

Amateur Radio Listening

1) Equipment required

- UHF receiver capable of receiving SSB or CW, minimum tuning step of 100 Hz
- Batteries or power supply for radio receiver
- High gain UHF antenna, typically 4 or more elements
- Tripod or a friend to point the antenna
- Coax to connect radio to antenna
- Tracking software or internet access

2) Setup and connections

- Find a comfortable position to mount the radio and antenna for at least 20 minutes
- Make sure one can power on the radio in the correct mode (SSB or CW)
- Tune the radio to 437.32 MHz
- Using the coax, connect the antenna to the radio

3) Finding and tracking the satellite

- Using an application or a website, determine the local time that the elevation will be at least 5° at your location
- Most programs will provide a pass prediction of azimuth and elevation during the time of the pass overhead
- A typical pass for TJ3Sat will last between 5 and 15 minutes long
- Doppler shift for 437 MHz is about +/- 0.013 MHz
- Position the antenna to point to the azimuth and keep the elevation low, about 10° above the horizon
- Tune the receiver higher in frequency to account for the Doppler shift - start with 437.333 MHz
- Coordinate with your friend or the antenna to reorient the antenna elevation and azimuth each minute during the pass
- Slowly tune the frequency around the 432.322 at the start of the pass, biasing your sweep toward 437.320 MHz
- When the pass is half way over, the Doppler shift is zero, and the receiver should be tuned to 437.320 MHz
- Continue to lower the frequency toward the end of the pass, ending about 437.307 MHz
- During the pass listen for a short "beep" every 13.5 seconds
- Note that every ten minutes the satellite will give its call sign in morse code as KK4PHU
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General Information

First Contact:

Listen for the spacecraft before trying to transmit. Batteries state of charge may not support a long transmission. The spacecraft will enter into beacon mode two hours after deployment, or about 2:20 after launch. In beacon mode the satellite will beep once every 13.5 seconds and announce its amateur radio call sign every ten minutes. The satellite will remain in this mode until commanded to exit.

With luck, the satellite is heard in beacon mode. After confirming it is tj3st by timing the 13.5 second beep, note frequency every minute to determine the center frequency. This is important in case the frequency shifted during the launch event and will help in finding the satellite next time.

Reporting TJ3Sat contacts

If your station picks up transmissions from TJ3Sat, please log onto our webpage at tjhsst.edu/students/activities/tj3sat, click on the Mission section, and scroll down to click the button reading "Report Contact with Satellite". It will take you to a Google Form where you can input the information. If you have any problems, you can just email the following information to tjcubesat@gmail.com. Thank you!

- Please put the words **[Tj3sat contact report]** in the subject of the email.
- Your name
- Your call sign
- Your geographic location (city/state/country and if possible lat/lon)
- Time of the contact(s)
- Observed receive frequencies during the pass. This will help us narrow down our orbital elements
- TLE object number and TLE epoch you used to track the satellite
- Number of beacons heard
- Any additional observations