

Phase Zero, Lesson One: Multimeter Mastery

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electronics

multimeter

maker

learning

arduino

bench-power-supply

I have officially completed the first lesson of Phase Zero in my electronics curriculum: [Multimeter Mastery](#).

This is the one where I stop pretending the multimeter is a yellow box of judgement and start using it as an actual tool. The payoff was immediate: I measured a brand new AA battery, checked the output from my suspiciously cheap bench power supply, and learned that at least some of the funny numbers around the dial are not there purely for intimidation.

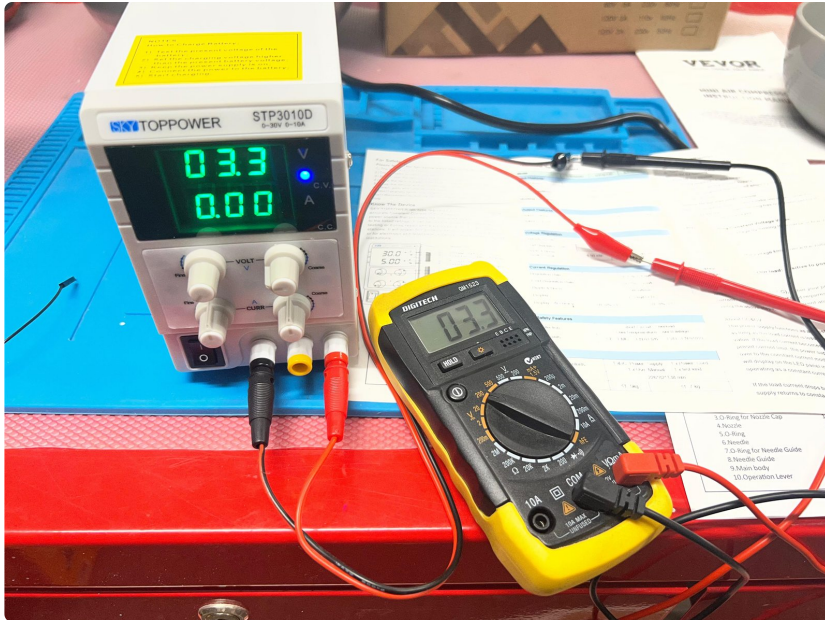


A fresh alkaline AA battery reading 1.6 V. That is normal: AA alkalines are nominally 1.5 V, but a new one often reads closer to 1.6 V with no load attached.

The Cheap Bench Supply Enters The Chat

The bench power supply is a SKY TOPPOWER STP3010D, labelled 0-30 V and 0-10 A. I paid AU\$89.86 for it on Amazon Australia, which feels like the absolute bargain-basement end of adjustable bench supplies. To its credit, it shipped very quickly. That may be its finest laboratory-grade feature.

The useful thing about a bench supply is that it can give me a controlled voltage for breadboard experiments, and it can limit current so beginner mistakes are less likely to become expensive mistakes. I am not yet doing anything heroic with it. I am using it for the most important beginner task: set a small voltage, measure it, and make sure reality agrees with the glowing numbers.



The supply says 3.3 V. The meter says 3.3 V. The current display says 0.00 A because there is basically no load attached. Voltage mode on the multimeter has very high resistance, so it should not draw meaningful current.

That was surprisingly satisfying. I set the output to 3.3 V, put the black probe in COM, put the red probe in the V/Ohm/mA socket, turned the dial to DC volts, and the meter agreed with the power supply. This is a tiny result, but it matters. Before trusting a supply on a breadboard, I now know how to prove what it is actually outputting.

The Dial Is Slightly Less Mysterious Now

My multimeter in these photos is a Digitech QM1523, not the FNIRSI meter listed in the original lesson inventory. The same beginner idea still applies: the black lead goes into COM, the red lead goes into the voltage/resistance socket for these measurements, and the big 10 A socket stays alone unless I am deliberately measuring current.

The dial has ranges around it. That was my first useful mental model. If I am measuring a small DC voltage, I choose a DC voltage range higher than the thing I expect. Measuring a 1.5 V battery on the 20 V DC range is fine. Measuring a 3.3 V supply on the 20 V DC range is fine. The number is the range ceiling, not the value I am trying to create.

I also learned the difference between the main types of tests:

- Voltage: measure across two points while the circuit is powered.
- Resistance: measure a resistor with the circuit unpowered.
- Continuity: check whether two points are connected by a low-resistance path.
- Capacitance: measure how much charge a capacitor can store.
- Diode mode: check the one-way voltage drop of a diode or LED.

That distinction is already useful, because it leads directly to my first correction.

My First Fact Check

I originally described capacitance as "the ability for one end of a wire to conduct to the other end of a wire." That is not capacitance. That is continuity.

Continuity is the beep test. If I touch one probe to one end of a jumper wire and the other probe to the other end, a beep means the wire conducts from end to end. No beep means the wire is broken, the probes are not making good contact, or I have chosen the wrong mode. This is going to save me from blaming Arduino code when the real problem is a bad jumper.

Capacitance is different. A capacitor stores electrical charge. A multimeter capacitance test estimates how much charge it can store, usually in farads, microfarads, or similar units. Also, capacitor measurements should be done with power off, and larger capacitors should be discharged safely first. This is one of those details that feels boring right up until it stops being boring.

Resistance, meanwhile, was exactly as advertised: testing resistors. The meter sends a tiny test current through the part and calculates the resistance. I like this because it turns the resistor colour bands from a strange secret code into something I can verify. Brown-black-red says 1 kOhm, the meter says roughly 1 kOhm, and suddenly the coloured stripes are not decorative nonsense anymore.

Small Win, Real Confidence

This lesson was not glamorous. No Arduino. No LEDs blinking. No WiFi. No graph. Just probes, dials, and a few numbers on a screen.

But it felt like unlocking the first tool. I can now check whether a battery is fresh. I can test whether a power supply is actually producing the voltage it claims. I can verify resistors instead of trusting tiny colour bands under poor lighting. I can use continuity mode to prove whether a wire or breadboard row is connected. And I now know that capacitance is not "wire conducts good", which feels like progress.

The biggest lesson is that the multimeter is not a magic object. It is a truth machine. When the next circuit does something weird, I have a way to ask the desk what is actually happening.

Phase Zero has begun.

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