UD14927 Rolls-Royce/Bentley Coolant Level Amplifier Repair

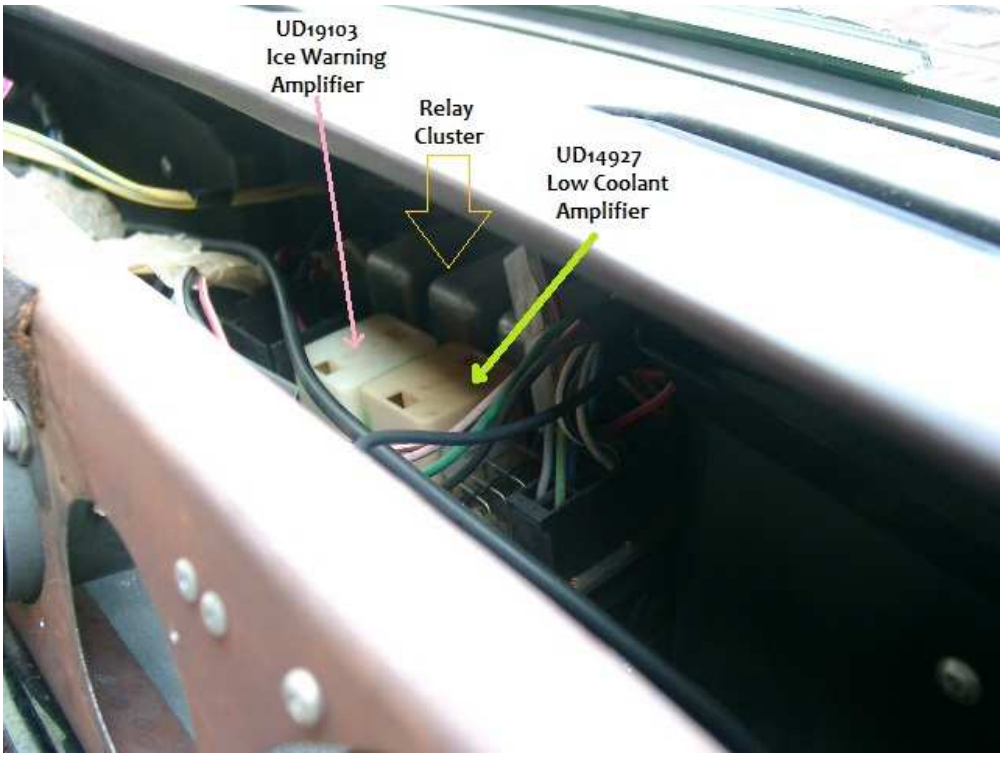
If the *Low Coolan*t light never comes on other than during the lamp check, or if it stays on constantly, your coolant level amplifier may have gone wonky.

If the light never comes on be sure the bulb is not burned out before digging in to the dash "guts" under the center of the top roll to get to the coolant level amplifier. All warning lamps should illuminate when you are starting the car as part of the lamp check feature. Also make sure that no previous owner has intentionally put both header tank sensor wires on a single post to "make that light go away."

If the light is constantly on, try putting both sensor wires on one of the posts to see if this causes it to extinguish. You could also use a jumper wire to create a connection between both posts if you prefer. If the light goes out the ends of the sensor probes in the header tank have probably developed enough corrosion to prevent them from completing the circuit. If that's the case just remove them, clean them, put everything back together, then do this check again. The seal for the header tank probes is an AS568A-208 O-ring in EPDM.

After checking the above, along with as much of the wiring related to the coolant probe circuit as you possibly can, if you have a low coolant light that's either perpetually on or perpetually off you probably have a bad coolant level amplifier.

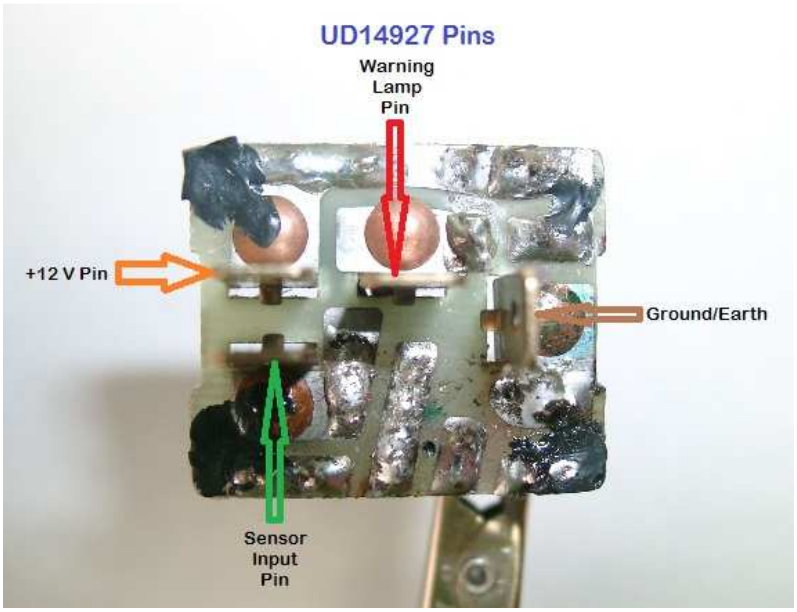
To get to the amplifier remove the top roll from the dash and look almost dead center for a cluster of relays, which will be oriented differently depending on the era of the car (1978 Silver Shadow II shown below):



On the same board as those relays will be a whitish plastic cube, usually with its label intact, that reads: "UD 14927 Coolant Level." Carefully remove it from the relay board. After it is off the relay board, gently and carefully pry the circuit board out of the base of the cover. When that's done you should see something exactly like or very similar to this:

Once you have the circuit board oriented to match the photo above, you know which transistors and diodes need to be replaced and with what.

Here's what the pin arrangement on the underside of the circuit board looks like:



For the diodes, make sure that you maintain the same orientation of the cathode (striped) end and anode end when you solder the new ones in. You must also be certain to replace the rectifier diode with another rectifier diode and the zener/breakdown diode with a zener/breakdown diode rated for at least 5V and less than 7V (the wattage really doesn't matter for this application).

The transistors are a bit trickier since they have three legs: an emitter, collector, and base. You should be able to determine which is which on your replacement transistors based upon their spec sheets (and markings). The originals, however, can be trickier. Always check what's on your board against the following. While the annotations above are correct for the PCB in question, you never know when the actual arrangement of the PCB might have changed. The connections, though, won't change:

1. For the existing sensor transistor:
    - Emitter leg is soldered to the legs of a resistor and diode
    - Collector leg is soldered to the leg of a resistor only
    - Base leg is soldered to the sensor input pin and the leg of a resistor

2. Amplifier transistor #1 [at upper, left side of annotated photo]
    - Emitter leg is soldered to a diode, two resistors, and the +12V pin
    - Collector leg is soldered to the warning lamp pin
    - Base leg is soldered to a resistor

3. Amplifier transistor #2 [at bottom, left side of annotated photo]
    - Emitter leg is soldered to a resistor (other end of resistor goes to base of other amp transistor)
    - The collector leg is soldered to two diodes and ground/earth/negative pin
    - The base leg is soldered to a resistor (other end of resistor goes to sensor transistor)

You simply solder in your replacement BD139/PN100 sensor transistor such that its legs match the original sensor leg configuration and do the same for each of the two respective BD138/PN200 amplifier transistors.

Testing Your Amplifier Before Reinstallation

In order to test your amplifier you first need to make yourself a couple of basic tools. If you do any sort of electrical work on your car, e.g., testing relays or whether switches are working, you may already have both of these things already in your tool kit, but if not, here are the things you need to put together.

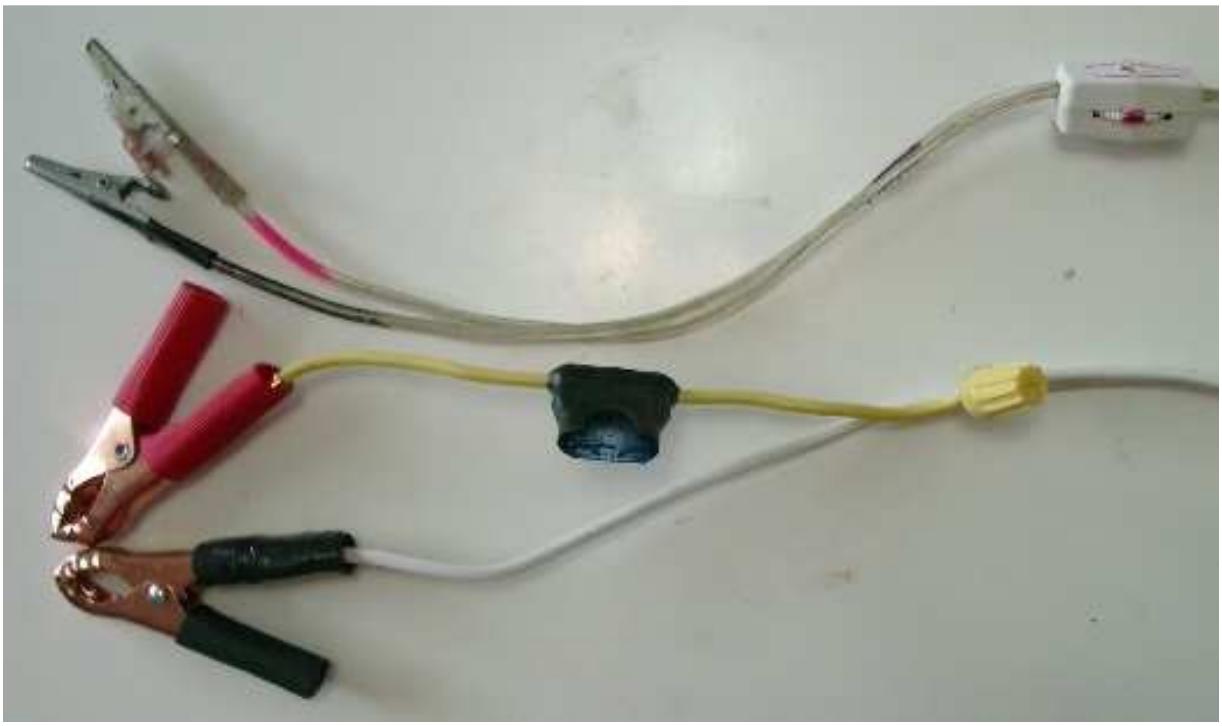
First you will need a **power supply cable** that allows you to connect items to the battery and switch them off and on. To build it you will need:

- An extension cord. I suggest using a really long one (e.g., 15-ft) because there are occasions where you'll want to supply power at the front of the car and the battery is in the back.
- Two large alligator clips for the connection to the battery terminals themselves.
- Two small alligator clips for the connection to whatever you're trying to supply power to.
- A rotary switch like you see on lamp cords.
- An inline fuse holder (available at any automotive parts store) and a supply of low amp fuses (e.g., 5 or 10 amp)
- A wire nut (optional)
- A soldering iron and electrical solder or a crimping tool

Now, on to how to put it together:

1. Cut the plug and receptacle ends off of the extension cord. Split each end to separate the two lines from each other for at least 12 inches/30 cm (you can always pull them apart more if you need to later).
2. Strip the insulation from the tips of the ends
3. On one of the ends, connect the fuse holder and secure it with a wire nut. You could also solder the connection and cover it with electrical tape.
4. Attach a large alligator clip to the opposing end wire of the fuse holder. It is best to solder these on but you can crimp them on if you so choose. [I generally attach what I intend to be the positive connection on this side.]
5. On the other wire of the extension cord at the same end you've been working on, attach the other large alligator clip.
6. Now, near to the opposite end of the extension cord on the same line you have the fuse holder connected to, splice in your rotary on/off switch. I put mine in about 2-inches/5 cm behind where I stopped separating the two halves of the extension cord.
7. The final step is crimping and/or soldering the two small alligator clips on to the two remaining ends of the cord just ahead of the rotary switch.

You should have something that looks somewhat like this at each end:



Next you will need a **simple test lamp**. To build it you will need:

- An extension cord. A short one is fine for this application, but it's still helpful to have one that's several feet long.
- Two small alligator clips
- One 12V LED (easily sourced at Radio Shack or your local equivalent electronics store) or a 12V automobile lamp with holder for same

To put it together:

1. Cut the plug and receptacle from the ends of the extension cord. Split each end to separate the lines from each other for about 6 inches/15cm on one end and 3 inches/7.5 cm on the other. Strip a bit of insulation from each lead.
2. Crimp and/or solder the alligator clips to the leads on the end with the 6-inch/15 cm lines.
3. Twist the respective leads from either the LED or the lamp holder to the leads at the opposing end of the extension cord. Solder if desired. Cover with electrical tape or small wiring nuts.

You should now have something that looks like this at each end:

These will become a permanent part of your tool kit and you won't regret having them.

Now, on to the specific items you'll want to have directly related to this test:

- A length of wire with a male slide connector on one end and the insulation stripped from the opposing end. Though the male slide connector is not essential, it makes it so much easier to hook the line up on the amplifier, keep it hooked up, and not have it interfere with the power source lines.
- Another length of wire with the insulation stripped from both ends
- A small container of water (a small bowl with a stable base is fine)

Testing Procedure

You can do this in the boot/trunk of your car.

1. With the switch turned off, hook your power supply cable to the battery. Connect the alligator clip from the positive lead to the +12V pin on the amplifier and the negative lead to the ground/earth pin on the amplifer.
2. Connect one alligator clip from the test lamp to the warning lamp pin on the amplifier and the other alligator clip to the ground/earth pin on the amplifier (or to the alligator clip on the power supply cable that's connected to same – you just need to have a ground connection with this lead somewhere, it could even be the chassis of the car).
3. Slide the male slide connector on to the sensor input pin and submerge the opposite end of the wire in the bowl of water.
4. Connect one end of the remaining "bare ended" wire to the chassis somewhere to create ground/earth. One good spot for that is where the negative battery cable

screws on to the chassis with its wing nut. Place the remaining end in the bowl of water, but not touching the lead from the sensor pin that's in there already.

5. Turn on the switch on your power supply cable. At this time your test lamp should ***not*** be illuminated.
6. Lift one of the wires resting in the bowl of water out of the bowl. When you do this your test lamp ***should illuminate***.
7. Turn off the switch on your power supply cable and carefully disconnect everything.

If the above produced the expected results, celebrate your success and reinstall the coolant level amplifier back in its place in the car.