Thumb Stadium ~ Assembly Instructions

Thumb Stadium™ is a 2-player hand-held game kit which features four (4) totally different games of skill.

Easy and fun to build, Thumb Stadium is sure to provide years of entertainment while teaching you electronics!

What You Need:

~ Soldering Iron
~ Solder
~ Small Philips Screwdriver
~ Wire Snippers
~ Wire Strippers
~ 3 AAA Alkaline Batteries
~ Eye Protection

and a happy state of mind

Parts List:

Check the contents of your kit against this list:
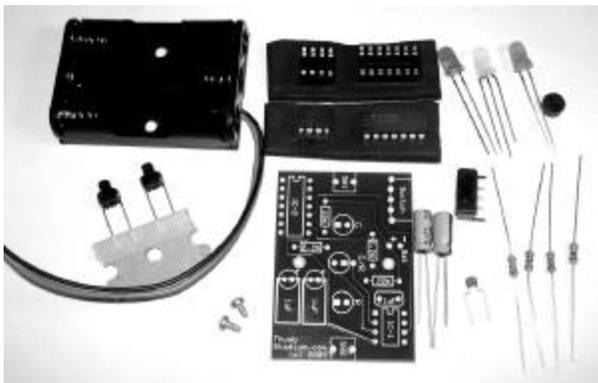
PCB Label	Item	Amount
	Circuit Board	1
IC-1	8 Pin Socket and Chip ~ PIC Microcontroller 12F629, with Thumb Stadium firmware	1
IC-2	14 Pin Socket and Chip ~ 74F14PC Schmitt Trigger	1
2.2K	2.2K ohm 1/4 watt Metal Film Resistor *RED RED BLACK BROWN BROWN*	2
22K	22K ohm 1/4 watt Metal Film Resistor *RED RED BLACK RED BROWN*	2
G/R	Black Rubber LED standoff	1
G/R	Dual Color Green/Red Diffused LED (clear lens)	1
R	Red Diffused LED	1
G	Green Diffused LED	1
Switch	Slide Switch	1
.1uF	0.1uF Capacitor (104)	1
SW1, SW2	Tactile Switches	2
1uF	1 uF Electrolytic Capacitor	2
Bat +, -	3xAAA Battery Holder - Red is [+], Black is [-]	1
circles	Battery Pack Screws	2

Assembly:

The top of the circuit board looks like this:
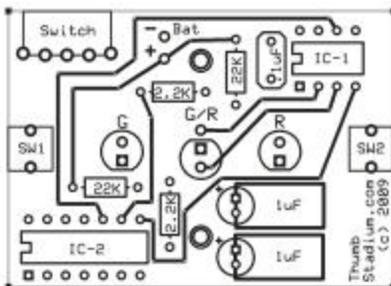
Assemble the parts in the order they appear in the Parts List, above.

The chips go in the places labeled IC-1 and IC-2. Look for the rounded out bit on top of the socket and **face the sockets the same direction as indicated on the circuit board**. Put the chips in the sockets in the same direction.

Make sure you have the correct value resistors by checking the colored stripes.

The center LED has three leads and is clear plastic. Place the LED leads into the holes of the standoff (the little black rubber spacer). Next place the LED in the circuit board, being sure to put the flat edge of the LED facing up, as shown on the circuit board graphic. Orient the Green and Red LEDs as shown on the PCB by aligning their flat sides.

The 1 uF capacitors are polarized, so be sure to put the longer lead in the [+] hole. Leave a little extra lead above the circuit board so you can bend the capacitor over prior to soldering. Trim all the leads nice and short after soldering.

Trim and strip the leads from the battery pack to the desired length. Cut them so they will wrap fairly tightly around the edge of the circuit board when the leads are soldered and the battery pack is screwed into place (about 3/4"). **Be sure to leave a little extra wire so you have some to strip,** and in case you make a mistake. Once proper operation is confirmed, remove the batteries and attach the battery holder to the circuit board using the two self-tapping screws. Put the screws through the battery holder, then screw them into the bottom of the circuit board. Get them good and snug, but do not over-tighten. Push the battery holder wires flat.

Here is what the finished product should look like:
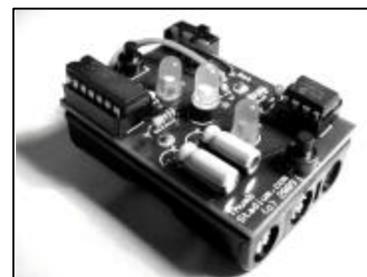
How To Play: Turn Thumb Stadium on with the slide switch. The LEDs will alternately flash green then red while Thumb Stadium waits for you to press the Green Side Button. After the first press, the green player LED will flash indicating Game 1 is selected. Pressing the Green Side Button again flashes the red center LED indicating Game 2 is selected. Another press selects Game 3 and flashes the green center LED. One more press and the red player LED flashes indicating Game 4. Additional presses repeat this cycle. Choose your game by pressing the Red Side Button.

In the 2-player games, the first to 5 wins. Because rematches are at the sole discretion of the victor, only the winner can restart the game by pressing 3 times. To switch to another game, turn Thumb Stadium off then on.

Game 1 ~ ThumbWar™ ~ Flashes: G-R-G-R-G-R-G-R, *as in 1-2-3-4 let's have a thumb war!* The object of ThumbWar is simple: press while the other player is pressing. If you do, you get a point.	Press again to "throw" to the other player who has to catch on time and throw back. The time to catch gets shorter each throw.
Game 2 ~ SlapJack™ ~ Flashes: G-G-R-R-G-G-R-R During SlapJack, Thumb Stadium will randomly flash the center LED red or green. Be the first to press when center is green and get a point. Don't press if it isn't green or the other player gets a point.	**Game 4 ~ Reflexy™ ~** Flashes: G-G-G-G-R-R-R-R Reflexy is a one-player game. The object is to quickly press the button that matches the color in the center LED. You go until you miss or are too late. The time to react gets shorter each turn.
Game 3 ~ Jai Alai™ ~ Flashes: G-R-R-R-G-R-R-R Center lights up ~ quickly press to "catch" your color.	After the game, your score is flashed ~ Center = x10, Red LED = x1. For example two center flashes followed by three red player LED flashes indicates a score of 23. Press the Red Side Button three times to restart.

Theory Of Operation: Processing is performed by a central microcontroller, which also lights the LEDs. A microcontroller is literally a tiny computer on a chip that uses flash memory to store the program. Thumb Stadium firmware is "burned" into the chip. Because of the sockets, Thumb Stadium makes a terrific platform for those interested in programming Microchip's 12F629 PIC microcontroller. **Download sample code and the basic setup files to develop your own games at *www.ThumbStadium.com***   -- LIMITATIONS FUEL CREATIVITY --

Because switches make lots of noise when they open and close, and because Thumb Stadium needs to accurately handle very rapid switch presses, a carefully tuned debounce circuit is essential. Thumb Stadium incorporates our proprietary debounce circuit to eliminate switch noise. This involves two resistors, a capacitor, and a Schmitt Trigger on each switch. The debounce circuit provides stability and accuracy to the switch presses while eliminating false switching due to switch noise. Thumb Stadium also incorporates a proprietary random number algorithm to vary the timing in games 2-4.

Download the schematic at *www.ThumbStadium.com*

Troubleshooting: Every chip is hand-tested before it leaves our factory. If Thumb Stadium does not work, poor soldering is likely to blame. Check all solder joints carefully under a bright light. Reheat the joints where necessary. Use desoldering braid to remove excess solder. Check that all components are in the right place and facing the right direction, especially the chips and electrolytic capacitors. Make sure your batteries are fresh.