

## SECTION 9-B BRAKE TROUBLE DIAGNOSIS

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### 9-5 INSPECTING AND TESTING BRAKES

#### a. Inspecting Brakes

At reasonably frequent intervals the brakes should be inspected for pedal reserve, which is the clearance between the pedal pad and the toeboard. Inspection should be made with brake pedal firmly depressed while brakes are cold.

Pedal reserve, on manual brake-equipped car should be not less than 2-1/4". On power brake-equipped car, pedal reserve should be not less than 1-1/2".

Heat generated by high speed stops will expand brake drums and increase shoe clearance, thereby permitting pedal pad to go closer to toeboard when brakes are hot.

Brake shoe linings should not be permitted to wear down until rivets contact drums because drums will be scored. As car mileage approaches the point where relining may be required it is advisable to remove one or more drums for inspection of lining in order to avoid the possibility of damaging brake drums.

#### b. Testing Brakes

Overall brake performance cannot be properly tested with the wheels jacked up because this procedure does not test the self-energizing servo action of the brake shoes and the effect of car weight distribution on deceleration.

Brakes should be tested on dry, clean, reasonably smooth and

level roadway. A true test of brake performance cannot be made if roadway is wet or greasy, or covered with loose dirt so that all tires do not grip the road equally. Testing will also be adversely affected if roadway is crowned so as to throw weight of car toward wheels on one side, or if roadway is so rough that wheels tend to bounce.

Test brakes at different car speeds with both light and heavy pedal pressure; however, avoid locking the wheels and sliding the tires on roadway. Locked wheels and sliding tires do not indicate brake efficiency since heavily braked, but turning wheels will stop the car in less distance than locked wheels. More tire-to-road friction is present with a heavily braked turning tire than with a sliding tire.

#### c. External Conditions That Affect Brake Performance

In addition to roadway conditions mentioned above (subpar. b) the following external conditions may affect brake performance and should be corrected before work is done on the brake mechanism.

a. Tires. Tires having unequal contact and grip on road will cause unequal braking. Tires must be equally inflated and non-skid tread pattern of right and

left tires must be approximately equal.

b. Car Loading. When car has abnormally unequal loading, the most heavily loaded wheels require more braking power than others. A heavily loaded car requires more braking effort.

c. Front Wheel Bearings. A loose front wheel bearing permits the drum to tilt and have spotty contact with brake shoe linings, causing erratic brake action. See paragraph 7-8.

d. Front End Alignment. Misalignment of the front end particularly in regard to limits on camber and theoretical king pin inclination, will cause brake action to appear unequal between sides.

e. Shock Absorbers. Faulty shock absorbers that permit bouncing of car on quick stops may give the erroneous impression that brakes are too severe.

### 9-6 BRAKE TROUBLE INDICATIONS AND CORRECTIONS

#### a. Brake Pedal Travel Excessive, or Pedal Goes to Toeboard

(1) Excessive Brake Shoe Clearance. Excessive clearance is indicated if a good brake is obtained after pumping brake pedal several times. Condition may be caused

by wear of brake linings or by improperly functioning self-adjusting mechanism.

(2) Fluid Reservoir Empty. If fluid reservoir is empty, a good brake cannot be obtained by pumping brake pedal. Fill reservoir (par. 9-7) and check for springy pedal action (subpar. b, below).

(3) Air in Hydraulic System. Air in hydraulic system will cause a springy action of brake pedal. If volume of air is large, the pedal will go to toeboard under normal pressure. See subparagraph (b) below for causes of air in hydraulic system. Bleed hydraulic system (par. 9-7).

(4) Fluid Leak in Hydraulic System. A leak in the hydraulic system will allow the pedal to go to the toeboard gradually under continued pressure. An external leak is indicated by loss of fluid in fluid reservoir. Check all brake pipe connections and all cylinders for evidence of fluid loss. If no leaks are found, remove master cylinder, disassemble and check for internal leak. Check for scores or other damage to cylinder bore, piston, or primary cup (par. 9-14).

(5) Improper Brake Fluid. Improper brake fluid may boil due to high temperature. Flush system and refill with specified brake fluid (par. 9-7).

#### **b. Springy, Spongy Action of Brake Pedal**

(1) Air in Hydraulic System. Air will enter the hydraulic system if there is not sufficient reserve fluid in the master cylinder reservoir. A disconnected pipe permits air to enter the system. A clogged filler cap vent will permit air to be drawn in past the piston secondary cup on the return stroke. A leaking check

valve causes loss of static pressure in the system, thus permitting air to be drawn in past wheel cylinder cups.

Clean out clogged vent or replace leaking check valve as required. Fill reservoir and bleed hydraulic system (par. 9-7).

(2) Brake Drum Out of Round. This condition is usually indicated by an unstable action of brake pedal. Check brake drums and true up if necessary (par. 9-12).

#### **c. Brakes Severe on Light Pedal Pressure**

(1) Loose Front Wheel Bearings. Check for play in bearings with wheels jacked up and adjust if necessary (group 7).

(2) Loose Brake Backing Plate. Tighten all backing plate bolts.

(3) Brake Shoes Not Properly Adjusted. Inspect self-adjuster mechanisms.

(4) Excessive Dust in Brake Assemblies. When excessive dust is present, brakes are usually more severe. Thoroughly clean brake shoe linings to remove embedded dirt (par. 9-11).

(5) Faulty Brake Shoe Linings or Drums. Charred linings or scored drums cause grabbing action. A small amount of grease or brake fluid on linings may cause grabbing action. Replace linings and true up or replace scored drums (par. 9-12).

(6) Brake Shoe Linings Reversed. The primary lining is shorter than secondary lining and of different composition. Install brake shoes in proper positions (par. 9-11).

#### **d. Excessive Pedal Pressure Required**

(1) If brake shoes do not have full contact with drums, excessive pedal pressure is required to

obtain effective braking. Repair brake linings (par. 9-11, subpar. d).

(2) Foreign Substances on Brake Linings. Check for grease, brake fluid, or other foreign substances on linings. Replace grease or fluid soaked linings (par. 9-11). Sand off other foreign substances.

(3) Improper Brake Lining. Very hard brake lining may have poor braking effect. Install standard Buick lining or equivalent (par. 9-11).

(4) Improper Brake Fluid. Fluid containing substances injurious to rubber will cause swelling of rubber cups in master and wheel cylinders. Replace rubber cups, flush system and refill with specified brake fluid (par. 9-7, 9-13, 9-14).

#### **e. Brakes Drag at One Wheel**

(1) Loose Front Wheel Bearings. Check for play in bearings with wheel jacked up and adjust if necessary (group 7).

(2) Insufficient Clearance at Brake Shoes. Check self-adjuster mechanism.

(3) Weak or Broken Brake Shoe Spring. Replace spring and check brake shoe adjustment (par. 9-11).

(4) Wheel Cylinder Piston Stuck or Cups Distorted. These conditions may be caused by dirt in hydraulic fluid, improper fluid, or previous use of a cleaning fluid which is detrimental to rubber parts. Overhaul wheel cylinder and replace any defective parts (par. 9-13). It is also advisable to flush hydraulic system to prevent repetition of trouble (par. 9-7).

(5) Obstruction in Brake Pipes or Hoses. Obstruction may be caused by foreign material, damaged pipe, kinked or deteriorated brake hose. Flush hydraulic system (par. 9-7) or replace damaged or defective parts as required.

**f. Brakes Drag at All Wheels**

(1) Insufficient Clearance at Brake Shoes. Check self-adjuster mechanism.

(2) Master Cylinder Piston Compensating Holes Closed. If the compensating holes are plugged by foreign material, or are covered by the piston primary cup when brake pedal is in released position, high pressure will be maintained in hydraulic system and brake shoes will be held in contact with drums. This condition is indicated by lack of normal pedal travel and a very solid feel when pedal is depressed.

Make certain that pedal is free on pivot and at push rod connection.

If freeing up brake pedal does not correct the trouble, remove master cylinder for disassembly and thorough cleaning (par. 9-14).

**CAUTION:** Never insert a test wire through compensating holes as this may leave a burr, which will cut a groove in primary cup.

(3) Wheel Cylinder Piston Cups Distorted. If the rubber parts in master cylinder are found to be swollen and distorted (step 2, above), it indicates the presence in hydraulic system of a mineral base oil such as kerosene, gasoline, or engine oil. Such substances will cause all rubber parts to swell and distort, therefore it is necessary to thoroughly flush the hydraulic system (par. 9-7) and replace all rubber parts.

**g. Car Pull to One Side**

(1) Tires Unequal. Tires Unequally inflated, or having unequal wear of treads, or tires of different non-skid tread designs may cause car to pull to one side when brakes are applied. Inflate all

tires to specified pressure (par. 1-1). Rearrange tires if necessary so that tread non-skid characteristics are more nearly equal on both sides of car.

(2) Loose Front Wheel Bearings. With wheels jacked up check for play in bearings and adjust if necessary. See Group 7.

(3) Out-of-Round or Scored Brake Drums. True up or replace as required (par. 9-12).

(4) Brake Linings Not Matched, or Improperly Placed. Brake linings must be of same composition on left and right sides of car, otherwise unequal braking action will result. If primary and secondary linings are interchanged at any wheel, unequal braking will be obtained. Replace or change linings as required (par. 9-11).

(5) Foreign Substances on Some Brake Linings. Any foreign substance on linings will affect braking action. Thoroughly clean any linings having water, sand, paint, imbedded particles of metal, etc., on surface. Sand or brush the affected surface--do not use any liquid cleaning agent. Linings having oil, grease, or hydraulic fluid on surface cannot be cleaned satisfactorily and must be replaced (par. 9-11).

(6) Loose Brake Backing Plate. Tighten all backing plates.

(7) Unequal Camber. If car has a tendency to lead to one side when driven on a level road it will also pull to one side when brakes are applied. Adjust camber to specified limits (group 7).

**h. Brakes Noisy**

(1) Brake Drum Condition. Carefully inspect brake drums for out-of-round, scoring, or cracks. Rebore any drum if out-of-round or scored (par. 9-12). Replace

any drum which is cracked or has hard spots in braking surface.

(2) Foreign Material Imbedded in Lining. Metallic particles or grit imbedded in brake lining will cause squeaking. Sand the surfaces of linings and remove all particles of metal. In some cases it may be necessary to dress the lining surfaces with a portable resurfacing machine in order to properly clean the surfaces and insure good contact with brake drums.

(3) Linings Loose on Brake Shoes. Replace any rivets that are loose. Lining must be tightly held against brake shoe flange, particularly at the ends (par. 9-11).

(4) Bent Brake Backing Plate. True up or replace backing plate.

(5) Improper Brake Shoe Lining. Install standard Buick Lining or equivalent.

(6) Shoes Scraping on Backing Plate. Squeaking or "crunch" will be produced if contact surfaces are dry, rusty, or rough. The noise is more pronounced if brake shoes have considerable movement due to large clearance between shoes and drums. Clean, smooth up, and lubricate contact surfaces and reduce shoe movement by adjusting to safe minimum clearance (par. 9-8).

(7) Shoes Slapping Against Backing Plate. If drums have been turned with noticeable lead, shoes tend to follow lead and produce a regular slapping noise against backing plate during brake application. Polishing drums with light emery cloth will reduce noise.

**i. Brakes Fade (Fail to Hold)**

The condition known as "fade" is caused by loss of friction between brake lining and drums as a result of abnormally high lining temperatures. Excessive heat

cooks out the most volatile ingredients of the bonding material in lining and this acts as a lubricant.

Excessive lining temperatures will be produced by partial or spotty contact of linings with brake drums, due to improper adjustment. Excessive lining temperature also can be caused by frequent and heavy braking at high speed, driving with parking brakes partially applied, "riding" the brake pedal, or prolonged use of brakes on steep grades without using second gear (synchromesh) or low range (automatic transmission) to obtain adequate engine braking.

After a set of brakes have faded a few times, it is probable that they will continue to fade even though the shoes have been adjusted to establish full contact of linings with drums. This is because the cooking out of bonding ingredients has destroyed the frictional properties of the lining surfaces. If the lining thickness is ample and the cooking process has not been prolonged, it may be possible to obtain a correction and some useful life by grinding off about .020" from the lining. Merely sanding off the lining surface will not remove destroyed lining material. If this cannot be done, replacement of lining is the

only remedy.

The use of improperly compounded linings will also produce fade. Some replacement linings lose their frictional properties at lower temperatures than the linings selected for Buick brakes. Such linings must be replaced.

When brake drums are rebored too thinly they will have excessive expansion due to heat. The result is loss of pedal reserve and braking when drums are hot, and good brakes when drums are cold. This may be erroneously diagnosed as fade, but fade occurs with ample pedal reserve.