Analog 2.0 documentation

Vol. 9

VCF production

Version: 2.3

Created: December 08, 2009

table of contents

1. About this document

This document is for the VCF module of the analog synthesizer system Analog2.0.

I will explain how to make it.

This document should be produced by the user with reference to the following documents.

It is written on the premise of.

--Analog2.0 Starter Kit

--vol.3 Production of power supply and lifeline

--vol.4 Manufacture of noise generator and mixer

--vol.5 Production of VCA

--vol.6 VCO production

--vol.7 Production of envelope generator

--Vol.8 LFO production

Change log

Version date		Changes
2.0 2.0	2009/11/19	Analog2.0 Document version 2.0 --Reviewed the circuit design. --Revised the document accordingly.
2.1 2.1	2009/12/05	--Corrected an error in the circuit diagram (Fig. 2-3)
2.2	2009/12/06	--Corrected an error in the circuit diagram (Fig. 2-3) --Fixed parts list R17 (Error) 15kÿ (Correct) 6.8kÿ --Fixed parts list R27 (Error) 47kÿ (Correct) 100kÿ --Fixed parts list VR1 (Error) A curve (Correct) B curve
2.3	2009/12/08	--Corrected an error in the circuit diagram (Fig. 2-3) Values for VR1, VR2, VR3, C10, R13

2. Production: VCF production

2.1. Production flow The module

production flow is the same every time as follows. -Obtaining **parts** - Installing parts on the **board** - **Installing panel parts-** Checking **the wiring on the board-Checking** the **operation** - **Adjustment**

2.2. Outline of the module to be manufactured 2.2.1. Functions

In this article, we will build a VCF module.

VCF stands for Voltage Controlled Filter. Filters the input sound signal to change the timbre.

The feature of VCF is that the frequency characteristics can be controlled using CV. This makes it possible to give a synthesizer-specific timbre change.

2.2.2. Positioning in the system

Figure 2-1 shows the position of the VCF in the configuration of the Analog2.0 production system. VCF is It is a sound processing module like VCA.

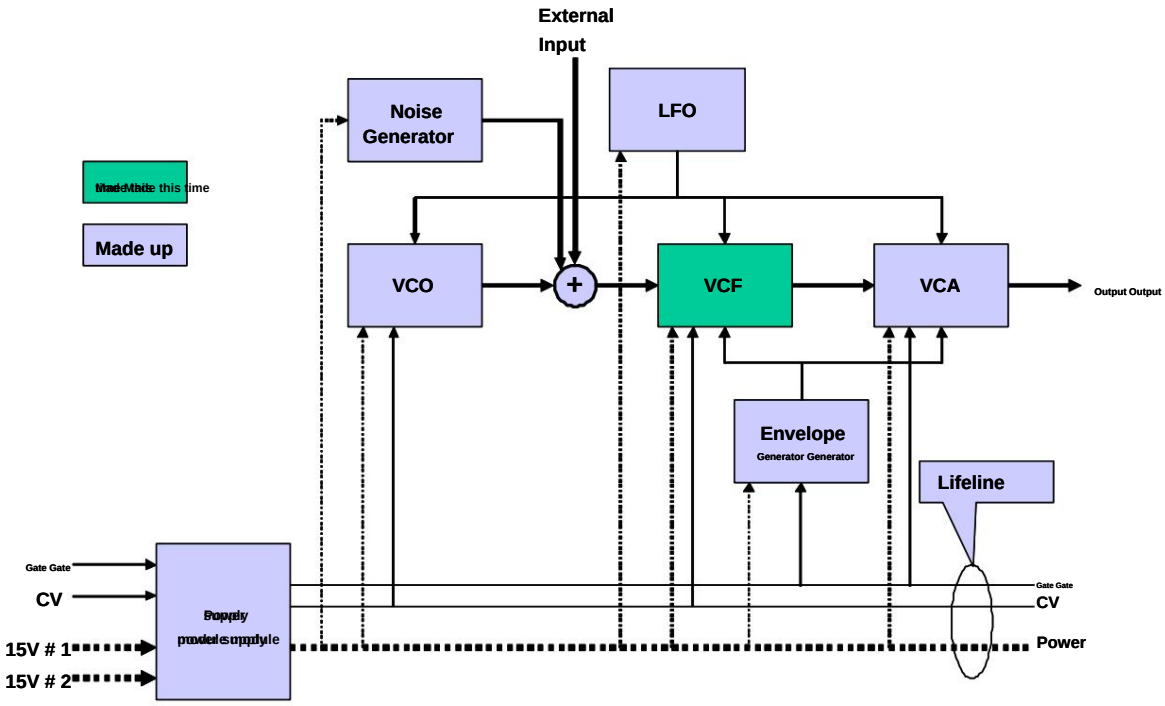


Figure 2-1 Positioning of VCF

Within the panel, the VCF is positioned as shown in Figure 2-2.

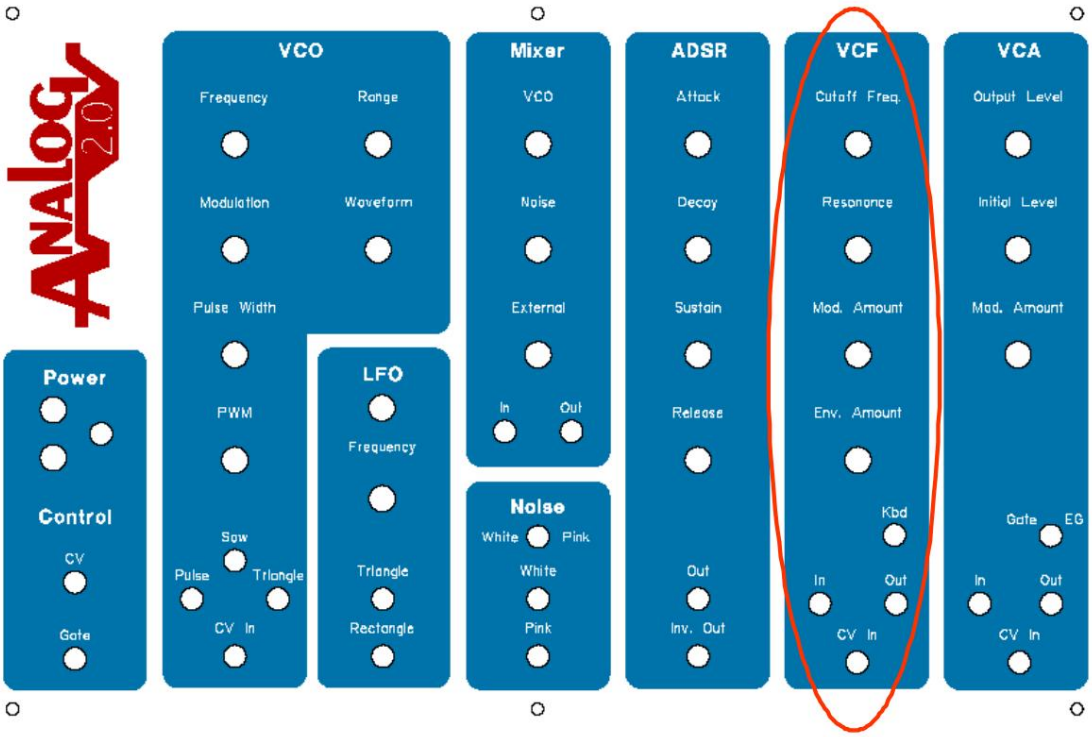


Figure 2-2 Positioning in the panel

2.2.3. Specifications

The VCF specifications are as follows:

-Input **signal level: ± 5V** - **Output**

signal level: ± 5V - **Parameters:**

Cutoff Frequency, Resonance, Mod. Amount, Env. Amount, Keyboard

Track Track

-Input : **sound signal, CV** -

output: sound signal

2.2.4. Circuit

The circuit diagram of the VCF to be manufactured is shown in Figure 2-3.

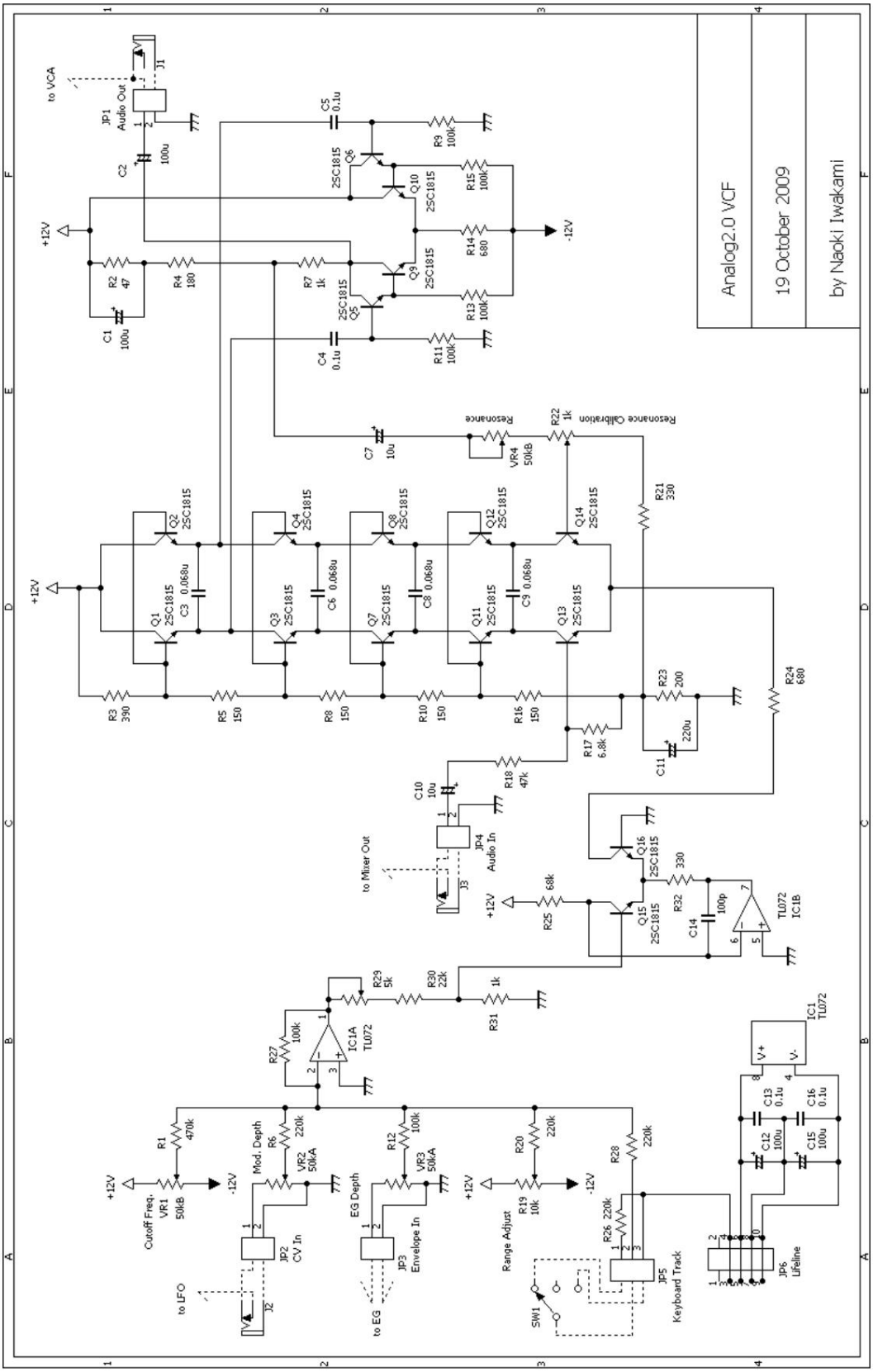


Figure 2-3 Schematic of the VCF module

2.3. Obtaining parts

Well then, it's finally time to start production. The parts required for production are as follows. For production So, get these parts first. Modules in this parts list

Not only the parts to be mounted on the circuit board, but also the switches and jacks to be mounted on the panel are included. vinegar. The parts list does not include the knob. The knob is suitable for your taste Please get it.

Table 2-1: Parts required for VCF manufacturing (inside the board)

parts number	Device name	Value / model number	remarks
C1	electrolytic capacitor	100 ÿF	
C2	electrolytic capacitor	100 ÿF	
C3	Polypropylene Capacitor 0.068ÿF C4	Myra Capacitor	
		0.1 ÿF	
C5	Myra Capacitor	0.1 ÿF	
C6	polypropylene capacitor 0.068ÿF		
C7	Electrolytic Capacitor	10 ÿF	
C8	Polypropylene Capacitor 0.068ÿF		
C9	Polypropylene Capacitor 0.068ÿF C10	Electrolytic	
Capacitor C11	Electrolytic Capacitor C12	Electrolytic	
Capacitor		220ÿF	
		100 ÿF	
C13	Multilayer Ceramic Capacitor 0.1ÿF C14	Ceramic	
Capacitor		100pF	
C15	Electrolytic	100 ÿF	
Capacitor C16	Multilayer Ceramic Capacitor	0.1ÿF	
IC1	op amp	TL072	
JP1	pin header 2.5mm pitch	1x2	Audio Out
JP2	pin header 2.5mm pitch	1x2	CV In
JP3	pin header 2.5mm pitch	1x2	Envelope In
JP4	pin header 2.5mm pitch	1x2	Audio In
JP5	pin header 2.5mm pitch	1x3	Keyboard Track Track
JP6	pin header 2.5mm pitch 2x5		Lifeline

Q1 transistor	2SC1815	
Q2 transistor	2SC1815	
Q3 transistor	2SC1815	
Q4 transistor	2SC1815	
Q5 transistor	2SC1815	
Q6 transistor	2SC1815	
Q7 transistor	2SC1815	
Q8 transistor	2SC1815	
Q9 transistor	2SC1815	
Q10 transistor	2SC1815	
Q11 Transistor	2SC1815	
Q12 transistor	2SC1815	
Q13 Transistor	2SC1815	
Q14 Transistor	2SC1815	
Q15 Transistor	2SC1815	
Q16 transistor	2SC1815	
R1 resistor	470kÿ	1 / 4W 5%
R2 resistor	47ÿ	1 / 4W 5%
R3 resistor	390ÿ	1 / 4W 5%
R4 resistor	180ÿ	1 / 4W 5%
R5 resistor	150ÿ	1 / 4W 5%
R6 resistor	220kÿ	1 / 4W 5%
R7 resistor	1kÿ	1 / 4W 5%
R8 resistor	150ÿ	1 / 4W 5%
R9 resistor	100kÿ	1 / 4W 5%
R10 resistor	150ÿ	1 / 4W 5%
R11 resistor	100kÿ	1 / 4W 5%
R12 resistor	100kÿ	1 / 4W 5%
R13 resistor	100kÿ	1 / 4W 5%
R14 resistor	680ÿ	1 / 4W 5%
R15 resistor	100kÿ	1 / 4W 5%
R16 resistor	150ÿ	1 / 4W 5%
R17 resistor	6.8kÿ	1 / 4W 5%
R18 resistor	47kÿ	1 / 4W 5%
R19 semi-fixed resistance	10kÿ	

R20 resistor	220kÿ	1 / 4W 5%
R21 resistor	330ÿ	1 / 4W 5%
R22 semi-fixed resistance	1kÿ	
R23 resistor	200ÿ	1 / 4W 5%
R24 resistor	680ÿ	1 / 4W 5%
R25 resistor	68kÿ	1 / 4W 5%
R26 resistor	220kÿ	1 / 4W 5%
R27 resistor	100kÿ	1 / 4W 5%
R28 resistor	220kÿ	1 / 4W 5%
R29 potentiometer	5kÿ	
R30 resistor	22kÿ	1 / 4W 5%
R31 resistor	1kÿ	1 / 4W 5%
R32 resistor	330ÿ	1 / 4W 5%
VR1 volume	50kÿ B	
VR2 volume	50kÿ A	
VR3 volume	50kÿ A	
VR4 volume	50kÿ B	

Table 2-2 Parts required for VCF manufacturing (outside the board)

parts number	Device name	Value / model number	remarks
J1 3.5mm jack			Audio Out
J2 3.5mm jack			CV In
J3 3.5mm Jack SW1			Audio In
Toggle Switch ON-OFF-ON			Neutral OFF type

2.3.1. Precautions when obtaining parts

As much as possible, the parts are made up of those available at Akihabara stores.

Transistor

In this production, using the transistors of Q1, Q2, Q3, Q4, Q7, Q8, Q11, Q12, Q13, Q14, it is called a transistor ladder. It constitutes a special circuit. Of general-purpose transistors I use 2SC1815, but the characteristics are the same on the left and right of the transistor. Must be.

If you buy transistors in bulk, they are usually in the same lot. It has become a thing, the characteristics are quite uniform and there is a big problem No, but better performance with transistor matching You can get it. The matching method is described in Appendix A.

Polypropylene capacitor A high-performance film capacitor that was also used in the VCO. If you cannot get it, you can use Myra capacitors. Polypropylene capacitors are a family of plastic film capacitors, the same as Myra capacitors, but have better temperature characteristics and accuracy than Myra capacitors. This time, I will use a semi-fixed resistor different from the one I have used so far. Please be careful as the pitch of the legs is different.

Semi-fixed resistance

(Fig. 2-4)

Potentiometer Aside from the semi-fixed resistance, a potentiometer is also used. Adjustment It is an elongated type with a sideways. (Fig. 2-5)

Toggle switch Use 3P neutral type. (Fig. 2-6) The neutral type toggle switch has two points where the switch stops, two points when it is tilted on both sides, and a total of three points where it is neutral. When tilted to both sides, it will connect to the contacts on each side, but when it is neutral, it will turn off without touching any of the contacts. This time, we'll use this switch to switch between keyboard tracks with cutoff frequencies. Tilt it to one side for 100% track, tilt it to the other side for 50% track, and neutralize it for no track.

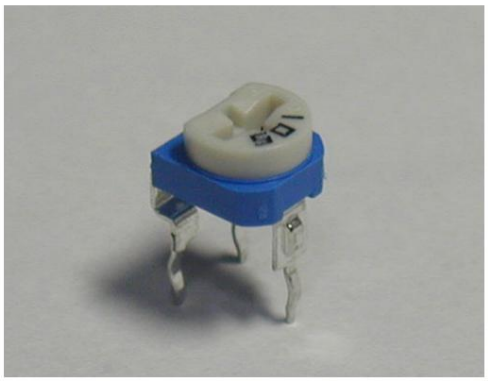


Figure 2-4 Semi-fixed resistance used in this production

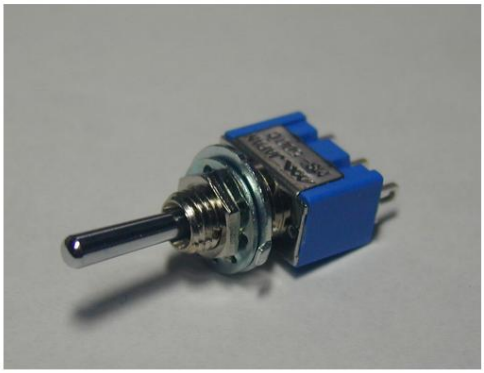


Figure 2-6 Neutral type toggle switch

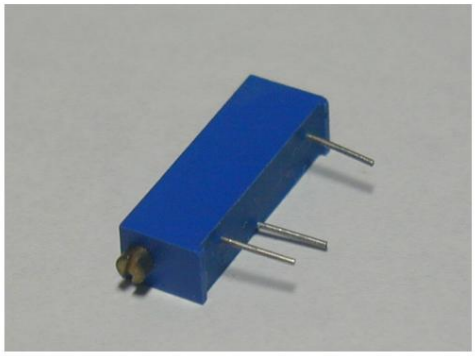


Figure 2-5 Potentiometer

2.4. Attaching parts to the board

Figure 2-7 is the wiring diagram of the printed circuit board to be manufactured this time.

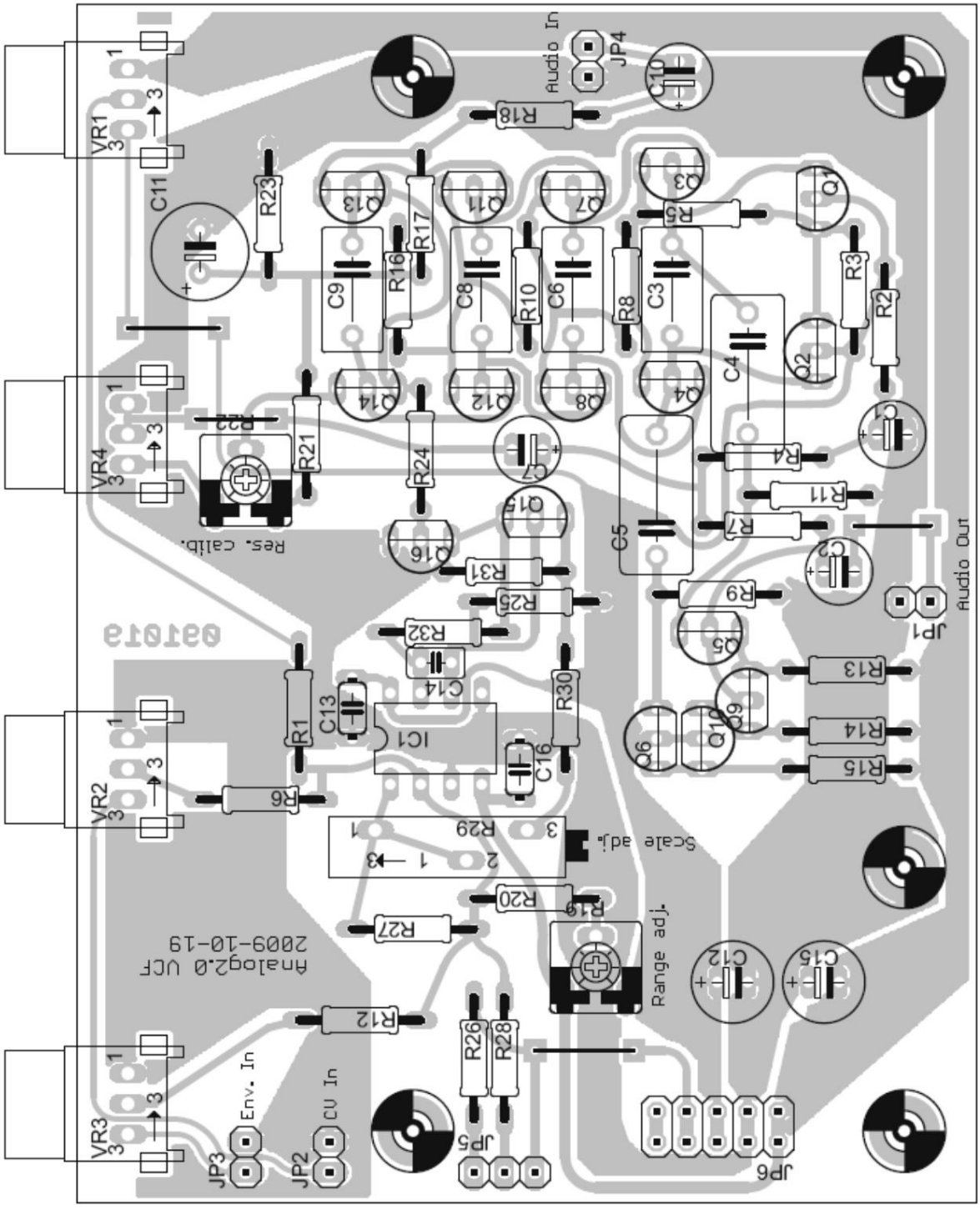


Figure 2-7 VCF board wiring diagram

2.5. Installation of panel parts

After installing the board parts, wire the parts to be attached to the panel (parts outside the board). Figure 2-8
Connect the pin header and the mini jack with lead wires as shown in. With this production,
all the wiring between the modules of Analog2.0 will be completed. Refer to the actual wiring diagram in Fig. 2-8.
Make sure that the internal wiring is correct.

The photo in Figure 2-9 is an example of mounting the board on a panel. Figure 2-10 shows the implementation on the panel.
It is a view from the front side. As you can see from the photo, the board is tightened with nuts on the volume shaft.
Fix by.

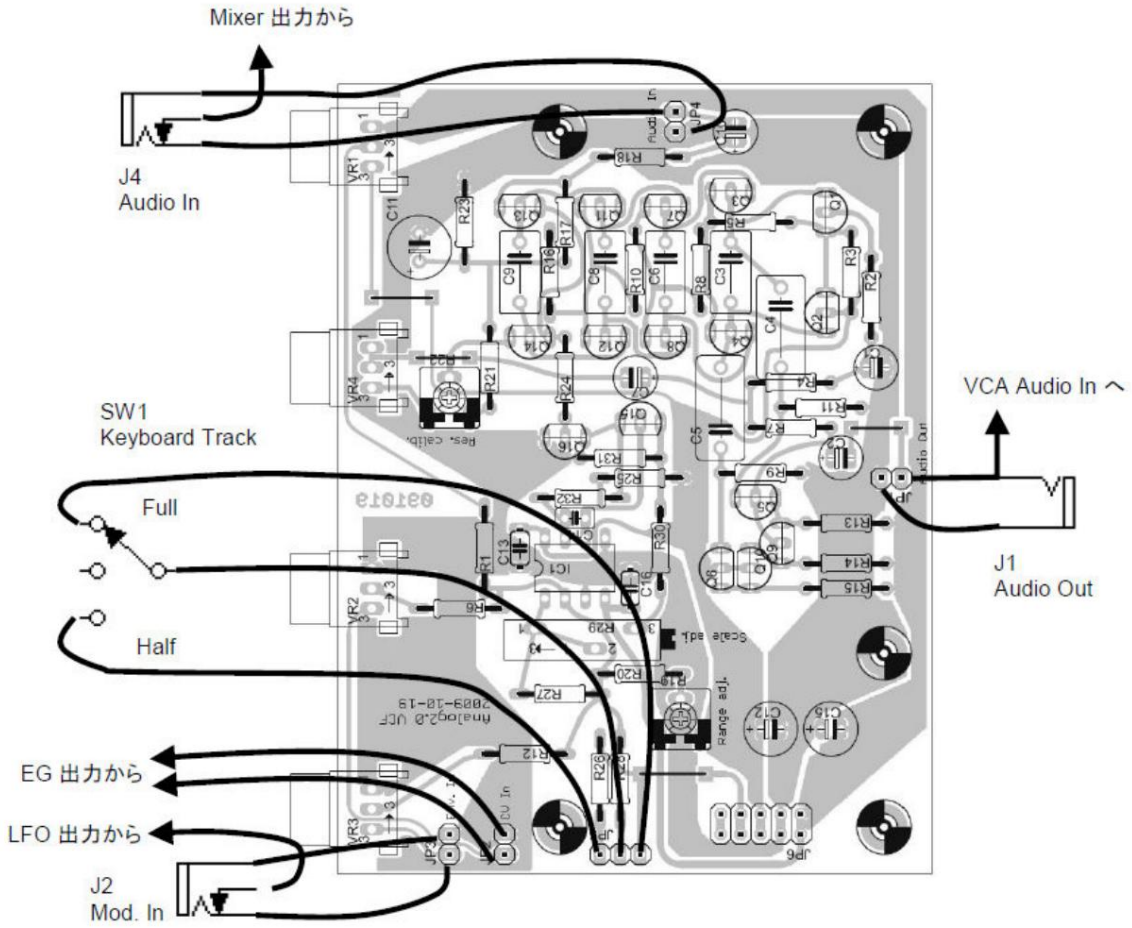


Figure 2-8 Wiring of panel parts

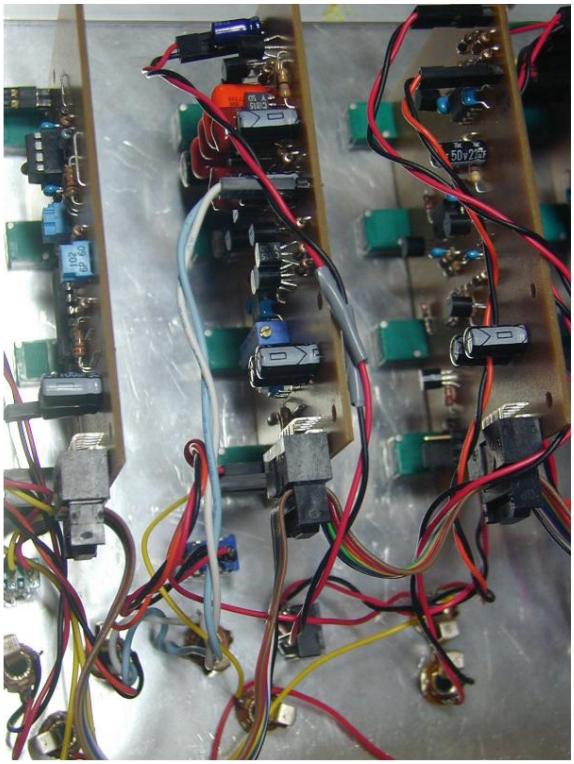


Figure 2-9 Mounting example on the panel (back side)

Figure 2-10 Implementation example on the panel (front side)

2.6. Checking the wiring on the board

At this point, the assembly of the VCF module is complete. As always, be sure to check the wiring before turning on the power. In the unlikely event that there is a wiring error, not only will it not operate normally, but in some cases the parts will be damaged. Correctly while looking at the checklist Check if it is wired.

[] Is the resistor installed in the correct place and with the correct value? [] Is the capacitor installed in the correct place, with the correct type and with the correct value? [] Is the electrolytic capacitor installed in the correct orientation? [] Is the diode installed in the correct place and in the correct orientation? [] Is the transistor installed in the correct place and in the correct orientation?

[] Is the IC installed in the correct location and in the correct orientation?

[] Is the jack pin header installed in the correct place? [] Turn the board over and check the soldering points. The adjacent copper foil pattern is Han

Is there a solder bridge that is short-circuited in the da?

[] Is there any place where the soldering is immo soldering? If the body of the part is shaken and the lead at the soldering point moves, it is almost certainly immo solder. The potato solder will peel off over time, so if you find it, re-solder it.

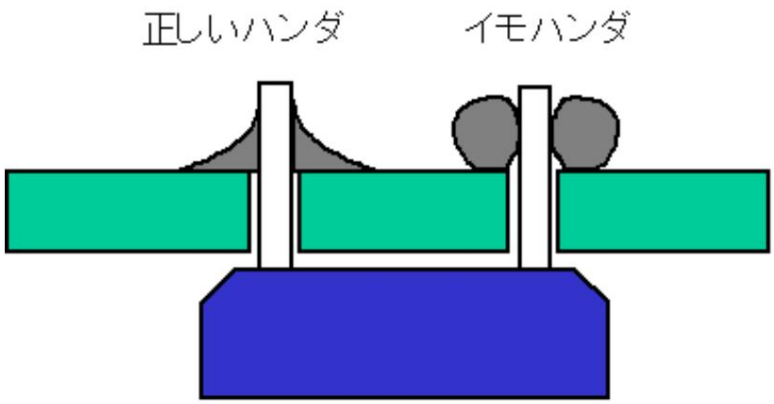


Figure 2-11 Correct solder and immo solder

2.7. Operation check

Now, let's check the operation. Check the operation when the internal wiring is completed. This time all the internal wiring is finished, so whether the whole internal wiring is done properly together We will also check if. Refer to Appendix B for how to check the internal wiring. Once Please continue the confirmation work until B.4 and come back here. Check the operation of VCF and make adjustments. Then go back to B.6.

VCF operation check is done before adjustment. First, set all semi-fixed resistors to the midpoint.

The tools required to check the operation are as follows.

--Analog **2.0 system** - **Patch cable**

-Monitor **speaker**

Use a monaural 3.5mm-3.5mm cable for the patch cable. Prepare a monitor speaker with an amplifier.

Check the operation in the following order.

1. Does the sound signal pass through the VCF?

2. Does the cutoff frequency knob work normally?

3. Does it take resonance?

4. Is it modulated?

5. Is the envelope generator modulation successful? 6. Is it keyboard track? 7. Is the wiring of the external input jack of the sound signal correct?

2.7.1. Checking the continuity of the sound signal Now, let's start checking the operation. First, set the knob and cable as shown in Fig. 2-12. In this state, if the sound can be heard from the speaker, the flow of the sound signal is normal.

If there is no sound, follow the steps below to find the problem. -Is **the sound signal coming from the mixer board to the VCF In jack?**

--Is **the sound signal coming from the VCF In jack to the audio in terminal on the VCF board?**

-Is **the sound signal output from the Out terminal of the VCF board? If there was no signal here,**

The VCF module is malfunctioning. Please check the following points to find out the problem. Isolating the problem is relatively easy if you go from input to output.

Is the lifeline cable properly oriented and properly inserted? Is the power supply properly in the circuit? Measure the voltage between GND V + and GND V with a tester. Are both 12V coming? Is the polarity okay?

Is the copper foil on the board broken? Are there any defective soldering points? Are there any mistakes in installing the parts? Resistance value, semiconductor orientation, etc.

--Is **the wiring from the Out terminal of the VCF board to the VCF Out jack correctly?**

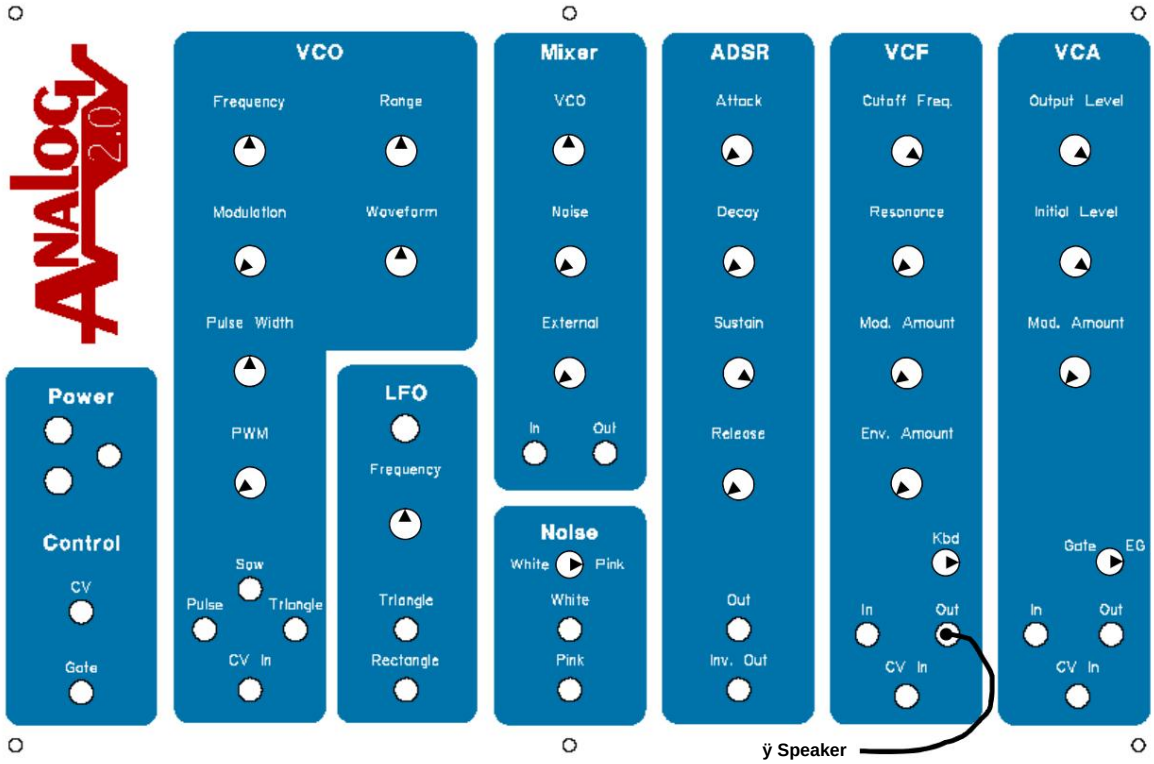


Figure 2-12 Initial state of VCF operation check

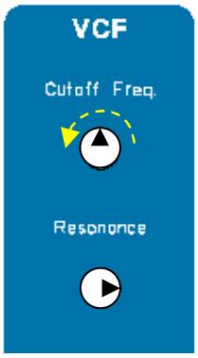
Since the path of the sound signal has been secured, we will check the operation of the VCF module while checking the area around the panel wiring.

2.7.2. Checking the operation of the cutoff frequency knob

First, check the operation of the cutoff frequency. In the initial state shown in Figure 2-12, the VCF cutoff frequency is set to the highest point. From here, turn the Cutoff Freq. Knob counterclockwise to lower the cutoff frequency. At this time, as the cutoff frequency decreases, the speed

It is normal if the sound coming out of the mosquitoes changes to a rounded and muffled sound. After checking, set the Cutoff Freq. Knob to the maximum again.

2.7.3. Confirmation of resonance operation



Next is the operation check of resonance. It was minimized in the initial state
Raise the Resonance knob to about 80% as shown in the figure on the left. In this state, turn the Cutoff Freq. Knob counterclockwise to reduce the cutoff frequency. This operation is the same as the confirmation operation earlier, but this time it should be a quirky sound like Myeongmyung.

Once you've verified the resonance, drop Cutoff Freq. Somewhere filtered and stop it for the next verification.

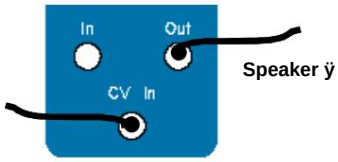
2.7.4. Modulation operation check

Move on to check the operation of the modulation. Set the knob as shown on the left To do. In this state, it is normal if the sound from the speaker is modulated to make it feel like it is screaming. If no modulation is applied, first check that the following modulation signal paths are wired correctly.

LFO Triangle output ÿ VCF CV In jack ÿ VCF board CV In terminal

The modulation signal is coming to the CV In terminal of the VCF board, and the modulation is If that doesn't work, try moving the Cutoff Freq. Up and down a bit.

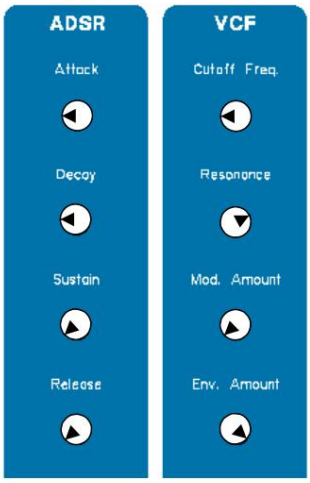
ÿ LFO
Rectangle



Speaker ÿ

By the way, let's check the wiring around the CV In jack. The position of the knob is that As it is, connect the CV In and the Rectangle output of the LFO with a patch cable as shown on the left. It is normal if the modulation of the filter changes from continuous to discontinuous. A place that doesn't change If so, check that the wiring per CV In jack is correct.

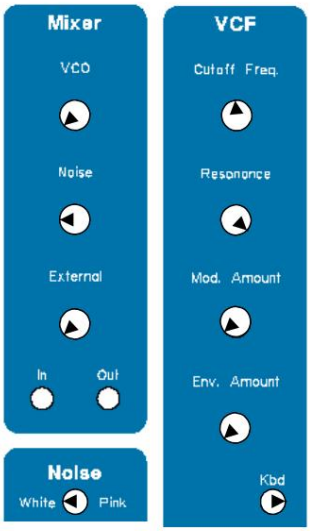
2.7.5. Envelope generator of generation modulation Confirmation



Next, check the modulation by the envelope generator. Set the cutoff frequency low and the modulation to zero, as shown on the left. Set Env. Amount to maximum so that it will be modulated by the envelope generator. Envelope generator has a shape with a clear attack

I will do it. In this state, input the gate signal to the system. Every time you turn on the gate, the sound you hear from the speaker is modulated into a "myon" feeling. Then it is normal.

2.7.6. Checking the keyboard track



Check the operation of the keyboard track. As shown on the left, change the mixer settings so that white noise enters the VCF. Cutoff frequency at midpoint, resonance at maximum, modulation and envelope modulation at zero to come. In this state, the speaker produces a sound with a sense of pitch. Turn the keyboard track switch 100% to put the CV into the system. It is normal if the pitch of the sound heard from the speaker changes as the CV changes. Then tilt the switch to the other side to set it to 50% track. Also, if you add a CV, it should slow down the follow-up to the CV. Neutralize the switch to 0% track. This time the pitch is unaffected by the CV Should be.

2.7.7. Check the wiring of the external sound input jack

With the work up to this point, we have confirmed the operation of the VCF module. There is only one more confirmation of the wiring of the In jack of the VCF panel. Keeping the above settings, use a patch cable to connect the SAW output of the VCO to the In of the VCF. It is normal if the sound heard from the speaker changes.

Up to this point, we have confirmed the operation of the VCF module.

2.8. Adjustment

After checking the operation and continuing the wiring check, I adjusted the VCF module before returning to B.6.

prize.

Follow the procedure below to make adjustments.

1. R22 resonance

2. R29 keyboard track

3. R19 cutoff frequency range

First, adjust the resonance. VCF oscillates when the resonance level is increased, and this adjustment determines the level at which oscillation starts. Set all the knobs of the mixer to the minimum, Stop the signal from Kisa. Set the modulation and envelope knobs to the minimum. Set the cutoff frequency knob to around the midpoint, and set the resonance knob to about 90%. This is the oscillation start level, so change the position as you like. Turn the semi-fixed resistor of R22 to the right until oscillation stops. When the oscillation stops, return the semi-fixed resistor to the left and stop it when the oscillation starts. This completes the resonance adjustment.

Next, adjust the keyboard track. Raise the level of resonance, and with oscillation occurring, push the keyboard track switch to the 100% side. This state

Then, input the reference voltage from the CV generator. When 1V changes, the oscillating pitch changes by 1 octave.

Adjust R29 so that it does not work.

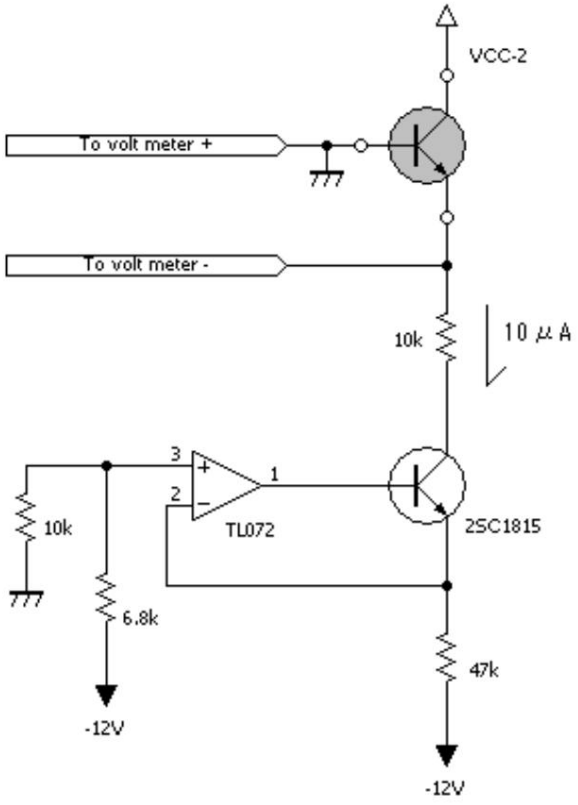
Finally, determine the cutoff frequency range. This is useful if you have an oscilloscope or frequency counter. Maximize the resonance, keep the VCF oscillating, and set the Cutoff Freq. Knob to maximum. Also, set the keyboard track switch to neutral OFF to stop the keyboard track. In this state, adjust R19 so that the oscillation frequency is about 15kHz to 18kHz. This range adjustment changes the usability of the VCF, so it's a place where you can express your taste. Even after adjustment, I feel uncomfortable while using it
If so, move R19 up and down to find the place you like.

This completes the VCF adjustment. Continue to return to B.6 and check the wiring between modules. Please.

After confirming that the modules are properly wired, the production of Analog2.0 is finally completed. Congratulations. Enjoy the sound of an analog synthesizer.

Appendix A. Transistor Matching Method

As I mentioned a little in Section 0, this time I will make a transistor ladder type VCF.
Then, if the characteristics of the left and right transistors are the same,
better performance can be obtained. This section describes how to match transistors to
find a pair of well-characterized transistors.



1. Assemble the measurement circuit as shown in Fig. A-1.
increase. Gray transistor measures
It is a target. It's easy to replace
Sea urchin socket or breadboard
You should use it.

2. Prepare dozens of transistors
And let it acclimatize to room temperature.

3. Insert the transistors one by one
into the socket and measure the
base-emitter voltage. This value is warm
Be careful not to touch the transistor
directly with your hands as it is sensitive to degrees.
give me.

4. Base-emitter voltage is ± 2mV
Matching is good if it is settled
I have taken it.

Figure A-1 Transistor matching circuit

In this way, find 4 pairs of matching transistors and use them on the left and right sides
of the transistor ladder circuit.

Appendix B. How to check the wiring between modules

With this document, you have completed all the modules of Analog2.0. Analog2.0 is a modular synth, but the modules are internally wired and designed to produce a single sound without patching. This section verifies that the wiring between the Analog 2.0 modules is correct. It's a lot of work and hard work, but if you wire the modules properly, the reliability of the synthesizer as a whole will improve, so please do your best to check it.

Please prepare the following for this operation check.

--CV **generator.**

-Patch **cable 3.5mm-A cable between 3.5mm monaural phone jacks.**

-Amplifier / **Speaker**

The input of the amplifier is a monaural 3.5mm phone jack.

-Continuity **checker**

-Oscilloscope _

Check the wiring in the following order from upstream to downstream of the signal.

--VCO _

-Mixer _

-Noise **generator**

--VCF _

--VCA _

-Envelope **generator**

B.1. Initial state of the

panel At the beginning of the panel, set the knobs and switches as shown in Fig. B-1. This section Ting is in the state that "the sound should come out anyway without doing anything".

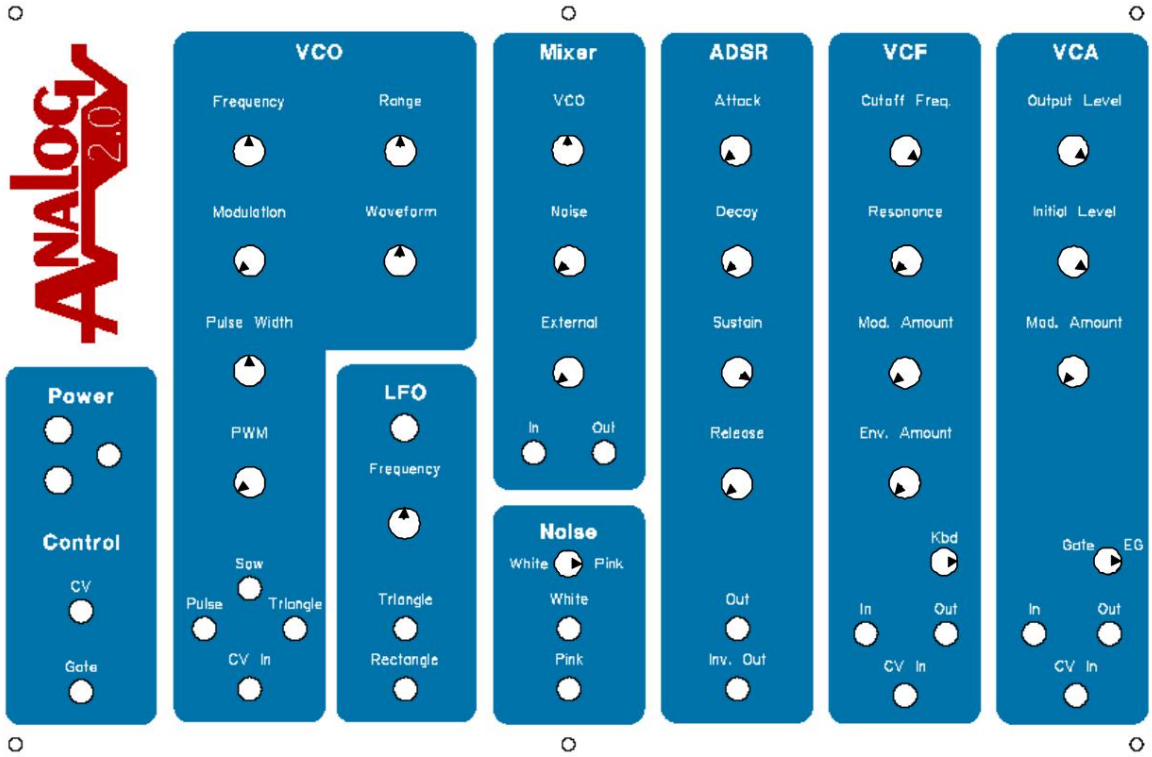


Figure B-1 Initial state of the panel when checking the internal wiring

B.2. Checking the VCO

wiring First, check if the VCO is wired correctly. Follow the steps below to check. 1. Is the output waveform from the board correctly wired?

2. Check the wiring around the CV

input 3. Check the PWM input part 4.

Check the connection part with the mixer

B.2.1. Checking each waveform output

First, plug the speaker with amplifier into the SAW output jack on the VCO panel. Departure

You should hear the vibrato. If you don't hear it, look for the problem as follows:

--Check **if the waveform is output from the VCO board. Oshirosco for SAW output of VCO**

Apply a loop and check if the waveform is output.

-Use a continuity checker to check the SAW output and SAW jack wiring on the VCO board .

Please. Also check that the polarity is correct.

In the same way, make sure that you can get the output from the Pulse output and the Triangle jack on the VCO panel.

B.2.2. Checking CV input

After checking each waveform output of the VCO, check the CV input side. Follow the procedure below.

1. Put a speaker with an amplifier in the SAW output and double-check that there is sound.
2. In this state, raise the Modulation knob on the panel to make sure that the VCO pitch is wavy.
   Please acknowledge. If it is not wavy, follow the steps below to isolate the problem. --First, check if the output is coming from the LFO--Next, check the wiring between the Triangle output of the LFO and the Mod In of the VCO. Also pay attention to the polarity.

3. Use a patch cable to connect the Rectangle output of the LFO to the CV input of the VCO to pitch.
   Make sure that the shaking is discontinuous.

B.2.3. Confirmation of PWM

After checking the wiring of the modulation input, check the wiring of the PWM input. Follow the procedure below.

1. Connect an oscilloscope to the VCO's Pulse output and use a pulse or square wave as a monitor.
   Confirm that it is displayed.
2. In this state, raise the PWM knob on the panel and check that the pulse width fluctuates.
   If it does not fluctuate, check the route of the Triangle output of the LFO ÿ the PWM In jack of the VCO panel ÿ the PWM In terminal of the VCO base.
3. With a patch cable, connect the Rectangle output of the LFO to the Mod In input of the VCO and check that the fluctuation of the pulse width is discontinuous.

B.2.4. Checking the connection to

the mixer Next, check the connection between the VCO and the mixer. Follow the procedure below to check.

1. Connect a speaker with an amplifier to the output of the mixer. 2.

Currently, the sawtooth wave is set to be output from the mixer output. Check if there is a sawtooth wave from the mixer output. It's safe to use an oscilloscope, but if you're used to it, you can make a judgment by listening to the sound. If there is no sound, check the wiring according to the following procedure.

ÿ Is there a waveform from the VCO? (2)
Is the rotary switch for waveform switching properly wired? (3) Correct the wiring of the mixer input jack from the rotary switch for waveform switching.

The squid?

ÿ Is the wiring from the mixer input jack to the mixer input correct? ÿ Is the wiring from the mixer output to the mixer output jack correct?

3. Turn the waveform selector switch to the right to switch to a triangular wave. Triangle wave from mixer output Make sure it comes out. If not, check the wiring and signal between the waveform switch from the VCO's triangular wave output.

4. Turn the waveform selector switch counterclockwise to switch to a pulse wave. Pulse from mixer output Make sure the waves come out. If not, check the wiring and signal between the waveform selector switches from the VCO's pulse wave output.

This completes the wiring check around the VCO.

B.3. Checking the mixer wiring

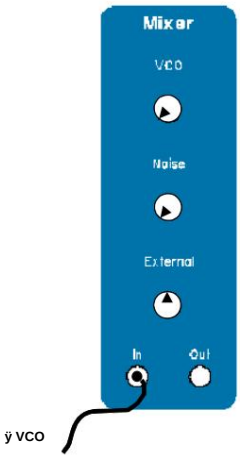
Next, check the mixer wiring.

In the initial state of confirmation, the VCO input is increased as shown in the figure on the left. In this state, the operation check of the input from the VCO has already been completed. 3 systems of input We will check the remaining two systems in sequence.

B.3.1. Checking the noise input

Decrease the VCO level to increase the noise level. Noise from mixer output Is OK if it appears. If there is no noise, the white output of the noise generator board ÿ noise type off Check if the wiring is correct in the order of the replacement switches.

B.3.2. Confirmation of external input



Pull a patch cable from the VCO's output jack and connect it to the mixer's input end.

Raise the level only for the External knob to output the VCO.

If you get, it's OK. If there is

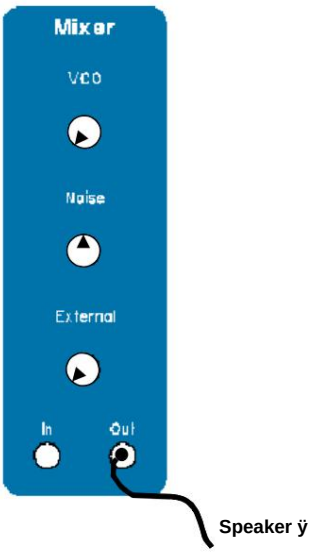
no output, check that the wiring from the mixer's external input jack to the mixer is

correct. This completes the wiring check around the mixer.

B.4. Checking the wiring of the noise generator /

generator Although some checks have already been completed by checking the wiring of the mixer, the noise generator continues.

Check the wiring of the data.



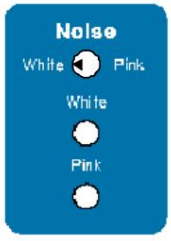
To check the noise generator, follow the procedure below.

-Reconfirm **the internal wiring of white noise-Check**

the **internal wiring of pink noise-Check the** white

noise output jack-Check the **pink noise output jack**

B.4.1. Checking the connection to the mixer

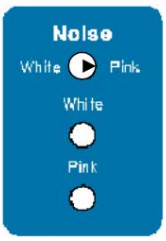


First, set the mixer knob so that only noise is output, and then connect the output to the

speaker. In this state, move the noise generator switch to the White side as shown in the figure

above. This has already been confirmed, but it is OK if white noise comes out from the speaker.

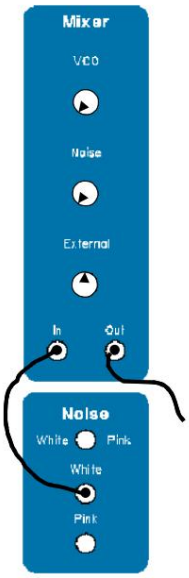
B.4.2. Checking the internal wiring of pink noise



Push the noise generator switch to the Pink side. It's OK if the sound switches to pink noise. Pink noise is lower than white noise

It's a heavy sound.

B.4.3. Checking the white noise output



After checking the wiring to the mixer, check the wiring of the output jack.

First, lower the noise level of the mixer and raise the level of External.

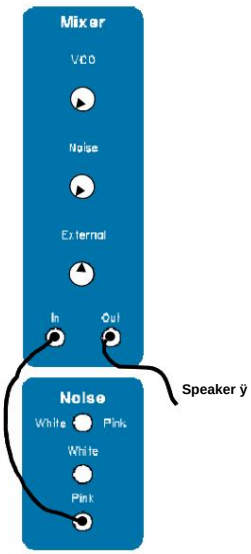
when.

With a patch cable, the White output of the noise generator and the input of the mixer Connect.

In this state, it is normal if white noise is heard from the speaker.

If the sound does not come out well, the White output of the noise generator board and Check the wiring between the White jacks.

B.4.4. Checking the pink noise output



Change the noise generator side of the patch cable from White to Pink.

In this state, it is normal if pink noise is emitted from the speaker.

If the sound does not come out well, Pink output of the noise generator board Check the wiring between the force and the Pink jack.

Now you have confirmed the wiring around the noise generator.

B.5. Wiring check of

VCF Since VCF is a module to be manufactured this time, it is necessary not only to check the wiring but also to check the operation of the module itself and make adjustments. See section 2.7 of the text for VCF. After confirming 2.7, please come back here and continue the confirmation work.

B.6. VCA wiring check

Next, VCA wiring check. Work in the following order.

1. Check if the sound signal passes through the module

2. Check if the signal can be input from the external sound signal input jack 3. Check the modulation 4. Check if the signal can be input from the external modulation input jack 5. Check the wiring around the envelope generator

B.6.1. Checking the

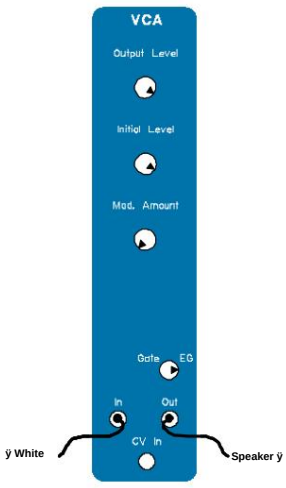
continuity of the sound signal First, check that the path of the sound signal is properly wired.

First, return the panel settings to the initial state shown in Figure B-1. In this state, connect a speaker with an amplifier to the Out terminal of the VCA. If you can hear the sound from the speaker, it's OK. If you ca

Look for the problem in the order of.

(1) Is a signal output from the Out terminal of the VCF board? ÿ Does the signal reach the In jack of VCA? (3) Is the signal reaching the Audio In terminal on the VCA board? Is the polarity of the connection correct? (4) Is a signal output from the Audio Out terminal on the VCA board? ÿ Is the wiring to the Out jack of VCA correct?

B.6.2. Confirmation of external sound input



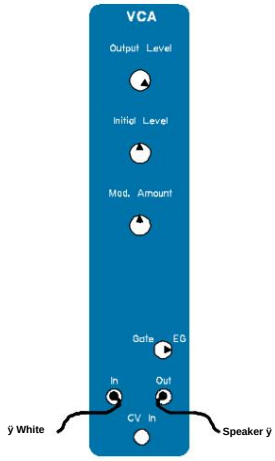
Next, check if the In Jack works properly.

As shown on the left, the VCA In jack and noise generator Connect the White output. White noise from the speaker If you can hear it, it is normal.

If you can't hear it, rewire the VCF to VCA

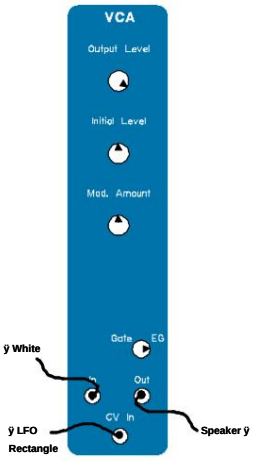
Please acknowledge.

B.6.3. Confirmation of modulation



After confirming the sound signal path, check the modulation wiring.
Move the position of the VCA knob as shown on the left.
In this state, it is normal if you can hear white noise with a loud wave
from the speaker. If it does not undulate, check the following
Do it and find the problem. (1) The
Triangle output of the LFO board is at the CV In jack.
Are you ready?
ÿ Is the wiring around the CV In jack correct? (3) The
signal from the CV In jack is the Audio In terminal on the VCA board.
Have you reached? Is the polarity of the connection to the terminal correct?

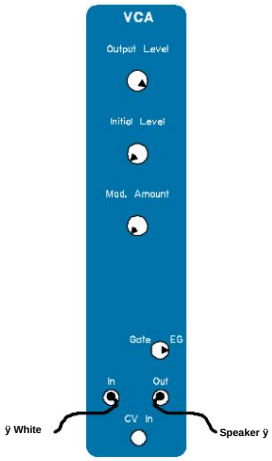
B.6.4. Checking the external modulation input



Also, make sure you can use the CV In jack correctly.

Use another patch cable to connect the Rectangle output of the LFO to
the CV In of the VCA. In this state, you can hear from the speaker
It is OK if the volume of the noise is discontinuously wavy. If something
goes wrong, check the wiring around the CV In jack.

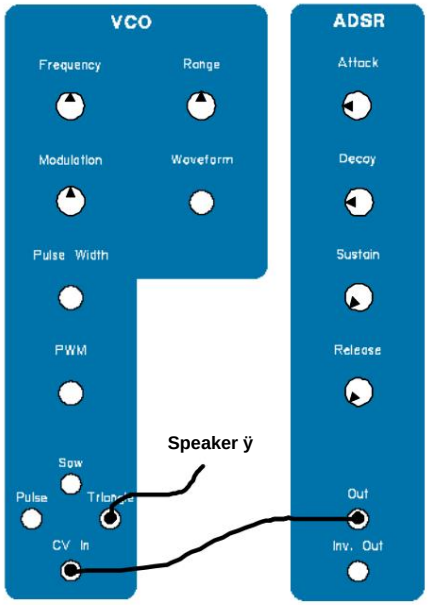
B.6.5. Envelope generator around the generator Check



At the end of the VCA verification process, check the wiring around the
envelope generator. Unplug the patch cable that came with the CV In to
minimize the Initial Level and Mod. Amount levels.
will do. In this state, there should be no sound.

Now put some gate signal into the system. MInI
It is convenient to use Board. When you put in the gate signal, you
should hear sound from the speaker. If it does not come out, Gate / EG switching switch
Check the wiring around the chi.
Next, push the switch to the Gate side. In this state, respond to Gate
It's OK if you can hear the sound output.

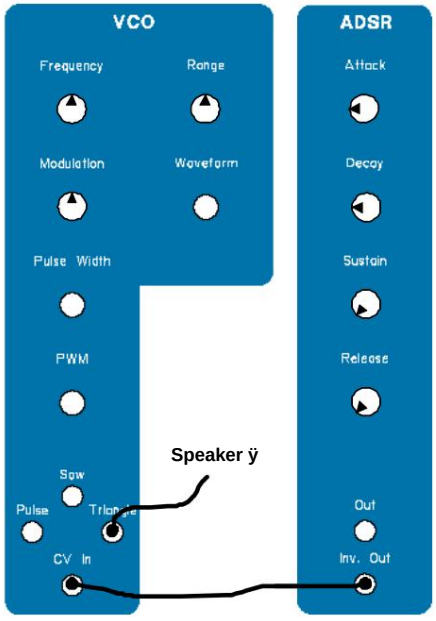
B.7. Envelope generator wiring Check the generator



With the work so far, the inside of the envelope generator Wiring has been confirmed. Finally, only a little wiring of the envelope output jack remains. Let's do our best and check it out.

Only use the VCO and EG for verification. Set the patch and knob as shown on the left. The knobs that can be set regardless of this work are white.

In this state, input the gate signal. It is normal if the pitch goes up with the pattern of EG. If not, check the wiring between the EG output and the Out jack.
when.



Finally, check the envelope inversion output jack.
increase. Reconnect the patches as shown on the left. It is normal if you put in the gate and the pitch goes down as the EG pattern goes down. If it does not go down, check the wiring on the EG Inv. Out jack.

This completes the wiring confirmation of the Analog 2.0 system.