Getting Started With Satellites

Working SO-50

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If you would like to try your hands at satellites, AMSAT-OSCAR SO-50 is a great place to start. This is a FM satellite that can easily be worked with a 5-watt dual band HT and a simple antenna. SO-50 is in a polar orbit and makes a circuit around the earth in about 90 minutes. It should be available over your QTH from one to several times a day for ten minutes. The main pieces of equipment needed are a 5-watt dual band HT capable of split operation. Simultaneous transmit and receive are not needed for SO-50.

Commercial antenna options include the Arrow and the Elk antennas. If you use an Elk, please remember the feedline attaches on the end of the antenna *furthest away* from you. Alternately you can build an antenna yourself. You'll need 3 elements on 144 MH and 5 or more elements on 435 MHz. Several NFARL members have successfully constructed such an antenna.

Other things that are helpful are a clock to keep track of time, a compass to establish direction and a small digital recorder. A typical QSO on SO-50 lasts about 10 seconds so it is best to record the entire pass and then log later. You will also need orbital projections for AOS (Acquisition of Signal), LOS (Loss of Signal) and Max E (Maximum Elevation). There are lots of sources for these. One easy and free source is http://www.amsat.org/amsat-new/tools/predict/index.php.

The last thing you need to do is program your HT. The uplink is centered on 145.850 MHz, PL 67.0. The downlink is centered on 436.795 MHz. The Doppler shift (change in apparent frequency as the satellite approaches and then leaves) is small enough on 2m that it can be ignored. Not so for the downlink. You need to program 10 frequency pairs:

1. 436.815 (RX) 145.850 PL 67.0 (TX)
2. 436.810 (RX) 145.850 PL 67.0 (TX)
3. 436.805 (RX) 145.850 PL 67.0 (TX)
4. 436.800 (RX) 145.850 PL 67.0 (TX)
5. 436.795 (RX) 145.850 PL 67.0 (TX)

6. 436.790 (RX) 145.850 PL 67.0 (TX)
7. 436.785 (RX) 145.850 PL 67.0 (TX)
8. 436.780 (RX) 145.850 PL 67.0 (TX)
9. 436.775 (RX) 145.850 PL 67.0 (TX)

At AOS you should be on step 1. At Maximum Elevation (Max E) you should be on step 5. And on LOS you should be a step 9. Just keep working your way up through the memories to keep the receive audio clear using the three known points just described as land marks.

Working SO-50 is a great way to get into satellites without spending large amounts of money. Later this year SO-50 will be joined by two more FM satellites, AMSAT FOX-1a and FOX-1c. Both of these cubesats are designed to be worked with an HT and simple antennas. Building and launching satellites is not cheap. AMSAT is currently raising $150,000 to pay for the commercial launch of FOX-1c Please consider joining AMSAT and/or contributing to the FOX-1c project.

Working the satellites is a great way to use you HT to do something “out of this world.” I hope to see you on SO-50 in the very near future.

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