

The D-Jetronic Throttle Switch

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1976 Jaguar XJ-S
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Background

The early Jaguar 5.3 L v12 used the Bosch D-Jetronic Electronic Fuel Injection (EFI) system. An important element in this system is the throttle switch, located beneath the throttle capstan, Figure 1. The red arrow in the photo points to the connector to the switch, peeking out from under the capstan.



Figure 1 Throttle capstan

The switch provided several throttle-related signals to the ECU, including idle state, full throttle state, and acceleration state. It is a simple, fairly reliable device, although it sometimes needs attention. This document shows how to disassemble and clean the switch, as well as how to test and adjust it.

For a more complete description of the function of the switch see the D-Jetronics section of the AJ6 Engineering Web site (<http://www.jagweb.com/aj6eng/>).

Access to the Switch

You have to remove the throttle capstan to gain access to the switch. The removal steps are described in the Throttle Capstan document.

Disassemble and Clean

Once the throttle capstan is off the engine you can remove the switch, held to the bottom by two screws (see Figure 2). The switch requires some gentle prying with a flat blade screwdriver. It's being held by friction on a shaft through the center of the capstan pulley.



Figure 2 Removing switch

The black plastic case can be pried off the steel base of the switch. Turning the switch upside down, Figure 3 reveals four tabs with tiny slots around the edges. These tabs have to be pried outwards while prying the case away from the base.



Figure 3 Removing case

Note: When the case is removed you *might* find a little plastic spacer in each corner. One of the units I disassembled had them while the other one did not. Perhaps had gotten there before me and lost them. I'm not sure what they are for, other than to give a little rigidity to the assembly.

Once the case is removed you can see the internal construction. Basically, there is a printed circuit board with five circular tracks, Figure 5. The connector, at the top of the photo, has five fixed contacts that press against these tracks. Additionally, the rotating element has several contacts against the tracks. These contacts move with the rotating element as it is turned by the capstan shaft.

There are four things you want to do while it's apart:

1. Clean under each contact (fixed as well as moving),.
2. Burnish the surface of the tracks to knock down any burrs that may have been developed where the moving contacts have gouged the tracks,
3. Clean the "lash contacts" on the rotating element, and

4. Clean everything thoroughly.

Cleaning under the contacts is done with fine sandpaper. I used 600 grit paper. Take a small piece of the paper and fold it over. Gently lift the fixed contacts and slide the folded paper between the tracks and the contact. Then pull the paper from side to side a few times. Repeat this with the moving contacts.

The tracks can be burnished with the same paper, rubbing gently while applying pressure with your finger or some kind of soft probe such as the erase end of a pencil. Do as much of the track surface as you can with the rotating element in its normal position, then move it a far enough to access the rest. Don't turn it too far, as you risk damaging the moving contacts if moved beyond their normal range.

The rotating element has a pair of "lash contacts" that serve to introduce backlash and a means of telling if the throttle shaft is moving clockwise (acceleration) or counterclockwise (deceleration). This is shown in Figure 4. You can clean these by slipping the folded sandpaper between the contact arms and their posts. Apply gentle pressure you're your finger while slipping the paper back and forth.



Figure 4 Lash contacts

After the contacts and tracks have been cleaned and burnished use a cleaning solvent and brushes to clean everything, Figure 6. If you have shop air or a can of compressed air from your electronics shop that can be used to blow out the solvent.

When the cleaning is finished, reattach the case. Be sure to put the little spacer in each corner if one was there in the first place. The switch is now ready to remount on the capstan and adjust.

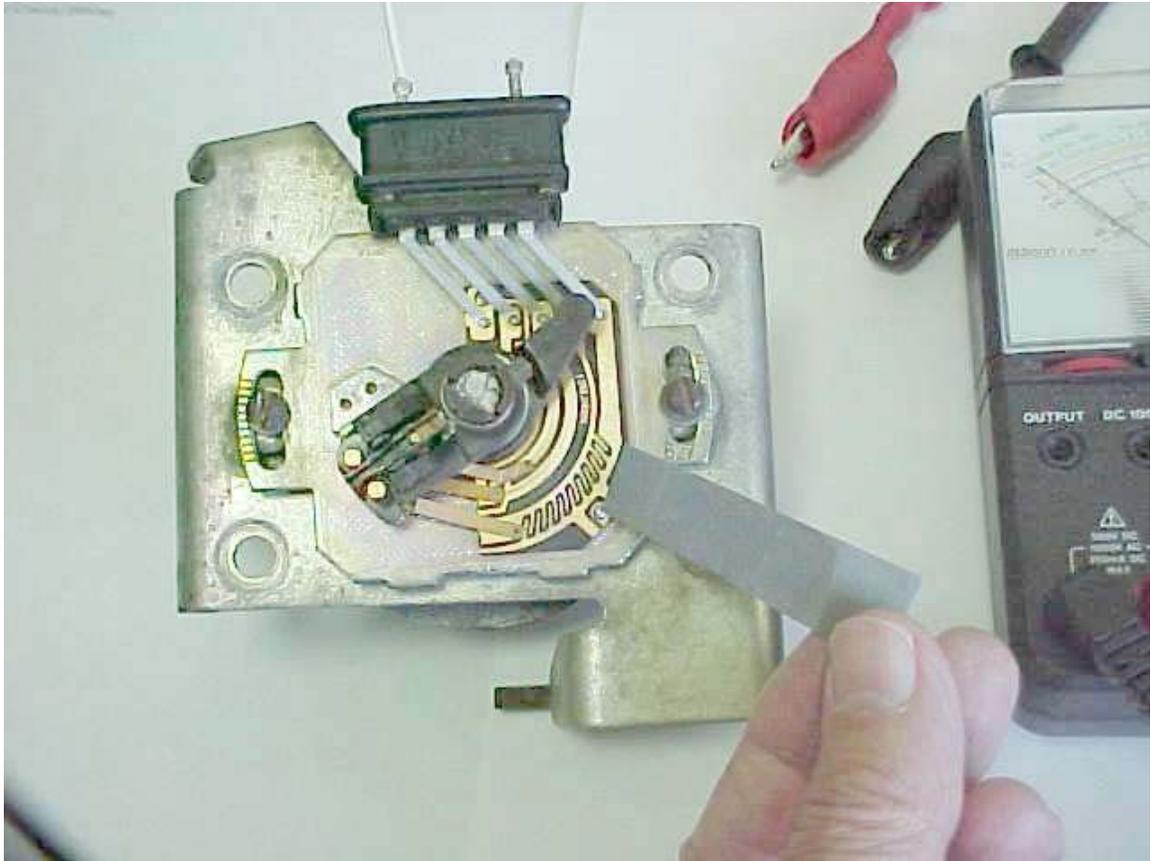


Figure 5 Cleaning contacts



Figure 6 Cleaning

Adjustment

The switch must be installed on the capstan to do this adjustment. You can test this adjustment *in situ* but the capstan assembly must be off the engine if any change is required.

You will need some kind of spacer to hold the capstan pulley 0.050" (1.27 mm) off the idle stop. I used a combination of feeler gauges. You will also need some kind of continuity tester such as an Ohmmeter. You could jury-rig a simple battery/bulb circuit if nothing else is available.

Start with the switch as close to centered as possible, as that's probably where it will be close to right. Attach your tester across pins 17 and 12/47. Now with the capstan pulley on the idle stop check to be sure there is "connect," i.e., low resistance, between the pins. Then, insert the spacer between the pulley arm and its stop on the capstan base. There should now be no connect, i.e., infinite resistance. If these two tests are good, you're probably OK. Just be sure, reduce the spacer thickness a bit, to perhaps 0.040" to see if it goes back to connect. The idea is to get the transition from connect to no connect as close to 0.050" as you can.

Testing

The switch must be installed on the capstan to properly test it. First, the idle test has no meaning if the switch is not mounted and adjusted. But even the other tests can't be done reliably on a freestanding switch. If you attempt to test it off the capstan you will get anomalous results because the rotating element has to be turned from the center shaft, and without introducing any movement except rotation. I found this impossible to do with the switch off the capstan.

To test the switch you need some kind of continuity tester. I used an analog Ohmmeter. (My digital was not fast enough to easily do the acceleration enrichment tests.) I also used a pair of small female contacts on short leads to make attachment to the connector contacts easier. You can see one of them in Figure 6.

A simple *in situ* test procedure is given in the ROM (19.22.37). In that procedure only the idle signal and the acceleration enrichment signal are measured. In Table 1 I give a more complete test recommended by Tom Mackie. He devised these tests by study of the switch internals.

Table 1 Throttle Switch Testing

Test	From pin	To pin	Expected result
Acceleration enrichment	9	12/47	No connect at closed throttle Alternates between connect/no connect 10 times through motion Connect at full throttle
	20	12/47	No connect at closed throttle Alternates between connect/no connect 10 times through motion
Idle signal. Must be done after adjustment.	17	12/47	Connect at closed throttle No connect at 0.050" from closed throttle stop (XJS) No connect through full motion
	2/14	12/47	No connect at closed throttle No connect through motion Connect at full throttle
	17	2/14	No connect any time
	20	2/14	No connect any time
	9	2/14	Connect at full throttle only No connect as soon as throttle pressure released
	9	20	No connect any time
	17	20	No connect any time
	17	20	No connect any time

Final Thoughts

I carried out the cleaning and testing on two units, the one off my car and another from junkyard XJ-S of the same vintage, kindly provided by an XJ-S list member. I installed the junkyard part as wanted to see if it made any difference in the running of my car, suffering from a tendency toward lean running, manifested as popping on acceleration. I detected no difference, so I decided to put my original one back on. When I did I discovered a new running problem, namely a slight hesitation with initially hitting the accelerator. I put the other one back on and am now running with it. At this point I don't know if I just did a poor job of

adjusting the original when reinstalling it, or if my cleaning somehow messed it up internally. One day I'll look into it again.