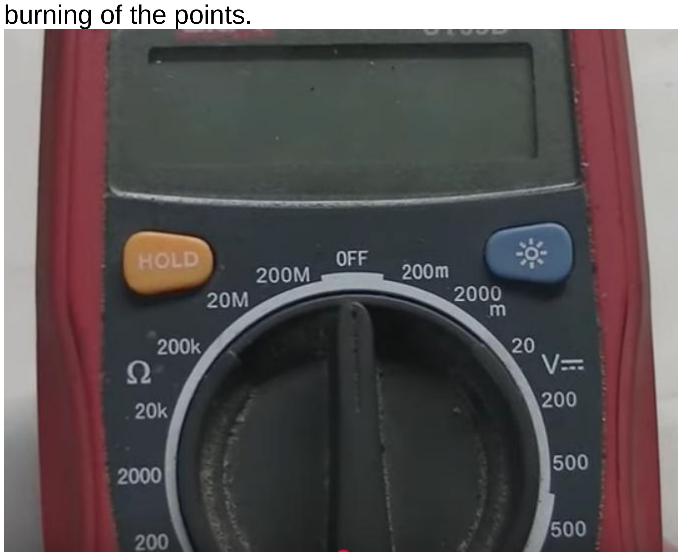
## How to test a condenser

Ian Ailes provides a useful guide to testing a condenser. Usually a condenser is changed at the same time as the contact breaker points but here is a test to see if it's faulty or not. Engines will not run well without a good condenser, as a poor condenser can cause a misfire and burning of the points.




Using **a digital multimeter** to start the test, earth the condenser on its body to discharge it. Then set the meter to 20M in the Ohms Ω section of the meter. Connect the probes to the body and tail - they are not polar sensitive. If it is good, the meter reading will rise up then stop at 1.

Using an **analogue (dial) multimeter** set the meter to 20K in the Ohms Ω section of the meter, then connect the probes to the body and tail. They are not polar sensitive. If it is good, the meter needle will rise briefly very slightly then return to zero.

Ian says "if anyone wants to learn more about capacitors, have a look at the article in John James' TTT2 website Issue 31, August 2015." Link

Replacement condensers are available from Moss and Brown & Gammons.

**Further information**

Alongside Bob Owen provides some background technical information that expands on the basic note, but not so far as the linked article and a little more directly related, which could be useful for those interested.

**Nomenclature** The article refers to **condensers** and elsewhere **capacitors**. The term condenser is actually an archaism that the automotive world hangs on to but in the rest of the technical world it was replaced by the term capacitor in the 1950s. Calling a capacitor a condenser is akin to calling a radio a wireless. Capacitors have capacitance which is measured in units called Farads (after Michael Faraday). This is a very large unit so typically they are measured in microfarads, symbol μF, with 1μF being one millionth of a Farad. Since we are talking in the automotive world, and moreover the classic automotive world, we can stay with the term "condenser". A typical condenser in a distributor has a capacitance of 0.22μF.

**Failures in condensers** A faulty condenser will likely be open circuit (failed internal connection) or short circuit (internal breakdown of insulation). A basic test such as the one described above is one that will show these conditions. However, it is also possible for condensers to suffer high voltage breakdown - in operation the condenser is subjected to voltages of several hundred volts at each opening of the contact breaker points. The only convenient non specialist test here is substitution of a known good condenser.

A condenser suffers from no wear mechanisms, nor, if well made of good quality materials, any degradation with age. So I personally would not treat condensers as service items and similarly for rotor arms. A long life is testament to the quality of their construction and an indicator of continued reliability. Of course, the points are subject to mechanical wear on the heel and continued erosion of the contacts at every spark, so they are definitely service items and the amazing thing is not how short their life is but how long!

**What is this test actually doing?** The test makes use of the fact that an ohmeter or resistance tester passes a current through the unknown resistance in order to measure its value, applying Ohm's Law, R =V/I, to display the answer.. In this case the current flows into the capacitor until it is fully charged (ie until it reaches the applied voltage) and then stops.

In the case of a **Digital Multimeter** (DMM) it will pass a constant current, determined by the range setting, through the device under test up to a voltage maximum set by the design. The constant current through the capacitor will result in a uniform increase in voltage (shown as a uniform increase in "resistance" reading) until the limit of the DMM is reached. The current will then stop and the DMM show an overload/open circuit, normally depicted by a "**!**" in the leftmost position. Putting a few numbers in: the final voltage will typically be in the few volts region since the DMM battery is usually 9V. The 20M (Megohm) range will use a current of around 0.2μA (giving 4V at 20M which will show as 20.00M). The charge equation for a capacitor is CV = It, or transposed, V/t = I/C. So for 0.22μF.at 0.2μA the rate of change of voltage is about 1V/s, or say 4s from connection until the "**!**" indication. This is very approximate as it depends on the DMM design, but it gives an idea of what to expect. **A faulty condenser will likely be open circuit (failed internal connection) or short circuit (internal breakdown of insulation.)** This test will show both of these fault conditions, viz will remain at "**!**" when connected or will go to zero when connected and remain there. The ramping transition to "**!**" shows the charging of a working condenser. What it won't do is indicate a condenser that suffers high voltage breakdown.

In the case of an **Analogue Meter** the current passed through the capacitor will be through a resistor and the moving coil meter itself and be much greater than with a DMM. So the capacitor will be rapidly charged and the meter pointer just receives a kick for the instant of the charge. In general use the highest resistance range available.

**What if my DMM doesn't have a 20M range?** Many DMMs are "Auto-ranging". Unfortunately these are unsuitable for this test. They will be trying to sort out the correct "resistance" range and be faffing around until it's all over with nothing meaningful shown on the display. If your DMM has a top range of 2M (or 2000k) this will probably be fine but the test will be over in around half a second so this will not encompass many readings of the display and the effect of ramping will not be evident.

Sometimes a DMM has manual ranging but omits various intermediate decades of ranging so may have a 200M range but no 20M range. The 200M range should work but merely give a 10x longer ramping time. However, be aware that dirt on the lead and body of the condenser could constitute a resistance below 200M so the end point of "**!**" may not be reached. This high level of resistance is of no material consequence and does not indicate a failure.

Although most DMMs have a 2000 scale length others may have 4000 or 6000 or others. This doesn't materially change this test, just the times. Use the range(s) nearest to 20M.