

GEMINI ROBOT KITS

General Assembly Instructions

INTRODUCTION

Congratulations! You are about to discover the benefits of the GEMINI robot in component form. GEMINI is a state-of-the-art autonomous robot engineered with the educator-hobbyist in mind.

GEMINEX, the EXperimenters version of GEMINI, is an excellent teaching device in the field of robotics, microprocessor interfacing, propulsion system principles and artificial intelligence. As you use this manual of assembly instructions to build your Saver kit, you will be gaining practice in identifying and installing components and connectors, and increasing your knowledge in electromechanical assembly techniques.

Our Customer Service Department (301)730-1237 is available to assist you with your questions, problems and suggestions on how we may improve the GEMINI components. We would also like to know if you have any outstanding successes or new applications. Please write to:

ARCTEC SYSTEMS, INCORPORATED

9104 Red Branch Road

Columbia, Maryland 21045

The following is a complete list of tools required for building the entire robot from kit form. Although you may only be assembling one kit, the specific tools necessary are listed with each subassembly instructions.

Construction

1/4" Flat blade screw driver

Small ball peen hammer

Small block of wood

1/8" Flat blade screw driver

11/32" Nut driver

1/4" Nut driver

11/32" Wrench

1/4" Wrench

Short needle nose pliers

Wire strippers

Small dikes (diag. cutters)

Volt Ohm meter

12" ruler

1/10" Allen wrench

Soldering Iron (small tip)

Screw starter

7/16" Wrench

9/64" Allen wrench

1/8" Allen wrench

Crimping Pliers

Mechanical

Ruler or tape measure

Needle nose pliers

Small pair of diag. cutters

Jewelers screw driver

Soldering iron

Solderwick

Wire strippers

Electrical

4" Diagonal cutters

4" Long nose pliers

1/8" Screw driver or smaller

wire strippers

Testing

Digital multimeter

Screwdriver

Jewelers screw driver

RS232 Link on a personal computer

General Instructions on How to Proceed

Before proceeding any further, there are some major precautions that should be noted concerning CMOS components.

The CMOS chips are extremely static sensitive; therefore, it is highly recommended that you assemble the boards on the charger static mat, included in each \$aver kit. We recommend that you ground yourself to the static mat with a wrist strap, which can be purchased at a local electronic store. Before you begin working with the chips, be sure to touch ground with one hand. When handling the CMOS chips, try to keep the chip in one hand. Try not to transfer the chip from one hand to the other. As one of our electronic trouble shooters explained, "Get ridiculous in preventing static."

If you are concerned that a CMOS chip has been damaged by static discharge, contact our factory and we will take your order for a replacement chip and ship it to you immediately.

Individual parts are identified in the beginning of each of the peripheral descriptions. If there is a problem identifying the specific part needed, consult the "How To" section for review. The components are identified with photos.

When the kit parts are opened for the first time, check to make sure that all are present in accordance with the parts list. If you should find any discrepancies with the parts, contact Arctec Systems, Inc. factory first and we will either ship you the new individual part or ask you to send the entire kit back so we can ship you a corrected kit.

Follow the instructions carefully. Be sure to read the entire step before performing each operation.

How to Section

One of the most important operation you will perform while assembling this kit is soldering. The secret of good soldering is to use the right amount of heat. Too little heat will produce a "cold soldered joint"; too much may injure a component. The iron and the solder should be applied simultaneously to the joint. A good solder connection will form an electrical connection between two parts; a bad solder connection may prevent an otherwise well-assembled kit from operating properly.

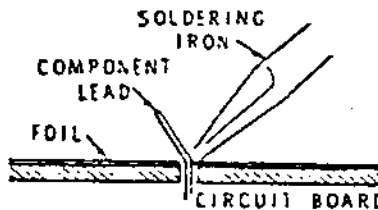
Some tips to keep in mind while soldering:

- * Keep the iron clean by brushing the hot tip with a wet sponge or cloth.

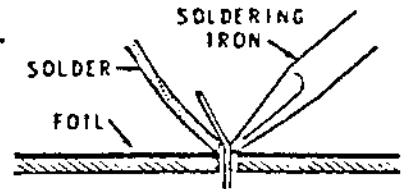
- * Apply solder to the tip to give the entire tip a wet look. This is called tinning and will help protect the tip and enable you to make good connections. This process may have to be repeated if the solder tends to ball or does not stick to the tip.
- * Always use rosin-core solder, never acid-core.
- * Use 60:40 or 50:50 tin-lead content.

A brief example of how to solder is seen below with a resistor:

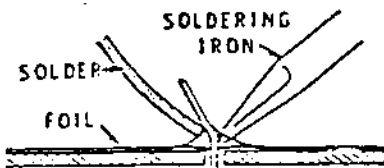
Push the soldering iron tip against both the lead and circuit board foil. Heat both for two or three seconds.



Now apply solder to the other side of the component lead. Let the heated lead and the foil of the circuit board melt the solder.



As the solder begins to melt, it will flow around the connection. Allow it to do so. Then remove the solder and the iron and allow the connection to cool.



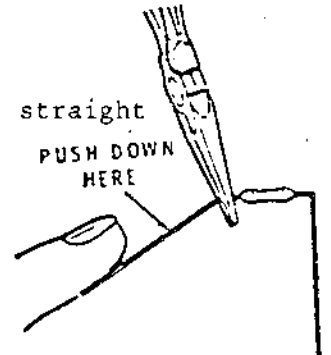
Cut off the excess lead length close to the connection being careful not to dig into the solder. Use caution since the leads will tend to fly off when you cut them. Check each connection. Look for imperfections such as: pin holes, ripples, solder joints that did not adhere to the foil. If

any of these problems occur, reheat the joint and add a small amount of solder. Use the same procedure for each connection.

The following are detailed instructions on how to install the components on the circuit board. Read and perform each step carefully. Use these steps whenever you install components on a circuit board.

RESISTORS

Hold a resistor with long nose pliers and bend the leads straight down to fit the hole spacing on the circuit board.



When inserting into the circuit board, it is helpful to have the colors aligned with the way you read them. From left to right. Example BRN-BLK-RED-GOLD.



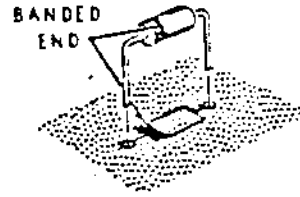
Insert the resistor so it lays flat against the circuit board. Push the leads through the holes at the indicated location on the circuit board. Press the resistor against the circuit board. Then bend the leads outwards slightly to hold the resistor in place.



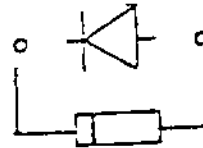
Turn the circuit board over and solder the resistor leads to the foil. Cut off excess length.

DIODES

When installing the diodes, be sure to position the banded end over the band mark on the circuit board.

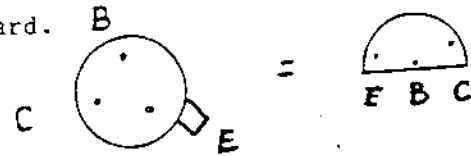


When installing a diode, one end will have a black band on it. Always position the diode over the diode marker on circuit board as shown.

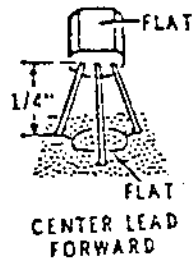


TRANSISTOR

Position the transistor so that the lead marked with "E" is in the hole closest to the tab mark on the circuit board.



When you install a transistor, align its flat with the flat on the board. Insert the leads into the correct holes. Position the transistor 1/4" above the board. Then solder the leads to the foil and cut off the excess lead length.



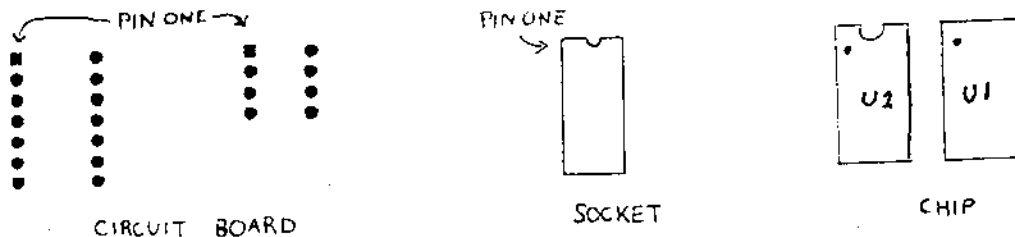
CAPACITORS

When installing an electrolytic cap (capacitor), be sure to match positive end with (+) the mark on the circuit board. Minus arrows indicate negative end of cap.



IDENTIFYING PIN 1 ON IC'S

When installing the IC's, sockets will be used and they will be soldered directly to the circuit board. Make sure that pin 1 is at the proper end. On circuit boards, pin 1 sometimes has a square solder pad as shown in the sketches below. Sockets have a notch to indicate pin 1. On U1 IC pin 1 is marked by a small circle and on U2 by the notch in one end. The diagram below shows that pin 1 starts at top left, and are sequentially numbered counting counter-clockwise.



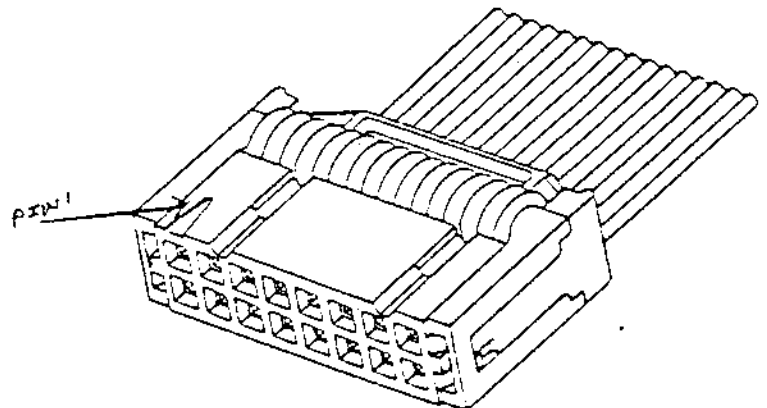
CONNECTORS

In order for you to properly install the connectors the following diagrams have been provided.

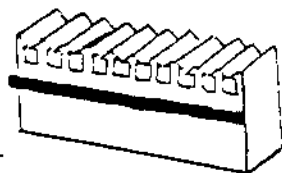
Small 3 pin Molex Connector



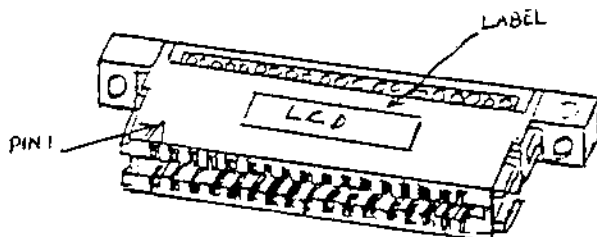
40, 34, 20 and 26 - pin Connectors



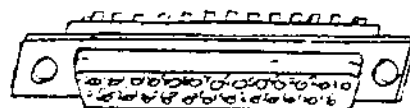
Small Molex Connector



Card Edge Connector



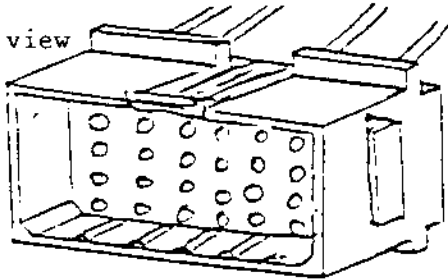
RS232 Connector



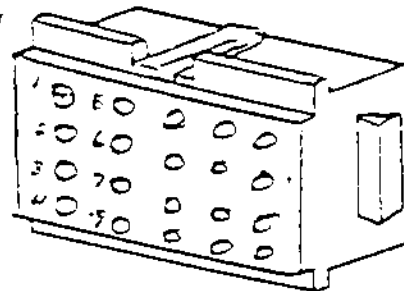
Male Molex Pin connector

36 pin Male Molex Connector

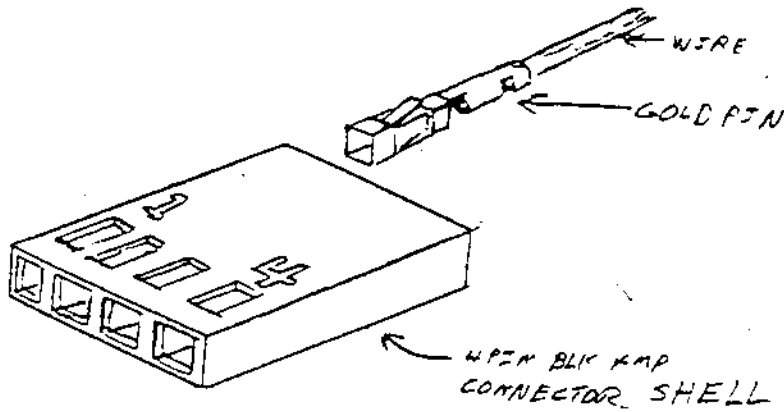
Front view



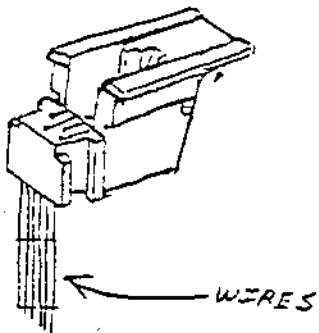
Back view



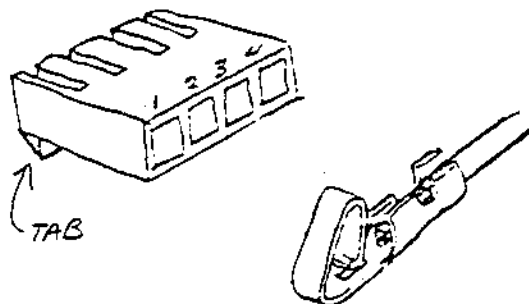
AMP Connector and Crimp pins Gold



Key Board Connector

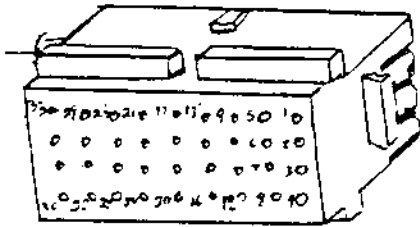


Molex Spring Connector and Molex Spring pin

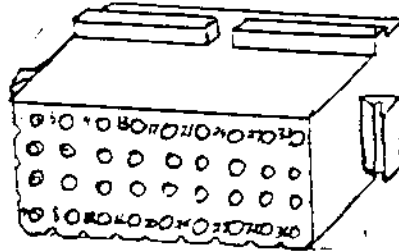


36 Pin Female Molex Connector

Back view



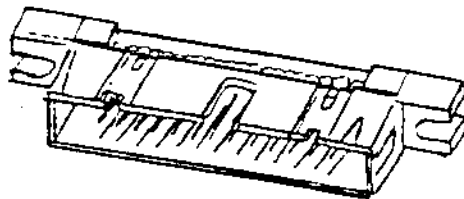
Front view



Joystick Connector



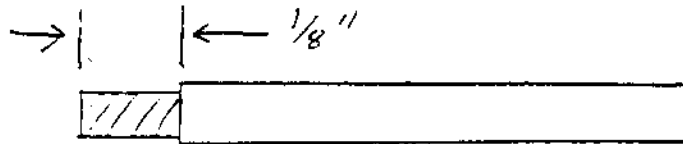
34 and 26 Pin Connector



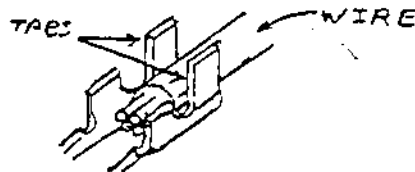
Now that we have identified each of the connectors, it is important to understand how each of the various connectors are to be attached.

If you have a crimping tool, it will make this job easy to do. It is imperative that the tabs be carefully rounded. Follow the procedure below.

Step 1 Cut wires to desired lengths. Remove $1/8$ " of insulation from one end of the wire. NOTE: Some cables DO NOT NEED any insulation removed from their ends. There are also a few cables that are partly made up and a few that are already completed.

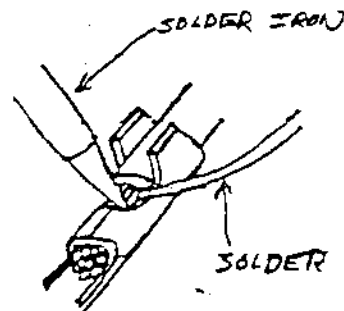
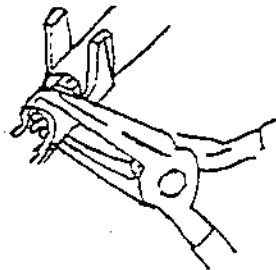
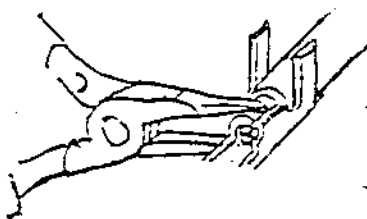


Step 2 Place wire between tabs in connector.

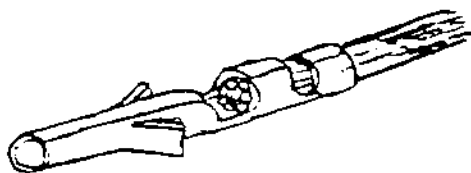


Step 3 Bend the tabs over bare wire first. Then apply solder. DO NOT allow solder to flow into the connector.

BEND OPPOSITE TAB
AROUND FIRST TAB.

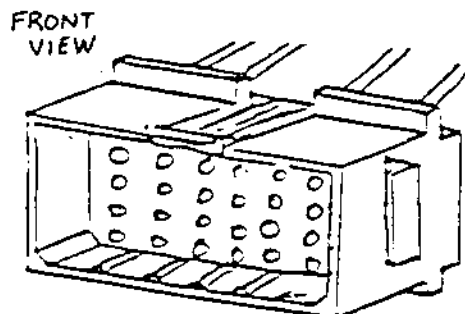
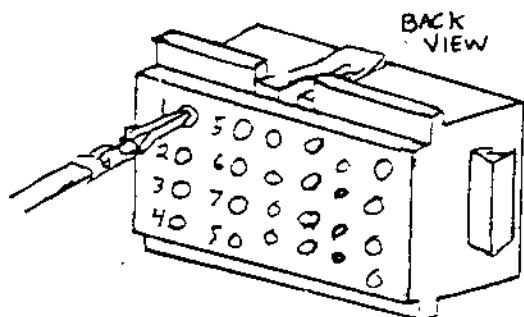


Step 4 When solder has cooled down, bend the end tabs over the insulation on the wire.

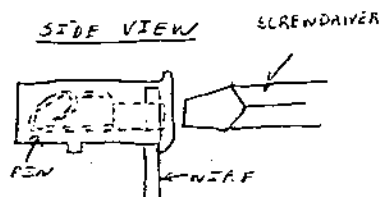
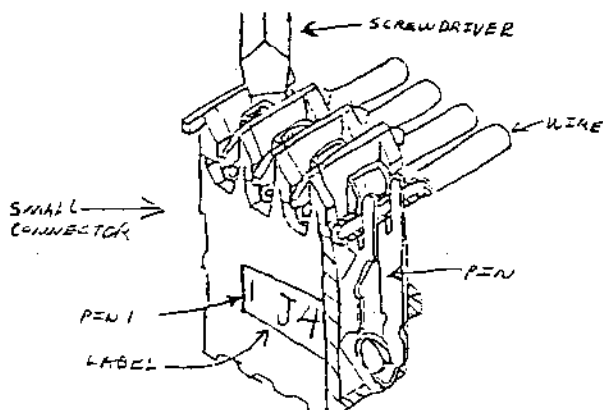


Step 5 Follow steps 1 - 4 for other similar connectors. Example: Sonar Clips, Fork Terminals.

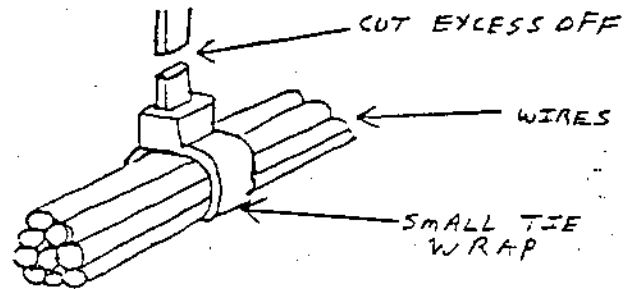
Step 6 Insert connectors into the large Molex Male and Female connector shells as indicated in the assembly instructions.



Attaching small Molex connectors: Take a small flathead screwdriver and gently push wires into the specified pins, take careful notice of location of pin one and label connector with this in mind. NO INSULATION should be removed from the wires going into this type of connector.



Lace wires together where indicated on lacing diagram. Use small tie wraps for this and space them about 2" apart.

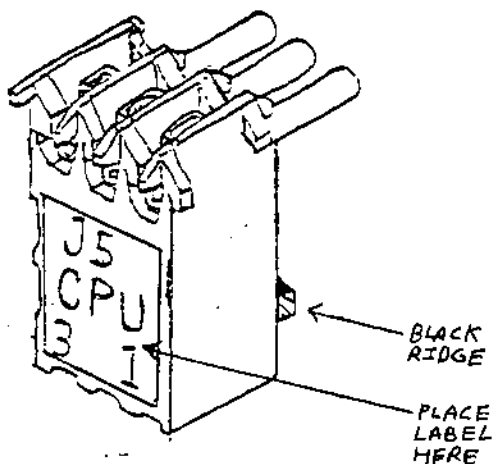


Install other components and cables on chassis as indicated in the instructions.

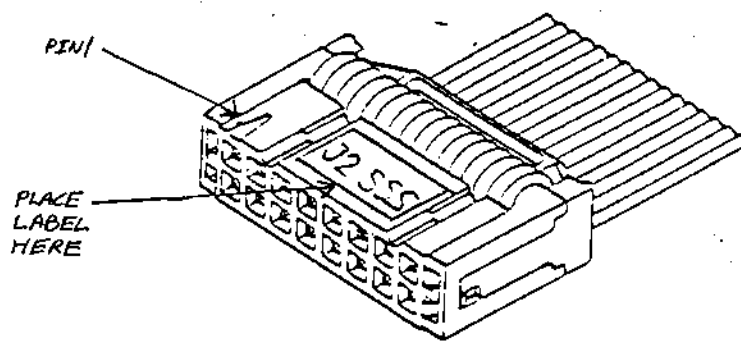
LABELS

Careful notice should be taken when labeling the various connectors. The location of pin one on the connectors will be different even on connectors of the same type. This is because the location of pin one on the PC boards will vary from board to board. With this in mind use the illustrations below for the proper orientation of the labels.

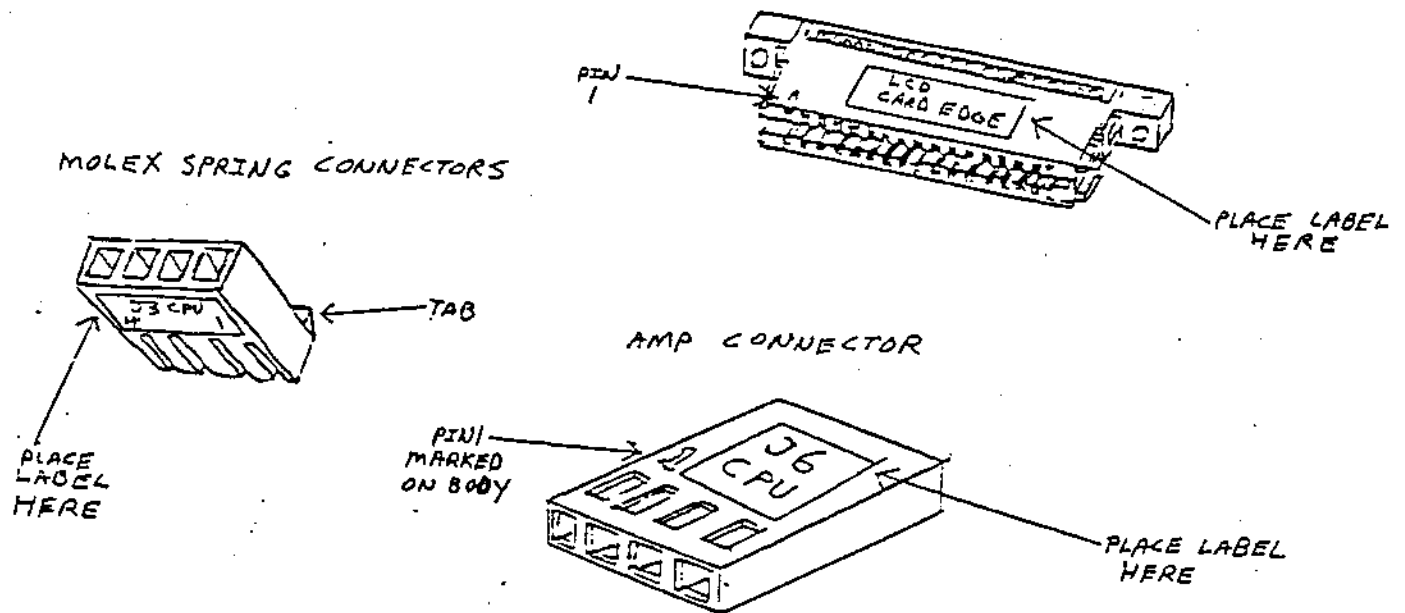
SMALL MOLEX CONNECTORS



40, 34, 20 AND 26-PIN CONNECTORS



CARD EDGE CONNECTOR



WARNING: If you wish to leave your Robot turned off and off it's charger for any length of time you must disconnect the J4 torso cable located near the base. If you do not do this you will drain the batteries.