Lot.No.

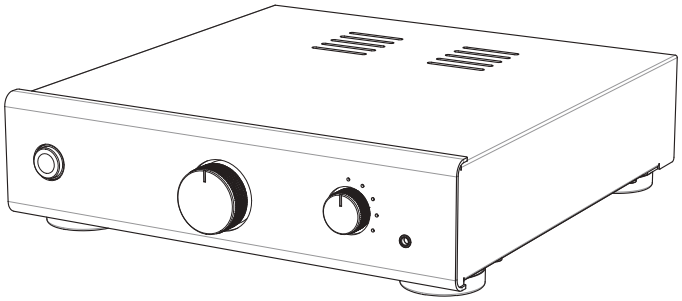
Tube Preamp Kit
TU-8450
Assembly Instruction Manual

●Contents

1. Overview

This is a preamplifier kit with a built-in phono equalizer amplifier.

- Uncompromising measures have been taken for reduction of power supply hum and noise, i.e., a low leakage flux R-core transformer adopted for the main power supply, FET ripple filters for B-power and DC heater supply.
- 12AU7(ECC82) tubes are adopted for the flat amp stage, and the gain is set at approx.13.6dB (approx. 4.8 times), the most versatile range of gain. (It is possible to set it to approx.9.5dB (approx.3 times)
- Low noise OP amp has been selected for the equalizer amp stage. (IC socket offers easy exchange with other commercially available OP amp ICs).
- CR equalizer circuitry is used for its renowned sound quality. Supports both MM and MC phono cartridges.
- "REC-OUT" is equipped just after the input selector for the purpose of recording by a device such as AD converters or tape decks. (LINE 1-4 can also be used as a passive selector even when the preamplifer power is OFF.)

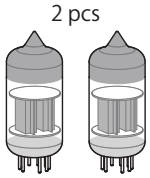


There are two types of kits:
"kit including tubes" TU-8450 and
"kit without tubes" TU-8450N.

In case of "kit without tubes", you must provide your own vacuum tubes.

See page 21 for details.

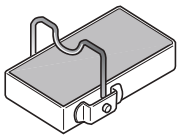
Voltage amplifying tubes
12AU7
(ECC82, 6189)
2 pcs



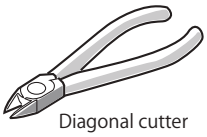
2. Necessary tools

Soldering iron
(Approx.30W)
* Quick heating type is recommended.

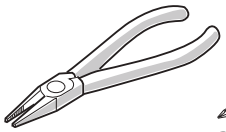
Solder
(for electronic parts)
(diameter 0.8 to 1.2mm is recommended)
* DO NOT USE SOLDERING PASTE!



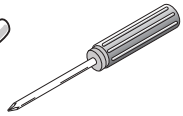
Soldering iron stand



Diagonal cutter



Long-nose pliers

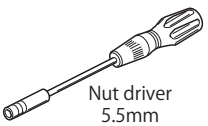


Philips screwdriver
(No.2)

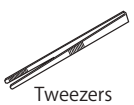
Scissors or pen knife

File
or
sand paper

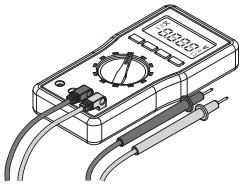
Helpful tools



Nut driver
5.5mm



Tweezers
(Also useful for labeling)



Multimeter
(Optional voltage and connection check is suggested. Both analog and digital are OK.)

EK JAPAN CO.,LTD.
E-mail : info@elekit.co.jp
https://www.elekit.co.jp/en

3. Assembly precautions - Be sure to read for safety assembly.

For your own safety, please read this "Assembly Instruction Manual" carefully before you begin assembling the preamplifier. Please follow the instructions step by step for correct assembly and operation check. Keep this manual close at hand.

◆Do not work near any source of water. Failing to do so may cause fire and electric shock.

◆Do not put containers with water on the work table such as vases, cups, cosmetics and drugs. Spilling water on components may cause fire and electric shock.

◆Do not work, keep or place the amplifier near small children due to safety concerns. In addition, please discard packing waste and any waste from assembling the kit according to local standards and regulations for safety and protection of the environment.

◆Be careful when handling tools, such as diagonal cutters, pen knives, and other sharp tools in particular to avoid injury or accident.

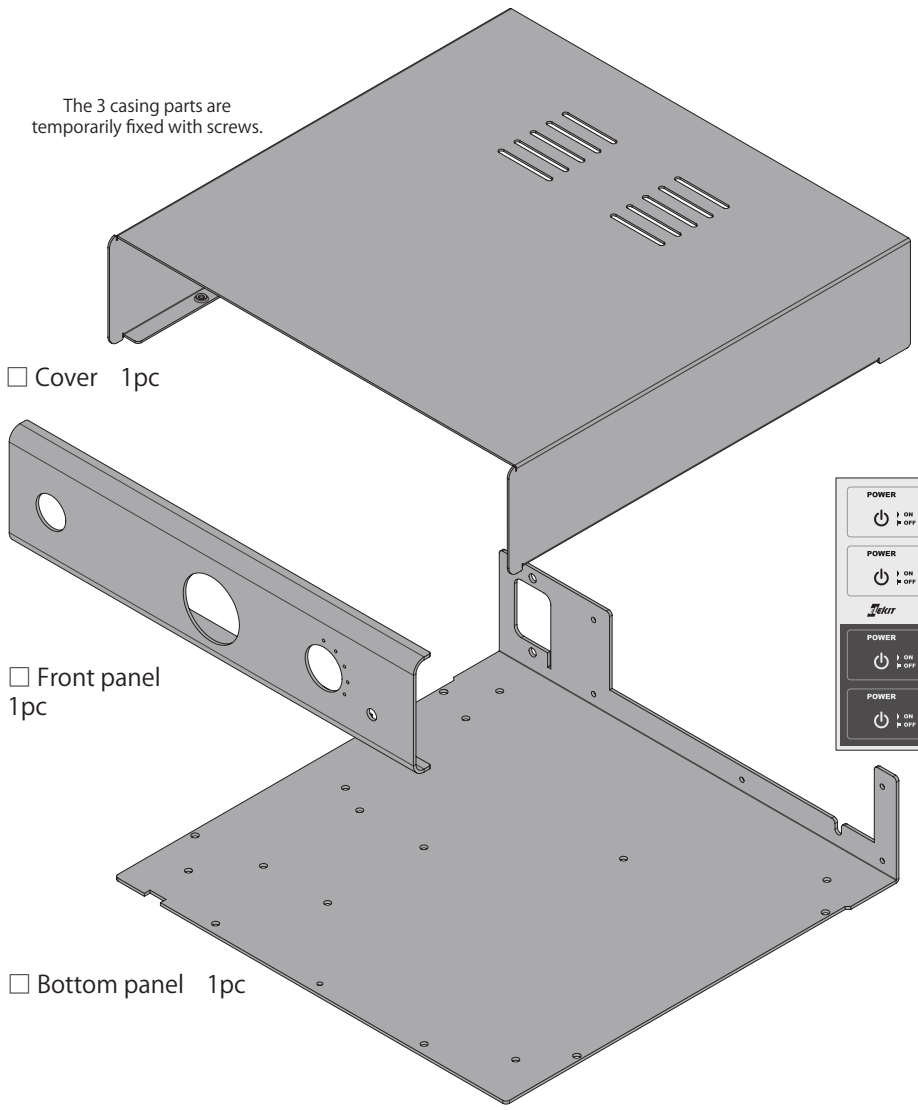
◆Do not work near small children. Children must not play with tools, plastic bags, and electronic parts as they may cause harm or choking hazard.

◆Some essential pieces in this kit include small and sharp objects that are made of glass or metal. Be extremely careful so that small children do not play with them to avoid accidents and injury. In case a child swallows such an object, immediately consult with a doctor. Discard empty plastic bags promptly to avoid choking hazards.

◆The specifications, forms and contents of this product are subject to change for improvement without prior notice.

4. Parts list

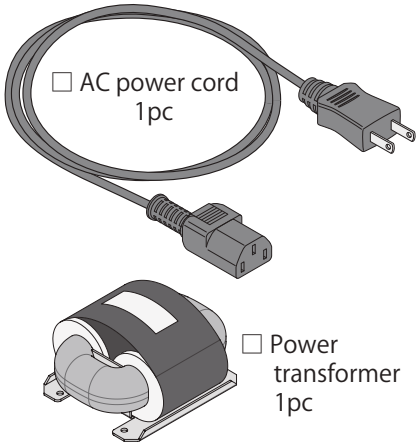
Please use the check box next to each part to verify they have been included with the kit.
*There may be more screws and nuts than indicated. Keep them as spare parts.



☐ Cover 1pc

☐ Front panel 1pc

☐ Bottom panel 1pc



☐ AC power cord 1pc

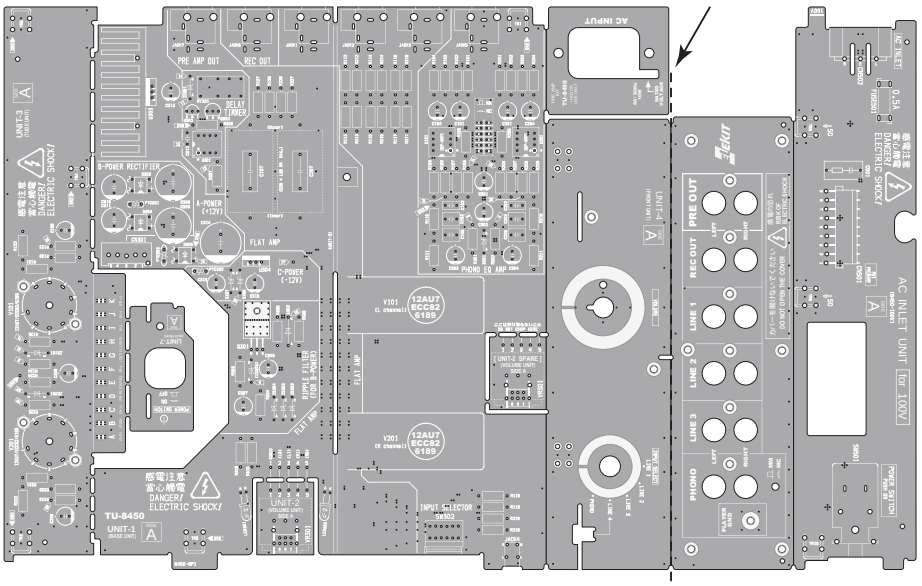
☐ Power transformer 1pc

☐ Function label 1pc

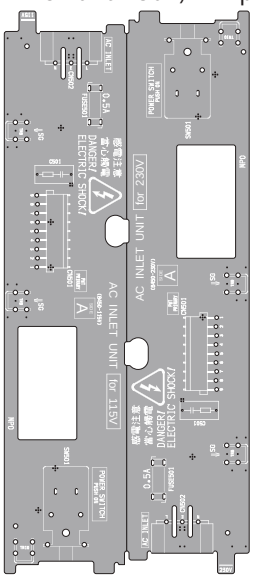
☐ Warning label 1pc

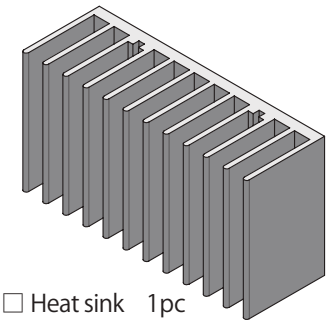
☐ PCB (MAIN UNIT) 1 set
(It might be separated into several pieces.)

Pre-cut off on this line.

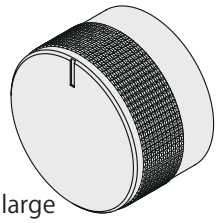


☐ PCB (AC INLET UNITs for 115V and 230V) 1pc

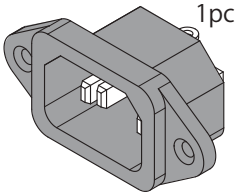




☐ Heat sink 1pc

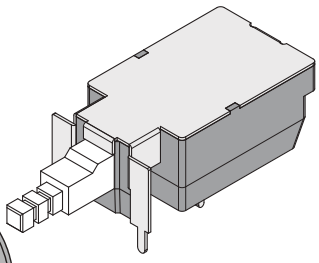


☐ Knob large
1pc

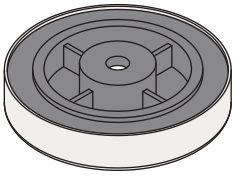


☐ AC inlet
1pc

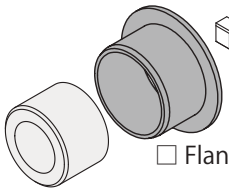
☐ Knob small
1pc



☐ Power switch 1pc



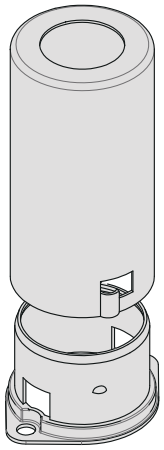
☐ Insulator footing 4pcs



☐ Switch
button
1pc

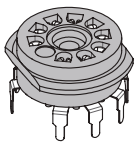
☐ Flange bush
1pc

☐ Tube shield 2 sets

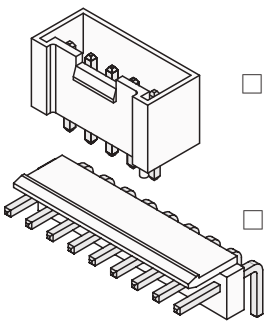


Case

Base



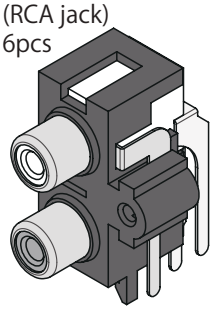
☐ Tube socket 9-pin 2pcs



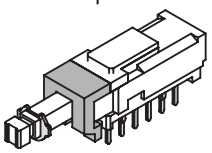
☐ Box type
VH connector
5-pin 1pc

☐ L-shaped
VH connector
9-pin 1pc

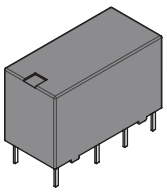
☐ Pin jack
(RCA jack)
6pcs



☐ Mini push switch
1 pc

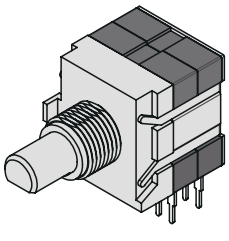


☐ 3-pole mini jack
1 pc

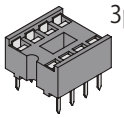


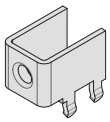
☐Relay 1 pc

☐ Rotary switch 1 pc
(with a nut and a washer)



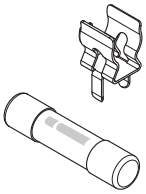
☐ IC socket 8-pin
3pcs





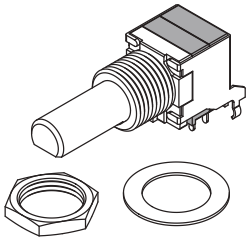
☐ PCB terminal 10pcs

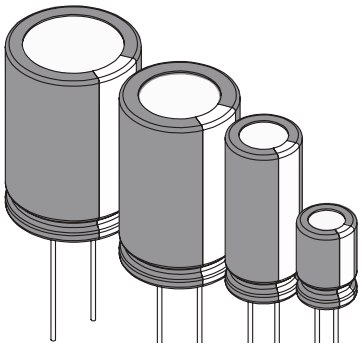
☐ Fuse holder 2pcs



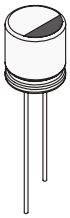
☐ Midget fuse 0.5A
2pcs (incl.1 spare)

☐ Volume (dual) 1pc
(with a nut and a washer)

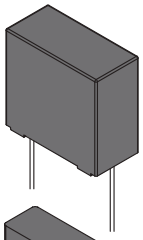




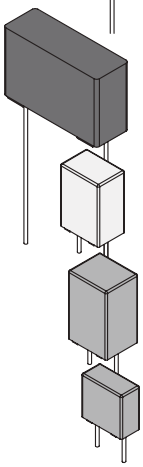
Aluminum electrolytic capacitor
- ☐ 3300μF 35V 1pc
- ☐ 100μF 200V 2pcs
- ☐ 220μF 80V 2pcs
- ☐ 10μF 200V 3pcs
- ☐ 470μF 25V 5pcs



Hybrid electrolytic capacitor
- ☐ 150μF 35V (indicated as 150 V) 8pcs

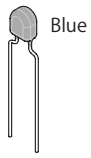


- ☐ Spark killer RE1201 (black) 1pc

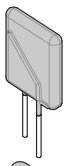


Film capacitor
- ☐ 0.47μF (450V) (indicated as 474, black) 2pcs
- ☐ 1μF (63V) (indicated as 1, ivory) 2pcs
- ☐ 0.1μF(=100nF) (63V) (indicated as 100n, gray) 2pcs
- ☐ 0.033μF(=33nF) (250V) (indicated as 33n, gray) 2pcs

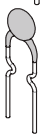
Ceramic capacitor
- ☐ 1 μF(indicated as 105) 1pc



PTC (Yellow)
- ☐ RX110 1pc



- ☐ R010 2pcs



1/2W carbon film resistor

- ☐ 3.3Ω (ORN-ORN-GLD-GLD) 2 pcs
- ☐ 100Ω (BRN-BLK-BRN-GLD) 2 pcs
- ☐ 390Ω (ORN-WHT-BRN-GLD) 8 pcs
- ☐ 1kΩ (BRN-BLK-RED-GLD) 8 pcs
- ☐ 4.7kΩ (YEL-VIO-RED-GLD) 4 pcs
- ☐ 10kΩ (BRN-BLK-ORN-GLD) 8 pcs
- ☐ 22kΩ (RED-RED-ORN-GLD) 4 pcs
- ☐ 47kΩ (YEL-VIO-ORN-GLD) 6 pcs
- ☐ 220kΩ (RED-RED-YEL-GLD) 17 pcs
- ☐ 2.2MΩ (RED-RED-GRN-GLD) 1 pc

1/4W metal film resistor

- ☐ 3.3kΩ (ORN-ORN-BLK-BRN-BRN) 2 pcs
- ☐ 24.9kΩ (RED-YEL-WHT-RED-BRN) 2 pcs

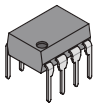
- ☐ Resistor-type jumper 5 pcs

(with 1 black line or no indication)

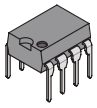
Semiconductor devices

*Semiconductor devices are generally sensitive to static electricity. Please handle them in a static-free environment as much as possible.

IC

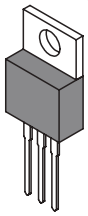


- ☐ 2068DD (OPamp) 2pcs

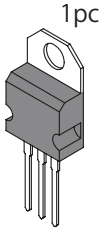


- ☐ PIC10F222 (Microprocessor) 1pc

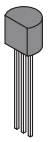
- ☐ LM1085 IT-12 1pc



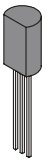
- ☐ 7912 1pc



- ☐ 78L05 1pc



Transistor
- ☐ 2SD882L 1pc



- ☐ Diode 1pc

- ☐ Bridge diode (indicated as ~,+,-) 3pcs

- ☐ Schottky barrier diode (indicated as 1S4, smaller) 3pcs

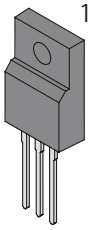
- ☐ Zener diode (56V) 5pcs

Made of glass

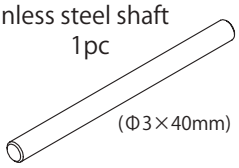
- ☐ LED 2pcs

Green

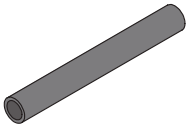
FET
- ☐ 80R1K4P7 1pc



- ☐ Stainless steel shaft 1pc



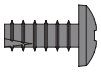
- ☐ Vinyl tube (Black) 1pc



Screw

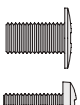
*There may be more screws than needed. Keep them as spare parts.

Actual size

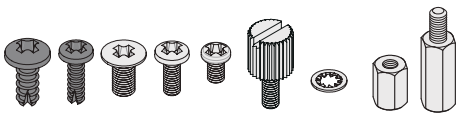


- ☐ Tapping screw 4x10 (black) 2pcs

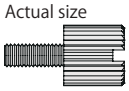
- ☐ Tapping screw 3x10 (black) 7pcs



- ☐ Low head screw M4x8 4pcs
- ☐ Binding screw M3x8 24pcs



Actual size



- ☐ Thumb screw M3×8 1pc

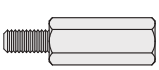
- ☐ Pan head screw M3×5 8pcs

- ☐ Claw washer (for M3) 8pcs

Threaded spacer (hex)

Actual size

- ☐ M3×8 Female-female 4pcs



- ☐ M3×14 Male-female 1pc

5. PCB assembly

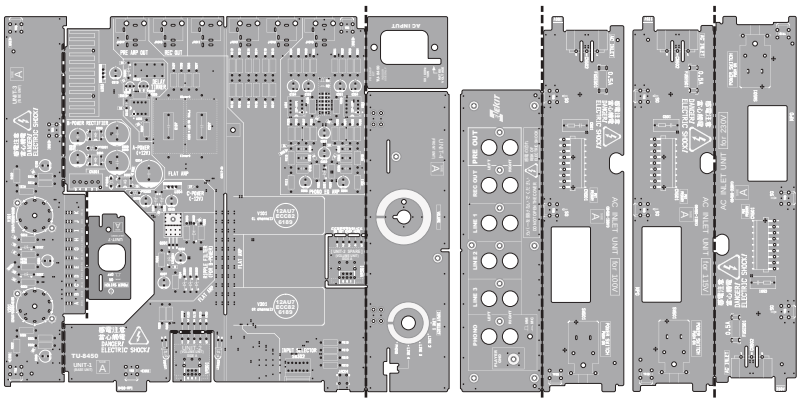
*Follow the instruction step by step. Check off the box after each component has been soldered.

Before soldering

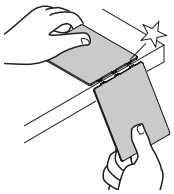
① Before soldering, follow the cut lines (groove lines) on the PCB to break it into 8pcs.

＊Do not break "UNIT-2 SPARE".

② Use sandpaper or a file to smooth the rough edges of the PCB to avoid injury.



Use an edge of a desk to break the PCB easily.



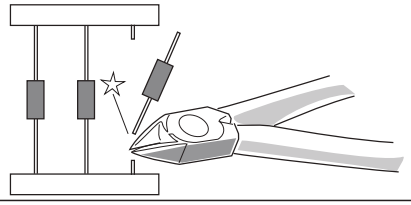
IMPORTANT!

Messages for correct PCB side mounting and orientation of parts

+ Caution! Check ○ the ORIENTATION −	The component has a polarity such as + and - and has a specific mounting orientation. Incorrect mounting may cause improper operation and component damage.
[Not orientation specific]	There is no polarity, such as + and -, and no specific orientation when mounting.
No indication	There is a polarity, such as + and -, but as the shapes of the parts and the PCB do not allow the parts to be mounted incorrectly, there is no need to mention the orientation.

Caution for taped parts

Some electronic parts are fixed with tape. Cut the leads of these taped electronic parts with a diagonal cutter. The leads are attached to the tape securely. Do not pull the parts by hand forcibly from the tape, or the parts may get damaged.



For soldering, do not use paste and flux as some of them are conductive or corrosive.

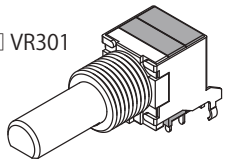
TIPS for assembly

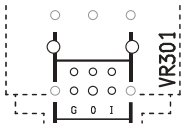
- The part mounting order is determined according to the part height, generally short to tall.
- Unless otherwise specified, insert the parts from the printed side of the PCB, and solder on the other side.
- Parts in this kit are numbered in "100", "200", and "300" series. "100" series parts are for the left channel, "200" for the right channel, and "300" series are common to both channels. For example, R101 and C101 are for the left channel, and R201 and C201 are for the right channel. Keeping this information in mind should help you find a correct location for a part on the PCB.
- In order to avoid the parts to be mounted tilted or not closely seated on the PCB, solder just 1 terminal first. After confirming that the soldered terminal is on level and closely attached to the PCB, solder another terminal. Repeat this process, then correction of badly soldered joint becomes easier.
- Please refer to the complete PCB layout on page 10 and 11 as well.

UNIT-2 assembly

1 Volume (dual)

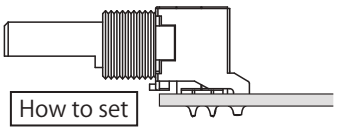
☐ VR301





Mark on PCB

Make sure it is fully seated and level on the PCB before soldering.



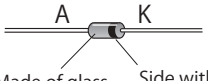
How to set

*Attached nut and washer will be used in a later step.

UNIT-3 assembly

2 Zener Diode (56V)

+ Caution! Check ○ the ORIENTATION −



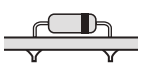
☐ ZD101
☐ ZD201

Made of glass

Side with a black line is K

Mark on PCB

How to set



3 1/2W carbon film resistor [Not orientation specific]

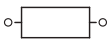
10kΩ (BRN-BLK-ORN-GLD)
☐ R123 ☐ R223

22kΩ (RED-RED-ORN-GLD)
☐ R125 ☐ R225

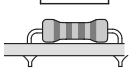
47kΩ (YEL-VIO-ORN-GLD)
☐ R120 ☐ R220

220kΩ (RED-RED-YEL-GLD)
☐ R121 ☐ R221
☐ R122 ☐ R222
☐ R124 ☐ R224

Mark on PCB

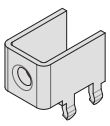


How to set



4 PCB terminal

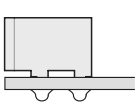
+ Caution! Check ○ the ORIENTATION −



☐ TM3
☐ TM4
☐ TM5

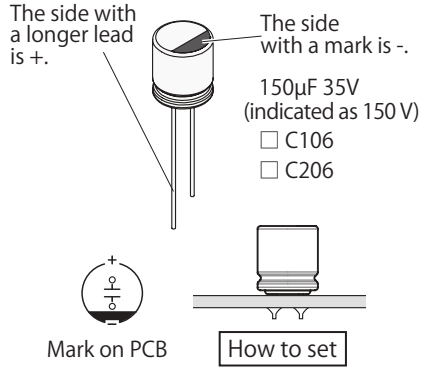
Mark on PCB

How to set



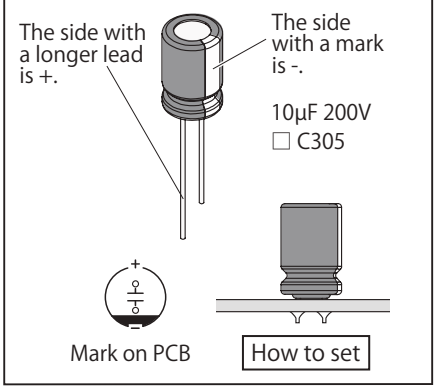
5 Hybrid electrolytic capacitor

Caution! Check the ORIENTATION

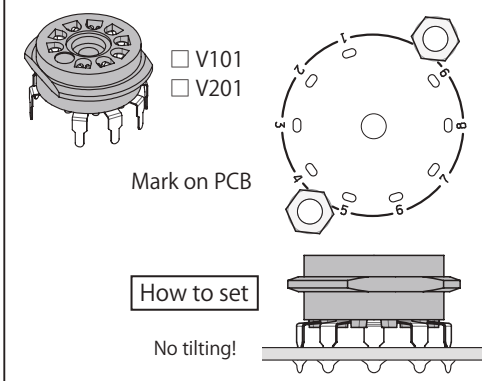


6 Aluminum electrolytic capacitor

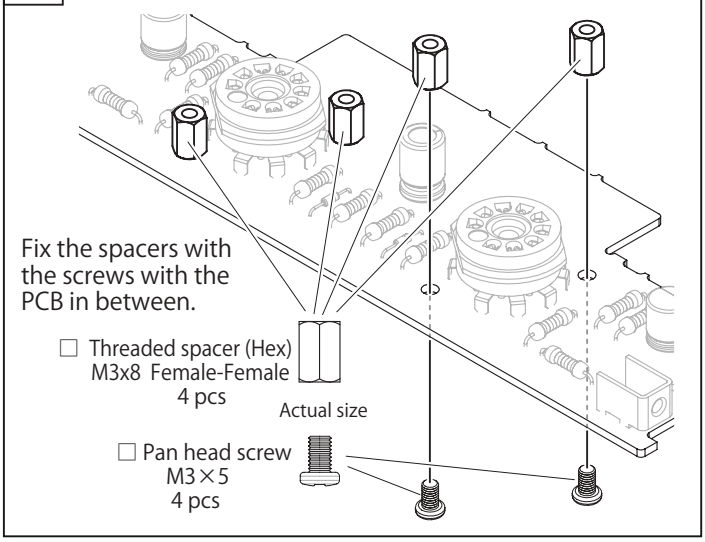
Caution! Check the ORIENTATION



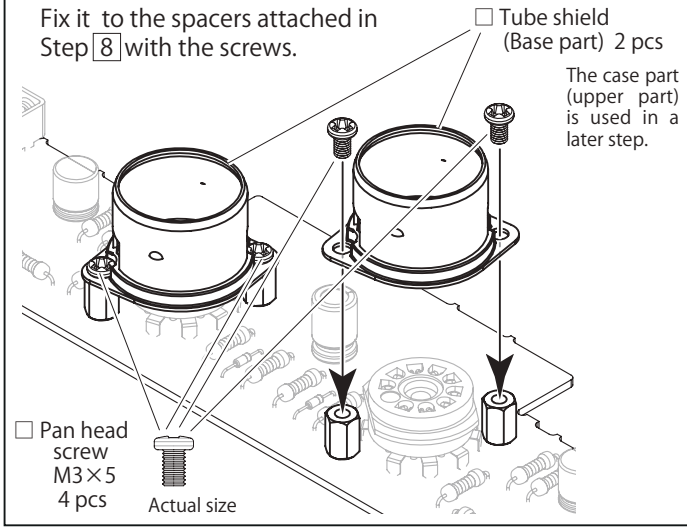
7 Tube socket 9-pin



8 Threaded spacer (Hex) [Not orientation specific]



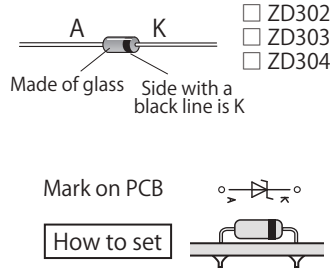
9 Tube shield (Base part) [Not orientation specific]



UNIT-1 assembly

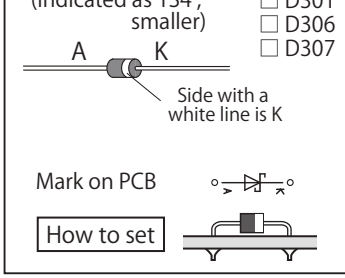
10 Zener diode (56V)

Caution! Check the ORIENTATION



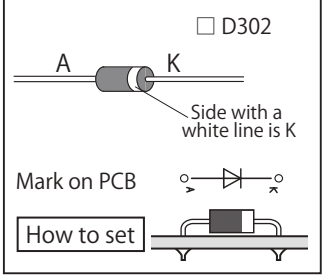
11 Schottky barrier diode

Caution! Check the ORIENTATION



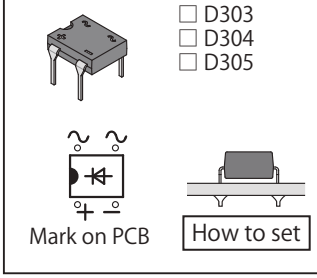
12 Diode

Caution! Check the ORIENTATION



13 Bridge diode

Caution! Check the ORIENTATION



14 Resistor

[Not orientation specific]

1/4W metal film resistor

3.3kΩ (ORN-ORN-BLK-BRN-BRN)
☐ R107 ☐ R207

24.9kΩ (RED-YEL-WHT-RED-BRN)
☐ R106 ☐ R206

1/2W carbon film resistor

3.3Ω (ORN-ORN-GLD-GLD)
☐ R301 ☐ R302

100Ω (BRN-BLK-BRN-GLD)
☐ R102 ☐ R202

4.7kΩ (YEL-VIO-RED-GLD)
☐ R307 ☐ R308
☐ R309 ☐ R310

390Ω (ORN-WHT-BRN-GLD)
☐ R103 ☐ R203
☐ R108 ☐ R208
☐ R111 ☐ R211
☐ R127 ☐ R227

1kΩ (BRN-BLK-RED-GLD)
☐ R113 ☐ R213
☐ R115 ☐ R215
☐ R117 ☐ R217
☐ R119 ☐ R219

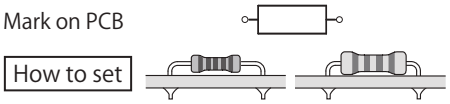
10kΩ (BRN-BLK-ORN-GLD)
☐ R105 ☐ R205
☐ R109 ☐ R209
☐ R118 ☐ R218

22kΩ (RED-RED-ORN-GLD)
☐ R303 ☐ R304

47kΩ (YEL-VIO-ORN-GLD)
☐ R101 ☐ R201
☐ R110 ☐ R210

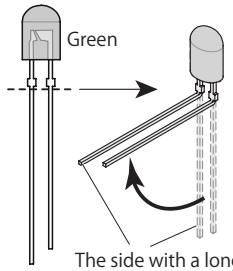
220kΩ (RED-RED-YEL-GLD)
☐ R104 ☐ R204
☐ R112 ☐ R212
☐ R114 ☐ R214
☐ R116 ☐ R216
☐ R126 ☐ R226
☐ R305

2.2MΩ (RED-RED-GRN-GLD)
☐ R306



15 LED

Caution! Check the ORIENTATION

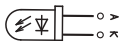


Bend the leads at the right angle and to the orientation shown on the left, then insert the leads to the PCB.

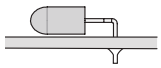
☐ LED301
☐ LED302

The side with a longer lead is A.

Mark on PCB

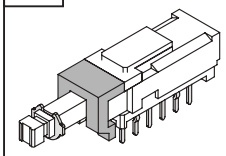


How to set



16 Mini push switch

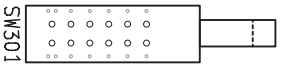
Caution! Check the ORIENTATION



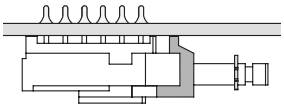
☐ SW301

CAUTION!
Only this component is inserted from SIDE B of the board and soldered on SIDE A.

Mark on PCB



How to set



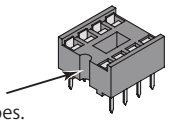
Make sure the part is fully seated and level on the PCB!

17 From here, mount on SIDE A.

IC socket 8-pin

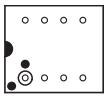
Caution! Check the ORIENTATION

☐ U101
☐ U201
☐ U301

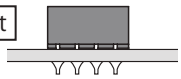


Match the shapes.

Mark on PCB

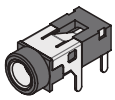


How to set



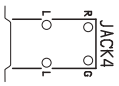
18 3-pole mini jack

Caution! Check the ORIENTATION

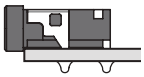


☐ JACK4

Mark on PCB

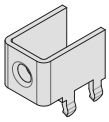


How to set



19 PCB terminal

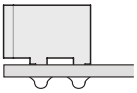
Caution! Check the ORIENTATION



☐ TM1
☐ TM2

Mark on PCB

How to set



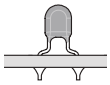
20 Ceramic capcitor

[not orientation specific]

1 μF
(indicated as 105)
☐ C312

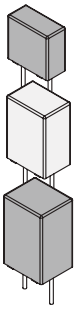
Mark on PCB

How to set



21 Film capacitor

[not orientation specific]



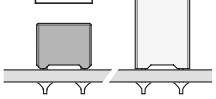
0.033μF(=33nF) (250V)
(indicated as 33n, gray)
☐ C102 ☐ C202

1μF (63V)
(indicated as 1, ivory)
☐ C105 ☐ C205

0.1μF(=100nF) (63V)
(indicated as 100n, gray)
☐ C103 ☐ C203

Mark on PCB

How to set

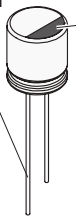


22 Hybrid electrolytic capacitor

Caution! Check the ORIENTATION

The side with a longer lead is +.

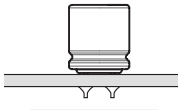
The side with a mark is -.



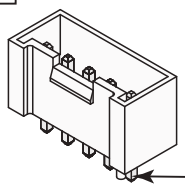
150μF 35V
(indicated as 150V)
☐ C101 ☐ C201
☐ C104 ☐ C204
☐ C301 ☐ C302

Mark on PCB

How to set

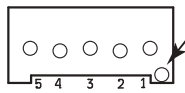


23 Box type VH connector 5-pin



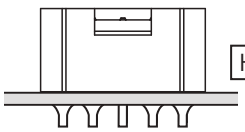
☐ CN301

The protrusion fits in the hole of the PCB.



Mark on PCB

How to set

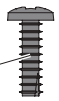


24 FET

Caution! Check the ORIENTATION (Bending orientation)

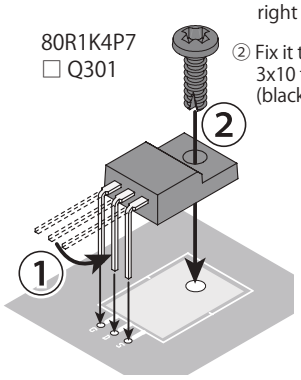
① Bend the leads at the right angle.

② Fix it to the PCB with a 3x10 tapping screw (black) and solder.

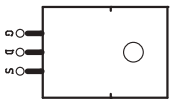


Actual size

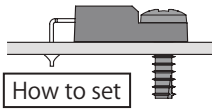
80R1K4P7
☐ Q301



Mark on PCB

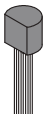


How to set



25 IC

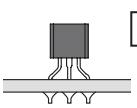
Caution! Check the ORIENTATION



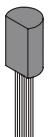
78L05
☐ U302

Mark on PCB

How to set

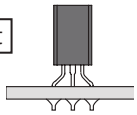


26 Transistor



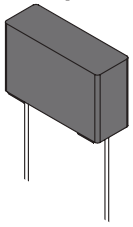
2SD882L
☐ Q302

How to set

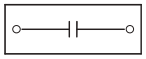


27 Film capacitor

[not orientation specific]

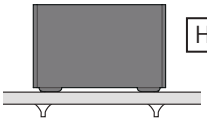


0.47μF (450V)
(indicated as 474, black)
☐ C107
☐ C207

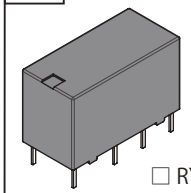


Mark on PCB

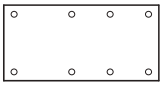
How to set



28 Relay

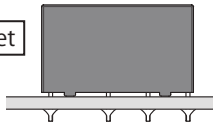


☐ RY301



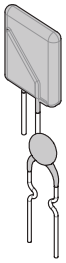
Mark on PCB

How to set



29 PTC [not orientation specific]

(Yellow)

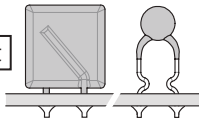


RX110
☐ PTC303

R010
☐ PTC301
☐ PTC302

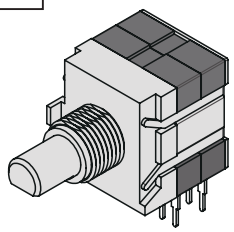
Mark on PCB

How to set



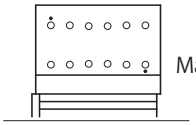
30 Rotary switch

Caution! Check the ORIENTATION



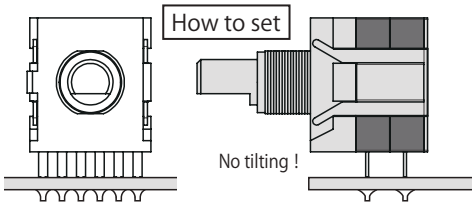
☐ SW302

Attached nut and washer will be used in a later step.



Mark on PCB

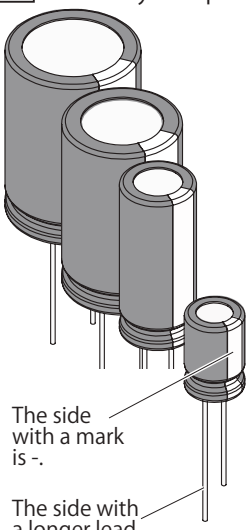
How to set



No tilting !

31 Aluminum electrolytic capacitor

Caution! Check the ORIENTATION



470µF 25V
☐ C303 ☐ C304
☐ C313 ☐ C315
☐ C316

10µF 200V
☐ C306 ☐ C307

220µF 80V
☐ C310 ☐ C311

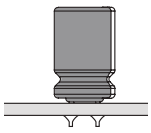
100µF 200V
☐ C308 ☐ C309

3300µF 35V
☐ C314

The side with a mark is -.

The side with a longer lead is +.

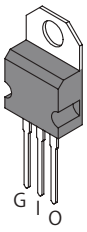
Mark on PCB



How to set

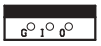
32 IC

Caution! Check the ORIENTATION

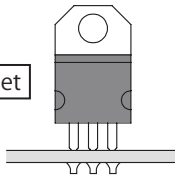


7912
☐ U304

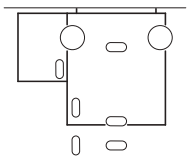
Mark on PCB



How to set

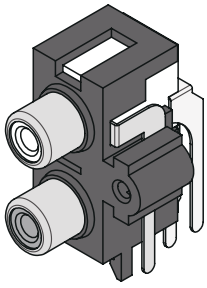


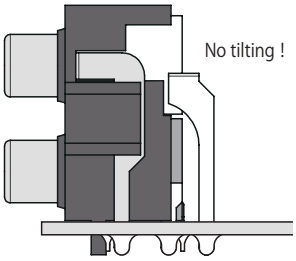
33 Pin jack (RCA jack)



Mark on PCB

☐ JACK1
☐ JACK2
☐ JACK3
☐ JACK5
☐ JACK6
☐ JACK7

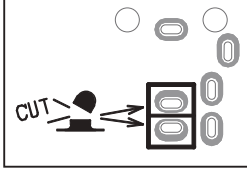




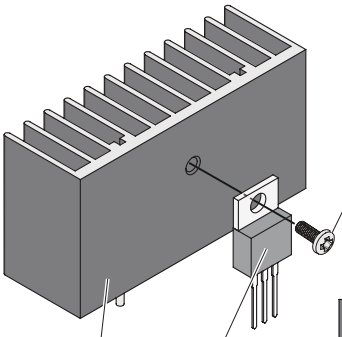
No tilting !

How to set

After soldering JACK5, cut only the two pins indicated on the SIDE B to about half the length.



34 IC and heat sink

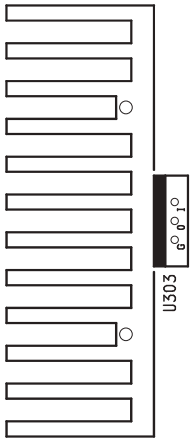


Actual size

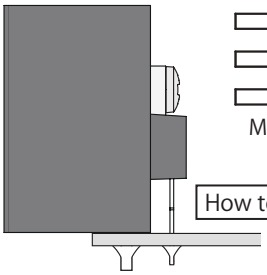
Binding screw M3x8

Heat sink

LM1085IT-12
☐ U303



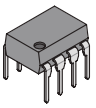
Mark on PCB



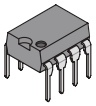
How to set

35 IC (OPamp and microprocessor)

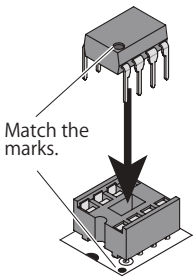
Caution! Check the ORIENTATION



2068DD
(OPamp)
☐ U101 ☐ U201



PIC10F222
(Microprocessor)
☐ U301

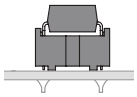


Match the marks.

Insert the IC securely to the IC socket mounted in Step 17.

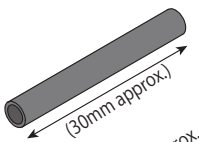
The pins are spreading outward. Push them inward a little so that the pins on both sides become parallel.

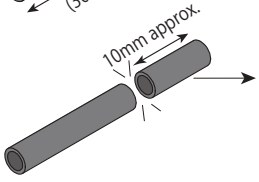
Insert as deep as shown below.

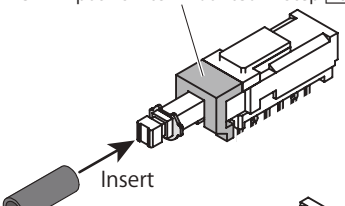


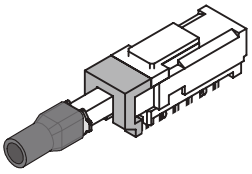
36 Vinyl tube (Black)

The mini push switch mounted in Step 16.





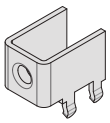




UNIT-4 assembly

37 PCB terminal

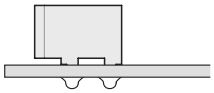
Caution! Check the ORIENTATION



☐ TM6
☐ TM7

Mark on PCB

How to set



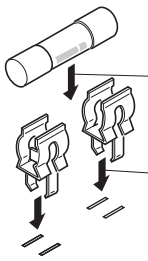
AC INLET UNIT assembly

This kit includes three AC INLET UNIT PC boards for 100V,115V and 230V.

Choose the PC board according to the power supply voltage you will use.

38 Midget fuse, Fuse holder

Caution! Check the ORIENTATION
(Fuse holder only)

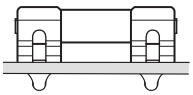


☐ FUSE501 (0.5A)

①Set the midget fuse to the fuse holders.
(No soldering)

②Mount the fuse holders to the PCB and solder.
(For fuse, not orientation specific)

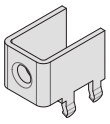
Mark on PCB



How to set

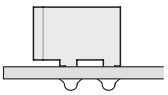
39 PCB terminal

Caution! Check the ORIENTATION



☐ TM8
☐ TM9
☐ TM10

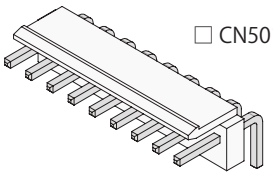
Mark on PCB



How to set

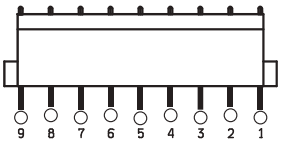
40 L-shaped VH connector 9-pin

Caution! Check the ORIENTATION



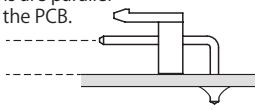
☐ CN501

Mark on PCB

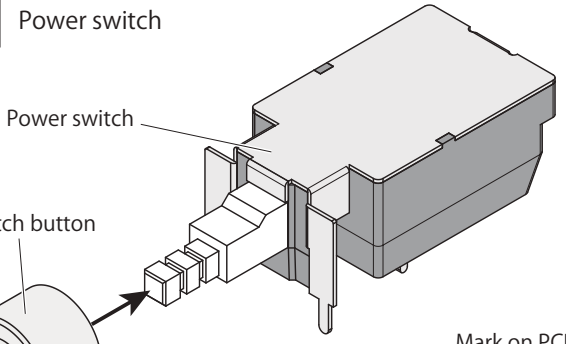


Make sure the pins are parallel to the PCB.

How to set



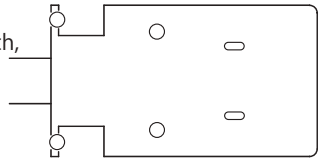
41 Power switch

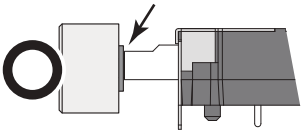


☐ SW501

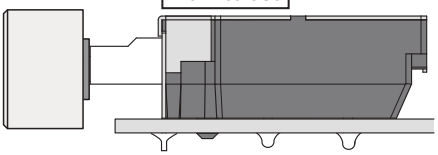
Push the switch button firmly to the shaft of the power switch, and mount the power switch to the PCB.

Mark on PCB



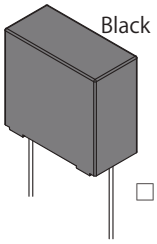


How to set

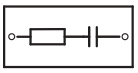


42 Spark killer RE1201

[not orientation specific]

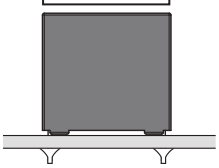


☐ C501



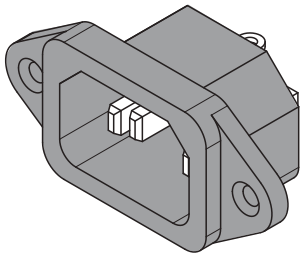
Mark on PCB

How to set

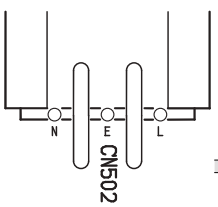


43 AC inlet

☐ CN502

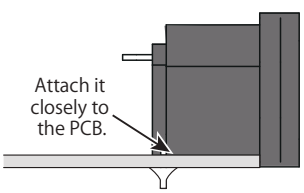


Mark on PCB



How to set

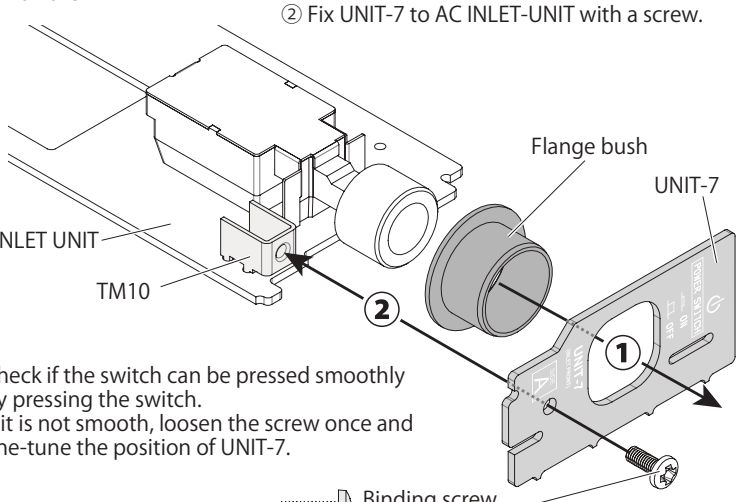
Attach it closely to the PCB.



44 Flange bush and UNIT-7

① Attach the flange bush to the hole of UNIT-7.

② Fix UNIT-7 to AC INLET-UNIT with a screw.



③ Check if the switch can be pressed smoothly by pressing the switch.
If it is not smooth, loosen the screw once and fine-tune the position of UNIT-7.

Actual size

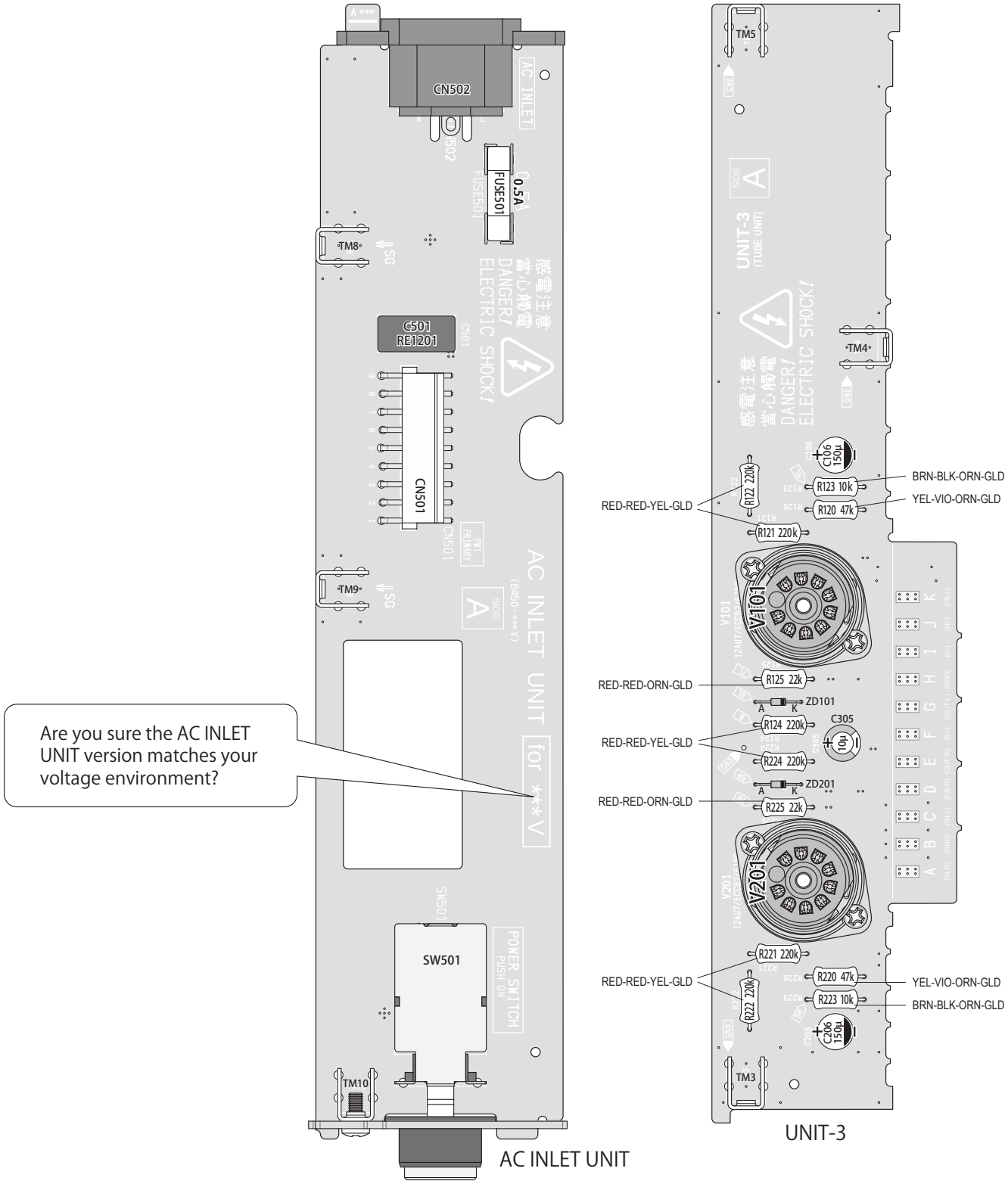
Binding screw M3x8

Before moving on to the next assembly, make sure all the electronic parts are correctly mounted, referring to the complete PCB drawing on Page 10-11.

In addition, check the soldering of each electronic part. Re-solder any part if there is a bad solder joint.

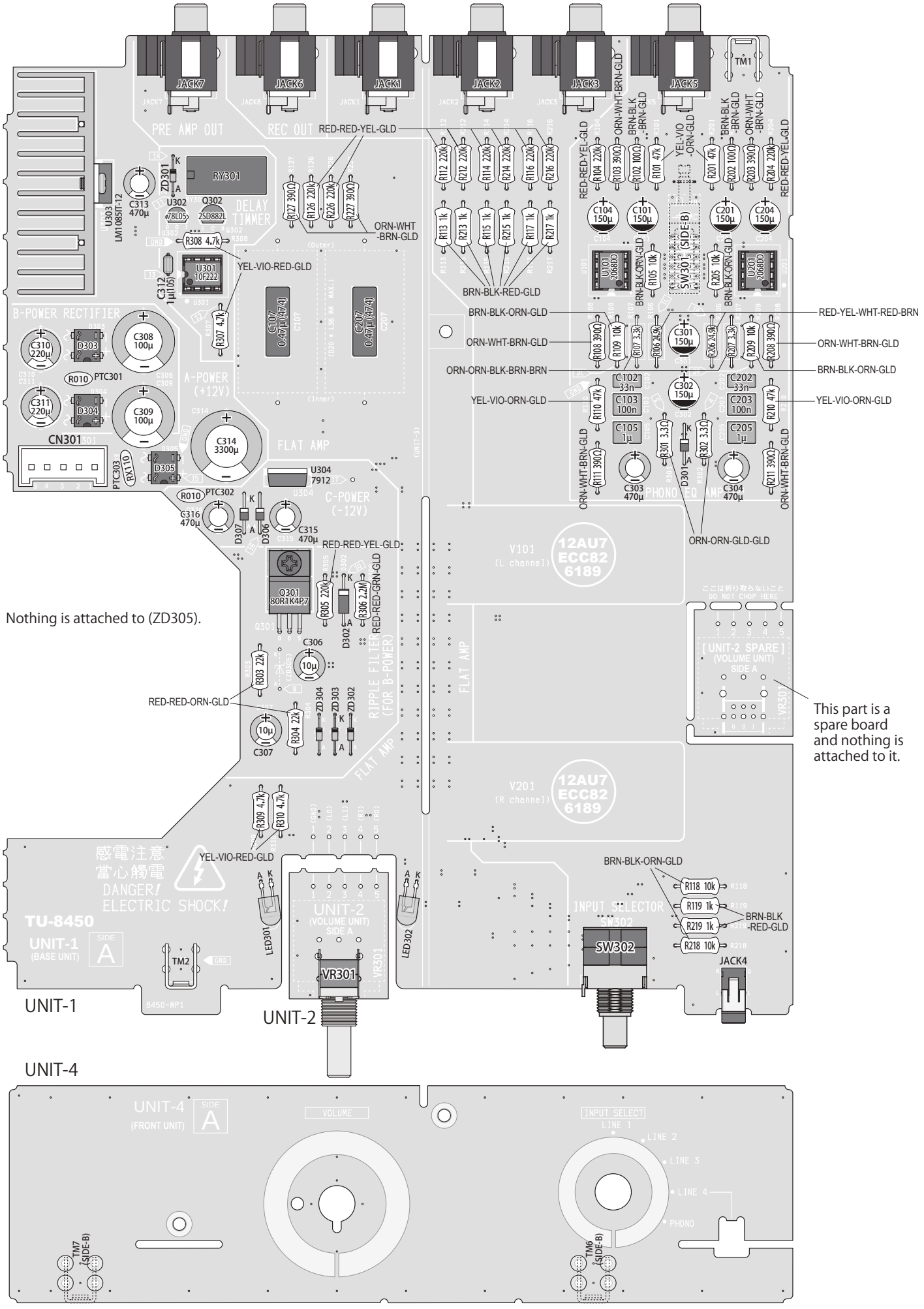
Please also refer to the board pattern diagram on page 12.

●Complete PCB



AC INLET UNIT

Compare your PCB with this PCB image.
Check for any unsoldered leads or pins, solder bridges between pads, and components that are not fully seated/soldered on the PCB.
Check for correct component mounting orientation- especially electrolytic capacitors, diodes, transistor, FET, ICs, LEDs, etc.

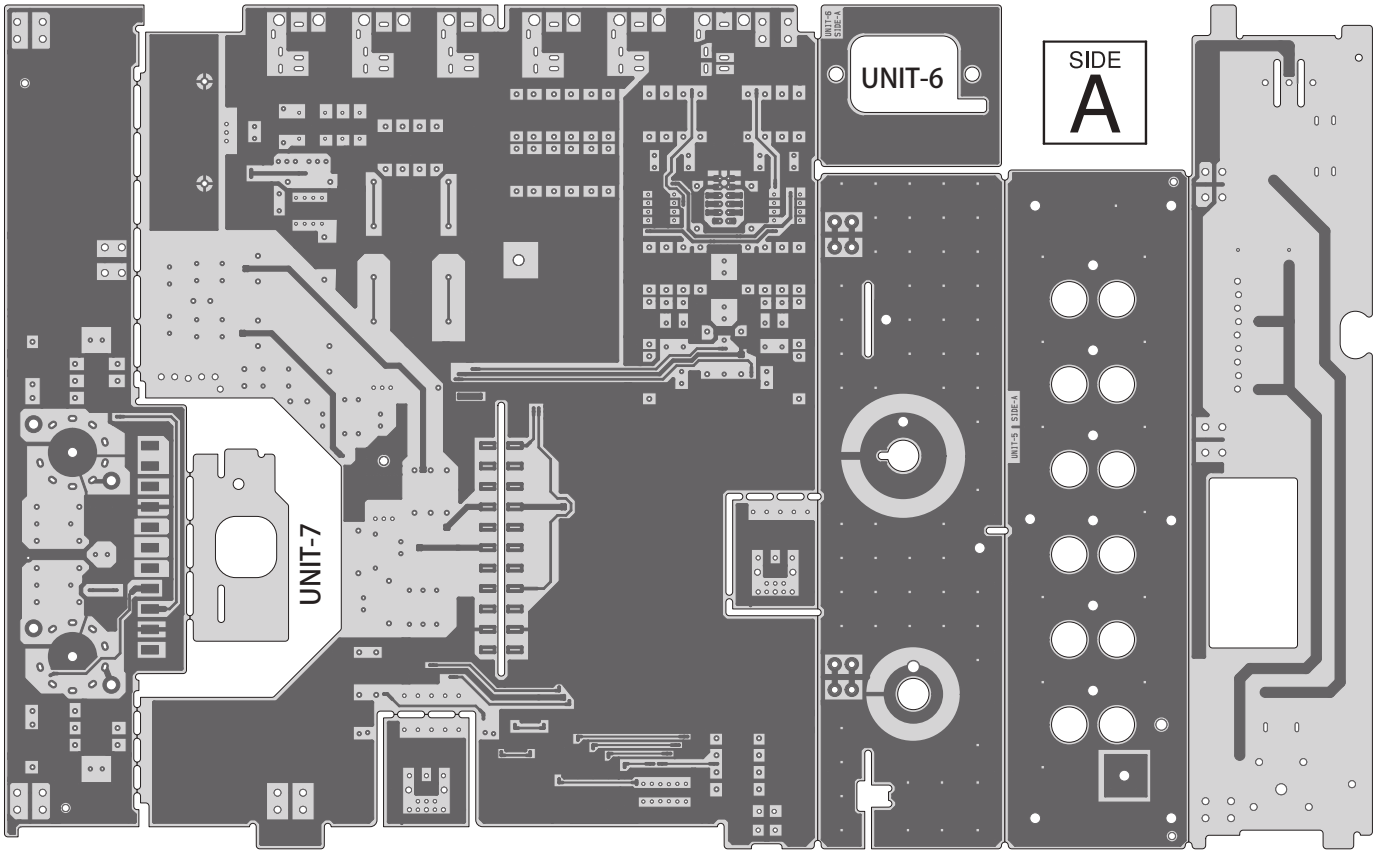


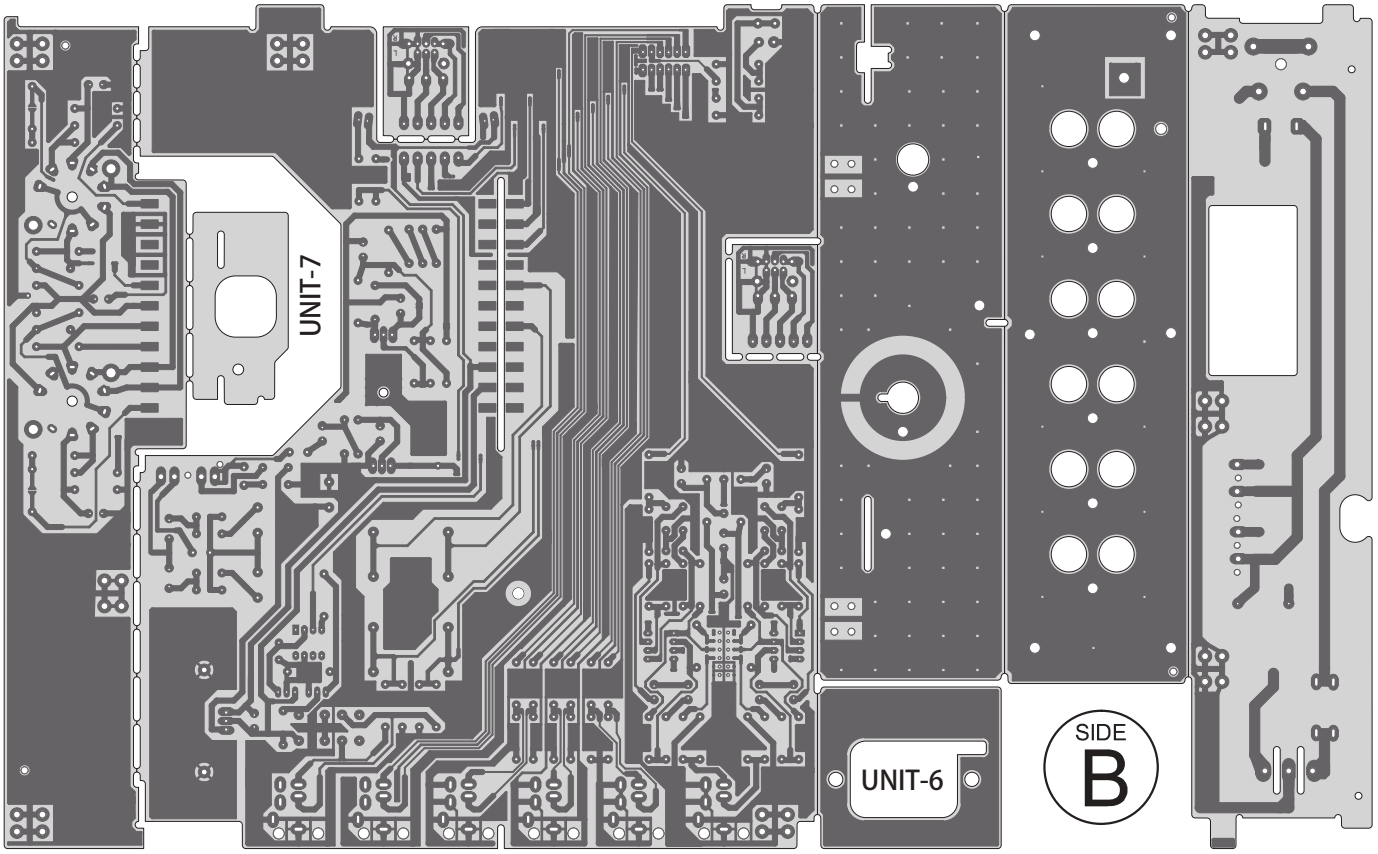
Nothing is attached to (ZD305).

This part is a spare board and nothing is attached to it.

● PCB Layout

*Please refer to the diagrams below to check the PCB condition, such as disconnection of the copper foil, solder bridge, etc.

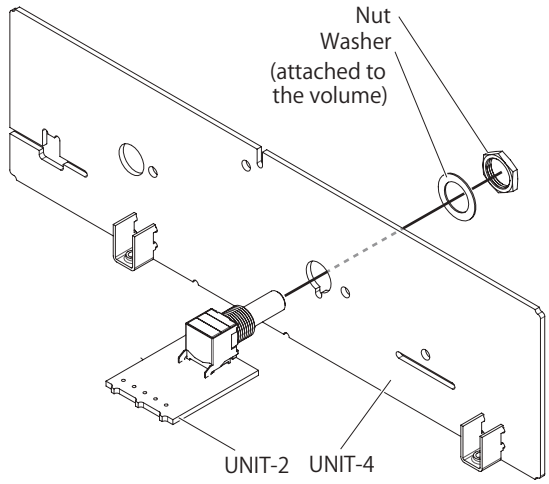




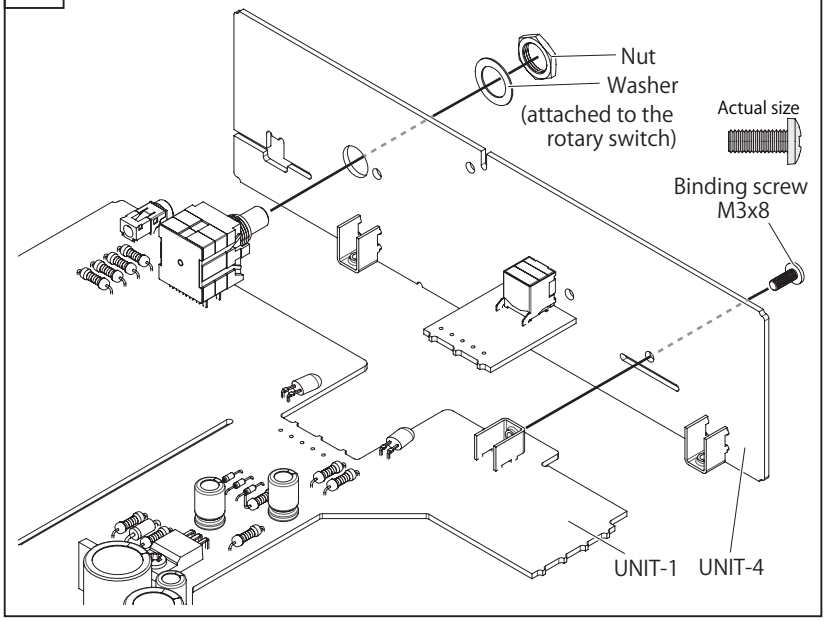
*AC INLET UNIT for 115V and 230V are not shown here.

Unit-to-unit assembly

45 Fix UNIT-2 to UNIT-4

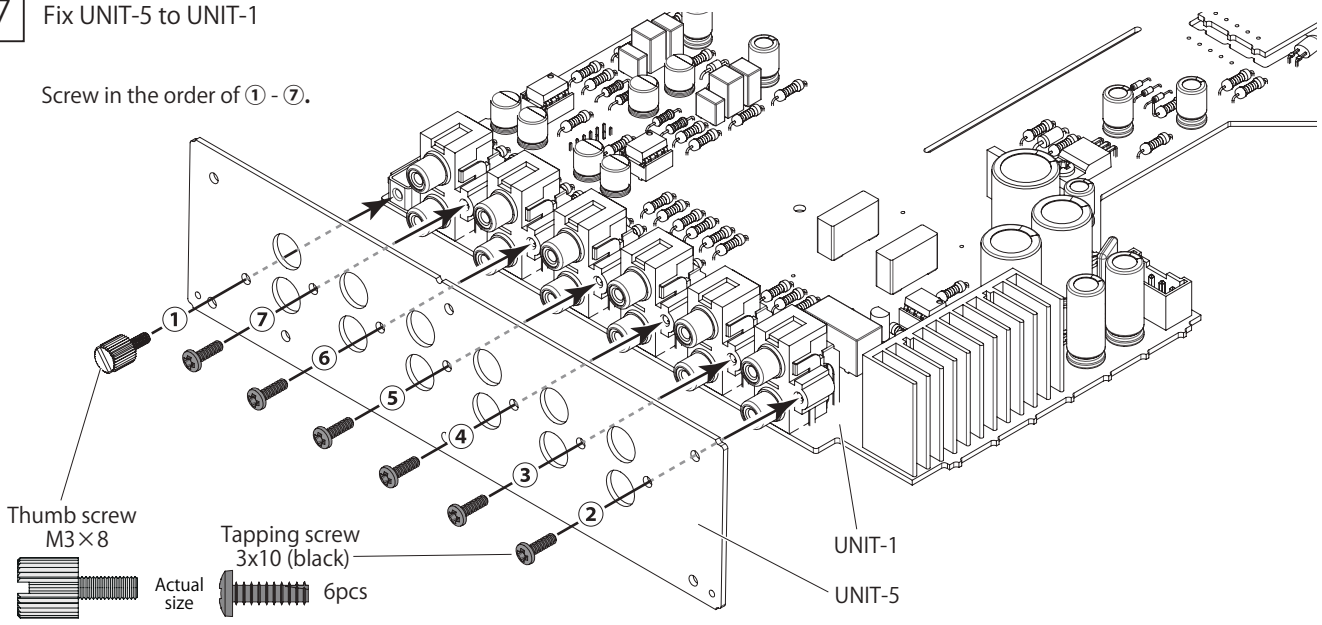


46 Fix UNIT-4 to UNIT-1

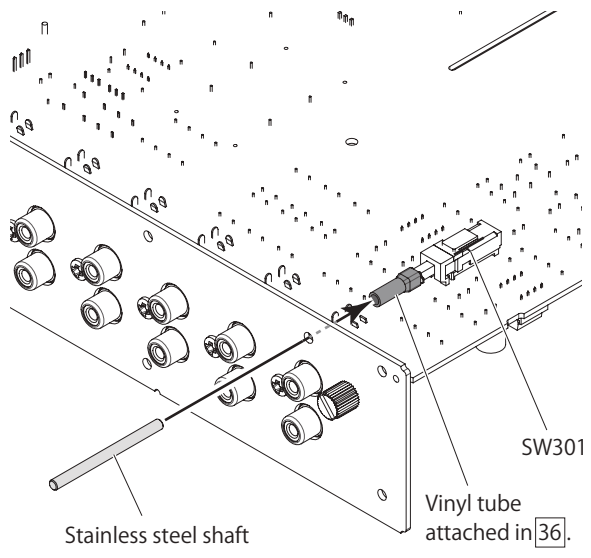


47 Fix UNIT-5 to UNIT-1

Screw in the order of ① - ⑦.

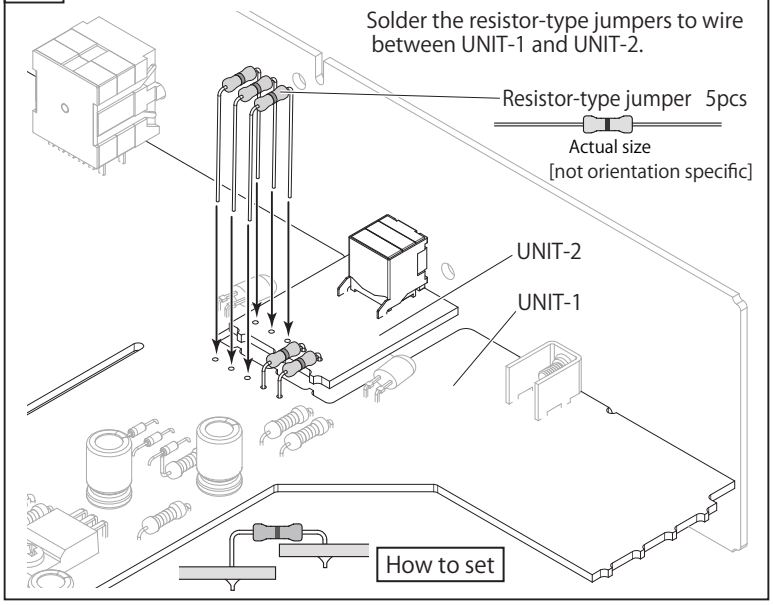


48 Stainless steel shaft

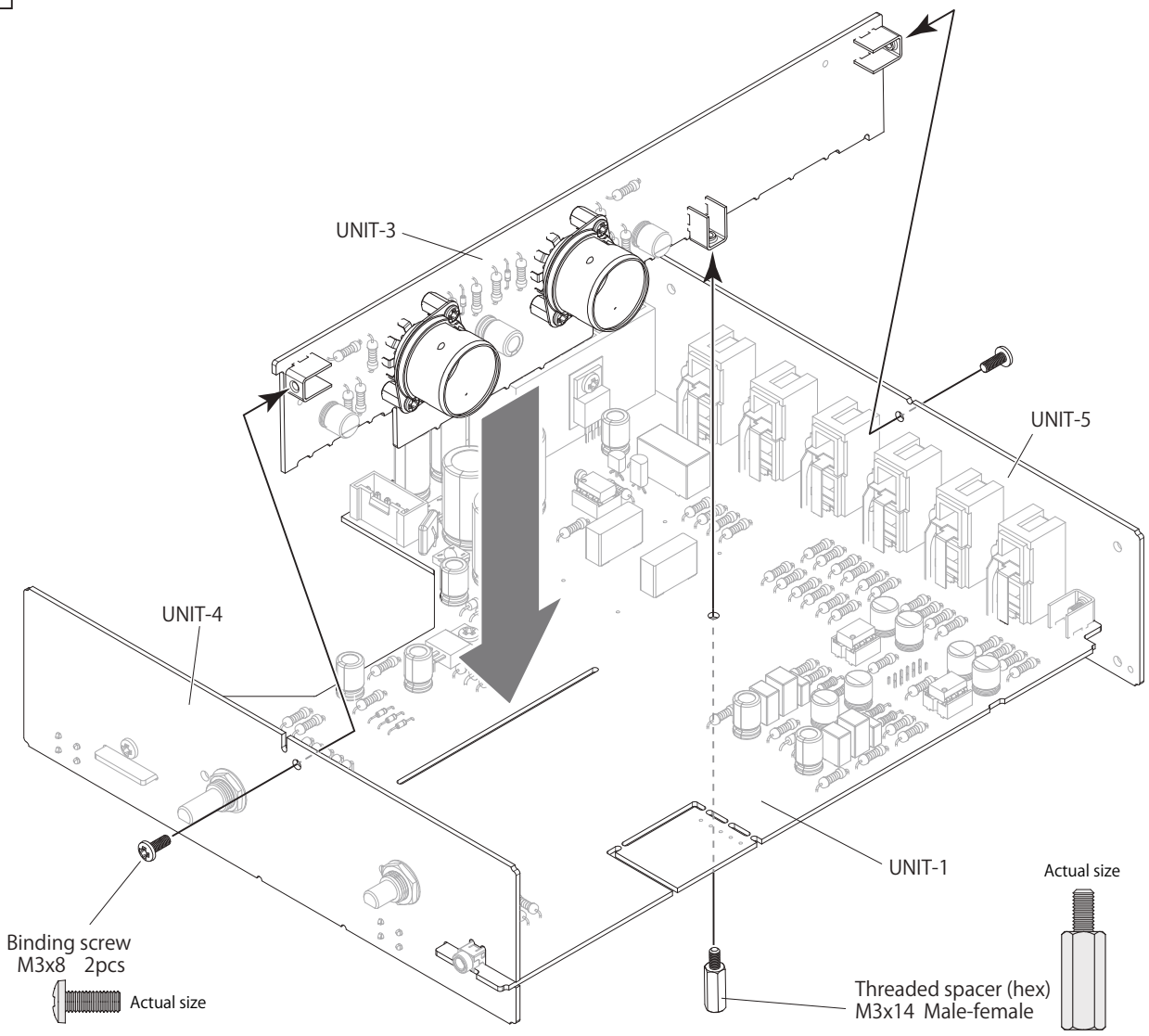


49 Resistor-type jumper

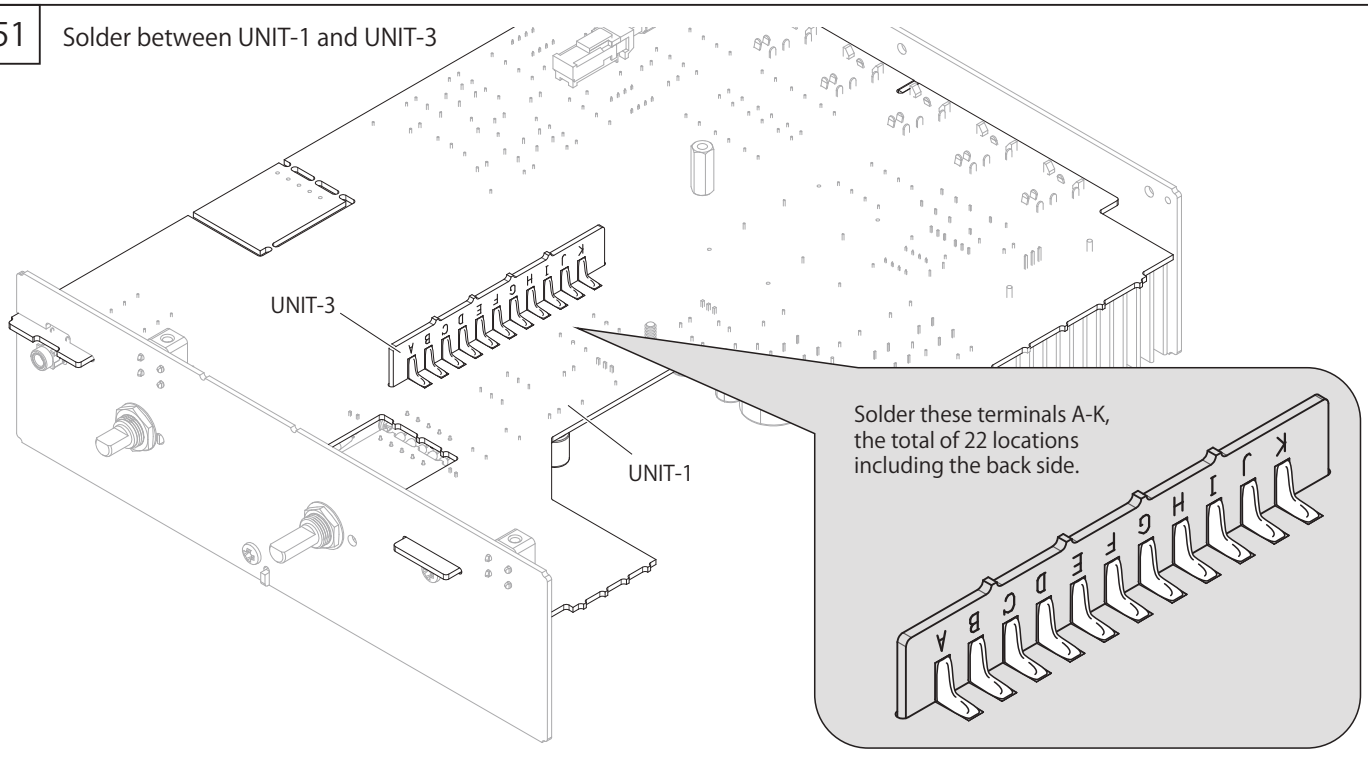
Solder the resistor-type jumpers to wire between UNIT-1 and UNIT-2.



50 Fix UNIT-3 with screws



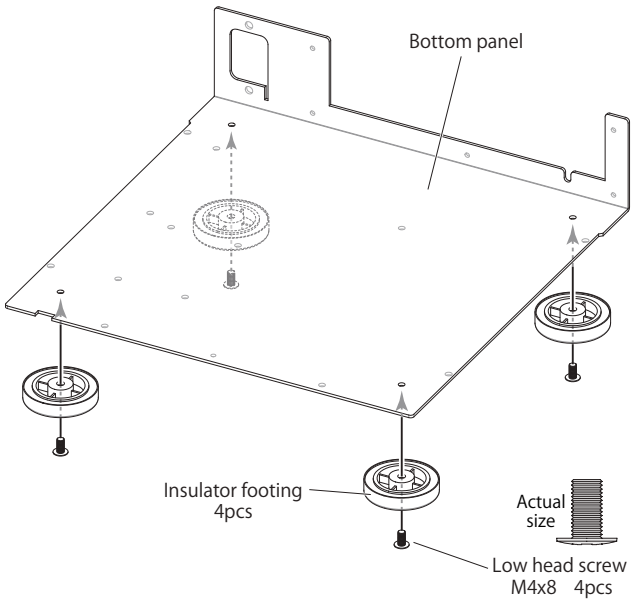
51 Solder between UNIT-1 and UNIT-3



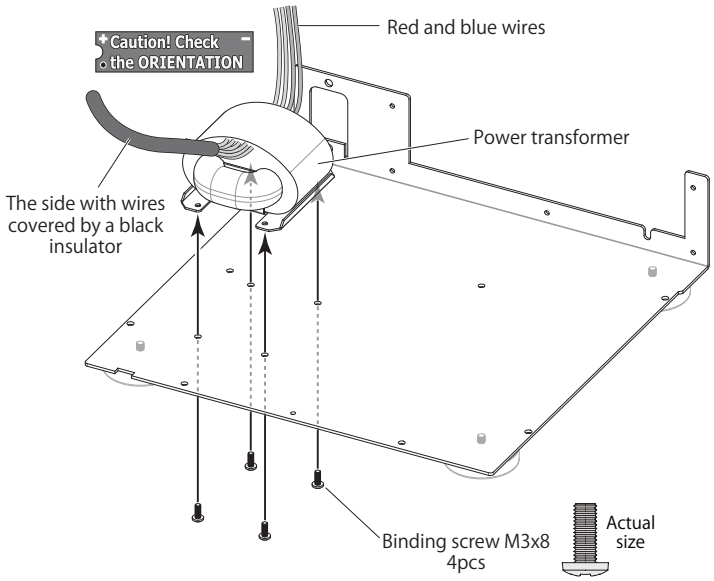
Now all the soldering is finished. Let's go on to the chassis assembly.

6. Chassis assembly

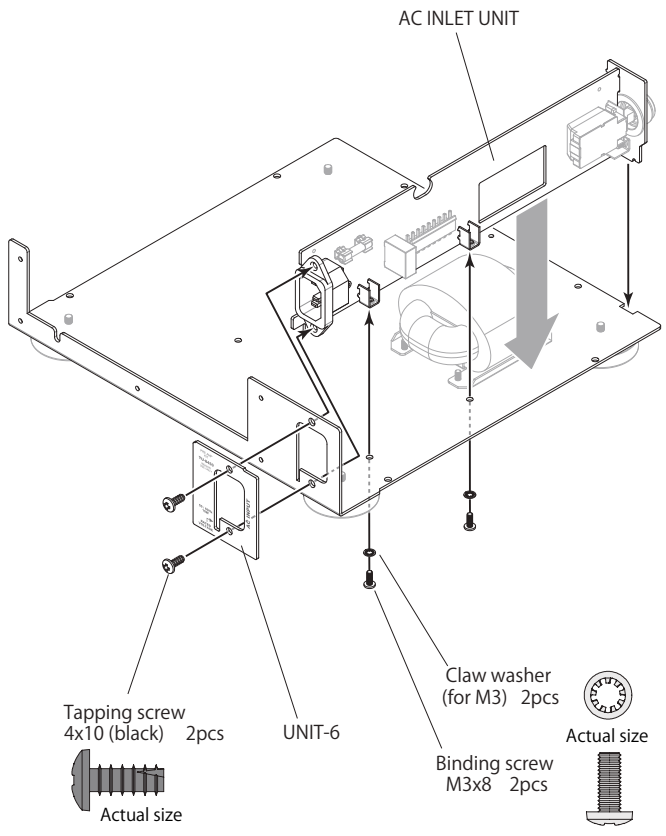
52 Insulator footing



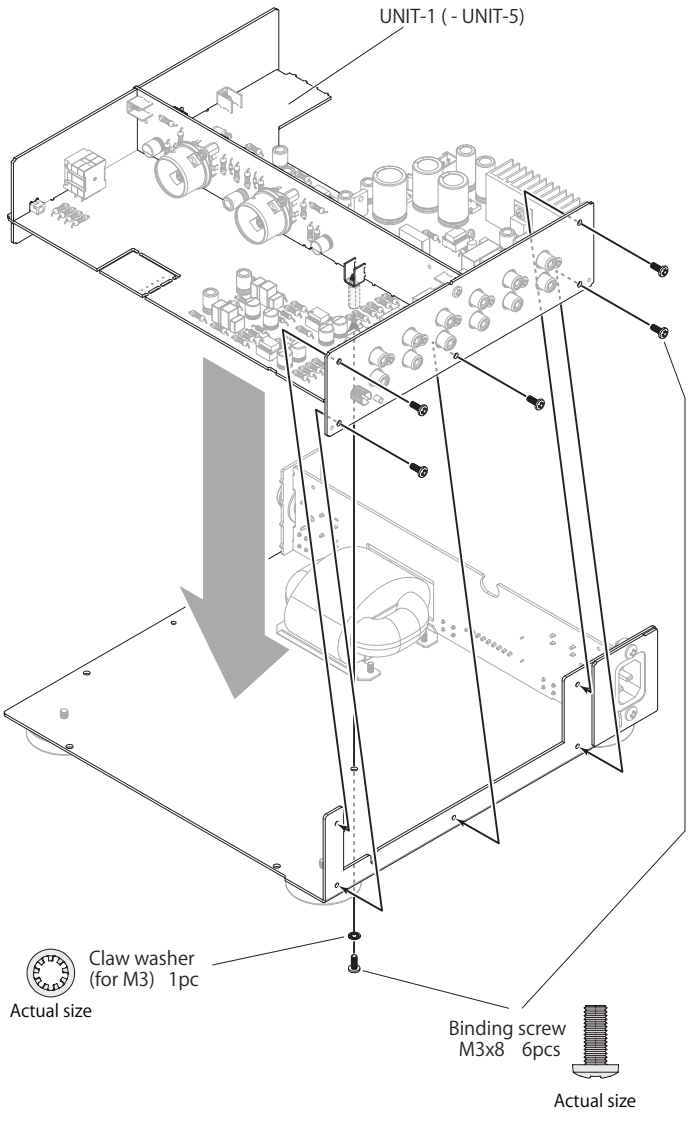
53 Power transformer



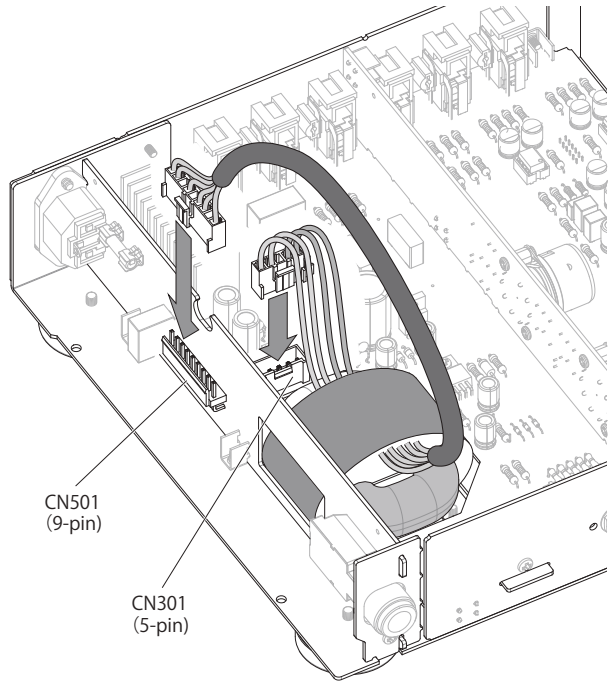
54 AC INLET UNIT



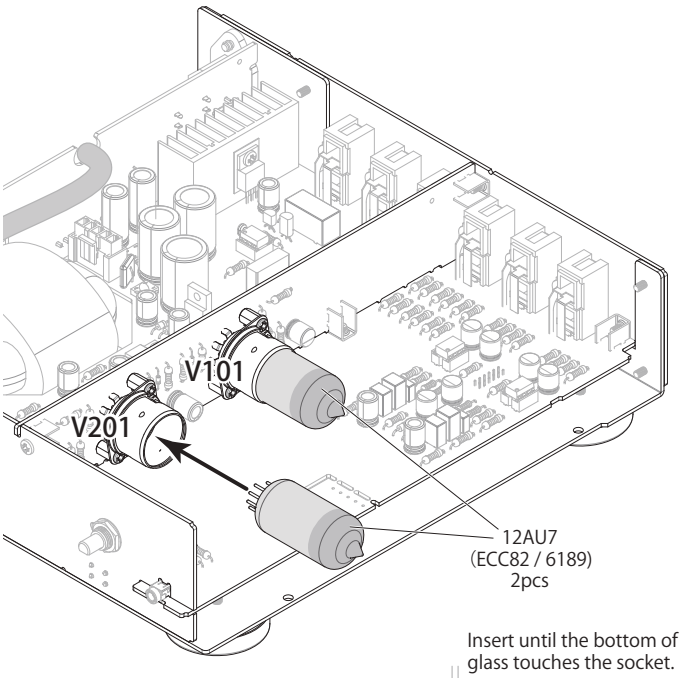
55 Assemble UNIT-1



56 Power transformer connection

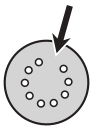


57 Install tubes

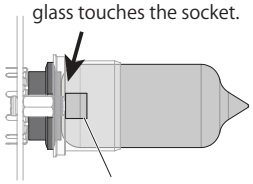


Make sure the tube pins are correctly aligned in the socket.

Note that the socket is very tight when a tube is inserted for the first time.

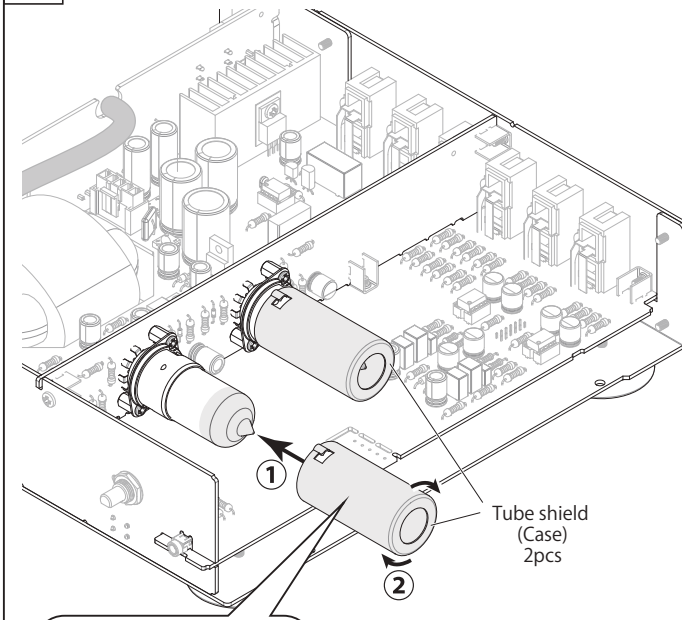


Insert until the bottom of the glass touches the socket.

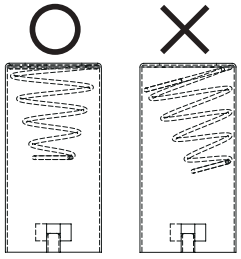


It can be seen through the window of the base of the tube shield.

58 Attach Tube shield (Case)

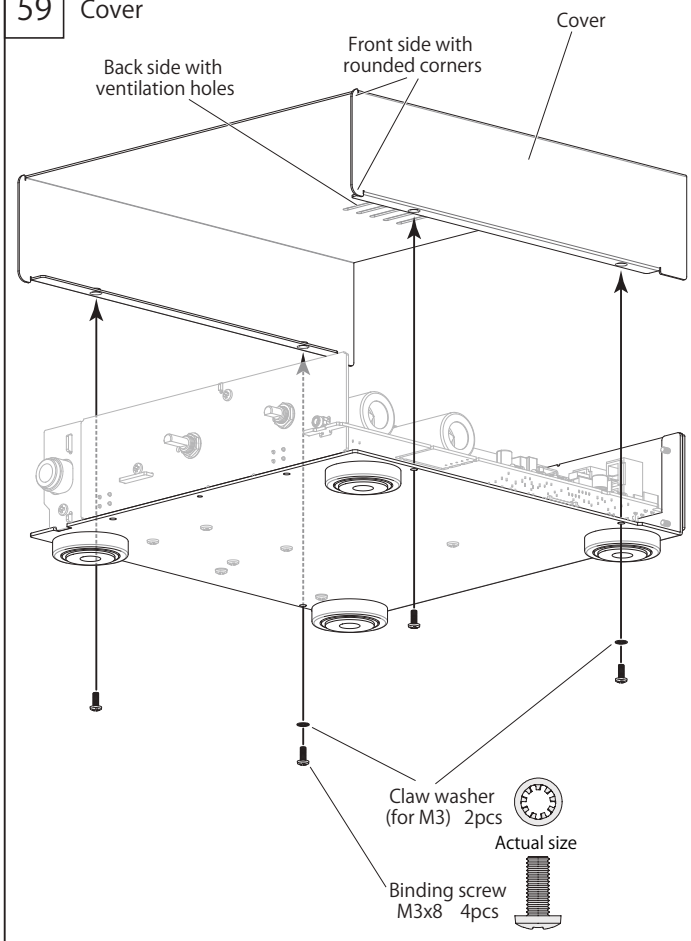


The attaching method of the shield case is bayonet type. Push in lightly and twist clockwise to lock.

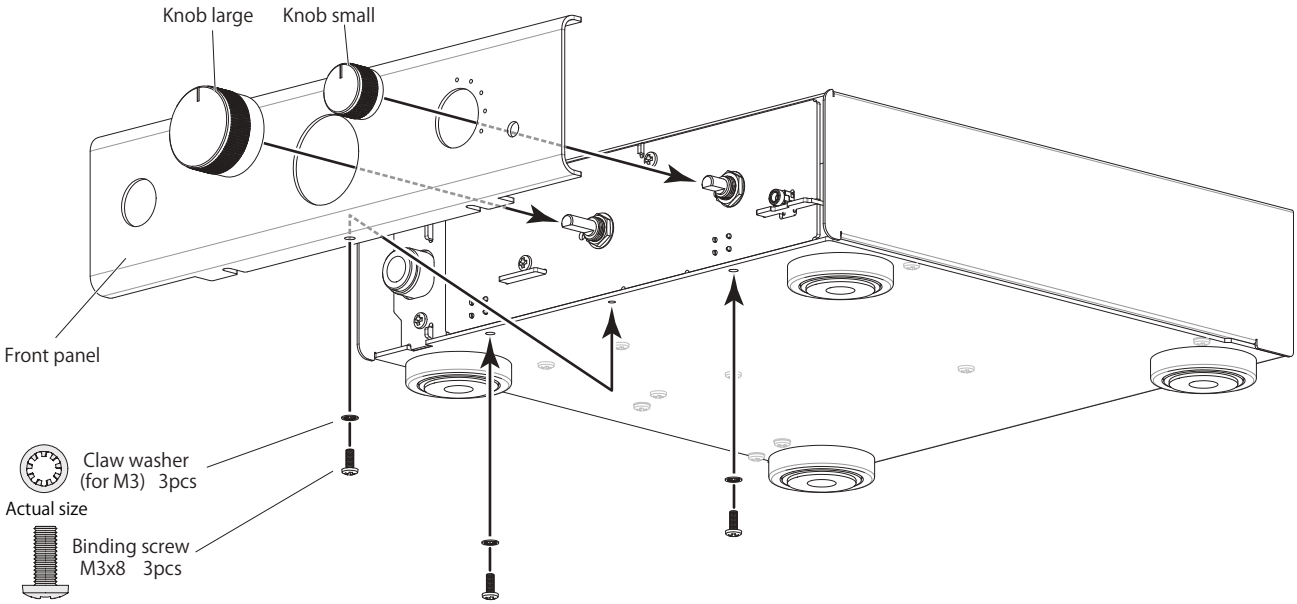


The internal spring tends to displace easily, so, push it back in with your finger before attaching.

59 Cover

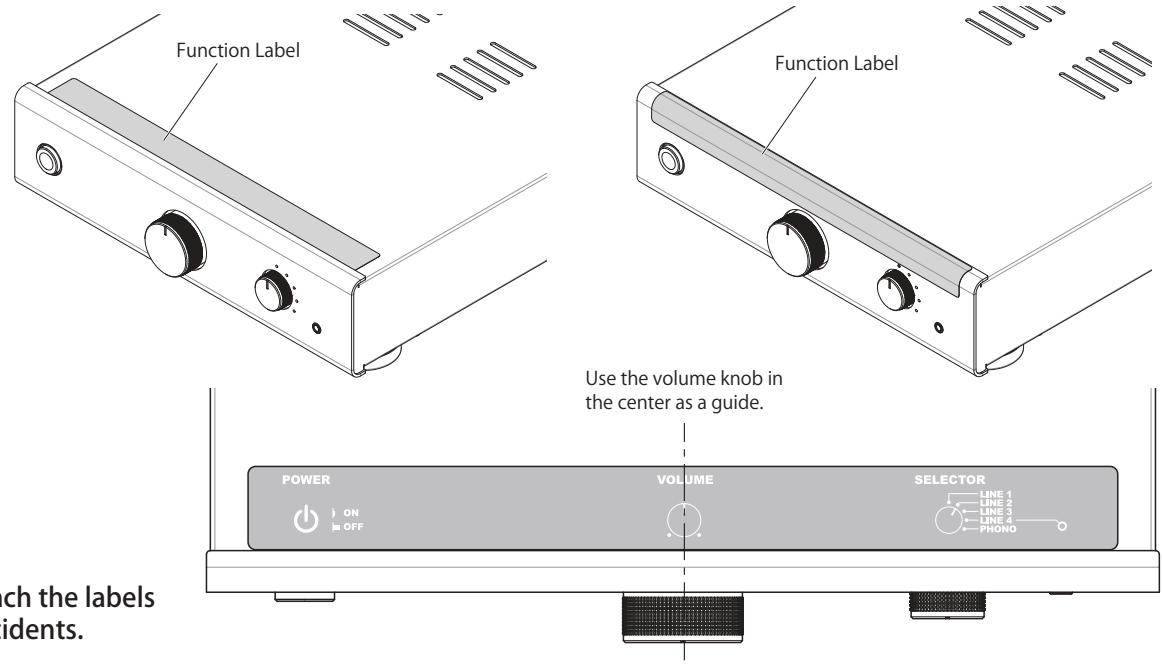


60 Front panel and knobs

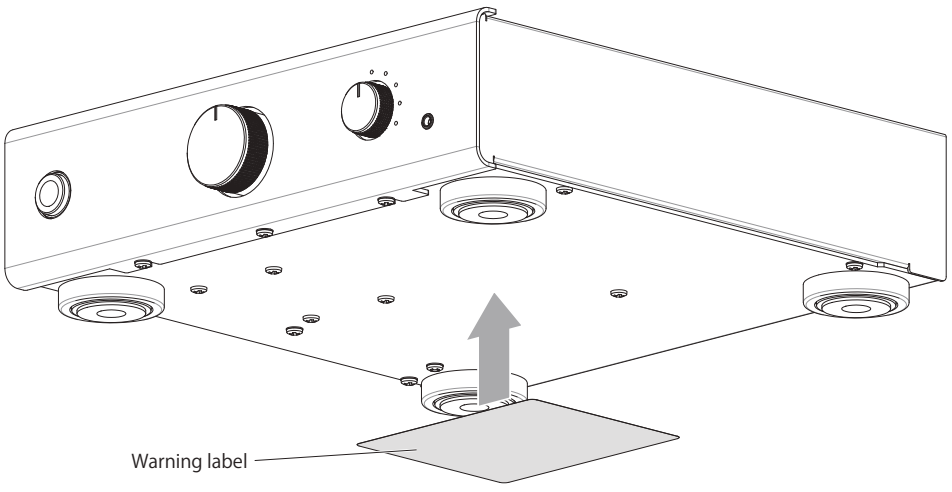


61 Labels

There are 2 types of design for 2 ways of attaching the function label. Choose whichever you like.



Be sure to attach the labels to prevent accidents.



Assembly is now complete.

7. Safety precautions and safety check (Be sure to read for safety use)

Incorrect use or handling of the product may cause electric shock, bodily harm, and damage to the product and other connected components. Please read the cautions below to avoid accidents.

⚠ CAUTION

◆Before closing the chassis after assembly or repair, verify that all parts are installed correctly, wiring is correct, and there are no solder bridges, missing solder, etc. BEFORE turning ON the power.

◆Electronic components in a vacuum tube amplifier exceed several hundred volts. To prevent electric shock, do not remove the cover when powered ON.

◆When operating the amplifier with the power ON by necessity (as to test the device), do not touch the parts, terminals, and metal parts with bare hands. Make sure to wear a pair of gloves. Find a safe place away from others who may come into contact with the amplifier while testing. Even when the power plug is disconnected, there is electricity remaining in the capacitors. Make sure to wait at least 10 minutes after the power plug has been disconnected before touching any components inside the amplifier.

◆If you experience anything unusual while using the amplifier, immediately turn OFF the power and unplug the power plug from the outlet, and refer to "Troubleshooting" on page19. If you cannot solve the problem, consult your local dealer or EK JAPAN.

◆Do not use the amplifier under an electric environment other than the preset power supply voltages.

◆When connecting and disconnecting the amplifier to/from other devices, read the instruction manuals of the connected devices carefully and follow the instructions. For connection, use the cords specified in those manuals.

◆When connecting and disconnecting the amplifier to/from other devices, make sure to turn OFF the power of all the connected devices. Failing to do so may cause damage to the amplifier and/or the connected devices.

◆Before turning ON or switching ON inputs, verify the volume control is turned all the way down to prevent ear injury, or speaker damage.

◆Adjust the sound volume slowly to an appropriate level, especially with headphones, to prevent sudden burst of high volume that may cause ear injury and auditory disorder.

◆Make sure to turn OFF the amplifier power before installing/uninstalling the vacuum tubes. Failing to do so may damage the amplifier and/or speakers.

◆During operation, the vacuum tubes become hot. To avoid burns, always use the amplifier with the cover attached.

◆If water or any unwanted substance gets into the main body of the amplifier, immediately turn OFF the power and unplug the AC power cord. Wait for at least 10 minutes, open the chassis and remove/wipe off the substance, and consult with your local dealer or EK JAPAN. Failing to do so may cause failure, fire, or electric shock.

◆Hold onto the AC power plug or connectors when unplugging. Do not unplug by yanking the AC power cord, as it may cause potential injury, fire, or electric shock.

◆Do not put heavy items on or under the AC power cord. Do not place the amplifier near any source of heat, such as a heater. Doing so may damage the AC power cord and cause fire or electric shock. Do not use damaged AC power cord.

◆Do not plug/unplug AC power cord with wet hands. Doing so may result in electric shock.

◆Handle the amplifier gently, especially the vacuum tubes as they are made of glass.

◆Place the amplifier on a stable surface to avoid a falling hazard. Place the amplifier in a location where nothing could fall onto the amplifier. Keep the amplifier out of small children's reach.

◆Keep out of direct sun, extreme hot and cold, humid or dusty areas as they may cause accidents and damage. Do not allow gas or corrosive substances to come into contact with the amplifier. Failing to do so may cause damage or hazard.

◆Make sure the amplifier is placed at least 10cm away from walls, and has at least 10cm of space above it as well, as the amplifier will radiate heat. Placing the amplifier too close with other equipment may cause a fire. Do not place the amplifier on a thick carpet, or in an enclosed space such as a drawer, or a box that will obstruct ventilation. Do not cover the amplifier with table cloths, towels, pillows or anything that may cause fire.

◆Clean the amplifier regularly. If dust accumulates on the circuit board, it may cause fire or other hazards. It is recommended to clean the amplifier before the start of humid or rainy seasons.

◆Do not make any modifications other than specified on Page21 of this manual. Failing to do so may cause accidents and/or malfunction.

◆The amplifier is designed for home use. Do not use it in environments that it would push the amplifier beyond it's limitations.

◆Discard the amplifier according to the rules and standards in your region. Failing to do so may cause damage to the environment and others.

8. Operation check

* Check the amp in the following order.
Turn the amp OFF immediately if there is anything not in order during the operation check.

□① Make sure the power of the preamp is switched OFF, and connect the peripheral devices and power cord referring to the connection example on page 20. Turn down the volume knob of the preamp and set the input selector to "LINE 1"

□② Press the power switch of the preamp to turn ON. The LEDs near the volume knob will flash green.

□③ After 20 seconds, you will hear the relay "click" and the green LEDs will change from flashing to continuously lighting up. (There is no output from "PRE OUT" until the relay is activated.)

□④ Turn up the VOLUME of the preamp and check the sound from "LINE 1" is working properly (LINE 1 audio source must be ON and functioning).

□⑤ Do the same check for "LINE 2 to 4" with an audio source.
If there is no issue, the flat amp part is OK.

□⑥ Next, check the phono amp. Set the input selector to "PHONO" and perform the same check as in ④.

When all are OK, the operation check is complete.

To further confirm the safe operation of the preamp, it is recommended to check the voltage of each test point with a multimeter. Refer to the voltage check chart on Page 23.

9. Troubleshooting

- Please refer to the below troubleshooting steps during use or operation check.
- Please also refer to the voltage check chart on Page 23.
- It is very difficult to visually detect a bad soldering even with a magnifier. We recommend applying a soldering iron to all solder joints again if there is an issue.
- In not a few cases, the cause of the malfunction is not the amplifier but the disconnection of the connecting cable, so please inspect it as well.
- If you cannot solve the problem, please consult with EK JAPAN or your local dealer.

In TU-8450, the PC board and circuit diagram (Page 22-23) are labeled with an indication for each functional section, so it is easy to guess the section where the trouble occurs from the symptoms.

- PHONO EQ AMP
- FLAT AMP
- DELAY TIMER
- A-POWER(+12V) (Low-voltage positive power supply for heaters and OPamps)
- C-POWER(-12V) (Low-voltage negative power supply for OPamps)
- B-POWER RECTIFIER
- RIPPLE FILTER (FOR B-POWER) (High-voltage power supply for amplification)
- AC INLET UNIT

The part numbers are basically assigned as follows (with some exceptions), so it is easy to narrow down the list when the symptoms are different on the left and right channels or common for both channels.

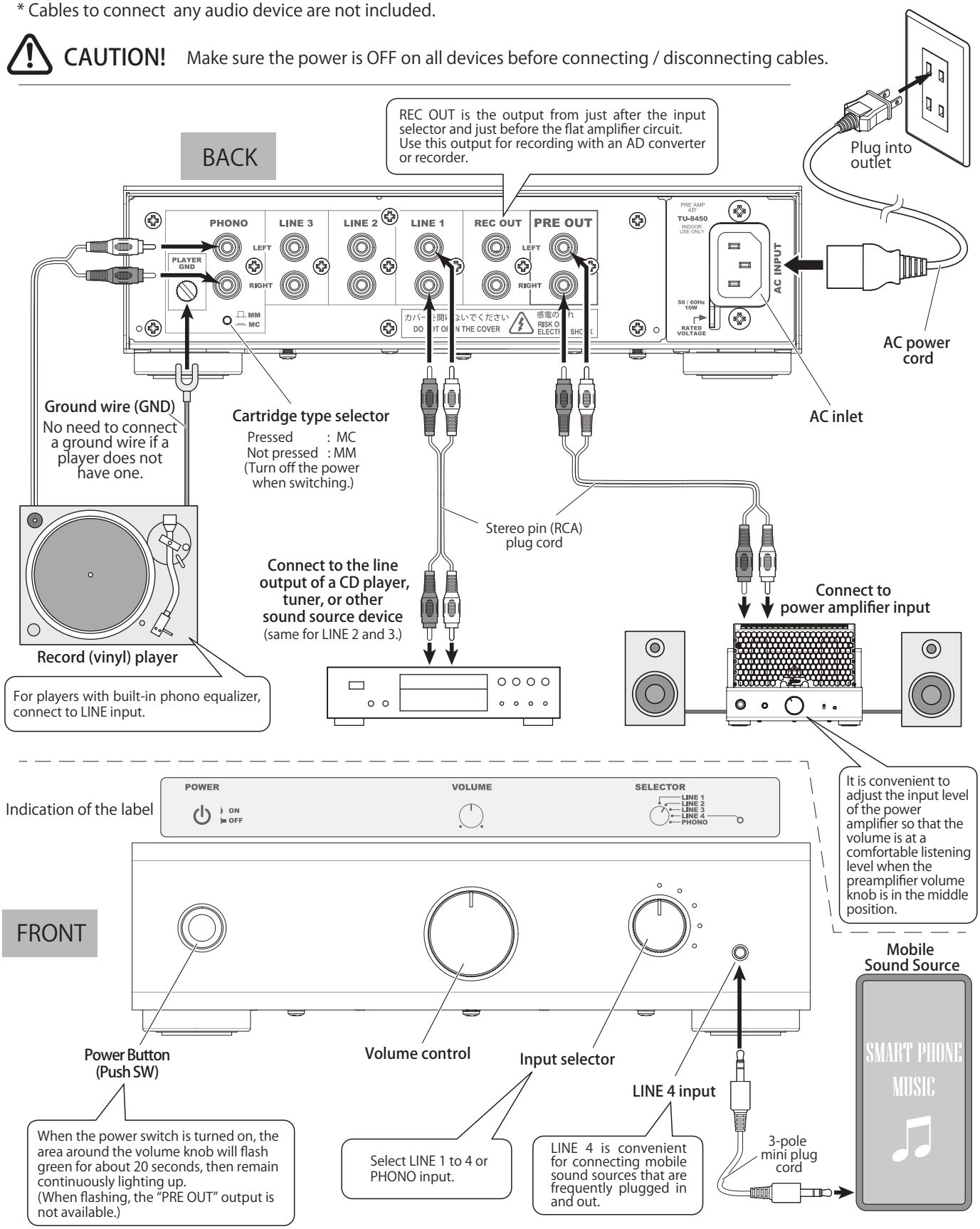
- Parts for left channel ---------- Number in the 100's
- Parts for right channel ---------- Number in the 200's
- Parts that are common or not separated by right and left channels ----- Number in the 300's or 1- to 2-digit number (AC INLET UNIT is in the 500's)

	Symptom	Check points (Check the installation and soldering of each part.)
1	Will not turn ON (Pilot LEDs OFF, the tube heaters do not glow).	Is the AC power cord plugged both ends securely? or the AC power cord damaged? "AC INLET UNIT" section (Also check FUSE.) "A-POWER(+12V)" section
2	LEDs light up, but the tube heaters do not.	Pin 4 and 5 of socket for tube that do not light up. If both tubes do not light up ; Soldering between UNIT-1 and UNIT-3 ("I" or "J").
3	Relay does not operate or operates too early.	"DELAY TIMER" section
4	Amplifier operates normally, but LEDs do not light up.	LED301, LED302, R309 and R310
5	"LINE 1 to 4" inputs are normal, but only "PHONO" is malfunctioning.	"PHONO EQ AMP" section and SW302 If hum noise is generated and the hum becomes louder when touching the tone arm of the player, the GND between the player and the preamp is not electrically connected. There are cases of cable disconnection or disconnection inside the player, so please inspect them as well.
6	Any input is a malfunction.	"FLAT AMP" section and SW302 If the symptoms are the same on both sides, check "RIPPLE FILTER (FOR B-POWER)" as well.
7	Either one of LINE1 - 4 is malfunctioning.	Jack of malfunctioning input, R112 - 119, R212 - 219 and SW302
8	When a tube is tapped, the tap is amplified and heard through the speakers.	The noise is called "microphonic noise" inherent in tube amps. Microphonic noise occurs by the electrode of the tube picking up oscillations. See page 21 for details. Avoid placing vacuum tube amplifiers close to speakers, as vibrations can cause sound quality degradation.
9	Big difference in the brightness of the heaters of the tubes	The heater in the tube heats up the cathode electrode, and the excess heat is seen as the glow of the heater. The brightness of this glow from the heater varies from tube to tube. It has nothing to do with the quality of the tubes.

10. Connections

* Cables to connect any audio device are not included.

CAUTION! Make sure the power is OFF on all devices before connecting / disconnecting cables.



How to change the gain of the flat amp

TU-8450 is set to a gain level that is designed for connection to a typical power amplifier. However, if you are using a power amplifier with high input sensitivity, it may be easier to use if you decreasing the gain of the preamplifier.
If you apply solder to the JP1 and JP2 lands on the SIDE B of UNIT-3 and cause a short circuit, the gain will decrease.
(Normally approx. 13.6dB (4.8 times) → approx. 9.5dB (3 times))

[Column] Power ON/OFF sequence

In an audio system, power is generally turned on in the following order: sound source equipment, preamplifier, and power amplifier (from the sound source side to the speaker side).
When turning off the power, do so in the reverse order (from the speaker side to the sound source side).
In this way, you can prevent noise from being emitted to the speakers when turning ON/OFF.

11. Enjoy TU-8450 to the fullest

①Tube rolling

Various vacuum tubes manufacturers make the same model or equivalent of a tube. You can find different brands of same model tubes from various tube vendors. Although the model numbers are the same, tubes from different manufacturers will have variations in the way they sound. The ability to experience different sounds by changing tubes is one of the real thrills of tube amplifiers.
Some tubes have additional letters at the end of the model number. They basically have the same specifications as those with original model numbers, or some of them are improved version, i.e., less noise, lower voltage resistance, smaller chance of breakage, etc. So it is no problem to use them as a substitute of the tubes with original model numbers.

12AU7 = ECC82 = E82CC (*1) = ECC802 (*2) = 6189 (*3)

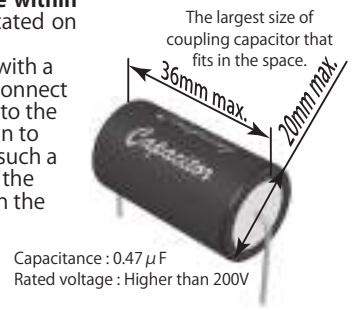
*1 : High reliability tube
*2 : Low noise tube
*3 : Those with 4-digits are for industrial or military use.
6189 are recommended, especially for audio.

Tubes have a phenomenon called "microphonic noise," in which the electrodes inside the tube pick up vibrations, and this can be a particular problem in preamplifiers, so select a good quality tube.
Although it is not so explicit in the current tubes, those with "W" or "S" at the end are countermeasures, so please refer to them.

* Make sure to **turn OFF the power** before installing/removing tubes.

② Change the capacitors in search of your favorite sound

In a preamplifier, the coupling capacitor is said to have a particular influence on the sound quality. ELEKIT believes the quality of these capacitors in the kit is already quite high, and you may not hear the effect even after they are exchanged. However, some audiophiles may opt for different capacitors. TU-8450 PCB is designed with some extra space for larger size of capacitors, for C107 and C207. When replacing these capacitors, make sure to select a capacitor which **rated voltage is higher than 200V and the capacitance is 0.47uF.**
In addition, **the size should be within the maximum figures** as indicated on the right.
For those capacitors wrapped with a film, it might be instructed to connect the outer side of the electrode to the lower impedance side of the pin to minimize noise or crosstalk. In such a case, connect the outer side of the electrode to the "Outer" side on the PCB.



③ Exchange the OPamp

In TU-8450, there is a phono equalizer amp circuit with two OPamps (U101, U201). OPamps can be exchanged if they meet the following conditions.

- The package must be DIP-8-pin and the pin assignment is general dual OPamp specifications (4558 type).
- Must be able to use ±12V power supply.

Since they are used in areas where very small signals are handled, it is advisable to select low noise OPamps in principle. (Those included in TU-8450 kit are low noise Opamps.)

* We are not liable or responsible for any problems/failures caused by component exchange or modifications, and kindly ask you to conduct such component exchange and modifications at your own risk and responsibility.
* We do not provide the capacitors and tubes for exchange. Please purchase them from reputable electronic or vacuum tube vendors.
* There seems to be a scattering of problems caused by inadvertent replacement of parts. **Do not replace parts other than indicated above.**

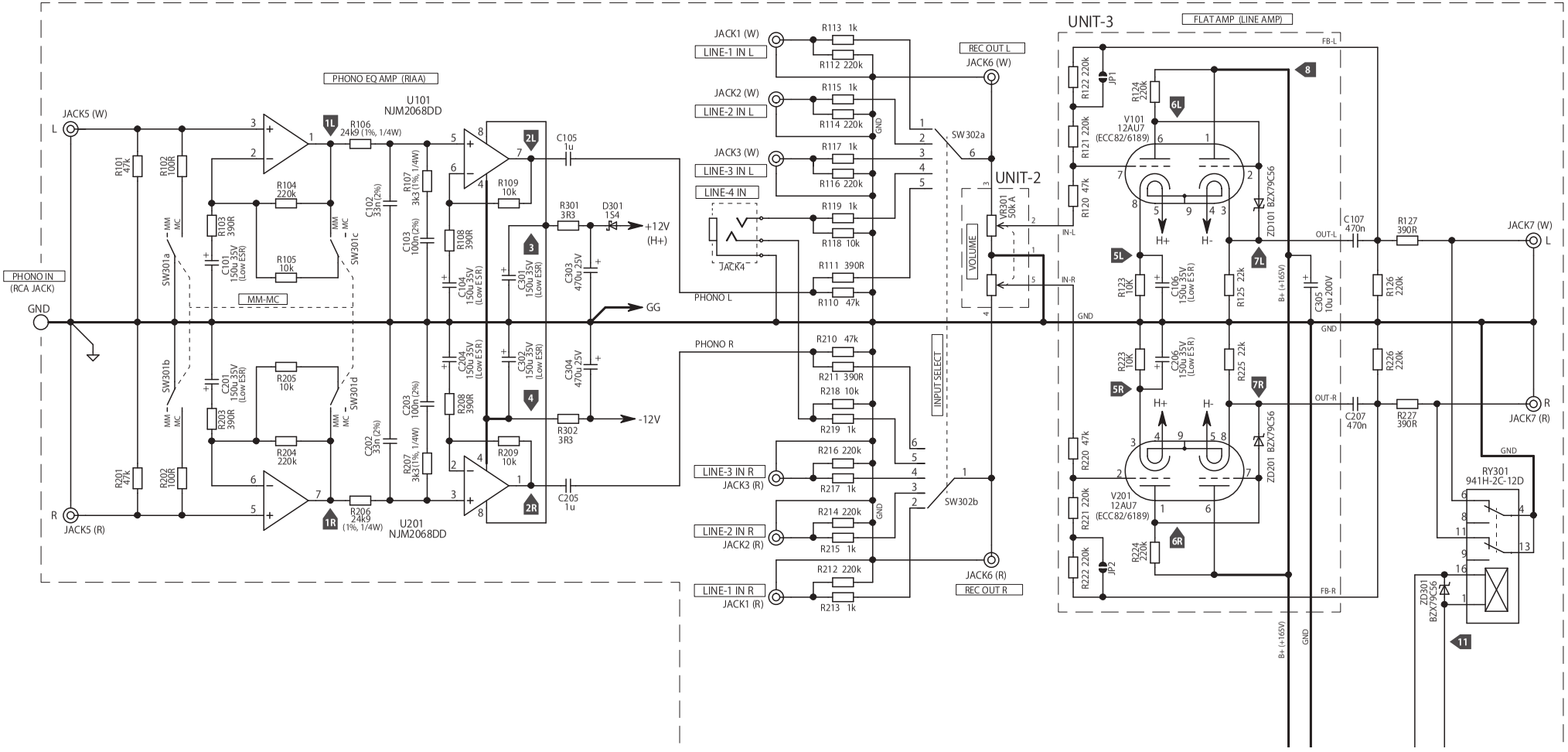
12. Technical data

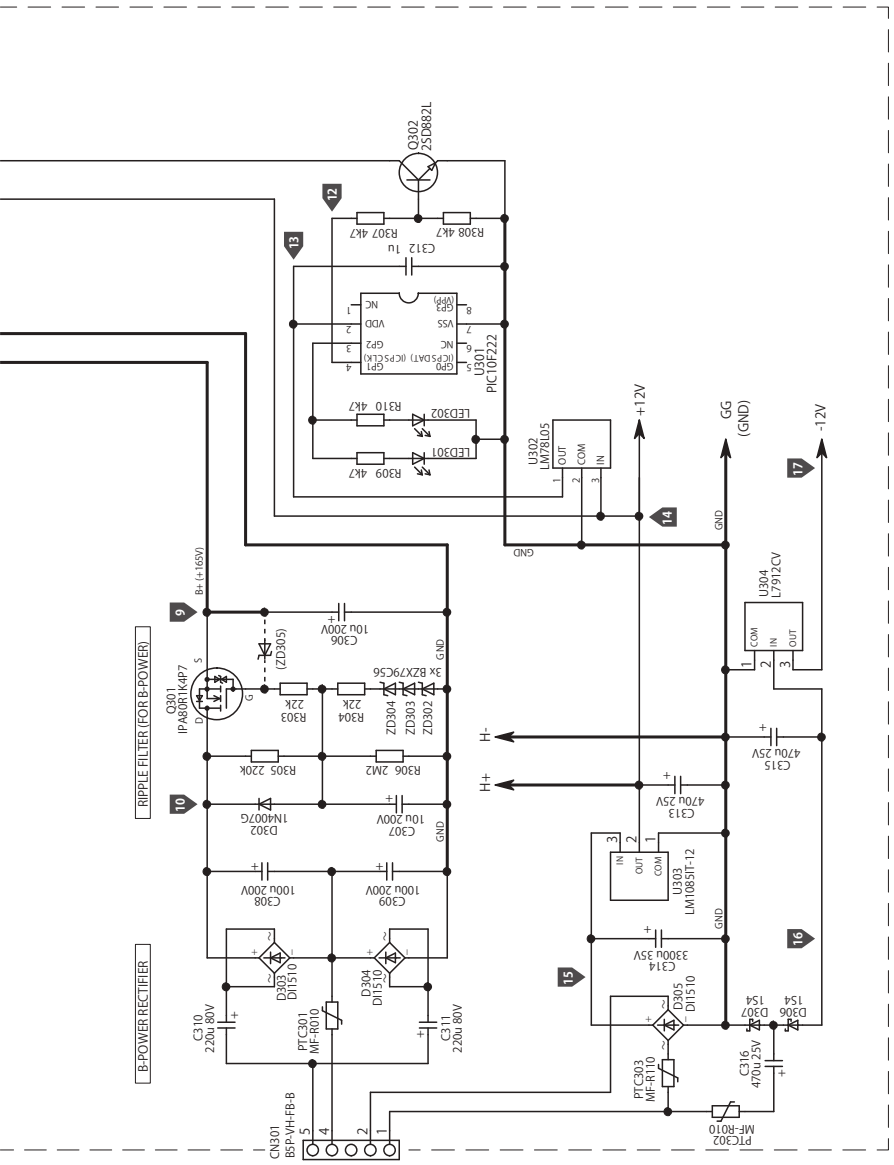
Specifications		Each specification shows a typical value. (not guaranteed values)
Comprehensive	Model No.	TU-8450 (with tubes) / TU-8450N (without tubes)
	Tubes	2 x 12AU7/ECC82/ECC802/E82CC/6189
	Circuit configurations	Vacuum tube stereo preamplifier
	Flat amp (Line amp)	Consists of tubes, Volume control, Delay timer included
	Phono EQ amp	Consists of OP-amps, CR equalizer circuitry for RIAA, for MM (or equivarent) or MC cartridge
	A-power	Regulated 12V DC
	B-power	Regulated 160V DC by MOSFET
	Input terminal	LINE 1, LINE 2, LINE 3, PHONO : RCA jacks / LINE 4 : 3.5mm 3-pole mini jack (front right side)
	Output terminal	PRE OUT (2-lines, pallarel output), REC OUT (selector output) : RCA jacks
	Control function	VOLUME, INPUT SELECT
	Power voltage	115V AC or 230V AC 50/60Hz (Select either AC115V or 230V upon assembly.) IEC standard 3P inlet type
	Rated power consumption	10W
	Dimensions	W 253 x H 73 x D 272 mm (incl. projections)
	Weight	Approx. 3kg (assembled, excl. power cord)
Phono EQ amp	Gain (at 1kHz)	36dB (MM), 63dB (MC)
	RIAA deviation	±0.5dB max. (20Hz - 20kHz)
	Maximum output voltage	7V rms (1kHz)
	Residual noise (IHF-A)	20μV (MM), 290μV (MC)
	Input resistance	47kΩ (MM), 100Ω (MC)
	Effective output impedance	Approx. 500Ω
Flat amp	Gain (Volume position is maximum)	13.6dB (approx. 4.8 times) (9.5dB (approx. 3 times) when JP1 and JP2 are shorted)
	Frequency response (-3dB)	5Hz - 200kHz
	Residual noise (IHF-A)	20μV
	Maximum output voltage	17V rms
	Input resistance	Approx. 50kΩ (LINE 1 to 3), approx. 10kΩ (LINE 4)
	Effective output impedance (PRE OUT)	Approx. 600Ω

● Schematic diagram

Resistors not otherwise specified are
1/2W standard size, class J (±5%).

VOLTAGE TEST (CHECK) POINT
No. DC VOLTAGE vs. GND





VOLTAGE TEST (CHECK) POINT

No. DC VOLTAGE vs. GND

How to use multimeter probes

Measure in DC range with respect to the GND.
(Apply the "-" (negative) lead to GND.)

Voltage check points and voltage references (DC voltage with respect to GND)

This is a guideline when measured with a multimeter with an internal resistance of 10 MΩ during normal operation and no signal. Measurement values may vary depending on individual differences in vacuum tubes, power supply voltage, measurement conditions, etc., so please consider them as guidelines only.

Check point	Reference voltage (guideline)	Remark
1L 1R	5 mV or less (MM) 50 mV or less (MC)	For U101 and U201 with the included operational amplifiers (NJM2068DD)
2L 2R	5 mV or less (MM) 50 mV or less (MC)	
3	11.5 V	
4	-12 V	
5L 5R	4 V	Varies depending on individual difference of V101or V201
6L 6R	70 - 78 V	
7L 7R	[Value of 6L or 6R] + approx. 2V	
8	163 V	** ±10% depending on voltage fluctuation of AC line
9	163 V	
10	180 V **	
11	0 V	
12	5 V	
13	5 V	
14	12 V	
15	17 V **	
16	-17 V **	
17	-12 V	

13. Warranty

Since this is an electronic product assembled by a user, EK JAPAN cannot provide a standard warranty like those found with a regular electronic product. Instead, EK JAPAN can provide help to resolve your problems via troubleshooting support from your local EK JAPAN dealer, or you can e-mail EK JAPAN directly.
If you experience problems with the assembled product, please contact an EK JAPAN dealer in your region or the store from which you purchased the product for further assistance.
If you do not know who to contact, please send us an e-mail describing the problem you are facing to the e-mail address below. Throughout the instruction manual, there are many check points, and in many instances the problem can be solved if you review these points closely, and use the troubleshooting on Page 19 before consulting with your dealer or EK JAPAN.

Contact information

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