ROBISON ON ROVERS

Repairing ABS problems in the Discovery II

By John Robison

Welcome to the techie column for the Fall edition of the Rover News. In this column, we're going to look at some of the common problems with the antilock brakes on Discovery II models. The Discovery II electronic braking system, called SLABS (self leveling anti lock braking), is made by Wabco of Germany. Wabco is a subsidiary of American Standard, a company better known to the public for toilets than brakes. In the automotive field, Wabco specializes in braking and suspension systems for trucks. According to the company, two out of three commercial vehicles with advanced braking systems are equipped with Wabco products.

The Land Rover system includes four-wheel antilock braking, hill descent control, and four-wheel traction control. The SLABS control unit also controls the self-leveling suspension, if the vehicle has that feature. The Discovery air suspension is also a Wabco product. As an aside, Wabco air suspension is also found in the new Audi A6 and the Mercedes CLS.

One of the most common ABS questions I hear is, Why do I see the ABS, Traction Control, and Hill Descent lights coming on?

All three of those systems share a common set of core components. The wheel speed sensors, the hubs, the modulator, the controller, and other parts serve all three systems. So a fault in any one of them will cause a problem in the other two. It is actually rare to have a fault that would only disable one of the three systems. 99% of the time, if one is affected, they all are.

To see what's wrong, you will need to connect a Land Rover test system and read the faults. These systems are not OBD II compatible, so a generic scanner won't talk to them. At Robison Service, we use the T4 or Autologic tools for this work.

The most common faults are wheel speed sensor faults. The wheel speed sensors in a Land Rover are coils that sense the motion of a toothed wheel that's a part of the wheel hub. The rotation of the wheel induces a sine wave signal in the sensor whose frequency is proportional to the speed, and whose amplitude increases with speed from 0.5 volts to more than 5 volts.

If your Rover has a speed sensor fault, there are two paths to repair. The first is to replace the entire hub on the affected corner. This is the approach favored by dealers because the toothed wheel – called a reluctor ring – and the actual sensor are both part of the hub. The reluctor can get damaged by rust or corrosion, and it can also get damaged by a bad wheel bearing. The only way to service it is to change the hub.

As of this writing, hubs *(front-RND646 / rear-RND694)* cost around $400 and take about three hours to change.

The sensor can be removed from the hub fairly easily. If you remove your sensor and look inside you should be able to see if the reluctor ring is damaged. The reluctor ring can get damaged if the wheel bearing gets loose. It can also get damaged by corrosion. That's especially true for Rovers that run on beaches. If you see reluctor ring damage, or corrosion, or if the hub has any free play at all – you need a complete assembly. If there is no damage, you may be able to fix the vehicle by changing the sensor *(front-RN292 / rear-RNH293)* alone, a $100 part that's less than an hour to swap.

The path you choose should be determined by examination of the reluctor via the sensor hole. If the hub looks good, there's an "8 or 10" odds that a sensor alone will fix your problem.

Every now and then you will see a Rover that has wiring problems, usually at the connector between ABS sensor and body. Always pull it apart and look for corrosion.

The next common fault in these systems is called shuttle valve failure. The shuttle valve is a part of the brake modulator – that big thing in the location where a master cylinder would be. The modulator incorporates the functions of an ABS servo and a brake master cylinder into one unit.

If you have shuttle valve problems, you will see the three warning lights on the dash and there will be one or more stored faults for shuttle valve failure. Land Rover has a test procedure to determine if these faults result from a failure in the modulator or if they are caused by wiring troubles in the ABS harness or grounds. Unless you have corroded grounds and cables, your trouble is probably in the modulator.

Until now, this problem was addressed by replacement of the brake modulator *(RNH082)*. That's a $1,500 part. As you can imagine, shuttle valve failure produced a lot of unhappy owners and Land Rover finally listened up and developed a fix.

As of March 2006, Land Rover sells a shuttle valve repair kit for under $100. You will have to remove the modulator and flip it over to install the valves on a workbench. Removal of the modulator, replacement of the valve, and refit to the vehicle takes three hours or so.

This shuttle valve repair is a huge improvement over the former method of addressing this problem.

The part number for the repair kit is *(SW0500030)*. If you buy it from a dealer you may also want to ask for the March 2006 bulletin that gives test and installation instructions.

Another common problem is a mushy brake pedal. In my experience, the only explanation for a mushy pedal is improper bleeding procedure. Bleeding a Discovery II takes two people and the Land Rover test system, and it takes the two of them a bit over half an hour. You need the tester to operate the pump and valves to make sure all the air is purged from the modulator.

If you are paying for this service, expect a labor bill in the range of one and a half hours and $20-30 of brake fluid. If you are not at a dealer, make sure they use the correct Castrol LMA fluid. Don't even start this process unless the shop has a tester to run the pump and valves. You could bleed brakes in the field without one in an emergency, but there is no way to get a really good pedal without cycling pump and valves.

There is no shortcut for this job. You need two people and the Land Rover tester.

We see quite a few stop lamp circuit problems. The usual way this problem manifests itself is a truck that won't shift out of park. Discovery II models have an interlock that prevents shifting out of park unless the brake is pressed. So, if the brake light circuit fails, the car won't go into gear.

If that happens to you, the first step is to check the stop lamp fuse. We've seen several trucks where the stop lamps were fitted wrong, or the contacts corroded, and the fuse blew. Also check the trailer connector, if your Rover has one. A short there can pop fuses.

If the fuses are good, you should check the stop lamp switch. It's located above the brake pedal. If you are stuck somewhere, it is possible to get out of park by jumping the switch temporarily with a paper clip.

Finally, you should check your Rover to see if the brake modulator recall was done. If it was, you should have a B148 sticker on the radiator support. All Discovery II models built before spring of 2003 are subject to the recall. Land Rover found the caps on the ABS modulator were cracking under heavy off-road use. Therefore, they came up with heavier replacements. The caps are a quick bolt on installation. If you are near a dealer they will do this for you at no charge. If you can't get to a dealer, or you're outside the USA, the part number for the kit is SWO500010K. Complete illustrated instructions can be found in the B148 recall bulletin, available from your dealer with the kit.

This recall does not involve any hydraulic system disassembly, so the brakes won't feel or act any differently. The heavier caps are plainly visible on top of the modulator. Once you see them, you'll be able to tell it was done.

Note: Recalls should always be done at your dealer so they can be properly recorded. Only do this yourself if you absolutely can't get to a dealer, or if your Rover is not eligible because it's a rebuilt salvage vehicle.

Final notes:

Remember that you can access all of the most current service information, including workshop manuals, electrical manuals, recall notices, and service bulletins on Land Rover's web site,
http://www.landrovertechinfo.com
www.landrovertechinfo.com

If you look on the Land Rover site under "training" you will find the introduction to the 1999 Discovery II. That training book has a 23-page description of the Wabco electronic system.

You can also find quite a bit of information – including reprints of many of my articles - on my web site, http://www.robisonservice.com www.robisonservice.com > Service > Land Rover > advice and articles
Wabco is online at http://www.wabco-auto.com
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