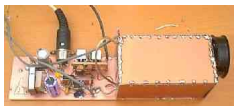
This page details the 30m QRSS beacon experimental results and subsequent modifications. The page became too long so I have broken it down into individual sections. Click on the screenshots to go to the details page or show the full size images.

{gallery}qrss/title{/gallery}The picture above shows the beacon in operation, with the ATU sitting on top of it and above that my 80/40m 1-valve CW transmitter (not a part of these experiments). The QTH was a few miles South of London IO91VH. The antenna was about 62 metres long bent longwire, about 6 metres above ground at its highest point, following around the house and sloping down in a South-Eastern direction to about a bush about 2.5m high. Estimated transmitter power was 300mW but I did not have a reliable means of measuring it.

Frequency Calibration



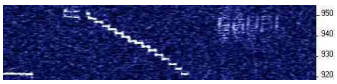
Following an unsuccessful period of operation at Christmas during which NO signal reports were received, the general conclusion was that since the frequency counter in my HF Receiver
was uncalibrated, I was probably giving out false frequency measurements which were far enough away from the true frequency for listeners to miss me. So this time, I built a simple 30m direct conversion receiver
. With this I was able to receive my own transmission, but also crucially I was able to monitor the Russian time signal station RWM on precisely 9,996,000Hz. By zero beating the receiver to RWM and noting the indicated frequency I was able to determine a correction factor for the frequency counter. It was reading over 1KHz too low! Having done that it was a simple matter to measure the beacon frequency, to within an estimated 10Hz accuracy.
Read more...

First reception reports

The first report was received from Peter DF3LP in Kiel JO54AG. Further reports came in from Peter DL6NL near Munich JN58SG and Heinz OE5EEP in Austria JN67TW. **Read more...**

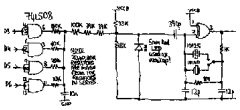
First round of Modifications

From the initial reports it became clear that some modifications were required! The frequency was rather a 24-hour QRO station on 10.144MHz, so the frequency of the beacon was lowered to 10.142. Addtionally a separate voltage regulator was installed for the oscillator in an attempt to improve the frequency stability. Finally a thumbwheel switch added extra message memory capabilities. **Read more...**



Post-modification reception reports

Three reception reports came in from the three who soon became known as "the usual suspects", Peter DF3LP, Peter DL6NL and Heinz OE5EEP. Unfortunately they show that the frequency "chirp" was still present. **Read more...**



Some more modifications

Yet more modifications, following the results of the previous efforts. In this attempt, I added buffers between the oscillator and the pa to prevent variations in load drawn by the pa from affecting the oscillator frequency. I also reduced the frequency shift range, and added more capacitors for good measure. **Read more...**

Followed by some more reception reports

Three more reception reports from the usual suspects Peter DF3LP, Peter DL6NL and Heinz OE5EEP. Despite all my efforts, the chirp still remains! There is also a discontinuity on the staircase at steps 7 and 8, indicating non-linearity of the resistor network. **Read more...**

Which led to yet more changes

Now I packaged up the oscillator in its own screened box made from scraps of single sided PCB stock, and moved it further away from the 74HC240 PA chip. Linearising the resistor network was relatively easy, just a matter of trimming one of the resistors with parallel resistance. **Read more...**

Slow Hellschreiber Tests

Now for the first time, I changed the message. The new message consists of an experiment in slow-hell. The message also contained a QRSS10 "N" to observe chrip, and a staircase for observing the shift linearity. **Read more...**

The Grand Finale: A Hell/QRSS/DFCW Challenge!

With a reward of 300 capacitances (in 10 different values), a 6-word message was sent out in a mixture of Hell, QRSS10 and DFCW. The text was **G0UPL HOMEBREW RADIO RULES THE WAVES** (3 words Hell, 1 word QRSS10 and 2 words DFCW in that order). **Read more...**

Conclusions

A huge amount of fun. It is incredible to think that such a tiny signal can be received so far away, and yet by QRSS standards my 300mW signal could almost be considered QRO!

The tests show that really the MUF is King. G0UPL might rule the waves but the MUF rules G0UPL **AND** the waves. I carried out frequency calibrations against the RWM timesignal on 9996KHz from Moscow. At times it was completely inaudible, and they have several kilowatts of transmitted power. So if the MUF disallows a path, it really disallows it. Which is a pity for all the listeners in the UK, Holland and Belgium who were tried to copy my signal but were not allowed to.

The tests also show the importance of a stable oscillator signal, and the difficulty of obtaining one! At QRSS scales, even a crystal oscillator which we normally consider "rock" stable, is drifty.

QRSS and DFCW are obviously much easier to copy than the Hell, and much better suited to QRPP operation. But the Hell was a lot of fun to do and I think provided a nice change from the more usual QRSS modes. Apart from anything else, the Hell experiments allowed me to test my equipment to the max. In future I ought to use a better designed font, and also scan characters from bottom to top as Heinz OE5EEP suggested, so that the slope was a more natural left-to-right style.

Many thanks to all participants for a very interesting experiment!