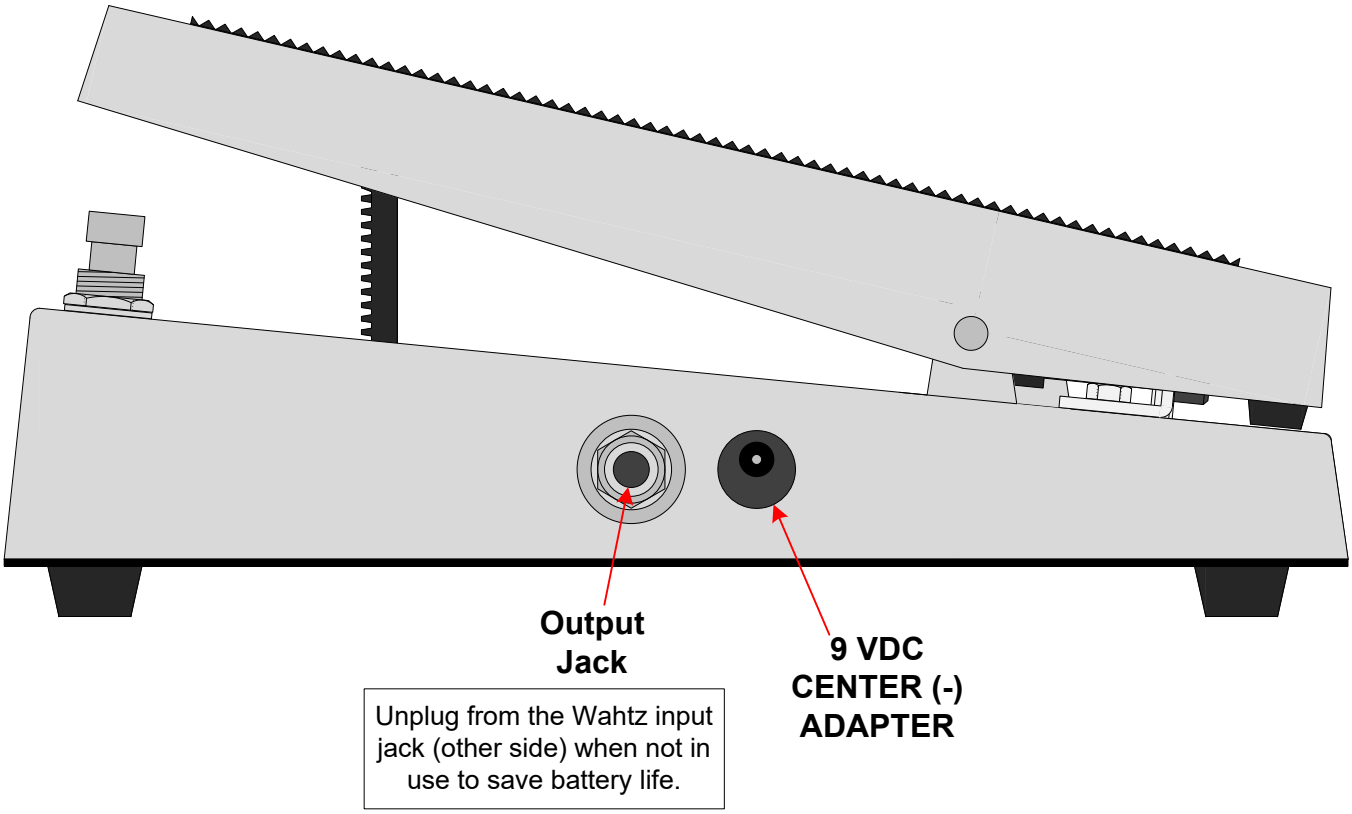
THE WAHTZ WAH (K-985)



Use these instructions to learn:

- How to build a wah-wah pedal

The Wahtz Wah Pedal produces the classic wah tone you've come to expect with a hint of extra bite and growl. True bypass switching insures no loss of signal when the wah effect is not engaged, and the long life potentiometer manufactured specifically for use in wah pedals is included to provide years of smooth, quiet operation. Point to point construction allows advanced kit builders to easily experiment with modifications to further tailor the tone to more individual tastes.

Warning: This circuit was designed for use with a 9 VDC power supply only.

www.modkitsdiy.com

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These are the last 3 pages. They should be used as a reference for assembly.

Visit www.modkitsdiy.com if you have any problems when first turning on your pedal for troubleshooting help. Remember to use caution when applying power to the pedal to avoid electric shock.

TOOL LIST

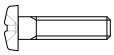
- Wire Strippers
- Needle Nose Pliers
- Cutting Pliers
- Desoldering Pump
- Solder (60/40 rosin core)
- Soldering Station
- Phillips Head Screwdrivers
- Channellock Pliers (or similar type)
- Ruler
- Contact Cement or RTV Silicone Adhesive
- Small Hammer
- Small Metal File or Course Grit Emery Cloth (to clean off flash on some pedal parts)
- ½" Nut Driver or Small Adjustable Wrench (to tighten the input and output jacks)
- ¼" Pin Punch (to insert the bearing pin)
- 5mm Allen Wrench (to tighten the tension adjustment screw)
- 12 mm Wrench (to fasten the wah pot in its mounting bracket)
- Contact Cement or other adhesive (to secure the tread and pedal bumpers)

PARTS LIST 1

Rack Assembly Parts:

Rack (1)
P-ECB-RACK

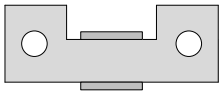
Small Screw (1)
(M3 x 0.5, L = 12 mm)



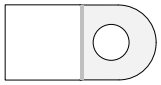
Hex Nut (1)
(M3 x 0.5)

Split Lock Washer (3)

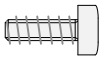
Rack mount (1)



Rack Tensioner (1)



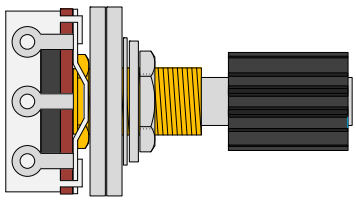
Self-Tapping Screws (3)



#6 Internal Tooth Lock Washer
S-HLW6 (1)

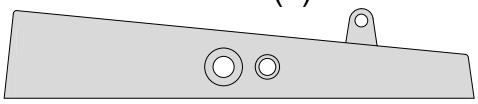
Bearing Pin (1)

100K Wah Pot
R-VWAH-POT (1)



Treadle (1)

Wah Base (1)

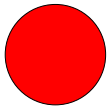


Bottom Cover (1)

Front Bumpers (2)

Rear Bumper (1)

Felt Switch Pad (1)
K-PWAH-FELT

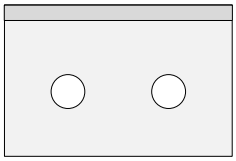


Rubber Tread (1)

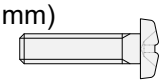
Rubber Feet, Tapered (4)

Mounting Screws (4)
(M3 x 0.5, L = 10 mm)

L-bracket (1)



Mounting Screws (2)
(M4 x 0.70, L = 16 mm)



Mounting Nuts (2)
(M4 x 0.70)

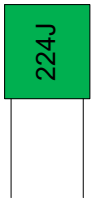
Washers (2)

Center Pillow Block & Tension Adjustment Screw (1)

PARTS LIST 2

0.01µF Capacitor 400V
C-TD01-400 (2)

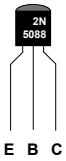
0.22µF Capacitor 100V
C-PEID22-100 (2)



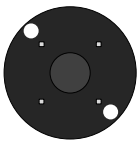
4.7µF Polarized Capacitor 35V
K-PC4D7-35 (1)

Stranded Wire (22 AWG) - White
K-PUL1569-WHITE (5 FT)

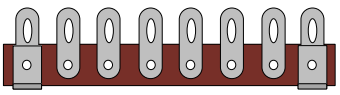
NPN BJT (2N5088)
P-Q2N5088 (2)



Inductor - 500 mH
P-ECB-156 (1)

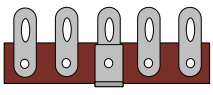


Terminal Strip with 8 Terminals
P-0802H (2)

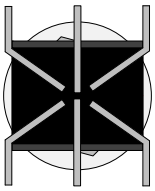


Terminal Strip with 2 Terminals
P-0201H (1)

Terminal Strip with 5 Terminals
P-0501H (1)

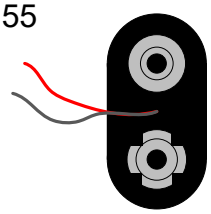


DPDT Foot Switch
P-H498 (1)



DC Power Jack
S-H750 (1)

Battery Clip
S-H155 (1)

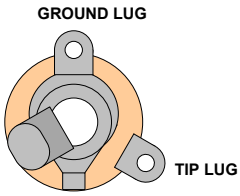


#4 Screws (3/8" long)
S-HS440-38 (6)

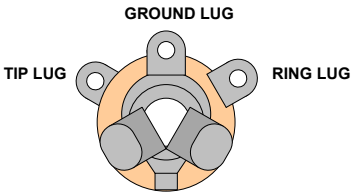
#4 Nuts
S-HHN440 (6)

#4 Lock Washers
S-HLW4 (6)

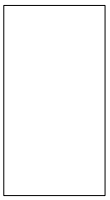
¼" Mono Jack (Output Jack)
W-SC-11-T (1)



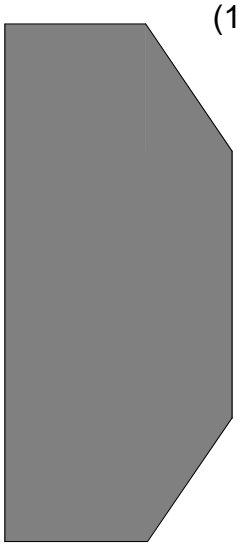
¼" Stereo Jack (Input Jack)
W-SC-12B (1)



Double Sided Adhesive Foam Tape (2)



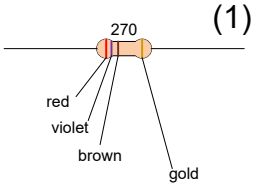
Foam Battery Cushion (1)



PARTS LIST 3

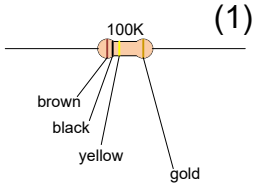
270 Ω Resistor ½ W

R-A270 (1)



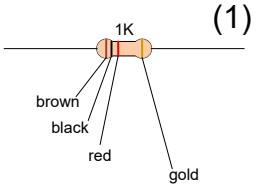
100kΩ Resistor ½ W

R-A100K (1)



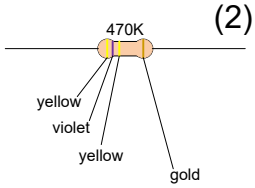
1kΩ Resistor ½ W

R-A1K (1)



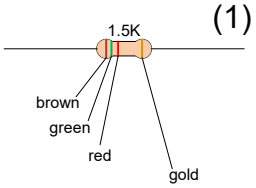
470kΩ Resistor ½ W

R-A470K (2)



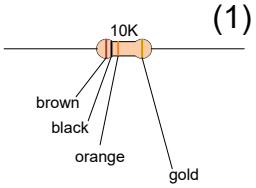
1.5kΩ Resistor ½ W

R-A1D5K (1)



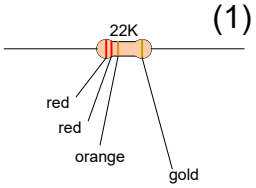
10kΩ Resistor ½ W

R-A10K (1)



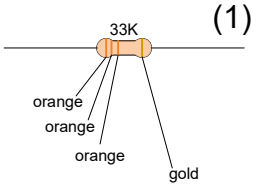
22kΩ Resistor ½ W

R-A22K (1)



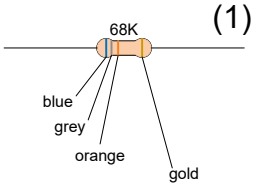
33kΩ Resistor ½ W

R-A33K (1)



68kΩ Resistor ½ W

R-A68K (1)

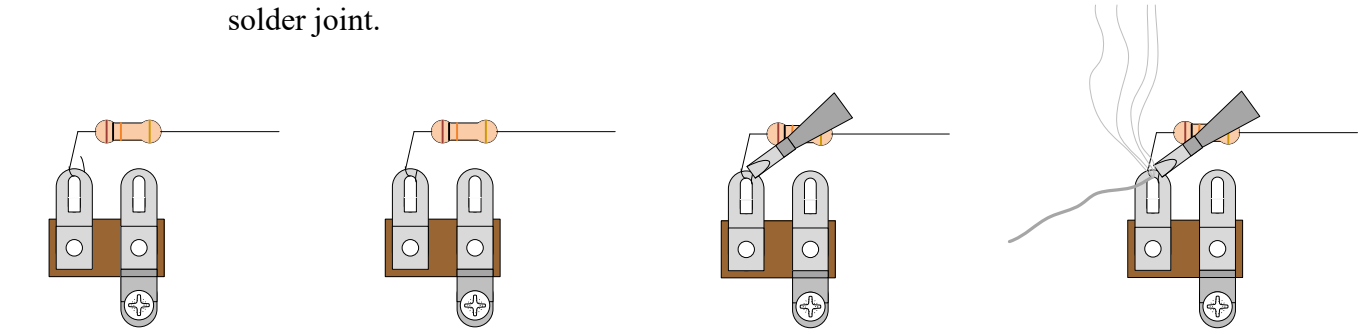


SOLDERING TIPS

It is important to make a good solder joint at each connection point. A cold solder joint is a connection that may look connected but is actually disconnected or intermittently connected. (A cold solder joint can keep your project from working.)

Follow these tips to make a good solder joint. *Take your time with each connection and make sure that all components are connected and will remain connected if your project is bumped or shaken.*

1. Bend the component lead or wire ending and wrap it around the connection point.
   - Make sure it is not too close to a neighboring component which could cause an unintended connection.
2. Wrap the component lead so that it can hold itself to the connection point.
3. Touch the soldering iron to both the component lead and the connection point allowing both to warm up just before applying the solder to them.
4. Be sure to adequately cover both component lead and connection point with melted solder.
   - Remove the soldering iron from your work and allow the solder joint to cool. (The solder joint should be shiny and smooth after solidifying.)
   - Cut off any excess wire or component leads with cutting pliers.
   - Clean the soldering iron's tip by wiping it across the wet sponge again after making the solder joint.



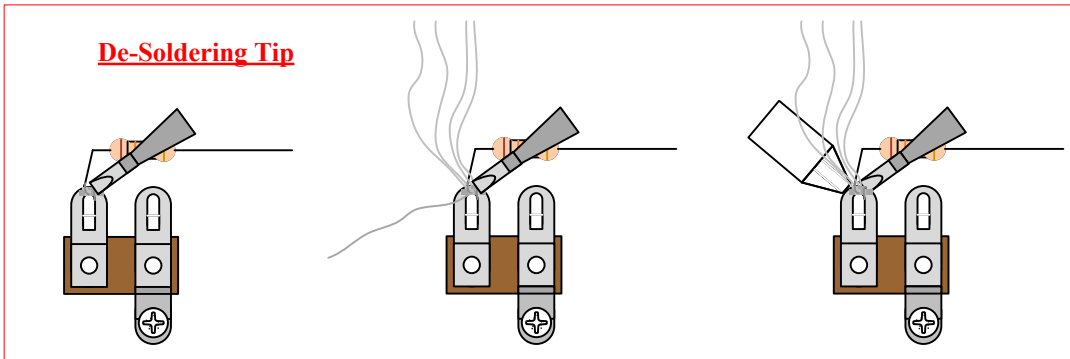
1. Bend the component lead and wrap it around the connection point.

2. Wrap the component lead so that it can hold itself to the connection point.

3. Heat up both component lead and connection point with the soldering iron.

4. Apply solder to both component lead and connection point.

De-Soldering Tip



1. Heat up old solder joint with the soldering iron.

2. Apply fresh solder to mix in with old solder joint

3. Use a de-soldering tool to remove the old solder joint while it is heated.

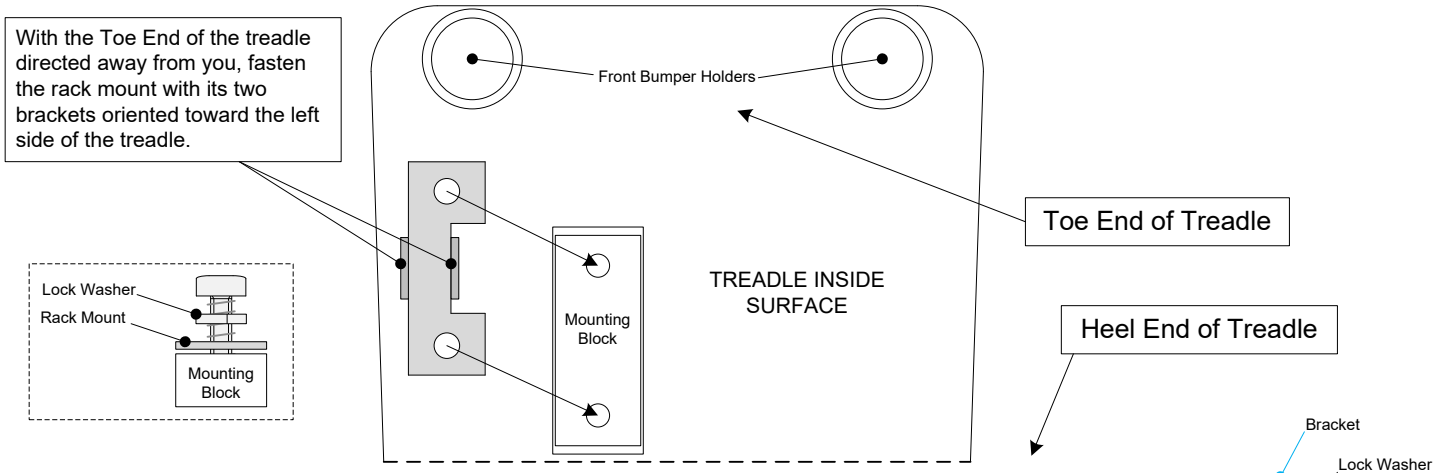
SECTION 1 - Wah Shell Assembly

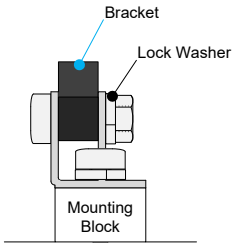
If you plan on painting the enclosure, do so prior to assembly and allow plenty of time for the paint to dry.

Rack Assembly and Bumpers

On the treadle, use two of the self tapping screws and split lock washers to fasten the rack mount to its mounting block in the same orientation as shown in the drawing.

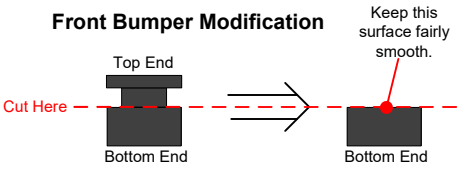
It may be necessary to file off some aluminum flash from the surface of the treadle mount block surface so the rack assembly will sit flush against the mounting block surface. (Because these are self tapping screws it will take considerable pressure to get the screws in).





- Use the small screw, split lock washer and nut to attach the rack to the rack mount with the teeth of the rack pointed toward the toe end of the treadle. The split lock washer should be placed underneath the nut. Do not over-tighten the nut so that the bracket can no longer swing freely.

- Remove the paper backing on the felt pad and attach it to the treadle's inside surface centered between the two front bumper holders at the toe end. (This will cushion the footswitch when turning the pedal on and off).
  Before attaching any part with an adhesive, be sure to clean the mounting surface.



- Using wire cutters or small scissors, clip off the top end of the two front bumpers. The surface of the bottom end should be fairly smooth, it will go into the front bumper holders.

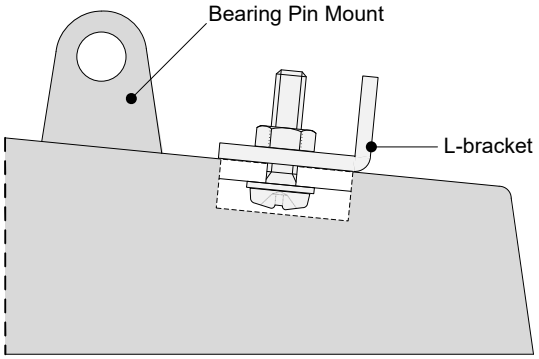
- Using contact cement or other pliable adhesive, attach the modified front bumpers in the front bumper holders. If possible, you should allow the adhesive to set up according to the instructions on your adhesive before continuing assembly of the pedal. You may want to put masking tape over them to keep them in place if you wish to continue assembly without interruption.

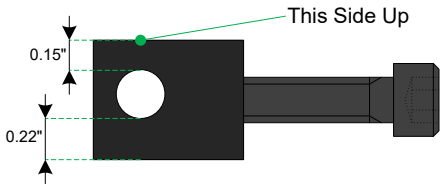
- Remove the backing from the rear bumper and mount it in the hole on top of the holder centered at the treadle's heel end.

Treadle assembly is almost complete. We recommend that you wait until after completing the rest of the wah pedal shell assembly before attaching the rubber tread to the outer surface of the treadle. It will take some time for the glue to completely dry and it's best not to handle the treadle while the rubber tread is still drying.

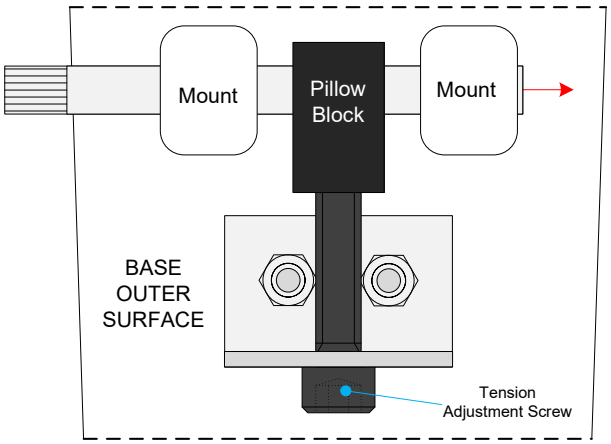
- Mount the L-bracket on the outer surface of the base using the two long 16 mm screws, nuts and flat washers as shown in the drawing. The screws should be inserted from the inside of the base so that the screw heads are on the inside of the pedal.
- Push the tension adjustment screw through the hole in the L-bracket. Place the pillow block between the two bearing pin mounts.
- Screw the tension adjustment screw part way into the threaded hole in the pillow block.

  The non-threaded hole in the pillow block is slightly off center. The side of the pillow block that the non-threaded hole is closest to should face up so that it lines up better with the two bearing pin mount holes.





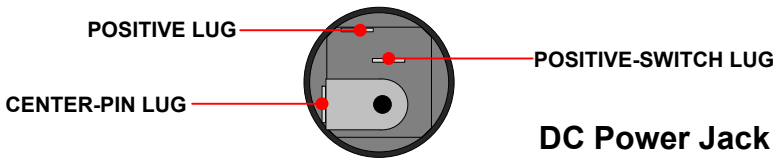
- Slide the bearing pin through the two mounts and the pillow block as shown in the drawing. Turn the tension adjustment screw with your fingers until its head is flush with the back of the L-bracket. Do NOT tighten this screw, yet. Slide the bearing pin out and set it aside. The pillow block is now aligned for final assembly.



SECTION 2 - Mounting Large Components to the Base

Please refer to DRAWING 1

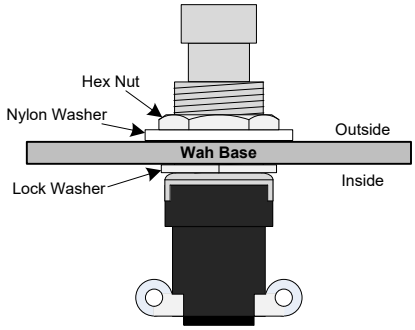
- Using #4 screws, nuts and lock washers, mount the four terminal strips as shown in Drawing 1.
- Mount the input jack in the hole on the left side of the base (where indicated in the drawing). Make sure the two solder lugs are in the most upright position before tightening the nut.
- Mount the output jack in the hole on the right side of the base (where indicated in the drawing). Make sure the two solder lugs are in the most upright position before tightening the nut.
- Mount the DC power jack in the 15/32" hole just below the output jack. Orient the lugs on the DC power jack so the larger center-pin lug is facing the output jack. Tighten the DC power jack.



DC Power Jack

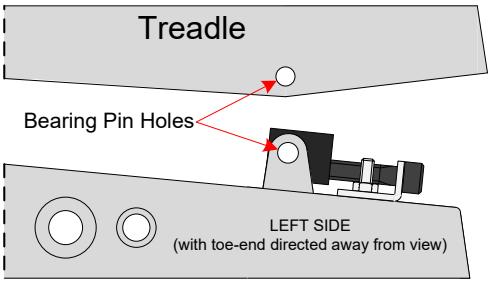
- Mount the wah pot on its mounting bracket with solder lugs facing up as shown in Drawing 1. Be sure to press the pot all the way down to rest against the bottom of the bracket. The pot's nut and small flat washer will be on the input jack side of the mounting bracket. The lock washer and two large washers will be on the output jack side of the mounting bracket. Tighten the wah pot hardware by using a 12 mm wrench or some other tool to make sure it will stay securely in place when the wah pedal is in use.

- Mount the footswitch. Remove all the nuts and washers from the footswitch and place only the lock washer on the footswitch bushing. Insert the footswitch bushing through the ½" hole at the toe-end of the base. Place the footswitch large nylon washer over the bushing on the outside of the base and then screw on one of the hex nuts. Orient the lugs on the footswitch as shown in Drawing 1. When positioned correctly, tighten the hex nut.



SECTION 3 - Final Assembly of Pedal Base and Treadle

- Place the treadle on top of the base as shown in the drawing. Make sure the rack stays inserted through the large rectangular hole in the base. Line up the bearing pin holes on the treadle with those on the base. Insert the bearing pin, smooth end first, through all of the bearing pin holes including: both treadle holes, both base mount holes and the pillow block hole.



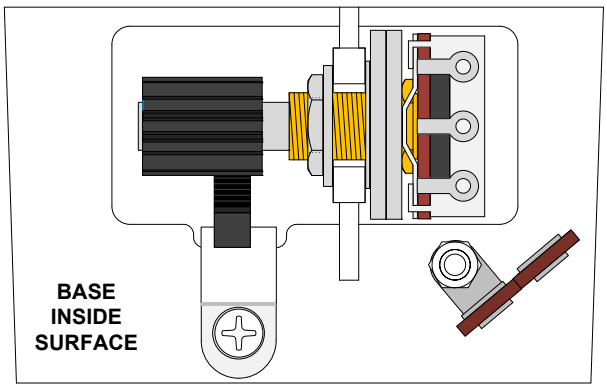
- Using a hammer and ¼" pin punch, carefully tap the splined end of the bearing pin into the hole until it is flush with the side of the treadle.

Tip: Lay the pedal on its side with a couple of magazines stacked underneath the treadle, on the side opposite from where you will be hammering, to keep the treadle propped up from your work bench.

- Adjust the tension of the adjustment screw with a 5 mm Allen wrench so that the treadle stays in place when you remove your foot and so that it suits your playing preference.

Base Assembly

Looking at the inside surface of the base with the toe end directed away from you. Use the remaining self tapping screw and internal tooth lock washer to mount the rack tensioner to the hole as shown in the drawing. The lock washer goes directly underneath the screw head. (Keep this screw fastened loosely until the final assembly stage on p. 12).

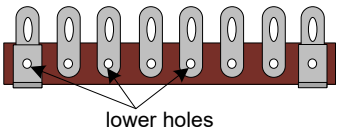


SECTION 4 - Wiring the Jacks, Pots, Footswitch and Terminal Strips

Please refer to DRAWING 2

Stripping and tinning wire: Throughout these instructions you will be told to strip and tin a length of wire numerous times. Unless noted otherwise, cut the wire to the length stated in the instructions. Then strip ¼" of insulation off each end. Twist each end of the stranded wire, and apply a small amount of solder to each end (tin the wire ends). This will prevent the stranded wire from fraying and will make the final soldering much easier.

Tip: Wires should be routed as close to the bottom of the base enclosure as possible in order to make mounting the components easier later in the assembly process. Consider making wire connections to the lower terminal holes and leaving the upper part of the terminals for component connections.



1) Strip and tin a 6 ½" piece of wire and connect the input jack's tip lug to footswitch lug 2.

2) Strip and tin a 6 ½" piece of wire and connect the output jack's tip lug to footswitch lug 5.

3) Strip and tin a 1 ¾" piece of wire and connect footswitch lugs 1 and 4 to each other.

4) Strip and tin a 1" piece of wire and connect pot lug 1 to terminal #22.

5) Strip and tin a 3" piece of wire and connect terminal #2 to terminal #18.

6) Strip and tin a 3 ½" piece of wire and connect terminal #3 to terminal #20.

7) Strip and tin a 6 ½" piece of wire and connect terminal #4 to pot lug 3. Do NOT solder the pot connection, yet.

8) Strip and tin a 1 ½" piece of wire and connect pot lug 3 to footswitch lug 6. Now solder the pot connection.

9) Strip and tin a 4 ½" piece of wire and connect terminal #10 to terminal #21.

10) Strip and tin a 5 ½" piece of wire and connect terminal #6 to terminal #23.

11) Strip and tin a 2" piece of wire and connect terminal #13 to terminal #15.

12) Strip and tin a 4" piece of wire and connect terminal #17 to footswitch lug 3.

13) Strip and tin a 1 ½" piece of wire and connect terminal #16 to the DC power jack's center-pin lug.

14) Strip and tin a 3 ½" piece of wire and connect terminal #11 to the DC power jack's positive lug.

SECTION 5 - Mounting the Components

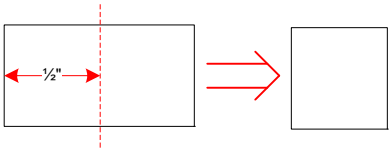
Please refer to DRAWING 3

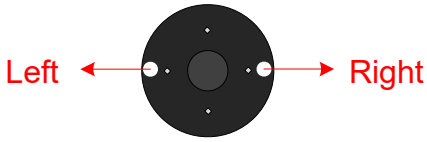
Unless noted otherwise, "connect" means to trim the component's leads to a reasonable length, wrap them tightly around their connection points and solder. (See "Soldering Tips" on page 6).

1) Connect a .22μF cap to pot lug 2 and terminal #23.

2) Mount the inductor with double sided foam tape.

Cut a ½" x ½" piece of double sided foam tape, remove the backing from one side and press it on to the flat side of the inductor. Remove the backing from the other side of this piece of tape and fasten the inductor to the enclosure surface as shown in Drawing 3. Two of the inductor leads are marked with a dot. These leads should be positioned toward the left and right sides of the enclosure. *(The inductor is not polarized so it does not matter which dot is on the left or the right).* When in the proper position, press down on the inductor to insure that it is firmly attached to the base.





3) Strip and tin a 1" piece of wire and connect terminal #21 to the marked inductor lead on the right side of the enclosure. *(Leave space for 3 more leads to be connected to terminal #21).*

Tip: The best way to connect to the inductor leads is to make a U-shaped bend in one end of the wire and crimp it around the terminal with needle nose pliers.

4) Strip and tin another 1" piece of wire and connect terminal #20 to the marked inductor lead on the left side of the enclosure.

5) Connect the 33K resistor to terminals #20 and #21.

6) Connect the 4.7µF cap and 100K resistor to terminals #19 and #21. Make sure the (-) negative end of the capacitor goes to terminal #19.

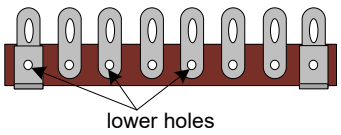
7) Connect the 68K resistor to terminals #17 and #18.

8) Connect a .01µF cap to terminals #2 and #15.

9) Connect the 1.5K resistor to terminals #3 and #15.

10) Connect the remaining .01µF cap to terminals #3 and #7.

11) Connect a 470K resistor to terminal #6 and insert the other end through the lower hole of terminal #12. Do NOT solder at terminal #12, yet. *(Use the lower hole of terminal #12 to allow for more room to connect 4 more components to this terminal).*



12) Connect the remaining 470K resistor to terminal #10 and insert the other end through the lower hole of terminal #12. Now, solder the lower hole connections at terminal #12.

13) Connect the 1K resistor to terminals #5 and #11.

14) Connect the 10K resistor to terminals #7 and #8.

15) Connect the 22K resistor to terminals #11 and #12.

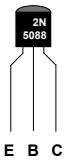
16) Connect the 270 Ω resistor to terminals #14 and #16.

17) Connect the remaining .22µF cap to terminals #4 and #12.

Mount this capacitors upside-down with the insulated top end touching the enclosure surface.

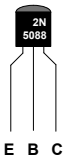
18) Mount one 2N5088 transistor to Terminals #5, #6 and #7.

Terminals #5: Collector
Terminals #6: Base
Terminals #7: Emitter



19) Mount the remaining 2N5088 transistor to Terminals #12, #13 and #14.

Terminals #12: Collector
Terminals #13: Base
Terminals #14: Emitter

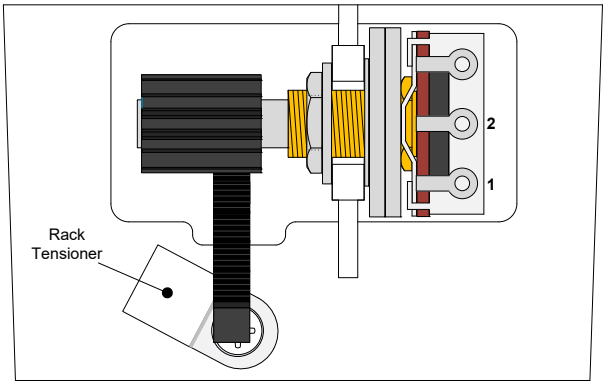


20) Locate the battery clip. Twist its leads together a few times. Connect the black lead of the battery clip to the input jack's ring lug. Connect the red lead of the battery clip to the power jack's positive-switch lug.

Tip: It's always a good idea to thoroughly double check all of your connections to insure they are properly connected and soldered before applying power for the first time.

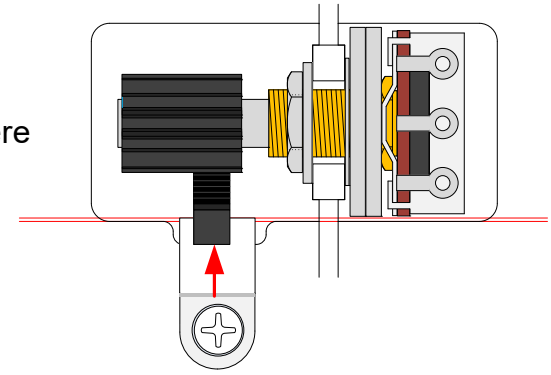
SECTION 6 - Final Assembly

Setting up the Wah Pot with the Rack



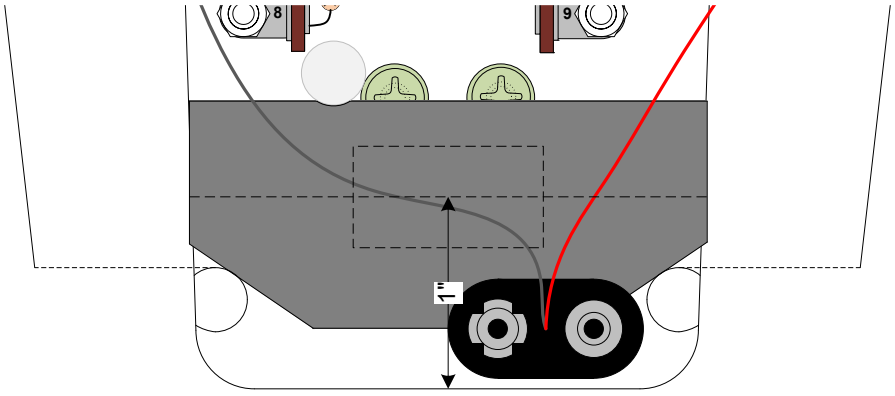
- Loosen the rack tensioner screw and push the rack tensioner to the side so that the wah pot's gear is completely separated from the rack.
- With the wah pedal still upside down, push the wah base to close against the treadle so that the footswitch is lightly resting against the treadle in toe-down position.
- While looking at the top of the wah pot from the input jack side of the enclosure, use your fingers to rotate the pot's shaft and gear to the full counter-clockwise position.

  (If you measure the electrical resistance between pot lugs 1 and 2 with an ohm meter at this setting, you should be measuring the pot's minimum resistance - i.e. close to 0Ω instead of 100kΩ).
- Now, bring the rack forward so that its teeth interlock with those of the pot's gear. (You may have to advance the pot's shaft slightly clockwise to get a snug fit between the rack teeth and pot gear).
- While holding the rack against the pot gear, bring the rack tensioner so that its edge is parallel with the ledge in the rectangular opening as shown in the drawing.
- While holding the rack against the pot gear, position the rack tensioner so that its edge stays parallel with the edge of the rectangular opening as shown in the drawing. Pull the rack tensioner towards the rack as much as possible and hold it there while using a screw driver to tighten the rack tensioners screw all the way down. Make sure the front edge of the tensioner is still parallel. *(You can add a dab of Vaseline to the junction between the rack and the rack tensioner for lubrication).*



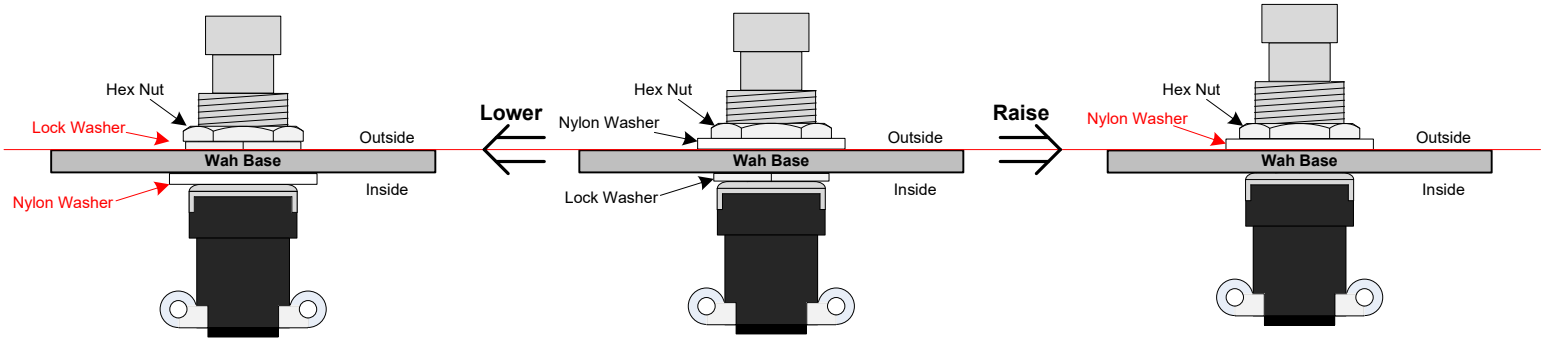
Installing the Foam Battery Cushion

- Locate the remaining piece of double sided foam tape and the gray foam battery cushion. This will be installed to keep the battery in place.
- Remove the backing from one side of the foam tape and attach to the inside of the wah base at the heel end roughly centered about 1" away from the rear edge as shown by the rectangle in the drawing below.
- Remove the remaining backing of the foam tape and place the foam block over the tape so the angled corners just clear the screw holes. Press down on the middle of the foam block to make sure it is firmly secured to the base.
- Install a fresh 9 volt battery and lay it over the gray foam block. Place the bottom cover over the base and attach the base using the feet and their mounting screws.



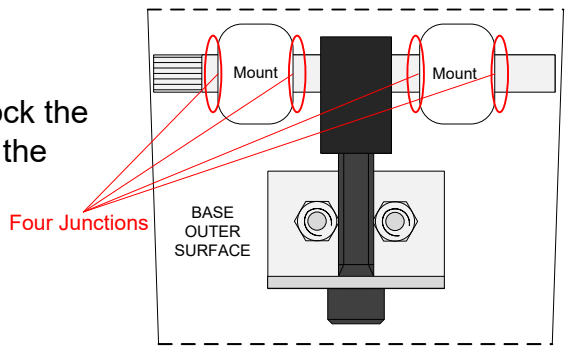
Adjustment of the Footswitch Height

- If you find that the **footswitch engages too easily** while rocking the treadle back and forth with your foot, you can lower the height of the footswitch by swapping the location of the large nylon washer and the lock washer.
- If you find that the **footswitch does not engage** when pressing the toe-end of the treadle all the way down with your foot for bypass mode, you can raise the height of the footswitch by removing the lock washer from the switch altogether.



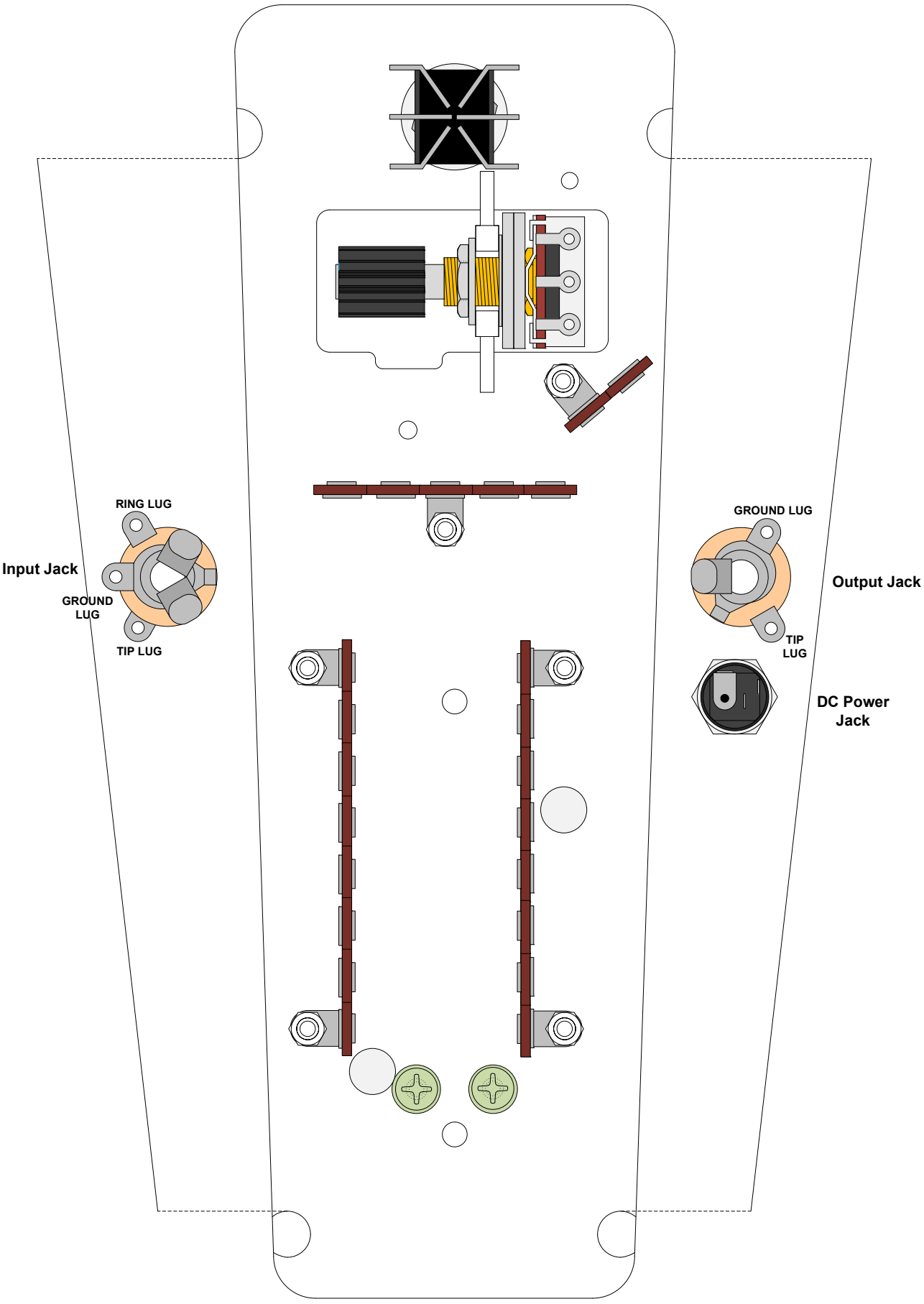
Fixing a Squeaky Wah

- If you find that your wah pedal is squeaking when you rock the treadle, try squirting WD40 into the four junctions where the bearing pin meets the bearing pin mounts.



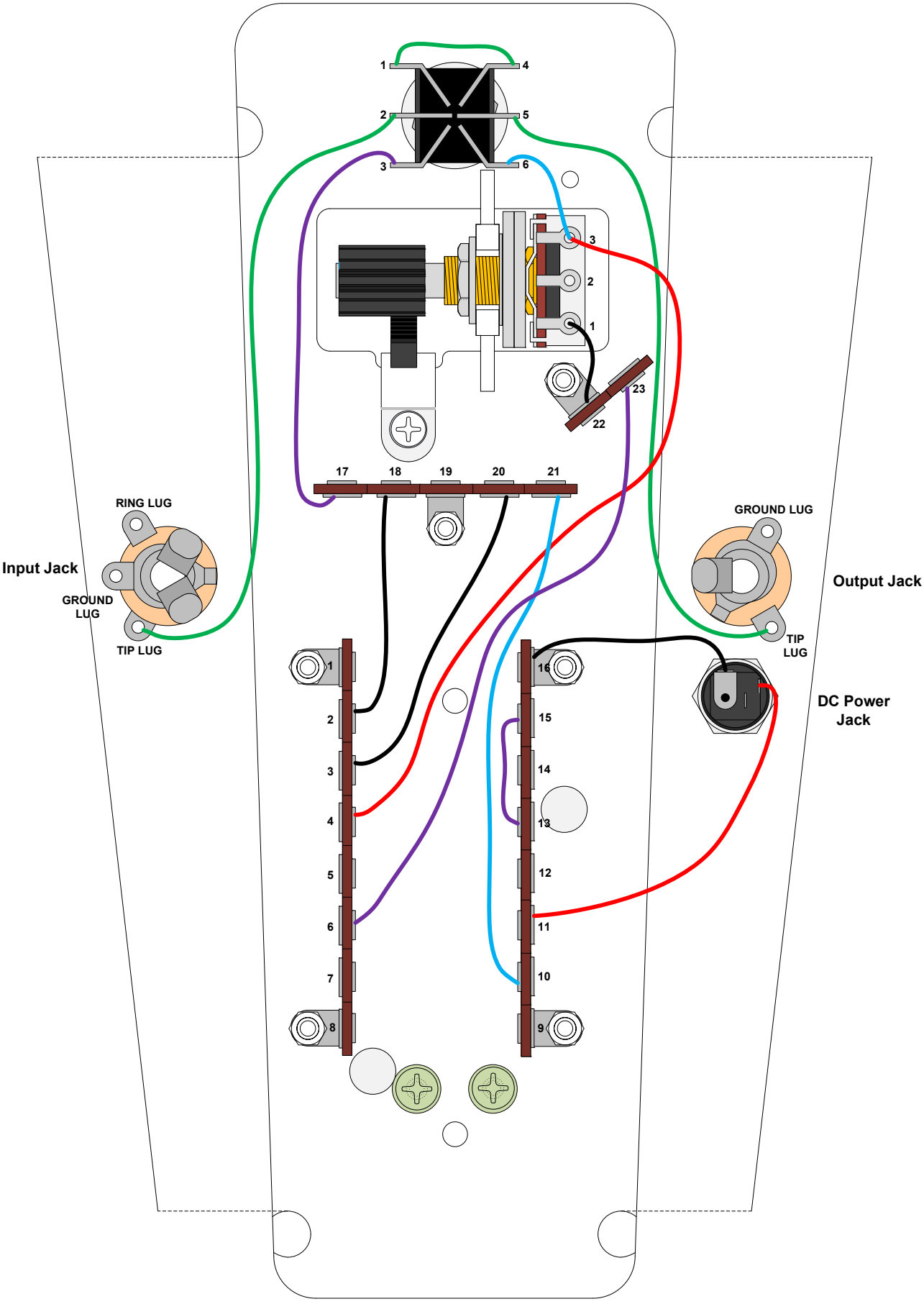
DRAWING 1

INSIDE VIEW OF THE BASE ENCLOSURE



DRAWING 2

INSIDE VIEW OF THE BASE ENCLOSURE



DRAWING 3

INSIDE VIEW OF THE BASE ENCLOSURE