

## **Brake Pad Wear Sensors Discussion**

**Date:** 07-23-18

**Vehicles Involved:** Vehicles with Pad Wear Sensors

**Condition:** Types of Brake Pad Wear Sensors

### **Original Pad Wear Indicators**

The original pad wear indicator was actually integrated into the brake pad itself. In fact, many manufacturers still use this pad wear indicator today.

The indicator is actually a piece of metal connected to the pad's backing plate or shim (See Figure 1). The piece of metal protrudes about two to three millimeters past the backing plate.



**Figure 1**

When the pads wear down past two to three millimeters, the metal will make contact with the rotor. This produces a high-pitched squealing noise. That squeal tells the driver that it is time to take their vehicle in for a brake job.

### **Electronic Pad Wear Sensors**

The original electronic pad wear sensors are a loop of wire with a small electric current in it (See Figure 2). The sensor has a known resistance, usually 2,000 ohms.

The wire connects near the brake pad very close to the rotor. Once the brake pad wears down past a certain point, the rotor will start rubbing up against the wire. Eventually, the wire will break and the change in resistance will cause the brake wear indicator to light up on the dashboard.



**Figure 2**

### **Two-Stage Electronic Pad Wear Sensors**

Many German manufacturers, including BMW, have recently released a two-stage pad wear sensor (See Figure 3). These sensors are able to do more than warn the driver of a worn brake pad. They can actually estimate how many miles a brake pad has left.



**Figure 3**

These sensors are called two-stage sensors because they have two sensors integrated into the wire. There are two resistor circuits at two separate depths in the wire.

When the first resistor circuit breaks, usually halfway through the pads lifecycle, At this point, the vehicle's information center will begin measuring things like:

- mileage
- wheel speed
- brake pressure
- brake temperature
- brake operating time

The computer will use this information to calculate the life left in a brake pad.

This first stage will not trigger the light on the dashboard. Some systems may show the life left on the brake pads when you start the vehicle. Others will list this in the information center on the dashboard.

Once the second wire breaks, a brake wear indicator light will light up on the dashboard.

## **Using the Parking Brake Module to Track Rear Pad Wear**

Some manufacturers, like Mercedes Benz, use the electronic parking brake module to track rear pad wear. The system counts the number of times the stepper motor rotates to apply the back brakes. By doing this, the system can calculate how much life is left in the rear pads.

### **Repair Procedure:**

When sensors fail or contact the rotor, some technicians cut the two wires and twist them together rather than replace sensors. This turns the brake wear indicator light off on the dash, however, this is not a professional repair procedure.

This method will not work with the new two-stage electronic wear sensors. The sensors will notice that there is no voltage dropping across the circuit and will trigger the light on the dashboard.

As a general rule of thumb, it's always a good idea to replace wear sensors during a brake job. Make sure to route the wiring through the factory brackets during installation (See Figure 4).



**Figure 4**

Finally, make sure to reset the brake life service indicator on the dash board. On some vehicles, you can reset this light on the dashboard. On other vehicles, you will need to use a scan tool to reset the indicator.