Mechatronics Workshop July 2013

Part II

CONTENTS

TOPIC: SOLAR OPERATED DIGITAL ALARM CLOCK

Experiment No: 01

Title: To Assemble Digital Alarm Clock

General Description:

The LM8560 is a digital alarm clock chip which includes all the logic required to hold several types of clocks & timers with digital display mode: Hours, minutes, alarm display settings, alarm off setting is done via the standard set buttons when the chip is in the various display modes. The battery backup in case of power failure is indicated by a special display mode.

**Technical Specifications – Characteristics:**

Working voltage: 12 AC/DC

Current: 200 mA

Component List:

SR.NO	COMPONENT	SPECIFICATION	DETAILS
1	**R1**	10MΩ	Brown, Black ,Blue
2	**R2…..R6**	1KΩ	Brown ,Black, Red
3	**R8……R23**	390Ω	Orange, White, Brown
4	**Q1…..Q4**	BC547	Transistor
5	**IC1**	LM8560	CLOCK IC
6	**IC2**	CD4541 14 pin	IC IC Socket for 'IC2'
7	**C1**	1000µF/16V	Electrolytic Capacitor
8	**XTAL**	3.2768MHz	Crystal
9	**D1….D7**	1 N4007	Rectifier Diode
10	**Display**	Duplex LED	Clock Display
11	**BUZZ**	Buzzer	27CTS buzzer
12	**SW1…..6**	Switch	Push to on
13	**BATT**		9v Battery Snap

Circuit Diagram:
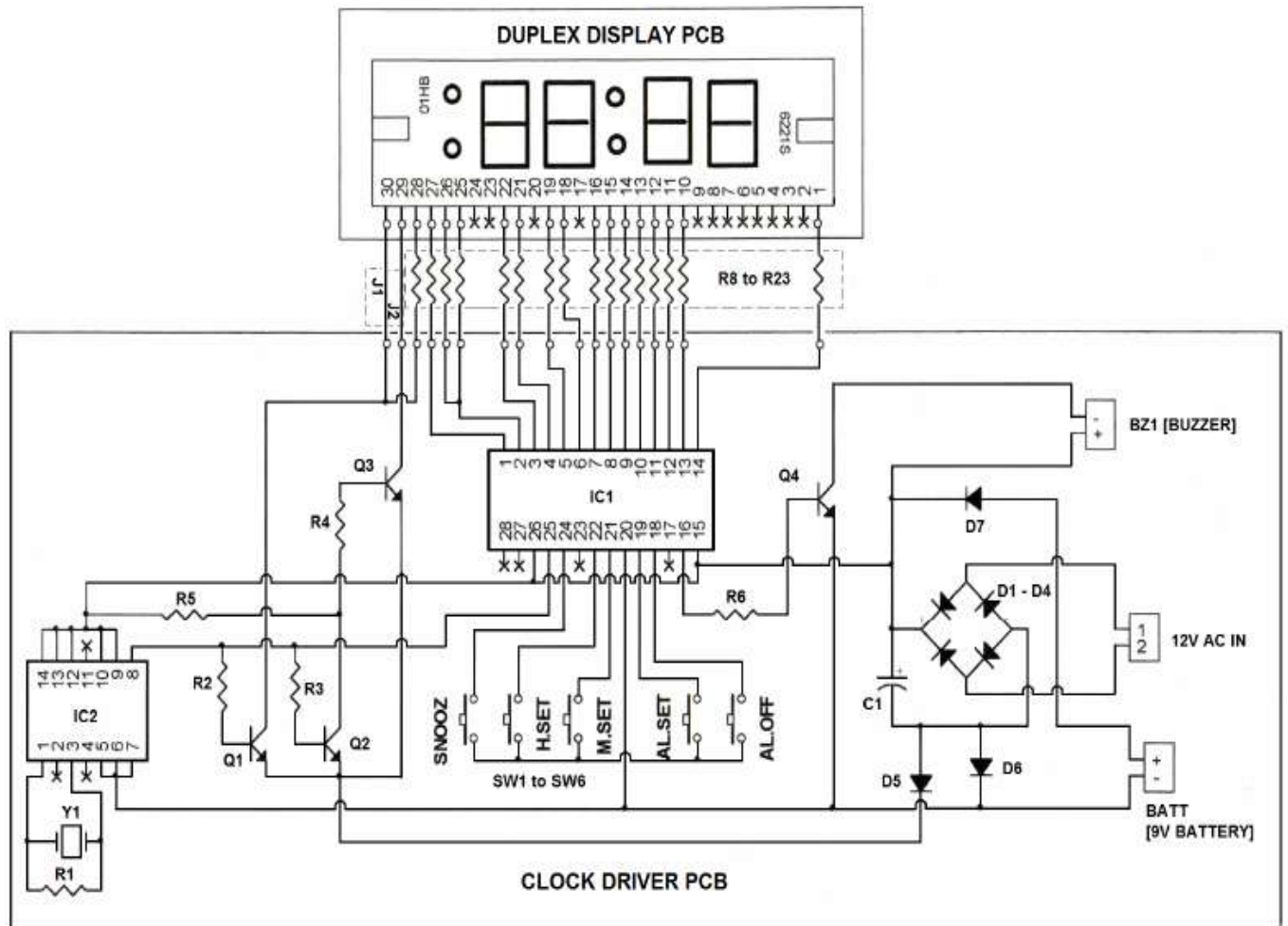
Features:

1. Current time display

2. Snooze alarm function

3. Single chip P-channel ED MOS LSI

4. LED direct drive using time division (duplex configuration)

5. Wide operating power supply voltage range

6. Built-in alarm function with 24 hour control

7. Supports changeover between 12 hour AM/PM and 24 hour displays

8. Built-in battery back-up CR oscillator.

9. Uses 50Hz/60Hz as standard frequency.

10. Built-in automatic fast forward function for hour and minute settings

11. Built-in snooze function supporting repeat use

Note:

1. R8 to R23 connect between clock PCB & duplex display PCB.

2. J1 & J2 are jumper connect PCB & Display R7, Q5 & S2 are not used in the kit.

Applications:

1. Alarm Clock

2. Clock Radio

TOPIC: SOLAR OPERATED BIRD BELL

Experiment No: 02

Title: To Assemble bird bell operated on Mains / Solar

Description: This project is ideally suited for home constructor & is easy to build. It gives out chirping sound of birds.

How it works?

     The circuit is straight forward, and is of an oscillator, which is super imposed by the charging & discharging of C4, through T1 & R1. This charging & discharging produces varying sound similar to the Chirping of birds.

Technical Specifications:

Working voltage: 230V AC/ Solar Battery Supply

Construction:

1. First solder all the resistors, capacitors, transformer and then transistor.

2. When everything has been soldered in its place connect the speaker supplied with the kit at points or "SPK."

3. Connect 230V AC to the points written as "AC MAINS" - for not more than ½ minutes.

4. During all the tests do not touch any part of the circuit while it is connected to the mains.

5. You will hear chirping sounds from the speaker.

Circuit Diagram:

K19 - BIRD BELL 230V
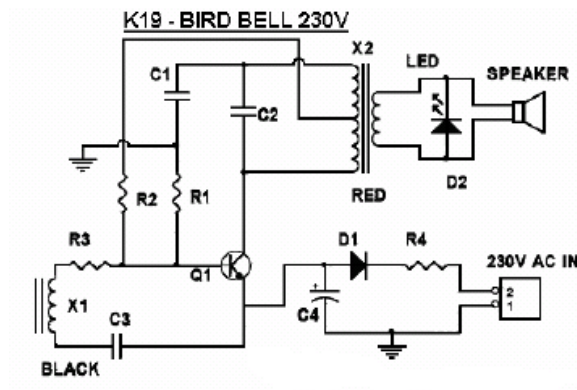
Application:

It can be used as a door bell which gives chirping sound.

TOPIC: SOLAR OPERATED 12 TUNE BELL ALLTIME

Experiment No: 03

Title: To assemble 12 tune door bell

General Description:

This circuit is based on COB (Chip on Board) chip designed for DOOR BELL application. This project is ideally suited for home constructor & is easy to build. It gives out Musical Tune.

**Technical Specifications –Characteristics:**

Working voltage: 3VDC – [2 Pcs of 1.5V Pencil Cell Battery]

Component List:

SR.NO	SYMBOL	COMPONENT	SPECIFICATION
1	IC	COB	12/16 tune COB
2	T1	BC547	Transistor
3	R1	180K	Brown ,Gray ,Yellow
4	SW1	Switch	Push to on
5	SPK	Speaker	0.5W/0.8E
6	BT	Battery holder	For Pencil Cell/ Solar Panel

How it works:

1. All Tunes are preprogrammed on the chip.
2. The first Tune will be played with auto stop after power on and a negative pulse is applied to pin.
3. Each Tune is played in turn on each subsequent trigger.

Circuit Diagram:
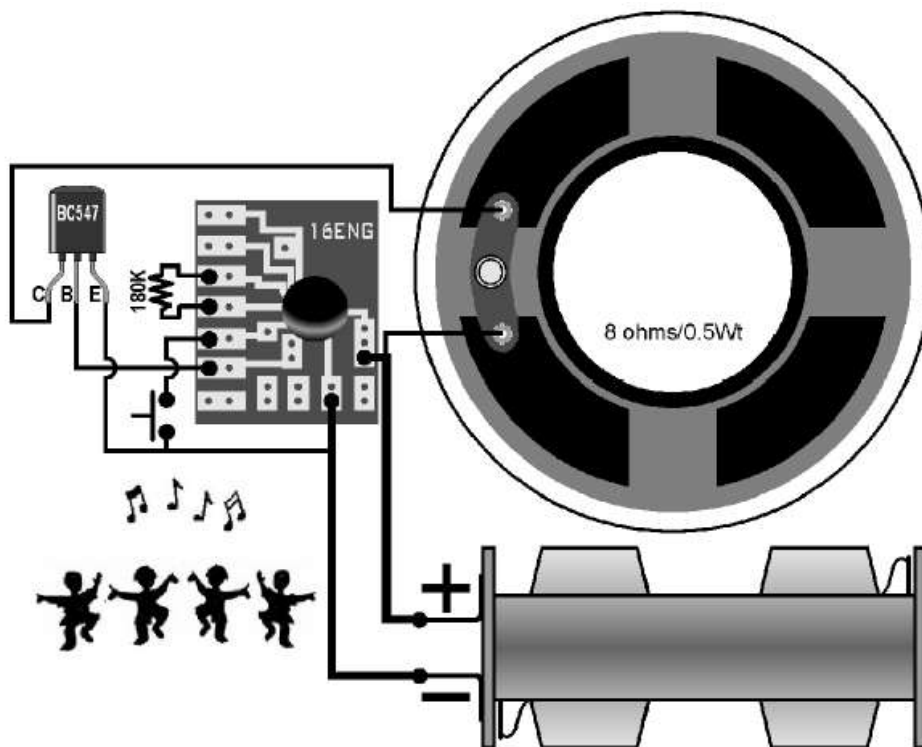
Construction:

1. First solder all resistors, capacitors, transistor & then IC socket.
2. When everything has been soldered in its place, supply with the kit at points" □ "or "SPK."
3. Connect the Pencil Cell holder to [+] & [-] accordingly.
4. You should be able to hear the sweet musical tunes from the speaker at the press of S1.

Application:

It can be used as a door bell which gives musical sound.

TOPIC: WATER TANK LEVEL CONTROLLER

Experiment No: 04

Title: To Assemble liquid level sensor.

General Description:

It has been found that more man power was consumed to maintain refilling of water reservoir or tanks. With this fluid sensor same job can be simplified and save time and money if used in coupled with solar circuit.

In liquid sensor are based on electrolytic reaction between the liquid and the sensors. The used of metal sensors with AC current tends to corrode metal sensors due to use of Ac current. This can be avoided by using DC which goes on exchanging electrodes more frequently.

An annoying drawback of many liquid level sensors is the effect of electrolytic reaction between the liquid and the sensors. Metal electrodes are prone to corrosion and consequent loss of effectiveness (reduced conductivity), with the result that they have to be replaced at frequent intervals.

One Solution to this problem is to ensure that there is an AC rather than DC potential between the sensor electrodes. The constant reversal of electrode polarity drastically inhibits the electrolytic process, so that corrosion is considerably reduced. For this any standard stainless steel rods can be used as electrodes.

Technical Specifications:

1. Working voltage: 12V DC
2. Current: 60mA
3. Contact Rating: 6A / 230V AC

How it works:

1. The actual circuit of the level sensor is extremely simple. The circuit around N1 forms an oscillator.
2. If the two sensors are immersed in a conducting solution, C4 will be charged up via the AC coupling Capacitors (C2 and C3) and the diodes so that after a short time the output of N2 is taken low and the relay is pulled in.

3. The relay can be used to start a pump for example, which in turn controls the level of the liquid.

4. When a conductive path between the two sensors no longer exists.C4 discharges via R2 with the result that the output of N2 goes high and the relay drops out.

5. The Relay turns ON or OFF only when a contact between the two electrodes due to Presence of water.
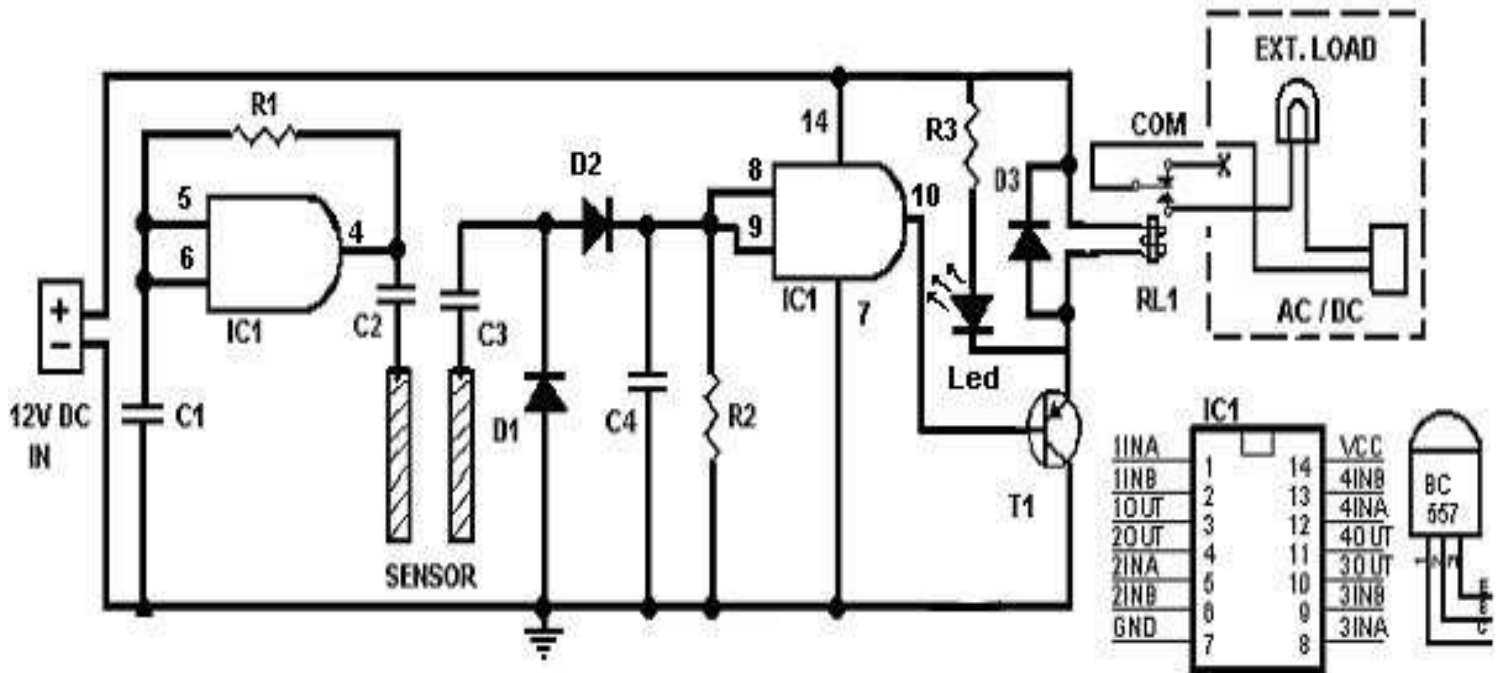
Component List:

SR. NO.	COMPONENTS	SPECIFICATION	DETAIL
1	R1	470 KΩ	Yellow, Violet, Yellow
2	R2	10 MΩ	Brown, Black, Blue
3	R3	1 KΩ	Brown, Black, Red
4	C1,C2, C3, C4	2.2 nf	2.2 ktf/222
5	T1	BC557	PNP transistors
6	D1, D2, D3	TN4148	Diode
7	LED	LED	3m.m RED
8	IC1	4093 14 Pin	Cmos IC IC Socket for IC1
9	Rly1	12V/1CO	Rely

Applications

1. Low level sensing
2. High level alarm
3. Overfill shut off
4. Level and Temperature Control

Circuit Diagram:

TOPIC: ALL TIME WELCOME DISPLAY.

Experiment No. 05

Title: To study the construction of welcome display.

TECHNICAL SPECIFICATIONS:

Operating Voltage: 12V AC/DC

Maximum current: 1AMP

COMPONENT LIST:

1. Circuit PCB Board:

| NAME	VALUE	SPECIFICATION
R1	1MΩ	Preset
R2	18KΩ	[Brown, Grey, Orange]
R3	100KΩ	[Brown, Black, Yellow]
R4	39KΩ	[Orange, White, Orange]
R5,7,9,11,13	1KΩ	[Brown, Black, Red]
R15,17,19	1KΩ	[Brown, Black, Red]
R6	10KΩ	[Brown, Black, Orange]
R8,10,12,14	100Ω	[Brown, Black, Brown]
R16,18,20	100Ω	[Brown, Black, Brown]
Q1,…Q8	BC547B	NPN Transistor
C1	1000µf/25V	Electrolytic Capacitor
C2	470µf/16V	Electrolytic Capacitor
C3	10Kpf	(103)Disc Capacitor
C4	1µf/63V	Electrolytic Capacitor
D1…D4	1N4007	Rectifier Diode
D5	1N4148	Fast Switching Diode
IC1, IC2, IC3	7805, 555(8 Pin), 74LS164(14 Pin) resp.	IC's and respective Sockets

2. Display PCB Board:

NAME	VALUE/ DESCRIPTION	SPECIFICATION
LED's	Red	78 NOS
RX	330Ω	[Orange, Orange, Brown]
RY, Z	390Ω	[Orange, White, Brown]

DESCRIPTION:

It is a circuit to display 'WELCOME' message, which lights up the content of the message (alphabet) bit by bit & then puts all outputs off. In simple words each letter of the sign is lighted one after other until all are on and after a few seconds they all go out simultaneously & the whole process again repeats it.

CIRCUIT DIAGRAM:
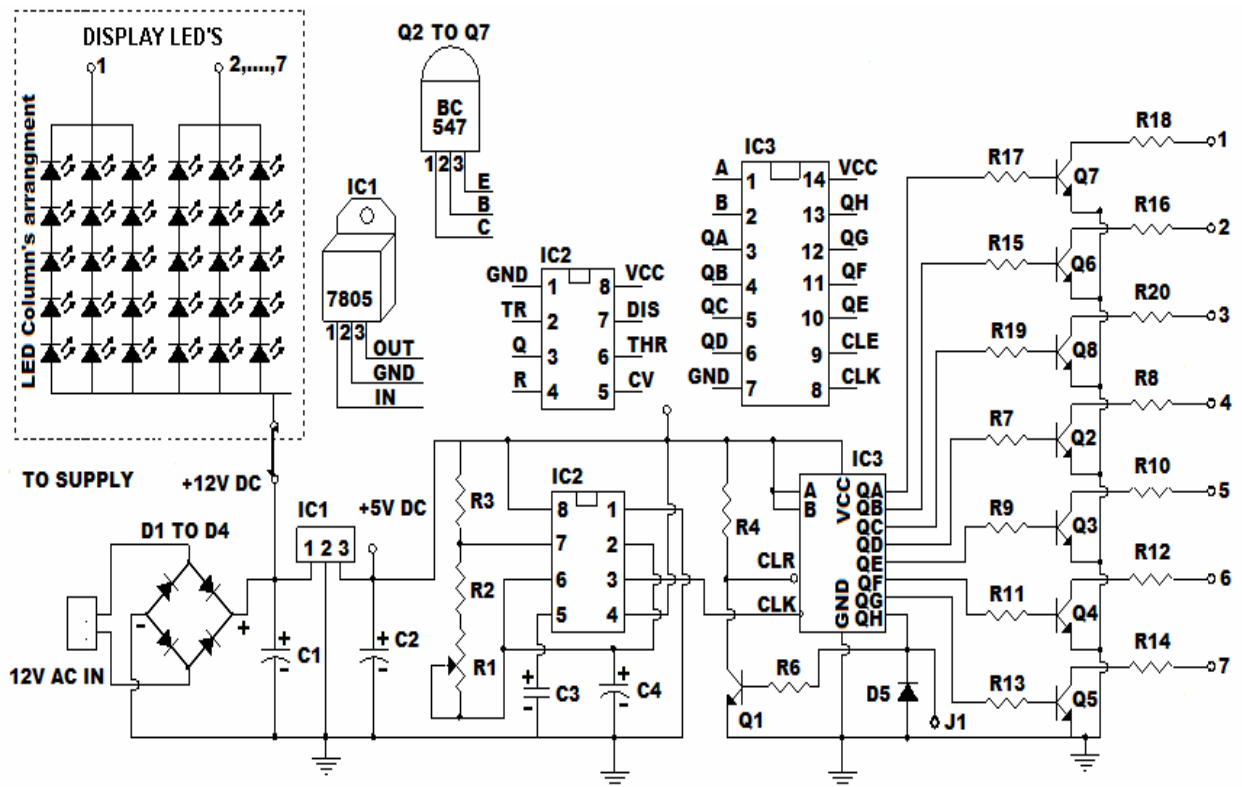
LED Display Board

CONSTRUCTION AND WORKING:

1. It uses a TTL shift register (74 LS 164) & Timer IC (555).

2. The 555 timer being used in astable mode generates continuous clock pulses.

3. LED driver circuit uses transistor BC547 to drive the LED'S.

4. These clock pulses are given serially to (IC74LS164) whose outputs go on becoming high after each consecutive pulse.

5. After 7 pulses the 8th pulse is given to transistor BC 547 which in turn Resets (IC 74LS164) in turn putting all the outputs off.

6. Then with the next pulse again the first o/p will become high & so on. The cycle repeats endless.

7. The running speed of the Word "WELCOME" can be changed by varying preset (R1).

APPLICATIONS:

1. **LED Display** is one of the versatile display solutions as it consumes very less power energy in comparison of any other display system, so basically, led displays are known for its power saving behavior.

2. Led display's are long life display boards because normal life span of led is 100000 burning hour.

3. Led display boards are used as indoor and outdoor display boards to display the messages.

TOPIC: FLASHING LIGHT LED ORNAMENTS - STAR EFFECT

Experiment No. 06

Title: To study the LED Ornaments.

TECHNICAL SPECIFICATIONS:
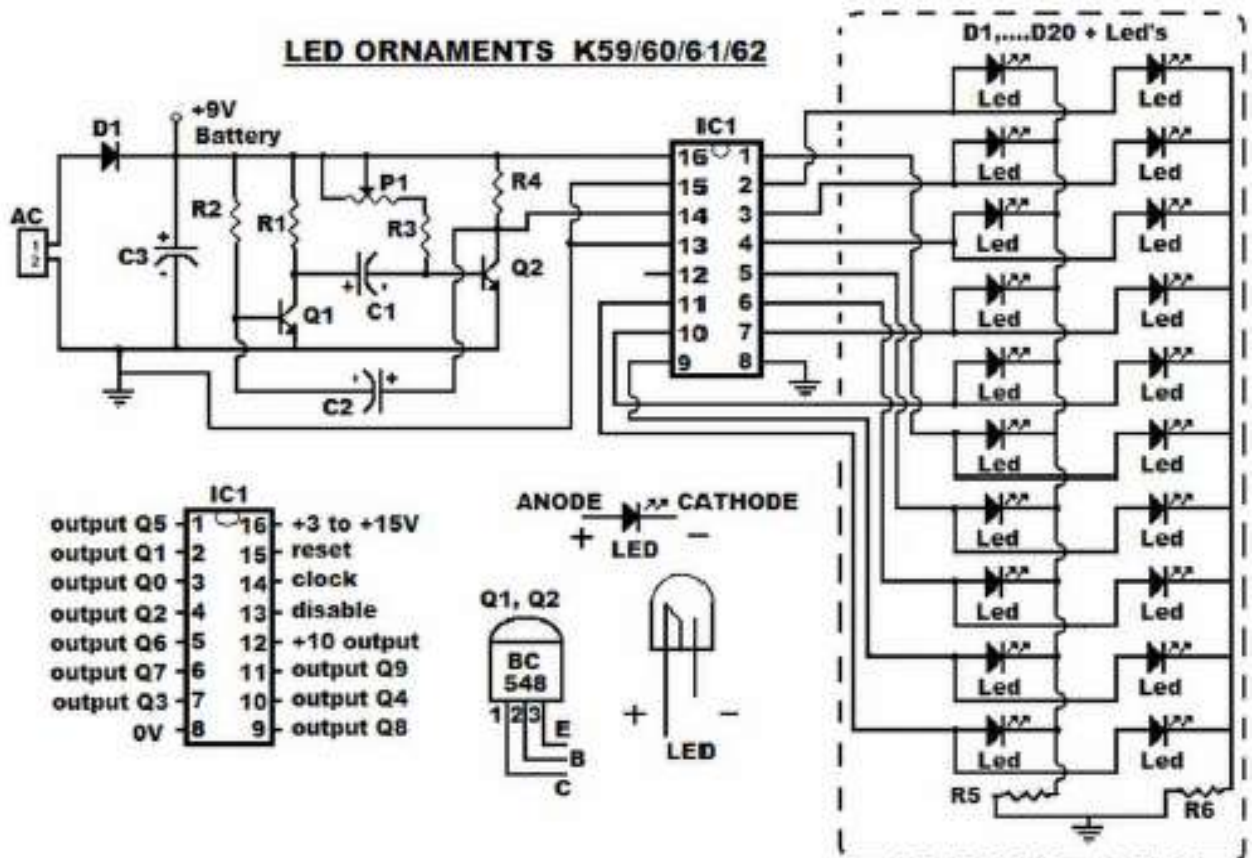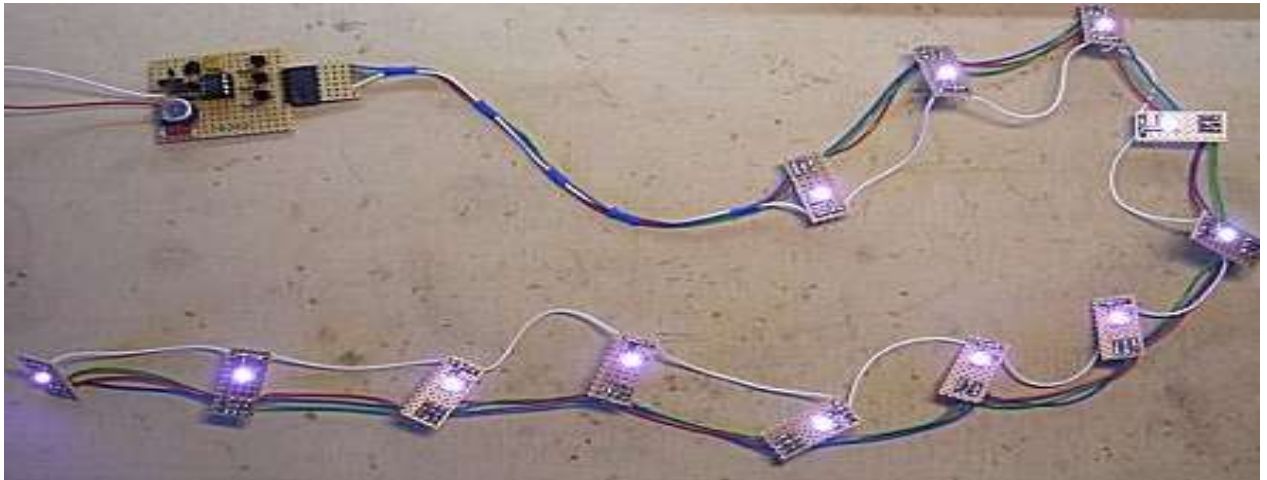
Operating Voltage: 9V DC

Maximum current: 100mA

COMPONENT LIST:

NAME	VALUE/ DESCRIPTION	SPECIFICATION
R1,3	1K8Ω	[Brown, Grey, Red]
R2,4	220Ω	[Red, Red, Brown]
R5,6	120Ω	[Brown, Red, Brown]
P1	47kΩ	Preset
C1,2	2.2μf/16V	Electrolytic Capacitor
C3	100μf/16V	Electrolytic Capacitor
IC1	CD4017	IC
	16 Pin	IC Socket
Q1,2	BC 548	Transistor
D1	1N4007	Rectifier Diode
9V	Snap	for connecting 9V Battery
D1 ….20	3mm Led	Red LED

DESCRIPTION:

Now a circuit does not necessarily, have to do anything, except may be play a game or simply look decorative. OF course, electronics is totally suited to this sort of task and, as we have always known, electronics can just be good fun. The purpose of this circuit is to make suitable for hanging or as an exclusive brooch.

CIRCUIT DIAGRAM:

CONSTRUCTION AND WORKING:

1. To construct Led ornament few basic components are required an oscillator for the flash timing, the divider and Led driver.
2. Decade counter IC CD 4017 is used as a divider circuit.
3. Connect the reset input (pin 15) to the ground. P1 is used to vary the speed of flashing LED.
4. Use 9V battery pack for power supply. If more current is required then use 100Ma 9Volts eliminator adapter.
5. The diffused colour types of LEDs are used. These have a wide viewing angle and remain visible from a distance.
6. The figure such as CROSS, SQUARE, CIRCLE, SPIRAL, STAR consists of a group of   LEDs arranged in a certain pattern.

APPLICATIONS:

4. LED's are used for street and outdoor lighting.
5. LED's are used for architectural lighting.
6. LED's are used for ornamental and festival lighting.
7. To children, it could be something totally fascinating, and it is also an idea for a unique present.

TOPIC: FLASHING LIGHT LED ORNAMENTS – CIRCLE EFFECT

Experiment No. 07

Title: To study the LED Ornaments.

TECHNICAL SPECIFICATIONS:
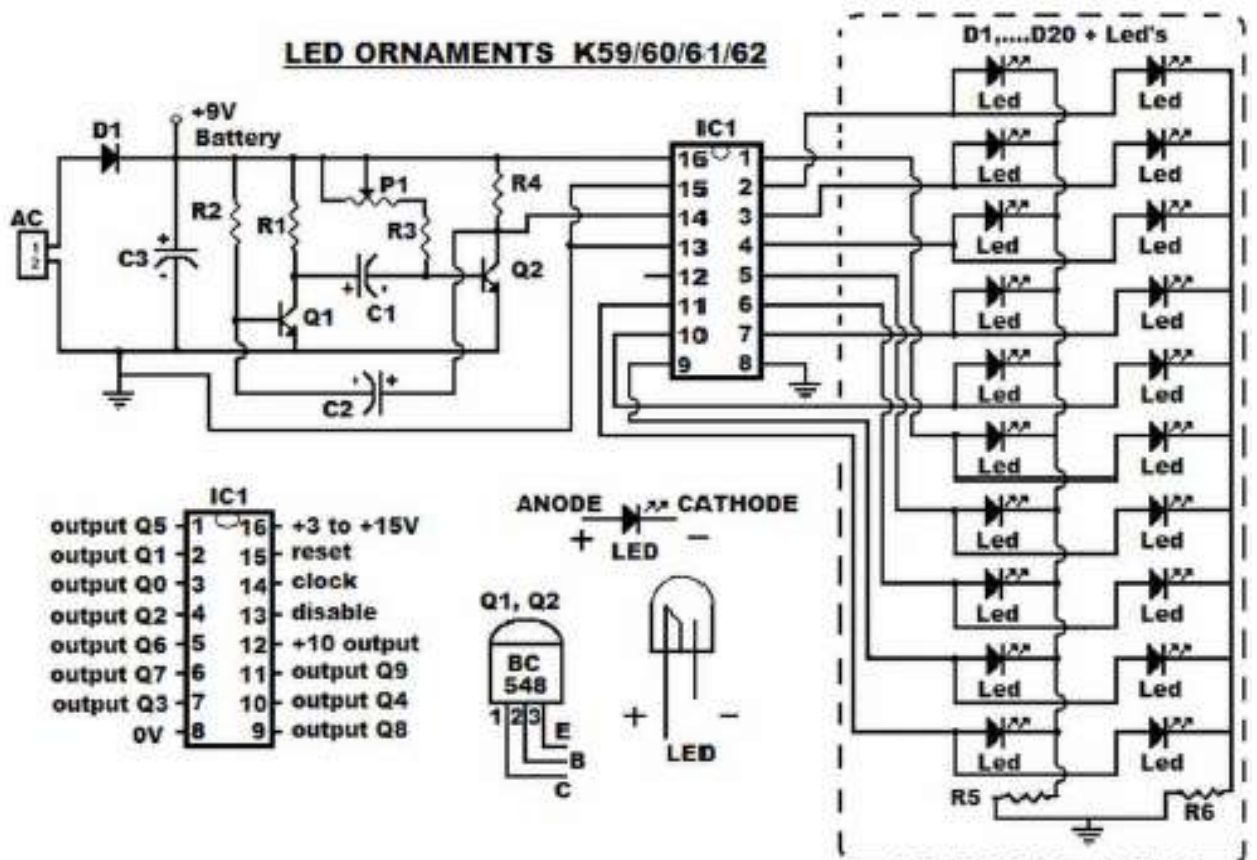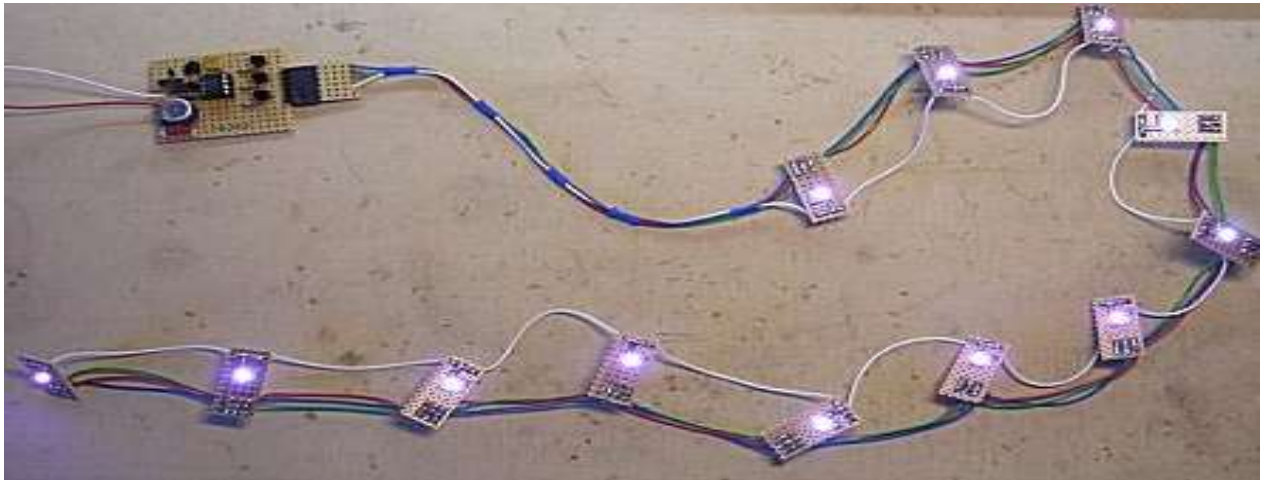
Operating Voltage: 9V DC

Maximum current: 100mA

COMPONENT LIST:

NAME	VALUE/ DESCRIPTION	SPECIFICATION
R1,3	1K8Ω	[Brown, Grey, Red]
R2,4	220Ω	[Red, Red, Brown]
R5,6	120Ω	[Brown, Red, Brown]
P1	47kΩ	Preset
C1,2	2.2µf/16V	Electrolytic Capacitor
C3	100µf/16V	Electrolytic Capacitor
IC1	CD4017	IC
	16 Pin	IC Socket
Q1,2	BC 548	Transistor
D1	1N4007	Rectifier Diode
9V	Snap	for connecting 9V Battery
D1 ….20	3mm Led	Red LED

DESCRIPTION:

Now a circuit does not necessarily, have to do anything, except may be play a game or simply look decorative. OF course, electronics is totally suited to this sort of task and, as we have always known, electronics can just be good fun. The purpose of this circuit is to make suitable for hanging or as an exclusive brooch.

CIRCUIT DIAGRAM:

CONSTRUCTION AND WORKING:

7. To construct Led ornament few basic components are required an oscillator for the flash timing, the divider and Led driver.

8. Decade counter IC CD 4017 is used as a divider circuit.

9. Connect the reset input (pin 15) to the ground. P1 is used to vary the speed of flashing LED.

10. Use 9V battery pack for power supply. If more current is required then use 100Ma 9Volts eliminator adapter.

11. The diffused colour types of LEDs are used. These have a wide viewing angle and remain visible from a distance.

12. The figure such as CROSS, SQUARE, CIRCLE, SPIRAL, STAR consists of a group of   LEDs arranged in a certain pattern.

APPLICATIONS:

8. LED's are used for street and outdoor lighting.

9. LED's are used for architectural lighting.

10. LED's are used for ornamental and festival lighting.

11. To children, it could be something totally fascinating, and it is also an idea for a unique present.

TOPIC: FLASHING LIGHT LED ORNAMENTS – SPIRAL EFFECT.

Experiment No. 08

Title: To study the LED Ornaments.

TECHNICAL SPECIFICATIONS:
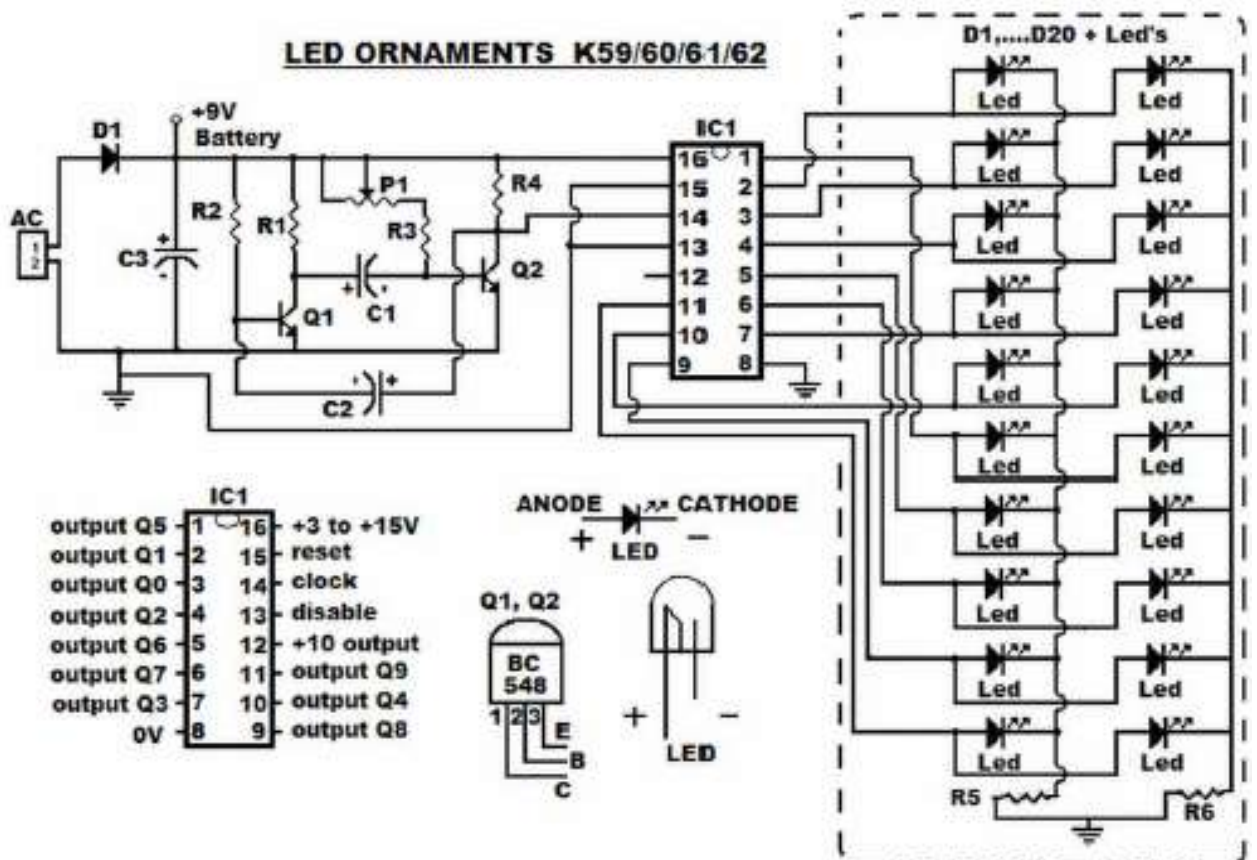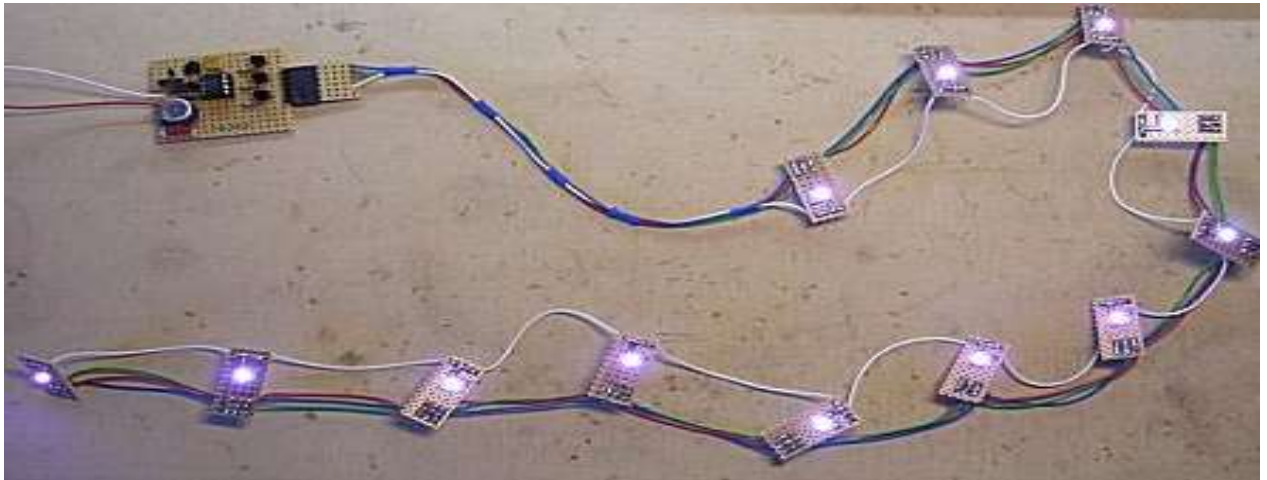
Operating Voltage: 9V DC

Maximum current: 100mA

COMPONENT LIST:

NAME	VALUE/ DESCRIPTION	SPECIFICATION
R1,3	1K8Ω	[Brown, Grey, Red]
R2,4	220Ω	[Red, Red, Brown]
R5,6	120Ω	[Brown, Red, Brown]
P1	47kΩ	Preset
C1,2	2.2μf/16V	Electrolytic Capacitor
C3	100μf/16V	Electrolytic Capacitor
IC1	CD4017	IC
	16 Pin	IC Socket
Q1,2	BC 548	Transistor
D1	1N4007	Rectifier Diode
9V	Snap	for connecting 9V Battery
D1 ….20	3mm Led	Red LED

DESCRIPTION:

Now a circuit does not necessarily, have to do anything, except may be play a game or simply look decorative. OF course, electronics is totally suited to this sort of task and, as we have always known, electronics can just be good fun. The purpose of this circuit is to make suitable for hanging or as an exclusive brooch.

CIRCUIT DIAGRAM:

CONSTRUCTION AND WORKING:

13. To construct Led ornament few basic components are required an oscillator for the flash timing, the divider and Led driver.

14. Decade counter IC CD 4017 is used as a divider circuit.

15. Connect the reset input (pin 15) to the ground. P1 is used to vary the speed of flashing LED.

16. Use 9V battery pack for power supply. If more current is required then use 100Ma 9Volts eliminator adapter.

17. The diffused colour types of LEDs are used. These have a wide viewing angle and remain visible from a distance.

18. The figure such as CROSS, SQUARE, CIRCLE, SPIRAL, STAR consists of a group of   LEDs arranged in a certain pattern.

APPLICATIONS:

12. LED's are used for street and outdoor lighting.

13. LED's are used for architectural lighting.

14. LED's are used for ornamental and festival lighting.

15. To children, it could be something totally fascinating, and it is also an idea for a unique present.

TOPIC: FLASHING LIGHT LED ORNAMENTS- SQUARE EFFECT.

Experiment No. 09

Title: To study the LED Ornaments.

TECHNICAL SPECIFICATIONS:
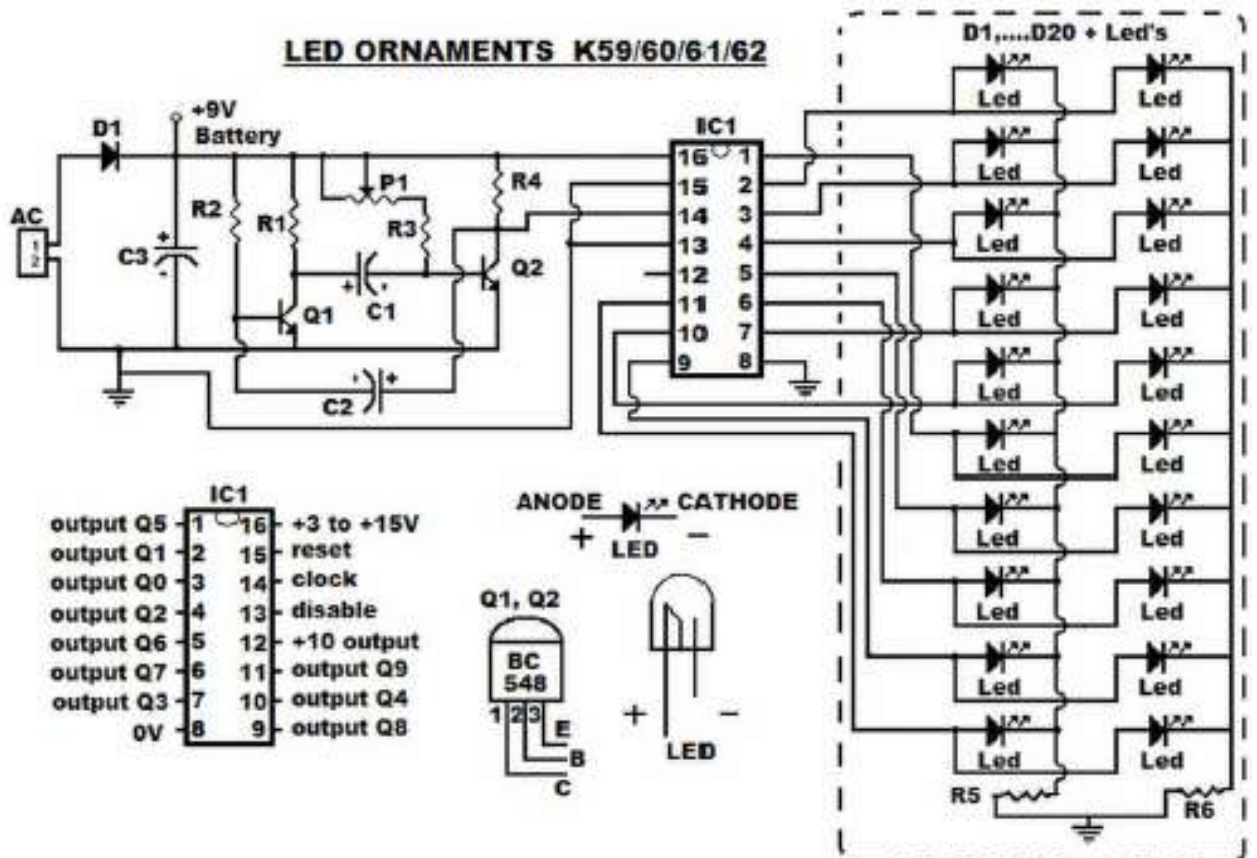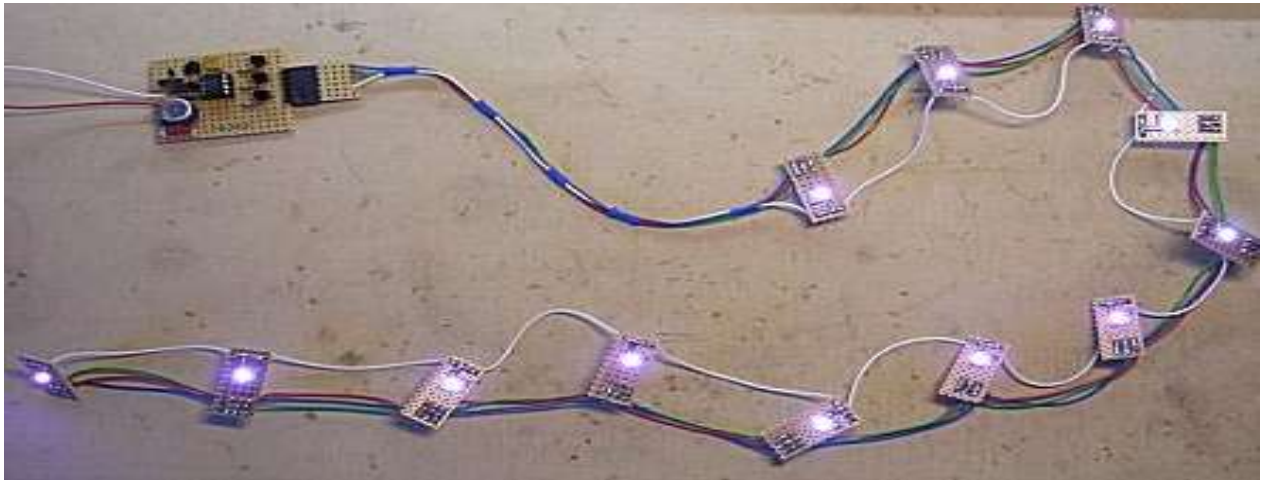
Operating Voltage: 9V DC

Maximum current: 100mA

COMPONENT LIST:

NAME	VALUE/ DESCRIPTION	SPECIFICATION
R1,3	1K8Ω	[Brown, Grey, Red]
R2,4	220Ω	[Red, Red, Brown]
R5,6	120Ω	[Brown, Red, Brown]
P1	47kΩ	Preset
C1,2	2.2μf/16V	Electrolytic Capacitor
C3	100μf/16V	Electrolytic Capacitor
IC1	CD4017	IC
	16 Pin	IC Socket
Q1,2	BC 548	Transistor
D1	1N4007	Rectifier Diode
9V	Snap	for connecting 9V Battery
D1 ….20	3mm Led	Red LED

DESCRIPTION:

Now a circuit does not necessarily, have to do anything, except may be play a game or simply look decorative. OF course, electronics is totally suited to this sort of task and, as we have always known, electronics can just be good fun. The purpose of this circuit is to make suitable for hanging or as an exclusive brooch.

CIRCUIT DIAGRAM:

LED ORNAMENTS K59/60/61/62

IC1	
output Q5 – 1	16 – +3 to +15V
output Q1 – 2	15 – reset
output Q0 – 3	14 – clock
output Q2 – 4	13 – disable
output Q6 – 5	12 – +10 output
output Q7 – 6	11 – output Q9
output Q3 – 7	10 – output Q4
0V – 8	9 – output Q8

ANODE ▷|◁ CATHODE
+ LED –

Q1, Q2
BC 548
1 2 3
E
B
C

LED
+ –

D1,....D20 + Led's

CONSTRUCTION AND WORKING:

19. To construct Led ornament few basic components are required an oscillator for the flash timing, the divider and Led driver.

20. Decade counter IC CD 4017 is used as a divider circuit.

21. Connect the reset input (pin 15) to the ground. P1 is used to vary the speed of flashing LED.

22. Use 9V battery pack for power supply. If more current is required then use 100Ma 9Volts eliminator adapter.

23. The diffused colour types of LEDs are used. These have a wide viewing angle and remain visible from a distance.

24. The figure such as CROSS, SQUARE, CIRCLE, SPIRAL, STAR consists of a group of LEDs arranged in a certain pattern.

APPLICATIONS:

16. LED's are used for street and outdoor lighting.

17. LED's are used for architectural lighting.

18. LED's are used for ornamental and festival lighting.

19. To children, it could be something totally fascinating, and it is also an idea for a unique present.

TOPIC: BURGLAR ALARM KITS

Experiment no. 10

Title: Catch Burglar All Time

General Description:

This project can be used in a variety of applications. Just place your hand on a door handle or a metal plate & the circuit will immediately sound an alarm. This is a touch-sensitive alarm unit, originally designed to hang on a doorknob and thus monitor the door. Whenever a potential thief touches the other side of the door, the alarm will briefly sound to warn the user. The new alarm can thus provide a degree of protection against an intruder in your home.

Technical Specifications :

Voltage: 9V DC / Solar Panel

Construction :

1) The entire circuit can be easily fit on a compact PCB.
2) A small aluminium foil is to be covered inside the cabinet.
3) The external shield ground point must be connected to that aluminium foil.
4) For using 9V adaptor supply, do not shield the ground point since the power supply itself should provide sufficient captive coupling to earth.

Working:

1) IC1a forms a simple oscillator with a nominal frequency of around 1MHz.
2) The oscillator output passes through a 15pF capacitor to IC1b, which is AC-coupled to a full-wave rectifier.
3) As long as the door handle untouched, the oscillator output will switch the input to IC1b above and below its two trigger voltages.
4) IC1b's output will switch alternately low and high at the clock rate to drive the rectifier.
5) If the door handle or metal plate is touched, most of the signal from the oscillator will be capacitively shunted to the shield ground that forms a pseudo earth.
6) The alarm will sound as long as contact is made with the handle.
7) Time delay network consists of a 4.7uF capacitor, a 470k variable resistor and a 1N4148 diode. It provides a minimum alarm time, if momentary contact is made with the touch plate.
8) The delay provided for alarm is 2-3 seconds. The delay can be increased or decreased by varying the above RC values.

9) Power for the unit is derived from a single 9V battery, with decoupling provided by a 4.7uF electrolytic capacitor.

Applications:

Door security, Office security**,** Touch pad for a sick person in case of emergency.

Circuit Diagram:
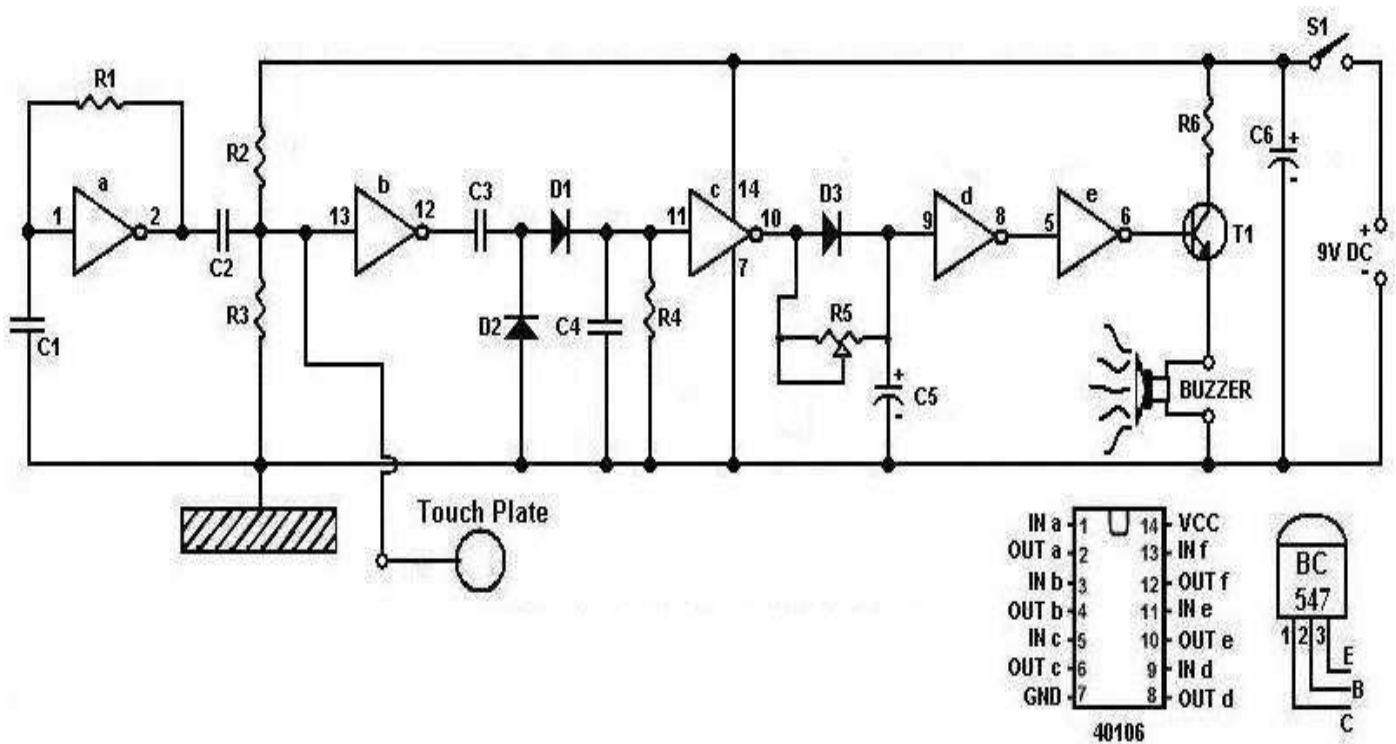
TOPIC: CLAP - CLAP SWITCH

Experiment No. 11

Title: CLAP SWITCH

General Description

This is a circuit that can be used to turn a device on and off by sound only, hand clapping, whistling etc. Can be used to turn the lights on and off, in security systems. When triggered the circuit will stay in the on or off condition till it is triggered again.

## Technical Specifications – Characteristics

Working voltage   : 230V AC Current   : 60mA
Contact Rating   : 3A/ 6A as per the kit selected.

Procedure
1) The circuit contains two stages first of which is a preamplifier using transistor Q1 for greater amplification of the microphone signals.
2) The second circuit contains 2 transistors Q2 & Q3 connected as a FLIP-FLOP. The flip-flop is triggered by the preamplifier's output and it triggers in turn the output transistor Q4 which controls the relay.
3) As you can easily see with each change of state of the FLIP-FLOP the output transistor will also be forced to change state being either on or off and this consequently turns the relay on or off.
4) The relay is of the changeover type and its contacts are rated for 220V / 3A / 6A as purchased. The microphone used in this project is of the condenser type for greater sensitivity.
5) The supply voltage required for the correct operation of the clap switch is 12 VDC and is provided by the transformer supplied in the KIT.
6) First of all you should place on the board the resistors the capacitors, the transistors & make sure that the electrolytic capacitors & diodes are connected the right way round because they are polarized.
7) Make a careful visual inspection for mistakes, shorts across adjacent tracks etc. and if everything seems to be all right
8) The transformer must be connected at points "12 ~ 0" and the relay contacts are marked as "RLY". Connect the power to the circuit and clap your hands in front of the microphone. The relay should click.

Application

1. Household application
2. Home Automation
3. Musical Show
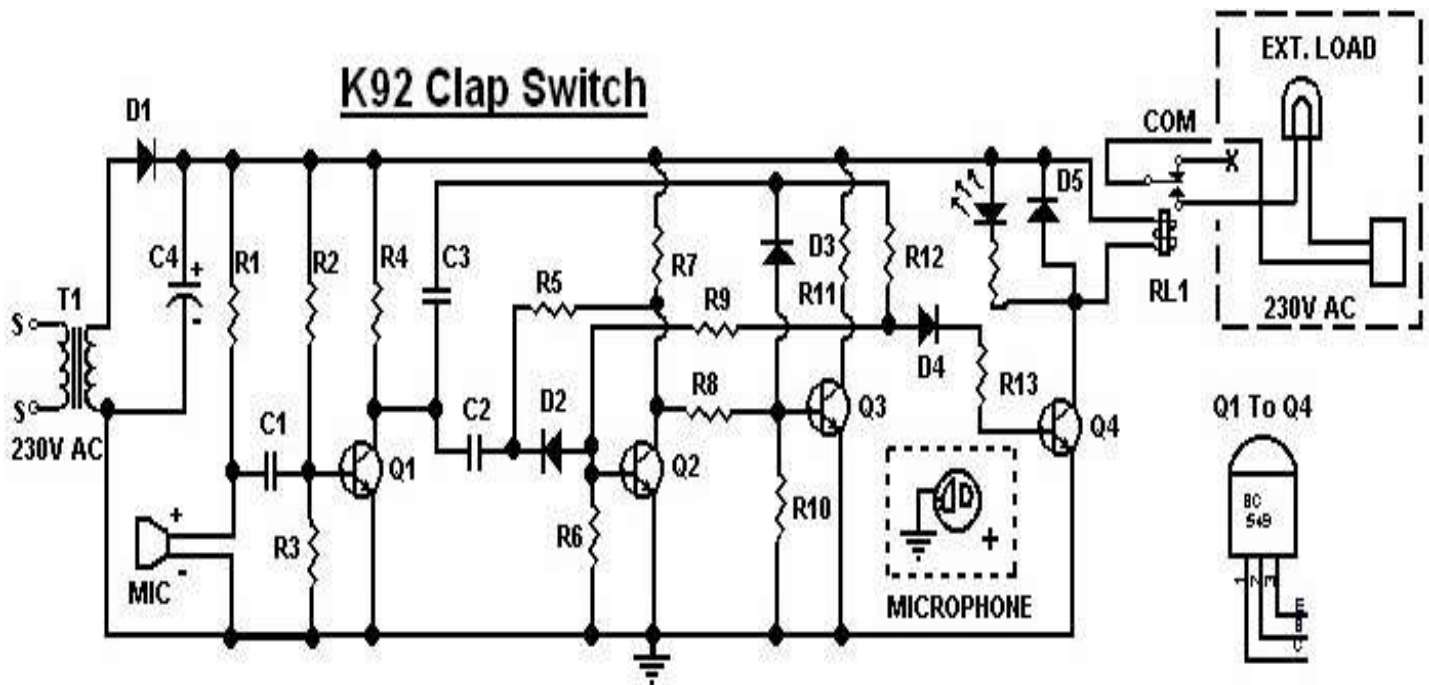
TOPIC: PRECISION 2 RANGE 555 TIMER

Experiment No: 12

## Title: To design a precision 2 range 555 timer

General description:

The circuit has the biggest advantage that it does not consume current even when the circuit is in off mode. The circuit is useful for providing controlled 'on' times for such equipment as photo enlargers, developers, small heaters, incandescent lamps, etc.

Component List:

Resistors	
R1	100K
R2	22K
R3	15K
RV1	1M Pot
RV2,3	10K Preset
Semiconductor	
IC1	555
D1	1N4007
D2	1N4007
Capacitors	
C1	10µf/25V
C2	100µf/25V
C3	0.1µf Disc
Misc	
PB1'2	Push On SW
SW1	2P 2W On/Off
RLY 1	12V/2CO pla make

How it work?

1. In this circuit time is varied by external pot meter RV1 & provides a 2 precision range of 0.9 Sec to 10 Second & 9 Sec to 100See (with SW1).
2. The timing can be increased by changing value of capacitor C1 to higher value (i e) 470uF.

Circuit Diagram:
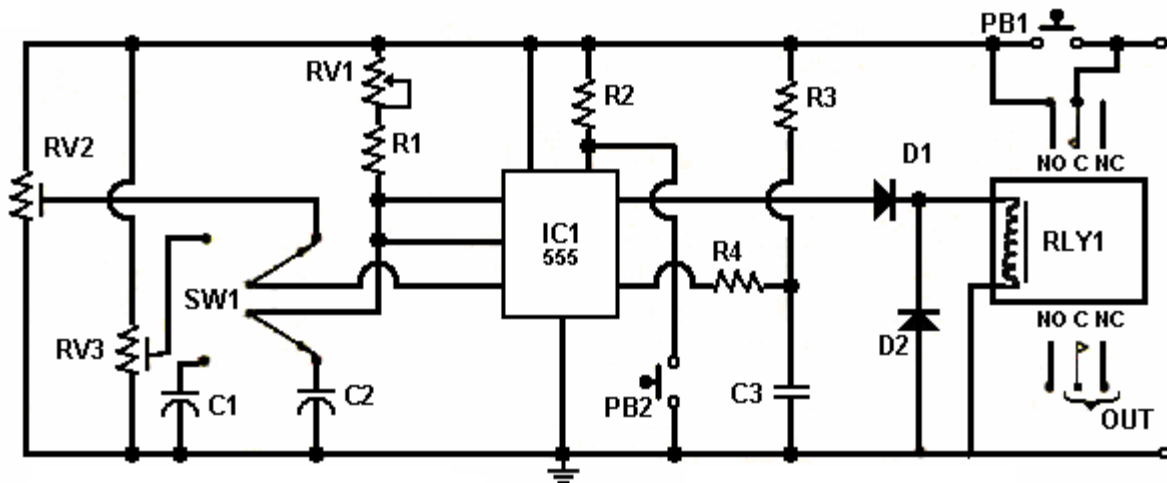
Construction:

1. The output at pin 3 is normally low and the relay is held closed (when switch PB 1 is triggered) for a time 1.1 * (R1 + R2) C1 and then released.

2. Power is fed to the timer circuit via PB1 or RL Y/1.

3. The timing cycle is initiated by closing PB1. At this moment, C3 is fully discharged and feeds a start pulse to the 555's pin 2 via R4, thus starting the timing cycle and driving relay RLA on.

4. By making contacts RLA1 close, it maintains the circuit's power connection even when PB1 is released.

5. RLA1 re-open, thus removing power from the timer circuit again.

6. The circuit's timing is controlled mainly by R1-RV1 and by C1 or C2.

7. To set up the circuit, first set RV1 to maximum value.

8. Set range switch SW1 to position 1, activate start button PB1, and adjust RV2 to give a timing period of precisely 10s.

9. Set SW1 to position 2, activate PB1, and adjust RV3 to give a timing period of 100s.

10. Adjustments are then complete, and the timing scale can be calibrated over the full 10/100s range.

Applications:-

1. In alarm circuits

2. In pulse width modulator

3. In digital clocks

TOPIC: LISTENING BUG

Experiment No: 13

Title: To design a listening bug for hearing adjoining conversation.

General Description:

It is a simple inexpensive and hi-fi device for listening to the conversation going on in an adjoining room or for the parents wishing to keep a strict, vigil on the activities of their children through the sound in children's room. It is one evening project for an experimenter.

Technical Specifications – Characteristics:

1. Working voltage: 9V DC / 9V BATTERY
2. Current: 60mA

Component List:

Sr. No.	Component	Specification	Details	Component	Specification	Details
1.	R1	3K3Ω	Orange ,Orange ,Red	C1	47Kpf	0.047μf/473
2.	R2	4.7K Ω	Yellow, violet ,red	C2	10μf/25V	Electrolytic Capacitor
3.	R3,4	10K Ω	Brown ,Black ,Orange	C3	220μf/16V	Electrolytic Capacitor
4.	P1	2.2MΩ	PRESET	C4	1000μf/16V	Electrolytic Capacitor
5.	Q1	BEL 187	Transistor	MIC	Condenser Mic	
6.	Q2	BEL 188	Transistor	SPK	8Ω/0.5W	Speaker
7.	IC 1	LM 741 8 pin	IC and IC Socket	SNAP	9V	Battery Snap

Circuit Diagram:
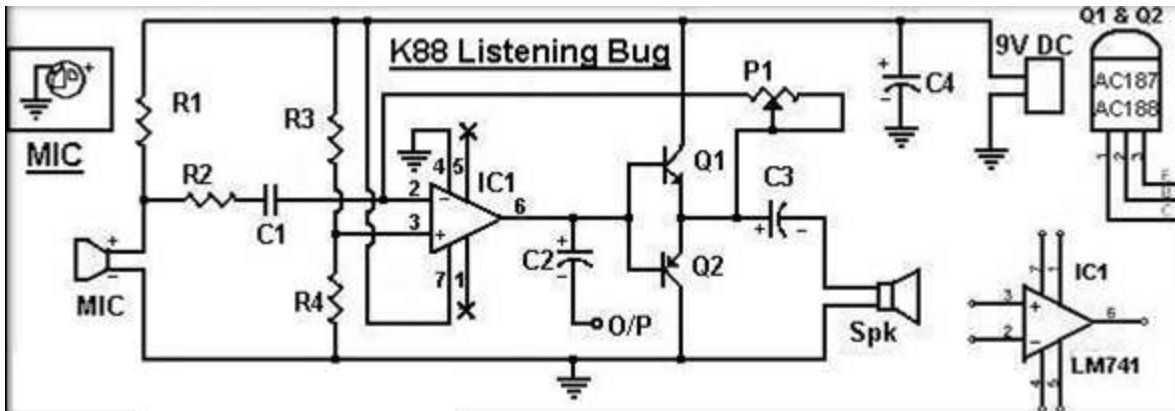
How it works?

1. The condenser microphone picks up the sound signals (even at a distance of 5 meters from the mike), and converted into electrical variations.
2. These are amplified by the op-amp IC 741 used in the inverting mode with a single supply using divider network of resistors.
3. Varying the feedback through 2.2M_ preset can set the gain of IC 741.
4. The output of IC 741 is further amplified using transistors BC 187/188 pair.
5. A shielded wire should be used to suppress hum for carrying the output signal.
6. Alternatively, from point C onwards, the amplifier can be dispensed with by feeding the output of the IC 741 to the pick-up point of an ordinary transistor radio.

Construction:

1. Place the resistors, the capacitors, and the transistors on the board.
2. Make sure that the electrolytic capacitors & diodes are connected the right way because they are polarized.
3. The supply voltage required for the correct operation of the LISTNING BUG is 9VDC. We can use 9v battery.
4. The battery snap must be connected at points "VCC (+) / GND (-)" and the microphone contacts are marked as "MIC".
5. The microphone, speaker and preset to be connected with a wire.

Applications:

1. In cell phones with camera
2. In military services
3. In RF signal detector

TOPIC: SIMPLE PHASE CONTROLLED LIGHT DIMMER FOR PORTABLE APPLICATIONS

Experiment No. : 14

## Title: To study simple Triac Light Dimmer construction

TECHNICAL SPECIFICATION:

Working voltage: 230V AC

Current: 4amp

.

COMPONENT LIST:

NAME	VALUE\DESCRIPTION	SPECIFICATION
R1	68KΩ	Blue, Gray, OrangE
R2	270Ω	Red, Violet, Brown
R3	10KΩ	Brown, Black, Orange
P1	100KΩ	Present
P2	470KΩ	Linear Carbon Potentiometer
C1, C2	330nf/400V	Paper Polyster Capacitor
C3	27nf or 33nf/400V	Paper Polyster Capacitor
Tri	BT136	Triac
D1	DB3	Diac
	PI-41	Heastink for Triac

CIRCUIT DIAGRAM:
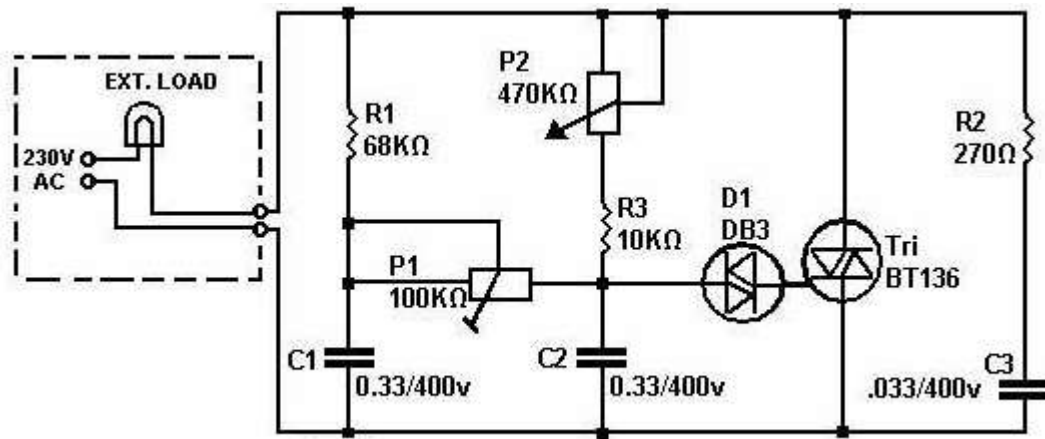
CONSTRUCTION & WORKING:

1] The printed circuit board to be used is very compact and can easily be square type mounting switch panel or in a small box for portable applications.

2] The safety point to be note is that no part of the circuit should be accessible from the outside. The case should preferably be made of plastic or other insulating material, and fixing screws for the board should be made up of nylon.

3] If a metal case is used the board must be adequately insulated from it.

4] The potentiometer should have a plastic spindle.

5] The circuit operates on the phase-control principle. The main control is provided by P2.

6] This determines the rate at which C2 charges and hence the point along the mains waveform at which the voltage onC2 reaches the breakdown voltage of the Diac, which is when the used as a fine brightness control.

7] Interference suppression is provided by R2 and C3.

APPLICATIONS:

I.   This simple triac dimmer can be used to control incandescent filament lamps up to 1000W.

II.   Low power TRIACs are used in many applications such as <u>light</u> <u>dimmers</u>, speed controls for <u>electric fans</u> and other <u>electric motors</u>.

III.   Used in the modern computerized control circuits of many household <u>small</u> and <u>major</u> <u>appliances</u>.

TOPIC: IC-723 AS VOLTAGE REGULATOR

Experiment No: 15

Title: To study simple construction of Bench Power Supply 0-30Volt/1Amp power supply Circuit.

TECHNICAL SPECIFICATION:

Working voltage: 0-30V AC   Current: 1amp

COMPONENT LIST:
RESISTORS:

NAME	VALUE/DESCRIPTION
R1	2K2 Ω 1 W
R2	560Ω 1/2W
R3,R9	2K2 Ω 1/2W
R4	10KΩ 1/2W
R5	1K2Ω 1/2W
R6	1KV 1/2W
R7	100 Ω 1/2W
R8	0.33Ω
P1	10K PRESENT
P2	10K LIN
P3	1K LIN

CAPACITORS:

NAME	VALUE\DESCRIPTION
C1	100 µf/63V
C2	470 µf/40V
C3	1000µf/63V
C4	1Kpf
C5	100 µf/35V

SEMI-CONDUCTORS:

NAME	VALUE/SPECIFICATION
D1,D2,D6,D7	1N4002
D8…..D11	1N4002
D3	33 V/1 W ZENER
D4	4 V 7/1 W ZENER
D5	LED
T1	BC1578
T2	BC141 OR
T3	2N3055
TC1	723

SUNDRIES:

NAME	VALUE/SPECIFICATION
F1	1 amp. Fuse
TRL	30 V/ 1Amp. Transformer
Panel meter	As desired
Heatsink	For T-3 Transistor

CIRCUIT DIAGRAM:

Bench Power Supply 0-30V / 1Amp
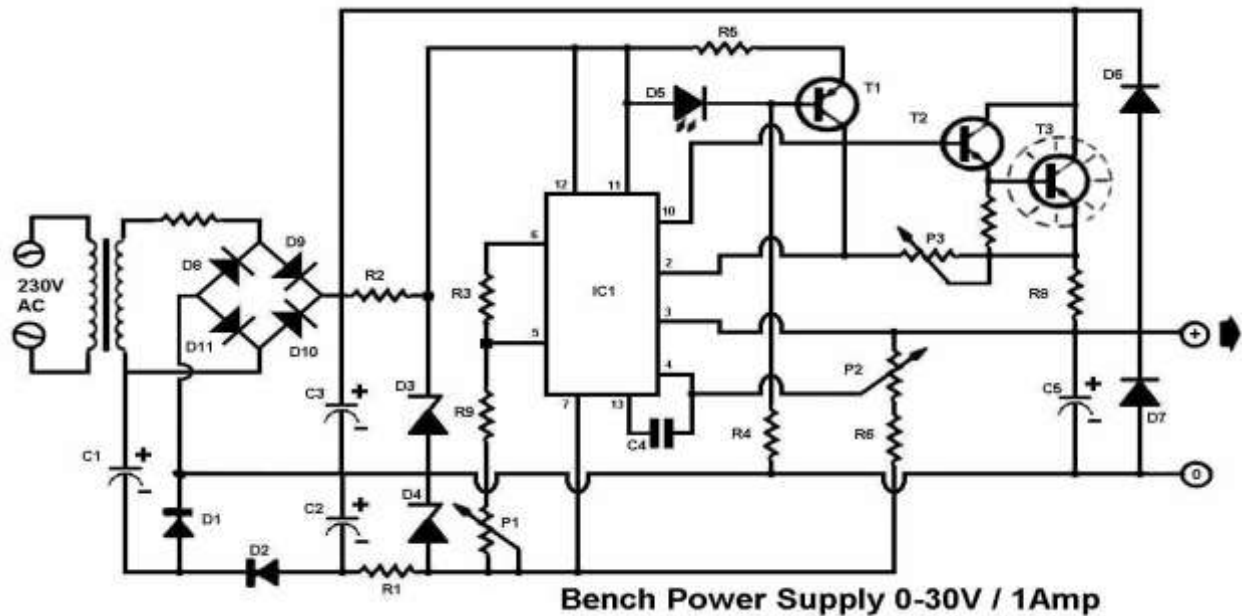
CONSTRUCTION & WORKING:

1. This laboratory power supply offers excellent line and load regulation and an output voltage continuously variable from 0 to 30 V at output currents up to one amp.
2. The output is current limited and protected against output fault conditions such as reverse voltage or over voltage applied to the output terminals.
3. The circuit is based on the well-known 723 I C regulator. As readers who have, used this IC will know the minimum output voltage normally obtainable from this IC is + 2V relative to the V – terminal of the device (which is normally connected to 0V).
4. The problem can be overcome by connecting the V - pin to a negative potential of at least - 2V, so that the output voltage can swing down to + 2V relative to this. i.e. to zero volts.

5. To avoid the necessity for a transformer with multiple secondary windings the auxiliary negative supply is obtained using a voltage doublers arrangement comprising C1, C2, D1 and D2 and is stabilized at - 4.7 V by R1 and D4.
6. The use of -4.7 V rather than -2 V means that the differential amplifier in the 723 is still operating well within its common-mode range even when the output voltage is zero.
7. The main positive supply voltage is obtained from the transformer via bridge rectifier B1 and reservoir capacitorC3. The supply to the 723 is stabilized at 33V by D3 to prevent its maximum supply rating being exceeded and a Darlington pair T2/T3 boosts the output current capability to 1A.
8. The current limit is continuously variable by means of P3.The output voltage may be adjusted using P2, while preset P1 is used to set zero output voltage.
9. The supply is protected against reverse polarity being applied to the output terminals by D7, and against over voltages up to 63 V by D6.To set the output voltage to zero P2 is first turned anticlockwise (wiper towards R8) and P1 is then adjusted until the output voltage is zero.
10. With P2 turned fully clockwise the output voltages should then be approximately 30V. If due to component tolerance, the maximum output is less than 30 V the value of R6 may require slight reduction.
11. When constructing the circuit particular cares should be taken to ensure that the 0 V rail is of low resistance (heavy gauge wire or wide p.c.b. track) as voltage drops along this line can cause poor regulation and ripple at the output.

APPLICATIONS:

1. The IC-723 voltage regulator is commonly used for series voltage regulator applications.
2. It can be used as both positive and negative voltage regulator. It has an ability to provide up to 150 mA of current to the load, but this can be increased more than 10A by using power transistors.
3. It also comes with comparatively low standby current drain, and provision is made for either linear or fold-back current limiting.
4. LM723 IC can also be used as a temperature controller, current regulator or shunt regulator and it is available in both Dual-In-Line and Metal Can packages. The input voltage ranges from 9.5 to 40V and it can regulate voltage from 2V to 37V.

TOPIC: GENERATING IDEAL POWER SUPPLY

Experiment No: 16

Title: To study 78 xx regulated power supply

TECHNICAL SPECIFICATION:
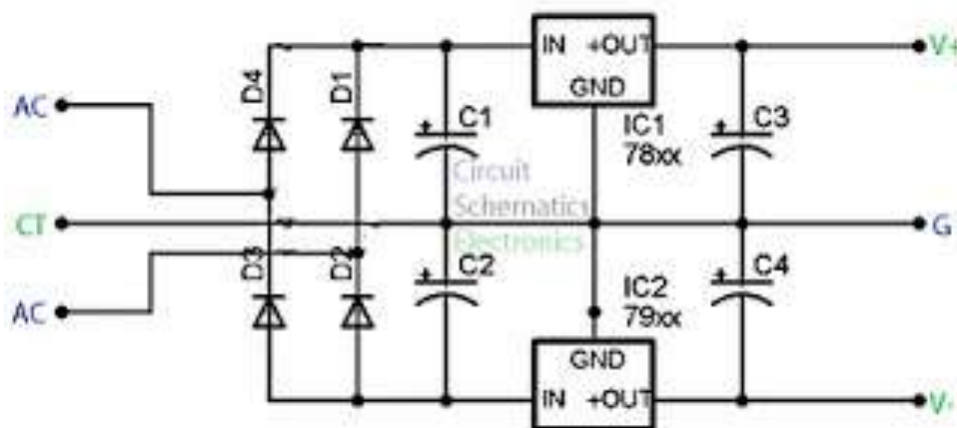
Working voltage: As per kit selected

Current: 1amp
Internal Thermal overload protection.
Internal short circuit protection.

.

COMPONENT LIST:

NAME	VALUE\DESCRIPTION	SPECIFICATION
C1…C4	1N4007	Rectifier Diode
C1...C2	0.1µF	Disc Cap
C3	2200 µF/25V	Electrolytic Cap
IC1	78XX	Regulated IC
	HEATSINK	PI49 for IC1

CIRCUIT DIAGRAM:

CONSTRUCTION & WORKING:

1] The circuit is very simple really as it makes use of voltage regulator IC.

2] This is a revolutionary device which has simplified power supply designs very much as it has eliminated the need of complicated transistors regulated supplies has lowered power consumption and the current handling capability of the circuits which makes use of IC regulators is much better(for similar size and cost) than their transistor equivalents.

3] The input voltage should be slightly higher than the desired output (by 3-4V) and usually this is automatically taken care of if the transformer used has the same secondary voltage as the required DC output from the circuit.

4] As the rectified DC voltage is approximately 1.44 times higher than the AC input there is plenty of headroom for the regulators needs.

5] There is nothing especially difficult with the construction of this project.

6] The components are few and their places are clearly marked on the Printed Circuit Board.

7] Care should be taken to place the polarized components correctly in their places. If we only going to draw a maximum current of 500 ma from the circuit there is no need to use a Heatsink.

8] If however we need heavier currents please use a Heatsink and a transformer that is accordingly rated.

9] Maximum current in circuit can supply is up to 1 Amp if regulator is mounted on an adequate Heatsink.

APPLICATIONS:

Applicable for ideal power supply devices (circuits) and it can deliver 5/6/8/9/12/15/18/24 VDC in its output with current rating of 1Amp

TOPIC: QUIZ-MASTER

Experiment No. 17

Title: Impartial Electronic Quizmaster

General Description:

In many quiz games, it is important to be able to determine who is the first to reply to a question. To avoid disputes and familiar arguments, the simplest approach is to use an impartial electronic 'quizmaster'.

Technical specifications :

Working Voltage : 9V DC / Solar Panel
Current : 30mA

Component List :

Name	Value	Description / Specification
R1-R8	2kΩ	Red, Red, Red
R9-R12	22kΩ	Red, Red, Orange
R13-R16	330Ω	Orange, Orange, Black
T1-T4	-	Transistor BC147
S1-S5	-	Pushbutton Switch
C1-C4	4.7kpF	Capacitor
D1-D4	-	LED, Red, 5mm
N1, N2	-	IC4012
FF1-FF4	-	IC4013

Construction :

1) If desired, the pushbutton switches can be connected to the board via long wires.
2) The relatively low impedance of the pulse former networks ensures that hum and other types of inductive interference are sufficiently suppressed.
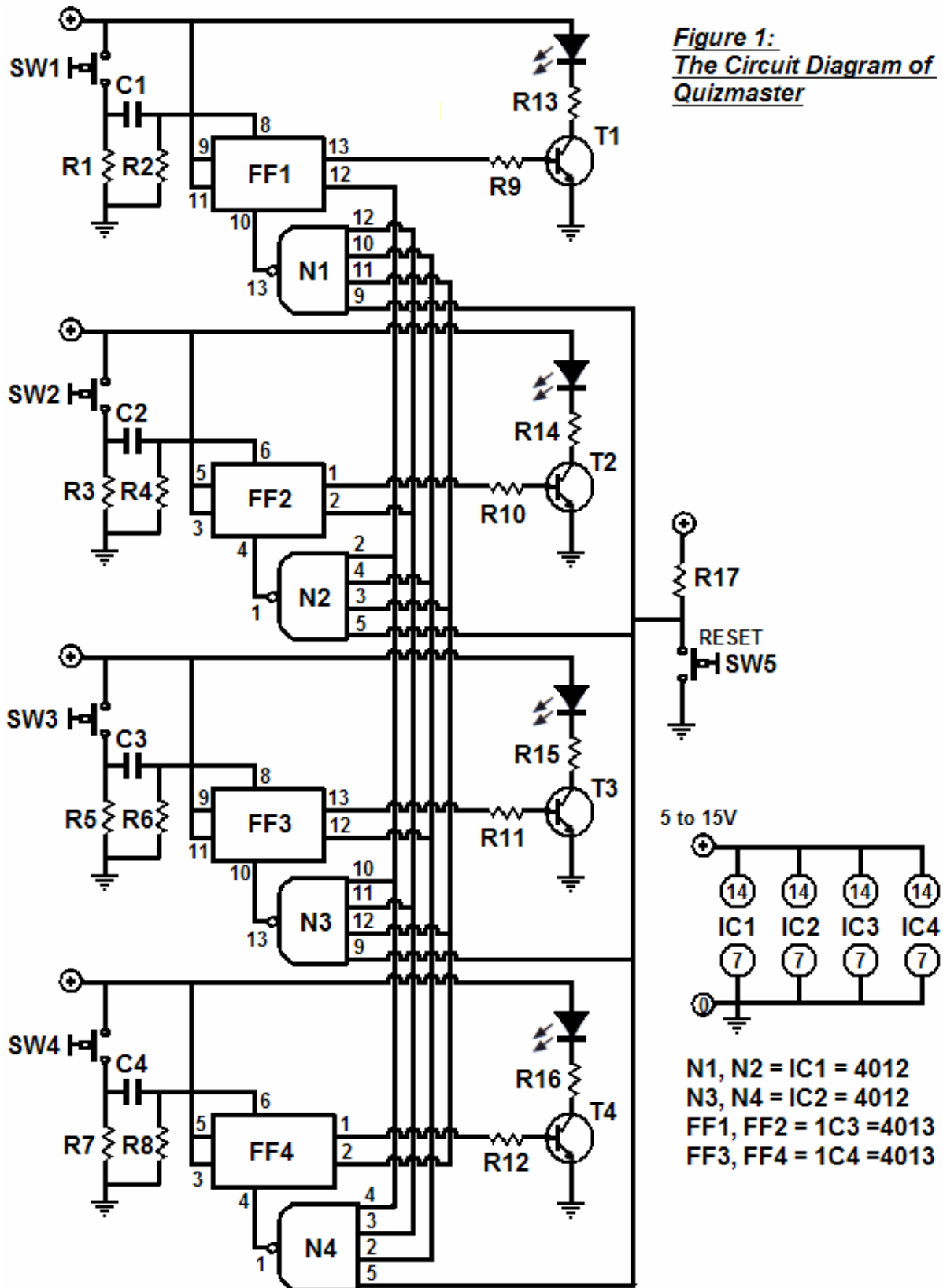3) If needed, the resistor values of these networks can be reduced to 1k.

Working :

1) The arrangement shown is for 4 players, however, the design can be extended for any number of competitors.
2) The operation of the circuit is extremely simple. Each of the modules shown in figure 1 consists of a flip-flop which is set by means of a pushbutton switch.
3) The Q output of each of the flip-flops is connected via NAND gate to the reset input of each of the other flip-flops.
4) As soon as one flip-flop is set, the remaining flip-flops will therefore be inhibited, since their reset inputs are held high.
5) The Q output of the flip-flop which has been set goes high, turning on the associated transistor and lighting a LED thus providing a visual indication of which pushbutton was pressed first.
6 The circuit is reset for the next round by pressing S5.
7) The RC network at the input of each stage is simply a pulse former which prevents undefined logic states occurring in the event of both the set and reset inputs of the flip-flop being high at the same time.
8) It is a simple matter to extend the circuit to accommodate more than four competitors.
9) For each additional person an extra flip-flop circuit is needed and the number of inputs to the NAND gates must be increased accordingly.
10) The printed circuit board was designed to use a CD 4068 which is an 8-input NAND gate.
11) It may be more convenient to use a 4-Input NAND (MC14012, CD4012.
12) This configuration is equivalent to a 6-input NAND, excluding the reset input and would therefore be suitable for seven competitors.
13) It must be remembered that any unused inputs should be connected to the positive supply.

Applications :

1. Quiz competitions
2. Group competitions for singing, etc.

Circuit Diagram :

Figure 1:
The Circuit Diagram of
Quizmaster

5 to 15V

N1, N2 = IC1 = 4012
N3, N4 = IC2 = 4012
FF1, FF2 = 1C3 =4013
FF3, FF4 = 1C4 =4013

TOPIC: INFRARED LIGHT BEAM ALARM

Experiment No. 18

Title: INFRARED LIGHT BEAM ALARM

General Description
The invisibility of infrared beam also makes it ideal for use as a Burglar Alarm. The unit could be positioned across an appropriate doorway or even across a whole room. So that when the invisible beam is broken by an intruder, an alarm is activated. Since the unit is battery powered it is

Technical Specifications
Working voltage:230V   AC Current:250mA

Procedure

Transmitter
The source of light in the transmitter is and infrared LED and rather than merely providing a continuous source of light, it is flashed on and off at about 10Khz. This is done so that the receiver can selectively amplify the signal from the transmitter and completely reject ambient light. The standard oscillator is used in the transmitter. The frequency of the oscillator is determined by the 4.7KΩ Resistor (R3) & 0.0068μf Capacitor (C2) and is normally around 10Khz. The oscillator drives an output stage consisting of a transistor T1 and a infrared Light Emitting Diode.

Receiver
Infrared light generated by the LED's is picked up at the receiver by a special infrared PHOTO-DIODE. Referring to the circuit diagram of the receiver, the PHOTO - DIODE is connected with its cathode to the +9V rail via an RC de-coupling network, while the anode is connected via a 470KΩ Resistor (R6) to the ground. In operation the photo - transistor acts as a current source, i.e. it generates a current proportional to the incident light. This current signal is converted to a voltage signal by the 470KΩ Resistor (R6). The signal from the photo transistor is fed to the input of T2 a FET. The FET offers a high input impedance, a low output impedance, output of FET is fed to a band pass filter consisting of a transistor T3 and T4. The centre frequency of the filter is about 10Khz and it has a Q of 10 i.e., the bandwidth is 1Khz. This bandwidth is wide enough to pass the 10khz signal from the transmitter, even allowing for some mistuning, yet it effectively eliminates interference from the other sources (e.g. fluorescent lights). Disregarding the two 0.0068μf capacitors (C5, C6) for the moment, T3 and T4 form a two stage inverting amplifier. Both transistors operate as common emitter amplifier, with the second stage providing two separate outputs, one from the junction of the two 330Ω resistors (R18).

Completely portable and easy to set up in any location. Alternatively, the unit can be powered from a 9V DC Adaptor and the battery can be used as a

backup.   Conventional   applications such as Shop Entry indicator are also possible, or it could be used to automatically open and close doors.

(R19) and the second from T4's collector. The first output has a low impedance and is used to drive the filter and to provide DC feedback via the 47KΩ resistor (R17) to bias T3.

As already mentioned, the amplifier is used as "multiple feedback" band pass filter. The filter components   are   the   two   0.0068uf   capacitors (C5,C6) and the 47KΩ bias resistor (R17) which, together with the low output   impedance of the previous FET   stage,   determine   the   centre frequency and Q of the filter. The collector output of T4 provides an amplified version of the filter output. This output is DC coupled to the next stage, which consists of transistor T5 in another common emitter amplifier circuit. A 0.1μf emitter bypass capacitor 9 (C7) is included to provide further attenuation of unwanted low frequency signals. Following T5 the signal is coupled to IC2. When the signal peaks from T5 the device purifies the signal & generates a constant 10khz output. To convert the presence or absence of 10Khz signal into a simple high or low signal, the output of IC2 is rectified & filtered by two IN4148 diodes (D1,D2) the 0.0022μf (C9) & 0.01μf (C10) capacitors & a 100KΩ resistor(R15).

The signal given by IC2 is a logic high when the beam is broken or a logic low when the beam is intact. It must be noted that the output of Alarm is high only when the beam is broken. If the beam is broken momentarily, the Alarm time be very short. To overcome this problem we have a pulse extender circuit consisting of a IN4148 (D3) a 1MΩ Resistor (R16) & a 1uf tantalum capacitor (C11).The length of the pulse to the input of IC2 will thus be at least as long as the time constant or the 1 MΩ

Construction

Note the IR LED & photo transistor both of them have their sensitive area on their tip and their anode lead is longer than cathode. When the unit is fully assembled the photo transistor must be kept about 20mm from the light beam entry hole of the box. This does not reduce the range of the unit, but is intended to prevent direct light from falling on the photo transistor & thus reducing the sensitivity. We still found that when used outdoors, strong sunlight reduces the range of the unit, but this can be readily.

Testing

When the transmitter & the receiver are completely assembled, the combination can then be tested as follows: resistor (R16) & Capacitor (C11). If C11 is 1μf time constant is 2 seconds. The only additional points to be noted are the optional 9V DC supply and the used of the several decoupling capacitors in the supply to prevent feedback in the amplifier section. Thus this extended pulse is then given to a driver transistor T6 to drive it ON, when the beam is broken.

The collector output is given to a Buzzer to trip an Alarm. cured by fitting a small tube non-reflective material 20-30mm in diameter of about 50mm long in front of the receiver. The range of the unit i.e. the maximum distance between transmitter and receiver is almost about 5 to 7 feet. No lenses are used and no adjustment of sensitivity is required just point the transmitter in the general direction of the receiver and you are in business. If greater range is desired, the transmitter current can be increased

1. Switch the Receiver ON,
2. When the transmitter is OFF the Buzzer should turn ON.
3. Now Switch the transmitter ON & aim it at the receiver the Buzzer should Stop.
4. Finally, check that the Buzzer is activated whenever the beam is interrupted.
5. Finally, check that the Buzzer is activated whenever the beam is interrupted.
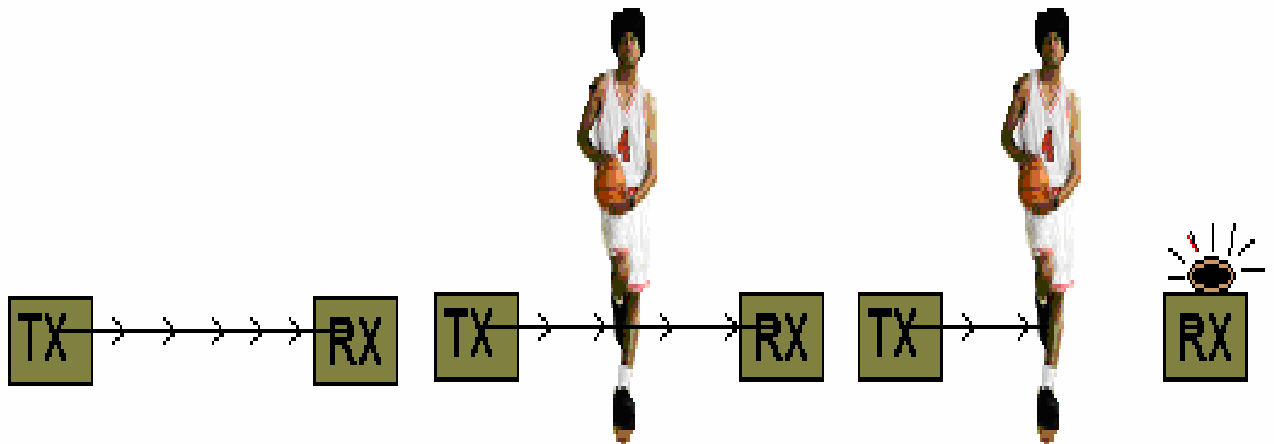
Application

1. Doorway Beam Sensor,
2. Border Patrol door entry alarm.
3. Wireless driveway alarm.

Circuit Diagram
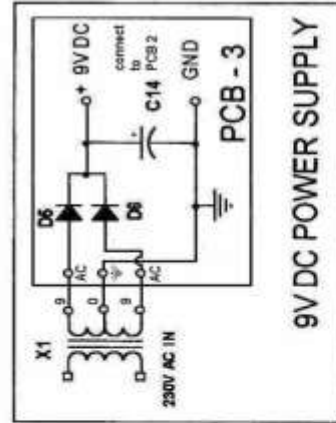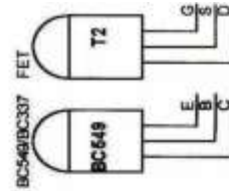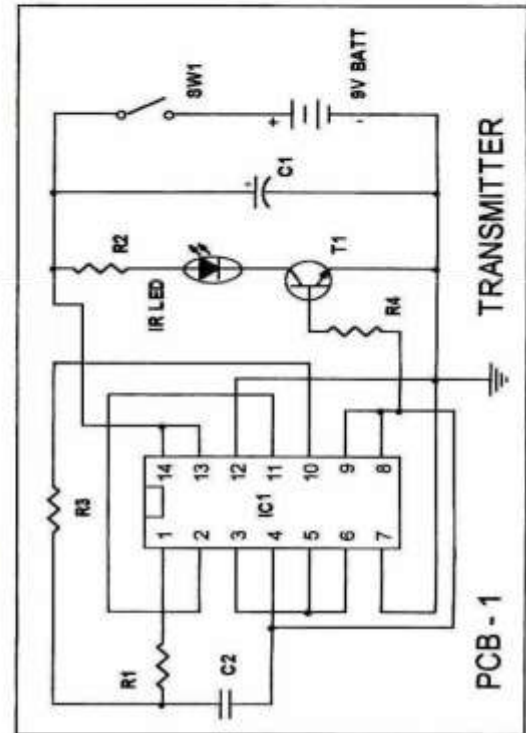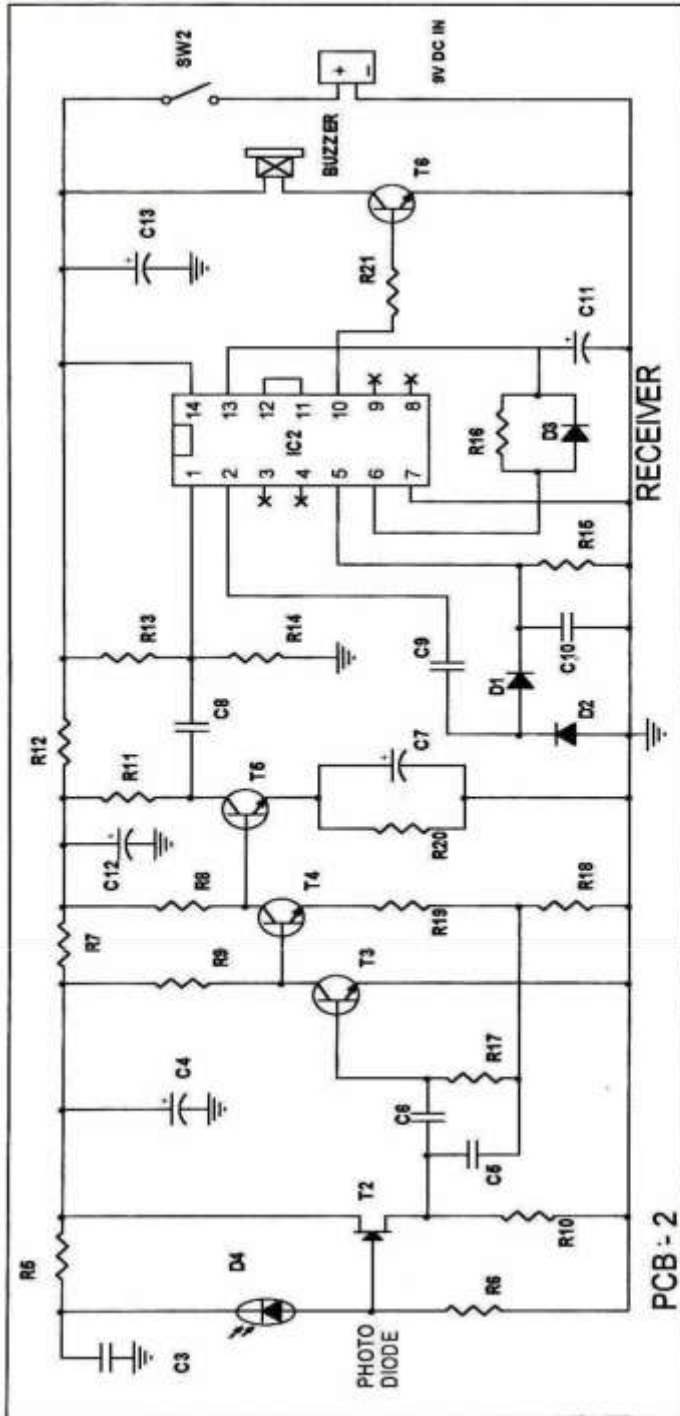
TOPIC: ULTRASONIC MOVEMENT DETECTOR RELAY

Experiment No. 19

Title: Ultrasonic Movement Detector Relay

General Description

This movement detector is built around a matched pair of ceramic transducers, which convert movement energy to electrical energy and vice versa. The operating frequency of the pair is 40KHz. Any movement in the area scanned by the pair of transducers will be detected and a 6V pulse is produced. In this kit, the pulse turns on an LED.

Technical Specifications

Working voltage : 9V DC Current : 100 mA

Procedure

Two NAND Schmidt trigger circuits are connected as a multi-vibrator circuit that delivers square wave pulses to the transmitter unit. The frequency can range from about 11 kHz to 55 kHz and is controlled by a 50K-(R20) preset. The receiver uses a similar transducer to receive the signals that are reflected back to it. The electrical signals produced by it are then amplified by transistor T3. They are further amplified by the op-amp IC1 that also references the negative peaks of the signal to a predetermined DC level. The output of IC1 is inverting input of IC2. The feedback circuit on this op-amp can be adjusted by the sensitivity preset to control there is no change in incoming signal level IC2 quickly adjusts to a steady high output. Sound waves reflected by different objects arrive at the receiver in different phases. If they are in phase they add to create a larger signal. If they are out of phase they cancel to give a smaller signal. As an object moves towards or away from the RX unit by a small distance (about1 cm) it causes the receiver signal to cycle through a high/low cycle. It is this change from in-phase to out-of-phase which triggers the unit. The steady high output of IC2 is pulled down causing the NAND gate output to go high. The high turns on the Darlington arrangement of transistors, which turns on the LED. This 6V signal is available at Pads 1 and 2 where it can be taken to manage other devices such as relays, buzzers opto-couplers etc.

Construction

The most important thing is to make sure the Ultrasonic Transmitter (TX) and Receiver (Rx) units are put into their correct positions on the small circuit board. If they are mixed up then it will damage the receiver. The transmitter is marked with 'S'/'T'. The receiver is marked with 'R'. To make soldering easier, gently scrape the leads of each unit before soldering. The second most important thing is to connect the earth/case Rx sensor pin (it is the pin which is connected to the metal case) to earth pad of the 'TO RECEIVER' pads on the main circuit board. The earth pad is the TOP pad.

The polarity of the TX unit is not important in this circuit. It can be connected either way around. The circuit is very sensitive. Separate the two wires going to the two ultrasonic units to prevent electrical crosstalk between them. If you want to locate the unit's more than 1-2 feet from the PCB then you should use coaxial cable to shield the two transducers. With these points to keep in mind assembly is straightforward and components may be added to the PCB in any order. Generally it is best to solder the lowest height components first such as the resistors and IC Sockets.   Then move on to the physically taller components.   Note in particular the polarity of the electrolytic capacitors, the IC's and the diodes. As mentioned clean the leads of the TX and Rx units so soldering is quick and easy.   Do not overheat the ultrasonic units during soldering.

 Separate the two wires going to the two ultrasonic units to prevent electrical crosstalk between them. If you want to locate the unit's more than 1-2 feet from the PCB then you should use coaxial cable to shield the two transducers. With these points to keep in mind assembly is straightforward and components may be added to the PCB in any order.
        Generally it is best to solder the lowest height components first such as the resistors and IC Sockets.   Then move on to the physically taller components.   Note in particular the polarity of the electrolytic capacitors, the IC's and the diodes. As mentioned clean the leads of the TX and Rx units so soldering is quick and easy.   Do not overheat the ultrasonic units during soldering.

 Adjust the position slights towards the 10 O'clock position then try again. Move further away about 1 to 2 meters and try again. There will be one particular position, which is most sensitive at about 2 meters.   Also simultaneously adjust the sensitivity control as well either on way or the other. No more than 2-3 minutes should be needed to calibrate the unit in this way. If you have a CRO (Cathode Ray Oscilloscope) then you can very easily do the calibration by displaying the signal from the TX.

What To Do If It Does Not Work

Poor soldering is the most likely reason that circuit does not work. Check all solder joints carefully under a good light. Next, check that all components are in their correct position on the PCB especially diodes, electrolytic capacitors, and IC's. If you put in the TX/Rx around the wrong way they have. Probably been damaged. Did you CALIBRATE the transmitter? Check the transmitter is working. The easiest way to do this is to use a CRO to check that a DC pulse wave is being fed into the TX unit or a portable frequency meter held in front of the TX unit

Application

1. Burglar Alarms.
    2. People Counter device.
   3. High security safe system.

Circuit Diagram
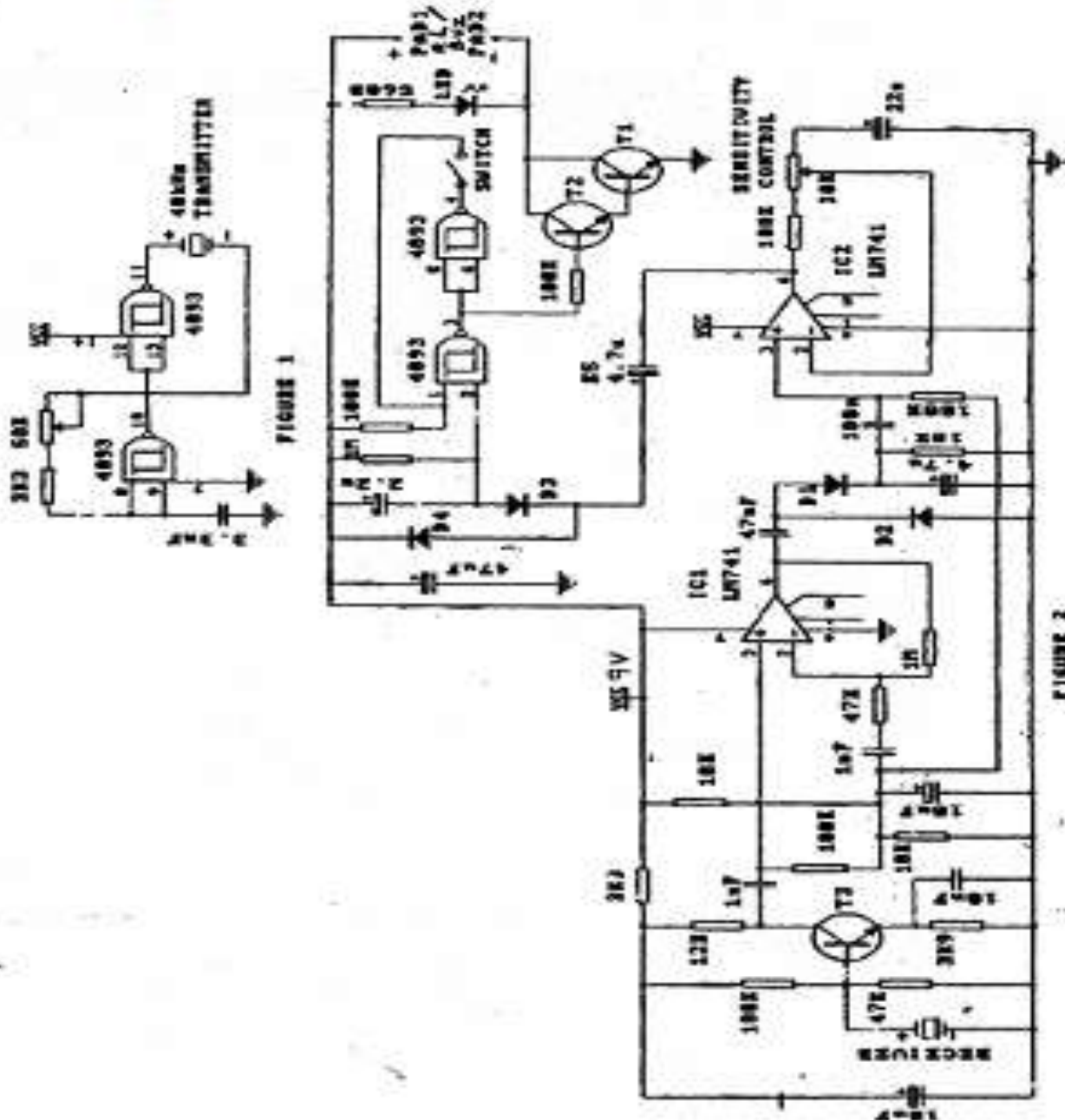
TOPIC: TIMER WITH AUDIBLE WARNING

Experiment No: 20

Title: Timer IC 4060 for Audible warning

Component list:

|						
R1	2.2MΩ	Red Red Green		C1*		
R2	18KΩ	Brown Gray Orange		C2	0.01µF	Disc cap [103/10KPF]
R3,5	1KΩ	Brown Black Red		T1	BC 547	Transistor
R4	1MΩ	Brown Black Green		D1	LED	5mm Red
P1*				BZ1	Buzzer	PIEZO 27CTS
1C1	4060	IC		S1	Switch	SPST
	16 Pin	IC Socket			SNAP	For 9V Battery Supply
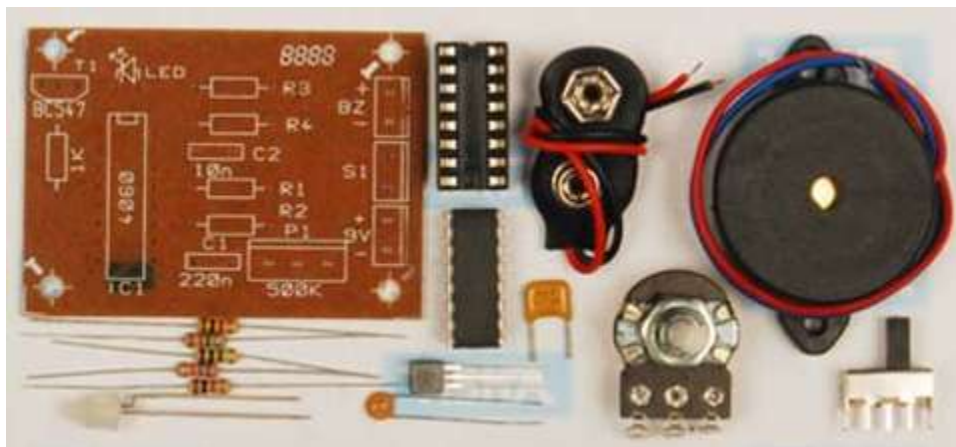
Technical Specifications:

Working Voltage   : 9V DC

Circuit Current   : 10mA

Contact rating of relay   : 6Amps

Circuit Diagram:-
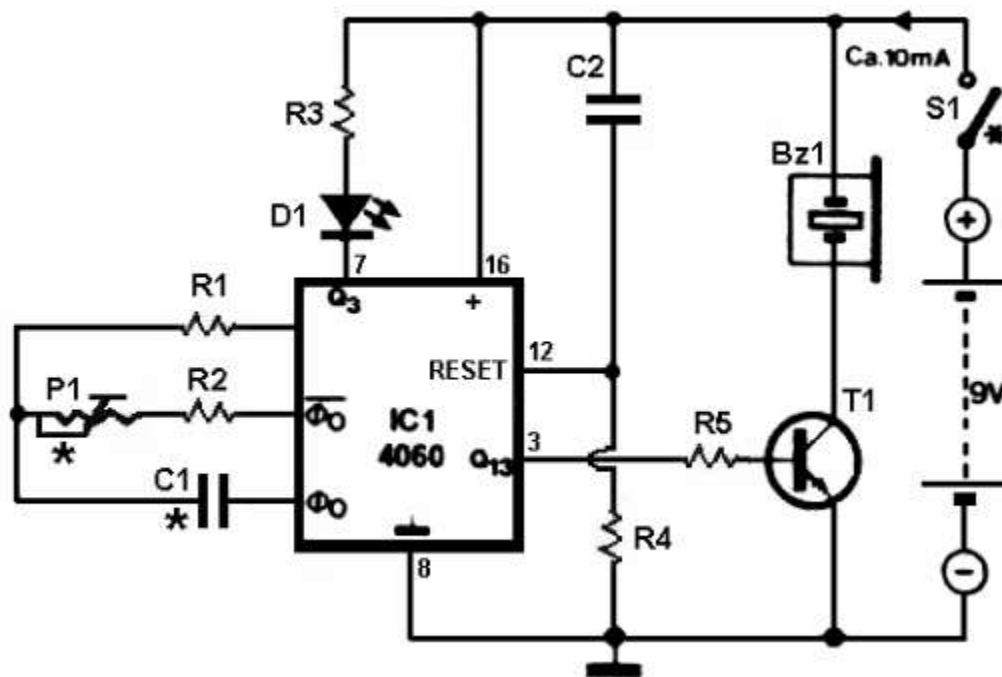
Theory:

- When the circuit is switched on with S1 the pulse at junction R4-C2 resets counter and counting starts.

- When count reaches bit 14 (Q13), pin 3 goes high so that self oscillating piezo-electric buzzer a 12V type is turn on via driver T1.

- The time delay is set with aid of P1. Time delays of between one minute and two hours are possible by appropriate dimensioning of timing components

*

1-30 Minutes	: $C_1 = 220nF$; $P_1 = 500K\Omega$
1-60Minutes	: $C_1 = 470nF$; $P_1 = 500K\Omega$
1-120Minutes	: $C_1 = 470nF$; $P_1 = 1M\Omega$

- The timer is powered by a 9V pp3 battery.

- LED D1 does not affect the operation of the circuit and is included merely to show that timer works Diode d1 & Resistor R3 are therefore optional components.

- A mercury tilt switch may be used for s1 if the unit is to be used as kitchen timer.

- The timer is then started by inverting it like sand-glass. With the buzzer actuated, timer draws a current about 10mA.

Applications:

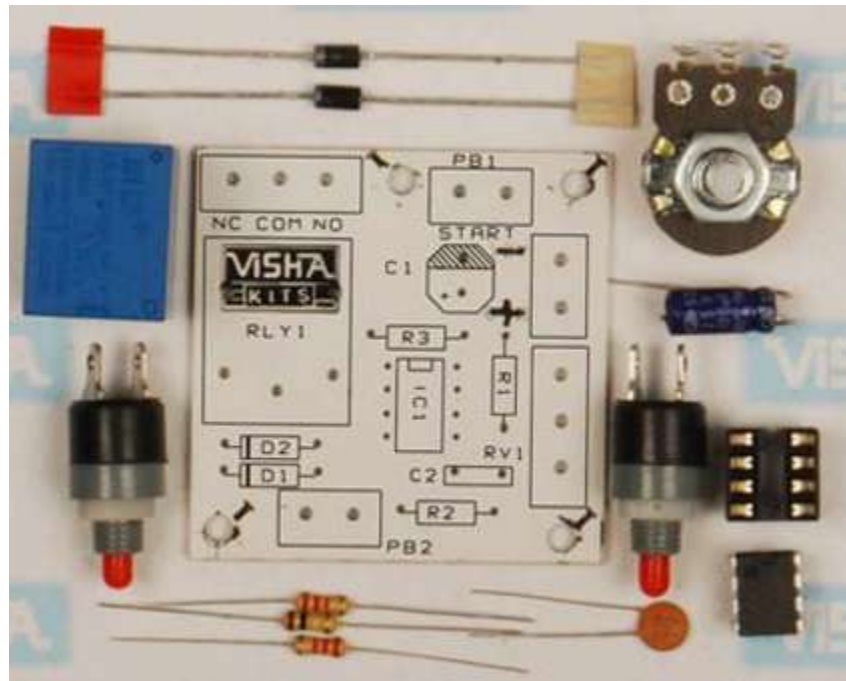It can be used in a portable parking meter timer and egg timer.

TOPIC: TIME SWITCH

Experiment No: 21

Title: To study Timer IC 555

Component list:

R1	100KΩ	Brown Black Yellow	C1	100µF	Electrolytic cap
R2, 3	22KΩ	Red Red Orange	C2	0.1 µF	Disc Cap
RV1	1MΩ	Potentiometer	D1, 2	IN4007	Diode
IC1	555	IC	PB 1, 2	Switch	Push to on
	Socket	8pin for IC1	RLY	Relay	12V/1C

Construction:

- Place the pins and IC socket on the board and solder them and then continue with relay, the resistor, the trimmer, the capacitors, and finally the diode.

- When everything is in place, make the final visual inspection of the board and insert the IC in its socket.

- Make sure that you have inserted it the right way round and that you have not bent any pins under its body during insertion.

- You can connect your timer now to 12V DC Power supply & after pushing switch PB1depending on the setting of VR1 the relay gets energized.
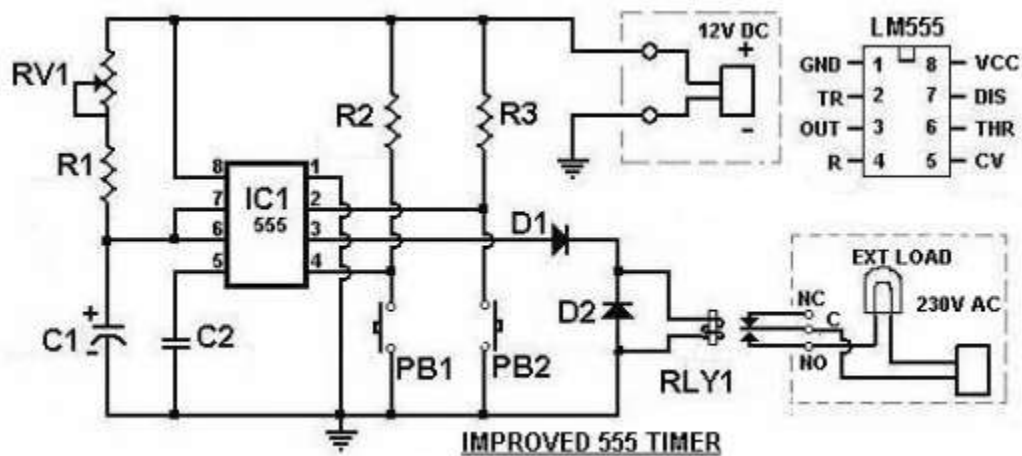
Technical Specifications:

Working Voltage   : 12V DC

Max.Current   : 50MA

Time Adjustment   : 1-120seconds

Circuit Diagram:

Theory:

- The time is set by external potentiometer RV1 which provides range of 1 to 120 seconds with timing capacitor C1 of 100μF.

- The timing can be increased by changing the value of C1 to higher value such as 470μF.

- The output at pin 3 is normally low and relay is held closed [when switch PB1 is triggered] for time 1.1*[R1+R2]*C1 and then released.

- The 555 Timer is used to drive non-inductive loads [via pin 3] at current up to 200mA, here in our circuit the diodes D1 and D2 protect IC 555 against inductive switching damage; relay contacts can be used to control external circuitry up to 3Amps.

- The Circuitry also shows how a reset facility can be applied; i.e. just by enabling PB2 the timing period can be aborted any moment.

Applications:

It can be used to control corridor lights, as a reminder in kitchen, in photographic laboratories. It can be also used in small heaters, incandescent lamps.