

# LineKit Manual

LineKit is a line-tracing robot. It follows a path laid out for it along a floor, paper or other smooth surface. The path must be a dark line on a white or light background.

LineKit has three pairs of infrared emitters and receivers. One pair is on the left, another in the middle and the third on the right. Each emitter projects infrared light onto the floor. The amount of light reflected back from the dark line differs from that reflected from the floor; thus it can tell where the dark line is.

LineKit comes in kit form, allowing the user to more fully understand robotic structure and functionality. Although relatively simple to assemble, LineKit is highly functional and is quite "smart". Information travels from the sensors to the CPU and then to the motors for steering. By including a CPU in LineKit's construction, the robot is able to make constant course corrections, search for the line if it is knocked off course, and handle the cross over involved in a "figure 8" course layout.

LineKit is good for beginners who never have come in contact with a robot or a student to learn the basic of robot. User also can adjust its driving velocity. It is specific benefit to find that velocity controlling the robot ideally.

- Robot following a line path !!!
- Possible adjustment of ideal moving velocity and sensor's sensitivity !!!
- Fantastci robot racing game !!!

--> Tools require to assemble linekit



Driver



Nipper



Long-nose Plier

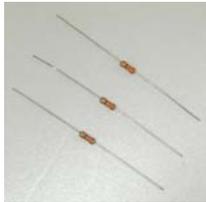


Stand



Iron

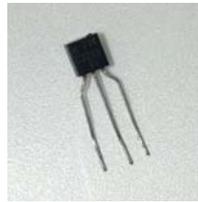
--> Parts required to assemble LineKit



R1,R2(470ohm)  
R3,R4(10Kohm)



R7(100ohm)



Q1,Q2 Transistor 2EA  
(N2222) R5,R6(330ohm)



HD74HC14 IC 1EA



C1 Condensor(22uF)



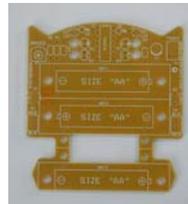
D3,D4 LED 2EA



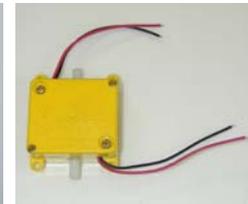
D1,D2 Diode 2EA



Q3,Q4(ST7L)2EA



PCB



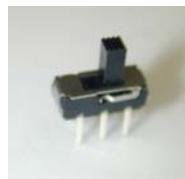
Gear Box



wheels & tires



Battery holder3EA



Power SW



wire 2EA



13mm bolt&nut



8mm bolt 4EA

Linetracer robot following black line (ex. black-colored electric tape) is usually used as AGV(Automatic Guide Vehicle) which carry and load goods in industry.

LineKit can trace the line using three pairs of infrared emitters and receivers and if it is knocked off the line, LineKit can find and return back to the last line by remembering its last course.

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Caution

- Start to assemble after reading the assembly guide in detail.
- Do not rotate the motor to prevent motor from brokening.
- It is only responsible for user about any fault made by user's mistake when assembling robot or by losing any part.

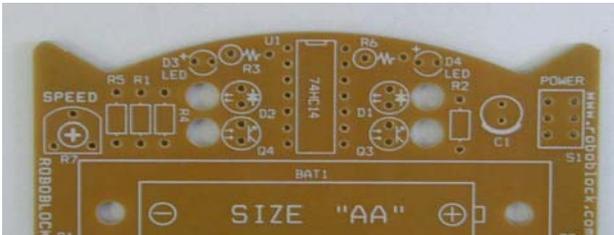
- Keep it not to touch by children younger than 5 years old. When assembling robot, guardian is positively necessary.
  - In a room, if it is too much bright, the robot may operate incorrectly.
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## 1. Install resistors on upper circuit boards.

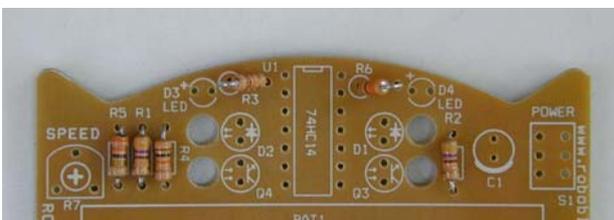
R4(brown-black-orange)  
 R6(orange-orange-brown)  
 R2(yellow-violet-brown)

R1(yellow-violet-brown)

R3(brwon-black-orange)  
 R5(orange-orange-brown)

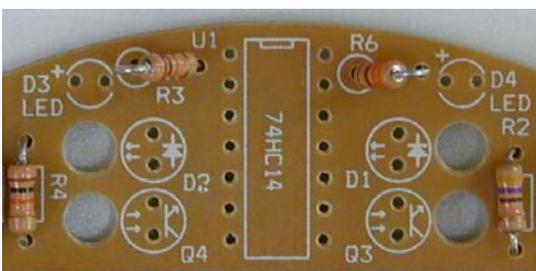


< upper circuit board after inserting resistors into it >

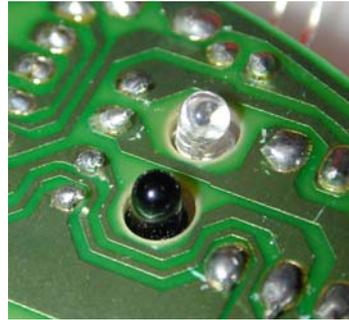
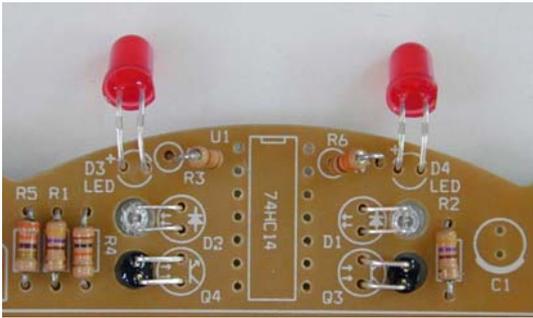


< lower circuit board after inserting resistors into it >

## 2. Install sensors and LEDs at forward circuit board.



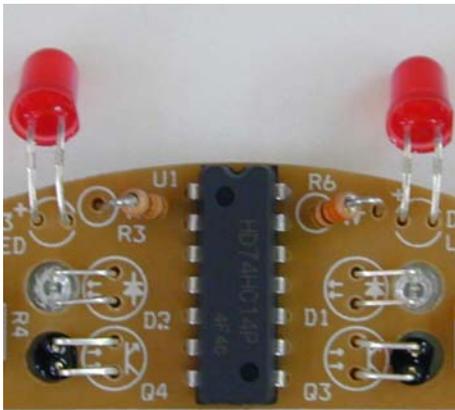
--> Bend D1,D2(transparency) / Q3,Q4(black) by matching the hole as shown in below figure.



--> View of sensors and LEDs after insert.

\* Caution : Make sure the polarity of LED coincide with that marked on circuit board.

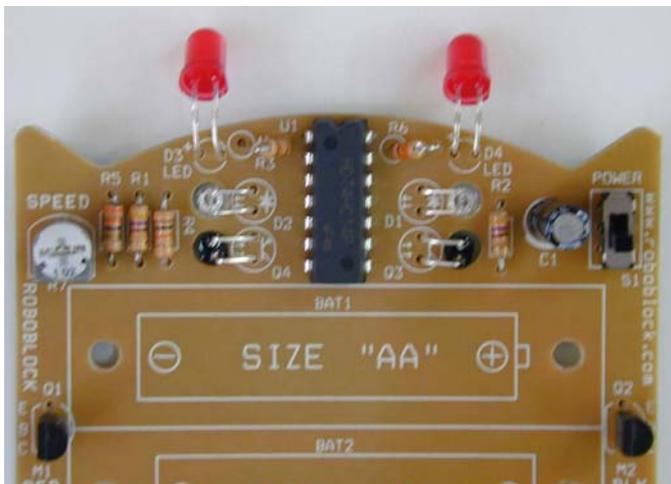
### 3. Install logic circuit component (74HC14).



< View after logic circuit component is inserted >

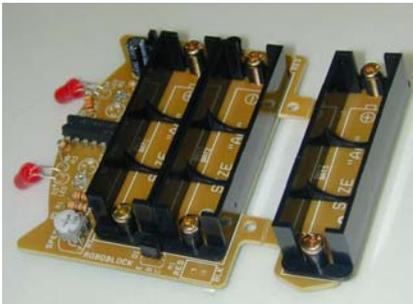
\* Caution: Put it into board not to change the direction as shown in the above figure.

### 4. Install electrolytic condensor and Variable Resistors on board.

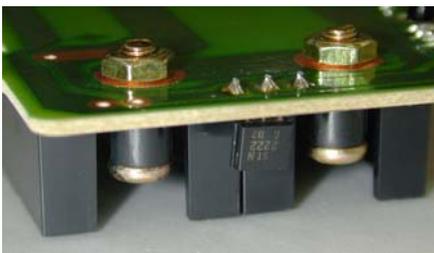
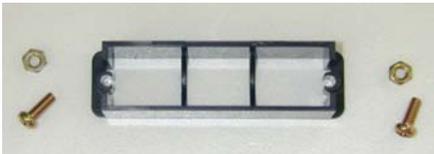


5. Install transistor on board.

6. Install the battery holder.



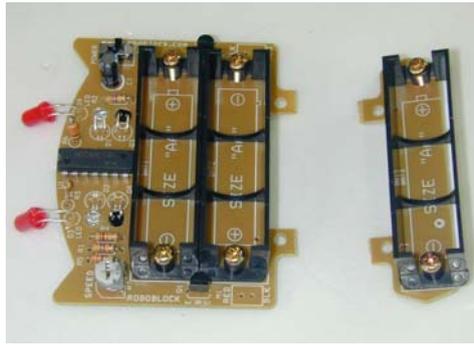
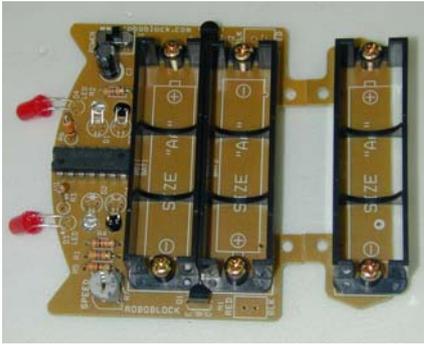
< upper board view after inserting battery holder >



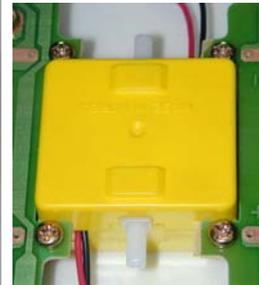
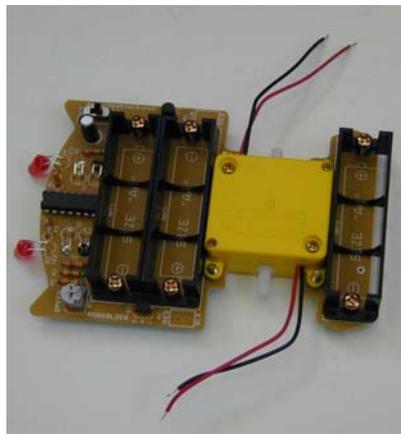
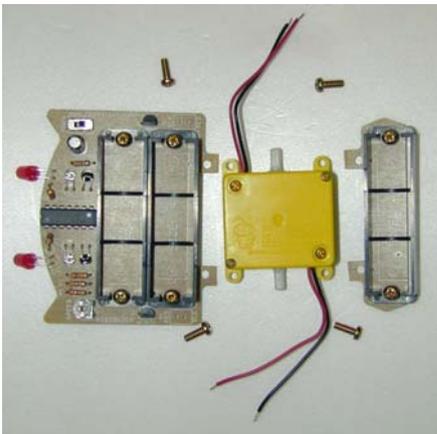
<Install loosely battery holder with nut at opposite side.>

\* After inserting battery, secure it.

7. Divide the board into two parts as shown in below figure.

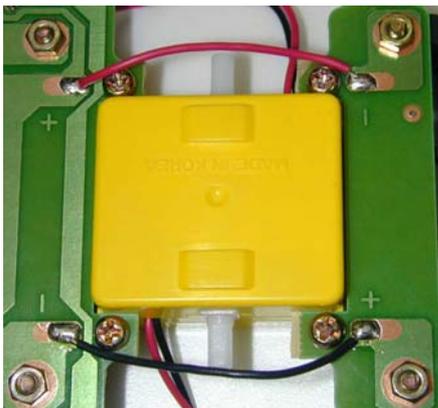


8. Install a gearbox.



< Secure it with screws at back side of board. >

9. Solder the wires for battery connection.

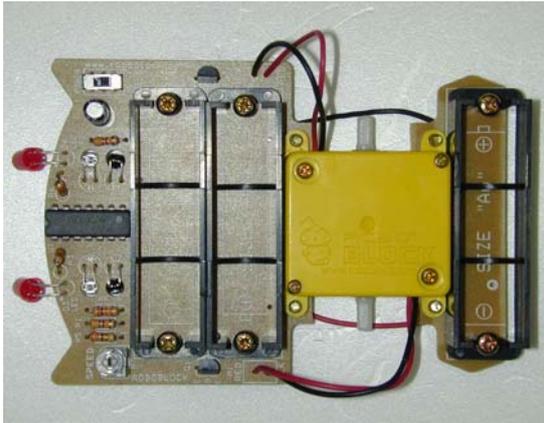


< Solder them at back side of board. >

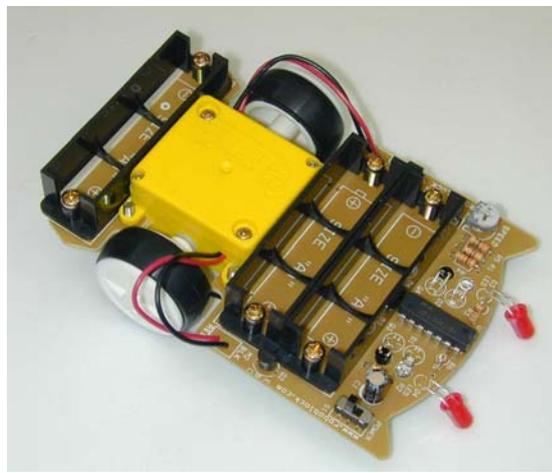
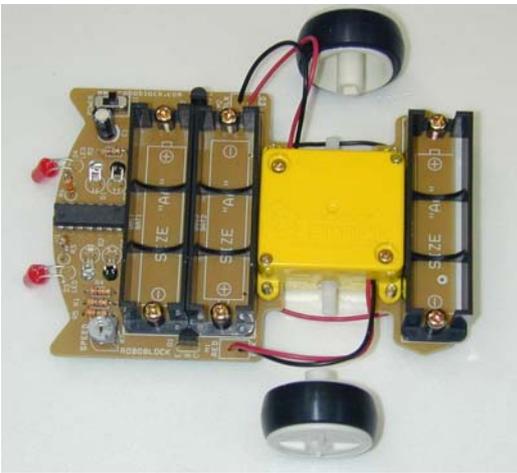
10. Install motor wires of gearbox.

< Connect the wires to coincide with those colors. >

\*Be careful not to change the circuit direction.



11. Install two wheels at gearbox.



☞ Operate the completed LineKit.

- Insert the battery matching its polarity.

(\*When inserting battery, first release the nut, insert the battery and then secure the nut.)

- Make a black line with black-colored electric tape and then put the LineKit on it.

☞ Check Points when LineKit is not operating.

- Adjustment of Sensor : At above assembly step 2, keep the infrared emitters and receivers to become vertically or face each other.

- When knocking off by overspeed : Adjust R7 variable resistor for speed control.

- Illuminating LED adjustment: Adjust the angle of two protruding LEDs to keep their sensitivities.