

ROTARY SOUND PROCESSOR

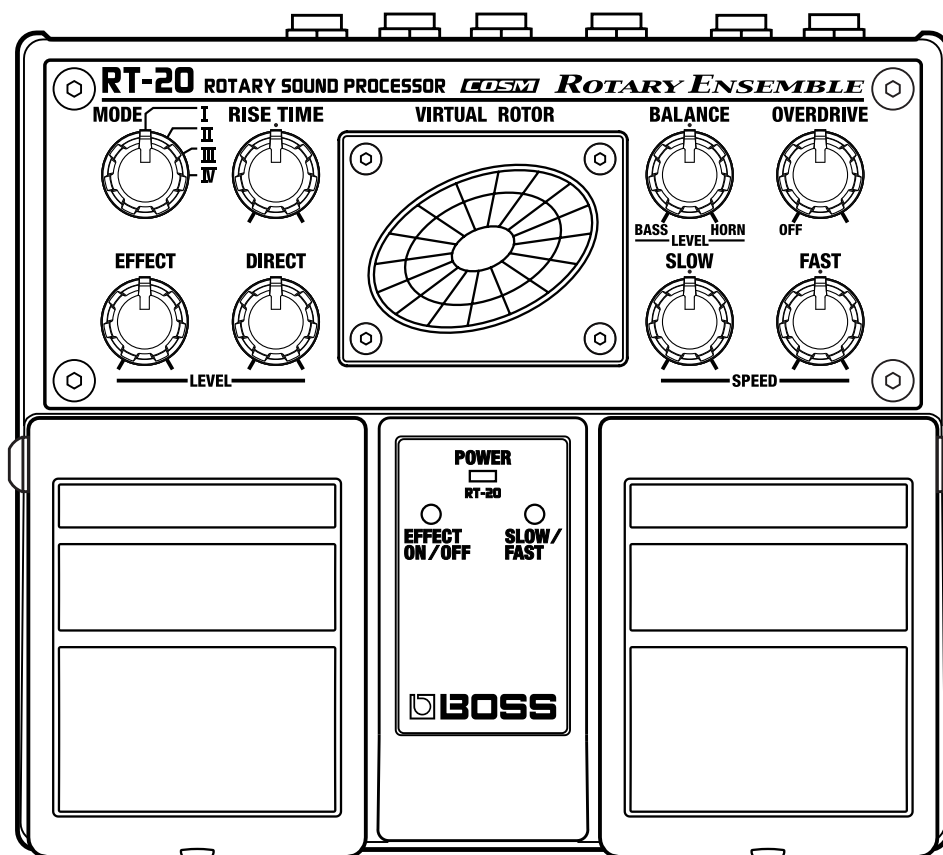
RT-20

SERVICE NOTES

Issued by RJA

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Roland

17058357E0

Printed in Japan (0500) (SC-KWS)

Cautionary Notes

Before beginning the procedure, please read through this document.

No User Data

This product cannot save user data. Backing up user data during servicing is not required.

Parts List

A component whose part code is ***** cannot be supplied as a service part because one of the following reasons applies.

- Because it is supplied as an assembled part (under a different part code).
- Because a number of circuit boards are grouped together and supplied as a single circuit board (under a different part code).
- Because supply is prohibited due to copyright restrictions.
- Because reissuance is restricted.
- Because the part is made to order (at current market price).

Part Replacement

When replacing components near the power-supply circuit or a heat-generating circuit (such as a circuit provided with a heat sink or including a cement resistor), carry out the procedure according to the instructions with respect to the part number, direction, and attachment position (mounting so as to leave an air gap between the component and the circuit board, etc.).

Circuit Diagram

In the circuit diagram, 'NIU' is an abbreviation for 'NOT IN USE'.

The circuit board and circuit-board diagram show silkscreened indications, but no components are mounted.

Specifications

RT-20: Rotary Sound Processor

Nominal Input Level

-20 dBu

Input Impedance

1 M Ω

Output Impedance

1 k Ω

Recommended Load Impedance

10 k Ω or greater

Display

VIRTUAL ROTOR

Controls

EFFECT ON/OFF pedal
 SLOW/FAST pedal
 OVERDRIVE knob
 BALANCE knob
 RISE TIME knob
 MODE knob
 FAST SPEED knob
 SLOW SPEED knob
 DIRECT LEVEL knob
 EFFECT LEVEL knob
 DRIVE TYPE switch

Indicators

POWER indicator (serves also as battery check indicator)
 EFFECT ON/OFF indicator
 SLOW/FAST indicator

Connectors

INPUT A (MONO) jack (1/4 inch phone type)
 INPUT B jack (1/4 inch phone type)
 SPEED (EXP PEDAL) jack (stereo 1/4 inch phone type)
 PHONES jack (stereo 1/4 inch phone type)
 OUTPUT A (MONO) jack (1/4 inch phone type)
 OUTPUT B jack (1/4 inch phone type)
 AC Adaptor jack

Power Supply

DC 9 V: Dry battery (R6/LR6 (AA) type) x 6, AC Adaptor

Current Draw

85 mA (9 V max.)

* *Expected battery life under continuous use:*

Carbon: 6 hours

Alkaline: 10 hours

These figures will vary depending on the actual conditions of use.

Dimensions

173 (W) x 158 (D) x 57 (H) mm

6-13/16 (W) x 6-1/4 (D) x 2-1/4 (H) inches

Weight

1.1 kg / 2 lbs 7 oz (including batteries)

Accessories

Owner's Manual (#G6017153R0)

Leaflet ("USING THE UNIT SAFELY," "IMPORTANT NOTES," and "Information") (#G6017303)

Dry battery (R6 (AA) type) x 6

* *We recommend that alkaline batteries be used when replacing the batteries.*

Options

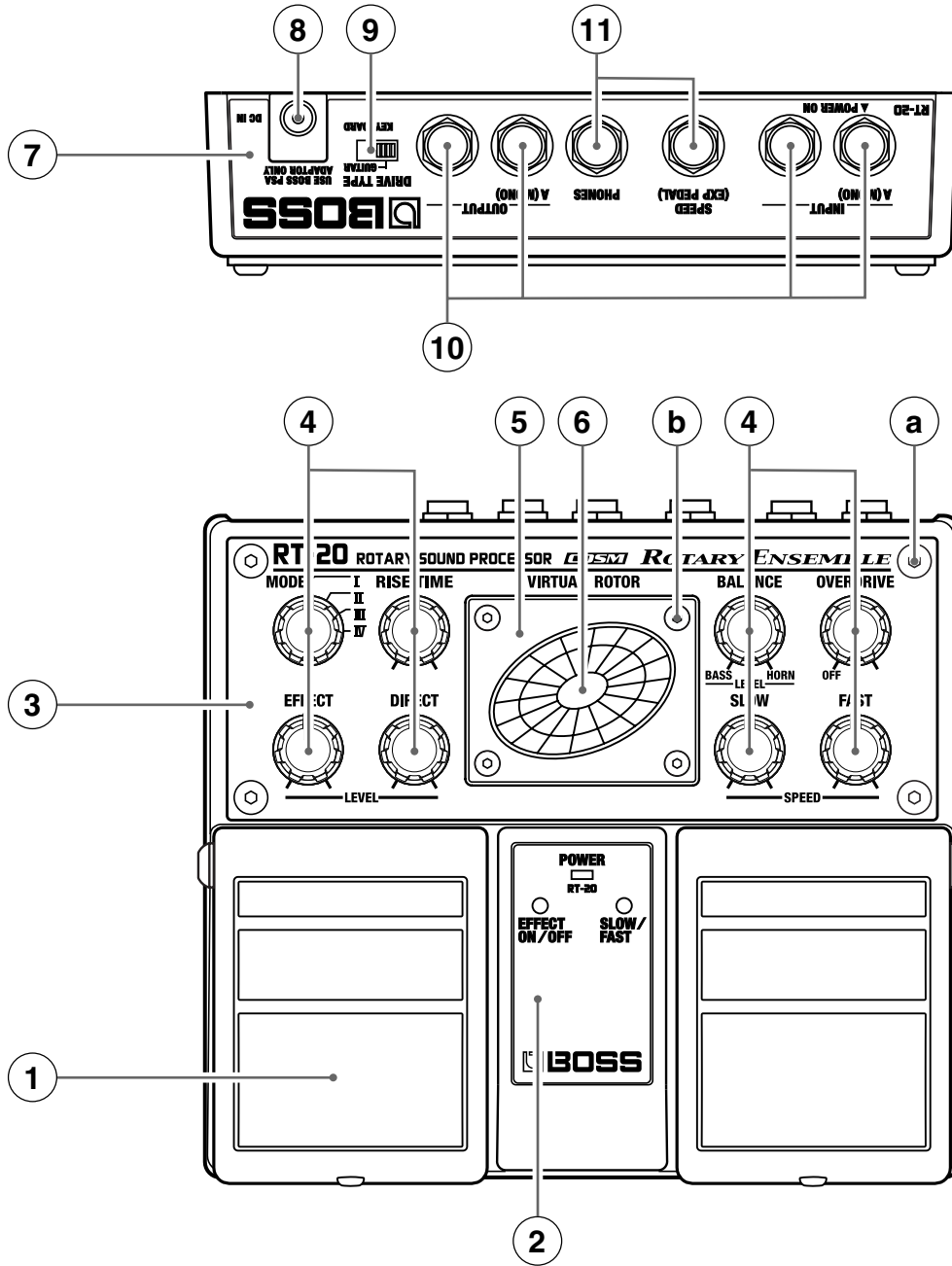
AC Adaptor (PSA-series)

Expression Pedal (Roland EV-5)

* $0 \text{ dBu} = 0.775 \text{ Vrms}$

* *In the interest of product improvement, the specifications and/or appearance of this unit are subject to change without prior notice.*

Location of Controls



Location of Controls Parts List

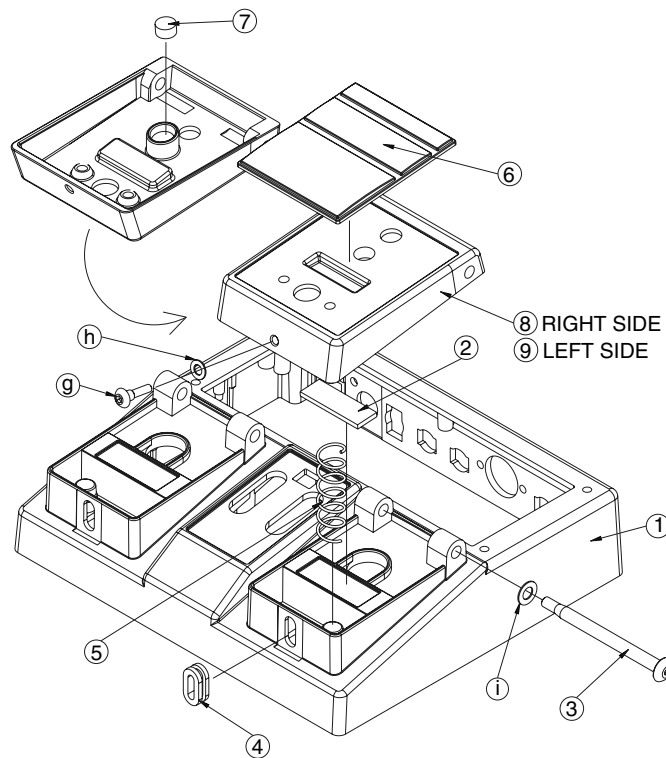
[PART]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
1	G2357116R0	PEDAL PLATE	62X53	2
2	G2217749R0	LED PANEL		1
3	G2217192R0	PANEL		1
4	75D522N0R0	MINIMUM VR KNOB		8
5	G2567163R0	LED COVER		1
6	G2147880R0	LED LENS		1
7	G2217191R0	REAR PANEL		1
8	F3449415	ADAPTOR JACK	KM02009AB	1
9	F3159104	SWITCH	SS037-P222BHH-PE9	1
10	13449150	6.5MM JACK	HLJ0544-0100109	4
11	F3449707	PHONE JK (STREO)	HTJ-064-12DS	2

[SCREW]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
a	H5029855	SCREW M4X8	HEXAGON BUTTON HEAD NI	4
b	H5029901R0	SCREW M3X10	HEXAGON SOCKET (FE/NI)	4

Exploded View (1)



Exploded View (1) Parts List

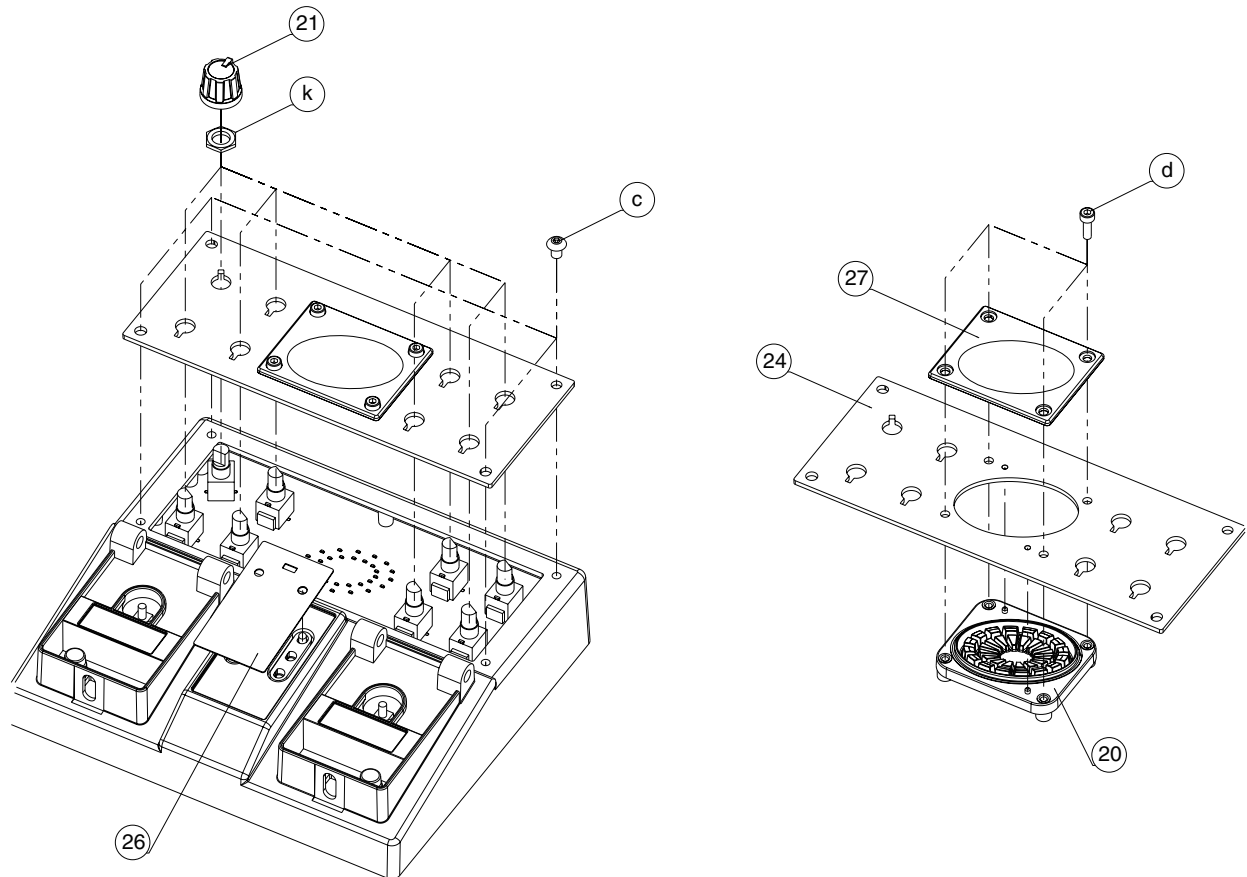
[PART]

No.	PART CODE	PART NAME	DESCRIPTION	Q'TY
1	75E202T000	CASE		1
2	G2357111R0	CUSHION R		2
3	H5029851	PEDAL SHAFT		2
4	22157702R0	PEDAL GUIDE BUSH		2
5	22177109R0	COIL SPRING		2
6	G2357116R0	PEDAL PLATE	62X53	2
7	G2357115	PEDAL FOOT	M8	2
8	G2187529R0	PEDAL R		1
9	75E202T1R0	PEDAL L		1

[SCREW]

No.	PART CODE	PART NAME	DESCRIPTION	Q'TY
g	H5029852	SCREW 4M3 FEBZC	HEXAGON SOCKET BU	2
h	H5039413	NYLON WASHER M4.1X7.5X0.5	BLACK	2
1	H5039414	NYLON WASHER M5.1X9.5X0.5	BLACK	2

Exploded View (2)



Exploded View (2) Parts List

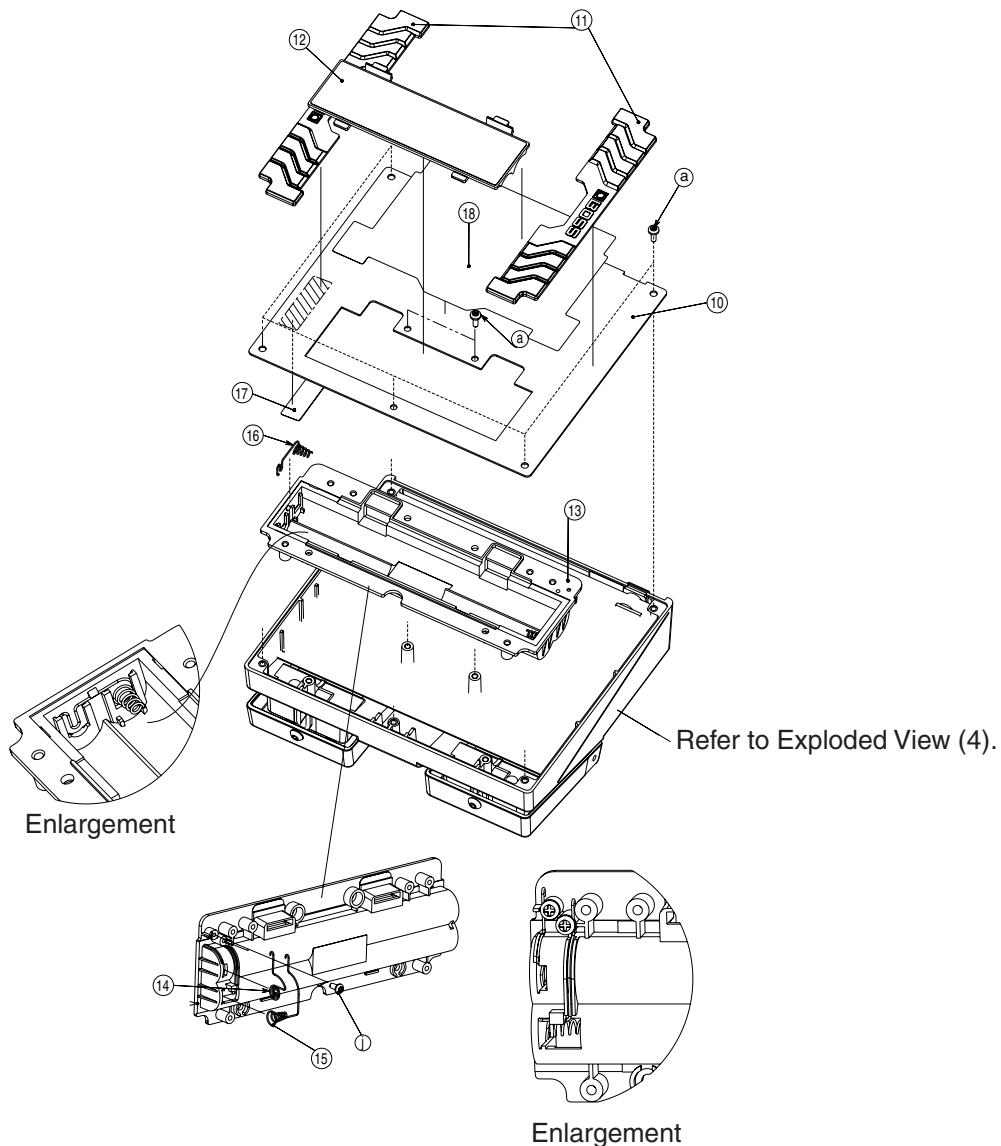
[PART]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
20	G2147880R0	LED LENS		1
21	75D522N0R0	MINIMUM VR KNOB		8
24	G2217192R0	PANEL		1
26	G2217749R0	LED PANEL		1
27	G2567163R0	LED COVER		1

[SCREW]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
c	H5029855	SCREW M4X8	HEXAGON BUTTON HEAD NI	4
d	H5029901R0	SCREW M3X10	HEXAGON SOCKET (FE/NI)	4
k	H5039521R0	NUT M7		8

Exploded View (3)



Exploded View (3) Parts List

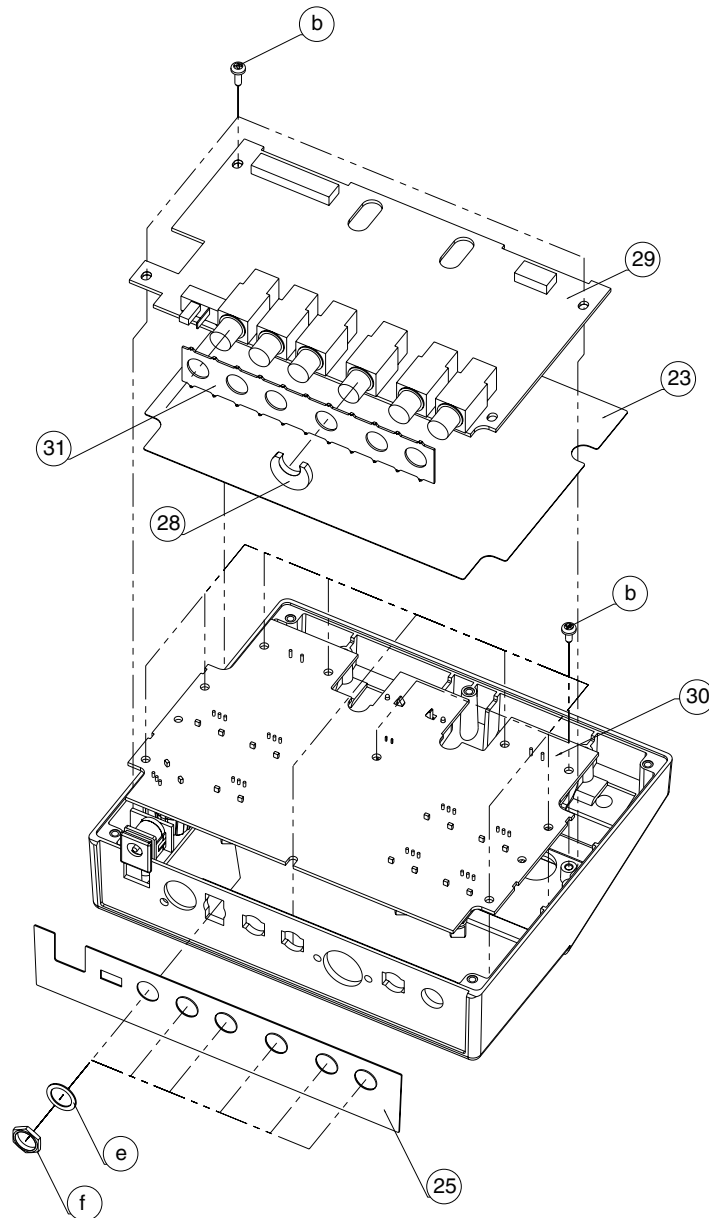
[PART]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
10	75D422E000	BOTTOM COVER		1
11	G2357118	BOTTOM FOOT		2
12	G2017621R0	BATTERY COVER		1
13	G2017620	BATTERY CASE		1
14	G2177308	BATTERY TERMINAL (+)		1
15	G2177309	BATTERY TERMINAL (-)		1
16	G2177307	BATTERY TERMINAL (+-)		1
17	G2257130	BATTERY INSULATING SHEET		1
18	G2537007R0	BOTTOM COVER LABEL		1

[SCREW]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
a	H5019115	SCREW M3X8	PAN TAPPING-2 FEBZC	7
j	H5019430	SCREW M2.6X5	BINDING HEAD	2

Exploded View (4)



Exploded View (4) Parts List

[PART]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
23	G225712901	INSULATING SHEET		1
25	G2217191R0	REAR PANEL		1
28	G2197127	JACK SPACER		1
29	75E203J0R0	JACK BOARD ASSY		1
30	75E203P0R0	PANEL BOARD ASSY		1
31	G2147807	JACK HOLDER		1

[SCREW]

No.	PART CODE	PART NAME	DESCRIPTION	QTY
b	H5019110	SCREW M3X6	PAN TAPTITE FEZC	13
e	H5039158R0	WASHER M9X14X0.5T NI		6
f	H5039510R0	NUT M9X12X2T NI		6

Parts List

SAFETY PRECAUTIONS:
The parts marked Δ have safety-related characteristics. Use only listed parts for replacement.

Due to one or more of the following reasons, parts with parts code ***** cannot be supplied as service parts.

- Part supplied only as a component in a complete assembly
- Copyright does not permit the part to be supplied
- Part is sold commercially

NOTE: The parts marked # are new. (initial parts) The description "Q'TY" means a necessary number of the parts per one product.

CASING					
	G2357115	PEDAL FOOT	M8		2
	G2357116R0	PEDAL PLATE	62X53		2
	G2017620	BATTERY CASE			1
	G2017621R0	BATTERY COVER			1
	75D422E000	BOTTOM COVER			1
	G2357118	BOTTOM FOOT			2
#	75E202T000	CASE			1
#	G2217192R0	PANEL			1
#	G2187529R0	PEDAL R			1
#	75E202T1R0	PEDAL L			1
#	G2217191R0	REAR PANEL			1
KNOB, BUTTON					
	75D522N0R0	MINIMUM VR KNOB			8
SWITCH					
	13129778	TACT SWITCH	SKQKAH	SW2, SW3	2
JACK, EXT TERMINAL					
	F3159104	SWITCH	SS037-P222BHH-PE9	SW1	1
	F3449415	ADAPTOR JACK	KM02009AB	JK8	1
	F3449707	PHONE JK (STREO)	HTJ-064-12DS	JK1, JK4	2
	13449150	6.5MM JACK	HLJ0544-0100109	JK2, JK3, JK5, JK6	4
PWB ASSY					
#	75E203J0R0	JACK BOARD ASSY			1
#	75E203P0R0	PANEL BOAD ASSY			1
IC					
#	04012978	IC (CPU)	UPD780034AGK	IC11	1
	02565501	IC (DSP)	TC220CCA0AF-B01 (MR3)	IC10	1
	F5179125	IC (DC-DC)	S-8520E33MC-BJS-T2	IC12	1
	F5209150	IC (RESET)	S-80130ALMC-JAP-T2	IC16	1
	F5289102	IC (OP.AMP)	NJM2100M 8P SOP	IC3	1
	15189261	IC (BIPOLAR OP AMP)	M5218AFP-600E	IC1, IC2, IC5	3
	15289109	IC (BIPOLAR OP AMP)	M5216FP-600D	IC4	1
	F5279309	IC (LED DRIVER)	BU2090F-E2	IC13, IC14, IC15	3
	02451434	IC (AD/DA)	AK4552VT	IC6	1
#	F5249136R0	IC (CMOS)	74HC4052PW (TSSOP16)	IC9	1
TRANSISTOR					
	F5139608	POWER MOS FET	IRF7606	Q14	1
	15329103	FET	2SK880GR-TE85R	Q1,Q4	2
	F5329530	FET	2SK879Y	Q2, Q3, Q5, Q7, Q15	5
	15319107	TRANSISTOR	2SC4116-GR (TE85R)	Q9, Q10, Q11, Q12, Q13	5
DIODE					
	F5339137	DIODE	SS14 VF=0.45V	D7, D6	2
	F5029126	POWER LED	L-113GDT	LED1	1
	15029281	LED (RED)	GL-3PR8	LED34, LED35	2
	15339120	DIODE	1SS302	DA1, DA2, DA3, DA4, DA5, DA6, DA7	7
	15339119	DIODE	1SS-352	D1, D2, D3, D4, D9	5
#	F5029163R0	CHIP LED	19-21UBC/C470/TR8 (CHIP_BLUE)	LED2, LED3, LED4, LED5, LED6, LED7, LED8, LED9, LED1	16
#	F5029162R0	CHIP LED	19-21SURC/S530-A2/TR8	LED18, LED19, LED20, LED21, LED22, LED23, LED24, LE	16
	F5019309	ZENNER DIODE	02DZ5.1-Y	D8	1

RESISTOR					
#	F5419771R0	RESISTOR ARRAY	RTA03-4D(0603) 10R	RA5, RA4	2
	02124645	MTL.FILM RESISTOR	RR0816R-473-D	R42, R46	2
	01905001	MTL.FILM RESISTOR	RR0816P-103-D	R9, R16, R24, R37, R60, R67	6
	F5399950	CHIP RESISTOR(1/2W)	R-33 1/2W	R33, R57	2
	F2569127	POLY SWITCH	MINISMDC075	R90	1
	F5419726	RESISTOR ARRAY	CRN34473J	RA1, RA2, RA3	3
	F5399158	RESISTOR	47K J	R1, R2, R7, R8, R12, R13, R17, R23, R25, R28, R32, R35,	27
	F5399106	MTL.FILM RESISTOR	47 J	R89	1
	F5399118	MTL.FILM RESISTOR	330	R44, R68, R97	3
	F5399154	MTL.FILM RESISTOR	27K J	R94	1
	F5399190	MTL.FILM RESISTOR	220K J	R79	1
	F5399130	MTL.FILM RESISTOR	2.2K J	R93	1
	F5399130	MTL.FILM RESISTOR	2.2K J	R98, R99, R101, R102, R104, R105, R107, R108, R110, R	16
	F5399200	MTL.FILM RESISTOR	1M J	R6, R31, R76, R95	4
	F5399128	MTL.FILM RESISTOR	1K J	R4, R14, R20, R64, R70, R96, R136, R137, R138, R139, R	16
	F5399128	MTL.FILM RESISTOR	1K J	R100, R103, R106, R109, R111, R112, R114, R115, R117	16
	F5399150	RESISTOR	18K J	R15, R27, R55, R66	4
	F5399140	MTL.FILM RESISTOR	10K J	R3, R11, R22, R30, R49, R58, R84, R87, R92	9
	F5399140	MTL.FILM RESISTOR	10K J	R124, R127	2
	F5399170	MTL.FILM RESISTOR	100K J	R5, R10, R18, R19, R29, R38, R39, R51, R52, R61, R69, R	18
	F5399104	MTL.FILM RESISTOR	10 J	R47	1
	F5399129	MTL.FILM RESISTOR	1.5K J	R85	1
	F5399101	MTL.FILM RESISTOR	0 J	L1, L2, L4	3
POTENTIOMETER					
#	F3219119R0	POTENTIOMETER	RD901F-40-125F-B50K-04D	VR1	1
	F3279819	ROTARY POT. W/CENTER CLICK	RD901-40-125F-B54-0CD 50KB	VR2, VR5, VR7, VR8	4
	F3279802	POTENTIOMETER NO CLICK 50KB	RD901-40-125F-B54-00D	VR3, VR4, VR6	3
CAPACITOR					
	F5359704	CHIP CAPACITOR (1608 TYPE)	GRM39CH220J50PT	C103, C104, C111, C112	4
	F5359803	CHIP CAPACITOR (1608 TYPE)	GRM39CH151J50PT	C30, C48	2
	F5359817	CERAMIC CAPACITOR	GRM39B683K50PT 0.068 K	C98	1
	F5359812	CHIP CAPACITOR (1608 TYPE)	GRM39B473K25PT	C60, C61, C62, C63	4
	F5359740	CHIP CAPACITOR (1608 TYPE)	GRM39B222K50PT	C9, C14, C35, C43	4
	F5359780	CHIP CAPACITOR (1608 TYPE)	GRM39B103K50PT	C64, C66, C69, C77, C78, C79, C89, C90, C91, C92, C93	11
	F5359387	CERAMIC CAPACITOR	GRM39B102K50PT 0.001 K	C106	1
#	F5359814R0	CHIP CAPACITOR	47P(0603SIZE)	C1, C22, C24, C41	4
	F3629703	CAPACITOR	47/16	C87,C107,C109	3
	F3629703	CAPACITOR	47/16	C123, C121	2
#	F3629695R0	CHEMICAL CAPACITOR	1U/50V	C56	1
	F3629700R0	CHEMICAL CAPACITOR	10U/16V (H=7MM)	C4, C7, C8, C10, C11, C20, C21, C26, C28, C32, C34, C46	17
	F3629700R0	CHEMICAL CAPACITOR	10U/16V (H=7MM)	C118, C119, C120, C141, C142, C143, C144	7
	F5359318	CHIP CAPACITOR	10P	C17, C54, C57, C141	4
#	13629550R0	CHEMICAL CAPACITOR	100U/16V	C18, C27, C36, C40, C42, C53, C65, C100, C113, C117, C	11
	F5359311	CHIP CAPACITOR	100P	C3, C6, C13, C15, C25, C44	6
#	F5359828R0	CHIP CAPACITOR	0.47U (0603SIZE)	C49, C31	2
#	13549329R0	CHEMICAL CAPACITOR	0.1U/50V	C2, C23	2
	F5359313	CHIP CAPACITOR	0.1	C122, C124, C125, C126, C127	5
	F5359313	CHIP CAPACITOR	0.1	C19, C33, C37, C39, C55, C67, C68, C70, C71, C72, C75	37
INDUCTOR, COIL, FILTER					
	F2449210	SMD COIL	SLF7032T-4R7M1R7-2(4.7UH)	L5	1
	F2449209	COIL	SLF7032T-151MR29-2(150UH)	L6	1
	F5409117	EMI FILTER	NFM4516P13C204F	C105	1
CRYSTAL, RESONATOR					
	F5299114	CRYSTAL	HC-49SM 5MHZ	X1	1
	02673278	CRYSTAL	CX-49G 11.2896MHZ	X2	1
CONNECTOR					
	F3439183	CONNECTOR	A2001WV2-13P P=2MM	CN1, CN8	2
	F3439160	CONNECTOR	53015-0210 2P P=2MM	CN2	1
WIRING, CABLE					
	G3467250	WIRING 13P	L=40MM P=2MM	CN10, CN9	2
	G3477165	FLAT CABLE	3P-70X6X6 P=2.0	CN7, CN6	1

SCREWS				
	H5019110	SCREW M3X6	PAN TAPTITE FEZC	13
	H5019115	SCREW M3X8	PAN TAPPING-2 FEBZC	7
	H5029852	SCREW 4M3 FEBZC	HEXAGON SOCKET BUTTON HEAD	2
#	H5029901R0	SCREW M3X10	HEXAGON SOCKET (FE/NI)	4
	H5029855	SCREW M4X8	HEXAGON BUTTON HEAD NI	4
	H5039413	NYLON WASHER M4.1X7.5X0.5	BLACK	2
	H5039414	NYLON WASHER M5.1X9.5X0.5	BLACK	2
	H5019430	SCREW M2.6X5	BINDING HEAD TAPTITE P FEZC	2
	G2197127	JACK SPACER		1
	H5039521R0	NUT M7		8
	H5039510R0	NUT M9X12X2T NI		6
	H5029851	PEDAL SHAFT		2
	H5039158R0	WASHER M9X14X0.5T NI		6
PACKING				
#	G2357111R0	CUSHION R		2
	G2607212	PACKING CASE LOWER		1
#	G2627755R0	PACKING CASE UPPER		1
	G2237613	REAR PAD		1
	G2237614	SIDE PAD		1
MISCELLANEOUS				
	G3487163	WIRING BATTERY	L=80MM 2P	1
	G2257130	BATTERY INSULATING SHEET		1
	G2177308	BATTERY TERMINAL(+)		1
	G2177307	BATTERY TERMINAL(+)		1
	G2177309	BATTERY TERMINAL(-)		1
#	G2537007R0	BOTTOM COVER LABEL		1
	22177109R0	COIL SPRING		2
	G225712901	INSULATING SHEET		1
	G2147807	JACK HOLDER		1
#	G2567163R0	LED COVER		1
#	G2217749R0	LED PANEL		1
#	G2147880R0	LED SPACER		1
	22157702R0	PEDAL GUIDE BUSH		2
ACCESSORIES (Standard)				
	G6017303	IMPORTANT NOTES	JAPANESE/ENGLISH	1
#	G6017152R0	OWNER'S MANUAL	JAPANESE	1
#	G6017153R0	OWNER'S MANUAL	ENGLISH	1

Checking the Version Number

Enter Test Mode and execute "1. CPU, DSP Check" and "2. Version Check" in this order.

About Updating

Exchange the circuit board for updating of system program. Follow the service information when it's needed.

Test Mode

Test Items

1. CPU, DSP Check
2. Version Check
3. Knobs Check
4. DRIVE TYPE Switch Check
5. Expression Pedal Check
6. Analog Bypass Waveform Check
7. Analog Bypass Route FET Switch Check
8. D/A Output Waveform Check
9. DSP Through (Output) Waveform Check
10. DSP Through (PHONES) Waveform Check
11. DSP Route FET Switch Working Check
12. Bypass Route Residual Noise Check
13. DSP Through Route Residual Noise Check
14. Battery Working Check

Items Required

- Monitor Speaker
- Expression Pedal (EV-5)
- Noise Meter
- AC Adaptor (PSA series)
- 47-k Ω Short Plug x 2
- Oscilloscope
- Oscillator

Entering Test Mode

1. Rotate all of the eight knobs on the top panel counterclockwise fully.
2. While holding down the left and right pedals, connect the AC adaptor.
3. When the POWER LED lights, release the both pedals.
4. Press the left pedal within 2.5 seconds, then press the right pedal.

When the blue LEDs light, you will enter the Test Mode, and **1. CPU, DSP Check** is executed automatically.

Exiting Test Mode

Turn off the power.

Skipping

If you set the **MODE** knob previously as follows before entering the Test Mode, you can specify the start point of the Test Mode.

- MODE knob I:** from **1. CPU, DSP Check** (normal Test Mode)
MODE knob II: from **6. Analog Bypass Waveform Check**
MODE knob III: from **8. D/A Output Waveform Check**
MODE knob VI: from **12. Bypass Route Residual Noise Check**

1. CPU, DSP Check will be always executed irrespective of the **MODE** knob's setting first. And next, when the right pedal is pressed, you will enter the test item corresponding to the **MODE** knob's setting. You can confirm which test item you entered by checking the Virtual Rotor Display. (Refer to the explanation of each test item.)

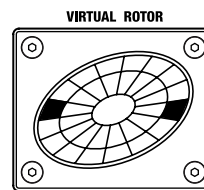


Any test item can be skipped by pressing the right pedal (SLOW/FAST pedal). However, the test item **3, 4, and 5** can be skipped.

Details for Tests

1. CPU, DSP Check

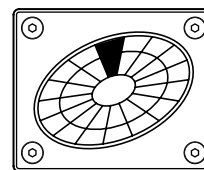
After entering the Test Mode, first, CPU and DSP will be tested. If they are normal, two blue LEDs in the Virtual Rotor Display will light as the following picture.



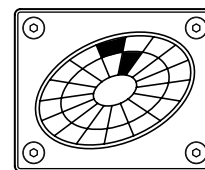
If there are any problems, you cannot advance to the next test item. Then turn off the power to finish the Test Mode.

2. Version Check

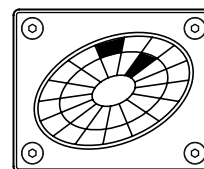
1. Press the right pedal to start the **Version Check**.
Version is shown in the Virtual Rotor Display as the following picture.



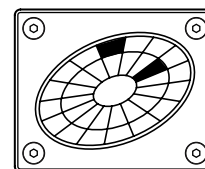
Ver. 1.00



Ver. 1.01



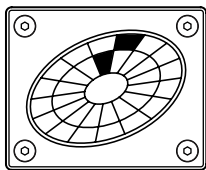
Ver. 1.02



Ver. 1.03

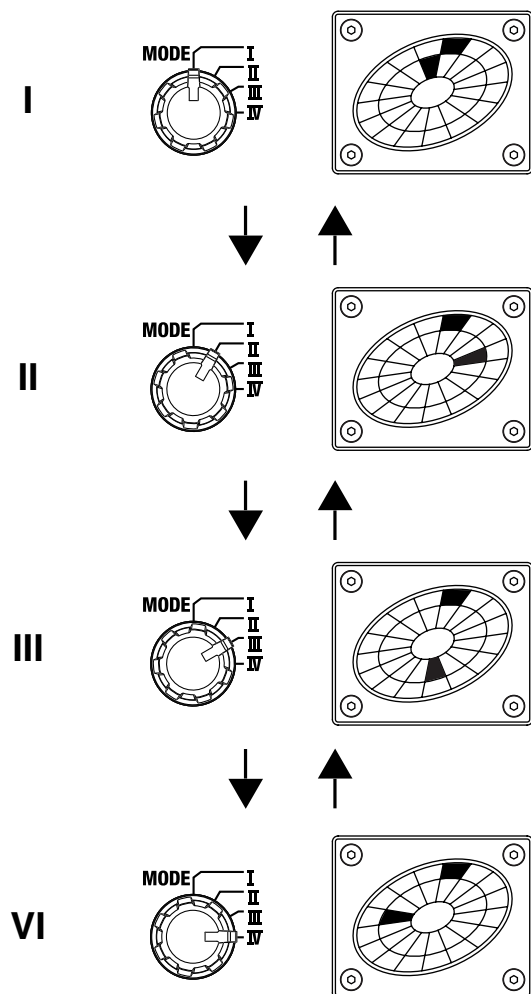
3. Knobs Check

1. Press the right pedal to start the **Knobs Check**.



MODE knob

2. Rotate the MODE knob in the order of I, II, III, IV, III, II and I, and then confirm the lighting position of LED in the Virtual Rotor Display moves as the following picture.

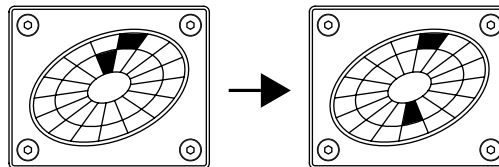
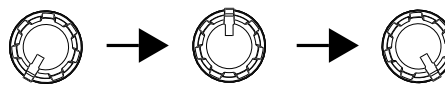


RISE TIME knob

3. When adjusting the RISE TIME knob to MAX, confirm the display of the Virtual Rotor Display changes.
4. Confirm there is a feel of clicking at the center position.

Other knobs

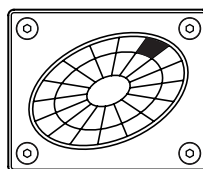
5. When rotating the [EFFECT] knob clockwise fully from the MIN position, confirm the display of the Virtual Rotor Display changes. And when rotating it fully to the MAX position, confirm the display of the Virtual Rotor Display changes again.



6. In the same way, check [DIRECT], [BALANCE], [OVERDRIVE], [SLOW] and [FAST] in this order.
7. Confirm there are feels of clicking at the center positions of the [BALANCE], [SLOW] and [FAST] knobs.

4. DRIVE TYPE Switch Check

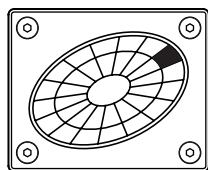
1. Press the right pedal to start the **DRIVE TYPE Switch Check**.



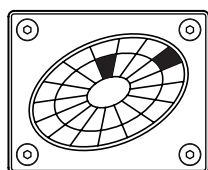
2. Switch the DRIVE TYPE switch on the rear panel to **GUITAR**, and check the **SLOW/FAST** LED lights.
3. Switch it to **KEYBOARD** in the same way, and check the **EFFECT ON/OFF** LED lights.
4. Switch it back to **GUITAR** again, and check the **SLOW/FAST** LED lights.

5. Expression Pedal Check

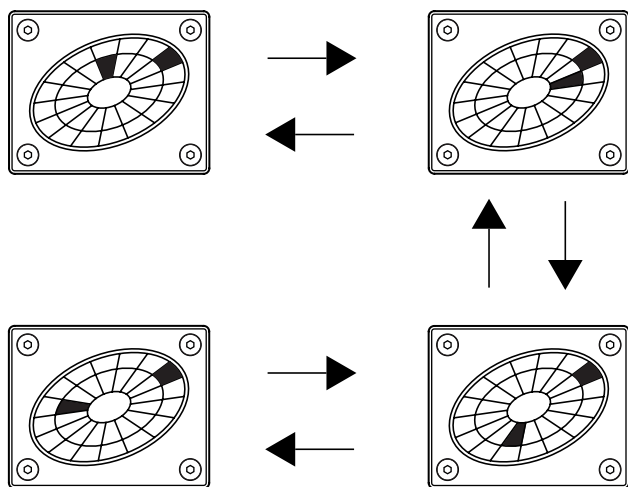
1. Press the right pedal to start the **Expression Pedal Check**.



2. Connect an EV-5 to the **SPEED (EXP PEDAL)** jack.
3. Set the MIN knob of the EV-5 to 0.
4. Press down the pedal of the EV-5 to the heel side.
5. Confirm the red LED at the position of 12 o'clock in the Virtual Rotor Display lights.



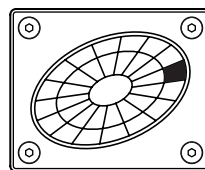
6. Press down the pedal of the EV-5 to the toe side slowly.
7. Confirm the lighting position of the red LED in the Virtual Rotor Display moves to 12, 3, 6 and 9 o'clock.
8. Press down the pedal of the EV-5 to the heel side slowly.
9. Confirm the lighting position of the red LED in the Virtual Rotor Display moves to 9, 6, 3 and 12 o'clock.



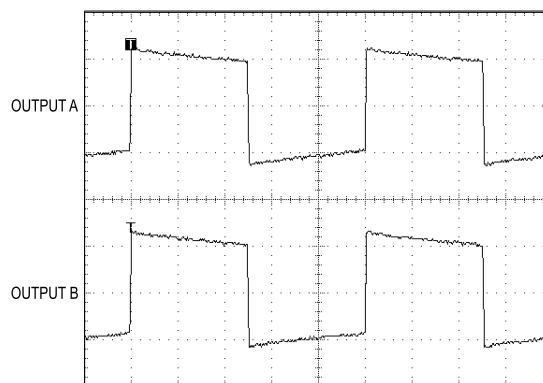
10. Remove the EV-5 from the **SPEED (EXP PEDAL)** jack.
11. Confirm the red LED in the Virtual Rotor Display turns off.

6. Analog Bypass Waveform Check

1. Press the right pedal to start the **Analog Bypass Waveform Check**.



2. Connect an oscilloscope to OUTPUT A (MONO) and OUTPUT B.
3. Connect an oscillator to INPUT A (MONO), and input a rectangular wave of 200 Hz/500 mV p-p.
4. Confirm the output waveform will be like the following picture.

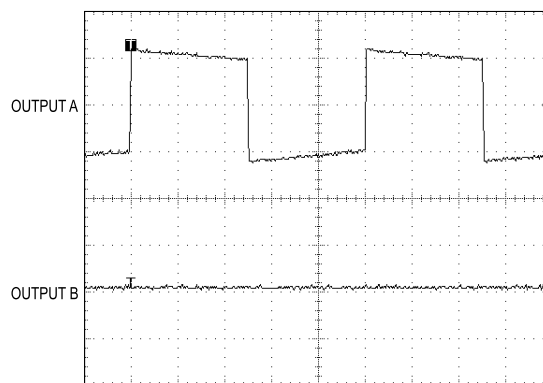


200mV/DIV, 1ms/DIV

<< 200Hz, 500 mV p-p +/-40 mV p-p >>

5. Hold the signal to INPUT A (MONO), and insert a 47-kΩ short plug to INPUT B.

6. Confirm the output waveform will be like the following picture.

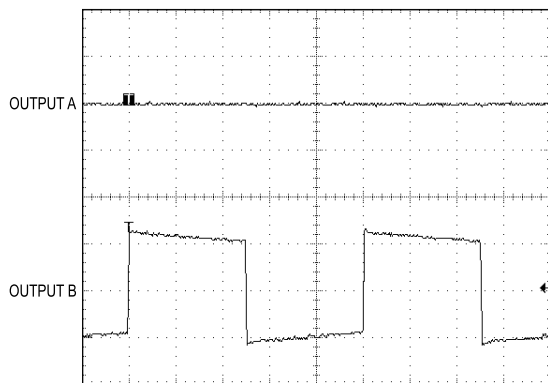


200mV/DIV, 1ms/DIV

<< 200Hz, 500 mV p-p +/-40 mV p-p >>

7. Remove plugs of INPUT A (MONO) and INPUT B, and then input a rectangular wave of 200 Hz/500 mV p-p to INPUT B only.

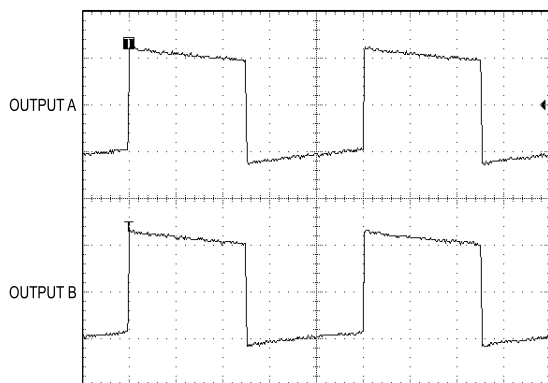
8. Confirm the output waveform will be like the following picture.



<< 200Hz, 500 mV p-p +/-40 mV p-p >>

9. Input the 200 Hz/500 mV p-p rectangular wave to both INPUT A (MONO) and INPUT B.

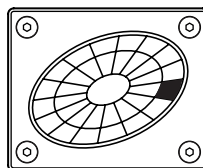
10. Confirm the output waveform will be like the following picture.



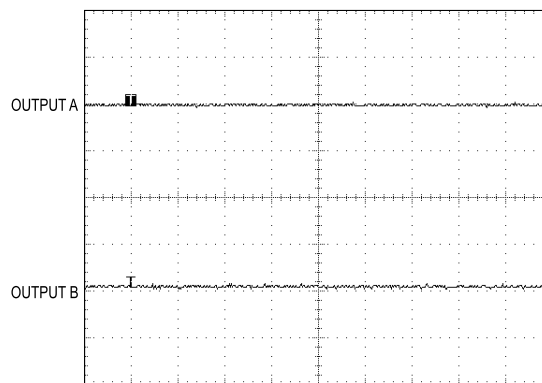
<< 200Hz, 500 mV p-p +/-40 mV p-p >>

7. Analog Bypass Route FET Switch Check

1. Press the right pedal to start the **Analog Bypass Route FET Switch Check**.



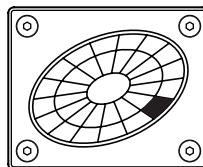
2. Confirm the output wave disappears and the following picture appears.



<< 200Hz, 500 mV p-p +/-40 mV p-p >>

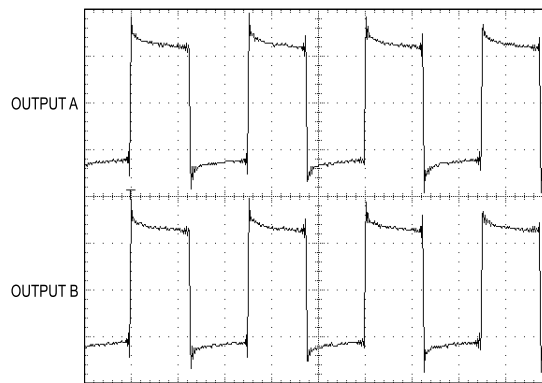
8. D/A Output Waveform Check

1. Press the right pedal to start the **D/A Output Waveform Check**.



2. Connect an oscilloscope to OUTPUT A (MONO) and OUTPUT B. (Or confirm they have been connected.)

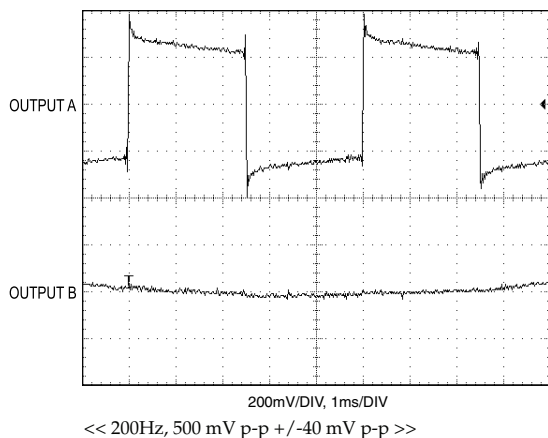
3. Confirm the output waveform will be like the following picture.



<< 400Hz, 500 mV p-p +/-40 mV p-p >>

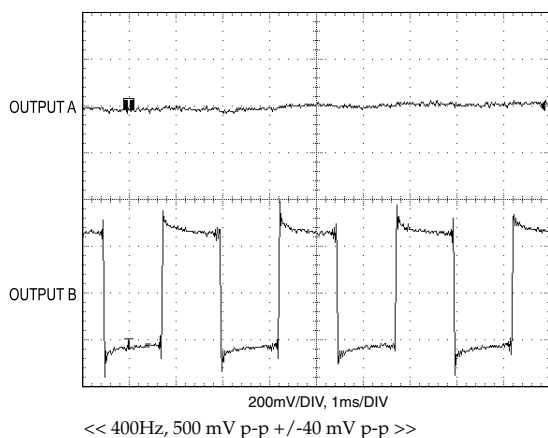
4. Remove the connection of OUTPUT B.

5. Confirm the output waveform will be like the following picture.



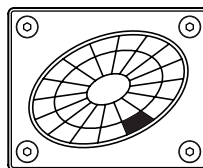
6. And after removing the connection of OUTPUT A (MONO), connect an oscilloscope to OUTPUT B.

7. Confirm the output waveform will be like the following picture.

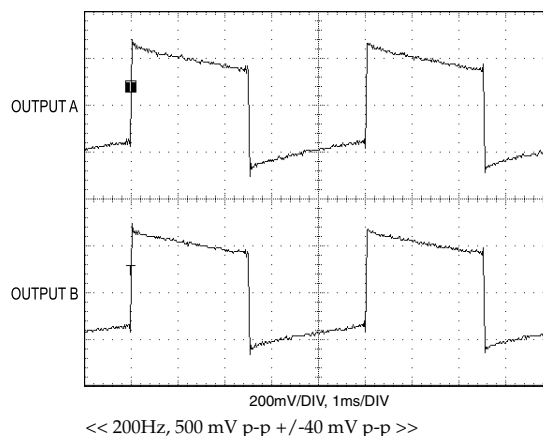


9. DSP Through (Output) Waveform Check

1. Press the right pedal to start the **DSP Though (Output) Waveform Check**.

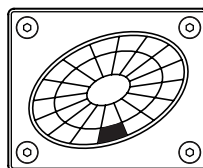


2. Connect an oscilloscope to OUTPUT A (MONO).
3. Connect an oscillator to INPUT A (MONO) and INPUT B, and input rectangular waves of 200 Hz/500 mV p-p. (Or, confirm they have been inputted).
4. Confirm the output waveform will be like the following picture.

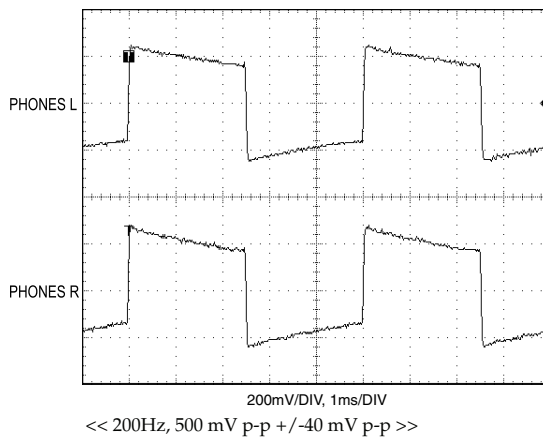


10. DSP Through (PHONES) Waveform Check

1. Press the right pedal to start the **DSP Though (PHONES) Waveform Check**.

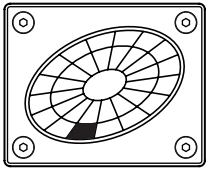


2. Connect an oscilloscope to PHONES (L, R).
3. Confirm the output waveform will be like the following picture.

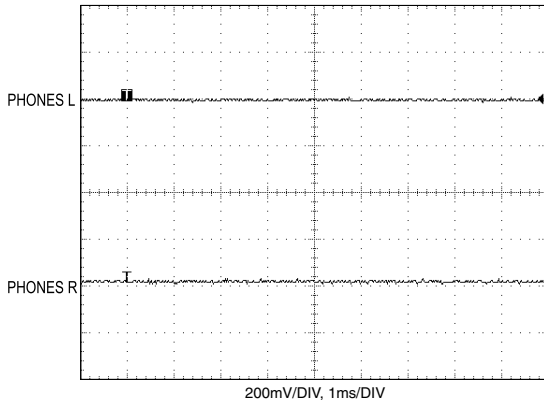


11. DSP Route FET Switch Working Check

1. Press the right pedal to start the **DSP Route FET Switch Working Check**.

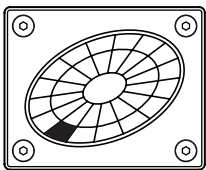


2. Confirm the output wave disappears and be like the following picture.



12. Bypass Route Residual Noise Check

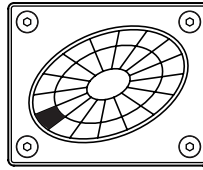
1. Press the right pedal to start the **Bypass Route Residual Noise Check**.



2. Connect the 47-k Ω short plugs to INPUT A (MONO) and INPUT B.
3. Connect the noise meter to OUTPUT A (MONO) and measure the residual noise.
Passing Value: -91 dBu or less (JIS-A)
4. Connect the noise meter to OUTPUT B and measure the residual noise.
Passing Value: -91 dBu or less (JIS-A)
5. Connect the noise meter to PHONES (L, R) and measure the residual noise.
Passing Value: -91 dBu or less (JIS-A)
6. Connect monitor speakers to OUTPUT A (MONO) and OUTPUT B.
7. Give a shock (hard vibration) to the RT-20's body, and confirm any abnormal noise are not generated from OUTPUT A (MONO), OUTPUT B or PHONES (L, R).

13. DSP Through Route Residual Noise Check

1. Press the right pedal to start the **DSP Through Route Residual Noise Check**.

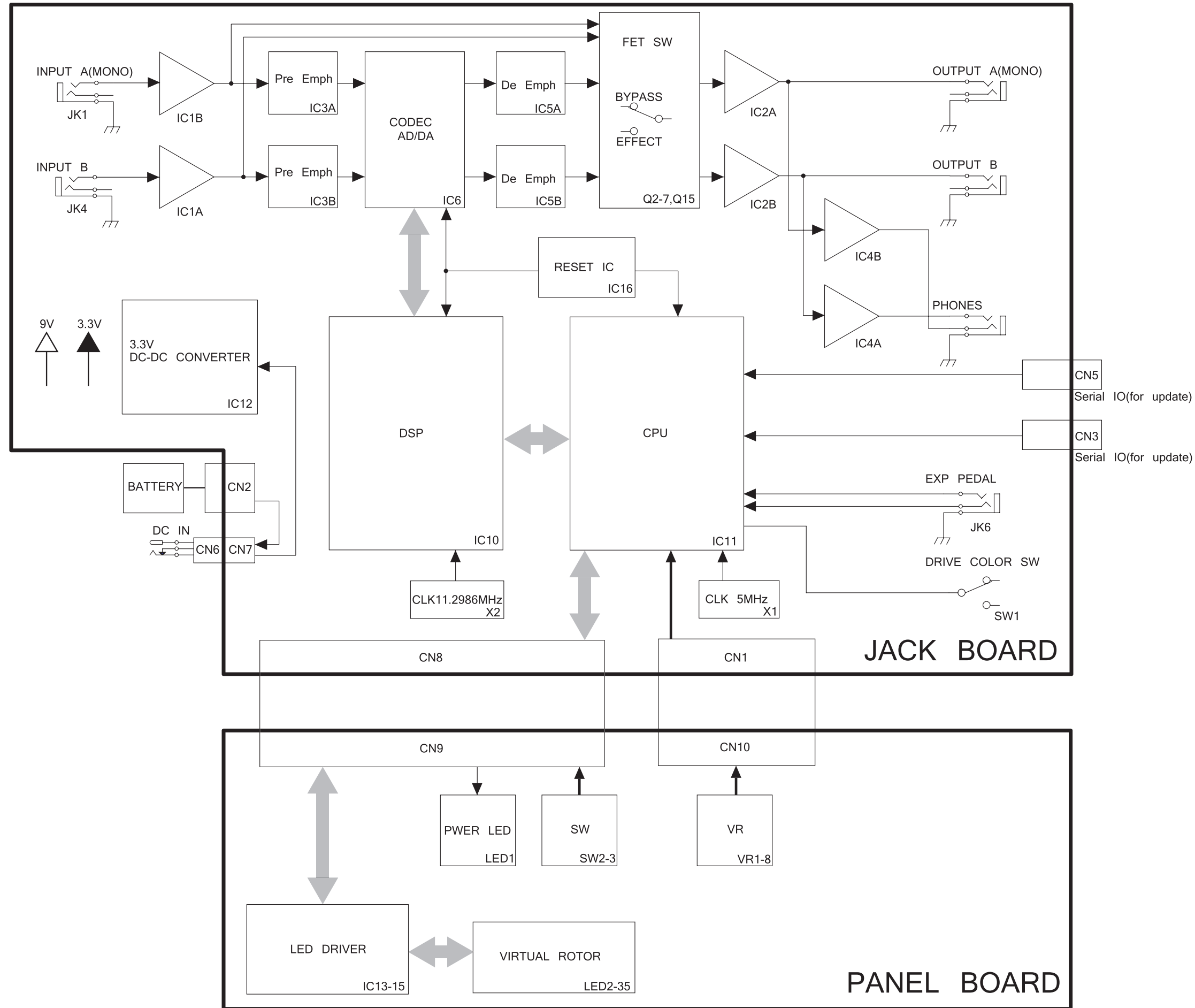


2. Connect the noise meter to OUTPUT A (MONO) and measure the residual noise.
Passing Value: -84 dBu or less (JIS-A)
3. Connect the noise meter to OUTPUT B and measure the residual noise.
Passing Value: -84 dBu or less (JIS-A)
4. Connect the noise meter to PHONES (L, R) and measure the residual noise.
Passing Value: -84 dBu or less (JIS-A)
5. Connect monitor speakers to OUTPUT A (MONO) and OUTPUT B.
6. Give a shock (hard vibration) to the RT-20's body, and confirm any abnormal noise are not generated from OUTPUT A (MONO), OUTPUT B or PHONES (L, R).

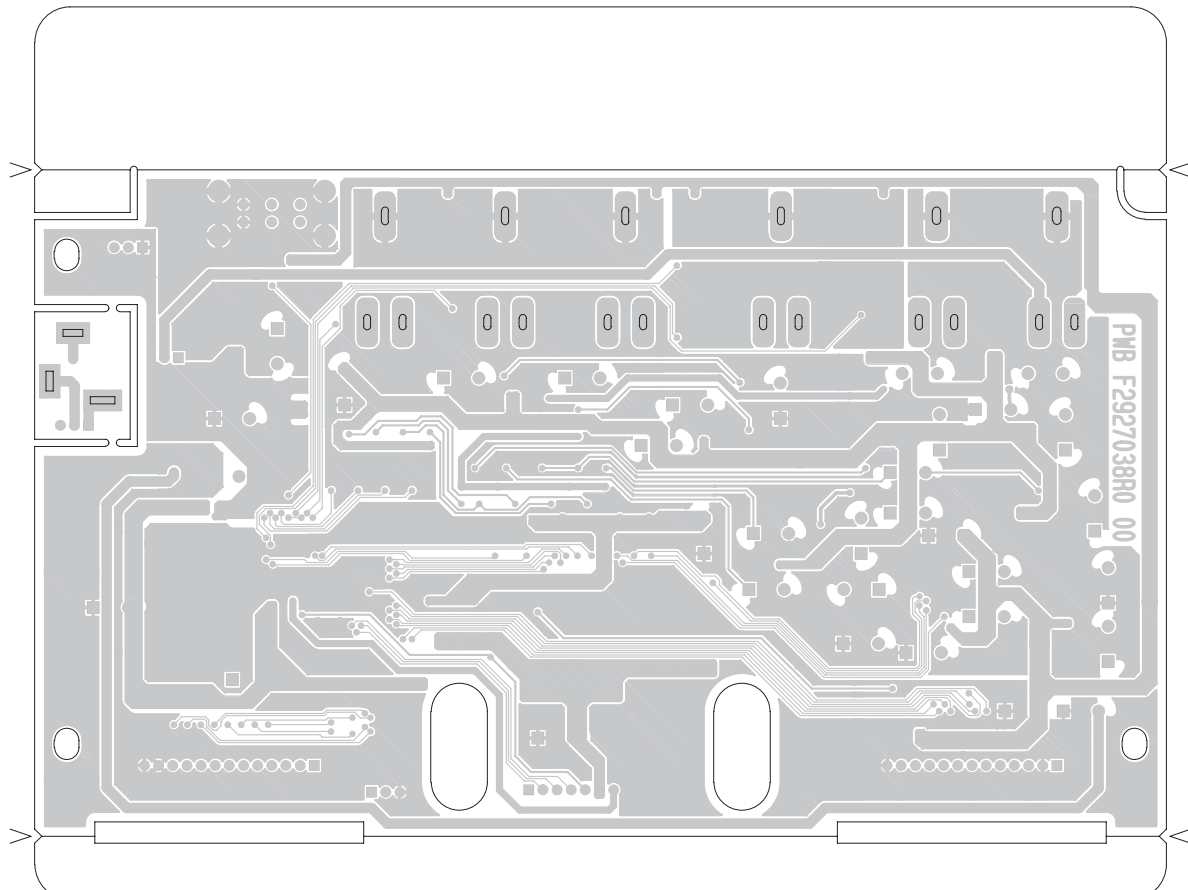
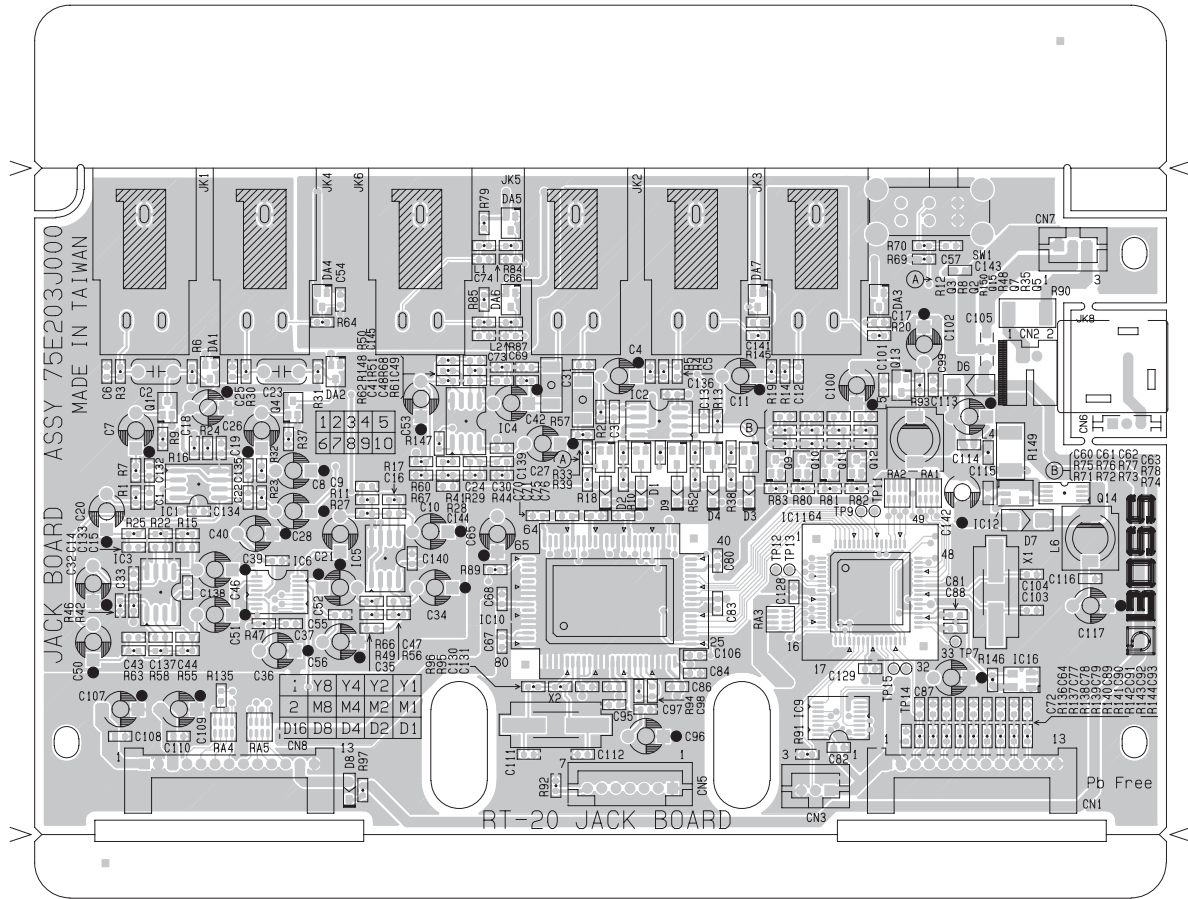
14. Battery Working Check

1. Remove the AC adaptor to turn off the power.
2. Put batteries into the battery box and connect a plug to INPUT A (MONO).
3. Check the **POWER** LED lights.

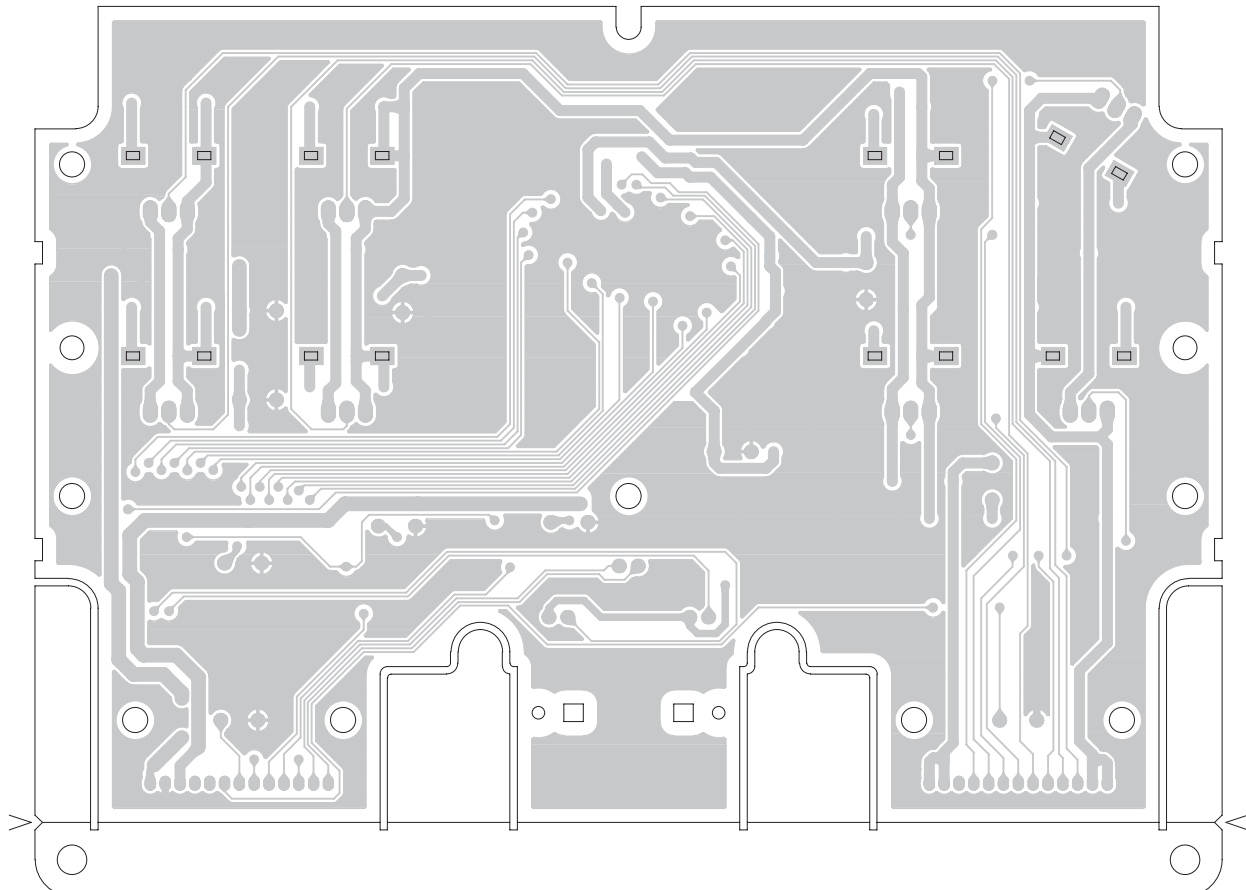
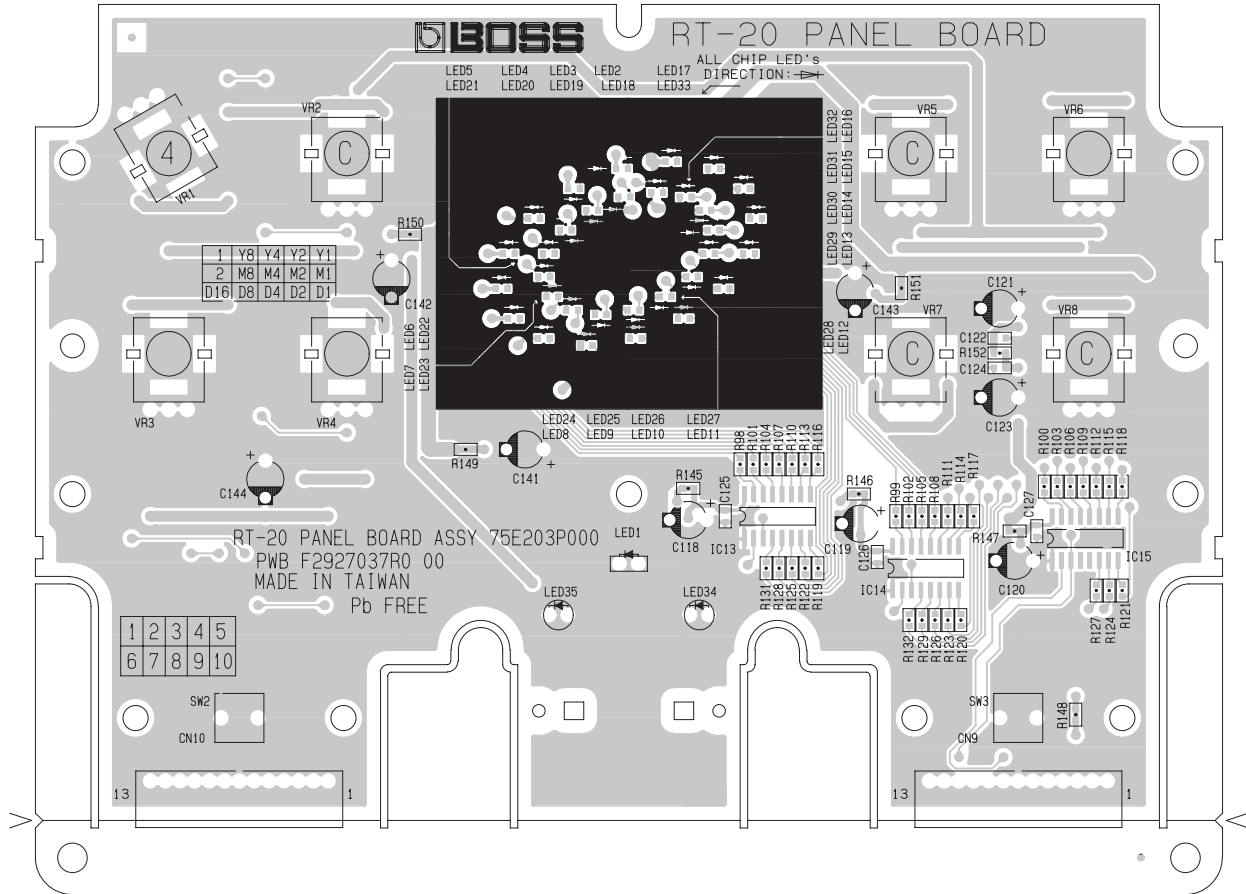
Block Diagram



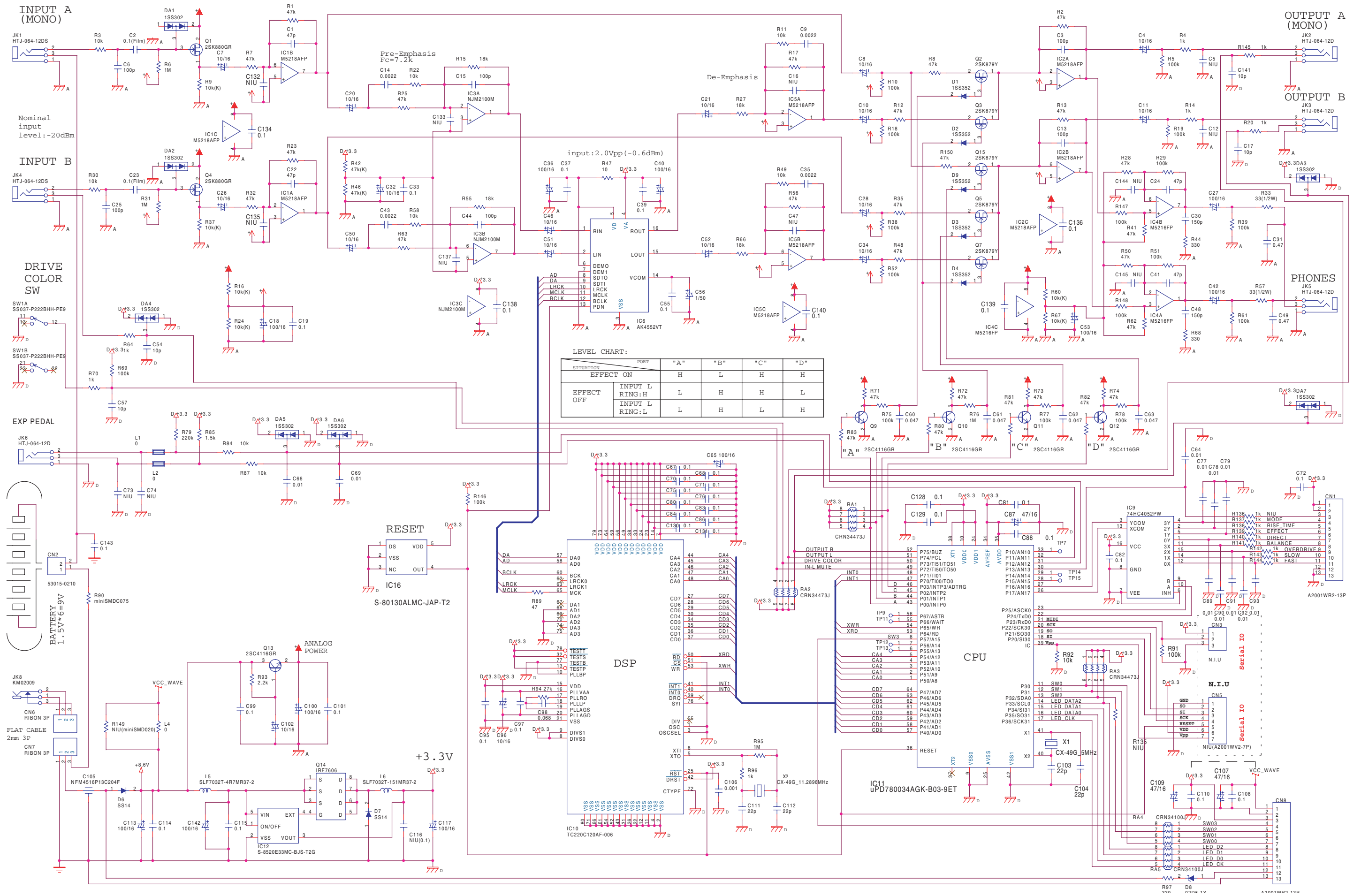
Circuit Board (JACK BOARD)



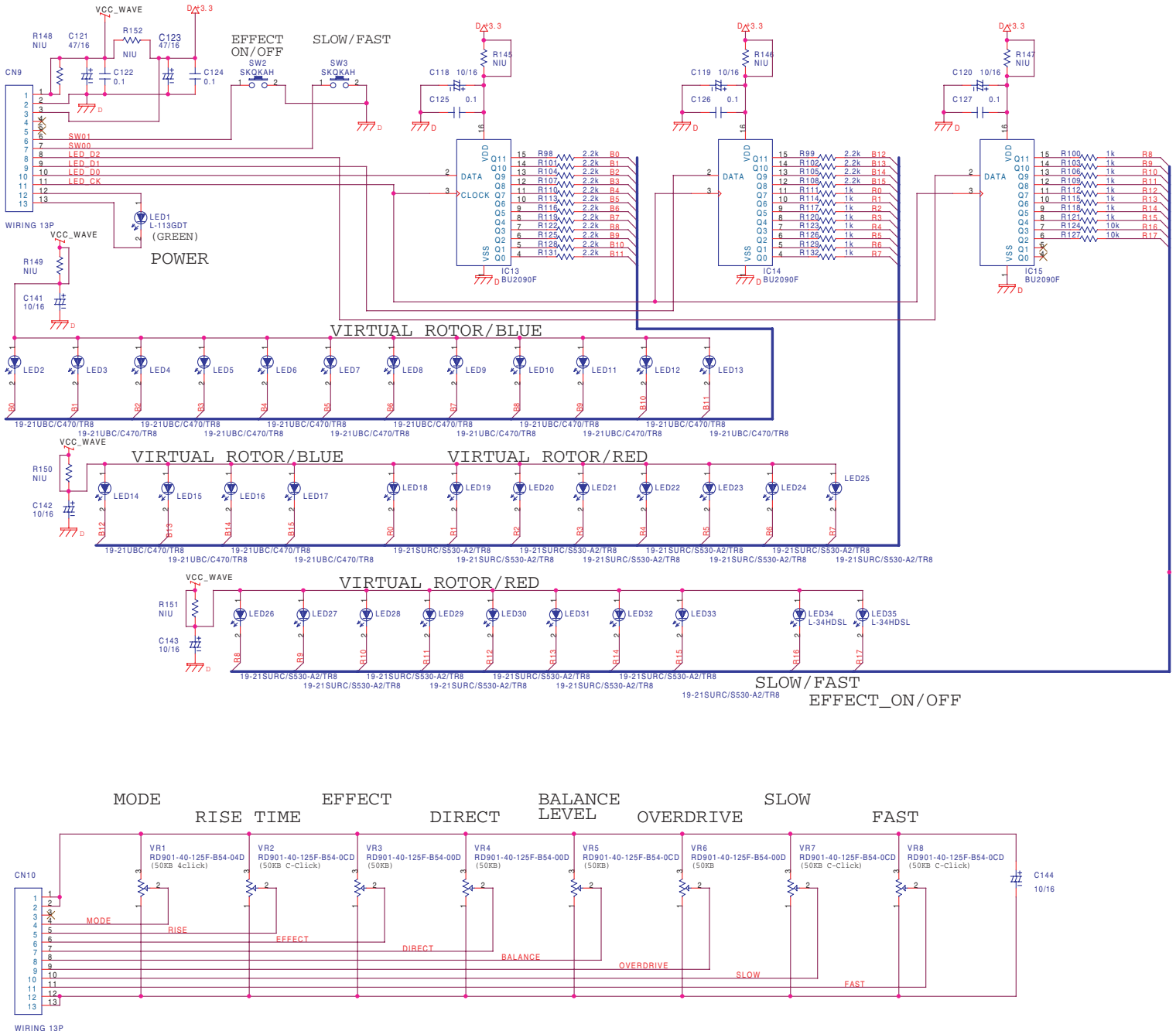
Circuit Board (PANEL BOARD)



Circuit Diagram (JACK BOARD)



Circuit Diagram (PANEL BOARD)



MEMO

MEMO