Adding an External Frequency Reference Input to the RFspace SDR-14

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1 April 2020

My favorite microwave receiver is the AOR AR5000. I have it locked to either my 10 MHz rubidium or GPS references. The 10.7 MHz IF output goes to an RFspace SDR-14 which I display using SpectraVue.

The SDR-14 does not come with a provision for feeding an external reference, but I know I had seen something about this a long time ago. I Googled it, and found out that Dave Powis, G4HUP, the originator of the mod had become SK. His web page is no longer active, but found it using WayBackMachine. Here is his original post:

> "**G4HUP Reference Locking the SDR-IQ and SDR-14 receivers**
>
> Thanks to the interest and efforts of Wolfgang, DJ3QD, there is now a DFS solution for locking your SDR-I4 to a 10MHz reference. The SDR uses an internal 66.667MHz clock for the ADC - this can be synthesised using a DFS - see the Iss 2 Filters and Version pages for details.
>
> Click here for an article explaining the principles and the modifications required. (N2QG: I couldn't find a copy of this article)
>
> Complete kits are available for the 66.667MHz DFS version, including the crystals for the final filter - see SDRDFS. Kits and information are also available for the squarer needed for correctly driving the SDR-IQ - see here.
>
> The connection of the signal into the SDR-IQ and SDR-14 are relatively easy - but please note that it is not a 'no intervention' solution! You must go inside and make some small changes, as detailed below, and once you have done this the SDR will require an external 66.667MHz input to operate.
>
> See also the implementation by K9IQY
>
> Modifying the RFSpace SDR products for External LO input
>
> These instructions are courtesy of RFSpace, manufacturers of the SDR-IQ and SDR-14:
>
> SDR-14
>
> 1. Solder a cable on location W2. This cable is where the 66 MHz signal comes in.
>
> 2. Short pin 1 of the G1 oscillator to ground. The pin is marked with a circle on the part and a triangle on the board. (This disables the oscillator) You can also remove the oscillator if you like.

3. The required level is about 1.5 to 3.3 volts. You should be able to drive a sinewave or squarewave into it. The clock is clamped to about 0.4 volts with diode D3. Any signal above that should work fine. There is also a 1:4 transformer that will increase the voltage so it does not need a lot of signal into it.

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I successfully modified my SDR-14 and am feeding it 66.666,666 MHz from a Leo Bodnar Mini Precision GPS Reference Clock. I’m documenting the mod with picture in case anyone else needs instructions.

Figure 1 – Inside of the RFspace SDR-14. The internal clock generator is in the upper left corner of the PCB.

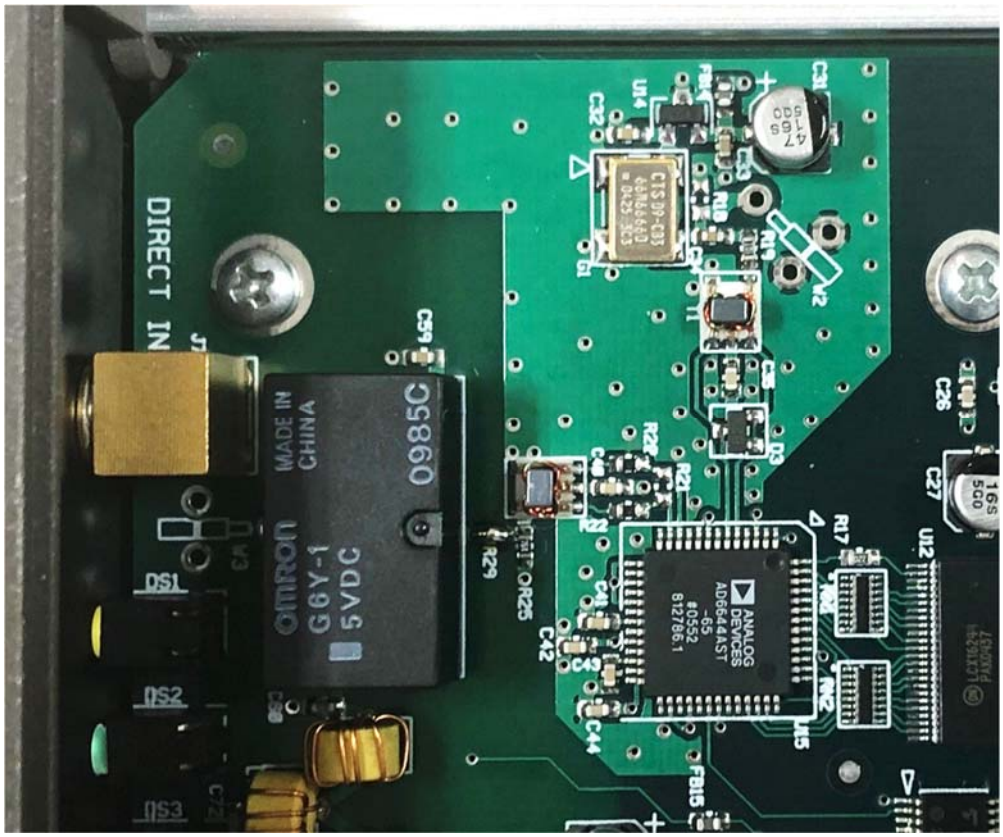

Figure 2 – Clock generator section showing G1 – the internal 66.666 MHz oscillator and W2 where the external source will be injected

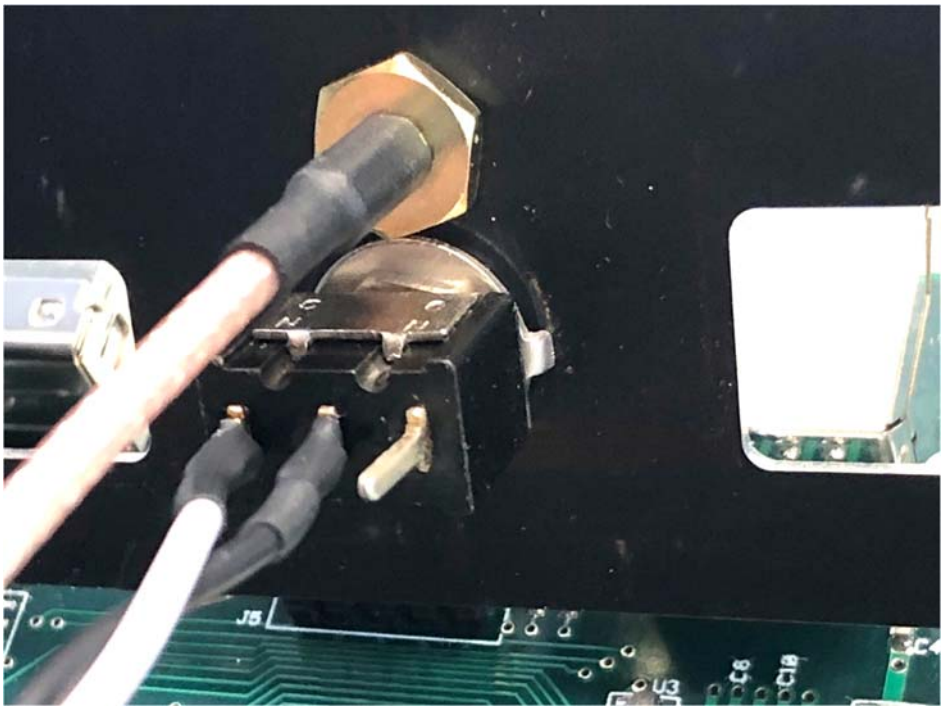

Figure 3 – A switch and a SMA pigtail need to be added to the back panel

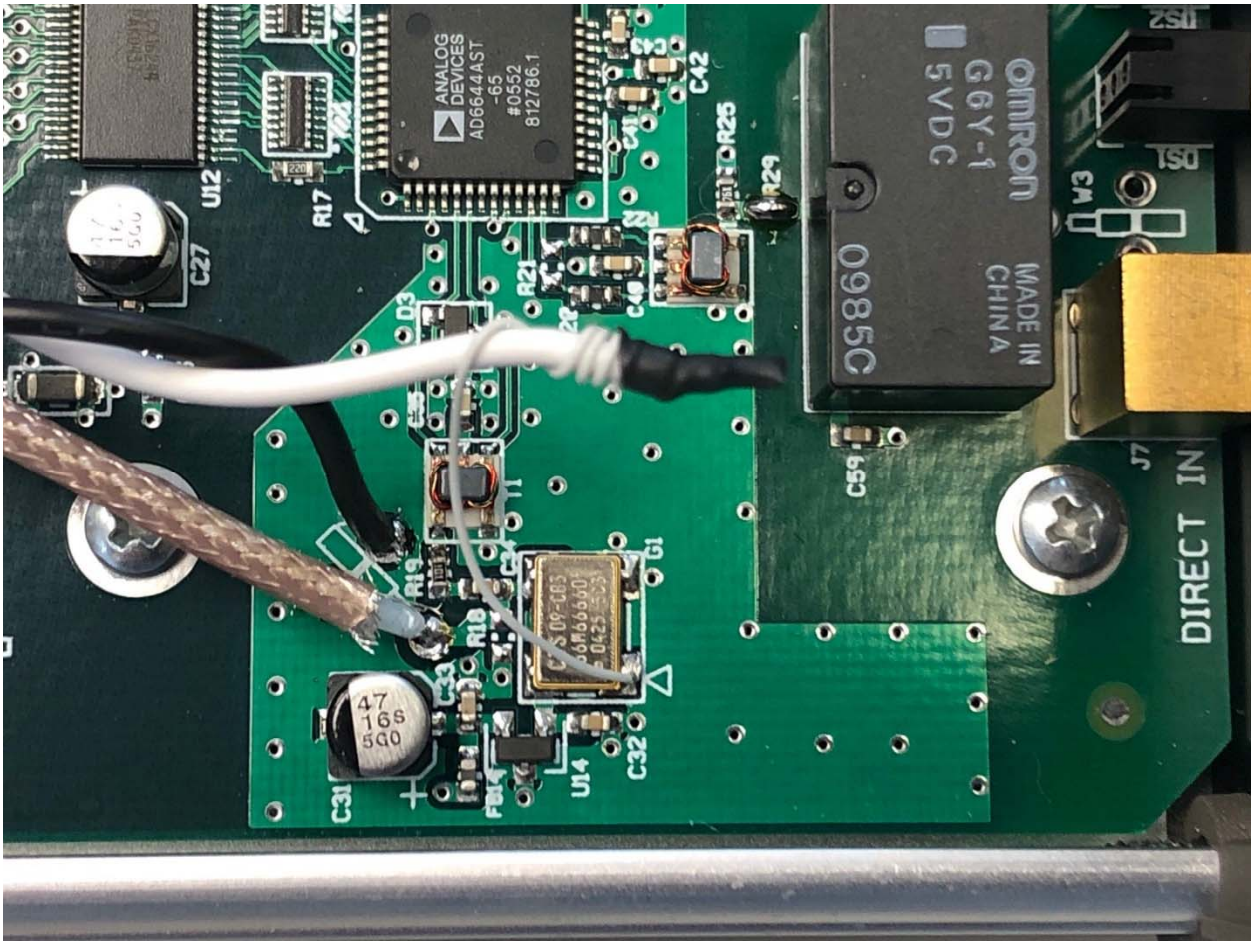

Figure 4 – The switch is used to turn off the internal oscillator when an external reference is injected via W2. The switch grounds pin 1 of G1 (identified by a triangle) to disable the internal oscillator.

Figure 5 – Modified back panel of the RFspace SDR-14.

Figure 6 – I connected the output of a Leo Bodnar Mini Precision GPS Reference Clock to the new External Reference input to the RFspace SDR-14

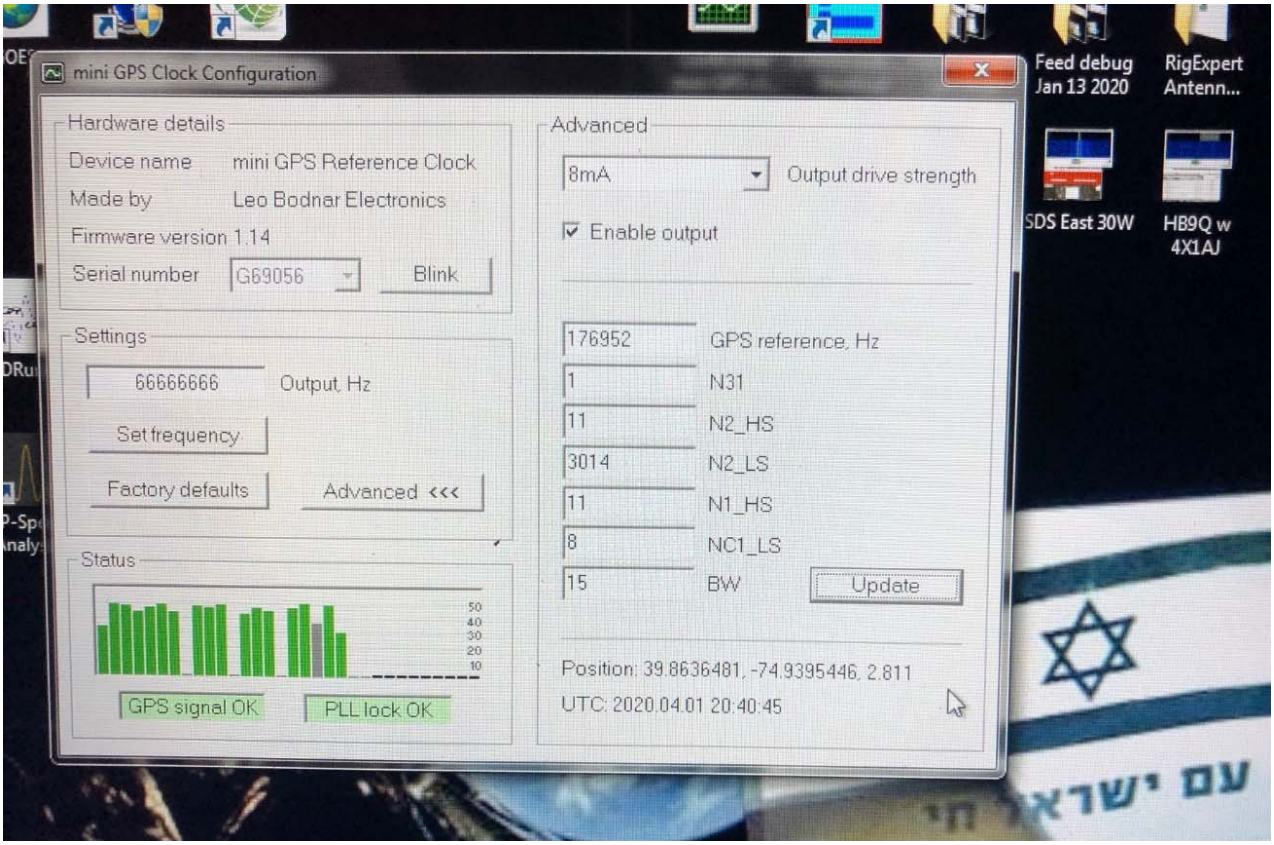

Figure 7 – The Leo Bodnar Mini Precision GPS Reference Clock needs to be correctly set up using its configuration software.

Figure 8 – AOR AR5000 and SDR-14 are now both GPS-locked for rock-solid frequency stability for EME and DSN RX