

PRACTICE EXAM 20: ASE T4 BRAKES SIMULATION

1. A heavy-truck driver brings in a tractor-trailer combination with the following symptoms: brake pedal feels firm, all wheels show normal brake adjustment, but the truck is consistently pulling slightly to the left during stops. The technician's BEST first step is to:

- A. Replace the master cylinder
- B. Inspect for contaminated friction material on the right side, or worn rotors causing imbalance
- C. Replace the wheel speed sensors
- D. Replace all brake hoses

2. A heavy-truck air system shows that the compressor cuts out at 130 psi and cuts in at 105 psi. The differential is:

- A. Acceptable for cold-weather operation only
- B. Within normal specifications (20 to 25 psi differential is typical)
- C. Too small — should be at least 5 psi
- D. Excessive and indicates governor failure

3. A heavy-truck driver complains that the trailer brakes feel "weak" during all stops. After verifying the trailer relay valve is functioning correctly and brake adjustment is within specification at all wheels, the technician should next:

- A. Inspect the trailer brake friction material for contamination, oil saturation, or excessive wear
- B. Replace the trailer reservoir

- C. Replace the tractor master cylinder
- D. Replace all wheel speed sensors

4. A heavy-truck wheel bearing service is being performed. The technician removes the hub and finds the wheel seal has been leaking, and lubricant has reached the brake friction surfaces. The recommended action for the contaminated friction material is to:

- A. Clean and reuse the friction material
- B. Allow the material to air-dry and reinstall
- C. Apply heat to drive off the lubricant
- D. Replace the contaminated friction material because lubricant exposure permanently degrades friction coefficient

5. A heavy-truck driver complains that the brake pedal feels firm but the brakes feel "weak" during emergency braking. After confirming brake adjustment, friction material, and brake balance are all within specification, the technician should next inspect:

- A. The wheel bearings
- B. The supply pressure at the chambers during application — pressure drop during application indicates restricted air supply
- C. The ABS warning lamp
- D. The wheel speed sensors

6. A heavy-truck wheel bearing endplay measurement of 0.012 inches indicates:

- A. The bearing is properly adjusted
- B. Normal operation
- C. Excessive endplay — bearing requires readjustment to 0.001 to 0.005 inches specification
- D. The bearing should be tightened to no clearance

7. A heavy-truck driver reports that the brake pedal feels normal during light applications but becomes noticeably softer during firm applications. The MOST likely cause is:

- A. Hose or hydraulic component compliance under high pressure that becomes apparent under firm application
- B. Failed master cylinder
- C. Worn brake pads
- D. Failed compressor

8. The federal regulation that requires ASE certification for brake inspectors is:

- A. 49 CFR 393.1
- B. 49 CFR 380.12
- C. 49 CFR 391.45
- D. 49 CFR 396.25

9. A heavy-truck driver complains of a "pulsation through the steering wheel" during braking from highway speed. The vibration disappears at lower speeds. The MOST likely cause is:

- A. Failed wheel bearings
- B. Front rotor thickness variation amplified at higher rotational speeds
- C. Failed power steering pump
- D. ABS modulator failure

10. A heavy-truck wheel speed sensor is being tested with a multimeter. The reading is 1,200 ohms. This reading is:

- A. Below the typical range — sensor is shorted

- B. Well above the typical range — sensor is open
- C. Within the typical range for a healthy sensor (typically 900 to 2,000 ohms)
- D. Acceptable only if temperature is above freezing

11. A heavy-truck air brake system uses what type of fittings for most service line connections?

- A. SAE J512 inverted flare fittings
- B. NPT pipe threads only
- C. Quick-release SAE fittings only
- D. Brass compression fittings only

12. A heavy-truck driver complains that the brakes "drag" on one wheel during normal driving — the wheel becomes hot. The MOST likely causes include all of the following EXCEPT:

- A. Failed master cylinder compensation port
- B. Seized caliper
- C. Contaminated brake fluid causing seal swelling
- D. Wheel speed sensor with excessive air gap

13. A heavy-truck air system's compressor has worn piston rings, allowing oil to pass into the air system. After replacing the compressor, the technician should also:

- A. Replace the trailer relay valve
- B. Replace the air dryer cartridge and inspect/clean the entire supply-side system
- C. Replace the master cylinder
- D. Replace the wheel speed sensors

14. A heavy-truck 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. Failed wheel bearings
- B. Compressor failure
- C. Worn brake hardware (return springs, hold-downs, anchor pins)
- D. ABS modulator failure

15. A heavy-truck driver reports that the brakes feel "weak" during emergency braking. The pedal feels firm. After verifying brake adjustment is correct, the technician should next:

- A. Inspect for contaminated friction material on one or more wheels
- B. Replace the master cylinder
- C. Replace the compressor
- D. Replace all brake hoses

16. The brake compressor on a heavy-truck typically has a displacement of:

- A. 3 to 5 CFM at 1,250 RPM
- B. 50 to 60 CFM at 1,250 RPM
- C. 150 to 200 CFM at 1,250 RPM
- D. 13 to 18 CFM at 1,250 RPM

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

- A. Can be reinforced with new friction material
- B. Must be replaced as a matched axle set immediately

- C. Should be machined to remove the rivet heads
- D. Can be returned to service if measurement is within specification

18. A heavy-truck driver reports the brakes feel "spongy" only after parking overnight, returning to normal feel after driving. The MOST likely cause is:

- A. Failed master cylinder
- B. Worn brake pads
- C. Internal flex hose delamination becoming more pronounced when fluid is cold
- D. Failed compressor

19. A heavy-truck wheel bearing race shows uniform discoloration to bright blue. This indicates:

- A. The bearing has been overheated, the steel has lost its temper, and the bearing must be replaced
- B. Normal coloration from manufacturing
- C. Slight overheating that is acceptable
- D. Manufacturing defect requiring warranty claim

20. The brake compressor on a heavy-truck typically receives lubrication from:

- A. A dedicated compressor oil reservoir
- B. Splash lubrication only
- C. Fuel oil mixed with the air supply
- D. The engine's pressurized oil supply through an external line

21. A heavy-truck driver complains that the brake pedal feels normal during light applications but pulses during firm braking. The MOST likely cause is:

- A. Failed master cylinder
- B. Rotor thickness variation that becomes more pronounced under higher caliper pressure
- C. Worn caliper slide pins
- D. Failed wheel bearings

22. A heavy-truck air system's safety relief valve is set to open at:

- A. 80 to 100 psi
- B. 60 psi
- C. 150 to 175 psi
- D. 250 to 300 psi

23. A heavy-truck driver complains that during a recent panic stop, the brake pedal traveled unusually deep before the brakes engaged. After the 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. Failed wheel bearings

24. The brake fluid moisture content threshold for replacement is approximately:

- A. 1%
- B. 5%

C. 10%

D. 3%

25. A heavy-truck driver complains that the parking brake "drags" during normal driving. The MOST likely cause is:

A. Failed master cylinder

B. Insufficient air pressure reaching the spring chamber control ports

C. Failed wheel bearings

D. ABS modulator failure

26. The brake camshaft on an S-cam foundation brake typically rotates approximately how many degrees during a full brake application?

A. 30 degrees

B. 180 degrees

C. 75 to 90 degrees

D. 270 degrees

27. A heavy-truck 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. 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

28. A heavy-truck driver complains that the brake pedal feels normal during the first stop but progressively softer with each subsequent stop. The MOST likely cause is:

- A. Failed master cylinder
- B. Worn caliper slide pins
- C. ABS modulator failure
- D. Air entering the hydraulic system through normal use, requiring system bleeding

29. The brake camshaft on an S-cam foundation brake is rotated by:

- A. The chamber diaphragm directly
- B. The slack adjuster
- C. The wheel speed sensor
- D. The compressor

30. A heavy-truck driver complains of a "hissing" sound that occurs only during hard braking. The hissing stops when the pedal is released. The MOST likely cause is:

- A. Air dryer purge cycle activating
- B. Tire road noise
- C. Air leak at a chamber location during application — likely a torn diaphragm or cracked supply line
- D. Engine vacuum loss

31. The brake fluid in a hydraulic system flows in which order?

- A. From caliper through master cylinder
- B. From wheel back to reservoir
- C. From compressor to wheel

D. From reservoir, through master cylinder, through lines, to wheel cylinders or calipers

32. A heavy-truck driver complains that the brake pedal feels firm but the brakes feel "weak" during all stops. 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 wheel speed sensors

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

A. Activate the parking brake automatically

B. Produce ABS warning lamp illumination and stored DTC for that sensor

C. Improve ABS function

D. Increase compressor cut-out pressure

34. A heavy-truck driver complains that during emergency braking on wet pavement, the brakes feel "different" — the pedal pulses and there's a clicking sound. The MOST likely cause is:

A. Failed master cylinder

B. Air in the hydraulic lines

C. ABS activation during the wet-road hard stop — pedal pulsation and modulator clicks are normal operation

D. Loose wheel bearings

35. A heavy-truck wheel bearing pre-load adjustment that produces excessive tightness will:

- A. Improve bearing service life
- B. Reduce noise during operation
- C. Improve braking performance
- D. Generate excessive heat and lead to lubricant breakdown and accelerated bearing failure

36. A heavy-truck driver complains of a "scraping" sound from the front brakes during application. Inspection reveals brake pads worn down to metal-to-rotor contact. The rotor:

- A. Should be inspected for damage and likely replaced if scoring exceeds the discard limit
- B. Can be returned to service without inspection
- C. Should be reinforced with new friction material
- D. Should be machined to remove the metal-to-rotor scoring without inspection

37. The trailer's relay emergency valve performs how many primary functions simultaneously?

- A. Two: service and parking
- B. Three: service relay, reservoir charging, emergency application
- C. Four: service, parking, ABS, supply
- D. One: service relay only

38. A heavy-truck wheel bearing has been operating with insufficient lubrication. The MOST likely outcome is:

- A. Improved bearing service life
- B. Reduced wheel hub temperature

C. Rapid bearing failure — friction generates excessive heat that destroys the lubricant and damages the bearing surfaces

D. Quieter operation

39. A heavy-truck driver complains that the trailer brakes apply during stops but the trailer pulls slightly to the right. The MOST likely cause is:

A. Failed compressor

B. Excessive wheel bearing endplay

C. ABS warning lamp circuit issue

D. Brake imbalance between trailer wheels — typically contaminated or worn friction material on one wheel

40. The brake fluid in a hydraulic system is essentially:

A. Incompressible, allowing pressure to transmit equally per Pascal's Law

B. Highly compressible

C. Magnetic

D. Non-conductive

41. A heavy-truck driver complains that the brake pedal "rises" — meaning the pedal moves higher in the cab — over the course of weeks. The vehicle has hydraulic drum brakes. The MOST likely cause is:

A. Failed master cylinder

B. Drum brake self-adjusters compensating for shoe wear by automatically tightening clearance

C. Excessive flex hose age

D. ABS modulator stuck closed

42. A heavy-truck wheel bearing service interval is determined by:

- A. Driver preference
- B. Calendar time only
- C. Manufacturer specification — typically miles or hours of operation
- D. Tire wear pattern

43. The brake fluid type used in most heavy-truck hydraulic brake systems is:

- A. SAE 5W-30 motor oil
- B. DOT 1 mineral oil
- C. DOT 5 silicone-based fluid
- D. DOT 3 or DOT 4 glycol-based fluid

44. A heavy-truck driver complains that the brakes feel different but cannot describe the change precisely. 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 the next service interval
- B. Replace the master cylinder
- C. Replace all brake calipers
- D. Replace the vacuum booster

45. The brake compressor on a heavy-truck rotates whenever:

- A. The driver applies the brake pedal
- B. The engine is running
- C. The trailer is connected

D. The ABS is active

46. A heavy-truck wheel speed sensor produces what type of signal?

A. DC voltage steady output

B. PWM digital signal

C. AC pulse signal proportional to wheel speed

D. 4-20 mA analog signal

47. A heavy-truck driver complains of a "metallic squeal" from the front brakes during light braking. The squeal disappears under firm braking. The MOST likely cause is:

A. Failed wheel bearings

B. Compressor failure

C. ABS modulator failure

D. Worn brake pad wear indicator contacting the rotor

48. The federal regulation that defines air brake system requirements for heavy trucks is:

A. FMVSS 121

B. FMVSS 105

C. FMVSS 135

D. FMVSS 106

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

- A. Failed master cylinder
- B. Internal flex hose deterioration that has progressed gradually
- C. Failed wheel bearings
- D. ABS fault

50. A heavy-truck driver complains that during a recent road trip down a long mountain grade, the brake pedal "fade" was noticeable. 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

PRACTICE EXAM 20 — ANSWER KEY AND EXPLANATIONS

1. B — Inspect for contaminated friction material on the right side, or worn rotors causing imbalance. Vehicle pull during braking is caused by imbalance between sides — the side with stronger braking pulls the vehicle in that direction. Contaminated friction material on the right side reduces its braking effectiveness, causing the left side to do more work and producing the leftward pull.
2. C — Within normal specifications (20 to 25 psi differential is typical). The standard differential between governor cut-in and cut-out is 20 to 25 psi. A 25 psi differential (130 cut-out, 105 cut-in) is exactly within this range and represents normal governor function. This balances compressor duty cycle with adequate reserve pressure.
3. A — Inspect the trailer brake friction material for contamination, oil saturation, or excessive wear. After verifying the relay valve and brake adjustment are correct, the next step in diagnosing weak trailer brakes is to inspect the friction material. Contamination or excessive wear reduces the coefficient of friction at the trailer wheels, producing weak braking despite proper adjustment.
4. D — Replace the contaminated friction material because lubricant exposure permanently degrades friction coefficient. Lubricant contamination of brake friction material permanently reduces the coefficient of friction. Cleaning, air-drying, or applying heat cannot restore performance — the contaminated material must be replaced. The wheel seal must also be replaced as part of the same service.
5. B — The supply pressure at the chambers during application — pressure drop during application indicates restricted air supply. After verifying brake adjustment, friction material, and brake balance are within specification, the next step is to inspect the supply pressure at the chambers during brake application. Pressure drop during application indicates restricted air supply that limits chamber force.
6. C — Excessive endplay — bearing requires readjustment to 0.001 to 0.005 inches specification. The standard endplay specification is 0.001 to 0.005 inches. A reading of 0.012 inches is significantly above this range, indicating the bearing is too loose. Continued operation produces hub wobble, accelerated wear, and potential safety issues — readjustment is required.
7. A — Hose or hydraulic component compliance under high pressure that becomes apparent under firm application. Sponginess that is more pronounced under firm application points to compliance in the hydraulic system that responds to pressure. The components are absorbing pedal effort

through compliance rather than transmitting hydraulic pressure efficiently. Hose inspection and replacement may be required.

8. D — 49 CFR 396.25. This regulation defines the qualifications required for a person to be considered a qualified "brake inspector" on commercial motor vehicles. Requirements include documented training, experience, and certification — typically ASE T4 — that must be on file for each person performing brake inspections.
9. B — Front rotor thickness variation 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.
10. C — Within the typical range for a healthy sensor (typically 900 to 2,000 ohms). Most heavy-truck ABS wheel speed sensors read between approximately 900 and 2,000 ohms at room temperature. A reading of 1,200 ohms falls comfortably within this range, indicating the sensor coil itself is electrically healthy and the diagnostic search should expand to wiring and gap conditions.
11. A — SAE J512 inverted flare fittings. SAE J512 inverted flare fittings are the dominant standard for heavy-truck air brake line connections. The inverted flare design provides reliable sealing under pressure, vibration, and thermal cycling without thread sealants — making it ideal for safety-critical brake applications.
12. D — Wheel speed sensor with excessive air gap. A wheel speed sensor with excessive air gap affects ABS function but does not cause brake drag. The other three options (failed master cylinder compensation port, seized caliper, contaminated brake fluid causing seal swelling) all directly produce residual brake pressure that causes drag at the affected wheel.
13. B — Replace the air dryer cartridge and inspect/clean the entire supply-side system. When a compressor fails with oil blowby, contamination carries downstream into the dryer, reservoirs, and beyond. Simply replacing the compressor without addressing this contamination leads to repeat failure of the new compressor and continued system contamination — the entire supply-side must be cleaned.
14. C — Worn brake hardware (return springs, hold-downs, anchor pins). 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.
15. A — Inspect for contaminated friction material on one or more wheels. After confirming brake adjustment is correct, the next step in diagnosing weak braking is to inspect for contaminated friction material. Contamination reduces the coefficient of friction at the affected wheel, producing weak braking even with proper adjustment.

16. D — 13 to 18 CFM at 1,250 RPM. Typical Class 8 tractor air compressors have a displacement of 13 to 18 cubic feet per minute at 1,250 RPM. This range provides adequate reserve capacity to meet FMVSS 121 buildup time requirements while supporting normal in-service demand.
17. B — 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.
18. C — Internal flex hose delamination becoming more pronounced when fluid is cold. Cold-stiff hose with internal delamination produces increased compliance (sponginess) when fluid is cold. As fluid warms during operation, the hose conforms differently and pedal feel returns to normal. This temperature-correlated symptom is the distinctive fingerprint of progressing flex hose deterioration.
19. A — The bearing has been overheated, the steel has lost its temper, and the bearing must be replaced. Bright blue 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 — continued use will result in rapid failure.
20. D — The engine's pressurized oil supply through an external line. Heavy-truck air compressors share the engine's pressurized oil supply through an external oil line. This integration ensures consistent lubrication during operation and eliminates the need for a separate compressor lubrication system — but also means a compressor oil leak indicates a brake-system fault that must be addressed.
21. B — Rotor thickness variation that becomes more pronounced under higher caliper pressure. Pulsation under firm braking but not light braking points to rotor thickness variation. The variation creates an alternating clamping force that becomes more pronounced as caliper pressure increases — exactly the described pattern.
22. C — 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.
23. 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.

24. D — 3%. The industry standard for brake fluid replacement is when moisture content exceeds approximately 3%. Above this threshold, the wet boiling point drops significantly, increasing the risk of brake fade under hard braking. Periodic moisture testing and replacement is essential maintenance.
25. 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.
26. C — 75 to 90 degrees. The brake camshaft typically rotates approximately 75 to 90 degrees during a full brake application, depending on chamber type and the slack adjuster's lever arm length. Greater rotation produces greater shoe spread and braking torque.
27. A — 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.
28. D — Air entering the hydraulic system through normal use, requiring system bleeding. A pedal that becomes progressively softer with each subsequent stop indicates air being pushed forward in the hydraulic system, redistributing through the lines. This is the classic symptom of air in the hydraulic system, requiring proper bleeding to remove the trapped air.
29. B — The slack adjuster. The brake camshaft on an S-cam foundation brake is rotated by the slack adjuster, which converts the linear pushrod force from the chamber into rotational force at the camshaft. The slack adjuster's lever arm length determines the mechanical advantage of this conversion.
30. C — Air leak at a chamber location during application — likely a torn diaphragm or cracked supply line. Hissing during hard braking that stops on release is the diagnostic fingerprint of a chamber-related leak that opens up under high pressure. Possible causes include a torn chamber diaphragm or a cracked air supply line that leaks only under application pressure.
31. D — From reservoir, through master cylinder, through lines, to wheel cylinders or calipers. Brake fluid flows from the reservoir into the master cylinder, where it is pressurized when the driver applies the pedal. The pressurized fluid flows through the brake lines to the wheel cylinders or calipers, generating the braking force at each wheel.
32. 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 verification is fundamental to "weak brakes" diagnosis.

33. B — Produce 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.
34. C — ABS activation during the wet-road hard stop — pedal pulsation and modulator clicks are normal operation. ABS activation during a wet-road hard stop produces characteristic pedal pulsation from the modulator cycle and an audible ticking sound from the modulator solenoids. The system intervened to prevent wheel lockup, which is exactly what it is designed to do — this is normal operation, not a malfunction.
35. D — Generate excessive heat and lead to lubricant breakdown and accelerated bearing failure. Excessive bearing pre-load produces continuous friction at the contact surfaces. Heat generated by this friction breaks down the lubricant, accelerates wear, and eventually causes bearing seizure. Proper endplay adjustment is essential to avoid this failure mode.
36. A — Should be inspected for damage and likely replaced if scoring exceeds the discard limit. Metal-to-rotor contact damages the rotor friction surface. The rotor must be inspected for scoring and dimensional integrity. If scoring exceeds the discard limit (typically 0.060 inches over nominal) or the rotor is below minimum thickness, replacement is required.
37. B — Three: service relay, reservoir charging, emergency application. The trailer relay emergency valve performs three simultaneous functions: amplifying the service signal from the tractor for fast trailer brake response, charging the trailer reservoir from supply air, and automatically applying the trailer brakes from reservoir air during supply pressure loss. This multifunction design is the backbone of trailer air brake safety.
38. C — Rapid bearing failure — friction generates excessive heat that destroys the lubricant and damages the bearing surfaces. A wheel bearing operating without adequate lubrication generates excessive friction at the rolling contact surfaces. The friction generates heat that destroys the lubricant and damages the bearing surfaces, leading to rapid mechanical failure. Continued operation produces catastrophic damage.
39. 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.
40. A — Incompressible, allowing pressure to transmit equally per Pascal's Law. Brake fluid is essentially incompressible, allowing pressure applied at the master cylinder to transmit equally throughout the system per Pascal's Law. This near-incompressibility is exactly why hydraulic brakes function — it transmits pedal effort efficiently to the wheel ends.

41. B — Drum brake self-adjusters compensating for shoe wear by automatically tightening clearance. Drum brake self-adjusters automatically compensate for lining wear by tightening shoe-to-drum clearance over time. As linings wear, the adjuster engages slightly, causing the pedal to rise as the shoes are positioned closer to the drums. This is a normal operational pattern.
42. C — Manufacturer specification — typically miles or hours of operation. Wheel bearing service intervals are determined by the vehicle manufacturer based on hub design (sealed/oil-bath vs. grease) and operating conditions. Modern sealed designs often go 100,000 to 250,000 miles between services. Always follow the manufacturer's specified interval.
43. D — DOT 3 or DOT 4 glycol-based fluid. Most heavy-truck hydraulic brake systems specify DOT 3 or DOT 4 glycol-based brake fluid. These fluids are hygroscopic, must be kept sealed, and must be replaced periodically as moisture absorption lowers their boiling point. DOT 5 silicone is incompatible and used only in specifically designated systems.
44. A — Discuss observations with the driver, perform a road test to recreate the condition, and document findings for the next service interval. 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 recreate the condition, and document findings clearly. Monitoring at the next interval allows early detection if the symptom develops further.
45. B — The engine is running. The compressor rotates whenever the engine is running because it is gear-driven and cannot be disengaged. When the system reaches cut-out pressure, the compressor unloads internally — the unloader holds the inlet valves open so the compressor rotates without producing air.
46. C — AC pulse signal proportional to wheel speed. Wheel speed sensors are magnetic devices that generate AC pulse signals each time a tone ring tooth passes the sensor tip. The pulse frequency and amplitude are both proportional to wheel rotational speed, providing the ABS ECU with accurate wheel-by-wheel speed data.
47. D — Worn brake pad wear indicator contacting the rotor. 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.
48. A — FMVSS 121. FMVSS 121 specifies the air brake system requirements for heavy trucks, including dual-circuit design, pressure thresholds, ABS requirements, and other safety-critical specifications. This is the foundational federal standard that all heavy-truck air brake systems must comply with.
49. 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.

50. 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.