

PRACTICE EXAM 4: ASE T6

SIMULATION

1. A technician uses the half-split diagnostic method to locate an open circuit in a trailer lighting harness that runs approximately 40 feet from the cab to the rear of the trailer. Where should the first test be performed?

- A. At the headlight switch output terminal inside the cab fuse panel
- B. At the midpoint of the harness, approximately 20 feet from the cab, such as the frame rail junction box
- C. At the rearmost light fixture on the trailer where the symptom is observed
- D. At the SAE J560 trailer connector plug where the tractor and trailer connect

2. A heavy-duty truck battery reads 12.45 volts after surface charge removal. The technician performs a capacitance test and the tester reports the battery at 62% of its rated CCA. What action should be taken?

- A. Recharge the battery and retest because the low state of charge may affect capacitance test accuracy
- B. Return the battery to service because 62% CCA capacity is adequate for normal operation
- C. Perform an additional load test to confirm the capacitance tester's findings before replacement
- D. Replace the battery because it has fallen below the 70% CCA threshold indicating insufficient capacity

3. A technician is diagnosing a circuit that has both a 10-amp fuse and a 20-amp circuit breaker protecting different branches. The 10-amp fuse blows repeatedly, but the 20-amp circuit breaker never trips. What does this tell the technician about the fault location?

- A. The fault is in the branch protected by the 10-amp fuse, not in the branch protected by the circuit breaker
- B. The circuit breaker is defective and should be replaced with a fuse for proper protection

- C. Both branches have the same fault but the circuit breaker resets before the technician notices
- D. The 10-amp fuse is undersized for its branch and should be replaced with a 20-amp fuse

4. Technician A says that when testing a diode with a DMM's diode test function, a good diode shows approximately 0.5 to 0.7 volts in the forward direction. Technician B says a good diode shows OL (over limit) in the reverse direction. 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

5. A commercial vehicle's power steering pressure sensor sends a varying voltage signal to the engine ECM. The ECM uses this signal to increase engine idle speed when the steering wheel is turned to full lock. The driver reports that idle speed no longer increases during tight turns. The scan tool shows the pressure sensor reading zero at all times. What should the technician check first?

- A. The power steering pump output pressure using a mechanical gauge to verify actual pressure
- B. The ECM idle control strategy by reprogramming the module with updated software
- C. The sensor's reference voltage, signal voltage, and ground circuit at the sensor connector
- D. The power steering fluid level and condition for contamination affecting sensor function

6. A truck's fuel gauge reads approximately one-quarter tank, but the driver states the tank was filled completely two hours ago and only 30 miles have been driven. The technician grounds the sending unit signal wire at the tank connector and the gauge reads full. What is the confirmed diagnosis?

- A. The instrument cluster module requires recalibration for the correct fuel tank size
- B. The fuel level sending unit is defective — likely a stuck float or a contaminated resistor element
- C. The wire between the instrument cluster and the fuel tank has excessive resistance

D. The fuel gauge mechanism inside the cluster has a faulty stepper motor

7. A fleet of trucks has experienced repeated alternator failures at approximately 18-month intervals. The alternators test within specification when new but fail prematurely under normal operating conditions. Investigation reveals that the alternator output cables show signs of heat discoloration at the B+ terminal connection. What is the most likely root cause?

A. Defective replacement alternators from the parts supplier with substandard internal components

B. An overloaded electrical system exceeding alternator capacity by more than 20% continuously

C. Excessive engine bay temperatures degrading the alternator's internal components prematurely

D. A high-resistance connection at the B+ output terminal generating heat that damages the alternator over time

8. A technician is testing a truck's CAN bus with the ignition on and engine off. The DMM reads a steady 2.5 volts on CAN_H and a steady 2.5 volts on CAN_L with no fluctuation on either wire. What does this indicate?

A. Normal CAN bus operation with all modules in a low-communication idle state

B. A properly functioning bus in recessive state with no module actively transmitting data

C. A bus communication failure — with the ignition on, modules should be transmitting and causing voltage fluctuations between recessive and dominant states

D. Normal CAN bus behavior because modules only begin communicating after the engine starts

9. A truck's electric horn produces a continuous buzzing sound instead of its normal tone when the horn button is pressed. Battery voltage is 12.6 volts and the horn relay tests good. What is the most likely cause?

A. A failing horn with a cracked diaphragm or weakened internal electromagnetic coil

B. Excessive resistance in the horn power feed wire reducing current to the horn

C. A voltage regulator fault causing pulsating voltage output from the alternator

D. A faulty horn relay coil that vibrates rather than holding the contacts firmly closed

10. A commercial vehicle has a charging system that tests normal at 2,000 RPM but produces only 12.1 volts at idle speed with the headlights and blower motor on. When the electrical loads are turned off, idle voltage rises to 13.8 volts. What is the most likely cause?

- A. A failed voltage regulator that cannot increase field current in response to heavy loads
- B. A shorted stator winding reducing the alternator's maximum current capacity at all speeds
- C. Corroded battery terminals that restrict current flow only when high loads are present
- D. An alternator that cannot produce sufficient output at idle speed to meet the combined electrical demand

11. A medium/heavy truck has an intermittent starting problem. The driver reports that turning the key to the start position sometimes results in a single click from the solenoid with no cranking, but trying again immediately works. Batteries and cables test good. What is the most likely cause?

- A. A starter motor with worn brushes that occasionally lose contact with the commutator
- B. A starter solenoid with a worn contact disc that intermittently fails to bridge the main terminals
- C. A faulty ignition switch that drops out of the start detent before the solenoid fully engages
- D. A cracked flywheel ring gear that occasionally presents a gap to the starter pinion

12. A truck's tail lights remain on at all times, even with the headlight switch in the off position and the ignition key removed. The brake pedal is not depressed. What is the most likely cause?

- A. A failed body controller module that has defaulted to a lights-on safety mode
- B. A faulty headlight switch with internally fused contacts on the tail light circuit
- C. A misadjusted or failed brake light switch that is being held in the closed position
- D. A short-to-power in the tail light circuit from an adjacent always-hot wire

13. A technician is diagnosing a truck where the voltmeter gauge on the dash consistently reads 11.5 volts while driving. The engine is running and all accessories are off. A DMM connected directly to the battery reads 14.2 volts. What is the most likely cause of the discrepancy?

- A. A faulty DMM that is producing an inaccurately high battery voltage reading
- B. Normal operation because dash voltmeters are less accurate than handheld DMMs
- C. An overcharging alternator that the dash gauge is correctly identifying as abnormal
- D. Excessive voltage drop in the circuit between the battery and the voltmeter gauge's sense wire

14. A truck driver states that after driving through standing water, several electrical systems began operating erratically — the wipers activated on their own, interior lights flickered, and the horn sounded briefly. All symptoms cleared after approximately 30 minutes of driving. What is the most probable explanation?

- A. Water intrusion into one or more wiring connectors caused temporary short circuits that resolved as heat from normal operation dried the moisture
- B. The alternator ingested water through its cooling vents, causing internal arcing
- C. The body controller module was submerged and permanently damaged its internal circuitry
- D. Water contaminated the battery electrolyte through the vent caps, temporarily altering system voltage

15. All of the following conditions would cause a heavy-duty truck's starter to crank the engine more slowly than normal EXCEPT:

- A. Batteries at 50% state of charge with open circuit voltage of 12.2 volts
- B. An open in the starter control circuit between the ignition switch and the starter relay
- C. A 1.5-volt drop measured on the battery positive cable during cranking
- D. Engine oil viscosity that is too thick for the current ambient temperature

16. A truck has a 12-volt circuit powering four marker lights wired in parallel. Each bulb draws 1 amp. The circuit is protected by a 5-amp fuse. One bulb develops an internal short that reduces its resistance to nearly zero. What happens when the circuit is energized?

- A. Only the shorted bulb fails while the other three continue to operate at normal brightness
- B. All four lights illuminate at increased brightness due to the reduced total circuit resistance
- C. The fuse blows because the shorted bulb draws excessive current far exceeding the fuse rating
- D. The shorted bulb glows brighter while the other three dim significantly

17. Technician A says that a parasitic draw test should be performed immediately after turning off the ignition and closing all doors. Technician B says that electronic modules may need 20 to 45 minutes to enter sleep mode before an accurate parasitic draw reading can be taken. Who is correct?

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

18. A truck is equipped with dual alternators. Alternator 1 produces 14.3 volts and 150 amps under full load. Alternator 2 produces 14.3 volts but only 80 amps under the same conditions. Both are rated at 160 amps. What is the most likely cause of Alternator 2's reduced output?

- A. A failed voltage regulator in Alternator 2 limiting field current below normal levels
- B. A slipping drive belt on Alternator 2 reducing rotational speed under heavy load
- C. A corroded output cable connection on Alternator 2 that is not visible during external inspection
- D. An internal fault in Alternator 2, such as an open stator phase or failed diode, reducing its maximum capacity

19. A commercial vehicle's scan tool retrieves a DTC with an SPN indicating the coolant temperature sensor circuit and an FMI of 3. In the J1939 standard, FMI 3 indicates "voltage above normal." What does this code mean?

- A. The coolant temperature is above the safe operating range and the engine is overheating
- B. The voltage on the coolant temperature sensor circuit is higher than the expected range, indicating an open sensor circuit or disconnected sensor
- C. The coolant temperature sensor itself has an internal fault generating excessive voltage
- D. The sensor reference voltage from the ECM is set too high and needs recalibration

20. A technician discovers that a truck's left rear combination light housing has moisture inside the lens. The bulbs are functional but the contacts and socket show green corrosion. The left rear lights have been intermittent. What should the technician do?

- A. Replace only the corroded bulb sockets since the bulbs test good and the wiring appears intact
- B. Clean the corrosion from the sockets, replace the housing seal, and investigate the source of moisture entry
- C. Apply dielectric grease to all socket contacts and reinstall the existing housing
- D. Replace the entire light assembly and all associated bulbs regardless of individual test results

21. A truck's tractor-mounted ABS module communicates normally with all other modules on the J1939 bus, but the trailer ABS module shows no communication. The trailer ABS warning light on the dash is illuminated. What should the technician check first?

- A. The trailer ABS module's internal processor for firmware corruption
- B. The tractor's ABS module configuration for trailer detection settings
- C. The blue wire in the SAE J560 seven-pin trailer connector, which carries the ABS/auxiliary power circuit to the trailer
- D. The CAN bus backbone termination resistors for proper 60-ohm total resistance

22. A driver complains that the truck's instrument cluster backlighting is much dimmer than normal. All gauges read correctly and all warning lights function. The dash dimmer control is set to maximum brightness. What is the most likely cause?

- A. Excessive voltage drop in the power feed or ground circuit for the cluster backlight LEDs
- B. A failed instrument cluster processor that has reduced backlight PWM duty cycle
- C. A data bus command from the body controller reducing brightness based on ambient light sensor input
- D. A failing alternator that cannot maintain adequate voltage for the backlight circuit

23. A heavy-duty truck's cranking speed is normal, but the engine fails to start. The technician notices that the batteries are consistently at 12.8 to 13.0 volts when the truck returns from routes, suggesting the charging system is functioning. However, after sitting overnight, the batteries read 11.9 volts. What condition does this pattern suggest?

- A. An alternator with an open diode that reduces maximum output during driving
- B. A failed voltage regulator that charges only intermittently during driving
- C. Battery cables that develop high resistance only after the engine cools overnight
- D. Excessive parasitic draw draining the batteries from 13.0 volts to 11.9 volts during the overnight period

24. A truck's left headlight produces a noticeably yellowed, dim beam compared to the right headlight, which is bright and white. Both headlights are the same part number and were installed at the same time. What is the most likely cause?

- A. A faulty dimmer switch that sends reduced voltage to the left headlight circuit only
- B. An electrical fault in the left headlight circuit causing the bulb to operate at reduced wattage
- C. The left headlight bulb is nearing end of life — tungsten deposits on the inner glass darken the light output
- D. A failed body controller module delivering pulsed rather than continuous power to the left headlight

25. A technician replaces a truck's engine control module. After installation, the engine starts but the speedometer reads incorrectly, the cruise control does not function, and the transmission shift points are wrong. What is the most likely cause of all three symptoms?

- A. The replacement ECM has not been programmed with the correct vehicle parameters including tire size, axle ratio, and speed signal calibration
- B. A CAN bus communication fault caused by the new ECM not being compatible with the existing bus protocol
- C. The replacement ECM has a defective internal processor that is corrupting outgoing data
- D. The old ECM's security code was not transferred to the new module before installation

26. A technician measures the current draw of a truck's HVAC blower motor at each speed setting. The readings are: Low — 5 amps, Medium — 9 amps, High — 16 amps. These readings match the manufacturer's specifications. The technician then notices that the blower motor runs noticeably slower than expected on each setting despite drawing correct current. What is the most likely cause?

- A. A failing blower motor with worn bearings creating mechanical drag that converts electrical energy into heat instead of airflow
- B. A blower motor with worn brushes that are increasing the motor's internal resistance
- C. An undersized fuse restricting current flow to the motor despite correct ammeter readings
- D. A partially blocked evaporator core reducing airflow through the HVAC ductwork, making the motor sound slower

27. A fleet technician discovers that a truck's alternator charges correctly for the first 30 minutes of operation, then the charge indicator light begins flickering and system voltage drops to 12.8 volts. After the engine cools for an hour, the alternator charges correctly again. What is the most likely cause?

- A. A slipping drive belt that glazes as it heats up, losing grip at operating temperature
- B. A weak battery that becomes saturated after 30 minutes, rejecting further charging current
- C. An engine thermostat that opens after 30 minutes, rerouting coolant and reducing alternator drive speed

D. An alternator with an intermittent internal fault — such as a brush, connection, or regulator — that opens when heat expands the component

28. A driver reports that the truck's speedometer needle oscillates between 55 and 65 MPH while driving at a steady speed on cruise control. All other gauges are stable. What is the most likely cause?

A. An erratic vehicle speed sensor signal caused by a damaged reluctor ring, loose sensor mounting, or intermittent sensor wiring connection

B. A faulty cruise control module that cannot maintain a steady throttle position

C. An instrument cluster stepper motor that is losing calibration at highway speed readings

D. A data bus message timing error between the transmission module and the instrument cluster

29. A truck's headlights illuminate normally, but when the driver activates the turn signal, the headlight on that side dims noticeably in rhythm with the turn signal flash. What does this symptom indicate?

A. A faulty turn signal flasher module that is back-feeding voltage into the headlight circuit

B. A failed headlight relay that allows current from the turn signal circuit to affect headlight power

C. A poor ground connection shared by the headlight and turn signal on that side, causing the circuits to interact

D. An overloaded alternator that cannot support both the headlight and turn signal simultaneously

30. A technician needs to verify whether a truck's alternator is producing AC ripple that could be affecting sensitive electronic systems. What is the quickest field test to check this condition?

A. Connecting an oscilloscope to the battery terminals and analyzing the waveform for AC content

B. Using a carbon pile load tester to apply maximum load while monitoring voltage stability

C. Checking for radio speaker whine that increases in pitch with engine RPM

D. Measuring AC voltage at the alternator B+ terminal with a DMM set to AC volts while the engine runs

31. A commercial vehicle's backup alarm sounds continuously when the ignition is on, even when the transmission is not in reverse. The backup alarm did not have this problem before a recent trailer wiring repair. What should the technician investigate?

- A. Whether the trailer wiring repair pinched or crossed a wire that now feeds voltage to the backup alarm circuit
- B. The backup alarm switch to determine if the recently installed aftermarket wire caused the switch to contact ground
- C. Whether the backup alarm module has failed internally due to a power surge during the wiring repair
- D. The transmission range sensor for correct adjustment since it controls the reverse signal to the backup alarm

32. A heavy-duty truck's batteries are two years old and have been properly maintained. A load test shows both batteries passing at 9.8 volts under load. However, the truck cranks slowly every morning and requires extended cranking to start. All cable connections pass voltage drop tests. What should the technician investigate next?

- A. The starter motor current draw to determine if the motor is drawing excessive amperage due to an internal fault
- B. The battery CCA ratings to verify they meet the minimum specification for the engine application
- C. The alternator output to confirm the batteries are being fully charged before shutdown each day
- D. The engine glow plug or intake heater system to ensure it is functioning and reducing compression resistance during cold starts

33. A truck's washer pump runs when the switch is activated, and fluid sprays onto the windshield, but the wipers do not activate during the wash cycle. They operate normally when the wiper switch is used independently. What is the most likely cause?

- A. A faulty wiper motor park switch that does not respond to the washer trigger signal
- B. A seized wiper linkage that requires more torque than the wash-cycle signal can command

C. A failed connection or logic fault in the circuit between the washer switch and the wiper activation relay or module

D. An incompatible replacement washer pump that does not output the wiper trigger signal

34. A truck driver reports that the trailer clearance lights stay illuminated for approximately 30 seconds after the headlight switch is turned off, then gradually fade out. This behavior started recently. What is the most likely cause?

A. Normal operation of an automatic light delay feature integrated into the headlight switch

B. A properly functioning trailer light relay with a built-in capacitor discharge delay circuit

C. A trailer-mounted aftermarket LED light kit that retains stored energy in its driver capacitors

D. A body controller module or headlight switch with an internal fault causing delayed de-energization of the trailer light output

35. A truck's oil pressure warning light illuminates briefly at idle when the engine is warm, then goes out when RPM is increased slightly. The engine has over 500,000 miles. What is the most likely cause?

A. A marginal oil pressure sending unit switch that is nearing end of life and triggering prematurely

B. Actual low oil pressure at warm idle due to normal engine bearing wear, with pressure increasing when RPM rises

C. A faulty instrument cluster module that drops the oil pressure gauge signal at low engine speeds

D. A partially clogged oil filter reducing oil flow at idle but not at higher RPM where pump output increases

36. Technician A says that Kirchhoff's Voltage Law states that the sum of all voltage drops in a series circuit equals the source voltage. Technician B says that Kirchhoff's Voltage Law only applies to circuits with resistive loads and does not apply to circuits containing motors or solenoids. 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

37. A truck's electronic instrument cluster displays a wrench icon and the message "SERVICE ELECTRICAL SYSTEM" on the driver information display. The truck appears to operate normally with no driveability concerns. What should the technician do first?

- A. Ignore the message since the truck is operating normally and the icon may be a false alert
- B. Replace the instrument cluster module since it is generating unwarranted service messages
- C. Connect a scan tool to retrieve diagnostic trouble codes from all modules on the data bus
- D. Check the battery voltage and charging system since electrical system service messages often relate to voltage

38. A medium/heavy truck's left turn signal operates correctly on the tractor, but when the trailer is connected, activating the left turn signal causes both left and right turn signal lights on the trailer to flash simultaneously. Tractor lights are unaffected. What is the most likely cause?

- A. A faulty multifunction switch that sends power to both turn signal outputs when the left turn is selected
- B. A defective trailer flasher module that has failed into a hazard-flash mode
- C. An oversized fuse in the trailer lighting circuit allowing crossover current between circuits
- D. A short between the yellow (left turn) and green (right turn) wires in the trailer cord or trailer wiring harness

39. A technician is testing a truck's battery cables after a slow-crank complaint. The positive cable voltage drop during cranking is 0.3 volts and the negative cable voltage drop is 0.2 volts. Both are within specification. The batteries pass load testing. What should the technician check next?

- A. The alternator output to rule out an undercharging condition that may be weakening the batteries
- B. The starter motor current draw and mechanical condition to determine if the starter itself is the cause of the slow cranking

- C. The engine oil viscosity and level to rule out excessive mechanical resistance
- D. The neutral safety switch adjustment since a partially engaged switch can reduce current flow to the solenoid

40. A truck's dome light stays on continuously. The driver has confirmed the dash dome light switch is in the off position — not in the door-activated or manual-on position. What is the most likely cause?

- A. A short-to-power in the dome light circuit providing battery voltage directly to the light, bypassing the switch
- B. A faulty door jamb switch stuck closed on a door the driver has not checked
- C. A failed body controller module commanding the dome light on regardless of switch input
- D. A defective dome light bulb with an internal short that creates a current path independent of the switch

41. A technician discovers that a truck's instrument cluster has been replaced by a previous technician. The odometer reads 15,000 miles, but the fleet records show the truck should have approximately 340,000 miles. What regulatory concern does this create?

- A. The ABS module must be reprogrammed to match the cluster mileage for proper wheel speed calibration
- B. The engine ECM warranty is voided because the odometer no longer matches the ECM's internal hourmeter
- C. The incorrect mileage reading only affects resale documentation and has no regulatory impact
- D. Federal odometer regulations require the correct accumulated mileage to be programmed into the replacement cluster, and the discrepancy constitutes an odometer violation

42. A heavy-duty truck's alternator passes voltage and amperage output tests but the batteries are consistently undercharged at the end of each shift. The drive belt is in good condition and properly tensioned. Charging circuit voltage drop tests are within specification. What should the technician investigate next?

- A. The alternator's internal voltage regulator for intermittent failure under sustained load conditions

- B. The battery reserve capacity ratings to determine if they are adequate for the vehicle's application
- C. The total electrical load on the vehicle to determine if it exceeds the alternator's capacity during normal operation
- D. The engine idle speed setting since low idle reduces alternator output during extended idle periods

43. A commercial vehicle's scan tool retrieves DTCs from the body controller indicating overcurrent faults on three separate lighting outputs. The technician clears the codes and the lights function normally. Two days later, the same three codes return. What does this pattern suggest?

- A. A failing BCM that is incorrectly detecting overcurrent on multiple outputs simultaneously
- B. An intermittent fault — such as a loose connector, chafing wire, or partially damaged insulation — that periodically causes a momentary short on the affected circuits
- C. Bulbs with slightly higher wattage than specification that occasionally trigger the BCM's overcurrent threshold
- D. A voltage regulator fault causing periodic voltage spikes that the BCM interprets as overcurrent events

44. A truck's cruise control engages and holds speed on flat terrain but disengages on upgrades when the engine load increases. No DTCs are stored. What should the technician investigate?

- A. The throttle position sensor signal and the cruise control module's input from the brake switch and vehicle speed sensor to verify all signals remain valid under load
- B. The engine's turbo boost pressure to determine if insufficient power is available on upgrades
- C. The transmission downshift logic to verify proper gear selection during uphill driving
- D. The cruise control cable or electronic actuator for physical binding at full throttle travel

45. A fleet technician notices that a group of trucks with LED tail light assemblies occasionally set "open circuit" DTCs on the body controller, even though the LEDs are functioning. What is the most likely explanation?

- A. A software calibration issue in the BCM that affects all units from this manufacturer

- B. The truck's charging system voltage exceeds the LED driver circuit's input range intermittently
- C. A wiring harness design flaw specific to this model year that affects the LED ground path
- D. The LED assemblies draw significantly less current than the incandescent bulbs the BCM was calibrated to detect, causing the module to interpret the low draw as an open circuit

46. A technician is diagnosing a truck with a dead battery. The alternator, cables, and connections all test good. The parasitic draw test shows 40 milliamps, which is within specification. The battery passes a load test when fully charged. However, the battery goes dead every time the truck sits for three days. What should the technician investigate?

- A. The alternator's diode trio for a reverse current leak that does not appear on standard output tests
- B. The parasitic draw test methodology to determine if the test was conducted before all modules entered sleep mode
- C. The battery's self-discharge rate and internal condition, as a battery with internal defects can pass a load test but have an abnormally high self-discharge rate
- D. The low voltage disconnect system threshold to determine if it is set too high and disconnecting loads prematurely

47. A heavy-duty truck's turn signal indicator on the instrument cluster does not flash when the turn signal is activated, but the exterior turn signal bulbs flash correctly at the normal rate. What is the most likely cause?

- A. A burned-out turn signal indicator bulb or faulty LED in the instrument cluster
- B. A defective turn signal flasher module that is not sending the indicator signal to the cluster
- C. A failed multifunction switch that activates the exterior lights but not the cluster indicator circuit
- D. A data bus communication fault preventing the turn signal status from reaching the cluster display

48. A commercial vehicle's check engine light illuminates and the scan tool shows a DTC indicating the intake air heater circuit has an open. The truck starts and runs normally in warm weather. When would this fault most likely cause a driveability problem?

- A. During highway driving when intake air temperatures drop due to ram air cooling
- B. During heavy load conditions when the engine requires maximum fuel delivery
- C. During extended idle periods when the intake manifold temperature stabilizes
- D. During cold-weather starting when the intake air heater is needed to warm incoming air for reliable combustion

49. A truck's power windows work normally from the driver's master switch, but the window lock button on the master switch panel does not disable the passenger window switches. The passenger can still operate their window regardless of the lock button position. What is the most likely cause?

- A. A failed passenger-side window motor relay that bypasses the lockout signal
- B. A faulty window lock switch or an open in the lockout circuit that prevents the disable signal from reaching the passenger switch
- C. A short-to-power in the passenger window switch wiring that provides an alternate power path
- D. A failed body controller module that has lost the window lockout programming function

50. A technician performs an alternator AC ripple test and measures 0.8 volts AC at the B+ terminal with the engine running. The technician then removes the alternator and bench-tests individual diodes in the rectifier bridge. All six diodes pass the diode test — forward voltage of 0.5 to 0.7 volts and OL in reverse. What could explain the elevated AC ripple despite all diodes testing good individually?

- A. The DMM's AC measurement function was set to the wrong scale during the vehicle test
- B. The alternator's stator windings have an intermittent short that only appears under load and heat
- C. The elevated ripple was caused by a noisy data bus signal interfering with the DMM's AC measurement
- D. The diodes may pass a low-current bench test but fail under the high-current, high-temperature conditions of actual operation

PRACTICE EXAM 4: ANSWER KEY

1. B — The half-split method works by testing at the midpoint of the circuit first, which immediately eliminates half the wire run as the fault location. Testing at the frame rail junction box — approximately 20 feet from each end — tells the technician whether the open is in the tractor-side wiring or the trailer-side wiring. Each subsequent test halves the remaining suspect area, dramatically reducing diagnostic time on long commercial vehicle circuits.
2. D — A capacitance test reading of 62% of rated CCA means the battery has lost more than one-third of its original cranking capacity. The industry threshold for replacement is typically 70% — below this level, the battery cannot reliably deliver the cranking current needed for heavy-duty diesel engines, particularly in cold weather. The 12.45-volt state of charge is adequate for the capacitance test to be valid.
3. A — Each protection device protects only the branch it is installed in. The 10-amp fuse blowing repeatedly confirms an overcurrent condition — most likely a short-to-ground — in the branch it protects. The 20-amp circuit breaker not tripping confirms that its branch is operating within normal current limits. The technician should focus diagnostic efforts exclusively on the fuse-protected branch.
4. A — Both technicians are correct. A good silicon diode tested with the DMM's diode function shows a forward voltage drop of approximately 0.5 to 0.7 volts when current flows in the forward-bias direction. In the reverse-bias direction, a good diode blocks all current flow, producing an OL reading. A diode showing low readings in both directions is shorted, and OL in both directions is open.
5. C — The power steering pressure sensor is an electronic input to the ECM with a reference voltage, a signal return, and a ground — the standard three-wire sensor configuration. Before condemning the sensor or the power steering system, verify that the ECM is providing the correct reference voltage and ground at the sensor connector. A missing reference voltage or open ground produces a zero reading regardless of sensor condition.
6. B — Grounding the sending unit wire at the tank connector is a standard gauge circuit test. The gauge responding by reading full scale confirms the gauge mechanism and the entire wire path from the cluster to the tank are functional. With those components proven good, the only remaining component is the fuel level sending unit — a stuck float or contaminated resistor element is preventing the sender from producing the correct resistance for a full tank.
7. D — Heat discoloration at the B+ terminal connection is direct evidence of a high-resistance connection generating heat under load. This heat transfers into the alternator housing and damages internal components over time, causing premature failure. Each replacement alternator eventually

fails for the same reason because the root cause — the resistive connection — was never repaired. Cleaning and properly securing the B+ connection breaks the failure cycle.

8. C — With the ignition on, multiple control modules are powered and actively communicating on the bus. Normal communication causes CAN_H and CAN_L to toggle between recessive and dominant states, producing visible voltage fluctuations. Both wires resting at a steady 2.5 volts with no fluctuation means no module is successfully transmitting data — the bus is stuck in the recessive state, indicating a communication failure.
9. A — A horn that buzzes rather than producing a clear tone indicates the internal electromagnetic mechanism is not operating at full capacity. A cracked diaphragm cannot vibrate at the correct resonant frequency, and a weakened coil cannot pull the diaphragm with sufficient force to produce the characteristic sharp horn tone. The relay and battery voltage have been confirmed good, isolating the fault to the horn itself.
10. D — The alternator charging correctly at 2,000 RPM confirms internal components are functional. At idle, the alternator spins more slowly and produces less output. When the combined headlight and blower load exceeds the alternator's idle-speed output capacity, voltage drops below the charging threshold. Turning off the loads reduces demand below the idle-speed output, and voltage recovers. A higher-output alternator or idle speed adjustment resolves the condition.
11. B — An intermittent single click without cranking that resolves on retry points to the starter solenoid contact disc. The solenoid plunger moves to engage the drive and close the main contacts, but a worn contact disc occasionally fails to make solid connection across the two main terminals. The slight repositioning between attempts is enough for the disc to bridge the terminals successfully on the next try.
12. C — Tail lights and brake lights both illuminate the same rear bulbs or circuits on many commercial vehicles. A brake light switch stuck in the closed position — due to misadjustment, a broken return spring, or physical interference — continuously provides voltage to the brake/tail light circuit regardless of pedal position. The headlight switch and ignition key are irrelevant because the brake switch provides an independent power path.
13. D — The DMM at the battery reads the actual charging system voltage of 14.2 volts, which is within normal range. The dash voltmeter reads only 11.5 volts because its sense wire — the wire that feeds battery voltage to the gauge — has excessive resistance somewhere between the battery and the gauge input. This voltage drop causes the gauge to display a lower reading than the actual system voltage at the battery.
14. A — Water intrusion into electrical connectors creates temporary low-resistance paths between terminals and to ground, causing random circuit activations. As the engine compartment heats up during normal driving, the moisture evaporates and the unintended connections break. The symptoms clearing after 30 minutes of driving is consistent with heat-driven evaporation. The affected connectors should be inspected, dried, and resealed to prevent recurrence.

15. B — An open in the starter control circuit prevents the starter from operating at all — there would be no cranking whatsoever, not slow cranking. Low state of charge reduces available current, high cable voltage drop restricts current delivery, and thick oil increases mechanical resistance — all three cause slow cranking. An open control circuit causes a no-crank condition, which is a different symptom entirely.
16. C — A bulb with an internal short that reduces its resistance to near zero draws enormous current — using Ohm's Law, $I = 12 \div 0$ approaches infinite amps. Even with the wire resistance limiting actual current, the draw far exceeds the 5-amp fuse rating, blowing the fuse immediately and killing the entire circuit. In a parallel circuit, a shorted branch affects all branches because they share the same fuse.
17. A — Technician B is correct. Modern commercial vehicles have numerous electronic modules that remain active after ignition-off, drawing several amps while they complete shutdown routines, save data, and transition to sleep mode. This process takes 20 to 45 minutes depending on the vehicle. Testing before all modules sleep produces an artificially high reading that does not represent the true parasitic draw.
18. D — Both alternators receive the same drive belt speed and produce the same regulated voltage, eliminating belt slip and regulator faults as likely causes. The identical voltage output confirms the regulators are functioning. Alternator 2 producing only 80 amps versus its 160-amp rating — approximately a 50% reduction — indicates an internal capacity limitation such as an open stator phase or failed rectifier diodes reducing maximum output.
19. B — In the J1939 DTC structure, the FMI describes how the parameter faulted, not the physical condition it measures. FMI 3 means "voltage above normal" on the sensor circuit — not that the coolant temperature itself is high. A coolant temperature sensor circuit with voltage above the expected range typically indicates an open sensor or a disconnected connector, because the pull-up resistor in the ECM drives the signal voltage high when the sensor resistance path is broken.
20. B — Simply cleaning the corrosion treats the symptom without addressing the cause. The moisture source must be identified and eliminated — a cracked lens, a deteriorated gasket, a missing grommet, or a damaged housing seal. After sealing the housing against future water entry, cleaning the corrosion and replacing damaged sockets restores reliable electrical contact. Without stopping the moisture entry, the corrosion returns.
21. C — The blue wire in the SAE J560 connector carries ABS power and communication to the trailer. If this wire is open, damaged, or has a corroded connector pin, the trailer ABS module receives no power and cannot communicate on the bus. The tractor ABS module and all other tractor modules communicating normally confirms the tractor-side bus is healthy — the fault is in the tractor-to-trailer connection path.
22. A — All gauges and warning lights functioning correctly confirms the cluster's main processor, data bus communication, and power supply are healthy. The backlighting circuit is a separate

internal circuit that powers the LED array illuminating the gauge faces. Excessive voltage drop in the dedicated backlight power feed or ground connection reduces the voltage reaching the LEDs, causing dim illumination despite the dimmer being set to maximum.

23. D — The batteries returning from routes at 12.8–13.0 volts confirms the charging system is working during driving. The batteries dropping to 11.9 volts overnight — a loss of approximately 1 volt — indicates something is consuming stored energy while the truck sits. This pattern of adequate charging followed by overnight voltage decline is the classic presentation of excessive parasitic draw from a module or circuit that is not entering sleep mode.
24. C — A yellowed, dim beam from a halogen bulb of the same age and part number as a bright companion indicates the affected bulb is nearing end of life. As a halogen bulb ages, tungsten evaporates from the filament and deposits on the inner glass surface, darkening the capsule and reducing light transmission. The halogen regenerative cycle slows as the filament thins, accelerating the darkening process. Replacing the bulb restores full brightness.
25. A — The speedometer, cruise control, and transmission shift points all depend on vehicle-specific calibration data stored in the ECM — tire size, axle ratio, and speed signal configuration. A replacement ECM installed without programming these parameters uses default values that do not match the vehicle, causing all three systems to operate based on incorrect calculations. Proper programming resolves all three symptoms simultaneously.
26. B — The blower motor drawing correct current at each speed setting eliminates the resistor block, switch, and power supply as causes. If the motor draws the specified current but runs slower than expected, the motor itself is converting electrical energy into heat through internal friction rather than useful rotation. Worn brushes increase internal resistance, and worn bearings create mechanical drag — both reduce motor speed while maintaining the expected current draw.
27. D — An alternator that works correctly when cold but fails after 30 minutes of operation and recovers after cooling exhibits a classic heat-related intermittent fault. As the alternator reaches operating temperature, thermal expansion causes a marginally worn component — a brush that lifts off the slip ring, a solder joint that opens, or a regulator connection that separates — to lose contact. Cooling contracts the component back into contact, temporarily restoring function.
28. A — A speedometer needle that oscillates while all other gauges remain stable isolates the fault to the speed signal input. The vehicle speed sensor generates pulses from a toothed reluctor ring, and any inconsistency in that signal — a cracked or chipped reluctor tooth, a loose sensor that shifts relative to the ring, or an intermittent wiring connection — produces erratic pulse timing that the cluster interprets as fluctuating speed.
29. C — When a headlight and turn signal share a common ground connection, current from both circuits returns through the same path. If that ground has high resistance, the turn signal current creates a voltage drop across the ground that affects the headlight circuit. Each time the turn signal

pulses current through the shared ground, the headlight's effective voltage changes, causing it to dim in rhythm with the flash.

30. D — Measuring AC voltage at the alternator B+ terminal with a DMM set to AC volts is the quickest and most direct field test for AC ripple. With the engine running, a healthy rectifier bridge produces less than 0.5 volts AC. A reading above 0.5 volts AC confirms one or more failed diodes are allowing AC to pass into the DC system. This test takes seconds and requires only a standard DMM.
31. A — The backup alarm functioning correctly before the trailer wiring repair and malfunctioning immediately after establishes a direct cause-and-effect relationship. During the repair, a wire was likely crossed, pinched, or routed in contact with the backup alarm circuit, providing an unintended voltage path that keeps the alarm energized whenever the ignition is on. Inspecting the recent repair area will reveal the wiring error.
32. A — Batteries and cables have been confirmed good through load testing and voltage drop testing. The next logical step in systematic diagnosis is testing the starter motor itself. A current draw test determines whether the starter is drawing excessive amperage due to internal faults — worn bushings, shorted windings, or a dragging armature — which would cause slow cranking despite healthy batteries and cables.
33. C — The washer pump running and delivering fluid confirms its circuit is functional. The wipers operating normally from the wiper switch confirms the wiper motor and linkage are functional. The missing function is the automatic wiper activation that should occur when the washer is triggered. The connection between the washer switch and the wiper activation circuit — whether a relay, a module input, or a direct wire — has a fault that prevents the wash cycle from commanding the wipers on.
34. D — A 30-second gradual fade-out of trailer clearance lights after the switch is turned off is not a designed feature — it represents a slow discharge of energy through the circuit after the power feed is interrupted. The most likely cause is a body controller module or headlight switch with a failing internal component that does not cleanly disconnect the trailer light output, allowing residual current to flow until the stored energy is depleted.
35. B — An engine with 500,000 miles has significant bearing wear that allows increased oil clearances. At warm idle, oil pump volume is at its lowest output while bearing clearances allow maximum oil bypass. This produces marginally low oil pressure that triggers the warning light. Even a slight RPM increase raises pump output enough to bring pressure above the warning switch threshold. This is an engine wear condition, not an electrical fault.
36. A — Technician A is correct. Kirchhoff's Voltage Law states that the algebraic sum of all voltages around any closed circuit loop equals zero — meaning all voltage drops must equal the source voltage. This law applies universally to all circuit types regardless of the load components,

including motors, solenoids, resistors, and any other device. Technician B's claim that it only applies to resistive loads is incorrect.

37. C — A service message on the driver information display is generated by a control module that has detected a fault condition. The correct first step is always to retrieve diagnostic trouble codes from all modules using the scan tool. The stored codes identify which module generated the message and what specific fault condition was detected, directing the technician to the correct system for further diagnosis.
38. D — A short between the yellow (left turn) and green (right turn) wires in the trailer cord or trailer wiring creates a bridge between the two turn signal circuits. When the left turn is activated, voltage on the yellow wire feeds through the short into the green wire, energizing the right-side turn signal lights simultaneously. The tractor lights are unaffected because the short is downstream of the tractor-to-trailer connection.
39. B — Batteries, cables, and connections have all been verified as good. The systematic diagnostic process requires testing the starter motor next. A current draw test determines whether the motor is drawing normal, excessive, or insufficient amperage. Excessive draw indicates internal mechanical or electrical problems within the starter. Low draw with slow cranking would redirect attention back to the delivery path. This test completes the starting system evaluation.
40. A — The dome light switch in the off position should disconnect all paths to the light — both manual and door-activated. If the light stays on despite the switch being off, something is providing voltage to the light through a path that bypasses the switch entirely. A short-to-power in the dome light circuit — where the dome light wire contacts a hot wire from another circuit — delivers battery voltage directly to the light regardless of switch position.
41. D — Federal odometer regulations (49 USC §32703) require accurate mileage disclosure and prohibit disconnecting, resetting, or altering an odometer to change the mileage reading. A replacement cluster must be programmed with the correct accumulated mileage from the vehicle's records. A 325,000-mile discrepancy constitutes an odometer violation that affects the vehicle's legal status, resale value, and warranty documentation.
42. C — The alternator, belt, and charging circuit have all tested within specification, confirming the charging system is delivering its rated output efficiently. If the batteries are still undercharged at shift end despite a healthy charging system, the total electrical demand during normal operation may exceed the alternator's capacity to both power loads and recharge batteries simultaneously. An electrical load audit comparing total demand against alternator capacity identifies whether the system is undersized.
43. B — Codes that clear successfully and then return after two days indicate an intermittent condition rather than a permanent fault. The BCM detects legitimate overcurrent events that occur periodically but are not present during static testing. Chafing insulation that makes intermittent contact with a ground surface, a loose connector pin that shifts under vibration, or partially

damaged wire insulation that touches metal during certain driving conditions all produce this pattern of recurring intermittent faults.

44. A — Cruise control disengaging under load without setting DTCs suggests the module is receiving a signal that it interprets as a disengage command. The throttle position sensor signal, brake switch input, and vehicle speed signal must all remain valid and consistent under load for the cruise to maintain engagement. A TPS signal that drops out under heavy throttle, a brake switch that bounces closed from vibration during upgrades, or a speed signal fluctuation can all trigger a disengage that appears load-related.
45. D — LED assemblies draw significantly less current than the incandescent bulbs they replace — often 80–90% less. If the body controller module was calibrated to monitor for the current draw of incandescent bulbs, the much lower LED current falls below the module's minimum expected threshold, triggering an open-circuit fault code. Reprogramming the BCM for LED-compatible current thresholds or installing load resistors resolves the false codes.
46. C — All external factors have been eliminated: the alternator charges correctly, cables and connections are good, parasitic draw is within specification, and the battery passes a load test. A battery that is fully charged, has low parasitic draw, and still goes dead in three days has an abnormally high internal self-discharge rate. Internal plate damage, dendritic growth, or contaminated electrolyte can create internal leakage paths that drain the battery from within.
47. A — The exterior turn signal bulbs flashing correctly at the normal rate confirms the flasher module, multifunction switch, and all exterior wiring are functioning properly. The instrument cluster indicator operates on a separate circuit or internal driver that illuminates in sync with the exterior flash. A burned-out indicator bulb or failed indicator LED within the cluster prevents the visual confirmation in the cab while the exterior function remains unaffected.
48. D — The intake air heater is designed to warm incoming combustion air during cold-weather starting to aid ignition in diesel engines that rely on compression heat. In warm weather, the heater is not activated and the engine starts normally without it. During cold starts when ambient air temperature is low, the heater is commanded on to raise intake temperature. An open circuit in the heater prevents this function, causing hard starting or extended cranking in cold conditions.
49. B — The window lock function works by interrupting the power supply to the passenger window switches when the lock button is activated. If the lock switch fails internally or the lockout circuit wire is open, the disable command never reaches the passenger switch, which continues to operate normally. The master switch controlling both windows correctly proves the motor circuits and window mechanisms are functional.
50. C — Diodes can pass a low-current bench test at room temperature while failing under the high-current, high-temperature conditions inside an operating alternator. The heat generated during normal operation causes thermal expansion of the diode's semiconductor junction, and a marginally damaged diode that maintains its one-way function at low current may partially break

down when subjected to the full stator phase current at elevated temperature. This is a common reason for elevated AC ripple despite all diodes appearing to pass static bench testing.