

Instruments and Gauges

FLAKY INSTRUMENTS: There are four vertical gauges in the center of the instrument panel on most older XJ-S's, and they are unreliable -- not because they quit working altogether, but because they never seem to provide consistent readings. Brian W. Rice writes: "All gauges in my 85 XJ-S read low by 25% when I acquired the car several years ago. I did some tests by lifting No. 4 fuse and applying a variable voltage to the dead end from a power supply, making sure not to exceed 15 volts. With precisely 12 volts applied the voltmeter showed about 9V. The fuel gauge also only indicated 3/4 with a full tank of petrol." These problems are because the wiring *to* these gauges is a disaster, with at least *four* likely locations for poor connections on each lead to each gauge.

Even if you don't think you have a problem with the gauges, it is suggested you do a minor overhaul and cleanup of the instrument cluster anyway. It's really easy, anyone can do it, and it'll only take a couple hours even if you're really milkin' the job.

First, remove the instrument cluster from the dash -- see notes above. Second, remove five screws from the back side and separate the front cover from the rear housing of the instrument cluster. This will give you access to all the innards.

Now, if you have a VOM, you should be using it. Check the ohmage of each circuit from the socket where the wiring harness plugs in all the way to the brass nuts on the screw posts on the side of the gauge itself. Of course, these circuits should read zero ohms, or maybe some really small amount like 0.1Ω if you have a sensitive digital VOM. Basically, they should read pretty much the same thing you read if you just connect the leads of the VOM together.

You're likely to find some poor connections indeed. This author found circuits with more than 2Ω . That may not sound like much, but it's a *lot* for a circuit that isn't supposed to have *any* measurable resistance. Of course, if you don't have a VOM, just dive in and fix all the connections described below as though they are all bad.

The first likely source of trouble is the harness connectors themselves. The entire panel is wired with a clever flexible printed circuit, and the harness sockets are formed by folding portions of this flexible circuit into a hole and pushing the plugs in; the connections on the sides of the plug make contact with the bare copper on the flexible sheet. There's not a whole lot you can do here other than clean up the connections a bit (rub with fine sandpaper or the like) and perhaps apply some Ox-Gard to prevent further corrosion, but if some of the circuits are really messed up, here's a tip: places that do stained glass work use thin copper foil tape, and some of this tape might be usable to fix a damaged connection on that flexible circuit. Another idea is a hobby shop; places that sell stuff for model trains and the like sometimes sell copper foil conductors for sticking down on a surface and then painting over so there are no wires visible.

Each of the four vertical gauges is connected to the flexible circuit with screws with stainless steel wavy washers under the heads. Here's the second likely spot for a bad connection. If you're in a hurry, you might just loosen the screws a bit and retighten, since that will usually make a good connection for a while. For a more permanent solution, there are several suggestions. Besides polishing up the copper surface, you might consider replacing that wavy washer with something with a little more "bite". Basic steel is not recommended, though; this is one place you don't need rust. Some hardware stores sell bronze lock washers; if you find some in a suitable size, they'd probably work well. You'll need at least 29 of them. Alternatively, you might just take a pair of pliers to those wavy washers and make them *more* wavy. Rice makes another suggestion: "I was able to repair by soldering tinned copper wire to the flexible circuit board tracks being careful not to melt the plastic flexible board and fashioning the wire into circular washers to go under the terminal nuts thus establishing good contacts again." If you try this, you might want to go to the effort of removing the entire flexible circuit from the cluster so you can solder on it separately, avoiding the possibility of melting the plastic housing itself.

The screws for the gauges appear to simply screw into a tapped hole in the plastic housing. How can that make an electrical connection? Looking at the other side, each gauge is mounted on a small printed circuit board (this one's rigid) with three broad copper conductors. This PCB fits into a slot and is held in place with two small clips. When the screws are threaded in from the back side, the threads dig into the copper conductors on the face of this PCB -- that's correct, the third likely place for a bad connection. Of course, one possible fix here is to use a longer screw so it screws farther up the side of that PCB and contacts it with more threads; again, a screw that's likely to rust is not recommended, brass screws might be a good idea.

Remove the two or three connection screws and two clips on a gauge and lift it out. You will note that the gauge is mounted to the little PCB with three brass nuts and wavy stainless steel washers. This is likely bad connection number four; it may not appear as likely to cause trouble as the first three, but in fact on this author's car these nuts were the worst problem!

The fix for the last two types of bad connection is one operation. Remove the three brass nuts and separate the PCB from the gauge itself, being careful not to drop the small panel behind the PCB or a mysterious clip around one post that seems to do nothing but provide proper spacing. Set the gauge aside; if it's been working at all, it's not likely there's anything wrong with it. Polish both ends of each conductor on the PCB, then set it down on a flat surface and apply some solder. It solders really well. Build up a ring of "tinning" around each post hole, and tin an area at the end of each conductor for those screws to dig into. When cool, wipe away any excess resin and reassemble. You can easily do one gauge at a time so you don't mix anything up.

GAUGE REPAIR: All four vertical gauges are of similar design: two stationary coils at 90° to each other, and a heavily damped rotor. Automobiles have always used damped gauges; not only does it reduce the likelihood of damage from vibrations in the car, but gauges zipping up and down make drivers nervous.

Val Danilov reports, "Once I was sure that the oil gauge was faulty and not the sending unit, I pulled the gauge out of its housing by removing 3 screws from the back of the plate the gauge was attached to, as well as 2 metal clips. It's pretty much self-explanatory once you get to it. Once the gauge was out, in good lighting, you can see several hair-thin metal wires that run from the winding to 3 metal posts on the periphery of the gauge. The wires are soldered to the posts in such a way that they appear to be misplaced (as if they should extend farther to some other point), when in fact they are simply so small that you cannot easily see the points of attachment. When trying to move them with a tiny screwdriver, I found one wire which was loose. I used a regular soldering iron to affix the wire back on the post. Voilà! Problem solved.

"When the gauge is out of the instrument cluster, it is very easy to test it with a 12 volt supply by simply connecting one of the electrodes to +, while grounding the other electrode. Note: the gauge has 3 electrodes (nuts on the threaded ends of the posts), do not use the middle post. The post nearest the bottom of the gauge is ground."