

Getting Started on FM Satellites

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Quick, after the USSR and USA who was the third entity to have a satellite orbit the earth? If you guessed Amateur Radio operators you were right. It was OSCAR 1 and was launched on December 12, 1961. It only orbited for 22 days but it beat the third entity the UK's Ariel 1 launched on April 26, 1962. Over the years there have been a large number of Amateur Radio Satellites with a variety of operating modes, frequencies and orbit paths. One type of AR Satellite is very easy to work with equipment you might already have. According to Clint Bradford, K6LCS's *Work FM Satellites with your HT!*-- "If you have 2-meter and 440 capabilities (either "split frequencies" in one HT, or two radios), you can work FM voice satellites!" His short Internet guide will provide you basic information on how to work FM Satellites.



There are basically 5 steps necessary to work these low orbit FM satellites:

1. Have a **2M/440 FM Radio** capable of split operation or individual 2M and 440 radios, even handhelds can work.
2. Program your radio's **Memories with Receive & Transmit Frequencies** to allow easy tuning as Doppler shift of moving satellite changes frequencies in use.
3. Have a **Beam Antenna**. No, the built-in rubber duck will probably not hack it for 2-way contacts although you may still be able to hear your first Satellite with it.
4. Know when and where the satellites will be accessible at your location by using **Tracking Software or Websites**
5. Know your **Grid Square** as that is typical exchange

For my operation I use:

- **Yaesu FT-817** (current version at Yaesu is the FT-818)
- [Free FT-817 Commander software](#) to easily program memories. You can even download my [memory file](#) and upload it to Commande software.
- **Arrow Antenna**- Model #146/437-10WBP a dual-band crossed yagi with a duplexer.
- **N2YO Online Satellite Tracking**- www.n2yo.com

Typical operation:

- Find a time when the satellite will be visible at your site
 - Currently Suggested Satellites (as of Oct 2019)
 - SO-50 (SaudiSat-1C)
 - AO-91 (RadFxSat/Fox-1B)
 - AO-92 (Fox-1D)
 - Look for passes where Elevation will be at least 25 degrees above the horizon
 - Satellite "footprint" will include both you and your target areas
 - Print out a copy of pass information
 - Times of pass
 - Azimuth- compass directions to point the antenna

- Elevations- angle above the horizon for pointing the antenna
 - How these will change over time from initial acquisition through maximum elevation to final LOS (loss of signal)
- Get Ready
 - Remember that passes are short usually between 5 and 14 minutes so be ready!
 - **Open the radio's Squelch.** These are weak signals not like your local repeater
 - Headphones may be helpful especially in windy or noisy environments
 - Use a strap, belt pack or another way to support the radio as you move around because your hands will be busy with pointing the antenna, changing frequencies, keying the mic, logging contacts, etc.
 - You can use a portable voice recorder or even your cellphone to record audio so you can log contacts later (just make sure you have a way to know times in recording)
 - Use a compass to make sure you know the direction to point antenna during the pass
- Point antenna with the radio set to the first frequency in the memory set for the desired satellite.
 - Once you find the right direction to point the antenna and begin to hear signals rotate antenna elements to enhance signal strength
 - If you hear stations calling try replying
 - Keep calls short and use clear phonetics
 - Don't step on other stations
 - Don't use excessive power as this can overwhelm satellite receiver
 - If the satellite is busy with many operators keep your contacts very short
 - Callsign
 - Grid Square
 - State
- After the pass enter all contacts into your station log and upload QSLs to LOTW
- Doing More
 - Experiment with lower elevation passes for further distances
 - Try contacting the ISS (International Space Station) www.ariss.org/contact-the-iss.html
 - FM 145.800 downlink/144.490 uplink
 - Try Satellites with other modes than FM
 - Will require equipment with SSB and/or CW capability
 - Benefit from better antennas
 - Use computer control of rigs to adjust for doppler shift
 - Computer-controlled antenna rotation and elevation

Links:

- This document- <http://tiny.cc/fm-sat>
- K8ZT Space & Satellite Resources- www.k8zt.com/space
- Clint Bradford, K6LCS's
 - *Work FM Satellites with your HT!*- http://www.work-sat.com/Home_files/WorkSat-08112019.pdf
 - SO-50, AO-91/92 & ISS freqs- http://work-sat.com/Home_files/FM-VOICE-SATS-02-2019.pdf
- AMSAT- www.amsat.org/
- Arrow Antennas- <http://www.arrowantennas.com>
- Elk Antennas- <https://elkantennas.com>
- FT-817 Commander- <https://ft-817-commander.software.informer.com/download>
- N2YO Online Satellite Tracking- www.n2yo.com
- Heavens Above- <https://heavens-above.com>