

## EXPERIMENT #6

### TO ANALYZE FM DEMODULATION

#### OBJECTIVE:

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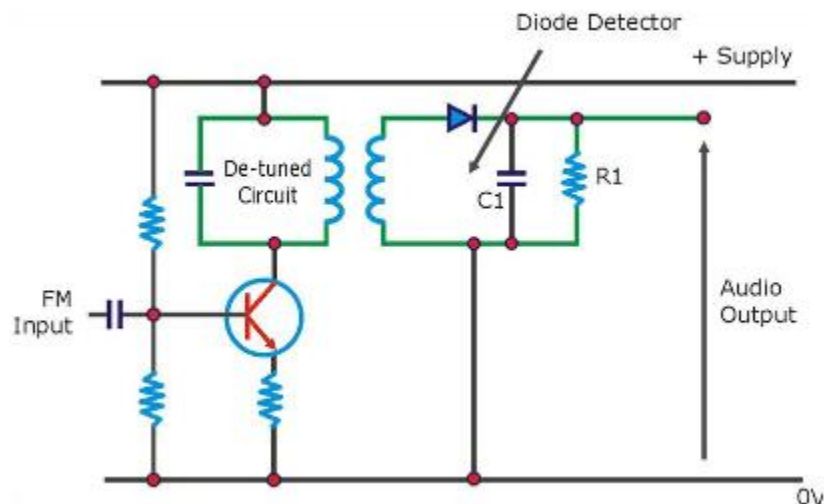
#### FM DEMODULATION:

Frequency modulation (FM) has numerous advantages over AM such as better fidelity and noise immunity. However, it is much more complex to both modulate and demodulate a carrier wave with FM and AM predates it by several decades.

There are several common types of FM demodulators:

- The quadrature detector, which phase shifts the signal by 90 degrees and multiplies it with the unshifted version..
- The signal is fed into a PLL and the error signal is used as the demodulated signal.
- Detuned circuit coupled with the diode detector is used to demodulate the signal.

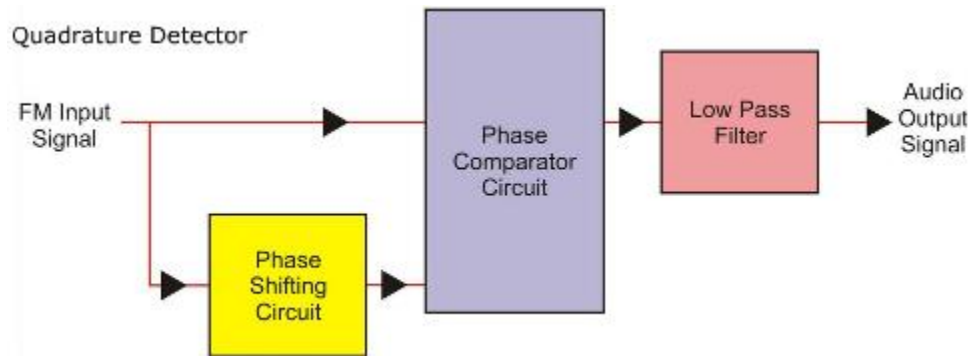
#### DETUNED RESONANT CIRCUIT DETECTOR:



The FM input is applied to the base of the transistor. The signal from the detuned circuit will pass through the diode detector. Diode detector will allow current when forward bias and block when reversed. The output is passed through low pass filter to remove ripples and DC level from the

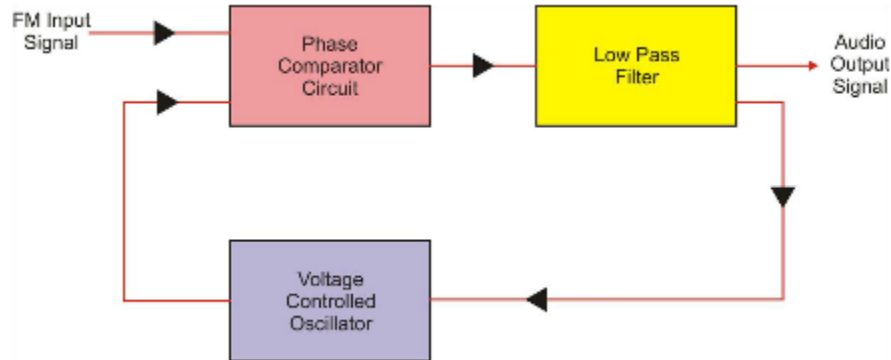
signal.

### **QUADRATURE DETECTOR:**



The quadrature detector is comparatively a better design with less distortion. The incoming signal is phase shifted. The degree of phase shifting is determined by the frequency of the signal. The phase comparator will compare the phases of original and phase shifted signal. The signal is demodulated and passes through low pass filter to remove ripples and DC level.

### **PHASE LOCK LOOP DETECTOR:**



A phase-locked loop or phase lock loop (PLL) is a control system that generates an output signal whose phase is related to the phase of an input signal. While there are several differing types, it is easy to initially visualize as an electronic circuit consisting of a variable frequency oscillator and a phase detector. The oscillator generates a periodic signal. The phase detector compares the phase of that signal with the phase of the input periodic signal and adjusts the oscillator to keep the phases matched. Bringing the output signal back toward the input signal for comparison is called a feedback loops since the output is "fed back" toward the input forming a loop.



## Post Lab Questions

a) What are the methods used for FM Demodulation?

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b) What is the function of Phase Comparator Circuit?

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c) Draw block diagram for Phase lock loop Detector?

