# PRACTICE EXAM 15: ASE A6 SIMULATION (50 QUESTIONS)

1. A 144-watt headlight assembly operates at 12 volts. The current draw of this assembly is:

A. 0.083 amperes during operation

B. 1728 amperes at peak output

C. 12 amperes through the circuit

D. 156 amperes at steady state

2. A technician measures 9 volts at the input to a switch and 9 volts at the output. Zero volts reaches the load. The fault is located in:

A. The wiring between the switch output and the load

B. The switch itself, which has failed to close

C. The battery supplying the switch input circuit

D. The ground connection at the load component

3. Watt's Law expresses the relationship between:

A. Voltage and resistance in a DC circuit only

B. Current flow in different parts of a series circuit

C. Resistance and temperature in conductors

D. Power, voltage, and current in any circuit

4. A wire color code of "VT/WH" on a schematic indicates:

A. A solid violet wire with no tracer marking

B. A violet base color with a white tracer stripe

C. A white wire with an orange secondary stripe

D. Two separate wires bundled together, violet and white

5. The formula for calculating resistance when voltage and current are known is:

A. $R = E \times I$ (resistance equals voltage times current)

B. $R = I \times E$ (resistance equals current multiplied by voltage)

C. $R = E \div I$ (resistance equals voltage divided by current)

D. $R = I^2 \times E$ (resistance equals current squared times voltage)

6. A technician observes a fuse that blows immediately after replacement. The MOST likely cause is:

A. A normal inrush current event during startup

B. An open circuit between the battery and load

C. Normal fuse aging requiring upgraded replacement

D. A short to ground in the circuit causing excessive current

7. Technician A says that a logic probe is safer than a conventional test light for testing sensor signals. Technician B says a conventional test light can damage module inputs due to its higher current draw. Who is correct?

A. Both A and B, both observations are valid

B. Technician A only; logic probes are preferred

C. Technician B only; test lights damage modules

D. Neither; both tools are interchangeable on all circuits

8. A soldered electrical splice must be protected from moisture intrusion because:

A. Moisture improves electrical conductivity within the splice

B. Moisture causes corrosion that creates high resistance over time

C. Moisture prevents the solder from properly bonding to copper

D. Moisture has no significant effect on automotive applications

9. A lab scope waveform shows a 12-volt signal that is high for 3 milliseconds and low for 7 milliseconds in each cycle. The duty cycle of this signal is:

A. 70 percent of full duty cycle

B. 50 percent of normal output

C. 43 percent at typical operation

D. 30 percent of the total cycle time

10. A technician uses a DMM on the continuity setting and hears a beep when probing a wire. This indicates:

A. A short to ground in the wire being tested

B. An open circuit requiring immediate repair

C. Good continuity through a complete circuit path

D. Excessive resistance in the wire connection

11. A wire gauge of 18 AWG has:

A. A smaller cross-section than 14 AWG wire

B. The same cross-section as 22 AWG wire

C. A larger cross-section than 10 AWG wire

D. A cross-section unrelated to current-carrying capacity

12. Technician A says an MOSFET uses voltage to control current between drain and source. Technician B says an MOSFET gate draws substantial current during switching. Who is correct?

A. Technician B only; gates draw current during switching

B. Both A and B, both statements are accurate

C. Neither, both statements are incorrect entirely

D. Technician A only; MOSFET gates are voltage-controlled

13. A technician measures 14 volts at the battery during engine operation with the headlights and HVAC blower running. This reading indicates:

A. An overcharging condition requiring immediate repair

B. Normal charging system operation under load

C. A completely discharged battery unable to accept charging

D. A failed voltage regulator producing incorrect output

14. A flooded lead-acid battery reading 12.0 volts at rest is approximately:

A. 25 percent state of charge

B. 50 percent state of charge

C. 75 percent state of charge

D. Fully charged at 100 percent capacity

15. An AGM battery is preferred over a flooded battery for start-stop applications because:

A. AGM produces higher nominal voltage output

B. AGM is significantly less expensive than flooded

C. AGM tolerates repeated deep-cycle discharge better

D. AGM requires no specific charging profile

16. A starter draws 350 amperes during cranking on a vehicle rated for 180 amperes. This indicates:

A. A healthy starter operating at peak efficiency

B. Starter internal binding or shorted armature windings

C. A normal condition for diesel engine starting

D. Excessive battery voltage forcing overcurrent flow

17. Before performing a parasitic draw test, the technician should:

A. Disconnect the alternator from the charging circuit

B. Remove all fuses from the main fuse panel first

C. Fully discharge the battery for accurate readings

D. Allow the vehicle to sleep for at least 30 minutes

18. When connecting jumper cables to boost a vehicle, the final ground connection should be made to:

A. The negative terminal of the discharged battery directly

B. Any painted body panel of the discharged vehicle

C. The engine block of the discharged vehicle, away from the battery

D. The positive terminal of the good vehicle for safety

19. Cold Cranking Amperes (CCA) is measured at:

A. 0°F for 30 seconds while maintaining 7.2 volts minimum

B. 70°F under typical shop temperature conditions

C. 32°F for 15 seconds at half the rated capacity

D. −40°F under extreme cold-weather conditions

20. A battery that fails a load test, dropping to 8.8 volts at one-half the CCA rating, is:

A. Marginal but acceptable for normal service

B. Defective and requires replacement

C. Fully charged and operating properly

D. Lightly discharged and needs charging first

21. Sulfation in a lead-acid battery typically occurs when:

A. The battery is overcharged at high voltages repeatedly

B. The battery is left in a partially discharged state for extended periods

C. New electrolyte is added to an old battery's cells

D. The alternator produces AC ripple above normal levels

22. Battery registration on a modern vehicle with BCM-controlled charging is required because:

A. The battery's warranty begins at the registration date

B. Federal law mandates battery documentation for all replacements

C. The BCM's charging strategy must be updated for the new battery

D. The BCM must verify the battery's physical dimensions

23. The voltage regulator in a modern alternator controls output by:

A. Varying the current through the rotor field winding

B. Switching between single-phase and three-phase operation

C. Adjusting the drive belt ratio at the pulley mechanism

D. Modulating the stator output through pulse-width modulation

24. An alternator's three-phase AC output is converted to DC using:

A. A single high-power transistor on the output terminal

B. Capacitors mounted externally to the alternator housing

C. The vehicle battery's chemical reaction during charging

D. Six rectifier diodes arranged as a full-wave bridge

25. A voltage drop test between the alternator B+ terminal and the battery positive post reads 0.2 volts during normal charging. This indicates:

A. A healthy charging cable operating within specification

B. Excessive resistance requiring cable replacement

C. A failed voltage regulator in the alternator

D. An overcharging condition requiring immediate service

26. Drive belt slippage commonly produces charging system symptoms that:

A. Disappear entirely at higher engine RPM speeds

B. Mimic an alternator fault requiring electrical diagnosis

C. Only appear during cold-weather operation

D. Cause overcharging rather than undercharging

27. AC ripple measured at the battery terminals with the engine running should be:

A. Between 2 and 5 volts peak-to-peak under load

B. Anywhere from 0 to 8 volts during operation

C. Exactly 60 hertz at a fixed amplitude

D. Less than 100 millivolts under typical electrical load

28. HID headlight bulbs require approximately how long to reach full brightness?

A. Less than 100 milliseconds from activation

B. 2 to 5 minutes for complete stabilization

C. 10 to 30 seconds for the arc to fully establish

D. 30 to 60 seconds for warm-up to complete

29. A halogen bulb fails within hours of installation. The MOST likely cause is:

A. Skin oils transferred during handling of the glass envelope

B. Incorrect wattage rating for the vehicle's electrical system

C. A voltage spike during engine start overloading the filament

D. Moisture contamination from condensation inside the bulb

30. The Center High-Mount Stop Lamp (CHMSL) is required by:

A. Individual state motor vehicle inspection regulations only

B. SAE International recommended practice J2012

C. Federal Motor Vehicle Safety Standard 108

D. Manufacturer-specific OEM design requirements

31. A turn signal on one side of a vehicle flashes at twice the normal rate. This symptom indicates:

A. A failed hazard flasher relay affecting both sides

B. An open circuit in the brake light wiring system

C. A burned-out turn signal bulb on the fast-flashing side

D. A short to ground in the dome light circuit

32. Daytime Running Lights (DRLs) on most modern vehicles operate at:

A. Reduced voltage, typically around 60 percent of normal headlight voltage

B. Full voltage equivalent to high beams at all times

C. Zero voltage when the engine is at idle

D. Varying voltage based on ambient light conditions

33. A modern vehicle's headlight switch position is typically processed by:

A. Direct switching of battery voltage to the headlight bulbs

B. A mechanical relay bypassing electronic logic circuits

C. The engine control module through the fuel injection processor

D. The body control module, which commands headlight activation

34. A modern instrument cluster's speedometer displays vehicle speed based on:

A. A mechanical cable driven by the transmission output shaft

B. A network message broadcast by the ABS module via CAN

C. The engine control module's fuel injection pulse rate

D. A direct analog signal from the vehicle speed sensor

35. A warning lamp that stays illuminated after the key-on bulb check indicates:

A. A fault exists in the system the lamp monitors

B. The bulb check is not yet complete

C. A normal operation during the testing phase

D. The battery voltage is insufficient for the display

36. A fuel level gauge reads incorrectly despite correct sending unit resistance and intact wiring. The MOST likely cause is:

A. The fuel pump drawing excessive current during operation

B. The fuel pressure regulator limiting system flow

C. The instrument cluster's internal fuel gauge circuit

D. The ground connection at the battery negative terminal

37. A head-up display (HUD) shows a ghost image above the primary display. The MOST likely cause is:

A. A weak projector reaching the end of its service life

B. Software corruption in the HUD control module

C. A dirty windshield area where the HUD is projected

D. A standard replacement windshield installed on a HUD-equipped vehicle

38. After replacing an instrument cluster on a modern vehicle, the vehicle will not start. The MOST likely cause is:

A. A blown fuse during the replacement procedure

B. The cluster has not been programmed to the vehicle immobilizer

C. A disconnected wiring harness at the cluster connector

D. The battery discharged during the replacement work

39. A driver information center (DIC) displays incorrect outside air temperature while the scan tool shows correct data. The fault is MOST likely in:

A. The DIC's internal data processing or display circuits

B. The outside air temperature sensor hardware itself

C. The wiring between the sensor and the BCM input

D. The BCM's signal conditioning for the temperature

40. A power window operates only from the master switch but not from the passenger door switch. The MOST likely cause is:

A. A failed window motor requiring complete replacement

B. A blown fuse affecting the entire power window circuit

C. A defective passenger door switch or break in its wiring

D. A disconnected battery cable at the door control module

41. Pinch protection on a modern auto-up power window system works by:

A. Using infrared sensors across the window opening path

B. Timing the up-travel cycle against a stored maximum duration

C. Measuring force on the glass through a piezoelectric sensor

D. Monitoring motor current for a spike caused by obstruction

42. A rain-sensing wiper system detects precipitation using:

A. Piezoelectric sensors measuring raindrop impact force

B. Infrared optical sensors measuring total internal reflection changes

C. Ultrasonic sensors detecting surface moisture content

D. Humidity sensors within the cabin HVAC system ducting

43. A power door lock operates from the key fob but not from the interior lock switch. The MOST likely cause is:

A. A defective interior lock switch or break in its wiring to the module

B. A failed lock actuator with stuck internal contacts

C. An unsynchronized rolling code between the fob and vehicle

D. A blown fuse shared by both fob and switch commands

44. A horn that sounds weakly compared to normal is MOST likely caused by:

A. A completely failed horn requiring replacement

B. A stuck steering wheel horn button in the on position

C. Voltage drop in the horn circuit wiring or connections

D. Low battery voltage affecting all vehicle electrical functions

45. A remote keyless entry fob works at short range but not at the typical distance. The MOST likely cause is:

A. Damage to the vehicle's keyless entry receiver antenna

B. A weak or depleted battery inside the key fob

C. Radio frequency interference from nearby cellular sources

D. An unsynchronized rolling code between fob and vehicle

46. A rear defogger has one trace that is not heating while others operate normally. The fault is located in:

A. The defogger relay supplying power to the entire grid

B. The dashboard defogger switch and its indicator lamp

C. The body control module timer function circuit

D. The specific trace on the glass, which is broken

47. Before performing any service on SRS components, the technician MUST:

A. Disconnect the battery and wait the manufacturer-specified time

B. Scan the SRS module for DTCs with ignition on first

C. Remove the steering wheel to access the clock spring safely

D. Discharge the SRS capacitors manually through the squib connector

48. A squib connector in an SRS airbag system includes a shorting bar that:

A. Measures squib resistance during normal SRS operation cycles

B. Provides low-resistance ground reference for module testing

C. Automatically shorts the squib wires when disconnected to prevent deployment

D. Reduces electromagnetic interference from the squib wiring harness

49. A healthy high-speed CAN bus measured across CAN-H and CAN-L with ignition off reads approximately:

A. 120 ohms, representing a single active terminator in the bus

B. 60 ohms, representing two parallel 120-ohm terminators

C. 240 ohms, representing both terminators connected in series

D. 30 ohms, representing three terminators in parallel

50. A gateway module failure on a modern vehicle MOST commonly causes:

A. Only the infotainment system to stop functioning properly

B. A single isolated DTC in one specific module only

C. The engine to fail to start with all other systems working

D. Multiple seemingly unrelated symptoms across different systems

## Practice Exam 15: Answer Key and Explanations

1. C — Current equals power divided by voltage: 144 W ÷ 12 V = 12 amperes. This calculation applies Watt's Law inversely to determine current draw when wattage and voltage are known. Understanding this relationship is essential for sizing fuses, evaluating wire gauges, and predicting circuit loads during diagnostic work.

2. A — Nine volts at both switch terminals confirms the switch is working correctly. Zero voltage at the load means voltage is being lost somewhere downstream of the switch. The fault is in the wiring between the switch output and the load, indicating an open circuit or severely high resistance in that specific wire segment.

3. D — Watt's Law expresses the mathematical relationship between power, voltage, and current: P = E × I. This fundamental formula calculates power consumption in any electrical circuit. Combined with Ohm's Law (E = I × R), these equations allow complete analysis of any two known circuit parameters during diagnostic work.

4. B — The standard wire color code convention lists the base color first and the tracer stripe second. "VT/WH" indicates a violet (VT) base color with a white (WH) tracer stripe. This notation appears throughout service information and is essential for identifying the correct wire within a harness bundle during diagnostic and repair work.

5. C — Ohm's Law solved for resistance is R = E ÷ I (resistance equals voltage divided by current). The three forms of Ohm's Law are E = I × R, I = E ÷ R, and R = E ÷ I. Fluency with rearranging this equation to solve for any unknown is essential for virtually every automotive electrical diagnostic calculation.

6. D — A fuse that blows immediately upon replacement indicates a low-resistance path allowing excessive current to flow, which is the signature of a short to ground. The fuse is doing its protective job; the short must be located and repaired before the circuit can function normally. Never substitute a higher-rated fuse to "solve" this problem.

7. A — Logic probes draw less than 1 milliampere, making them safe for sensor signal circuits. Incandescent test lights draw 150-300 milliamperes, sufficient to damage sensor output drivers and module input circuits designed for microampere signals. Both technicians correctly describe the safety difference — Technician A praises logic probes; Technician B warns about test light damage.

8. B — Moisture intrusion into an unprotected splice causes corrosion that gradually increases resistance over time. This resistance creates voltage drop, reduces load performance, and can eventually create intermittent faults as corrosion worsens. Heat-shrink tubing with adhesive liner provides environmental sealing that prevents this long-term degradation.

9. D — Duty cycle is the percentage of each cycle that the signal is high. A signal high for 3 ms and low for 7 ms in a 10 ms total cycle has a duty cycle of 3 ÷ 10 = 30 percent. Duty cycle interpretation matters for PWM fuel injectors, alternator field drivers, and other PWM-controlled accessory circuits.

10. C — A DMM on the continuity setting beeps when the measured resistance is below the meter's continuity threshold (typically 20-50 ohms), indicating a complete circuit path through the wire being tested. This confirms the wire has good continuity without physical breaks. The audible beep provides instant feedback without requiring visual reading of the meter.

11. A — The AWG scale is counterintuitive: larger AWG numbers indicate smaller, thinner wires. 18 AWG is thinner than 14 AWG, with higher resistance per unit length. Recognizing this relationship is essential for selecting correct replacement wires and understanding specifications in service information. Matching original wire gauge is important for maintaining circuit performance.

12. D — MOSFETs use voltage-controlled gates with an insulated layer that prevents current flow through the gate terminal. The gate voltage creates an electric field that controls current between drain and source. This voltage-controlled operation with virtually no gate current distinguishes MOSFETs from BJTs. Technician B is wrong; Technician A correctly describes MOSFET operation.

13. B — A reading of 14 volts with the engine running and heavy electrical load is normal charging system output. Typical charging system voltage ranges from 13.8 to 14.7 volts depending on load, temperature, and battery state of charge. Voltages above 15 volts indicate overcharging; values below 13.5 volts under heavy load suggest insufficient charging capacity.

14. A — A flooded lead-acid battery reading 12.0 volts at rest is approximately 25% state of charge. The voltage-to-SOC relationship is: 12.6+ V = 100%, 12.4 V = 75%, 12.2 V = 50%, 12.0 V = 25%, below 11.9 V = essentially discharged. A battery at 25% charge should be fully charged before testing state of health.

15. C — AGM batteries tolerate repeated deep-cycle discharge far better than conventional flooded batteries, making them ideal for start-stop applications where the battery is repeatedly discharged during engine-off periods. Start-stop cycles would quickly destroy a flooded battery. The enhanced durability of AGM construction is why OEMs specify AGM for this application.

16. B — A starter drawing nearly twice its rated current indicates starter internal damage — typically binding bushings, a dragging armature, or partial shorts in the field or armature windings. This excess

draw suggests mechanical or electrical internal problems. Starter replacement is typically required; rebuilding starters is increasingly uncommon due to the availability of remanufactured units.

17. D — Parasitic draw testing requires the vehicle to be in its fully asleep state. Modern vehicles take approximately 30 minutes after shutdown for all modules to complete their shutdown sequences and enter standby mode. Testing too soon produces inflated readings that include module wake-up activity, leading to false diagnosis of excessive parasitic draw.

18. C — The final ground connection during jump-starting should be made to the engine block of the discharged vehicle, away from the battery. This places any spark that may occur during connection away from accumulated hydrogen gas around the dead battery. Direct connection to the battery negative creates explosion risk, so the proper sequence places the final spark safely away.

19. A — Cold Cranking Amperes is specified at 0°F (−17.8°C) for 30 seconds while maintaining at least 7.2 volts at the battery terminals, per SAE J537. This simulates worst-case cold-start conditions when battery chemistry is slowest and engine oil is thickest. The 7.2-volt threshold ensures sufficient voltage for ignition and fuel injection to function.

20. B — A battery that drops below 9.6 volts at 70°F during a one-half CCA load test is defective. The 9.6-volt threshold per SAE J537 indicates internal resistance has risen beyond acceptable limits. Replacement is required; a battery that fails this standard load test cannot reliably support vehicle starting and should not be returned to service.

21. B — Sulfation develops when a battery remains in a partially discharged state for extended periods. Lead sulfate crystals harden on the plates over time and eventually stop participating in the charge-discharge reaction. Severe sulfation is permanent and causes reduced capacity, poor cranking performance, and eventual battery failure. Keeping batteries fully charged prevents this damage.

22. C — Battery registration informs the BCM that a new battery has been installed, allowing the BCM to update its charging strategy to match the new battery's characteristics. The BCM adapts its charging profile over time; without registration, the outdated profile continues to be applied to the new battery, potentially leading to improper charging and premature failure.

23. A — The voltage regulator controls alternator output by varying the current through the rotor field winding. Stronger field current creates a stronger magnetic field, which induces higher voltage in the

stator. Weaker field current reduces output voltage. This electrical field control enables voltage regulation independent of RPM and load conditions.

24. D — A rectifier bridge uses six diodes arranged in pairs to convert three-phase AC from the stator into DC output. Three positive diodes and three negative diodes form the bridge, with two diodes conducting at any instant corresponding to whichever two phases currently have the greatest voltage difference. This produces the smooth DC output for vehicle loads.

25. A — A voltage drop of 0.2 volts across a charging cable is well within normal specification (typically under 0.5 volts is acceptable). This reading indicates a healthy charging cable with minimal resistance. Higher drops would suggest corrosion or damage requiring repair, but 0.2 volts confirms the cable is operating normally.

26. B — Drive belt slippage reduces the mechanical torque transferred from engine to alternator, producing reduced electrical output that appears identical to an alternator fault. Belt issues produce charging symptoms that are mechanical in origin. Belt inspection is essential before any electrical diagnosis to avoid unnecessary alternator replacement.

27. D — A healthy rectifier bridge produces less than 100 millivolts of AC ripple at the battery terminals under normal load. Some residual AC always remains because three-phase rectification is not perfectly smooth, but output should be predominantly DC. Readings above 500 mV indicate rectifier diode failure and typically require alternator replacement.

28. C — HID bulbs require 10-30 seconds to reach full brightness because the metal halide salts inside must vaporize and the arc must fully establish before the bulb operates at rated output. This warm-up period is normal and inherent to HID technology, not a fault. LED and halogen technologies reach full brightness much faster.

29. A — Skin oils transferred during handling create thermal stress concentration points on halogen bulb glass envelopes, causing premature failure. This is the single most common cause of early halogen bulb failure. Proper installation technique — handling by base or with clean cloth, and cleaning any finger contact with isopropyl alcohol — prevents this problem.

30. C — The Center High-Mount Stop Lamp (CHMSL) is required by Federal Motor Vehicle Safety Standard (FMVSS) 108, which regulates all vehicle exterior lighting and signaling. CHMSL has been

required on all U.S. passenger cars since 1986 as a safety measure to reduce rear-end collisions by providing an additional brake signal to following drivers.

31. C — A fast-flashing turn signal on one side is the flasher circuit's deliberate fault indicator, designed to alert the driver that one of the turn signal bulbs on that side has failed. The reduced current load from the burned-out bulb triggers the flasher to accelerate its flash rate. Replacing the failed bulb on the fast-flashing side restores normal flash rate.

32. A — Daytime Running Lights typically operate the headlight filaments at reduced voltage (around 60-70% of normal voltage), producing dimmer output than full headlights while providing daytime visibility. Some implementations use dedicated DRL lamps or operate fog lights at reduced intensity. The dimmer output provides visibility without the full glare of normal headlights.

33. D — Modern vehicles route headlight switch inputs to the BCM, which then commands headlight activation through dedicated output drivers. Direct switching of headlight current through the switch itself is largely obsolete. This architecture enables features like automatic headlights, daytime running lights, and intelligent lighting control based on ambient conditions.

34. B — Modern instrument clusters receive vehicle speed as a network message broadcast by the ABS module that reads wheel speed sensors. The ABS module calculates vehicle speed from wheel rotation data and transmits it on the CAN bus, where the cluster receives it and renders the speedometer display. This centralized architecture replaced mechanical cables.

35. A — A warning lamp illuminated after the key-on bulb check indicates a fault in the system the lamp monitors — the commanding module is actively requesting the lamp remain on because the condition persists. This is distinct from a lamp that fails to illuminate during bulb check (which indicates a lamp-circuit fault). Understanding this distinction is critical for diagnosis.

36. C — If the sending unit tests correctly and wiring is intact, but the cluster displays incorrect values, the fault must be in the cluster itself. Modern clusters include internal electronic processing of fuel gauge signals that can fail independently of external components. Cluster repair or replacement is typically required to address these internal electronic failures.

37. D — HUD-equipped vehicles require a special windshield with a wedge-shaped PVB inner layer that prevents ghost imaging. A standard replacement windshield reflects the projected image from both

inner and outer glass surfaces, creating the characteristic "ghost" double image. Replacement with the correct HUD-compatible glass is the only fix for this problem.

38. B — Modern clusters store immobilizer authentication data that must match other vehicle modules. A replacement cluster not properly programmed to the vehicle is rejected by the immobilizer, which denies the engine-enable signal and prevents starting. Programming or pre-programmed cluster supply is required on modern vehicle cluster replacement; a simple physical swap alone is insufficient.

39. A — If the scan tool shows correct data from the sensor but the DIC displays incorrect information, the data is reaching the DIC correctly but something in its internal processing or display has failed. This isolates the problem to the DIC itself. The sensor and upstream modules are functioning; the DIC's internal electronics are the fault.

40. C — A window that operates from one switch but not from another isolates the fault to the non-working switch's circuit. The motor, regulator, and master switch wiring are all functional since the master switch works. A defective passenger door switch or broken wiring between the switch and door control module is the most likely cause.

41. D — Modern pinch protection monitors motor current through the H-bridge driver during up-travel. An obstruction causes a sudden current spike that the module detects, immediately reversing motor direction to prevent injury. This function is federally mandated on auto-up windows and protects occupants from pinching hazards. Current monitoring is the most practical and responsive sensing method.

42. B — Rain-sensing wiper systems use infrared optical sensors that measure changes in total internal reflection from the windshield. Water droplets on the outer glass surface reduce the reflected signal, and the sensor interprets this as precipitation, commanding wiper activation. This is the dominant rain-sensing technology on modern vehicles and requires a clean windshield for proper operation.

43. A — The lock actuator responds to fob commands, confirming the actuator, wiring, and module output are all functional. A separate switch input path isn't reaching the module. A defective interior lock switch or broken wiring between the switch and the door module is the most likely cause, confirmed by testing the switch circuit with a voltmeter.

44. C — Reduced horn volume indicates voltage drop somewhere in the horn circuit — corroded ground, degraded wire, or failing switch contacts. Voltage drop testing from the battery positive to the

horn connector during operation reveals the location of unwanted resistance. The horn itself is rarely the fault when volume is merely reduced; wiring and grounds are typically the cause.

45. B — A fob working at short range but failing at longer distances is the classic signature of a weak battery. The transmitter output is reduced, shortening effective range progressively. This is the simplest and most common RKE complaint; battery replacement almost always restores normal range. Try this before proceeding to receiver or programming diagnosis.

46. D — A defogger grid has multiple parallel horizontal traces; one broken trace disables only that one line while others continue operating normally. A voltmeter walking along the broken trace locates where voltage drops abruptly from battery voltage to zero. Small breaks can be repaired with silver-ceramic paint kits; larger damage requires glass replacement.

47. A — Every SRS requires a manufacturer-specified disabling procedure including battery disconnection and a waiting period (typically 1-10 minutes) for deployment-energy capacitors to discharge. Accidental airbag deployment during service causes severe injury. Scanning DTCs, removing the steering wheel, or manually discharging is not sufficient — the full system must be de-energized through proper battery disconnect.

48. C — Squib connectors include a mechanical shorting bar that automatically shorts the two squib wires together when the connector is disconnected. This prevents stray voltages from static electricity, inadvertent battery contact, or test equipment from triggering accidental airbag deployment. When the connector reconnects, the bar retracts to allow normal operation. This is a critical safety feature.

49. B — A healthy high-speed CAN bus uses two 120-ohm termination resistors at its physical endpoints. Measured across CAN-H and CAN-L with the ignition off, these two resistors appear in parallel, giving a combined reading of approximately 60 ohms. This is a fundamental CAN diagnostic check; significant deviation indicates missing, damaged, or shorted terminators.

50. D — Gateway module failures affect message translation between network types, causing multiple seemingly unrelated modules to lose communication with each other. Symptoms appear across systems that don't share obvious functional connections — cluster, infotainment, climate, and safety systems can all exhibit issues simultaneously. Recognizing this pattern quickly saves significant diagnostic time on complex vehicles.