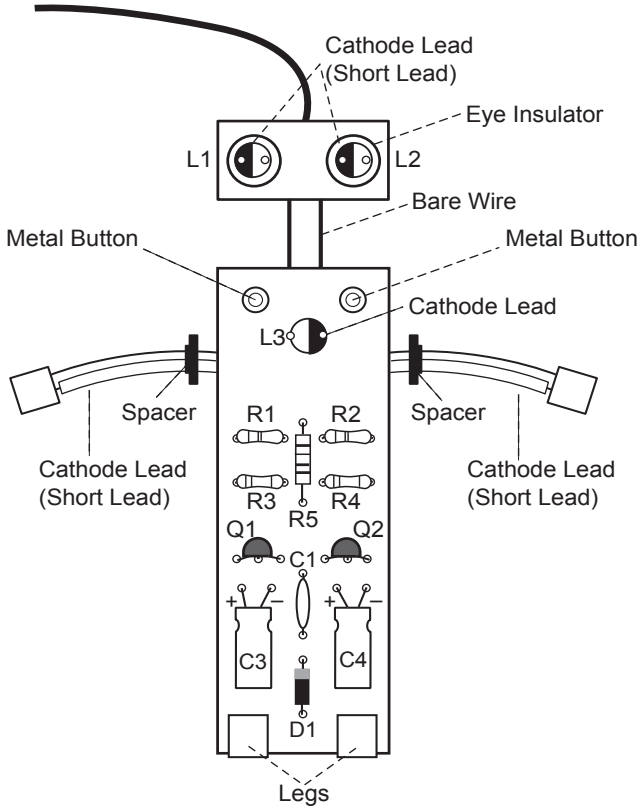


# Kit Assembly Instructions

## C6845 LEARN TO SOLDER ROBOT KIT

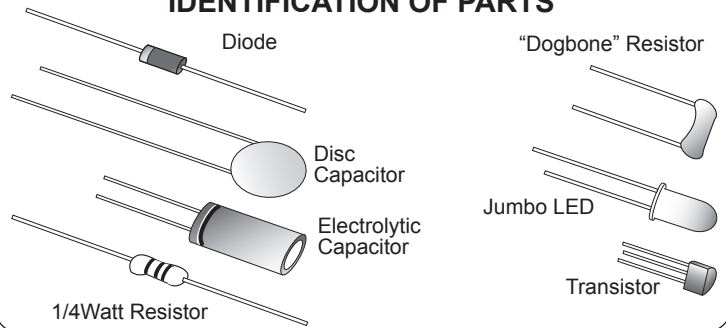
Figure 1  
Parts Layout



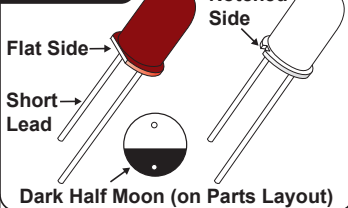
### PARTS LIST

- L1, L2 \_\_\_\_\_ Jumbo Red/Orange LEDs
- L3 \_\_\_\_\_ Red Flashing LED
- L4, L5 \_\_\_\_\_ Mini Yellow Rectangular LEDs
- R1-R4 \_\_\_\_\_ "Dogbone" Resistors
- R5 \_\_\_\_\_ Regular 1/4W Resistor
- Q1, Q2 \_\_\_\_\_ Transistors
- C1, C2 \_\_\_\_\_ Disc Capacitors
- C3, C4 \_\_\_\_\_ Electrolytic Capacitors
- D1 \_\_\_\_\_ Diode
- Misc \_\_\_\_\_ (2) Metal Legs, (2) Metal Buttons, (2) Spacers, Heat Shrink Tubing, (2) "Eye" Insulators, Battery Snap, Small PC Board and Larger PC Board

### IDENTIFICATION OF PARTS



### LED Cathodes:

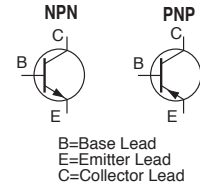


There are three main ways to determine the cathode side of the LED. The Parts Layout will indicate the cathode side of the LED by a dark half moon shape. On the physical part, usually, the cathode can be identified by one of three ways:

- 1) The lens of the LED has a flat side when viewed from the top (sometimes difficult to see).
  - 2) The shorter lead of the LED.
  - 3) If there is no flat side on the LED, there will be a notch in the lens of the LED.
- Please Note: Some LEDs may have both a flat side and a notched side. With these LEDs, always use the flat side to locate the cathode of the LED.

Figure 2  
LED (cathode) information

### TRANSISTOR TYPES



### TRANSISTOR CASE

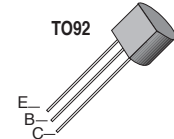


Figure 3  
Transistor Information

### RESISTOR COLOR CODE

BAND COLOR	1st DIGIT	2nd DIGIT	MULTIPLIER
BLACK	0	0	1
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1,000 (K)
YELLOW	4	4	10,000
GREEN	5	5	100,000
BLUE	6	6	1,000,000 (M)
VIOLET	7	7	10,000,000
GREY	8	8	100,000,000
WHITE	9	9	1,000,000,000

\*TOLERANCE: NO COLOR 20%, SILVER 10%, GOLD 5%

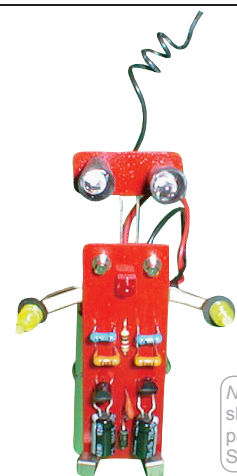
Figure 4  
Resistor Color Code

**LEARN TO SOLDER ROBOT KIT**



Electronic Project KIT SKILL LEVEL **1**

## C6845



NOTE: This picture shows an optional painted PC Board. See Step 1.

### CAUTIONS

The electronic components in this kit are solder plated. Solder contains lead and therefore do not put components in your mouth. Always wash your hands after working with the components. Students under the age of 13 should not build this kit.

Made in the U.S.A.

Rev 02/13/09LW

### Tools Needed for Assembly:

- Small Pencil type soldering iron (40 watts rating or less)
- Pair of wire cutters, a screwdriver & needle nose pliers
- Pair of safety goggles or safety eyeglasses
- Damp sponge
- Fresh Rosin or Resin Core Tin/Lead solder

### ASSEMBLY INSTRUCTIONS

1. **Important:** You will notice that some of the pads on your PC boards are intentionally undrilled to allow you to make the necessary connections directly to the boards. The first step in assembling your Learn to Solder Robot is to customize your PC board (if desired). You may want to round off all corners using sandpaper or a file. The small board is the head and the larger board is the Robot's body. After shaping the board, you may wish to spray paint the non-foil side with a bright color of your choice. After each PC board dries, you can start the soldering process which begins in Step 2.
2. First we need to practice soldering components to a circuit board. After putting on safety glasses or goggles you may heat up and tin your soldering iron. Use rosin or rosin core solder, not acid core solder. After your soldering iron is tinned, solder the Diode D1 into the bottom center of the circuit board as shown in the Parts Layout (Figure 1) and Proper Soldering Technique (Figure 5). **Note:** Because this is just a practice part, it does not matter which direction that you have placed the "cathode band." After you have soldered the leads of D1, you should cut them off flush (as close as possible to the PC board). Again refer to Proper Soldering Technique (Figure 5). Show your instructor your results before you proceed to Step 3.
3. Now install Capacitors C3 and C4 observing polarity as shown (see Figure 1). These capacitors are inserted part of the way into the PC board, then are bent over as shown (see Figure 1), and then the leads are soldered. After soldering, trim the remaining leads on the foil side of the board like you did when installing D1.
4. Now solder in the rest of the practice components C1, Q1, Q2, R1-R5. After each component is soldered in, make sure that the leads are trimmed "flush" on the foil side. Take your time and make sure each solder connection is "good." Save 2 of the longest left over cut off leads for Step 11.
5. Now you may push the two silver buttons into the top of the PC board as shown in Parts Layout (Figure 1) and solder.

(Step 6 Continued on Page 3)

Figure 5  
Proper Soldering  
Technique

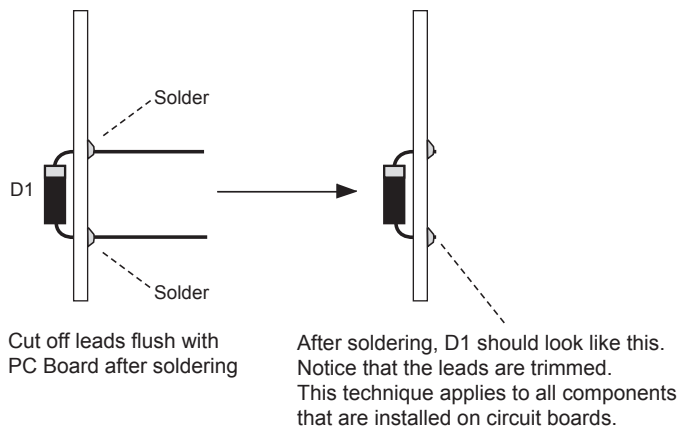


Figure 6a  
Soldering Robot "Legs"

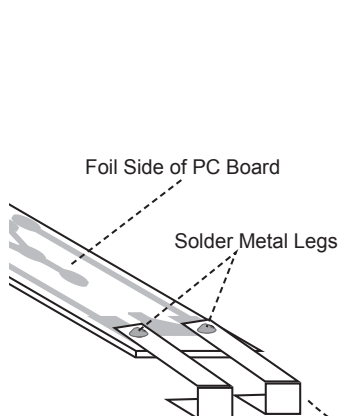
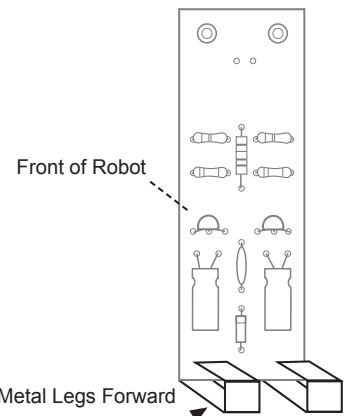


Figure 6b  
Bending Robot "Legs"



# Assembly Instructions

## C6845 LEARN TO SOLDER ROBOT KIT

(Continued from Page 2)

6. Install metal legs by first turning board over so that the foil side is up. Now lay metal piece with hole on top of pad as shown in Figure 6a and solder. Repeat for the other leg. After solder cools, carefully bend metal legs over in front of robot as shown (see Figure 6b).
7. This completes the solder practice portion of your Robot construction. You should now be able to make good solder connections. Start the final assembly process by first slipping a rubber "eye" insulator over each of the large red LEDs (see Figure 7). Notice that each of the large red LEDs (L1 and L2) have 1 short (cathode) lead and 1 long lead (see Figure 2 for LED cathode information). Insert each LED into the small PC board with the short lead (cathode) at the location shown by Figure 7. It is very important that you position the "X" on the small board correctly. **Note:** Heat the "eye" insulator at the base of the LED for a secure fit. Use the tip of the soldering iron.
8. Next, solder the red flashing LED (L3) into the PC board with the short lead (cathode) at point shown by Parts Layout (Figure 1).
9. Now cut the heat shrink tubing supplied into two equal pieces. Insert one piece on the cathode (shorter lead) of each yellow LED (L4 and L5). See Figure 2 for more info about LED cathodes. Now insert black spacer ring over both leads and push up about 1/2 of the way. With the foil side of the larger robot board facing up, solder the LEDs L4 and L5 at points shown by Figure 8 making sure that each cathode lead (the shorter lead covered with tubing) is soldered at the point shown.
10. Next, cut the battery snap leads to 1" in length, strip about 1/8" insulation from the ends and solder observing the correct location for the red and black wires. Save the left over Red and Black wire pieces.
11. Now connect the small PC board to the large one by using the two long cut off wire leads from Step 4 (see Figure 5). **Note:** Make sure that the small "X" on the small board is located as shown.
12. Now solder the left over red or black wires from Step 10 to the top pad for a fake antenna (see Figure 8).
13. Finally solder the remaining Disc Capacitor C2 across the points shown on Figure 8. This capacitor's only function is to hold the battery next to the PC board so leave the leads full length.
14. Connect a fresh 9V alkaline battery to the snap and insert the battery under the capacitor C2. Bend the leads of C2 to hold the battery in. You may need to "pinch" the leads of C2 against the battery to get a snug fit (see Figure 9). Your robot should begin flashing its five LEDs. If it doesn't, you have installed a component incorrectly or have a bad solder joint. See the troubleshooting section on page 4. If the robot is flashing, you may bend its arms and antenna to customize its appearance.

Figure 7  
Soldering "Eyes" of Robot

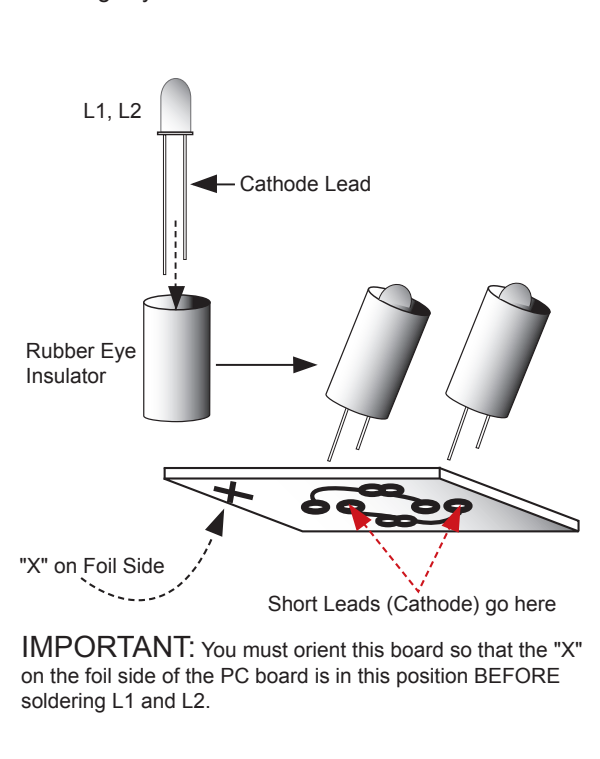
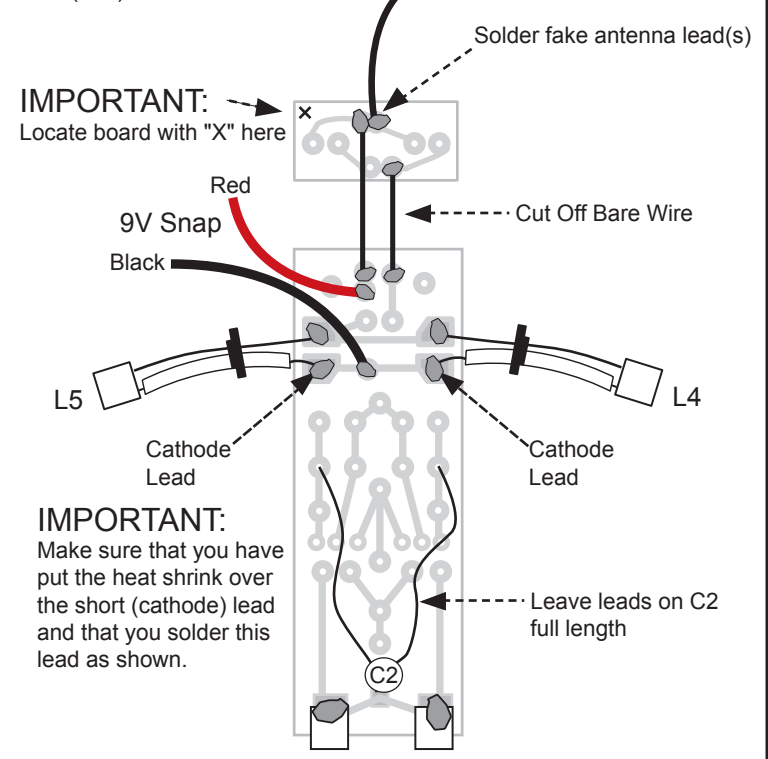


Figure 8  
Back (Foil) Side of Robot



### THEORY OF OPERATION

The C6845 Learn to Solder Robot Kit uses two bright red LEDs for eyes, two bright yellow LEDs for arms and one special flashing red LED to provide a unique flashing robot. The two “eye” LEDs are connected in parallel with each other and they are connected in series with the flashing red LED which is also connected in series to the two yellow LEDs which are connected in parallel with each other. When 9VDC is applied to the circuit, the internal IC oscillator in LED L3 flashes the entire LED circuit. The other components that are included with the kit enable the student to gain necessary skills in soldering so that functional kits can be built.

Figure 9  
Making Your Robot Stand

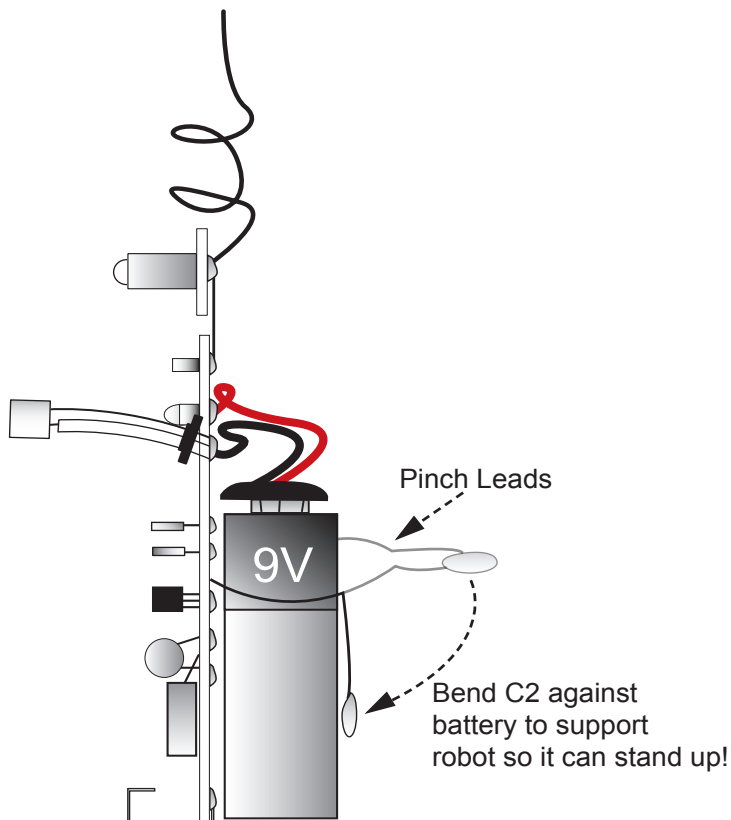
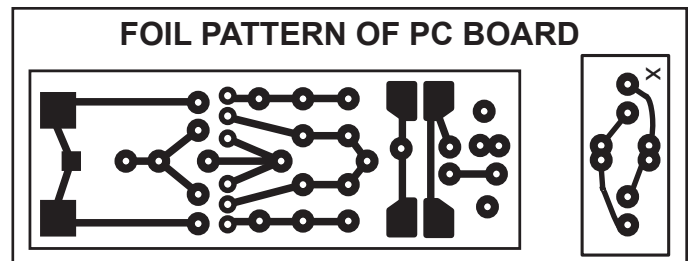
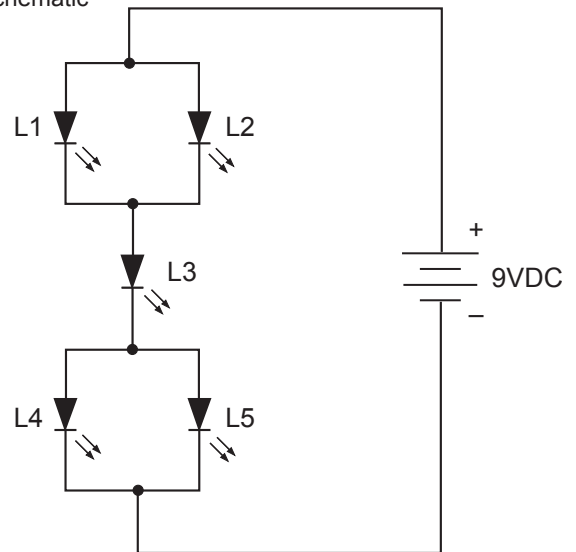


Figure 10  
Schematic



### TROUBLE SHOOTING HINTS

1. First of all, make sure that the solder used to build kit was rosin or resin core. If acid core solder was used, the kit will be conducting voltage to various points where it should not and the kit will be **DESTROYED**.  
*PLEASE NOTE: We cannot repair any kit that was assembled using acid core solder.*
2. Check for cold solder joints and add solder and reheat any suspect connections.
3. If your robot is still not lighting up and flashing, it is probably the result of having one or more of the LEDs installed wrong. The cathode lead must be soldered at the location shown by the Parts Layout. Refer to the LED (cathode) Information in Figure 2 to identify each LED's cathode lead. Take out each LED one at a time and rotate it 180° and then solder it back in. If the robot begins to flash, you have fixed the problem. If not, you must unsolder the same LED and reinstall it the original way before moving on the next LED. Repeat this step on each LED until you find the LED that you have installed wrong.