

Parking Brake Operation

by Lance Schall

This collection of pictures is not presented here as a how to rebuild brakes article (jack the car up like this, take thus and such sized wrench, put brake grease there, etc). Neither do we attempt to exhaustively discuss how the parking brakes work. Our goal is to improve the reader's understanding of the basic operation of the system by examining the parts during a step by step disassembly:



Figure A - Left caliper complete showing parking brake actuator lever.



Figure B - Allen adjuster cover bolt below bracket. Bleed nipple and brake line port can be seen in this view.



Figure C - Remove one slider pin, under cap, with 10mm wrench. Flip open to remove brake pads, w-clips, and brake pad slide clips.



Figure D - Brake pads are set aside, this shows the orientation of the slider pins, boots, and caliper body.



Figure E - Turn adjuster hex in the tighten direction to drive the piston all the way out of the bore.



Figure F - Infamous adjuster hex is finished for now. Dump it out.



Figure G - With the piston and dust seal out of the way, we can see the piston seal in its groove at the mouth of the cylinder. Carefully remove piston seal with a pick.



Figure H - At the bottom of the bore is the internal c-ring. No c-ring pliers known to man fit down in the bore. Picking the c-ring out is a slightly painstaking process. With the c-ring out, remove the bolt and its o-ring seal.



Figure J - Left to right: adjuster arm, cover bolt (above), hotdog pin, adjuster hex (above), bolt, o-ring seal (below), c-ring, piston (with internal adjuster), piston seal, dust cover



Figure K - Eccentric pocket ground into actuator shaft. One end of hotdog pin rides in this hole.



Figure L - Showing position of actuator, hotdog, bolt, piston, and adjuster hex.



Figure M - This automatic adjuster. Its purpose is to compensate such that the travel of the parking brake handle does not increase as the brake pads wear. As the Enthusiast Manual points out, it has no serviceable parts. We took it apart anyway. It is held in the piston by a wire external c-ring (shown Figure Q). We used a puller to separate adjuster from the piston.



Figure N - Remove coil lash spring exposing external c-clip.



Figure P - Remove external c-clip and slid off toothed wheel.



Figure Q - Collar with inclined slot lifts off completing disassembly. Wave washers are retained on hub by pressed in pin. We did not remove the pin as we were not certain it could be successfully reused. We have satisfied ourselves that there is nothing to replace here and fortunately nothing to wear out either.

Reassembly is reverse of disassembly, with two notes: 1) Remember to replace the actuator shaft/arm first and then drop hotdog into place through the cylinder bore, followed by the bolt and its c-ring. If you put the bolt in first, you will find that the hotdog can not be inserted from the actuator shaft/arm side. And you will get to pick the bolt retaining c-ring out again. 2) The piston dust cover is easiest to place in the cylinder first and then have an assistant (preferably with small fingers) help you expand the other end of the dust cover to accept the piston. Use a small amount of brake fluid to lubricate the process. References to first time sexual experiences are expected at this point, but not helpful.

FAILURE MODES

Now that we've examined the guts of the caliper, we have the background to consider the popular failures seen in the rear caliper assembly:

1) Actuator lever sticky - Dirt and corrosion binds actuator shaft. If you never use the parking brake, you can't have this problem. Diagnosis is one parking brake is intermittently stuck on, usually lightly. Smoking brake pads may be observed. Repair is to rebuild or replace caliper assembly. The actuator shaft bore in the caliper will probably be scored. Sleeving the bore or replacing the caliper body will return the braking system to good condition.

2) Hex adjuster too loose - Lever overcenters, locks one brake on hard. May spontaneously free itself or a manual nudge on the actuator lever may be necessary. Can effect one wheel, usually intermittent depending on how hard the brake handle is set. Typical diagnosis is parking brake lever comes up very high and one wheel's parking brake stays engaged when handle is released. Smoking brake pads will probably be observed. To repair, adjust hex at both rear calipers (make sure actuator lever is in the released position before you start) and then adjust parking brake cable to achieve desired parking brake handle travel. By the way, if the adjuster hex is withdrawn and it is wet with brake fluid, this indicates a failed o-ring and caliper should be rebuilt to return it to top-notch condition. Also, coupled with relative movement between the caliper and rotor, and the w-springs falling out (common), the loose hex adjustment can allow the piston to retreat into the caliper and driver will detect excessive pedal travel when applying brakes.

3) Caliper slider stuck - Upper caliper slider pin becomes dirty and corroded. Symptoms are one brake stuck, usually medium on. Can effect one wheel and may result from either parking brake usage or regular braking with pedal. Smoking brake pad probably seen, but only the outer side. Typically, when the pads are replaced the caliper body will rotate upwards allowing access to the pads, but it will not slide back and forth allowing correct operation of the brakes (or normal disassembly for that matter). Repair is to disengage slider pin and clean, sand, buff pin. Relubricate with brake grease and reassemble, taking care that slider pin dust boot is in securely fitted. Caliper disassembly and rebuild not required.

As you may have noticed, the symptoms of these malfunctions are similar and careful observation or even disassembly of the caliper may be needed to diagnose which one(s) you are suffering from.

Note from reader

I'd like to take a minute to thank Lance for his valuable information re the parking brake. I had a problem with my parking brake and after reading over my Miata shop manual many times, I could not resolve the problem. Thanks to Lance and his informative piece on the proper operation of the E brake I was able to correct the problem. The key to the problem was releasing the parking brake cable fully

to allow the actuating levers to fully release, and then, adjusting the allen screws in until the pads just touch and backing off 1/3 of a turn. The last step is to readjust the parking brake cable to the proper number of clicks and lastly verifying that the brakes do not drag when released. Thanks again Lance. PS Nowhere in the shop manual does it say anything about returning the levers to the fully released position before making the allen screw adjustments. Someone had messed with this problem before me and apparently didn't realise that there were manual adjusters. I had one new caliper with no adustment made, or it was backed off fully because of the intermittent overlocking of the lever and the resulting brake drag on that wheel.
