Calibrating Frequency

By G8MNY (New Mar 06)
(8 Bit ASCII Graphics use code page 437 or 850)

HF

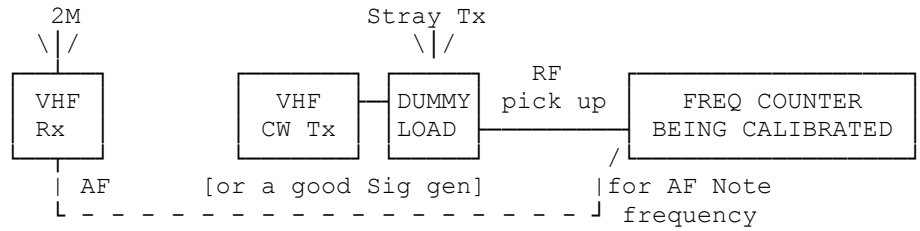
For broadband Rx it is fairly straight forward, you just select a standard frequency station at say 5 10 or 15MHz can be heard (weak at times) & adjust the dial tuning to read that frequency then adjust a calibrate control (internal) until a zero beat is heard or estimated in SSB mode. Sometimes a known offset such as 1KHz is needed, then U can compare LSB & USB & adjust for the same pitch. Other HF broadcast station can be used but they a not so accurate. For more accurate work calibration of a HF Tx harmonic against a VHF beacon can be used, see below.

VHF

The accuracy becomes more important for some modes & the same procedure can be done with a good beacon. The newly rebuilt 2M beacon GB3VHF @ Wrotham in Kent is currently on 144,430,000 Hz with typically only ± 1 Hz error, as it is now locked to GPS satellite reference, this could be 100x better than your frequency counter!

COUNTER CALIBRATION

Many hams use a frequency counter for setting up/checking rig frequencies. Here is a method of transfusing the high calibration accuracy of a beacon like GB3VHF to a frequency counter.



This assumes you have access to a Rx (ideally AM mode but FM/CW/SSB will do) that can Rx the beacon. And a CW Tx or a harmonic of one!

This is a 2 step method, so if the Rx is always running the error in the middle CW Tx kit can be monitored & kept to a minimum.

STEP1

1/ Adjust the stray signal emission if you can to be a similar strength to the beacon.

2/ Adjust the CW Tx to zero beat with the beacon, or if not, to a known measured AF beat note high or low off the beacon.

STEP2

3/ With the counter now measuring the CW Tx, adjust the counter's cal trimmer to read either the beacon frequency or the beacon +/- AF offset. If using a harmonic of a CW Tx, do the maths to calculate the true Tx frequency & calibrate the counter to read that.

DRIFT

Without an PLL to an external reference most crystal controlled equipment is only about ± 10ppm over a modest temperature range or long term. Temperature compensated oscillators are better, where temperature variation on other components is allowed to compensate for the crystal oscillator temperature drift. Short term improvements of 5x are possible (± 2 ppm). Some kit may even

have a crystal oven to eliminate temperature drift, these give quite noticeable warm up delay, & consume power, but drift can easily be 10x better than an uncompensated crystal oscillator.

Why don't U send an interesting bul?

73 de John, G8MNY @ GB7CIP