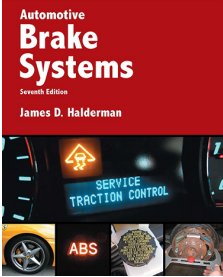


Automotive Brake Systems



CHAPTER 10

Drum Brakes

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OBJECTIVES

- Discuss the advantages and disadvantages of drum brakes.
- Identify drum brake component parts.
- Explain the function and types of drum brake shoes.
- Describe the operation of non-servo brakes.

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OBJECTIVES

- Explain the operation of dual-servo brakes.
- Discuss automatic brake adjusters.

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DRUM BRAKE ADVANTAGES

- Self-Energizing and Servo Action
 - Primary advantage
 - Drum brakes apply more stopping power for given amount of force applied to brake pedal than do disc brakes
 - Brake drums use servo action
 - One brake shoe helps the other, providing for increased stopping power

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DRUM BRAKE ADVANTAGES

- Parking Brake
 - Drum brakes make excellent parking brakes
 - Low effort from driver holds heavy vehicle in place
 - Disc brakes require complex set of extra parts to serve as parking brakes

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DRUM BRAKE DISADVANTAGES

- Brake Fade
 - Four types of brake fade
 - Mechanical Fade, Lining Fade, Gas Fade, Water Fade
- Brake Adjustment
 - Drum brake design requires adjusting
 - Brake shoe lining wears
 - Clearance between lining and drum increases

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DRUM BRAKE DISADVANTAGES

- Longer brake pedal travel results
- Most vehicles have automatic adjustments to maintain proper drum to lining clearance
- Brake Pull
 - Brake pull occurs when friction assemblies on opposite sides of vehicle have different amounts of stopping power

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DRUM BRAKE PARTS

- Backing Plate
 - Foundation of drum brake is backing plate
 - Mounts to suspension or axle housing
 - Support pads contact edges of brake shoes to keep linings aligned
 - Pads are also called ledges or shoe contact areas

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DRUM BRAKE PARTS

- Pad lightly coated with silicone brake grease to minimize wear
- Backing plate serves as mounting surface for friction assembly parts
- Plate protects brake assembly from contaminants
- Edge of backing plate curves outward to form lip
- Lip fits into groove in edge of brake drum to form water barrier

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DRUM BRAKE PARTS

- Plate has openings to permit inspection and adjustment
- Openings sealed with metal plugs
- Metal plugs must be punched out to allow inspection or adjustment
- Rubber replacement seals available
- Shoe Anchors
 - Prevent brake shoes from rotating with drum when brakes applied

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DRUM BRAKE PARTS

- Most drum brakes have one anchor; some have two or more
- Many anchors are round post mounted on backing plate
- Brake shoes have cutouts that contact anchor
- Another anchor is keystone anchor
- Piston Stops
 - Piston stops prevent wheel cylinder pistons from coming out of their bores

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DRUM BRAKE PARTS

- Wheel Cylinders
 - Hydraulic pressure transferred from master cylinder to each wheel cylinder through brake fluid
 - Pressure forces piston inside wheel cylinder to move outward
 - Pushrods or links force brake shoes outward against brake drum

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DRUM BRAKE PARTS

- Return Springs
 - Brake shoe return springs retract shoes when brake pedal is released
 - Springs prevent brake drag
 - Most brakes use closed coil springs
- Brake Shoe Holddowns
 - Keep shoes securely against support pads on braking plate

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DRUM BRAKE PARTS

- Help prevent noise, vibration, and wear
- Allow free movements to allow adjustments of shoes
- Most common holddown design is steel pin installed through hole in backing plate
- Another holddown is taper-wound coil spring with hook on its end

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DRUM BRAKE PARTS

- Parking Brake Linkage
 - Consists of cable, lever, and strut system that spreads brake shoes apart
- Brake Drums
 - Turns with wheel
 - Mounts on the hub or axle
 - Covers the rest of the brake assembly
 - Cast iron/aluminum with cast-iron liner
 - May have ribs or fins to dissipate heat

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DRUM BRAKE SHOES

- Linings of drum brakes attached to curved metal assemblies called brake shoes
- Outer edge of lining is lined with friction material
- Friction material contacts drum brake to generate stopping power
- Curved outer portion of the shoe is lining table, or shoe rim or platform

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DRUM BRAKE SHOES

- Lining table supports the block of friction material
- Metal piece of shoe under the lining table is shoe web
- All of force actuating shoe is transferred through web to the lining table
- Web usually has number of holes and notches where hardware attaches

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DRUM BRAKE SHOES

- Brake shoes can be relined and reused if web and lining table are not damaged
- Primary and Secondary Brake Shoes
 - Primary shoe is self-energized by drum rotation to create servo action
 - Servo action forces secondary shoe more firmly against drum
 - Because of different forces involved, primary and secondary shoes are different

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DRUM BRAKE SHOES

- Secondary shoe lining extends nearly the full length of lining table
- Secondary shoe lining material has higher coefficient of friction
- Primary shoe undergoes far less stress
- Primary shoe may run half the length of lining table
- Primary shoe lining has lower friction coefficient

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NON-SERVO BRAKE DESIGN

- Parts and Operation
 - Self-energizing action occurs when leading shoe contacts drum
 - Drum attempts to rotate shoe with it
 - Shoe is fixed in place by anchor
 - Drum rotation energizes shoe by wedging it tightly against brake drum
 - When trailing shoe contacts drum, rotation de-energizes shoe by forcing it away from brake drum

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NON-SERVO BRAKE DESIGN

- Trailing brake shoe is always de-energized by drum rotation
- Leading shoe becomes trailing shoe when vehicle is in reverse
- Trailing shoe becomes leading shoe when vehicle is in reverse
- Leading shoes wear faster than trailing shoes because they are applied with greater force; they will often have thicker lining or larger surface area

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NON-SERVO BRAKE DESIGN

- Design has one energized and one de-energized shoe
- Non-servo brake designs not as powerful as servo brake
- Less prone to lockup than servo brake

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DUAL-SERVO BRAKE DESIGN

- Dual-Servo Brake Operation
 - When dual-servo brake is applied, wheel cylinder attempts to force tops of both brake shoes outward against drum
 - Primary shoe not directly anchored to backing plate so it rotates
 - As primary shoe rotates, it forces secondary shoe to rotate
 - Rotation seats secondary shoe firmly against anchor, increasing braking force

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AUTOMATIC BRAKE ADJUSTERS

- Servo Brake Starwheel Automatic Adjusters
 - Three styles of starwheel adjusters
 - Cable
 - Lever
 - Link

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SUMMARY

- Drum brakes make excellent parking brakes
- Drum brake design requires adjusting
- Foundation of drum brake is backing plate
- Linings of drum brakes attached to curved metal assemblies called brake shoes

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