

TekBot Remote Control Receiver Board Construction

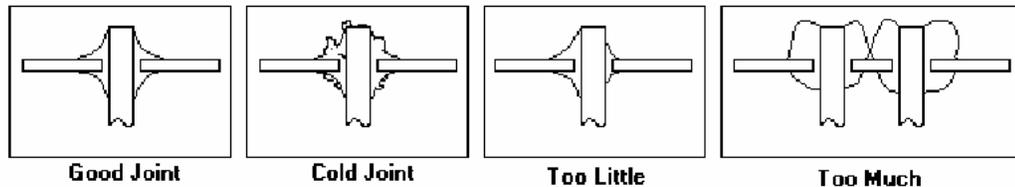
Purpose

This tutorial illustrates the procedure for construction of the Receiver board for the TekBot.

A Guide to Soldering

Many of you have soldered once or twice before but most likely very few of you have ever been instructed how to recognize 'good' soldering from 'bad' soldering. There are a few basic concepts involved in soldering that we will detail here, the first being that solder itself melts with heat. Well duh. Part of this simple concept though is the key to making a 'good' solder joint. A good solder joint will conduct electricity well and prevent the component from falling out. Since solder melts with heat we need to be sure that we give enough heat to the solder to get it to melt uniformly, not in clumps. A solder joint that was made without enough heat is called a 'cold joint' (See the figure below).

Another problem can be if there is too much or too little solder used for the joint. If too little solder is used the joint will not be strong enough and will likely break. If too much is used there is a risk of a 'solder bridge' being formed (See figures below). An ideal joint should appear 'shiny' even after it cools and should look like the solder is stretched from the pad to the wire.



Pre-Project

Look over the parts list & circuit board and become familiar with the placement of all the components. Be sure to pay special attention to diodes and capacitors that have polarity markings. (*Components that can only go in one way*) Note that the foot prints show in **Fig. 1** will NOT be connected. These are for RF components that will not be part of this lab. **Fig. 2** Shows all the components laid out in the order of the parts lists. We will be placing them in a different order. You may want to print out the parts list or use two monitors if possible.

FIG 1

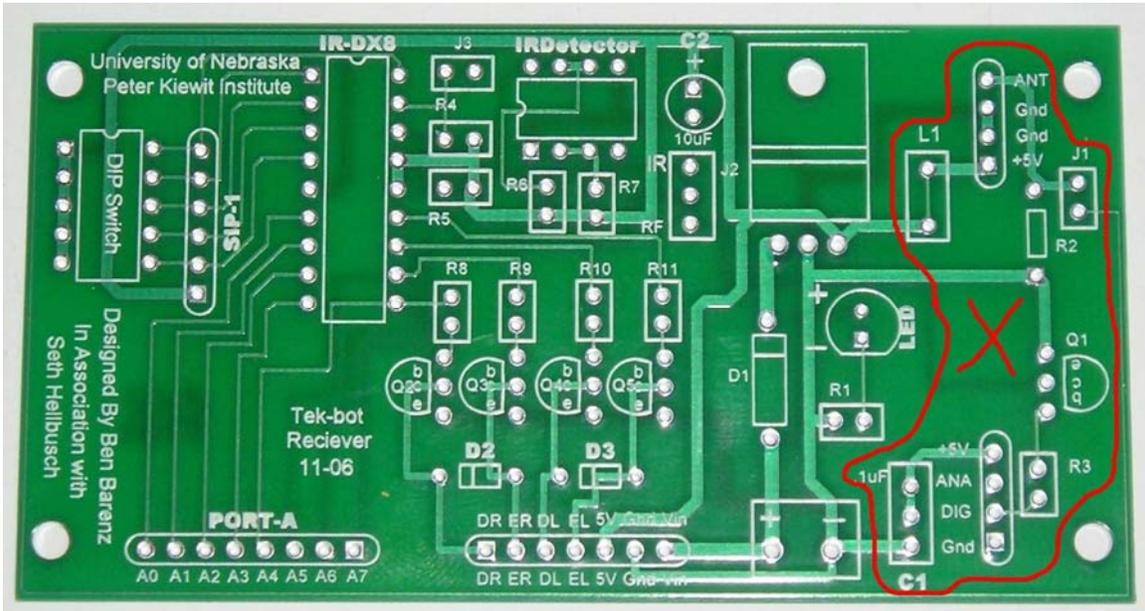
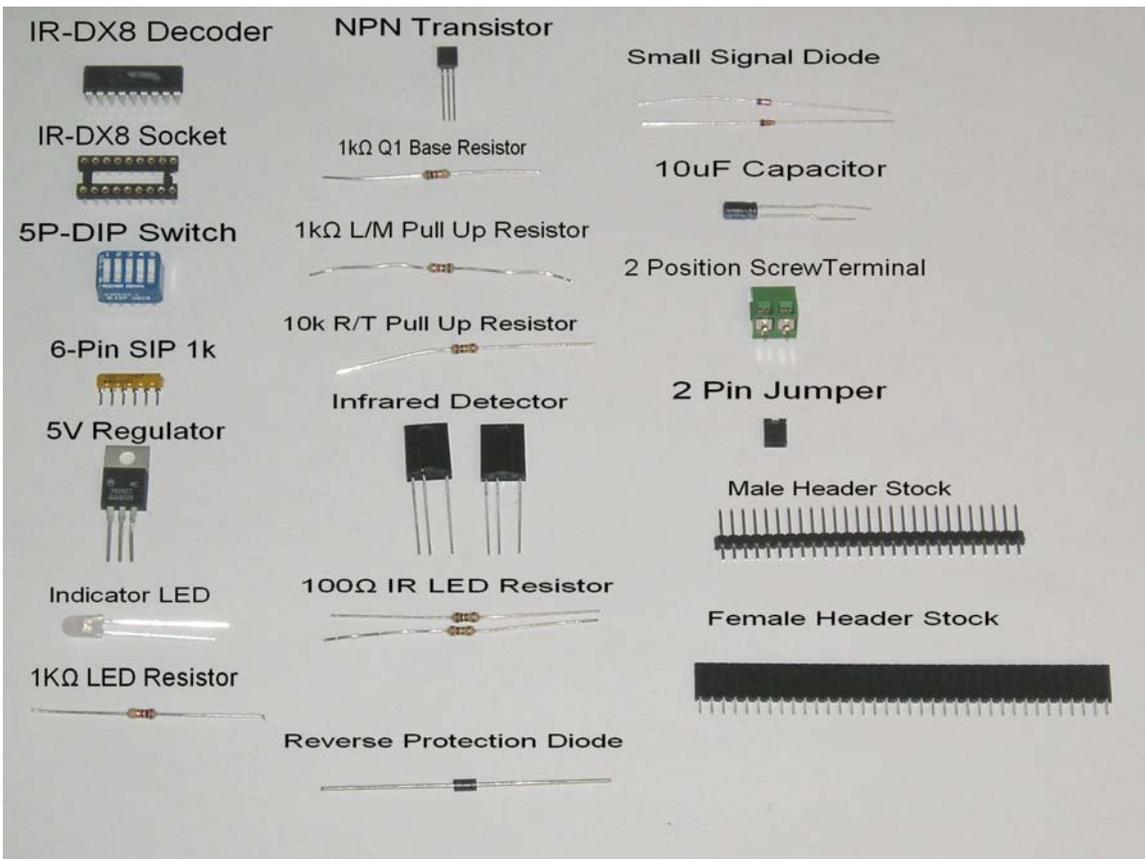


FIG 2



Receiver Board Parts list			
Part	Description	Circuit ID	Quantity
18-Pin IC Socket for IC-1	DIP-18 Decoder Socket	IC-1	1
Decoder	DIP-18 IC	IR-DX8	1
5P-DIP Switch	DIP-10 Blue Switch	Dip Switch	1
6-Pin SIP 1k	Yellow SIP Resistor	SIP-1	1
5V Regulator	Big 3 Pin IC	VR-1	1
Indicator LED	Translucent lens	LED	1
1K Ω LED Resistor	brown,black,red	R1	1
NPN Transistor	Small 3 pin IC	Q2-Q5	4
1k Ω Q1 Base Resistor	brown,black,red	R8-R11	4
1k Ω L/M Pull Up Resistor	brown,black,red	R4	1
10k R/T Pull Up Resistor	brown, black,orange	R5	1
Infrared Detector	IR Detector	IRDetector	2
100 Ω IR LED Resistor	brown,black,brown	R6,R7	2
Reverse Protection Diode	Black with Grey stripe	D1	1
Small Signal Diode	Small Glass Diode	D2,D3	2
10uF Capacitor	Small Black round Cap	C2	1
2 Position Screw Terminal	Green Screw Terminal	T-1	1
2 Pin Jumper	small 2pin black	J1,J2.J3	3
3 Pin Male Header	black (pins)	J2	1
2 Pin Male Header	Black (pins)	J3	1
7 Pin Female Header Power	DR,ER,DL,EL,5V,GN D	power	1
8 Pin Female Header Port-A	Black (holes)	Port-A	8
Total			29

Look over this parts list and the photo and make sure you have all your components. If you have a missing or damaged component alert one of the lab technicians before proceeding.

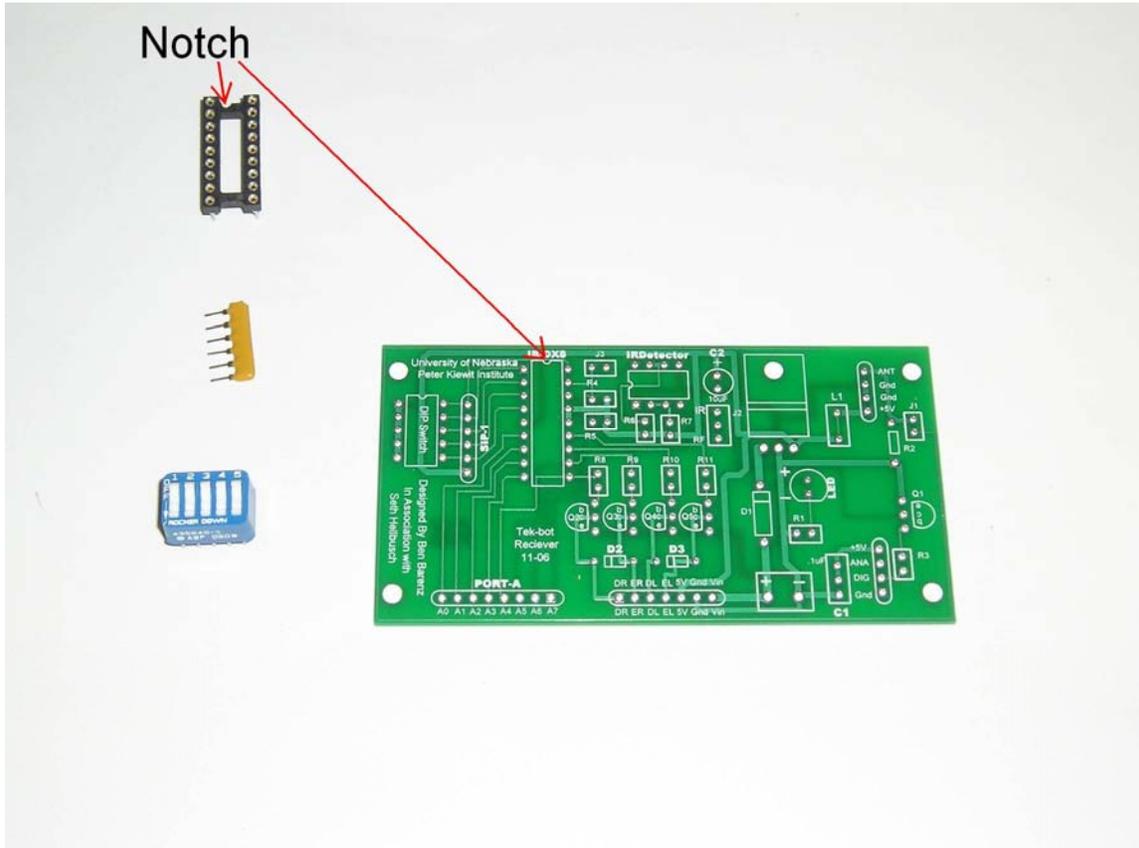
Tools:

- Soldering Iron
- Flux Core Solder
- Wire cutters
- Small Pliers (Optional)

Assembly

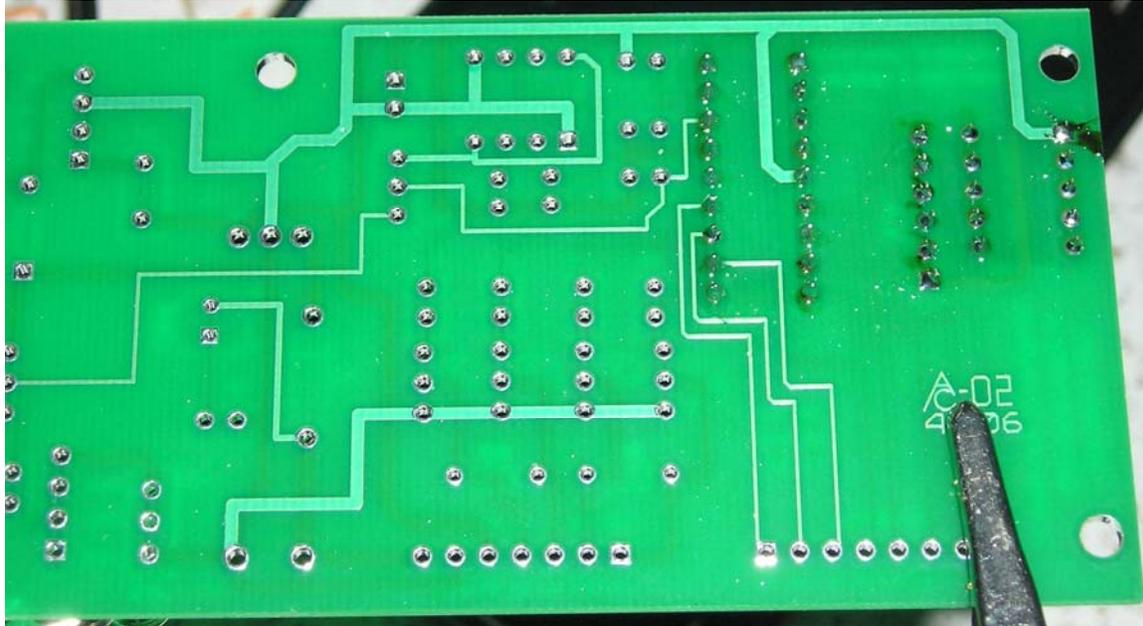
The first components we will place are the DIP-18 Socket, 6-Pin SIP resistor and the 5P DIP Switch as shown in Fig 3.

FIG 3



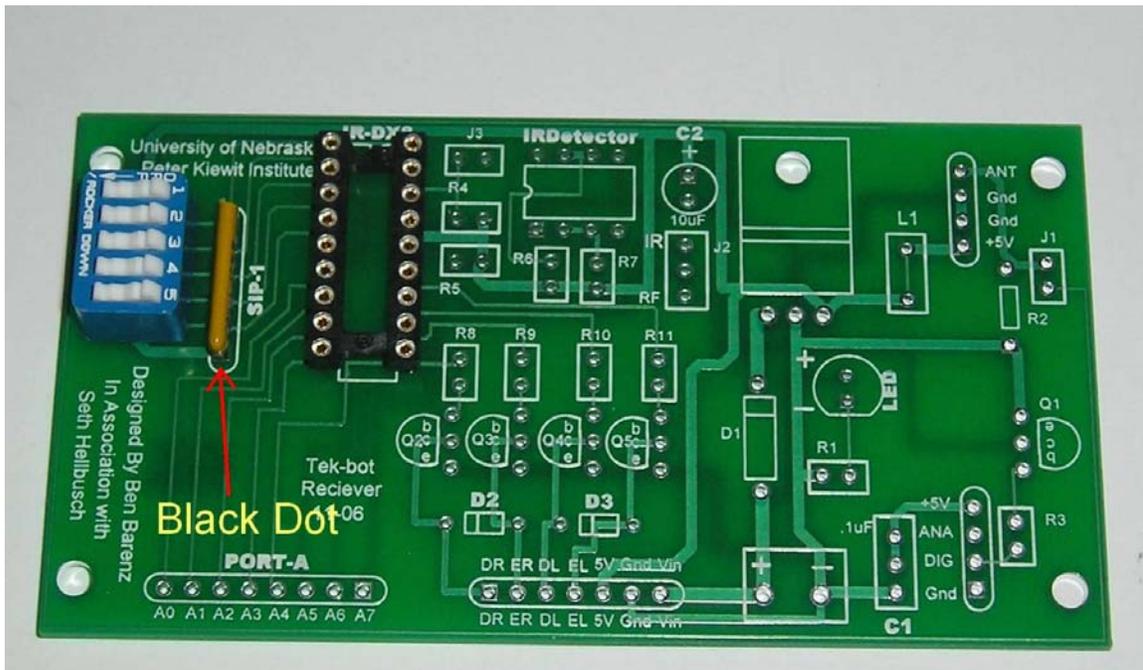
Start by placing the DIP-18 IC socket. The notch goes UP as shown in **Fig 3**. Flip the board over, then while holding the component from the back side solder the first pin in the upper corner. Apply solder then hold the iron tip on the joint for about 1 second then remove. Repeat this process for the rest of the pins as shown in **Fig 4**.

FIG 4



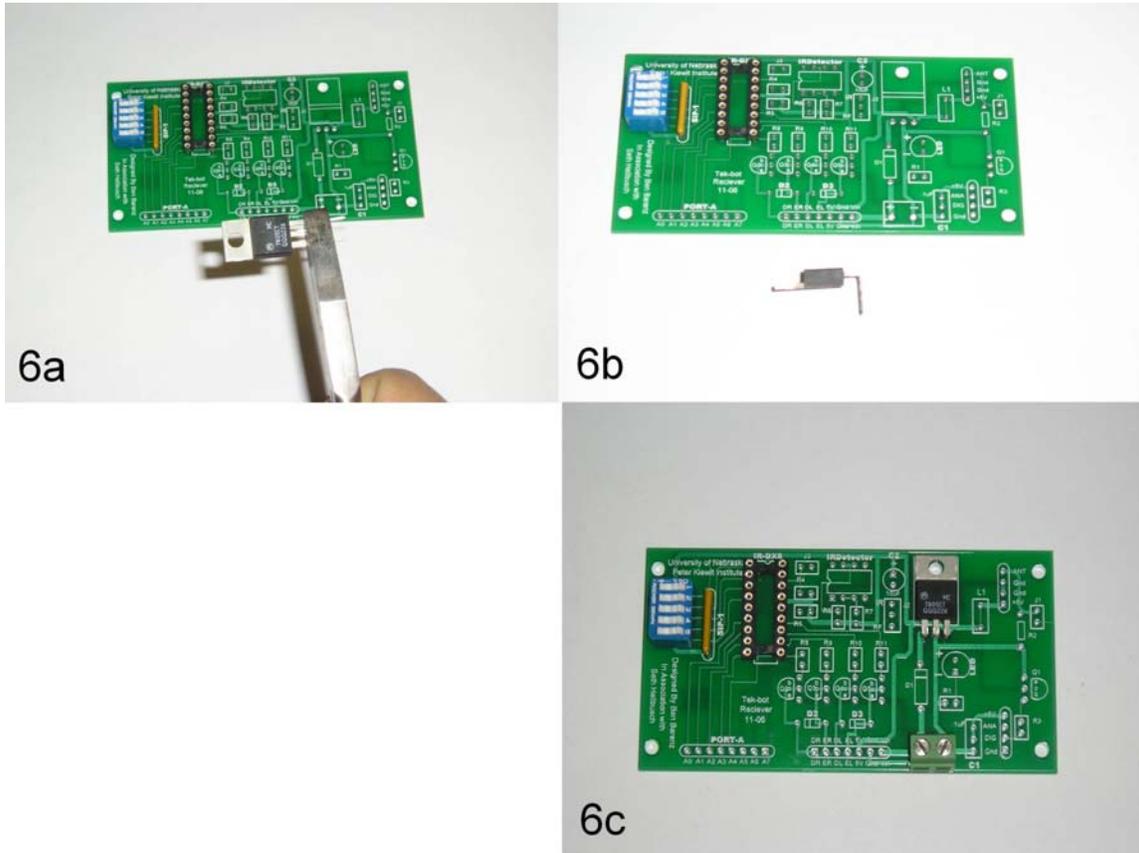
Next, place the SIP resistor with the black dot facing down on the board as shown in Fig 5. Then solder in the 5P DIP Switch in Fig 5.

FIG 5



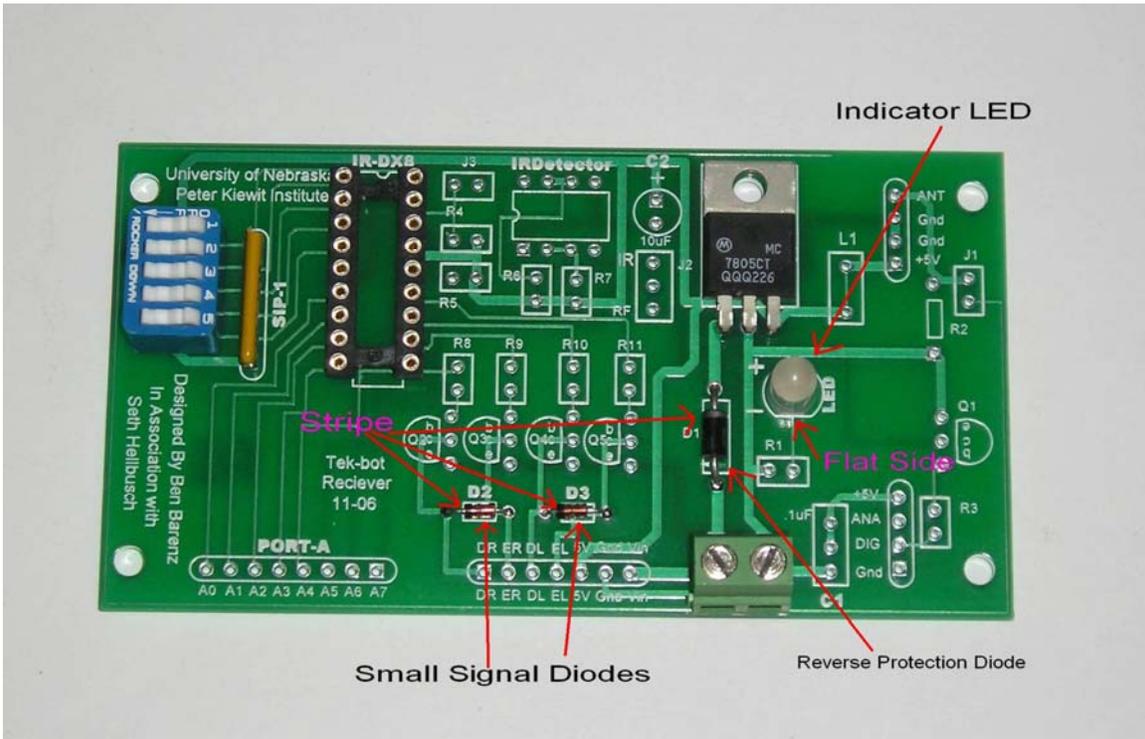
Next we will place the 5V regulator and 2-Pin Screw terminal. Start by bending the leads of the regulator as shown in Fig 6a, 6b. Next place the regulator in the spot marked on the silk screen then solder. Then place the screw terminal in as shown in Fig 6c and solder.

FIG 6



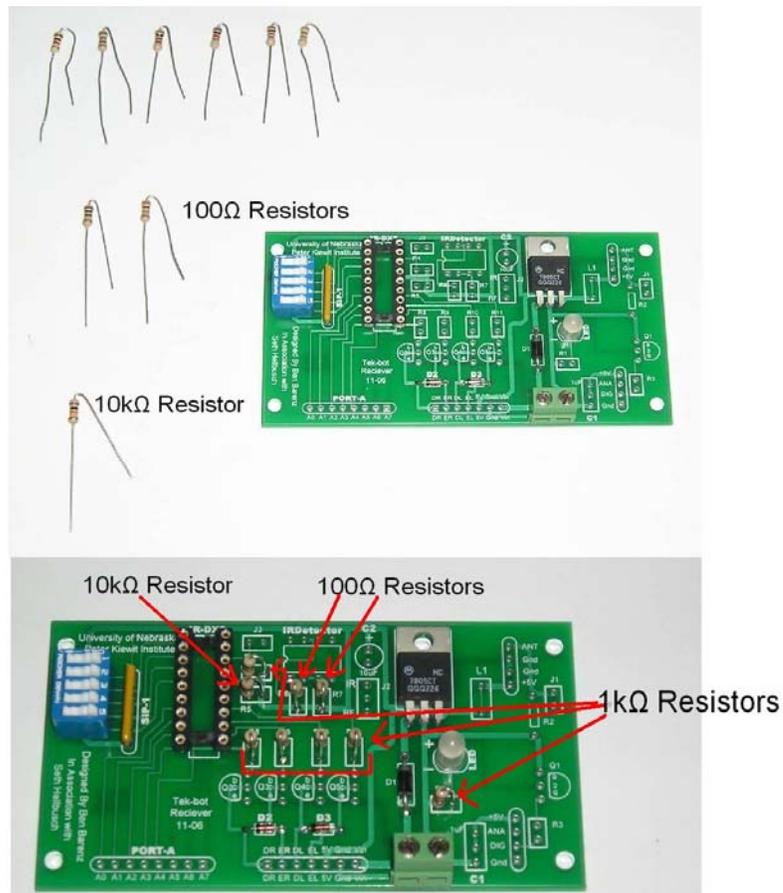
Next we will be placing the diodes. Pay special attention to the polarity marked by the line on one end of the diode. Place the reverse protection diode, small signal diodes, and indicator LED as shown in Fig 7.

FIG 7



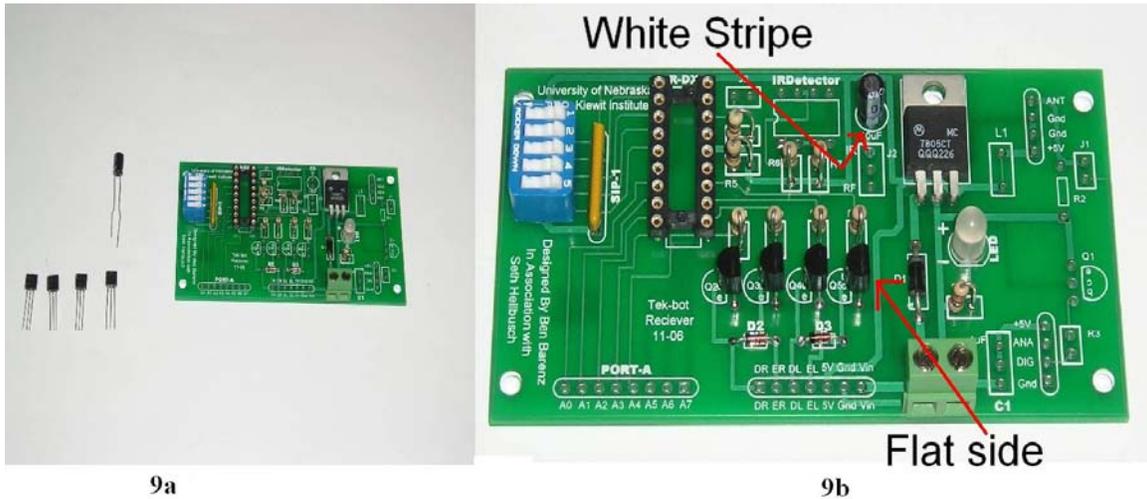
Next we will be placing the Resistors. We need six 1kΩ resistors for R1,R4,R8,R9,R10,R11 two 100Ω resistors for R6,R7 and one 10kΩ resistor for R5. All of the resistors will be vertical mount as shown in Fig 8.

FIG 8



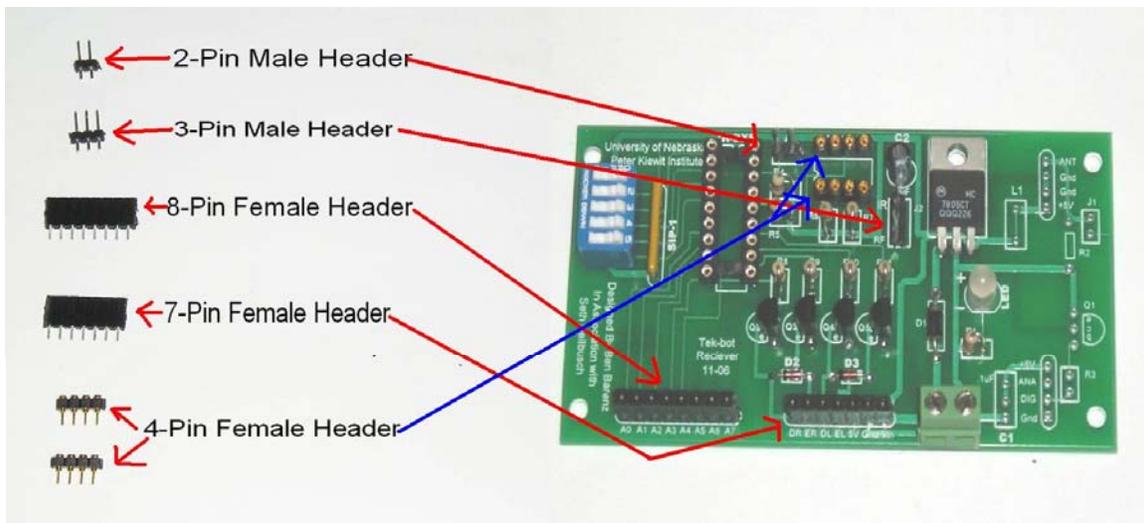
Next we will place the four NPN Transistors and the 10 μ F Capacitor as shown in Fig 9a. Pay careful attention to the orientation of the transistors outlined in the silk screen. When placing the capacitor, the white stripe on the side goes on the negative side as shown in Fig 9b.

FIG 9



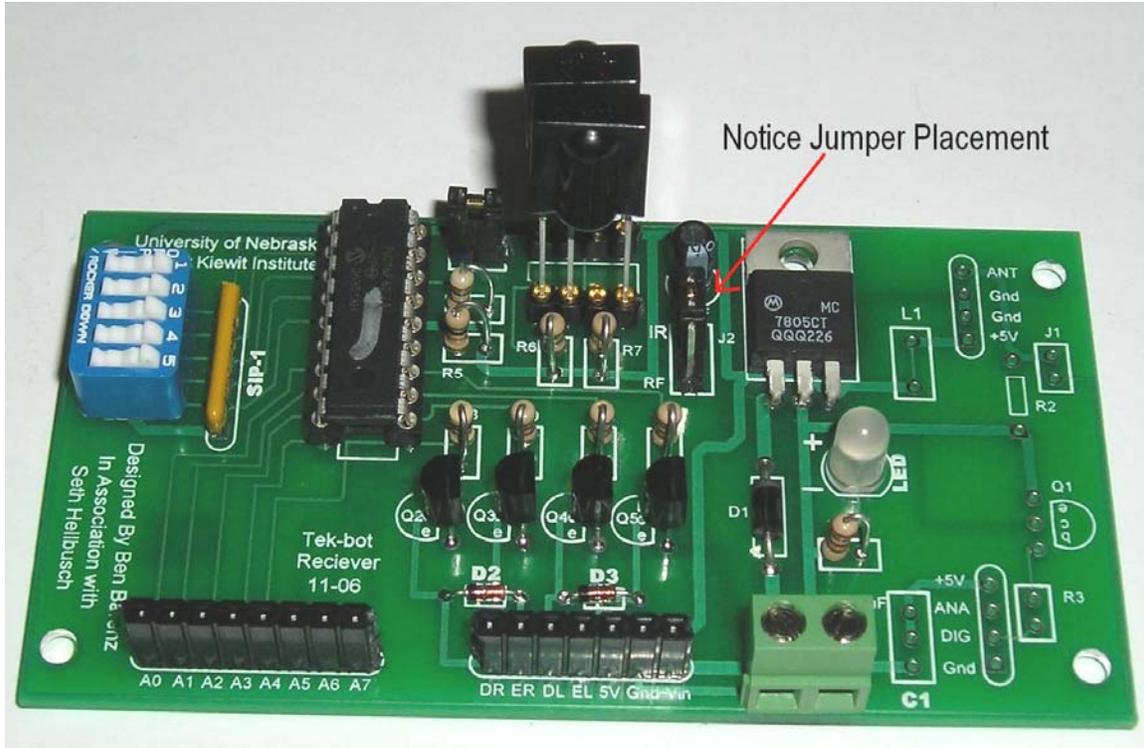
Next we need to cut our headers. We need one 2-Pin male header, one 3-Pin male header, one 8-Pin female header, one 7-Pin female header and two 4-pin female headers as shown in Fig 10a. Cut the headers from the stock pieces and solder in place as shown in Fig 10b. The two 4-pin females can be made out of standard female header or the SIP socket style shown. The SIP socket style holds the part better and since these will hold the IR Detectors we want them to be secure.

FIG 10



We are now done soldering! Next, place the IR-DX8 into the DIP-18 socket. Place a 2-pin jumper across J2 and J3 as shown in Fig 11. Finally insert the IR detectors as shown in Fig 11.

FIG 11



Next we will install the receiver board on the TekBot.

Installing Receiver board on TekBbot

First install the receiver board as shown in Fig 12.

FIG 12



Next we will need two 2-Pin wires to connect the motor controller board to the receiver board and one 2-Pin wire for power. Cut three sets of two wires approximately 8" long. Then solder a 2-pin male header to the end of each wire as shown in Fig 13. On one wire used for power DO NOT solder header pins to one end of the wires because these will be connected to the screw terminals.

FIG 13



The final step is to connect the wires to the TekBot. Connect the DR ER to the Direction and Enable pin for the Right motor and DL EL for the left motor respectively. Connect the header end of the power wire to a free port on the charger board and using a small flat screw driver, tighten the wires down into the screw terminal. You may connect the polarity backwards and observe the reverse hook up protection feature of the receiver board. Finally turn on the power and your ready to drive! Try changing the address on the transmitter and receiver using the DIP switches. If others units are in the room you will have to have a different address or your TekBots will interfere with each other. There are 32 different channels available for the TekBot.

