28. Application - Si5351 Calibration

No Si5351 module has an accurately calibrated 25MHz xtal. But a function of the Si5351 library can be used to counter this and accurately calibrate the synthesiser's output.

```
#define CALIBRATION 5000

Si5351 dds;

dds.init(SI5351_CRYSTAL_LOAD_8PF, 0, CALIBRATION);
```

A parameter CALIBRATION can be defined, and then used to calibrated the Si5351 object dds in the init function. Three parameters are used. The first is the xtal capacitance presented to the Si5351 chip. The next is '0' if the xtal is 25MHz, otherwise it's the xtal frequency. Finally a calibration value (can be + or -).

CALIBRATION
So how to find the right value for your own SI5351 modules (they will all be different)? When the Arduino library SI5351.h is installed in the IDE, a very useful example sketch is also included. This can be opened by File > Examples > Etherkit SI5351 > si5351_calibration. Uploading this sketch to an Arduino and connected Si5351 module will program it to a nominal output of 10MHz. Now what you need is either a calibrated receiver, a frequency meter or a 10MHz frequency standard.

Listening on a calibrated receiver, you will probably find the Si5351 module is not outputting 10MHz, it will either be low or high. Open the IDE Serial Monitor and reset the Arduino and module. Now the screen will show some instructions to be followed to get a CALIBRATION constant for your module. Pressing the "r-p" keys will step the frequency up, or the "f-;" keys to bring it down.

```
Serial.println(F("   Up:   r   t  y  u  i   o  p"));
Serial.println(F(" Down:   f   g  h  j  k   l  ;"));
Serial.println(F("   Hz: 0.01 0.1 1 10 100 1K 10k"));
```

When it is correct as received, then hitting "q" will stop the calibration and give your your value for the CALIBRATION to be used in your sketches.

Receiver and WSJT-X
It may be convenient to tune your receiver to 10MHz + 1kHz. Then when correctly calibrated the output will be a 1kHz LSB output tone. This can be viewed on audio spectrum analyser software running on your PC, as picked up by your microphone. The WSJT-X digital mode software can be used for this.