Olivier Ernst, F5LVG sent me the following article about his simple frequency stabiliser, built according to the original Huff Puff theory (as opposed to the more complex "Fast" method). He used ordinary diodes as varicap diodes, a zener for the main VFO tuning and a red LED for the stabiliser correction. See my page Common Diodes as Varicaps for information about my own experiments.

Olivier's web page (in French): http://oernst.f5lvg.free.fr .

A Simple Frequency Stabiliser

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If you have made an LC oscillator that drifts you need a frequency stabilizer. Perhaps you need a simple frequency counter to. Here is your solution.

The front end adapts the VFO signal to the 74HCT7474 (figure 1). A frequency reference is obtained by a 74HCT4060 that divided the crystal frequency by 16384. This frequency reference is applied to the 74HCT7474. This IC compares both signals. It is a dual D type positive edge triggered flip-flop : during the positive edges of the clock, the Q output takes the value of the data input and keeps it until the next positive edge of the clock. If the reference and the VFO are in phase, the Q output remains constant. If the VFO and the reference are not in phase the Q output fluctuates between the high and the low level. In that case, after the 1 uF capacitor, there is a series of positive and negative pulses. Only the positive pulses go through the BD137. These pulses are integrated by the 680 uF capacitor and applied to the VFO varicap. The voltage across the varicap tends to increase, consequently, the stabilizer tends to increase the VFO frequency. When the VFO frequency and the reference are again in phase, no pulses are applied to the varicap. This demonstrates that the stabilizer is able to correct a negative drift. To correct a positive drift, the 680 uF capacitor is connected so that the voltage applied to the varicap is 0.33 V when the system starts, and after tends to decrease. Therefore, even if the VFO has a positive drift without the stabilizer, it has a negative drift when connected to the stabilizer.

My VFO (8.5 - 20 MHz) is depicted figure 2. It is used in a small receiver. Sure you can make a better VFO ! A red LED is used as a varicap.

Under the dot line of figure 1 is shown the frequency counter. You can omit it. The 14 MHz crystal is necessary to calibrate the system. Adjust the 2 adjustable resistors (1 K and 100 ohm) and the 4.7 Kohm potentiometer to read 140.0 mV on your digital voltmeter between the 10 Kohm and the ground (the 1 Mohm resistor disconnected). The two 100 kohm adjustable resistors are used in case of a superheterodyne receiver to obtain a frequency shift. A similar frequency counter was described in a previous SPRAT.

If you make this simple stabilizer, first adjust the 100 Kohm adjustable resistor to obtain 1.4 V on the BC549c collector. Second, choose an adequate time constant for the integrator. In my case it is a 220 Kohm resistor and a 680 uF. The simplest way is to adjust the resistor. If the time constant is too long, there is no stabilisation. If the time constant is to short there a positive drift. With my receiver and this stabilizer it is possible to listen to an SSB transmission more than one hour without noticeable drift in all the frequency range of the oscillator. It is necessary to push a short time INT1 to discharge the 680 uF only when the capacitor is completely charged (listening time more than 1 or 2 hours). If there is a thermal drift of the frequency counter, exchange the 1 uF capacitor by a mixing of ceramic (negative temperature coefficient) and polyester (positive temperature coefficient) capacitors.

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