# How to Build your Infrared Hexapod Robot

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Design Brief – Using a laser Cutter, design and cut out the Hexapod Parts on Acrylic or ply, constructing your Infrared Controlled 14M2 Picaxe Hexapod Robot.

Note – The photos taken in this "How to Build" are using 3 mm thick Plywood. The same can be done using 3mm coloured acrylic on the Laser.

3 mm Plywood

3 mm Acrylic
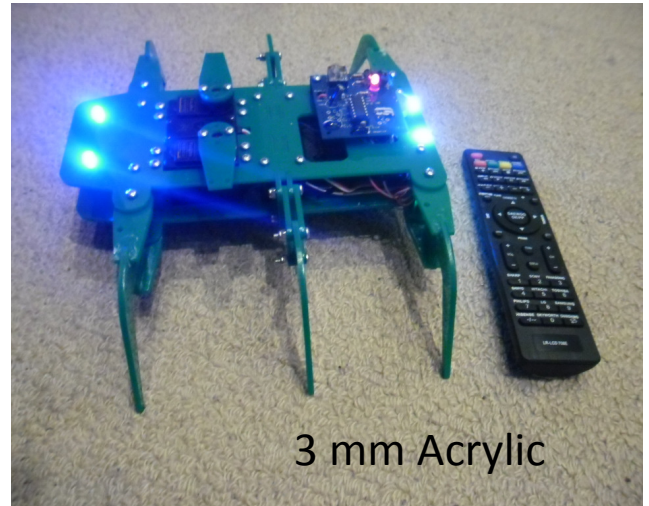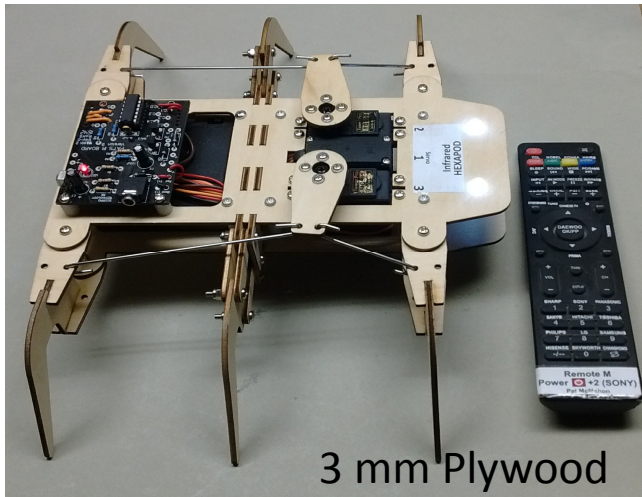
Below are some of the Production Steps, you can use your own design, Tick off each box as you complete a task and Document it.

Tools Required– Soldering Iron, Side Cutters, Pointy Nose Pliers, Phillips Head Screwdrivers, Glue, Tape.

NOTE– Nyloc nuts are supplied to lock without over tightening, leave all connections free of any friction, back off all tightened nuts.

☐ **Check, you will need M3 Pan Head Metal Threads & nuts.**

8 – M3x 35 mm
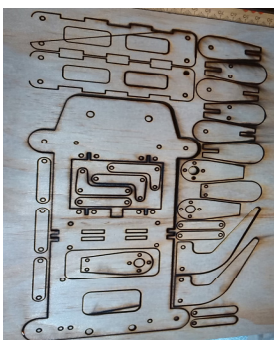
10 – M3x 16 mm

20 – M3x 10 mm

38 – M3 Nyloc Nuts

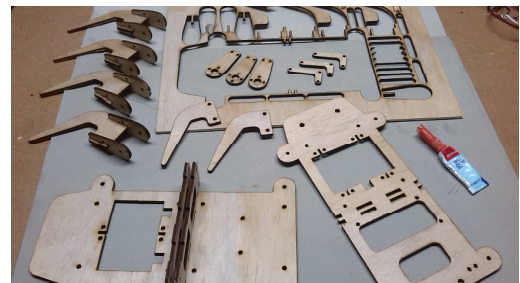☐ **Carefully using a Stanley Knife / PVC Pipe cutter, cut**

7mm diameter Plastic Riser Tube Spacers-

8 x 24 mm long Spacers

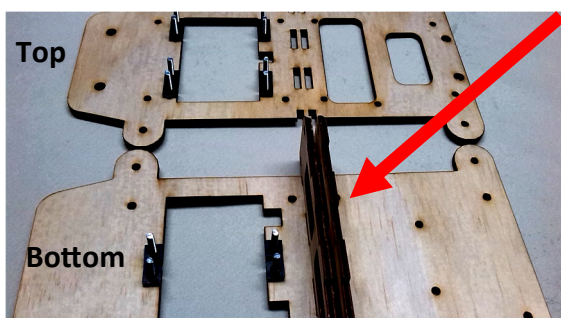2 x 10 mm long Spacers

☐ **Design & Cut your Laser Parts.**

☐ **Glue the 8 Outer Link Arms to the 4 Outer Legs, ensuring perpendicular and pushed firmly home. (Super Glue for Ply or "Weld On 16 " for Acrylic)**
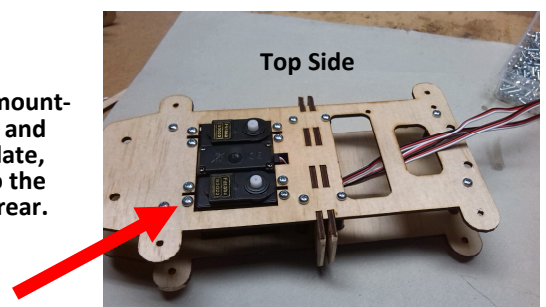
☐ **Press fit the 2 Centre Spacer Blocks in Bottom Plate**

Top

Bottom

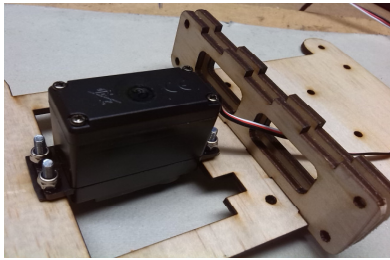☐ **Insert 12 M3 x 10 in Top & Bottom Plates, using Servo Motor rubber mounts to hold in place.**

IMPORTANT-

Ensure servos are mounted under Top Plate and between Bottom Plate, Servo Brand sign to the front, wires to the rear.
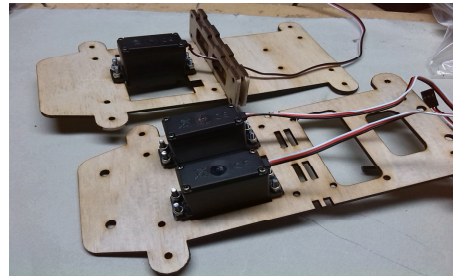
Top Side

☐ **Mount & fasten the 3 Servos**
Ensure servos are in between the Top & Bottom Plates.
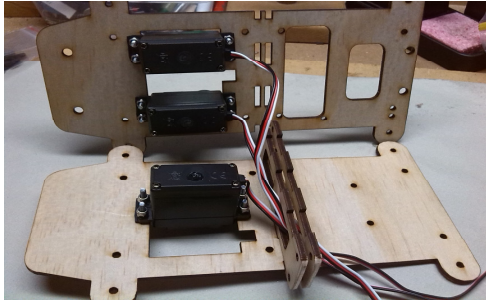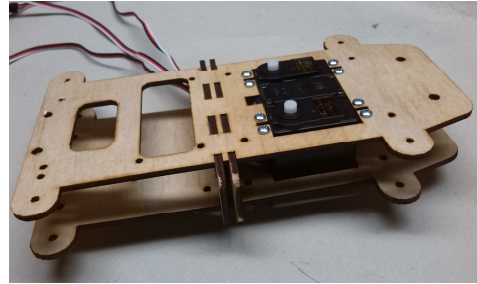
(40mmx20mmx39mm)

☐ **Pass Servo leads through the spacer blocks**

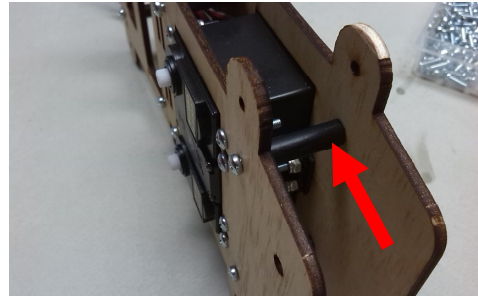☐ **Attach top to base with press fit.**

☐ **Ensure top & bottom plates are parallel.**

☐ **Run leads out rear top plate hole & Mark servo No's.**
& Cut ~120mm from the plastic end & mark the white/yellow wire with marks for servo No 1, 2 or 3.

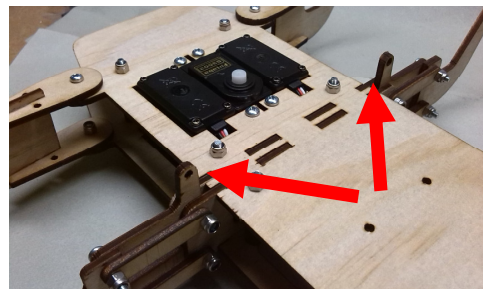☐ **Use M3 x 35 Metal Threads & nuts, to fasten the 8 plastic spacers.**

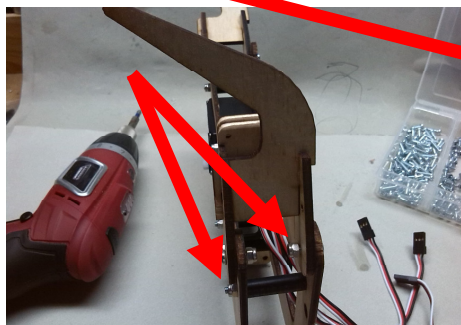**Don't over tighten.**

☐ **Make up 2 opposite inner Hook assemblies using M3 x16 metal threads & nuts, with the heads facing towards the front.**
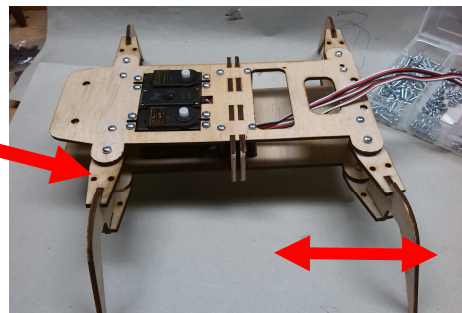

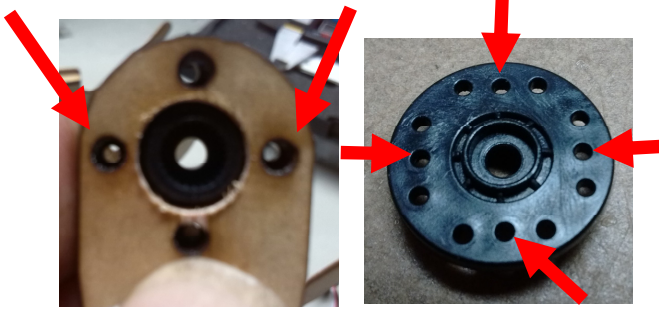☐ **Ensure both Hook link Arms are in between the spacer Blocks, in similar relative positions & fasten loosely.**

☐ **Attach 4 outer leg assemblies with 8 -M3 x 10 & Nuts**
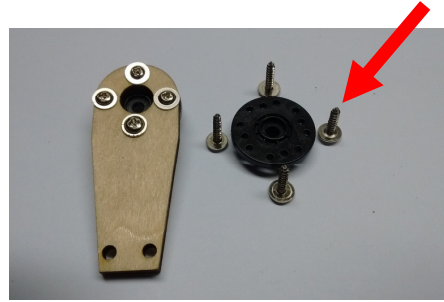**Ensuring they are mounted under the Top & Bottom Plate, freely.**

☐ **Ensure ease of swing by backing off the nut adjustment.**

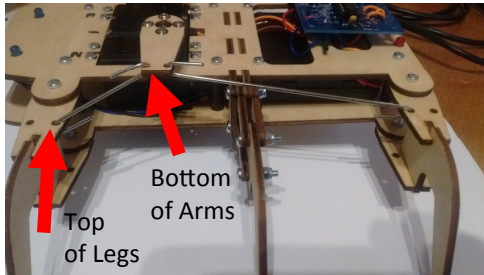☐ **Rotate Servo Arm until two holes line up.**

☐ **Use Servo supplied self tappers to fasten Servo Arms.**

Don't fasten arms to servos, until you turn on the micro-controller to centre. Servo shaft has 24 splines, 15 degrees for each spline rotation.

☐ **Attach the 6 connecting rods, perpendicular as below.**
**Keep as horizontal as possible, top of legs, bottom of arms.**

Bottom of Arms

Top of Legs

☐ **Pass all the wire leads, out rear opening before connecting and soldering.**

To fit wire rods, you will need to temporarily remove the servo arm & replace when rods are in the holes, in place.
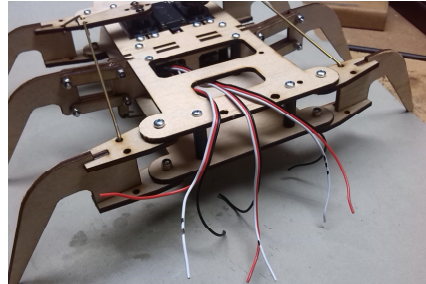
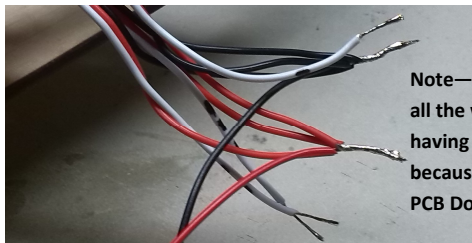☐ **If inserting LED's, temporarily solder & build on top, connecting wires, insulate, remove & insert with tape underneath.**

LED's up side down

Insulate with tape
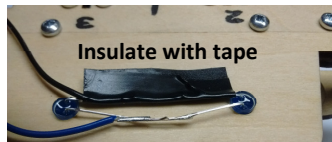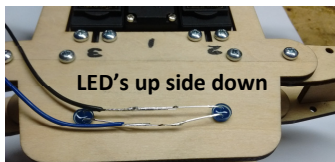
Remove & insert LED's from underneath & tape up

☐ **Solder Black /Brown negatives (3 Servo + 2 LED + 1 extra PCB Wire) all 6 together.**

Note—The reason for grouping all the wires together and only having 1 set of Extra PCB wire is because all 6 won't fit into one PCB Doughnut pad.

☐ **Solder Red positives (3 Servo + 1 extra PCB Wire) all 4 together. Keep White/Yellow output wires single & separate, ensuring marked with servo No's, 1, 2 & 3.**
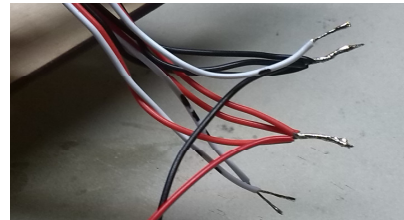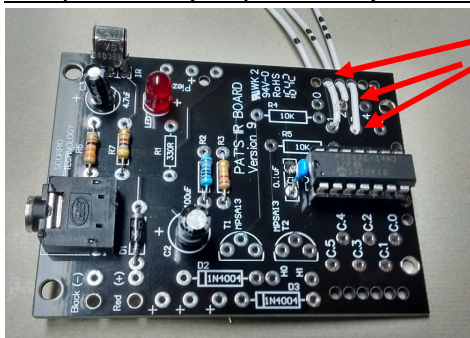
☐ **Trim and put tape or Heat shrink around the ends of the wires, to stop shorting.**
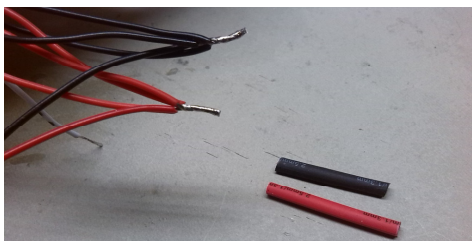
☐ **If using Heat Shrink, heat to Shrink with mini blow torch.**
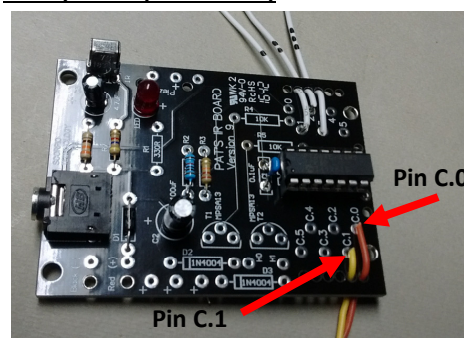
☐ **Skip pin 0, putting the servo output signal white/yellow wires, servo 1 in pin 1, servo 2 in pin 2 & servo 3 in pin3.**
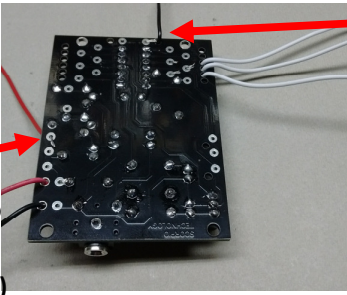
Pin 1, 2 & 3
(Not pin 0)

☐ **Solder positives from LED's into C.0 (front LED's) & C.1 (Back LED's)**
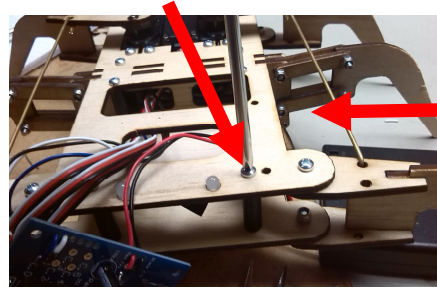
Pin C.0

Pin C.1

☐   **Solder Extra PCB wires in PCB.**

Insert the Black extra PCB wire, in the Negative (—) doughnut pad, through the tug hole.

Insert the extra Red PCB wire to one of the Positives (+)

☐ **Remove back right screw & insert the 6v Battery Box (with batteries installed, & turned off) between legs, switch end first, feeding + & - up through back opening.**
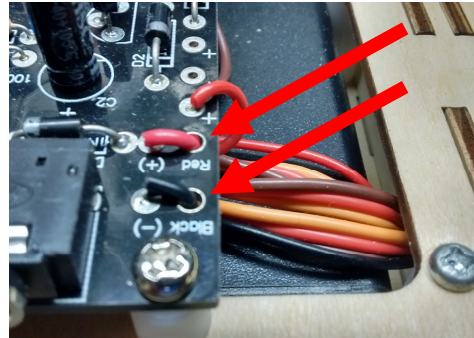
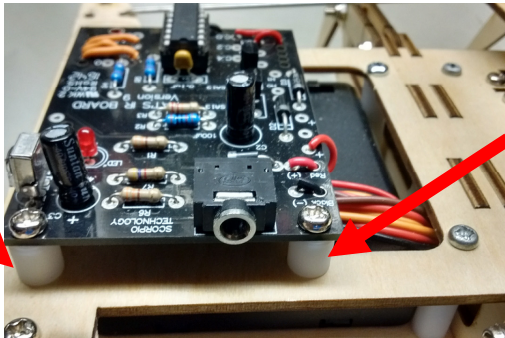Slide in Battery Box filled with 4 x 1.5 V AA Batteries.

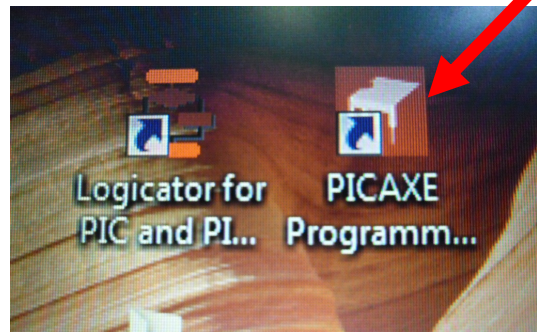☐   **Replace screw and spacer. It should be a tight fit to stop the Battery Box moving around.**
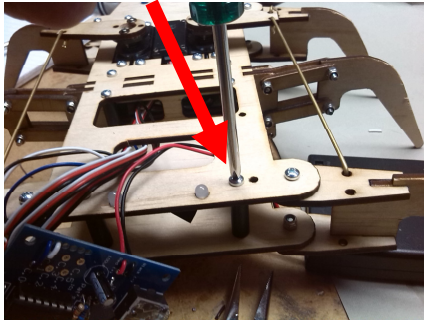
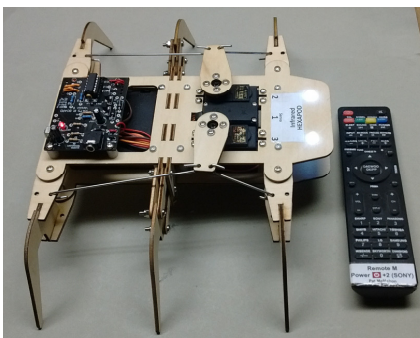☐   **Join the Battery Box + & - wires to the 14M2.**

☐   **After ensuring all wires are connected together & protected, using two 10mm long plastic riser tube spacers, attach 14M2 with two M3x16 screws and nuts.**
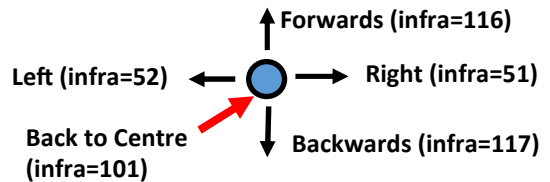
☐   **Program using Picaxe "Programming Editor".**

☐   **Test your program and adjust the throw of the servos in the program, for correct leg movement.**

☐ **Once you have mastered the movement, try programming the Universal Remote M for the actions below-**

↑ **Forwards (infra=116)**

Left (infra=52) ← ● → **Right (infra=51)**

Back to Centre (infra=101)

↓ **Backwards (infra=117)**

Note—The Infra= commands above, are for the Universal Remote M (LR-LCD 708E). If you are using a different Universal Remote you will need to find and change the infra= commands.

Well Done!
Congratulations for persevering to build, test, modify and program/code your own Infrared Controlled Picaxe 14M2 Hexapod Robot.