

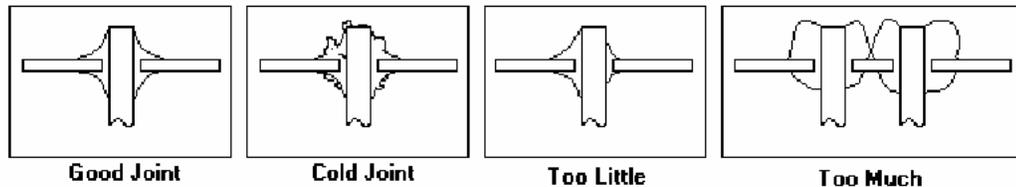
TekBot Remote Control Receiver Board Construction

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 in **Fig. 1** 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*). **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

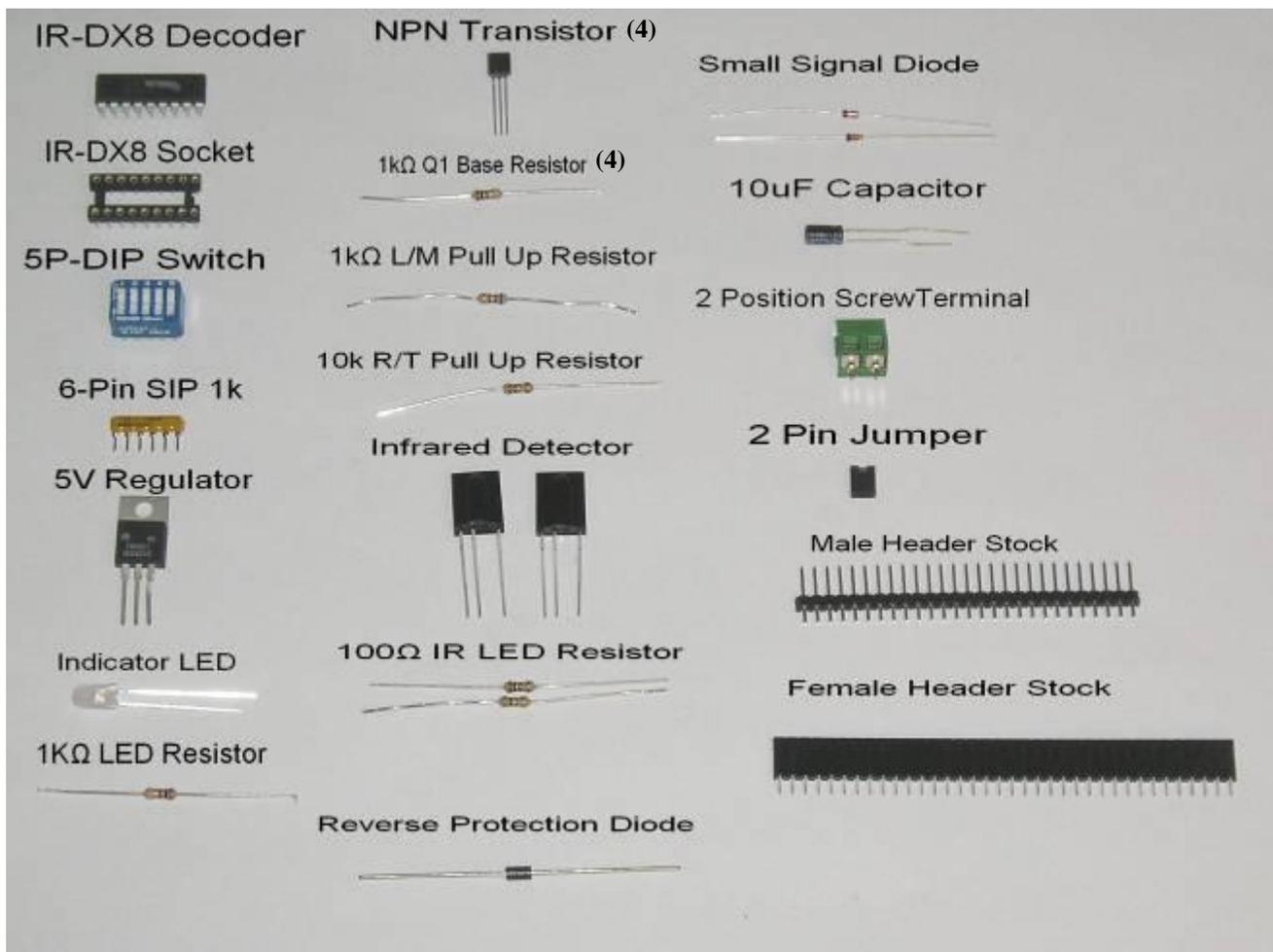
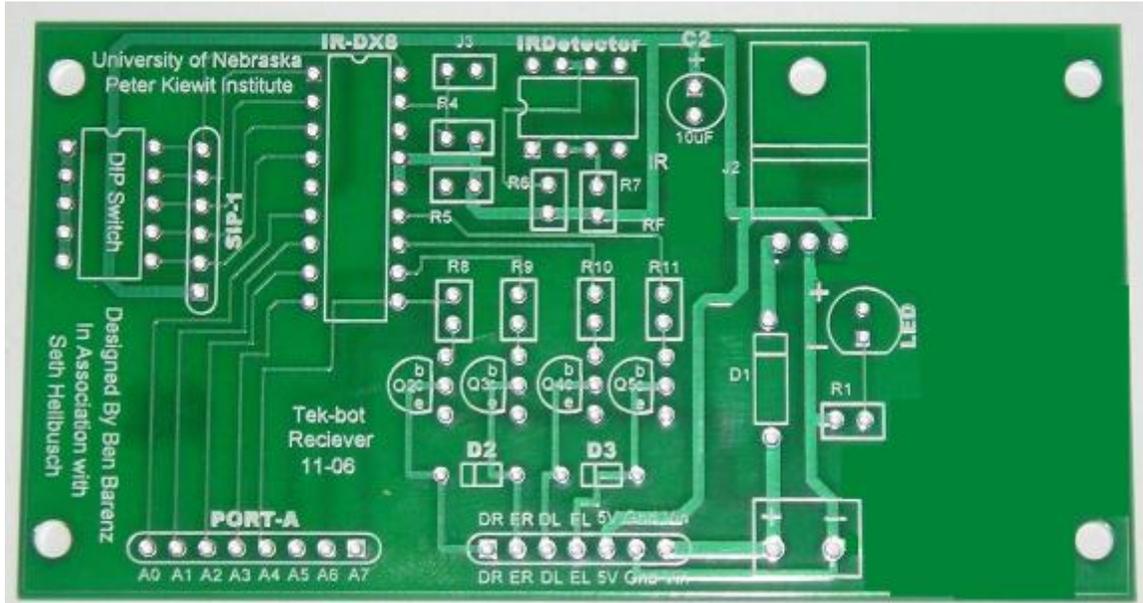


FIG 2

Receiver Board Parts list			
Part	Description	Circuit ID	Quantity
18-Pin IC Socket	DIP-18 Decoder Socket	IR-DX8	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 Q2-5 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	IR Detector	2
100 Ω IR LED Resistor	brown,black,brown	R6,R7	2
Reverse Protection Diode 1N4001	Black with Grey stripe	D1	1
Small Signal Diode 1N914 or 1N4148	Small Glass Diode	D2,D3	2
10 μ F Capacitor	Small Black Round Cap	C2	1
2 Position Terminal	Green Screw Terminal	T-1	1
2 Pin Jumper	small 2pin black	J3	1
2 Pin Male Header	Black (pins)	J3	1
7 Pin Female Header Power	DR,ER,DL,EL,5V,GND	power	1
8 Pin Female Header Port-A	Black (holes)	Port-A	1

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.

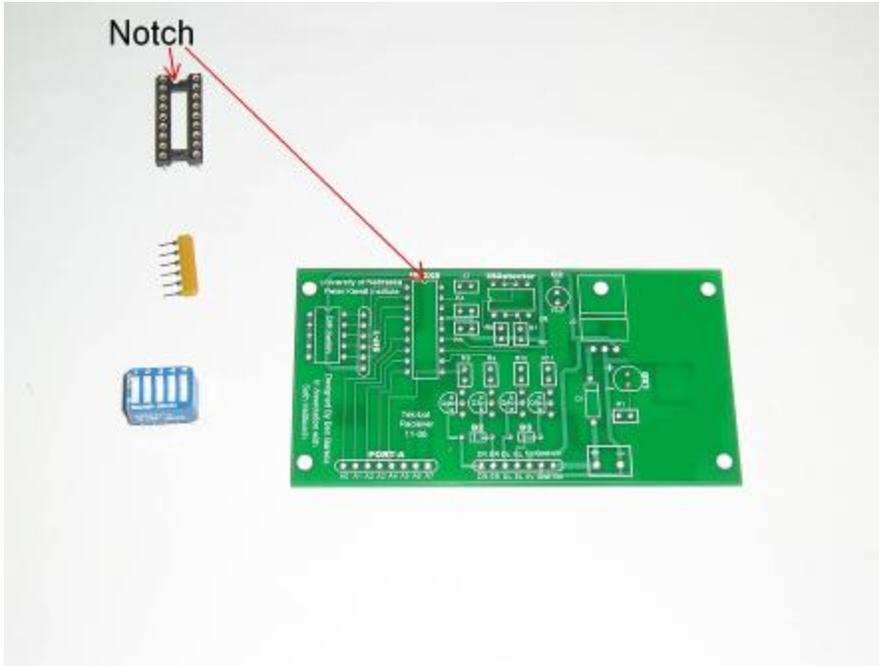
Tools:

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

Assembly

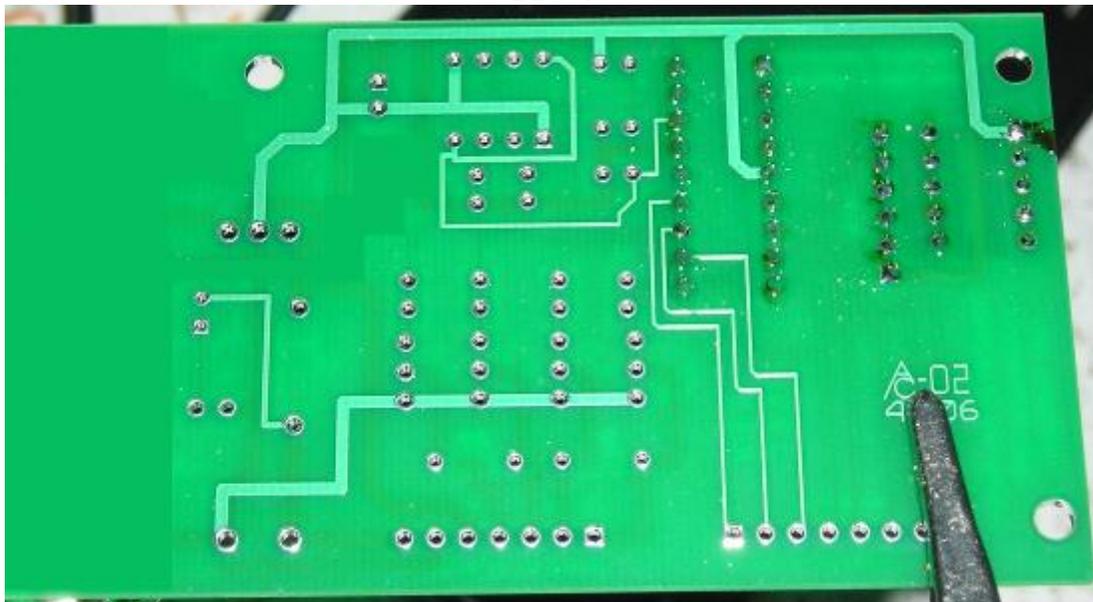
The first components you will place are the DIP-18 Socket, 6-Pin SIP resistor and the 5P DIP Switch (shown in **Fig 3**). Start by placing the DIP-18 IC socket. The notch goes UP as shown in **Fig 3**.

FIG 3



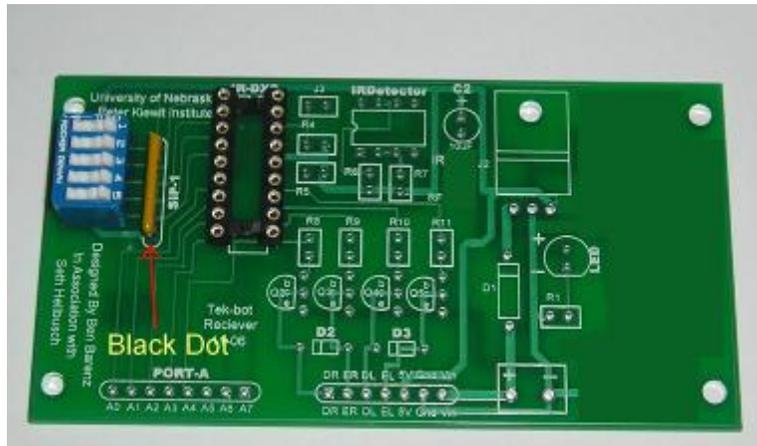
Flip the board over, then while holding the component from the back side solder the first pin in the upper corner. Apply solder then hold the iron tip on the joint for about 1 second then remove. Repeat this process for the rest of the pins as shown in **Fig 4**.

FIG 4



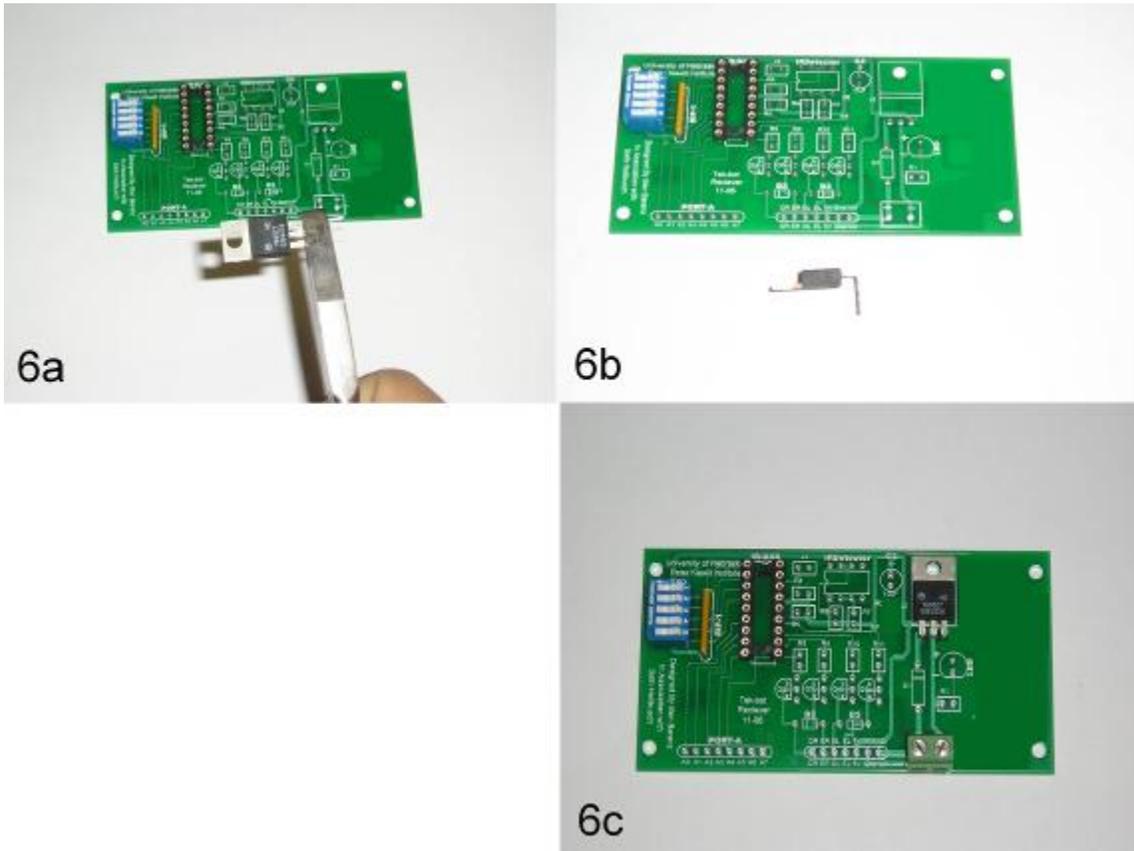
Next, place the SIP resistor with the black dot facing down on the board as shown in **Fig 5**. Then solder in the 5P DIP Switch in **Fig 5**.

FIG 5



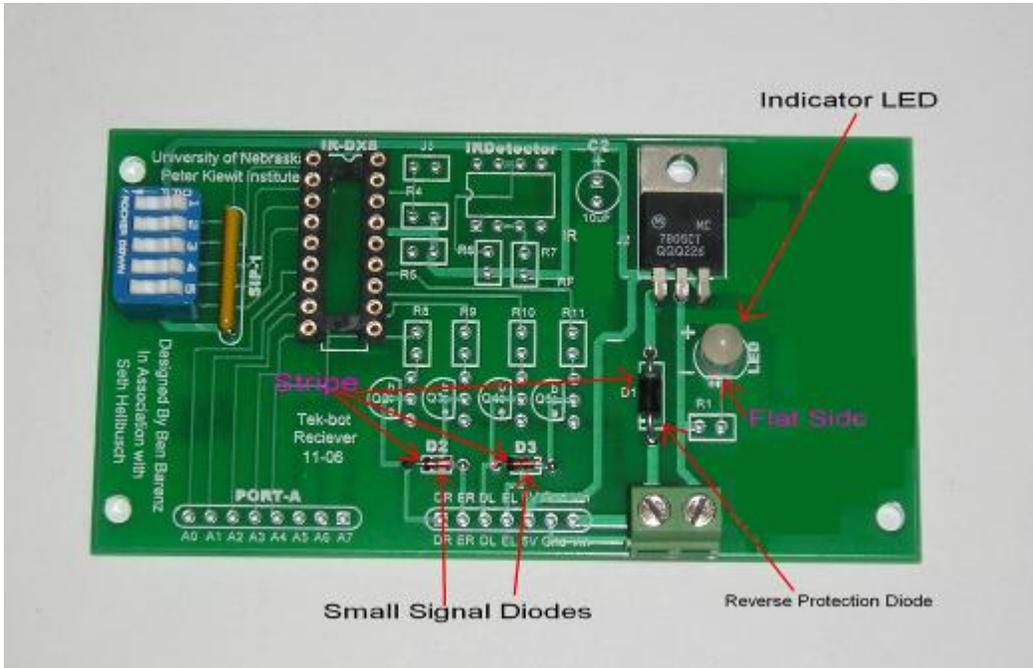
Next, place the 5V regulator and 2-Pin screw terminal. Start by bending the leads of the regulator as shown in **Fig 6a, 6b**. Place the regulator in the spot marked on the silk screen and solder. Place the screw terminal as shown in **Fig 6c** and solder.

FIG 6



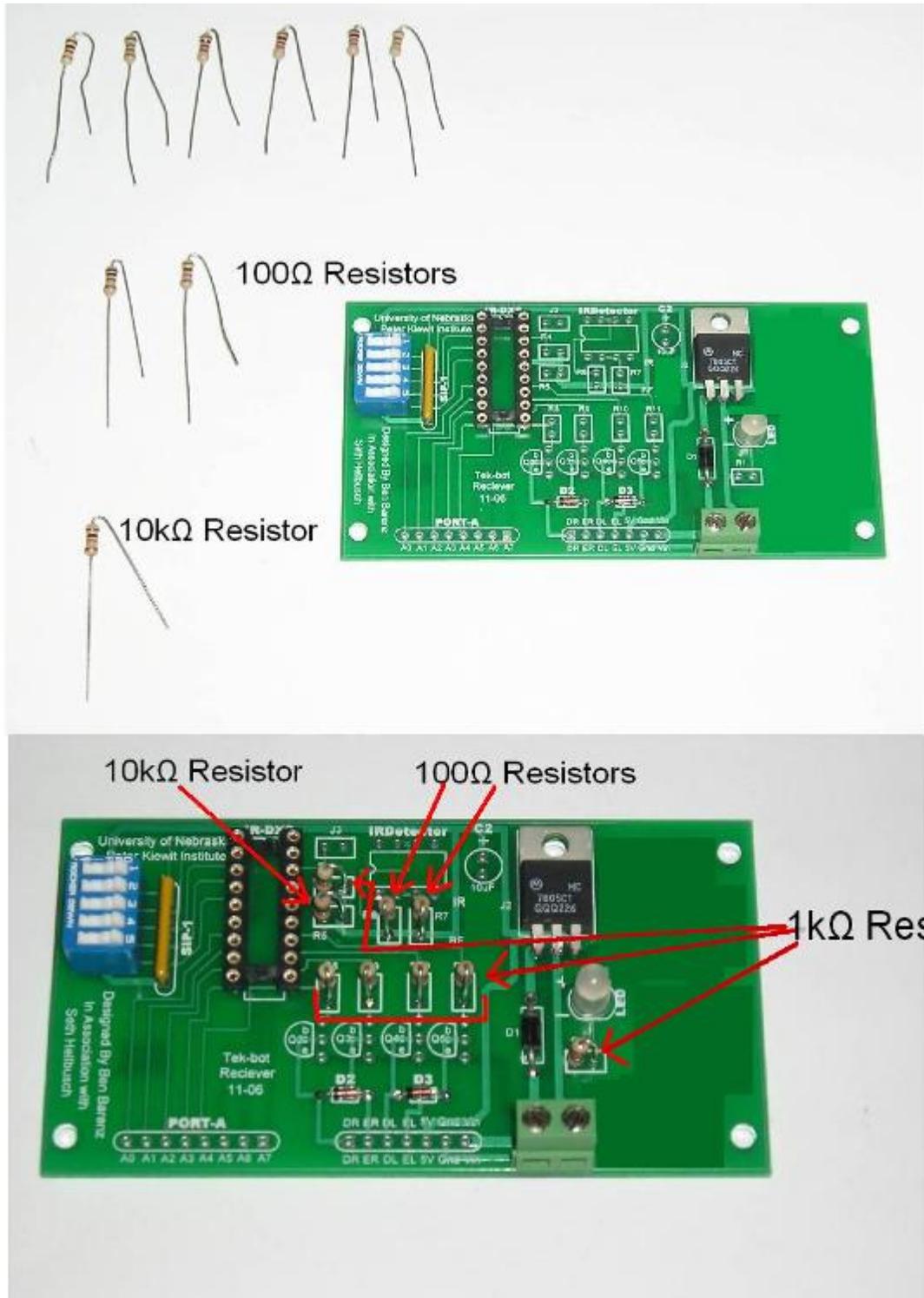
Next, install the diodes. Pay special attention to the polarity marked by the line on one end of the diode. Place the reverse protection diode, small signal diodes, and indicator LED as shown in **Fig 7**. The LED has a flat side (the shorter lead is closest to it).

FIG 7

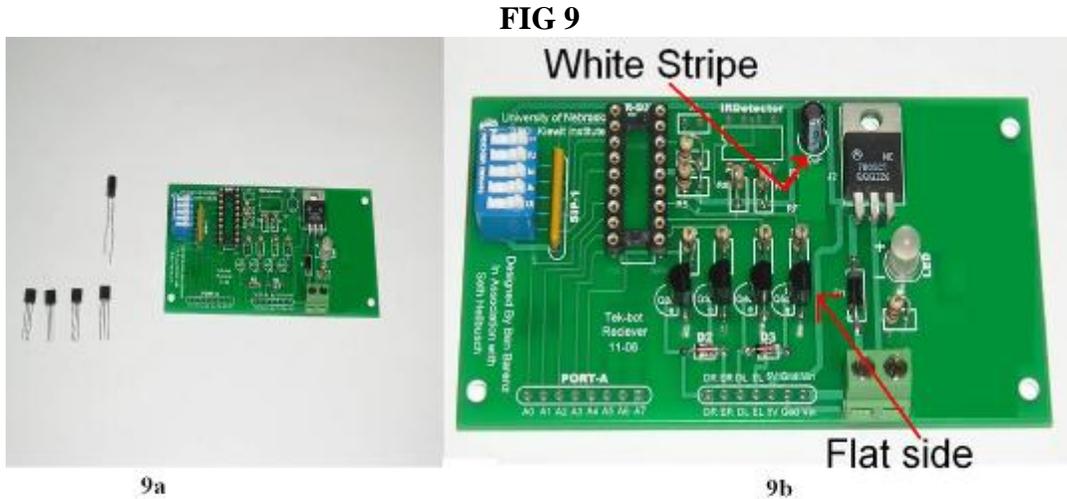


Next, place the resistors. There are six 1kΩ resistors R1, R4, R8, R9, R10, R11, two 100Ω resistors R6,R7, and one 10kΩ resistor R5. All resistors will be mounted vertically as shown in Fig 8.

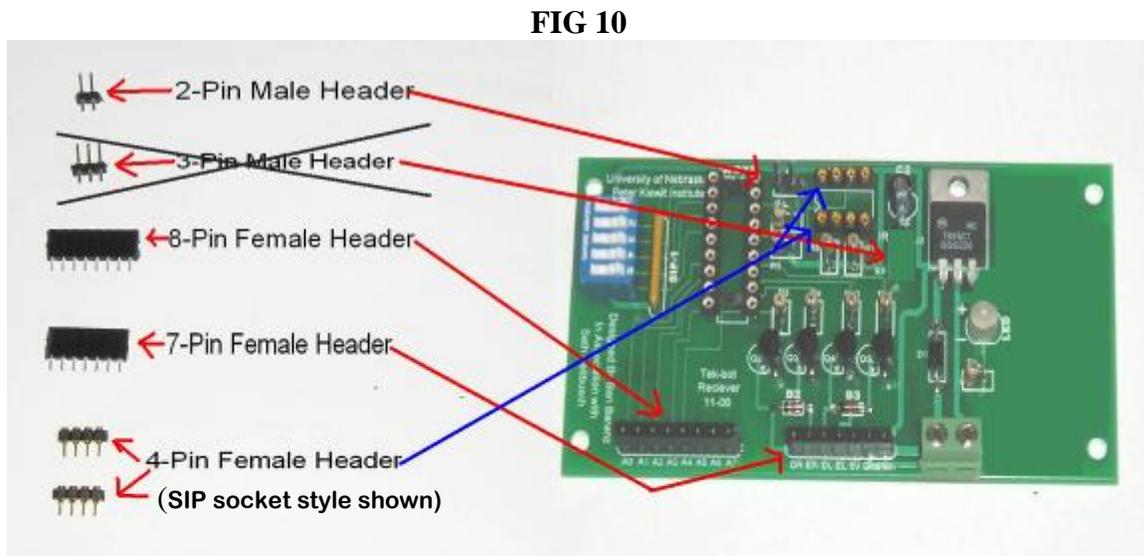
FIG 8



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



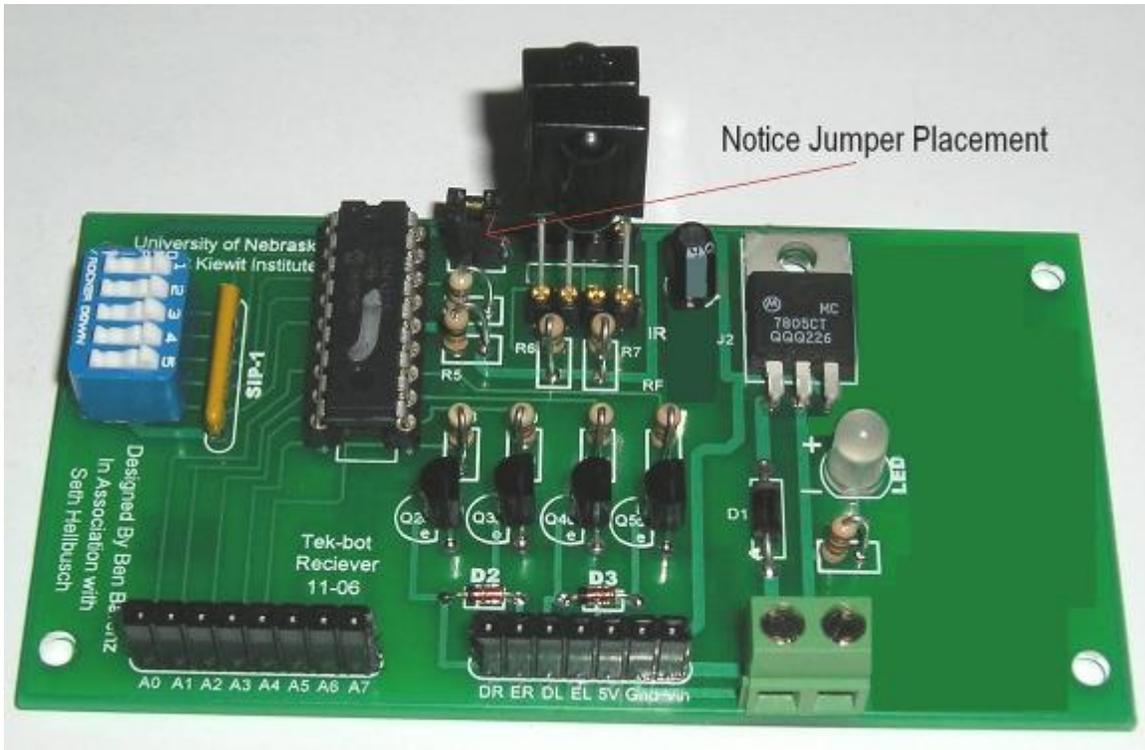
Next, cut the header stock and solder the headers in place as shown in **Fig 10** (ignore the crossed out header). The 4-pin females can be standard female header or the SIP socket style shown. The SIP socket style holds the part in place better.



The soldering is now completed.

Next, place the IR-DX8 into the DIP-18 socket. Place the 2-pin black jumper across the male headers of J3, and insert the IR detectors as shown in **Fig 11**.

FIG 11

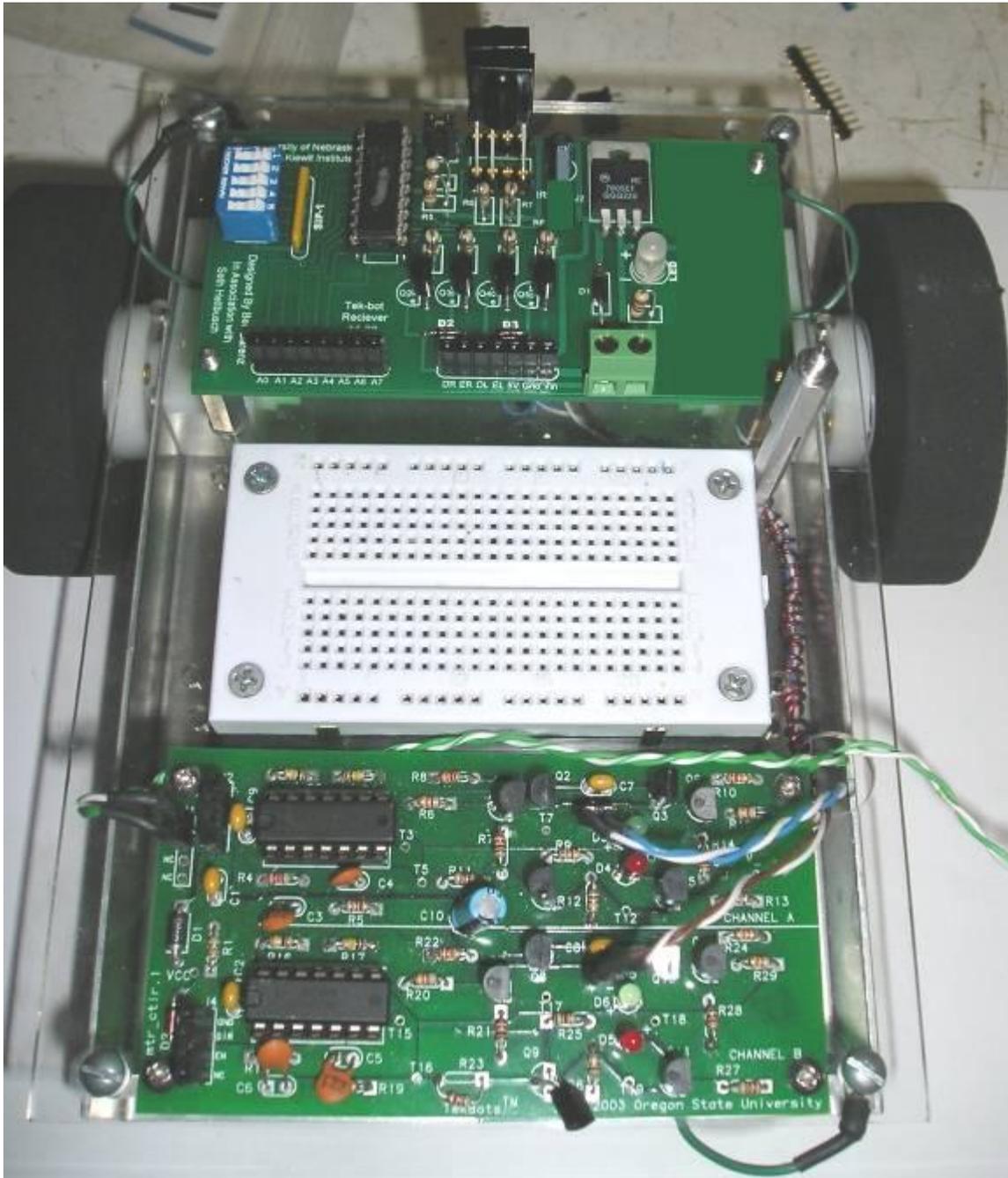


Next we will install the receiver board on the TekBot.

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**.

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 you're 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.