Getting Started with Amateur Radio Satellites

From handhelds to space!

Who is AMSAT

- Founded in 1969, nonprofit, volunteer-driven
- Develops, builds, and operates amateur satellites
- Global network (AMSAT-NA, AMSAT-UK, AMSAT-DL, etc.)

Why Work Satellites?

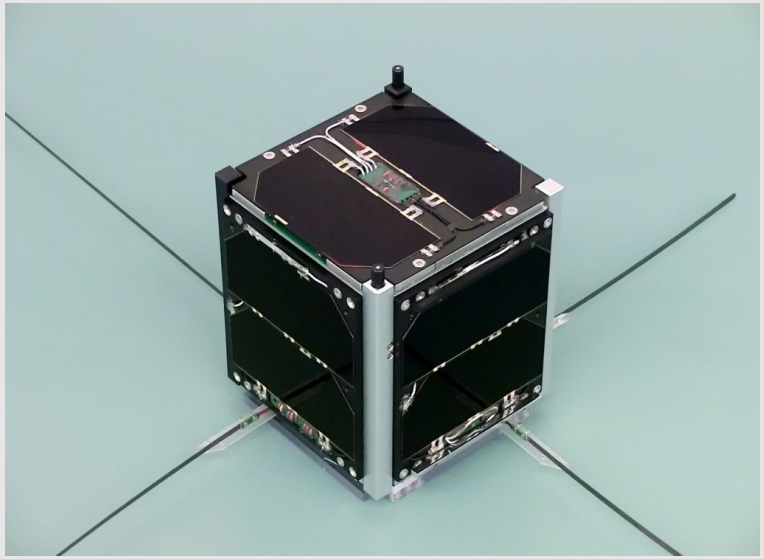
Make QSOs hundreds or thousands of miles away

Technical challenge: Tracking, Doppler, Timing

Fun portable ops (backyard, field day, SOTA/POTA)

What Do Amateur Satellites Look Like?

- CubeSats: 1U (10cm cube), 3U, 6U, etc.



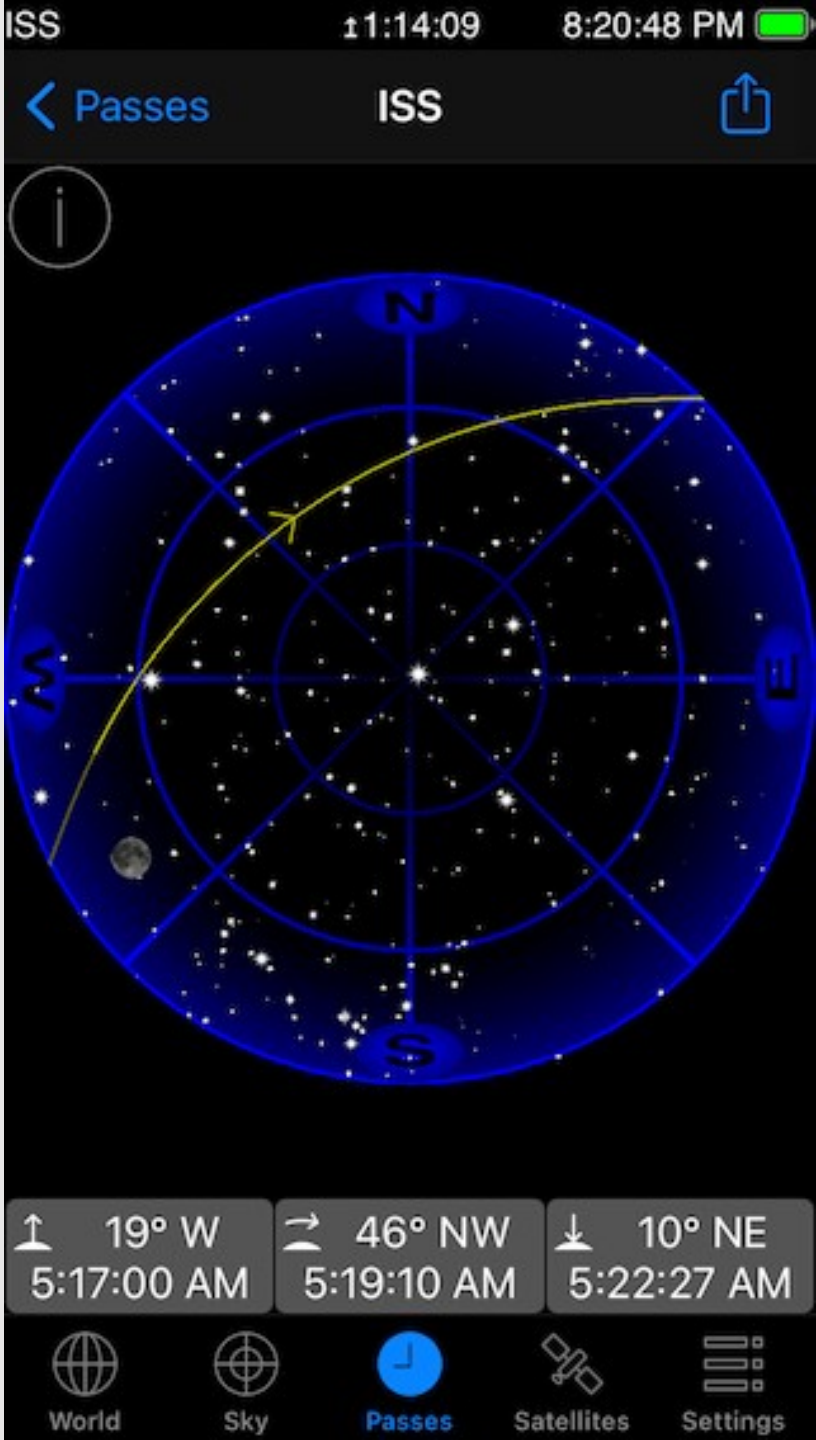
- Some larger satellites in past (AO-10, AO-40)
- Transponders: FM repeater, linear transponder, APRS/digipeater

Where Are They?

- LEO (Low Earth Orbit):
- ~250–750 miles above Earth
- 10–15 min passes across the sky
- Line of sight — horizon to horizon

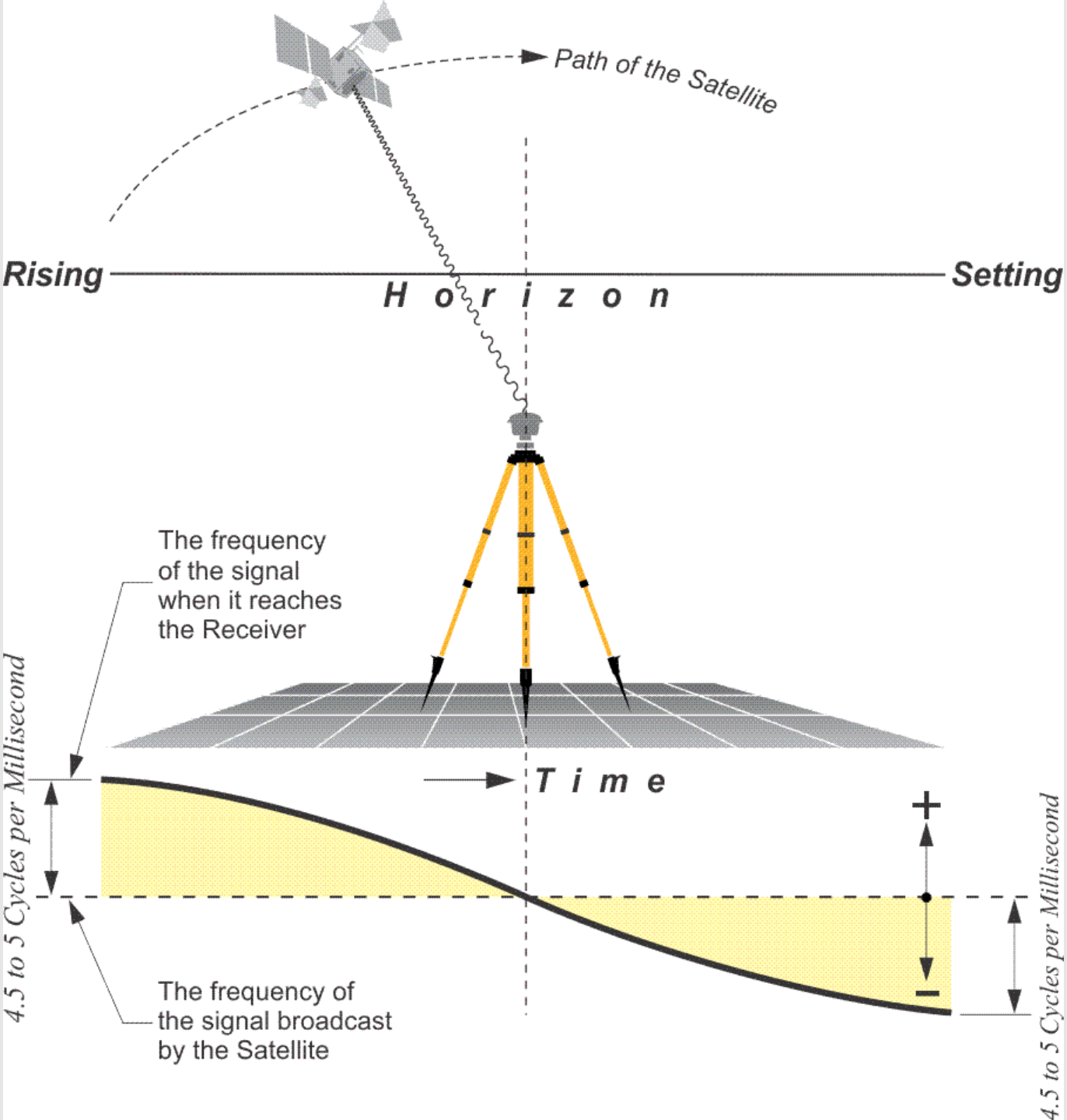
Tracking Satellites

- Pass prediction apps:
  - AMSAT Droid - Android
  - Heavens Above
  - GoSatWatch - iOS
- PC software:
  - SatPC32 - Windows
  - Gpredict - Linux



Doppler Shift

- As satellite approaches: frequency shifts higher
- As it moves away: frequency shifts lower
- Example: Train horn or police siren
- FM: shift by ±10 kHz during pass
- Linear: more precise tuning needed



Easiest Entry: FM “EasySats”

- Examples: SO-50, PO-101, ISS repeater (if active)
- Operate like an FM repeater, but in space
- One uplink frequency, one downlink frequency
  - If using single radio, must be capable of odd-splits.

What You Need

- Dual-band HT (crossband TX/RX is ideal, but not required)
- Handheld directional antenna (Arrow, Elk, or DIY Yagi)
- Prediction app to know when passes happen
- Neighbors that won’t think you have lost your mind!

Tips for Success

- Start by listening only
- Record audio to log QSOs later
- Practice antenna pointing (use ISS or NOAA WX satellites)
- QSO’s are rapid fire: Don’t tie up the airwaves
  - Don’t call CQ, just state callsign and grid square (EM79).
  - When replying to someone else say their call, then your call and gridsquare.

First Targets

- FM voice satellites (SO-50, PO-101)
- ISS digipeater on 145.825 MHz
- Great starting points for beginners

Questions?

Amateur Radio Satellites: Quickstart Guide

Beginner-Friendly Satellites

1. SO-50 (FM voice repeater, 2m uplink / 70cm downlink)
2. PO-101 (FM voice repeater, often active)
3. ISS (145.825 MHz APRS digipeater, sometimes FM crossband voice repeater)

Sample HT Memory Programming (SO-50 Example)

1. Downlink (receive): 436.795 MHz (adjust for Doppler ±10 kHz)
2. Uplink (transmit): 145.850 MHz with 67.0 Hz CTCSS tone
3. Program several memories for RX: 436.805 / 436.800 / 436.795 / 436.790 / 436.785

Recommended Apps & Tools

1. AMSAT.org – satellite status, pass predictions
2. Heavens-Above.com – quick web-based pass predictions
3. ISS Detector (Android) / GoSatWatch (iOS) – mobile pass tracking
4. Gpredict (PC) – free satellite tracking software
5. SatPC32 (Windows) – advanced satellite tracking and radio control

Tips for Your First Contacts

1. Start by listening only until you are comfortable.
2. Use a handheld directional antenna (Arrow, Elk, or homebrew Yagi).
3. Record passes to help with logging later.
4. Operate outdoors with a clear view of the sky.
5. Be patient – passes are only 10–15 minutes long.

Compiled for club presentation. More info at AMSAT.org