Analog 2.0 documentation

Vol. 4

Manufacture of noise generator and mixer

Version: 2.2

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1. About this document

This document is **a noise generator for the analog synthesizer system Analog** 2.0 .

And I will explain how to make a mixer module.

Before reading this document, read the Starter Kit manual to get **the basics** of Analog 2.0 .

Please understand the general structure.

This document also includes the panel, power supply module, and lie included in the starter kit.

It is written on the assumption that the fly has already been assembled.

Change log

Version date		Changes
2.0	2009/11/19	Analog2.0 **Document version** 2.0 -Review **the circuit design.** -Revised **the document accordingly.**
2.1	2009/12/10 **Corrected the mistake in the circuit diagram and parts list** Q2	
	(false) 2SC1015 (positive) 2SA1015	
2.2	2009/12/29 **Changed the circuit diagram and circuit constant of parts list** C11	
	(Before change) 51pF (After change) 47pF	

2. Manufacture of noise generator and mixer 2.1. Production

flow - **Obtaining** parts - **Installing parts on** the board - **Installing panel parts-** Checking **the wiring of the board-Checking** the **operation** - **Adjustment**

2.2. Outline of the module to be manufactured

Function

In this article, we will build a noise generator and mixer module.

As the name implies, the noise generator is a module that outputs noise. This is the first sound source created by Analog 2.0.

A mixer is a module that inputs electrical signals from a sound source and outputs a signal that is a mixture of them . In Analog2.0 , **the VCO / noise generator and external signal are input, and the output is** sent to the VCF .

Positioning within the system

Figure 2-1 shows the positioning of the noise generator and mixer in the configuration of the Analog 2.0 **production system.**

Synthesizer modules can be categorized as sound sources, CV sources, and sound processing modules, depending on their role. The noise generator is a sound source, and the mixer is a processing module that mixes the sound sources.

The output of the noise generator is internally connected to ch.2 of the mixer. The output of the mixer **will be connected to the VCF in a later article,** but at this stage it will not be connected.
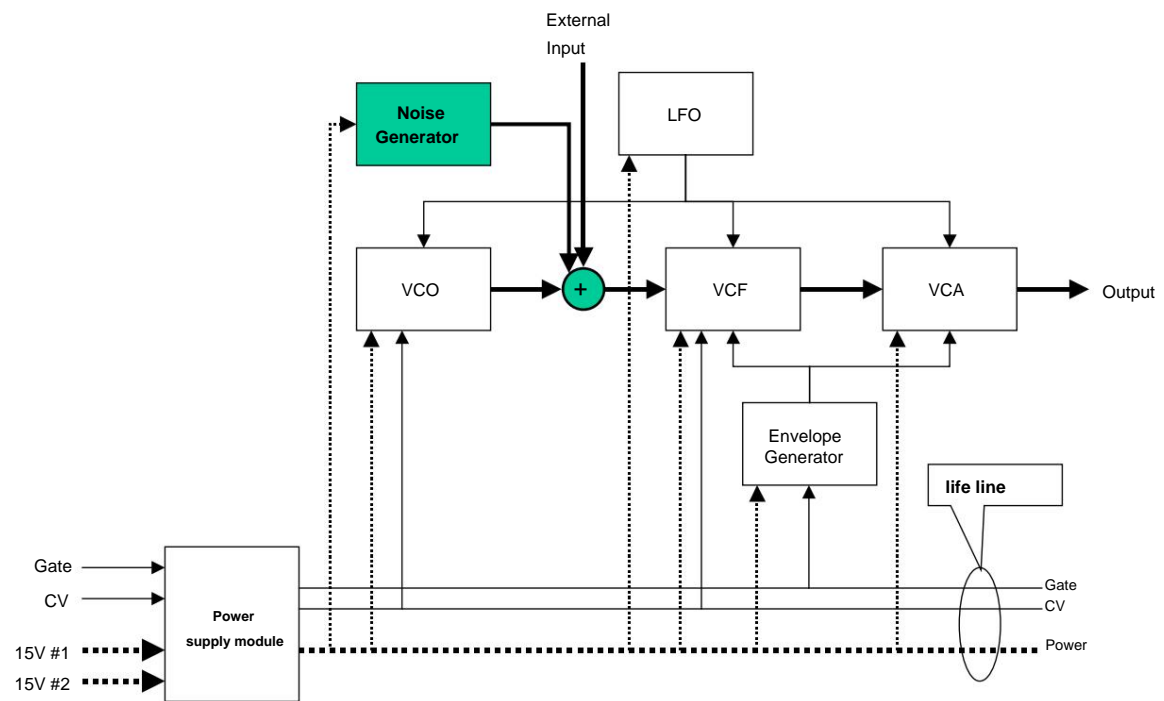
Figure 2-1 **Positioning of noise generator and mixer**

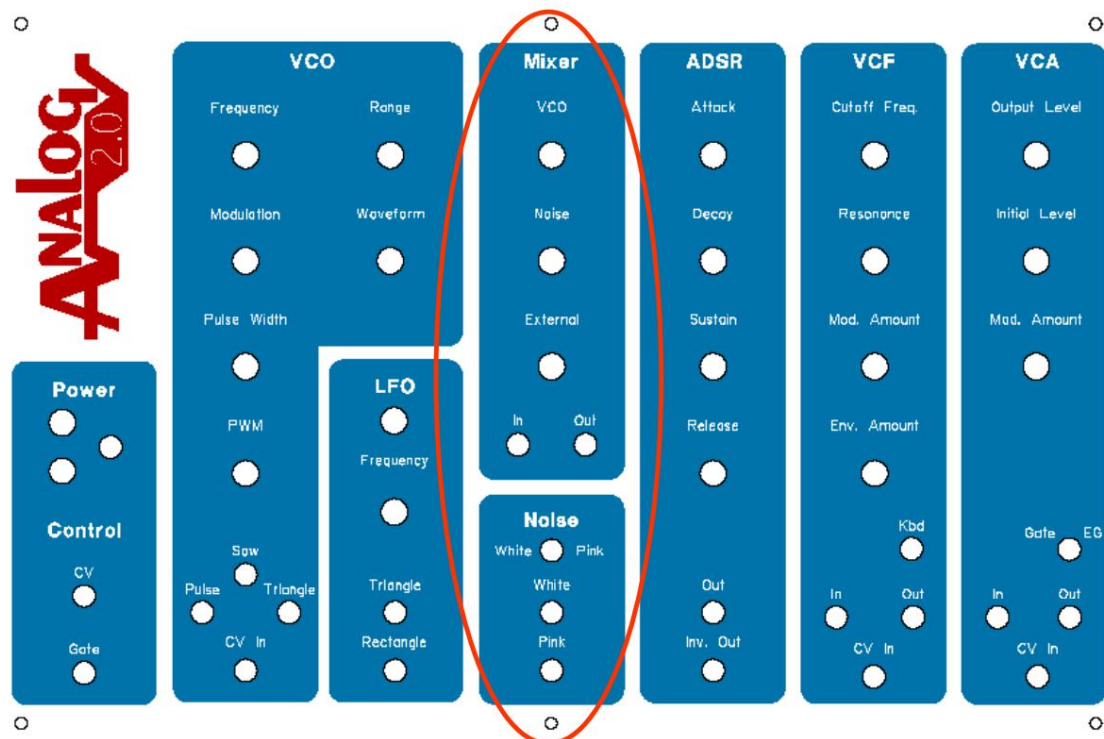**In the panel, it is positioned as** shown in Figure 2-2 .

Figure 2-2 **Positioning in the panel**

specification

Noise generator The

specifications of the noise generator are as follows.

-Output **waveform: white noise and pink noise**

-Maximum **output level: ± 5V**

-Input : **None**

There are various types of noise depending on its nature, but this module is

It produces two types of noise, called white noise and pink noise.

White noise is the same level at all frequencies when the frequency components are analyzed.

It is noisy and sounds like a "sir".

Pink noise can be found in any frequency band by dividing the frequency components into bands separated on the logarithmic axis.

Noise with the same energy, called "go" that feels a little muffled than white noise.

It sounds like a humming sound.

Mixer

The specifications of the mixer are as follows.

--3- **channel input**

·   1 **channel output**

-Level **control is possible for each input.**

-Maximum **input / output voltage level: ± 10V**

Panel design

Figure 2-3 **is an example of the panel design of the noise generator / mixer section. In this example, noise**

The generator output is **internally connected to** ch.2 **of the mixer via the white / pink selector switch.**

It has been. Apart from that, it has a patch output terminal for each of white and pink. Mixer

Inputs VCO to ch.1 **and external signal to** ch.3 **in addition to the noise generator . External communication**

The **number is input from the In patch terminal, and the mixer output is internally connected to the module in the subsequent stage.**

It also has a patch output terminal.
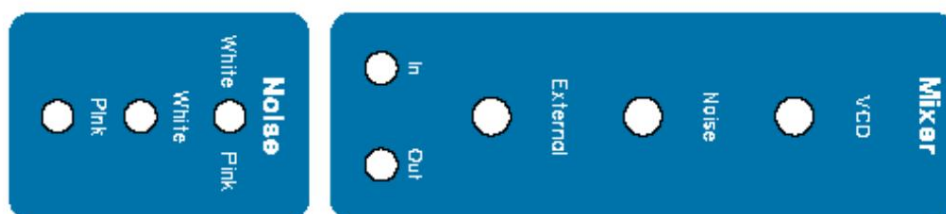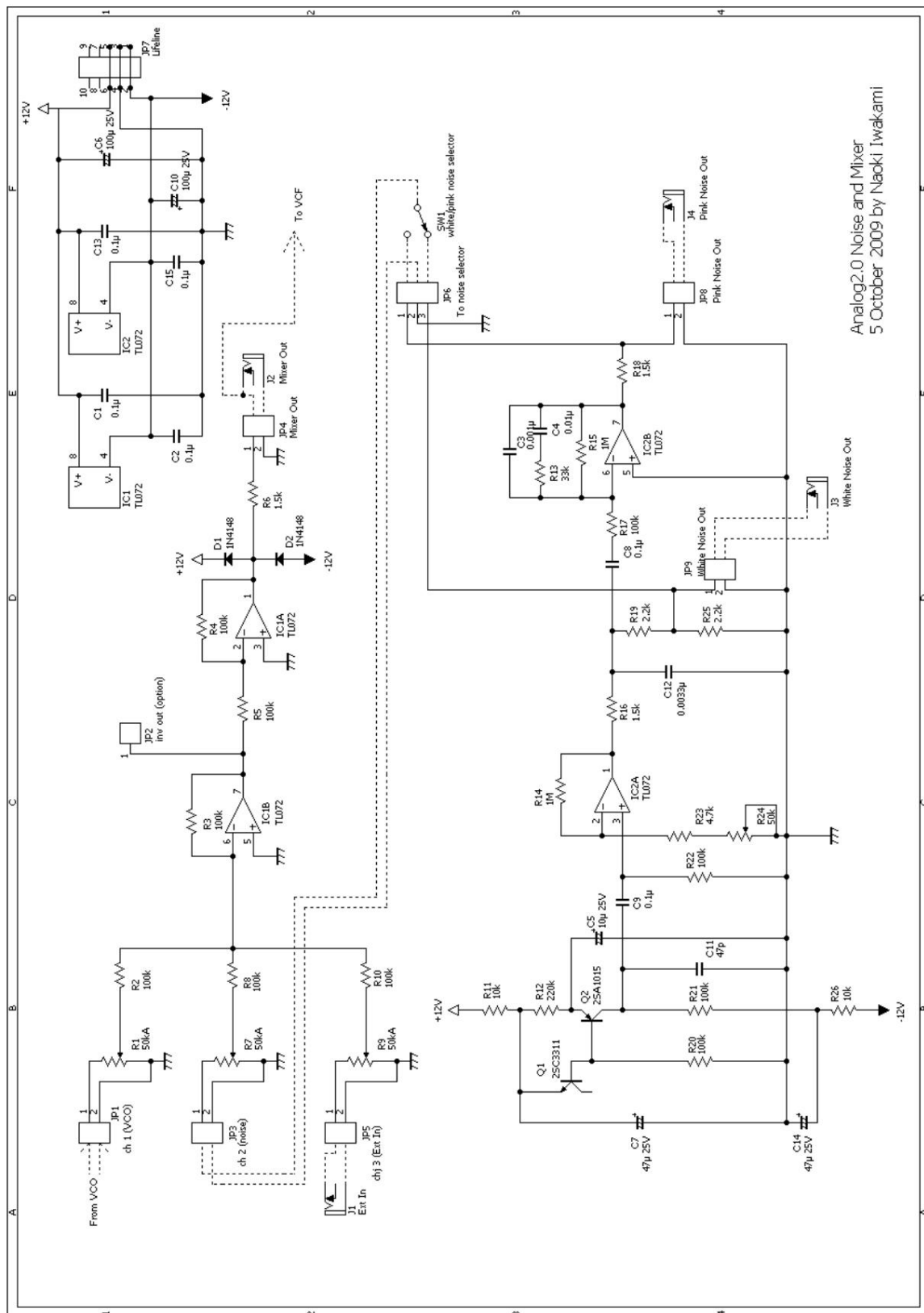

Figure 2-3 **Mixer / noise generator Panel design example**

circuit

The circuit diagram of the power supply circuit to be manufactured is shown in Figure 2-4 .

Figure 2-4 **Noise generator Mixer module circuit diagram**

2.3. Obtaining parts

The parts required for production are as follows. When making, first get these parts

please. This parts list includes not only the parts to be placed on the module circuit board, but also the parts to be placed on the module circuit board.

It also includes switches and jacks that attach to the panel. In addition, the knob is in the parts list.

Is not included. Get the knobs as you like.

Table 2-1: **Noise generator: Parts required for manufacturing the noise generator / mixer circuit**

Part number	Device name	Value / model number	Remarks
C1	Multilayer Ceramic Capacitor 0.1ÿF Multilayer		
C2	Ceramic Capacitor 0.1ÿF		
C3	Polyester capacitor	0.001ÿF	
C4	Polyester capacitor	0.01ÿF	
C5	Electrolytic	10ÿF 25V	
C6	Capacitor	100ÿF 25V	
C7	Electrolytic	47ÿF 25V	
C8	Capacitor Electrolytic Capacitor Polyester Capacitor	0.1ÿF	
C9	Polyester capacitor	0.1ÿF	
C10	Electrolytic	100ÿF 25V	
C11	capacitors Ceramic	47pF	
C12	capacitors Polyester capacitors	0.0033ÿF	
C13	Multilayer ceramic capacitor 0.1ÿF		
C14	Electrolytic capacitor	47ÿF 25V	
C15	Multilayer ceramic capacitor 0.1ÿF		
D1	diode	1N4148	
D2	diode	1N4148	
IC1	Op amp	TL072	
IC2	Op amp	TL072	
JP1	Pin header 2.5mm pitch	2P	ch 1 (VCO)
JP2	Pin Header 2.5mm Pitch Pin	1P	inv out (option)
JP3	Header 2.5mm Pitch	2P	ch 2 (noise)
JP4	Pin header 2.5mm pitch	2P	Mixer Out
JP5	Pin header 2.5mm pitch	2P	chj 3 (Ext In)
JP6	Pin header 2.5mm pitch	3P	To noise selector
JP7	Box pin header 2.5mm	2x5P L-shaped Lifeline	

JP8	Pin header 2.5mm pitch	2P	Pink Noise Out
JP9	Pin header 2.5mm pitch	2P	White Noise Out
Q1	Transistor	2SC3311	
Q2	Transistor	2SA1015	
R1	Variable resistor	50kÿA	
R2	Carbon resistance 1 / 4W	100kÿ	
R3	5% Carbon resistance 1 / 4W 5%	100kÿ	
R4	Carbon resistance 1 / 4W	100kÿ	
R5	5% Carbon resistance 1 / 4W 5%	100kÿ	
R6	Carbon resistance 1 / 4W 5%	1.5kÿ	
R7	variable resistance	50kÿ A	
R8	Carbon resistance 1 / 4W 5%	100kÿ	
R9	variable resistance	50kÿ A	
R10	Carbon resistance 1 / 4W	100kÿ	
R11	5% Carbon resistance 1 / 4W 5%	10kÿ	
R12	Carbon resistance 1 / 4W 5%	220kÿ	
R13	Carbon resistance 1 / 4W 5%	33kÿ	
R14	Carbon resistance 1 / 4W	1Mÿ	
R15	5% Carbon resistance 1 / 4W 5%	1Mÿ	
R16	Carbon resistance 1 / 4W	1.5kÿ	
R17	5% Carbon resistance 1 / 4W 5%	100kÿ	
R18	Carbon resistance 1 / 4W 5%	1.5kÿ	
R19	Carbon resistance 1 / 4W 5%	2.2kÿ	
R20	Carbon resistance 1 / 4W	100kÿ	
R21	5% Carbon resistance 1 / 4W 5%	100kÿ	
R22	Carbon resistance 1 / 4W	100kÿ	
R23	5% Carbon resistance 1 / 4W 5%	4.7kÿ	
R24	Semi-fixed	50kÿ	
R25	resistance Carbon resistance 1 / 4W 5%	2.2kÿ	
R26	Carbon resistance 1 / 4W 5%	10kÿ	

Part number	Device name	Value / model number	Remarks
J1	3.5mm mini jack		Ext In
J2	3.5mm mini jack		Mixer Out
J3	3.5mm mini jack		White Noise Out

J4	3.5mm mini jack		Pink Noise Out
SW1	3P toggle switch		white/pink noise selector

Precautions when obtaining parts

As much as possible, the parts are made up of those that can be obtained at stores in Akihabara, but especially the following parts

However, you need to be careful when you get it.

volume

Be **aware that the Analog 2.0 board will be attached directly to the panel.**

It is designed. Use the volume to attach to the panel

It is done. Therefore, when attaching the panel directly, the volume

There are restrictions on the shape of the mud. Board vertical with terminal pitch of 2.5 mm

Use a mounted volume. At stores such as Akihabara

Is available in green Alpine volumes. With this

It doesn't matter, but the claws that fix the main body to the board as shown in Fig. 2-5 .

The ki type is stronger and recommended. How to get

Has information on **the** analog 2.0 **site.**

http://gaje.jp/analog20/

In addition, the volume has a difference in the relationship between the rotation angle of the shaft and the resistance value.

There are several types such as A **curve, B curve, C curve, D** curve, etc.

It has been. All the ones used in this production are A **curves. A**

You can use the D **curve for what is designated as a** curve.

Hmm. Please keep this in mind when obtaining it.

Transistor 2SC3311 2SC3311 **This transistor is used to generate white noise.**

vinegar. Since the output noise varies depending on the individual, obtain more than one.

You may want to select the one with the best results. just

However, the characteristics of the transistor once used as a noise source have changed.

Please note that it cannot be reused in a normal circuit.

when.

Operational amplifier TL072

TL072 is specified for the operational amplifier, but the pinout is the same.

If so, you can use another one. For example, NJM4558,

You can also use NJM4580, NE5532, **etc.**

2x5 **box pin header** Use **L-shaped lead wires as much as possible.**

When using the straight type, pay attention to the direction of the notch when installing.

Please to mind.

Knob

Knobs are parts with different tastes, so I dare to use this document.

Does not specify the model number. Please select according to your preference.

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The shaft diameter of the volume used for production is 6 mm , **and any knob**

that matches this can be used. For reference, in the prototype,

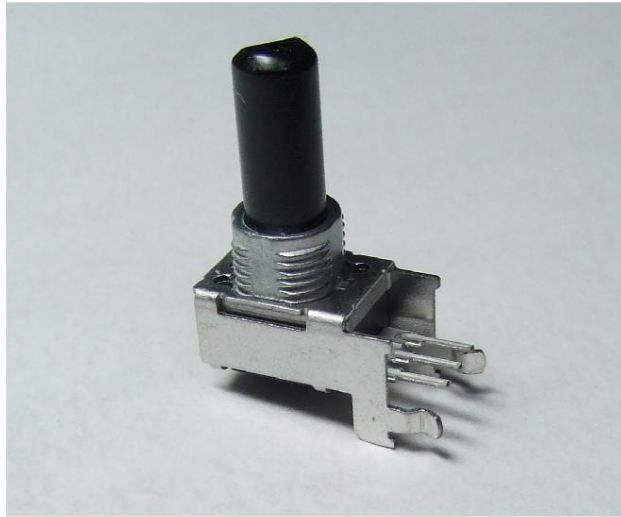I am **using the product number** MAV B-15 .

Figure 2-5 **Volume used for production**

2.4. Substrate manufacturing

Figure 2-6 **is the wiring diagram of the printed circuit board to be manufactured this time. The line connecting the**
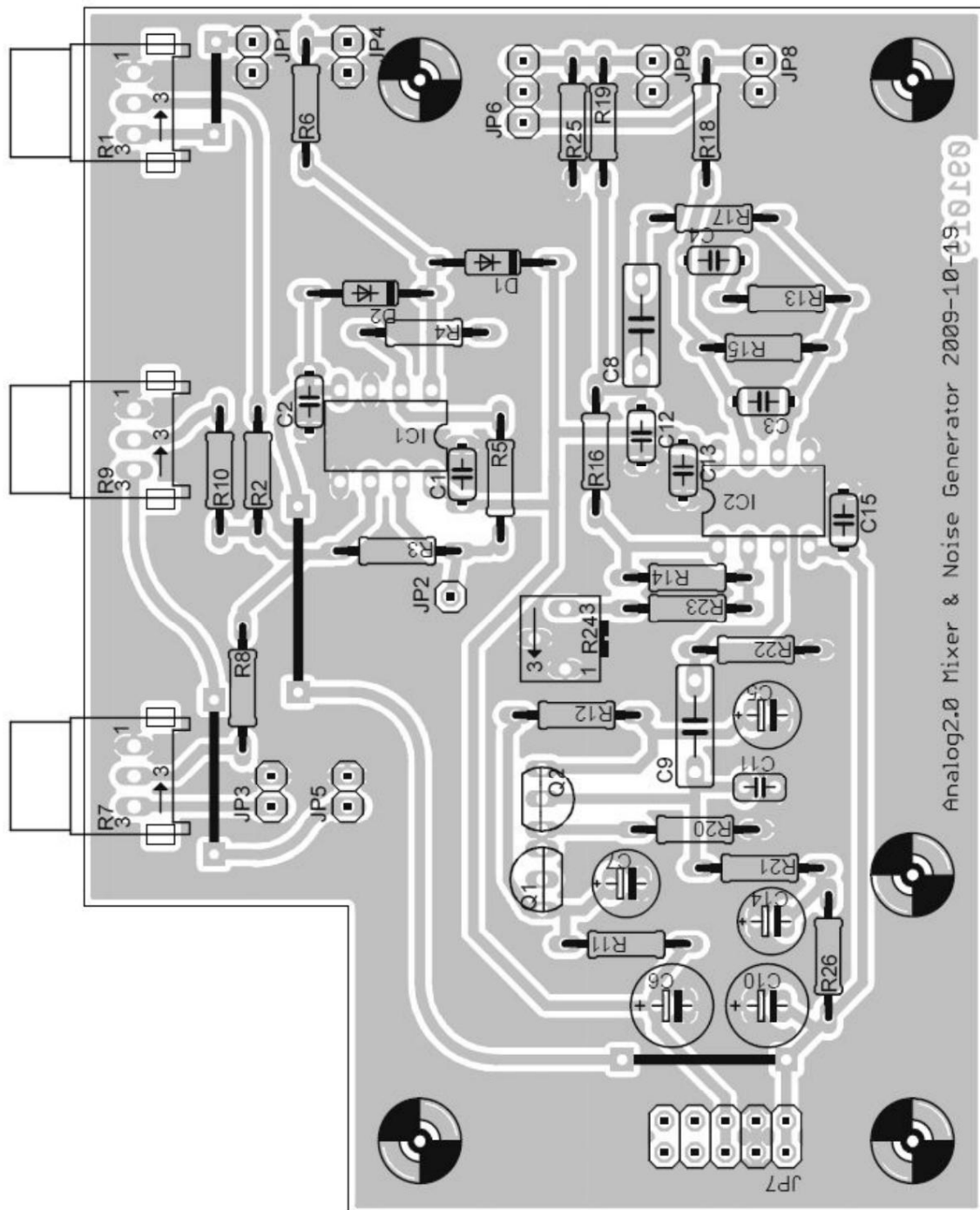
square lands is the jumper line.

Figure 2-6 **Wiring diagram of noise generator / mixer board**

2.5. Attaching parts to the board

When the board is completed, attach the parts by referring to the wiring diagram in Fig. 2-6 . **Basic arrangement**

For the line method, refer to Document vol.3 Appendix B. There are some caveats.

-The **red line drawn in the wiring diagram shows the jumper wire. As shown in the red line, use a**
   lead wire that has been cut down from the resistor, or a 0.6 mm **tin-plated wire or solder-plated wire.**
    Please connect.

-This **time too , there are polar parts such as ICs, transistors, and electrolytic capacitors. Direction**
   Be careful not to make a mistake when wiring.

2.6. Attaching the board to the

panel After attaching the board parts, wire the parts to be attached to the panel (parts outside the

board). Connect **the pin header and the switch / mini jack with lead wires as shown in Figure** 2-7 . **VCO input end**

The child and the end of the output jack are not connected because the module of the connection partner has not been manufactured yet.

Please leave it. In the actual

wiring diagram shown in **Fig.** 2-7 , **the lead wires are largely routed to make the connection easier to**

see, but in actual wiring, try to make the lead wires as compact as possible. The photo in Figure

2-8 is an actual wiring example. Figure 2-9 is an image of mounting on a panel. As you can see

from the photo, the board is fixed by tightening the volume shaft with nuts.

caution! The notation of "ch2 in" **and** "ch3 in" **on the silk screen of the board is reversed. JP3**

Is written as ch2 in and JP5 **is** written as ch3 in , **but it should be correct.**

JP3 = ch3

JP5 = ch2

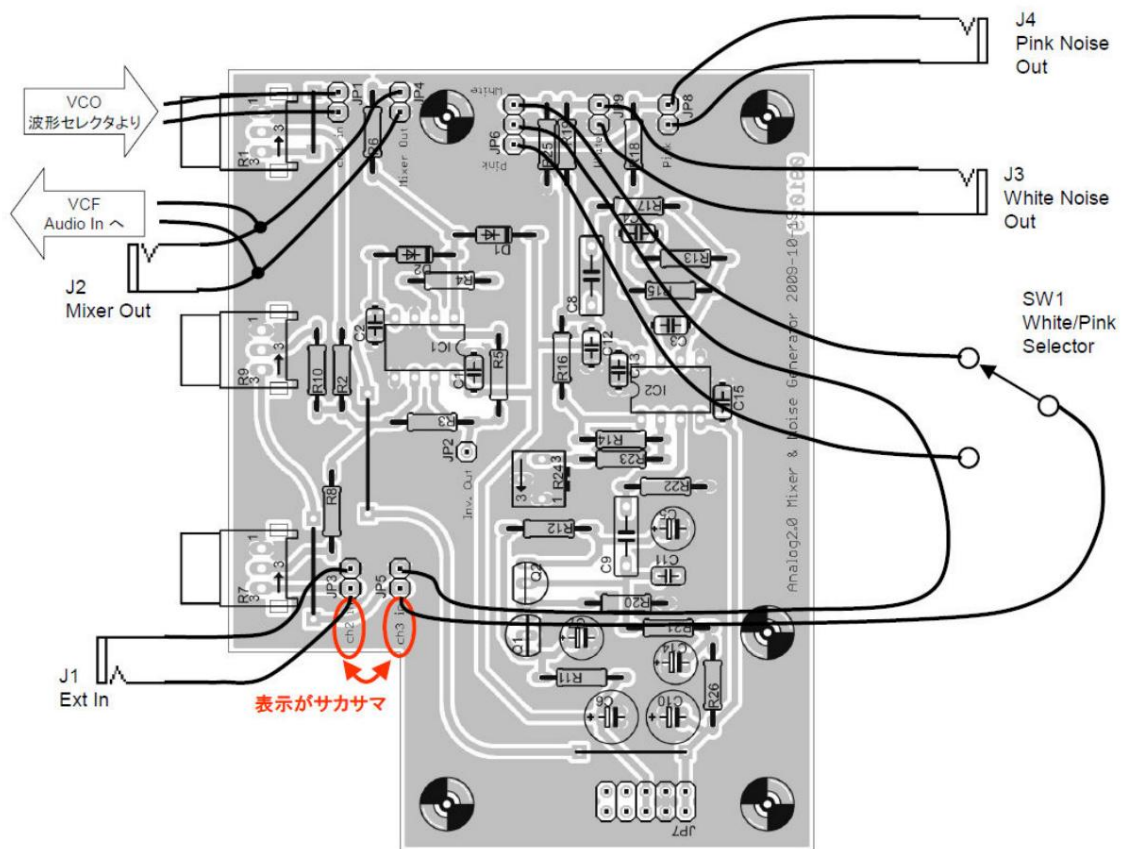**is. Put the noise generator signal in** JP5 (ch2) .

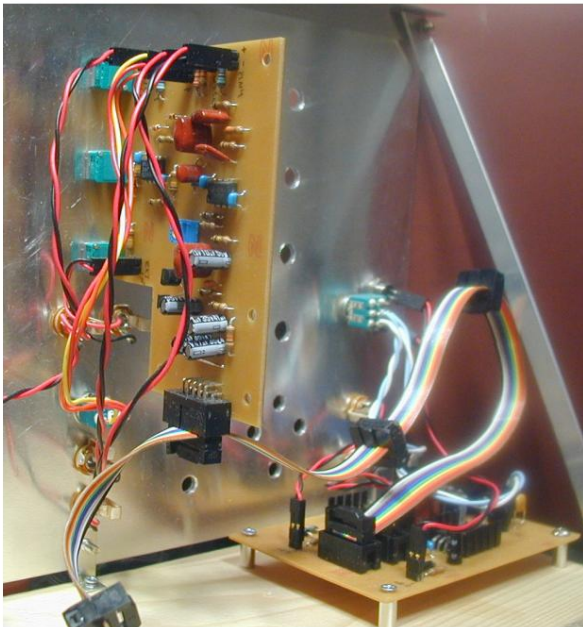**Figure** 2-7 **Wiring of panel parts**

Figure 2-8 **Wiring example of power supply module**

Figure 2-9 **Implementation example on the panel**

2.7. Checking the wiring on the board

This completes the assembly of the noise generator / mixer circuit. I'd like to move it right away, but don't turn it on yet. 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. Check the checklist below to make sure the wiring is correct.

[] 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?

[] Are IC1 and IC2 installed in the correct place 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.
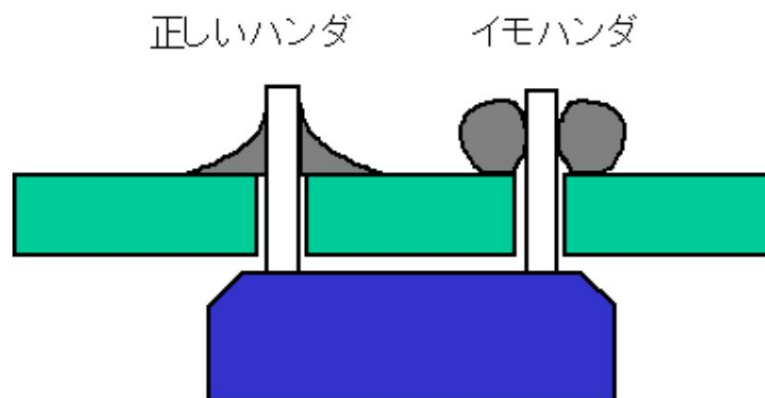

正しいハンダ　　　イモハンダ

Figure 2-10 **Correct solder and immo solder**

2.8. Operation check and adjustment

Now, let's check the operation. Let's make some adjustments as well. The adjustment point this time is one

It is a place.

Before turning on the power, make the following

preparations. -Prepare **a mini speaker and an amplifier. The amplifier can input sound using a mini plug.**

   Please use the one. A simple one such as for a PC is fine. **On the contrary, use high-class ones**

   If it is damaged in an accident, the damage will be great, so a simple one may be more suitable.

   Also, monaural is sufficient for playback.

-Make **sure the board is secured to the panel.** -Make **sure the power**

switch is off, then power module and noise mixer module

   With a lifeline cable.

ÿÿConnect the two AC adapters **to the** DC **jack of the power supply, and it's finally time to turn on the power.**

Follow the procedure below to check and adjust the operation.

1. Insert the amplifier / speaker mini-plug into the white **output of the noise generator . Speee**

   Monitor the sound from the mosquitoes and make sure you hear a sir.

2. **Turn the semi-fixed resistor of the module and find the point where the tone is the best and the maximum output can be obtained. The tone is**

   If it does not change, you can fix it to the maximum volume. If you can see the waveform on the

   oscilloscope, adjust so that the maximum output point is about 5V .

3. Insert the amplifier / speaker mini-plug into the pink **output of the noise generator . Speee**

   Monitor the sound from the mosquitoes and make sure you hear a go.

4. Insert the **amplifier / speaker mini-plug into the Mixer** Out . **All the volume of the mixer**

   Squeeze to the lowest. Make sure there is no sound from the speaker.

5. **Turn the output switch of the noise generator to** white **and turn the noise volume of the mixer** to white.

   Gradually raise it. Confirm that white noise is output.

6. **Keep the noise volume level at maximum and switch the noise generator to** pink

   Tilt to the side. Confirm that the mixer output switches to pink noise.

7. **Minimize the noise volume of the mixer, and output one of the noise generators and the mixer.**

   Connect **the** In **with a patch cable. Confirm that a noise sound is output by gradually increasing the**

   external volume of the **mixer .**

At this point, the production of the noise generator / mixer module is complete. congratulations
Thank you.