Stimkit I

Assembly Manual

Rev 1.6

First things first. While your first inclination may be to jump right in both feet first, before starting assembly it would be a good idea to take a look through the assembly manual and familiarize yourself with everything first.

Before starting any assembly do a quick inventory check to make sure that all of the parts listed below came in your kit. If you are missing any parts contact support@stimkits.com or call toll free 844-784-6548 to receive a replacement. Hard to believe but yes- sometimes we screw up...

CAPACITORS:
5 0.1uF Ceramic Capacitor, Marked 104
4 47uF Electrolytic Capacitor
2 4.7uF Electrolytic Capacitor
2 1000uF Electrolytic Capacitor
1 100uF Electrolytic Capacitor
1 10uF Electrolytic Capacitor

RESISTORS:
8 100K Ω, Marked brown, black, black, orange, brown
2 18 Ω, Marked brown, gray, black, gold, brown
3 4.7K Ω, Marked yellow, violet, black, brown

POTENTIOMETERS:
2 1.0K Ω Potentiometer
1 10K Ω Potentiometer Dual Gang

INTEGRATED CIRCUITS:
2 TDA2030 Audio Amplifier
1 LM78L05 Voltage Regulator
1 Bluetooth Module

CONNECTOR JACKS:
2 3.5mm Mono Jack, Black
1 3.5mm Stereo Jack, Green
1 Power Inlet Jack

MISCELLANEOUS:
1 AC Power Adapter
1 Terminal Strip, 6-pin
2 Aluminum Heatsink
2 3mm Screws
3 Knobs w/white tick mark
1 Enclosure with expander frame and screws
2 Toggle Switch Boots
1 Printed Circuit Board
1 Color Graphic Overlay
1 2-Conductor wire, 7” in Length
2 3.5mm Cord Set, 2mm pins
2 Electrode Pad Sets
1 18” length, 60/40 rosin core solder

TRANSFORMERS:
2 Output Transformer

SWITCHES:
2 DPDT Toggle Switch
1 DPST Push Switch w/push button

Each step in the manual is formatted in a specific manner to help you locate the correct part and install it into the correct location on the printed circuit board (PCB) in the correct orientation. Check off each step as you do it, this will assure that you are assembling your kit in the correct order, all of the individual parts are being placed in the correct locations on the circuit board and you don’t omit any steps.

Each step will be formatted like this:
☐ *A CHECK BOX, COMPONENT DESIGNATION, COMPONENT VALUE, UNIQUE PART MARKINGS (if any), Additional pertinent information regarding the installation step.*

Capacitor Example:
☐ C1, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

Resistor Example:
☐ R1, 1000 ohm, brown-black-red-brown, This is a non-polarized component and can be installed in either direction.

IC’s and Semiconductors Example:
☐ U100, TDA2030, Insert into PCB. NOTE: The leads on this part are arranged in such a way so that that it will only fit in the designated location on the PCB one way. Solder and clip the leads close to the PCB.

Printed Circuit Board:
The printed circuit board is a high quality double sided solder masked circuit board with pre-tinned solder lands which aid in soldering by making the solder flow more easily around the component leads. The component outlines and component designations are printed on the PCB. The top of the board is the side where the controls and input/output jacks are located and will be referred to the “control side”. The bottom side is where the individual components mount and will be referred to as the “component side”.

Tools:
The minimum tool requirements are a small diagonal wire cutter, small needle nose pliers, regular pliers, various screwdrivers. 10mm and 8mm metric nut drivers are optional but not required.

Soldering:
A 35-Watt (max) soldering iron with a small (1/16”) point soldering tip is recommended. **DO NOT** use an old style soldering gun, the intense magnetic fields and electrical noise generated by these devices can destroy modern electronic components. Use only thin rosin core 60/40 solder when assembling this kit. A length of the correct solder is supplied with the kit that should be ample to complete the assembly. **DO NOT** use acid core solder it is not meant for use in electronics and will ultimately destroy the components and the PCB.

Assembly order:
During assembly of the PCB the order of assembly will be to complete the component side of the PCB first and the control side second and then the installation into the enclosure. For ease of assembly the smallest components will be installed first working up to the largest.

Is your soldering iron all warmed up?

LET’S BEGIN:

Installing the capacitors:
This kit is supplied with both ceramic and electrolytic capacitors. The capacitance is measured in micro-farads (uF). The value of each capacitor is printed on the capacitor. Ceramic capacitors are non-polarized meaning that they may be installed in either direction on the PCB. Either lead may be installed in either hole. Electrolytic capacitors are polarized meaning that they have a positive (+) and negative (-) lead and must be installed a certain way. The leads on an electrolytic capacitor are easy to identify. The negative lead side of an electrolytic capacitor will be clearly marked with a minus (-) sign on the side of the capacitor itself. On the positive lead side of an electrolytic capacitor, the positive (+) lead will be longer than the negative (-) lead. When installing an electrolytic on the PCB, the longest lead will go into the hole marked with a plus (+) sign. Once the capacitor is inserted into the PCB bend each lead to approximately 45 degrees to hold it in place, turn the board over and solder both leads, then with a small diagonal wire cutter clip each lead close to the solder joint.

Install the five 0.1uF ceramic capacitors:

☐ C1, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

☐ C5, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

☐ C7, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

☐ C8, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

☐ C12, 0.1uF, marked 104, This is a non-polarized component and can be installed in either direction.

Install the two 4.7uF electrolytic capacitors:

☐ C3, 4.7uF, This is a polarized component and the polarity must be observed.

☐ C10, 4.7uF, This is a polarized component and the polarity must be observed.

Install the 10uF electrolytic capacitor:

☐ C15, 10uF, This is a polarized component and the polarity must be observed.

Install the four 47uF electrolytic capacitors:

- [ ] C2, 47uF, This is a polarized component and the polarity must be observed.

- [ ] C6, 47uF, This is a polarized component and the polarity must be observed.

- [ ] C9, 47uF, This is a polarized component and the polarity must be observed.

- [ ] C13, 47uF, This is a polarized component and the polarity must be observed.

Install the 100uF electrolytic capacitor:

- [ ] C14, 100uF, This is a polarized component and the polarity must be observed.

Install the two 1000uF electrolytic capacitors:

- [ ] C4, 1000uF, This is a polarized component and the polarity must be observed.

- [ ] C11, 1000uF, This is a polarized component and the polarity must be observed.

Installing the resistors:

The value of resistance is measured in Ohms. The value of a resistor is color coded and printed on the resistor with a series of bands. The resistors supplied with this kit are 1% tolerance meaning they have a fairly high accuracy. This is necessary to maintain equal gain between both channels. Note that resistors are non-polarized and may be mounted with either lead in either hole in the PCB. Bend the leads of each resistor so that they are 90 degrees to the resistor body. After inserting the resistor leads push the resistor firmly down onto the PCB. Bend the leads on the opposite side of the board 45 degrees to hold the resistor in place and solder both leads, then with a small diagonal wire cutter clip each lead close to the solder joint.

Install the eight 100K Ohm resistors:

- [ ] R1, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R2, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R3, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R6, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R8, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R9, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R10, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

- [ ] R13, 100K ohm, brown-black-black-orange-brown, Non-polarized and can be installed in either direction.

Install the two 18 Ohm resistors:

- [ ] R4, 18 ohm, brown-gray-black-gold-brown, Non-polarized and can be installed in either direction.

- [ ] R11, 18 ohm, brown-gray-black-gold-brown, Non-polarized and can be installed in either direction.

Install the three 4.7K Ohm resistors:

- [ ] R5, 4.7K ohm, yellow-violet-black-brown-brown, Non-polarized and can be installed in either direction.

- [ ] R7, 4.7K ohm, yellow-violet-black-brown-brown, Non-polarized and can be installed in either direction.

- [ ] R12, 4.7K ohm, yellow-violet-black-brown-brown, Non-polarized and can be installed in either direction.

Install the Three Terminal Voltage Regulator:

- [ ] U3, 78L05, Orient the flat side of the 78L05 with the legend on the PCB solder and clip the excess leads.

NOTE: The solder pads on this device are very close together. Triple check that there are no solder bridges between the leads on this device. High tech fireworks can result if there is!

Installation of the integrated circuits:

☐ To install the integrated circuits locate the two TDA2030 IC's, the two aluminum heatsinks and two 3mm metric screws. For each IC place the back side (metal) of the TDA2030 against the heatsink aligning the mounting hole on the top metal tab of the IC with the threaded hole in the heatsink. Inset the mounting screw through the metal tab on the IC and screw it to the heatsink making sure the that the TDA2030 is centered on the heatsink.

☐ U1, TDA2030, Insert into PCB. There are 5 leads on this part that are configured in such a way so that that it will only fit in the designated location on the PCB one way. With the heatsink flat against the PCB solder the leads to the PCB. No trimming of leads is necessary.

☐ U2, TDA2030, Insert into PCB. There are 5 leads on this part that are configured in such a way so that that it will only fit in the designated location on the PCB one way. With the heatsink flat against the PCB solder the leads to the PCB. No trimming of leads is necessary.

Install the transformers T1 and T2:

☐ There are two output transformers- one for each channel. The transformer primary has three wires, the secondary has two. The mounting hole pattern on the PCB follows the transformer leads- as such the transformers can not be installed backwards. Insert the transformer leads into the holes of the PCB then carefully push the mounting tabs into their respective slots in the PCB. Bend the mounting tabs towards each other. Solder the mounting tabs to the PCB first then solder the transformer leads. With a small diagonal cutter clip each lead close to the solder joint.

Install the push-button power switch:

☐ SW3, DPST, The legend shown for the power switch SW3 is on the control side of the PCB. However the switch actually mounts underneath on the component side of the PCB. **NOTE,** there are two mounting posts on the bottom of the switch housing that snap into two holes in the PCB. Insert the switch leads into the PCB and the mounting posts into the holes then press the switch down firmly to seat the switch onto PCB. Solder the switch leads to the PCB. Do not install the push-button knob onto the switch shaft at this time.

Install the power connection wire:

☐ Locate the short piece of two conductor wire. Separate the two wires so that there is approximately ¾" of length on each wire. Next, strip 1/8" of insulation from each end of the wires.

☐ Solder one end of the RED wire to the printed circuit board at the location marked J4 (**+)**

☐ Solder the same end of the BLACK wire to the printed circuit board at the location marked J4 (**-)**

This completes the installation of the parts on the component side of the PCB.

Next you will install the components on the control side of the PCB.

Install the bluetooth audio receiver module:

☐ MOD1, MH-M18, Locate the MH-M18 bluetooth module and the six-pin inline terminal strip. The bluetooth module has 4 holes on one edge and six holes on another also note that on the terminal strip there is a black separator holding the pins in place. The pins are shorter on one side of the separator than the other. Insert the short pin side of the terminal strip into the bottom of the bluetooth module on the six hole edge of the module. Solder the six pins to the bluetooth module from the componenet (top) side. Next, insert the bluetooth module into the designated location on the PCB so that the separator on the terminal strip is against the PCB. Make sure that before soldering the bluetooth module is parallel to the PCB. Solder the six terminals to the PCB. With a small diagonal cutter clip each lead close to the solder joint.

Install the input/output jacks:

☐ Locate the two mono output jacks (black), and the stereo input jack (green). Remove and save the nut and washer them.

☐ J1, 3.5mm Mono jack (black), Seat firmly onto the PCB and solder the leads. No lead trimming needed.

☐ J2, 3.5mm Stereo jack (green), Seat firmly onto the PCB and solder the leads. No lead trimming needed.

☐ J3, 3.5mm Mono jack (black), Seat firmly onto the PCB and solder the leads. No lead trimming needed.

Install the potentiometers:

☐ Locate the three potentiometers. Remove and save the nut and washer from them.

☐ RV1, 1K, Seat firmly onto the PCB and solder the leads and mounting tab to the PCB

☐ RV2, 10K Dual Gang, Seat firmly onto the PCB and solder the leads and mounting tab to the PCB

☐ RV3, 1K, Seat firmly onto the PCB and solder the leads and mounting tab to the PCB

The DPDT toggle switches will be installed later:

This Completes the construction of the PCB.

Final Assembly:

Affix the Graphic Overlay:

☐ Locate the top cover of the enclosure and the color graphic overlay. This is a rather complicated procedure with only one shot to get it right so pay attention! The high quality graphic overlay is made of polycarbonite and backed with an industrial strength adhesive. There is literally only a few thousandths of an inch of clearance to center the graphic overlay into the recess in the top cover. If the alignment is only slightly off the graphic overlay will not seat correctly in the recess. There is a way however to prevent the overlay from sticking until you are ready to permanently affix it to the to top cover. The procedure is called “floating” whereby the graphic literally “floats” on a thin layer of water until you are ready to press it into place. The same procedure is used to affix decals and large graphics onto cars and trucks.

To begin, fill a small spray bottle with water and mix in a few drops of dish soap. The dish soap is used to break the surface tension of the water molecules and basically make the water more slippery. Spray enough of the mixture onto the top of the enclosure to create large beads of water in the recess.

The top of the overlay has a short tab which is used to remove the protective backer sheet from the adhesive layer on the graphic overlay. Peel the backer completely off. Making sure that the holes in the graphic overlay and the holes in the top of the enclosure are oriented in the same direction place one of the long edges of the graphic overlay into the recess of the enclosure making sure that the corners of the short edges are inside of the recess. Slowly lay the graphic overlay into the recess making sure that all of the edges of the overlay are inside the recess. Slowly lower the graphic overlay into the recess. Once you are happy that the overlay is centered into the recess starting from the center, use a paper towel and slowly press the graphic overlay down on the enclosure top working from the inside out to remove all the water and air bubbles.

Bottom Enclosure:

☐ Locate the bottom cover of the enclosure and the DC Power input jack. NOTE: There are two different power jacks supplied depending on component availability. A three lug power jack as shown in figure 1 or a two lug black power jack not shown. We will address the correct wiring connections for each in the next section.

☐ Insert the DC power jack into the mounting hole in the orientation shown in Figure 1.
Ignore the wires (for now).

☐ Using the supplied hardware secure the power inlet jack in place.

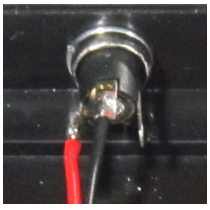

Figure 1

Top Enclosure:

☐ If you have not already done so, remove all hardware from the controls on the top side of the printed circuit board.

☐ Locate the two DPDT toggle switches. Remove any hardware from them.
Seat SW1, and SW2 firmly onto the PCB. Do not solder the terminals yet- all will become apparent.

☐ Insert the circuit board control side up into the bottom of the enclosure top so that the controls are seated against the bottom of the enclosure top.

☐ Place a flat washer and nut on each of the potentiometers and tighten the nut with 10mm nut driver. Snug works. Do not over tighten as you can strip the threads on the potentiometers.

☐ Place a nut on each of the 3.5mm jacks and tighten the nuts using an 8mm nut driver. Do not over tighten.

☐ Locate the two rubber switch boots and screw them finger tight onto the toggle switches. No other hardware is used on the toggle switches so if there is any feel free to toss it, or if you're a packrat like me put it somewhere and save it forever. NO there is not a shock hazard touching the metal bat handles on the switches. The boots are there so that whatever conductive medium is used on the of electrodes it won't get down into the switch and it makes cleaning the top a whole bunch easier.

☐ Solder the terminals of SW1 and SW2 to the PCB

☐ Locate the enclosure expander frame, note that there is a hole in one side for the power switch and the edges are keyed to lock into the top and bottom shells of the enclosure.

☐ Place the expander frame onto the enclosure top oriented so that the hole in the expander frame lines up with the push-button switch shaft.

☐ If your kit was supplied with the thee terminal power jack, Referring to Figure 1, solder the BLACK(-) lead of the power connector wire to the center lug of the power input jack, next solder the RED (+) lead of the power connector wire to the left lug of the power input jack.

☐ If your kit was supplied with the two terminal power jack, solder the BLACK(-) lead of the power connector wire to the LONG terminal lug, solder the RED(+) lead of the power connector wire to the SHORT lug of the power input jack.

☐ Place the bottom enclosure shell onto the expander frame orienting it so that the power input jack is located at the same end as the audio jacks. Using the four black self tapping screws secure the enclosure together. NOTE: The screws only need to be snug, over tightening them will strip the holes.

☐ Locate the knob for the push-button power switch and press it onto the switch shaft. The power button has been purposely recessed to aid in preventing accidental turn on/off.

☐ Manually rotate the shafts on potentiometers RV1, RV2, and RV3 fully counter-clockwise.

☐ Locate the three black knobs and place them on the potentiometer shafts.

☐ Align the white tick mark on the knobs for CHANNEL A VARIABLE and CHANNEL B VARIABLE to the -5 position on the front panel and tighten the slotted set screw onto the potentiometer shafts.

☐ Align the white tick mark on the knob for OUTPUT LEVEL to the 0 position on the front panel and tighten the slotted set screw onto the potentiometer shafts.

The construction of your kit is complete.

Please refer to the General Operating Information document for a functional overview.

PLAY SAFE: As a general rule keep all electrical play below the waist.

There are many resources outlining the generally accepted basic rules for safe electrical play available on the internet. Also, please read the following section.

The following information is copied from the FDA Guidance Document for Powered Muscle Stimulator 510(k)s
This IS NOT medical advice nor is it to be considered as medical advice. It is merely the most authoritative thinking on the safe use of these types of devices.

CONTRAINDICATION
Powered muscle stimulators should not be used on patients with cardiac demand pacemakers.

WARNINGS
1. The long-term effects of chronic electrical stimulation are unknown.
2. Stimulation should not be applied over the carotid sinus nerves, particularly in patients with a known sensitivity to the carotid sinus reflex.
3. Stimulation should not be applied over the neck or mouth. Severe spasm of the laryngeal and pharyngeal muscles may occur and the contractions may be strong enough to close the airway or cause difficult in breathing.
4. Stimulation should not be applied transthoracically in that the introduction of electrical current into the heart may cause cardiac arrhythmias.
5. Stimulation should not be applied transcerebrally.
6. Stimulation should not be applied over swollen, infected, or inflamed areas or skin eruptions, e.g., phlebitis, thrombophlebitis, varicose veins, etc.
7. Stimulation should not be applied over, or in proximity to, cancerous lesions.

PRECAUTIONS
1. Safety of powered muscle stimulators for use during pregnancy has not been established.
2. Caution should be used for patients with suspected or diagnosed heart problems.
3. Caution should be used for patients with suspected or diagnosed epilepsy.
4. Caution should be used in the presence of the following:
   a. When there is a tendency to hemorrhage following acute trauma or fracture;
   b. Following recent surgical procedures when muscle contraction may disrupt the healing process;
   c. Over the menstruating or pregnant uterus; and
   d. Over areas of the skin which lack normal sensation.
5. Some patients may experience skin irritation or hypersensitivity due to the electrical stimulation or electrical conductive medium. The irritation can usually be reduced by using an alternate conductive medium, or alternate electrode placement.
6. Electrode placement and stimulation settings should be based on the guidance of the prescribing practitioner.
7. Powered muscle stimulators should be kept out of the reach of children.
8. Powered muscle stimulators should be used only with the leads and electrodes recommended for use by the manufacturer.
9. [FOR PORTABLE DEVICES ONLY]: Portable powered muscle stimulators should not be used while driving, operating machinery, or during any activity in which involuntary muscle contractions may put the user at undue risk of injury.

ADVERSE REACTIONS
Skin irritation and burns beneath the electrodes have been reported with the use of powered muscle stimulators.

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