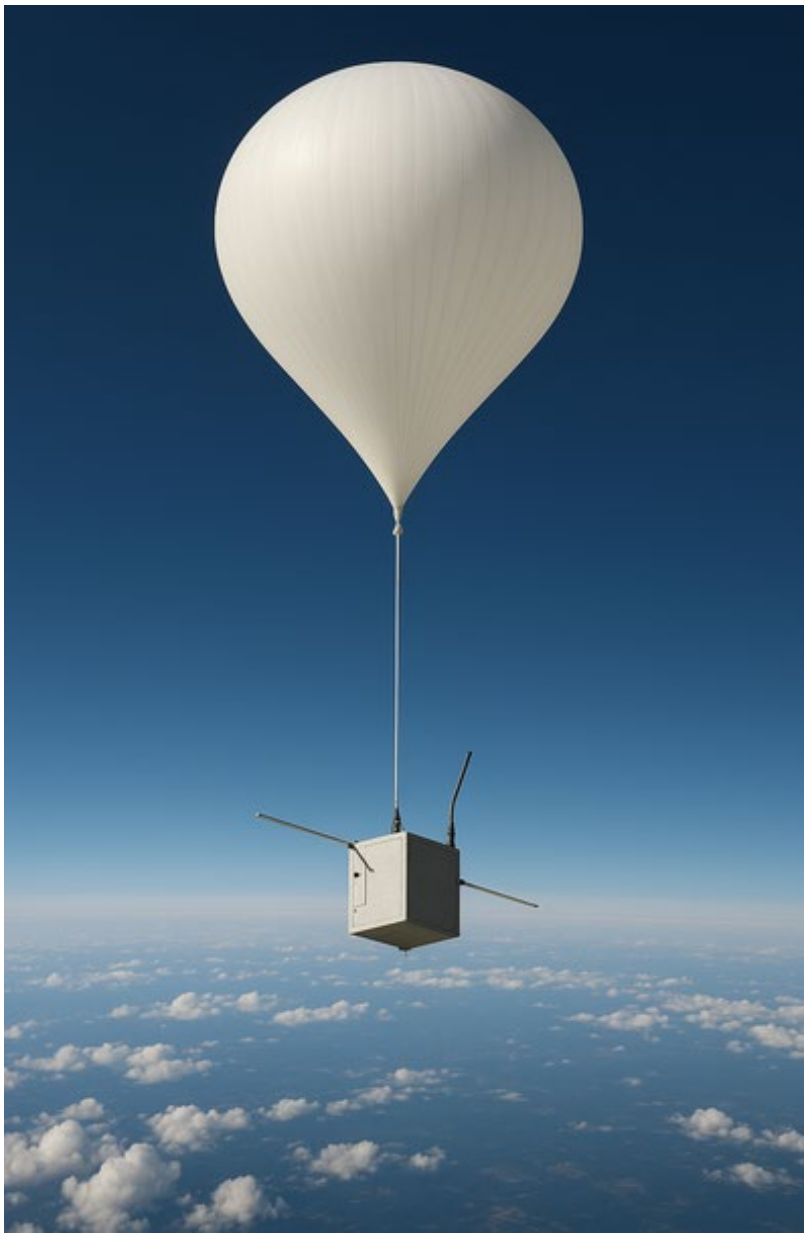
RSGB High-altitude balloon (HAB) competition

Your LoRa APRS tracker, what next?

Version 4 23.09.2025 Dave Pegler, M0JKS



If you took part in the RSGB High-altitude balloon (HAB) competition that was held on Saturday 20 September 2025 and are wondering what to do next with your Heltec Wireless Tracker board, read on! Like most radio amateurs I have boxes and drawers full of kit from completed (and many half-completed) radio-related projects. Now that the RSGB High-altitude balloon (HAB) competition is over, how about reconfiguring your Heltec Wireless Tracker board for the standard UK or EU LoRa APRS frequencies. You can then use it for tracking your car, motorbike, tractor, van, boat, lorry, horse or even yourself while out in the great outdoors. If this sounds interesting, keep reading.

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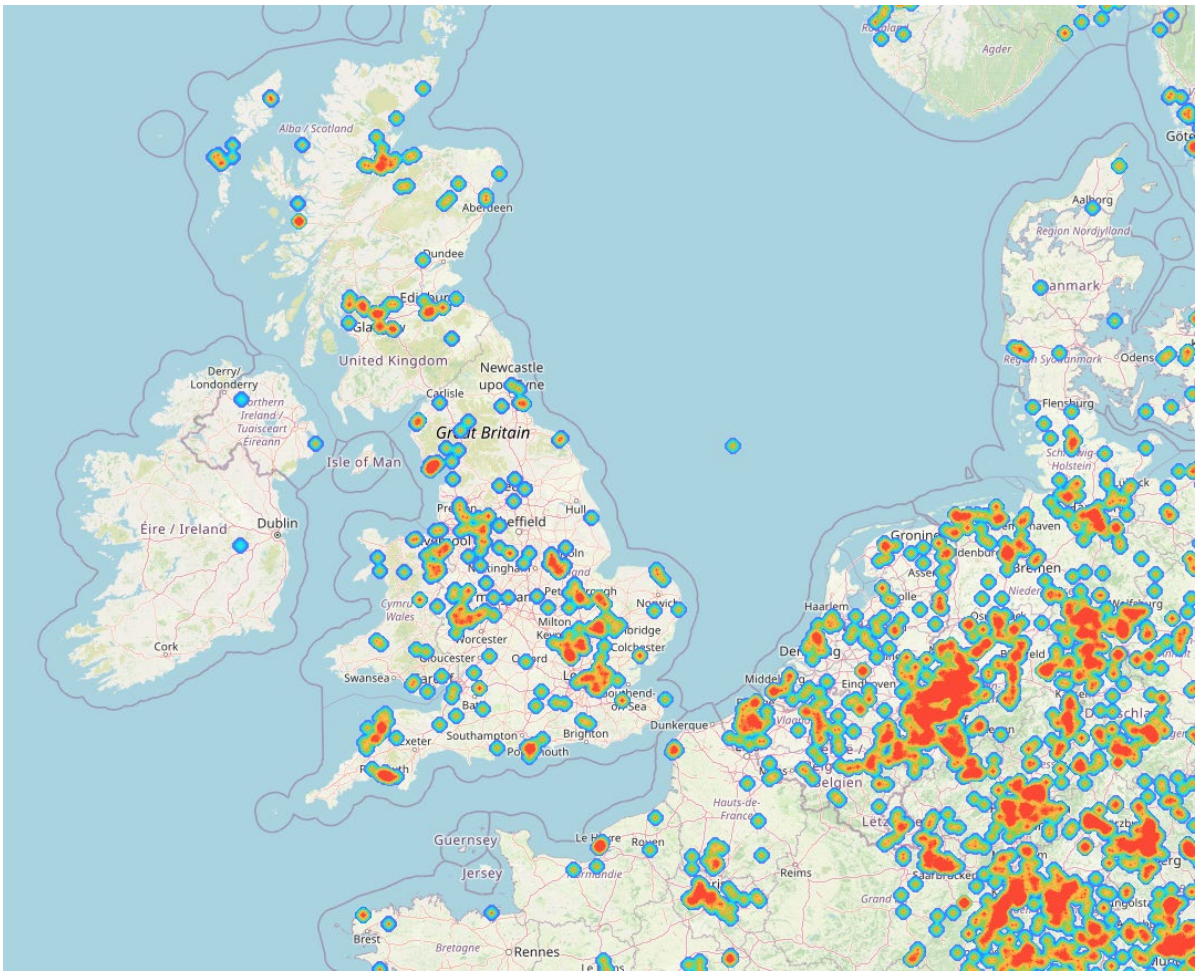
1 UK and EU LoRa APRS Frequencies

As outlined in section three of the RSGB High-altitude balloon (HAB) competition document, the digipeater on the RSGB HAB was set up with an uplink frequency of 439.850MHz which was allocated for the event by the RSGB ETCC. It was deliberately different to the current UK LoRa APRS frequency of 439.9125MHz to ensure that the HAB cross-frequency digipeater only received and decoded APRS packets from radio equipment participating in, and for the duration of, the competition. Now that the competition is over, all that is required to start using your Heltec Wireless Tracker board as a personal, or vehicle tracker, is to change the frequencies to one of the standard frequencies used around the world. These are 433.775MHz (EU, Australia, US), 434.855MHz (Poland) and 439.9125MHz (UK).

2 Improving the UK LoRa APRS infrastructure

Below is a hot-map (taken from website https://lora.ham-radio-op.net) which shows the LoRa APRS infrastructure (iGates and digipeater) across the UK and Northern Europe.



To get a more detailed view of the UK LoRa APRS network, please click on the following link, using the mouse scroll wheel to zoom in and out:

https://lora.ham-radio-op.net/?center=52.9553,-1.6644&zoom=8

Back in 2020 when I began using LoRa and APRS, there were only a small number of iGates in the UK; just one in the Peak District, a couple in North Wales and a few up in the Scottish islands. Over the last five years radio amateurs around the UK, many from the Summits on the Air (SOTA) community, have expanded the network of LoRa iGates and digipeaters so that there are now well over two hundred across the country. For anyone not familiar with APRS nomenclature, an iGate is a device that takes a RF signal (e.g. from your LoRa APRS tracker) and forwards it to (and from) the APRS Internet Service (APRS-IS) via a cluster of tier2 "aprsc" servers. A digipeater is a much simpler device which acts as an RF to RF repeater. Typically, an iGate is installed on a low-altitude building (e.g. a house) where it can access power and the internet (usually via Wi-Fi or Ethernet to a router); and a digipeater is typically installed at altitude, such as a mountain top. For example, the LoRa APRS digipeaters G3WGV-11, M0MZB-15, MB7UBL-2, 2W0LPU-15, M0JKS-1 and MM0EFI-3 are all installed in remote elevated locations that together provide coverage to parts of the Lake District, Eyri National Park (Snowdonia), the Brecon Beacons, the Peak District and Cairngorms. These have been set up to improve coverage in remote, mountainous and rural areas, so that LoRa APRS trackers can be used by people enjoying a walk in many of the UK national parks.

The installation of one of above digipeaters (MM0EFI-3) was documented earlier in the year by Fraser, MM0EFI on his excellent amateur radio YouTube channel:

https://www.youtube.com/watch?v=WWtaks9cQY4&t=871s

3 What do all the LoRa APRS symbols on websites like aprs.fi mean?

The four most common LoRa APRS symbols shown on sites like aprs.fi (or on the LoRa-only website of lora.ham-radio-op.net) are a full iGate (TX/RX), represented as a red diamond, a digipeater represented as a green star, a RX only iGate represented as a black diamond and a weather or telemetry station represented as blue circle. Because they are all LoRa devices, the "L" character is usually overlayed on top.

There are many other symbols used to represent LoRa APRS devices on aprs.fi (and other websites), but these are mainly for things that do not have fixed location such as humans, cars, trucks, vans or bicycles. Here are some you can choose:

To view the full list of APRS symbols available for your LoRa APRS tracker, please visit the following link

https://blog.thelifeofkenneth.com/2017/01/aprs-symbol-look-up-table.html

4 Get outdoors with your LoRa APRS tracker

So, if radio is your thing, but you also like getting out into the great outdoors, why not shut up the shack and take your LoRa APRS tracker out with you and see how far away it gets picked up. In fact, why not consider joining one of the many “On the Air” programs such a Summits on the Air (SOTA), Parks on the Air (POTA), and UK Bunkers on the Air (UKBOTA) – to name just few.

For more information on POTA or UKBOTA see the following links:

https://parksontheair.com/

https://bunkersontheair.org/

Probably the biggest “On the Air” programme is Summits on the Air (SOTA) which is an award scheme (started here in the UK) for licensed radio amateurs, that encourages portable operation in hilly and mountainous areas. SOTA has been carefully designed to make participation possible for all radio amateurs and short-wave Listeners – it is not just for the mountaineers amongst us! There are awards for activators (those who ascend to the summits) and chasers (those who either operate from home, a local hilltop or are even activators on other summits). SOTA is fully operational in nearly a hundred countries across the world. Each country has its own Association which defines the recognised SOTA summits within that Association. Each summit earns the activators and chasers a score which is related to the height of the summit. Certificates are available for various scores, leading to the prestigious "Mountain Goat" and "Shack Sloth" trophies. An Honour Roll for activators and chasers is maintained at the SOTA online database.

For more information on SOTA see the following link:

https://www.sota.org.uk

5 OK I like the sound of this, but what do I actually need to do?

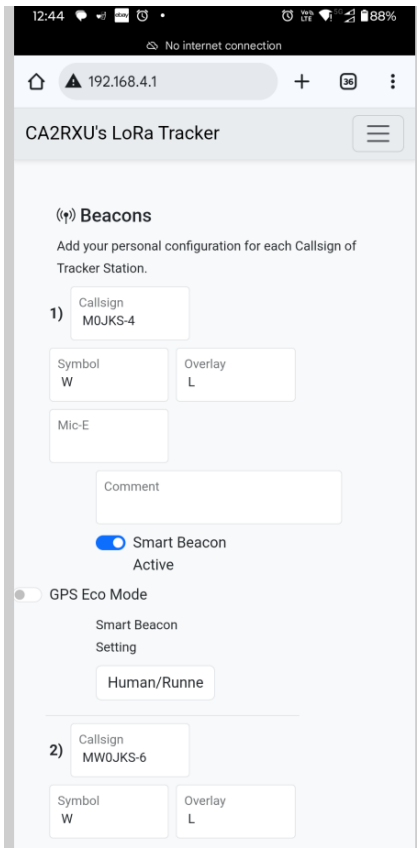
If you’re thinking, “OK I like the sound of this, but what do I actually need to do?”, the answer is very little – you’ve already done most of the hard work for the RSGB HAB competition. As described above, your Heltec Wireless Tracker board is on a special frequency (439.850MHz) which was only permitted for the duration of the RSGB HAB competition. The correct frequency for the UK is 439.9125MHz and there are two ways to change this. You can either choose the easy option and follow the instructions in section 16 of the RSGB HAB document (on how to force your LoRa APRS tracker into “Config WiFi-AP” mode,) and then follow section 15 to change the frequency and APRS Symbol. Alternatively, you can download, compile and install the official version of software from the GitHub repository of Richardo Guzman, CA2RXU, where the frequency for the EU, Poland and the UK are set.

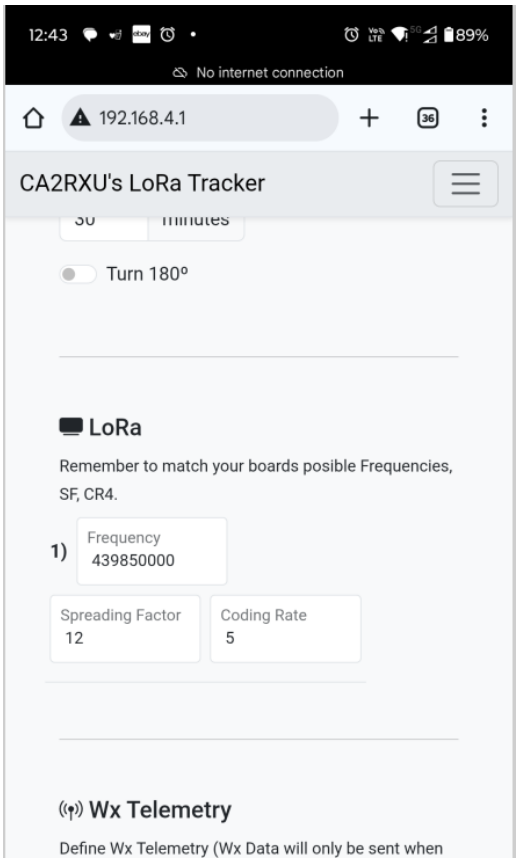
6 Updating your HAB tracker for UK frequencies, the simple way

If you opt to go for the easy option, follow the instructions in section 16 of the RSGB HAB document (on how to force your LoRa APRS tracker into “Config WiFi-AP” mode) and then follow section 15 so you can change the frequency and APRS symbol.

As shown in the screenshots overleaf, the first parameter you need to change is the “Symbol” and “Overlay” character for the three callsigns that you have programmed into your tracker. For the RSGB HAB competition the default tracker symbol was a Green Circle (“W” symbol) with an “L” overlay.

To change this for the human walking symbol, replace the “W” in the Symbol field with the square open bracket “[“ and the “L” in the Overlay field with a forward slash symbol “/”. You must do this for all three callsigns!





Next, to change the frequency from 439.850MHz to 439.9125MHz, scroll down to the section labelled “LoRa”, where you see “1) Frequency”, and change 43985000 to 439912500 (4399125 and two 0’s). Once you are happy with the configuration options you have changed, click on the three parallel bars at the top right-hand corner (next to “CA2RXU’s LoRa Tracker”) and you should be presented with a big green “Save” button.

When you click on the green “Save” button, this will save your changes to the internal flash memory and force the Heltec Wireless Tracker board to reboot. When it comes back up it should now use the human walking APRS symbol (which will be displayed on aprs.fi) and it will operate on the UK LoRa APRS frequency of 439.9125MHz.

7 Updating your HAB tracker for UK frequencies, the alternative way

As described in section 6 above, the alternative way to update your LoRa APRS tracker is to download and compile (as you already did successfully for the HAB competition) the official version of the LoRa APRS tracker software from the GitHub repository of Richardo Guzman, CA2RXU :

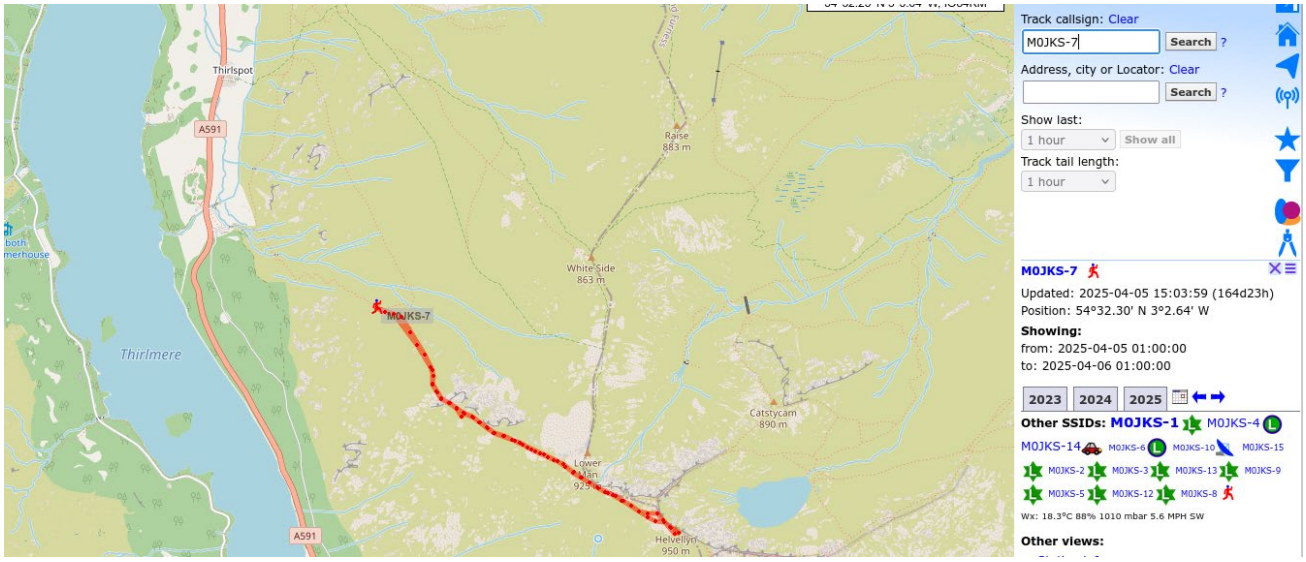
https://github.com/richonguzman/LoRa_APRS_Tracker

Once you have downloaded and extracted the zip file, follow sections 8 to 15 of the RSGB HAB competition document to compile, link and upload this version of software to your tracker. This way you will have a tracker which has the latest software from Richardo; and which will also have all the

correct frequencies used around the world programmed into it (e.g. 433.775MHz for the EU/Australia/US; 434.855MHz for Poland; and 439.9125MHz for the UK).

8 Using aprs.fi to track your APRS activity

Once you have updated your tracker, all you then need to do is get out of the shack and see what iGates and digipeaters pick you up. When you get back home, go to aprs.fi and then on the right-hand side in the "Track Callsign" box enter the callsign (and SSID) of your tracker. If you want aprs.fi to track a list of callsigns (and SSIDs), simply enter each separated by a comma. For example, to track recent activity by me and my good friend Martin, 2E0BIA, one would enter "M0JKS-7, 2E0BIA-7". If you wanted to track everything from a particular callsign (i.e. you don't care about the SSID), use the wildcard * character like so "M0JKS*". You can even select the date going back many years to see where you were on a particular day.



For example, on Saturday 5 May this year, my tracker (M0JKS-7) was tracked climbing Helvellyn (G/LD-003) in the Lake District while taking part in the SOTA Lake District activity weekend.

9 My tracker is not being picked up at home, what can I do?

One of the main complaints I hear from fellow UK radio amateurs after setting up a tracker on the UK frequency, is that their tracker is not getting picked up at home, or when they take the dog out for a walk. If it does get picked up, brilliant, that's because someone else has gone to the effort of building and installing an LoRa APRS iGate at their home QTH; and it's in range of your QTH. The LoRa APRS infrastructure is only the size it is today because others have encountered a black spot and then done something about it. If you find you are in LoRa APRS black spot, and you would like to build and install your own iGate, feel free to get in touch for help. My contact details are on qrz.com.

Best of luck everyone,

73 Dave, M0JKS