The simple man's Spectrum Analyser
1st Mixer

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Now we come to the all-important VCO and first mixer. My design uses the internal oscillator of the NE6

The controversial component of this circuit is going to be the coil. Some experiment is going to be neces

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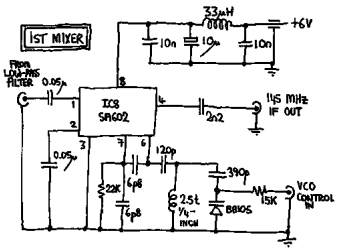
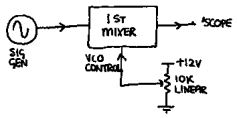


The best way to test this module is to connect the signal generator to its input, oscilloscope to the output, and manually control the VCO control voltage (see below).



When the VCO control input is at its highest voltage (+12V) the varicap capacitance is smallest and the frequency will be highest. The ultimate goal is for the range of the VCO to be from 145MHz at +0V input, to approx 300MHz at +12V input. Not that one can measure anything like these high frequencies on the cheap 5MHz oscilloscope.

However, by careful use of the signal generator and oscilloscope we can find out when the VCO and signal generator frequencies are within a few MHz of each other, since we can see the difference product on the oscilloscope. In fact, it is possible to tune through the zero beat and observe everything on the oscilloscope.

Care is needed to ensure the frequency observed is really the fundamental frequency of the signal generator output, since it is likely to have significant harmonics as well. The best way to start is set the VCO control voltage to zero (lowest frequency), and the signal generator down from its maximum frequency until the zero beat is observed. Tuning down some more, signal generator frequencies will be found whose harmonics also cause zero beats, but these should all have a much lower amplitude.

So, now we know where the low end of the VCO frequency range is. Increasing the VCO frequency slightly by increasing the control voltage should increase the beat frequency, and it should be possible to increase signal generator frequency to get back to zero beat. Unless your signal generator goes up to 300MHz you won't be able to see the upper limit, but for now this is Ok.

The low end of the VCO frequency range needs to be a little (say 10MHz) below 145MHz. Remember from the 145MHz IF Filter testing that the 145MHz setting is known. If it is substantially below the desired frequency, the turns of the coil can be expanded slightly with a screwdriver to raise the frequency. If above about 135MHz, the coil turns can be squeezed together a little. If even these measures are not enough, it might be necessary to experiment with the coil value by removing or adding a turn respectively.

As long as the VCO range starts at about 135MHz for 0V and seems to go up high with increasing VCO control voltage, the exact range isn't too critical at this stage. It's much easier to make final adjustment later when the spectrum analyser is working.