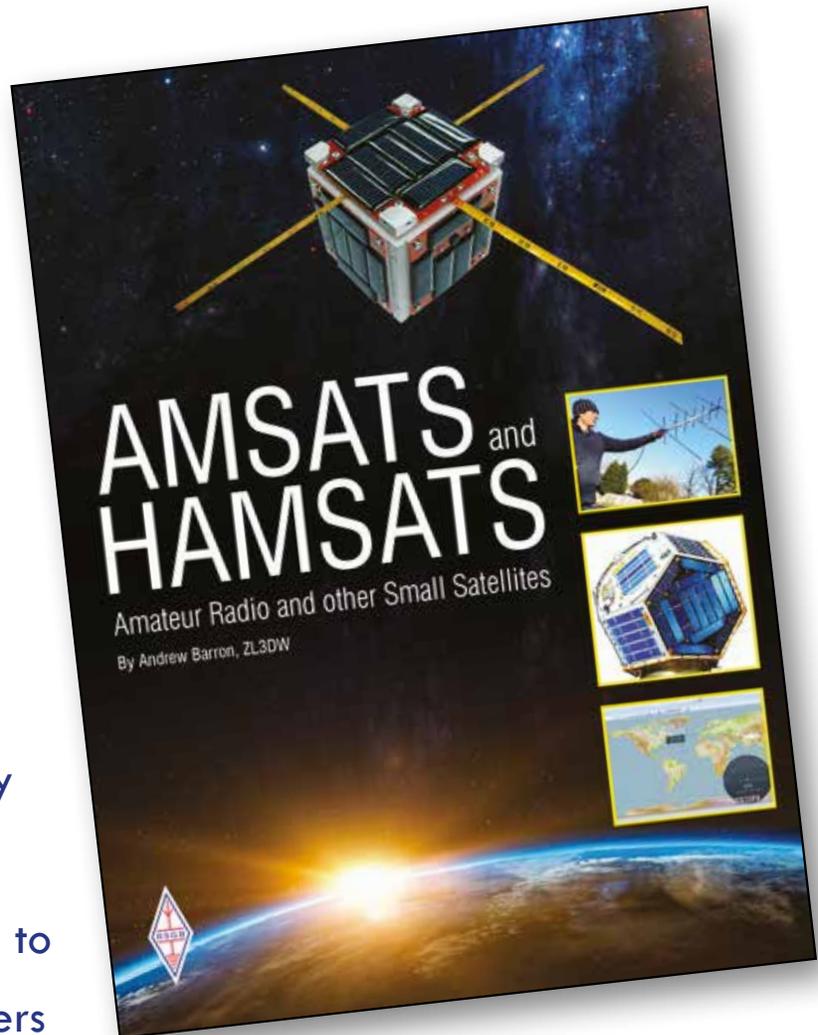




# OSCAR N° 221 - March 2018

# news

See inside for  
details of this  
new book soon  
to be published by  
the RSGB and the  
discount available to  
AMSAT-UK members



[amsat-uk.org](http://amsat-uk.org)

The official journal of AMSAT-UK for all users of  
Orbital Satellites Carrying Amateur Radio

# Work FM Satellites with your HT!

Clint Bradford - K6LCS

**Most hams already have the necessary equipment to work FM voice satellites.**

This guide offers a quick start for successfully making contacts! If you have 2-meter and 440 capabilities (either “split frequencies” in one HT, or two radios), you can work FM voice satellites! For example, in satellite SO-50’s VHF/UHF (V/U) mode, the UPLINK frequency (to SO-50) for FM voice is 145.850MHz. The DOWNLINK frequency (from SO-50) is 436.795 MHz.

First, you need to know WHEN and WHERE the satellites will be passing over your location. There are several commercial computer programs[1] that will tell you. In the home office, I use MacDoppler. Outside, I’ll use PocketSat3 on my Smartphone. On Windows systems, Nova and SatPC32 are marvellous.

But there are free-of-charge info sources online, too, at... [heavens-above.com](http://heavens-above.com), [amsat.org](http://amsat.org) or [N2YO.com](http://N2YO.com)

Log in to these sites, plug in your grid square, and you will have access to accurate 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 satellites to be strong enough to break squelch like your local repeater does. Sure, it’s a little noisy - but that’s part of the process: That noise is an aid in locating the satellites! When the frequency starts exhibiting quieting, that’s a sign that you are capturing the satellites’ signals.

Improve your HT’s stock antenna (most are rated at NEGATIVE 6db or worse!). The Smiley

All cited resources are available to you at one web site:

[work-sat.com](http://work-sat.com)

270A[2] is a good performer, and is available in Male SMA, Female SMA, and Male BNC models. But for best success, you need more GAIN, so using an Arrow Satellite Antenna[3] or Elk Log Periodic is much better. If you prefer to home-brew your antennas[4], go to the [work-sat.com](http://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 centre frequency[5] - you will acquire the satellite sooner and clearer. When the downlink gets scratchy or fuzzy, tune down 5KHz at a time, and reception may be clearer. Only transmit when you can clearly hear the satellite. Follow the signal down in frequency as the pass continues. The new AO-91 and AO-92 birds are a little different, with their 2M downlinks and 440 uplinks (see the frequency charts at [work-sat.com](http://work-sat.com)).

If using a whip antenna, don’t hold it upright. Held in a vertical position, your transmitted signal is hitting land-based receivers. And most of our satellites are not land-based (grin). You need to tilt your HT’s antenna about the same amount as the satellites ELEVATION. Get it perpendicular! You will quickly get the hang of it - and hear the difference! Again, you will have much better results with a modest beam or Yagi antenna.

Ideally, we should be working the FM voice satellites in full-duplex mode, where we can simultaneously listen to the downlink as we are transmitting. Although this method is referred, it is not mandatory: Carefully monitor the downlink, and wait for a break in the conversations to key your mic and announce yourself. You might find it helpful to record your sessions for later review: Even if you do not

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. And if working full-duplex, use an earpiece or headset to monitor the downlink to avoid acoustic feedback.

Knowing your grid square - and having a grid square map - is a quick way of identifying locations of operators you will hear. The ARRL and Icom America 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 FM voice satellites. Not every pass is workable with an HT - don't go after the sub-10-degree elevation passes as your start "working the birds." Choose your passes wisely: Working higher elevation passes will give you much better results.

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

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

Check [work-sat.com](http://work-sat.com) for the satellites' home pages - to make sure the satellites are in the modes you can work with your setup!

### Notes

[1] - Links to several satellite pass data programs - as well as free online resources - available on the 'TRACKING' page at [work-sat.com](http://work-sat.com).

[2] - The Diamond RH-205 is a collapsible 2M BNC antenna. Be careful using it - its mass places a lot of stress on your HT's antenna connector. The Smiley 270A is available at Ham Radio Outlet - [hamradio.com](http://hamradio.com) - or from Smiley's Web site at [htantennas.com](http://htantennas.com).

[3] [4] - Arrow's Model 146/437-10WBP is a dual-band cross-Yagi design, with a diplexer built into the boom's handle. Links to the Arrow - as well as the Elk and build-'em-yourself antennas - on the 'ANTENNAS' page at [work-sat.com](http://work-sat.com).

[5] - Here's how to program your HT for SO-50 and AO-92

### SO-50

Ch #	Alpha	TX Freq	TX Tone	RX Freq	RX Tone
01	50 +2	145.850	67.0	436.805	None
502	50 +1	145.850	67.0	436.800	None
503	50 74	145.850	74.4	436.795	None
<b>504</b>	<b>SO-50</b>	<b>145.850</b>	<b>67.0</b>	<b>436.795</b>	<b>None</b>
505	50 -1	145.850	67.0	436.790	None
506	50 -2	145.850	67.0	436.785	None

### AO-92 (aka Fox-1D)

Ch #	Alpha	TX Freq	TX Tone	RX Freq	RX Tone
921	AOS 2	435.340	67.0	145.880	None
922	AOS 1	435.345	67.0	145.880	None
<b>923</b>	<b>AO-92</b>	<b>435.350</b>	<b>67.0</b>	<b>145.880</b>	<b>None</b>
924	LOS 1	435.355	67.0	145.880	None
925	LOS 2	435.360	67.0	145.880	None

[6] - A .pdf copy of Icom's grid square map is available on the 'SHACK AIDS' page at [work-sat.com](http://work-sat.com).

[7] - Download the ARRL's Handy Ops Guide from the 'SHACK AIDS' page at - you guessed it - [work-sat.com](http://work-sat.com) .

**CONSULT THE SATELLITES' CONTROL TEAM PAGES FOR POSSIBLE FREQUENCY / MODE CHANGES AND UPDATES!**

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