

# PRACTICE EXAM 13: ASE T4 BRAKES

## SIMULATION

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1. A driver pulls in with a complaint that the trailer brakes "don't work" only when the truck is cold in the morning. After the truck has run for 20 minutes, the trailer brakes work normally. The MOST likely cause is:

- A. A failed compressor on the tractor
- B. Frozen condensate in the air lines that thaws as the system warms
- C. Worn brake shoes on the trailer
- D. ABS warning lamp circuit malfunction

2. A heavy-truck technician notices that during static leakage testing on a tractor with brakes applied at 90 psi, the system loses 8 psi in 60 seconds. This rate exceeds:

- A. The 1 psi per minute released-brake limit for combinations
- B. The 2 psi per minute applied-brake limit for bobtails
- C. The 4 psi per minute released-brake limit for combinations
- D. The 6 psi per minute applied-brake limit for combinations

3. A wheel speed sensor circuit is being tested with a multimeter. The technician measures 2,000 ohms across the sensor terminals. This reading is:

- A. Below the typical range — sensor likely shorted
- B. Well above the typical range — sensor likely open
- C. Within the typical range for a healthy sensor

D. Acceptable only if temperature is below freezing

4. A driver complains that the brake pedal feels normal during daily driving but during a recent panic stop the pedal went unusually deep before the brakes engaged. After the panic stop, normal pedal feel returned. The MOST likely cause is:

A. ABS activation during the panic stop produced characteristic pedal travel that resolved when normal driving resumed

B. Master cylinder failure

C. Air entered the lines during the panic stop

D. Trailer brakes failed momentarily

5. A heavy-truck technician is replacing a slack adjuster. After installation, the applied stroke at 90 psi measures 1-1/2 inches on a Type 30 long-stroke chamber. This stroke is:

A. Out of adjustment — exceeds the 1-1/4 inch limit

B. Well within the 2-1/2 inch readjustment limit for Type 30 long-stroke

C. Excessive and requires shoe replacement

D. Acceptable only if vehicle is bobtail

6. A trailer's relay emergency valve has all of these primary functions EXCEPT:

A. Relay service brake signal from the tractor to the trailer chambers

B. Charge the trailer reservoir from supply air

C. Apply trailer brakes from reservoir air during supply loss

D. Generate engine RPM signals for the trailer ABS

7. A driver complains of a "scraping" sound from the rear brakes during application. Inspection reveals the brake shoe linings have been worn down to the rivet heads. The shoes:

- A. Should be reinforced with new friction material
- B. Can be returned to service if measurement is within 1/16 inch of original specification
- C. Must be replaced as a matched axle set immediately
- D. Should be machined to remove the rivet heads

8. A heavy-truck driver reports that the parking brake released suddenly during operation, with no driver input. The MOST likely cause is:

- A. An internal leak in the spring brake chamber that allowed control air to enter the parking section
- B. Excessive system pressure
- C. ABS modulator failure
- D. Worn wheel bearings

9. The brake fluid reservoir cap on a hydraulic brake system contains a:

- A. Pressure relief diaphragm
- B. Vent that allows atmospheric pressure equalization but excludes contamination
- C. Magnetic separator for metal debris
- D. Heating element to prevent freezing

10. A driver complains of a "squealing" sound from the front brakes during light braking. The sound disappears under firmer braking. The MOST likely cause is:

- A. Master cylinder failure
- B. Wheel bearing failure

C. ABS modulator activation

D. Worn brake pad wear indicator contacting the rotor — pad is approaching minimum thickness

11. A heavy-truck technician is performing a wheel bearing service on a non-drive axle. The technician should:

A. Replace both the cup and cone as a matched set, replace the seal, and adjust to manufacturer's endplay specification

B. Reuse the cup if it appears clean

C. Reuse the original seal to save costs

D. Adjust the bearing to maximum tightness with no clearance

12. A heavy-truck air system shows that the air dryer cartridge has accumulated significant water and oil. The most likely root cause is:

A. Excessive system pressure

B. Worn brake shoe linings

C. Compressor with worn piston rings allowing oil blowby into the air system

D. Failed engine alternator

13. A technician inspecting an air brake chamber finds a small puddle of fluid below the chamber on the ground. The chamber appears intact and there is no visible leak. The fluid is:

A. Brake fluid leaking from the master cylinder

B. Likely water from condensation that has drained from the chamber's drain hole

C. Oil from a failed compressor

D. Coolant from the engine

14. A driver complains of a "pulling to the right" sensation during normal stops. The pull is consistent and pronounced. After inspection, the technician finds the right front rotor measures 22 mm thick (minimum is 22 mm) and the left front rotor measures 26 mm. The MOST likely cause is:

- A. Normal post-service variation
- B. The right rotor needs to be machined
- C. Excessive driver pedal pressure
- D. Imbalance from rotor thickness difference between sides — both rotors are at minimum or different thicknesses, producing uneven braking

15. A heavy-truck air brake system is undergoing service. Before opening any service line, the technician should:

- A. Disconnect the battery
- B. Remove all wheel lug nuts
- C. Drain all reservoirs to zero pressure
- D. Apply the parking brake

16. A driver complains that the trailer brakes apply normally during light pedal pressure but seem weak during firm application. The MOST likely cause is:

- A. Reduced trailer relay valve effectiveness under high signal pressure
- B. Excessive driver pedal pressure
- C. Failed master cylinder
- D. ABS warning lamp circuit issue

17. A heavy-truck wheel speed sensor that has been damaged by impact during wheel-end service will produce:

- A. Continuous false ABS activation at every brake application
- B. ABS warning lamp illumination and stored DTC for that sensor
- C. Activation of the parking brake automatically
- D. Increased compressor cut-out pressure

18. A heavy-truck air compressor's drive method (gear vs. belt) affects:

- A. Brake fluid pressure
- B. ABS modulator response time
- C. Engine RPM directly
- D. Reliability of compressor operation under high torque loads — gear drive eliminates slippage

19. The standard heavy-truck wheel bearing endplay specification, after final adjustment, is approximately:

- A. 0.020 to 0.030 inches
- B. 0.060 to 0.090 inches
- C. 0.001 to 0.005 inches
- D. 0.150 inches

20. A driver complains of a "groaning" sound from the front brakes only on the first application after parking overnight. The sound disappears after the first stop. The MOST likely cause is:

- A. Light surface rust on the rotor friction surface that gets cleaned off by the first application
- B. Failed wheel bearings

- C. Worn brake pad wear indicator
- D. ABS modulator failure

21. A heavy-truck air brake system's safety relief valve typically opens at:

- A. 80 to 100 psi
- B. 150 to 175 psi
- C. 60 psi
- D. 400 psi

22. A driver complains of a "vibration in the steering wheel" during braking from highway speed. The vibration disappears at lower speeds. The MOST likely cause is:

- A. Worn wheel bearings
- B. Failed power steering pump
- C. Excessive caliper slide pin wear
- D. Front rotor thickness variation that produces vibration amplified at higher rotational speeds

23. A heavy-truck driver reports that during a recent road trip, the brake pedal "fade" was noticeable during a long descent. The driver had to apply the pedal increasingly hard to maintain stopping power. The MOST likely cause is:

- A. Excessive air pressure in the supply circuit
- B. Master cylinder failure
- C. Brake fade from sustained heat exceeding the friction material's effective temperature range
- D. Failed ABS system

24. A typical heavy-truck disc brake caliper uses how many pistons?

- A. 1 to 2 pistons depending on caliper design
- B. 3 pistons in opposed configuration
- C. 6 pistons for redundancy
- D. 12 pistons in a specific firing order

25. A driver complains of a "dragging" sensation at one front wheel during normal driving. The wheel becomes hot during driving even when not braking. The MOST likely cause is:

- A. Failed master cylinder
- B. Excessive wheel bearing endplay
- C. Worn brake pad wear indicator
- D. Seized caliper, blocked compensation port, or contaminated brake fluid producing residual brake pressure

26. A heavy-truck air compressor that has been operating without lubrication for an extended period will:

- A. Continue to operate normally
- B. Suffer rapid mechanical failure of bearings, pistons, and other moving components
- C. Produce more pressure than specified
- D. Activate the parking brake automatically

27. A wheel bearing inspection reveals discoloration on the rollers and races. The discoloration is uniform and bright blue/purple. The bearing:

- A. Is brand new and ready for service
- B. Has been properly lubricated and is in good condition

- C. Has been overheated and the steel has lost its temper — must be replaced
- D. Is contaminated with the wrong grease type

28. A heavy-truck driver is performing daily pre-trip inspection. The driver notices that the air pressure gauge reading drops significantly during normal pedal application. After release, pressure recovers. This is:

- A. Normal operation — air consumption during application is expected
- B. A symptom of a failed compressor
- C. Excessive system leakage
- D. ABS modulator failure

29. A heavy-truck driver reports that the trailer brakes apply during emergency braking but the trailer pulls to the right. The MOST likely cause is:

- A. Failed compressor
- B. Excessive system pressure
- C. ABS warning lamp circuit issue
- D. Brake imbalance between trailer wheels — typically contaminated or worn friction material on one wheel

30. A heavy-truck air dryer's purge valve operates in coordination with the:

- A. Master cylinder application
- B. Governor's unload signal to the compressor
- C. Wheel speed sensor pulse
- D. ABS warning lamp

31. The brake camshaft on an S-cam foundation brake is supported by:

- A. The wheel bearing housing
- B. The ABS modulator
- C. The brake spider or a dedicated camshaft bracket bolted to the axle
- D. The chamber mounting bracket only

32. A driver complains of a "metallic clunking" sound from the rear brakes during braking. The vehicle has rear drum brakes. The MOST likely cause is:

- A. Worn brake hardware (return springs, hold-downs, anchor pins) — components are loose and contacting during application
- B. Failed wheel bearings
- C. ABS modulator failure
- D. Compressor failure

33. A heavy-truck driver is operating a tractor pulling a single trailer. During a normal stop, the trailer brakes apply slightly later than the tractor brakes. The reason for this delay is:

- A. Trailer brake design fault
- B. Excessive trailer reservoir pressure
- C. Failed compressor
- D. Normal signal travel time from the tractor's treadle valve to the trailer's relay emergency valve, then to the chambers — design feature, not malfunction

34. The federal regulation that requires drive-axle brake adjustment to be checked at PM intervals is:

- A. 49 CFR 393.1

- B. 49 CFR 396.17 (annual inspection)
- C. 49 CFR 380.12
- D. 49 CFR 391.45

35. A heavy-truck wheel speed sensor mounted with excessive air gap from the tone ring will:

- A. Produce stronger signal output
- B. Improve ABS function
- C. Produce weak or no signal output and likely trigger an ABS DTC
- D. Activate the parking brake automatically

36. A heavy-truck driver complains that the brakes feel "weak" but the pedal feels normal. After verifying air pressure is normal, the technician should:

- A. Check brake adjustment at each wheel — out-of-adjustment brakes produce weak braking despite normal air pressure
- B. Replace the master cylinder
- C. Replace the compressor
- D. Replace all brake hoses

37. A heavy-truck spring brake chamber that fails to release even with proper air pressure at the control port:

- A. Is functioning normally
- B. Has excess service brake force
- C. Has excess wheel bearing endplay
- D. Has internal damage — likely a broken power spring, seized internal piston, or failed mechanical components

38. A driver complains of a "spongy" pedal feel that has gradually worsened over several months on a hydraulic-braked Class 6 truck. The MOST likely root cause is:

- A. ABS fault
- B. Internal flex hose deterioration that has progressed gradually
- C. Master cylinder failure
- D. Wheel bearing failure

39. A heavy-truck air brake system uses how many separate circuits in modern installations?

- A. One — single-circuit design
- B. Five — pentadual-circuit design
- C. Two — dual-circuit design as required by FMVSS 121
- D. Eight — octa-circuit design

40. A driver complains of a "metallic squeal" from the front brakes that occurs only during light braking. The squeal disappears under firm braking. The MOST likely cause is:

- A. Worn brake pad wear indicator contacting the rotor — pad approaching minimum thickness
- B. Failed wheel bearings
- C. ABS modulator failure
- D. Compressor failure

41. The brake fluid level on a hydraulic system should be:

- A. Always at the maximum mark
- B. At the minimum mark
- C. Below the minimum mark

D. Within the normal operating range, between minimum and maximum marks

42. A heavy-truck driver complains that the trailer brakes have a "leading edge" feel — the trailer brakes apply slightly before the tractor brakes. This is:

A. A safety-critical fault

B. Normal behavior on vehicles where the trailer hand valve is being used during the application

C. Indicative of failed tractor brakes

D. Caused by excessive wheel bearing endplay

43. A heavy-truck air brake system uses a "double check valve" in the spring brake circuit. This valve's purpose is to:

A. Boost compressor output

B. Modulate ABS pressure

C. Select the higher of two pressure inputs to the spring chamber control circuit

D. Regulate engine RPM

44. A heavy-truck driver reports that the brakes feel different but cannot describe the specific change. All measurements are within specification. The technician should:

A. Discuss observations with the driver, perform a road test to recreate the condition, and document findings for monitoring

B. Replace the master cylinder

C. Replace all calipers preventively

D. Recalibrate the ABS system

45. A heavy-truck air brake system using FMVSS 121 dual-circuit design ensures that:

- A. A failure in one circuit affects all braking
- B. Excessive driver pedal pressure causes both circuits to fail
- C. ABS controls both circuits independently
- D. A failure in the primary circuit does not eliminate braking on the secondary circuit

46. A driver complains of a "pulling to the left" during braking that is consistent and pronounced. The MOST likely cause is:

- A. Normal post-service variation
- B. Brake imbalance — typically worn or contaminated friction material on the right side, causing the left side to do more work
- C. Excessive air pressure
- D. Failed compressor

47. The wheel bearing service interval on most heavy-truck applications is determined by:

- A. The driver's preference
- B. Calendar time only
- C. Manufacturer-specified interval based on miles or hours of operation
- D. Brake friction material wear

48. A heavy-truck air brake system's primary reservoir typically holds:

- A. Approximately 1,500 to 2,500 cubic inches of air, varying by application
- B. 50 cubic inches
- C. 5,000 cubic inches
- D. 10 cubic inches

49. A driver complains of a "vibration through the brake pedal" during braking from highway speed. The vibration disappears at lower speeds. The MOST likely cause is:

- A. Failed wheel bearings
- B. ABS modulator activation only at highway speeds
- C. Failed power steering pump
- D. Front rotor thickness variation that produces pedal pulsation amplified at higher rotational speeds

50. A heavy-truck driver reports that the parking brake "drags" during driving — the spring brakes are partially applied even though the dash valve is pushed in. The MOST likely cause is:

- A. Wheel bearing failure
- B. Insufficient air pressure reaching the spring chamber control ports
- C. Failed master cylinder
- D. ABS modulator failure

# PRACTICE EXAM 13 — ANSWER KEY AND EXPLANATIONS

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1. B — Frozen condensate in the air lines that thaws as the system warms. Cold-morning trailer brake failures that resolve after warm-up are the diagnostic fingerprint of frozen moisture in the air system. As the system warms during operation, the ice melts and normal function returns. The root cause is a saturated or failing air dryer that allowed moisture to reach downstream components.
2. D — The 6 psi per minute applied-brake limit for combinations. CVSA allows up to 6 psi per minute leakage on a combination vehicle with service brakes applied. A measured 8 psi per minute exceeds this limit and represents excessive leakage that must be located and corrected before the vehicle returns to service.
3. C — Within the typical range for a healthy sensor. Most heavy-truck ABS wheel speed sensors read between approximately 900 and 2,000 ohms at room temperature. A reading of 2,000 ohms falls comfortably within this range, indicating the sensor coil itself is electrically healthy and the fault may lie elsewhere.
4. A — ABS activation during the panic stop produced characteristic pedal travel that resolved when normal driving resumed. ABS activation during a panic stop produces characteristic pedal travel sensations including longer-than-normal pedal travel, pulsation, and audible modulator clicks. After the stop, normal pedal feel returns as the system returns to standby — exactly the described pattern.
5. B — Well within the 2-1/2 inch readjustment limit for Type 30 long-stroke. The CVSA readjustment stroke limit for a Type 30 long-stroke chamber is 2-1/2 inches. A measured 1-1/2 inch stroke is well below this limit and within specification — confirming the new slack adjuster has been installed correctly with proper geometry.
6. D — Generate engine RPM signals for the trailer ABS. The relay emergency valve has three primary functions: relay service signal, charge the trailer reservoir, and apply trailer brakes during supply loss. It does not generate engine RPM signals — these come from the engine ECU, not the trailer relay valve.
7. C — Must be replaced as a matched axle set immediately. Brake shoes worn to the rivet heads have reached the end of useful life. Continued use produces metal-to-drum contact, which damages the drum and creates safety risks. Shoes must be replaced as a matched axle set, not just on one wheel, to maintain balanced braking torque.

8. A — An internal leak in the spring brake chamber that allowed control air to enter the parking section. An internal leak within the spring brake chamber can allow air to migrate between sections, partially or fully releasing the spring force. Sudden parking brake release without driver input is the classic symptom of this rare but recognized failure mode.
9. B — Vent that allows atmospheric pressure equalization but excludes contamination. The brake fluid reservoir cap contains a one-way vent that allows atmospheric pressure equalization as fluid level changes (during braking and from temperature changes) while excluding moisture and dirt contamination. Tight sealing prevents the hygroscopic fluid from absorbing excess moisture.
10. D — Worn brake pad wear indicator contacting the rotor — pad is approaching minimum thickness. The metallic squeal during light braking that disappears under firm pressure is the distinctive signature of a brake pad wear indicator contacting the rotor. The indicator is designed to alert the driver that pad replacement is needed before metal-to-rotor contact occurs.
11. A — Replace both the cup and cone as a matched set, replace the seal, and adjust to manufacturer's endplay specification. Wheel bearing service requires complete replacement of both cup and cone as matched sets, replacement of the seal, and proper endplay adjustment to manufacturer specification. Reusing components or skipping seal replacement leads to early failure of the new components.
12. C — Compressor with worn piston rings allowing oil blowby into the air system. Significant water and oil contamination in the air dryer cartridge points to compressor wear with oil blowby. The oil contaminates the desiccant and accelerates its failure. The water accumulation occurs because the saturated dryer can no longer remove moisture effectively. Compressor replacement is needed.
13. B — Likely water from condensation that has drained from the chamber's drain hole. Air brake chambers have a small drain hole at the bottom for accumulated condensate. Water collected in the chamber from atmospheric moisture entering through the pushrod opening drains out through this hole, producing the observed puddle. This is normal and does not indicate component failure.
14. D — Imbalance from rotor thickness difference between sides — both rotors are at minimum or different thicknesses, producing uneven braking. Significant rotor thickness differences between sides produce different thermal mass and braking effectiveness, causing the vehicle to pull. The right rotor at minimum thickness has reduced thermal capacity, contributing to the imbalance — both rotors should be replaced.
15. C — Drain all reservoirs to zero pressure. Before opening any service line connection, all reservoirs must be drained to zero pressure to prevent injury from pressurized air release. Pressurized air can launch components and fittings forcefully, making zero-pressure draining the only safe condition for line service.
16. A — Reduced trailer relay valve effectiveness under high signal pressure. A trailer relay valve with internal wear may deliver normal pressure under light signal but reduced pressure under high

signal. The valve cannot maintain proper amplification across the full pressure range, producing weak braking specifically during firm applications when high pressure is needed.

17. B — ABS warning lamp illumination and stored DTC for that sensor. A damaged wheel speed sensor produces ABS warning lamp illumination and stored DTC for the affected wheel. The ABS ECU detects the missing or weakened signal during its monitoring routine and stores the appropriate diagnostic code, alerting the technician to the specific sensor needing replacement.
18. D — Reliability of compressor operation under high torque loads — gear drive eliminates slippage. Gear drive provides reliable torque transmission without slippage under heavy compressor loads, which is the primary reason it dominates over belt drive in heavy-truck applications. Belt drive can slip under high torque, leading to inconsistent compressor output and potentially shortened belt service life.
19. C — 0.001 to 0.005 inches. The standard endplay specification for most commercial vehicle wheel bearings after final adjustment is 0.001 to 0.005 inches. This small clearance must be measured with a dial indicator — it is too small to verify by feel or torque readings alone, and it ensures proper bearing operation without overheating.
20. A — Light surface rust on the rotor friction surface that gets cleaned off by the first application. Light surface rust forms on rotor friction surfaces during overnight parking. The first brake application after starting produces a "groaning" sound as the rust is mechanically cleaned from the surface. The sound disappears as rotor surfaces normalize — a normal, harmless symptom.
21. B — 150 to 175 psi. Heavy-truck air brake safety relief valves are typically set to open at approximately 150 to 175 psi. This pressure threshold is well above normal operating ranges (120-135 psi cut-out) but below the failure threshold of system components, providing safety protection without normal operational interference.
22. D — Front rotor thickness variation that produces vibration amplified at higher rotational speeds. Front rotor thickness variation produces vibration at each wheel that is transmitted through the steering knuckle and steering linkage to the steering wheel. The vibration amplitude is amplified at higher rotational speeds because the alternating clamping force occurs at higher frequency.
23. C — Brake fade from sustained heat exceeding the friction material's effective temperature range. Sustained downhill braking with service brakes generates more heat than the foundation brakes can dissipate. As friction material temperature exceeds its effective range, the coefficient of friction drops sharply — producing the described "increasingly hard pedal" symptom that resolves once the brakes cool.
24. A — 1 to 2 pistons depending on caliper design. Heavy-truck disc brake calipers typically use 1 or 2 pistons depending on the specific design. Single-piston floating calipers and dual-piston designs are both common, with the choice depending on application requirements for clamping force and pad contact.

25. D — Seized caliper, blocked compensation port, or contaminated brake fluid producing residual brake pressure. A wheel that becomes hot during driving without braking indicates residual brake pressure that doesn't fully release. The cause may be a seized caliper, blocked compensation port in the master cylinder, or contaminated brake fluid that has caused seal swelling — all producing residual pressure.
26. B — Suffer rapid mechanical failure of bearings, pistons, and other moving components. A compressor operating without lubrication will rapidly fail. Bearings and pistons are designed to operate with continuous oil supply from the engine; without it, friction generates heat that damages components within minutes. Continued operation produces catastrophic mechanical failure requiring complete replacement.
27. C — Has been overheated and the steel has lost its temper — must be replaced. Bright blue or purple discoloration on bearing rollers and races indicates the steel has been heated beyond tempering temperature, permanently reducing hardness. The bearing is structurally weakened regardless of apparent surface condition and must be replaced.
28. A — Normal operation — air consumption during application is expected. Air pressure consumption during pedal application is normal and expected — the brake chambers consume significant air to apply the brakes. Pressure recovery after release is also normal. This is not a fault; it's the way the system is designed to operate.
29. D — Brake imbalance between trailer wheels — typically contaminated or worn friction material on one wheel. Trailer pull during braking indicates one trailer brake is doing more or less work than the others. The most common cause is contaminated or worn friction material on one wheel, shifting the balance of braking force and causing the trailer to pull toward the side with stronger braking.
30. B — Governor's unload signal to the compressor. The air dryer's purge valve opens in coordination with the governor's unload signal. When the governor commands the compressor to unload at cut-out, the same control air signal opens the purge valve. This coordinated timing allows the desiccant to regenerate using stored dry air to purge accumulated moisture and contamination.
31. C — The brake spider or a dedicated camshaft bracket bolted to the axle. The brake camshaft runs across the axle and is supported in camshaft bushings installed in the brake spider or in a dedicated camshaft bracket bolted to the axle housing. Wear in these bushings allows camshaft deflection during brake application and produces a distinctive clunking sound.
32. A — Worn brake hardware (return springs, hold-downs, anchor pins) — components are loose and contacting during application. A "metallic clunking" sound from rear drum brakes during braking is the distinctive fingerprint of worn brake hardware. Loose components contact each other during the application, producing the characteristic clunking sound. Hardware should be inspected and replaced as needed during shoe service.

33. D — Normal signal travel time from the tractor's treadle valve to the trailer's relay emergency valve, then to the chambers — design feature, not malfunction. Slight trailer brake delay is normal because the air signal must travel from the treadle valve, through the gladhand, through the trailer's relay emergency valve, then to the chambers. This signal travel time is inherent to the system design and is acceptable as long as it falls within FMCSA timing specifications.
34. B — 49 CFR 396.17 (annual inspection). The federal regulation that requires annual brake inspections is 49 CFR 396.17. This regulation specifies that all commercial motor vehicles must undergo annual inspections including brake adjustment measurements, leak testing, and component condition assessments. The inspection report must be retained for verification.
35. C — Produce weak or no signal output and likely trigger an ABS DTC. Excessive air gap between sensor and tone ring weakens the magnetic coupling, reducing the electrical pulse signal. The weakened signal can be insufficient for the ABS ECU to process correctly, producing a fault code and lamp illumination. The sensor must be reinstalled with the correct gap.
36. A — Check brake adjustment at each wheel — out-of-adjustment brakes produce weak braking despite normal air pressure. Out-of-adjustment brakes produce weak braking even with normal air pressure delivered to the chambers. The reduced mechanical advantage at the slack adjuster means the chamber force is not converted efficiently to braking torque. Brake adjustment is fundamental to "weak brakes" diagnosis.
37. D — Has internal damage — likely a broken power spring, seized internal piston, or failed mechanical components. A spring brake chamber that fails to release with proper air pressure has internal mechanical damage. The most likely failures are a broken power spring (rare due to the spring's robust design), a seized internal piston preventing movement, or other mechanical failures that prevent the chamber from operating properly.
38. B — Internal flex hose deterioration that has progressed gradually. Gradual sponginess on a hydraulic-braked vehicle that has not had recent service typically points to flex hose internal deterioration. The hoses lose their internal reinforcement progressively, producing increasing compliance under pressure. Hose inspection and replacement is the recommended diagnostic and repair path.
39. C — Two — dual-circuit design as required by FMVSS 121. FMVSS 121 requires dual-circuit braking systems on heavy-truck air brake installations. The two circuits — primary and secondary — operate independently, ensuring that a failure in one circuit does not eliminate braking on the other. This redundancy is the core safety design principle.
40. A — Worn brake pad wear indicator contacting the rotor — pad approaching minimum thickness. The "metallic squeal" during light braking that disappears under firm braking is the distinctive signature of a brake pad wear indicator contacting the rotor. The indicator is intentionally designed to alert the driver that pad replacement is approaching minimum thickness specifications.

41. D — Within the normal operating range, between minimum and maximum marks. Brake fluid level should be maintained within the normal operating range marked on the reservoir. The maximum mark accommodates fluid expansion at high temperatures, while the minimum mark ensures adequate fluid for the master cylinder to function. Levels outside this range indicate either leakage or excessive consumption.
42. B — Normal behavior on vehicles where the trailer hand valve is being used during the application. The trailer brake hand valve applies the trailer brakes independently of the foot pedal. When used, the trailer brakes may engage slightly before the tractor brakes — a normal operational technique used in certain towing or coupling scenarios, not a malfunction.
43. C — Select the higher of two pressure inputs to the spring chamber control circuit. The double-check valve in the spring brake circuit has two inlets, and its shuttle automatically seals against the lower-pressure inlet, allowing the higher-pressure source through to the outlet. This selection function enables spring brake modulation during a primary-circuit failure by routing the highest available pressure to the chambers.
44. A — Discuss observations with the driver, perform a road test to recreate the condition, and document findings for monitoring. Vague complaints with no measurable findings should not result in unnecessary parts replacement. The technician should discuss observations with the driver, perform a road test to verify and characterize the condition, and document findings clearly. Monitoring at the next interval allows early detection if the symptom develops further.
45. D — A failure in the primary circuit does not eliminate braking on the secondary circuit. FMVSS 121's dual-circuit requirement ensures that a failure in the primary or secondary air service circuit leaves the remaining circuit capable of stopping the vehicle within specified distances. This redundancy is enforced through separate reservoirs, independent check valves, and dual-circuit treadle valve construction.
46. B — Brake imbalance — typically worn or contaminated friction material on the right side, causing the left side to do more work. Vehicle pull during braking is caused by imbalance between sides — the side with stronger braking absorbs more energy and "pulls" the vehicle in that direction. Worn or contaminated friction material on one side reduces its braking effectiveness, causing the other side to do more work and producing the pull.
47. C — Manufacturer-specified interval based on miles or hours of operation. Wheel bearing service intervals are determined by the vehicle manufacturer based on hub design, lubricant type, and operational conditions. Modern sealed designs often go 100,000+ miles between services. Always follow the manufacturer's specified interval rather than generic intervals.
48. A — Approximately 1,500 to 2,500 cubic inches of air, varying by application. Heavy-truck primary reservoir volumes typically range from 1,500 to 2,500 cubic inches, varying based on vehicle application and chamber size. Larger applications require larger reservoirs to meet FMVSS 121's 12× chamber displacement requirement.

49. D — Front rotor thickness variation that produces pedal pulsation amplified at higher rotational speeds. Front rotor thickness variation produces pedal pulsation at the driver's foot. The pulsation amplitude is amplified at higher rotational speeds because the alternating clamping force occurs at higher frequency. This produces the characteristic "highway-only" pulsation pattern.
50. B — Insufficient air pressure reaching the spring chamber control ports. Parking brake "drag" (partial application) indicates the spring chambers are not receiving adequate control air to fully release the power springs. Lines may be partially blocked, system pressure may be marginal, or there may be an upstream restriction reducing the pressure delivered to the chambers.