BONUS SECTION 3: BRAKE FLUID, VALVES, AND SYSTEM BLEEDING

10 Targeted Practice Questions

1. A technician is bleeding a brake system and the fluid coming out of the rear bleeder screws is dark brown and has small black particles suspended in it. The correct action is to:

A. Continue bleeding until clear fluid appears, then close the bleeders and return the vehicle to service

B. Continue bleeding until clear fluid appears, then inspect the master cylinder, calipers, and hoses for rubber component degradation that produced the particles

C. Stop bleeding immediately since particles indicate a cracked brake line is introducing corrosion into the system

D. Replace only the master cylinder since it is the source of all rubber debris in the brake system

2. A proportioning valve is set by the manufacturer to limit rear brake pressure above a specific threshold. The purpose of this pressure limiting function is to:

A. Protect the rear wheel cylinders and calipers from excessive pressure that could rupture their seals

B. Prevent the rear wheels from locking up during hard stops caused by forward weight transfer that reduces rear tire traction

C. Equalize brake force side-to-side across the rear axle to prevent yaw during braking

D. Reduce rear brake operating temperatures by limiting the hydraulic force applied to rear friction surfaces

3. A technician is gravity bleeding a brake system after replacing the master cylinder. After 20 minutes of gravity bleeding from all four corners, the brake pedal is still very spongy. The MOST likely reason this method failed is:

A. Gravity bleeding requires the vehicle to be on a lift with the wheels hanging freely and the technician did not elevate the vehicle properly

B. Gravity bleeding is too slow to purge air from the ABS modulator internal passages and scan-tool-assisted bleeding is required

C. Gravity bleeding cannot generate enough fluid flow to push large air pockets out of the system, particularly after a master cylinder replacement that introduces significant air volume

D. Gravity bleeding works from low to high in the system and air rises, so it effectively bleeds only the top portions of the brake circuit

4. DOT 3 and DOT 4 brake fluids are both glycol ether-based and are considered miscible. However, mixing them has the following practical consequence:

A. The mixture will immediately cause rubber seal swelling that requires complete system flushing

B. The mixture's boiling point will be between the two individual ratings — adding DOT 4 raises the effective boiling point of a DOT 3 system while adding DOT 3 lowers the boiling point of a DOT 4 system

C. The mixture creates a chemical reaction that accelerates moisture absorption, reducing the effective service interval of the fluid

D. Mixing them voids the brake system warranty but has no measurable effect on brake system performance

5. A metering valve in a combination valve delays pressure to the front disc brakes during initial brake application. This valve typically opens fully and allows full front brake pressure when:

A. The driver applies the brake pedal quickly, bypassing the delay mechanism during emergency stops

B. Rear drum brake shoe springs have been overcome and the shoes have begun to contact the drum, at which point front pressure is released to full system pressure

C. Vehicle speed drops below 20 mph, at which point the metering valve opens to allow full front braking for final vehicle stop

D. Master cylinder pressure exceeds 125 PSI, at which point the metering valve spring is overcome and full pressure passes to the front circuit

6. A pressure differential switch in a combination valve illuminates the brake warning light when:

A. Brake fluid temperature exceeds a safe operating threshold in either hydraulic circuit

B. A pressure imbalance develops between the two hydraulic circuits, indicating a leak or failure in one circuit has reduced its pressure relative to the other

C. The brake pedal is held down for more than 30 seconds, indicating a potential caliper or wheel cylinder leak

D. The master cylinder reservoir fluid level drops below the minimum mark, activating the pressure switch through a mechanical float linkage

7. A technician is using the pressure bleeding method to flush the brake system. The maximum pressure setting for the pressure bleeder adapter should be:

A. At least 100 PSI to ensure adequate flow through restricted brake lines

B. Matched to the pressure rating stamped on or specified for the master cylinder reservoir cap to avoid damaging the reservoir or seals

C. Set to 50 PSI as a universal safe pressure for all vehicle brake systems

D. As high as necessary to achieve steady fluid flow at all four bleeder screws simultaneously

8. A vehicle with ABS requires special consideration during brake bleeding because:

A. ABS brake fluid is a different specification than standard brake fluid and must not be mixed during bleeding

B. The ABS hydraulic control unit contains internal passages and solenoid valves that are normally closed and may trap air that cannot be purged with standard manual bleeding alone

C. ABS systems require the engine to be running during bleeding so the ABS pump maintains system pressure

D. Air in an ABS modulator always illuminates the ABS warning light, making it easy to identify when complete bleeding has been achieved

9. A residual pressure check valve was used in older master cylinders serving drum brake circuits. The residual pressure it maintained was typically:

A. 100–150 PSI to keep the wheel cylinder pistons extended against the brake shoes at all times

B. 8–10 PSI — just enough to keep wheel cylinder cup seals properly seated against the cylinder bore walls without actually applying the brakes

C. 25–35 PSI to maintain some brake shoe-to-drum contact and reduce pedal travel on the first application

D. Equal to the spring tension of the brake shoe return springs to precisely counterbalance the retraction force

10. A technician completes a brake fluid flush on a vehicle and finds the new fluid coming out of the bleeder screws is slightly yellowish rather than the clear color of the new fluid in the bottle. The technician should:

A. Continue flushing until perfectly clear fluid appears since any discoloration indicates contamination

B. Accept this as normal — new brake fluid is sometimes slightly amber or straw-colored and this does not indicate contamination or incomplete flushing

C. Test the fluid with a refractometer to measure its boiling point before accepting the flush as complete

D. Check whether the vehicle manufacturer specifies a different DOT rating since a color mismatch indicates wrong fluid was installed previously

BONUS SECTION 3 — ANSWERS AND EXPLANATIONS

1. B — Continue bleeding, then inspect rubber components — Black particles in brake fluid indicate rubber degradation from aging, contamination, or compatibility issues. The particles are fragments of deteriorating seals, hoses, or caliper boots circulating through the system. Simply flushing without inspecting the source allows continued degradation and potential seal failure after the service is complete.

2. B — Prevent rear wheel lockup from weight transfer — During hard braking, vehicle weight shifts forward, reducing the load on the rear tires. Less tire load means less available traction at the rear wheels. Without proportioning, the rear brakes could easily overpower the reduced rear tire traction and lock the wheels, causing dangerous vehicle instability and yaw. The proportioning valve prevents this by limiting rear circuit pressure above a calibrated threshold.

3. C — Gravity bleeding cannot purge large air volumes — Gravity bleeding relies entirely on the weight of fluid in the reservoir to push air out through open bleeders. This passive flow rate is adequate for minor air removal but is too slow and generates insufficient fluid velocity to reliably push large air pockets — such as those introduced by a master cylinder replacement — through the full length of the brake lines and out through the caliper bleeders.

4. B — Mixture boiling point falls between the two individual ratings — Since both fluids are chemically compatible glycol ethers, they mix without adverse reactions. However, the resulting mixture's boiling point is proportional to the ratio of each fluid present. Adding DOT 3 to a DOT 4 system dilutes the higher-rated fluid and reduces its boiling point toward the DOT 3 specification. For this reason, topping off a DOT 4 system with DOT 3 is technically acceptable but undesirable.

5. B — Rear shoes contact drum, then front pressure releases — The metering valve holds off front disc pressure at low hydraulic pressures to give the rear drum shoe return springs time to be overcome. Once the springs are compressed and the shoes begin contacting the drum — requiring a specific minimum pressure — the metering valve releases and allows full system pressure to reach the front discs, providing balanced front-rear brake engagement.

6. B — Pressure imbalance between circuits indicates a leak — The pressure differential switch sits between the two hydraulic circuits and monitors relative pressure. Under normal operation, both circuits experience equal pressure simultaneously. If one circuit develops a leak and loses pressure, the switch piston shifts toward the low-pressure side, closing a contact that completes the brake warning light circuit and alerts the driver of a circuit failure.

7. B — Match pressure to reservoir cap rating — Master cylinder reservoirs are designed to a specific pressure tolerance. Exceeding this tolerance during pressure bleeding can crack the reservoir, blow out the cap seal, or damage the float sensor. The maximum safe pressure is marked

on the reservoir cap or specified in the service manual. Most caps are rated for 10–15 PSI maximum pressure bleeding.

8. B — ABS HCU contains passages that trap air when solenoids are closed — The hydraulic control unit has numerous internal check valves and solenoid-operated passages that are closed during normal non-ABS operation. Air trapped behind these closed valves cannot be reached by fluid flow during standard manual or pressure bleeding. Activating the solenoids with a scan tool opens these passages and allows air to be pushed through and out of the bleeders.

9. B — 8–10 PSI keeps wheel cylinder cup seals seated — The small residual pressure maintained by the check valve in drum brake circuits is not enough to apply the brakes but is sufficient to keep the rubber cup seals on the wheel cylinder pistons pressed firmly against the cylinder bore walls. Without this pressure, the cups can pull slightly away from the bore and allow air ingestion during the piston retraction, causing a gradual spongy pedal.

10. B — Normal — new brake fluid can be slightly amber colored — Fresh DOT 3 and DOT 4 brake fluids range in color from water-clear to light amber or pale straw depending on the manufacturer's formulation and additive package. A slightly yellowish tint in new fluid does not indicate contamination or incomplete flushing. The flush is complete when the expelled fluid is consistent in appearance with the new fluid being used, regardless of whether that fluid is perfectly clear or slightly amber.