INSTRUCTION MANUAL
FOR
APPLICATIONS OF 555 TIMER KIT

Kit for 555 Timer circuit applications has been designed to perform the following experiments :-

1) Astable Multivibrator
2) Monostable Multivibrator
3) Bistable Multivibrator
4) Voltage to Time convertor / Voltage to Frequency convertor

The instrument comprises of the following builtin parts:-

1) DC regulated power supply of +5V (Vcc) available on sockets
2) IC 555 placed inside the cabinet & connections brought out at sockets.
3) Various resistances & capacitors placed behind the panel & connections brought out at the sockets
4) Two push to ON switches are provided on front panel. active low and active high for trigger input.
5) One potentiometer VP1 is also mounted on front panel to perform V to F or V to T experiments

T H E O R Y

With the monolithic integrated circuit 555 we can get accurate timing ranges of microseconds to hours, independent of supply voltage variations. This versatile device has a large number of interesting practical applications, especially for electronic hobbyists. Basically, the 555 timer is a highly stable integrated circuit capable of functioning as accurate time-delay generator and as a free running multivibrator. when used as an oscillator the frequency and duty cycle are accurately controlled by only two external resistors and a capacitor. The circuit may be triggered and reset on falling wave forms. Its prominent features are :-

1) Timing from micro seconds through hours.
2) Monostable and astable operation
3) Adjustable duty cycle
4) Ability to operate from a wide range of supply voltages
5) Output compatible with CMOS. DTL & TTL.
6) High current output can sink and source 200mA
7) Trigger and reset inputs are logic compatible
8) Output can be operated normal on and normal off
9) High temperature stability

PROCEDURE

ASTABLE MULTIVIBRATOR :-

1) Connect the circuit as shown in fig(1).
2) Connect CRO lead across pin no. 3 of 555 & ground point as shown in the circuit diagram
3) Switch ON the instrument using ON/OFF toggle switch provided on the front panel and also switch ON the CRO
4) Observe the square wave output on CRO
5) Calculate the frequency of output signal using formula

$$f = 1.44 / (R_A + 2R_B) C1$$

6) Calculate duty cycle using the formula

$$D = R_B / R_A + 2R_B$$

* We can also perform this experiment on LED. For this connect the LED across output instead of CRO & change the value of C1 to 1μF. The blinking LED will show the astable operation because in astable operation there is no stable state & the blinking will continue

MONOSTABLE MULTIVIBRATOR :-

1) Connect the circuit as shown in fig(2).
2) Connect CRO lead across pin no. 3 of 555 & ground point as shown in the circuit diagram
3) Connect Audio Frequency Signal Generator at the trigger input pin (Pin no. 2 of 555) Set the Signal Generator output at square wave of 2V peak to peak amplitude, 1kHz frequency.
4) Switch ON the instrument using ON/OFF toggle switch provided on the front panel and also switch ON the CRO.
5) Observe the square wave output on CRO & calculate the Pulse Width of output using formula:

$$W = 1.1 R_A C1$$

6) Connect the CRO across pin no. 6 of IC 555 & observe the output wave shape. It should be a saw tooth wave.

* We can also perform this experiment on LED. For this connect the LED across output instead of CRO & change the value of C1 to 1μF. Also disconnect the signal generator from trigger input (pin no 2 of IC 555). Apply a trigger input high at pin no. 2 through push to on switch & observe the effect of trigger input on the glowing LED.

BISTABLE MULTIVIBRATOR :-

555 timer can also function as a bistable multivibrator. This multivibrator offers the advantage that it operate from many different supply voltages, uses little power and requires no external component other than by pass capacitors in noisy environments. It also provide as a direct relay driving capability. As shown in circuit diagram a negative pulse applied to the trigger input terminal (pin no. 2) sets the multivibrator and the output Q goes high. A positive going pulse applied to threshold terminal will reset the multivibrator and drive the Q output low.

1) Connect the circuit as shown in fig. (3)

2) Switch ON the instument using ON / OFF toggle switch provided on the front panel

3) Apply a positive going pulse at pin no. 6 of IC, through push to on switch provided on front panel. It will reset the multivibrator and output Q goes low (LED off).

4) To set the multivibrator, apply a negative going pulse at pin no. 2. It will set the multivibrator and output Q goes high (LED glows).

VOLTAGE TO TIME CONVERTOR / VOLTAGE TO FREQUENCY CONVERTOR:-

1) Connect the circuit as shown in fig(4).

2) Connect external DC voltmeter between pin no. 5 & ground as shown in the fig. Also connect CRO across pin no. 3 & ground point.

3) Switch ON the instrument using ON/OFF toggle switch provided on the front panel and also switch ON the CRO.

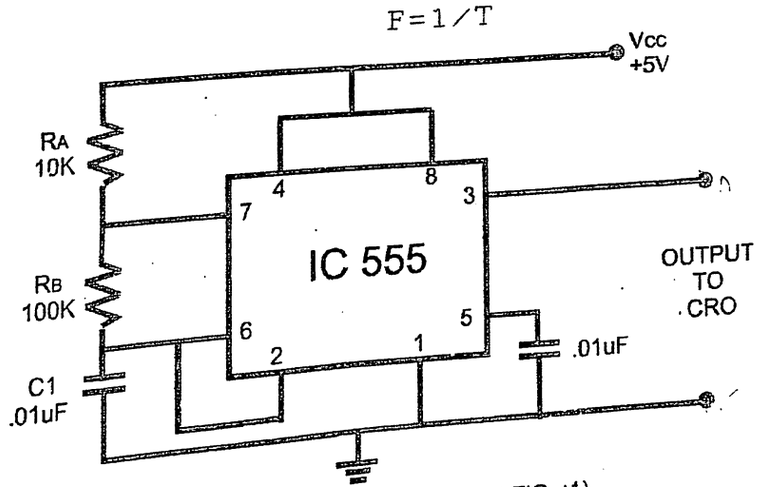
4) Observe the output wave form on CRO. Vary the voltage at pin no. 5 through potentiometer VR1& note down the corresponding change in time period & frequency of the output wave shape.

5) Calculate the time period using the formula

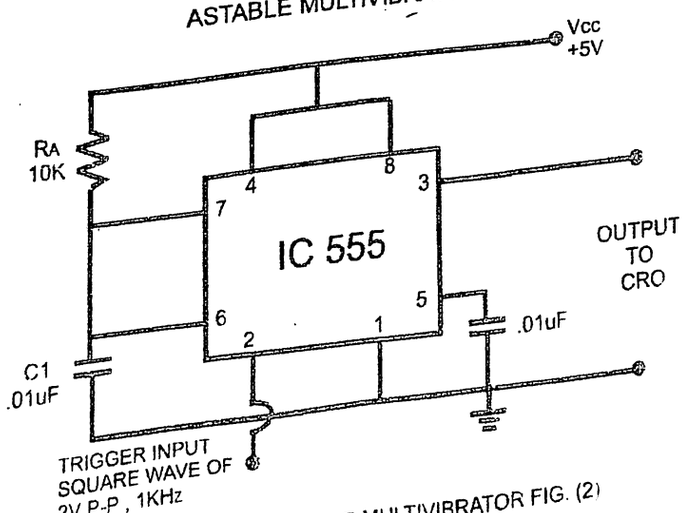
$$T = C1\ (R_A + R_B)\ \text{Inverse}\ (V_{cc} - V_{EXT} / 2) / (V_{cc} - V_{EXT}) + 0.693\ C1\ R_L$$

6) Calculate the frequency by using formula

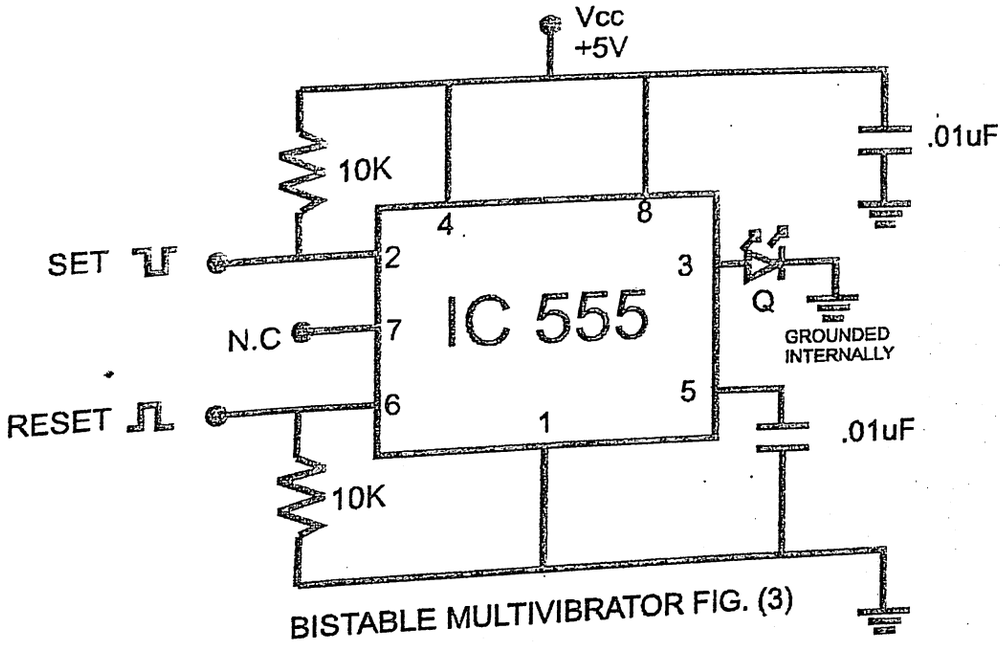
$$F = 1 / T$$



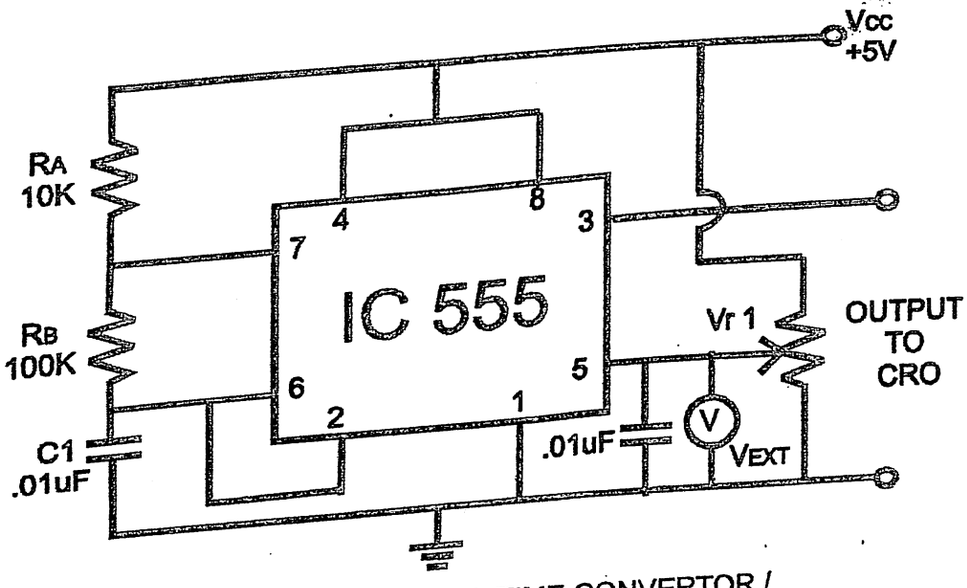
ASTABLE MULTIVIBRATOR FIG. (1)



MONOSTABLE MULTIVIBRATOR FIG. (2)



BISTABLE MULTIVIBRATOR FIG. (3)



VOLTAGE TO TIME CONVERTOR /
VOLTAGE TO FREQUENCY CONVERTOR
FIG. (4)

V_{EXT} : DC VOLTMETER CONNECTED EXTERNALLY