

PRACTICE EXAM 19: ASE T6

SIMULATION

1. A technician is diagnosing a truck where the scan tool communicates with all modules except the body controller module. All other modules report normal communication with each other. The BCM controls the marker lights, which are currently inoperative. What should the technician check first?

- A. The BCM's dedicated fuse and power supply circuit, since a module that has lost power cannot communicate on the bus or drive any outputs
- B. The CAN bus backbone for a break between the BCM's connection point and the rest of the network
- C. The BCM's bus stub wire and connector for an open that isolates the module from the network
- D. The marker light circuit for a short-to-ground that has damaged the BCM's internal processor

2. A heavy-duty truck's battery load test is performed at 475 amps on a 950 CCA rated battery. At the end of 15 seconds, the voltage reads 9.8 volts. The ambient temperature is 50°F. What is the test result?

- A. The battery fails because 9.8 volts is below the 10.0-volt minimum at 50°F
- B. The test is invalid because the load should have been applied at 50% of CCA at 0°F, not at room temperature
- C. The battery passes — 9.8 volts exceeds the 9.4-volt minimum threshold at 50°F
- D. The battery is borderline and should be charged and retested before making a replacement decision

3. A commercial vehicle's right rear turn signal and right rear brake light are both inoperative on the tractor. The left side works normally. The hazard flashers illuminate all four corners including the right rear. What does the hazard test confirm?

- A. The right rear bulb filament has a selective fault that only responds to the hazard flasher's higher-frequency pulse
- B. The right rear bulb, socket, wiring, and ground are all functional — the hazard circuit proves the hardware can illuminate, so the fault is in the power delivery path used during normal turn signal and brake operation, most likely the multifunction switch or its dedicated right-side output wiring
- C. The hazard flasher module is providing higher voltage than the turn signal flasher, compensating for a marginal connection
- D. The right rear combination light has dual filaments with one responding only to the hazard circuit

4. A truck driver reports that the engine starts normally but the instrument cluster is completely blank — no gauges, no warning lights, no display. All other systems including headlights, wipers, and the engine itself operate normally. What should the technician check first?

- A. The CAN bus for a backbone break that isolates the cluster from all data sources
- B. The alternator for a voltage instability that causes the cluster to enter a protective shutdown
- C. The body controller module for a fault that has disabled the cluster output channel
- D. The instrument cluster's dedicated fuse, power supply wire, and ground connection — a complete cluster failure while all other systems work points to a power or ground fault specific to the cluster

5. Technician A says that when measuring the resistance of a wire, the DMM leads add their own resistance to the reading. Technician B says that on a very low-resistance measurement, the technician should short the leads together and subtract the lead resistance from the final reading. Who is correct?

- A. Technician A only
- B. Technician B only
- C. Both Technician A and Technician B
- D. Neither Technician A nor Technician B

6. A heavy-duty truck has four batteries in parallel. The technician discovers that three batteries are Group 31 rated at 950 CCA each, but the fourth battery is a Group 24 rated at 650 CCA. All four batteries are one year old. What concern does the mismatched battery create?

- A. The smaller Group 24 battery has higher internal resistance than the Group 31 units, creating an imbalance where it receives a disproportionate share of charging current and contributes less during cranking — it will age faster and degrade the overall bank performance
- B. The Group 24 battery will overcharge because it reaches full voltage faster than the larger batteries
- C. The mismatched battery has no negative effect as long as all four are 12-volt units in parallel
- D. The Group 24 battery will draw the other batteries down to its lower CCA level

7. A truck's electronic cruise control system engages and maintains set speed on flat terrain. On a long downhill grade, the truck accelerates 8 MPH above the set speed before gradually returning to the set point on level ground. What explains this behavior?

- A. A faulty vehicle speed sensor that underreports speed during downhill travel
- B. The cruise control module has a delayed response algorithm for downhill speed management
- C. A data bus communication delay between the speed sensor and the cruise module during rapid speed changes
- D. Standard cruise control systems can only reduce speed by closing the throttle — they cannot apply the service brakes, so gravity accelerates the truck faster than throttle reduction can compensate on steep grades

8. A commercial vehicle's scan tool retrieves a DTC from the ECM: "Coolant Level Sensor — Signal Implausible." The technician checks the coolant level and it is full. The sensor connector is clean and dry. What does "implausible" mean in this context?

- A. The sensor has an intermittent fault that only appears when the engine vibrates at a specific frequency
- B. The ECM has compared the coolant level sensor reading against other known parameters and determined the reading is not physically possible under the current operating conditions
- C. The sensor's resistance value has drifted outside the ECM's programmable range

D. The CAN bus is delivering corrupted data for the coolant level parameter

9. A truck's alternator charges at 14.2 volts during the first 30 minutes of operation. After the engine reaches full operating temperature, the charging voltage drops to 13.8 volts and remains there. Is this voltage decrease a fault?

A. Yes — the voltage should remain constant regardless of temperature if the regulator is functioning

B. Yes — the 0.4-volt drop indicates a developing stator winding fault that worsens with heat

C. No — many alternator voltage regulators include temperature compensation that intentionally reduces charging voltage as temperature increases, because warm batteries require less voltage to maintain full charge

D. No — but only if the battery bank voltage also decreases by the same 0.4 volts

10. A heavy-duty truck's starter solenoid clicks once when the key is turned to start. The headlights dim severely during the click. The batteries read 12.6 volts at rest. What does the severe headlight dimming during the click indicate?

A. Heavy current is flowing through the cranking circuit — the solenoid main contacts are closing and the starter motor is attempting to draw cranking amps, but a mechanical fault such as a seized engine, a locked starter, or a hydrolocked cylinder is preventing rotation and causing the massive current draw that collapses system voltage

B. The batteries have adequate voltage but insufficient CCA capacity to sustain the cranking current

C. The solenoid contacts are partially welded, creating a momentary short across the main terminals

D. The battery cables have excessive resistance that limits current flow and causes the voltage collapse

11. A commercial vehicle's left front headlight has been replaced with a new bulb of the correct part number. The beam pattern appears distorted — the cutoff line is ragged and the hot spot is off-center. The housing is not cracked or damaged. What is the most likely cause?

A. The headlight housing reflector has internal corrosion that distorts the beam pattern

B. The vehicle's electrical system is delivering inconsistent voltage that causes the filament to vibrate

- C. The headlight aiming mechanism is out of adjustment, projecting the beam at an incorrect angle
- D. The replacement bulb is not fully seated in the housing — the alignment tabs are not properly engaged with the locating slots, causing the filament to sit off the reflector's focal point

12. A truck's electronic instrument cluster displays all gauges at exactly mid-scale — temperature, oil pressure, fuel, and voltmeter all read at the center position simultaneously. The engine is running normally. What is the most likely cause?

- A. A CAN bus fault delivering identical default values for all gauge parameters
- B. The instrument cluster has lost its data bus input and is displaying default mid-scale values for all gauges because it has no actual data to process
- C. Four simultaneous sensor failures all producing identical mid-scale readings
- D. A voltage regulation fault inside the cluster delivering equal drive current to all stepper motors

13. A heavy-duty truck's scan tool shows the ECM receiving a boost pressure of 2 PSI at full throttle under load. The specification calls for 25 to 35 PSI. The turbocharger wastegate solenoid is commanded closed by the ECM. What should the technician check?

- A. The wastegate solenoid circuit — including the solenoid itself, its wiring, and its ground — to verify the ECM's electrical command is actually reaching and energizing the solenoid, since a non-functioning solenoid allows the wastegate to remain open and prevents boost pressure from building
- B. The boost pressure sensor for a calibration drift that underreports actual boost pressure
- C. The ECM for a software fault that is not commanding the wastegate correctly
- D. The intercooler for a restriction that prevents boost pressure from reaching the intake manifold

14. A truck's power window on the driver door moves up but does not move down. The motor is confirmed functional by bench testing in both directions. The window switch has been tested and passes in both directions. What should the technician check next?

- A. The window regulator for a mechanical bind that prevents downward travel

- B. The body controller module for a one-directional output fault on the driver window channel
- C. The wiring between the switch and the motor for an open on the down-direction wire — the switch passes bench testing, the motor works in both directions, so the fault must be in the delivery path between the switch and motor for that specific direction
- D. The window motor's internal thermal protection for a one-directional trip

15. A commercial vehicle's trailer tail lights flash rapidly when the headlight switch is first turned on, then settle to steady illumination after approximately three to five seconds. No other trailer circuits are affected. What is the most likely cause?

- A. A body controller module ramp-up feature that gradually increases trailer tail light voltage during initial activation
- B. A loose or corroded connection on the brown wire at the J560 connector that arcs during initial current flow, then establishes stable contact as the terminal heats and expands slightly under current
- C. A faulty headlight switch that sends pulsed output during its initial contact engagement
- D. An aftermarket LED trailer tail light assembly that flashes during its internal driver circuit initialization

16. A heavy-duty truck's scan tool shows the transmission control module receiving a valid throttle position signal and a valid vehicle speed signal. The transmission shifts from first to second normally but will not shift into third gear. No DTCs are stored. What should the technician investigate?

- A. The transmission fluid level and condition as a mechanical cause
- B. The vehicle speed sensor for a signal quality issue that the TCM accepts for first-to-second but rejects for the second-to-third calculation
- C. The ECM for a torque limitation strategy that prevents the upshift
- D. The third-gear shift solenoid and its electrical circuit for a fault that prevents the solenoid from engaging when commanded — an open solenoid winding, a wiring fault, or a failed TCM output driver for that specific solenoid channel

17. A truck driver reports the horn works intermittently. The technician tests the horn in the shop by pressing the horn button — it sounds every time. During a road test, the horn fails to sound on several attempts. What type of fault should the technician suspect?

- A. A clock spring or steering column connection that maintains contact in the shop but intermittently loses contact during steering wheel movement and driving vibration
- B. A temperature-sensitive horn relay that opens when the engine compartment reaches operating temperature
- C. A horn diaphragm that seizes intermittently when exposed to road airflow during driving
- D. A body controller module that disables horn output above certain vehicle speeds

18. A commercial vehicle's alternator produces 14.3 volts at 2,000 RPM with all loads off. With headlights, blower on high, and heated mirrors all activated, the voltage drops to 13.0 volts at 2,000 RPM. The alternator is rated at 160 amps. An amp clamp shows 155 amps output. What does this indicate?

- A. The voltage regulator has failed and cannot maintain output under load
- B. The alternator drive belt is slipping under the heavy electrical load
- C. The alternator is operating at near-maximum capacity — the heavy electrical load demands nearly all of the alternator's 160-amp rating, and the voltage sag to 13.0 volts reflects the regulator allowing output to drop as the alternator reaches its current limit
- D. The battery bank is weak and drawing excessive current from the alternator

19. A truck's right front marker light flickers when the engine is running but is steady with the engine off and the headlights powered by battery only. What does this engine-dependent behavior suggest?

- A. A charging system fault introducing AC ripple that modulates the marker light brightness
- B. An engine-speed-dependent vibration that causes an intermittent connection at the marker light socket or its wiring to make and break contact at the engine's running frequency
- C. A body controller module that reduces marker light output when the alternator is charging
- D. An alternator voltage fluctuation that is visible in the marker light but not in other circuits

20. A heavy-duty truck's battery disconnect switch has been turned off for storage. When the switch is turned back on two months later, the batteries read 11.2 volts. What does this voltage indicate?

- A. The batteries are permanently damaged from the two-month storage and must be replaced
- B. The disconnect switch has an internal leakage path that drained the batteries over two months
- C. The batteries were not fully charged before storage and self-discharge over two months reduced them further
- D. All lead-acid batteries self-discharge over time, and two months without charging has reduced the state of charge — the batteries should be slow-charged to full voltage and then tested for capacity before determining if they are still serviceable

21. A commercial vehicle's scan tool shows the ABS module has set a code for "Left Rear Wheel Speed Sensor — Erratic Signal." The code sets only during heavy braking, not during normal driving. What is the most likely cause?

- A. A failing ABS module processor that cannot handle the rapid calculations required during heavy braking
- B. A data bus overload during heavy braking that corrupts the wheel speed data
- C. Excessive wheel bearing play on the left rear that allows the reluctor ring to shift relative to the sensor during the forces of heavy braking, producing a momentary signal disruption
- D. A contaminated reluctor ring that only affects signal quality during rapid deceleration

22. A truck's electronic throttle pedal has been replaced. The engine starts and idles normally but does not respond to pedal input. The scan tool shows TPS 1 at 0.5 volts and TPS 2 at 4.5 volts at all pedal positions — the signals do not change. What is the most likely cause?

- A. The replacement pedal's connector is not fully seated — the reference voltage and ground pins are making contact (allowing the ECM to see the sensors' rest-position voltages) but the signal pins or the sensor's internal element is not engaged, preventing the signals from changing with pedal movement
- B. The ECM has entered a limp-home mode that ignores throttle input
- C. The replacement pedal is from the wrong vehicle and has an incompatible connector pinout

D. The ECM's throttle input circuit has failed and cannot read changing voltages

23. A heavy-duty truck's dome light works when the manual switch is turned on but does not activate when any door is opened. The door jamb switches have been tested individually and all function correctly. What should the technician check?

A. The dome light bulb for a selective filament fault that only responds to the manual switch voltage

B. The fuse for the dome light timer circuit

C. The body controller module for a configuration setting that disables the door-activated dome light function

D. The wiring between the door jamb switches and the dome light circuit or BCM input — all individual switches test good, but the common wire that carries the door-open signal from the switches to the control circuit may have an open

24. Technician A says that a truck's headlight relay should click audibly when the headlight switch is turned on. Technician B says that if the relay clicks but the headlights do not illuminate, the relay contacts may be burned or the wiring between the relay and the headlights may have an open. 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

25. A truck's fuel gauge reads empty immediately after the driver fills the tank. The technician disconnects the sending unit wire at the tank and grounds it to the chassis. The gauge reads full. The technician then disconnects the ground wire from the chassis and the gauge returns to empty. What have these two tests confirmed?

A. The gauge mechanism, the wiring between the cluster and the tank, and the cluster's response to resistance changes are all functional — the fault is in the fuel level sending unit itself

B. The instrument cluster fuel gauge stepper motor is faulty and responds only to direct ground input

- C. The wiring between the gauge and the sending unit has intermittent continuity
- D. The fuel tank ground strap has excessive resistance preventing the sending unit from operating

26. A commercial vehicle's right headlight dims noticeably when the trailer is connected and the headlight switch is on. Disconnecting the trailer restores full brightness. The left headlight is unaffected. What is the most likely cause?

- A. The trailer's combined lighting load exceeds the alternator's capacity when added to the right headlight circuit
- B. A body controller module that reduces right headlight output when trailer load is detected
- C. A ground fault in the trailer wiring that returns current through the right headlight circuit instead of the proper ground path, creating a parallel current path that steals voltage from the headlight
- D. The J560 connector has crossed pins that connect the trailer circuit to the right headlight feed

27. A truck's scan tool shows the ECM broadcasting engine oil temperature of 280°F during highway driving. The specification maximum is 250°F. The oil pressure is within normal range. What should the technician advise?

- A. No concern — some heavy-duty engines routinely operate at oil temperatures above 250°F during sustained highway driving
- B. The oil temperature sensor has likely drifted and is reading higher than actual temperature
- C. The oil pressure being normal confirms the oil is still protecting the engine despite the elevated temperature
- D. The elevated oil temperature exceeds the specification maximum and should be investigated — the oil cooler, coolant flow through the oil cooler, oil level, and oil condition should be checked to identify why the temperature is above the designed operating range

28. A heavy-duty truck's starter cranks the engine at normal speed on the first attempt. On the second attempt two minutes later, the starter cranks noticeably slower. On the third attempt one minute after that, the starter barely turns the engine. All cable connections are clean and tight. What is the most likely cause?

- A. The batteries are unable to recover between closely spaced cranking events — each successive start attempt depletes more stored energy than the alternator can replace in the brief interval between attempts, progressively reducing available cranking capacity
- B. The starter motor is overheating during rapid successive starts, increasing internal resistance
- C. The battery inter-connect cables are heating up and increasing resistance with each start attempt
- D. The alternator voltage regulator reduces output after the first start, preventing battery recharge

29. A commercial vehicle's scan tool retrieves a U-code from the instrument cluster indicating lost communication with the ECM. However, the ECM communicates normally with the TCM, ABS module, and the scan tool itself. What does this specific pattern suggest?

- A. The ECM has a failing bus transceiver that intermittently drops from the network
- B. The instrument cluster has a fault in its bus receiver that prevents it from recognizing the ECM's broadcast messages — the ECM is transmitting normally (proven by other modules receiving its data), but the cluster cannot process the ECM's specific message format or has a localized connection issue
- C. A CAN bus backbone fault between the ECM's connection point and the cluster's connection point
- D. The scan tool is masking the ECM's actual communication failure by providing cached data

30. A truck's left headlight and left turn signal both flicker in unison when driving over rough roads. No other lights on the left side are affected. Both circuits pass static testing in the shop. What single fault could cause both to flicker?

- A. Two separate intermittent faults in the left headlight and left turn signal wiring that coincidentally occur at the same time
- B. A failing multifunction switch that intermittently loses contact on both the headlight and turn signal outputs during vibration
- C. A loose or corroded ground connection at the left front light assembly that is shared by both the headlight and turn signal — vibration interrupts the shared ground, simultaneously affecting both circuits
- D. A body controller module that intermittently drops power to both left-front outputs under vibration

31. A heavy-duty truck's four batteries have been tested. Three pass the load test with voltages between 9.7 and 9.9 volts. The fourth holds 8.8 volts. All four show 12.6 volts at rest. What action should be taken?

- A. Recharge the fourth battery and retest since its open circuit voltage is adequate
- B. Replace the fourth battery because 8.8 volts is well below the 9.6-volt minimum threshold, and strongly consider replacing all four as a matched set to prevent the bank imbalance caused by mixing a new battery with three aging units
- C. Return all four to service and monitor the fourth battery at the next maintenance interval
- D. Replace only the fourth battery since the other three pass and the bank voltage will equalize

32. A truck's electronic parking brake applies when the switch is pressed but the driver reports the truck rolls backward slightly on a steep incline before the brake fully holds. What could cause the delayed full application?

- A. A faulty parking brake switch that sends a delayed signal to the control module
- B. A CAN bus communication delay between the parking brake switch and the air system controller
- C. Normal parking brake behavior on steep inclines where full spring force takes a moment to develop
- D. A restricted air exhaust line from the parking brake apply solenoid to the spring brake chambers — the restriction limits the rate at which air exhausts from the chambers, delaying full spring brake application

33. A commercial vehicle's windshield washer pump runs when the ignition is off and the washer button is pressed. On most vehicles, the washer should only operate with the ignition on. The pump was recently replaced. What is the most likely cause?

- A. A faulty ignition switch that allows accessory circuits to remain powered in the off position
- B. A body controller module fault that provides continuous power to the washer circuit
- C. The replacement washer pump was wired to a constant battery power source instead of a switched ignition feed — either by mistake during the repair or because the replacement used a different connector that was adapted to the wrong power source
- D. The washer switch has an internal short to battery that bypasses the ignition circuit

34. A truck's scan tool shows the ECM receiving a MAP sensor signal of 4.8 volts at idle. The specification for idle MAP on this turbocharged engine is 1.0 to 1.5 volts. What is the most likely cause?

- A. A disconnected MAP sensor or an open in the sensor's ground circuit — with no current path through the sensor element, the signal wire floats to near the 5-volt reference voltage
- B. The turbocharger is producing excessive boost at idle, raising manifold pressure
- C. The MAP sensor has failed with a fixed high-output that does not vary with pressure changes
- D. The ECM's 5-volt reference is overpowering the sensor's signal output

35. A heavy-duty truck's alternator has been producing a clicking noise from the engine compartment that increases in frequency with RPM. Charging output tests normal. What is the most likely source?

- A. A loose alternator mounting bolt that allows the housing to vibrate against the engine block at certain RPM frequencies
- B. A failing rectifier diode that arcs intermittently during each AC cycle
- C. A cracked rotor pole finger that flexes under the alternating magnetic force
- D. A worn alternator bearing with a damaged roller or ball that contacts a defect in the race with each revolution, producing a click that tracks with RPM

36. A commercial vehicle's left turn signal indicator on the instrument cluster flashes at the normal rate, but the exterior left turn signal lights flash at double the normal rate. No trailer is connected. What is the most likely cause?

- A. A multifunction switch with an internal fault that sends the indicator signal at one rate and the exterior signal at a different rate
- B. A burned-out left turn signal bulb on the tractor has reduced the exterior circuit load, causing the exterior flasher to increase its rate — the dash indicator operates on a separate circuit that is not affected by the reduced exterior load
- C. A body controller module software error that commands different flash rates for the indicator and exterior outputs

D. Two separate flasher modules — one for the indicator and one for the exterior — with different calibrations

37. A truck's electronic instrument cluster occasionally resets — the gauges sweep, the startup logo appears, and everything returns to normal within three seconds. This occurs randomly two to three times per day. What is the most likely cause?

A. A failing instrument cluster processor that overheats and triggers thermal protection resets

B. A data bus communication error that causes the cluster to lose synchronization with the ECM

C. An intermittent power supply or ground connection to the cluster that causes momentary power loss, forcing the module to restart its initialization sequence before power is restored

D. A body controller module that periodically sends a reset command to the cluster

38. A heavy-duty truck's battery specific gravity readings are: Cell 1: 1.265, Cell 2: 1.260, Cell 3: 1.110, Cell 4: 1.262, Cell 5: 1.258, Cell 6: 1.260. What do these readings indicate?

A. Cell 3 is defective — the 0.155 variation between Cell 1 and Cell 3 far exceeds the 0.050 maximum acceptable cell-to-cell variation, indicating an irreparable cell fault that requires battery replacement regardless of the five healthy cells

B. The battery has a uniform low charge and needs slow charging before retesting

C. Cell 3 has lower electrolyte level and needs distilled water added before retesting

D. The hydrometer is producing inaccurate readings and should be calibrated

39. A commercial vehicle's scan tool retrieves a DTC from the body controller module: "Trailer Marker Light Circuit — Short to Ground." No trailer is connected. The tractor's marker lights work normally. What does this code indicate?

A. A faulty BCM that generates false trailer codes when no trailer is present

B. The code is expected behavior — with no trailer connected, the open J560 connector presents an open circuit that some BCMs interpret as a fault

C. A CAN bus error generating phantom trailer codes during the module's self-test

D. A short-to-ground in the tractor's wiring between the BCM trailer marker output and the J560 connector — the wire has chafed against the frame or contacted a grounded surface, providing a current path to ground even without a trailer plugged in

40. A truck's right rear tail light glows at approximately half normal brightness. A DMM at the socket measures 12.0 volts on the power terminal. The ground terminal voltage drop test reads 2.8 volts between the socket ground and a known-good chassis ground. What does the 2.8-volt ground reading confirm?

A. The alternator output is insufficient to maintain voltage at the right rear fixture

B. The right rear tail light ground connection has excessive resistance — the 2.8-volt drop far exceeds the 0.3-volt maximum, consuming voltage that should be available to the bulb and reducing its brightness to approximately half

C. The power side has adequate voltage but the bulb is nearing end of life

D. The body controller module is commanding reduced brightness to the right rear output

41. A heavy-duty truck has a no-crank condition. The batteries read 12.65 volts. When the key is turned to start, there is no click from the solenoid and no cranking. The technician applies 12 volts directly to the solenoid S terminal with a jumper wire. The starter cranks the engine normally. What has this test confirmed?

A. The starter motor, solenoid, batteries, and main cables are all functional — the fault is in the control circuit upstream of the solenoid between the ignition switch and the S terminal

B. The solenoid pull-in winding requires more current than the normal control circuit provides

C. The starter relay is the only possible failed component

D. The batteries have adequate voltage but the solenoid is intermittently faulty

42. A commercial vehicle's scan tool shows the ECM commanding the cooling fan clutch engaged. The technician measures 12.3 volts at the fan clutch solenoid connector with the command active. The solenoid resistance tests within specification. The fan does not engage. What should the technician check next?

- A. The ECM's fan control output driver for a fault that shows the correct command but delivers insufficient current
- B. The fan clutch air supply pressure to verify adequate air is available to the clutch engagement mechanism
- C. The CAN bus for a communication delay between the ECM command and the solenoid response
- D. The fan clutch solenoid ground circuit — voltage is present at the power terminal and the solenoid tests good, so the missing element is the ground return path that completes the circuit and allows current to flow through the solenoid

43. A truck's headlights both dim simultaneously for one to two seconds while driving, then return to full brightness. The technician cannot reproduce the fault during stationary testing. What diagnostic approach is most appropriate?

- A. Replace both headlight relays since they may have intermittent contact resistance
- B. Connect a recording DMM or data logger to the headlight power feed and drive the vehicle under the conditions that reproduce the dimming, capturing the voltage dropout with a timestamp that correlates to driving conditions
- C. Perform a wiggle test on the headlight circuit connectors while the engine is running
- D. Check the alternator output for intermittent voltage drops during high-demand transitions

44. A heavy-duty truck's electronic engine brake activates at highway speed but does not activate below 25 MPH. The driver expects it to work at all speeds. No DTCs are stored. What is the most likely explanation?

- A. A failing exhaust brake solenoid that cannot energize below a certain voltage threshold
- B. A wiring fault that reduces voltage to the engine brake solenoid at lower speeds
- C. The engine brake system is programmed with a minimum activation speed threshold — below 25 MPH, the ECM does not command the engine brake to prevent driveline shock or tire chirp at low vehicle speeds
- D. The vehicle speed sensor produces an inaccurate signal at low speeds that the engine brake module rejects

45. Technician A says that a truck's power window circuit uses a reversible motor that changes direction based on the polarity of the voltage applied by the window switch. Technician B says that reversing the two motor feed wires at the connector would cause the window to operate in the opposite direction from what the switch commands. 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

46. A truck's instrument cluster tachometer reads zero RPM while the engine is running smoothly at approximately 1,800 RPM. The speedometer, temperature gauge, fuel gauge, and all warning lights function correctly. The scan tool shows the ECM broadcasting the correct RPM value on the J1939 bus. What is the most likely cause?

- A. A crankshaft position sensor fault producing a signal the ECM can read but the cluster cannot display
- B. A CAN bus message filter error that blocks the RPM parameter from reaching the cluster
- C. A failing ECM that broadcasts RPM data to the scan tool but not to the J1939 bus
- D. The instrument cluster's tachometer stepper motor or its internal driver circuit has failed while all other cluster functions continue operating normally

47. A commercial vehicle's power door locks cycle once — lock then unlock — every time the driver opens the door. The locks work normally from the switches and key fob at all other times. What is the most likely cause?

- A. A faulty door lock actuator that sends a feedback signal each time the door latch releases
- B. A programmed vehicle feature where the BCM commands a lock/unlock cycle when a door opening is detected — either as a designed convenience function or as a result of a BCM configuration parameter
- C. A wiring fault between the door jamb switch and the lock relay that triggers a lock cycle during each door event
- D. A body controller module firmware error that links the door-open input to the lock output

48. A heavy-duty truck's alternator drive belt squeals for approximately five seconds during cold morning starts but is silent after the engine warms up. The belt is new and properly tensioned. What is the most likely cause?

- A. A failing alternator front bearing that produces noise until lubricant distributes
- B. A misaligned pulley that only contacts the belt improperly when cold
- C. Moisture or frost condensation on the belt surface that reduces friction between the belt and pulleys until engine heat and belt friction dry the moisture and restore normal grip
- D. The belt compound hardens in cold temperatures and requires warming before it becomes flexible enough to grip the pulleys

49. A truck's scan tool shows the body controller module commanding the left rear clearance light output at 100% duty cycle. The BCM output pin measures a steady 12.2 volts. The left rear clearance light is completely dark. What should the technician check?

- A. The wiring between the BCM output pin and the left rear clearance light fixture for an open — the BCM is delivering voltage at its output, but the power is not reaching the light, indicating a broken wire, disconnected connector, or blown inline fuse between the BCM and the fixture
- B. The BCM's internal output driver for a fault that shows voltage at the pin but cannot sustain current under load
- C. The left rear clearance light ground connection for an open that prevents current flow
- D. The left rear clearance light bulb for a burned-out filament

50. A fleet of trucks has a recurring problem where the electronic logging devices lose communication with the J1939 bus during cold weather starts. Communication restores within five minutes of engine operation. The ELDs work flawlessly in warm weather. What is the most likely cause?

A. The ELD firmware has a cold-start initialization bug that delays bus communication until the module warms up internally

B. Cold-weather cranking draws battery voltage below the ELD's minimum operating threshold, causing the device to reset and require reinitialization after the engine starts and voltage stabilizes

C. The engine ECM delays its J1939 bus communication during cold-start glow plug cycles, preventing the ELD from connecting

D. Thermal contraction of the nine-pin diagnostic connector pins during cold temperatures reduces contact pressure with the ELD plug, creating intermittent contact that improves as engine heat warms the connector

PRACTICE EXAM 19: ANSWER KEY

1. A — A module that cannot communicate on the bus and has no functional outputs has likely lost power entirely. The BCM's dedicated fuse, power supply wire, and ground connection should be checked first because a module without power cannot initialize its processor, connect to the bus, or drive any outputs. Verifying power before investigating bus connections follows the most-upstream-first diagnostic principle.
2. C — The minimum acceptable voltage during a load test decreases as ambient temperature decreases because cold batteries have higher internal resistance. At 50°F, the minimum threshold is approximately 9.4 volts. The battery reading 9.8 volts at the end of 15 seconds exceeds the 9.4-volt minimum, confirming the battery passes the load test under these temperature conditions.
3. B — The hazard flashers illuminating all four corners — including the right rear — proves the right rear bulb, socket, wiring, and ground are all capable of carrying current and producing light. The hazard circuit bypasses the multifunction switch and the brake switch path, powering both sides through the hazard flasher directly. The fault must be in the power delivery path used during normal turn/brake operation — most likely the multifunction switch's right-side output contact or its dedicated wiring.
4. D — All other electrical systems functioning normally confirms the battery, alternator, fuse panel, and main power distribution are healthy. A completely blank instrument cluster — no gauges, no warning lights, no display — while everything else works points to a power supply or ground fault specific to the cluster itself. The cluster's dedicated fuse, power feed wire, and ground connection are the most likely failure points.
5. C — Both technicians are correct. DMM test leads have a small inherent resistance — typically 0.1 to 0.3 ohms — that adds to any measurement. On high-resistance measurements this is negligible, but when measuring very low resistance values such as wire or connection resistance, the lead resistance becomes a significant percentage of the reading. Shorting the leads together and subtracting that value provides the most accurate measurement.
6. A — A Group 24 battery has a smaller plate surface area and higher internal resistance than the Group 31 units it shares the bank with. In a parallel configuration, the mismatched internal resistance causes uneven current sharing — the smaller battery receives disproportionate charging current relative to its capacity and contributes less during cranking. This accelerates the Group 24's aging and degrades the overall bank performance.
7. D — Standard cruise control systems can only reduce speed by closing the throttle — they have no ability to apply the service brakes or engage an engine brake. On a steep downhill grade, gravitational acceleration pushes the truck faster than throttle reduction alone can compensate. The 8 MPH

overshoot occurs because the truck gains speed from gravity faster than the closed throttle can slow it, and speed normalizes when the grade levels out.

8. B — "Signal implausible" is a rationality check where the ECM compares the sensor reading against what is physically reasonable given other known conditions. The coolant level sensor may be reporting empty or an out-of-range value despite the coolant being verified as full. The ECM determines the reading is not consistent with other operating parameters and flags the data as physically impossible under current conditions.
9. C — Many modern alternator voltage regulators include a temperature compensation function that intentionally reduces the charging voltage set point as temperature increases. Warm batteries reach full charge at a lower voltage than cold batteries, so the regulator reduces output to prevent overcharging. The drop from 14.2 to 13.8 volts after warmup is the designed thermal compensation response, not a fault.
10. A — The headlights dimming severely during the solenoid click proves massive current is flowing through the cranking circuit — the voltage collapse is caused by the enormous current draw pulling system voltage down. The solenoid contacts are closing and attempting to deliver cranking amps to the motor, but a mechanical obstruction — seized engine, locked starter, or hydrolocked cylinder — prevents rotation while the motor draws maximum stall current.
11. D — The housing is undamaged and the bulb is the correct part number, but the beam pattern shows a ragged cutoff and 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 displacement produces a noticeable distortion in the focused beam pattern.
12. B — All four gauges simultaneously displaying mid-scale readings while the engine runs normally is not a coincidence — it indicates the cluster has lost its data source and is displaying default values. When the instrument cluster cannot receive actual data from the J1939 bus, many cluster designs default all gauges to a mid-scale position rather than pegging them at zero or maximum, signaling to the technician that no live data is being processed.
13. A — The ECM commanding the wastegate solenoid closed should energize the solenoid, close the wastegate, and allow boost pressure to build. With only 2 PSI at full throttle, the wastegate appears to remain open. The solenoid, its wiring, and its ground must be verified to confirm the ECM's electrical command actually reaches and energizes the solenoid — a non-functioning solenoid allows the wastegate to stay open regardless of the ECM's command.
14. C — The motor works in both directions on the bench and the switch passes testing in both directions, eliminating both components. The fault must be in the delivery path between the switch and the motor. The down-direction wire — which carries the reversed-polarity signal for downward travel — has an open somewhere between the switch output and the motor input, preventing the down command from reaching the motor.

15. B — The trailer tail lights flashing during initial activation then settling to steady illumination indicates a connection that is unstable during initial current flow but stabilizes as it heats. A loose or corroded brown wire pin at the J560 connector arcs briefly when current begins flowing, producing the rapid flashing. As the terminal heats from the current, thermal expansion tightens the contact and steady illumination resumes.
16. D — The TCM receiving valid throttle and speed signals and successfully commanding the first-to-second shift proves the module's inputs and processing are functional. The transmission not shifting into third specifically isolates the fault to the third-gear shift solenoid circuit. An open solenoid winding, a wiring fault to that solenoid, or a failed TCM output driver for that specific channel prevents the solenoid from engaging when commanded.
17. A — A horn that works every time in the shop but fails intermittently during driving suggests a connection that is stable under static conditions but fails under the dynamic conditions of driving. The clock spring maintains electrical connections between the rotating steering wheel and the stationary vehicle harness — a worn or damaged conductor that loses contact during steering movement or driving vibration produces exactly this pattern.
18. C — The alternator producing 155 amps against its 160-amp rating is operating at 97% of maximum capacity. At this near-maximum output, the voltage regulator allows a controlled voltage sag to 13.0 volts because the alternator physically cannot produce more current at the present field excitation and speed. The heavy electrical load demands nearly all available output, leaving minimal reserve for battery charging.
19. B — The marker light flickering only with the engine running but being steady on battery power alone eliminates electrical noise and voltage fluctuation as causes — the battery provides steady DC without the alternator's influence. The engine's vibration creates a physical disturbance that causes an intermittent connection at the marker light socket, its bulb base, or a wiring connector to make and break contact at the engine's running frequency.
20. D — All lead-acid batteries self-discharge over time through internal chemical reactions, even with no external load connected. The rate varies by temperature and battery condition, but two months without charging will reduce any lead-acid battery's state of charge significantly. The batteries should be slow-charged to full voltage, allowed to rest, and then tested for capacity to determine if they are still serviceable after the extended storage period.
21. C — The code setting only during heavy braking — not during normal driving — indicates the fault is triggered by the physical forces specific to hard deceleration. Excessive wheel bearing play allows the hub and reluctor ring to shift relative to the sensor under the forward weight transfer forces of heavy braking. This momentary displacement moves the reluctor ring out of the sensor's optimal detection range, producing the erratic signal.
22. A — The scan tool showing both TPS signals at their correct rest-position voltages (0.5V and 4.5V) but not changing with pedal movement indicates the ECM can see the sensors' default state but

receives no varying input. The most likely cause is a connector that is partially seated — the reference voltage and ground pins make contact (powering the sensors to their rest positions) but the signal pins or the internal sensor element are not fully engaged.

23. D — All individual door jamb switches testing good eliminates the switches themselves. The manual switch working proves the dome light bulb, power feed, and ground are functional. The common element between all door switches is the wire that carries their combined door-open signal to the dome light control circuit or BCM input. An open in this shared signal wire prevents any door switch from triggering the dome light despite each switch functioning individually.
24. B — Both technicians are correct. Technician A accurately states that a functional relay should click audibly when its coil is energized by the headlight switch. Technician B correctly identifies the two most common causes of no-light-despite-a-click: burned relay contacts that click but don't close or pass current, and an open in the wiring between the relay output and the headlights that prevents power from reaching the bulbs.
25. A — Grounding the sending unit wire produced a full reading, confirming the gauge mechanism responds correctly and the wire between the cluster and tank has continuity. Removing the ground returned the gauge to empty, confirming the gauge responds to resistance changes. The gauge and wiring are proven functional through both tests. The only remaining component — the fuel level sending unit — is the source of the fault.
26. C — The right headlight working normally without the trailer and dimming only when the trailer is connected isolates the fault to the trailer's influence on the right headlight circuit. A ground fault in the trailer wiring creates an alternate current return path through the right headlight circuit. Trailer current that should return through the J560 ground pin instead paths through the headlight circuit, creating a voltage drop that dims the headlight.
27. D — Engine oil temperature of 280°F exceeds the 250°F specification maximum. Even though oil pressure is currently within normal range, sustained operation above the designed temperature limit accelerates oil breakdown, reduces lubricant effectiveness, and increases wear on bearings and other lubricated surfaces. The oil cooler system, coolant flow, oil level, and oil condition should be investigated to identify the cause.
28. A — Each cranking event draws hundreds of amps from the battery bank. With only one to two minutes between attempts, the alternator cannot replace the energy consumed during each cranking event. Each successive attempt starts from a lower state of charge than the previous one, delivering less voltage and current to the starter. The progressively slower cranking is caused by cumulative energy depletion without adequate recharge time.
29. B — The ECM communicating normally with the TCM, ABS, and scan tool proves it is broadcasting on the bus with a healthy transceiver. The cluster being the only module reporting lost ECM communication suggests the fault is specific to the cluster's ability to receive or process the ECM's

messages. A localized bus connection issue at the cluster, a configuration mismatch, or a failing cluster bus receiver explains the isolated communication failure.

30. C — Both the headlight and turn signal sharing the same combination light housing means both functions rely on the same ground connection at that fixture. A loose or corroded ground stud, a deteriorated ground strap, or a corroded housing-to-body contact intermittently breaks under vibration, simultaneously affecting every circuit that returns current through that ground point and producing the unified flickering.
31. B — The fourth battery at 8.8 volts has clearly failed the load test — well below the 9.6-volt minimum. Despite showing 12.6 volts at rest, its internal plate capacity has severely deteriorated. The other three pass but are aging units. Replacing only the failed battery creates a bank imbalance where the new unit compensates for the aging partners. Replacing all four as a matched set ensures balanced performance.
32. D — The parking brake applies by exhausting air from the spring brake chambers, allowing the powerful springs to push the brake shoes against the drums. A restricted air exhaust line between the apply solenoid and the chambers limits the flow rate of air leaving the chambers. The springs cannot fully compress the air fast enough through the restriction, causing a delayed application that allows the truck to roll briefly before full brake force develops.
33. C — The washer pump operating with the ignition off means it is connected to a power source that is always hot rather than a switched ignition feed. Since the pump was recently replaced, the most likely cause is an installation error — the replacement pump's power wire was connected to a constant battery feed instead of the switched ignition source, or the replacement used a different connector that was adapted to the wrong power terminal.
34. A — A MAP sensor reading 4.8 volts at idle — where normal manifold vacuum should produce approximately 1.0 to 1.5 volts — indicates the signal wire is floating near the 5-volt reference voltage. This occurs when the sensor is disconnected or when the sensor's ground circuit is open, because no current can flow through the sensor element and the ECM's reference voltage pull-up drives the signal line high.
35. D — All charging output parameters testing within specification eliminates electrical faults as the noise source. A rhythmic clicking that tracks with RPM from inside the alternator is characteristic of a mechanical bearing defect. A damaged roller or ball contacts a pit or spall in the bearing race once per revolution, producing a click at a frequency that increases proportionally with alternator rotational speed.
36. B — The dash indicator and exterior turn signals operating on separate circuits with different current monitoring characteristics explains the rate difference. A burned-out bulb on the left side reduces the exterior circuit's current draw, causing the exterior flasher to increase its rate as a burned-bulb alert. The dash indicator circuit operates independently and is not affected by the reduced exterior load, continuing to flash at the normal rate.

37. C — The cluster performing its full initialization sequence — gauge sweep and startup logo — confirms it is going through a complete power-on restart. This proves the module is losing power momentarily and rebooting. An intermittent power supply or ground connection specific to the cluster causes the brief power dropout. All other systems operating normally confirms the fault is in the cluster's dedicated power or ground circuit.
38. A — Five cells reading between 1.258 and 1.265 confirm those cells are fully charged and healthy. Cell 3 reading 1.110 is dramatically lower — the variation of 0.155 between the highest and lowest cells far exceeds the 0.050 maximum acceptable threshold. This single defective cell represents an irreparable internal failure that compromises the entire battery regardless of the five healthy cells.
39. D — No trailer is connected, so the code cannot be caused by trailer-side wiring. However, the tractor's wiring between the BCM trailer marker output and the J560 connector remains part of the tractor's electrical system. If this wire has chafed against the frame or contacted a grounded surface, it provides a current path to ground even without a trailer plugged in, triggering the short-to-ground detection.
40. B — Measuring 2.8 volts between the socket ground terminal and a known-good chassis ground reveals the ground path has severe resistance. A good ground should read near 0 volts in this test. The 2.8-volt drop far exceeds the 0.3-volt maximum, consuming voltage that should be available to drive the bulb at full brightness. Repairing the ground connection restores the full voltage differential across the bulb.
41. A — Jumping 12 volts directly to the solenoid S terminal bypasses the entire control circuit. The starter cranking normally proves the solenoid, starter motor, batteries, and main cables are all functional. The fault is confirmed to be upstream of the solenoid — in the control circuit that normally delivers voltage to the S terminal through the ignition switch, safety switches, and starter relay.
42. D — The ECM commands the fan clutch on (confirmed by scan tool), voltage of 12.3 volts is present at the solenoid connector (confirms power delivery), and the solenoid resistance tests within specification (confirms the solenoid element is healthy). With power at the terminal and a good solenoid, the missing element is the ground return path. An open ground prevents current from flowing through the solenoid to complete the circuit.
43. B — Both headlights dimming simultaneously for one to two seconds during driving — with no reproducibility during stationary testing — requires real-world data capture. A recording DMM or data logger connected to the headlight power feed captures the voltage dropout event with a timestamp, duration, and correlation to driving conditions, providing the diagnostic evidence needed to identify whether the fault is in the power feed, relay, or a shared connection.
44. C — Many engine brake systems are programmed with a minimum vehicle speed and/or minimum engine RPM threshold below which the brake will not activate. This is a designed safety feature that prevents engine brake engagement at low speeds where it could cause driveline shock, tire chirp, or uncomfortable deceleration. The system receiving valid speed data and having no DTCs confirms it is operating as programmed.

45. A — Both technicians are correct. Technician A correctly describes how reversible window motors work — the switch applies voltage to the motor in one polarity for up and reversed polarity for down, changing the motor's rotational direction. Technician B correctly identifies that swapping the two motor feed wires reverses the polarity relationship, causing the motor to run in the opposite direction from what the switch commands.
46. D — The scan tool confirming the ECM broadcasts the correct RPM on the J1939 bus eliminates the crankshaft position sensor, the ECM, and the bus communication as causes. All other cluster functions operating correctly eliminates cluster power supply and ground faults. The tachometer reading zero despite valid bus data isolates the fault to the cluster's tachometer stepper motor or its internal driver circuit.
47. B — The locks cycling once during each door opening — consistently and predictably — is characteristic of a programmed BCM function. Many commercial vehicles include automatic lock cycling features triggered by door events as convenience or security functions. A BCM configuration parameter controls this behavior, and it may have been enabled during a software update, module replacement, or configuration change.
48. C — A new, properly tensioned belt squealing only during cold morning starts and becoming silent after warmup is the classic signature of surface moisture. Morning dew, frost, or condensation on the belt surface reduces the friction coefficient between the belt and pulleys. Within a few seconds of operation, engine heat and belt friction evaporate the moisture, restoring normal grip and eliminating the squeal.
49. A — The BCM output pin delivering a steady 12.2 volts confirms the module is providing power. The light being completely dark despite voltage at the BCM output means the power is not reaching the fixture. An open in the wiring between the BCM output and the light — a broken wire, a disconnected connector, or a blown inline fuse in the delivery path — prevents voltage from traveling from the BCM to the clearance light.
50. D — The ELD communication loss occurring only during cold weather starts and restoring within five minutes of engine operation is a classic thermal contraction pattern. Cold temperatures cause the metal pins in the nine-pin diagnostic connector to contract slightly, reducing contact pressure with the ELD plug. As engine heat warms the cab and the connector, thermal expansion restores solid contact and communication resumes.