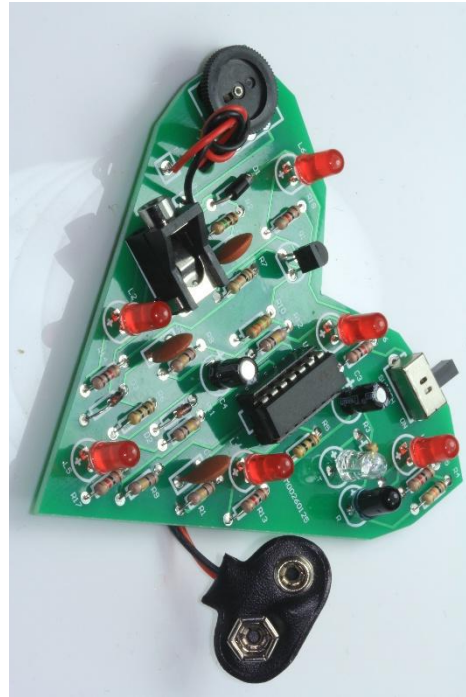


## HEARTBEAT DISPLAY

PRODUCT CODE: M00270077

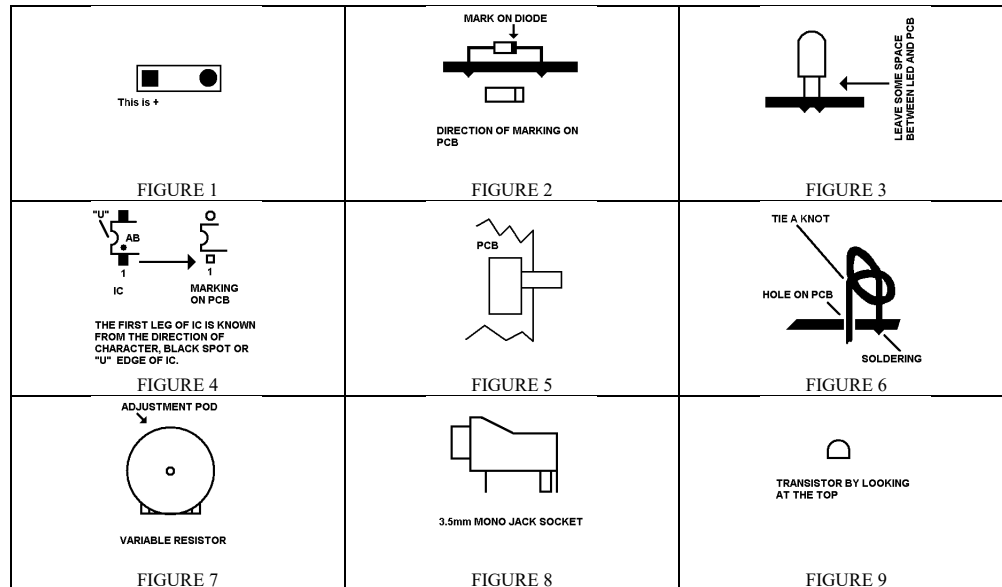
### FEATURE:

- When you put your finger to the IR transmitter and receiver, beating of your heart would show as beating of LEDs.
- On and Off switch is provided.
- Assembly is needed.



### READ BEFORE INSTALLATION:

- Put the component on the side of screen printing and solder on the back of PCB without printing.



### INSTALLATION:

Just install the component to the PCB M00260125 according to below table.

| ITEM | SYMBOL ON PCB         | DESCRIPTION                  | OUTLOOK                                 | DIRECTION ON INSTALLATION? AND OTHER |
|------|-----------------------|------------------------------|-----------------------------------------|--------------------------------------|
| 1    | R1                    | RESISTOR, 100K ohms          | BROWN, BLACK, YELLOW                    | NO                                   |
| 2    | R2                    | RESISTOR, 1M ohms            | BROWN, BLACK, GREEN                     | NO                                   |
| 3    | R3                    | RESISTOR, 470 ohms           | YELLOW, VIOLET, BROWN                   | NO                                   |
| 4    | R4                    | RESISTOR, 10K ohms           | BROWN, BLACK, ORANGE                    | NO                                   |
| 5    | R5                    | RESISTOR, 10 ohms            | BROWN, BLACK, BLACK                     | NO                                   |
| 6    | R6                    | RESISTOR, 10 ohms            | BROWN, BLACK, BLACK                     | NO                                   |
| 7    | R7                    | RESISTOR, 10K ohms           | BROWN, BLACK, ORANGE                    | NO                                   |
| 8    | R8                    | RESISTOR, 100K ohms          | BROWN, BLACK, YELLOW                    | NO                                   |
| 9    | R9                    | RESISTOR, 100K ohms          | BROWN, BLACK, YELLOW                    | NO                                   |
| 10   | R10                   | RESISTOR, 330K ohms          | ORANGE, ORANGE, YELLOW                  | NO                                   |
| 11   | R11                   | RESISTOR, 100K ohms          | BROWN, BLACK, YELLOW                    | NO                                   |
| 12   | R12                   | RESISTOR, 100K ohms          | BROWN, BLACK, YELLOW                    | NO                                   |
| 13   | R13                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 14   | R14                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 15   | R15                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 16   | R16                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 17   | R17                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 18   | R18                   | RESISTOR, 1K ohms            | BROWN, BLACK, RED                       | NO                                   |
| 19   | D1                    | DIODE, IN4001                | FIGURE 2 (MOSTLY BLACK)                 | FIGURE 2                             |
| 20   | D2                    | DIODE, IN4148                | FIGURE 2 (MOSTLY TRANSPARENT RED)       | FIGURE 2                             |
| 21   | D3                    | DIODE, IN4148                | FIGURE 2 (MOSTLY TRANSPARENT RED)       | FIGURE 2                             |
| 22   | V1                    | VARIABLE RESISTOR, 100K ohms | FIGURE 7                                | YES                                  |
| 23   | C1                    | CAPACITOR, 22*10E4 pF        | MARK WITH 224 OR SAME MEANING OF VALUE  | NO                                   |
| 24   | C2                    | CAPACITOR, 22*10E4 pF        | MARK WITH 224 OR SAME MEANING OF VALUE  | NO                                   |
| 25   | C3                    | CAPACITOR, 10uF              | MARK WITH 10uF OR SAME MEANING OF VALUE | YES, FIGURE 1, NOTE 1                |
| 26   | C4                    | CAPACITOR, 10uF              | MARK WITH 10uF OR SAME MEANING OF VALUE | YES, FIGURE 1, NOTE 1                |
| 27   | C5                    | CAPACITOR, 22*10E4 pF        | MARK WITH 224 OR SAME MEANING OF VALUE  | NO                                   |
| 28   | T                     | IR TRANSMITTER               | FIGURE 3 (TRANSPARENT)                  | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 29   | R                     | IR RECEIVER                  | FIGURE 3 (BLACK)                        | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 30   | L1                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 31   | L2                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 32   | L3                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 33   | L4                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 34   | L5                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 35   | L6                    | LED                          | RED                                     | YES, FIGURE 1, FIGURE 3, NOTE 1      |
| 36   | Q1                    | TRANSISTOR, 9014, NPN        | FIGURE 9                                | YES                                  |
| 37   | U1                    | DIP 14 SOCKET                | 14 LEGS                                 | NO                                   |
| 38   | ON THE TOP OF ITEM 37 | IC, LM324                    | 14 LEGS                                 | FIGURE 4                             |
| 39   | DCJACK                | 3.5mm MONO JACK SOCKET       | FIGURE 8                                | YES                                  |
| 40   | B+ B-                 | 9V BATTERY ADAPTOR           | RED WIRE, BLACK WIRE                    | YES, NOTE 2                          |
| 41   | SWITCH                | SLIDE SWITCH                 | SIX LEGS                                | YES, FIGURE 5                        |

- NOTE 1: On component, longer leg is “+”.

- NOTE 2: Red is B+ and Black is B-. Also, please tie a knot after the red and black wire has passed the neighbors hole before soldering. This is similar to Figure 6.

### HOW TO PLAY?

The Voltage of 9V plugs into the “B+, B-” or “DCJACK”. Then turn on the “SWITCH” to “ON” status. Put one finger on top of “T” and “R” together. Then turn “V1” clockwise or anti-clockwise until all six LEDs is all on or off. After that, turn “V1” on reverse direction slower. The six LEDs would vibrate at the same rate as your heartbeat. The LEDs just show you the real time heartbeat. The

**CIRCUIT DESCRIPTION:**

Now we look at Figure 10.

“UIC” is a voltage follower. Infinity input resistance and zero output resistance. Signal have nothing change but totally isolate signal interference before and after “UIC”.

The function of “UID” is a voltage comparator circuit. From Figure 11, three mountain is the signal due to pulse of heartbeat appear at “12”. There is a line in the middle which is adjusted by “V1” and would be appeared at “13”. The mountain filled with black ink is the voltage at “12” higher than “13”. The result is that this would let “14” becoming high and all the LEDs becoming “ON”. This is the reason the LEDs vibrate as heartbeat. On the other hand, the mountain is slim at top and fat at bottom. This means how long the LEDs is at “ON” or “OFF” status could be controlled by “V1”. This is also the answer to “HOW TO PLAY” on adjustment of “V1”.

The function of “D1” is a reverse power protection diode. “SWITCH” is an on/off switch.

The circuit diagram illustrates a multi-stage electronic system. At the top, a DCJACK is connected to a switch and a VCC supply. The switch is controlled by a signal from the DCJACK. The VCC supply is connected to a series of LEDs (L1-L6) through resistors (R13-R18). The main signal path starts with a DCJACK connected to a switch, which is controlled by a signal from the DCJACK. The switch is connected to a series of LEDs (L1-L6) through resistors (R13-R18). The main signal path involves two operational amplifiers (U1A, U1B) and a comparator (U1C). U1A is configured as a non-inverting amplifier with a feedback network of R1 (100K) and C1 (224). U1B is configured as a non-inverting amplifier with a feedback network of R2 (1M) and C2 (224). The output of U1B is connected to the non-inverting input of U1C. U1C is configured as a comparator with a feedback network of R3 (470) and C3 (10uF). The output of U1C is connected to a series of LEDs (L1-L6) through resistors (R13-R18). The microcontroller (U1D) is connected to the output of U1C and controls the LEDs (L1-L6) through resistors (R13-R18).

FIGURE 10

