

Hydronium Eurorack Assembly Guide

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Eurorack



Skills required

This is an intermediate skill level kit. We strongly suggest you practice on a simpler synth DIY project before beginning here. In addition, it can help you to have basic knowledge of electricity, and be familiar with the use of a digital multimeter.

You must be able to read fine print and identify colors. Use a magnifying glass, loupe, etc., to read the printing on the PCB, identify the colored stripes on the resistors, and read the faint laser markings on the chips and capacitors.

Work space

You should work on a suitable work surface such as a large, clean desk. You must have bright lighting at the workstation to avoid assembly errors. Use a tray to keep the parts organized as you unpack the kit.

Avoid breathing flux vapor. Use a fan for airflow across the desk, work near an open window, or use a smoke absorber.

Tools required

Your soldering iron must be of good quality (Hakko, Weller, MetCal, etc.). Don't use an oversized 50-year old soldering iron from the vacuum tube era, or an *el Cheapo* hobby store iron. The tip of your soldering iron must have a fine point.

To test the soldering iron:

- Plug it in and set it to a medium-high heat level. Wait 5 minutes.
- Wipe the tip on a damp sponge, then touch your solder to the tip of the iron. Observe what happens.

The solder must melt immediately, releasing a puff of flux vapor. The molten metal must cling to the tip of the iron, flowing freely to coat it like it has been wet with a drop of water. But, if the solder is reluctant to melt, and forms a bead that “runs away” from the tip, then the iron is bad, so don't use it or you will risk ruining the project.

You'll also need: fine tipped flush-cutting pliers, small needle-nose pliers, wire stripper, and a visual magnification aid such as a magnifying glass or jeweler's loupe. Hex sockets of various sizes are useful to tighten the panel nuts.

Solder

Use an electronics-type solder that is 0.032" diameter with rosin flux core. It can be lead-free (SAC305) or Sn/Pb alloy.

DO NOT use water-soluble flux. DO NOT use "paste flux". RA Flux, RMA Flux, No-Clean, and Glow-Core are ok.

De-soldering

You must be very careful when soldering. It takes much more effort to remove solder than to add it.

A common error is to let the tip of the iron touch two solder pads at the same time. You'll make a good connection where you wanted it, but the molten solder will also flow into the open hole of the adjacent pad and plug it. Then you won't be able to insert a component later, until after you have cleared the unwanted solder that is plugging the pad.

To remove solder, you can use de-soldering braid ("solder wick") or a vacuum syringe ("solder sucker").

If you aren't careful when de-soldering components, it is easy to damage the PCB copper foil. That's because the PCB material becomes soft while it is hot. In that state, the thin copper foil can easily lift off (de-laminate) and tear, requiring careful repair.

Resistors

This kit has a lot of resistors. Use a magnifying glass and desk lamp to read the color codes. To keep them organized, leave the carrier tape on the resistors until just before you assemble them.

We have tried to supply all the resistors of each value as a continuous section of cut tape. However you may find that 12 resistors of one value are divided into two strips of 4 + 8, for example.

The body of the resistors may be blue or brown. Try not to think of them as "blue ones" vs. "brown ones", because the selection will vary from kit to kit. In any case, they're all metal film type, of 1% tolerance and 1/8-watt rating. The only important feature is the color-coded stripes... so ignore the blue or brown background color.

Capacitors

Press all of the capacitors tight against the PCB when you solder them. There should be no air gap between the PCB and the capacitors. If the capacitors are sticking up off the board, they will interfere with the control panel when you assemble the unit.

Integrated circuits (IC's, chips)

This kit does not include sockets for most of the chips. Sockets are not necessary in most cases, and cheap sockets can actually decrease the reliability of the unit.

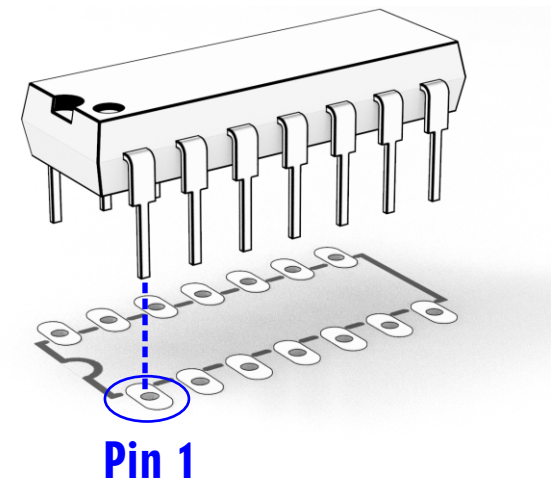
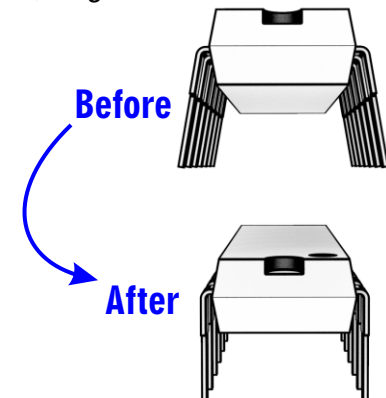
On a new chip, the leads are angled outwards from its body. (It makes them compatible with automatic assembly equipment). So before you can install your chips, you'll need to straighten their leads so they will easily fit into the holes in the PCB. Press the chip against an anti-static surface like aluminum foil to bend its leads straight.

You must be very careful not to put the chips in backwards when you solder them to the PCB. If you solder a chip in backwards, there is no way to remove it and re-use it. To remove a chip, you will have to cut each of its leads, then throw it away. Next, carefully remove the remaining solder from each hole. As you can imagine, its not easy... so don't get caught in this position!

The best way to be sure a chip is installed properly is to identify its Pin 1. The Pin 1 is marked on most chips by a dot on the top, and a semicircular indentation in the left edge. The printed outline on the PCB has a notch next to Pin 1. Always double-check before touching a chip with the soldering iron.

Handle the chips as little as possible, since they may be damaged by static electricity. Leave them in the anti-static foam material until you use them.

Straighten its leads before inserting a chip



Fine print

The printing on the PCB is small, and some of the numerals can be mistaken for others. Use a magnifier to avoid reading errors.

If you can't see any print on the chips, try moving the light source off to the side. The light must strike the surface from a low angle for laser markings to be visible.

Some digits look similar to others..



Support Policy

The parts included with your kit have been carefully counted. If you require replacements, we will provide you the URL of a commercial source (Mouser, DigiKey, etc.) for the part.

Limited technical support is available by email. If your kit doesn't work properly after assembly, and you are unable to correct the errors after discussing it by email, you may send your kit materials back to us, and Rare Waves will repair it, for a US\$75 bench fee plus shipping. If your PCB has been damaged beyond repair, then additional replacement cost will apply.

service@rarewaves.net

Sorry, we can't review your PCB assembly work and identify problems from a shaky cameraphone video. Please don't send us a shaky cameraphone video of the PCB and ask what's wrong with it.

Count

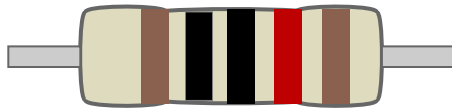
12

Reference

R9,R11,R16,R26,R27,R28,
R31,R42,R43,R44,R58,R59

Value

10 k Ω



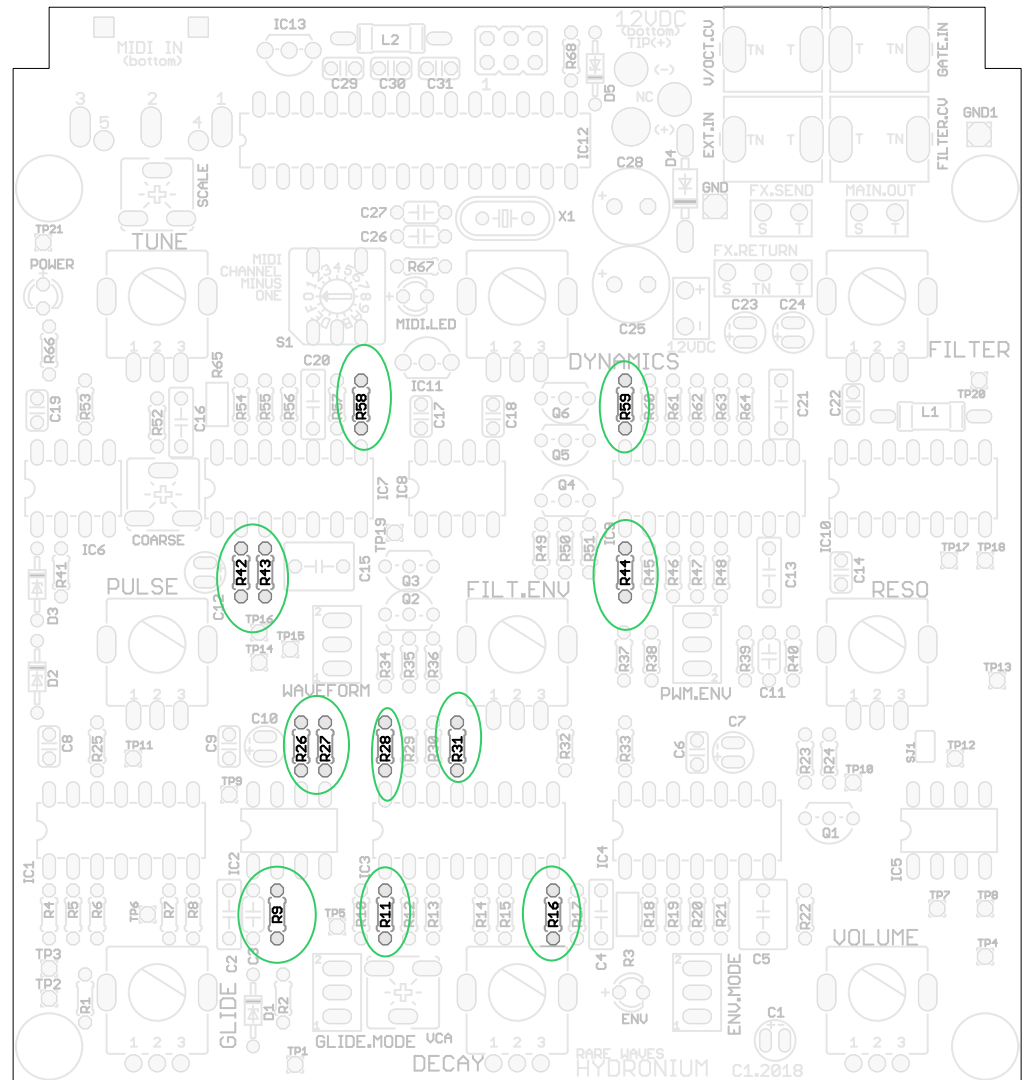
Type

Metal film resistor 1% 1/8W

Assembly Note

Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.

Don't confuse these with the 20k resistors. Be sure you recognize the difference in color between red and brown stripes.



Step 2



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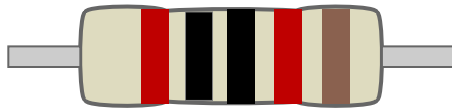
rev.C

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Count _____
12

Reference _____
R1,R2,R6,R13,R24,R38,
R48,R57,R61,R66,R67,R68

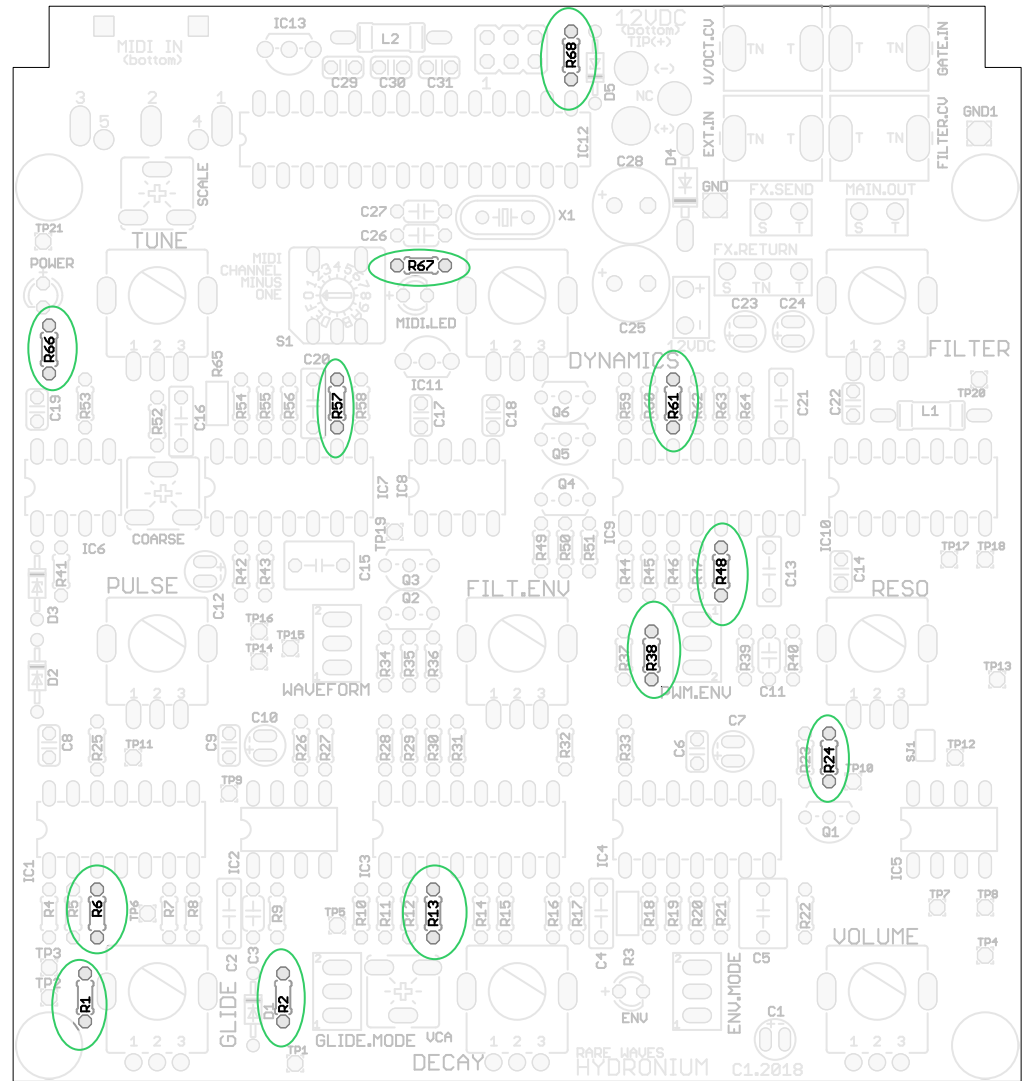
Value _____
20 k Ω



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes,
solder, then clip off excess length.

Don't confuse these with the 10k resistors. Be sure you
recognize the difference in color between red and brown
stripes.



Step 3



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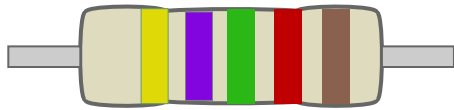
rev.C

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Count _____
6

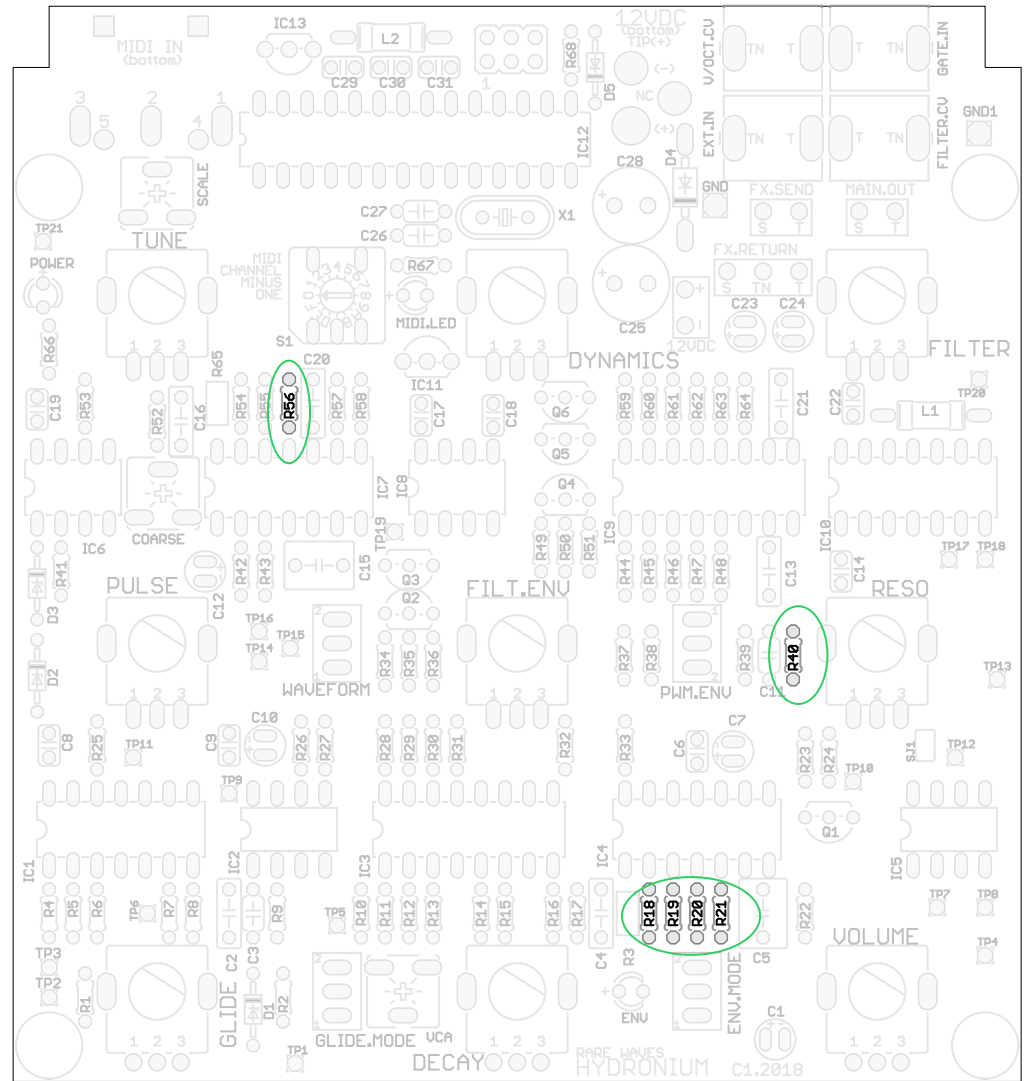
Reference _____
R18,R19,R20,R21,R40,R56

Value _____
47.5 k Ω



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 4



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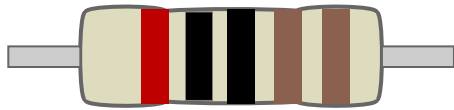
rev.C

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Count _____
5

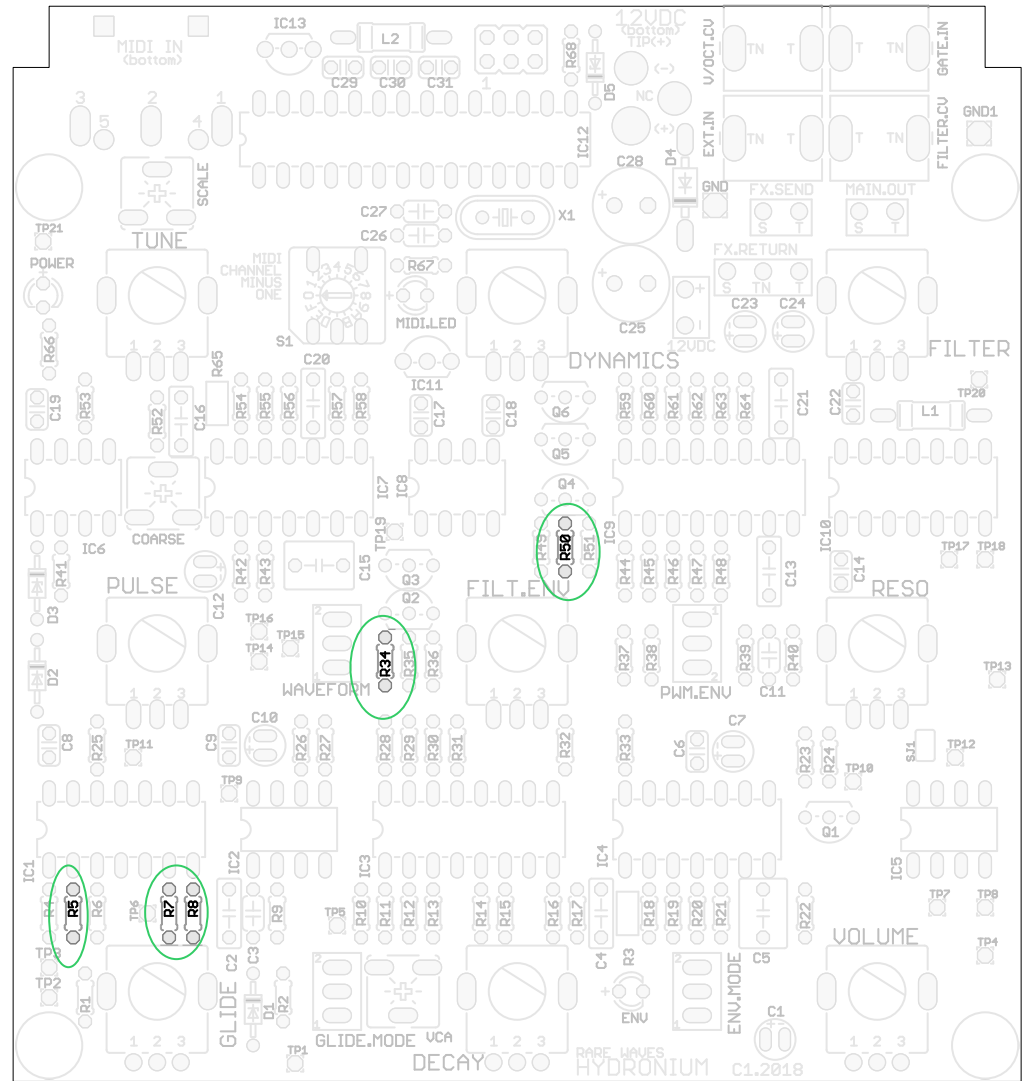
Reference _____
R5,R7,R8,R34,R50

Value _____
2 k Ω



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Count 4

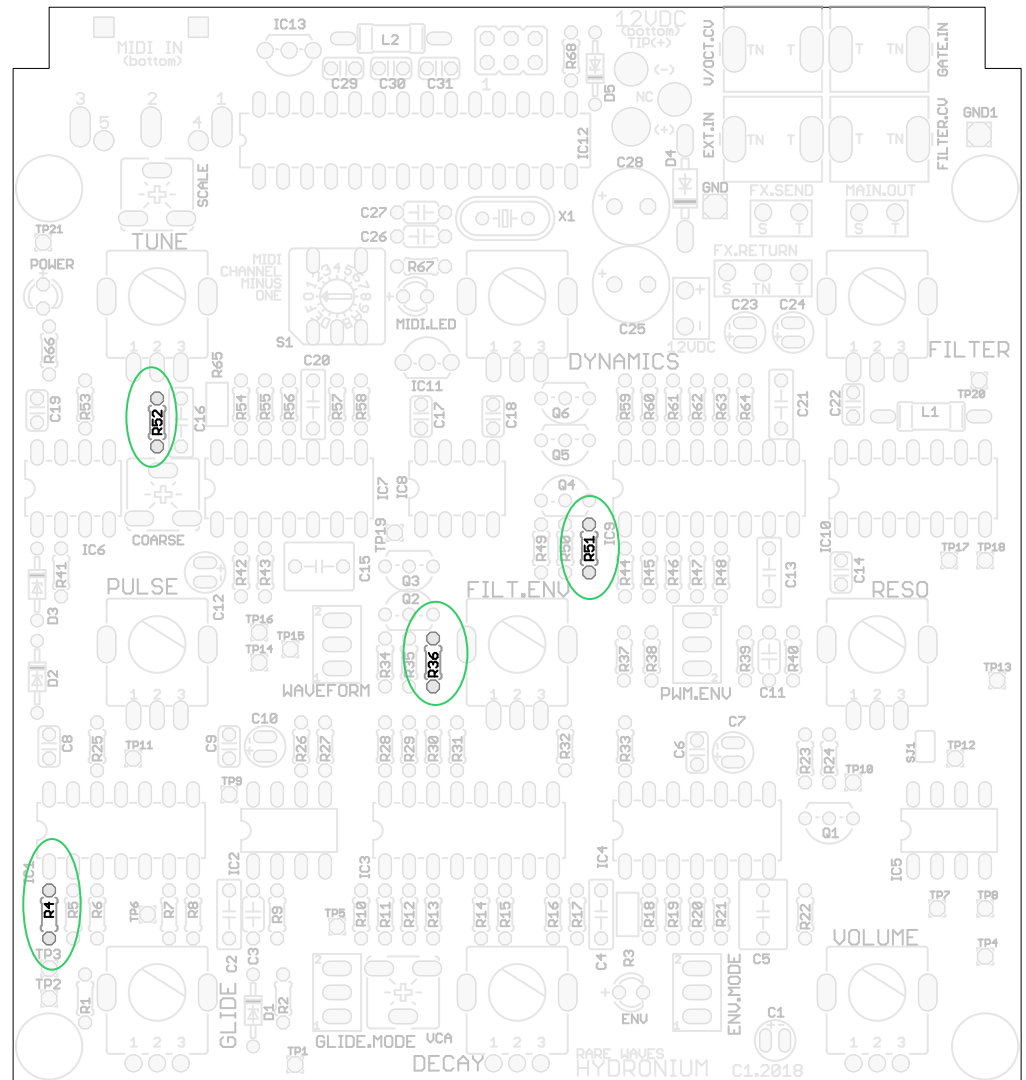
Reference R4,R36,R51,R52

Value 1 MΩ



Type Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 6



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Count _____ 4

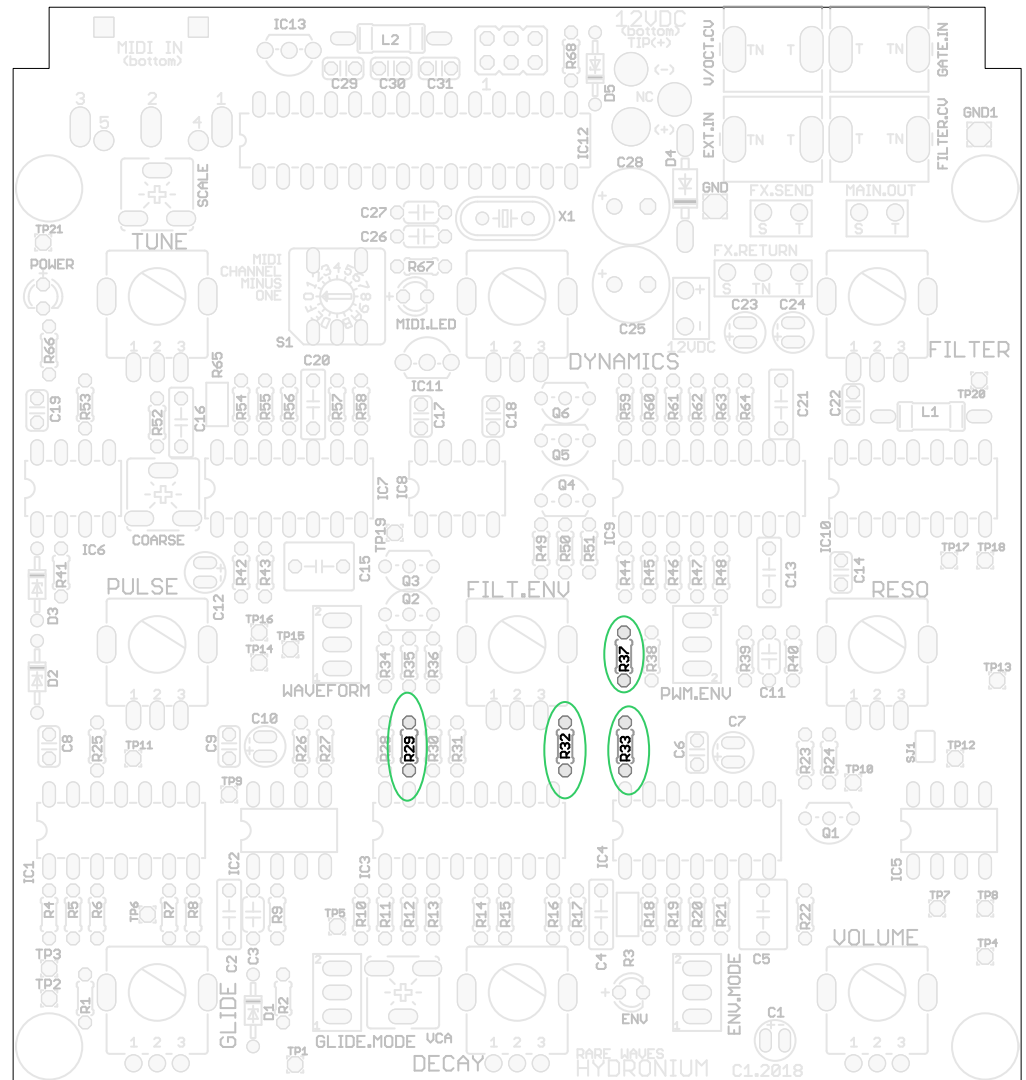
Reference _____
R29,R32,R33,R37

Value _____
3.32 kΩ



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes,
solder, then clip off excess length.



Step 7



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Count

3

Reference

R17,R25,R55

Value

100 k Ω

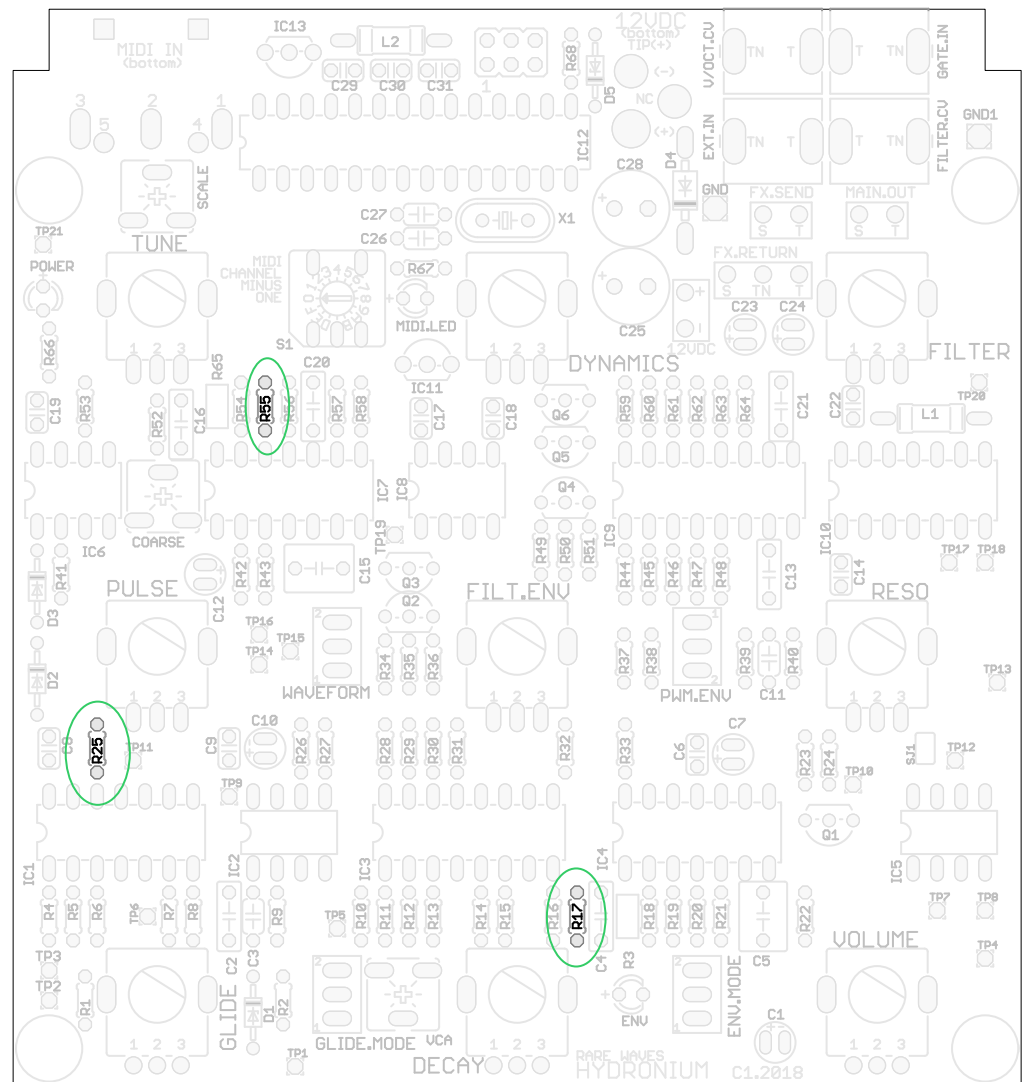


Type

Metal film resistor 1% 1/8W

Assembly Note

Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.

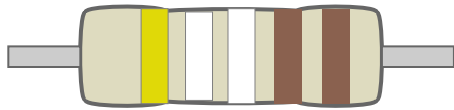


Step 8

Count 3

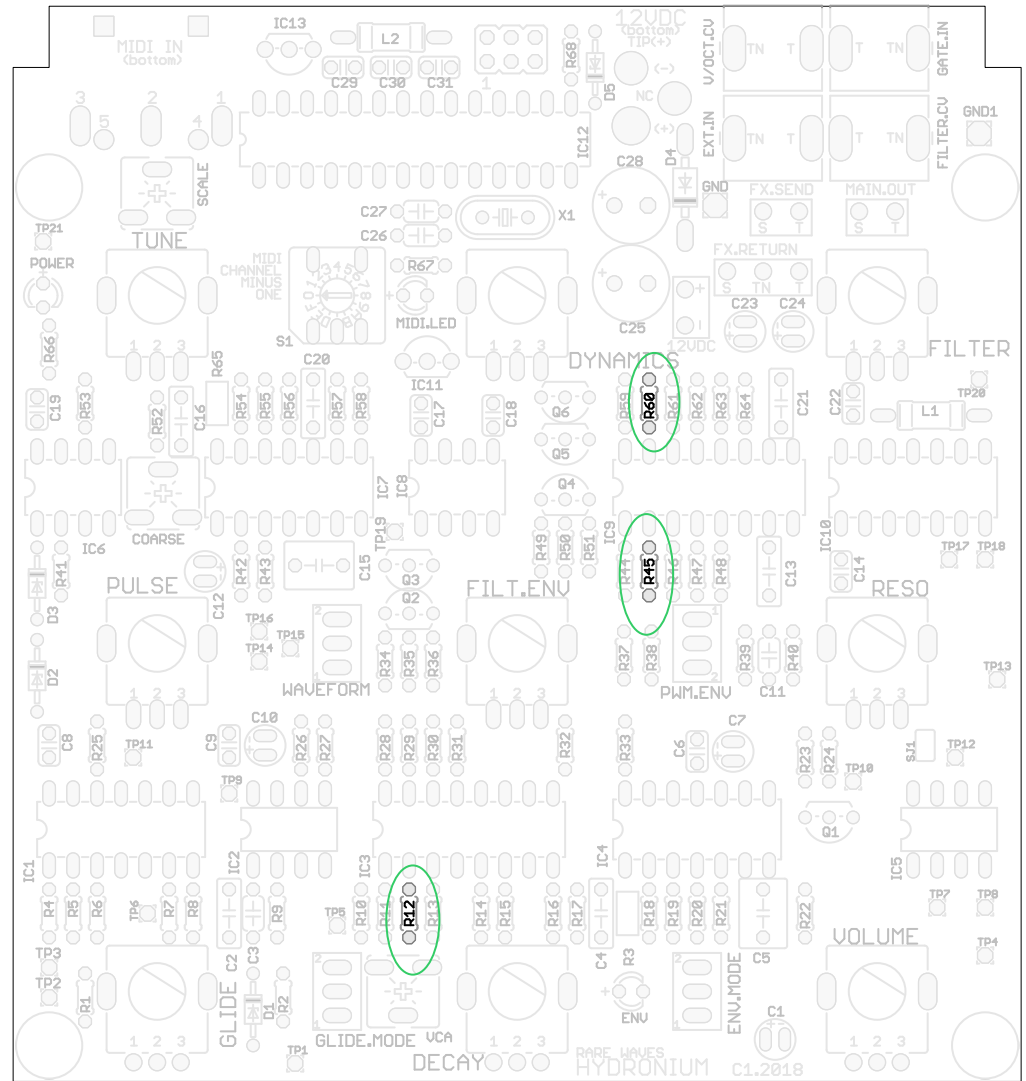
Reference R12,R45,R60

Value 4.99 kΩ



Type Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 9

Count 2

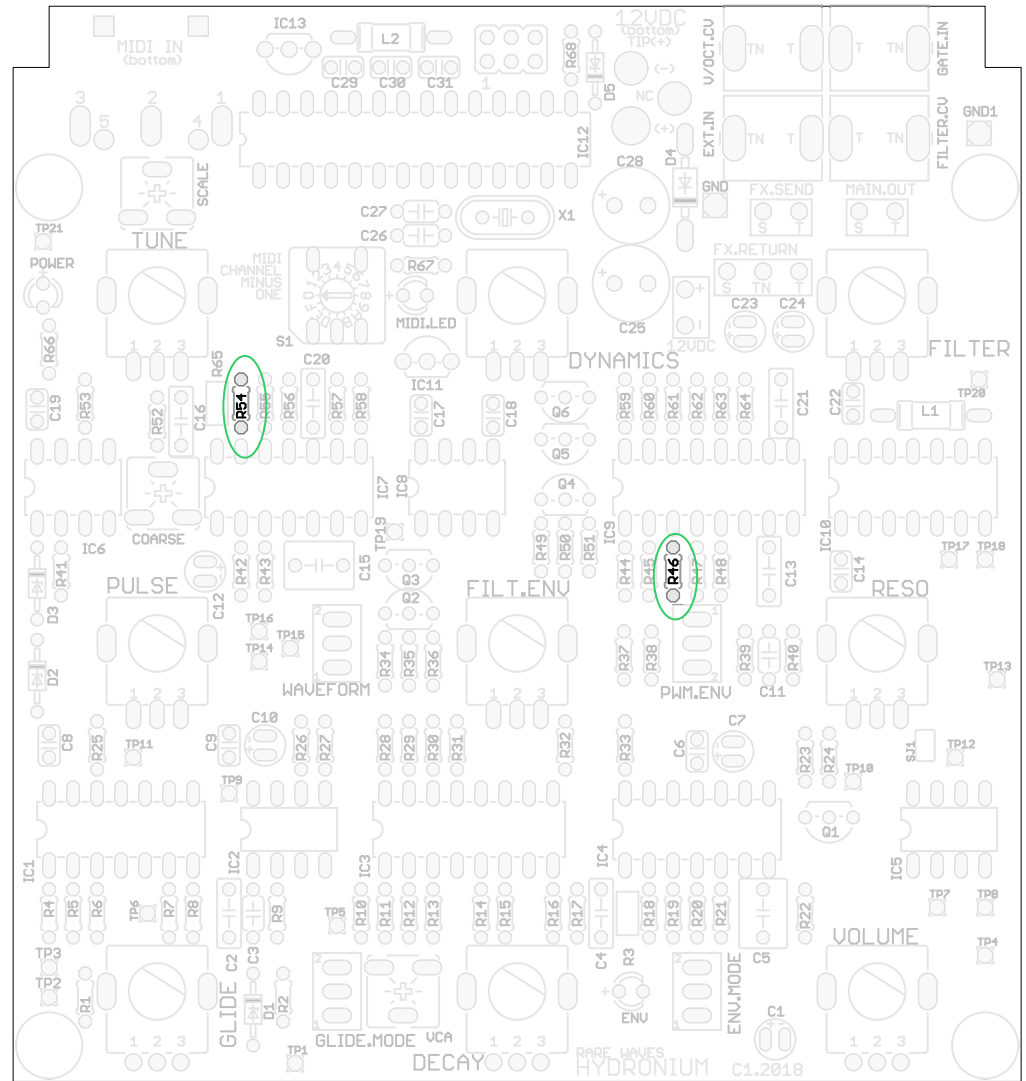
Reference R46,R54

Value 150 k Ω



Type Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 10



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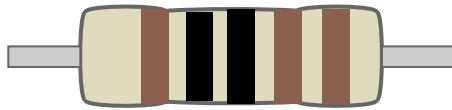
rev.C

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Count _____ 2

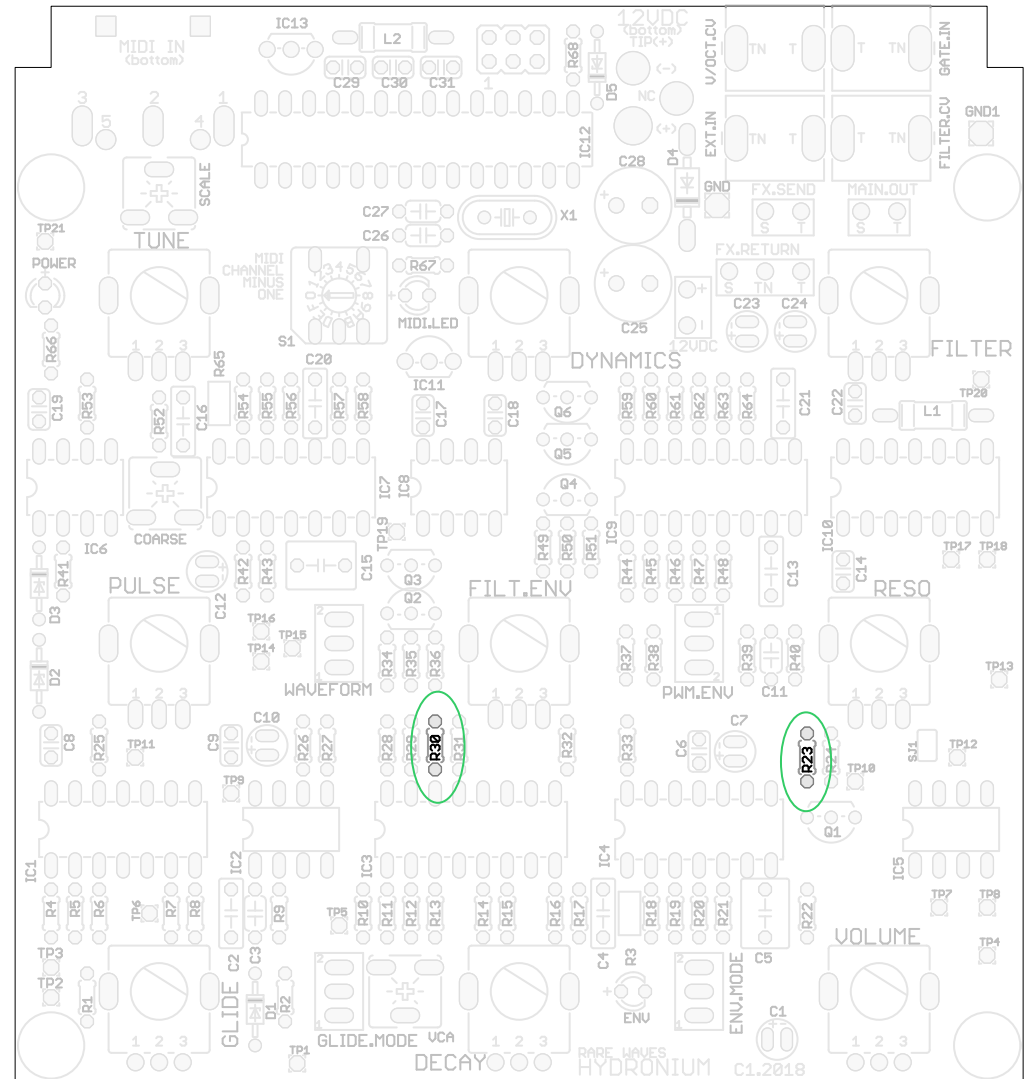
Reference _____ R23,R30

Value _____ 1 k Ω



Type _____ Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 11

Count 4

Reference D1,D2,D3,D5

Value 1N5233B

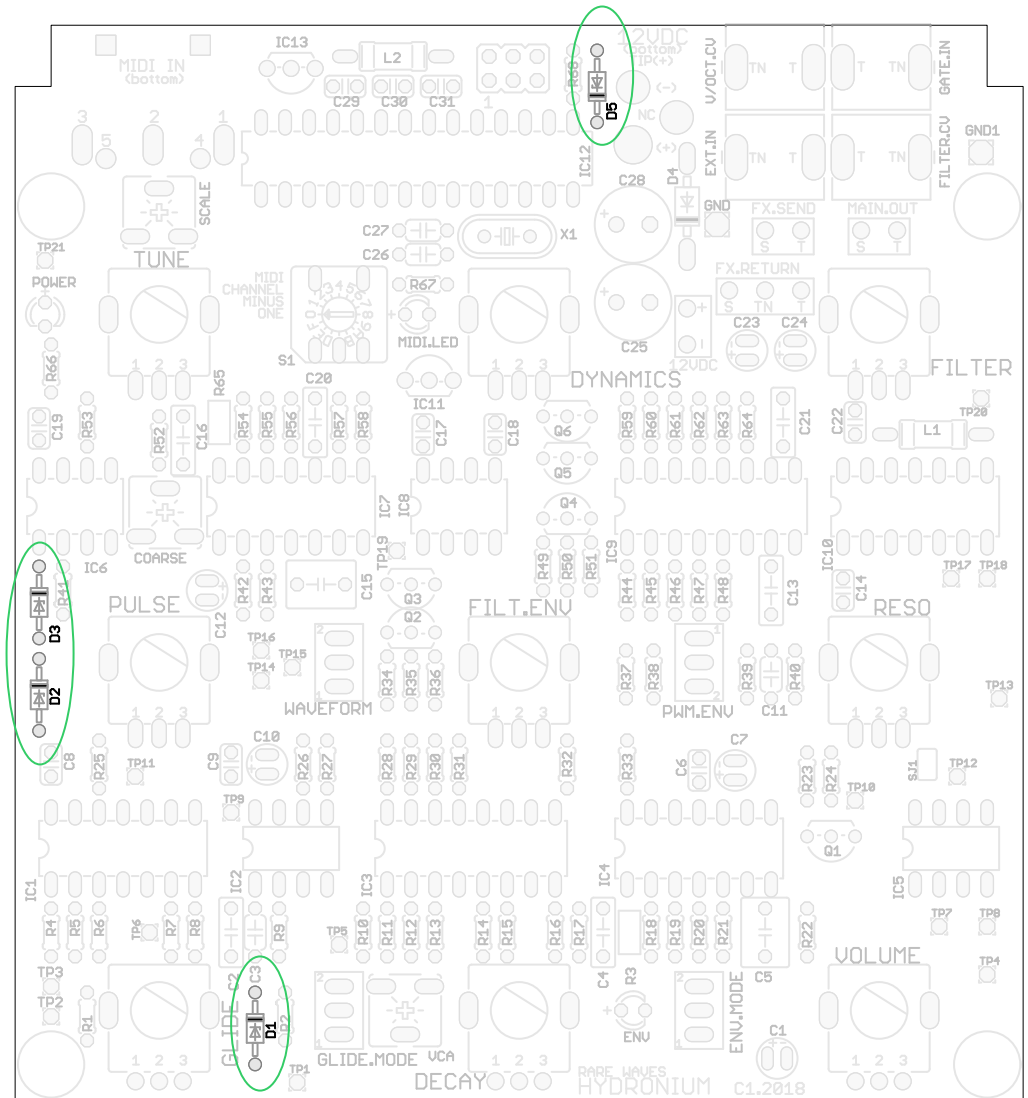
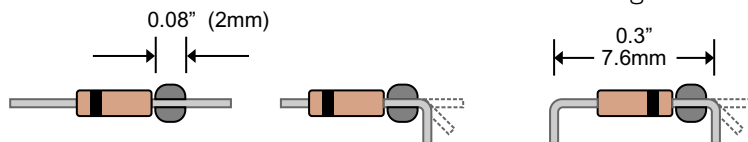


Type Zener diode 6.0V, DO-35

Assembly Note

Orient the part so its striped end matches the stripe printed on the PCB.

The part is made of glass. To prevent damage, grip the leads with tweezers or needle nose pliers close to the body while making the bends.



Step 12



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Count

Reference

D4

Value

1N4001



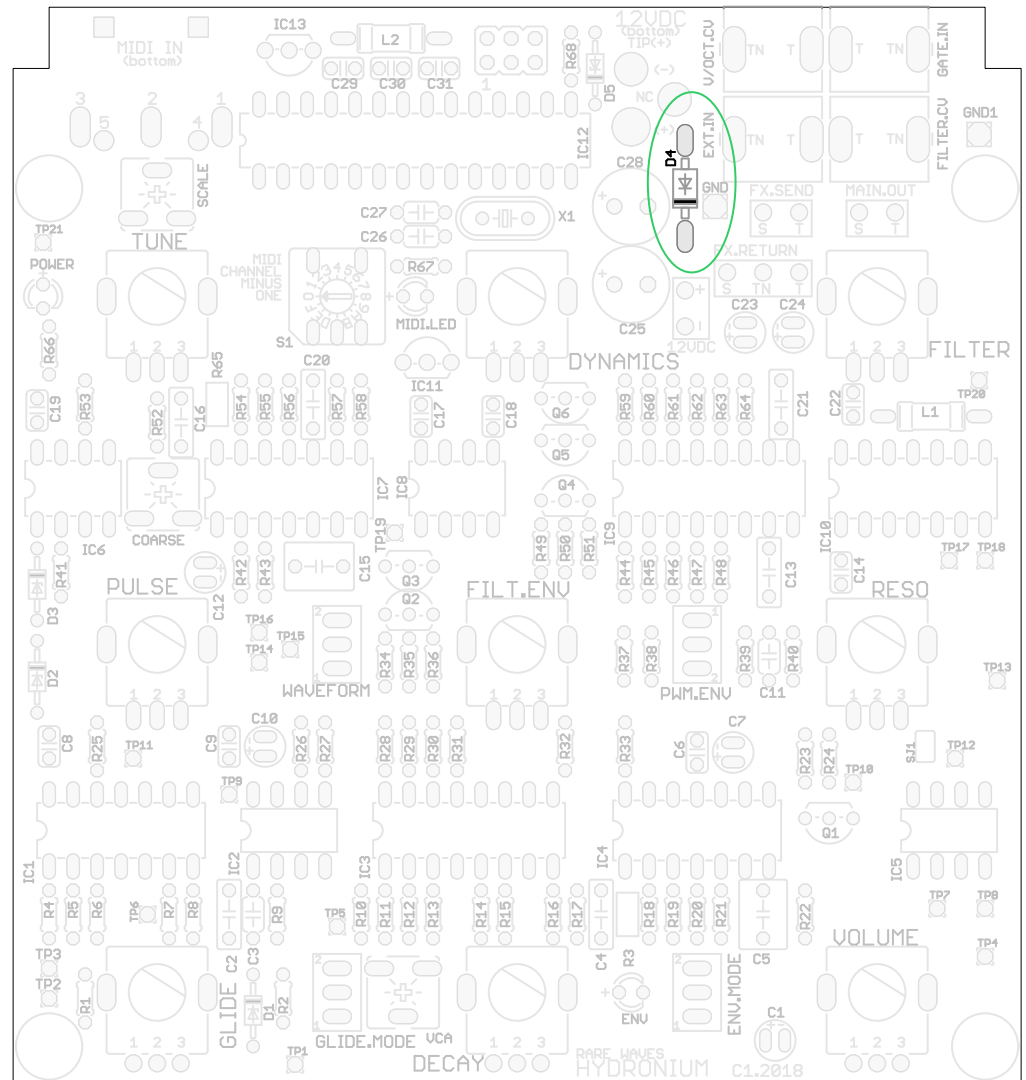
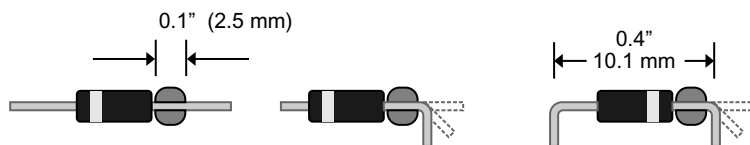
Type

Silicon rectifier diode, DO-41

Assembly Note

Orient the part so its striped end matches the printing on the PCB.

For best appearance, grip the leads with tweezers or needle nose pliers close to the body while making the bends.



Step 13



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Count _____ 2

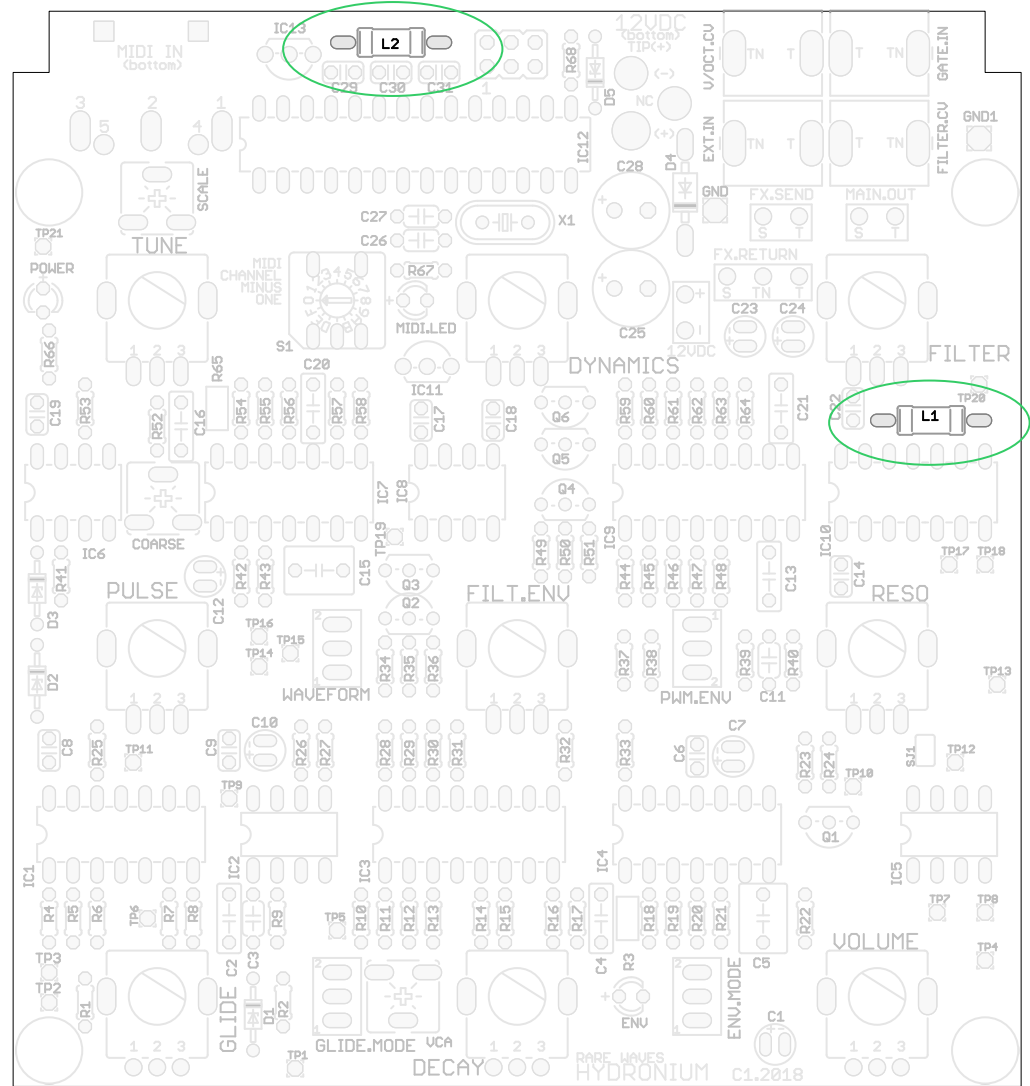
Reference _____ L1,L2

Value _____ 220 μ H



Type _____ RF choke inductor, axial leads

Assembly Note
Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.

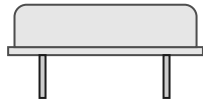


Step 14

Count _____

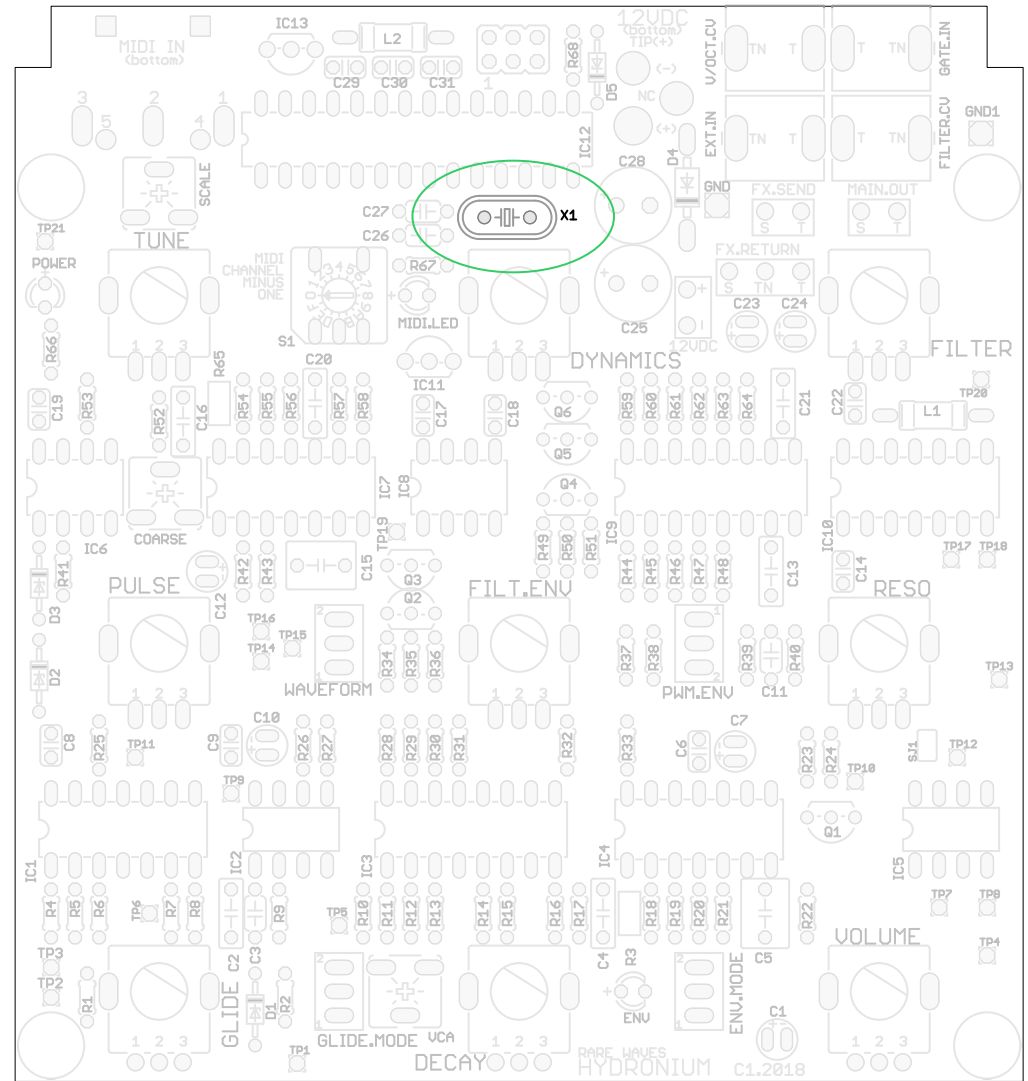
Reference _____ XI

Value _____ 8.000 MHz



Type _____ Frequency control crystal HC49-U

Assembly Note _____ Non-polar



Step 15



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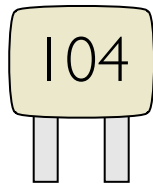
Count

11

Reference

C6,C8,C9,C14,C17,
C18,C19,C22,C29,C30,C31

Value



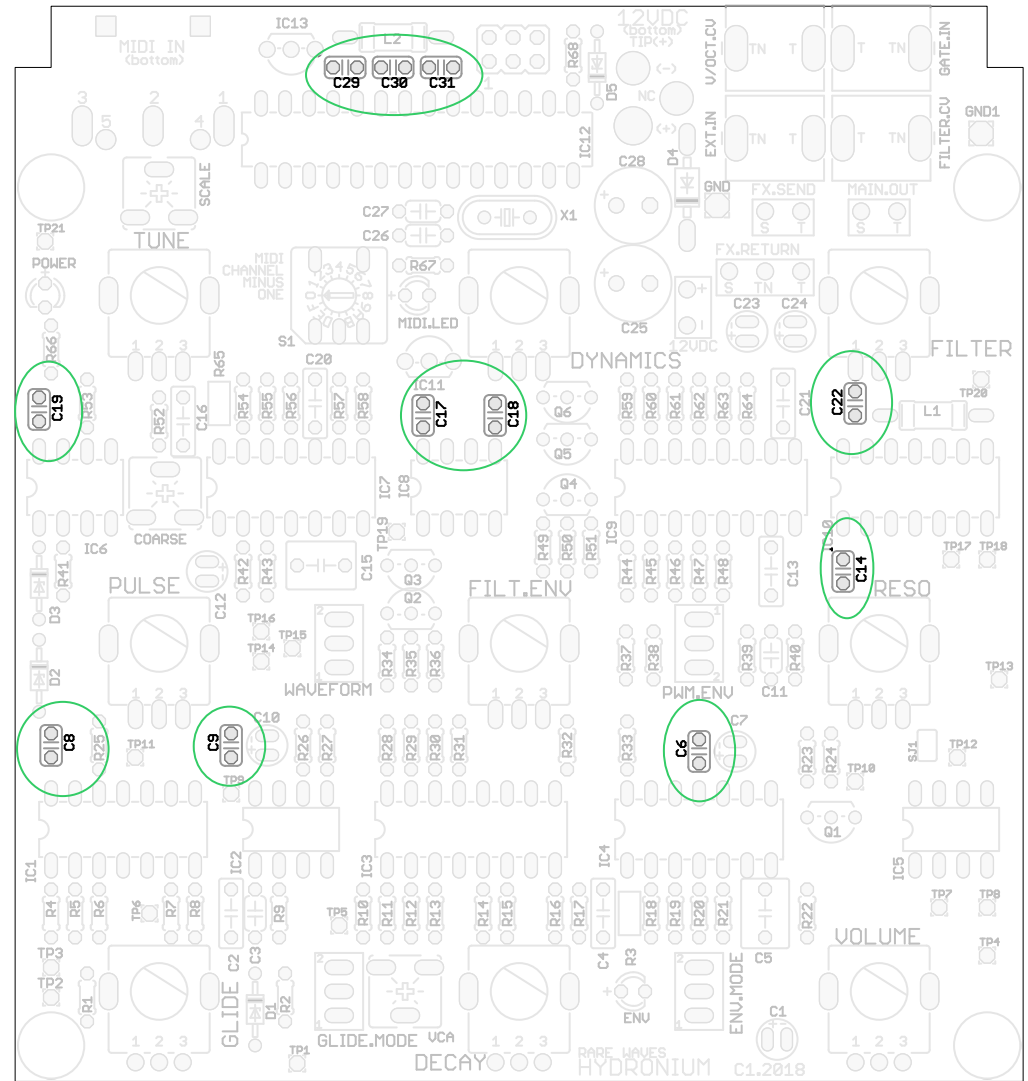
0.1 μ F

Type

Ceramic capacitor, X7R 20%

Assembly Note

Non-polar



Step 16



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2

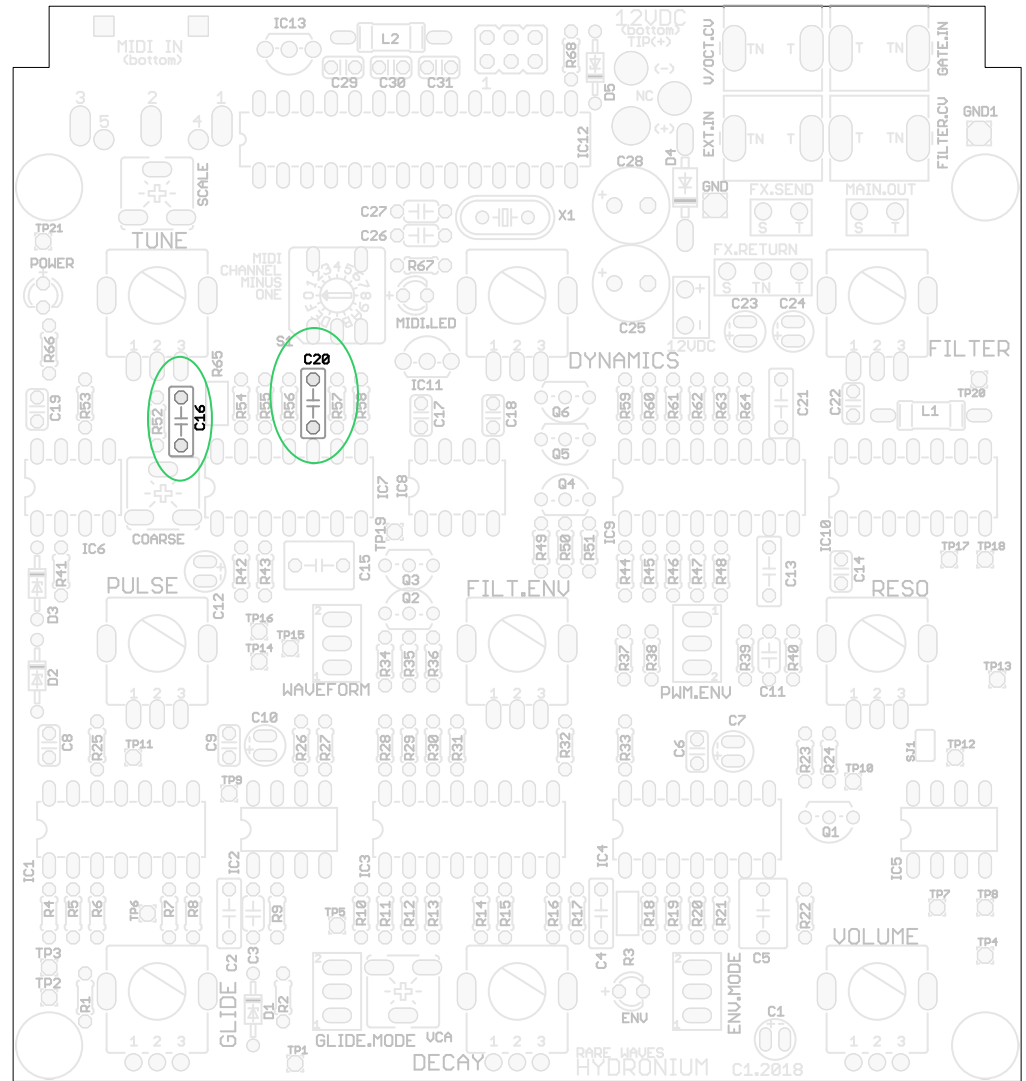
C16,C20

Inf



PET film box capacitor 5%

Non-polar



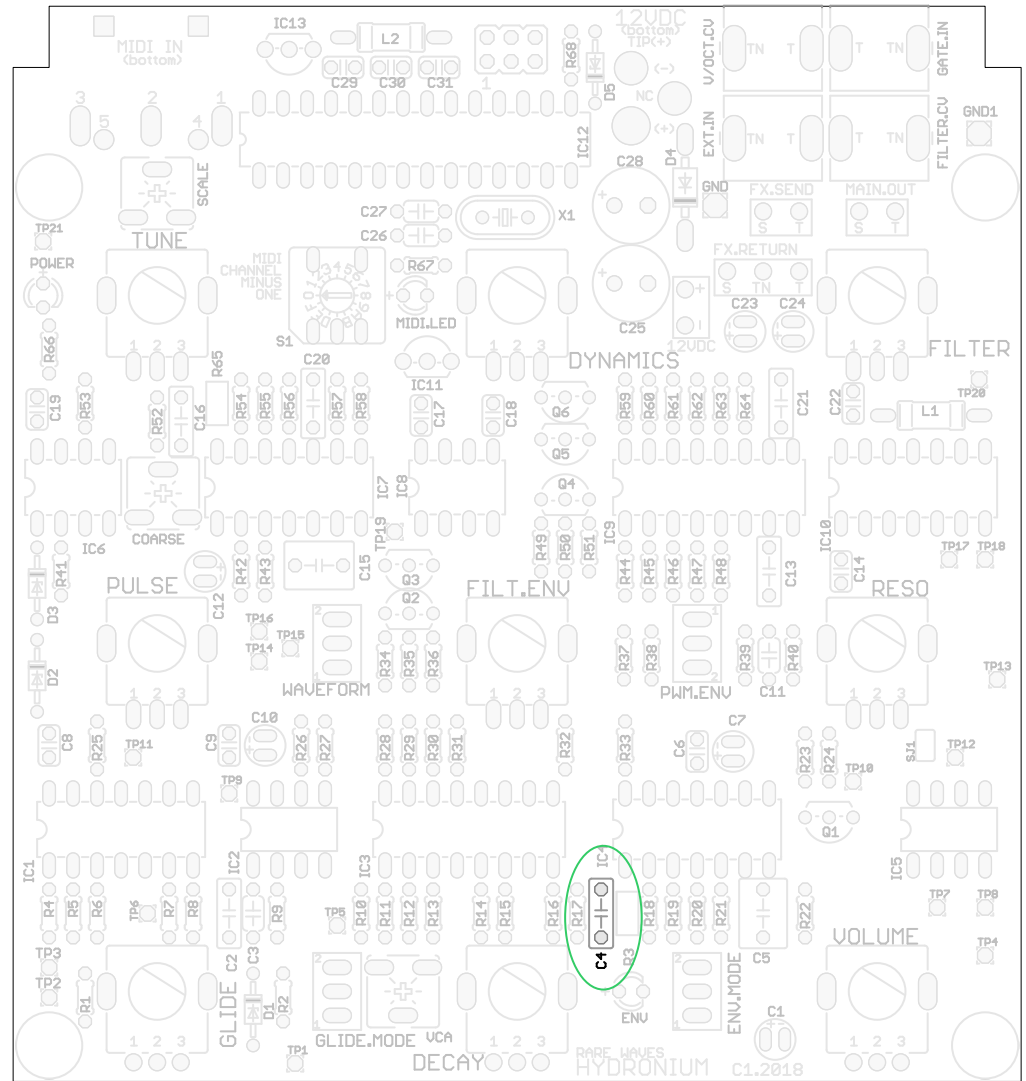
Step 17

C4

Diagram showing three resistors connected to a common node, which is then connected to a capacitor labeled 10 nF . The resistors are labeled 10n , 0.01 , and 103 .

PET film box capacitor 5%

Non-polar



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Count

1

Reference

C2

Value

150 nF

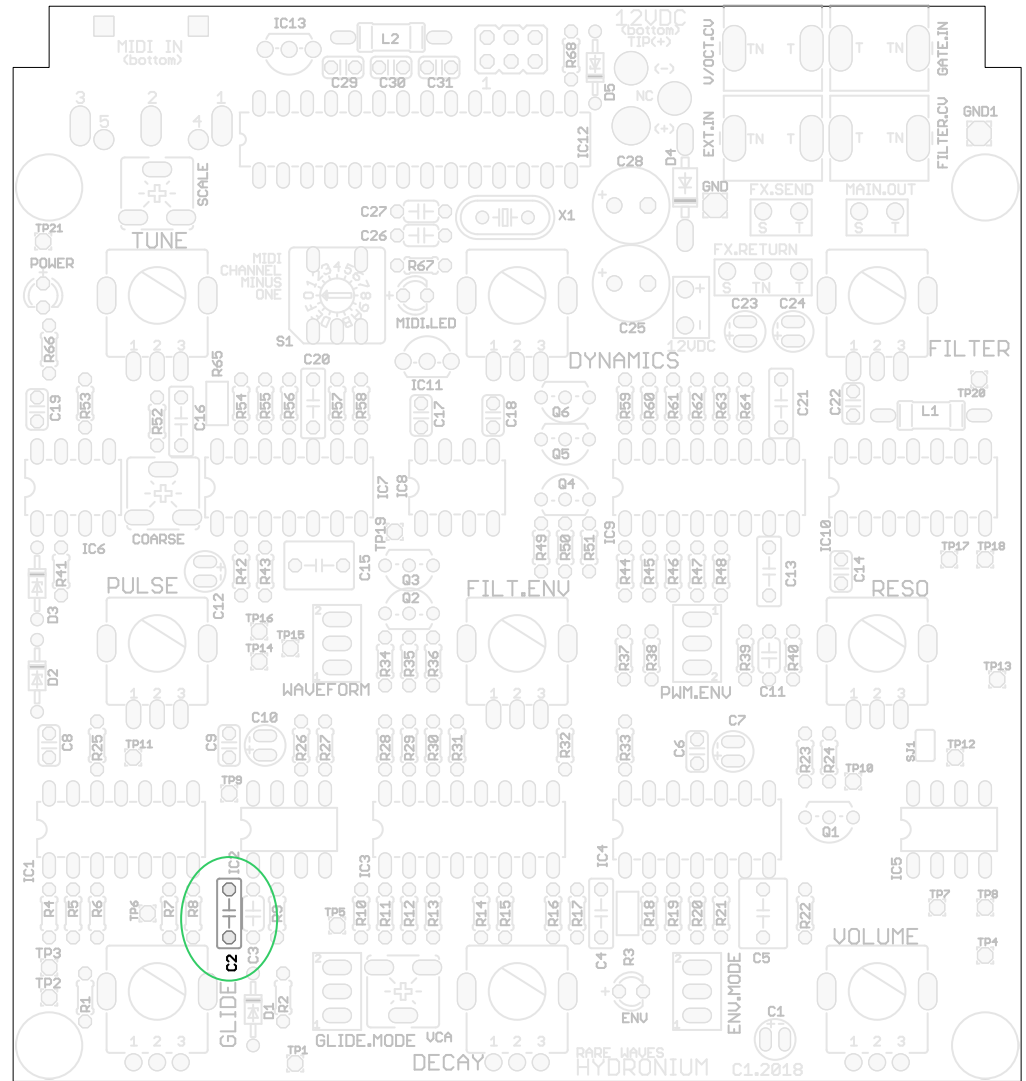
μ 15 0.15 μ 150n

Type

PET film box capacitor 5%

Assembly Note

Non-polar



Step 19



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Count _____
6

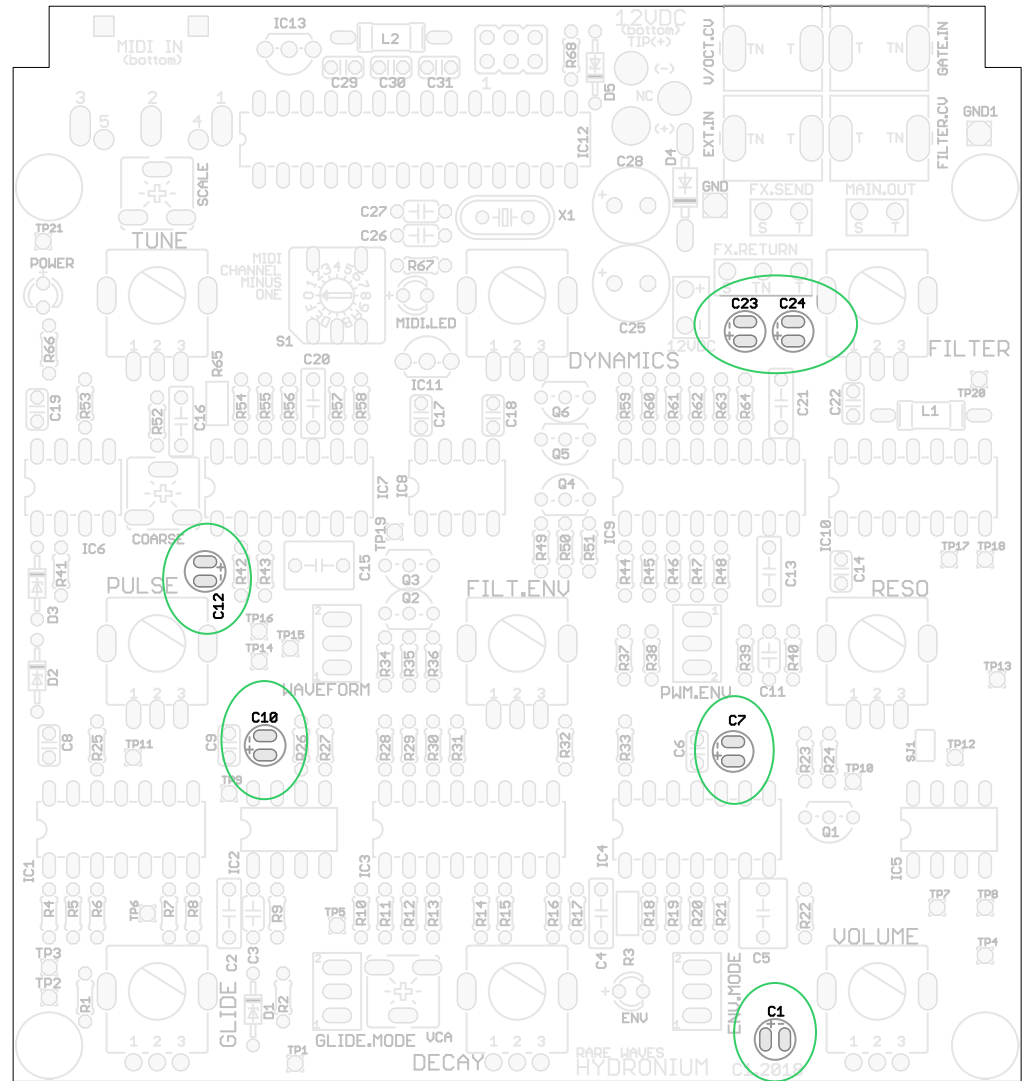
Reference _____
C1,C7,C10,C12,C23,C24

Value _____
22 μ F



Type _____
Electrolytic capacitor 4mm (d) x 7mm (h)

Assembly Note _____
The long lead must go into the hole marked (+)



Step 20



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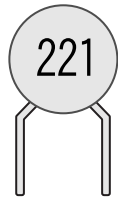
rev.C

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Count _____ 2

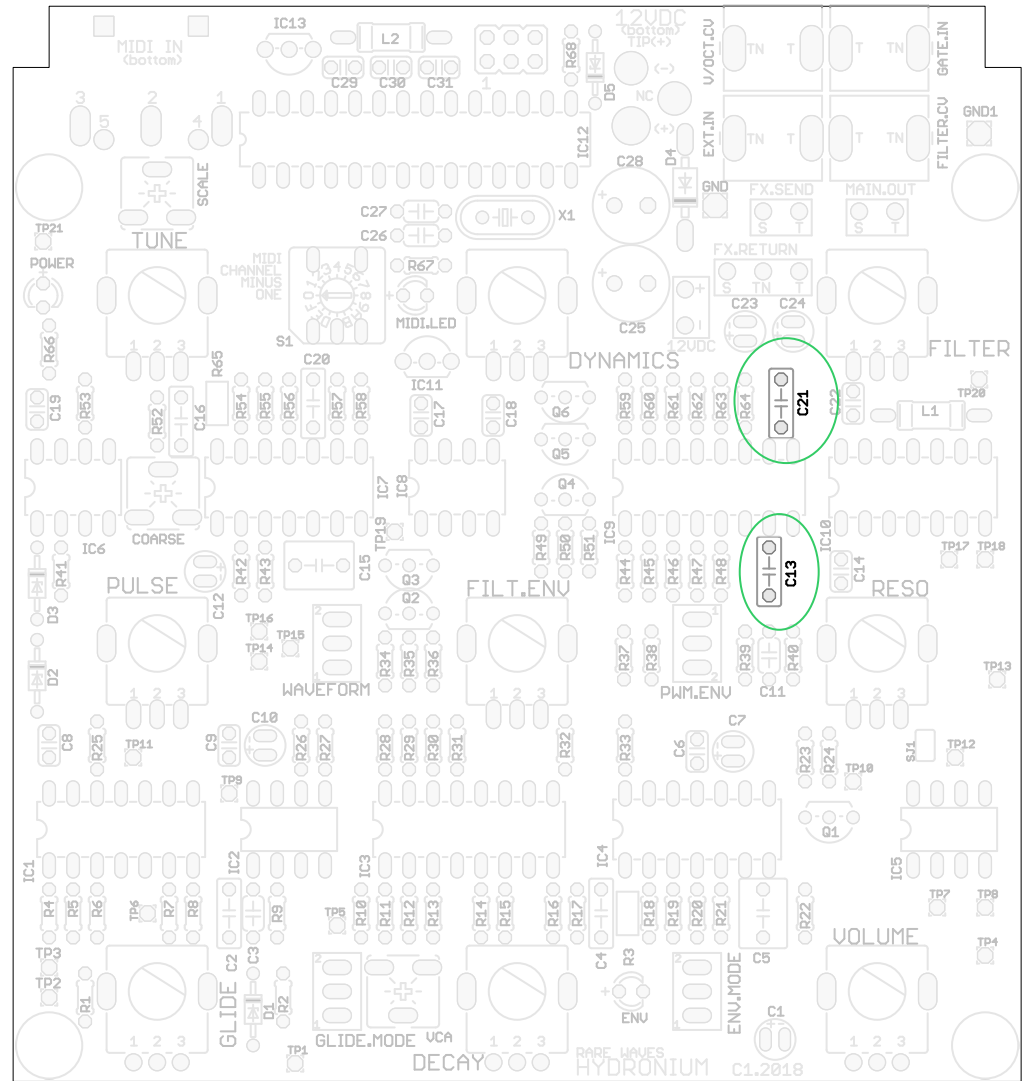
Reference _____ C13,C21

Value _____ 220 pF



Type _____ Ceramic disc capacitor 5%

Assembly Note _____
These parts are marked "221"...
Don't confuse them with the 22pF capacitors.



Step 22



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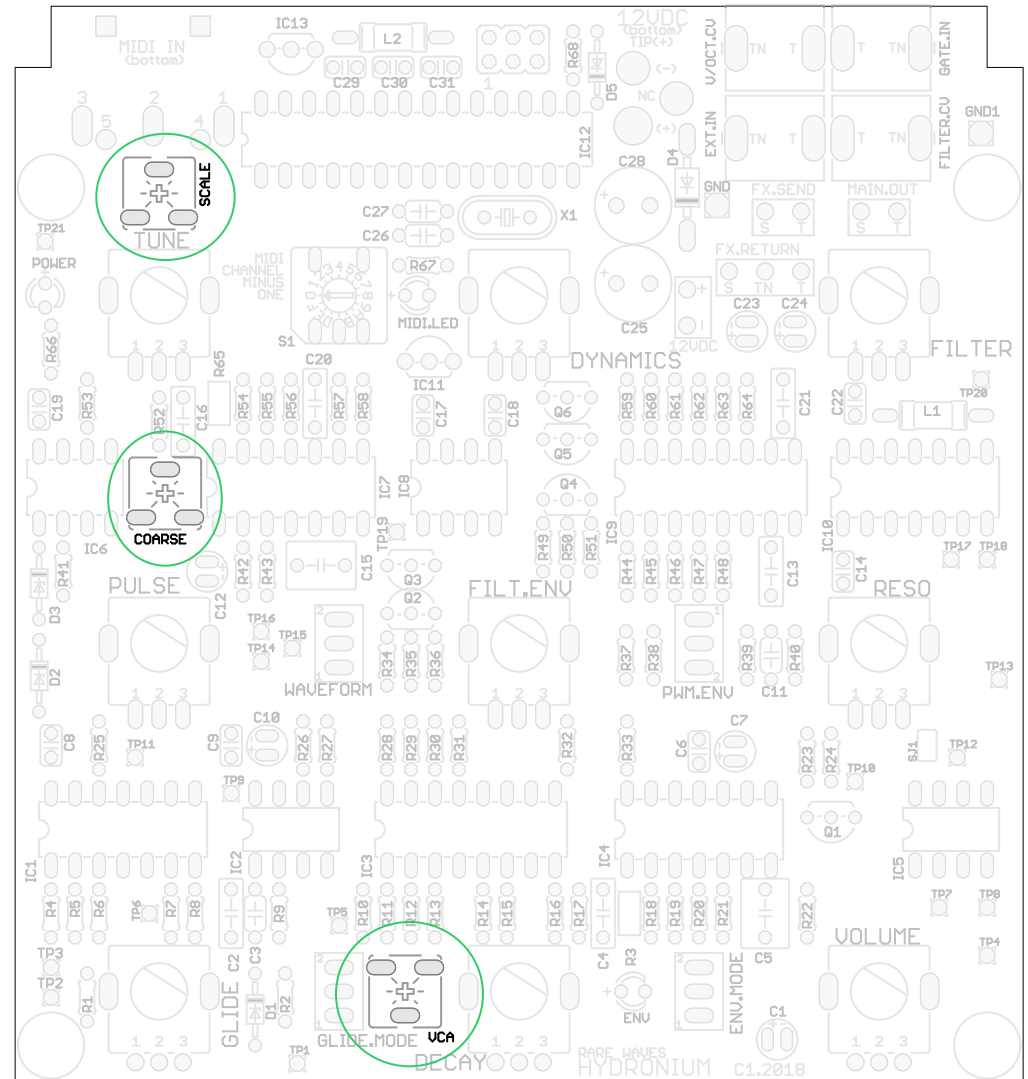
Count 3

Reference COARSE,SCALE,VCA

Value 2 k Ω

Type Variable resistor, trim potentiometer

Assembly Note The part should be sitting flat and straight on the PCB



Step 23

Count _____ 2

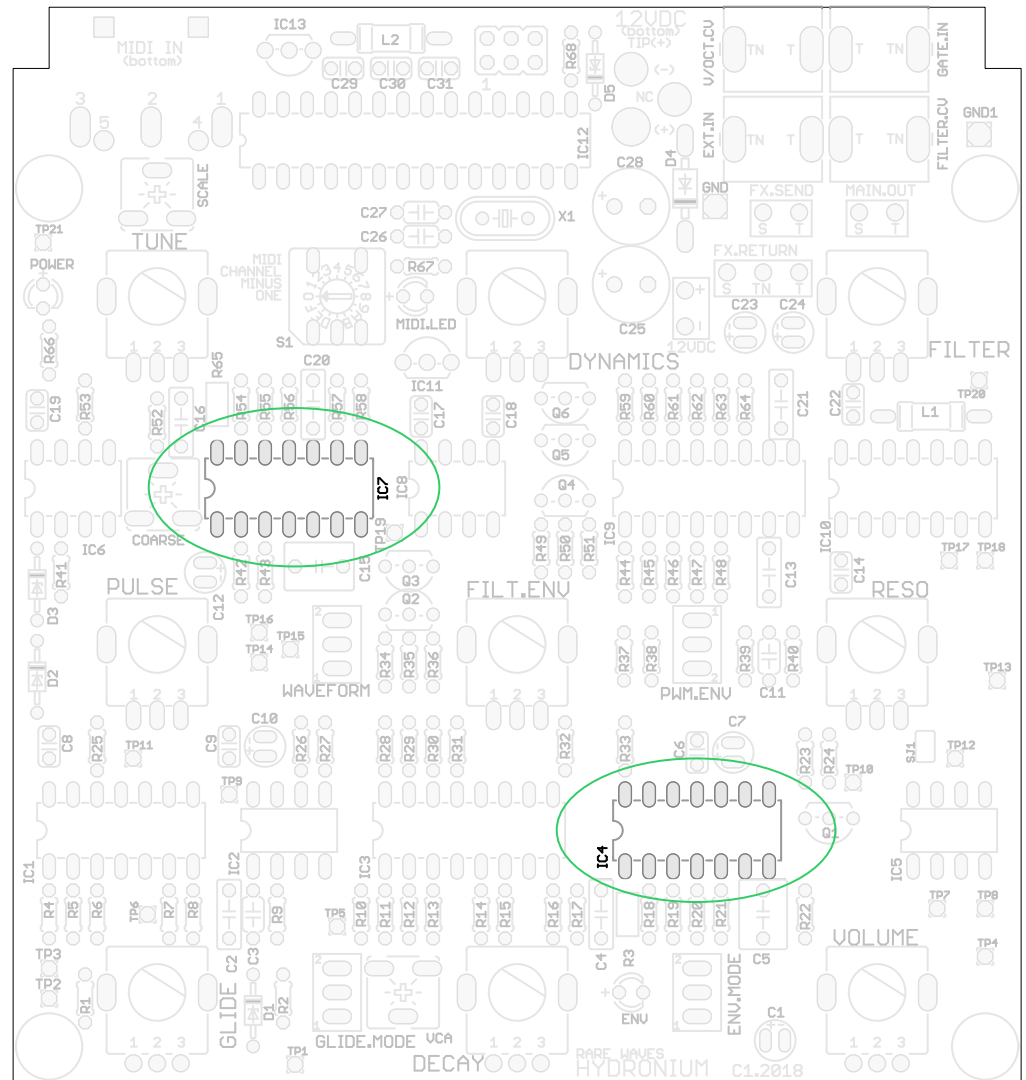
Reference _____ IC4,IC7

Value _____ MCP6004-I/P

Type _____ Quad op amp, DIP-14

Assembly Note

- Bend the leads straight to the body before inserting.
- Insert the IC into the holes on the PCB.
- Make sure all of the leads are passing through the holes.
- Wait! Double-check the orientation of the IC.
- Be sure its not installed backwards.
- Finally, solder all the leads.



Step 24



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Count _____ 2

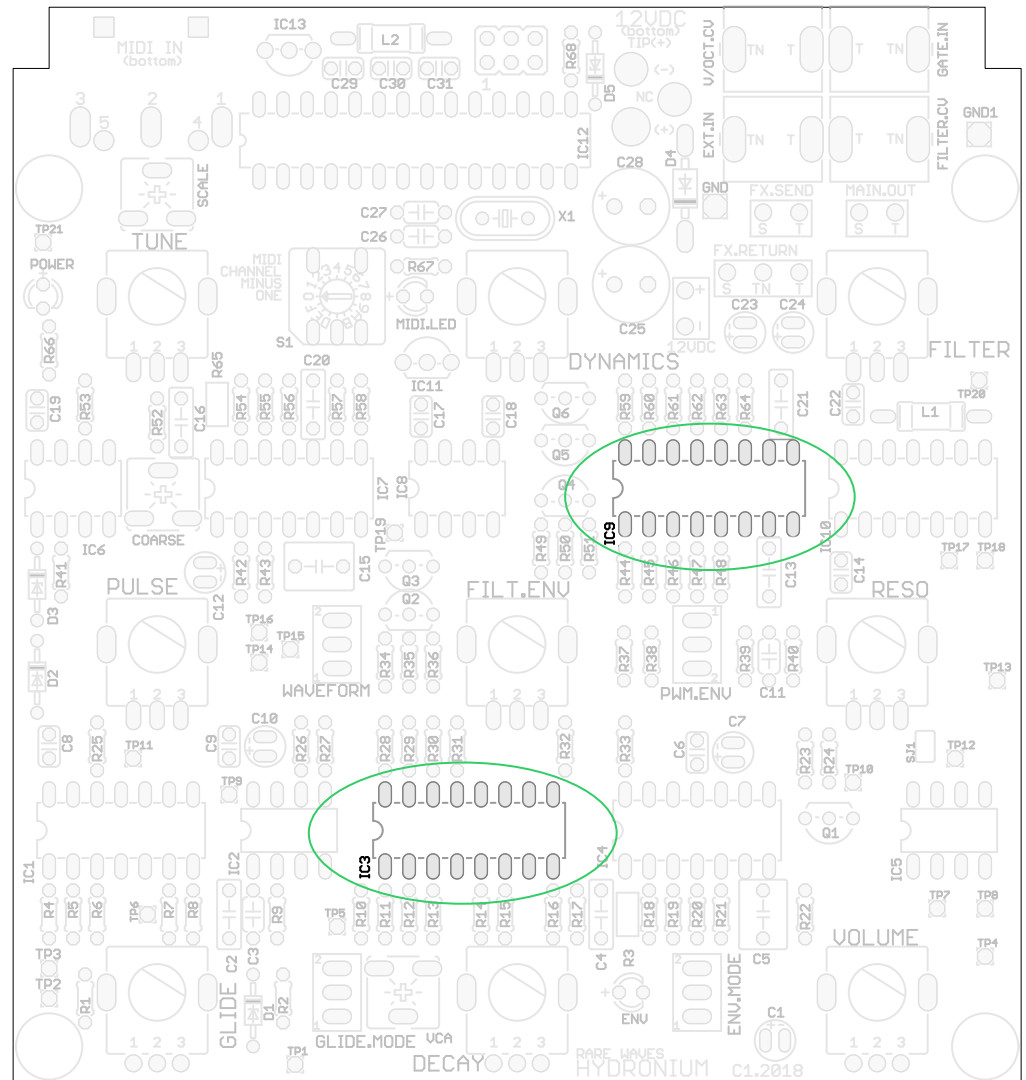
Reference _____ IC3,IC9

Value _____ NJM13700D

Type _____ Dual OTA, DIP-16

Assembly Note

- Bend the leads straight to the body before inserting.
- Insert the IC into the holes on the PCB.
- Make sure all of the leads are passing through the holes.
- Wait! Double-check the orientation of the IC.
- Be sure its not installed backwards.
- Finally, solder all the leads.



Step 25



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Count _____ 2

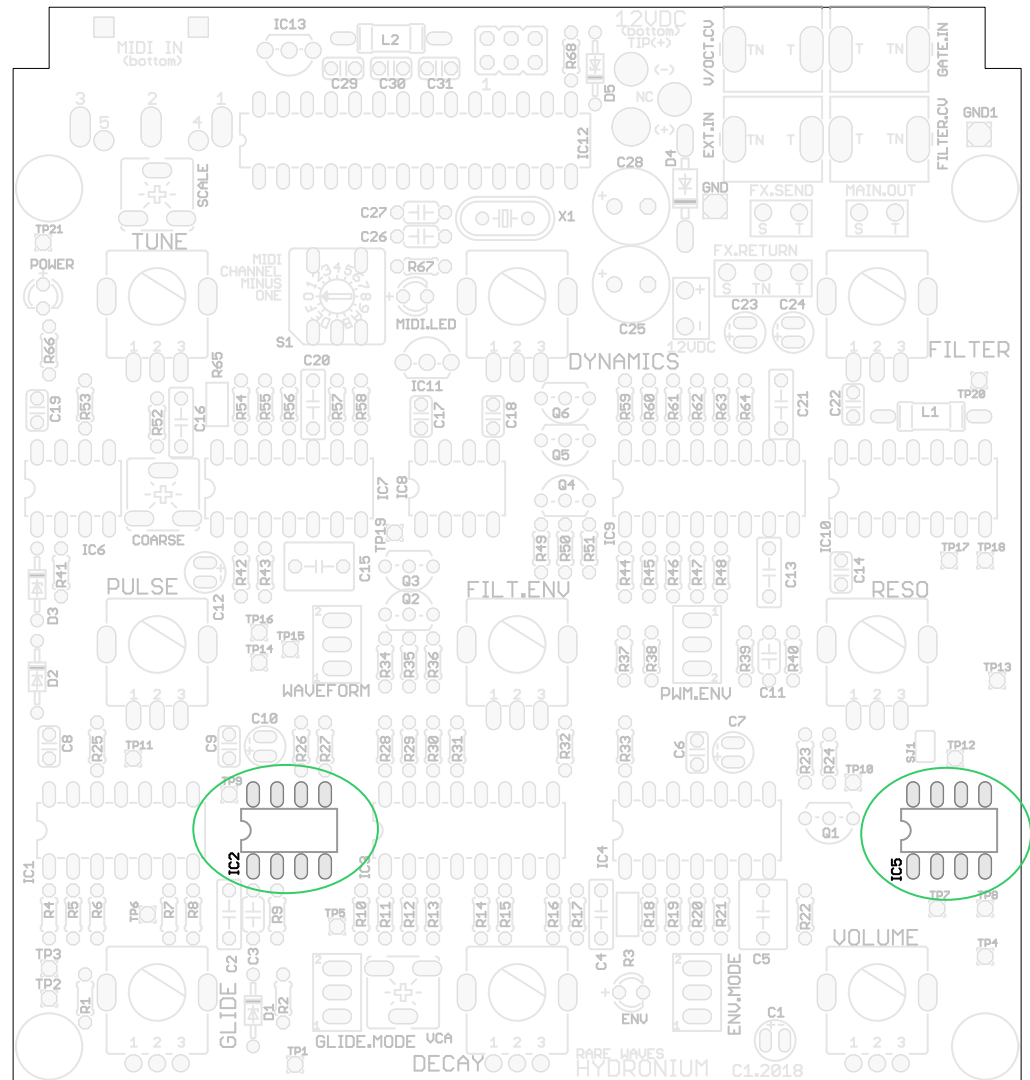
Reference _____ IC2,IC5

Value _____ TL 062

Type _____ Dual op amp, DIP-8

Assembly Note

- Bend the leads straight to the body before inserting.
- Insert the IC into the holes on the PCB.
- Make sure all of the leads are passing through the holes.
- Wait! Double-check the orientation of the IC.
- Be sure its not installed backwards.
- Finally, solder all the leads.



Step 26



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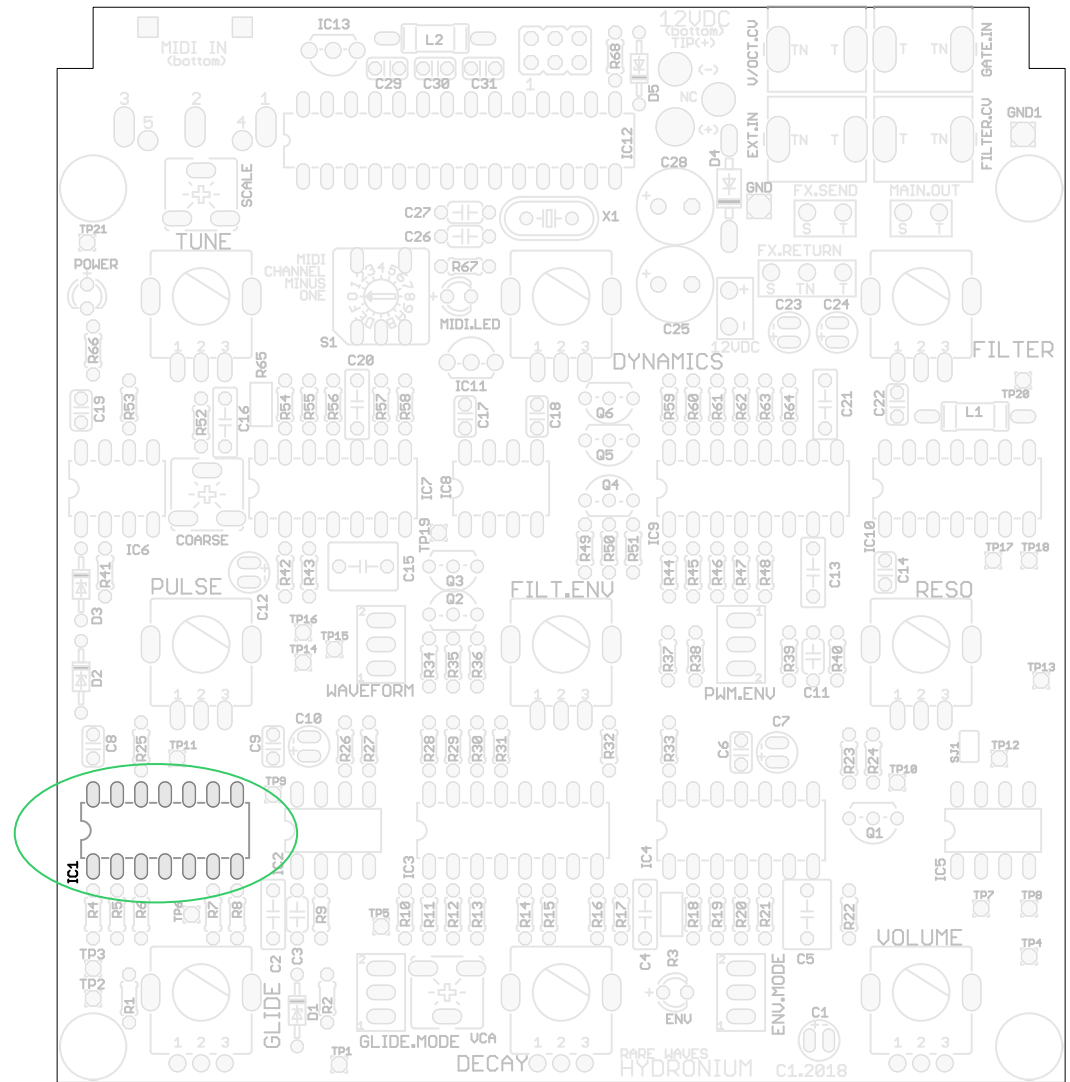
Count _____

Reference _____ IC 1

Value _____
CD74HC4066

Type _____
Quad analog switch, DIP-14

Assembly Note _____
Bend the leads straight to the body before inserting.
Insert the IC into the holes on the PCB.
Make sure all of the leads are passing through the holes.
Wait! Double-check the orientation of the IC.
Be sure its not installed backwards.
Finally, solder all the leads.



Step 29



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Count _____

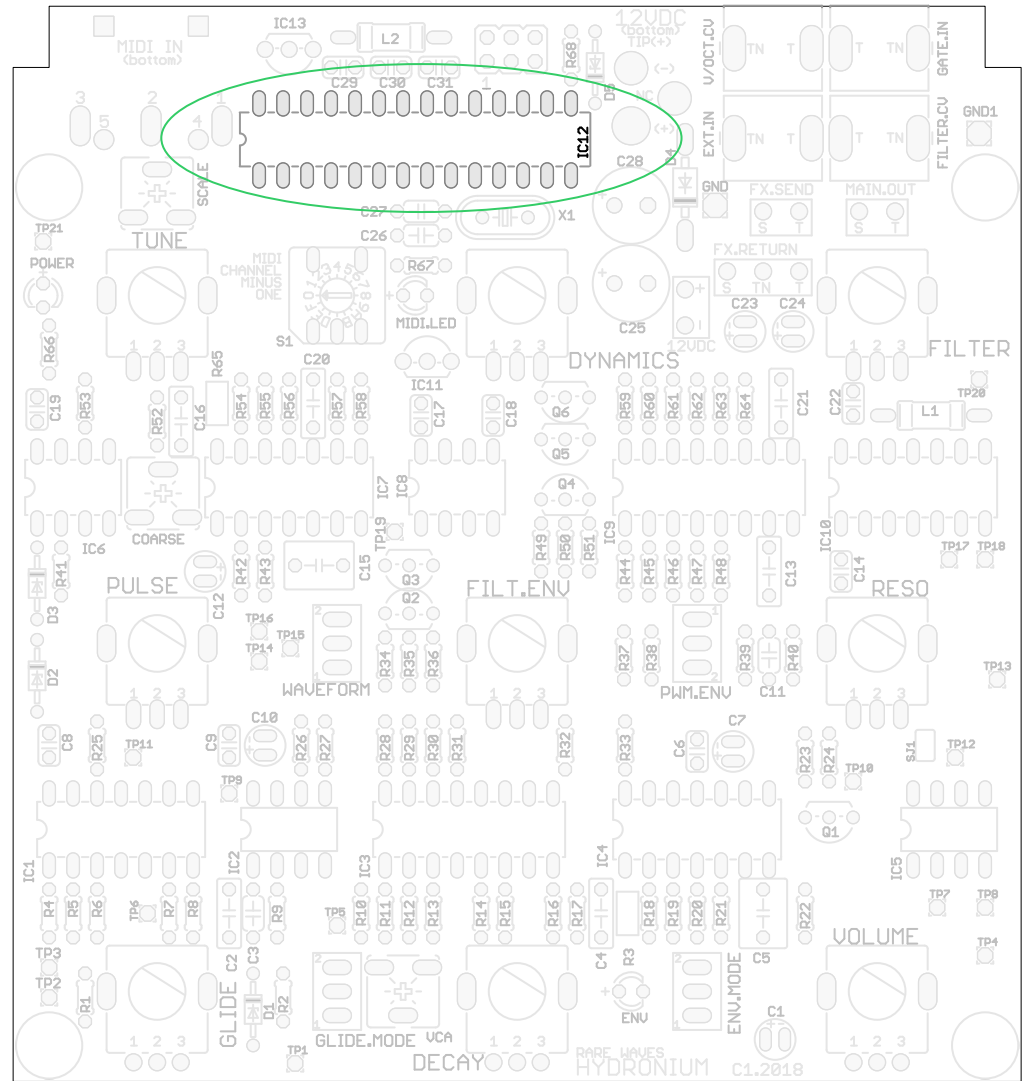
Reference _____
socket for IC 12

Value _____
IC socket, 28-pin

Assembly Note

This socket allows replacing the microcontroller “just in case”

Make sure the socket is installed in the correct orientation.



Step 31



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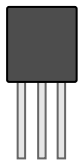
rev.C

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Count _____ 2

Reference _____ IC11, IC13

Value _____ 78L05



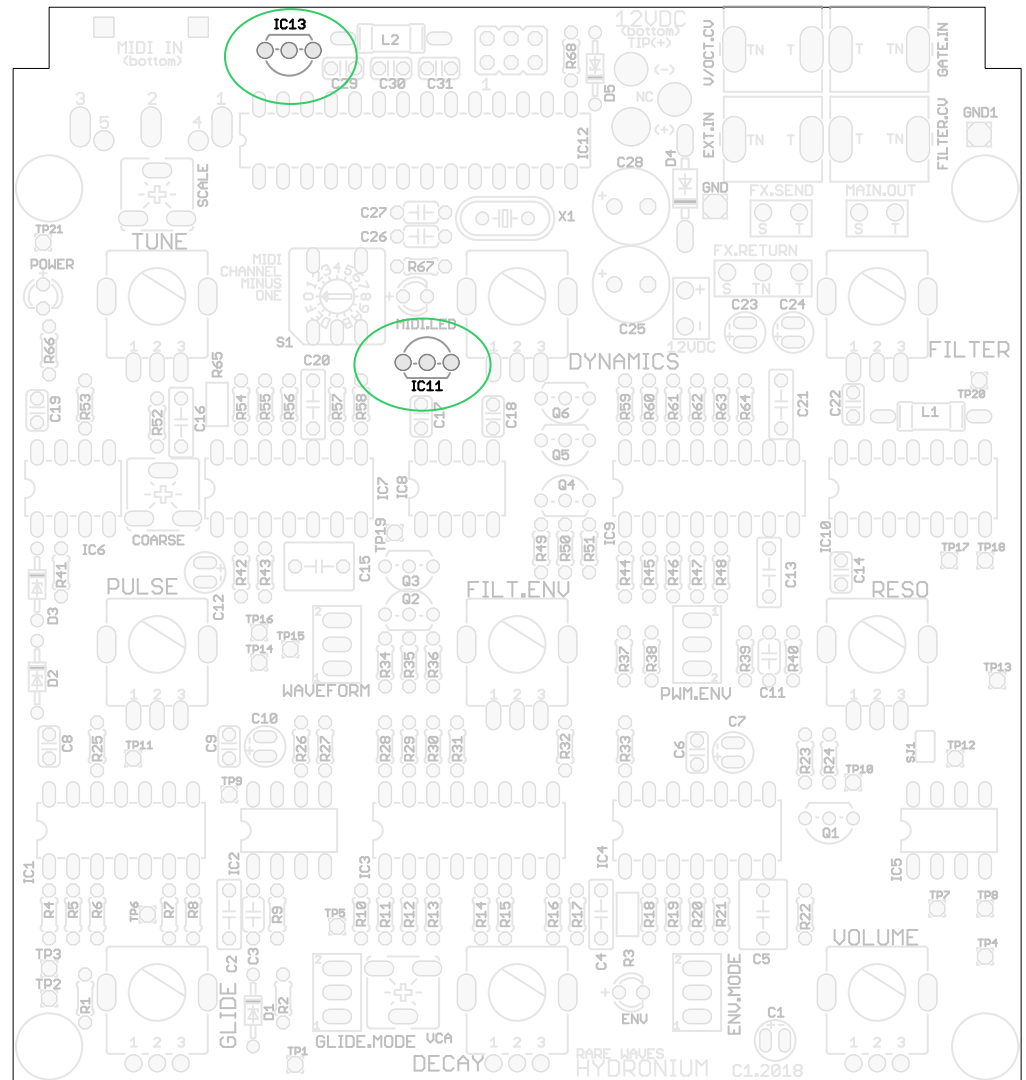
Type _____ 5-volt linear regulator, TO-92

Assembly Note

Use a magnifying lens to read the print on the part
Be sure you don't confuse it with the transistors.

Don't install it backwards.. The part must be oriented so it matches the outline printed on the PCB.

This part must sit low on the board. It must be less than 9mm high or it will interfere with the enclosure.



Step 32



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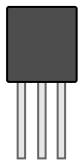
rev.C

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Count _____ 2

Reference _____ Q2,Q4

Value _____ BC549B



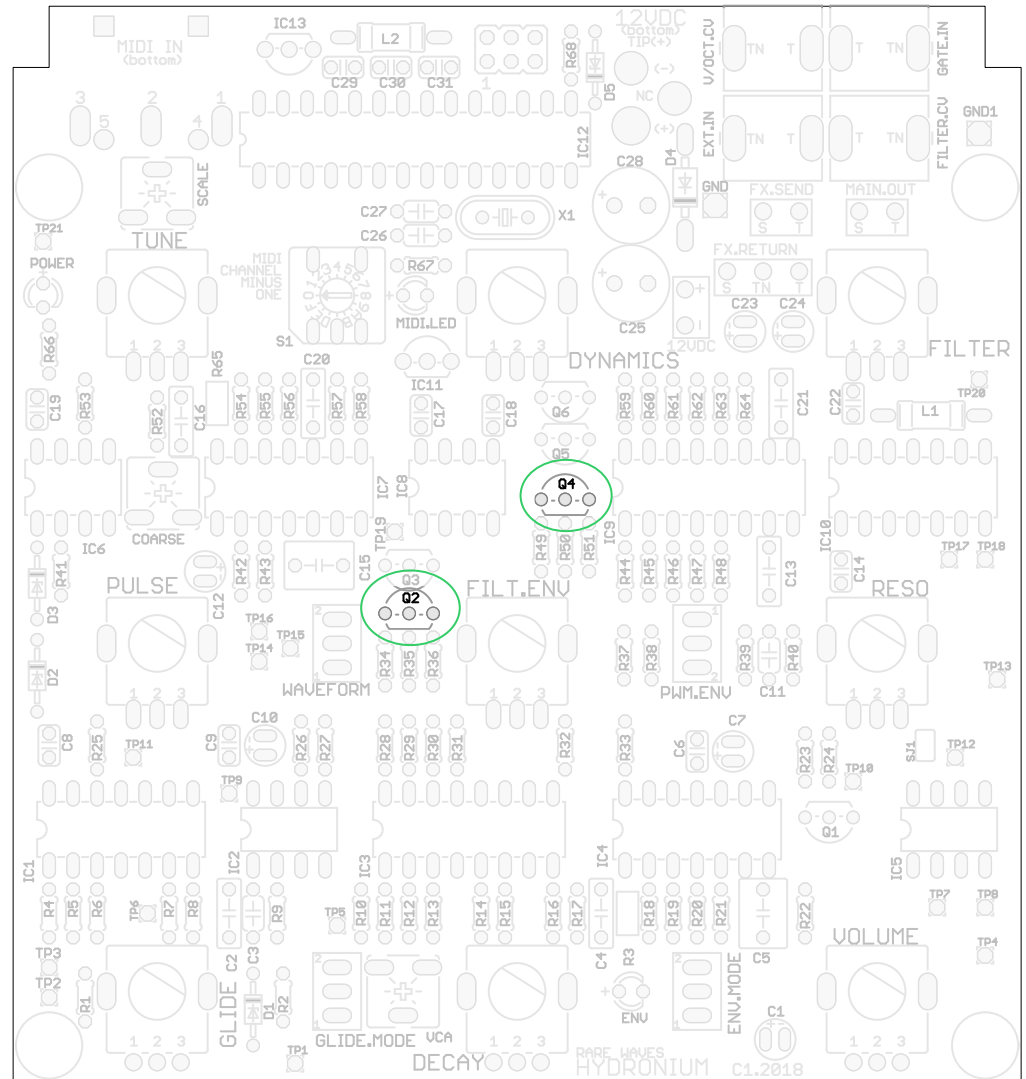
Type _____ NPN bipolar junction transistor, TO-92

Assembly Note _____

Use a magnifying lens to read the print on the part

Don't install it backwards... The part must be oriented so it matches the outline printed on the PCB.

These parts must sit low on the board. They must be less than 9mm high, or they will interfere with the enclosure.



Step 34



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Count _____ 2

Reference _____ C25,C28

Value _____ 220 μ F



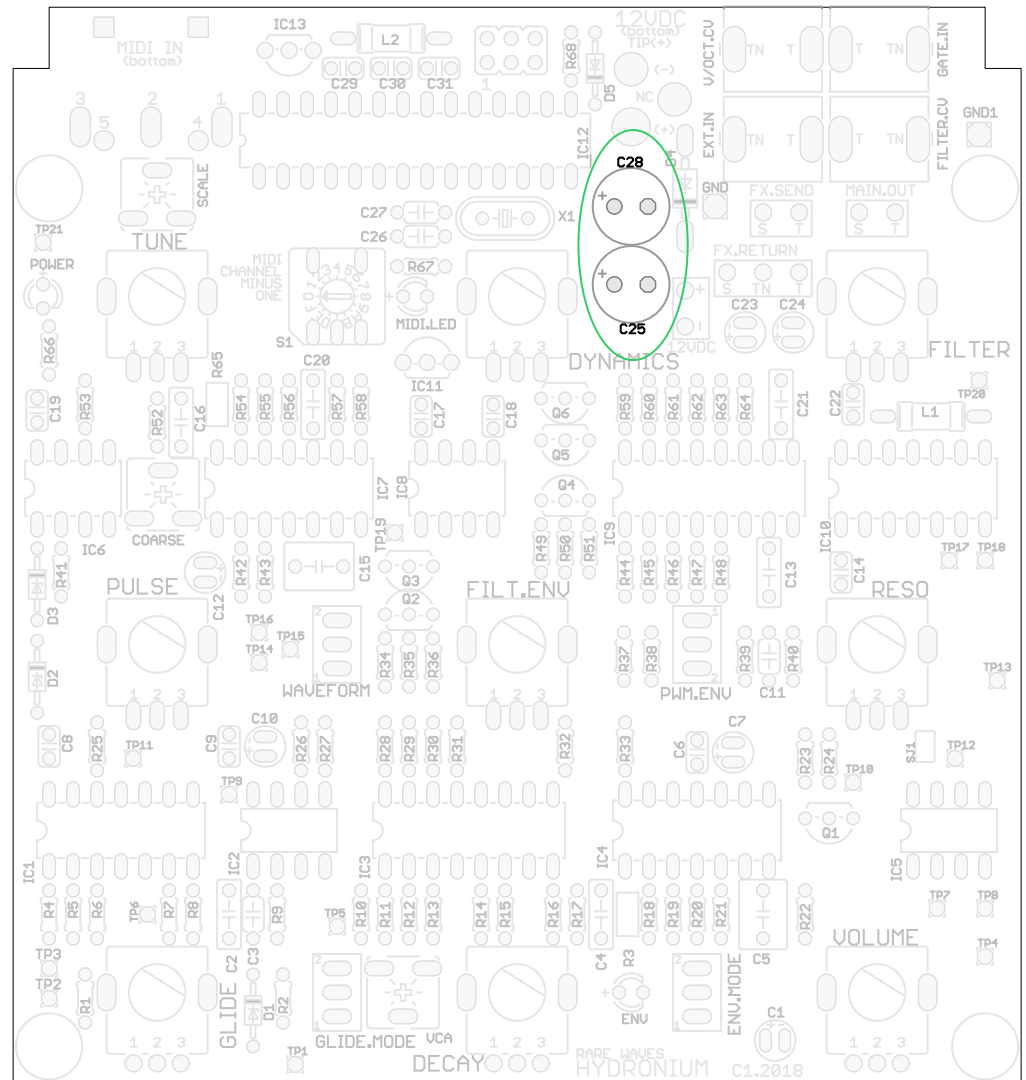
Type _____ Electrolytic capacitor, 8mm (d) x 9mm (h)

Assembly Note _____

The long lead must go in the hole marked (+).

**** IMPORTANT NOTE ****

The base of this part must be pressed tight against the PCB.
Otherwise it will be too tall, and it will interfere with the enclosure later when you go to assemble the case.



Step 35



HYDRONIUM : Main PCB Assembly Guide

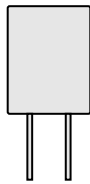
rev.C

rarewaves.net

Count _____ 2

Reference _____ C5,C15

Value _____ 2.2 μ F

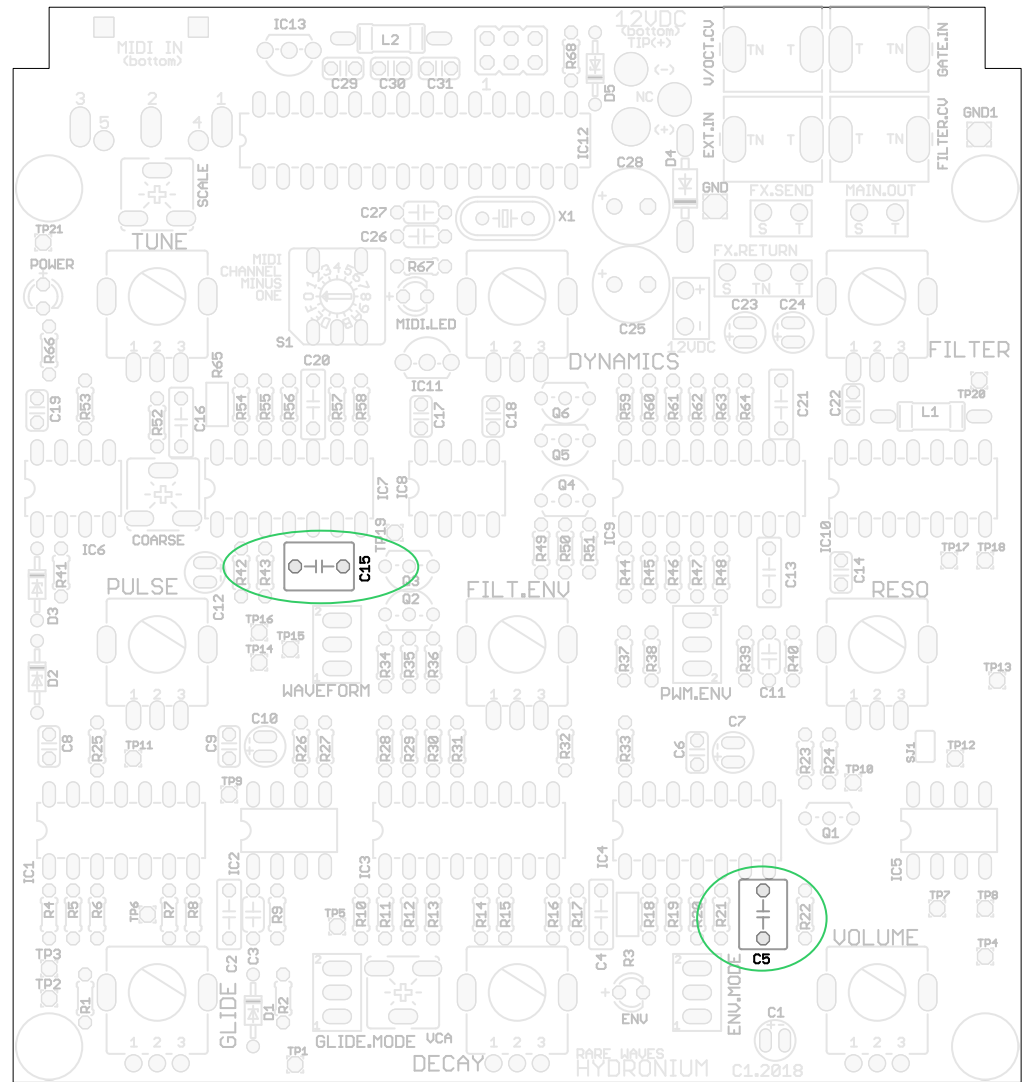


Type _____ PET film box capacitor 5%

Assembly Note _____

**** IMPORTANT NOTE ****

The base of this part must be pressed tight against the PCB.
Otherwise it will be too tall, and it will interfere with the enclosure later when you go to assemble the case.



Step 36



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HYDRONIUM : Main PCB Assembly Guide

rev.C

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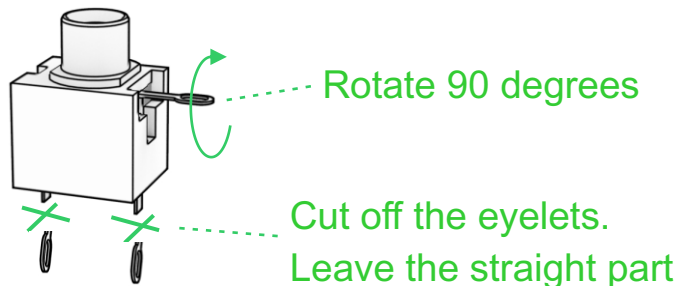
Count _____ 4

Reference _____
V/OCT.CV, EXT.IN, GATE.IN, FILTER.CV

Type _____
3.5 mm phone jack

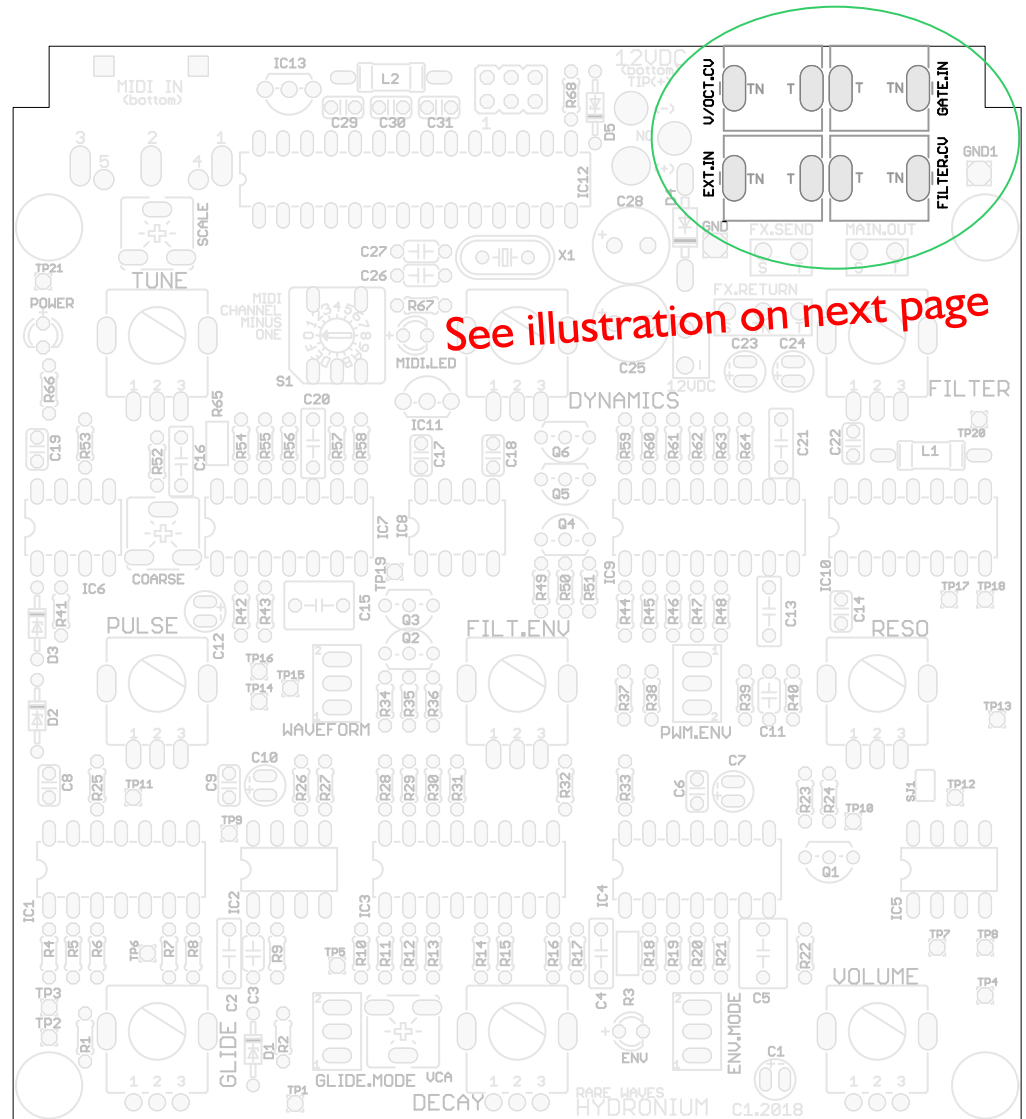
Assembly Note _____
Cut off the eyelets from the two leads on the bottom of the jack.
** Let the straight portion of the lead remain.
** Don't cut the lead on the side of the jack

Twist the lead on the side of the jack so it is rotated by 90 degrees.



Place the jacks on the PCB with the side lead facing toward the TN mark printed on the PCB.

Solder only one lead, then inspect carefully to be sure the part is sitting flat and straight on the PCB. Re-heat the solder and correct the alignment until it is perfect. Then solder its other lead.



Step 37

Reference

V/OCT.CV, EXT.IN, GATE.IN, FILTER.CV

Type

3.5 mm phone jack

Assembly Note (continued)

The side terminals of the jacks must be connected to the GND1 pad on the PCB. The GND1 pad is located next to the FILTER.CV jack.

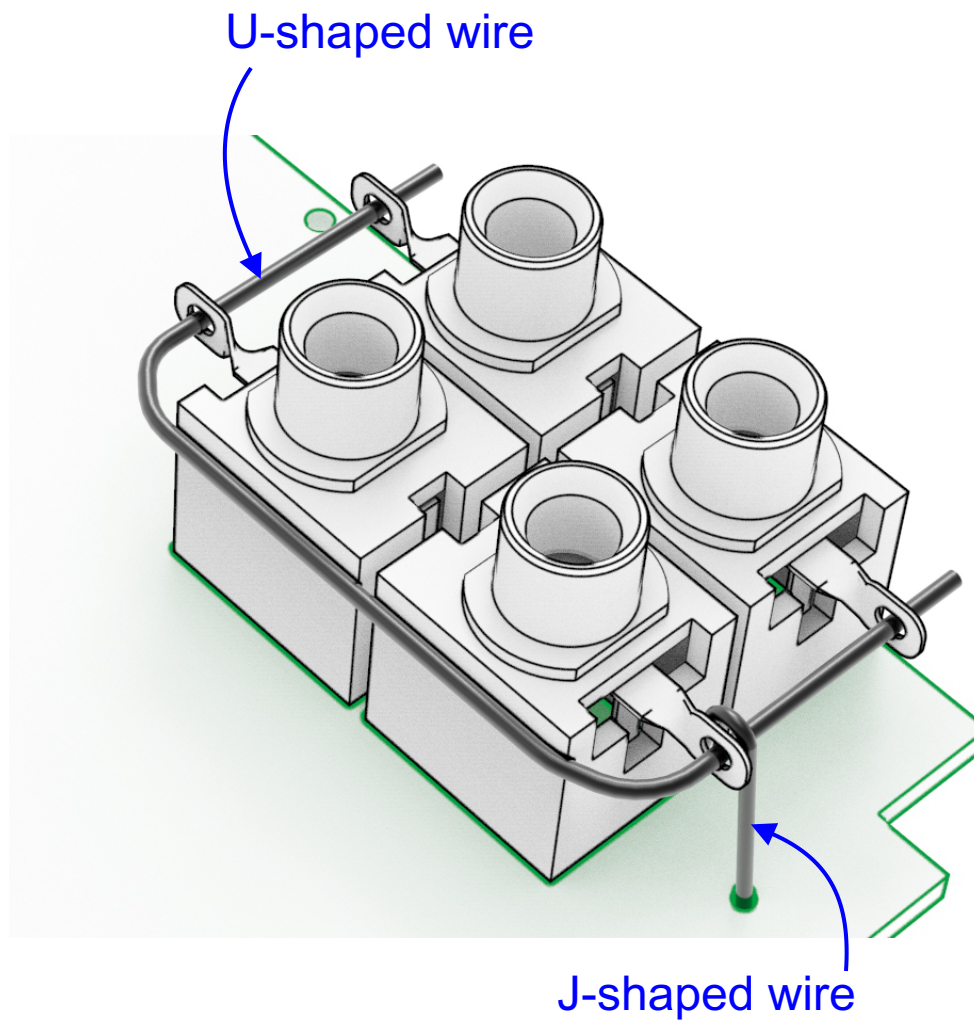
A short length of tinned copper bus wire is provided for this purpose.

Refer to the illustration on this page when forming the wire and installing it.

First, make a U-shaped piece of wire that will fit through all four of the solder eyelets. Solder it in place, then trim off the excess length.

Use the cut off piece to make a short jumper with a J-bend in its end. Install it so it connects the U-shaped piece to the GND1 pad on the PCB.

Solder the pieces in place so they make a secure electrical connection.



Step 37 (continued)



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: Main PCB Assembly Guide

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Count _____ 3

Reference _____
POWER, ENV, MIDI. LED

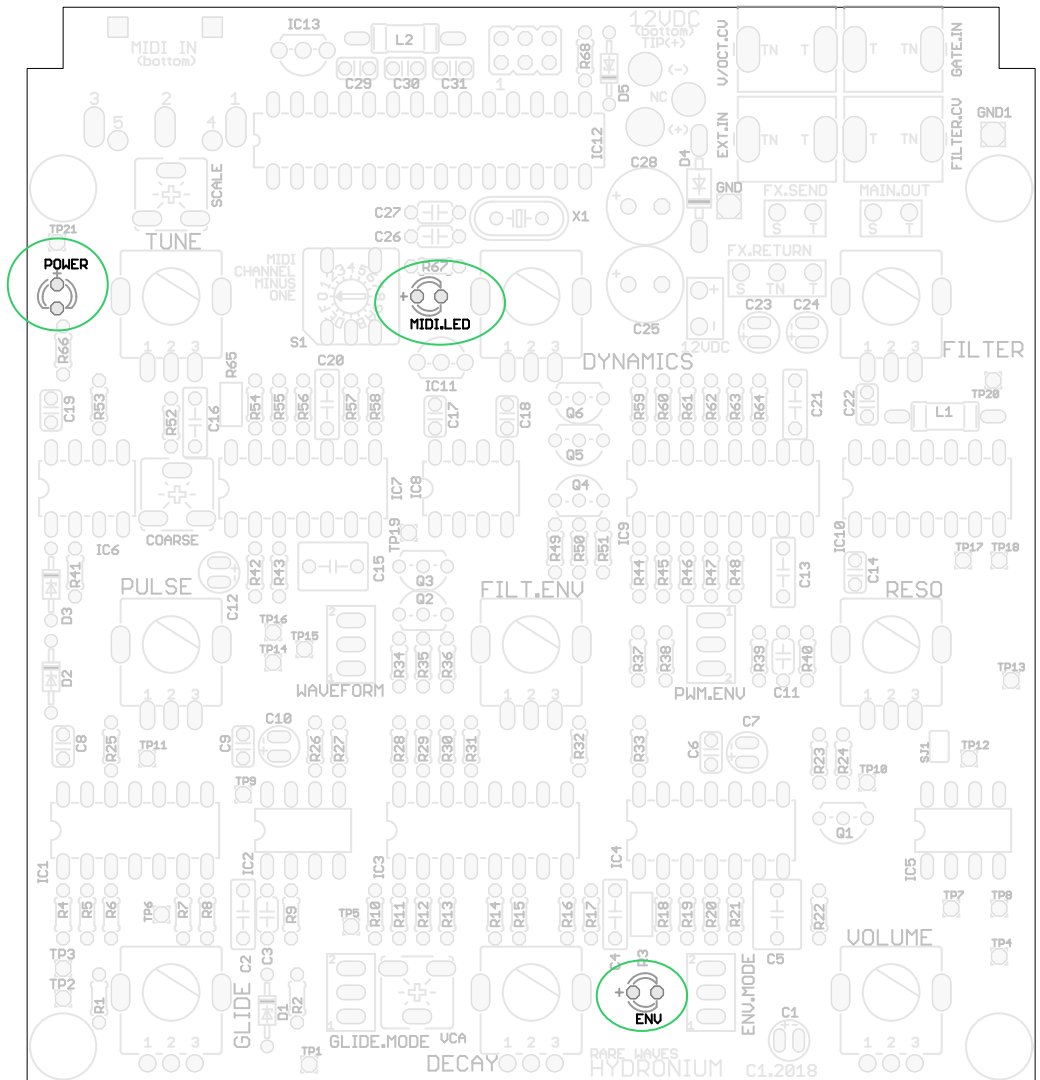
Type _____
3mm LED, with standoff

Assembly Note _____
Slide the LED into its plastic standoff before mounting it on the PCB. The standoff holds the LED in position so it matches the hole in the enclosure.

The long leg of the LED goes into the hole marked (+)

Solder one of the LED leads. Then, inspect its alignment. Correct the LED's alignment so it is perfectly straight and flat. If it needs re-alignment, heat up the solder and move the LED into position.

After the LED is aligned straight and flat against the PCB, finish it by soldering its other lead.



Step 38

Count

Reference

DC.IN

Type

DC power input jack, 2.1 mm center pin

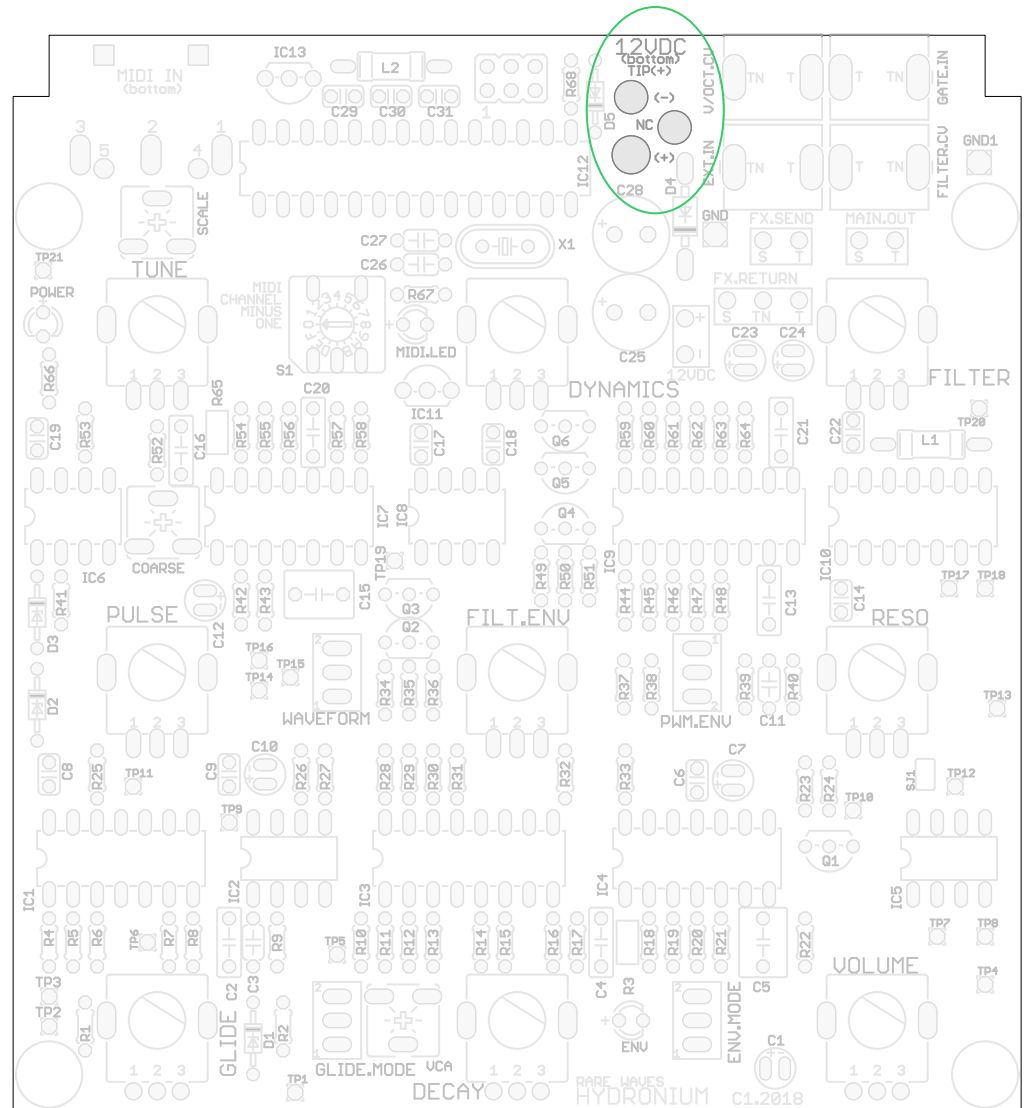
Assembly Note

Skip this step if you are building the Eurorack version

**** This part mounts on the bottom of the PCB ****

Before mounting this part, carefully trim the leads of D5 so they are flat with the surface of the PCB. Otherwise, the leads from D5 will interfere with this part and prevent it from sitting flat against the PCB.

It is important for this part to sit flat and straight on the PCB, because it must match the location of the hole in the chassis.



Step 41



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HYDRONIUM : Main PCB Assembly Guide

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Count

Reference

MIDI.IN

Type

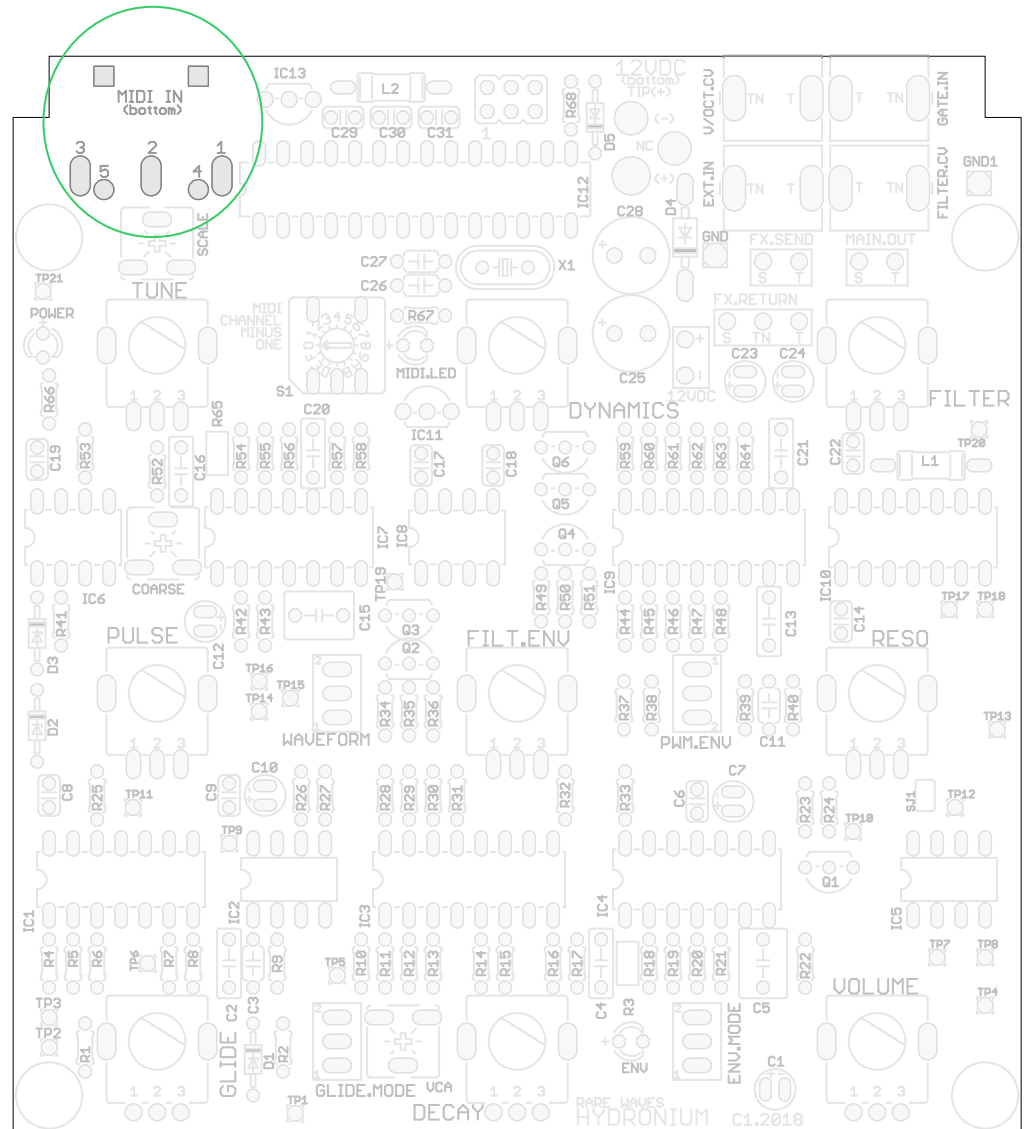
DIN-5 jack, right angle

Assembly Note

Skip this step if you are building the Eurorack version

**** This part mounts on the bottom of the PCB ****

It is important for this part to sit flat and straight on the PCB, because it must match the location of the hole in the chassis.



Step 42

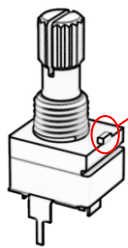
Count _____ 9

Reference _____
(various names)

Type _____
Potentiometer, 5k Ω linear

Assembly Note

First, remove the anti-rotation tab feature from the metal surface of the part. Use needle-nose pliers to break it off. Afterward, the top surface of the potentiometer will be flat.

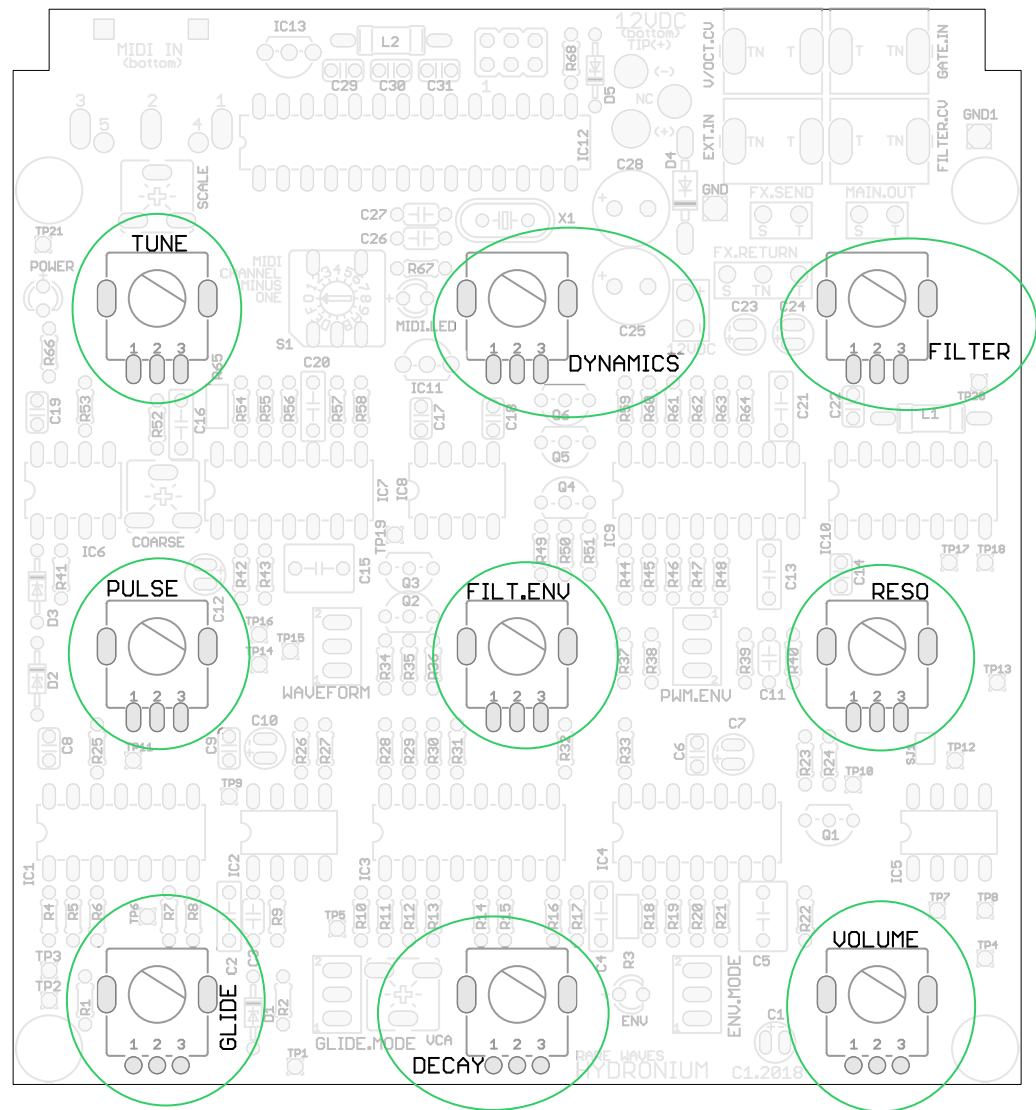


Break off this tab

Snap the potentiometers into their holes on the PCB. Be very careful that none of the pins deflects sideways and misses its hole.

After the pots are snapped in place, inspect them carefully to be certain they are flat and straight against the PCB.

Don't solder any of the pins on the potentiometers. This will be done later, after the PCB is mounted to the enclosure.



Step 43



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Count _____ 4

Reference _____
(various names)

Type _____
Toggle switch, SPDT

Assembly Note _____
First, solder only the center pin of the switch. Then inspect it to be sure it is sitting flat and straight on the PCB.

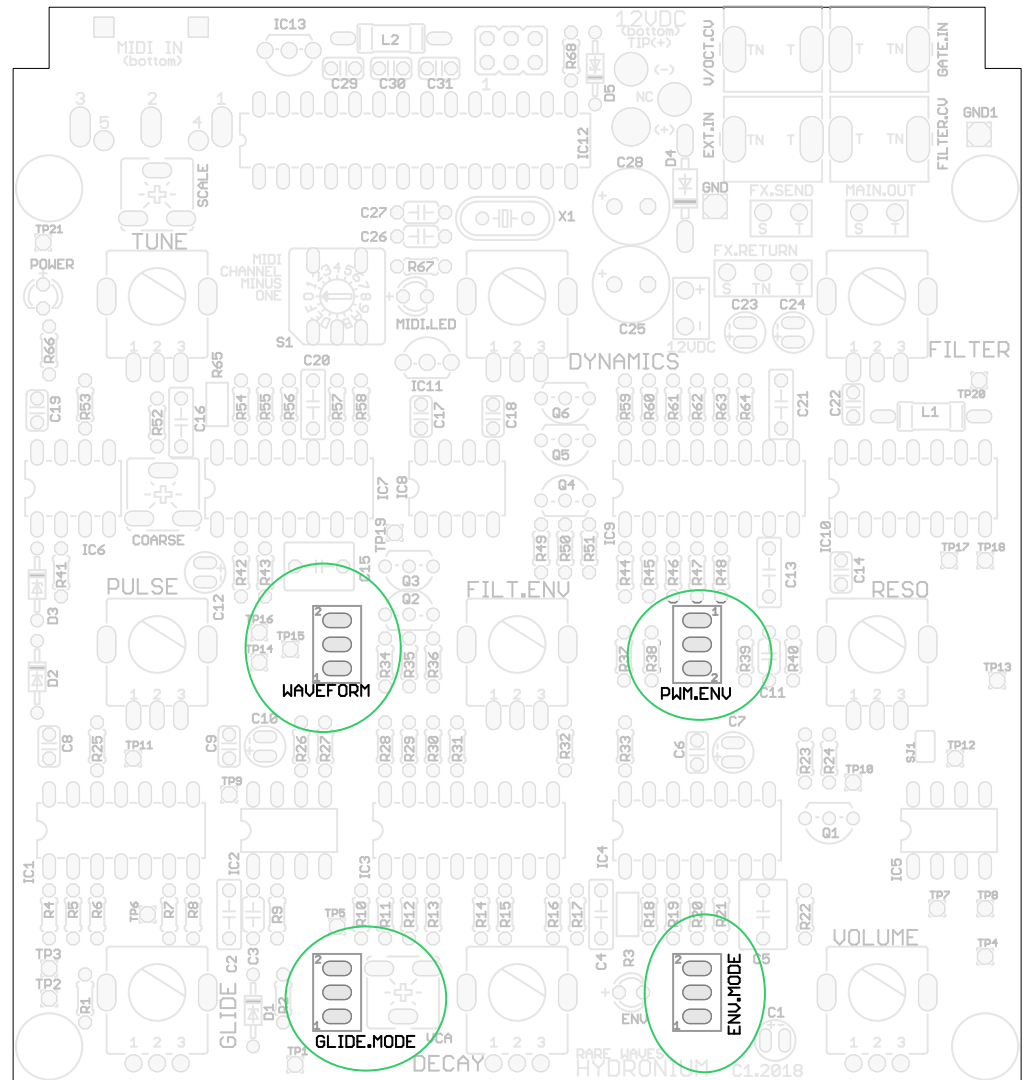
If its position needs adjustment, heat up the solder joint and move the switch into proper alignment.

Then, solder the remaining pins.

You are finished building the Main PCB!

Before you proceed to connect the Expander PCB, test the fit of the Main PCB to the control panel. All of the controls should pass through the holes in the panel. If any parts are not aligned correctly, re-heat the solder joints while applying pressure to align them straight so they fit through the panel.

Keep all of the hardware that came with the parts kit. You will use it later in the final steps of assembling the chassis.



Step 44



rare waves

HYDRONIUM : Main PCB Assembly Guide

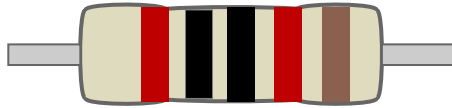
rev.C

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Count _____
5

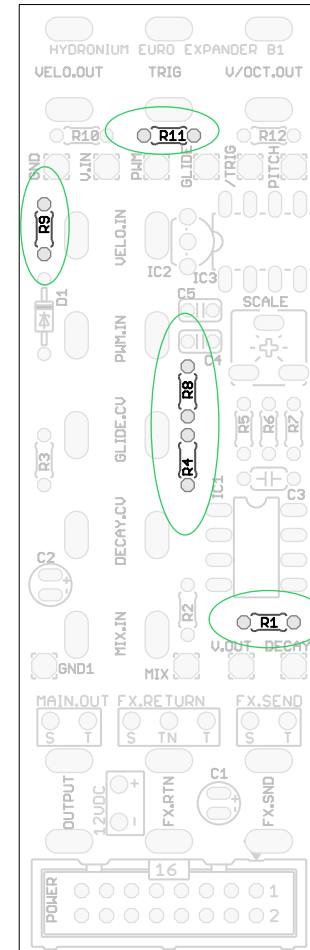
Reference _____
R1,R4,R8,R9,R11

Value _____
20 k Ω



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes,
solder, then clip off excess length.



Step 1



HYDRONIUM : Eurorack Expander PCB Assembly Guide

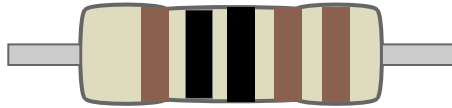
rev.B

rarewaves.net

Count _____
2

Reference _____
R3,R10

Value _____
1 k Ω



Type _____
Metal film resistor 1% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes,
solder, then clip off excess length.



Step 2



HYDRONIUM : Eurorack Expander PCB Assembly Guide

rev.B

rarewaves.net

Count _____
|

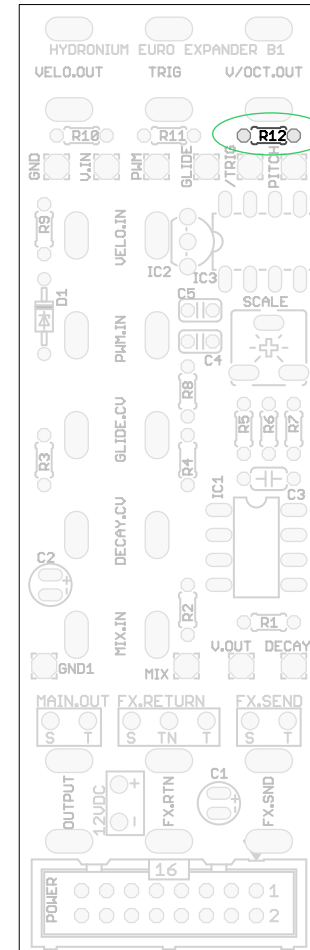
Reference _____
R12

Value _____
220 Ω



Type _____
Carbon film resistor 5% 1/8W

Assembly Note
Bend leads at right angle to body, then insert through holes,
solder, then clip off excess length.



Step 4



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rev.B

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Count

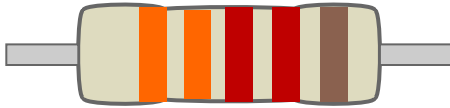
1

Reference

R7

Value

33.2 kΩ



Type

Metal film resistor 1% 1/8W

Assembly Note

Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 5



HYDRONIUM : Eurorack Expander PCB Assembly Guide

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Count

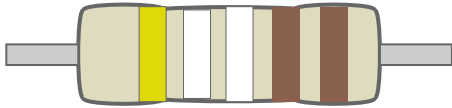
1

Reference

R6

Value

4.99 k Ω

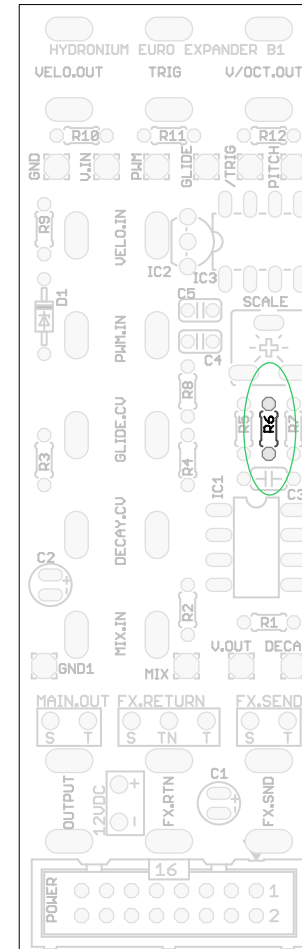


Type

Metal film resistor 1% 1/8W

Assembly Note

Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 6



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Count

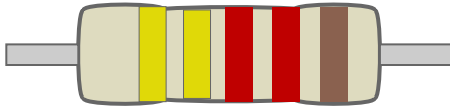
1

Reference

R5

Value

44.2 k Ω



Type

Metal film resistor 1% 1/4W

Assembly Note

Bend leads at right angle to body, then insert through holes, solder, then clip off excess length.



Step 7



HYDRONIUM : Eurorack Expander PCB Assembly Guide

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Count _____ |

Reference _____ DI

Value _____ IN5233B

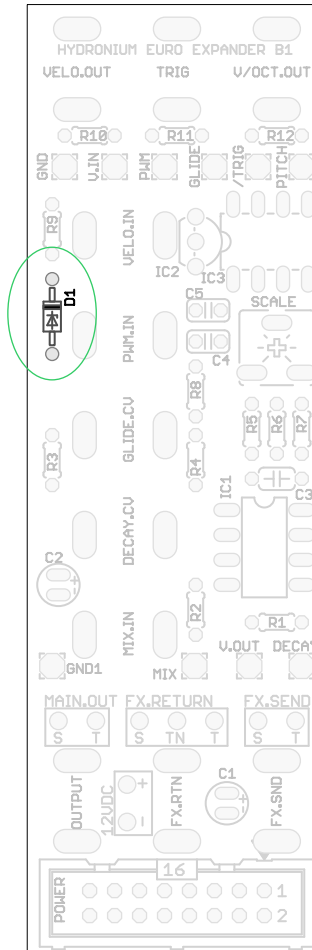
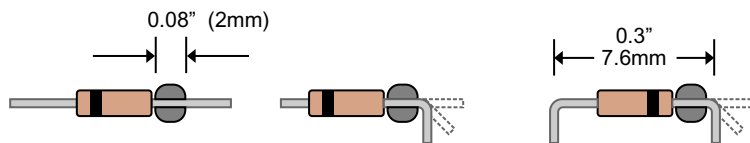


Type _____ Zener diode 6.0V, 5%, DO-35

Assembly Note

Orient the part so its striped end matches the stripe printed on the PCB.

The part is made of glass. To prevent damage, grip the leads with tweezers or needle nose pliers close to the body while making the bends.



Step 8



HYDRONIUM : Eurorack Expander PCB Assembly Guide

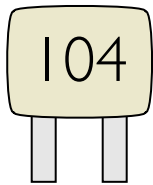
rev.B

rarewaves.net

Count _____
2

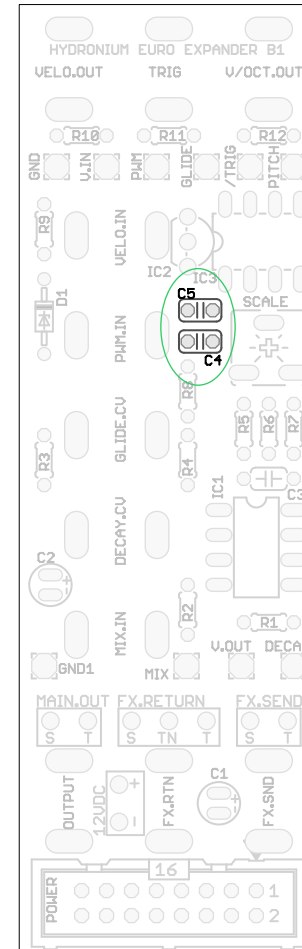
Reference _____
C4,C5

Value _____
0.1 μ F



Type _____
Ceramic capacitor, MLCC, 20%

Assembly Note _____
Non-polar



Step 9



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Count _____
2

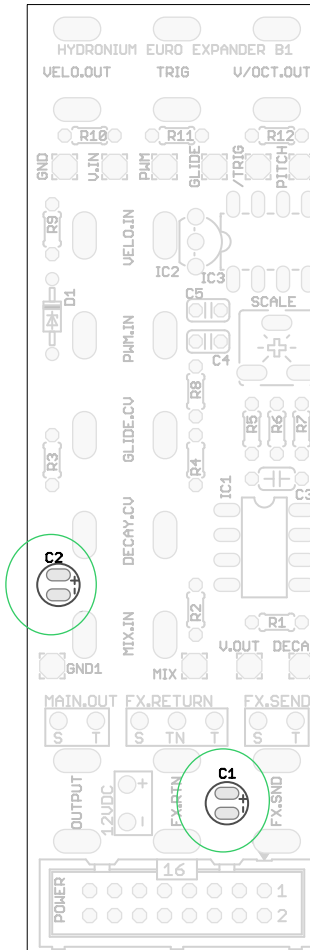
Reference _____
C1,C2

Value _____
22 μ F



Type _____
Electrolytic capacitor, 4 mm(d) x 7 mm(h)

Assembly Note _____
The long lead must go in the hole marked (+)



Step 10



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Count


1

Reference

C3

Value

220 pF

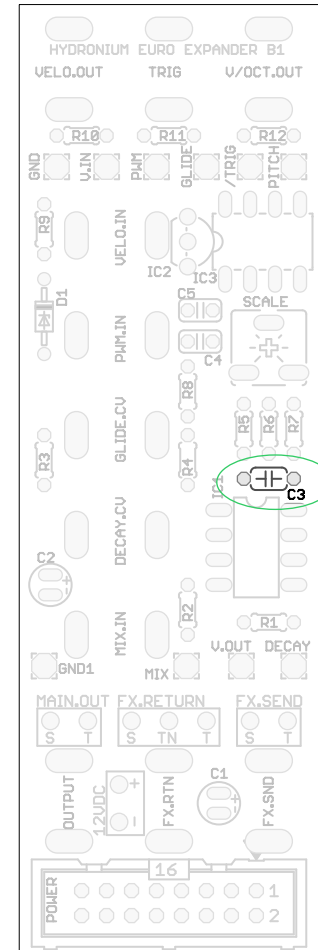


Type

Ceramic disc capacitor, 5%

Assembly Note

Non-polar



Step 11



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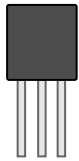
Count

1

Reference

IC 2

Value



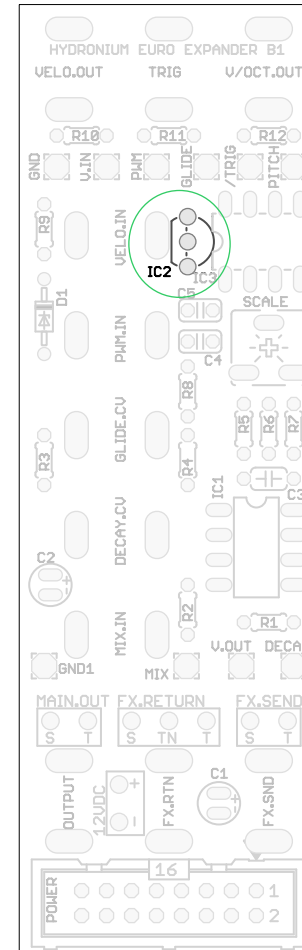
78L05

Type

5V linear voltage regulator, TO-92

Assembly Note

Don't install it backwards.. The part must be oriented so it matches the outline printed on the PCB



Step 12



HYDRONIUM : Eurorack Expander PCB Assembly Guide

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Count _____ |

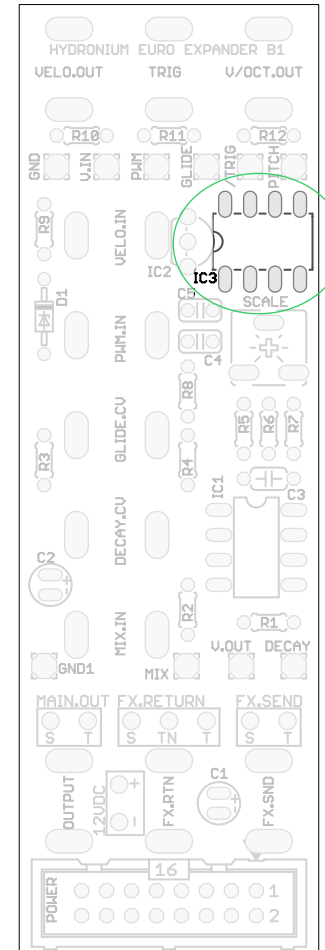
Reference _____
IC 3

Value _____
MCP6542-I/P

Type _____
Dual analog comparator, DIP-8

Assembly Note

Bend the leads straight to the body before inserting.
Insert the IC into the holes on the PCB.
Make sure all of the leads are passing through the holes.
Wait! Double-check the orientation of the IC.
Be sure its not installed backwards.
Finally, solder all the leads.



Step 13



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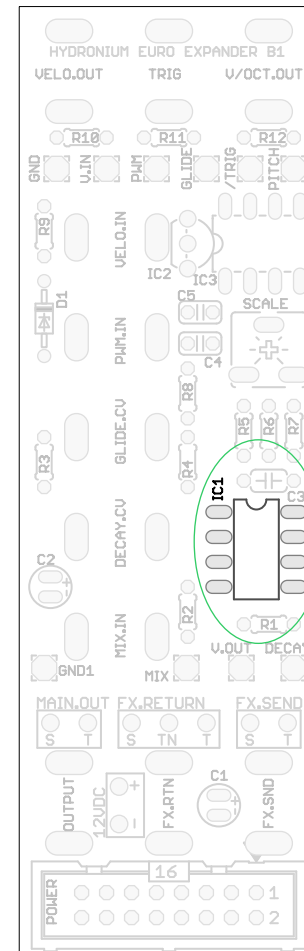
rarewaves.net

IC I

TL 062

Dual op amp, DIP-8

- Bend the leads straight to the body before inserting.
- Insert the IC into the holes on the PCB.
- Make sure all of the leads are passing through the holes.
- Wait! Double-check the orientation of the IC.
- Be sure its not installed backwards.
- Finally, solder all the leads.



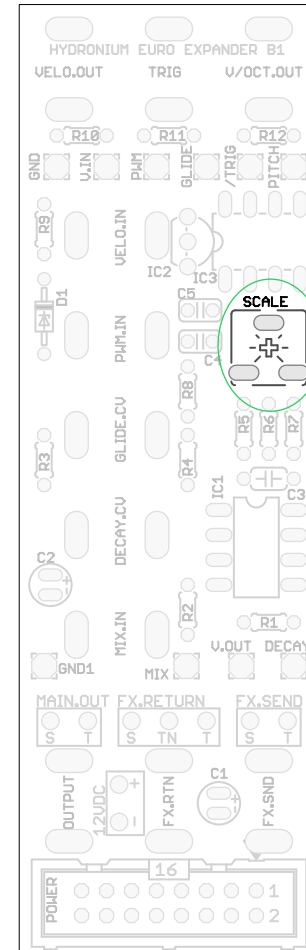
Count _____ |

Reference _____
SCALE

Value _____
2 k Ω

Type _____
Variable resistor, trimmer potentiometer

Assembly Note _____



Count

1

Reference

POWER

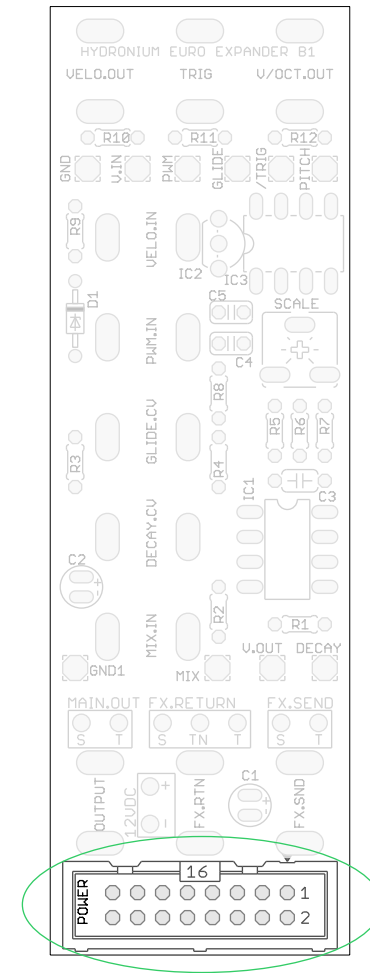
Type

1 6-pin shrouded header

Assembly Note

The header must be installed in the correct orientation. There is a triangular mark on the side wall of the header. Match it with the triangle mark printed on the PCB.

Be careful not to apply excess heat with the soldering iron because the plastic part will deform when hot, causing the pins to lose their straight alignment.



Step 16



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Count

||

Reference

VELO.OUT, TRIG, V/OCT.OUT, VELO.IN,
PWM.IN, GLIDE.CV, DECAY.CV, MIX.IN,
OUTPUT, FX.RTN, FX.SND

Type

3.5mm phone jack

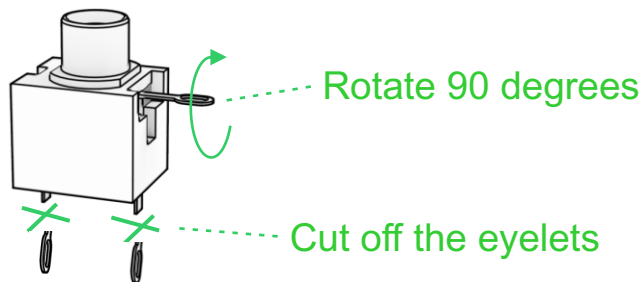
Assembly Note

Cut off the eyelets from the two leads on the bottom of the jack.

** Let the straight portion of the lead remain.

** Don't cut the lead on the side of the jack

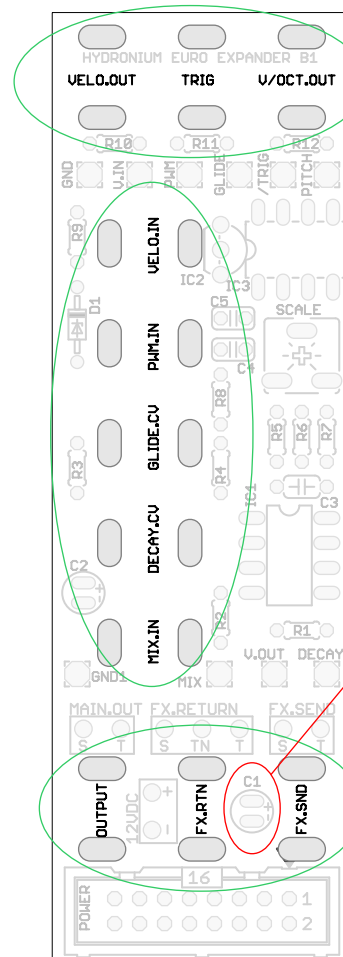
Twist the lead on the side of the jack so it is rotated by 90 degrees.



**** IMPORTANT NOTE ****

These parts mount on the bottom side of the PCB.

See illustration on next page



Reference

VELO.OUT, TRIG, V/OCT.OUT, VELO.IN,
PWM.IN, GLIDE.CV, DECAY.CV, MIX.IN,
OUTPUT, FX.RTN, FX.SND

Type

3.5 mm phone jack

Assembly Note (continued)

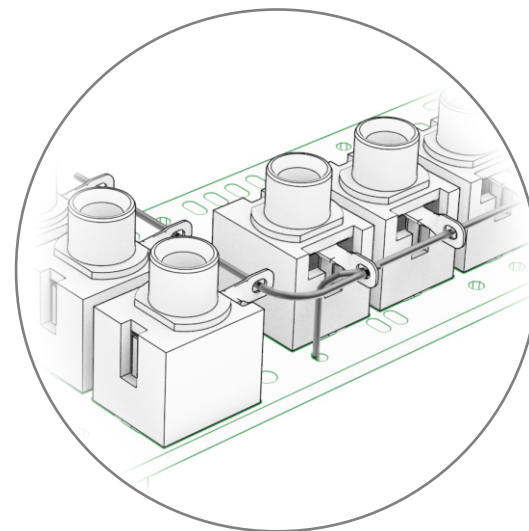
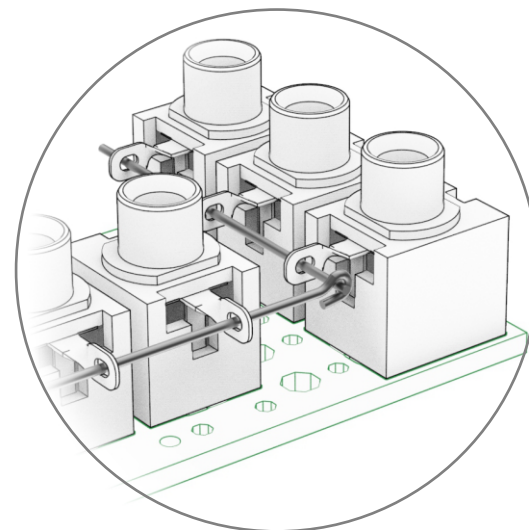
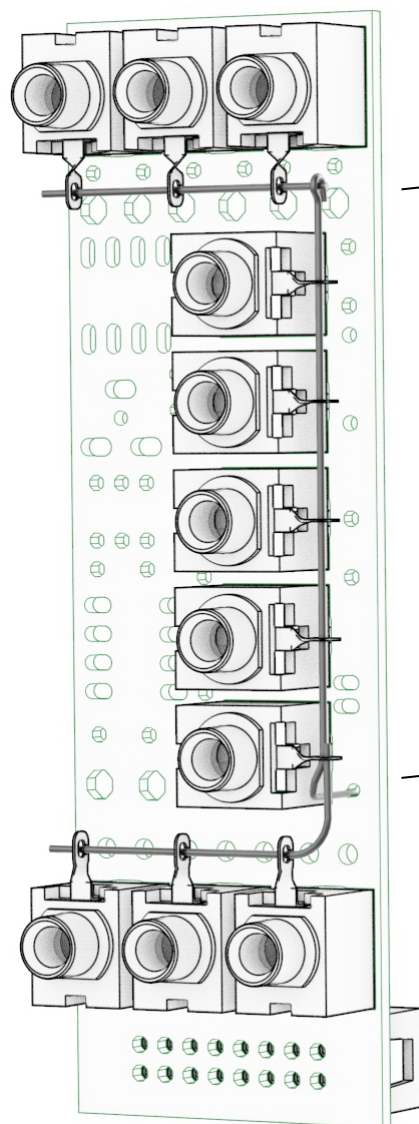
** IMPORTANT NOTE **

The jacks mount on the “bottom” of the PCB, opposite the other components.

First, solder only one terminal of each jack. Then inspect them to be sure they are sitting flat and in straight rows on the PCB. If they need adjustment, re-heat the solder and apply pressure to shift the jack into correct alignment. Test-fit it with the control panel to be sure all the jacks line up with the holes. After you have the jacks aligned well, solder the remaining terminals.

The side terminals of all the jacks must be connected to the GND pad on the PCB. The GND pad is located next to the MIX.IN jack. Segments of tinned copper bus wire are provided.

Refer to the illustration for detail on how to form the bus wires and route them through the eyelets of the jacks and into the GND pad. Solder the bus wires in place so they make a secure electrical connection with all of the jacks and the GND pads.



Operation

Audio Wiring

Assembly Note

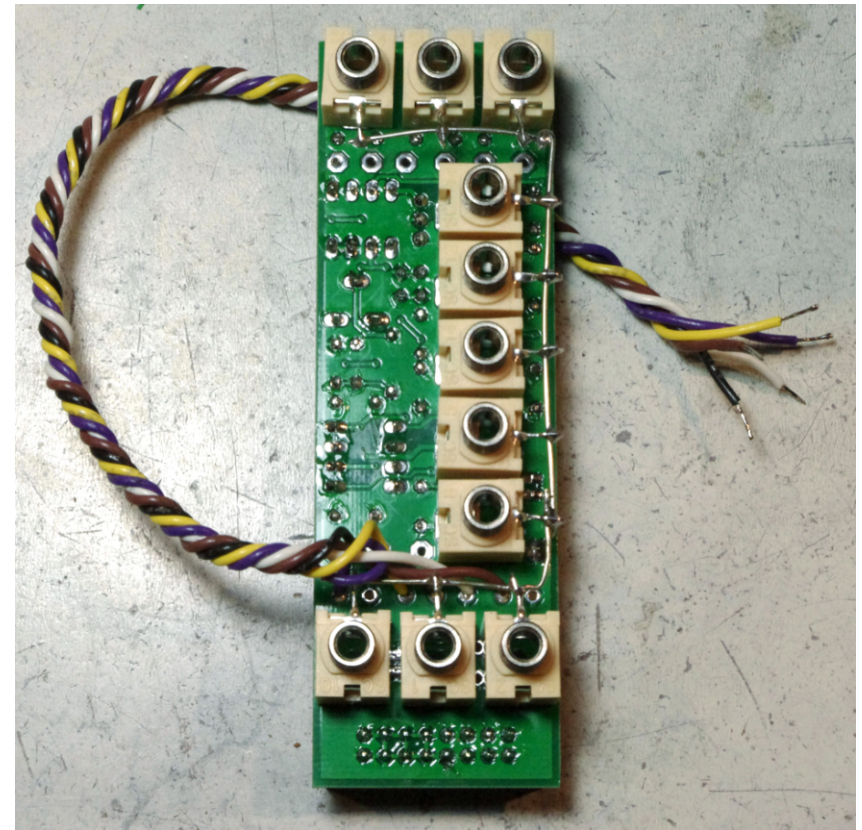
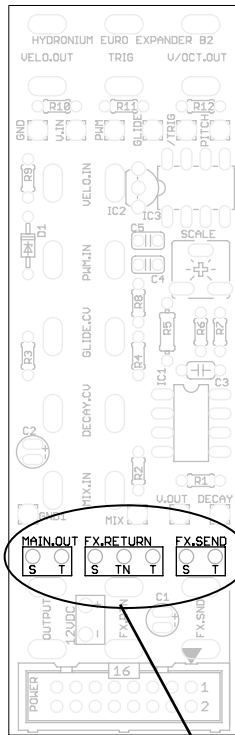
The parts kit includes a wire bundle of 5 twisted wires for this step.

Strip and tin both ends of each wire.

Referring to the photo, solder one end of the bundle to the Expander PCB, attaching the wires from the jacks side (opposite the silk screen).

Be sure to follow the color code given here.

Don't run the wires between the ground wire and the jacks.



FX.RETURN

S = white

TN = black

T = yellow

FX.SEND

T = violet

MAIN.OUT

T = brown



Step 1



HYDRONIUM : Eurorack Chassis Assembly Guide

rev.C

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Operation

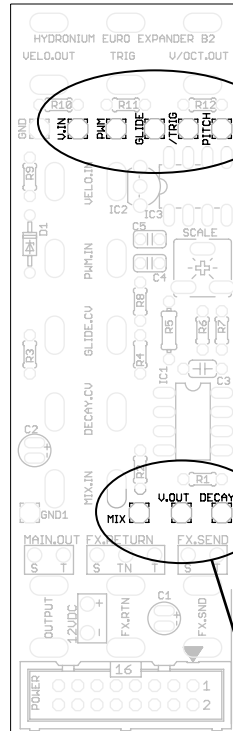
Interboard Wiring

Assembly Note

The parts kit includes segments of colored wire that are used to connect the Expander to the Main PCB.

Strip and tin both ends of each wire, then attach them to the pads on the Expander. These wires connect to the PCB from the jacks side (opposite the silkscreen).

Be sure to follow the color code given here.



V.IN
yellow

PWM
green

GLIDE
red

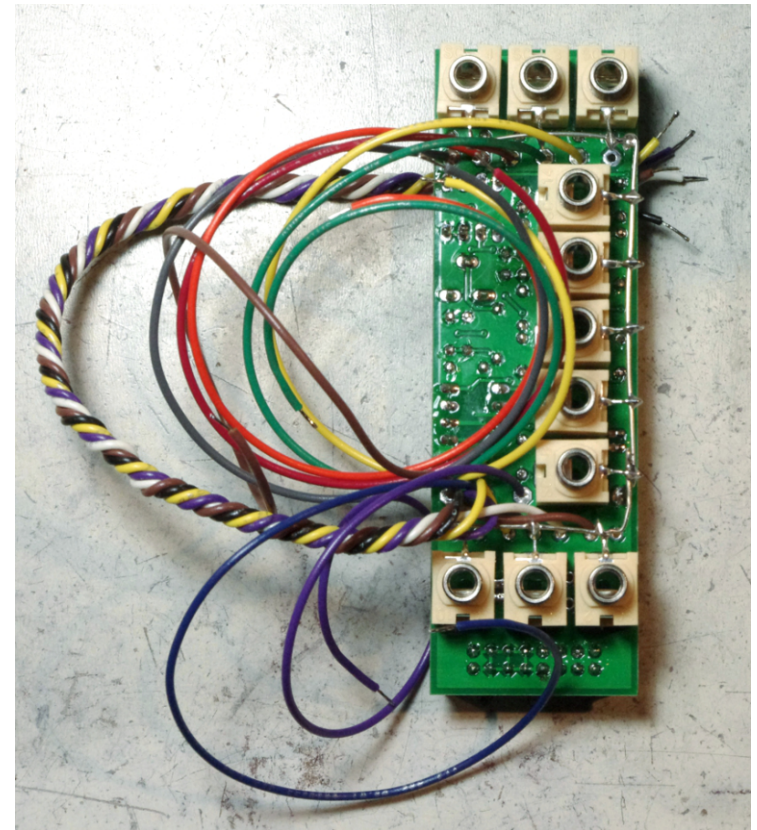
/TRIG
orange

PITCH
gray

MIX
violet

V.OUT
blue

DECAY
brown



Step 2



HYDRONIUM : Eurorack Chassis Assembly Guide

rev.C

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Operation

12V DC Wiring

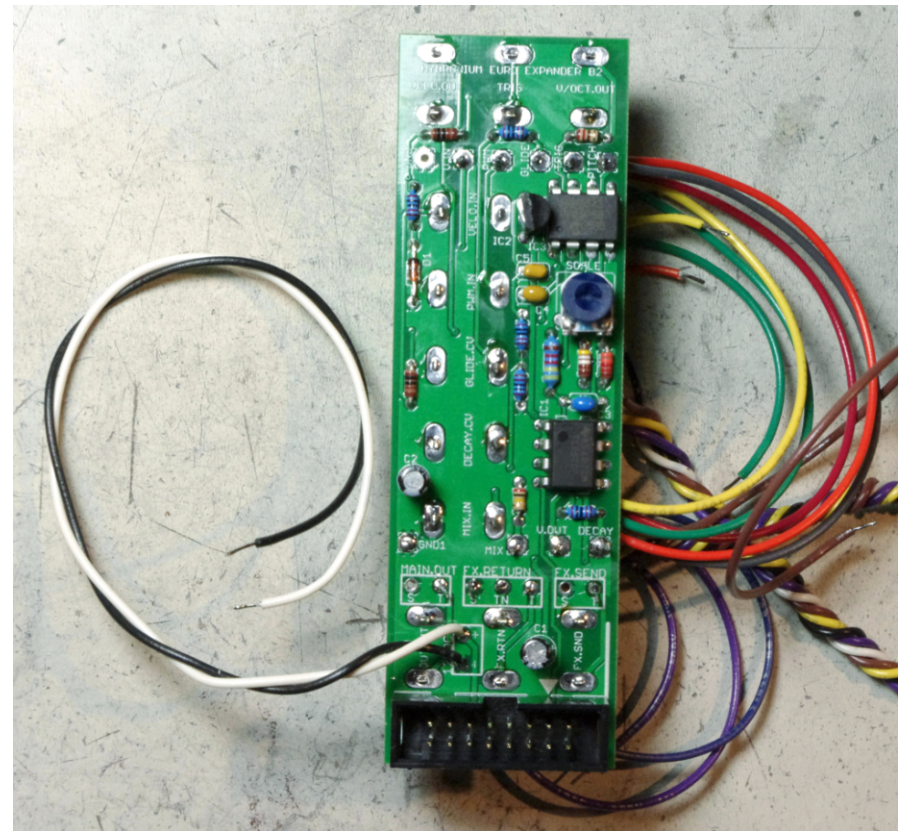
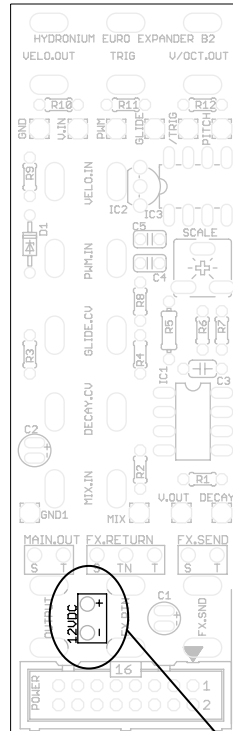
Assembly Note

In this step, attach the black and white individual wires to the Expander's 12VDC pads.

White = (+)

Black = (-)

Double check you got the color code right. These wires will supply power to the Main PCB.



12VDC
white = (+)
black = (-)



Step 3



HYDRONIUM : Eurorack Chassis Assembly Guide

rev.C

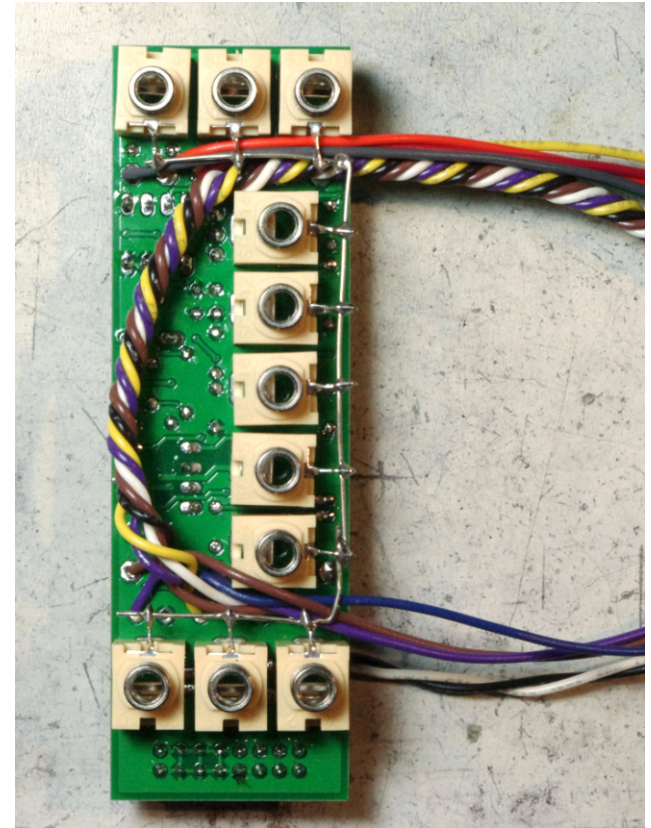
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Operation

Wire Dress

Assembly Note

Run the loose ends of all the wires through the openings between the jacks and under the ground wire, referring to the photo.



Step 4



: Eurorack Chassis Assembly Guide

rev.C

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Operation

Mate Expander with Panel

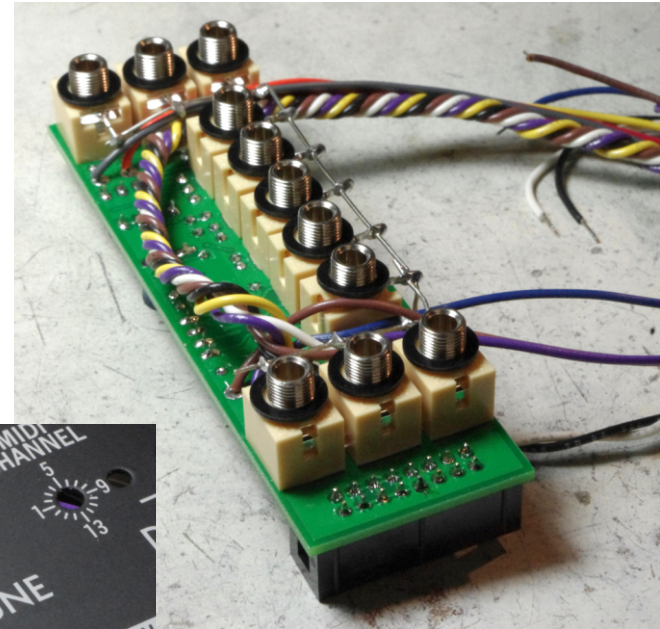
Assembly Note

Place a plastic washer (0.25" ID) on the bushing of each jack.

Mate the Expander to the panel, being sure none of the washers fall off.

Mount the knurled nuts on the jacks and make them finger tight to hold the assembly together.

Finally, tighten the nuts very carefully with pliers (or a special tool). Be careful not to scratch the finish!



Step 5



HYDRONIUM : Eurorack Chassis Assembly Guide

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Operation

Power Connection

Assembly Note

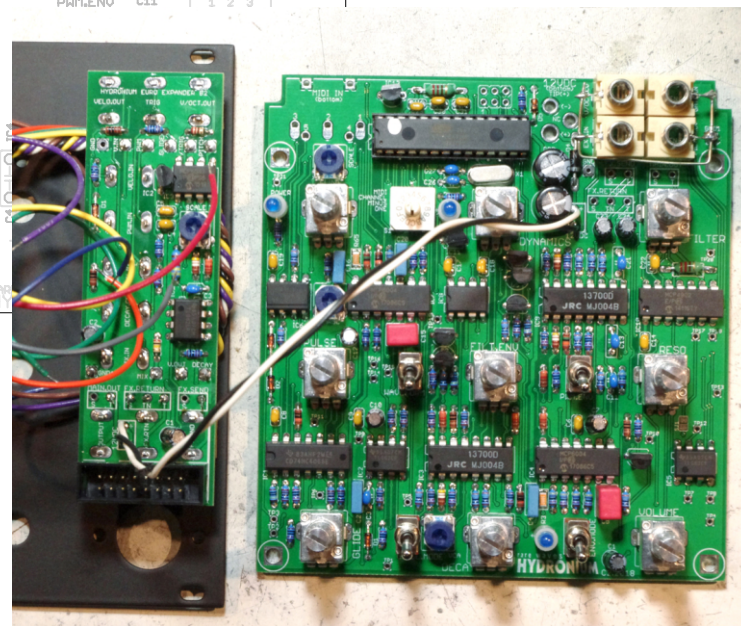
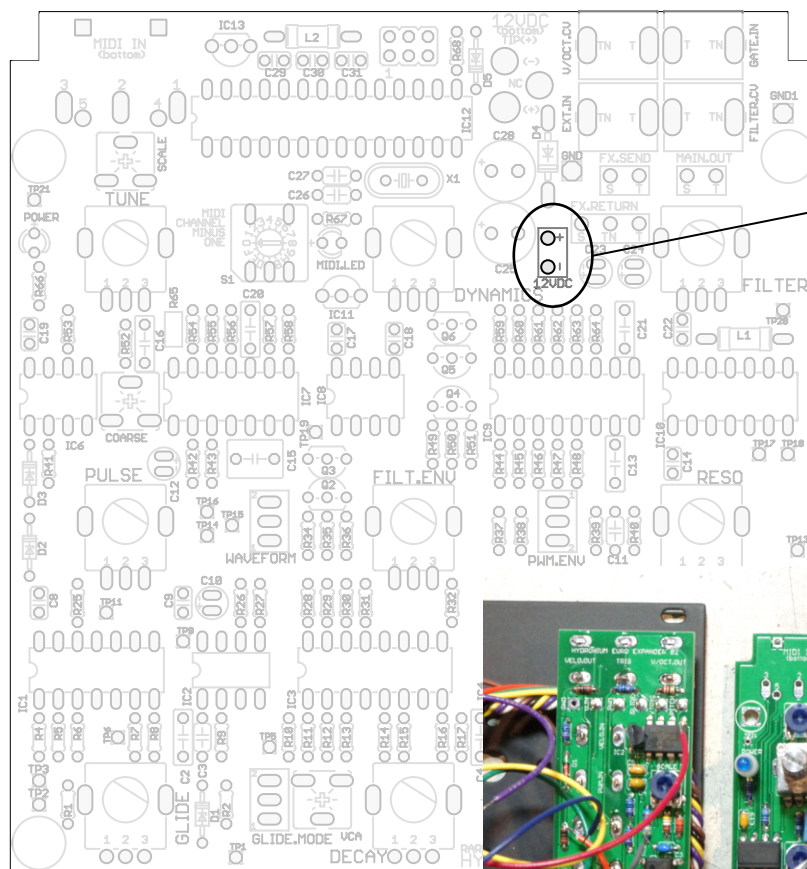
Solder the black and white individual wires to the Main PCB's DC.IN (+) and (-) pads.

Double check that you have used the correct color code on both ends of the wire.

White = (+)

Black = (-)

If its accidentally reversed, the Main PCB will receive reverse polarity from your rack power supply.



Step 6



HYDRONIUM : Eurorack Chassis Assembly Guide

rev.C

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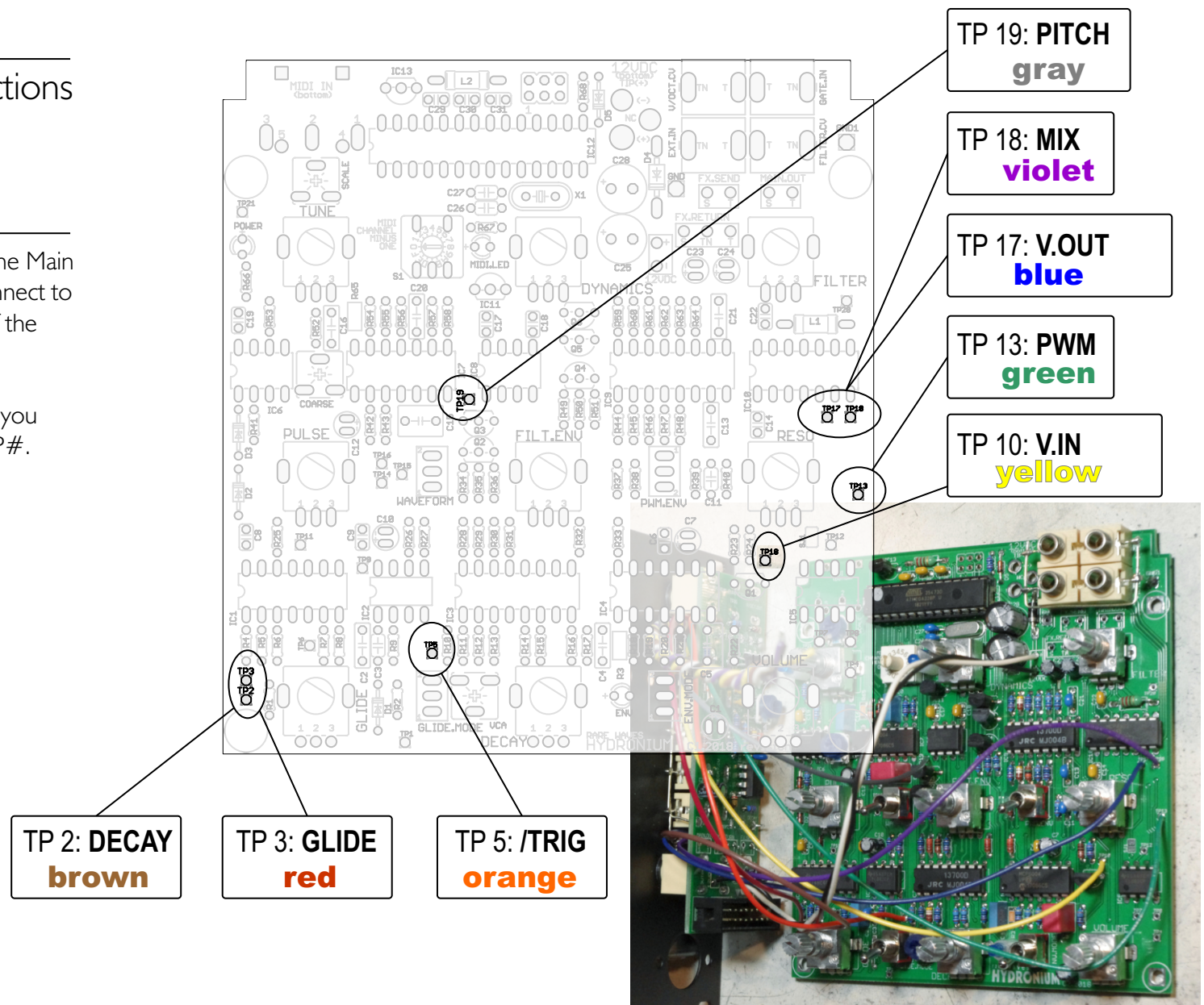
Operation

Interboard Connections

Assembly Note

Solder the 8 individual wires to the Main PCB's TP pads. These wires connect to the top side (component side) of the Main PCB.

Follow the table here to be sure you match the wire color with the TP#.



Step 7

Operation	Wire Dress
1. Turn on the power supply.	
2. Connect the power supply to the circuit.	
3. Adjust the voltage to 10V.	
4. Measure the current flowing through the circuit.	
5. Record the current value.	
6. Turn off the power supply.	
7. Disconnect the circuit from the power supply.	
8. Turn on the power supply.	
9. Connect the power supply to the circuit.	
10. Adjust the voltage to 20V.	
11. Measure the current flowing through the circuit.	
12. Record the current value.	
13. Turn off the power supply.	
14. Disconnect the circuit from the power supply.	
15. Turn on the power supply.	
16. Connect the power supply to the circuit.	
17. Adjust the voltage to 30V.	
18. Measure the current flowing through the circuit.	
19. Record the current value.	
20. Turn off the power supply.	
21. Disconnect the circuit from the power supply.	
22. Turn on the power supply.	
23. Connect the power supply to the circuit.	
24. Adjust the voltage to 40V.	
25. Measure the current flowing through the circuit.	
26. Record the current value.	
27. Turn off the power supply.	
28. Disconnect the circuit from the power supply.	
29. Turn on the power supply.	
30. Connect the power supply to the circuit.	
31. Adjust the voltage to 50V.	
32. Measure the current flowing through the circuit.	
33. Record the current value.	
34. Turn off the power supply.	
35. Disconnect the circuit from the power supply.	
36. Turn on the power supply.	
37. Connect the power supply to the circuit.	
38. Adjust the voltage to 60V.	
39. Measure the current flowing through the circuit.	
40. Record the current value.	
41. Turn off the power supply.	
42. Disconnect the circuit from the power supply.	
43. Turn on the power supply.	
44. Connect the power supply to the circuit.	
45. Adjust the voltage to 70V.	
46. Measure the current flowing through the circuit.	
47. Record the current value.	
48. Turn off the power supply.	
49. Disconnect the circuit from the power supply.	
50. Turn on the power supply.	
51. Connect the power supply to the circuit.	
52. Adjust the voltage to 80V.	
53. Measure the current flowing through the circuit.	
54. Record the current value.	
55. Turn off the power supply.	
56. Disconnect the circuit from the power supply.	
57. Turn on the power supply.	
58. Connect the power supply to the circuit.	
59. Adjust the voltage to 90V.	
60. Measure the current flowing through the circuit.	
61. Record the current value.	
62. Turn off the power supply.	
63. Disconnect the circuit from the power supply.	
64. Turn on the power supply.	
65. Connect the power supply to the circuit.	
66. Adjust the voltage to 100V.	
67. Measure the current flowing through the circuit.	
68. Record the current value.	
69. Turn off the power supply.	
70. Disconnect the circuit from the power supply.	
71. Turn on the power supply.	
72. Connect the power supply to the circuit.	
73. Adjust the voltage to 110V.	
74. Measure the current flowing through the circuit.	
75. Record the current value.	
76. Turn off the power supply.	
77. Disconnect the circuit from the power supply.	
78. Turn on the power supply.	
79. Connect the power supply to the circuit.	
80. Adjust the voltage to 120V.	
81. Measure the current flowing through the circuit.	
82. Record the current value.	
83. Turn off the power supply.	
84. Disconnect the circuit from the power supply.	
85. Turn on the power supply.	
86. Connect the power supply to the circuit.	
87. Adjust the voltage to 130V.	
88. Measure the current flowing through the circuit.	
89. Record the current value.	
90. Turn off the power supply.	
91. Disconnect the circuit from the power supply.	
92. Turn on the power supply.	
93. Connect the power supply to the circuit.	
94. Adjust the voltage to 140V.	
95. Measure the current flowing through the circuit.	
96. Record the current value.	
97. Turn off the power supply.	
98. Disconnect the circuit from the power supply.	
99. Turn on the power supply.	
100. Connect the power supply to the circuit.	
101. Adjust the voltage to 150V.	
102. Measure the current flowing through the circuit.	
103. Record the current value.	
104. Turn off the power supply.	
105. Disconnect the circuit from the power supply.	
106. Turn on the power supply.	
107. Connect the power supply to the circuit.	
108. Adjust the voltage to 160V.	
109. Measure the current flowing through the circuit.	
110. Record the current value.	
111. Turn off the power supply.	
112. Disconnect the circuit from the power supply.	
113. Turn on the power supply.	
114. Connect the power supply to the circuit.	
115. Adjust the voltage to 170V.	
116. Measure the current flowing through the circuit.	
117. Record the current value.	
118. Turn off the power supply.	
119. Disconnect the circuit from the power supply.	
120. Turn on the power supply.	
121. Connect the power supply to the circuit.	
122. Adjust the voltage to 180V.	
123. Measure the current flowing through the circuit.	
124. Record the current value.	
125. Turn off the power supply.	
126. Disconnect the circuit from the power supply.	
127. Turn on the power supply.	
128. Connect the power supply to the circuit.	
129. Adjust the voltage to 190V.	
130. Measure the current flowing through the circuit.	
131. Record the current value.	
132. Turn off the power supply.	
133. Disconnect the circuit from the power supply.	
134. Turn on the power supply.	
135. Connect the power supply to the circuit.	
136. Adjust the voltage to 200V.	
137. Measure the current flowing through the circuit.	
138. Record the current value.	
139. Turn off the power supply.	
140. Disconnect the circuit from the power supply.	
141. Turn on the power supply.	
142. Connect the power supply to the circuit.	
143. Adjust the voltage to 210V.	
144. Measure the current flowing through the circuit.	
145. Record the current value.	
146. Turn off the power supply.	
147. Disconnect the circuit from the power supply.	
148. Turn on the power supply.	

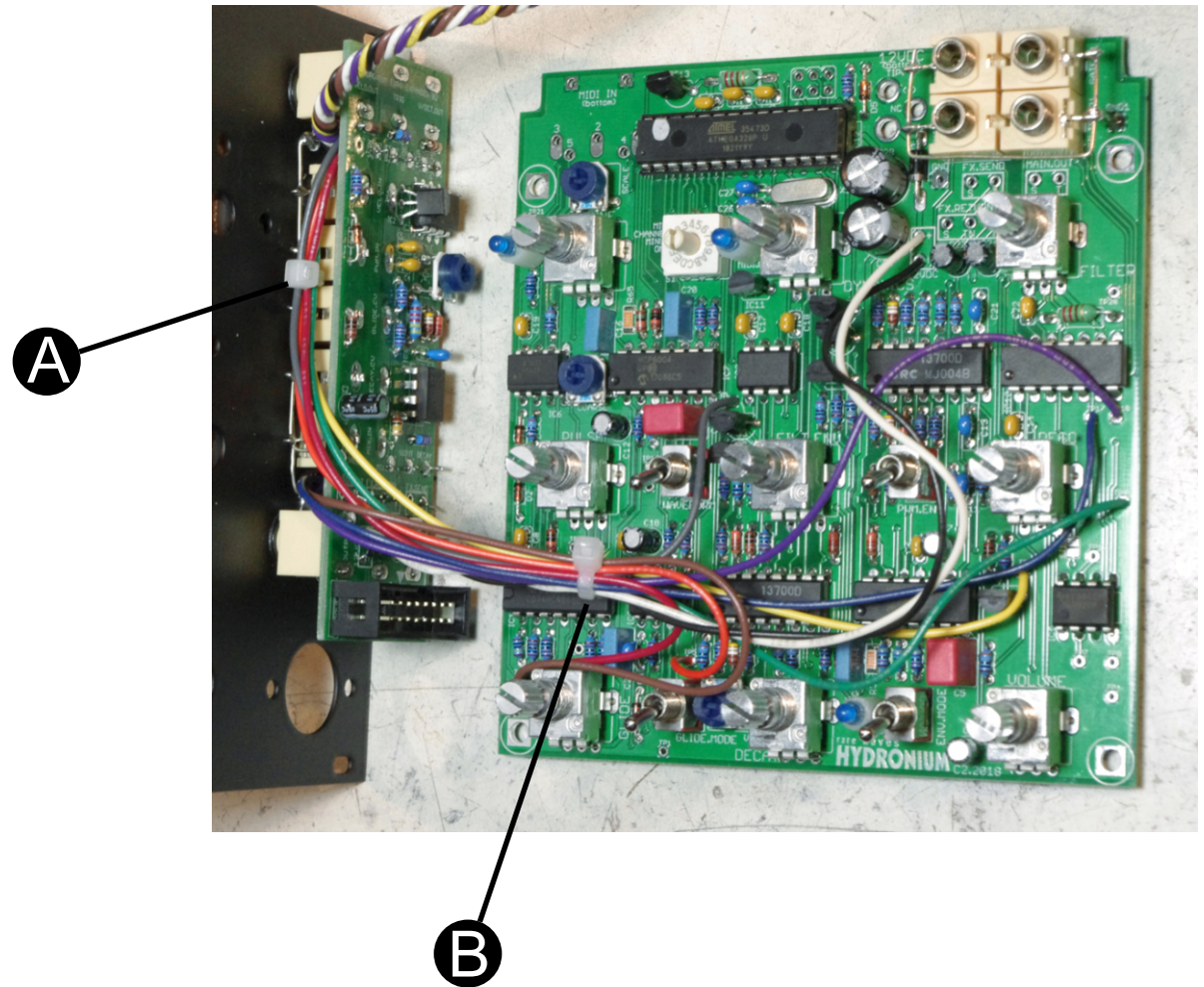
Assembly Note

Dress the wires with zip ties as shown in the photo.

Arrange the dressed wires so they don't lay on top of the pots or switches.

Do the upper zip tie (A) first. This holds the wire bundle onto the ground wire for the Expander's jacks. To start, it is convenient to first make a J-bend in the tip of the zip tie so you can easily thread it around the ground wire.

Leave the lower zip tie (B) loose so it can be re-positioned.



Operation

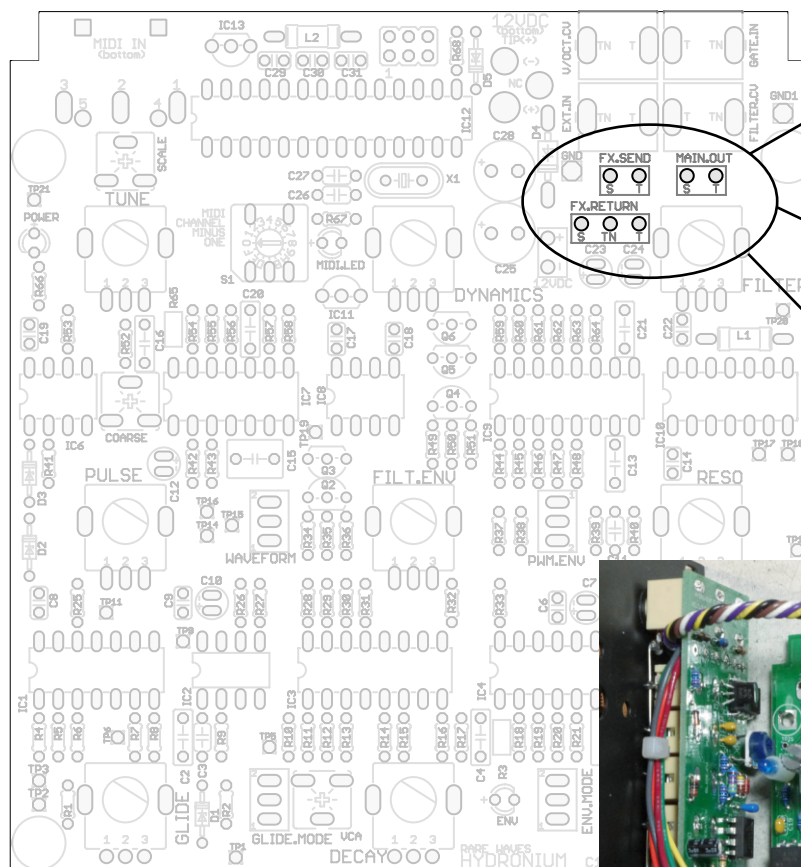
Audio Connections

Assembly Note

Solder the twisted bundle of 5 wires to the Main PCB's MAIN.OUT, FX.SEND, and FX.RTN pads.

Be sure to follow the color code given here.

Route the wire bundle underneath the ground wire on jacks next to it, so it doesn't interfere with the control panel.



FX.RETURN

S = white

TN = black

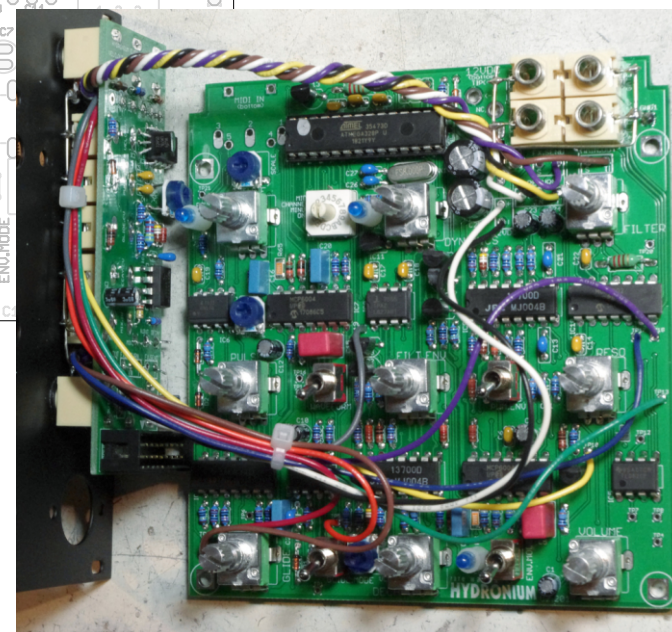
T = yellow

FX.SEND

T = violet

MAIN.OUT

T = brown



Step 9



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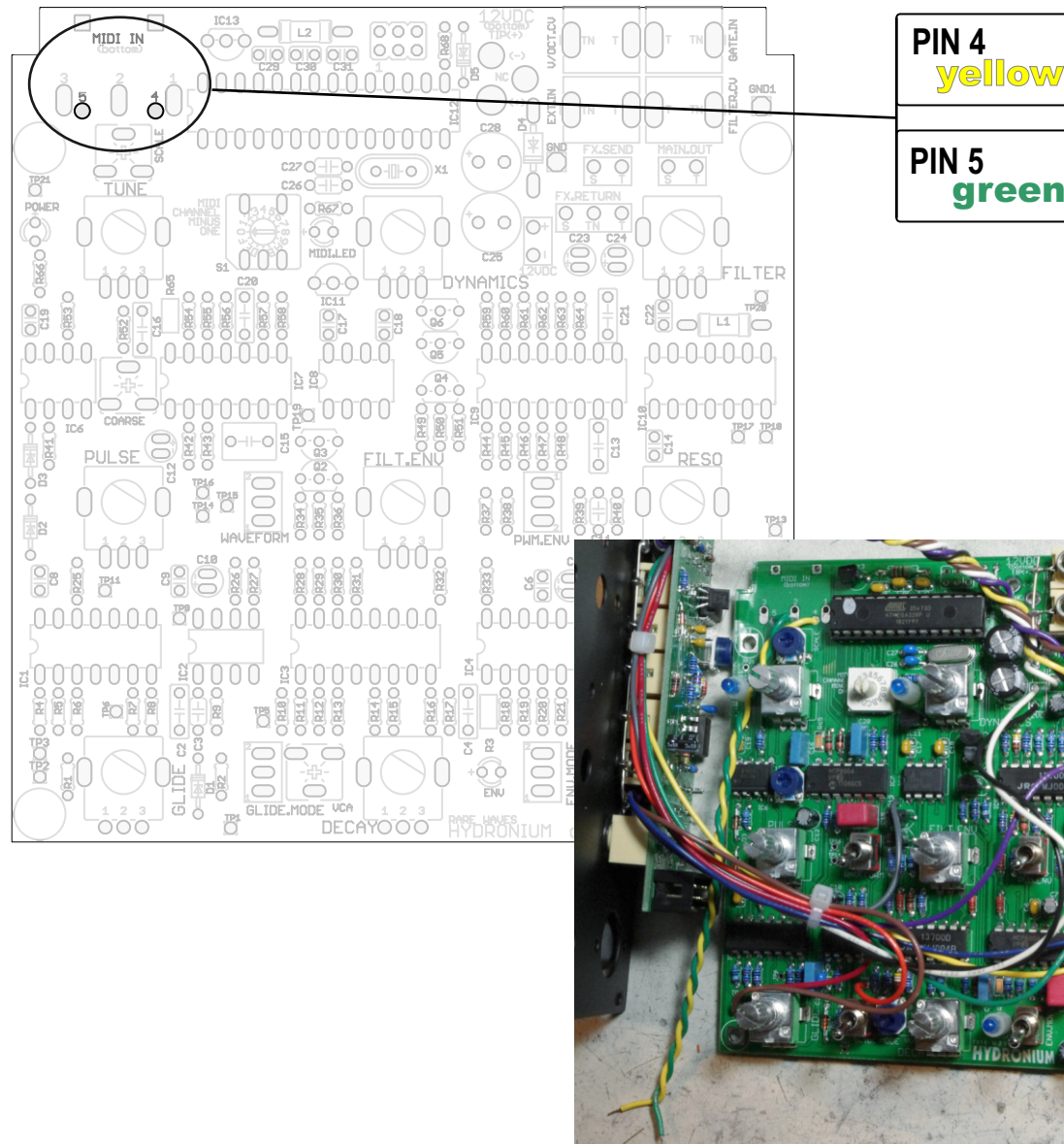
MIDI Wiring

Assembly Note

Locate the 2-twist of yellow and green wire. Strip and tin both ends. Connect it to the MIDI.IN pads of the Main PCB.

Be sure to follow the color code given here.

Route the other end down toward the bottom of the PCB as shown in the photo. It should sit between the LED and the potentiometer.



Operation

Washers Placement

Assembly Note

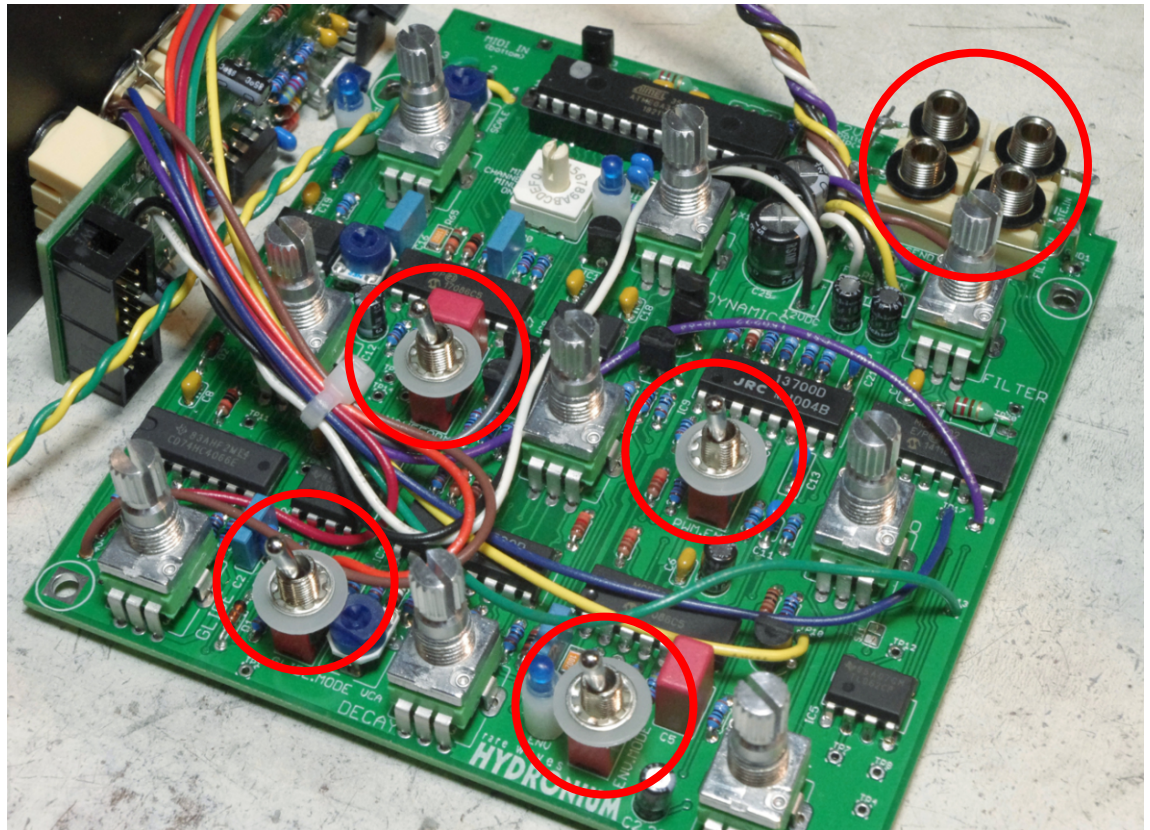
First, verify that the anti-rotation tabs have been removed from all 9 potentiometers.

Place washers on the switches. Each switch gets one plastic washer, and one serrated washer.

Place washers on the jacks. Each jack gets one plastic washer.

Put all 4 switches in the down position.

Position the wires so they don't lay on top of the pots, switches, or tall capacitors... Its tricky so be patient :)



Step 11



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Operation

Mate Main PCB with Panel

Assembly Note

Mate the Main PCB with the control panel. Be patient, it will take several tries!

If some of the wires are interfering by laying on top of the potentiometers or big capacitors, reposition them.

If the zip tie on the wire bundle is interfering, slide it to a better position.

Make sure none of the washers comes off of the switches and jacks.

When you have the panel fitting flat on all of the potentiometers and doesn't rock from side to side, it is ready for you to attach the hardware. Start by putting the hardware on the potentiometers.

- Each potentiometer takes one flat washer and one nut.
- Each switch takes one hex nut.
- Each jack takes one knurled washer.

Tighten the hardware carefully, being sure not to scratch the finish.



Step 12

Operation

Solder Potentiometers

Assembly Note

You're almost finished! Now, solder all nine of the potentiometers to the PCB.

We delayed doing this until now, to prevent residual tension from being trapped in the assembly.

There are 9 potentiometers, and each has 5 solder joints. Their locations are circled in red in the photo.

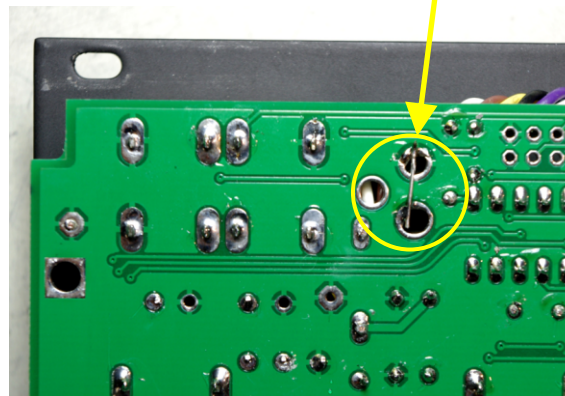
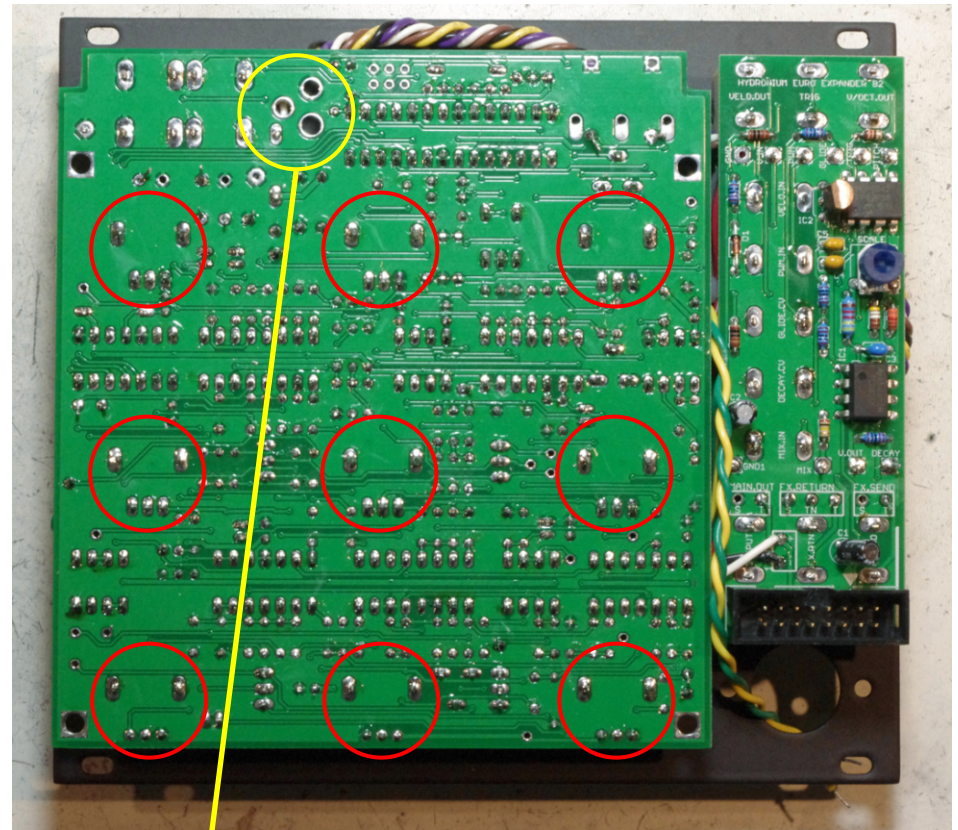
Operation

Enable Reverse Polarity Protection

Assembly Note

Use a section of scrap wire to bridge the two large solder pads, circled in yellow in the photo.

If reverse polarity power is applied, your rack's power supply will 'see' a short circuit on the +12V side. It will either not power up, or blow a fuse.



Step 13



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Operation

MIDI Jack Installation

Assembly Note

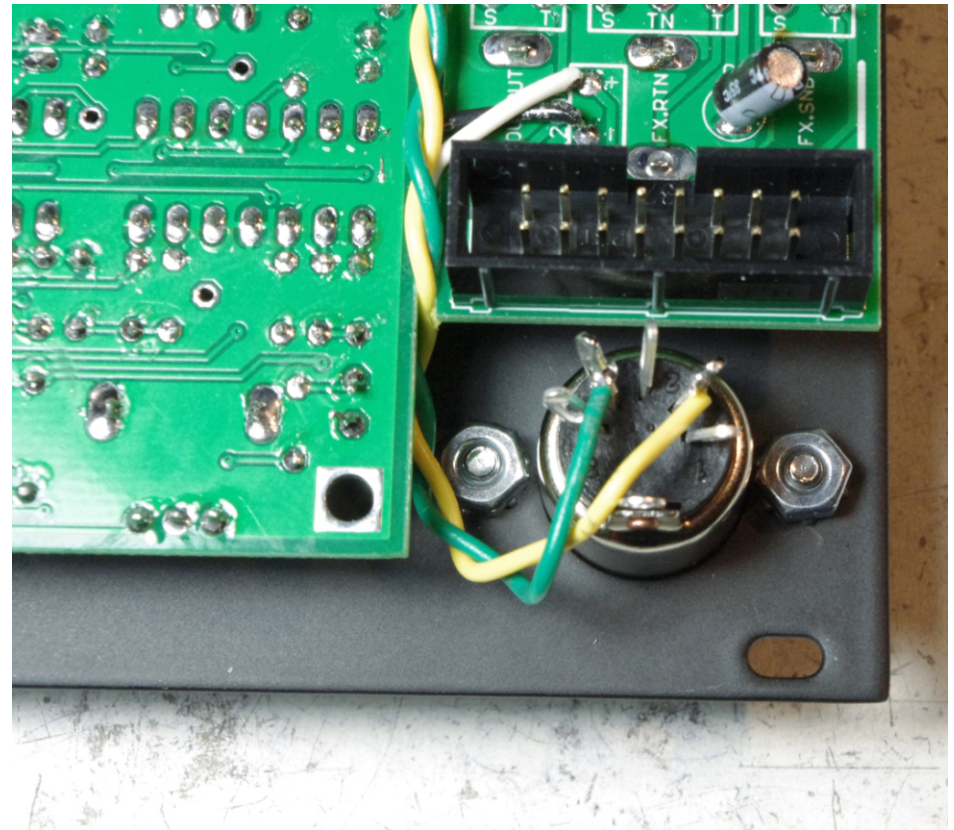
Mount the MIDI In jack to the control panel with the screws and lock nuts provided.

Solder the loose ends of the 2-twist yellow-green wire to the MIDI in's terminals 4 and 5.

Yellow = Pin 4

Green = Pin 5

Observe the photo for reference. The terminal numbers are molded into the plastic material, if you look closely



Step 14



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Operation

Install Knobs

Assembly Note

Attach the nine control knobs to the potentiometers.

First, rotate the shaft fully counterclockwise. Position its knob with its indicator pointing to the 7 o'clock position.

Then press the knob firmly onto the potentiometer shaft. If you encounter excessive resistance, try rotating the knob slightly, so its internal teeth line up with the grooves in the shaft.



Step 15



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Operation

Final Inspection

Assembly Note

Make a careful visual inspection of the back of the Main PCB.

- Trim any leads that are sticking out
- Do you see any solder joints that were missed?
- Do you see any solder bridges?

The Hydronium is ready to be powered up for a listening test!

Before it is playable, the trimmers must be calibrated. Refer to the User Guide for details.



That's all, folks



Step 16