

## Voltage Controlled Oscillator

By feeding back some signal to the input, we get oscillation since the tank circuit continues to run.

If replace the capacitor with a varactor diode, can control capacitance with a DC voltage on the diode. This allows us to control the oscillator frequency with DC voltage changes.

## Phase Detector

If put in a signal into the phase detector whose phase differs from the input signal (same frequencies but different in phase), the phase detector will detect this.

As 1 MHz comes in, as long as the two phases are the same (input and feedback), the phase detector will output 0 volts. Once the phase differs between input and feedback, the detector generates a small voltage which causes the VCO to adjust the capacitance so that it will adjust the phase.

## Phase Locked Loop

This is the 4046 chip we are putting in our circuits.

The PLL is made up of:

- phase detector
- filter input and output ports
- VCO (voltage controlled oscillator)

The filter is external to the chip since manufacturer doesn't know what frequency at which the customer will use the PLL.