

IMPLEMENTATION OF FREQUENCY SHIFT KEYING

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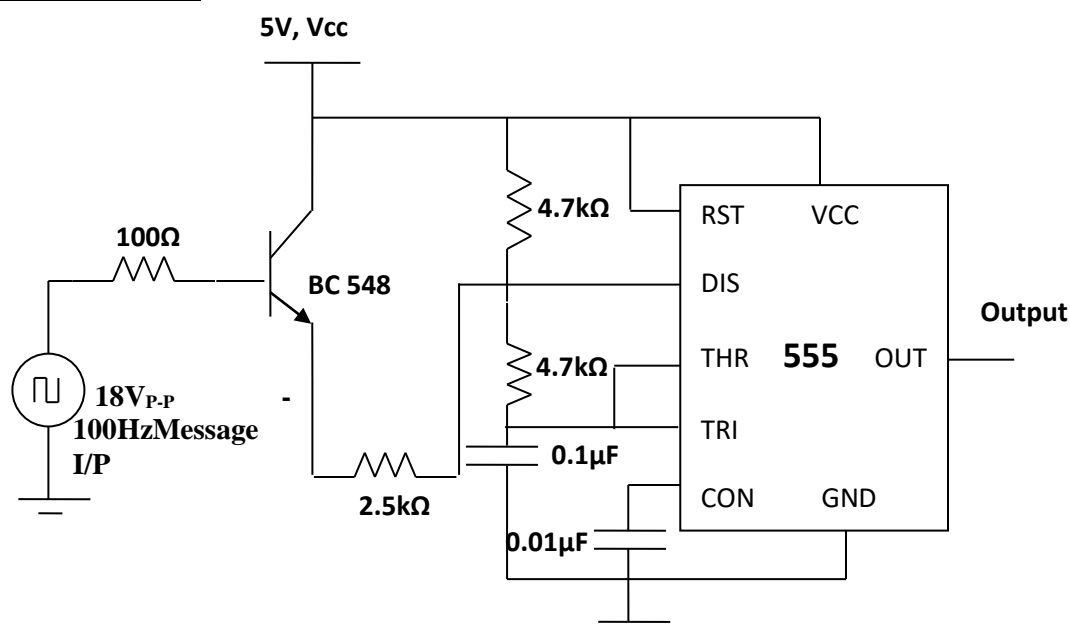
Aim:

To construct and study Frequency Shift Keying Modulation circuit and to observe the waveforms

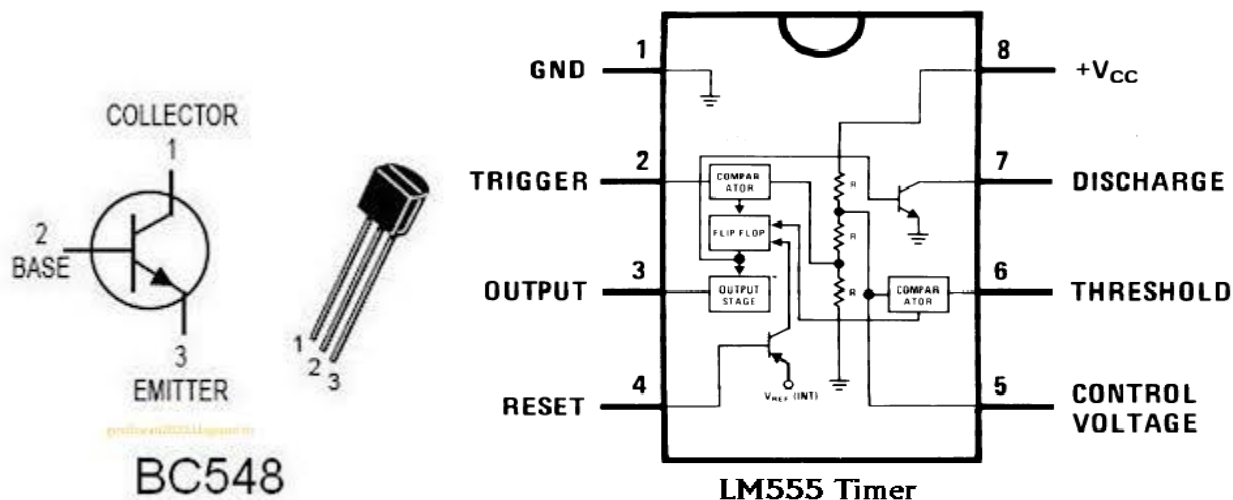
Components Required:

IC 555 timer	1
Transistor BC 548	1
Capacitors	0.1 μ F - 1 0.01 μ F - 1
Resistors	100 Ω - 1 2.5k Ω - 1 4.7k Ω - 2
DC Power Supply	1
Digital Storage Oscilloscope (DSO)	1
Bread Board & Connecting Wires Set	1
Function / Waveform Generator	1

Circuit Diagram:



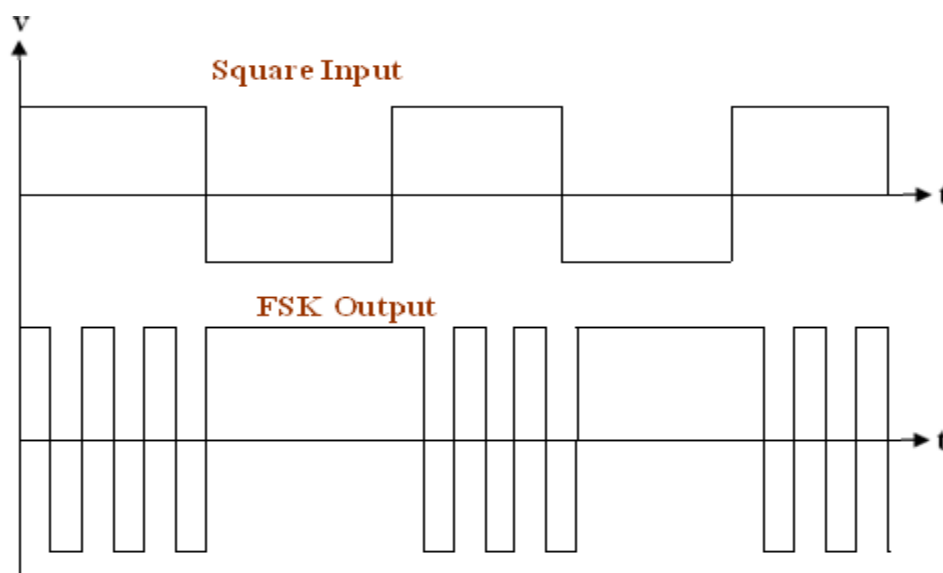
Pin Configuration for Transistor BC 548& IC LM555:



Procedure:

1. Connect the circuit as shown in the circuit diagram.
2. Feed input square wave to the base of the transistor BC548
3. Adjust the frequency to 100Hz and 18V
4. Observe the waveform on DSO screen.
5. Note the readings and plot the graph

Model graph:



Theory: Frequency-shift keying (FSK) is a frequency modulation scheme in which digital information is transmitted through discrete frequency changes of a carrier wave. The simplest FSK is binary FSK (BFSK). BFSK uses a pair of discrete frequencies to transmit binary (0s and 1s) information. With this scheme, the "1" is called the mark frequency and the "0" is called the space frequency. If the incoming bit is 1, a signal with frequency f_1 is sent for the duration of the bit. If the bit is 0, a signal with frequency f_2 is sent for the duration of this bit. This is the basic principle behind FSK modulation. In the demodulator circuit, the FSK modulated signal is applied to a high Q tuned filter. This filter is tuned to the frequency of either 0 or 1. This filter passes the selected frequency and rejects the other. The output is then passed through a FWR (Full Wave Rectifier) circuit and the output is now above zero volts only. It is then passed through a comparator; if the input to the comparator is greater than threshold value, the output is 1, else it is 0. This digital output of the comparator is the demodulated FSK output.

PreLab Questions:

1. Define multivibrator?
2. What are the different modes of multivibrator?

Tabular Column:

Signals	Amplitude (volts)	Time Period (s)
Modulating Input signal	18 Vpp	Ton= 5ms Toff = 5ms
Modulated FSK output signal	7.4 Vpp	Ton= 5ms Toff= 5ms

Inference: The FSK modulator circuits were set up and the observation was noted down and output waveform were observed.

IMPLEMENTATION OF FREQUENCY SHIFT KEYING (FSK) DEMODULATION

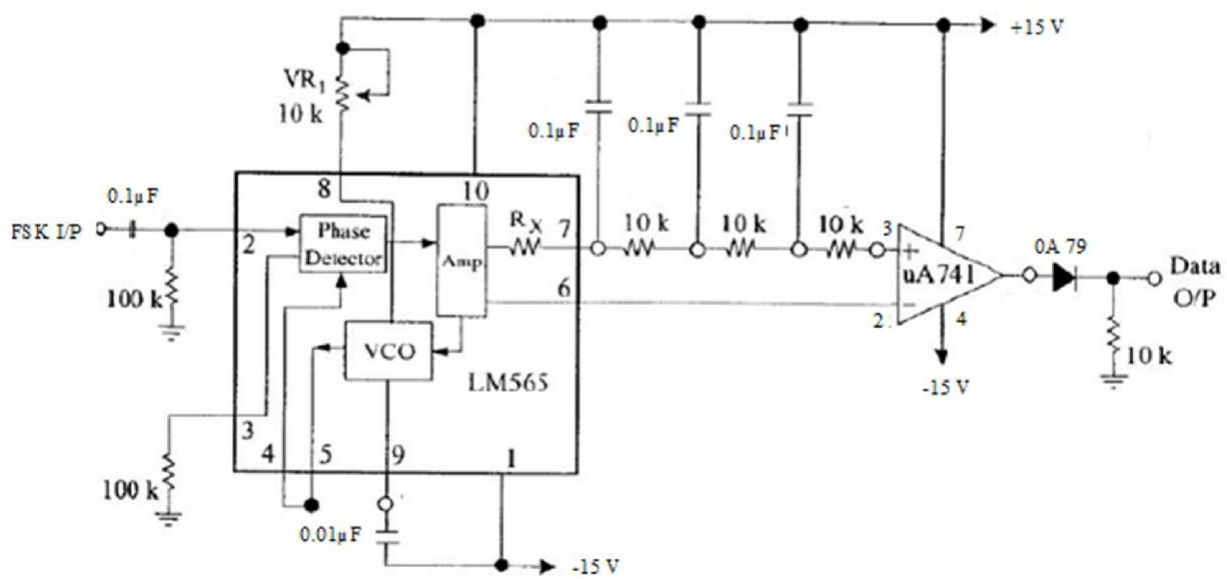
Aim:

To implement demodulation circuit for Frequency Shift Keyed (FSK) signal and observe the Bit detection.

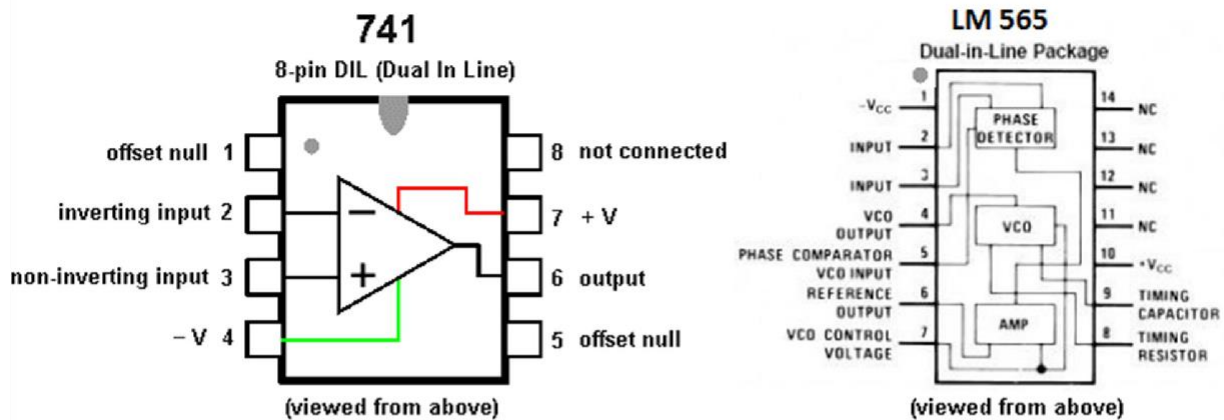
Components Required:

IC 741	1
LM 565	1
Diode	0A79-1
Resistors	100k - 2 10k Ω - 4 10k Ω (POT) - 1
Capacitors	0.1 μ F - 4 0.01 μ F - 1
DC Power Supply	1
Digital Storage Oscilloscope (DSO)	1
Bread Board & Connecting Wires Set	1
Function / Signal Generator	1

Circuit Diagram:



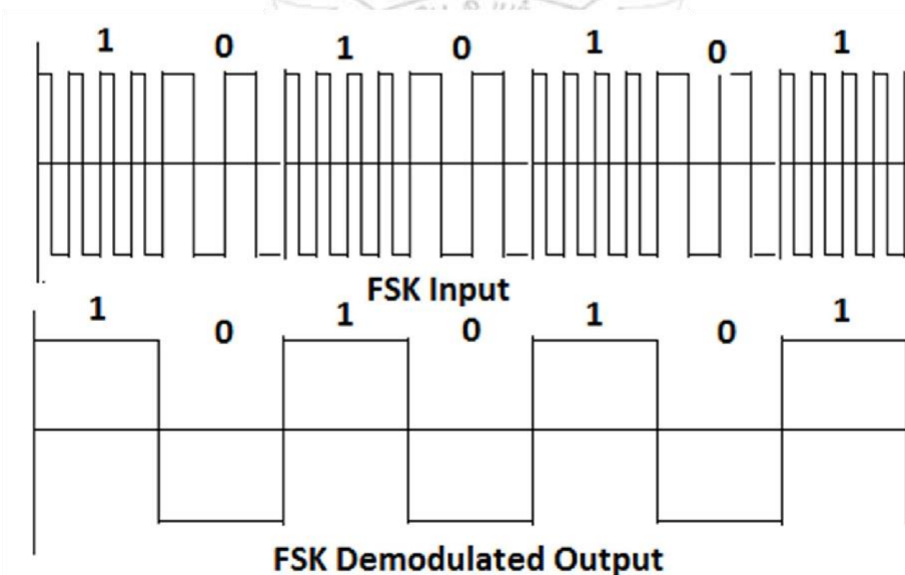
Pin Configuration for Transistor BC 107 & IC 714:



Procedure:

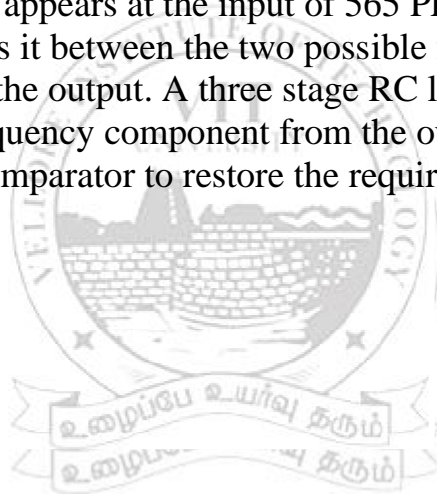
1. Use the Function/ Signal Generator choose Square wave (100 Hz) as input and select the modulation type for the signal as FSK. The generated FSK is used as the input to the FSK Demodulator Circuit.
2. Connect FSK Demodulation circuit as shown in the diagram
3. Feed the FSK generated from the Function/ Signal Generator as input, vary the 10k (POT) for smoothening the demodulated output in DSO.
4. Tabulate the readings and write the observations.

Model graph:



Theory:

Frequency Shift Keying (FSK) is a digital modulation scheme where the digital data is transmitted using a high frequency carrier signal. For logic '0' and '1' the carrier signal switches between two preset frequencies, hence the name FSK. A frequency shift keying modulator circuit made up of 555 timer is shown in figure. The 555 works in monostable mode. For logic '1' transistor BC 177 is OFF and the monostable works in normal mode and capacitor C1 charges through RA and RB and the output frequency is at the first preset level. For logic '0' the transistor is ON and the resistor RC comes in parallel with RA and reduces its effective resistance. The charging rate of the capacitor increases and a higher frequency signal is obtained at the output. This is the second preset frequency level. Thus the output signal switches between the two preset frequencies for logic '0' and '1'. The resulting signal is FSK modulated. PLL IC 565 is used to demodulate the FSK signal. As the signal appears at the input of 565 PLL, the PLL locks to the input frequency and tracks it between the two possible frequencies with a corresponding dc shift at the output. A three stage RC ladder filter is employed for removing the sum frequency component from the output. The demodulated output is applied to the comparator to restore the required logic levels.



PreLab Questions:

1. Define multivibrator?
2. What are the different modes of multivibrator?
3. What is Phase Locked Loop (PLL) and what are its applications?

Tabular Column:

Signals	Amplitude (volts)	Frequency (Hz) or Time Period (s)
Modulated FSK output signal	7.4 Vpp	10ms
Demodulated FSK output signal	13 Vpp	10ms

Inference:

The ASK demodulator circuits were set up and the observation was noted down and output waveform were observed.

