



## AMSAT-UK

Spectrum Forum Meeting – Saturday 7<sup>th</sup> November 2020

### Spectrum Report – Amateur-Satellite Service

#### About AMSAT-UK

AMSAT-UK represents the interests of amateur satellite operators in the UK and is at the forefront of amateur satellite construction.

The thrill of communicating via satellites orbiting in space has led amateurs to develop stations for the VHF, UHF and Microwave bands when they may not have otherwise done so. Having established a satellite capable station many have gone on to discover the fascination of terrestrial DX working, so helping generate more activity in these allocations which are sometimes overlooked by amateurs who start out on the HF bands.

Like many other amateur radio specialisms, amateur satellite activity has greatly increased this year due to the COVID lockdowns. Luckily, there are now many satellites carrying amateur radio equipment and which are generally available for use on a 24/7 basis. The [AMSAT-NA status page](#) always provides up-to-date information on activity.

#### The FUNcube project

On November 21, 2020 the first FUNcube spacecraft AO-73 will celebrate 7 years of successful operation in space.

A number of further projects are under review and development. These include development of high data rate downlinks using 10 GHz and further possible cooperation with university teams.

#### Es'hail-2 Geostationary Amateur Transponder Satellite



[Es'hail-2](#) (QO-100), the first geostationary satellite to carry amateur radio transponders, launched on November 15, 2018 into a geostationary slot at 26 degrees East.

There are two 2.4 GHz to 10 GHz transponders; a nominal 250 kHz bandwidth linear transponder for narrowband SSB and CW communications and an 8 MHz wide transponder for Digital ATV.

The coverage of this spacecraft extends from Brazil in the west to Thailand in the east.

Among the DX entities active on the satellite has been the Neumayer-III research station in Queen Maud Land, Antarctica. On November 3, 2020, German TV broadcaster WDR aired a news story about **Theresa DC1TH**, part of the Neumayer-III base 2021/22 overwintering crew, who will operate on QO-100. You can watch the news item at <https://www.facebook.com/watch/?v=1036866973482808>

PA1SDB conducted a QRP test using the digital mode ROS-4 and was able to copy the 10 GHz downlink signal when transmitting 1.5 milliwatts to a 95 cm dish on 2.4 GHz.

A wide range of modes have been used via the transponder, as well as the usual FT4, FT8 and SSB there has been a successful experiment with using LoRa communications while mobile.

AMSAT-UK and BATC collaboration continues to provide a WebSDR at the Goonhilly Earth Station in Cornwall, UK. This enables amateurs anywhere in the world to listen to the activity on the 10 GHz narrowband transponder downlink and view activity on the wideband transponder. It also provides a chat facility which is useful as a collaboration tool.

### **Amateur Radio on the International Space Station (ARISS)**

There are two amateur radio stations onboard the ISS. The station in the Russian Service module is used for the very popular Slow Scan TV (SSTV) transmissions as well as FM voice contacts with Russian school students. The station in the Columbus module has the packet radio digipeater and supports school contacts for countries around the world. The HamTV system used to be located in this module before it was returned to Earth.

The first part ARISS InterOperable Radio System (IORS) was installed in the Columbus module in 2020, this has enabled the operation of a VHF to UHF FM repeater.

Frequencies used by ARISS:

144.490 MHz FM Voice Uplink in Regions 2 and 3  
145.200 MHz FM Voice Uplink in Region 1  
145.800 MHz FM Voice and SSTV Downlink  
145.825 MHz FM APRS Digipeater  
145.990 MHz FM Repeater Uplink  
145 MHz frequencies have a Doppler shift of +/- 3.5 kHz  
During a pass the 145.8 downlink can be anywhere between 145.7965 and 145.8035 MHz

437.050 MHz FM CubeSat Relay Uplink  
437.525 MHz FM Voice School Contact Downlink  
437.550 MHz FM APRS Digipeater  
437.800 MHz FM Repeater Downlink  
437 MHz frequencies have a Doppler shift of +/- 10.5 kHz

ARISS are also planning an FM Voice Uplink in 23cm.

The ISS HamTV DATV system was returned to Earth for repair. The effects of the pandemic in Italy caused delays but it is understood to have been fixed and will hopefully be sent back to the ISS by the end of 2021. The downlink frequency used by HamTV is 2395.0 MHz +/- 57 kHz Doppler shift.

### **Spectrum**

AMSAT-UK welcomes the ongoing work by IARU volunteers involved with WRC-23 preparatory meetings in defence of the key Amateur and Amateur-Satellite Service allocations at 1240-1300 MHz and higher bands.

As we have noted in our RSGB Spectrum Forum reports going back to 2009, the regulatory threat posed by the 1260-1300 MHz downlink of the Galileo GNSS constellation is of great concern. We also note with concern that Japan's Quasi-Zenith (QZSS) GNSS, expected to become fully operational in 2023, also uses 1260-1300 MHz.

As stated in previous reports it remains an aspiration that the Amateur-Satellite Service allocations at UHF and Microwaves should align with the weak-signal sections of the bands. In particular it is desirable that the European Common Frequency Allocation Table Footnote EU17 sub-bands, **5660-5670 MHz** and **10360-10370 MHz** along with **50-51 MHz** and new 10 MHz wide L-band and S-band segments become available to the Amateur-Satellite Service for both Earth-to-Space and Space-to-Earth communications.

## Annual Colloquium

As a result of the pandemic AMSAT-UK's 2020 Colloquium was held online and radio amateurs from around the world were able to participate. More than 500 attended on the day and many stayed on for an open chat session in the evening. The video of the Colloquium is available on the [AMSAT-UK YouTube Channel](#) and has so far attracted over 1,700 views.

## Other Activities

On November 4, 2019 the AMSAT-UK [Twitter Account](#) had 11,086 followers and the [AMSAT-UK Facebook Page](#) 4,754 follows.

AMSAT-UK hosts the [Amateur Satellite Frequency Coordination Status](#) pages for the IARU. These pages give details of the many Amateur Radio satellite projects under development.

In addition to the QO-100 ground station already mentioned, through the support of GES (Goonhilly Earth Station Ltd) we also support a Web SDR covering the 144-146 MHz band which is located on the site.

The DPOGVN station in Antarctica also hosts a FUNcube ground station which, due to its location near the South Pole, greatly increases the telemetry data that we receive from AO73, EO88 and JO97 on almost every orbit.

**AMSAT-UK November 2020**  
<http://www.amsat-uk.org/>

