Work FM Satellites with your HT!
Many hams already have the necessary equipment to work FM amateur satellites.
This guide offers a quick start for successfully "working" an FM bird.

All cited resources are available to you at one Web site:
work-sat.com

If you have 2M and 440 capabilities (either "split frequencies" in one HT, or two radios), you can work an FM amateur satellite! For example, in satellite SO-50's VHF/UHF (V/U) mode, the UPLINK frequency (to SO-50) for FM voice is 145.850 MHz*. The DOWNLINK frequency (from SO-50) is 436.795 MHz*.

First, you need to know WHEN and WHERE the satellite will be passing over your location. There are several commercial computer programs that will tell you. In the home office, I use MacDoppler. Outside, though, I use PocketSat3 on my iPod touch/iPhone. On my netbook, Nova for Windows and SatPC32 are marvelous. But free of charge info is also available online at …

heavens-above.com - or - amsat.org - or - N2YO.com
Log in, plug in your longitude and latitude, and you will have access to amateur satellite pass information.

The one "absolute" for success is to open up your squelch. We are talking about “weak signals” from hundreds of miles away - so don't expect the satellite to be strong enough to break squelch like your local repeater. Sure, it’s a little noisy - but that's part of the process: That noise is an aid in locating the satellite. When the frequency starts exhibit quieting, that's a sign that you are capturing the satellite’s signal.

Improve your HT’s stock antenna (most are rated at NEGATIVE 6 db or worse!). For BNC connectors, Diamond’s RH-205 will make the difference. For male and female SMA - and BNC - the Smiley 270A is a good performer. But for best success, you need more GAIN, so using an Arrow Sat Antenna Yagi is much better. If you prefer to homebrew your antenna, go to the work-sat.com Web site’s ANTENNAS page for construction article links.

For SO-50, set up your radio to tune for the Doppler effect on the 440 downlink. Start listening above the center frequency - you will acquire the satellite sooner and clearer. When the downlink gets scratchy or fuzzy, tune down 5KHz at a time, and reception should be clearer. Only transmit when you can clearly hear the satellite. Follow the signal down in frequency as the pass continues. The new AO-85 is a little different, with its 2M downlink and 440 uplink (see the frequency charts that follow).
Don't hold your whip antenna upright. Held in a vertical position, your transmitted signal is hitting land-based receivers. You need to tilt your HT’s antenna so that it is perpendicular to the airborne satellite. Very few of the ham satellites are land-based (grin), so you must TILT your antenna about the same amount as the satellite's ELEVATION. You’ll quickly get the hang of it - and hear the difference! You’ll have best results with a modest beam or Yagi.

Ideally, we should be working the satellites in full duplex mode, where we can simultaneously listen to the downlink as we are transmitting. Although this method is preferred, it is not mandatory: Carefully monitor the downlink, and wait for a break in the conversations to announce yourself. You might find it helpful to record your sessions for later review. Even if you don’t make a contact during a pass, a recording can help you recognize the callsigns and voices of other operators. Pocket recorders or smartphone apps are great for this. If working full-duplex, use an earpiece or headphones to monitor the downlink and avoid acoustic feedback.

Knowing your grid square - and having a grid square map - is a quick way of identifying locations of what you will hear. The ARRL and Icom have grid square maps: Icom’s is free and available at better ham radio stores[6].

It just takes a little preparation and planning for working amateur satellites. Not every pass is workable with an HT — don't go after the sub-10° elevation passes as you start “working the birds.” Choose your passes wisely: Working higher elevation passes will give you better results.

When you clearly hear others, listen for a break in the action, and use the ITU-approved phonetics[7] to announce your callsign, grid square, and op mode:

"KILO-SIX-LIMA-CHARLIE-SIERRA, DELTA-MIKE - ONE-THREE, handheld."

Check work-sat.com for the satellites’ home Web pages – to make sure the sat is in the mode you can work with your setup!

Is there anything else up and running right now? There’s AO-7, FO-29 (JAS-2), and others with SSB/CW transponders on board. AO-73 FUNcube-1 is “fun” to work! Info on these on the SAT SKEDS page at work-sat.com.

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Notes


[2] The Pryme AL-800 has been discontinued. The Diamond RH-205 telescopes to 52” and collapses to 9”. Use caution with either of these massive, heavy antennas: they have the potential of placing a lot of stress on your radio's BNC connector. Smiley antennas are available in BNC and male-or-female SMA at HRO or from Smiley’s Web site at htantennas.com.

[3] Arrow’s Model 146/437-10WBP is a dual-band cross-Yagi design, with a diplexer built into the handle, with 3 elements on 2M and 7 on 440. See it in action in the December, 2007 issue of CQ Magazine. Links to Arrow – and others – are on the Antennas page at work-sat.com.


[5] Here’s how to program your radio for SO-50 -

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And here’s how to program your radio for AMSAT-NA’s Fox 1-A / AO-85 -

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[*] [**] Always consult the sats’ control team pages for possible frequency changes and updates (and problem reports).
Work-Sat.com

“Your Web site took me from zero knowledge to getting an HT and an Arrow. And just four months later, I have qualified for VUCC on the FM birds. A great site for the beginner on the birds. You un-mystify them.”

“I love the site and I greatly appreciate the information you have provided to get me going! Yours is a no-nonsense approach to working satellites … “

“Simplicity … the idea of working sats "sounds complicated" but that’s really not the case. You keep the language simple, illustrations simple, and concept simple … give folks the idea that any ham can do this (which they can) with the right equipment … if they follow the directions you provide.”

K6LCS gave a fantastic presentation on amateur satellites. It was most informative and entertaining. Clint's passion for the subject was evident, and I would imagine that the club members individually and/or in a group will be eager to try satellite contact in the near future.

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