CubeSatSim v2.0.0

Small Satellite Workshop 2025

Special thanks to

- Alan Johnston (KU2Y)
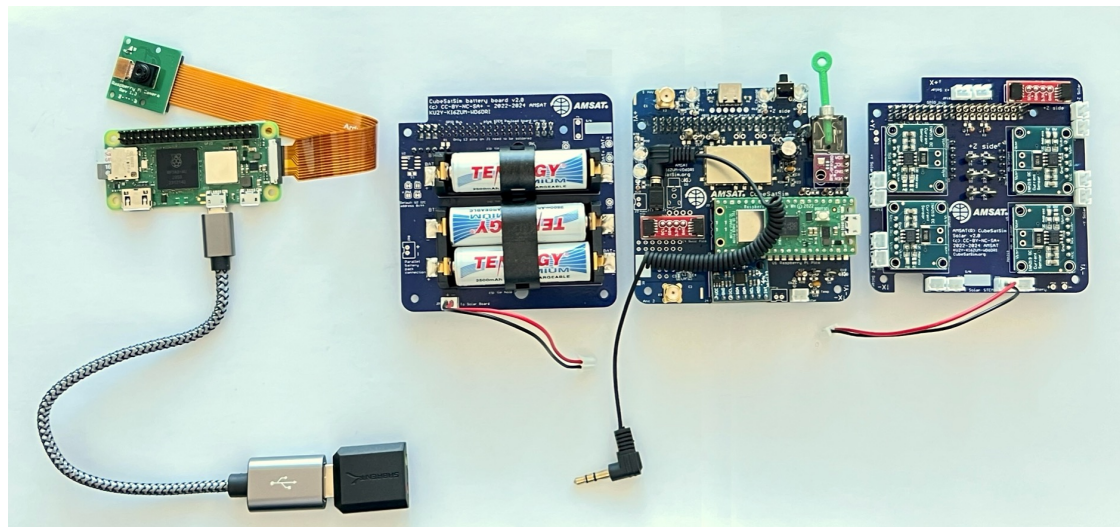
Exploring Satellite Telemetry with the CubeSat Simulator

by Alan Johnston KU2Y

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- Low-cost satellite emulator that runs on solar panels and batteries, transmits UHF radio telemetry
- Compliant to 1-U CubeSat specification

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- Low-cost satellite emulator that runs on solar panels and batteries, transmits UHF radio telemetry Compliant to 1-U CubeSat specification

- To demystify and reveal the inner workings of a Satellite $^{2.0}$

- To support educators and provide demonstrations to the public

- To help CubeSat developers be successful

- To share amateur radio and satellites with the maker community

CubeSatSim (CSS) ~~v1.3.2~~ v 2.0.2

- New FM transceiver module
    - For better frequency stability and simple command and control receiver to change telemetry mode
- More Raspberry Pi Pico micro controller
- Easily connect additional sensors for the Pico
    - Using the Qwiic connector system https://www.sparkfun.com/qwiic
- Can be modified to fly as a balloon payload
- With 500mW FM output for SSTV, APRS, or CW transmissions with software support on Pico for a serial GPS module
- Redesigned for blue INA219 voltage and current sensors
- Battery board now has integrated voltage and current sensor
- Simpler electrical power system

AMSAT's Current Operating Satellites

- AO-7 launched November 15, 1974, by a Delta 2310 launcher

- AO-91 (Fox-1B/RadFxSat) launched by a Delta II on November 18, 2017
  (suffering battery issues, sometimes functioning)

- AO-92 (Fox-1D) launched aboard Indian PSLV-C40 on January 12, 2018
  (suffering battery issues, sometimes functioning)

- AO-95 (Fox-1Cliff) launched via SpaceX Falcon 9 on December 4, 2018 (receiver non-functioning)

- AO-109 (Fox-1E) launched via Virgin Galactic LauncherOne on January 17, 2021 (commissioning)
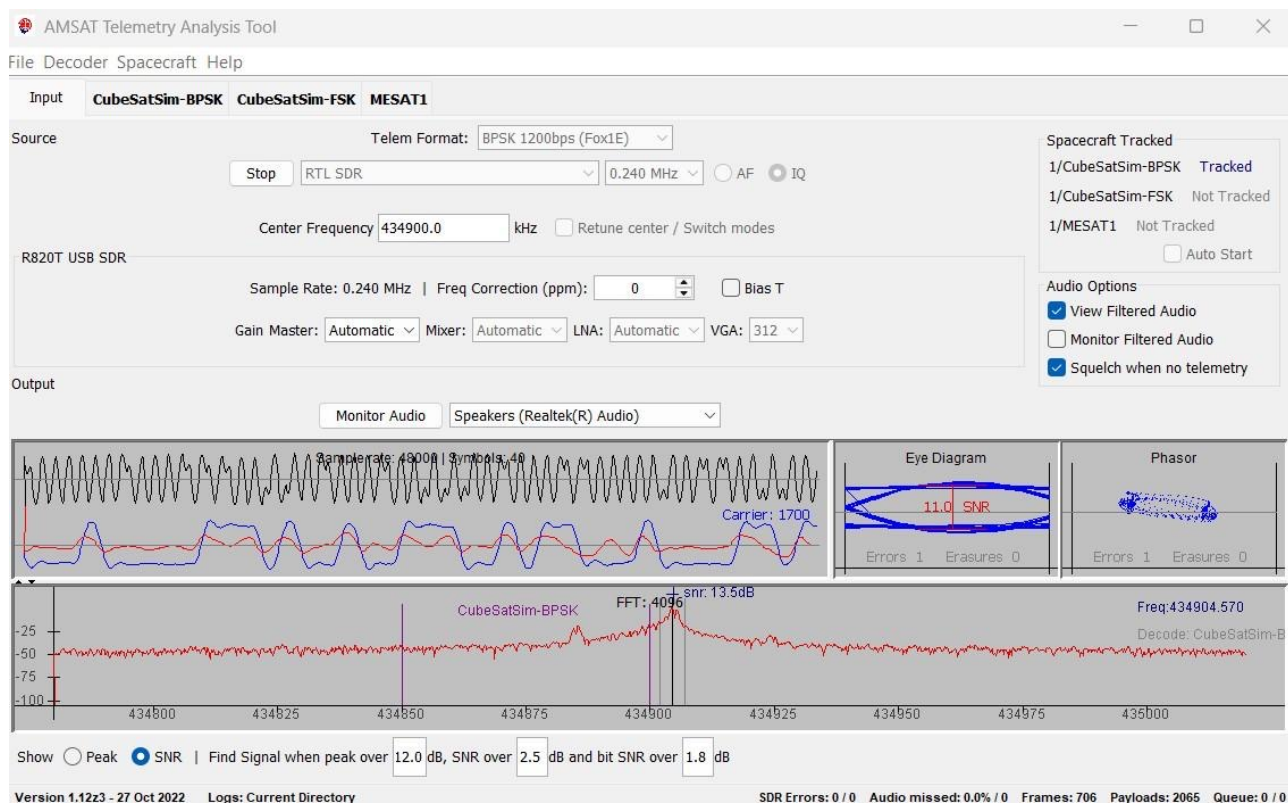

AMSAT Satellites

Purchased from AMSAT by Kangkook Jee
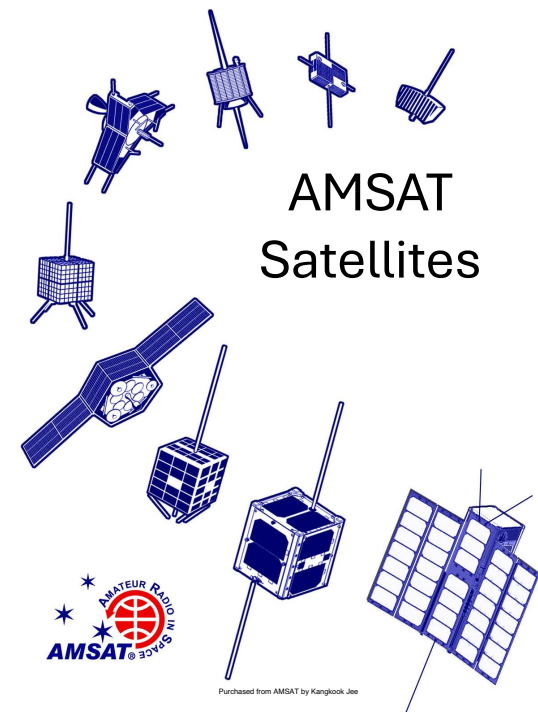
CubeSatSim Block Diagram v2.0
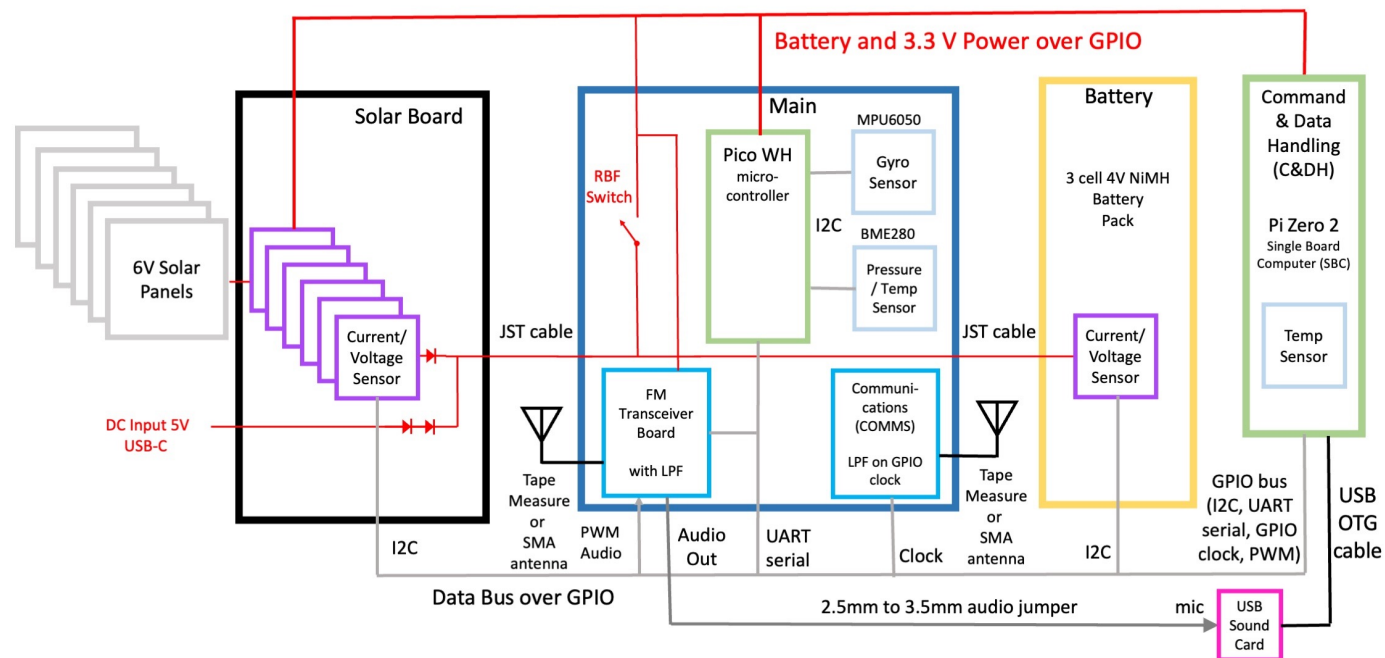
FoxTelem

RF Communication Support

- The CubeSatSim has the ability to transmit in 5 modes
  - Automatic Packet Reporting System (APRS)
  - AFSK Telemetry
  - BPSK Telemetry
  - Slow Scan TV (SSTV)
  - CW telemetry (morse code)