

Subaru Front Disc Brake Service

Front disc brake service can get to be pretty routine on most cars. The increased use of front wheel drive presented a few new brake problems for a while, but even these seem like old hat by now. Just to keep things interesting, however, a few manufacturers install the parking brake mechanism on the front calipers. I'm not sure why they do it, but it sure takes all of the fun out of hand brake turns.

The first time I took the front wheels off a Subaru, I thought I had grabbed the wrong end of the car. After my initial surprise, I realized that the Subaru front brake system isn't really all that different. It's only the addition of the parking brake mechanism that makes it unusual. Attention to a few special cautions will make front disc brake service on Subarus a routine job too.

- The factory manual recommends the use of a fish scale to check for dragging front brakes. Raise the front wheels off the ground and wrap a rope around the outside of one tire. Attach the fish scale to the free end of the rope to measure rotating friction. It should take less than a nine-pound pull to rotate the tire in neutral. Seized caliper pistons and improperly adjusted, or binding, parking brake cables can be detected using this method. (This test doesn't take drive axle drag, bad wheel bearings, or binding CV joints into account, however. If you do find excessive drag, check these as well.)

- The caliper pistons must be turned clockwise to retract them into the calipers during pad replacement. Use a retracting tool which is properly designed for this purpose. C-clamps and channel locks are not

acceptable alternatives. If you're lucky, you won't have to repair too many back yard experiments that used these methods.

- The construction of the Subaru front calipers, including the parking brake actuators, is nearly identical to the Toyota Supra caliper that we overhauled in our January 1989 issue. The only important differences between the two calipers are their piston diameters and how they mount to the caliper frame. Consult the Toyota article if you need to overhaul a Subaru caliper.

- Use caution during brake bleeding. Overstroking the brake pedal during pedal bleeding may force the master cylinder piston seals to pass over rough areas in the cylinder bore, damaging the seals. If you pedal bleed, limit your pedal stroke to about two inches during bleeding.

- Finish the job with proper rotor service. A new set of pads installed on glazed rotors will almost guarantee a comeback. Measure the rotors using the procedures in the accompanying photos. If you don't intend to re-surface the rotors on a lathe, at least use a disc sander to apply a non-directional finish and remove the glaze.

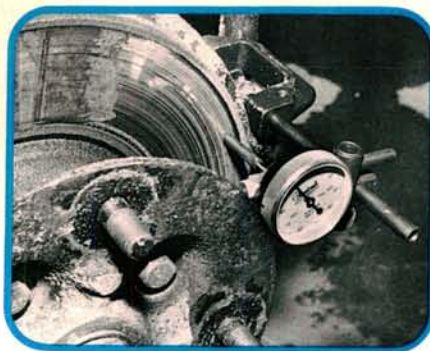
The photos for this article are of a 1983 Subaru 2WD Wagon. The specifications listed apply to the '83 model. Later models continue to use this braking system with very few changes. Consult the appropriate service manual for the correct specifications for newer models.

—By Karl Seyfert



1

Check for minimum rotor thickness and parallelism at eight equally spaced points around the rotor. A new solid rotor measures 12.5 mm (0.492 in) and has a wear limit of 10 mm (0.39 in). Vented rotors are 18 mm (0.71 in) when new with a wear limit of 15.5 mm (0.610 in). Replace undersized rotors.



2

Use a dial indicator to measure rotor runout. Mount the indicator base securely to the strut assembly. Locate the tip of the indicator no more than five millimeters from the edge of the rotor. Maximum allowable disc runout is 0.10 mm (0.0039 in).



3

Inspect the parking brake cables. Check for abrasions where the cables pass through mounting brackets on the lower control arms, and near the driveshafts and tie rods (arrow). Breaks in the rubber boots at the cable ends will allow water to enter the cables. After that, it's just a matter of time.



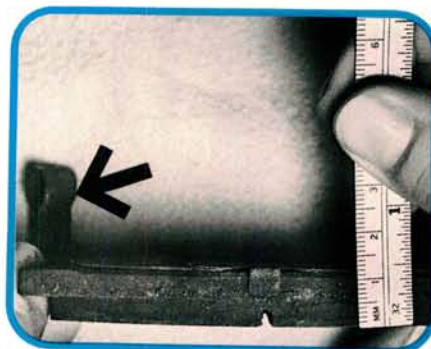
4

Remove the bolt from the bottom caliper sliding sleeve. Swing the caliper up as shown, then slide it off the upper guide stud. Newer models use a very similar brake system. The main difference is a separately replaceable upper guide stud on newer models. It's part of the caliper frame on this '83.



5

Remove the worn pads from the caliper frame. Remove the two caliper frame bolts, then remove the frame. Note their locations, then remove all the pad spring clips. Inspect everything for wear or breakage. Clean the old brake lube off the caliper frame, then wire brush its pad contact surfaces.



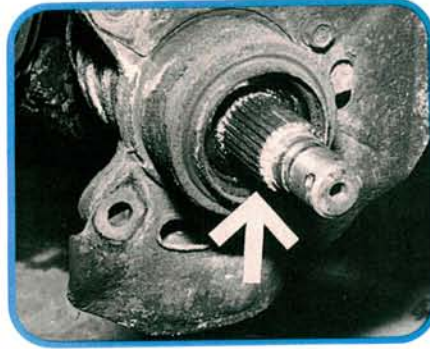
6

Measure the pad thickness, including the backing metal. New pads are 15.0 mm (0.591 in) thick. Minimum usable limit is 7.5 mm (0.295 in). There are wear indicator clips (arrow) on both the inner and outer pads. Pads should be installed with both wear indicators facing the bottom of the caliper frame.



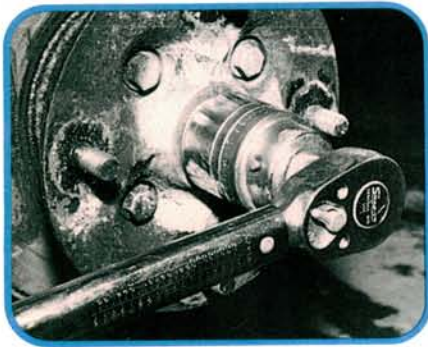
7

Remove the cotter pin, axle nut, and spring washer. A tapered center piece (arrow) fits behind the spring washer and mates to the center of the hub. Tightening the axle nut wedges the slotted center piece into the hub. Tap the end of the axle shaft with a soft-faced hammer to free the rotor.



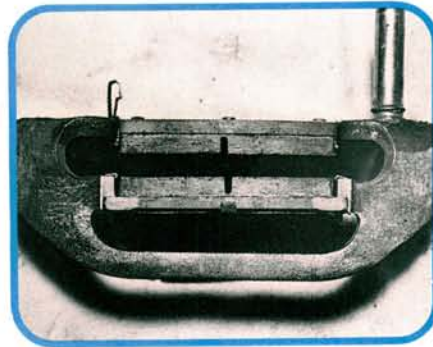
8

Remove the tapered center piece, then slide the rotor off the drive axle. Both inner and outer axle bearings remain in place in the knuckle (arrow). Inspect the inside of the rotor for signs of grease leakage caused by a bad seal. Repack the wheel bearings and replace the grease seals if necessary.



9

Apply anti-seize lube to the drive axle splines and threads, then reinstall the rotor, center piece, washer, and axle nut. Install the spring washer with its smaller side facing out. Torque the axle nut to 196 Nm (145 ft-lb), then continue tightening to the nearest castle nut slot.



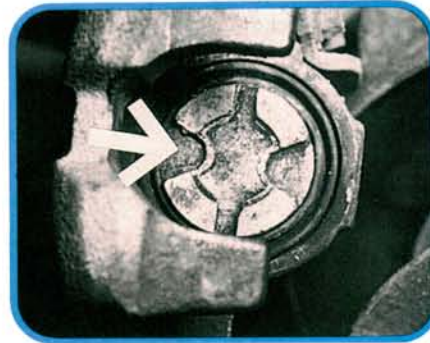
10

You may find it easier to assemble the pads and clips on the caliper frame before reinstalling the frame. Replace any worn or broken pad shims or hardware. Lubricate the pads where they contact the spring clips with a high temperature brake lubricant. Lube both sides of the outer pad shim.



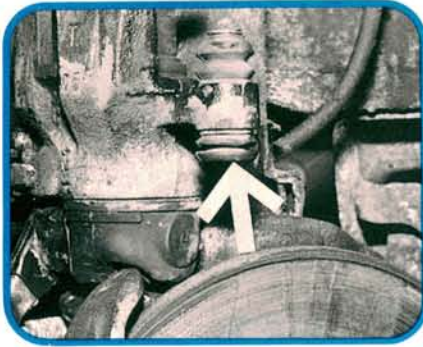
11

Use a properly designed retracting tool to turn the piston into the caliper. Using a C-clamp is an express ticket to disaster here. The piston should turn freely as it's retracted. A little spray lube will keep the piston dust boot from twisting while retracting the piston.



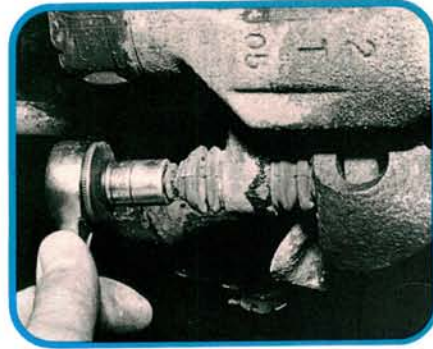
12

Continue turning the piston clockwise, ending in the position shown. A tab on the back of the inner pad must engage the piston in this area (arrow) for proper parking brake operation. Pull back the piston dust boot and check for fluid leakage. Inspect the parking brake lever boot for tears.



13

Clean the old grease out of the upper caliper guide stud hole. Replace the guide stud boot if it's torn. Slide the lower caliper guide sleeve (arrow) out of the caliper. Clean the guide sleeve boot and replace it if it's damaged. Lube the upper guide stud hole and lower guide sleeve with a silicone-based lubricant.



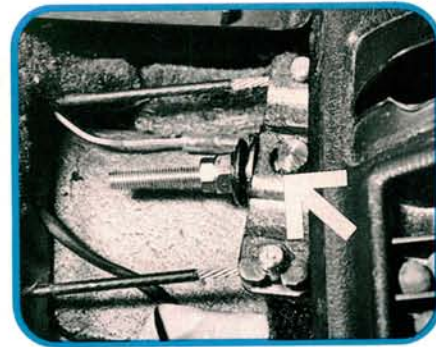
14

Reinstall the caliper frame. Apply anti-seize, then torque the frame bolts to 49-69 Nm (36-51 ft-lb). Slip the caliper onto the guide stud, then lower the caliper over the pads. Install the lower guide sleeve bolt. Torque to 16-24 Nm (12-17 ft-lbs). Overtightening may cause the guide sleeve to bind.



15

Apply the brakes gently several times to push the pistons out to meet the pads. The rear brakes have no self adjusters. If you have a low pedal, make sure that the rear shoes are properly adjusted. Turn each manual adjuster (arrow) until it locks the brakes, then back off the adjustment by one half turn.



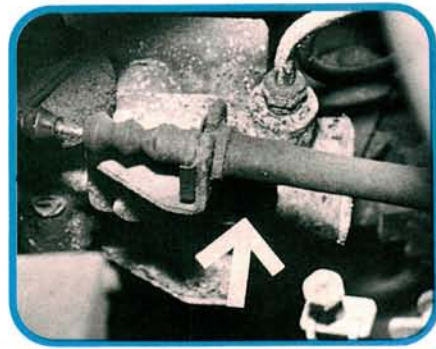
16

Adjust the parking brake cables at this turnbuckle beneath the center console. Pump the brake pedal several times, then check the cable adjustment. Both front brakes should lock with a lever stroke of three to four notches. When released, clearance here (arrow) should be no more than 0.5 mm (.020 in).



17

The rotors should turn freely after the parking brake has been released. Check for free play at the caliper lever. The caliper may work fine before a brake job but seize after its piston is retracted. A piston that's very difficult to retract during pad replacement is a good indication of trouble to come.



18

Subaru developed its hill-holder system for the less coordinated among us. The left front and right rear brakes are applied by the Pressure Hold Valve (PHV) on inclines of three degrees or more when both the clutch and brake pedals are depressed. The PHV is mounted on the left frame rail below the master cylinder.



19

The PHV is linked by cable to the clutch linkage. Check for proper PHV cable adjustment during brake service or when the clutch cable is adjusted. The brakes should release just as the clutch begins to take hold. Hold the cable with pliers to keep it from turning during adjustments.



20

Here's a maintenance item you might be overlooking. Subaru recommends changing the brake fluid at 15,000 mile intervals. Siphon the old fluid out of the reservoir, then refill with fresh fluid. Proper bleeding sequence for this dual-diagonal system is left rear, right front, right rear, then left front.
