

BRAKES

UNIT 4: DRUM BRAKE DIAGNOSIS AND REPAIR

LESSON 2: INSPECT AND DIAGNOSE DRUM BRAKE SYSTEMS

I. Terms and definitions

- A. **Brake fade** – The loss of brake effectiveness due to heat created during prolonged hard braking.
- B. **Brake wear indicator** – A small metal plate riveted to one of the brake pads. When the shoe becomes excessively worn, the indicator contacts the rotor and makes a harsh noise, which indicates that it is necessary to check the brakes.
- C. **Encapsulation** – The act of capturing and holding harmful brake dust.
- D. **Knockout** – A place in a metal that is intentionally weakened by the manufacturer so it can be knocked out.
- E. **Maximum drum diameter** – The maximum diameter a drum should be before it is discarded.
- F. **Rivets** – Metal fasteners. Rivets fasten some brake friction materials.
- G. **Self-adjuster** – A system of linkages that automatically adjusts the position of the brake shoes.
- H. **Star wheel** – A notched wheel found on some brake adjusters. When turned, the star wheel activates the adjuster.
- I. **Warping** – The bending or distorting of a component. Brake drums are sometimes distorted by extreme heat.

II. Visually inspecting the drum brake system

NOTE: A visual inspection is the only reliable method of determining the condition of brake components. Remove the brake drum before making a visual inspection.

- A. Using the procedure outlined in Lesson 2 of Unit 3, check the fluid level in the master cylinder and inspect the brake hydraulic system.





- B. Use proper lifting equipment to raise the vehicle. Remove the wheels.

CAUTION: When lifting a vehicle, always use proper lifting equipment and observe all safety precautions.



- C. Encapsulate and thoroughly clean the drum.

CAUTION: Asbestos is a cancer-causing substance. Never breathe asbestos dust or allow it to escape into the air. Special equipment is available to encapsulate the dust and prepare it for safe disposal. If this equipment is unavailable or in poor working order, do not perform brake work.



CAUTION: Carefully follow the manufacturer's instructions when using the encapsulator.

- D. After ensuring that the encapsulator is in place and the vacuum and compressed air are on, remove the brake drum.

1. In some systems, the drum can be removed from the wheel hub.
2. In other systems, it is necessary to disassemble the wheel bearing before removing the drum. See Lesson 1 of Unit 7 for procedures on wheel bearing service and adjustment.

NOTE: If the wheel bearing is disassembled, be sure to clean and repack it before reassembling the hub.



NOTE: It may be necessary to remove the encapsulator to make this adjustment. If so, be sure to reinstall the encapsulator and clean it out before removing the brake drum.

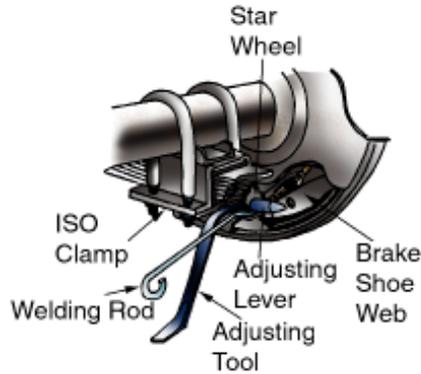


CAUTION: Do not remove the brake drum until the encapsulator is in place. Be sure that the encapsulator vacuum is on and running and that the compressed air is on.

3. If brake drums are grooved by the brake shoe rivets as a result of badly worn shoes, the grooves may mate with the rivets, making brake drum removal difficult. If this occurs, back off the brake adjuster.

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- a. To back off the adjuster plate, turn the star wheel with a brake spoon.



- b. An opening in the backing plate or the brake drum provides access to the adjuster. This opening may be closed with rubber plugs. In the brake drum, the opening may be a knockout in the drum. In either case, be sure to close the opening with specially designed rubber plugs.

NOTE: It may be necessary to remove the encapsulator to make this adjustment. If so, be sure to reinstall the encapsulator and clean it out before removing the brake drum.



4. When removing the brake drum, lay it down inside the encapsulator housing and blow off all the dust. Turn it over and finish blowing off the dust.
5. Blow off all of the dust from the brake assembly. Make sure to blow off all of the dust – even the dust that is behind the parts.
 - a. Using the gloves in the encapsulator, position the unconnected brake parts to thoroughly clean them with compressed air.
 - b. To get all of the dust out, vacuum the enclosure thoroughly using compressed air.
6. After completely freeing the encapsulator enclosure and all of the brake parts of brake dust, remove the encapsulator from the wheel.

E. Inspect the brake.

1. Carefully inspect the brake assembly and note any indication of fluid leaks. Identify the source of any leaks.

NOTE: If the rear brake on a rear-wheel-drive vehicle is contaminated with a heavy lubricant, replace the axle seals as well as the brake shoes.

NOTE: Do not use engine solvent on brake parts. Use only a solvent made specifically for brakes. Engine solvents and gasoline contaminate brake parts and may cause brake failure.

2. Inspect the brake lining.

- a. Check the thickness of the brake lining.

- Some linings are riveted to the shoe.
- The rivet heads should be at least 1/64 in below the lining surface.
- The lining that is bonded to the shoe should be at least as thick as the shoe itself.
- Replace any shoes that do not clearly meet thickness standards.

NOTE: Periodically check the brake lining on all vehicles. Annual checks are recommended for vehicles with more than 40,000 miles. Also check friction material if there are unusual sounds during braking or if the brakes fade, pull, vibrate, or lose power.

- b. Check the brake lining for cracks, loose rivets, missing or damaged areas, or any other problems.

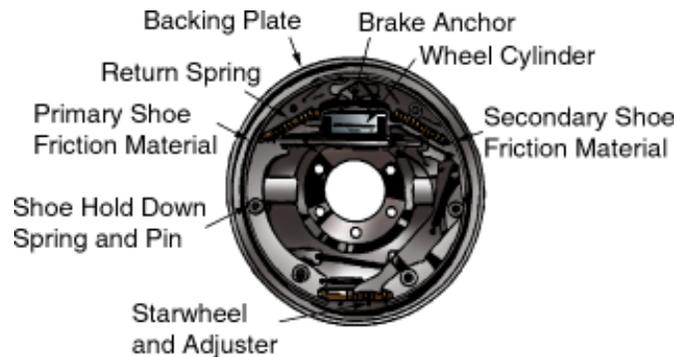
3. Inspect the backing plate for cracks and distortions; replace the plate if cracks or distortions are found.

- a. Make sure the plate is securely mounted.
- b. Also check the backing plate shoe contact locations. If these locations are grooved, file the areas or replace the backing plate.



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4. Inspect the brake shoe return springs for cracks and distortion. Make sure the springs are connected at both ends.
5. Make sure the hold-down springs are not distorted and the pins are not bent.



6. Brake inspection points
 - a. Make sure that the lever is not rounded at the point where it contacts the star wheel. Ensure that the wheel is not missing any teeth and that the adjuster threads are free to turn.
 - b. Make sure that the adjuster lever is positioned properly for its adjustment.

NOTE: Remove, disassemble, and clean the self-adjuster if it is dirty or hard to rotate. In servo brakes, the adjuster can be removed and cleaned without disassembling the entire brake.

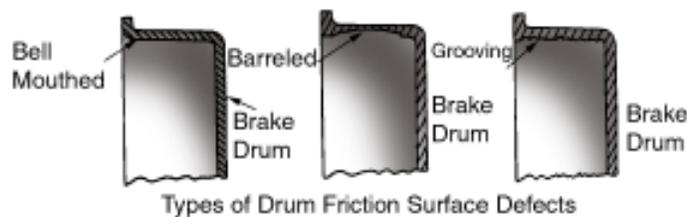


7. Inspect the anchor.
 - a. Make sure the anchor is firmly connected. The return springs should hold both shoes firmly against the anchor.
 - b. If either shoe is not held against its anchor, determine the reason why.
 - c. If the parking brake is applying pressure to the rear-wheel brake shoes, remove the pressure by adjusting the parking brake cable adjustment.



NOTE: When the parking brake is released, the parking brake cable should never move either shoe off the anchor.

8. Look for wetness around the wheel cylinder dust boots. Look for any other signs of leaks.
9. Inspect the brake drum.
 - a. Inspect the general condition of the drum. Note if the drum is belled, barreled, or grooved. Also note if the drum is warped or distorted. Look for cracks or blue spots on the drum.



Types of Drum Friction Surface Defects

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- b. Determine the discard diameter of the drum. The discard diameter is often stamped on the drum. The vehicle's service information also provides the discard diameter.
- c. Using a drum micrometer, measure the diameter of the drum. Always measure from the inside rims.



Accurately Measuring
the Drum Diameter

- d. If all the micrometer measurements vary less than .010 in, the drum is concentric and should next be checked for grooving.
 - If the drum is not concentric, it can be machined if its lowest micrometer reading is below .010 in.

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- If the lowest micrometer reading of the drum is above .010 in, discard the drum.
- e. Check the drum for grooves. Estimate the depth of any grooves. Determine if machining the grooves will cause the drum to exceed its discard diameter. See JS1-L4-U4 for machining procedures.

NOTE: A groove increases the diameter of the drum by twice the depth of the groove.

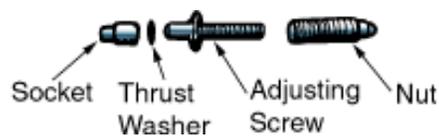
NOTE: Minor grooving is acceptable if the drum does not exceed its discard diameter.

NOTE: On some vehicles, the wheel hub is an integrated part of the drum. When inspecting the wheel bearings on these vehicles, make sure that the bearing cups are in good condition and that they press firmly into the hub. For the wheel bearing service procedure, see Lesson 1 of Unit 7.

- F. During brake inspection, the adjuster can be removed and cleaned without taking apart the entire brake assembly. Below is a general procedure for disassembling, cleaning, and reassembling the adjuster.

NOTE: Take apart only one drum brake assembly at a time. Doing so prevents confusing parts from one assembly with those from another. Use the assembled brake components as a guide for reassembly.

1. Using a large screwdriver or similar tool, pry apart the adjuster end of the shoes enough to allow removal of the adjuster.
2. Unscrew the link and clean the threads with a wire brush.
3. Remove the socket. Do not lose the thrust washer located between the socket and adjusting screw.



4. Lightly lubricate the threads of the adjuster screw and socket with an approved lubricant. Make sure that the thrust washer is in place.
 5. Reassemble the adjuster. Screw the adjuster link to its shortest adjustment.
 6. Spread the brake shoes sufficiently to replace the link. Make sure that the adjuster lever is properly positioned to turn the star wheel.
 7. Using a brake shoe gauge, adjust the link to fit the drum.
- G. After inspecting the brake and making all necessary repairs, replace the drum and wheel.