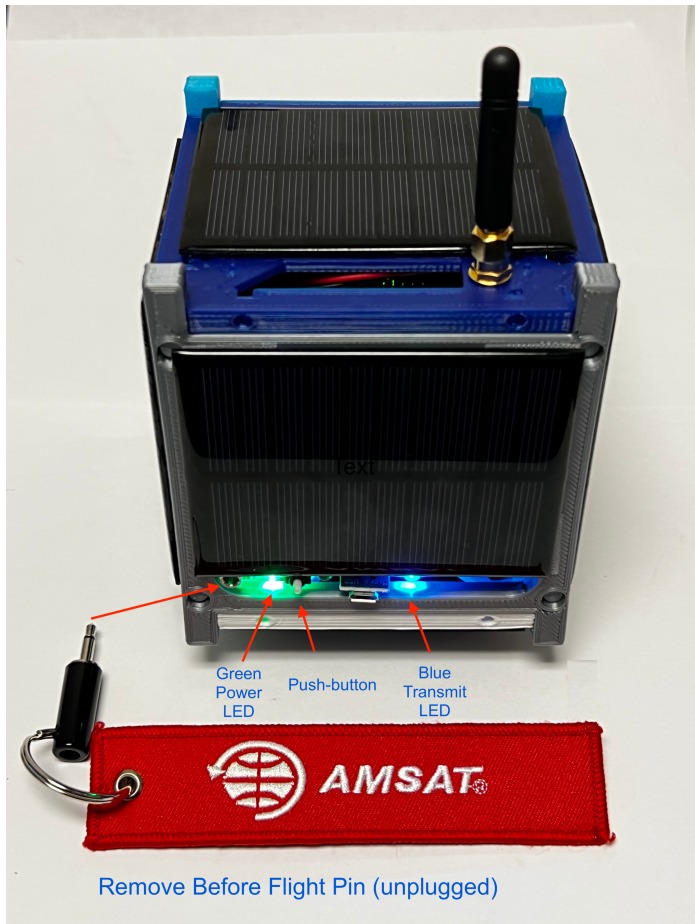# CubeSatSim Quick Start Guide

Note: This is for the v1.2 CubeSatSim. There is another version for the v1.3 and 2.0 CubeSatSim

This file can be downloaded here: https://cubesatsim.org/cubesatsim-qsg-v1.2
Videos are available at https://cubesatsim.org/qsg-videos

Green Power LED   Push-button   Blue Transmit LED

Remove Before Flight Pin (unplugged)

How to Turn on the CubeSatSim:

If the Remove Before Flight pin is plugged in (see photo), unplug pin and the CubeSatSim should turn on in about 30 seconds.

If the Remove Before Flight pin is not plugged in, press and release the Push-button (see photo). The CubeSatSim should turn on in about 30 seconds. If pressing the Push-button doesn't turn it on, try inserting and removing the Remove Before Flight pin. If it still doesn't turn on, the battery may be drained – see below on how to charge the CubeSatSim.

How to Turn Off the CubeSatSim:

Press and hold the Push-button. The Green Power LED will do a sequence of short blinks. When the Green Power LED begins to blink slowly, you can release the pushbutton and the CubeSatSim will shut down after about 30 seconds. When it is shutdown, the Green and Blue LEDs will be off. You should then insert the Remove Before Flight pin to prevent the battery from slowly discharging.

Red Charging LED   USB Charging Port

USD Charging Cable

How to Charge the CubeSatSim:

The CubeSatSim can be charged while turned on or off, with the Remove Before Flight pin unplugged or plugged. For fastest charging, charge with CubeSatSim off and the Remove Before Flight pin plugged in.

Plug the USB cable into the USB charging connector. The Red Charging LED will illuminate. It can take several hours to fully charge the batteries.

If the Remove Before Flight pin is not inserted during storage, the batteries will discharge, so always insert the Remove Before Flight pin after shutting down the CubeSatSim.

How to Receive Radio Signals from the CubeSatSim:

The CubeSatSim transmits on 434.9 MHz. The Blue Transmit LED will be illuminated when it is transmitting. The frequency can be offset slightly from this frequency, so you may need to tune up or down 5 or 10 kHz.

When the CubeSatSim starts up or changes modes, it will transmit a CW ID (Morse Code) that is HI HI DE CALLSIGN where CALLSIGN is either the default AMSAT or the callsign you configured on the Raspberry Pi Zero.

You can listen to it on a radio or using an SDR (Software Defined Radio) USB dongle plugged into a computer, such as the RTL-SDR.

How to Change the CubeSatSim Telemetry Mode:

Each of the five mode generates a different type of radio transmission. You can hear the difference between the different modes, and see a difference on your computer waterfall if you are using an SDR.

To change modes, press and hold the Push-button while the Green Power LED blinks. If you release the Pushbutton as it is blinking, the CubeSatSim will change to the mode associated with that number of blinks (see Mode Table).

If you press and release the Push-button, the CubeSatSim will reboot, so it will shutdown and the LEDs will turn off, and then it will start up, and the LEDs will turn on. It will take about a minute to complete a reboot cycle.

The Mode Table shows each mode and how many blinks are used to set that mode. Command tells you the command that can be typed into the Raspberry Pi to change to that mode. Decoding tells you what software you need. Note that some modes also require SDR software and audio loopback software as well. Audio is a link to an audio file so you can hear what the mode sounds like. Waterfall shows how the signal looks in an SDR waterfall.

Blinks	Mode	Description	Decoding	Command	Audio	Waterfall (Cubic SDR)
1	APRS	Automatic Packet Reporting System. This digital mode sends a packet of data with AFSK or Audio Frequency Shift Keying modulation.	Windows: SoundModem or Direwolf Raspberry Pi/Linux: OpenWebRX or Direwolf with spreadsheet http://cubesatsim.org/telem	`config -a`	CubeSatSim.org/a	
2	FSK	Frequency Shift Keying. This mode transmits a continuous signal that makes a rumbling sound that emulates the AMSAT Fox CubeSats such as Fox-1C or AO-95. Also known as DUV or Data Under Voice.	Windows/Raspberry Pi/Linux: FoxTelem	`config -f`	CubeSatSim.org/f	
3	BPSK	Binary Phase Shift Keying. This mode transmits a continuous signal that sounds like noise that emulates the AMSAT Fox-1E or HuskSat-1 CubeSats. You need to demodulate using USB.	Windows/Raspberry Pi/Linux: FoxTelem	`config -b`	CubeSatSim.org/b	
4	SSTV	Slow Scan TeleVision. This mode transmits stored images in Scottie 2 format which sounds like a series of tones.	Windows: MMSSTV Raspberry Pi/Linux: QSSTV	`config -s`	CubeSatSim.org/s	
5	CW	Continuous Wave or Morse Code. This mode transmits a FM modulated tone at 20 words per minute Morse Code telemetry.	Windows/Raspberry Pi/Linux: fldigi with spreadsheet http://cubesatsim.org/telem	`config -m`	CubeSatSim.org/m	