

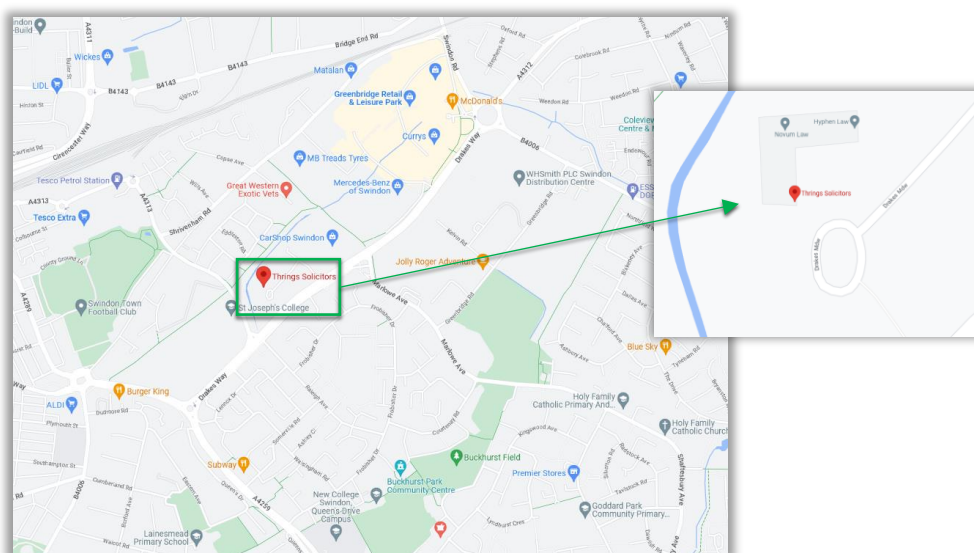
Ridgeway Repeater Group Newsletter - Second Quarter 2023

Messages/Notices

Ridgeway Repeater Group - Annual General Meeting 2023

The AGM of the Ridgeway Repeater Group will be held on Wednesday 10th May 2023 at Thrings Solicitors, 6 Drakes Meadow, Penny Lane, Swindon, Wiltshire SN3 3LL at 19.30. Please ensure you book in on entry to the meeting.

The AGM is also the time to renew your membership for 2023/24.



This Quarters Articles.

We have a plethora of reading material in this issue!

There are three articles this quarter:

- One that Richard/G4MUF sent in about the Hale-Bopp comet.
- One that Richard/G4MUF appended to the comet article, about an astronomy application called 'Stellarium' and
- The continuation of the SDR software reviews, done in collaboration with Robin/G8VVY.

Please don't forget; if you would like to submit your own articles, don't hesitate to send it to me for incorporation into a future newsletter.

Thanks kindly in advance.

Ken/G1NCG.

UPCOMING RALLIES

MENDIPS RALLY

11 June, 9:30 am (Traders 7.30am)
Admittance - £2.

Farrington Gurney Memorial Hall,
Church Lane, Farrington Gurney,
Somerset. BS39 6TY.

Tables in the Hall and Car Boot on
the field.

For bookings and enquiries please
contact Luke on 07870 168 197 or
email mendipsrally@hotmail.com

NEWBURY RADIO RALLY

26 June, 9am-3.30pm.
Admittance - £3.

Venue: Newbury Showground, Next
to Junction 13 of M4, Priors Court
Road Hermitage, Berkshire RG18
9QZ

Attractions: Car Boot Sale, Catering,
Special Interest Groups, Talk-In,
Trade Stands

Contact: Phill Morris, G6EES,
07771504738, rally@nadars.org.uk

WILTSHIRE RADIO RALLY, ELECTRONICS FAIR AND CAR BOOT

31-31 July, 9am-3pm
(Disabled: 8.30am)

Venue: Kington Langley Hall,
Kington Langley, CHIPPENHAM,
Wiltshire SN15 5NJ

Attractions: Car Boot Sale, Flea
Market, Trade Stands

Contact: Brian Tanner, G6HUI, 0,
rally@chippenhamradio.club

Articles

1. Comet Hale-Bopp – March 1997 by Richard/G4MUF

Comet Hale-Bopp was one of the brightest comets for many years and passed close to Earth in March 1997. Hale-Bopp, not to be confused with the regular Halley's Comet, was sketched by myself as shown on the following page, using a 3-inch refractor telescope with a ½ inch eyepiece giving 72 X magnification.

As is normal with astronomy telescopes, the image is upside down, as actually seen in the telescope. Furthermore, this image is a 'negative' or reversed image of the original pencil-on-white paper sketch. The white speckles are not stars: they are merely dust that had collected on the original drawing.

As the comet approached the sun, the heat caused the solid ices, (not only water-ice), on its sunward-facing side to sublime or boil off, as gas and dust, and spray outwards. The ice in the core is mixed with dust and/or sand particles which are ejected due to outwards expansion, during the sublimation.

The interesting features are as follows.

1. The Coma, being the bright area with embedded radiating 'spokes' of gas and dust spurting out from only the sunlit side of the comet.
2. The 3 'bow-waves', also only above the sunlit side.
3. The small bright centre, or head, which is not the actual solid comet itself but is the much brighter region near the core where the ejected material is denser and brighter.
4. The wide tail. The tail always points away from the sun whatever direction a comet is moving in, due to the solar wind pushing the tail away from the sun. The solar wind comprising ionised particles collides with the dust/gas squirting out of the comet under solar heating, and deflects/draws it away to form the tail. The hollow tail effect is presumably a consequence of less ejection from the cold, down-sun, side of the solid comet. The bow-waves may correspond to the radius from the core at which the ejection force is balanced by the solar wind force.

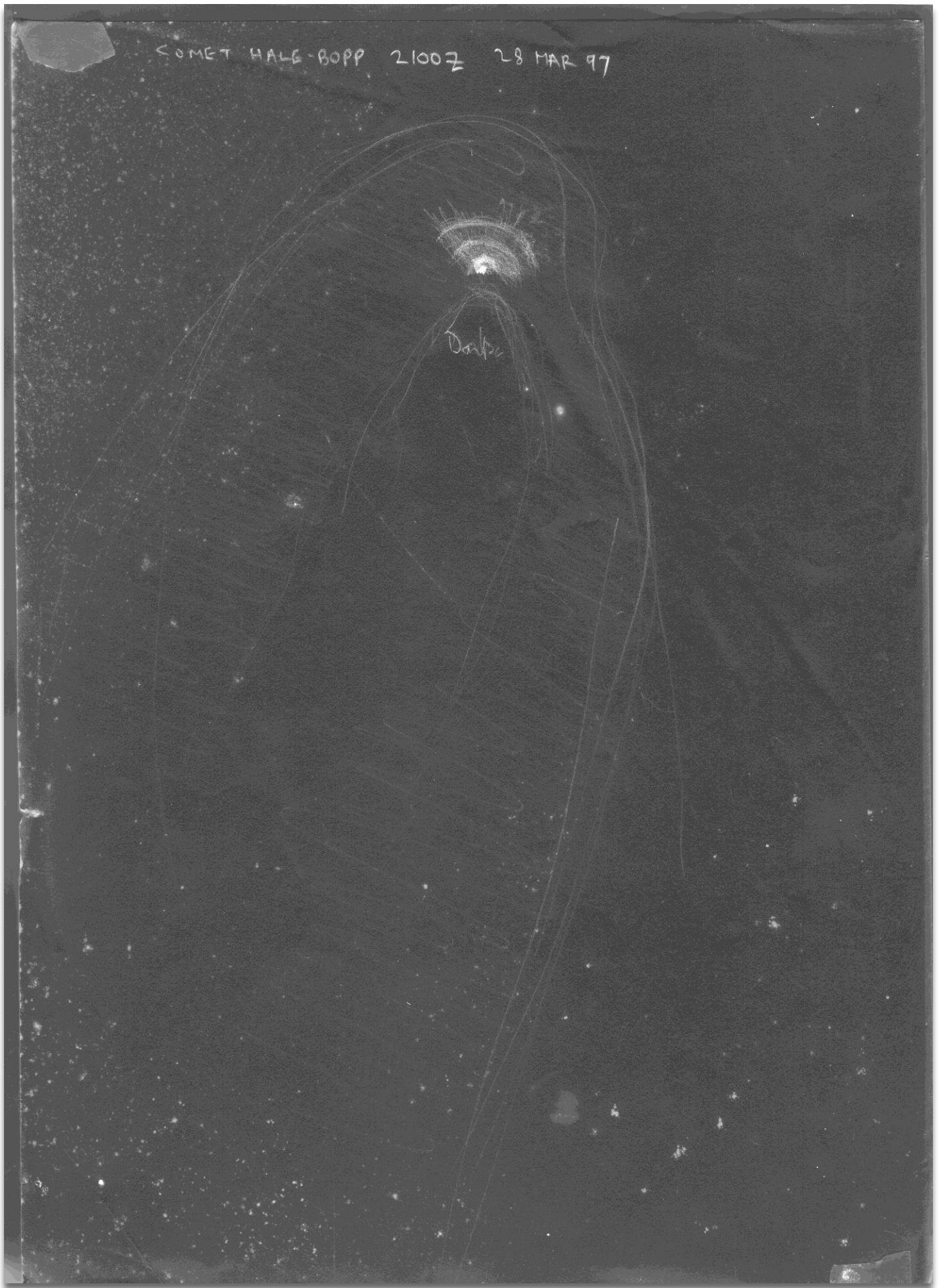
My sketch differs from most of the many photographs of Hale-Bopp found on the internet. Those photos are exposed to show the faint blue gas tail and brighter dust tail of Hale-Bopp. Therefore any detail of the head and coma is washed out. This photo, was taken in April, 1997, using the Astronomical Society of Harrisburg's 17" f/15 classical Cassegrain and a Pentax K1000 SLR camera and shows similar details as my Mk 1 eyeball and humble telescope!



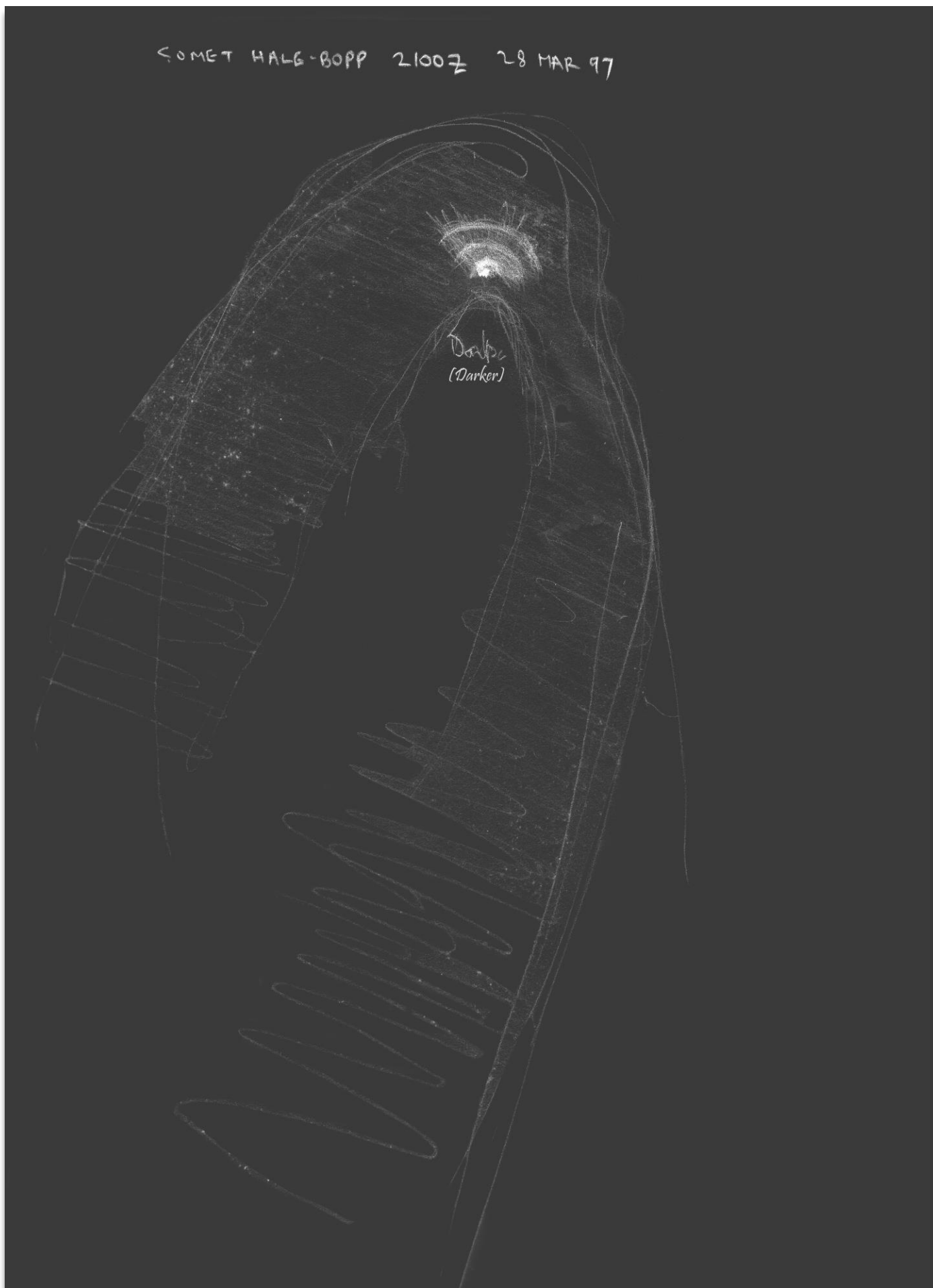
(Editor's note): The copy for this article was shared with Robin/G8VVY and he has made some additional online investigation, and a 're-work' of Richard's sketch to, hopefully, give some added value to the article. The original and amended images follow. They've been given a full page each to best show the detail.

COMET HALLE-BOPP 2100Z 28 MAR 97

Darks



(Ed.): Here is the sketch after cleaning to both remove a lot of the dust damage and to highlight the comet and coma.



The 3 'bow-waves' might be in fact be 3 whorls of a spiral caused by the comet's core rotating. If this is correct; it appears that there is one particular vigorous vent spewing out the jet of material which, like a spinning Catharine wheel, becomes a spiral. Alternatively they are indeed 3 bow-waves perhaps composed of 3 types of gas reacting differently to the Solar Wind.

Hale-Bopp was an occasional comet which got disturbed out of the Oort Cloud, (way beyond Pluto's orbit), and fell towards the sun, and later sent off back into deep space after its swing round the sun never to be identified as the same comet in the future.

Periodic comets like Halley's got captured into the solar system's vicinity due to planetary gravity diverting them out of their initial incoming orbit.

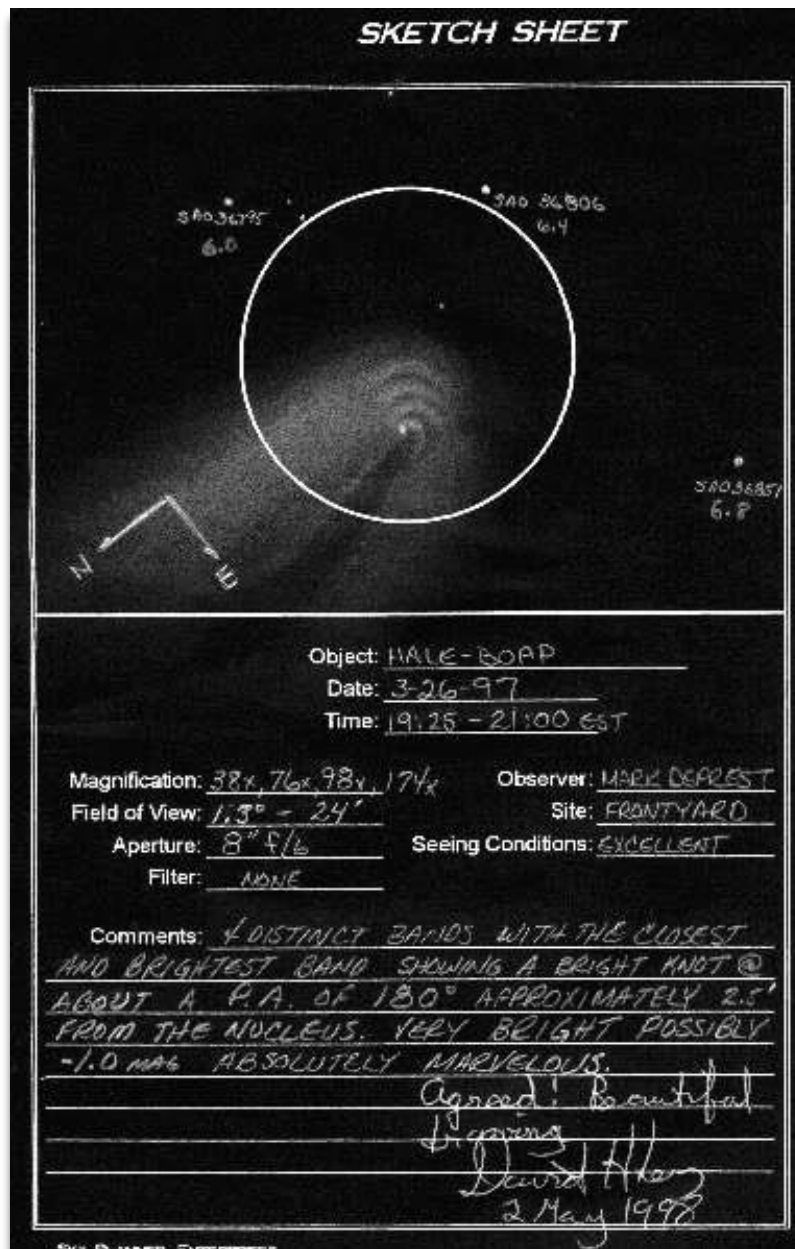
Richard Gosnell/G4MUF - February 2023

(Editor's notes): In investigating details of the comet sighting online, Robin/G8VVY came across a remarkably similar hand drawn sketch by a member of a university astronomy team – Mark Deprest, of the Lowbrow Astronomers - at Michigan State University and using a Meade Starfinder telescope.

The following link will take you to the website:

<https://websites.umich.edu/~lowbrows/astrophotos/halebopp/halebopp1.html>

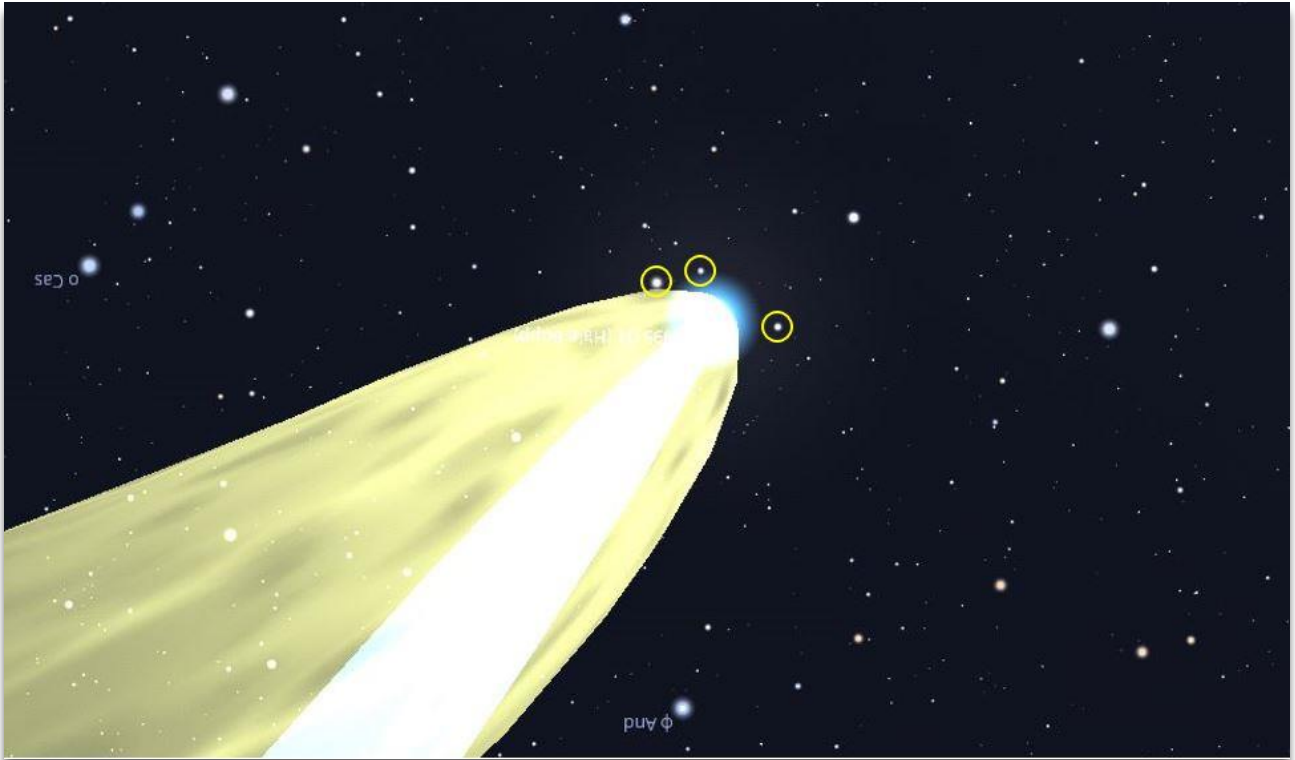
And here is the image, in negative, being referred to:



One final addition, to bring the concept into the 21st Century; an open source multi-platform programme called Stellarium will create an artificial 3D sky view from any source location on the planet.

You have the option then of configuring a past time to see the heavens as they would have appeared on that date and time.

There follows a Stellarium image of Hale-Bopp as it would have appeared in Michigan at the time that Mark Deprest made his drawing:



You can see just how accurate his sketch is, with the 3 stars referred to highlighted in the Stellarium image above.

2. The 'Stellarium' astronomy programme - by Richard/G4MUF

Your editors at RRG Newsletter noted I had referred to 'Stellarium' in the Hale-Bopp article and asked if I could summarise use of this very useful, free, star-finding programme.

First, a summary of star charts in general. Before computers, the 'Bible' for amateur stargazers was NORTON'S STAR ATLAS and Telescopic Handbook, originally by Arthur P. Norton, B.A. and J. Gall Inglis, F.R.A.S. It first came out in 1910 and has reached a 20th edition by 2023. It is just over A4 size (possibly foolscap or other pre A-scale paper sizes). The whole sky, N and S hemispheres, is displayed in 16 strips showing stars down to 6th magnitude, i.e. just visible to the unaided eye. Only the brighter stars have names appended. Apart from the charts, there is a lot of text on all matters of observing, telescopes etc.

Each strip of chart is accompanied by a description of interesting objects mapped therein. I have two editions myself, and, as is always a plus with a paper copy, I like to see my pencil marks showing comets etc. from times past.

The 'Skyglobe' computer star-chart programme came out in 1989 to run on MS DOS computers. Later, Windows versions came out, for instance 'SK4WIN'. 'Skyglobe' is still available. I stopped using it when 'Stellarium' came out so have no experience of recent versions of it.

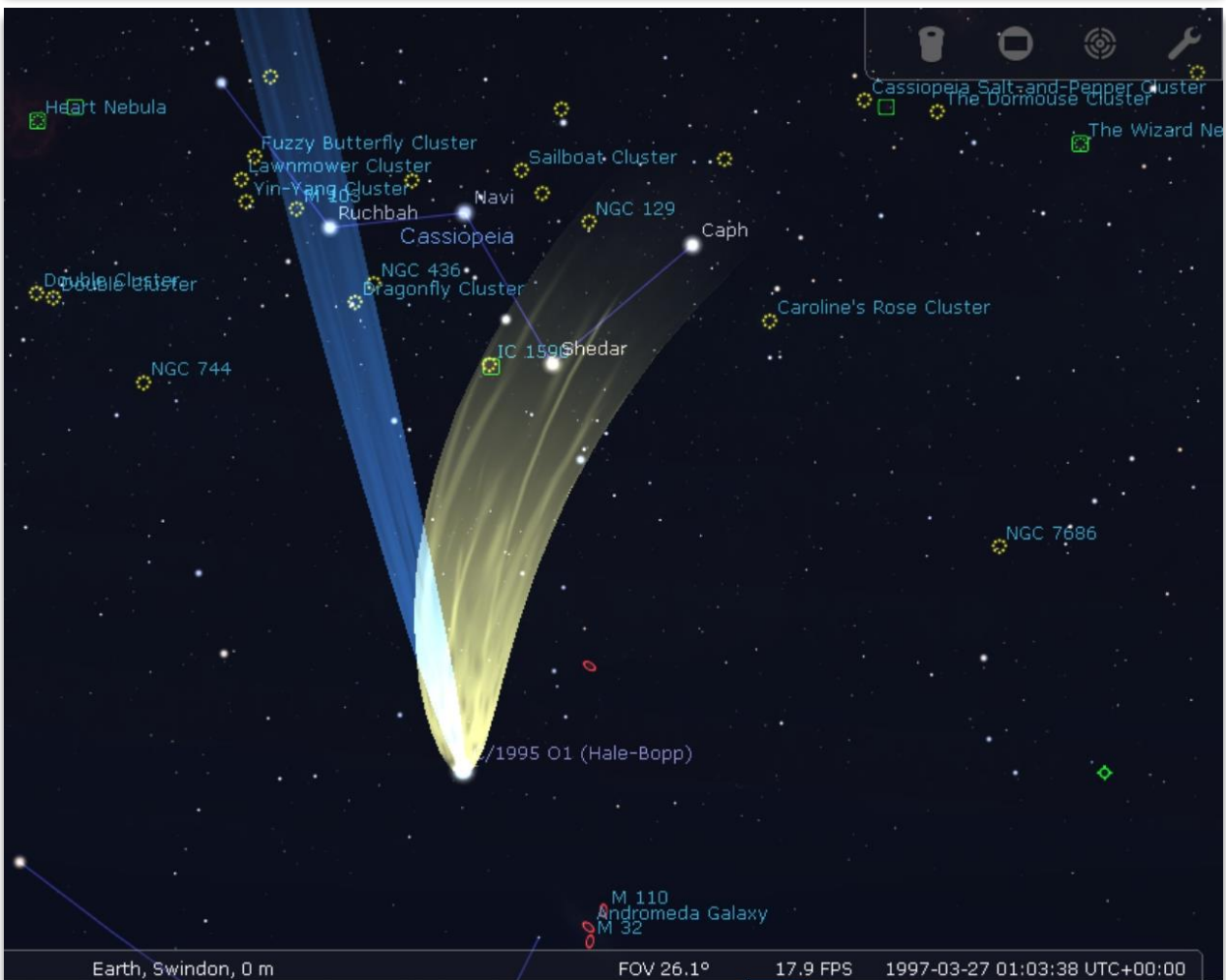
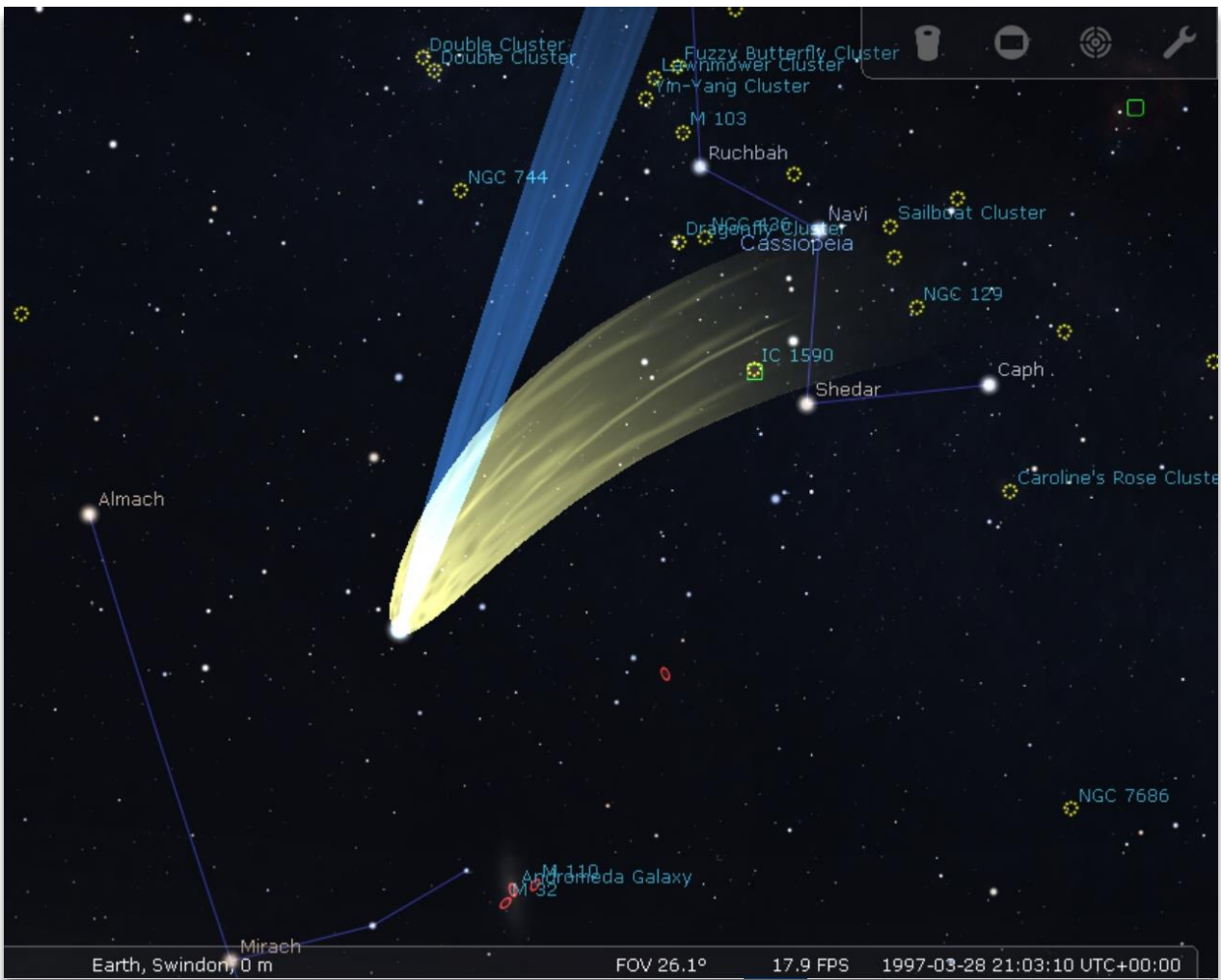
'Stellarium' came out around 2006 and has many improvements on 'Skyglobe'. For one, 'Skyglobe', (referring to early versions), only showed the position of a celestial body as a dot whose size represented the brightness of the body. With 'Stellarium', if you zoom in on a planet or comet etc. you eventually see details of the object's shape, such as Saturn's rings, a comet's tail or Jupiter's atmospheric bands. This graphic portrayal of the object isn't intended to change hourly or daily to keep up with the body's rotation etc., (as far as I know!). An object's changing brightness will be updated as it moves nearer or further from the sun and Earth. You click on the object to get a box giving all the data about that object.

If a new asteroid or comet is discovered, the orbital data and the object's shape soon get published online in a 'Stellarium'-acceptable format for importing, where after that body will be displayed on your 'Stellarium' chart. Googling on the name of a new body plus "in Stellarium" for instance, will show videos or text giving steps to do the acquisition and instalment. The orbit of a planet, asteroid or comet is defined in 3 dimensions by Keplerian parameters, or 'Keplers', plus a 4th dimension, time, so as to show where the body is at a given time. Comets' orbits tend to be approximately parabolic, but some (captured by the solar system), are ellipses or others slightly hyperbolic.

When 'Stellarium' is first installed, you need to enter the latitude/longitude of where the sky is to be observed from. Once done, 'Stellarium' keeps that as default when fired up. It defaults to the current date/time when fired up, but a menu allows selecting any date/time as Robin and I did to display the positions of Comet Hale-Bopp.

The ground and horizon are shown by default, blocking out sky below, and sky illumination is shown as bright if it is daytime. Both can be switched off to show stars below your horizon and as if the sky was dark. You need to select 'deep sky objects' to show galaxies and nebulae. It also helps to select 'Constellation outlines' and 'Constellation names'.

Here are the 'Stellarium' screen shots for the Hale-Bopp comet as seen when I made my sketch in Wotton Bassett, and by the Lowbrow, Michigan University astronomers on the previous day:



Richard Gosnell/G4MUF - April 2023

Following on from the previous quarter's newsletter; I now include reviews of both **SDR Console** and **SDR#** - Ken/G1NCG

Software Defined Radio - SDR

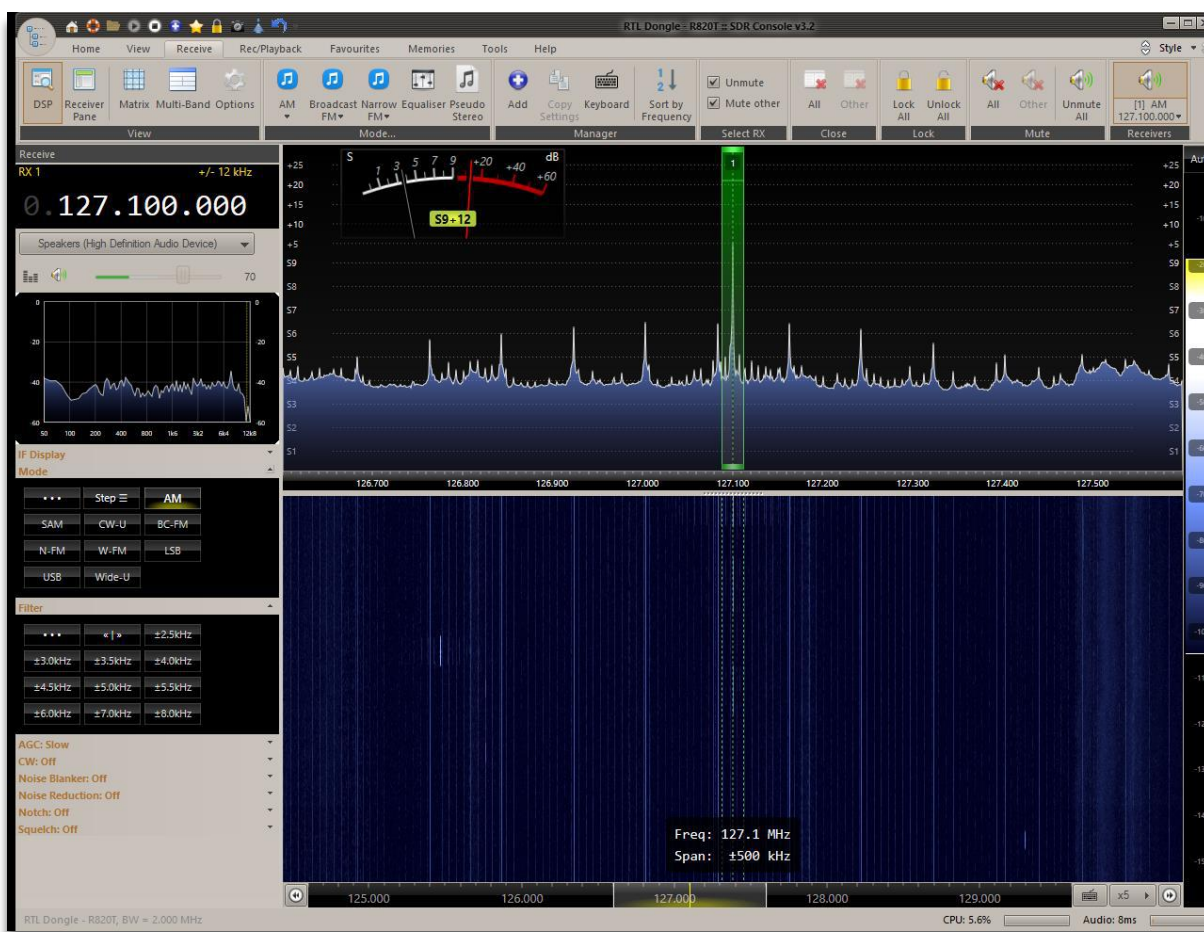
Review of SDR Console - used with a low cost RTL2832U dongle

SDR Console is Simon Brown/G4ELI's, (of Ham Radio Deluxe fame), excellent multi VFO SDR application, which can be downloaded from:

<https://ww.sdr-radio.com/radios>

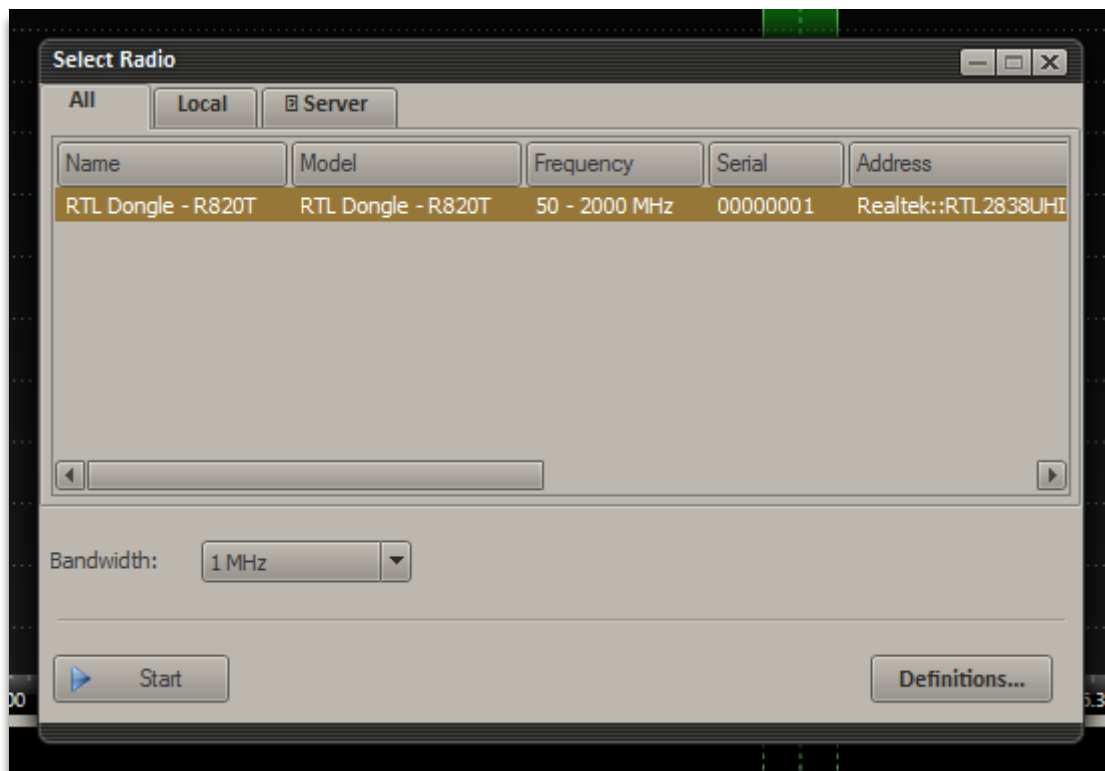
Both 32 and 64 bit versions are available and a choice of download sources, which include OneDrive and Dropbox.

As can be seen from the screenshot below, the screen layout is somewhat similar to some versions of MS Office with a 'button' bar in addition to the typical menu options.



There are a myriad of settings and options available in this package - I'll leave the bulk of them for you to discover from the ample information supplied by Simon Brown - but I will detail some of the features I found particularly useful and why I would recommend you to try this software.

Make sure you have your RTL-SDR dongle plugged in prior to starting the software for the first time and it will pop-up the following window:



Interestingly, it found my dongle automatically; the normal procedure is to click the 'Definitions' button and choose a device from the list. I'm guessing that, as I had already used Zadig to install the dongle driver to WinUSB, it found the details and populated the 'Select Radio' window accordingly.

You can also choose the bandwidth at this point, or from the 'Radio' section buttons at the top of the screen once the application is up and running. Current generation RTL-SDR dongles can run up to 3.2 MHz; I set my earlier generation to 2 MHz. A general rule of thumb is that if the sound breaks up, you are running the sampling rate too high. The sample rate has to be at least twice as high as the highest frequency being generated in the received signal.

I found, overall, SDR Console to be somewhat more intuitive than HSDR.

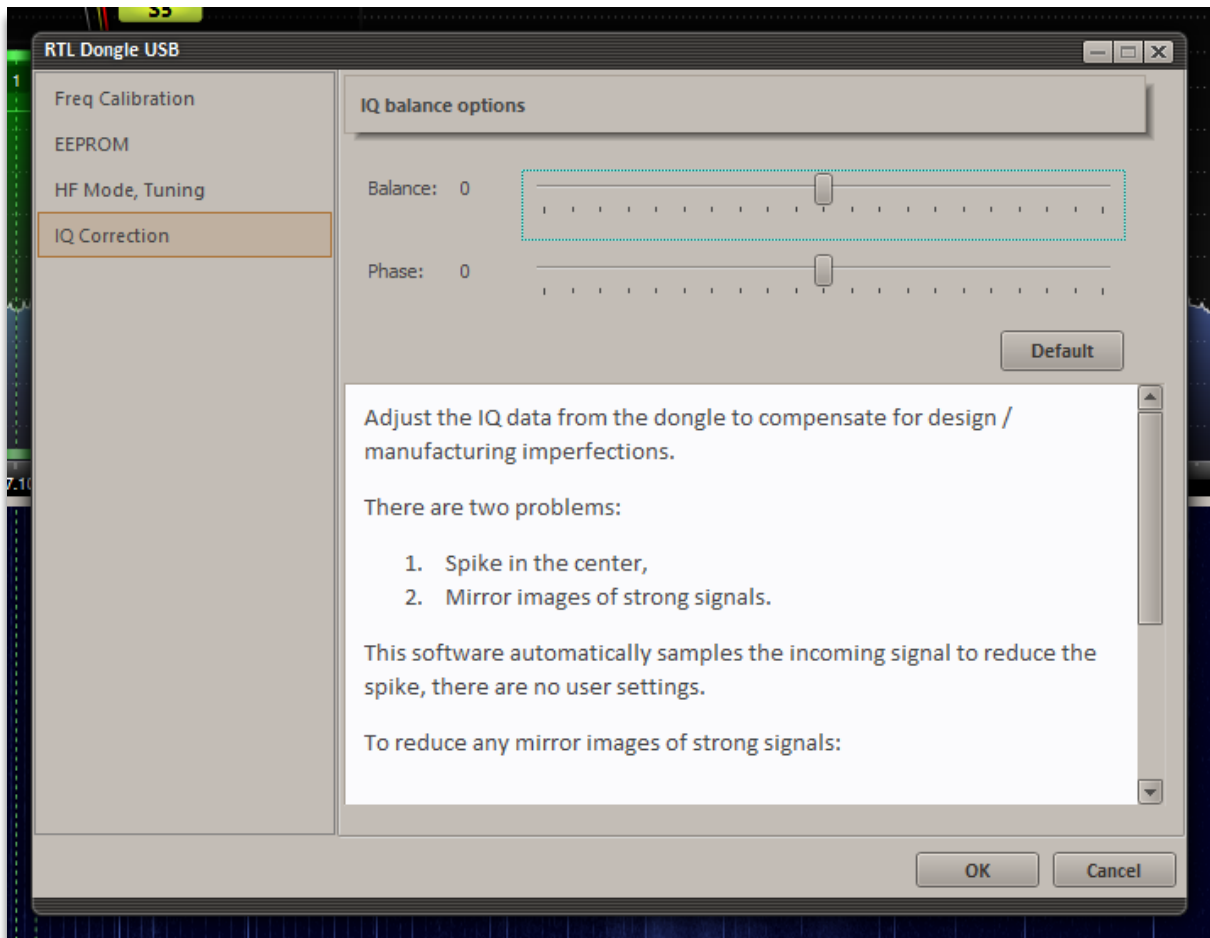
The emphasis put on the spectrum view, and making it an equal feature with the waterfall, I believe makes for a more informative display than that of HSDR.

Also; keeping the audio waterfall switched off by default, but showing the audio spectrum display to the left of the screen instead of encroaching upon the RF 'real estate', I found useful.

A common problem that can occur with direct conversion receivers, like the RTL-SDR, is that of DC offset or DC spike. With HSDR you have the option of moving the LO and Tune frequencies away from each other so that any oscillator 'leakage' isn't potentially swamping the signal being listened to.

There is no equivalent control in SDR Console; but it is possible to put in an IQ offset to move the DC spike away from the centre of the display.

With the receiver running and in 'Home' view, click the 'Radio Configuration' button and then the 'IQ Correction' option – as per the screenshot below:

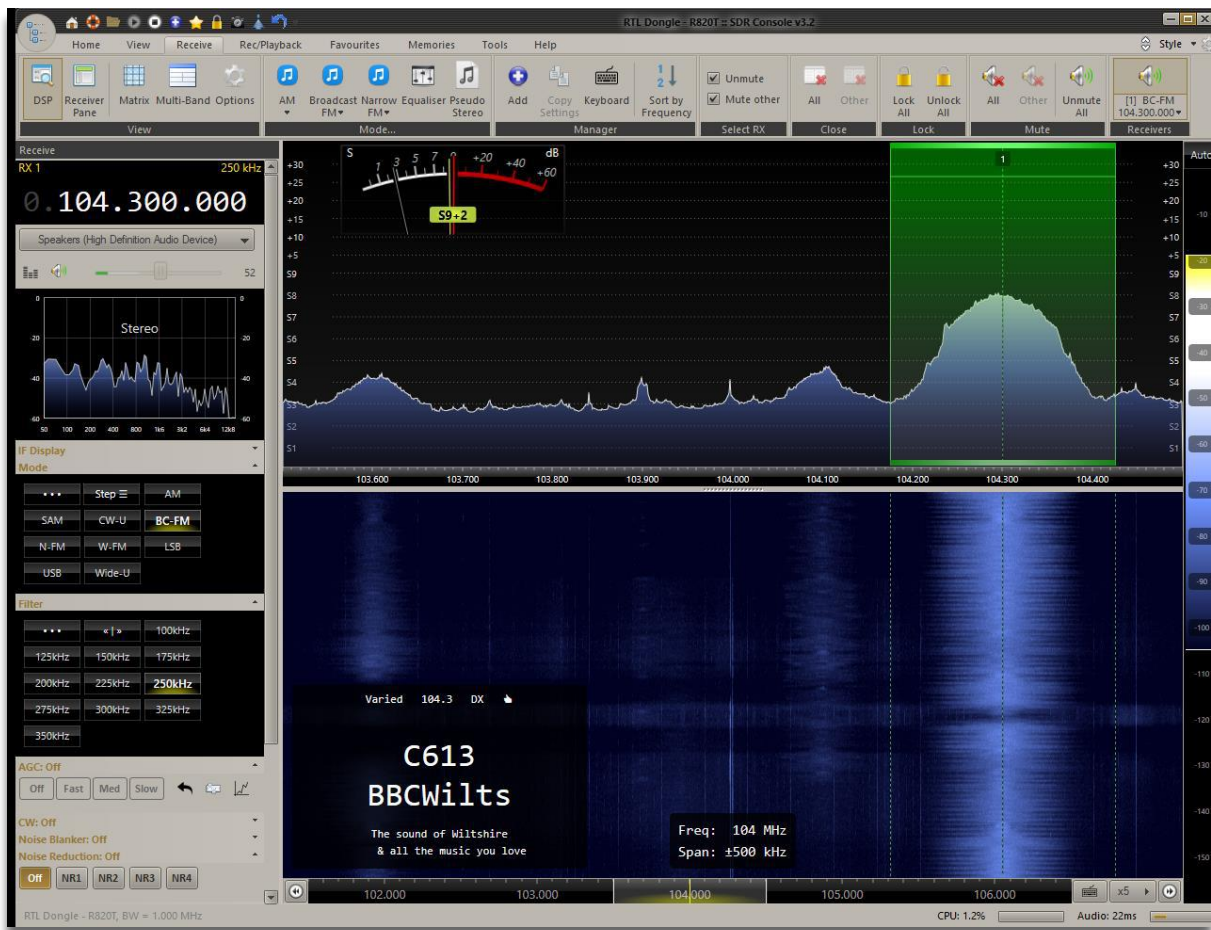


Other useful features I came across were:

- As in HSDR; being able to 'dial' up a frequency directly by using the mouse wheel over the relevant decade in the frequency readout
- Directly pointing to either a signal seen in the spectrum, or waterfall, display; seeing the exact frequency alongside the pointer and clicking to reset to that frequency
- Grabbing either to left or right of the green bandwidth bar in the spectrum display to directly change the bandwidth. The change is echoed – in yellow text - above and to the right of the frequency digital readout
- Instant centring of the current receive frequency by hovering in the RF spectrum and then clicking the ► | ◀ button – see below:



- I found the S-meter very informative with noise floor, actual and peak signal readings showing constantly. I did miss the squelch setting, directly on the meter scale, that is offered with HDSDR
- One surprise was, when tuning broadcast FM stations, to find that RDS decoding is built in to the native application. It also has the option to show the PI code of the station for full confirmation.



As mentioned earlier, there are a myriad of functions and options available in SDR Console and each user will find their own favourites and way of achieving what they wish.

I think this application makes the perfect companion with a low end SDR device – like the RTL2832U chipped dongles.

As an example; the latest Nooelec, (USA/Canada manufactured), SMART v5 dongle has a 0.5ppm TXCO and covers 100 KHz to 1.75 GHz and costs approx. £36! - (January 2023).

Review of SDR# - used with a low cost RTL2832U dongle

This review is set-out as per previous ones in that it is not meant to reiterate full application setting up and function, which is already in great detail and readily available on the web; but to give an opinion as to its suitability when used with a low cost SDR dongle.

SDR# doesn't install as a conventional Windows application, in that it doesn't populate either the 'Program Files' or 'Program Files (x86)' folders. It is supplied as a 'Zipped' archive file and can be 'dropped' and unpacked to a convenient folder.

It is run from the executable – SDRSharp.exe – and a suitable shortcut placed on the Desktop if needed.

SDR# is recommended by RTL-SDR.com website and they have an excellent guide on how to install it specifically to work with the RTL type dongles.

Download the guide from:

[RTL-SDR Quick Start Guide](#)

A batch (.bat) file is supplied as part of the ZIP package – install-rtlsdr.bat – and running this file will download the necessary driver file, and a copy of Zadig; the generic USB driver installer application for SDR type dongles.

It creates a temporary download directory and then unpacks the .dll driver file to the SDR# folder, runs Zadig to install the USB driver and then tidies the temporary stuff away!

I did notice that the file version being used dates from 2018! If you wished to use the latest Zadig version, (at time of writing), you would need to replace – by editing in Notepad - the following line:

```
set zadig_url=b721/zadig-2.4.exe
```

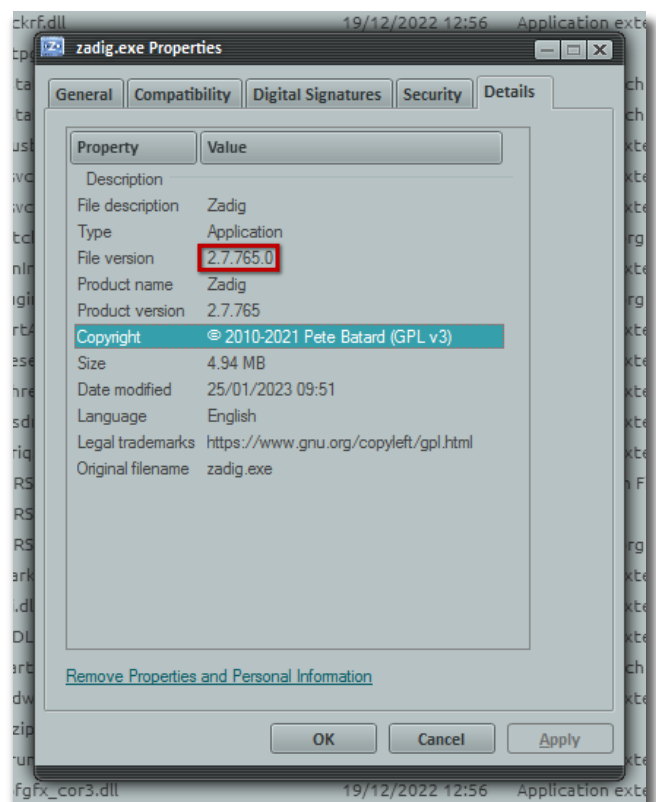
with

```
set zadig_url=v1.4.1/zadig-2.7.exe
```

Checking the properties of the downloaded file confirms that it is the 2.7 version - see right:

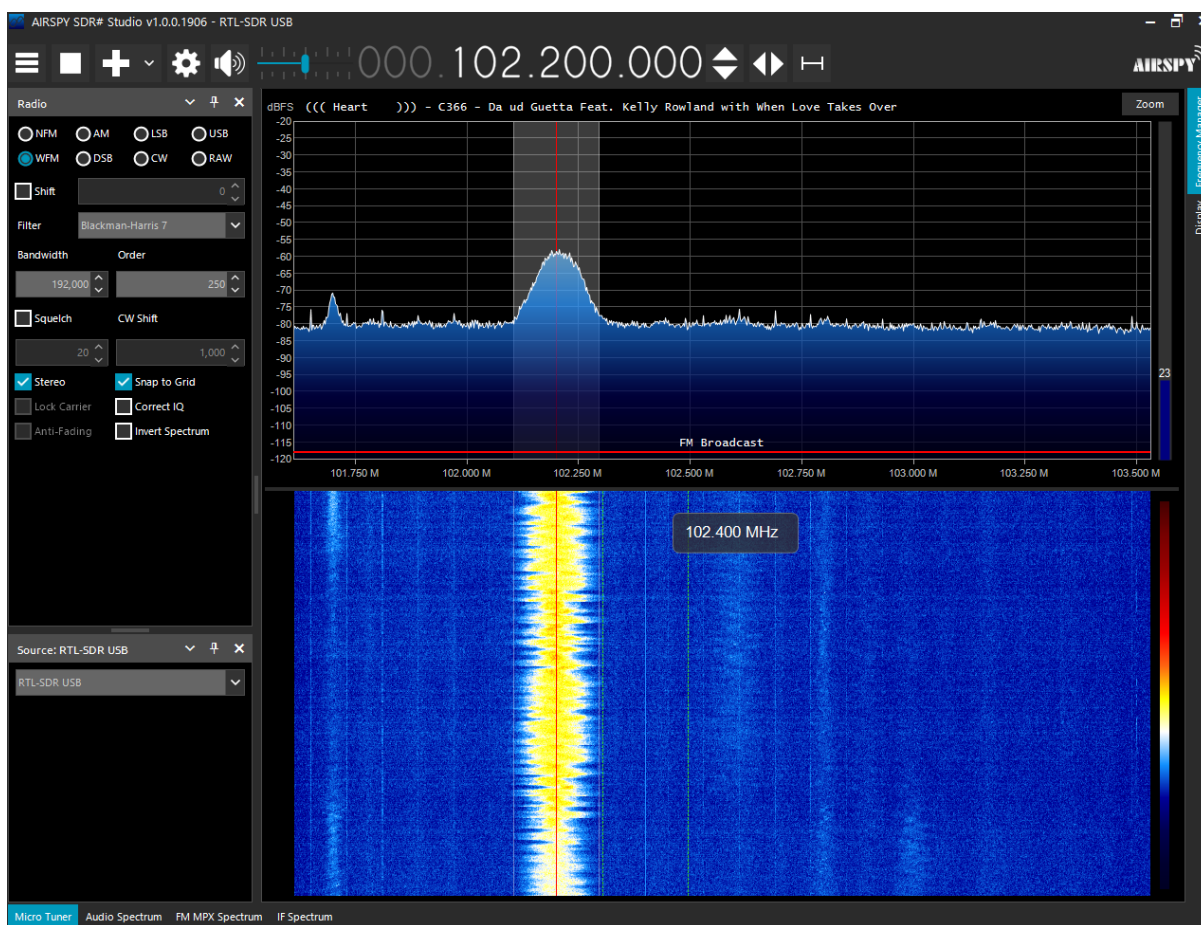
I have to admit I did not go through the whole instruction before starting to play with SDR# and fortunately came across probably the most important setting early on.

By default, the gain setting is set to ZERO!



I'll show a screenshot of the RTL-SDR Controller window further down this review, but clearly it is important to make this adjustment, before you try anything else, unless you are happy to listen to a quiet hiss! 🗣️

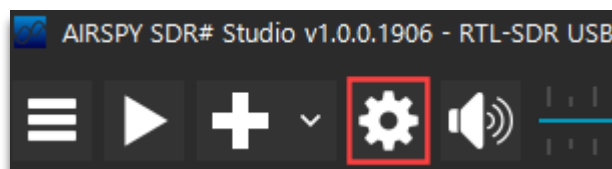
Before continuing, let me put up a screenshot of the SDR# window:



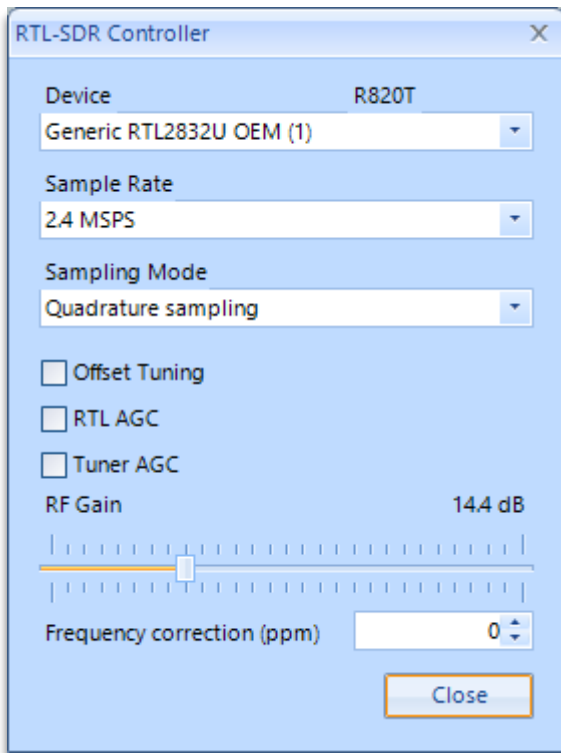
The first thing I was struck by was just how bold a layout is used for the application. I found that to be a plus point, as I would imagine possibly anyone who requires ocular assistance and is no longer in their youth may do too! 🗣️

Before delving into the workings of SDR#, it is necessary to configure the basic parameters of the dongle.

This can be done from the 'cog wheel' to the top left of the layout.



Clicking the cog brings up this settings box:



Running the sample rate too high may cause dropouts in the signal. A lot will depend on what type of signals you are listening too.

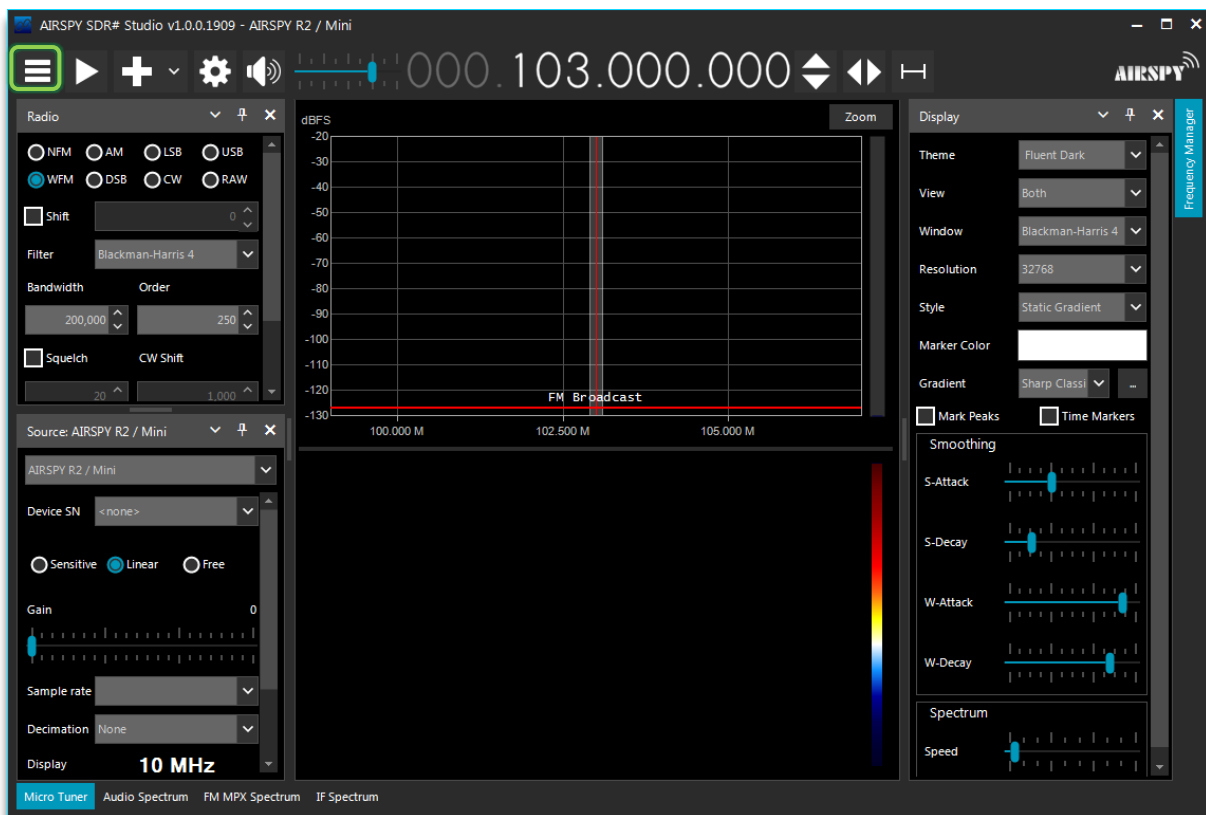
The signals I have used for testing have been FM broadcast stations, and so will be placing the most 'strain' on the dongle and software.

Through experimentation, I found that the shown settings of 2.4 MSPS and 14.4dB gain were optimum; but each individual will have ideally to check for themselves.


These figures will, I hope, at least get you going.


As mentioned, the RTL-SDR guides are excellent and will aid you in all the capabilities of SDR#.

The triple bar  button is where all of the application controls are started and where you can access all of the settings panels:



Some of the programme operations that I thought made this application particularly user friendly are:

- The  button to quickly choose frequency step size.

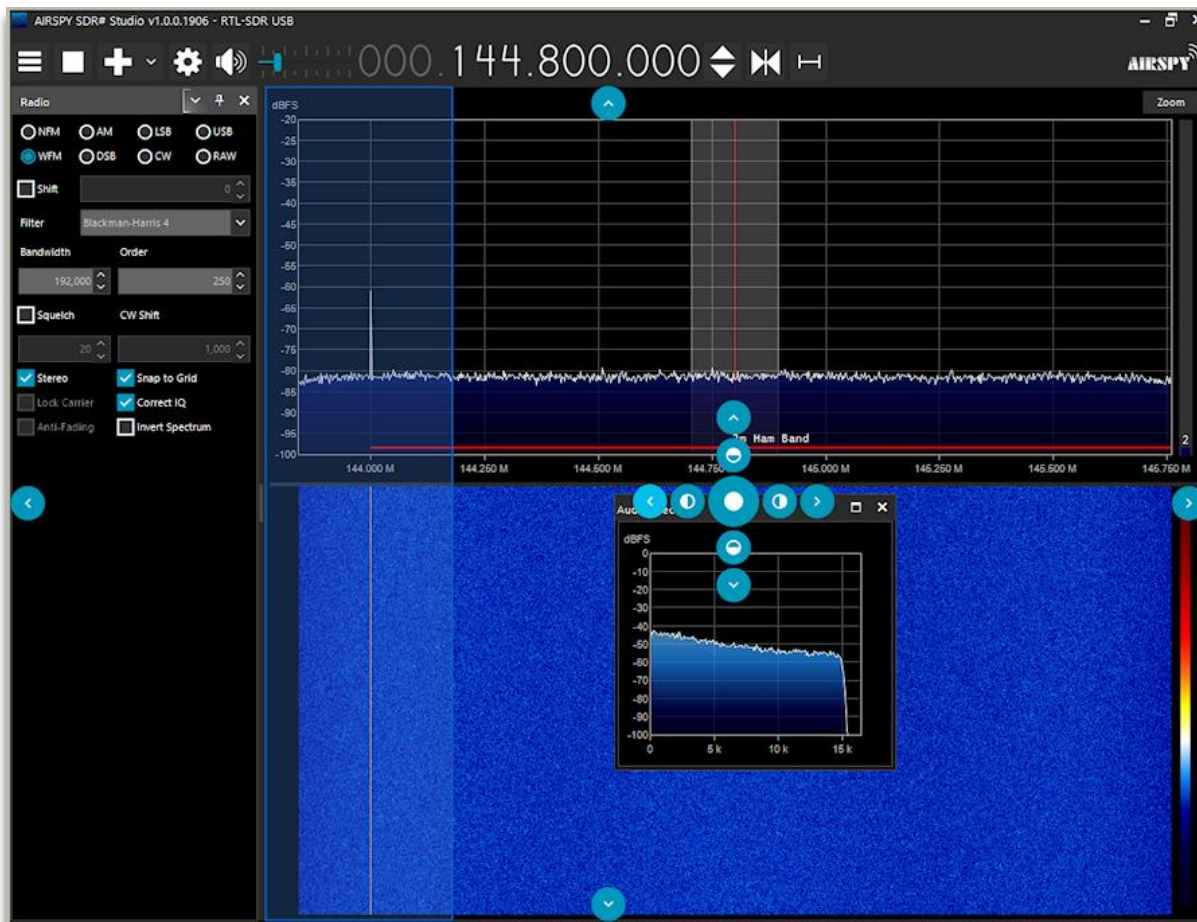
- The  button; with 3 different options:
 - ⦿ Free tuning – to allow mouse clicking anywhere within the displayed frequency range
 - ⦿ 'Sticky' tuning – to 'stick' the frequency to the VFO and allow the frequency scale to be slid left or right to observe adjacent activity and
 - ⦿ Centre tuning – the VFO frequency stays locked at the centre of the spectrum and waterfall

I found all these options useful when using different modes; sticky tuning especially when listening to air band activity.

- Checkboxes for both:
 - ⦿ Snapping cursor to a grid for the chosen frequency step
 - ⦿ Blanking out the IQ DC spike
- Ability to have, if you have the 'real estate', around 18 docked or floating information windows of your choice.
- Zoom, Contrast, Range and offset for the FFT display on a single button controlled window.
- As in SDR Console; full RDS decoding – including PI code - is built in to the native application.
- A very much streamlined IQ recorder with scheduling.
- Also, the virtually endless window arrangements options where you can dock or float windows entirely the way you would wish.

The following screenshot shows the huge number of options available for – in this case the audio spectrum window – docking.

The pictographs are very informative, as can be seen:



I was really pleased with the ease of use and general display of SDR#.

I think the standard 'dark' interface works well. Everything is clear and easy to read and you can bring additional windows onto the screen, if you wish, and place them exactly where they work best for you.

It is very easy to set up and I found, albeit with some previous experience of similar applications, that I quickly found all the basic things I was looking for.