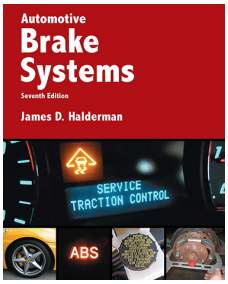
Automotive Brake Systems



CHAPTER 11

Drum Brake Diagnosis and Service

OBJECTIVES

- Discuss the procedure recommended for brake drum removal.
- Discuss the procedure for inspecting the backing plate, brake spring, drum brake lining, and wheel cylinder.
- Describe how to inspect, clean, and reassemble drum brake parts.
- Describe the symptoms of a faulty drum brake.

DRUM BRAKE FAULTS

- Brake lining wear and braking force reduced
- Brake springs get weaker due to exposure to hot brake temperatures and outside elements such as water and salt in northern areas
- Brake drum wear as a result of friction material on brake shoes rubbing on friction surface

DRUM BRAKE DIAGNOSIS

- STEP 1: Verify customer complaint.
- STEP 2: Visually inspect brakes and related parts (wheels, tires, suspension).
- STEP 3: Determine root cause.
- STEP 4: Restore brake system to like-new operation.

DRUM BRAKE DIAGNOSIS

- STEP 5: Test-drive vehicle to verify service corrected customer's complaint.

BRAKE DRUM REMOVAL

- Hub or Fixed Drums
  - Often used on rear of FWD vehicles
  - Drum has hub for inner and outer bearings
  - Is retained by a spindle nut
  - Remove dust cap and cotter key that retain spindle nut
  - Remove spindle nut and washer
  - Brake drum can be pulled off spindle

BRAKE DRUM REMOVAL

- Hubless or Floating Drums
  - Usually used on rear of rear-wheel-drive vehicle
  - Drum secured to axle flange by wheel and lug nuts
  - New vehicles have tinnerman nuts (clips)
    - Keep brake drum from falling off prior to installation of rear wheels
    - Discard tinnerman nuts

BRAKE DRUM REMOVAL

- After removing wheel, drum should move freely and slip off over brake shoes
- Some drum brakes have two threaded holes in drum so bolts can be installed
- Tightening bolts forces drum off hub
- Drum rusted to hub
- Brake shoes worn into drum

INSPECTING THE BACKING PLATE

- Backing plate supports parts of drum brake and helps keep water from getting on brake shoes
- Inspect six raised contact surfaces (pads, ledges, or shoe contact areas) that rub against sides of shoes
  - If pads worn more than 1/16 in. (1.5 mm), backing plate should be replaced

INSPECTING THE BACKING PLATE

- Inspect backing plate for looseness or bending
- Inspect backing plates to ensure they are parallel with axle flange
- Clean and lubricate raised pads

DRUM BRAKE LINING INSPECTION

- Front and rear lining material must be thicker than 0.060 in. (1.5 mm)
- U.S. nickel about 0.060 in. thick, so must have "nickel's worth of lining"
- Best possible inspection: remove brake drum for thorough visual inspection of entire brake
  - If riveted brake lining cracked between rivets, should be replaced

BRAKE SPRING INSPECTION

- Return Springs
  - Retracting springs that return brake shoes from drums when brakes released
  - Primary return spring attaches to primary brake shoe
  - Secondary return spring attaches to secondary brake shoe
  - Springs should be tested prior to brake overhaul

BRAKE SPRING INSPECTION

- Hold-Down Springs
  - One on each shoe
  - Used with retainer and hold-down spring pin to keep linings on backing plate
  - Still allow freedom of movement needed for proper braking operation

BRAKE SPRING INSPECTION

- Connecting Spring (Adjusting Screw Spring)
  - Attaches to lower portion and connects two shoes together
  - Check or replace at every brake lining change for best results

WHEEL CYLINDER INSPECTION

- Wheel cylinders: cast iron; finished smooth (bearingized) for wheel cylinder seals and pistons
- Surface finish on inside of wheel cylinder often destroyed when wheel cylinder honed
- Inspect dust boots, piston sealing cups, spring with piston seal expanders
- Bleed air from hydraulic system

INSPECTING THE DRUM BRAKE SHOES

- Check that replacements exactly same size (width and diameter) as originals
- Check for sound rivets (if rivet type)
- Friction material should be snug against metal brake shoe backing

BRAKE PARTS CLEANING

- Use denatured alcohol or “brake clean” to clean only disassembled parts
- Never clean assembled components with denatured alcohol or brake clean
  - Alcohol may not evaporate entirely from assembled component
  - Trapped alcohol will evaporate inside system, causing contamination
  - Trapped alcohol vapors also act like trapped air, causing spongy brake pedal

REASSEMBLING THE DRUM BRAKE

- STEP 1: Carefully clean backing plate.
- STEP 2: Check anchor pin for looseness.
- STEP 3: Lubricate shoe contact surfaces (shoe pads).
- STEP 4: Reassemble primary and secondary shoes and brake strut, along with all springs.

REASSEMBLING THE DRUM BRAKE

- STEP 5: Finish assembling drum brake, being careful to note correct location of all springs and parts.
- Most self-adjusters operate off rear (secondary) shoe
  - Should be assembled toward rear of vehicle

DRUM BRAKE SYMPTOM-BASED GUIDE

- Low Pedal or the Pedal Goes to the Floor
- Spring, Spongy Pedal
- Excessive Pedal Effort Required to Stop the Vehicle
- Light Pedal Effort—Brakes Too Sensitive

DRUM BRAKE SYMPTOM-BASED GUIDE

- Brake Pedal Travel Decreasing
- Pulsating Brake Pedal (Parking Brake Apply Pulsates Also)
- Brakes Fade (Temporary Loss of Brake Effectiveness When Hot)

DRUM BRAKE SYMPTOM-BASED GUIDE

- Shoe Click Noise
- Thumping Noise When Brakes Are Applied
- Grinding Noise
- One Wheel Drags
- Vehicle Pulls to One Side

DRUM BRAKE SYMPTOM-BASED GUIDE

- Wet Weather: Brakes Grab or Will Not Hold
- Brakes Squeak
- Brakes Chatter

SUMMARY

- Brake springs get weaker due to exposure to hot brake temperatures and outside elements such as water and salt in northern areas
- Backing plate supports parts of drum brake and helps keep water from getting on brake shoes
- Front and rear lining material must be thicker than 0.060 in. (1.5 mm)

SUMMARY

- Wheel cylinders: cast iron; finished smooth (bearingized) for wheel cylinder seals and pistons
- Check that replacements exactly same size (width and diameter) as originals
- Use denatured alcohol or “brake clean” to clean only disassembled parts