

# PRACTICE EXAM 15: ASE T6

## SIMULATION

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1. A technician is diagnosing a truck where the driver reports that two unrelated systems — the HVAC blower motor and the power mirrors — both stopped working at the same time. All other electrical systems operate normally. What is the most efficient first step?

- A. Test the blower motor and mirror motor individually to determine if both components have failed simultaneously
- B. Check the wiring harness for a common splice point where the two circuits share a conductor
- C. Check whether both circuits share a common fuse, circuit breaker, or power feed that has failed, disabling both systems at once
- D. Scan for body controller module fault codes that may have disabled both outputs simultaneously

2. A heavy-duty truck's battery bank consists of four Group 31 batteries in parallel. The technician measures the bank voltage at 12.58 volts. Without disconnecting any battery, the technician measures across the inter-connect cable terminals of each link. The cable between Battery 2 and Battery 3 reads 0.22 volts. All other inter-connect cables read less than 0.02 volts. What does the 0.22-volt reading indicate?

- A. The inter-connect cable between Battery 2 and Battery 3 has a high-resistance connection at one or both of its terminals that is consuming 0.22 volts as heat even under the light parasitic load
- B. Battery 2 and Battery 3 have a voltage imbalance of 0.22 volts between them
- C. The inter-connect cable is the wrong gauge for the application and has inherent resistance
- D. Normal voltage variation in a four-battery parallel configuration under no-load conditions

3. A commercial vehicle's headlights dim noticeably when the engine is running and the driver activates the electric engine cooling fan. The fan draws approximately 60 amps. The alternator is rated at 160 amps and currently produces 140 amps under the combined load. What is the most likely cause of the dimming?

- A. The alternator's voltage regulator cannot respond quickly enough to the sudden 60-amp load increase from the fan
- B. The battery bank is weak and cannot buffer the voltage dip caused by the fan activation
- C. The electric fan motor has a developing short that is drawing more than its rated 60 amps
- D. The headlight circuit and fan circuit share a power feed or ground path with limited capacity, and the 60-amp fan current creates a voltage drop across the shared section that affects headlight voltage

4. A truck driver reports that the cab dome light will not turn off regardless of the door position or the dash switch setting. The technician removes the dome light fuse and the light goes out. When the fuse is reinstalled, the light comes back on immediately. What does this pattern confirm?

- A. The dome light relay has failed with contacts welded closed, providing continuous power to the light
- B. The dome light circuit is receiving continuous power through its normal fused circuit path — the fault is downstream of the fuse in the switching or control section, not in the power supply
- C. The fuse is the wrong amperage rating and is allowing excess current to flow to the dome light
- D. A short-to-power is backfeeding the dome light from an adjacent circuit through the fuse panel bus bar

5. Technician A says that when crimping a terminal onto a stripped wire end, the stripped conductor should completely fill the terminal's crimp barrel without any insulation inside the barrel. Technician B says that after crimping, the technician should tug firmly on the wire to verify the terminal does not pull free. 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

6. A heavy-duty truck's engine cranks and starts normally in the morning. When the driver shuts off the engine for a 30-minute delivery stop and attempts to restart, the starter cranks very slowly and barely turns the engine over. After the truck sits for an additional hour, it starts normally again. What is the most likely cause?

A. The batteries have a heat-related internal fault that reduces capacity when the battery box temperature rises during engine operation

B. A parasitic draw that rapidly discharges the batteries during the 30-minute stop but recovers after a longer rest period

C. A starter motor with a heat-soak sensitivity — when the starter absorbs heat from the nearby engine and exhaust during the 30-minute stop, its internal resistance increases and performance degrades until it cools after an extended rest

D. The alternator's voltage regulator reduces output during hot engine conditions, failing to fully recharge the batteries during the drive

7. A technician is testing a relay-controlled headlight circuit. With the headlight switch on, the technician measures 12.3 volts at the relay coil power terminal and 0.1 volts at the relay coil ground terminal. The relay does not click. What does this voltage pattern indicate?

A. The relay coil is receiving adequate power and ground — with 12.2 volts across the coil and no click, the relay coil winding has failed open and the relay must be replaced

B. The relay coil has adequate power but the ground-side reading of 0.1 volts indicates the ground path is complete, so with power and ground present the relay coil itself is defective — it should click but does not

C. The relay ground circuit has excessive resistance preventing adequate current from flowing through the coil

D. The headlight switch is not providing sufficient current to energize the relay coil

8. A medium/heavy truck's scan tool retrieves a DTC from the ECM indicating "Injector #5 — Circuit High." The technician measures the resistance of the #5 injector at the ECM connector pins and reads 0.4 ohms. The specification calls for 11 to 14 ohms. What does the 0.4-ohm reading indicate?

- A. Normal injector resistance that has decreased slightly due to elevated engine operating temperature
- B. The injector wiring has a short-to-ground or the injector itself has an internal short, creating a near-zero resistance path that the ECM detects as "circuit high" because the resulting excessive current triggers the high-current threshold
- C. The ECM's injector driver circuit has failed and is producing a phantom low-resistance reading
- D. The technician measured across the wrong pins at the ECM connector

9. A truck's electronic instrument cluster has been replaced. After installation, the engine starts normally, all gauges function, but the mileage reads 0 on the odometer. The truck has 287,000 actual miles. What must the technician do before returning the truck to service?

- A. Contact the fleet manager to obtain authorization to leave the odometer at zero with a notation in the maintenance records
- B. Drive the truck for several miles to verify the odometer increments correctly, then return it to service since the mileage will accumulate over time
- C. Reflash the instrument cluster with the old cluster's software backup to transfer the stored mileage automatically
- D. Program the replacement cluster with the correct accumulated mileage of 287,000 miles, as required by federal odometer regulations

10. A commercial vehicle's windshield washer pump works when the ignition is off and the washer button is pressed. On most vehicles, the washer pump should only operate with the ignition on. What does operation with the ignition off suggest about the circuit?

- A. The washer pump is wired to a constant battery power feed rather than a switched ignition feed — either by design on this vehicle or due to incorrect wiring from a previous repair
- B. The body controller module is providing phantom voltage to the washer circuit through a backfeed path
- C. The washer pump relay contacts are welded closed, keeping the pump powered at all times regardless of ignition state
- D. The washer switch has an internal short to battery power that bypasses the ignition circuit

11. A heavy-duty truck driver reports that the truck's horn works when tested in the shop but does not work while driving. The technician tests the horn in the shop and confirms it sounds normally. During a road test, the horn fails to sound. What type of fault should the technician suspect?

- A. A temperature-dependent horn relay that contracts its contacts at operating temperature and opens the circuit
- B. A steering column or clock spring related fault that only manifests during steering wheel movement or at the vibration frequency experienced during driving
- C. A body controller module that disables horn operation above a certain vehicle speed as a noise ordinance compliance feature
- D. A horn diaphragm that freezes in cold airflow during driving but thaws when the truck is stationary in the shop

12. A truck's alternator produces 14.3 volts and passes a full-load amperage output test. The AC ripple test reads 0.35 volts AC at the B+ terminal. The charging circuit voltage drop is 0.3 volts output side and 0.2 volts ground side. Based on these test results, what is the overall condition of the charging system?

- A. The alternator has a developing diode fault indicated by the 0.35-volt AC ripple that will worsen over time
- B. The ground-side voltage drop of 0.2 volts is borderline and the ground connections should be cleaned as a preventive measure
- C. All test results are within specification — voltage is in the 13.5 to 14.5 range, AC ripple is below 0.5 volts, and both voltage drops are within their respective maximums of 0.5 volts (output) and 0.3 volts (ground)
- D. The combined voltage drop of 0.5 volts total (output plus ground) is excessive and requires repair

13. A technician discovers that a truck's aftermarket auxiliary lighting circuit uses a 30-amp relay to control LED work lights that draw only 4 amps total. Is the relay oversized for this application?

- A. Yes — the oversized relay contacts may not fully close under the light 4-amp load, creating an intermittent connection
- B. No — but only if the relay has a built-in current limiter that adjusts to the actual load

C. Yes — an oversized relay draws more coil current than necessary, wasting energy and reducing battery life

D. No — using a relay rated higher than the circuit's actual current draw provides a safety margin and does not create any functional problem for the circuit

14. A heavy-duty truck's starter motor has been bench-tested and found to have worn bushings. The technician replaces the bushings and reassembles the starter. Before reinstalling on the truck, what test should the technician perform to verify the repair?

A. A no-load bench test — run the starter with no load applied and check that it spins freely at the correct RPM and draws the specified no-load current, confirming the new bushings properly center the armature and no dragging or binding exists

B. A visual inspection of the commutator surface for scoring marks that would indicate the old bushings allowed armature contact with the field poles

C. A resistance check across the field winding terminals to verify the new bushings have not altered the magnetic circuit

D. A specific gravity test on the batteries that will be used to power the starter after installation

15. A truck's scan tool shows the ECM broadcasting a fuel rail pressure of 0 PSI with the engine cranking. The engine does not start. The fuel system is a high-pressure common rail diesel system. All other ECM sensor data appears normal. What is the most likely cause of the 0 PSI reading?

A. A failed crankshaft position sensor preventing the ECM from timing the fuel injection events

B. An ECM software error that displays 0 PSI when the actual pressure is within normal cranking range

C. A fuel system fault — failed high-pressure fuel pump, a stuck-open pressure relief valve, or a severed fuel supply line — preventing the system from building any rail pressure during cranking

D. A failed fuel rail pressure sensor or an open in its circuit that causes the ECM to read 0 PSI regardless of actual pressure

16. A commercial vehicle's trailer tail lights flash on and off rapidly when the headlight switch is turned on. The tractor tail lights operate normally with steady illumination. The trailer marker lights and clearance lights also operate normally. What is the most likely cause?

- A. A faulty headlight switch that sends a pulsed signal to the trailer tail light output circuit
- B. A loose or corroded connection on the brown wire (tail/license plate) in the SAE J560 trailer connector that makes and breaks contact rapidly due to vibration or thermal cycling when current flows through it
- C. A defective trailer cord with an internal conductor break on the tail light wire that arcs across the gap
- D. A body controller module that is PWM-controlling the trailer tail light output at an incorrect frequency

17. A truck's alternator has been producing a whining noise for the past week. Today, the charging system warning light illuminated and battery voltage dropped to 12.1 volts with the engine running. What is the most likely progression of events?

- A. The alternator bearings have been failing progressively — the week-long whine was the early symptom, and today the bearing seized or degraded enough to prevent the rotor from spinning at the speed needed for adequate output
- B. The alternator drive belt has been slipping for a week and today it broke completely, disconnecting the alternator from the engine
- C. The voltage regulator developed a fault today that coincidentally aligns with the unrelated bearing noise from the past week
- D. The battery bank has a weak cell that finally failed today, pulling system voltage below the charging threshold

18. A technician is diagnosing a truck where the left front headlight illuminates on both high and low beam, but the right front headlight only illuminates on high beam — low beam is completely inoperative. All fuses are good. What single fault could explain this specific pattern?

- A. A corroded right headlight ground connection that passes enough current for the high-beam filament but not the low-beam filament
- B. A faulty dimmer switch that has failed on the right-side low-beam output only

C. A body controller module with a failed right low-beam output driver while the high-beam output driver remains functional

D. A burned-out low-beam filament in the right headlight's dual-filament bulb, or an open in the wire specifically feeding the right low-beam circuit

19. A heavy-duty truck's battery disconnect switch is turned off when the truck is parked for the weekend. When the switch is turned back on Monday morning, the clock has reset, the radio presets are lost, and the driver seat memory position is gone. Is this expected behavior?

A. No — the battery disconnect switch should have a bypass circuit that maintains keep-alive power to memory circuits

B. No — the truck's body controller module should retain all memory settings in non-volatile memory regardless of battery disconnection

C. Yes — the battery disconnect switch interrupts all power to the vehicle, including the keep-alive circuits that maintain clock, radio preset, and seat memory data, so these settings reset when power is restored

D. Yes — but only for the clock; the radio and seat memory should be retained in permanent non-volatile storage

20. A commercial vehicle's scan tool retrieves a DTC from the body controller module indicating "Left Turn Signal Output — Overcurrent." The technician activates the left turn signal and it appears to work normally. What should the technician do?

A. Disregard the code since the turn signal currently works — overcurrent codes are informational only

B. Clear the code and road test the vehicle, monitoring for the code to return — if it returns, investigate the left turn signal circuit for an intermittent short-to-ground or a partially damaged wire that creates a momentary overcurrent condition under driving vibration

C. Replace the BCM because it is generating false overcurrent codes on a properly functioning circuit

D. Replace all left-side turn signal bulbs with lower-wattage units to reduce current below the BCM's overcurrent threshold

21. A technician discovers that a truck's engine compartment wiring harness passes directly over the exhaust manifold heat shield. The harness insulation shows signs of heat damage — discoloration and stiffening — but no bare conductors are exposed yet. What action should the technician take?

- A. Apply additional heat-resistant wrapping over the damaged section and continue monitoring at each service interval
- B. Test the affected wires for increased resistance and repair only those that have measurable degradation
- C. Leave the harness in place since no bare conductors are exposed and the current routing appears to be the factory installation
- D. Reroute the harness away from the heat source and secure it with appropriate clamps — the heat-damaged insulation will continue to deteriorate and eventually expose the conductors, creating a short-to-ground or fire hazard

22. A fleet of trucks has a pattern where the right front wheel speed sensor wire gets cut by road debris approximately once per year on trucks that operate in construction zones. Each repair involves splicing the wire and sealing it. What long-term solution should the fleet technician recommend?

- A. Install a protective split-loom conduit or abrasion-resistant sleeve over the vulnerable section of the wheel speed sensor wire to shield it from road debris damage
- B. Reroute the sensor wire to the opposite side of the axle where it is less exposed to debris
- C. Replace the wire with a heavier-gauge conductor that resists cutting better than the original
- D. Install a secondary backup wheel speed sensor on the same wheel to provide redundancy

23. A truck's electronic throttle position sensor has two signal outputs — Signal 1 and Signal 2. At idle, Signal 1 reads 0.5 volts and Signal 2 reads 4.5 volts. At full throttle, Signal 1 reads 4.5 volts and Signal 2 reads 0.5 volts. The two signals move in opposite directions. Why does the ECM use this mirror-image dual-signal design?

- A. To provide separate signals for the cruise control module and the transmission control module
- B. The opposing signals allow the ECM to verify sensor accuracy — if both signals do not mirror each other exactly, the ECM detects a TPS fault, providing a built-in redundancy and error-detection mechanism

C. The dual signals provide different resolution ranges — Signal 1 is more accurate at low throttle and Signal 2 is more accurate at high throttle

D. One signal controls fuel delivery while the other controls ignition timing independently

24. A heavy-duty truck's batteries have been recently replaced. Two weeks later, the positive battery terminals show heavy white and green corrosion buildup, but the negative terminals are clean. The charging system voltage is 14.2 volts — within normal range. What should the technician investigate?

A. The battery vent caps for proper seating and the battery case near the positive terminals for cracks that may be allowing acid vapor or liquid to contact the terminals

B. The alternator for an overcharging condition that is accelerating corrosion through excessive outgassing

C. The inter-connect cable material for a galvanic reaction between dissimilar metals at the positive terminal

D. Whether the new batteries are a different chemistry than the originals, producing more corrosive outgassing

25. A commercial vehicle's instrument cluster tachometer reads 200 RPM higher than the actual engine speed verified by a handheld tachometer. The speedometer, temperature gauge, and all other cluster functions are accurate. The scan tool shows the ECM broadcasting the correct RPM value on the J1939 bus. What is the most likely cause?

A. A data bus transmission error that only affects the RPM parameter between the ECM and the cluster

B. A failing crankshaft position sensor that adds phantom pulses to the RPM signal

C. The instrument cluster's tachometer stepper motor or its internal calibration has a fixed offset error, displaying 200 RPM higher than the bus data it receives

D. The ECM's RPM calculation algorithm has drifted and is adding extra counts to the broadcast value

26. A truck driver reports that the hazard flashers work normally but only the right turn signal functions — the left turn signal is completely inoperative. The left turn fuse is good. A test light at the left turn output terminal of the multifunction switch shows no voltage when the left turn is selected, but voltage is present at the right turn output when the right turn is selected. What has the test confirmed?

- A. The multifunction switch has an internal fault on the left turn output contact — it does not pass voltage when the left turn is selected, despite the right turn contact functioning normally
- B. The left turn signal bulbs have all burned out simultaneously, causing the switch to appear as if it has no output
- C. The turn signal flasher module has a failed left-side output that does not deliver pulsed voltage to the switch
- D. The wiring between the fuse panel and the multifunction switch for the left turn circuit has an open

27. A technician is diagnosing a truck with a slow-crank condition. The battery bank reads 12.65 volts at rest. During cranking, the positive cable voltage drop is 0.3 volts and the ground cable voltage drop is 0.2 volts. Both are within specification. The starter current draw is 195 amps — within the 180 to 220 amp specification. Despite all readings being within specification, the engine cranks slowly. What should the technician investigate next?

- A. The alternator output to determine if the batteries are being fully charged during operation
- B. The engine's mechanical condition — oil viscosity, compression, and accessory drag — since the electrical system has been verified as healthy and the slow cranking may be caused by excessive mechanical resistance in the engine itself
- C. The starter motor armature for a developing short that has not yet exceeded the current specification
- D. The battery CCA ratings to determine if the batteries are adequately sized for this engine application

28. A commercial vehicle's right headlight works perfectly when no trailer is connected. When a trailer is plugged in, the right headlight dims by approximately 30%. Disconnecting the trailer restores full brightness. The left headlight is unaffected. What is the most likely cause?

- A. A faulty J560 connector with a crossed pin that connects the trailer's green (right turn/stop) wire to the right headlight circuit, adding trailer load to the headlight

B. A body controller module that reduces right headlight output when trailer load is detected to prevent alternator overload

C. The trailer's combined right-side lighting load exceeds the alternator's capacity to maintain voltage to the right headlight circuit

D. A ground fault in the trailer wiring that returns current through the right headlight circuit instead of the proper ground path, creating a current path that steals voltage from the headlight

29. A heavy-duty truck's alternator output is being tested. With the engine at 2,000 RPM and all loads on, the alternator produces 14.0 volts and 135 amps. The alternator is rated at 160 amps. The technician turns off the headlights (reducing load by approximately 12 amps), and the alternator output drops to 123 amps while voltage remains at 14.0 volts. Is this behavior normal?

A. Yes — the alternator produces only the current demanded by the electrical system; when the headlight load is removed, total demand decreases by 12 amps and the alternator reduces its output accordingly

B. No — removing a 12-amp load should only reduce output by 12 amps, but it dropped by 12 amps so this appears correct at first glance; however, the voltage should have increased slightly with the reduced load

C. No — the alternator output should remain constant regardless of load changes if the regulator is functioning properly

D. Yes — but only if the battery bank is fully charged; a partially discharged bank would draw additional current to compensate

30. A truck's scan tool shows the body controller module commanding the cab marker lights at 100% duty cycle, but the lights are illuminated at approximately 50% brightness. The BCM output pin measures 12.3 volts. What does steady voltage at the BCM with reduced brightness at the lights indicate?

A. The BCM is internally voltage-limiting the marker output despite showing 100% in the scan data

B. The marker light bulbs have been replaced with incorrect lower-wattage units that produce less light at the same voltage

C. Excessive resistance in the wiring between the BCM and the marker lights or in the ground return path is dropping voltage before it reaches the bulbs

D. The BCM's output driver is failing and cannot sustain full current delivery despite measuring correct no-load voltage at the pin

31. A fleet technician discovers that a specific model of truck in the fleet consistently blows the left headlight low-beam fuse during cold morning starts, but the fuse remains intact once the engine warms up and the headlights are turned on during the day. The left headlight bulb is the correct part number. What is the most likely cause?

A. The headlight fuse blows during cold starts because the cold engine draws higher cranking current that creates a voltage spike when the starter disengages, and the fuse rating is marginal for the circuit's actual current draw during that transition

B. The left headlight circuit has a cold-sensitive short — possibly a connector or wire joint that contracts in cold temperatures and contacts a ground surface, creating an overcurrent path that opens when the material warms and expands

C. The alternator produces a momentary high-voltage pulse during cold-start engagement that overloads the left headlight fuse

D. The left headlight bulb is defective and draws higher inrush current when cold that exceeds the fuse rating

32. A commercial vehicle's scan tool retrieves a DTC from the transmission control module: "Turbine Speed Sensor — Signal Missing." The transmission operates in limp-home mode with only one forward gear available. The technician measures the sensor resistance at 1,250 ohms — within the 1,000 to 1,500 ohm specification. What should the technician check next?

A. The transmission fluid level and condition since contaminated fluid can affect sensor performance

B. The sensor output signal by spinning the input shaft and measuring AC voltage output with a DMM to verify the sensor generates a valid signal

C. The TCM's internal processor for a fault that prevents it from reading the turbine speed channel

D. The wiring and connectors between the TCM and the turbine speed sensor for an open, short, or high-resistance fault that prevents the signal from reaching the module despite the sensor being electrically healthy

33. A truck's power window motor runs in both directions when tested at the motor connector with a jumper wire, but does not respond to the window switch in either direction. The window lock switch is in the unlocked position. The fuse is good. What is the most likely cause?

- A. A body controller module output fault that has disabled the window motor drive for that door
- B. A failed window motor relay that does not respond to the switch input
- C. A faulty window switch, an open in the wiring between the switch and the motor, or a failed master switch that is not delivering power to the individual door switch circuit
- D. A window regulator mechanism that is jammed and preventing motor rotation through switch command

34. A heavy-duty truck's battery slow-charge has been running for eight hours. The charger indicates the battery accepted 80 amp-hours of charge. The battery's rated capacity is 200 amp-hours. The technician checks the open circuit voltage and reads 12.48 volts. What does the 12.48-volt reading after accepting 80 amp-hours indicate?

- A. The battery was deeply discharged before charging and has not yet reached full charge — it needs additional charging time to reach 12.6 volts or higher before capacity testing can be performed
- B. The charger malfunctioned and did not deliver the indicated 80 amp-hours to the battery
- C. The battery has a defective cell that is preventing it from reaching full charge voltage despite accepting significant current
- D. The battery has reached full charge and the 12.48-volt reading is normal for a battery immediately after an extended slow charge

35. A technician is diagnosing a truck where the scan tool communicates with the ECM and reads all sensor data correctly. However, when the technician attempts to command an output test — such as activating a fuel injector through the scan tool — the ECM does not respond. The scan tool reports "Bi-directional control not supported." What is the most likely cause?

- A. The engine is running and the ECM blocks bi-directional commands during engine operation as a safety measure
- B. The scan tool software does not have the correct bi-directional control protocol for this specific ECM model or software version

- C. The ECM's internal output driver board has failed and cannot respond to external commands
- D. A CAN bus configuration error prevents the scan tool from sending command messages to the ECM

36. A commercial vehicle's right side identification lights — the three red lights on the upper right corner of the cab — are all inoperative. The left side identification lights work normally. All marker and clearance lights work on both sides. The fuse is good. What does the right ID lights failing independently while everything else works indicate?

- A. A body controller module output driver failure affecting only the right-side identification light channel
- B. The headlight switch has an internal fault that disconnects the right-side ID light output when the switch is activated
- C. A voltage regulation imbalance that delivers insufficient current to the right-side ID light circuit
- D. An open in the dedicated wire or connector that feeds the three right-side identification lights after the point where that circuit branches from the shared lighting power distribution

37. A heavy-duty truck's batteries have been installed with the inter-connect cables at the factory-specified length. The technician notices that one cable appears to be stretched taut between two battery terminals with no slack. Why is this a concern?

- A. A cable under tension stresses the battery terminal posts and the crimp connections at each end — engine and road vibration will progressively work the terminals loose, crack the battery case around the post, or fatigue the cable strands at the crimp, eventually creating a high-resistance or open connection
- B. A taut cable restricts airflow between the batteries, reducing cooling and accelerating electrolyte evaporation
- C. The cable tension indicates the batteries are installed too far apart and the battery tray must be modified
- D. A cable under tension will overheat because the stretched conductor strands have increased resistance

38. A truck's scan tool shows the ABS module receiving valid wheel speed signals from all four wheels during normal driving. The driver reports that the ABS activates aggressively during normal stops on dry pavement at low speed. No DTCs are stored. What should the technician investigate?

- A. The brake system for a stuck caliper or contaminated pad on one wheel that locks earlier than the others during normal braking
- B. The ABS module software for a known calibration issue that sets the activation threshold too low for this vehicle weight
- C. The tire sizes on all four wheels — if one tire has significantly different rolling diameter than the others due to wear, incorrect replacement, or a mismatched spare, the ABS module interprets the different wheel speed as impending lockup
- D. The brake fluid for moisture contamination that reduces boiling point and causes premature ABS activation

39. A commercial vehicle's power locks work normally from both the driver switch and the key fob remote. However, when the driver uses the key to manually lock the driver door, the power locks on all other doors also engage. The driver expects the key to lock only the driver door mechanically without triggering the other doors. Is this behavior a fault?

- A. No — the driver door lock cylinder is connected to the lock actuator, and the actuator's movement triggers a signal that the body controller module interprets as a lock command for all doors
- B. No — many commercial vehicles use a one-key-locks-all system where the key cylinder has a switch that sends a lock-all command to the body controller
- C. No — this is a standard feature on this vehicle — the key cylinder lock triggers the door lock switch or BCM input that commands all doors to lock simultaneously, functioning as designed
- D. Yes — the key cylinder should only lock the driver door mechanically, and the other doors locking indicates a wiring fault between the key cylinder switch and the BCM

40. A heavy-duty truck's alternator has been replaced. The replacement unit charges at 14.3 volts with loads off but drops to 13.0 volts under heavy electrical load at 2,000 RPM. The previous alternator maintained 14.0 volts under the same conditions. What should the technician check?

- A. The replacement alternator's internal stator and rotor for a manufacturing defect that limits maximum output
- B. The battery state of charge since partially discharged batteries demand more current from a new alternator

C. The engine idle speed setting, as low idle reduces alternator output at that RPM

D. The alternator's output cable and connections, the sense wire routing, and the field connector to verify the replacement unit is properly connected — a loose B+ terminal, a disconnected sense wire, or a misrouted field wire can limit the alternator's ability to respond to heavy loads

41. A truck driver reports that the heated windshield works correctly on both zones, but a burning smell emanates from the dash area after approximately 10 minutes of operation. No fuses are blown and the system functions normally. What should the technician investigate?

A. The heated windshield relay or its connector for a high-resistance contact that generates heat under the sustained 20 to 30 amp current draw of the heating elements

B. The heated windshield elements for a resistance lower than specification that causes them to draw excessive current

C. The heated windshield glass itself for a defect that concentrates heat at the edge seal, producing an odor from the heated adhesive

D. The alternator for an overcharging condition that delivers excessive voltage to the heating elements

42. A technician discovers that a truck's aftermarket trailer camera system was installed using wire taps (scotch-lock connectors) on the trailer lighting harness. The camera system works but the trailer tail lights now flicker intermittently. What is the connection between the wire taps and the flickering?

A. The camera system is drawing excessive current from the tail light circuit, causing voltage fluctuations

B. The scotch-lock connector has pierced through the tail light wire conductor strands and partially severed them

C. Wire tap connectors are unreliable in the high-vibration commercial vehicle environment — they create a marginal contact that intermittently loses connection, and the metal blade can damage the original wire's conductor strands, introducing resistance and instability into the tail light circuit

D. The camera system's ground wire is backfeeding current into the tail light circuit through the scotch-lock

43. A commercial vehicle's scan tool shows the transmission oil temperature rising steadily during a road test — from 185°F to 210°F to 235°F over 30 minutes — while the driver reports the truck feels fine and shifts normally. At 235°F, the transmission warning light illuminates. Is the rising temperature a fault in the electrical sensor system or an actual mechanical condition?

A. An actual sensor reading should be verified by checking for hot transmission fluid smell, checking the transmission dipstick for overheated fluid color and odor, or using an infrared thermometer

B. The steady progressive rise over 30 minutes confirms the temperature sensor is accurate — sensor failures typically produce sudden jumps or fixed readings, not gradual changes that correlate with driving duration

C. The warning light at 235°F activating at the programmed threshold confirms the electrical warning system is functioning correctly based on the data it receives

D. The technician cannot determine whether the reading is accurate or a sensor fault from the scan tool data alone and must independently verify the actual temperature

44. A heavy-duty truck has four batteries in parallel. During a load test, Battery 1 holds 9.8 volts, Battery 2 holds 9.7 volts, Battery 3 holds 9.1 volts, and Battery 4 holds 9.5 volts. What action should be taken?

A. Recharge all four batteries and retest since the cold ambient temperature may have reduced their load test performance

B. Replace Battery 3 and Battery 4 because they are both below specification

C. Replace only Battery 3 since it is the only one below the 9.6-volt minimum at 70°F

D. Replace all four batteries as a matched set because Battery 3 has failed at 9.1 volts, Battery 4 at 9.5 volts is borderline, and mixing new batteries with the two older passing units creates a bank imbalance

45. A truck's electronic cruise control system sets speed correctly but surges — accelerating and decelerating in a rhythmic pattern. The speedometer also oscillates slightly, confirming the vehicle speed is actually varying. No DTCs are stored. What is the most likely cause?

A. A cruise control module with a failing internal processor that cannot maintain steady throttle commands

B. An ECM fuel delivery calibration issue that causes fuel injection pulsation during steady-state cruise operation

C. An erratic vehicle speed sensor signal that fluctuates around the actual speed, causing the cruise control to constantly chase the varying input with throttle corrections

D. A worn throttle actuator motor that cannot hold a steady throttle position and drifts between incremental positions

46. A fleet technician has installed aftermarket LED clearance lights on a truck. The LEDs work correctly, but the body controller module sets "open circuit" DTCs for each LED-equipped position. What should the technician install to eliminate the false codes?

A. Load resistors in parallel with each LED assembly to increase the total circuit current draw above the BCM's minimum detection threshold for each output

B. A signal converter module between the BCM and the LED assemblies to simulate incandescent bulb characteristics

C. A CAN bus filter that prevents the BCM from monitoring the affected clearance light outputs

D. A BCM firmware update that includes LED-compatible current thresholds for the clearance light outputs

47. A commercial vehicle's power seat adjustment operates normally in all directions when the ignition is on. With the ignition off, the power seat does not respond to any switch input. The driver expects seat adjustment to be available with the ignition off. How should the technician determine if this is a fault or a design feature?

A. Check the wiring diagram to determine if the power seat circuit is wired through a switched ignition feed or a constant battery feed — the answer determines whether ignition-off operation is available by design

B. Test for voltage at the seat connector with the ignition off to determine if the BCM is withholding power

C. Check the fuse panel for a separate always-hot seat circuit fuse that may have blown

D. Consult the body controller module configuration for a seat-power-off-with-ignition parameter

48. A heavy-duty truck's battery specific gravity readings are: Cell 1: 1.265, Cell 2: 1.260, Cell 3: 1.258, Cell 4: 1.262, Cell 5: 1.260, Cell 6: 1.255. The ambient temperature is 100°F. What are the temperature-corrected readings and what do they indicate?

A. Add 0.008 to each reading (0.004 per 10°F above 80°F for 20°F above) — corrected readings range from 1.263 to 1.273, indicating a fully charged battery with healthy cell balance well within the 0.050 maximum variation

B. Subtract 0.008 from each reading — corrected readings range from 1.247 to 1.257, indicating the battery needs additional charging

C. Add 0.020 to each reading — corrected readings range from 1.275 to 1.285, indicating an overcharged battery that may have been damaged

D. No correction needed at 100°F since specific gravity is only corrected for temperatures below 80°F

49. A truck's right rear turn signal on the trailer flashes at the correct rate, but the brightness alternates between full intensity and approximately 50% intensity with each flash cycle. The left side flashes at uniform full brightness. What is the most likely cause?

A. A faulty turn signal flasher module that delivers inconsistent voltage pulses on the right-side output

B. A body controller module PWM error that modulates the right turn output at an incorrect duty cycle

C. A high-resistance connection in the trailer's right turn signal circuit that worsens under current flow — during the first flash, the connection heats and resistance increases, reducing brightness on the next cycle; the brief off-period allows slight cooling, partially restoring conductivity for the next bright flash

D. A dual-filament bulb installed incorrectly in the right rear socket with the turn signal current alternately passing through the main filament and the lower-wattage filament

50. A fleet of trucks experiences a common complaint: the electronic logging device shows "Vehicle Motion Detected — No Driver Logged In" alerts during periods when trucks are parked with engines off. No driver is present. The ELDs receive vehicle speed data from the J1939 bus. What is the most likely cause?

A. Electrical noise on the J1939 bus is generating phantom speed data pulses that the ELD interprets as vehicle motion — a marginal bus connection, a corroding connector pin, or electromagnetic interference from an adjacent circuit is producing brief voltage transients that mimic valid speed signal broadcasts

B. The ELD firmware has a known bug that generates false motion alerts when battery voltage fluctuates below 12.4 volts during overnight parking

C. Wind gusts are physically moving the parked trucks enough for the wheel speed sensors to generate actual speed pulses

D. The GPS module in the ELD is detecting position drift from satellite signal multipath in the parking yard

# PRACTICE EXAM 15: ANSWER KEY

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1. C — When two unrelated systems fail simultaneously, the most efficient first step is identifying whether they share a common power source. A single blown fuse, tripped circuit breaker, or failed power feed that supplies both circuits explains the simultaneous failure with one root cause. Testing individual components first wastes time if the shared upstream source is the actual failure point.
2. A — In a parallel battery bank under light parasitic load, the inter-connect cables carry the small equalizing current between batteries. All other cables reading less than 0.02 volts proves those connections have negligible resistance. The 0.22-volt reading across the Battery 2 to Battery 3 cable reveals a high-resistance terminal connection that will worsen dramatically under the hundreds of amps demanded during cranking.
3. D — The alternator producing 140 amps against its 160-amp rating has adequate reserve capacity, and the fan only draws 60 amps. The dimming occurs because the headlight and fan circuits share a power feed wire, a fuse panel bus bar, or a ground return path. The 60-amp fan current flowing through the shared section creates a voltage drop that reduces the voltage available to the headlights during fan operation.
4. B — The dome light going out when the fuse is pulled confirms the light is powered through its normal fused circuit — not through a backfeed or alternate power path. The fuse itself is good and the power supply upstream of the fuse is normal. The fault is in the control section downstream of the fuse — a stuck switch, a welded relay, a shorted door jamb switch, or a BCM commanding the output on continuously.
5. A — Both technicians describe essential steps of a proper crimp procedure. The stripped conductor must completely fill the crimp barrel to maximize the metal-to-metal contact area — insulation inside the barrel prevents proper contact and creates a high-resistance joint. The pull test after crimping verifies the terminal is mechanically secure and will not separate under vibration during vehicle operation.
6. C — The pattern of normal cranking when cold, slow cranking after a 30-minute hot soak, and normal cranking again after cooling is the classic signature of starter heat soak. The starter motor absorbs heat from the adjacent engine and exhaust manifold during the stop. Elevated internal temperature increases the resistance of the motor windings and brushes, reducing cranking performance until the starter cools back to a functional temperature range.
7. B — The coil has 12.3 volts on the power terminal and 0.1 volts on the ground terminal. The 0.1-volt ground reading means the ground path is essentially complete — the ground side is at near-zero potential. With 12.2 volts available across the coil (12.3 minus 0.1) and a complete ground path,

current should be flowing through the coil and producing an electromagnetic field. The relay not clicking despite adequate power and ground confirms the coil winding itself is open.

8. B — Normal injector resistance is 11 to 14 ohms. A reading of 0.4 ohms indicates a near-complete short — either the injector winding has shorted internally, or the wiring between the ECM pins and the injector has a short-to-ground that creates a low-resistance path. The ECM detects the resulting excessive current flow and sets a "circuit high" code because the current exceeds the expected range for that injector driver.
9. D — Federal odometer regulations require the correct accumulated mileage to be programmed into any replacement instrument cluster. A cluster displaying 0 miles on a truck with 287,000 actual miles constitutes an odometer discrepancy that violates federal law and affects the vehicle's legal status, resale value, and warranty documentation. The correct mileage must be programmed before the truck is returned to service.
10. A — The washer pump operating with the ignition off means it is connected to a power source that is always hot — directly from the battery or from an always-hot fuse position — rather than a switched ignition feed that only provides power when the key is on. This may be the factory design for this specific vehicle model, or it may result from a previous wiring repair that connected the pump to the wrong power source.
11. B — A horn that works in the shop but fails during driving suggests a connection that is stable under static conditions but fails under the dynamic conditions of driving. The steering column clock spring maintains the horn circuit connection between the rotating steering wheel and the stationary vehicle harness. A worn or damaged clock spring conductor that opens under steering movement or driving vibration would produce exactly this intermittent pattern.
12. C — Every measurement falls within its respective specification. Voltage at 14.3 volts is within the 13.5 to 14.5 range. AC ripple at 0.35 volts is below the 0.5-volt maximum. Output-side voltage drop at 0.3 volts is below the 0.5-volt maximum. Ground-side voltage drop at 0.2 volts is below the 0.3-volt maximum. The charging system is performing within all parameters and no repair or further investigation is needed.
13. D — A relay rated at 30 amps controlling a 4-amp load simply has more capacity than the circuit requires. The contacts will close fully regardless of load current — relay contacts are designed to make physical connection through spring pressure, not current flow. The higher-rated relay provides additional safety margin and will experience less contact wear than a relay operating near its maximum rating.
14. A — A no-load bench test spins the starter without the mechanical resistance of compressing an engine. The technician measures free-spinning RPM and current draw. If the new bushings properly center the armature, the starter spins freely at the specified RPM with the specified no-load current. Excessive current or low RPM on the bench indicates the bushings are still causing the armature to drag, and further adjustment is needed before installation.

15. C — The scan tool confirming 0 PSI rail pressure during cranking could indicate either a fuel system mechanical fault or a sensor/circuit fault. However, the engine not starting with 0 PSI rail pressure most directly points to no actual fuel pressure being generated. A failed high-pressure pump, a stuck-open pressure relief valve, or a severed supply line would prevent any pressure buildup, explaining both the 0 PSI reading and the no-start condition.
16. B — The tractor tail lights working steadily and the trailer markers and clearance lights working normally eliminate the headlight switch, fuse, and BCM output as causes. The trailer tail lights specifically flashing on and off while other trailer circuits are stable isolates the fault to the brown wire (tail/license plate) path in the J560 connector. A loose or corroded pin on that specific circuit makes and breaks contact, producing the rapid flashing.
17. A — A progressive alternator bearing failure follows a predictable pattern. The initial whining noise indicates the bearing has lost lubrication or developed surface damage. Over time, the bearing deteriorates further, increasing friction and resistance. Eventually, the bearing degrades enough to slow or stop the rotor from spinning at the speed required for adequate output, and the charging system fails — producing the warning light and voltage drop to battery-only levels.
18. D — The left headlight working on both beams confirms the dimmer switch, headlight relay, main power feed, and common wiring are all functional. The right headlight working on high beam confirms its socket, ground connection, and the high-beam power path are intact. The fault is isolated to the right low-beam specifically — either the low-beam filament has burned out in the dual-filament bulb, or the wire dedicated to the right low-beam circuit has an open.
19. C — The battery disconnect switch is designed to completely interrupt all electrical connections between the battery bank and the vehicle. When the switch is turned off, every circuit loses power — including the low-current keep-alive feeds that maintain clock data, radio presets, and seat memory positions. When power is restored, these volatile memory settings are lost. This is expected behavior and is the trade-off for the security and safety benefits of a full disconnect.
20. B — A stored overcurrent code with the circuit currently functioning normally suggests the overcurrent event was intermittent. Clearing the code and monitoring during a road test determines whether the condition recurs under the dynamic conditions of driving — vibration, heat cycling, and harness movement. An intermittent short-to-ground from a chafed wire that contacts a ground surface during driving but loses contact when stationary would produce exactly this pattern.
21. D — Heat-damaged insulation that has not yet exposed bare conductors is a ticking time bomb. The stiffened, discolored insulation has lost its flexibility and protective properties. Continued heat exposure will cause it to crack and crumble, eventually exposing the conductors and creating a short-to-ground or fire hazard. Rerouting the harness away from the heat source and securing it properly eliminates the progressive damage before it causes a failure.
22. A — Repeated wire damage at the same location from the same cause requires a protective solution at the point of vulnerability. A split-loom conduit or abrasion-resistant sleeve over the exposed section

of the sensor wire provides a physical barrier between the wire and the road debris that has been cutting it. This addresses the root cause of the recurring damage without modifying the sensor circuit or adding unnecessary redundancy.

23. B — The mirror-image dual-signal design provides the ECM with a built-in error-detection mechanism. If Signal 1 increases, Signal 2 must decrease by the same amount. If both signals move in the same direction, or if one signal does not mirror the other within the programmed tolerance, the ECM knows the TPS has a fault. This redundancy prevents a single sensor failure from causing undetected incorrect throttle commands.
24. A — Heavy corrosion concentrated on the positive terminals with clean negative terminals indicates a localized acid source near the positive posts. Battery vent caps that are not fully seated or a crack in the battery case near the positive terminal allows acid vapor or liquid electrolyte to continuously contact the positive terminal area. The charging system is within normal range, eliminating overcharging as the cause.
25. C — The scan tool confirms the ECM broadcasts the correct RPM value, eliminating the crankshaft position sensor and the data bus as causes. All other cluster functions being accurate eliminates a cluster-wide power supply or calibration fault. The tachometer displaying 200 RPM higher than the bus data it receives isolates the fault to the cluster's tachometer stepper motor or its internal position calibration for that specific gauge.
26. A — The test light confirms voltage reaches the multifunction switch and is present at the right turn output when selected, proving the fuse, power feed, and the switch's right contact are functional. Zero voltage at the left turn output with the left turn selected confirms the switch's left turn contact is not passing voltage. The internal left turn contact has failed — it is open — while the right contact continues to function normally.
27. B — Every electrical component in the starting system has been verified within specification — batteries, cables, connections, and starter motor current draw. If the electrical system is healthy but the engine cranks slowly, the resistance is not electrical but mechanical. Excessive engine oil viscosity, high compression from a carbon buildup, a dragging accessory such as a seized A/C compressor, or tight engine bearings create mechanical resistance that slows cranking despite a fully functional electrical system.
28. D — The right headlight working perfectly without a trailer and dimming 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 right headlight circuit, creating a voltage drop that dims the headlight.
29. A — The alternator is a demand-responsive device — it produces only the current the electrical system requires, not its maximum rated capacity at all times. When the headlights are turned off and 12 amps of load is removed, total system demand decreases. The voltage regulator responds by

reducing field current, and the alternator's output drops by the 12 amps that are no longer needed. This is normal regulator behavior.

30. C — The BCM output pin measuring a steady 12.3 volts confirms the module is delivering full voltage. The lights operating at only 50% brightness despite full BCM output voltage means voltage is being lost between the BCM and the lights. Excessive resistance in the wiring, connectors, or ground return path between the BCM output and the marker light sockets drops voltage before it reaches the bulbs, reducing brightness proportionally.
31. B — A fuse that blows only during cold conditions and functions normally once warm indicates a temperature-dependent short. A connector or wire joint that contracts in cold temperatures may contact a ground surface — a sharp bracket, an exposed bolt, or the vehicle frame — only when the material shrinks in the cold. When the material warms and expands, the contact is broken and the short clears, allowing the fuse to remain intact.
32. D — The sensor resistance testing within specification proves the sensor element is electrically healthy. A "signal missing" code means the TCM is not receiving the signal despite the sensor being capable of generating it. The wiring between the TCM and the sensor — including connectors, splices, and exposed sections — is the most likely location for an open, short, or high-resistance fault that prevents the valid signal from reaching the module.
33. C — The motor running in both directions with a jumper wire proves the motor and regulator mechanism are functional. The window lock switch being in the unlocked position eliminates the lockout function as the cause. The motor not responding to the switch in either direction means no power is reaching the motor through the normal switch-controlled path — a failed window switch, an open in the wiring between the switch and motor, or a failed master switch not delivering power to that door's switch circuit.
34. A — A reading of 12.48 volts corresponds to approximately 70% state of charge — below the 75% minimum (12.4 volts) needed for load testing but suggesting the battery is accepting charge and making progress. The battery started from a deeply discharged state and has accepted 80 amp-hours but needs additional charging time to reach full charge at 12.6 volts or higher before capacity testing produces reliable results.
35. B — The scan tool communicating with the ECM and reading all sensor data confirms the physical connection, communication protocol, and read access are all working. The inability to perform bi-directional output commands is a separate function that requires the scan tool software to have the specific command protocols for this ECM model and version. Different ECM manufacturers and software versions use different bi-directional control procedures.
36. D — All marker and clearance lights working on both sides eliminates the headlight switch, main fuse, and common power distribution as causes. The left ID lights working eliminates the ID light fuse (if shared). The three right-side ID lights failing together while everything else works isolates the fault to the dedicated circuit branch feeding those three lights — an open in the wire, a

disconnected connector, or a corroded splice after the point where the right ID circuit branches from the shared distribution.

37. A — A cable under constant tension between two battery terminals experiences continuous mechanical stress at both terminal connections. Engine vibration and road impacts repeatedly flex the taut cable, progressively fatiguing the conductor strands at the crimp points and stressing the battery terminal posts. Over time, the crimp connection loosens, strands break, and the terminal posts can crack the battery case — all creating high-resistance connections or catastrophic failures.
38. C — The ABS module receiving valid wheel speed signals and having no DTCs indicates the sensors and module are functioning correctly. ABS activating aggressively during normal stops on dry pavement suggests the module is interpreting a genuine speed difference between wheels. Mismatched tire diameters — from uneven wear, an incorrect replacement, or a mismatched spare — cause actual rotational speed differences that the ABS module correctly identifies as impending lockup.
39. C — Many commercial vehicles are designed with a one-key-locks-all feature where turning the key in the driver door cylinder triggers a switch or actuator signal that the body controller module interprets as a lock-all command. This is a standard convenience and security feature — not a wiring fault. The key cylinder's mechanical movement activates the door lock switch circuit, which sends the same lock-all signal as the power lock button.
40. D — The previous alternator maintaining 14.0 volts under heavy load proves the vehicle's electrical system demand is within a 160-amp alternator's capability. The replacement unit dropping to 13.0 volts under the same conditions suggests it is not responding to load demand as effectively. A loose B+ connection, a disconnected sense wire, or a misrouted field wire on the replacement unit limits its ability to increase output when demand rises.
41. A — The heated windshield system drawing 20 to 30 amps through its relay creates significant current flow across the relay contacts for sustained periods. If the relay contacts or their connector terminals have developed resistance — from oxidation, corrosion, or wear — the  $P = I^2R$  heat generation under this high sustained current becomes significant enough to produce a burning smell at the relay location behind the dash.
42. C — Wire tap (scotch-lock) connectors use a metal blade that pierces through wire insulation to make contact with the conductor. In a commercial vehicle's high-vibration environment, the blade's contact point is inherently unreliable — it creates a small nick in the conductor strands that can sever some strands over time, and the connection loosens under vibration. The damaged conductor and intermittent contact cause the tail light flickering.
43. B — A sensor failure typically produces sudden jumps, fixed readings, or erratic spikes — not a smooth, progressive temperature rise that correlates with driving duration. The steady climb from 185°F to 235°F over 30 minutes follows the expected thermal profile of a transmission under

sustained load. While independent verification with a secondary measurement is always prudent, the progressive pattern strongly suggests an actual temperature condition rather than a sensor fault.

44. D — Battery 3 at 9.1 volts has clearly failed the load test. Battery 4 at 9.5 volts is below the 9.6-volt threshold and has also failed. Batteries 1 and 2 pass at 9.8 and 9.7 volts respectively, but replacing only the two failed batteries creates a bank with two new units paired with two aging units. The best practice is replacing all four as a matched set to ensure balanced internal resistance and capacity across the parallel bank.
45. C — The speedometer confirming the vehicle speed actually varies eliminates the cruise control module and throttle actuator as sole causes — the truck is physically accelerating and decelerating. An erratic vehicle speed sensor signal that fluctuates around the true speed forces the cruise control to continuously adjust throttle to chase the perceived speed changes. Each correction creates an actual speed change that the erratic sensor then misreads, perpetuating the surge cycle.
46. A — Load resistors connected in parallel with each LED assembly increase the total current draw on each BCM output to a level that matches or exceeds the module's minimum detection threshold. The BCM was calibrated to monitor incandescent bulb current — LEDs draw far less. The resistor simulates the missing incandescent current draw, preventing the BCM from interpreting the low LED current as an open circuit.
47. A — The simplest way to determine whether ignition-off seat operation is available is to check the vehicle's wiring diagram. If the power seat circuit is wired through a switched ignition relay or fuse position, it only receives power with the ignition on — this is a design feature, not a fault. If it is wired to a constant feed and should work with the ignition off, then a fault exists in the always-hot power path.
48. B — At 100°F, the temperature is 20°F above the 80°F standard. The correction is +0.004 for each 10°F above 80°F, which equals +0.008. Adding 0.008 to each reading: Cell 1: 1.273, Cell 2: 1.268, Cell 3: 1.266, Cell 4: 1.270, Cell 5: 1.268, Cell 6: 1.263. The corrected range of 1.263 to 1.273 confirms all cells are fully charged with a maximum variation of only 0.010 — well within the 0.050 limit.
49. C — Alternating brightness between full intensity and reduced intensity with each flash cycle points to a connection that worsens under current flow and partially recovers during the off period. A high-resistance connection heats during the on-cycle, increasing its resistance and reducing brightness. During the brief off-cycle, the connection cools slightly, partially recovering its conductivity for the next flash. This thermal cycling produces the characteristic alternating brightness pattern.
50. A — The ELDs receive vehicle speed data from the J1939 bus. Electrical noise on the bus — from a marginal connector, a corroding pin, or electromagnetic interference from an adjacent circuit — can produce brief voltage transients that the ELD's bus receiver interprets as valid speed data packets indicating vehicle motion. The phantom speed pulses are brief enough that no other module detects a communication fault, but the ELD's motion detection algorithm flags them as vehicle movement.