KSR6 – "LADYBUG" ROBOT KIT

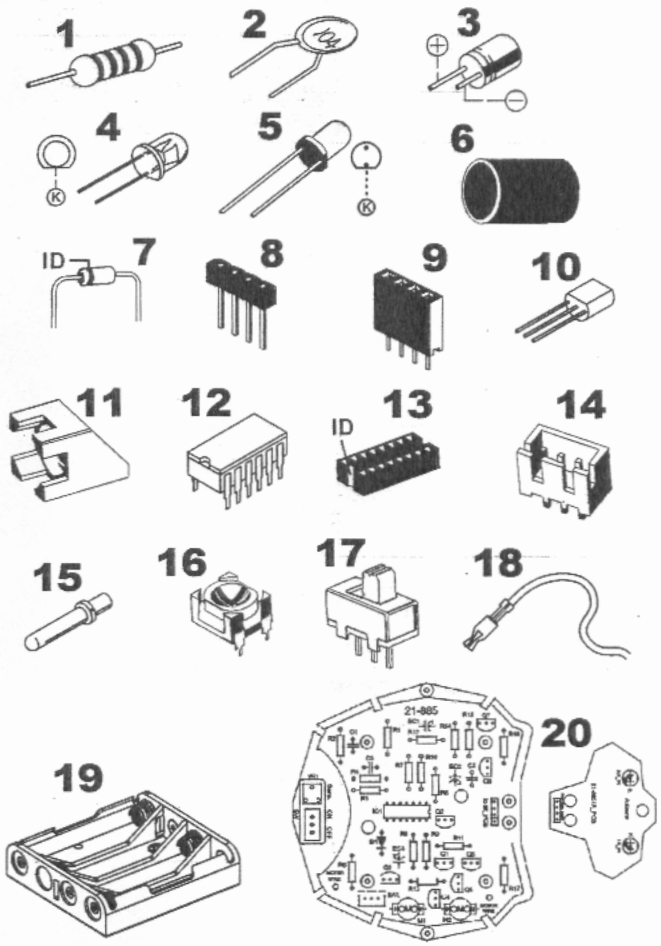
1. Introduction & Characteristics

Thank you for buying the **KSR6**! Read this manual carefully before bringing the device into use.
The **KSR6** uses infrared emitting diodes as "eyes" to avoid obstacles in its path. The Ladybug automatically makes a left turn when it detects an object. It continues to move forward as long as there's no detection.
The Kit comes complete with 2 sets of differently designed legs, which move in their own distinct way. Fun and excitement are guaranteed.
The **KSR6** requires four 1.5Vdc AAA-batteries (not included).
Apart from the batteries, you will also need a pair of long-nose pliers, a soldering iron, a diagonal cutter, a screwdriver, a soldering iron and a length of solder wire.

2. Electronic Parts List

1. resistor: 1x 10Ω (brown/black/black/gold)
   2x 15Ω (brown/green/black/gold)
   2x 100Ω (brown/black/brown/gold)
   1x 1K (brown/black/red/gold)
   4x 4K7 (yellow/purple/red/gold)
   3x 10K (brown/black/orange/gold)
   3x 120K (brown/red/yellow/gold)
   1x 1.8M (brown/grey/green/gold)
2. ceramic capacitor: 1x type 331, 4x type 104
3. electrolytic capacitor: 1x 4.7µf, 2x 100µf
4. IR emitting diode 5mm, clear (1x)
5. photo transistor, black (1x)
6. black tube (1x)
7. diode 1N4148 (1x)
8. pin header 4 pins (1x)
9. female pin header 4 pins (1x)
10. transistor: 3x C945, 1x A733, 2x 8050, 2x 8550
11. LED holder (2x)
12. IC: 1x type LM324 (14 pins)
13. IC socket 14 pins (1x)
14. battery connector (1x)
15. pin (4x)
16. variable resistor 50K (1x)
17. slide switch (1x)
18. connector with wire: 1 x yellow, 1 x green, 1 x orange, 1 x blue
19. battery holder (1x)
20. PCB (1x)

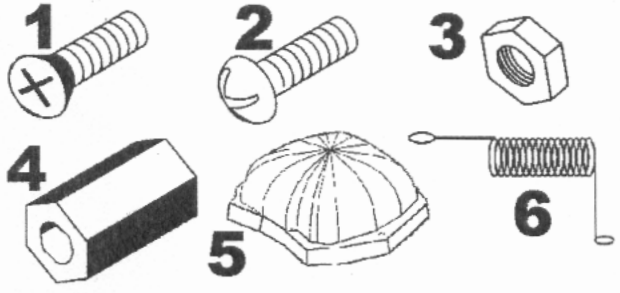
Fig. 1



3. Mechanical Parts List

1. 2x screw 3x6mm (P13)
2. 9x screw 3x6mm (P14)
3. 3x nut M3 (P15)
4. 4x hex post 10mm (P16)
5. 1x body (P17)
6. 2x antenna (P18)

Fig. 2



4. Assembly

a) PCB Assembly

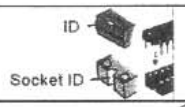
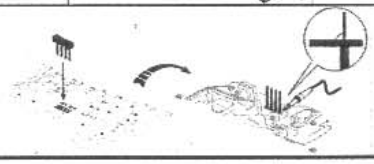
Start the assembly by mounting the resistors. The names of all components have been printed on the PCB:

Part ID	Description	Colour Code	Quantity
R11	10Ω	brown/black/black/gold	1
R12/17	15Ω	brown/green/black/gold	2
R13/16	100Ω	brown/black/brown/gold	2
R1	1K	brown/black/red/gold	1
R4/9/10/15	4K7	yellow/purple/red/gold	4
R2/3/5	120K	brown/red/yellow/gold	3
R6~8	10K	brown/black/orange/gold	3
R14	1.8M	brown/grey/green/gold	1

Mount the capacitors, the transistors and the diode next:

Part ID	Description	Quant.
C1	ceramic capacitor 331	1
C2/3	ceramic capacitor 104	2
EC3	electrolytic capacitor 0.47µf	1
EC1/2	electrolytic capacitor 100µf	2
Q1/2/7	transistor C945	3
Q8	transistor A733	1
Q4/5	transistor 8050	2
Q3/6	transistor 8550	2
D1	diode 1N4148	1

Mount the IC socket, the battery connector, the slide switch, the variable resistor, the pins, the IC and the pin header.

Part ID	Description		Quant.
IC1	IC socket (fig.1 #13)		1
BAT.	battery connector (fig.1 #14)		1
SW.	slide switch (fig.1 #17)		1
VR1	variable resistor (fig.1 #16)		1
M1 (+/-) M2 (+/-)	pins (fig.1 #15)		4
IC1	type LM324		1
To IR_PCB	pin header (fig. 1 #8)		1

Mount the IR emitting diode, the photo transistor and the female header:

Part ID	Description	Quantity
TX_IR	IR emitting diode (fig. 1 #4)	1
RX_IR	photo transistor (fig. 1 #5)	1
From Main_Board	female header (fig. 1 #9)	1

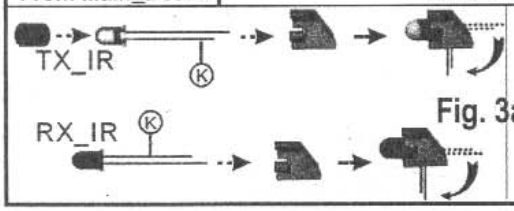


Fig. 3a

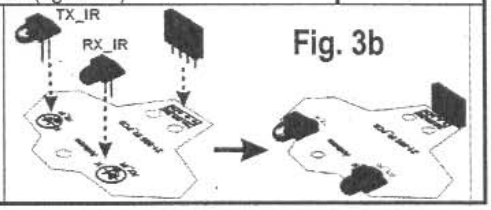


Fig. 3b

b) Gearbox Assembly

Parts

P1: motor x 2
P2: motor holder x 2
P3: screw (2x10mm) x 4
P4: nut (M2) x 4
P5: tapping screw (3x7mm) x 34
P6: eyelet x 6
P7: gear (44T+0) with shaft (green) x 2
P8: gear (44T+0) with shaft (orange) x 4
P9: pinion gear 8T (white) x 2
P10: gear 48/18T (white) x 2
P11: gear 44/18T (blue) x 4
P12: clear tube x 2

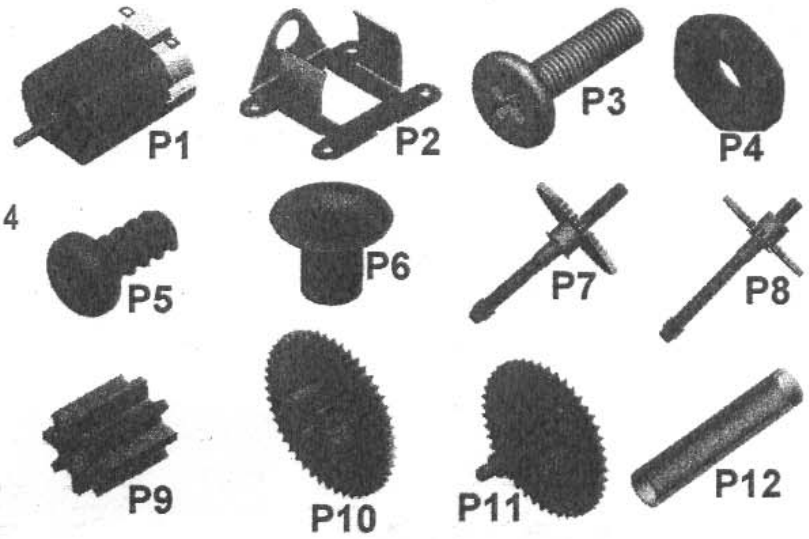


Fig. 4

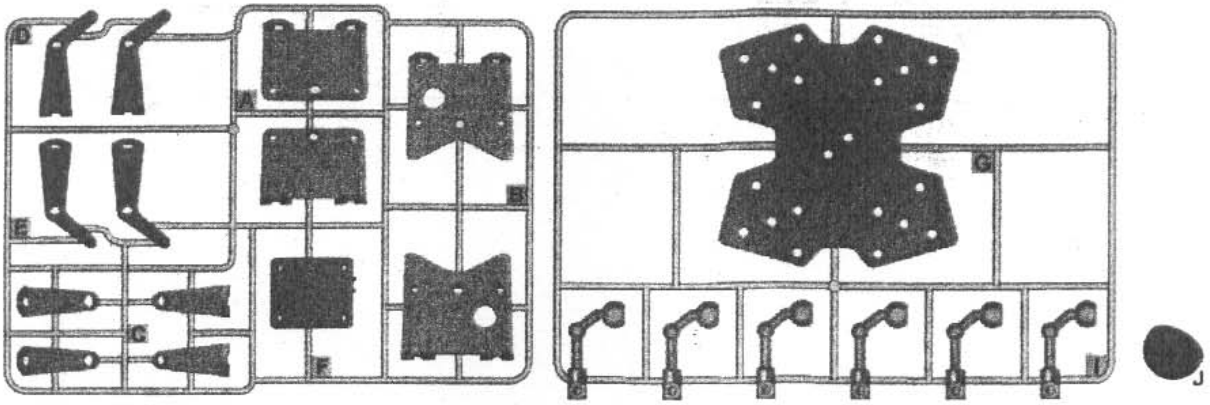
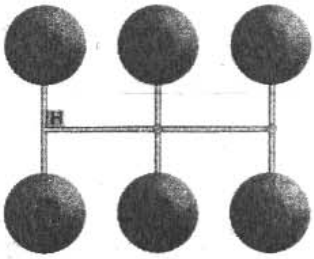
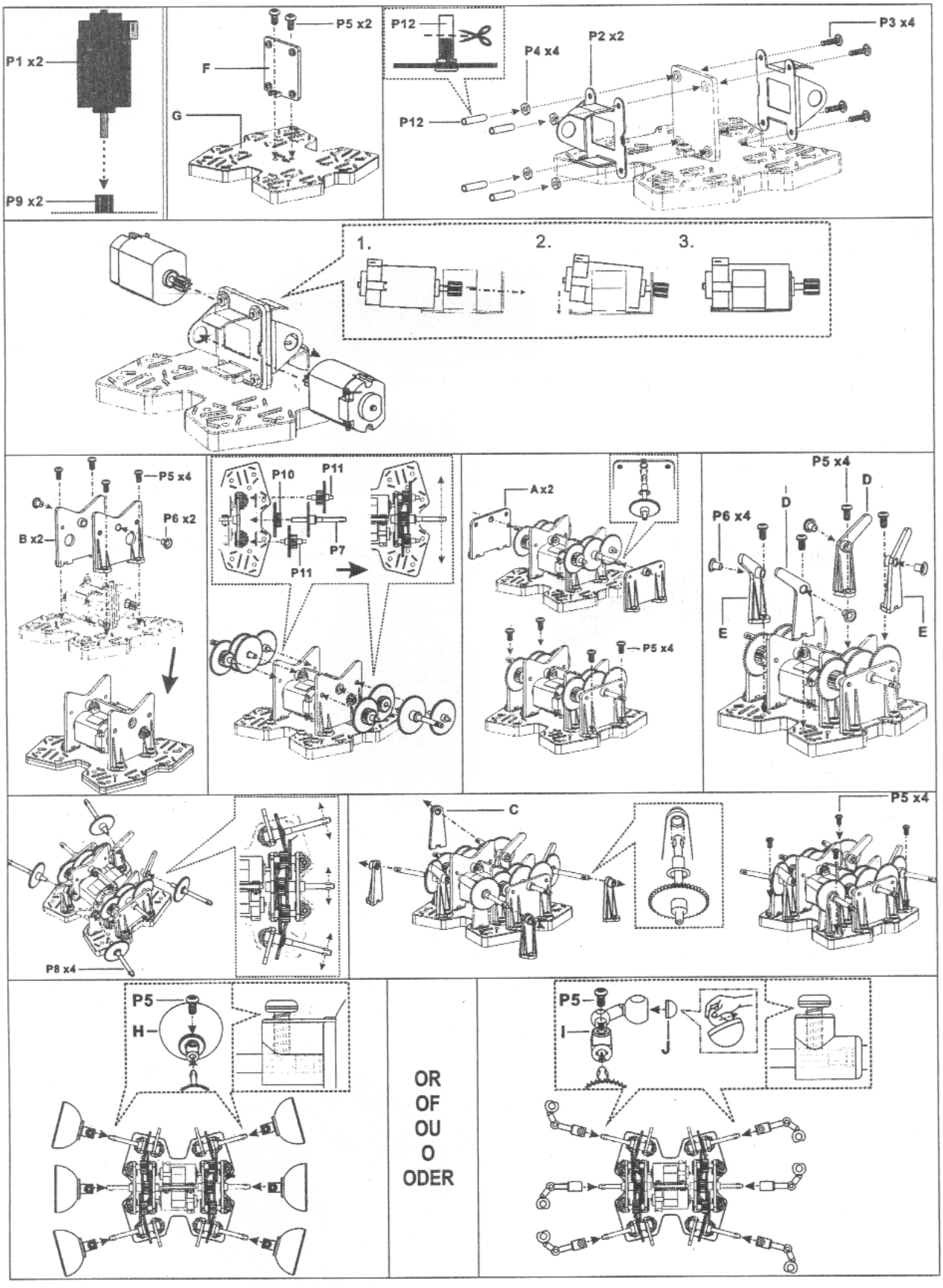


Fig. 5

A: gear protection plates (2)
B: motor protection plates (2)
C: protection plates (4) for corner wheel/leg gears
D: gear brackets (2) for corner wheel/leg gears
E: gear brackets (2) for corner wheel/leg gears
F: motor mounting bracket (1)
G: top plate (1)
H: wheels (6)
I: legs (6)
J: rubber feet for legs (6)



Assembly


P1 x2
P9 x2
P5 x2
F
G
P12
P4 x4
P2 x2
P3 x4
1.
2.
3.
P5 x4
B x2
P6 x2
P10
P11
P7
A x2
D
E
C
P8 x4
P5
H
I
J
OR
OF
OU
O
ODER

c) Mechanical Assembly

1. Mount the wires and the ceramic capacitors type 104 on the motors and fix the antennae on the small PCB. The colour code used for the wires is: 1=green, 2=yellow, 3=orange, 4=blue

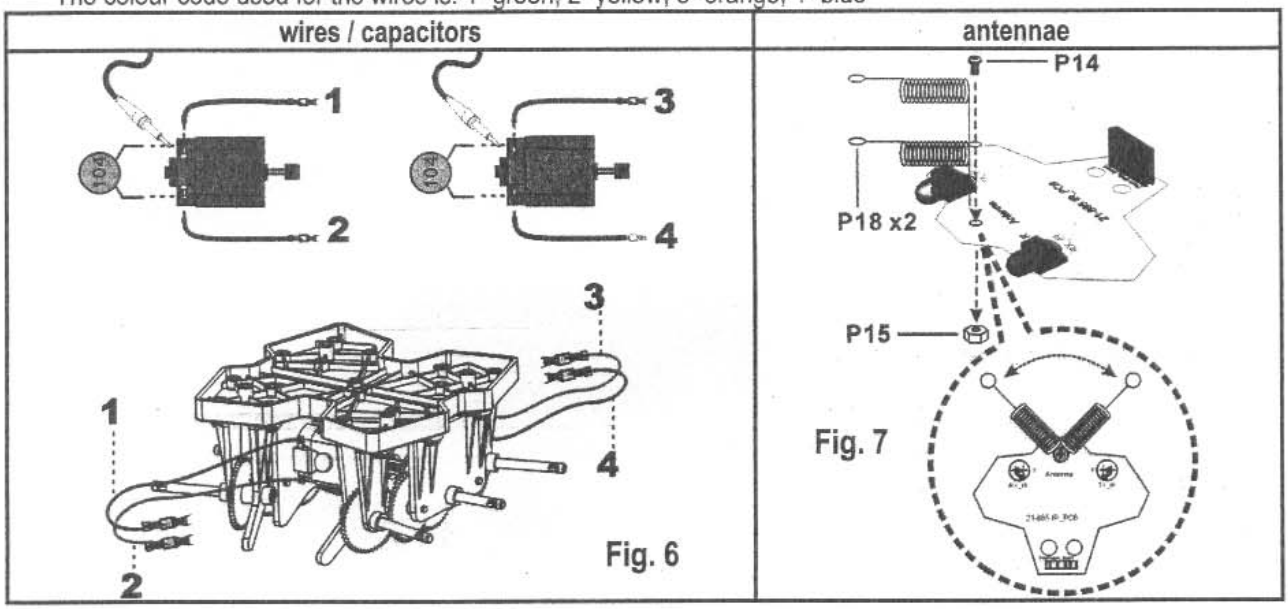


Fig. 6

Fig. 7

2. Attach the battery holder and the small PCB onto the main PCB (see figure 8). Connect the battery holder to the battery connector (BAT, see **"4.a) PCB assembly"**).

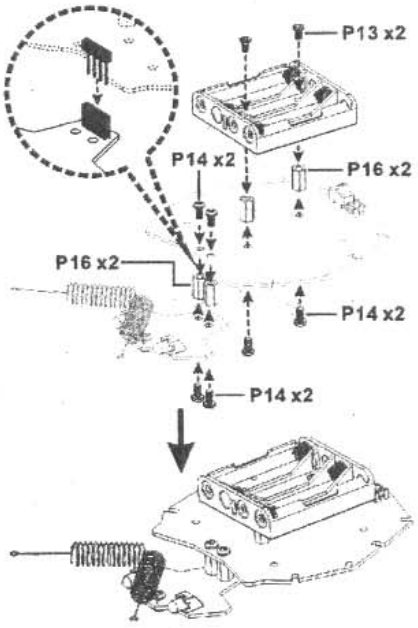


Fig. 8

3. Fix the PCB to the gearbox and put the wires through the holes at the right side of the device.

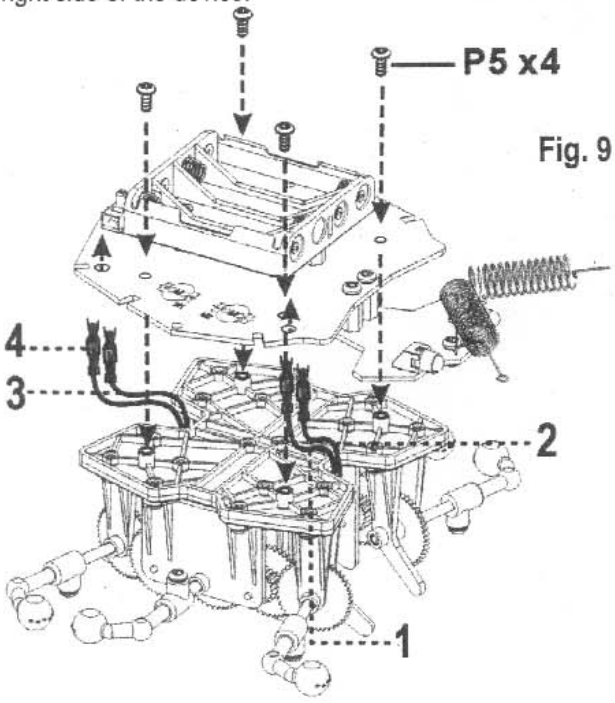


Fig. 9

4. Connect the wires to the pins on the M-terminals:

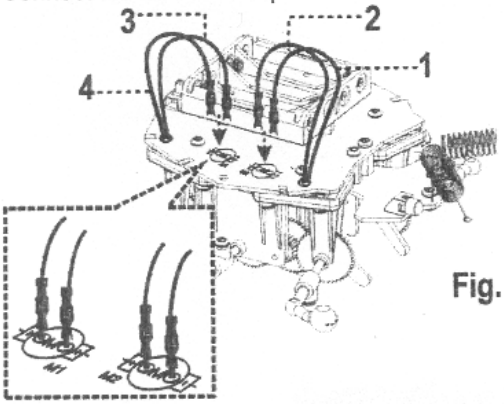


Fig. 10

5. Mount the body to the rest of the **KSR6**.

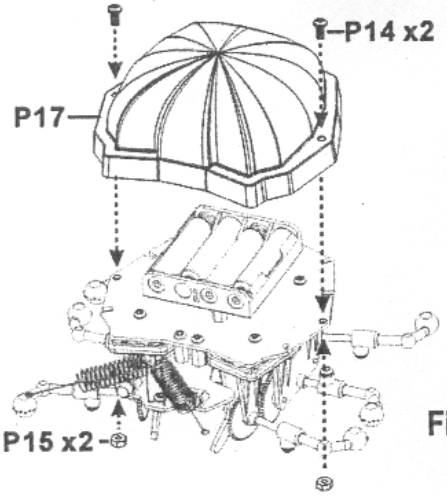


Fig. 11

5. Wiring Diagram

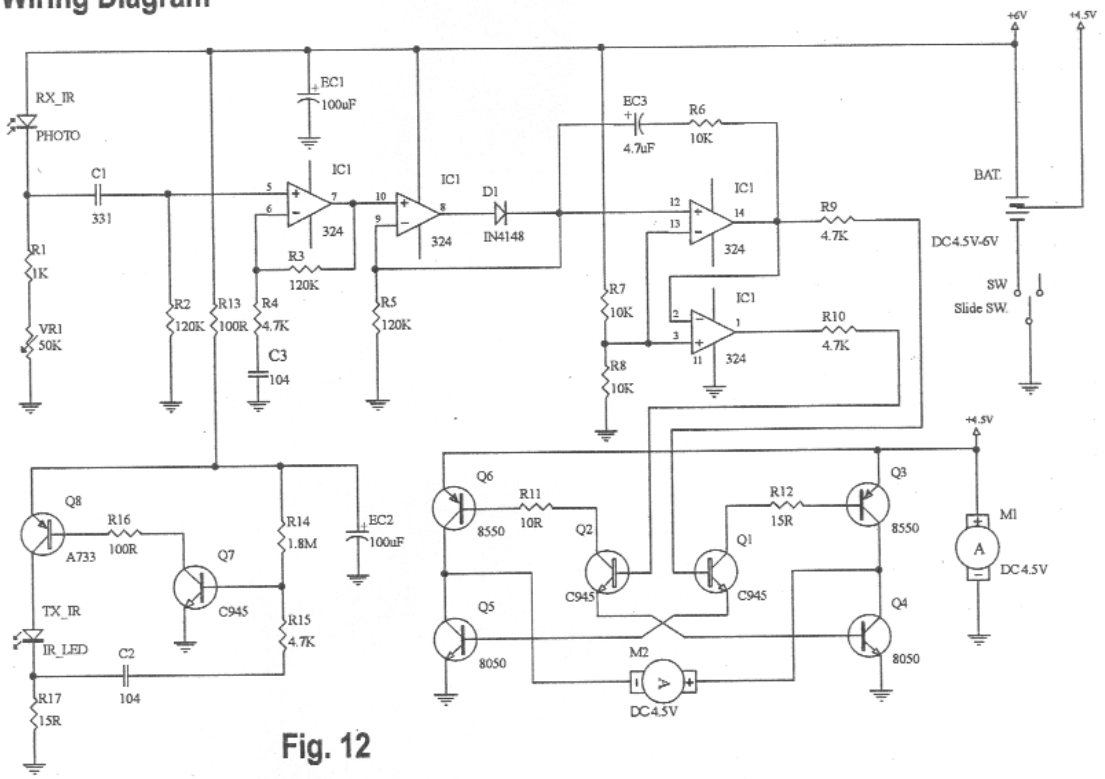


Fig. 12

6. Operation

1. Put the switch in the "ON"-position.
2. Put the **KSR6** on the ground ; it should start moving forward.
3. When it detects an obstacle, it will turn to the left. As long as there is no obstacle, it will continue to move forward.
4. Adjust the variable resistor and thus the detection distance (to the left = higher sensitivity, to the right = lower).

7. Troubleshooting

1. Make sure all components on the PCB are in the right position. Pay particular attention to the polarity of the IR diode and the photo transistor.
2. Make sure the wiring is connected correctly.
3. The sensitivity may be affected by fading battery power. Adjust the variable resistor to improve the range.
4. Apply a little bit of machine oil to the axles of the gears if the **KSR6** isn't running smoothly.

Note: The specifications and contents of this manual can be subject to change without prior notice.