Lecture 02.01 Supplying power

voltage sources
current sources
supplying power
supplying signals
supply loading

In the lecture course we have seen that we typically use two ideal models of power supplies or sources: *voltage sources* and *current sources*. In this lecture, we'll survey actual devices used to supply power. It's worth noting that there's typically a distinction made between supplying *power* and supplying *signals*: the latter are usually voltage of a specific waveform, but limited in current. In other words, devices that supply signals typically can't be *loaded*.

02.01.1 DC power supply

dc power supply

A *dc power supply* is an instrument that provides dc (constant) voltage and current to a circuit. These devices are sometimes active and use feedback to hold their outputs at the specified voltage or current—we call such power supplies *regulated*. Note that regulated supplies can be treated as ideal sources (voltage or current, whichever is applicable) within their power specifications.

regulated power supply

We will be using the *RSR HY3005* regulated power supply, with front panel shown in Figure 02.1. Its manual can be found here:

`ricopic.one/resources/HY3005.pdf`.

Figure 02.1: the front panel of the HY3005 dc power supply.

In order to use the HY3005 as a voltage source, use the following procedure, beginning with the POWER button in the OFF position and nothing connected to the output terminals.

1. Turn the CURRENT FINE and COURSE knobs completely clockwise (on).
2. Toggle the POWER button to ON.
3. Adjust the VOLTAGE FINE and COURSE knobs until the desired voltage is generated (as shown on the display).
4. Connect the + and − terminals. (Optionally, jumper the GND and − terminals.)

02.01.2 Function generator

A *function generator* is a device that generates a voltage signal. Most of these devices can produce sinusoidal, square, triangle, sawtooth, and other signals. The *frequency* and *amplitude* of the signals can be adjusted, as well.

Function generators are typically *not regulated*. Their outputs are typically BNC connectors with 50 Ω output resistance. Therefore, a function generator should be modeled as an ideal voltage source in series with its output resistance.

The nominal voltage displayed on the front panel of the function generator *assumes some specific load*, typically either 50 Ω or an infinite resistance. When working with a function generator, either consult the manual or measure its actual voltage output.

Figure 02.2: the front panel of the Tektronix AFG1062 function generator.

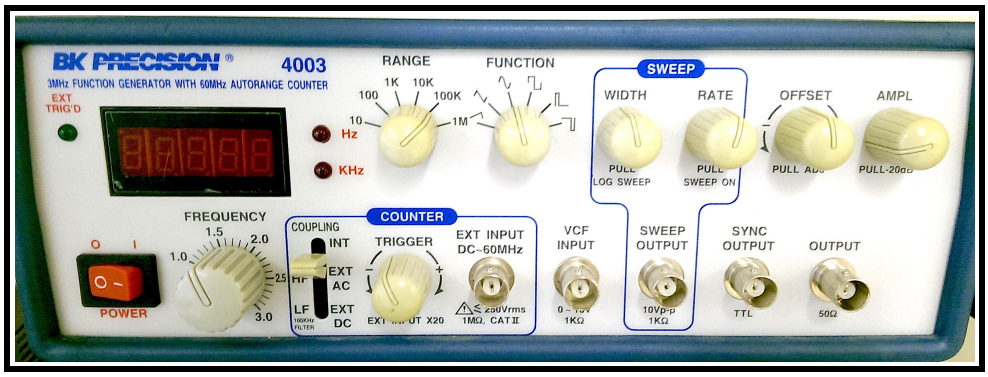

Figure 02.3: the front panel of the BK Precision function generator.

We will be using the *Tektronix AFG1062* function generator, with front panel shown in Figure 02.2. Its manual can be found here:

`ricopic.one/resources/afg1062.pdf`.

Also available in the lab is the *BK Precision 4003* function generator, with front panel shown in Figure 02.3. Its manual can be found here:

`ricopic.one/resources/BK_4003.pdf`.

The BK Precision has a readout of the frequency, but the amplitude is not given. Therefore, we must measure it ourselves!