

ELECTRONIC MUSICAL INSTRUMENT

ROLAND RHYTHM INSTRUMENT

Rhythm 33

**SERVICE
NOTES**

**THE 6th EDITION
Printed in Japan '76. Nov.**

 **Roland**

CONTENTS

SECTION 1. SPECIFICATIONS	1
SECTION 2. THEORY OF OPERATION	1
SECTION 3. GENERAL NOTICE	3
SECTION 4. DISASSEMBLING	4
SECTION 5. GENERAL BLOCK DIAGRAM	5
SECTION 6. LOGIC CIRCUIT	6
SECTION 7. MATRIX CIRCUIT	8
SECTION 8. RHYTHM SWITCH CIRCUIT	9
SECTION 9. VOICE GENERATOR AND POWER SUPPLY CIRCUIT.....	10
SECTION 10. RHYTHM PATTERN	14
SECTION 11. ADJUSTMENT	16
SECTION 12. PARTS LIST	21

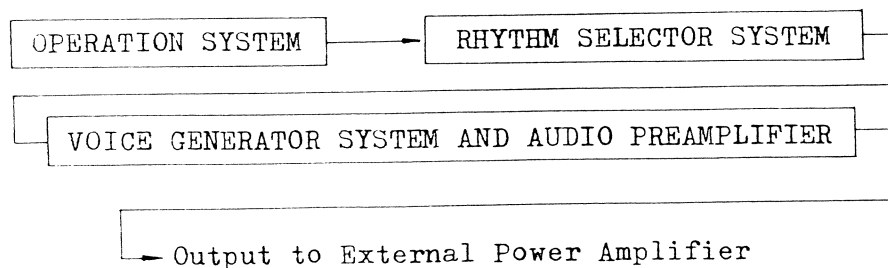
SECTION 1. SPECIFICATIONS

Summary	
Rhythm Selector	10 buttons Waltz, Slow Rock, Rock'n Roll, Bossa-Nova, Mambo, Cha-Cha, Beguine, Rhumba, 2 beat, 4 beat.
2 beat Variation	Bass Drum, Bass and Snare Drum, Fox Trot 1, Swing 1, March, Parade.
4 beat Variation	Bass Drum, Bass and Snare Drum, Fox Trot 2, Swing 2, Swing 3, Tango.
Voices	Bass Drum, Low Conga, High Conga, Cowbell, Maracas, Rim Shot, Claves, Snare Drum, High-Hat, Cymbal.
Features	UP-Tempo Switch(double speed), Touch Start Switch.
Controls	Volume, Balance, Tempo, UP-Tempo, Power ON-OFF.
Output Jack	Low Impedance : 10 Kohm
Set-Volume	used as adjusting output voltage.
Semiconductors	IC Silicon Transistors Silicon Diodes
Power Supply	100V, 117V 50/60Hz or 220V, 230V, 240V 50/60Hz
Power Consumption	4.9VA
Dimension	215(W) x 260(D) x 120(H)mm
Weight	3 Kgs
Accessories	Connection Cord 2.5m (with Pin-Plug Adaptor)... 1 Metal Accessories 1

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SECTION 2. THEORY OF OPERATION

Roland Rhythm TR-33 consists of three elemental sections and power supply. The first elemental section is Operation System for rhythm patterns, including a Master Oscillator and a Reset Circuit. The second elemental one is Rhythm Selector System which selects pulse patterns coming out of the Operation System. The third is Voice Generator System and the Audio Pre-amplifier. The following figure 1 shows the abovementioned :



2-1. Operation System

The Master Oscillator is a multi-vibrator composed of two transistors. Tempo is controlled by adjusting bias voltage of the oscillator, which consists of two semi-fixed resistors and a potentiometer of series connection. One semi-fixed resistor is slowest tempo, and the other semi-fixed resistor is the fastest tempo. The another one potentiometer located on the control panel is used by a player for adjusting a very delicate tempo. Divider is a 5-stage flip-flop counter set for dividing a beat cycle into $1/32$ cycle of the Master Oscillator.

(The first stage is composed of two transistors and following stages are made up to one chip of IC.)

As a $3/4$ beat rhythm must be necessary, the second and third stages divide a beat cycle as the unit of 3 instead of 4 with feed back between the output of the third and second stages of the divider.

Output of divider are connected to the diode matrix which is taking pulse patterns. Various pulse patterns are used as a trigger of a Voice Generator.

2-2. Rhythm Selector

The selector of rhythm patterns is made up of the 10 kinds of push button switches on the control panel and a rotary switch. The 8 rhythm buttons except 2 beat and 4 beat buttons have automatic cancel system. And the Rotary Switch for Variation works by pushing "2 BEAT" or "4 BEAT" button. The necessary pattern of the rhythm indicated by a buttons is connected with the Voice Generator. Buttons of Waltz, Slow Rock, Ballad provides for the circuit to feed back on the divider for making $3/4$ beat.

2-3. Voice Generator

Roland Rhythm TR-33 has 10 Voice Generators including Bass Drum, Low Conga, High Conga, Rim Shot, Cowbell, Claves, Snare Drum, Cymbal, High-Hat and Maracas. Each of Bass Drum, Low Conga, High Conga oscillates by electrical input pulses given to each phase shift circuit of necessary frequency and index decayed oscillation.

Rim Shot, Canbell and Claves are generated by shock exciting individual L-C circuits which oscillate at the proper frequency and decay exponentially. These low frequency voices are fed into the preamplifier.

A reverse biased transistor is used to generate white noise for the Cymbal, High-Hat, Maracas and high frequency Snare Drum. The output of noise transistor is fed through one stage of amplification. The collector load of this amplifier is a potentiometer which permits adjustment of the output level these high frequency voices.

To generate the Cymbal, a transistor, normally biased on, is tuned off by the incoming signal from the pulse pattern generator; the rising collector voltage of this transistor forward biases a tuned amplifier so that the white noise, always applied to the base of this tuned amplifier, is amplified for the High-Hat, Maracas and high frequency Snare Drum.

2-4. Audio Output

The high frequency signals and the low frequency signals are both fed into a preamplifier and from here to the volume control mounted on the control panel and then to the Rhythm 33 output.

2-5. UP-Tempo Switch

With UP-Tempo Switch, a variation of Tempo can be enjoyed.

In this case, double the trigger pulse is fed to the first stage flip-flop.

2-6. Touch-Start Chip (Touch-Plate)

Start and Stop of the rhythm machine can be operated with slight finger's touch.

SECTION 3. GENERAL NOTICE

- 3-1. Avoid playing near the fluorescent lights, neon lights, transformers and others so that undesirable noises are not created.
- 3-2. It is absolutely free from sound distortion, but it should be played within the capacity rating of the amplifier. It is always advisable to connect to amplifiers having ample output power.
- 3-3. Since it covers a very wide range of tones, the quality of tones may vary according to the types of amplifiers used. Use any amplifiers having high selective qualities.
- 3-4. Avoid using " Roland Rhythm " in high temperature or humid places.

Be careful not to let it accumulate dust.

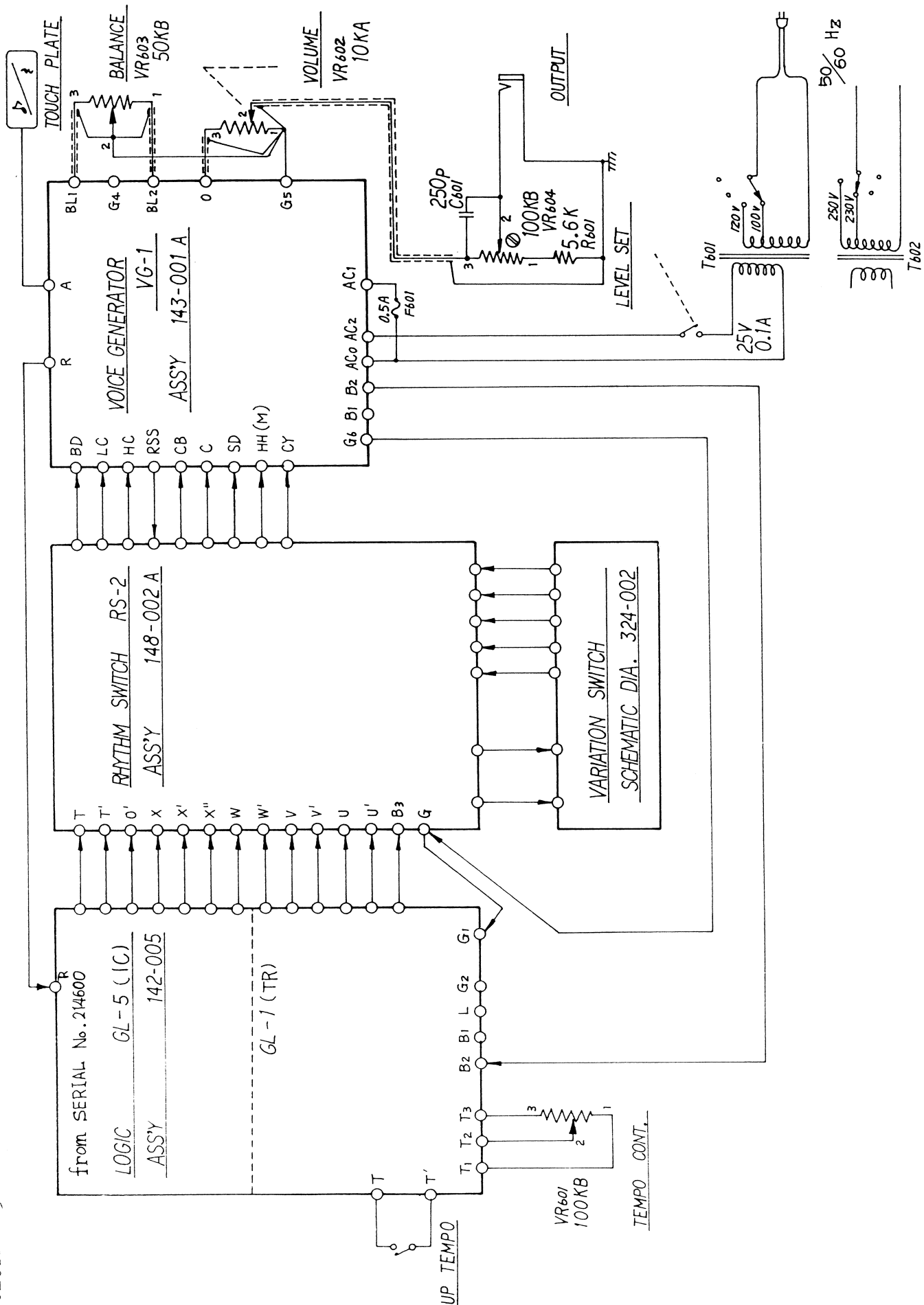
3-5. The voltage changer located inside of the chassis should not be turned.

SECTION 4. DISASSEMBLING

To pull out the chassis, remove 6 screws on the bottom to take off the bottom cover, and remove 6 screws on the upper chassis, and then remove 2 screws on the front chassis.

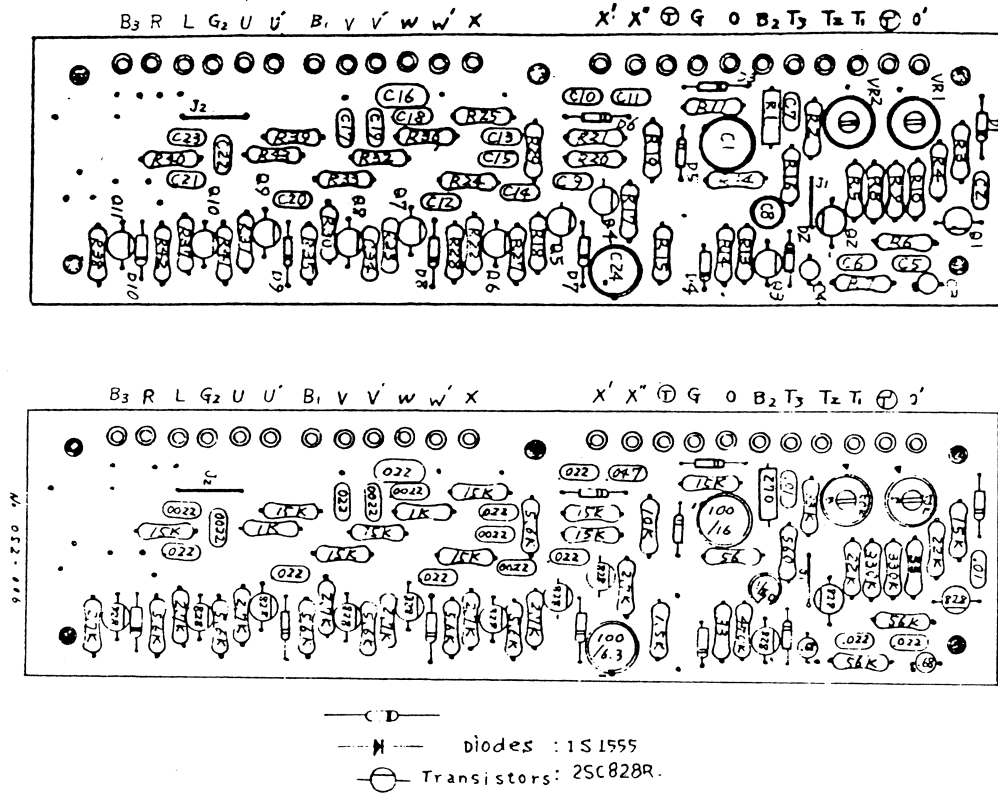
Note : The manufacture holds the right of changing any kind of component parts for improvement with or without previous notice.

SECTION 5. GENERAL BLOCK DIAGRAM

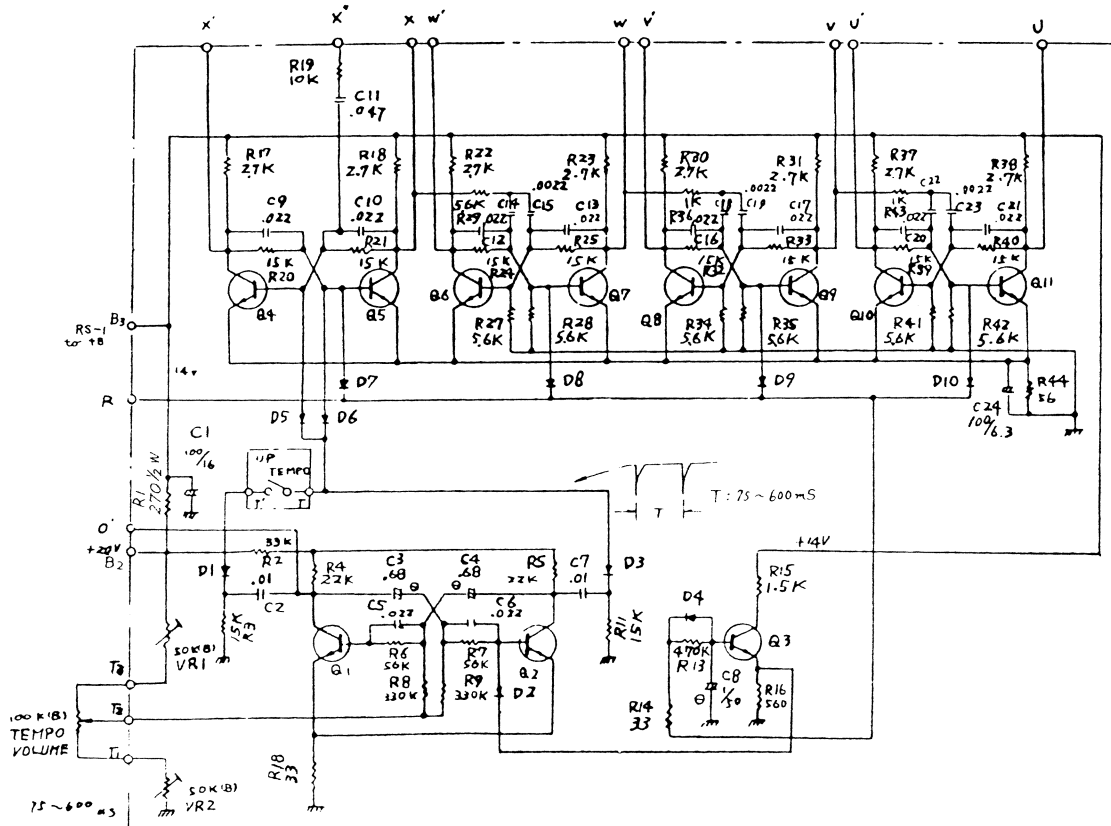


SECTION 6, LOGIC CIRCUIT

6-1 Logic Board Assembly Parts Layout (GL-1)



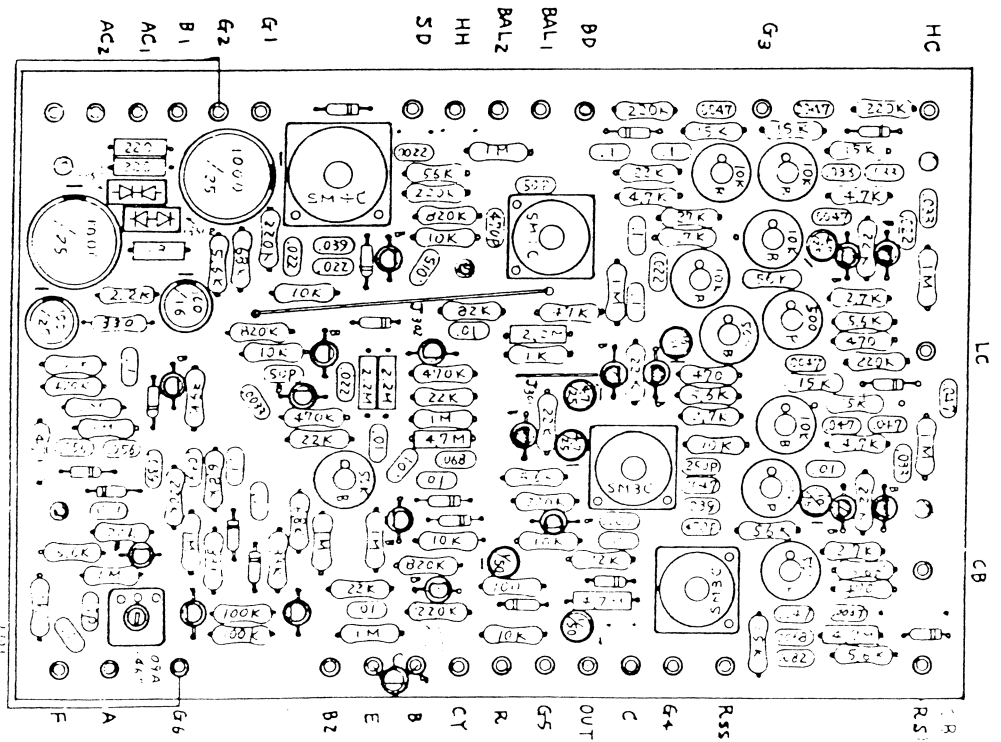
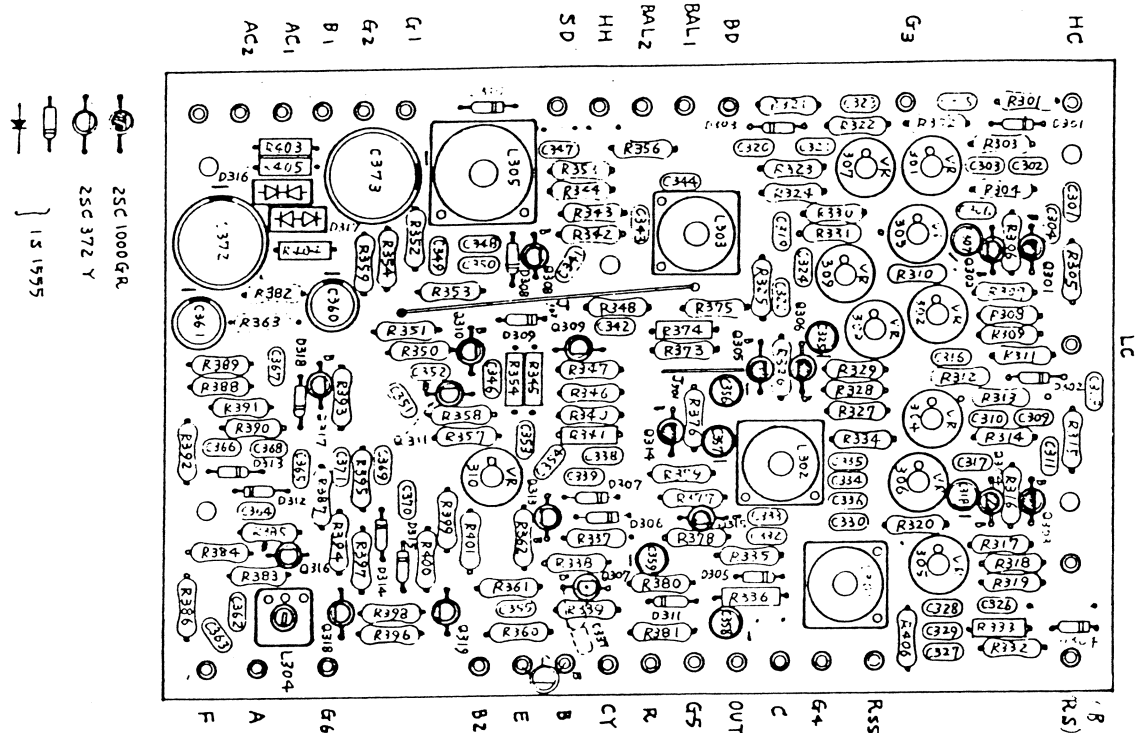
6-2 Logic Circuit Diagram (GL-1)

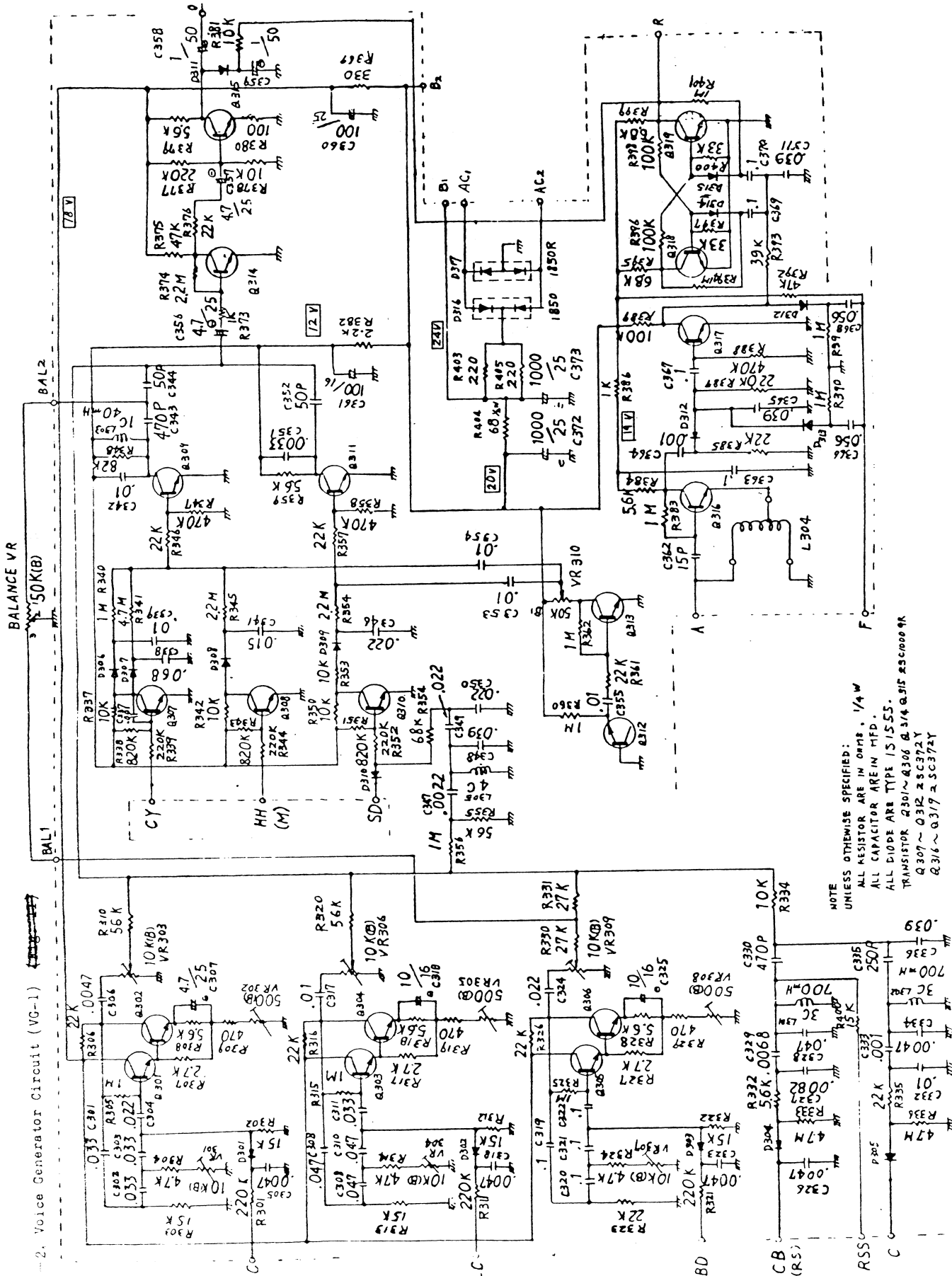


All Diodes are Type 1S1555
 All Transistors are Type 2SC828R.

SECTION 9. VOICE GENERATOR AND POWER SUPPLY CIRCUIT

9-1 Voice Generator Board (VG-1)

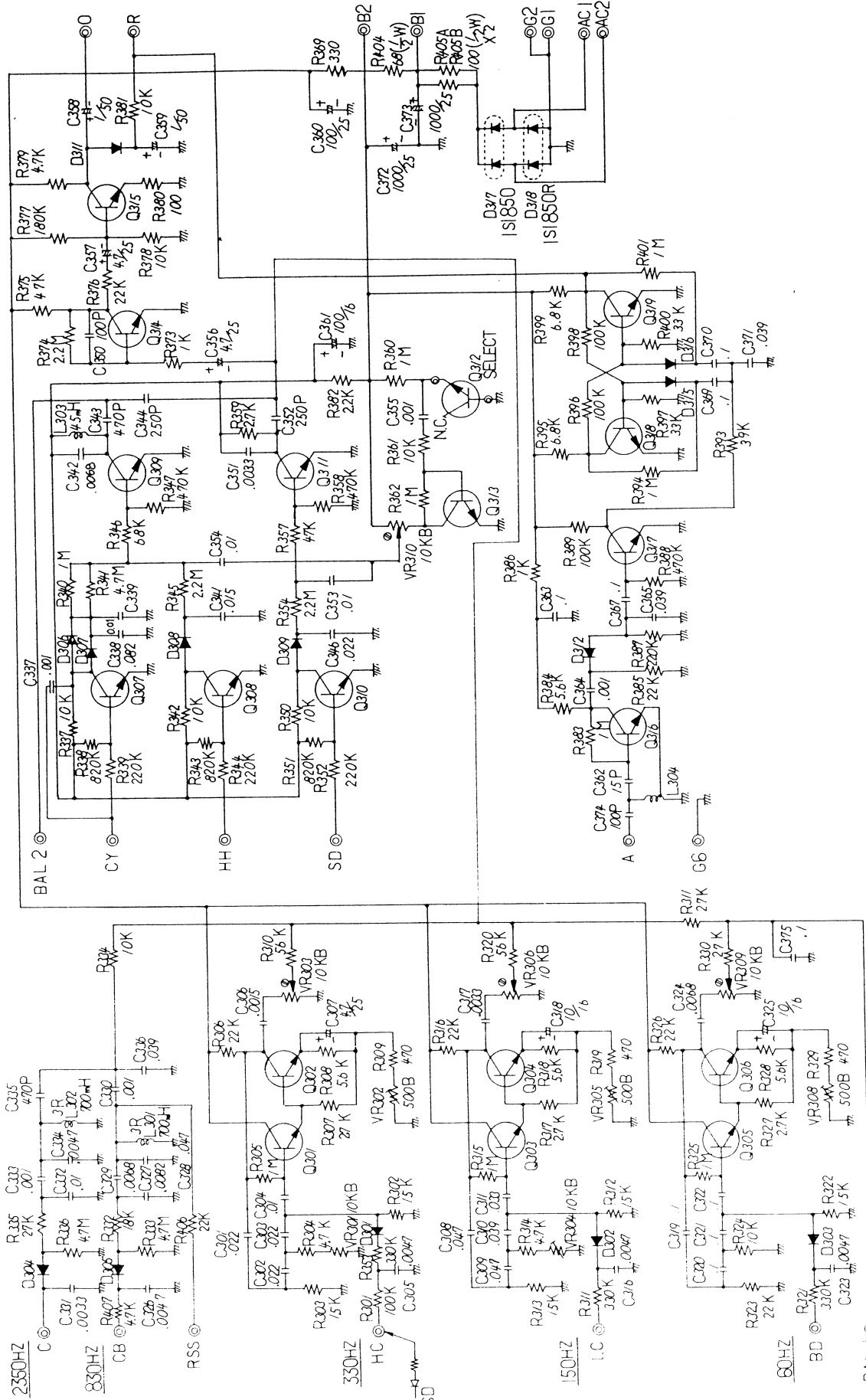




9-2. Voice Generator Circuit (VG-1)

NOTE
 UNLESS OTHERWISE SPECIFIED:
 ALL RESISTOR ARE IN OHMS, 1/4W
 ALL CAPACITOR ARE IN MFD.
 ALL DIODE ARE IN MFD.
 ALL DIODE ARE TYPE 1S1555.
 TRANSISTOR Q301~Q306 Q314 Q315 2SC0009K
 Q307~Q312 2SC372Y
 Q316~Q319 2SC372Y

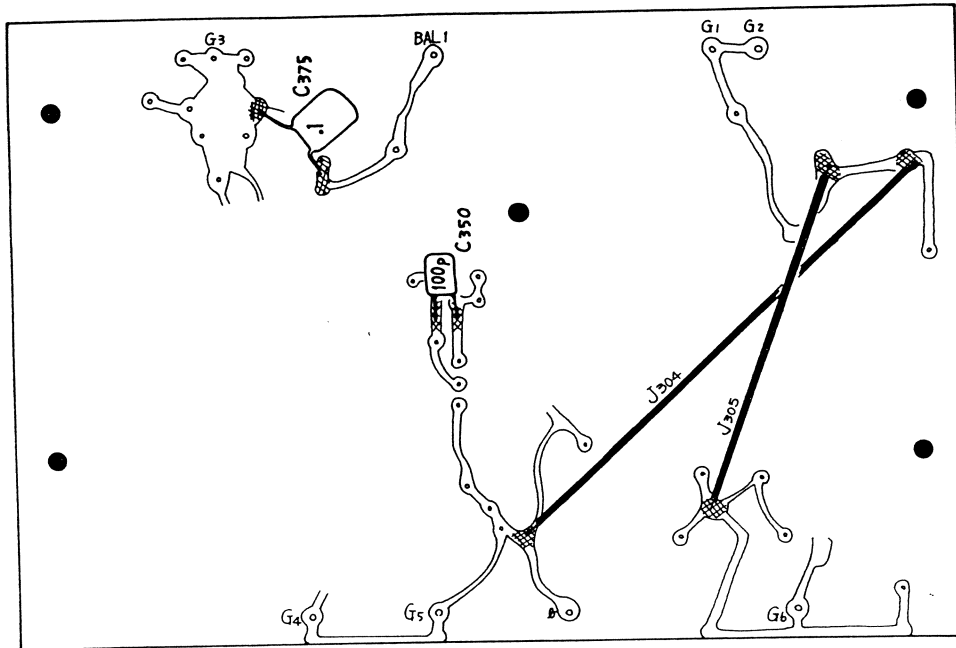
4-4 Voice Generator and Power Supply Circuit Diagram (VG-1) From SERIAL No.214600



- Q301 ~ Q306, Q314 ~ Q315 : 2SC1000-GR
- Q307 ~ Q311 : 2SC372-Y
- Q312 ~ Q313, Q316 ~ Q319 : 2SC828-R

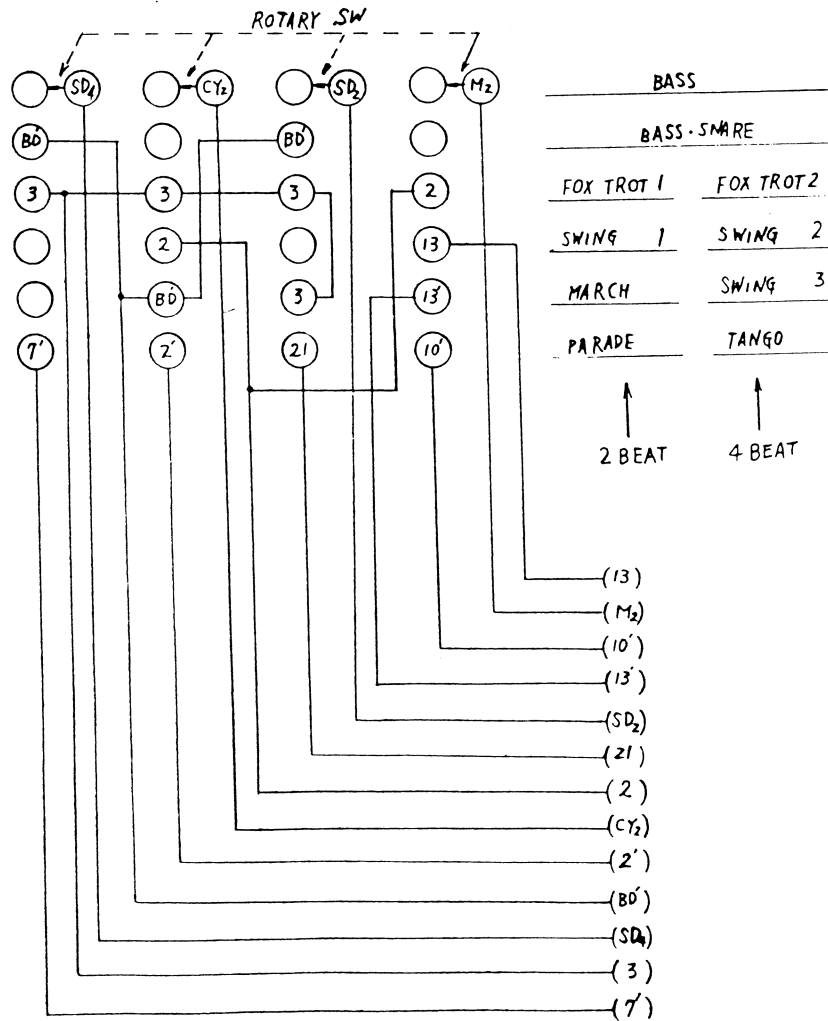
- G4 ⊕
- G5 ⊕

9-5. Rear Side View of VG-1 Board



SECTION 10. RHYTHM PATTERN

10-1. Relation between Beat Selector and Rotary Switch



SECTION 11. ADJUSTMENT

11-1. Adjustment of tempo speed by using oscilloscope

* Rating

At oscillation period of Master Oscillator (Q1, Q2)

50mS (Quick) - 300mS (Slow)

- Clockwise turning to the end of Tempo control volume (Quick), adjust semi-fixed resistor VR1 so that duration of one cycle of Master oscillator shows 50mS.
- Then, counterclockwise turning to the end of Tempo control volume (Slow), adjust semi-fixed resistor VR2 so that duration of one cycle of Master Oscillator shows 300mS.

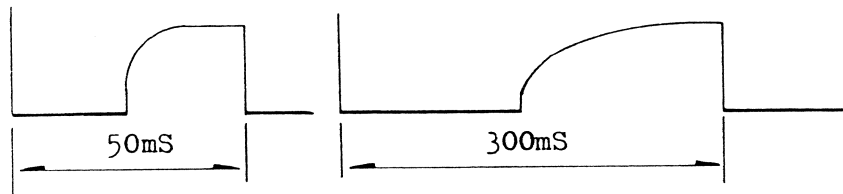


Fig. 1

These forms are the collector voltage wave forms of the Master Oscillator.

Seeing the wave form on the collector of Q1 or Q2, and check the wave forms whether they are as Fig.B undesirable waveform including unsaturated territory. The wave form like Fig.C including wide unsaturated territory is to be wrong. In case that hfe of the transistor Q1 or Q2 is small, or a time constant of R7.C2 or R6.C3 is small, the wave form like Fig.C will be appeared.

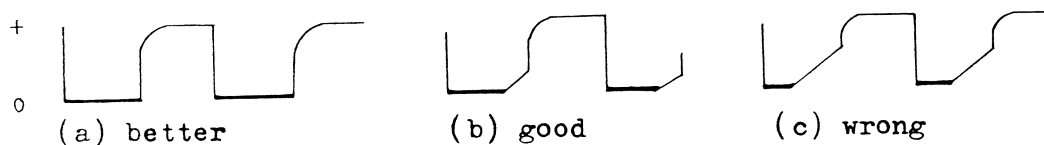


Fig. 2

Note : Be sure to use a Probe(10 : 1) to seeing the wave form on the collector.

11-2. Circuit of Touch Start Switch

11-2-1. Checking of Oscillation Frequency

Connect the oscilloscope with the collector of Q316, and check the oscillation frequency is over 1700KHz(0.59mS). If the oscillation

frequency is below 1700KHz, turn the core of L304 so that the frequency comes to over 1700KHz.

11-2-2. Checking of oscillation voltage

Connect the oscilloscope of frequency zone over 2MHz with the collector of Q316, and check that the oscillation voltage is over 6V(p-p).

11-2-3. Checking of oscillation stop

Connect the oscilloscope with the collector of Q316, touch the Touch-Plate slightly with hand, and check that the touch wave form disappears.

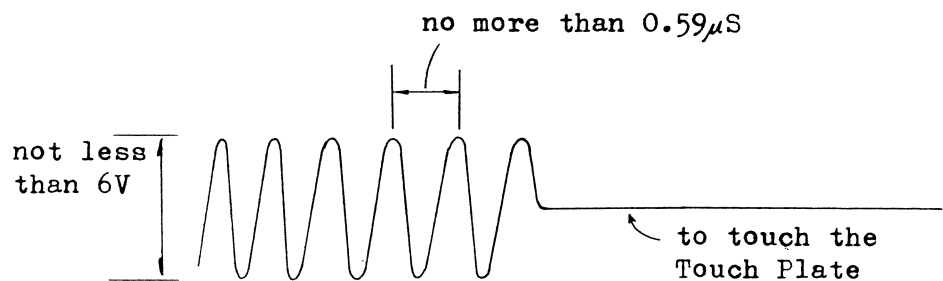


Fig. 3

11-3. Voice Generator

11-3-1. Adjustment by measuring wave form on the oscilloscope

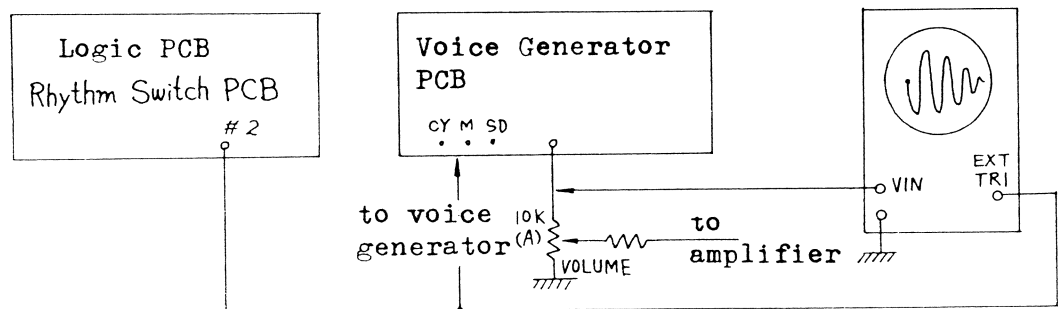


Fig. 4

Logic output "2"(Pulse track No.2, negative pulse) is a standard trigger pulse. The period of a standard trigger pulse is generally 0.6sec. Measure voltage of output terminal "0" on the Voice Generator PCB, and connect jack output(low out) with an amplifier. In case of listening to sound at the same time, connecting an amplifier, take down the volume position not to be due to output terminal.

11-3-2. Adjustment of the noise section (Cy, M(High-Hat), Sd)

Set the Balance control knob to maximum position of clockwise turn.

11-3-2-1. Adjustment of Maracas

Connect a trigger pulse with terminal "M" on voice generator PCB, and adjust semi-fixed resistor VR310 so that the level of output voltage may reach 1.5V. Check decay time within regular value.

11-3-2-2. Adjustment of Cymbal

Connect a trigger pulse with terminal "Cy" on the PCB, and check decay time and output voltage within regular value.

(Output adjustment of Cymbal is the same as Maracas's.)

11-3-2-3. Adjustment of Snare Drum

Connect a trigger pulse with terminal "SD" on the PCB, and check decay time and output voltage within regular value.

(Output adjustment of high frequency of Snare Drum is the same as Maracas's.)

11-3-3. Adjustment of the Drum section(BD, LC, HC, CB, RS, C)

Set the balance control knob to maximum position of counterclockwise turn.

11-3-3-1. Adjustment of Bass Drum

a) Territory of frequency(50 - 70Hz) is to be good.

Otherwise, replace the resistor R324(10Kohm) by the other one(5 - 15Kohm).

50Hz is 20mS. 70Hz is 14.3mS.

b) Adjustment of decay time

Adjustment the semi-fixed resistor VR308 so as to get the decay time(T_D) as 90 mS.

c) Adjustment of the output voltage

Adjustment the semi-fixed resistor VR309 so as to get the output voltage(E) as 2.0V.

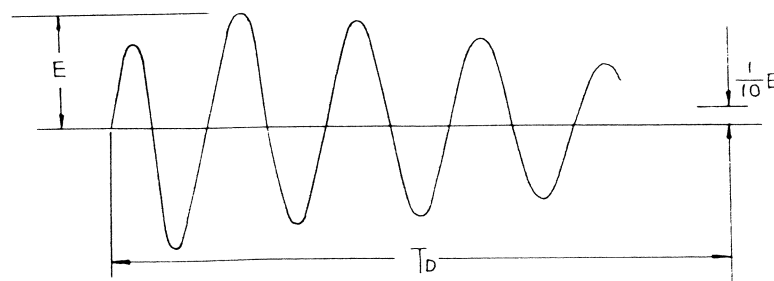


Fig. 5

11-3-3-2. Adjustment of Low Conga

a) Adjustment of frequency

Connect a trigger pulse with terminal "LC" on the PCB, and adjust the semi-fixed resistor VR304 so as to make the frequency as 147Hz.

147Hz is nearly 6.8mS.

b) Adjustment of decay time

Adjust the semi-fixed resistor VR305 so as to get the decay time (T_D) as 120mS.

c) Adjustment of the output voltage

Adjust the semi-fixed resistor VR306 so as to get the output voltage (E) as 3V.

11-3-3-3. Adjustment of High Conga

a) Adjustment of frequency

Connect a trigger pulse with terminal "HC" on the PCB, and adjust the semi-fixed resistor VR301 so as to make the frequency as 333Hz.

333Hz is 3.0mS.

b) Adjustment of decay time

Adjust the semi-fixed resistor VR302 so as to get the decay time (T_D) as 50mS.

c) Adjustment of the output voltage

Adjust the semi-fixed resistor VR303 so as to get the output voltage (E) as 1.5V.

BD, HC, LC : Repeat adjustment so that the condition a), b) and c) may be satisfied simultaneously.

11-3-3-4. Adjustment of Cowbell

a) Adjustment of frequency

Connect a trigger pulse with terminal CB on the PCB, and adjust the capacitor C328 so as to make the frequency as 830Hz.

830Hz is nearly 1.2mS.

b) Territory of decay time (10 - 50mS) is to be good.

c) Territory of output voltage (3.0 - 5.5V) is to be good.

Otherwise, adjust the capacitor C327, C329 or C330 by adding capacitors parallelly connected.

In case that a capacitor or value is changed, check frequency and decay time again.

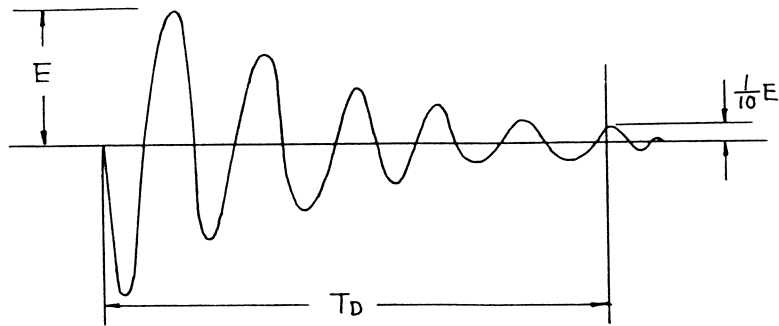


Fig. 6

11-3-3-5. Rim Shot

The circuit of Rim Shot is the same as Cowbell, but the L-C circuit is shunted by the resistor R406.

11-3-3-6. Adjustment of Claves

a) Adjustment of frequency

Connect a trigger pulse with the terminal "C" on the PCB, and adjust the capacitor C334 so as to make the frequency as 2350Hz.

2350Hz is nearly 0.42mS.

b) Territory of decay time(15 - 25mS) is to be good.

c) Territory of output voltage(0.6 - 1.5V) is to be good.

Otherwise, adjust the capacitor C332, C333 or C335 by adding capacitors parallelly connected.

In case that a capacitor or value is changed, check frequency and decay time again.

* Standard outputs of percussion instruments

VOICE	AMPLITUDE [V]			FREQUENCY [μ S] (Hz)			DECAY TIME [mS]		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
BD	1.7	2.0	2.3	20 (50)	16.7 (60)	14.3 (70)	70	90	120
LC	2.7	3.0	3.3	7.2 (139)	6.8 (147)	6.4 (156)	80	120	150
HC	1.3	1.5	1.7	3.2 (312)	3.0 (333)	2.8 (357)	30	50	70
CB	3.0	5.0	5.5	1.37 (730)	1.2 (830)	1.07 (930)	10	20	50
(RS)	—	4.0	—	—	—	—	2.5	4.5	6.5
C	0.6	1.0	1.5	0.48 (2100)	0.43 (2330)	0.38 (2600)	15	20	25
SD	1.5	2.0	2.5	—	—	—	60	80	110
HH (M)	1.0	1.5	2.0	—	—	—	45	60	75
CY	1.0	1.5	2.0	—	—	—	250	350	450

SECTION 12. PARTS LIST

TR-33 PARTS LIST

CABINET CONNECTION

083-003	Side Board	No.3 (right)
083-004	"	No.4 (left)
065-004	Cover	No.4

CHASSIS ASSEMBLY

061-007	Chassis	No.7	
064-003	Holder	No.3	
072-017	Panel	No.17	
	Channel	No.1	
	Stay	No.1	
016-011	Knob		MSA-14S
074-022	Badge	No.22	
001-003	Rotary Switch		ESR-E246R15B
001-004	Push Button Switch		1FS-2U-11BS
	"		10FS-52U-89CM
	Potentiometer	50 K(B)	EVH-BOAS15(Balance)
	"	100K(B)	EVH-BOAS10(Set)
	"	10 K(A)	EVC-BOHS15(Volume)
	"	100K(B)	EVH-BOAS15(Tempo)
	Voltage Selector Switch		XW-103-1-10
022-019BC	Power Transformer	PT-19B-C	(0-100V-120V)
BD	"	or PT-19B-D	(0-230V-250V)
	Jack		SG-7615 No.5
008-013	Wired-in Fuse	0.5A	
	Power Supply Cord	No.21	SVT.2
	Terminal Strip	1L-3P	
	Cord Bushing	R5	

LOGIC BOARD ASSEMBLY

GL-1

GL-5 (from SERIAL No214600: I.C type)

RHYTHM SWITCH BOARD ASSEMBLY

RS-2

VOICE GENERATOR BOARD ASSEMBLY VG-1

SEMICONDUCTORS

	IC	DN-811	
	Silicon Transistor	2SC828-R or 2SC373	
	"	2SC828-R (White noise)	
017-004	"	2SC372-Y	
017-003	"	2SC1000-GR	
	Silicon Diode	1S2473 or 1S1555	
018-003	"	1S1850 (Rectifier)	
018-004	"	1S1850R(")	
	Voltage Regulator Diode		RD13E-B or 05Z13

COILS

022-017	OSC Coil		09A-465
022-030	Choke	45mH	
	Coil	0.7H	3R or SM-3C

RESISTORS

	Semi-fixed Resistor	500ohm	EVL-R4X
	"	10Kohm	"
	"	20Kohm	"
	"	50Kohm	"
	Carbon Film Resistor	100 ohm	1/4 R

TR-33 PARTS LIST

	Carbon Film Resistor	470 ohm	1/4 R
	"	560 ohm	"
	"	1 Kohm	"
	"	1.5Kohm	"
	"	2.2Kohm	"
	"	2.7Kohm	"
	"	4.7Kohm	"
	"	5.6Kohm	"
	"	6.8Kohm	"
	"	10 Kohm	"
	"	15 Kohm	"
	"	22 Kohm	"
	"	27 Kohm	"
	"	33 Kohm	"
	"	39 Kohm	"
	"	47 Kohm	"
	"	56 Kohm	"
	"	68 Kohm	"
	"	100Kohm	"
	"	180Kohm	"
	"	220Kohm	"
	"	330Kohm	"
	"	470Kohm	"
	"	680Kohm	"
	"	820Kohm	"
	"	1 Mohm	"
	Carbon Solid Resistor	68 ohm	ERC12GK
	"	100 ohm	"
	"	270 ohm	"
	"	2.2Mohm	"
	"	4.7Mohm	"

CAPACITORS

035-001	Plastic Film Capacitor	470pfd	50V
035-005	"	.001 mfd	"
035-007	"	.0015mfd	"
	"	.0033mfd	"
	"	.0047mfd	"
	"	.0068mfd	"
	"	.0082mfd	"
	"	.01 mfd	"
	"	.015 mfd	"
	"	.022 mfd	"
	"	.033 mfd	"
	"	.039 mfd	"
	"	.047 mfd	"
	"	.056 mfd	"
	"	.082 mfd	"
	"	.1 mfd	"
037-002	Ceramic Capacitor	15 pfd	50V
037-006	"	100 pfd	"
037-007	"	250 pfd	"
	Electrolytic Capacitor	1 mfd	50V
	"	4.7 mfd	25V
	"	10 mfd	16V
	"	100 mfd	16V
	"	100 mfd	25V
	"	1000mfd	25V

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11454

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11454



10990

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