This project was really a way for me to test out the excellent USB synthesiser kit from Jan G0BBL's http://www.sdr-kits.net/ , which uses the new Si570 "programmable crystal" chip. The PCB quality and build instructions were excellent, and the whole thing went together with no trouble at all and worked first time at switch on.

The rest of the beacon is made entirely from junk box components. I found an IRF740 MOSFET in the junk box and stole the 10MHz low pass filter from my first DDS project . That makes up an amplifier providing a measured 520mW output into a 50-ohm dummy load (two 1/4 watt 100-ohm resistors in parallel). I built the PA and low pass filter on pieces of baked bean can! The heatsink is made from two old TV heatsinks bolted together. The heatsink is not at ground so care has to be taken to insulate it from the circuit ground, or alternatively one could use an insulating TO220 mount on the MOSFET. In my case the heatsink just hovers above the ground plane.

IMPORTANT NOTE: The 1K potentiometer sets the bias current in the MOSFET. It is VERY important to start with this turned all the way to the ground end, unless you want to kill the MOSFET! I monitored the RF output on my HP1741A oscilloscope. At first there is NO RF output. On increasing the bias voltage at the MOSFET gate by turning the potentiometer, the output power rises. At some point, it reaches a peak and if the potentiometer is turned beyond that, all that happens is a lot of heat arises and the MOSFET starts to fry. Even at the point of maximum RF output the generated heat is too much and I back off a bit from this point to obtain a reasonable output power and reasonable heat generation. In my final set up the output power was 520mW and the heatsink gets warm but not too hot to touch or smell bad.

Finally I made a quick C program and set up an ATtiny13 AVR to send my callsign "UPL" repeatedly in slow morse with 6 second dot length. It flashes a red LED in sync with the keying to give confidence something's happening. The AVR output drives the Si570 board's "CW" input. I set the FSK on the PC synthesiser control program to 5Hz and enabled FSK.

CLICK HERE to see the C program. Ugly and simple.

Circuit Diagram

{gallery}qrss570construction/circuit{/gallery}

Photos

Click the images for much larger versions!

{gallery}qrss570construction/photos{/gallery}

From left to right:

- The whole beacon. SI570 board on the left, PA on the right. Low pass filter at top right.
- Another view from the other direction, showing the low pass filter quite nicely.
- The underside of Jan G0BBL's Si570 kit. The Si570 is that tiny shiney rectangular blob at the left.
- Close-up of my ATtiny13 keyer board, which is mounted directly on the Si570 board.