YAMAHA

COMBO SYNTHESIZER

CS-50

SERVICE MANUAL

006361

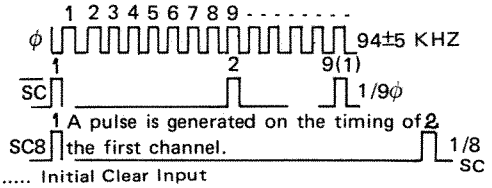
INDEX

KEY CODER LSI (YM26600)

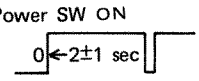
The LSI detects what keys are held down by judging the pulse combination of the octave and note.
It also generates the seven bit key code, which is processed by time sharing, in accordance with the key held down.

Pin. No. — Pin Name

1. VSS .....+8.5V Power Supply
2. ϕ ..... Master Clock Input
3. SC ..... Synchro-clock Output
4. SC8 ..... Synchro-clock Output on the first channel.



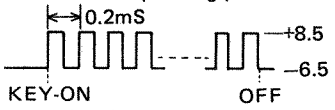
5. IC ..... Initial Clear Input



On this timing, C4# code is memoried.

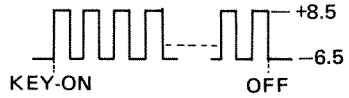
6. VDD .....–6.5V Power Supply Input
7. CL
8. C#
19. C .... Note on data input

When the key is depressed, the pulse is supplied the corresponding pin of the note.



20. V1
24. V5 .... Octave on data input

When the key is depressed, the pulse is supplied to the corresponding pin of the octave.



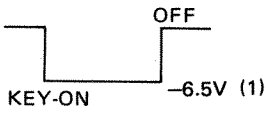
25. N1
28. N4 .... Note code data output

	C#	D	D#	E	F	F#	G	G#	A	A#	B	C
N	1	0	1	1	0	1	1	0	1	1	0	1
N	1	1	0	1	1	0	1	1	0	1	1	0
N	1	1	1	0	0	0	1	1	1	0	0	0
N	1	1	1	1	1	1	0	0	0	0	0	0

29. B1
31. B3 .... Octave Code Data Output

	C2	C2#~C3	C3#~C4	C4#~C5	C5#~C6
B1	0	1	0	1	0
B2	1	0	0	1	1
B3	1	1	1	0	0

32. KO1
39. KO8 .... Key on Data Output



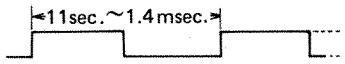
The number of note sounded is variable by using this pin.
i.e.) Up to 4 notes: Supply –6.5V to $\overline{KO5}$.
Up to 3 notes: Supply –6.5V to $\overline{KO4}$.

40. Mode .... Switching output for sound model
For 8 notes .... Supply –6.5V (1)
For 7 notes .... Supply +8.5V (0)

KEY ASSIGNER & D-A CONVERTER LSI (YM26700)

The time shared key data is supplied to the LSI. Analog DC voltage is produced in corporation with key by the data and supplied to each channel.

1. VSS ..... +8.5V Power Supply
2. $\overline{SC8}$ ..... Synchro-clock input on the first channel.
3. $\overline{POR}$ ..... Portamento and Glissando operation. When the portament VR is turned on, +8.5V is supplied to the pin and actuate.
4. PC ..... Clock input for Portament and Glissando operation.



The frequency is variable by changing the portamento VR.

5. $\overline{N1}$
8. $\overline{N4}$ ..... Note code data input
Note code data is supplied to the pins from key coder LSI.

9. $\overline{B1}$
11. $\overline{B3}$ ..... Octave code data input
Octave code data is supplied to the pins from key coder LSI.

12. OO ..... Output for octave key voltage. (8ch time sharing)
Provided the output key voltage for the octave selected from octave code.

13. OCT0
18. OCT5 ..... Input for octave key voltage.

* TU pin: 4.0V

	OCT0	OCT1	OCT2	OCT3	OCT4	OCT5
Voltage	0.25V	0.5V	1.0V	2.0V	4.0V	4.0V

The voltage of TU line is divided by the ladder composed resistors and supplied to each pin constantly.

19. C#
30. C .... Input for note key voltage

OO pin: 4.0V

	C#	D	D#	E	F	F#
Voltage	2.119	2.245	2.378	2.520	2.670	2.828

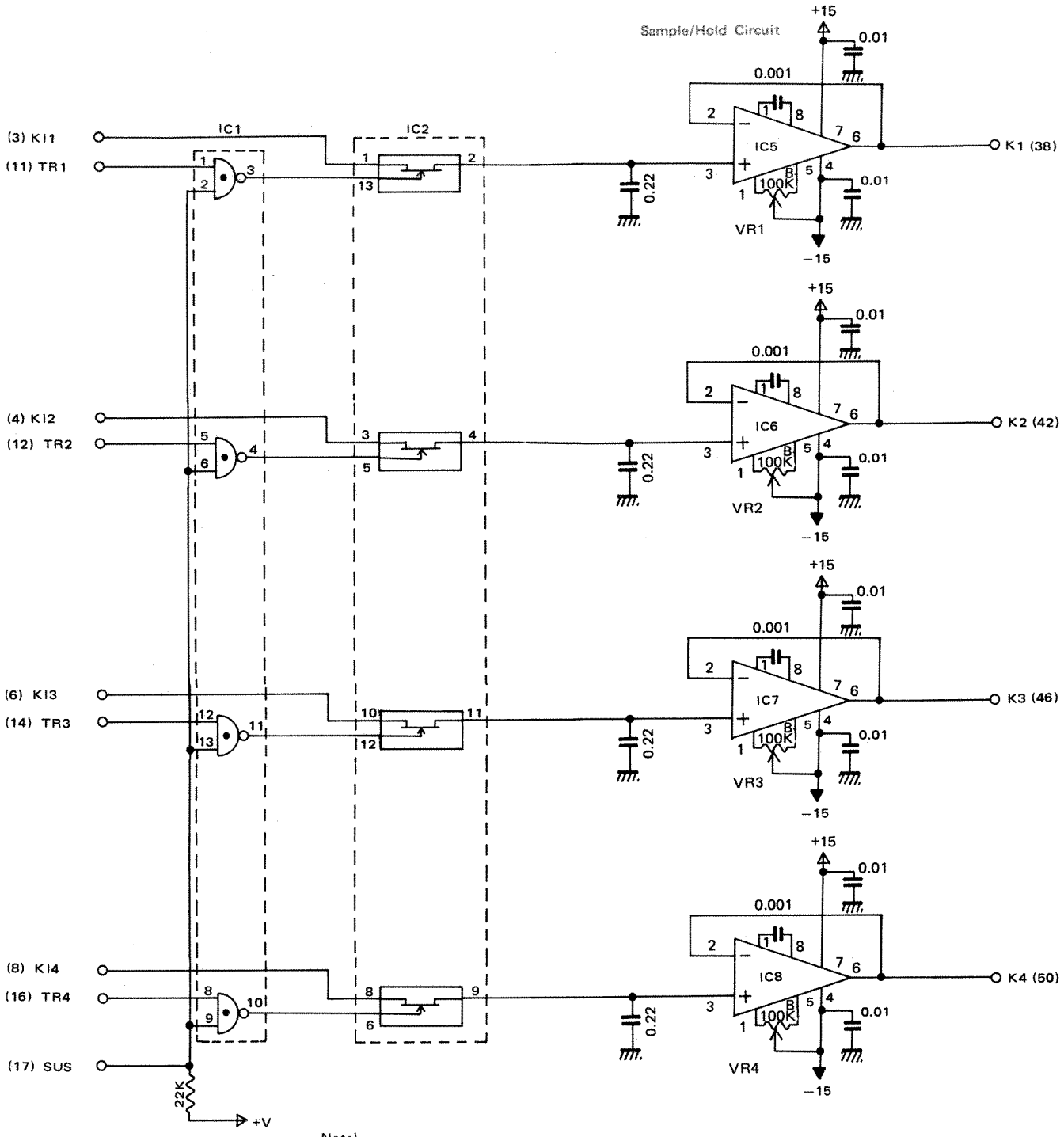
	G	G#	A	A#	B	C
Voltage	2.997	3.175	3.364	3.564	3.775	4.0V

The voltage of OO line is divided by the ladder composed resistors and supplied to each pin constantly.

31. CH8
38. CH1 .... Key voltage output
The output of voltage determined by each key is provided in accordance with the channel key code.

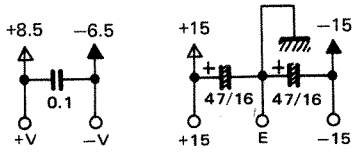
39. VDD .... –6.5V Power Supply, Input
40. ϕ ..... Master Clock Input f=94±5KHz

SH (Sample Hold) Circuit

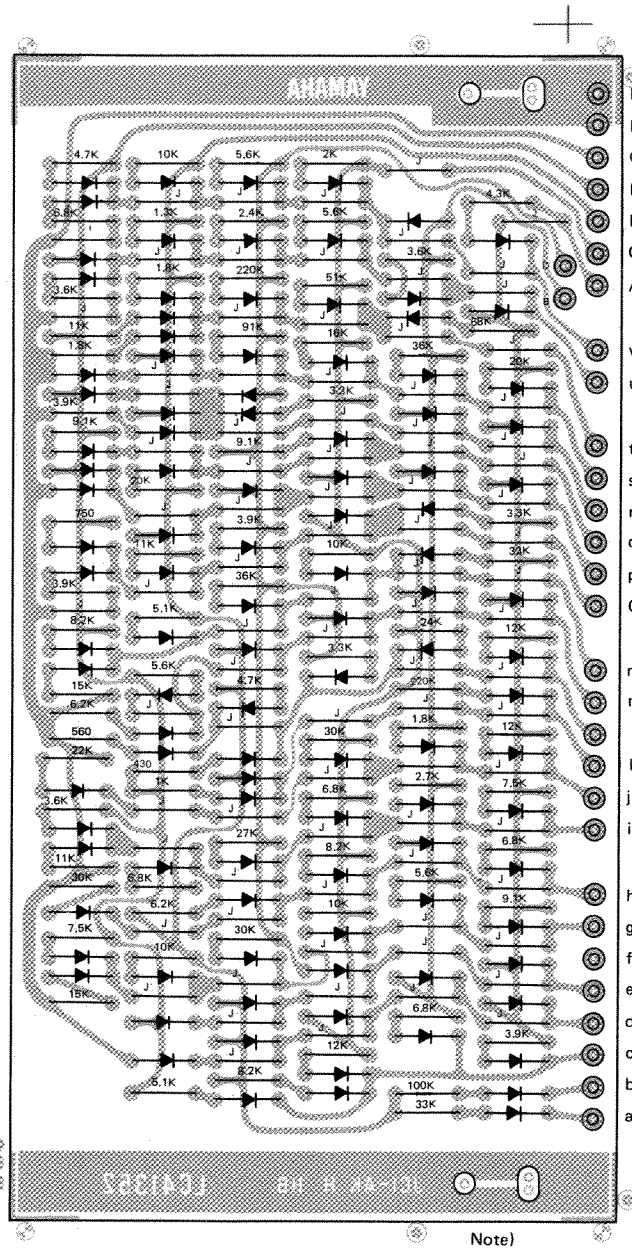


Note)

1. IC1,3 : TC4011P
   IC2,4 : TC4016P
   Power Supply of IC
   7 Pin ..... −V
   14 Pin ..... +V
2. Capacitor
   0.1 ..... Ceramic Capacitor
   0.22 ... Mylar Capacitor
   47/16... Electrolytic Capacitor



T72 Circuit Board



E (1)
E (2)
G (3) ← BR ← PN2-TS13-M
F (4) ← PK ← PN2-TS12-M
E (5) ← SB ← PN2-TS11-M
C (6) ← WH ← PN2-TS9-M
A (7) ← VI ← PN2-TS7-M

D (6') ← GG ← PN2-TS10-M
B (7') ← GY ← PN2-TS8-M

v (9) → GG → RA-R7-L2 (38)
RA-T71-v (9)
u(10) → WH → RA-T71-u (10)

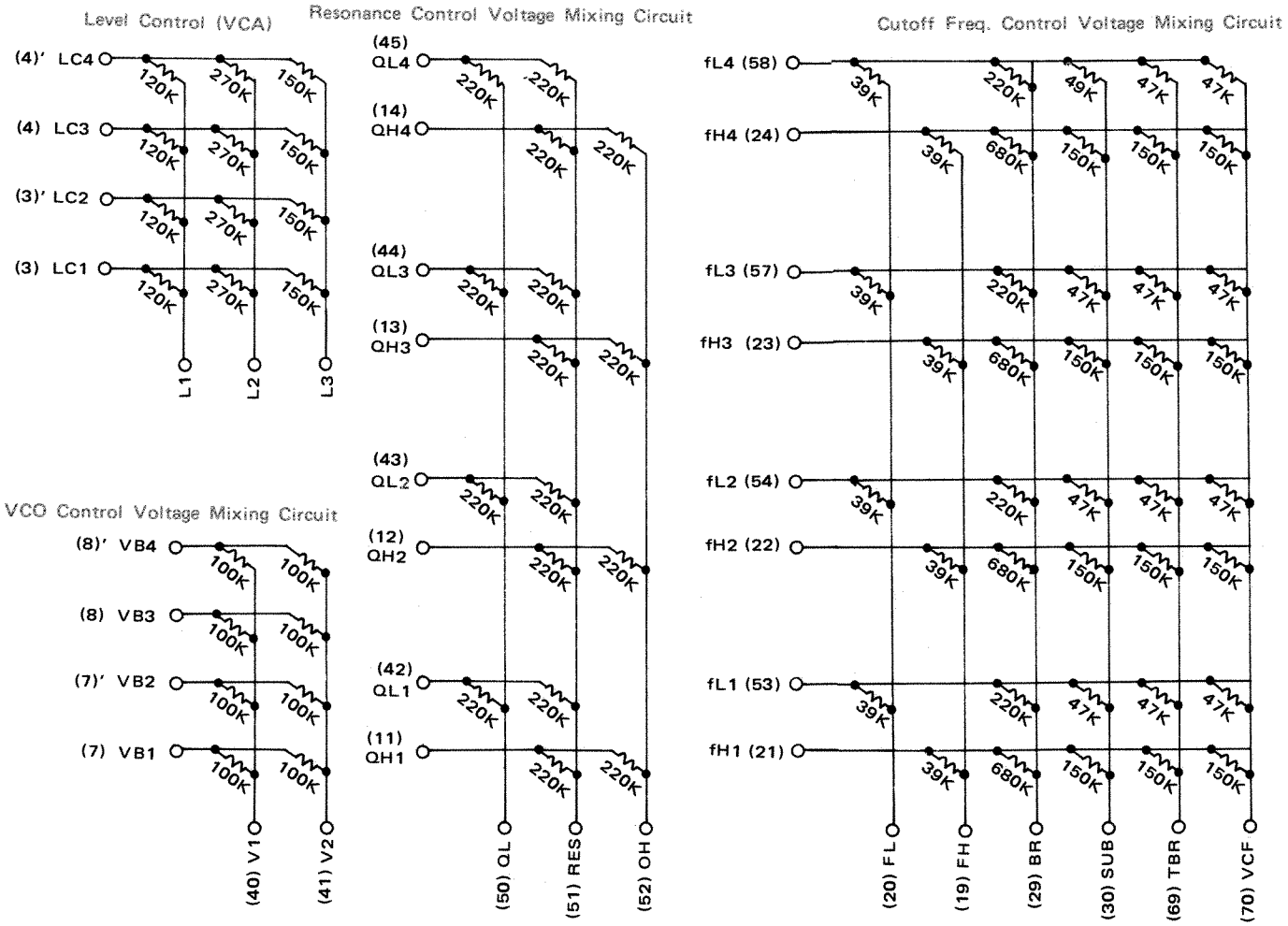
t(12) → GYx2 → RA-M1-SL (64)
RA-T71-t (11)
s(13) → VIx2 → RA-M1-DA (66)
RA-T71-S (12)
r (14) → BEx2 → RA-M1-AA (67)
RA-T71-r (13)
q (15) → GRx2 → RA-M1-LP2 (24)
RA-T71-q (15)
p (16) → YEx2 → RA-M1-LP1 (27)
RA-T71-P (16)
O (17) → OR → RA-T71-O (17)

n (19) → REx2 → RA-M1-DF (61)
RA-T71-n (18)
m(20) → BRx2 → RA-M1-AF (62)
RA-T71-m (19)
l (21) → PKx2 → RA-M1-AL (59)
RA-T71-l (21)
k (22) → SBx2 → RA-M1-JL (58)
RA-T71-k (22)
j (23) → GGx2 → RA-R7-QL (50)
RA-T71-j (23)
i (24) → WHx2 → RA-R7-FL (20)
RA-T71-i (24)

h (26) → GYx2 → RA-R7-QH (52)
RA-T71-h (25)
g (27) → VIx2 → RA-R7-FH (19)
RA-T71-g (27)
f (28) → BE → RA-T71-f (28)
e (29) → GRx2 → RA-M1-G2 (94)
RA-T71-e (29)
d (30) → YEx2 → RA-M1-G1 (45)
RA-T71-d (30)
c (31) → ORx2 → RA-M1-PW (40)
RA-T71-c (31)
b (32) → RE → RA-T71-b (32)
a (33) → BR → RA-T71-a (33)

Note)
1. Print Board : LC41352
2. Diode : 1S1555

R7 (Registor) Circuit



VCO III IC (IG00153)

This IC is used for voltage controlled oscillator.
Many defferent frequencies are produced by the voltage supplied.

1. FT ..... Resistor for determination of the feet.
   The electric current is provided to the pin from transposition changing circuit so that the octave can be determined.

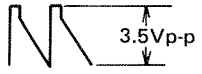
2. KV ..... Input of the key voltage
   The input of the voltage is provided to the pin in corporation with the keys held down.

   High voltage ..... High frequency
   Low voltage ..... Low frequency

Input Voltage	Output Frequency
0.250V	130.8Hz (C2)
0.500V	261.6Hz (C3)
1.000V	523.2Hz (C4)
2.000V	1046.0Hz (C5)
4.000V	2093.0Hz (C6)

Transposition "normal"

3.
4. OFF-SET .... Zero adjustment of input buffer circuit
5. Vee ..... −15V input power source.
6. Com .... Phase compensation for input buffer amplifier.
   Normally, the output (KV + 1V) is supplied to the pin.
7. OUT .... Output

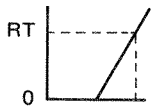


Asto the frequency, refer to the Pin No.2 (KV).

8. GND ..... Earth
9. Vref ..... Input of the standard voltage.
10. CT ..... Circuit for time constant.

The following wave shape is produced.

11. RT ..... Circuit for time constant.



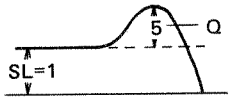
Determines the discharging voltage level.

12. T1 ..... Input for the comparator.
    Input of the wave shape ( ) is provided. from the pin no. 14 (TO).

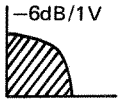
14. TO ..... Output from time constant circuit.
    The following wave shape is produced.
15. VIB ..... Input for vibrato control wave.
    Input of the control wave is provided by VCO lever of SUB-OSC.
16. Vcc ..... +15V input power source.

VCF IC (IG00156)

1. AI ..... Signal Input
   Input signals from VCO and WSC are provided to this pin.
2. KV ..... Key voltage input
   In order to change the tone color according to the tone range of keyboard, the designated voltage of the key will supplied to the pin. (0.25-4.0V)
3. fc ..... Adjustment of the cut off frequency.
   Set the control currency of the cut off frequency.
4. Vf ..... Input of the cut off voltage.
   Input voltage of cut off frequency is supplied to this pin so that the tone color can be changed. The center point of the cut off frequency can be also set.
   When the VK is 0.25V and Vf is 5V, the cut off frequency is set to just 1KMz.
5. Vcc ..... +15V input power source
6. Q0 ..... Q adjustment.
   The Q control current sets the Q equal to 5, when Vq is 0 volt.

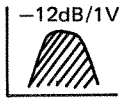


7. Vq ..... Input of the voltage for Q control.
   Q is variable according to the control voltage supplied.
   When the control voltage is
   0V (Max.), Q=5
   When the control voltage is
   10V (Min.), Q=0.5
8. GND .... Earth
9. FB ..... Q feed back
   This is the feed back output pin for the Q control by which the Q is determined.
10. LP ..... Low-pass output



The output of lower frequencies are produced.

11. C2 ..... C pin for determination of the cut off frequency.
12. Vee ..... −15V power source.
13. BP ..... Band-pass output.



The output of intermediate frequences are produced.

14. C1 ..... C pin for determination of the cut off frequency.
15. HP ..... Hi-pass output

The output of higher frequencies are produced.

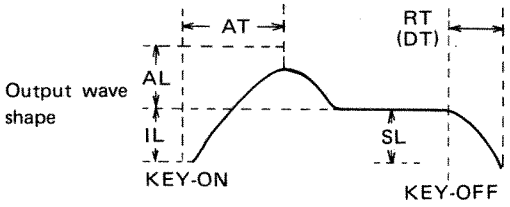
16. IN ..... In]ut of feed back
    The input signal for determination of cut off frequency.

VCF-EG IC (IG00152)

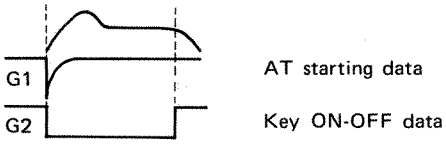
This IC generates envelope wave shape which is supplied to VCF and control the tone color.

1. NC ..... Not connected
2. BI ..... Input of buffer amplifier.
3. OUT .... Output of buffer amprifier.

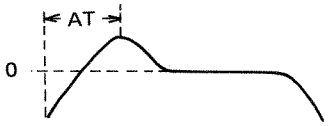
The buffer amplifier is built in for the purpose of matching inpedance.



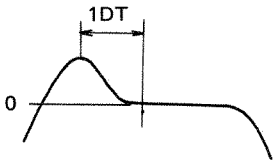
4. GND .... Earth
5. Vcc ..... +15V input power source.
6. G1 ..... Gate 1
7. G2 ..... Gate 2



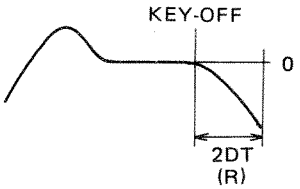
8. Vee ..... −15V input power source.
9. AT ..... Input of buffer voltage for determination of the attack time.
Input of the voltage between zero V and 10V is provided and the attack time is controlled from 1 mS until 1S.



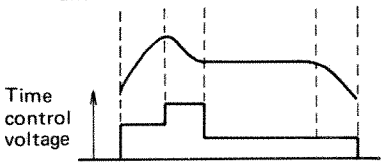
10. 1DT ..... Input of buffer voltage for determination of the decay time.
Input of the voltage between zero V and 10V is provided and the first decay time is controlled from 10mS until 10 S.



11. 2DT ..... Input of buffer voltage for determination of the release time.
Input of the voltage between zero V to 10V is provided and the time from KEY-ON until release is controlled from 10m second until 10 second.

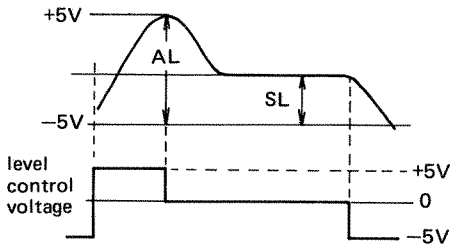


12. TC ..... Output of the time control.
Output of DC voltage is produced so that the each time of attack, 1DT and 2DT are controlled.



The higher the voltage, the shorter the time and the lower the voltage the longer the time.

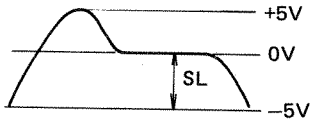
13. LC ..... Output of level control.



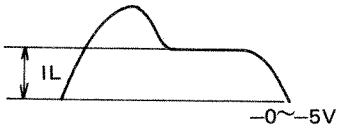
The higher the voltage, the higher the level and the lower the voltage the lower the level.

15. SL ..... Input of buffer voltage for determination of the sustain level.

Normally fixed to zero(0) volt.



16. IL ..... Input of buffer voltage for determination of the initial level.
Input of the voltage between zero (0) and ten (10) is provided and the initial level is controlled from zero to minus 5 volt.



YAMAHA

COMBO SYNTHESIZER

CS－50

Parts List

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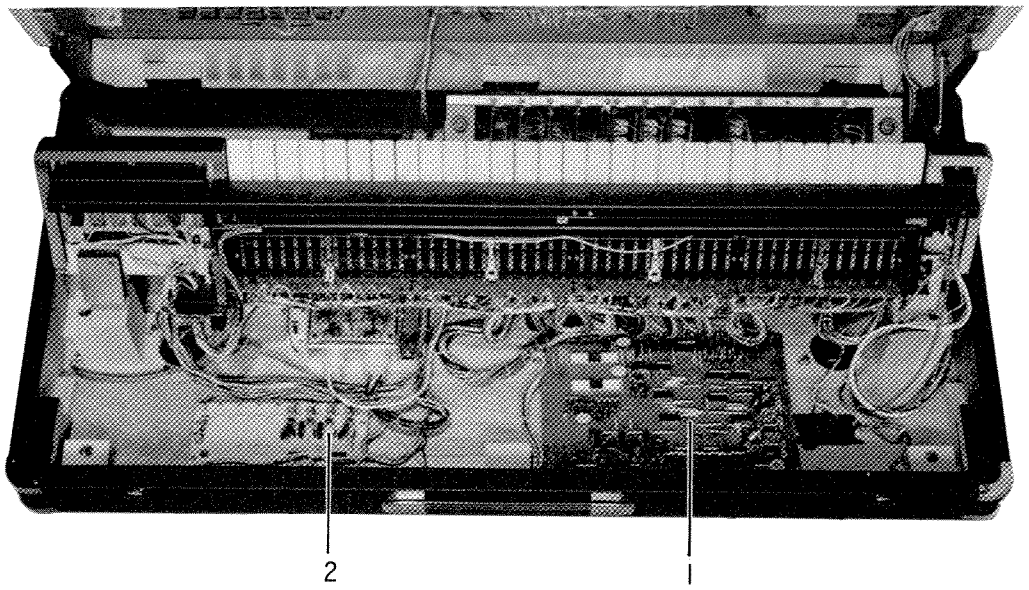
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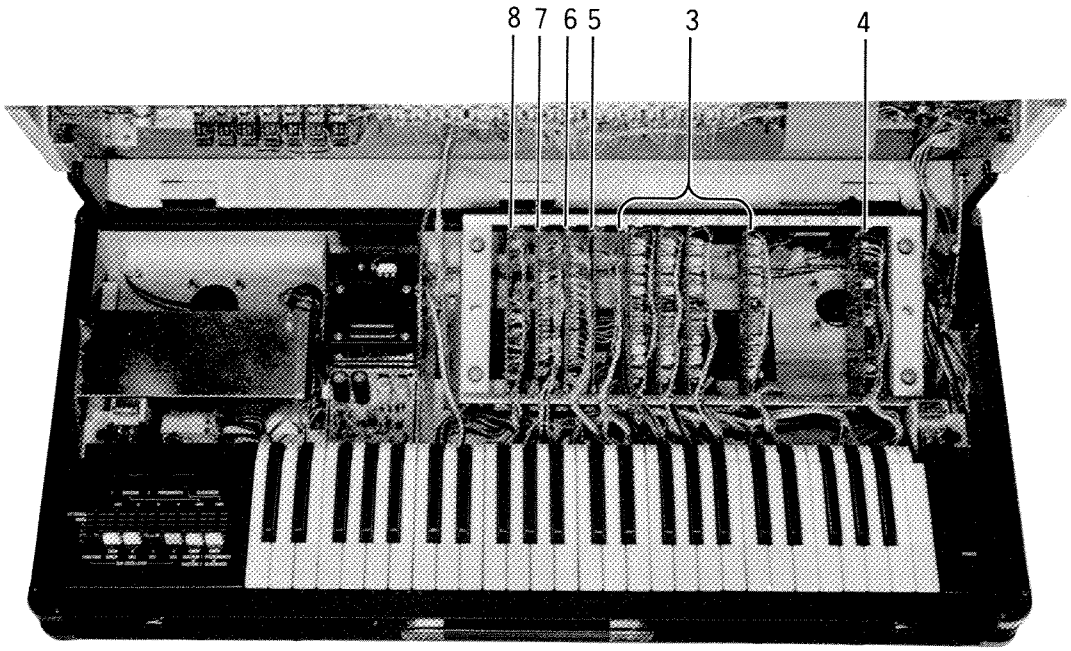
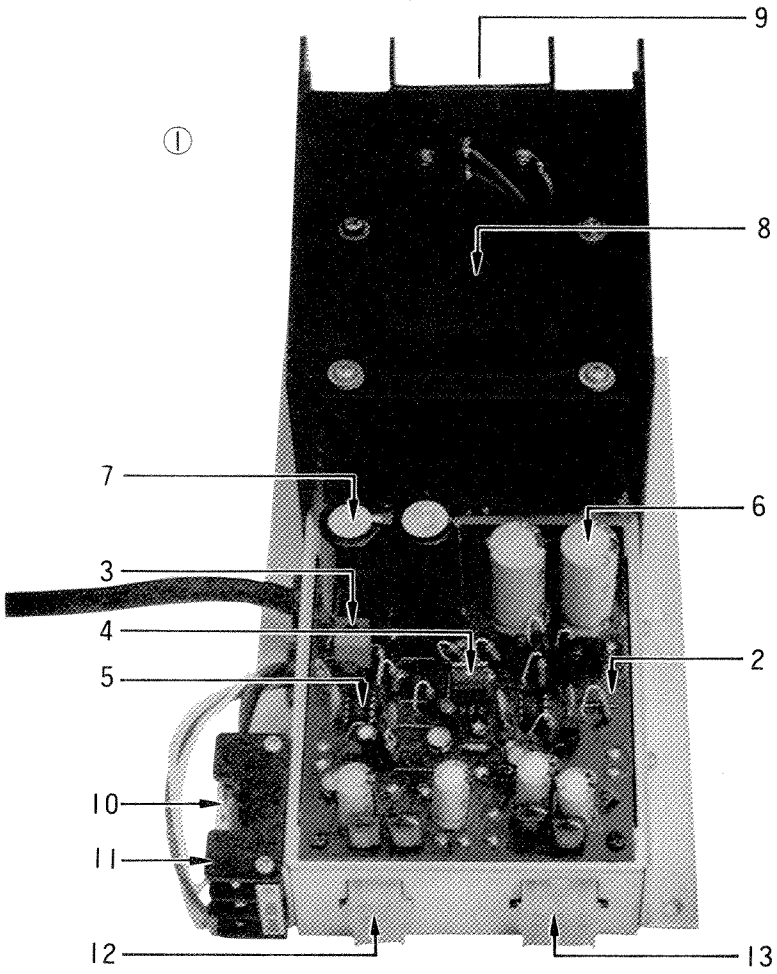
1


8 7 6 5
3
4

Ref. No.	Part No.	Description		Remarks	Common Models	
1	30 12 50 NA 03 65 00	KAS Circuit Board #21264	KAS シート			
2	30 12 50 NA 03 79 20	SH —do.— #22542	SH シート			
3	30 12 50 NA 04 48 50	M —do.— #21233	M シート		CS-60	
4	30 12 50 NA 04 48 60	PRA —do.— #41383	PRA シート			
5	30 12 50 NA 04 48 10	SUB —do.— #41336	SUB シート			
6	30 12 50 NA 04 48 40	R_7 —do.— #41361	R_7 シート			
7	30 12 50 NA 04 47 20	T7I —do.— #21183	T7I シート			
	30 12 50 NA 04 48 30	T72 —do.— #41352	T72 シート			
	30 10 00 YM 26 60 00	LSI YM26600	L S I			
	30 10 00 YM 26 70 00	—do.— YM26700	L S I			
	40 10 00 iG 00 10 40	Integrated circuit TA7504M	〃			
	40 10 00 iG 00 12 10	—do.— LM310	I C			
	40 10 00 iG 00 12 40	—do.— TC4011P	〃			
	40 10 00 iG 00 12 60	—do.— TC4069P	〃			
	40 10 00 iG 00 13 90	—do.— NJM4558D	〃			
	40 10 00 iG 00 14 10	—do.— BA617	〃			
	40 10 00 iG 00 15 00	—do.— IG00150	〃	VCOII		
	40 10 00 iG 00 15 10	—do.— IG00151	〃	VCA		
	40 10 00 iG 00 15 20	—do.— IG00152	〃	EG-VCF		
	40 10 00 iG 00 15 30	—do.— IG00153	〃	VCOIII		
	40 10 00 iG 00 15 60	—do.— IG00156	〃	VCF		
	40 10 00 iG 00 15 80	—do.— IG00158	〃	WSC		
	40 10 00 iG 00 15 90	—do.— IG00159	〃	EG-VCA		
	40 10 00 iG 00 16 20	—do.— MA796HC	〃			
	40 10 00 iG 00 16 90	—do.— TC4016P	〃			
	40 10 00 iG 00 17 90	—do.— TC4050P	〃			
	40 10 00 iG 00 22 20	—do.— CA3140T	〃			
	40 10 00 iA 04 90 20	Transistor 2SA490	トランジスタ			
	40 10 00 iA 05 61 70	—do.— 2SA561	〃			
	40 10 00 iC 04 58 80	—do.— 2SC458	〃			
	40 10 00 iD 02 34 30	—do.— 2SD234	〃			
	40 10 00 iE 00 00 10	FET 2SK30	F E T			
	40 10 00 iF 00 00 40	Diode 1S1555	ダイオード			
	40 10 00 iF 00 03 00	—do.— 1S1715P	〃			
	40 10 00 iF 00 04 20	Zener diode 02Z5.6A	ツェナー			
	40 10 00 HU 36 53 00	Metal film resistor 2% 300Ω	金属被膜抵抗			
	40 10 00 HU 36 53 30	—do.— —do.—330Ω	〃			
	40 10 00 HU 36 57 50	—do.— —do.—750Ω	〃			
	40 10 00 HU 36 68 20	—do.— —do.—8.2KΩ	〃			
	40 10 00 HU 36 71 00	—do.— —do.—10KΩ	〃			

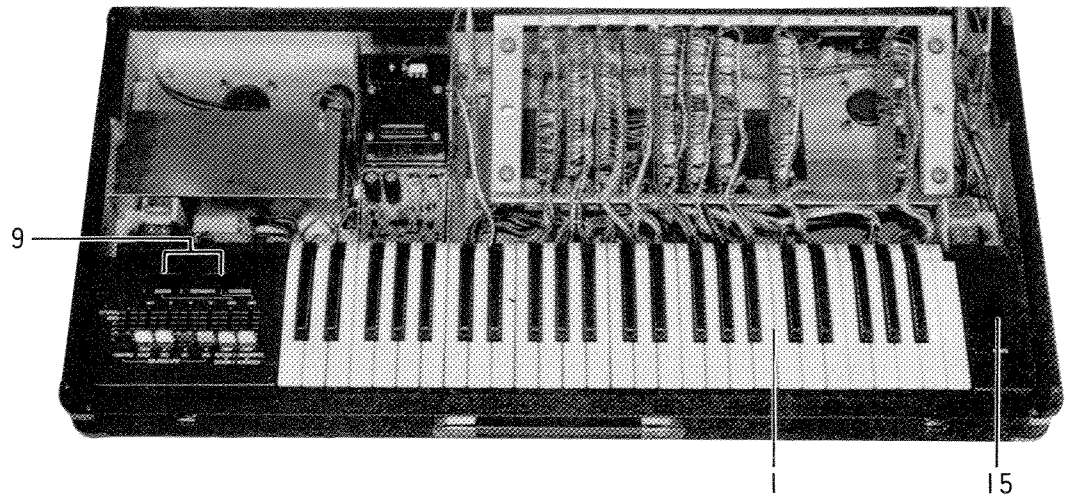
Ref. No.	Part No.	Description		Remarks	Common Models	
	40 10 00 HU 36 71 80	Metal film resistor 2% 18KΩ	金層被膜抵抗			
	40 10 00 HU 36 72 20	—do.— —do.—22KΩ	〃			
	40 10 00 HU 57 61 80	—do.— 1%—1.8KΩ	〃			
	40 10 00 HU 57 72 20	—do.— —do.—22KΩ	〃			
	40 10 00 HU 57 81 50	—do.— —do.—150KΩ	〃			
	40 10 00 HU 19 72 00	—do.— 0.1% 20KΩ	〃			
	40 10 00 HU 19 74 00	—do.— —do.—40KΩ	〃			
	40 10 00 HU 19 78 00	—do.— —do.—80KΩ	〃			
	40 10 00 HU 19 81 60	—do.— —do.—160KΩ	〃			
	40 10 00 HU 59 51 00	—do.— 0.01%100Ω	〃			
	40 10 00 HU 59 61 00	—do.— —do.—1KΩ	〃			
	40 10 00 HU 59 62 00	—do.— —do.—2KΩ	〃			
	40 10 00 HZ 00 08 60	—do.— —do.—29.94KΩ	〃			
	40 10 00 Hi 30 93 30	Solid resistor 3.3MΩ	ソリッド抵抗			
	40 10 00 Hi 20 94 70	—do.— 4.7MΩ	〃			
	40 10 00 Hi 20 99 90	—do.— 10MΩ	〃			
	40 10 00 HL 32 42 20	Metal oxide film resistor 2W 22Ω	酸化金属被膜抵抗			
	40 10 00 FF 04 31 20	Polystyleme capacitor 1200pF	スチロールコンデンサ			
	40 10 00 FP 13 72 20	Tantalum capacitor 16V 22μF	タンタル			
	40 10 00 FM 09 71 00	Nonpolar capacitor 16V 10μF	NP コンデンサ			
	40 10 00 FM 22 71 00	—do.— 25V 10μF	〃			
	40 10 00 FM 22 73 00	—do.— 25V 33μF	〃			
	40 10 00 FM 11 61 00	—do.— 50V 1μF	〃			
	40 10 00 FM 11 64 00	—do.— 50V 4.7μF	〃			
	40 10 00 HT 55 00 60	Semi variable resistor 3006 typeB-5KΩ	半固定抵抗			
	40 10 00 HT 56 01 50	—do.— 3321HType B-20Ω	〃			
	40 10 00 HT 56 00 00	—do.— —do.—B-50Ω	〃			
	40 10 00 HT 56 00 20	—do.— —do.—B-200Ω	〃			
	40 10 00 HT 56 00 70	—do.— —do.—B-10KΩ	〃			
	40 10 00 HT 56 01 00	—do.— —do.—B-100KΩ	〃			
	40 10 00 HT 12 00 10	—do.— V10K4ATypeB-1KΩ	〃			
	40 10 00 HT 12 00 80	—do.— —do.—B-2KΩ	〃			
	40 10 00 HT 12 00 20	—do.— —do.—B-5KΩ	〃			
	40 10 00 HT 12 00 50	—do.— —do.—B-50KΩ	〃			
	40 10 00 HT 12 00 70	—do.— —do.—B-	〃			
	40 10 00 HT 12 00 60	—do.— —do.—B-500KΩ	〃			
	40 10 00 HT 12 01 10	—do.— —do.—B-1MΩ	〃			

Ref. No.	Part No.	Descripton		Remarks	Common Models	
	40 10 00 HT 18 00 20	Semi variable resistor V10K 8A Type B-200Ω	半固定抵抗			
	40 10 00 HT 18 00 30	—do.— —do.— B-2KΩ	〃			
	40 10 00 HT 18 00 50	—do.— —do.— B-20KΩ	〃			
	40 10 00 HT 18 00 60	—do.— —do.— B-50KΩ	〃			
	40 10 00 HT 18 00 70	—do.— —do.— B-100KΩ	〃			
	40 10 00 HT 18 00 80	—do.— —do.— B-500KΩ	〃			



Ref. No.	Part No.	Description		Remarks	Common Models	
1	30 12 00 NP 00 13 00	Power Supply Unit	電源ユニット	BS		
	30 12 00 NP 00 13 10	—do.—	〃	国内		
	30 12 00 NP 00 13 20	—do.—	〃	General		
	30 12 00 NP 00 13 30	—do.—	〃	UL		
	30 12 00 NP 00 13 40	—do.—	〃	South African		
	30 12 00 NP 00 13 50	—do.—	〃	Australian		
	30 12 00 NP 00 13 60	—do.—	〃	European, North European		
	30 12 00 NP 00 13 80	—do.—	〃	CSA		
2	30 12 00 NA 03 55 90	SVU Circuit board #20922	SVU シート			
3	40 10 00 iA 04 90 20	Transistor 2SA490	トランジスタ			
	40 10 00 iA 05 61 70	—do.— 2SA561	〃			
	40 10 00 iC 08 28 80	—do.— 2SC828	〃			
4	40 10 00 iD 02 34 10	—do.— 2SD234	〃			
	40 10 00 iF 00 00 40	Diode 1S1555	ダイオード			
	40 10 00 iH 00 01 40	—do.— 10DC-4	〃			
	40 10 00 iH 00 01 50	—do.— 10DC-4R	〃			
	40 10 00 iF 00 01 00	Zener diode 1S1715	ツェナー			
	40 10 00 iF 00 07 80	—do.— WZ150	〃			

Ref. No.	Part No.	Description		Remarks	Common Models	
5	40 10 00 iG 00 13 90	Integrated circuit RC4558	I C			
	40 10 00 HL 31 24 70	Metal oxide resistor IP0.47Ω	酸金抵抗			
6	40 10 00 FJ 14 91 00	capacitor 25V 1000μF	コンデンサ			
7	40 10 00 FJ 25 92 20	—do.— 35V 2200μF	〃			
8	40 10 00 GA 02 86 10	Power transtermer	電源トランス			
	40 10 00 iA 04 90 10	Transistor 2SA490	トランジスタ			
	40 10 00 iA 07 45 00	—do. 2SA745	〃			
9	40 10 00 iD 02 03 00	—do.— 2SD203	〃			
	40 10 00 iD 02 34 10	—do.— 2SD234	〃			
	40 10 00 FZ 00 01 10	Sperk Killer 125V0.33μF+120Ω	CR 複合部品	UL spec		
	40 10 00 FZ 00 09 50	—do.— 250V —do.—	〃	CSA spec		
	40 10 00 HM 52 24 70	Cement molded resistor 2W 0.47Ω	セメント抵抗			
	40 10 00 FQ 02 44 70	Oil capacitor 630V 0.047μF	オイルコンデンサ			
10	40 10 00 KB 00 04 30	Fuse 1.25A	ヒューズ	国内		
	40 10 00 KB 00 03 10	—do.— 0.5A	〃			
	40 10 00 KB 00 07 10	—do.— miniature Type 0.5A	〃	BS, European, North European spec		
	40 10 00 KB 00 06 60	—do.— —do.— 0.4A	〃	BS spec		
	40 10 00 KB 00 11 50	—do.— Approved by UL 0.5A	〃	UL,CSA spec		
	40 10 00 KB 00 14 50	—do.— —do.— 1.25A	〃	—do.—		
11	40 10 00 LB 20 10 80	Fuse holder Block Type	ヒューズホルダー	BS,European, North European spec		
	40 10 00 LB 20 10 90	—do.— —do.—	〃			
12	40 10 00 LB 60 15 30	Connector 6 pin	コネクター6P			
13	40 10 00 LB 60 15 40	—do.— 9 pin	〃 9P			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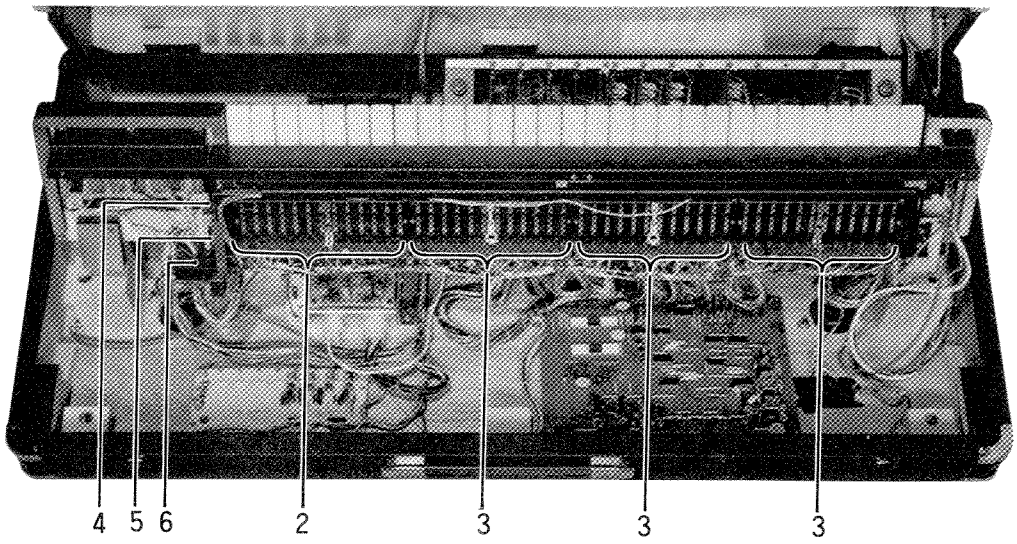
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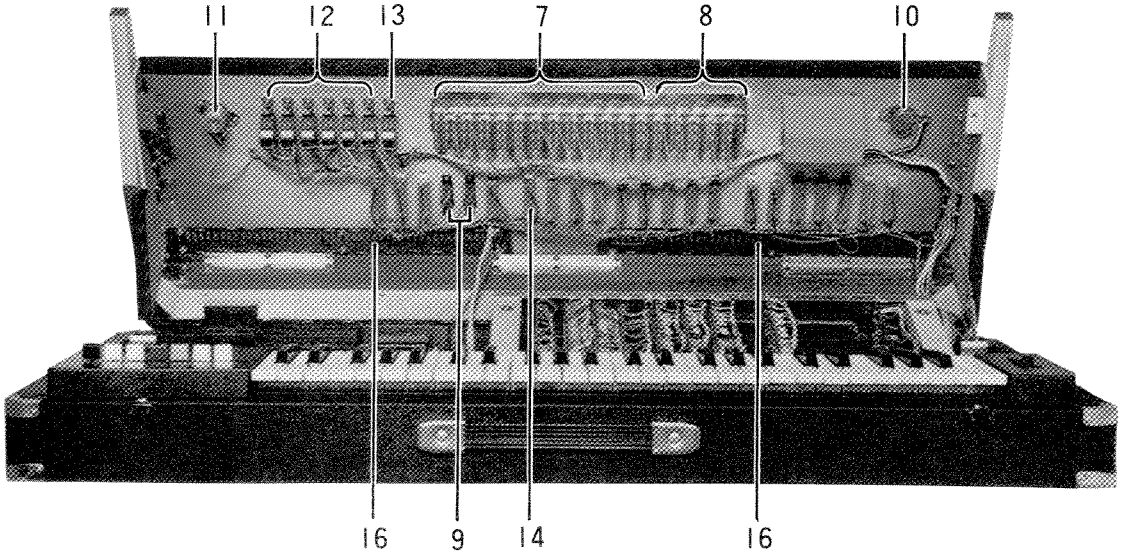
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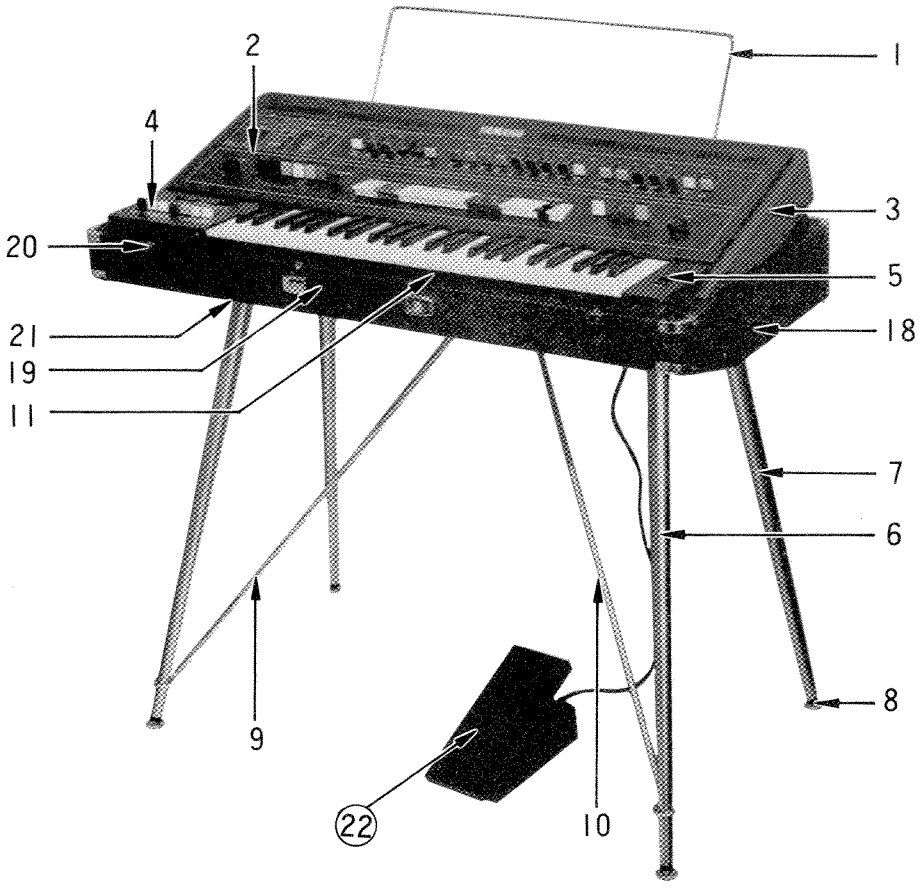
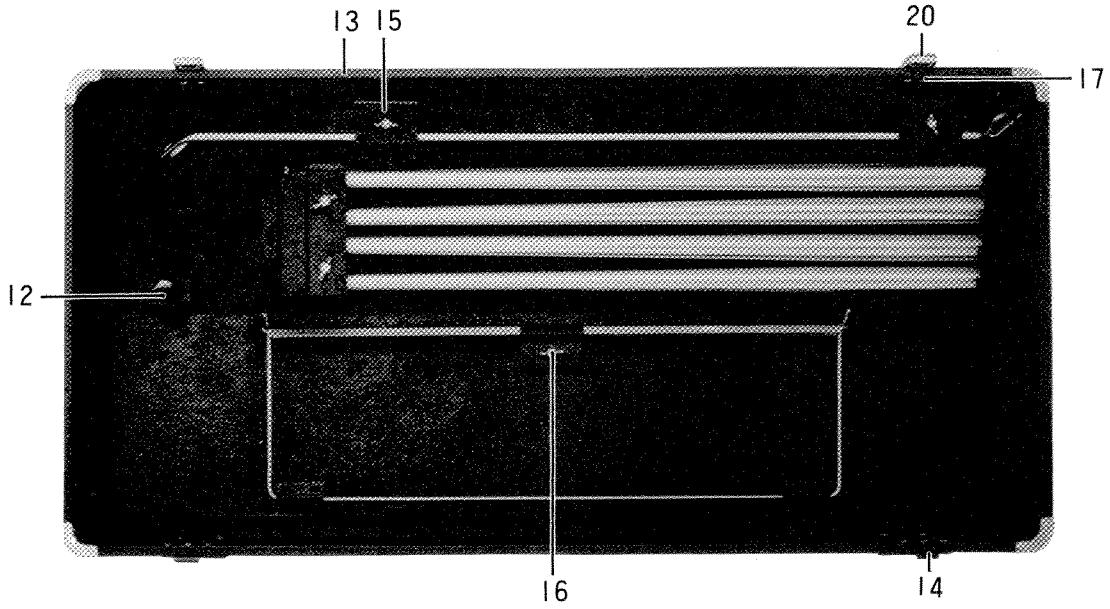
Ref. No.	Part No.	Description		Remarks	Common Models	
1	30 12 50 NB 04 51 50	Key board assembly	鍵　盤 A'ssy			
2	30 10 00 NB 04 51 60	Switch assembly IU #4085	スイッチA'ssy	13Keys		
3	30 10 00 NB 04 51 70	—do.— 2・3・4U #4086	〃	12Keys		
	30 10 00 CB 01 11 70	White Key C.F	白　　鍵			
	30 10 00 CB 01 11 80	—do.— D	〃			
	30 10 00 CB 01 11 90	—do.— E.B	〃			
	30 10 00 CB 01 12 00	—do.— G	〃			
	30 10 00 CB 01 12 10	—do.— A	〃			
	30 10 00 CB 01 12 20	—do.— C'	〃			
	30 10 00 CB 01 12 30	Black Key	黒　　鍵			
	30 10 00 AA 01 56 70	Key spring for White Key	キースプリング			
	30 10 00 AA 01 56 80	—do.— for Black Key	〃			
4	30 10 00 AA 03 24 40	Plate for Shatter	シャッター取付板			
5	30 10 00 BC 00 27 90	Shatter Plate	シャッター板			
6	30 10 00 NB 03 41 10	Touch Control pick-up assembly	T・Cピックアップ A'ssy			
	30 10 00 CB 01 86 40	Dust cover	ダストカバー			
	30 10 00 CB 02 86 00	Kno White	ツ マ ミ 白			
	30 10 00 CB 02 86 10	—do.— Black	〃　黒			
	30 10 00 CB 02 86 20	—do.— Red	〃　赤			
	30 10 00 CB 02 86 30	—do.— Green	〃　緑			
	30 10 00 CB 02 86 40	—do.— Yellow	〃　黄			
	30 10 00 CB 02 86 50	—do.— Gray	〃　灰			
	30 10 00 CB 02 86 60	—do.— Black	〃　黒	for Volume		
	30 10 00 CB 02 86 70	TVR Knob White	〃　白			
	30 10 00 CB 02 86 80	—do.— Black	〃　黒			
	30 10 00 CB 02 86 90	—do.— Red	〃　赤			
	30 10 00 CB 02 87 00	—do.— Green	〃　緑			
	30 10 00 CB 02 87 10	—do.— Gray	〃　灰			
	30 10 00 CB 03 01 20	Knob Black (out side)	〃 (外側)	for pitch		
	30 10 00 CB 03 01 30	—dn.— —do.— (inside)	〃 (内側)	—do.—		
7	40 10 00 KA 90 04 20	Push switch 14channel	プッシュ S W	for Tone Selector		
8	40 10 00 KA 90 04 30	—do.— 4 channel	〃	for Transposition		
9	40 10 00 KA 10 00 90	See saw switch	シーソー S W			
10	40 10 00 HR 20 00 20	Variable vesistor A-10KΩ	ボ リ ウ ム	for Volume		
11	40 10 00 HR 60 00 20	—do.— B-10KΩ +B-500Ω	〃	for Pitch		

Ref. No.	Part No.	Description		Remarks	Common Models	
12	40 10 00 HP 70 00 10	TVR B-10KΩ	T V R			
13	40 10 00 HP 70 00 20	—do.— B-10KΩ	〃	for Brilliance		
14	40 10 00 HQ 30 00 10	Slide variable resistor B-10KΩ	スライドVR			
	40 10 00 HQ 30 03 20	—do.— C-10KΩ	〃	for Sustain		
	30 10 00 AA 03 67 70	Back Pannel	バックパネル	General, South African models		
	30 10 00 AA 03 67 80	—do.—	〃	国内、UL,CSA,BS, Australian models		
	30 10 00 AA 03 70 20	—do.—	〃	North European, European models		
	40 10 00 LB 20 04 80	Holder for fuse	ヒューズホルダー	General,South African models		
	40 10 00 LB 20 05 90	—do.—	〃	North European, European models		
	30 10 00 CB 01 91 30	Knob EXTERNAL-LEVEL	ツマミ			
	40 10 00 HR 20 01 90	Variable resister —do.—	ボリューム			
	40 10 00 LB 20 02 50	Voltage Selector	電圧切替器			
	40 10 00 KA 40 00 00	Slide Switch High↔Low	スライドSW			
	40 10 00 LB 20 06 30	Phone jack Output	ヘッドフォンジャック			
	40 10 00 LB 40 01 00	—do.— Foot cantroller	〃			
15	40 10 00 KA 10 00 60	Power switch	パワーSW	国内		
	40 10 00 KA 10 00 70	—do.—	〃			
	40 10 00 KA 10 03 40	—do.—	〃	European,North European,BS models		
	40 10 00 JB 00 01 80	Neon lamp	ネオン管	European,North European,BSmodels		
	30 54 00 CB 00 16 60	Pilot lens, red	赤玉	—do.—		
	30 10 00 CB 00 77 70	Lamp holder	ランプホルダー	—do.—		
16	30 10 00 AA 04 01 70	Grille for radiator	放熱グリル			

4．Cabinet（外装部品）

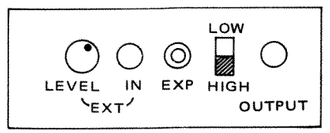


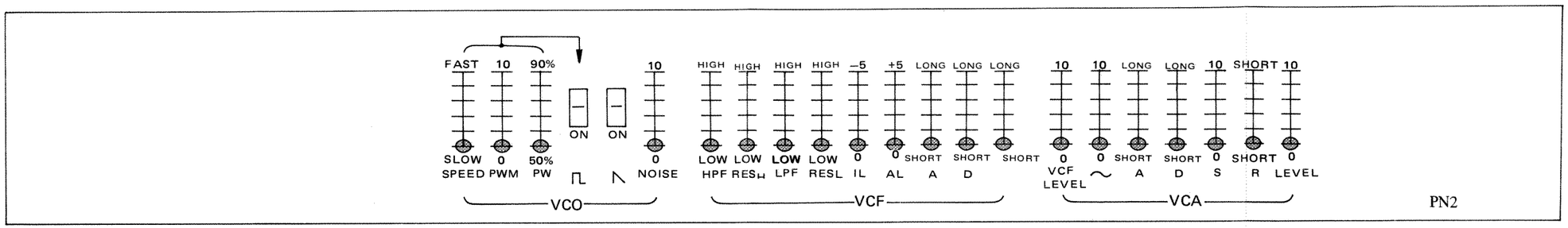


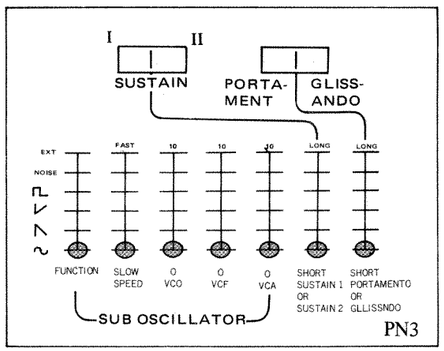
Ref. No.	Part No.	Description		Remarks	Common Models	
1	30 10 00 AA 03 69 70	Music rest	譜面台			
2	30 12 50 00 04 45 10	Control panel	コンパネ			
	30 13 00 AA 01 65 00	Stay for control panel	ステー			
3	30 12 50 00 05 55 00	Side panel	パネル側板			
	30 10 00 AA 03 68 40	Bush for music rest	譜面台ブッシュ			
4	30 12 50 00 04 55 10	End block Left	拍子木(左)			
5	DA 01 74 20	—do.— Right	〃 (右)			
	NK 00 27 30	—do.— —do.—	〃 (右)	North European, BS, European models		
6	30 10 00 NB 00 78 40	Leg Assembly Long	脚柱			
7	30 10 00 NB 04 53 40	—do.— Short	〃			
8	30 10 00 NB 00 78 50	Chair Grades	脚台			
9	30 10 00 AA 03 69 00	Stay Left	支柱(左)			
10	30 10 00 AA 03 69 10	—do.— Right	〃 (右)			
12	40 10 00 EK 00 32 10	Knob bolt for Stay sttopper	ノブボルト	6×30		
11	30 10 00 AA 03 67 40	Key board spacer	目金			
13	30 12 50 00 02 13 00	External cover	ケース蓋			
14	30 10 00 AA 96 09 00	Hinge Stopper	引掛け丁番			
15	40 10 00 EV 75 01 50	Wing bolt	蝶ネジ	M5×15		
16	40 10 00 EV 76 01 50	—do.—	〃	M6×15		
	40 10 00 CB 01 06 40	P Nut	Pナット			
	40 10 00 EA 03 01 00	Pan head screw	ナベ小ネジ	3×10 ZMCZ		
17	30 10 00 BB 00 18 90	Nut	特殊ナット			
18	30 12 50 00 04 07 00	Cabinet	本体ケース			
19	30 10 00 NB 80 29 00	Handle assembly	取手A'ssy			
20	30 10 00 AA 96 08 80	Lock	パッチン錠			
21	30 10 00 AA 01 39 20	Flange, leg	脚フランジ			
	40 10 00 EA 05 02 50	Pan head screw	ナベ小ネジ	5×25		
	40 10 00 EV 10 00 50	Hexagonal nut	六角ナット	5 ZMCZ-Y		
	40 10 00 EW 20 00 50	Flain washer	平座金	5		
	30 54 00 AA 80 18 50	Grille radiator	放熱グリル			
	30 10 00 AA 03 68 40	Bush Music rest	譜面台ブッシュ			
	30 12 50 00 04 07 10	Lid AC cord	コード収納蓋			

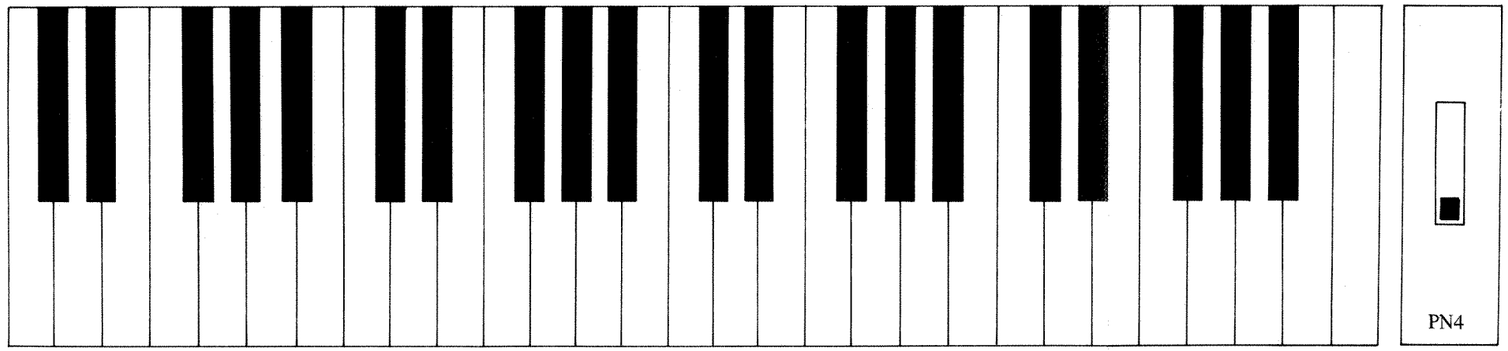
Ref. No.	Part No.	Description		Remarks	Common Model	
(22)	30 10 00 CB 01 02 60	Case	ケ　ー　ス			
	30 10 00 AA 01 37 70	Flame	フ レ ー ム			
	30 10 00 DB 03 00 40	Rubber for Stopper	すべり止ゴム			
	30 10 00 AA 01 38 00	Pedal	踏　　板			
	30 10 00 CB 00 36 80	Rubber Pedal mat	マ　ッ　ト			
	40 10 00 EV 10 00 40	Hexagonel nut 6S	六角ナット			
	40 10 00 EV 10 00 60	—do.— 4S	〃			
	30 10 00 AA 01 08 10	Shatter plate	シャッター板			
	40 10 00 CG 00 00 10		スリガラス			
	40 10 00 iK 00 00 30	Photocell, Cds	C　d　s			
	30 10 00 CB 00 76 30	Phntocell holder	Cds ホルダー			
	40 10 00 JB 00 01 70	Lamp, 24V 5W	ラ　ン　プ			
	30 10 00 CB 00 76 40	Lamp holder	ランプホルダー			
	30 10 00 CB 00 76 20	Cover for Lamp	ランプカバー			
	40 10 00 LB 20 01 20	Lamp socket	ブラケット			

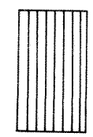
Assembly Layout (Top View)











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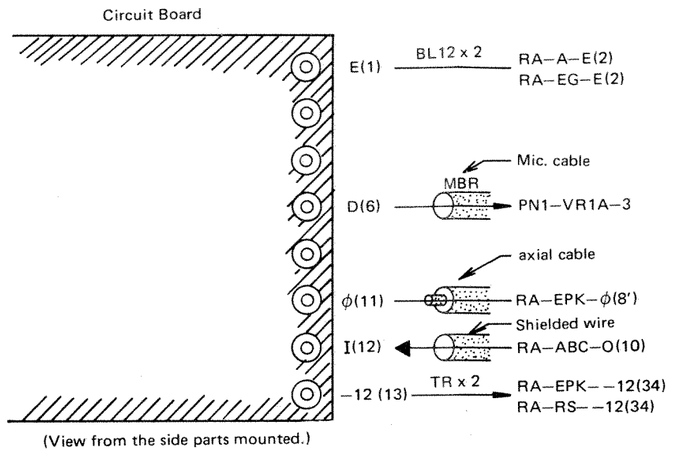
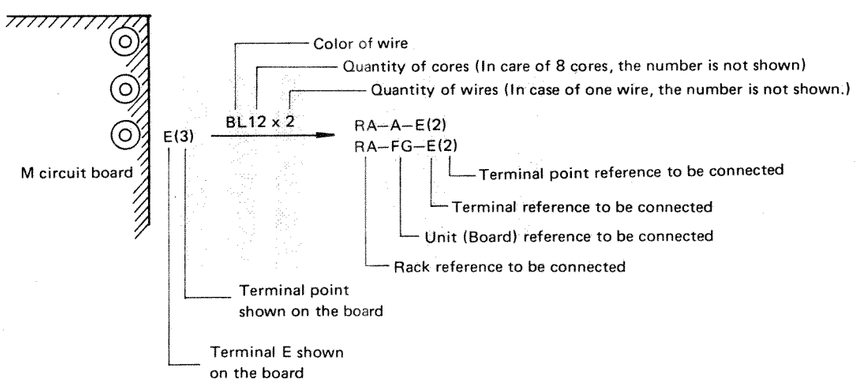
CIRCUIT BOARD AND WIRING



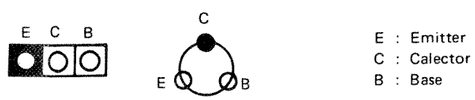
(View from the side parts mounted.)

The coding system is as follows.



Two (2) black wires go from "E" of M circuit board to each "E" terminal of A and FG boards.

NOTE; Transistor.



NOTE: ABBREVIATIONS OF WIRE COLOR IN ELECTONE

BL . . . . . .BLACK	BR . . . . . .BROWN	RE . . . . . .RED	OR . . . . . .ORANGE
YE . . . . . .YELLOW	GR . . . . . .GREEN	BE . . . . . .BLUE	VI . . . . . .VIOLET
GY . . . . . GRAY	WH . . . . . .WHITE	GG . . . . . .GRASS GREEN	SB . . . . . .SKY BLUE
PK . . . . . .PINK	TR . . . . . TRANSPARENT	TP.' . . . . . TIN PLATED WIRE	

← CORDING GUIDE

SPECIFICATIONS

KEYBOARD
- 49 keys

TONE SELECTORS

String 1	Harpsichord
String 2	Guitar 1
Brass 1	Guitar 2
Brass 2	Funky 1
Flute	Funky 2
Electric Piano	Funky 3
Clavichord	(Panel)

TONE CONTROLS
- VCO Section
  - ⋀ (Saw tooth wave)
  - ⊓ (Pulse wave)
  - PW (Pulse width)
  - PWM (Pulse width modulation)
  - SPEED
  - NOISE
- VCF Section
  - HPF (High pass filter)
  - LPF (Low pass filter)
  - RESH (Resonance, high)
  - RESL (Resonance, low)
  - IL (Initial level)
  - AL (Attach level)
  - A (Attack time)
  - D (Decay time)
- VCA Section
  - VCA Level
  - ～ (Sine wave)
  - A (Attack time)
  - D (Decay time)
  - S (Sustain level)
  - R (Release time)

EFFECT CONTROLS
- Ring Modulator
  - Modulation
  - Speed
  - Attack Time
  - Decay Time
  - Depth
- Touch Response
  - VCO
  - VCF
  - Brilliance
  - Level
- Sub Oscillator
  - Function (⋀ ,⋁ ,⊓, NOISE, EXTERNAL)
  - Speed
  - VCO
  - VCF
  - VCA
- Sustain 1
- Sustain 2
- Portamento
- Glissando
- Resonance
- Brilliance
- Pitch
- Transposition
  - Normal
  - 1 oct up
  - 1 oct down
  - 2 oct down

OTHER FITTINGS
- Head Phone Jack
- EXT, IN
- LEVEL CONTROL
- OUT PUT JACK
- (FOOT CONTROLER)

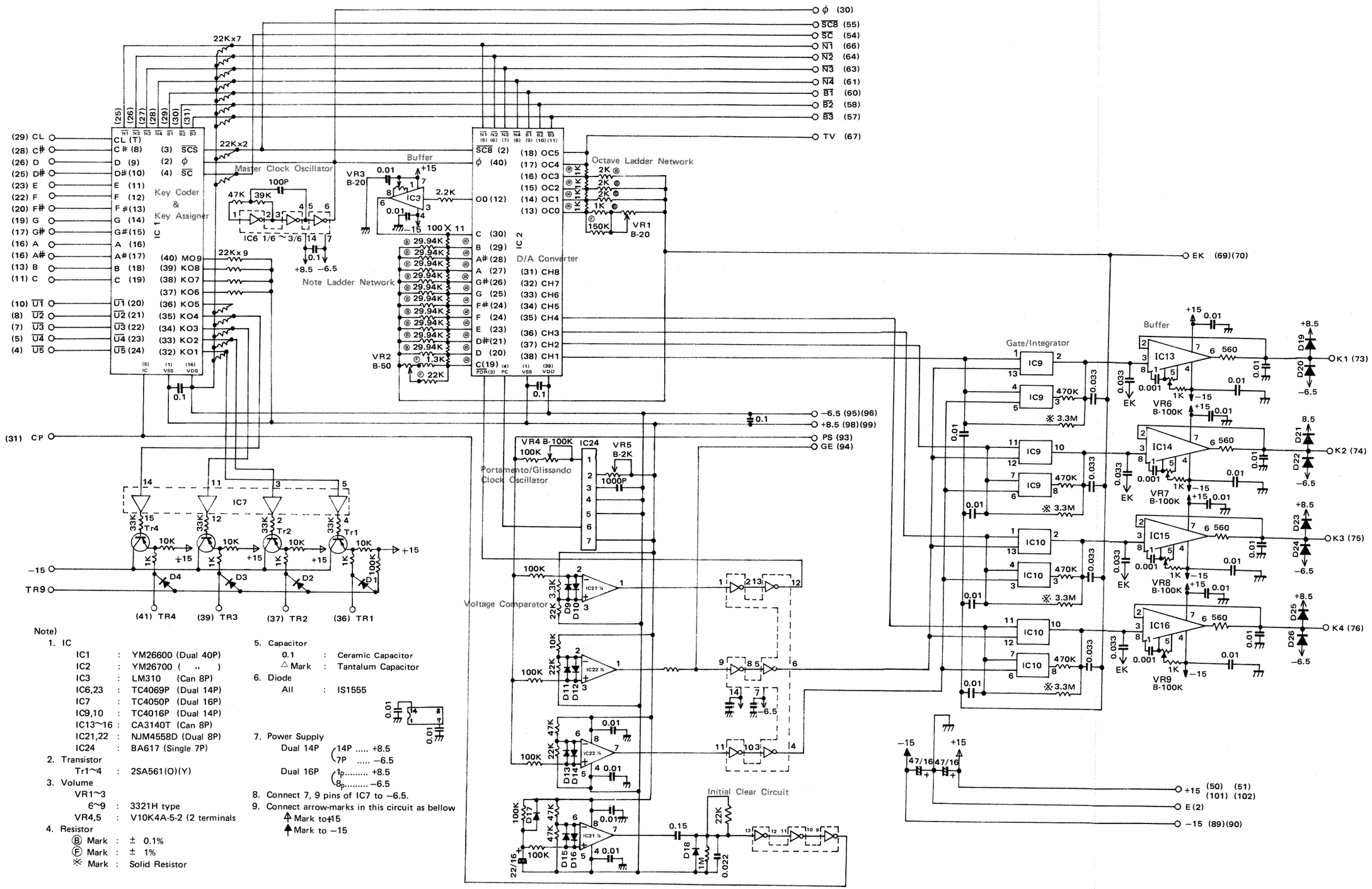
CIRCUITRY
- Power Consumption: 56W
- Power Source : 50/60 Hz, AC

DIMENTIONS
- Width : 98 cm (38-1/2")
- Depth : 49 cm (19")
- Height : 106 cm (41-1/2")

WEIGHT 35 kg (77 Lbs)

Specification subject to change without notice.

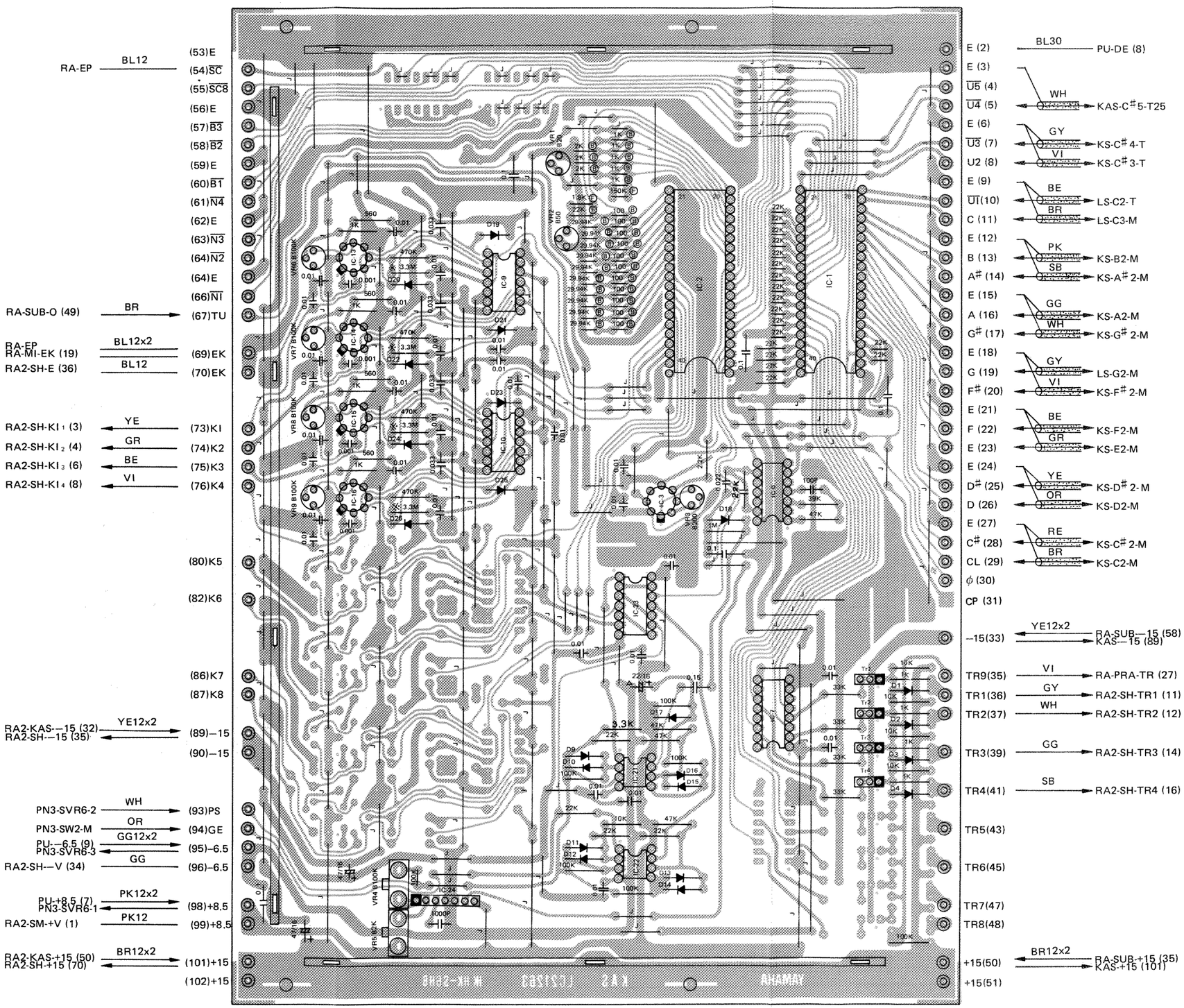
KAS (Key Assigner) Circuit



Note)

1. IC
   - IC1 : YM26600 (Dual 40P)
   - IC2 : YM26700 (〃)
   - IC3 : LM310 (Can 8P)
   - IC6,23 : TC4069P (Dual 14P)
   - IC7 : TC4050P (Dual 16P)
   - IC9,10 : TC4016P (Dual 14P)
   - IC13～16 : CA3140T (Can 8P)
   - IC21,22 : NJM4558D (Dual 8P)
   - IC24 : BA617 (Single 7P)
2. Transistor
   - Tr1～4 : 2SA561(O)(Y)
3. Volume
   - VR1～3 6～9 : 3321H type
   - VR4,5 : V10K4A-5-2 (2 terminals
4. Resistor
   - Ⓑ Mark : ± 0.1%
   - Ⓕ Mark : ± 1%
   - ※ Mark : Solid Resistor
5. Capacitor
   - 0.1 : Ceramic Capacitor
   - △ Mark : Tantalum Capacitor
6. Diode
   - All : IS1555
7. Power Supply
   - Dual 14P (14P ..... +8.5, 7P ..... −6.5)
   - Dual 16P (1p..... +8.5, 8p..... −6.5)
8. Connect 7, 9 pins of IC7 to −6.5.
9. Connect arrow-marks in this circuit as bellow
   - Mark to +15
   - Mark to −15

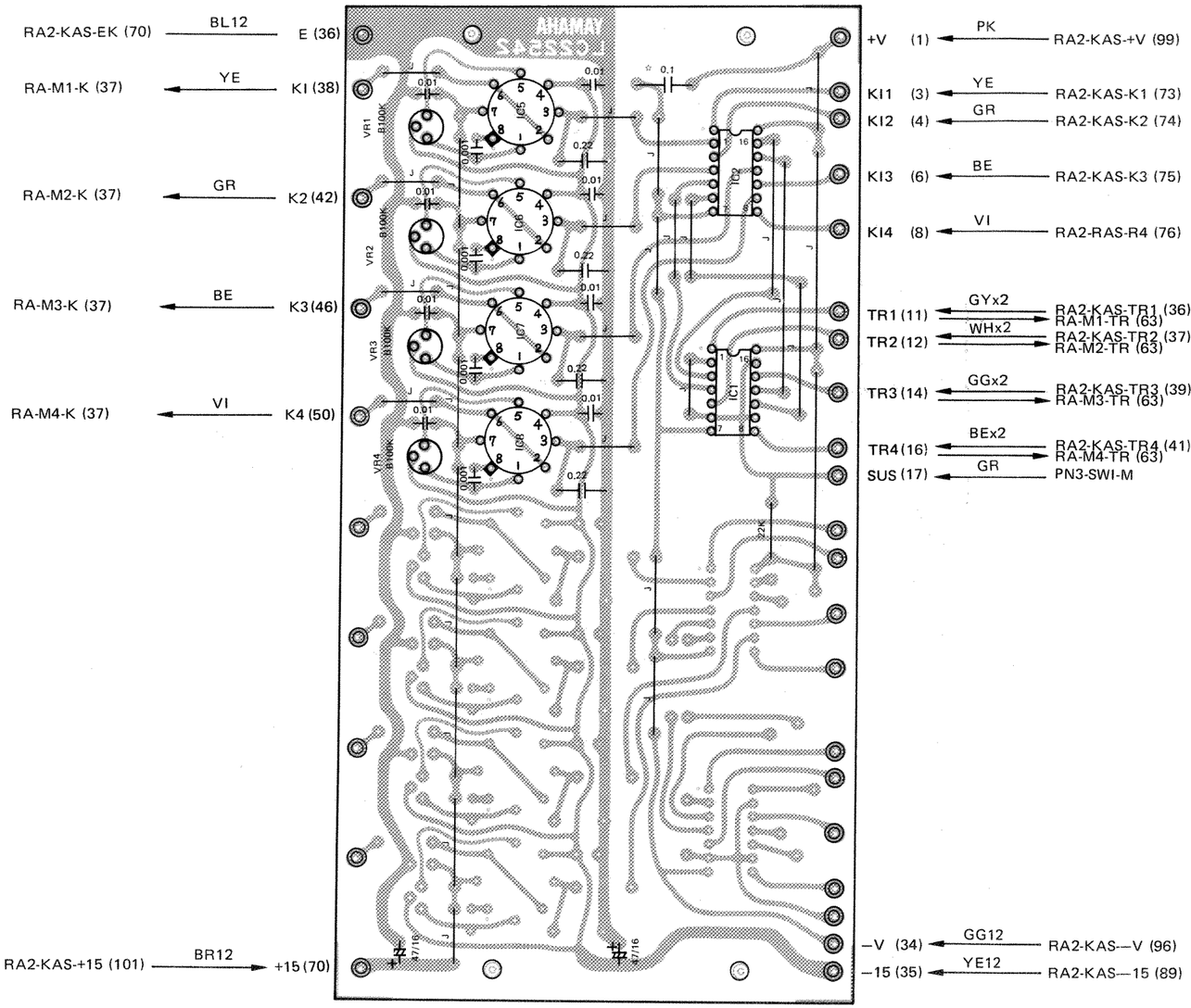
KAS Circuit Board



Note)

1. IC1 : YM26600 (Dual 40P)
   IC2 : YM26700 (,,)
   IC3 : LM310 (Can 8P)
   IC7 : TC4050P (Dual 16P)
   IC6,23: IC4069P (Dual 14P)
   IC9,10 : TC4016P (,,)
   IC13～16 : CA3140T (Can 8P)
   IC21,22 : NJM4558D (Dual 8P)
   IC24 : BA617 (Single 7P)
2. Transistor
   Tr1～4 : 2SA561 (O)(Y)
3. Volume
   VR1～3, 6～9 : 3321M type
   VR4, 5 : V10K4A-5-2 (2 terminals)
4. Resistor
   Ⓑ : ± 0.1%
   Ⓕ : ± 1%
   ※ : Solid Resistor
5. Capacitor
   △ marked : Tantalum Capacitor
   0.1 : Ceramic Capacitor
6. Diode
   All D : 1S1555
7. Camber-stop Hardware
   AA03991
8. Camber-stop Hardware
   AA03992

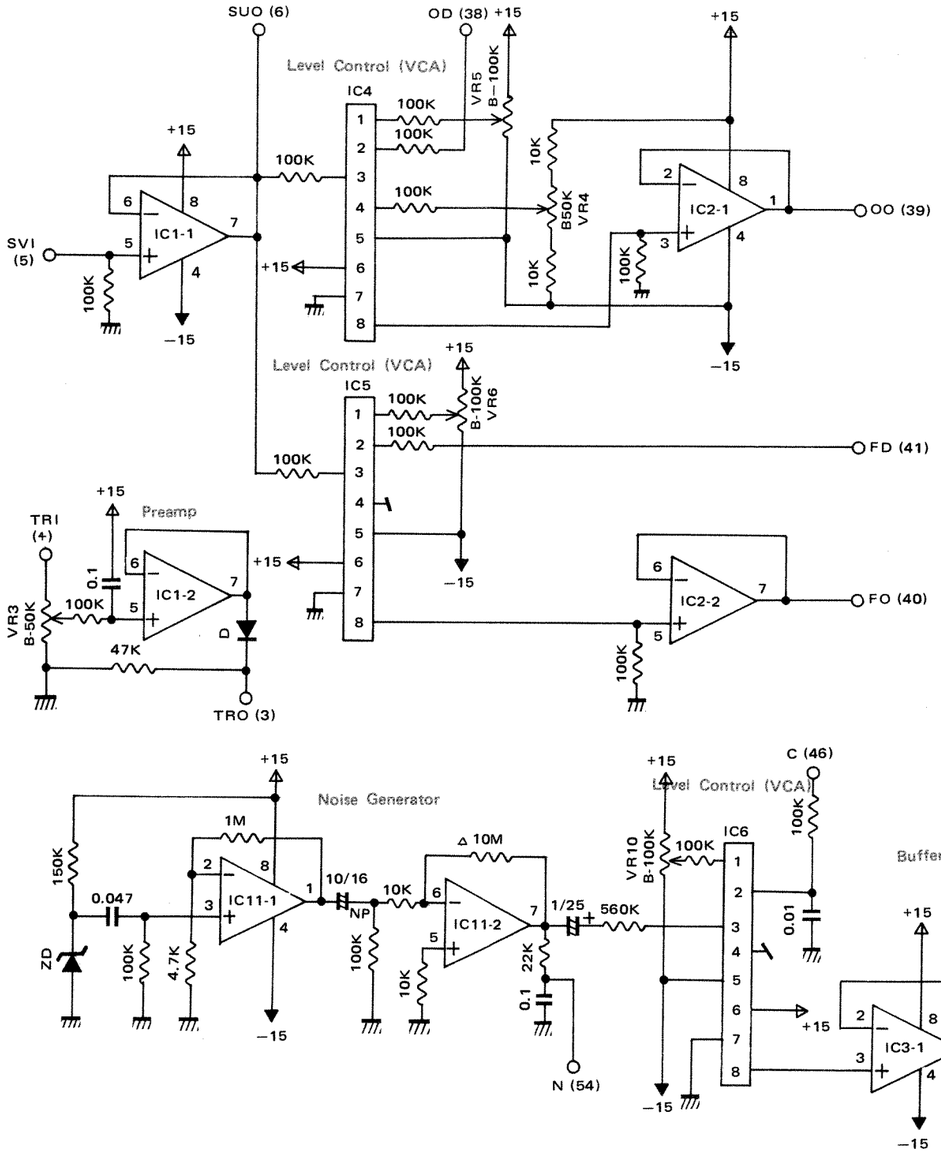
SH Circuit Board

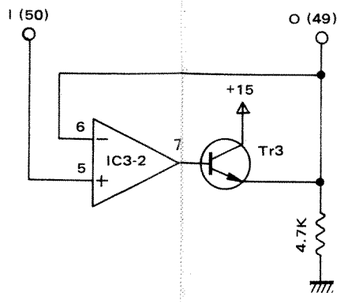


Note)

1. Capacitor
   ☆ Mark : Ceramic Capacitor
   Others : Mylar Capacitor
2. Volume
   3321H
3. IC
   IC1 : TC4011P
   IC2 : TC4016P
   IC5～8 : CA3140T
4. Print Board
   # 2259 2

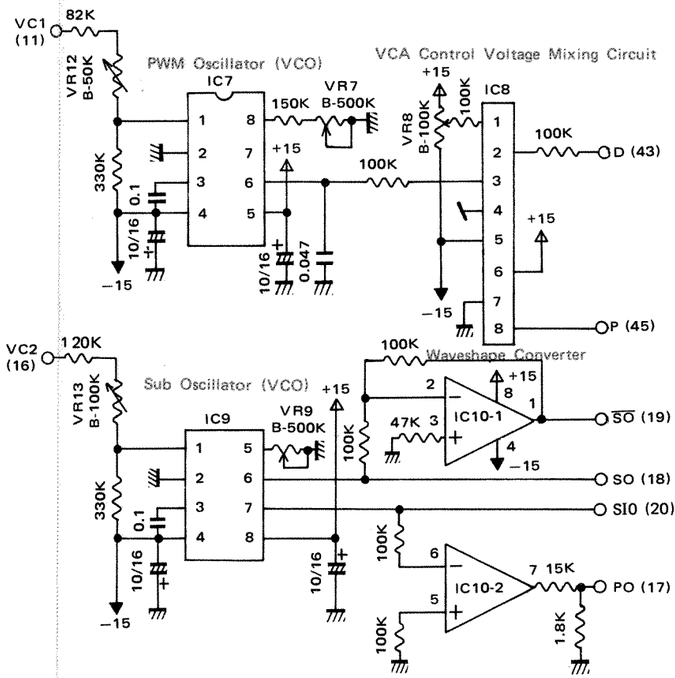
SUB (Sub Oscillator) Circuit

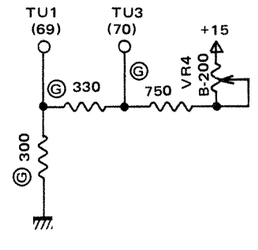


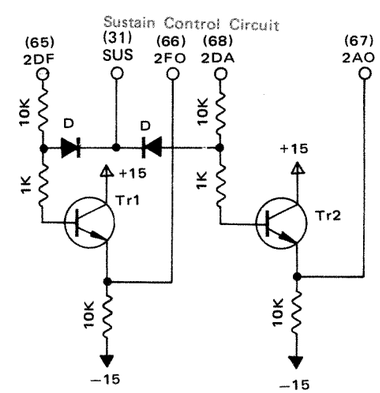


Note)

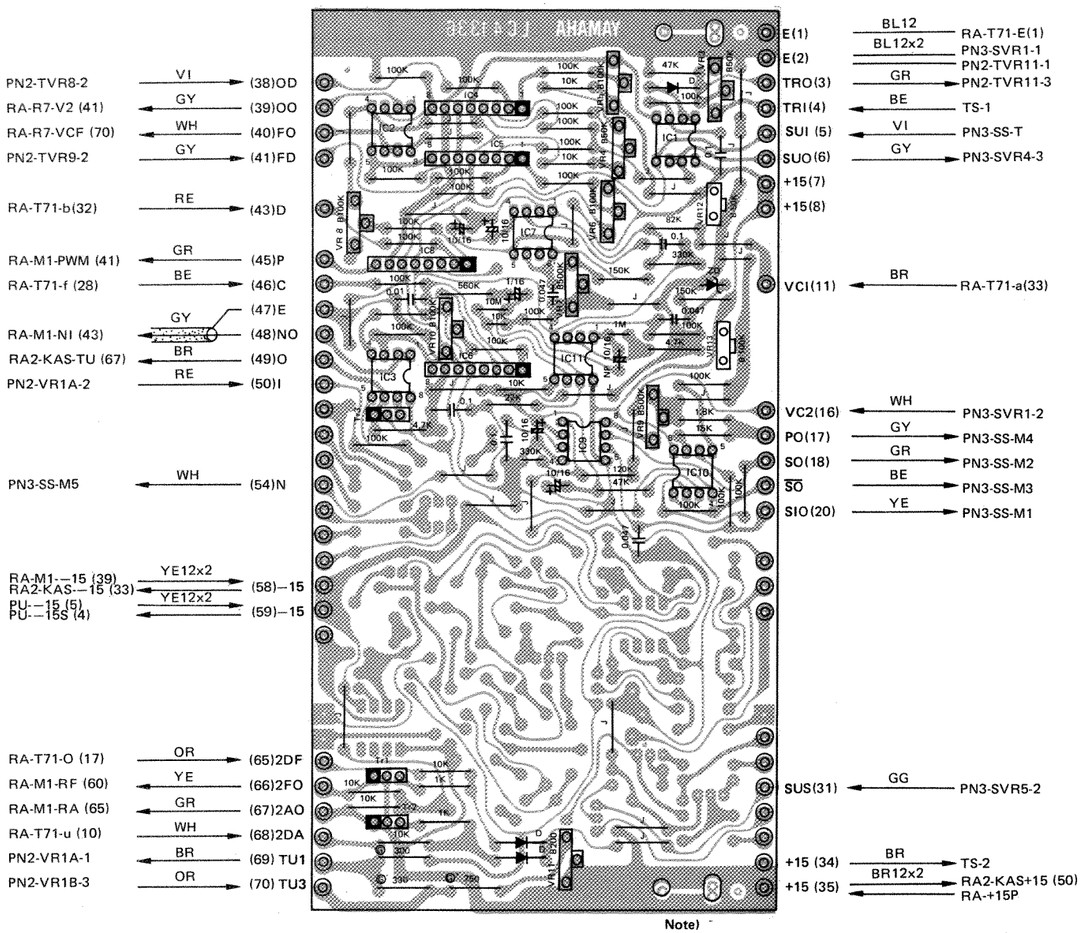
1. Diode
   - D : IS1555
   - ZD : IS1715P
2. All VR : V-10K
3. Resistor
   - △ Mark : Solid Resistor
   - Nothing Mark : (¼W) Horizontal-type carbon
   - Ⓖ Mark: 2% Resistor
4. Transistor
   - Tr1, 2, 3 : 2SC458(C) or (D)
5. IC
   - IC1,2,3,10,11: NJM4558 (JRC) pair
   - IC4,5,6,8 : IG00151(A)(B)
   - IC7,9 : IG00150







SUB Circuit Board

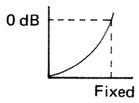


Note)

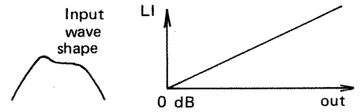
1. Print Board : LC41336
2. Transistor
   Tr1,2,3 : 2SC458(C) or (D)
3. IC1,2,3,10,11 : NJM4558
   IC4,5,6,8 : IG00151(A)(B)
   IC7,9 : IG00150
4. Diode : IS1555
   ZD : IS1715
5. △ Mark : Slid Resistor
   Ⓢ Mark : 2% Resistor
6. All Volume : V-10K

VCOII IC (IG00151)

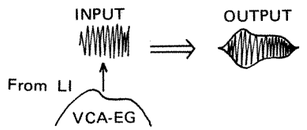
1. EI ..... Input voltage for level control.
   Input of the control voltage is provided for changing the level expotenentially.



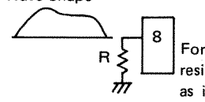
2. LI ..... Input of level control voltage.
   Input of the control voltage is provided for linear change of the level.



3. +IN ..... Input
   Input of the level modulated signal is provided.



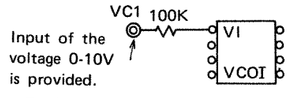
4. −IN ..... Negative feed back.
   Normally unused.
5. Vee ..... −15V input power source.
6. Vcc ..... +15V input power source.
7. GND ..... Earth
8. OUT ..... Output
   Output of the following wave shape is produced.



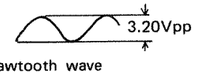
For checking, connect the resistor of 10K~30K ohm as illustrated.

VCO I IC (IG00150)

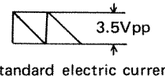
1. VI ..... Input of the control voltage.
   The frequency is variable in accordance with the voltage supplied.



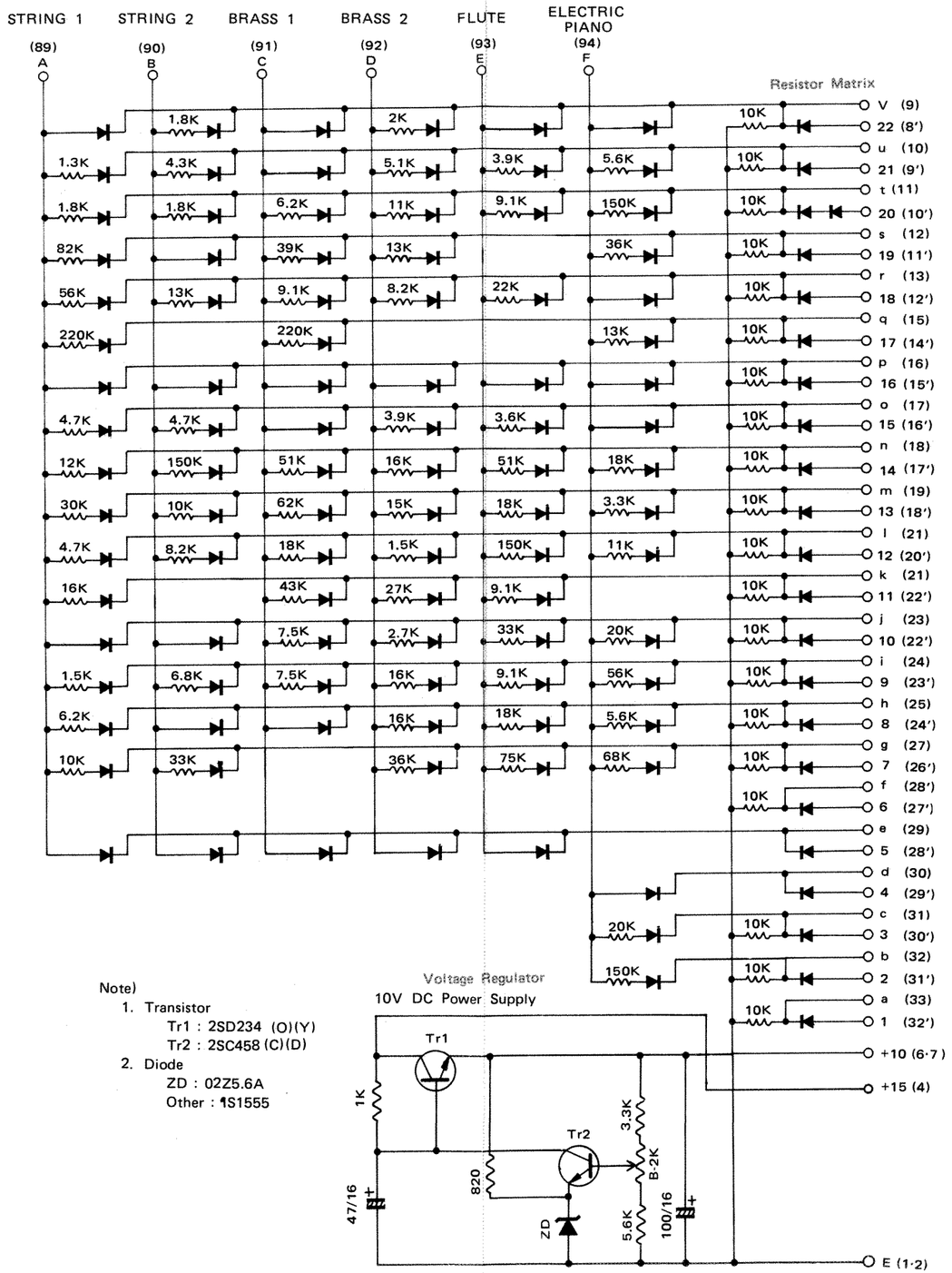
2. GND ..... Earth
3. C ..... Capacitor for determination of the frequency.
4. Vee ..... −15V input power source.
5. Vcc ..... +15V input power source.
6. SIO ..... Output of sine wave.



7. SO ..... Output of sawtooth wave



8. Iadj ..... Setting for standard electric current.
   The standard electric current is set so as to be the output 200Hz when VC1 is 10V and VC2 is zero volt.



Note)

1. Transistor
   Tr1 : 2SD234 (O)(Y)
   Tr2 : 2SC458 (C)(D)
2. Diode
   ZD : 02Z5.6A
   Other : 1S1555

Voltage Regulator
10V DC Power Supply

T71 (Tone Preset 1) Circuit

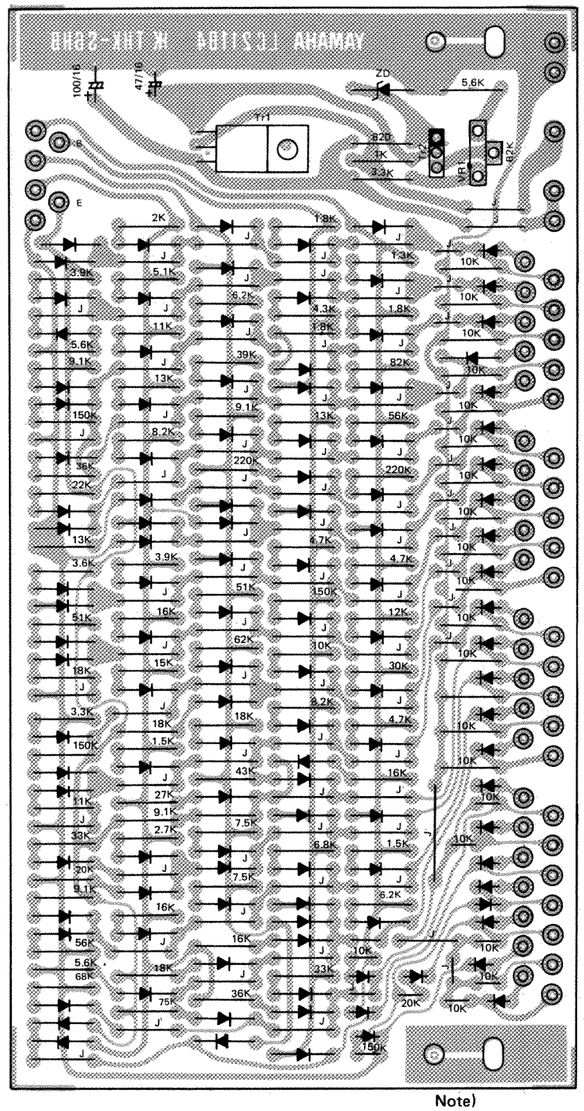
(Unit: V)

Input \ Output	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
String 1	0	0	0	0	10	0	5.00	6.17	8.70	10	3.85	6.80	2.50	4.55	6.80	10	0.45	1.52	1.09	8.47	8.85	10
String 2	0	0	0	0	10	0	2.33	10	5.95	10	0	5.49	5.00	0.63	6.80	10	0	4.35	10	8.47	6.99	8.47
Brass 1	0	0	0	0	10	0	0	10	5.71	5.71	1.89	3.57	1.39	1.64	10	10	0.43	5.24	2.04	6.17	10	10
Brass 2	0	0	0	0	10	0	2.17	3.85	3.85	7.87	2.70	8.70	4.00	3.85	7.19	10	0	5.49	4.35	4.76	6.62	8.33
Flute	0	0	0	0	10	0	1.18	3.57	5.24	2.33	5.24	0.63	3.57	1.64	7.35	10	0	3.13	0	5.24	7.19	10
Electric Piano	0	0.63	3.33	10	0	0	1.28	6.41	1.52	3.33	0	4.76	7.52	3.57	10	10	4.35	10	2.17	0.63	6.41	10

T71 Circuit Board

PN2-TS5-M —RE→ (39')B
PN2-TS5-M —GR→ (41')E

PN2-TS2-T —BR→ (39)A
PN2-TS3-M —OR→ (40)C
PN2-TS4-M —YE→ (41)D
PN2-TS6-M —BE→ (42)F



E (1) —BL12x2→ RA-EP, RA-SUB-E (1)
E (2) —BL12→ TS-4
+15 (4) —BR12→ RA-+15P
+10 (6) —OR12x2→ PN2-TVR2-1, PN3-SVR5-1
+10 (7)

v (9) —GG→ RA -T72-v (9)
u (10) —WHx2→ RA-T72-u (10), RA-SUB-2DA (68)
t (11) —GY→ PA-T72-t (12)
s (12) —VI→ RA-T72-s (13)
r (13) —BE→ RA-T72-r (14)

q (15) —GR→ RA-T72-q (15)
p (16) —YE→ RA-T72-P (16)
o (17) —ORx2→ RA-T72-o (17), RA-SUB-2DF (65)
n (18) —RE→ RA-T72-n (19)
m (19) —BR→ RA-T72-m (20)

l (21) —PK→ RA-T72-l (21)
K (22) —SB→ RA-T72-k (22)
J (23) —GG→ RA-T72-j (23)
i (24) —WH→ RA-T72-i (24)
h (25) —GY→ RA-T72-h (26)

g (27) —VI→ RA-T72-g (27)
f (28) —BEx2→ RA-T72-f (28), RA-SUB-C (46)
e (29) —GR→ RA-T72-e (29)
d (30) —YE→ RA-T72-d (30)
c (31) —OR→ RA-T72-c (31)
b (32) —REx2→ RA-T72-b (32), RA-SUB-D (43)
a (33) —BRx2→ RA-T72-a (33), RA-SUB-VCI (11)

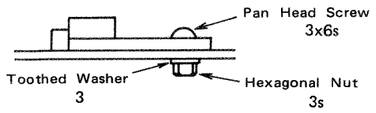
22 (8') —GG→ PN1-SVR20-2
21 (9') —WH→ PN1-SVR19-2
20 (10') —GY→ PN1-SVR18-2
19 (11') —VI→ PN1-SVR17-2
18 (12') —BE→ PN1-SVR16-2

17 (14') —GR→ PN1-SVR15-2
16 (15') —YE→ PN1-SVR14-2
15 (16') —OR→ PN1-SVR13-2
14 (17') —RE→ PN1-SVR12-2
13 (18') —BR→ PN1-SVR11-2

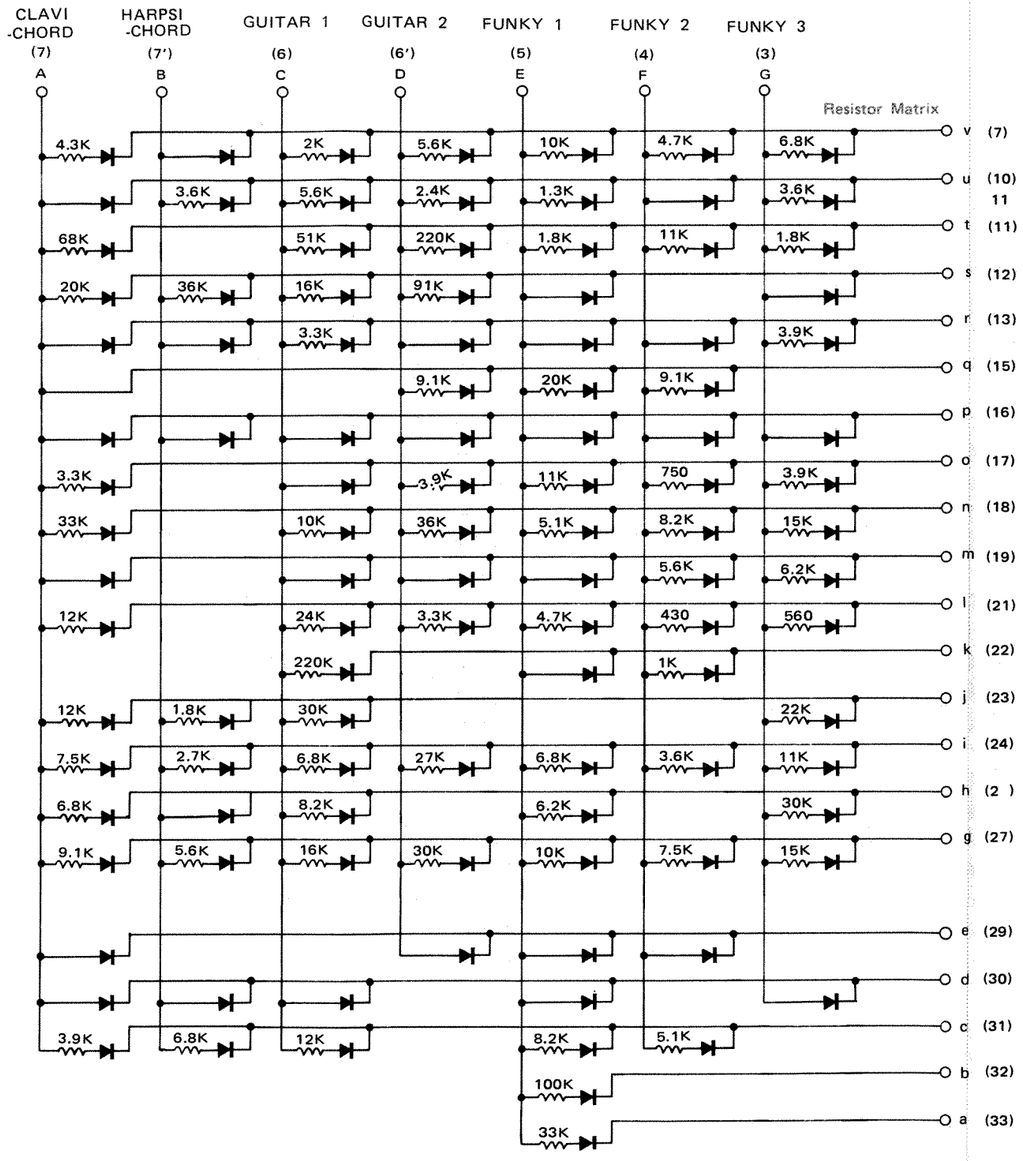
12 (20') —PK→ PN1-SVR10-2
11 (21') —SB→ PN1-SVR9-2
10 (22') —GG→ PN1-SVR8-2
9 (23') —RE→ RA-PRA-fLO (57)
8 (24') —GY→ PN1-SVR6-2

7 (26') —BR→ RA-PRA-fHO (59)
6 (27') —BE→ PN1-SVR4-2
5 (28') —GR→ PN1-SW2-T
4 (29') —YE→ PN1-SW1-T
3 (30') —OR→ PN1-SVR3-2
2 (31') —RE→ PN1-SVR2-2
1 (32') —BR→ PN1-SVR1-2

Note)
1. Print Board : LC21183
2. Transistors
   Tr1 : 2SD234 (O)(Y)
   Tr2 : 2SC458 (C)(O)
3. Diode
   ZD : 02Z5.6A
   Others : IS1555
4. Tr1 Install method



T72 (Tone Preset 2) Circuit



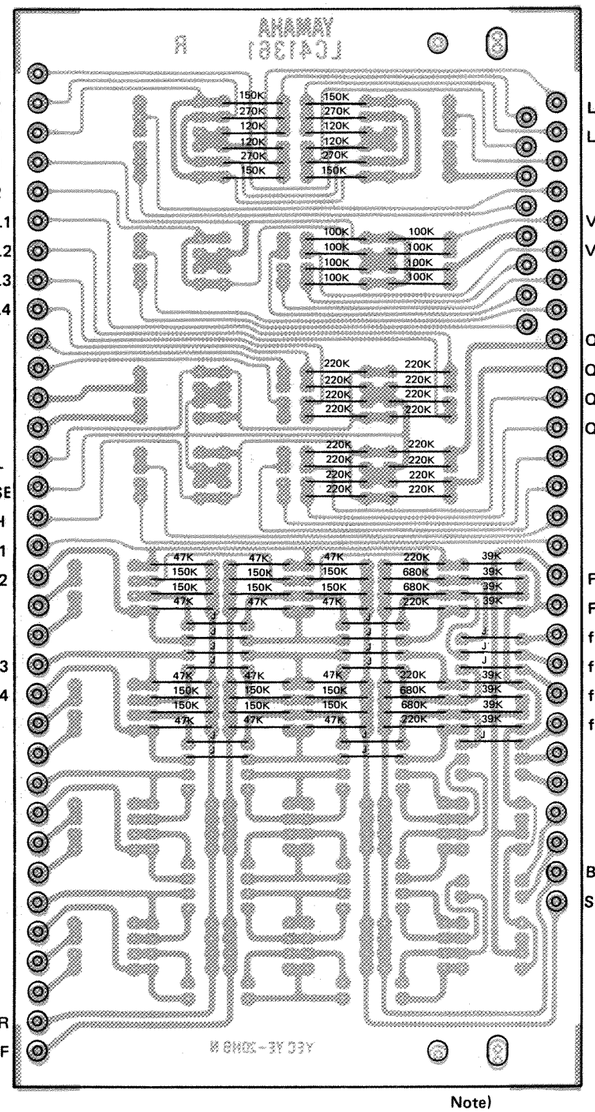
Note) Diode : 1S1555

(Unit: V)

Input \ Output	A	B	C	D	E	F	G
	v	u	t	s	r	q	p
Clavi -chord A	6.79	10	1.28	3.33	10	0	10
Harpsi -chord B	10	7.35	0	2.17	10	0	10
Guitar 1 C	8.33	6.41	1.64	3.85	7.52	0	10
Guitar 2 D	6.41	8.06	0.43	0.99	10	5.24	10
Funky 1 E	5.00	8.85	8.47	10	10	3.33	10
Funky 2 F	6.80	10	4.76	0	10	5.24	10
Funky 3 G	5.95	7.35	8.47	10	7.19	0	10

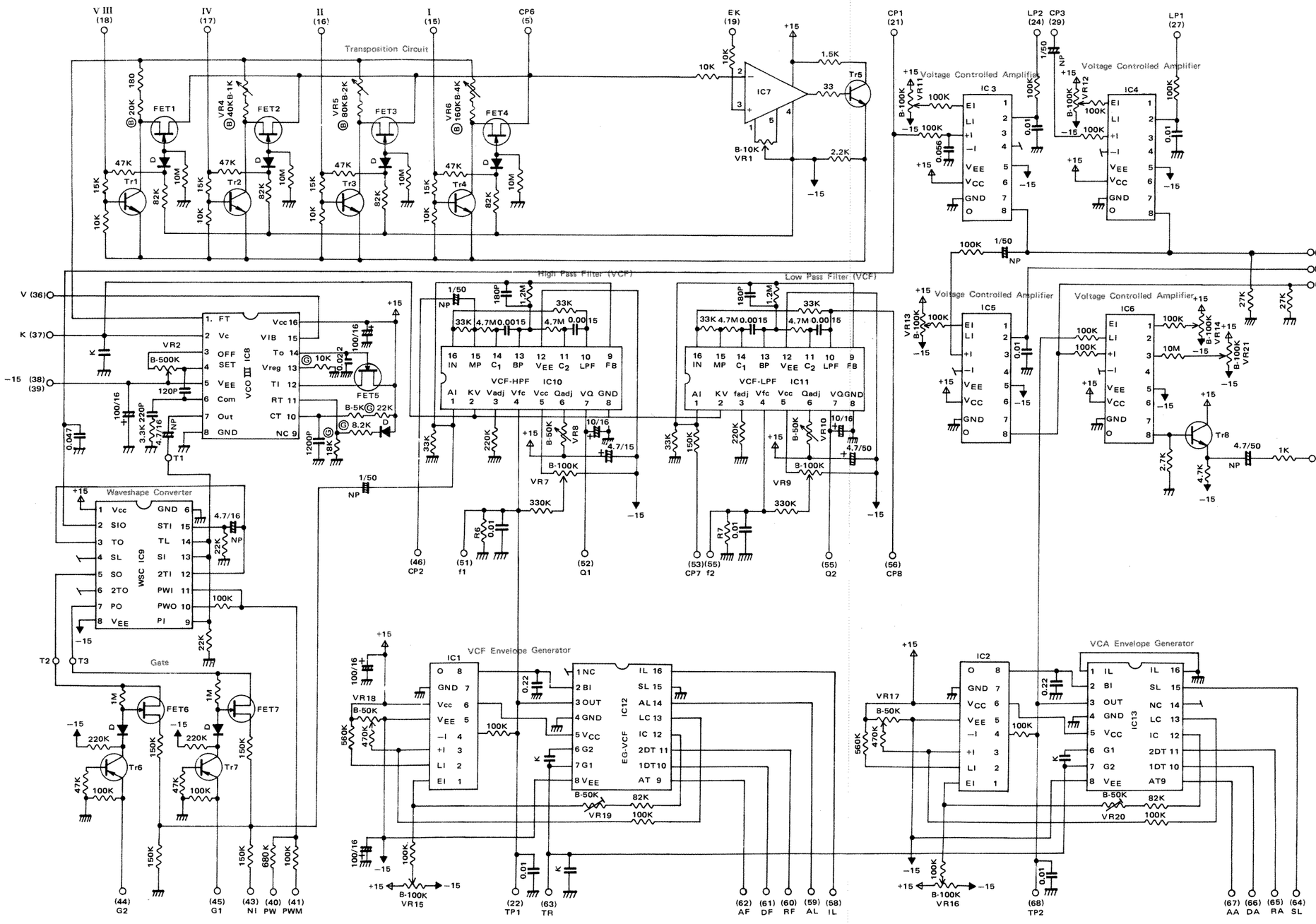
Input \ Output	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
Clavi -chord A	7.52	2.33	10	4.55	0	4.55	5.71	5.95	5.24	0	10	10	7.19	0	0
Harpsi -chord B	0	0	0	0	0	8.47	7.87	10	6.41	0	0	10	5.95	0	0
Guitar 1 C	10	5.00	10	2.94	0.43	2.50	5.95	5.49	3.85	0	0	10	4.55	0	0
Guitar 2 D	7.19	2.17	10	7.52	0	10	2.70	0	2.50	0	10	0	0	0	0
Funky 1 E	4.76	6.62	10	6.80	10	0	5.95	6.17	5.00	0	10	10	5.49	0.91	2.33
Funky 2 F	9.30	5.49	6.41	9.59	9.09	0	7.35	0	5.71	0	10	0	6.62	0	0
Funky 3 G	7.19	4.00	6.17	9.47	0	3.13	4.76	2.50	4.00	0	0	10	0	0	0

R7 Circuit Board



Note)
1. Print Board : LC41360
2. Transistor

M (Master) Circuit



	CS-80	CS-60,50
R1	Ⓑ 10K	Ⓑ 20K
R2	Ⓑ 20K	Ⓑ 40K
R3	Ⓑ 40K	Ⓑ 80K
R4	Ⓑ 80K	Ⓑ 160K
R5	100	180
VR4	B-500	B-1K
VR5	B-1K	B-2K
VR6	B-2K	B-5K

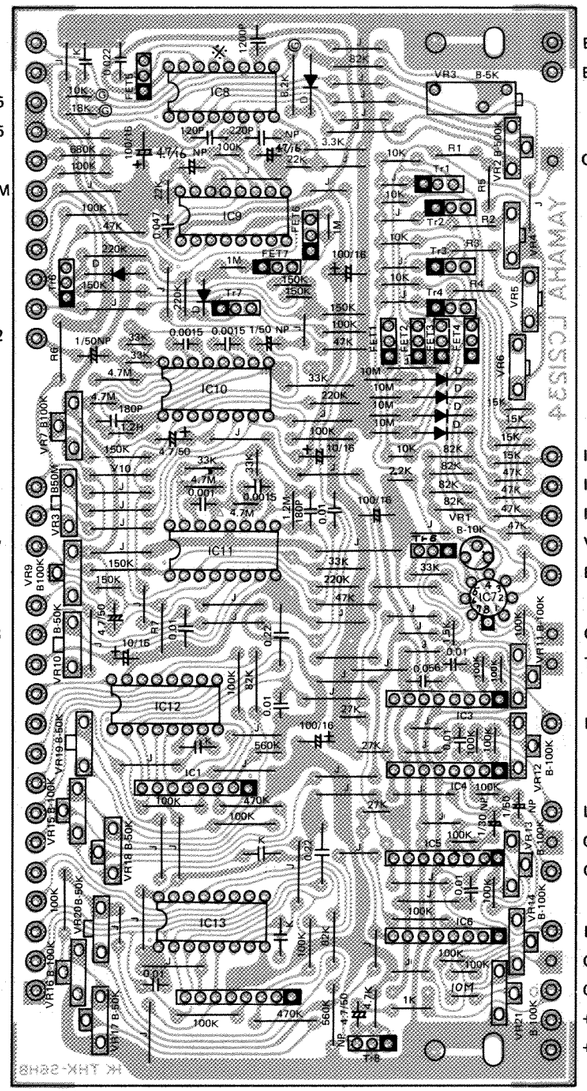
Note)

1. Tr1～Tr5,Tr8 : 2SC458(C) or (D)
   Tr6, Tr7 : 2SA561(Y) or (O)
   FET1～7 : 2SK30(Y)
2. D : IS1555
3. VR1 : 3321H type
   VR3 : 3006 type
   Other VR : V10K8-1-2 (3 terminals)
   : V10K4A-5-2 (2 terminals)
4. Ⓖ Mark : Metal Film Resistor (1%)
   Ⓑ Mark : ,, (0.1%)
5. K Mark : Ceramic Capacitor (1000P)
6. IC
   IC views show the pin disposition looked from upper. (Opposite to Pattern)
7. Surround the parts of [----] with the pattern of 3 terminal.
8. IC
   IC1～6: IG00151(A)(B)
   IC7 : TA7504M
   IC8 : IG00153
   IC9 : IG00158
   IC10,11: IG00156(A)(B)(C)
   IC12 : IG00152(A)(B)(C)(D)
   IC13 : IG00159(A)(B)(C)(D)
9. ※Mark : Styrol Capacitor 1200P

Constant value of R6, R7 in IC10,11 according to rank

	CS80	CS50,60	
A	2.7K	2.7K	R6
B	2.2K	2.2K	
C	1.8K	1.8K	
A	3.3K	3.0K	R7
B	2.7K	2.4K	
C	2.2K	2.0K	

M1, M2 Circuit Board



Note)

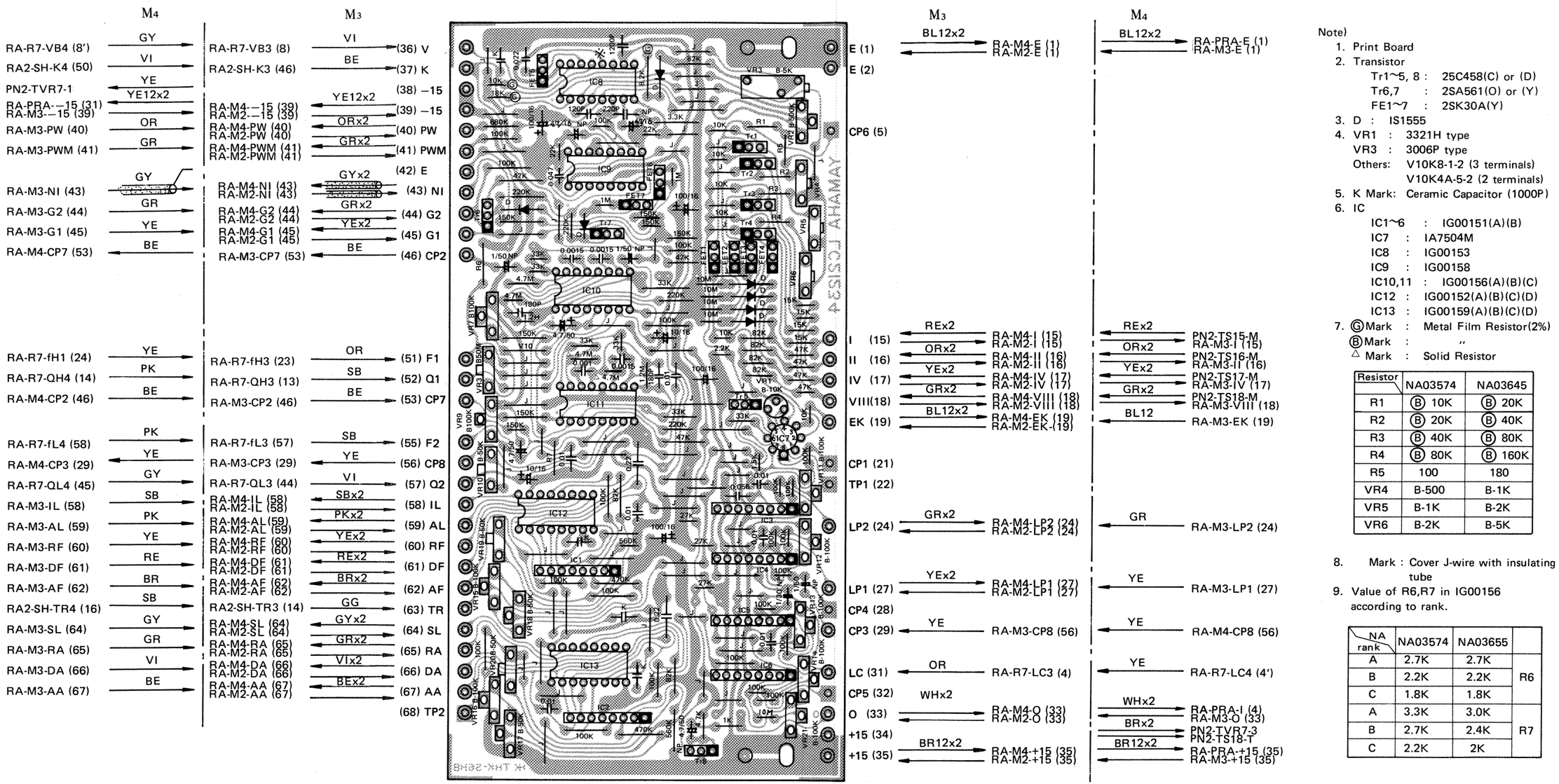
1. Print Board
2. Transistor
   - Tr1～5, 8 : 25C458(C) or (D)
   - Tr6,7 : 2SA561(O) or (Y)
   - FE1～7 : 2SK30A(Y)
3. D : IS1555
4. VR1 : 3321H type
   VR3 : 3006P type
   Others: V10K8-1-2 (3 terminals)
   V10K4A-5-2 (2 terminals)
5. K Mark: Ceramic Capacitor (1000P)
6. IC
   - IC1～6 : IG00151(A)(B)
   - IC7 : IA7504M
   - IC8 : IG00153
   - IC9 : IG00158
   - IC10,11 : IG00156(A)(B)(C)
   - IC12 : IG00152(A)(B)(C)(D)
   - IC13 : IG00159(A)(B)(C)(D)
7. Ⓖ Mark : Metal Film Resistor (2%)
   Ⓑ Mark : 〃 (0.1%)
   △ Mark : Solid Resistor

Resistor / NA	NA03574	NA03645
R1	Ⓑ 10K	Ⓑ 20K
R2	Ⓑ 20K	Ⓑ 40K
R3	Ⓑ 40K	Ⓑ 80K
R4	Ⓑ 80K	Ⓑ 160K
R5	100	180
VR4	B-500	B-1K
VR5	B-1K	B-2K
VR6	B-2K	B-5K

8. Mark : Cover J-wire with insulating tube
9. Value of R6, R7 in IG00156 according to rank.

NA / rank	NA03574	NA03645	
A	2.7K	2.7K	R6
B	2.2K	2.2K	
C	1.8K	1.8K	
A	3.3K	3.0K	R7
B	2.7K	2.4K	
C	2.2K	2K	

M3, M4 Circuit Board



Note)

1. Print Board
2. Transistor
   Tr1～5, 8 : 25C458(C) or (D)
   Tr6,7 : 2SA561(O) or (Y)
   FE1～7 : 2SK30A(Y)
3. D : IS1555
4. VR1 : 3321H type
   VR3 : 3006P type
   Others: V10K8-1-2 (3 terminals)
   V10K4A-5-2 (2 terminals)
5. K Mark: Ceramic Capacitor (1000P)
6. IC
   IC1～6 : IG00151(A)(B)
   IC7 : IA7504M
   IC8 : IG00153
   IC9 : IG00158
   IC10,11 : IG00156(A)(B)(C)
   IC12 : IG00152(A)(B)(C)(D)
   IC13 : IG00159(A)(B)(C)(D)
7. Ⓒ Mark : Metal Film Resistor(2%)
   Ⓑ Mark : ,,
   △ Mark : Solid Resistor

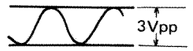
Resistor	NA03574	NA03645
R1	Ⓑ 10K	Ⓑ 20K
R2	Ⓑ 20K	Ⓑ 40K
R3	Ⓑ 40K	Ⓑ 80K
R4	Ⓑ 80K	Ⓑ 160K
R5	100	180
VR4	B-500	B-1K
VR5	B-1K	B-2K
VR6	B-2K	B-5K

8. Mark : Cover J-wire with insulating tube
9. Value of R6,R7 in IG00156 according to rank.

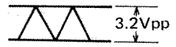
NA / rank	NA03574	NA03655	
A	2.7K	2.7K	R6
B	2.2K	2.2K	
C	1.8K	1.8K	
A	3.3K	3.0K	R7
B	2.7K	2.4K	
C	2.2K	2K	

WSC IC (IG00158)

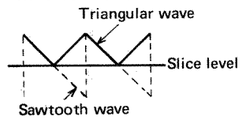
1. 1. Vcc ..... +15V input power source
   2. SIO ..... Output of the sine wave



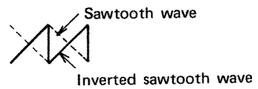
   3. TO ..... Output of triangular wave.



   4. SL ..... Input of slice level.
   Input of the DC voltage is provided to the pin for determination of the inverting level which makes triangular wave from sawtooth wave.



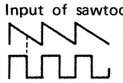
   5. $\overline{SO}$ ..... Output of the inverter wave
   Output of inverted sawtooth wave is produced.



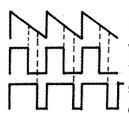
   6. 2TO ..... Output of double triangle wave
   Double triangle wave is produced from triangle wave.

   7. PO ..... Output of pulse wave.

   8. Vee ..... −15V input power source.
   9. PI ..... Input of pulse wave
   Input of sawtooth wave is provided.



   10. PWO ..... Output of OP amplifier.
   11. PWI ..... Input of OP amplifier.



   Input of the voltage is provided for determination of the sensitivity of PWM lever so that the pulse width is changed.

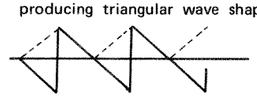
   12. 2TI ..... Input of triangular wave for producing double triangular wave shape.

   Input of triangular wave (TO) is provided for making double triangular wave shape.

   13. $\overline{SI}$ ..... Input of the pulse for producing inverted sawtooth wave.

   Input of the sawtooth wave is provided from VCO III for producing inverted sawtooth wave shape.

   14. TI ..... Input of the wave is provided for producing triangular wave shape.



   15. STI ..... Input of the wave for producing sine wave.

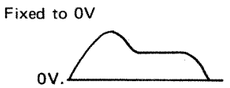
   Input of the triangular wave (TO) is provided for producing sine wave.

   16. GND ..... Earth

VCA-EG IC (IG00159)

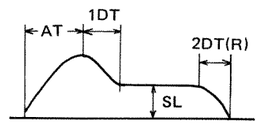
This IC generates envelope wave shape which is supplied to VCA and control the tone volume.

1. IL ..... Input of initial level.

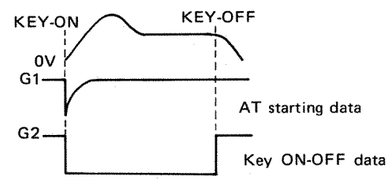


2. BI ..... Input of buffer amplifier.
3. OUT .... The buffer amplifier is built in for the purpose of matching inpedance.

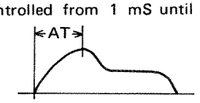
Output wave shape.



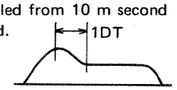
4. GND ..... Earth
5. Vcc ..... +15V input power source.
6. G1 ..... Gate 1
7. G2 ..... Gate 2



8. Vee ..... +15V input power source.
9. AT ..... Input of buffer voltage for determination of attack time.
   Input of the voltage between zero V and 10V is provided and the attack time is controlled from 1 mS until 1S.

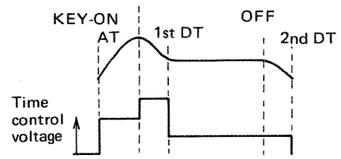


10. 1DT ..... Input of buffer voltage for determination of decay time.
    Input of the voltage between zero V and 10V is provided and the decay time is controlled from 10 m second until 10 second.



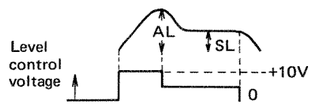
11. 2DT ..... Input of buffer voltage for determination of release time.
    Input of the voltage between zero V and 10V is provided and the time key-off until release is controlled from 10 mS until 10 S.

12. TC ..... Output of time control.
    Output of the DC voltage is produced so that the each time of Attack, 1st Decay and 2nd Decay are controlled.



    The higher the voltage, the shorter the time and the lower the voltage, the longer the voltage.

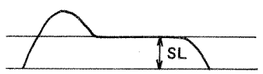
13. LC ..... Output of level control



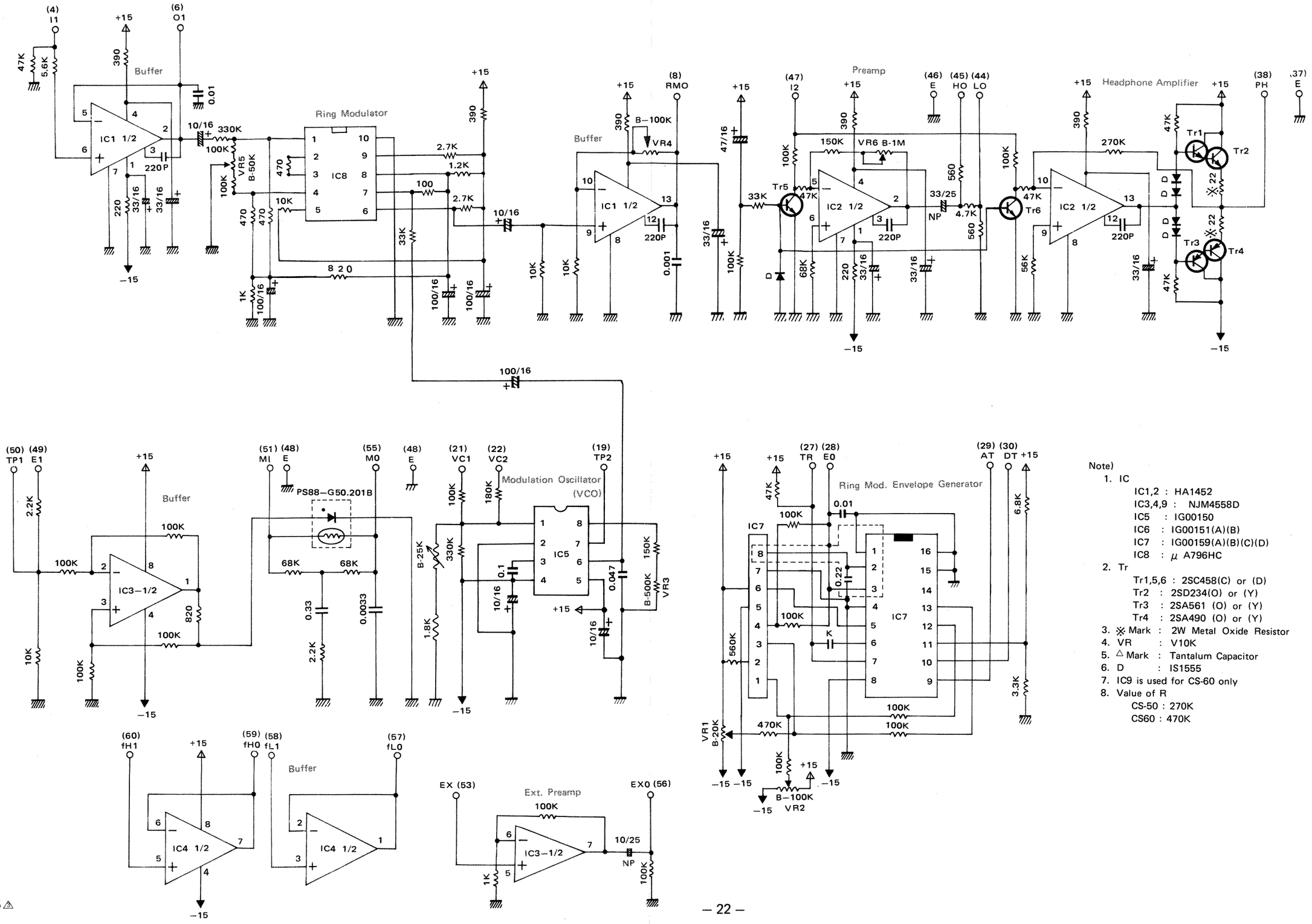
    Output of the DC voltage for AL and SL control is provided.

    The higher the voltage , the higher the level and the lower the voltage, the lower the level.

15. SL ..... Input of buffer voltage for determination of the sustain level.
    Input of the voltage between zero V and 10V is provided so that the sustain level can be controlled.



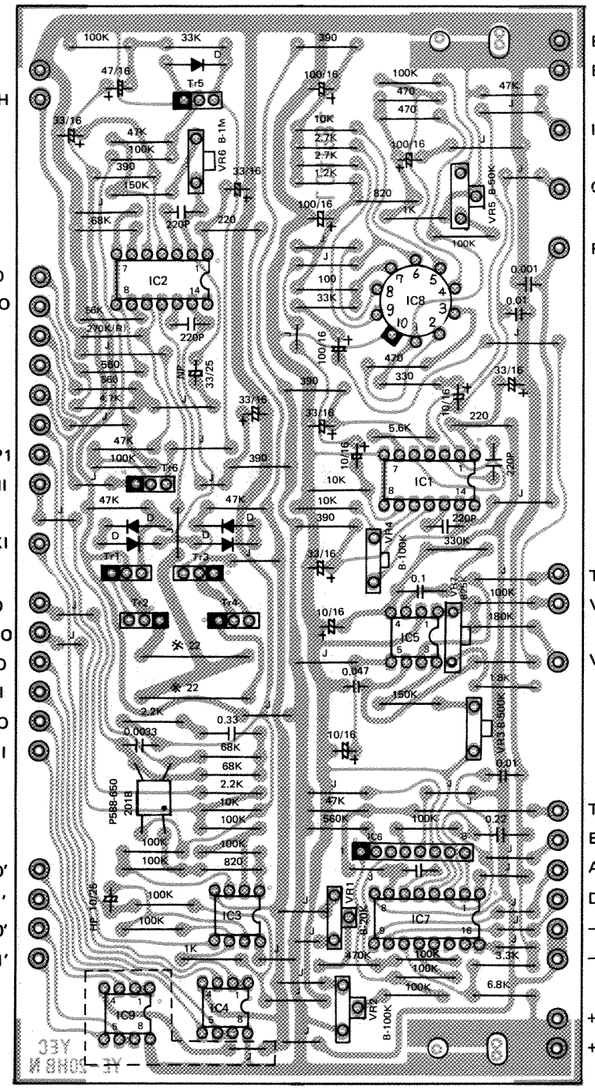
PRA (Pre Amp) Circuit



Note)

1. IC
   - IC1,2 : HA1452
   - IC3,4,9 : NJM4558D
   - IC5 : IG00150
   - IC6 : IG00151(A)(B)
   - IC7 : IG00159(A)(B)(C)(D)
   - IC8 : μ A796HC
2. Tr
   - Tr1,5,6 : 2SC458(C) or (D)
   - Tr2 : 2SD234(O) or (Y)
   - Tr3 : 2SA561 (O) or (Y)
   - Tr4 : 2SA490 (O) or (Y)
3. ※ Mark : 2W Metal Oxide Resistor
4. VR : V10K
5. △ Mark : Tantalum Capacitor
6. D : IS1555
7. IC9 is used for CS-60 only
8. Value of R
   - CS-50 : 270K
   - CS60 : 470K

PRA Circuit Board



PN6-E — BL12 — (37)E
PN6-S — WH12 — (38)PH

PN5-SW-M — BR — (44)LO
PN5-SW-B — RE — (45) HO
(46)E
PN2-VR2-2 — OR — (47)I2
(48)E
PN5-EXP-1 — GR — (49)EI
(50)TP1
PN2-TVR5-2 — YE — (51) MI
PN5-VR-2 — BE — (53) EXI

PN2-VR2-3 — GR — (55)MO
PN3-SS-M6 — BR — (56)EXO
RA-T71-9 (23') — RE — (57)fLO
PN1-SVR7-2 — WH — (58) fLI
RA-T71-7 (26') — BR — (59)fHO
PN1-SVR5-2 — VI — (60) fHI

(64)fLO'
(65)fL1'
(66)fH0'
(67)fH1'

E (1) — BL12x2 — PN2-TVR7-5, RA-M4-E (1)
E (2) — BL12x2 — PN2-VR2-EP, PN5-EXP-3
I1 (4) — WH — RA-M4-O (33)
O1 (6) — RE — PN2-TVR5-1
RMO(8) — OR — PN2-TVR5-3

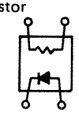
TP2(19)
VC1(20) — YE — PN2-TVR4-2
VC2(22) — GR — PN2-TVR3-2

TR (27) — VI — RA2-KAS-TR9 (35)
EO (28) — BE — PN2-TVR3-3
AT (29) — VI — PN2-TVR1-2
DT (30) — GY — PN2-TVR2-2
–15(31) — YE12 — RA-M4-–15 (39)
–15(32) — YE12x2 — PN5-EXP-2, TS-3

+15 (34)
+15 (35) — BR12 — RA-M4-+15

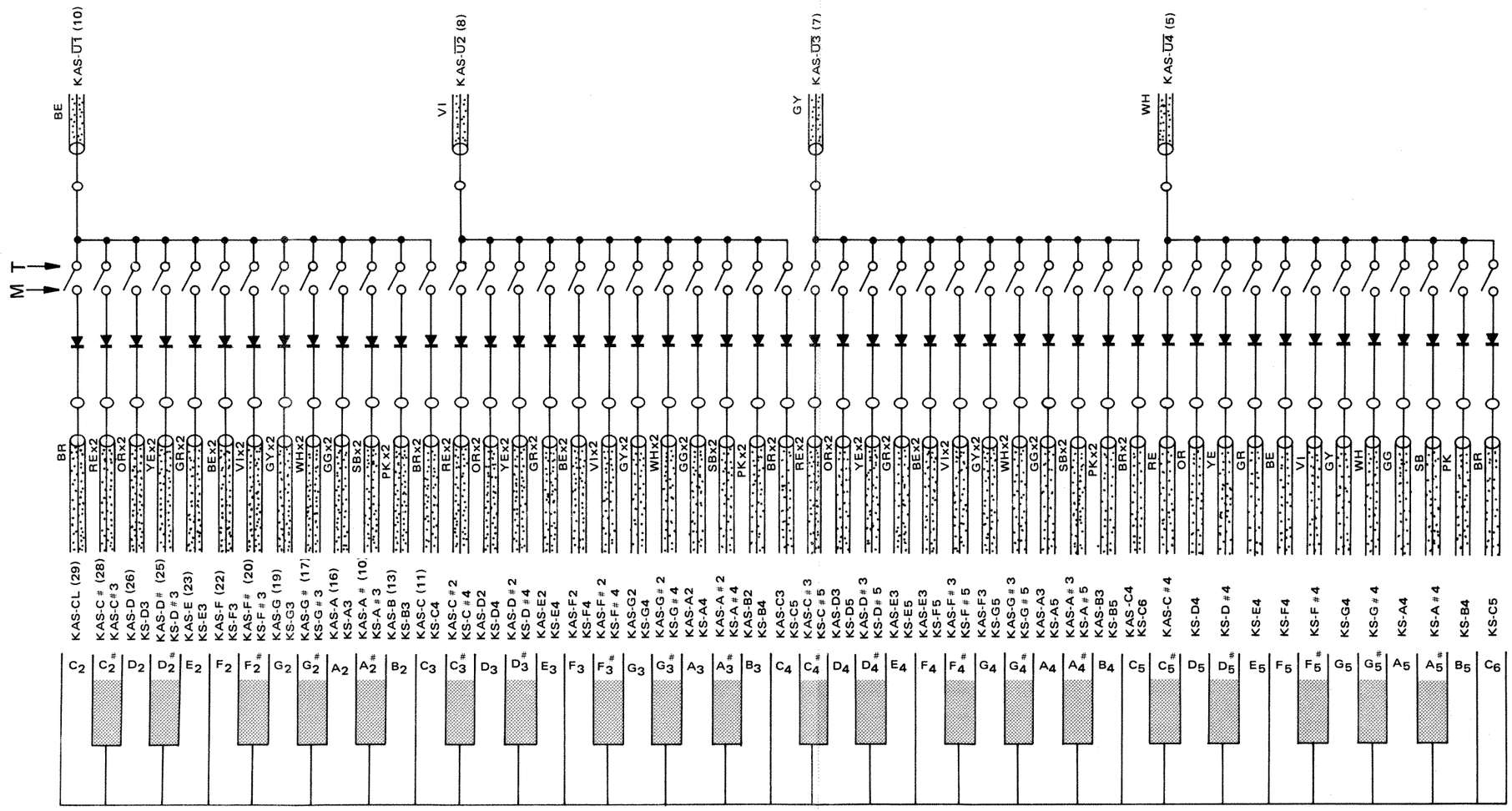
Note)

1. Print Board : LC41384
2. Transistor
   - Tr1,5,6 : 2SC458(C) or (D)
   - Tr2 : 2SD234(O) or (Y)
   - Tr3 : 2SA561(O) or (Y)
   - Tr4 : 2SA490(O) or (Y)
3. IC
   - IC1,2 : HA1452
   - IC3,4,9 : NJM4555D
   - IC5 : IG00150
   - IC6 : IG00151 (A)(B)
   - IC7 : IG00149(A)(B)(C)(D)
   - IC8 : μA796HC
4. Diode D : IS1555
5. Others
   - ※ Mark : 2W Metal Oxide Resistor
   - VR : V10K
   - △ Mark : Tantalum Capacitor
   - NP : Non-polar Capacitor
   - Install P588-G50-210B as below.

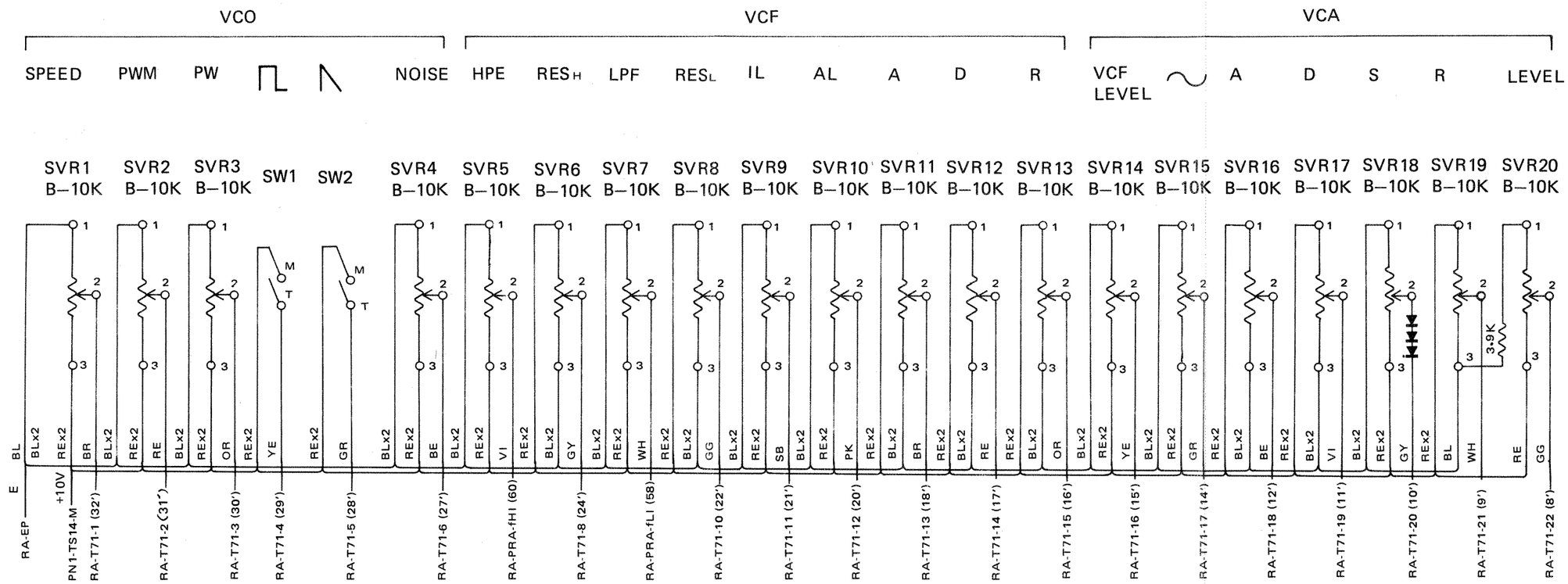


6. Use only NA03704 in [------]
7. Constant value of R
   - NA03704 ⟹ 470K
   - NA04486 ⟹ 270K

KS (Key Switch) Circuit



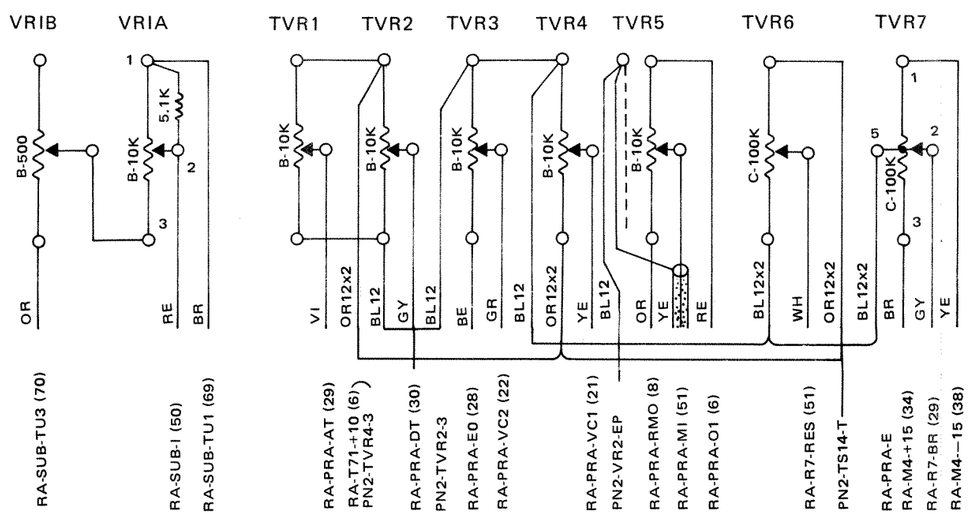
PN1 (Pannel 1) Circuit



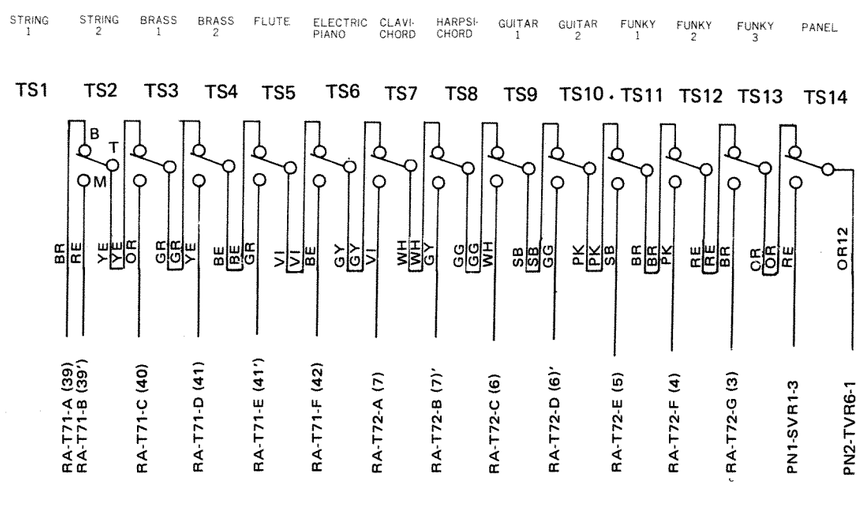
Note)
1. Diode : IS1555
2. Adjust three wires and cover then with insulating tube

PN2 (Pannel 2) Circuit

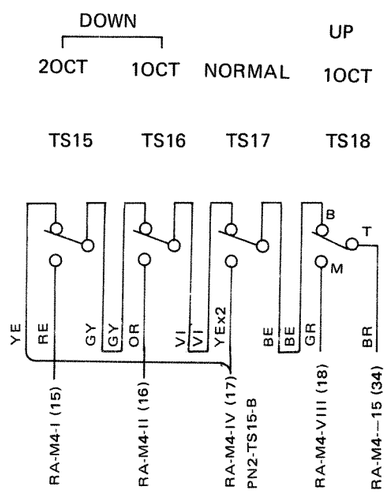
PITCH ATTACK TIME DECAY TIME DEPTH SPEED MODULATION RESONANCE BRILLIANCE



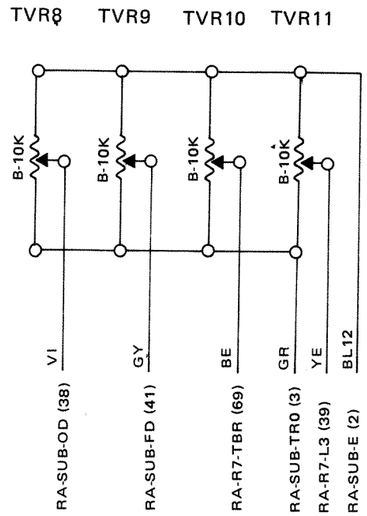
TONE SELECTOR



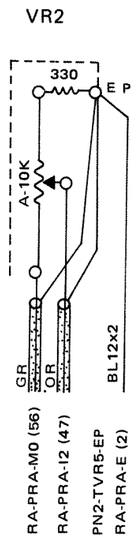
TRANSPOSITION

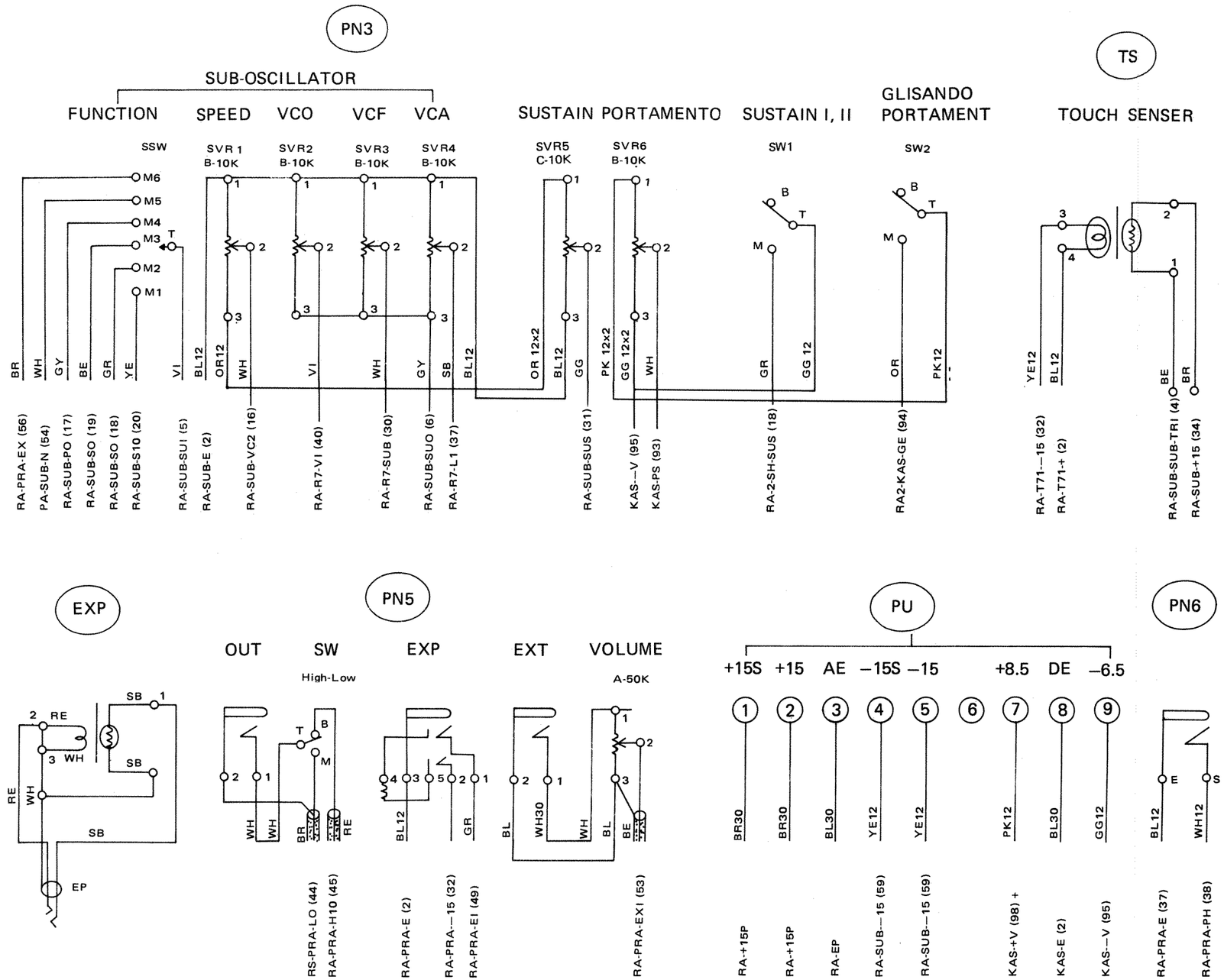


TOUCH RESPONSE

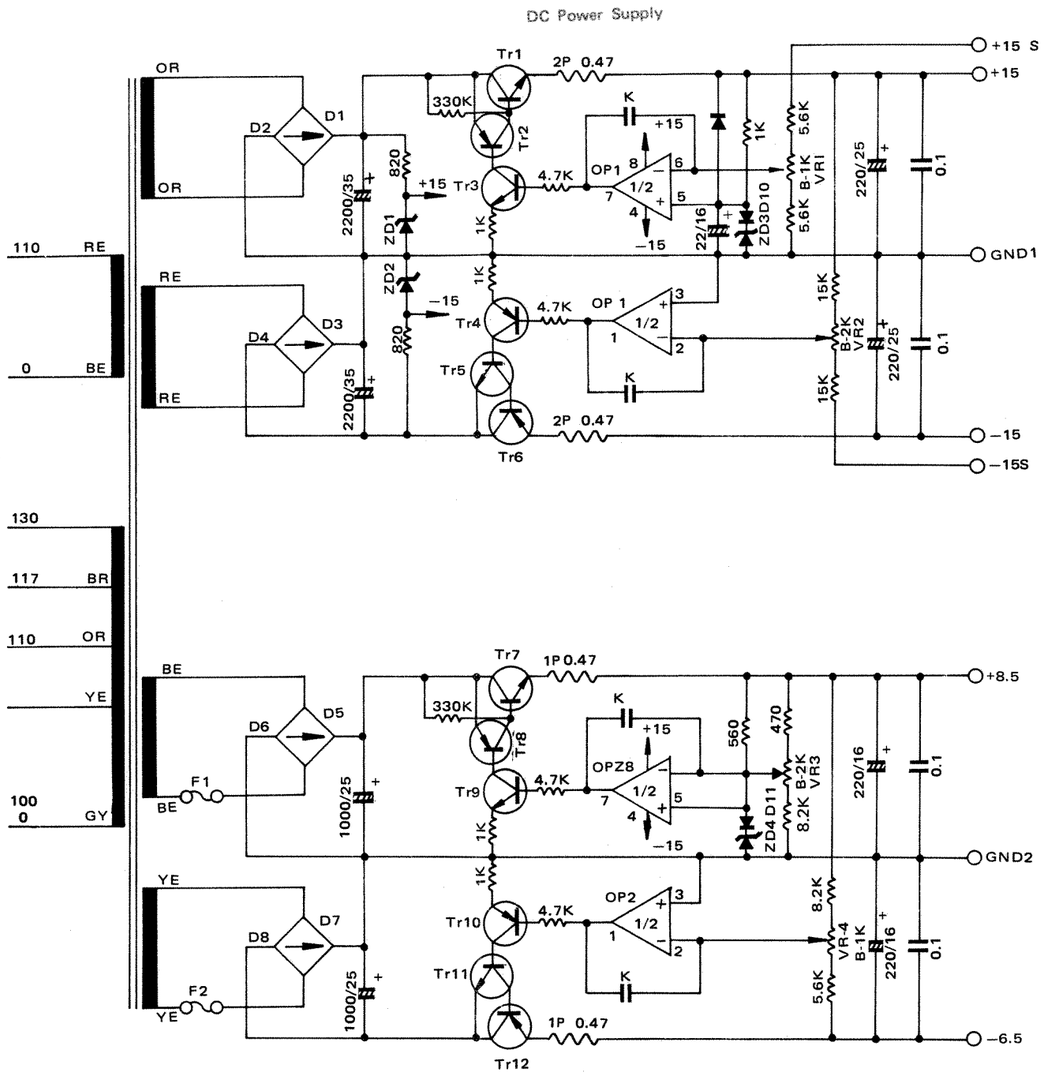


VOLUME




PN3
SUB-OSCILLATOR
FUNCTION
SPEED
VCO
VCF
VCA
SUSTAIN PORTAMENTO
SUSTAIN I, II
GLISANDO PORTAMENT
TOUCH SENSER
SSW
SVR 1 B-10K
SVR2 B-10K
SVR3 B-10K
SVR4 B-10K
SVR5 C-10K
SVR6 B-10K
SW1
SW2
M6
M5
M4
M3
M2
M1
T
B
M
BR
WH
GY
BE
GR
YE
VI
BL12
OR12
OR 12x2
PK 12x2
GG 12x2
GG
GG 12
OR
PK12
YE12
RA-PRA-EX (56)
PA-SUB-N (54)
RA-SUB-PO (17)
RA-SUB-SO (19)
RA-SUB-SO (18)
RA-SUB-S10 (20)
RA-SUB-SUI (5)
RA-SUB-E (2)
RA-SUB-VC2 (16)
RA-R7-VI (40)
RA-R7-SUB (30)
RA-SUB-SUO (6)
RA-R7-L1 (37)
RA-SUB-SUS (31)
KAS-—V (95)
KAS-PS (93)
RA-2-SH-SUS (18)
RA2-KAS-GE (94)
RA-T71—15 (32)
RA-T71-+ (2)
RA-SUB-SUB-TRI (4)
RA-SUB-+15 (34)
TS
EXP
PN5
PU
PN6
OUT
SW
High-Low
EXT
VOLUME
A-50K
+15S
+15
AE
—15S
—15
+8.5
DE
—6.5
RE
EP
RS-PRA-LO (44)
RA-PRA-H10 (45)
RA-PRA-E (2)
RA-PRA—15 (32)
RA-PRA-EI (49)
RA-PRA-EXI (53)
BR30
BL30
BL12
WH30
WH12
RA-+15P
RA-EP
RA-SUB—15 (59)
KAS-+V (98) +
KAS-E (2)
KAS-—V (95)
RA-PRA-E (37)
RA-PRA-PH (38)

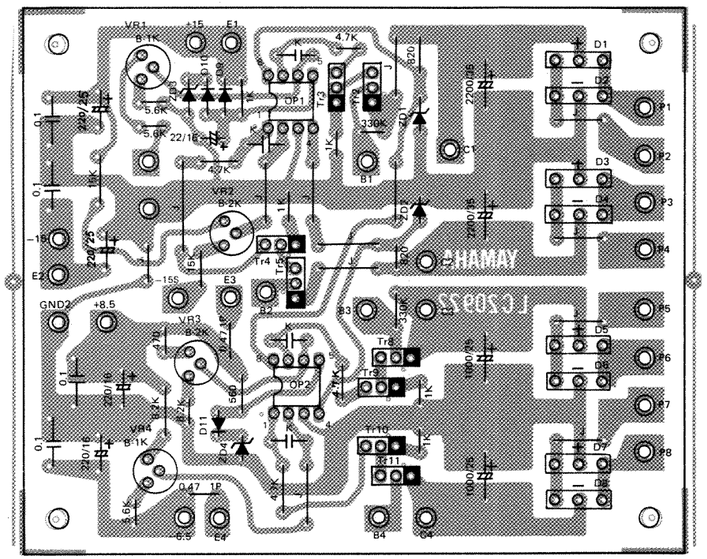
SVU Circuit



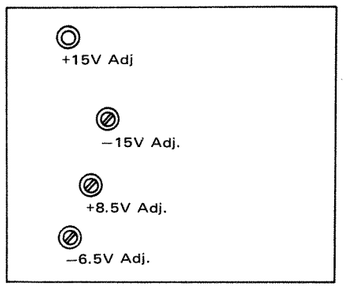
Note)

1. Transistor
   - Tr1 : 2SD203
   - Tr2, 12 : 2SA490 (Y)
   - Tr3,9,11 : 2SC828 (Y)
   - Tr4,8,10 : 2SA561 (Y)
   - Tr5, 7 : 2SD234 (O)
   - Tr6 : 2SA745
2. Diode
   - D1,3,5,7 : 10DC-4
   - D2,4,6,8 : 10DC-4R
   - D9,10,11 : 1S1555
3. Zener Diode
   - ZD1, 2 : WZ150
   - ZD3, 4 : 1S1715
4. OP Amplifier
   - OP1, 2 : RC4558
5. Fuse
   - F1 : 0.5A
   - F2 : 0.5A
6. VR1~4 : 3321H type
7. Ceramic Capacitor

SVU Circuit Board

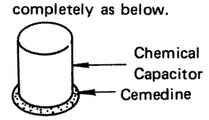


Adjustment



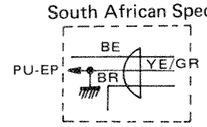
Note)

1. Print Board : LC20922
2. Transistor
   - Tr2 : 2SA490 (Y)
   - Tr4,8,10 : 2SA561 (Y)
   - Tr3,9,11 : 2SC828 (Y)
   - Tr5 : 2SD234 (O)
3. Diode
   - D1,3,5,7 : 10DC-4
   - D2,4,6,8 : 10DC-4R
   - D9,10,11 : 1S1555
4. Zener Diode
   - ZD1,2 : WZ150
   - ZD3,4 : 1S1715
5. K Mark : Ceramic Capacitor
6. OP Amplifier
   - OP1, 2 : RC4558
7. Volume
   - VR1~4 : 3321H type
8. Application Sketch of Cemedine
   Apply cemedine to the peripheral end surface of chemical capacitor completely as below.

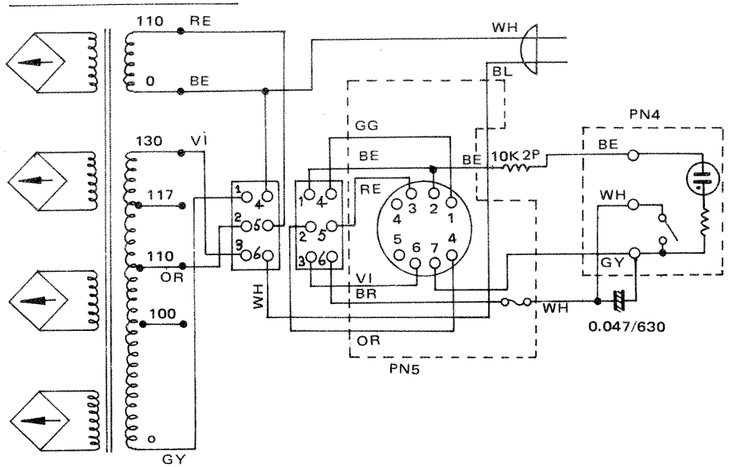


Power Supply NP0013Z (Primary) Circuit

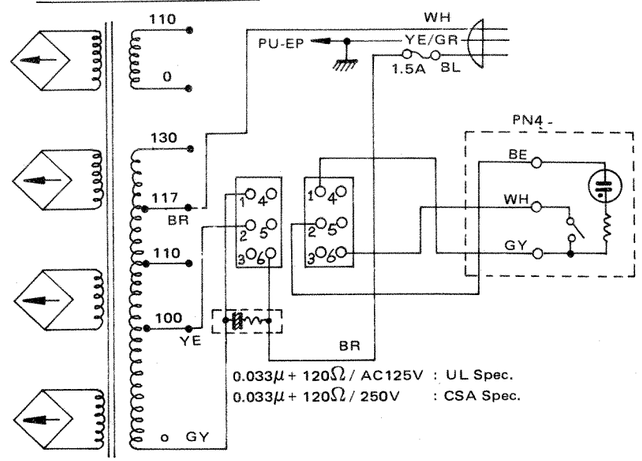
South African Spec.



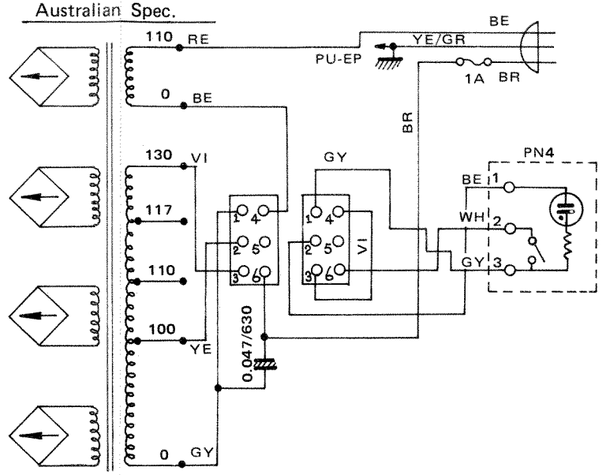
General · South African Spec.



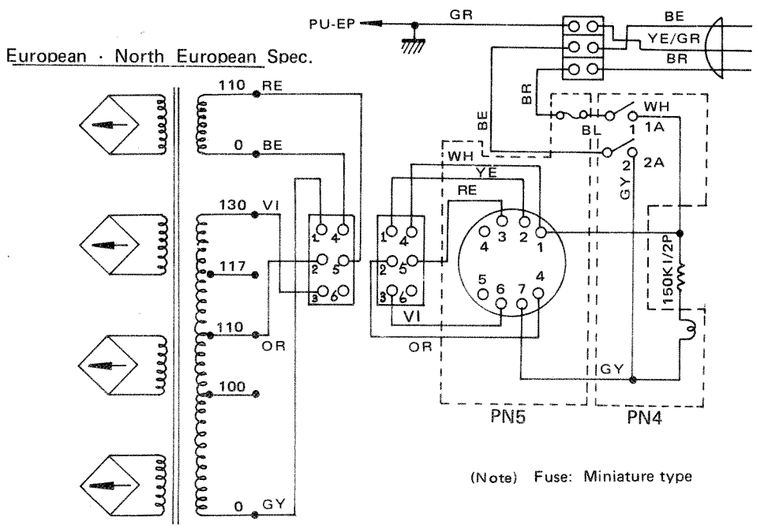
UL · CSA Spec.



Australian Spec.

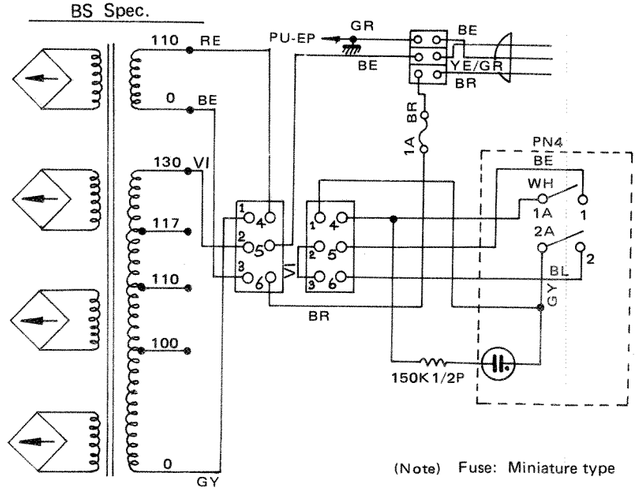


European · North European Spec.



(Note) Fuse: Miniature type

BS Spec.



(Note) Fuse: Miniature type

YAMAHA CS-50 SYNTHESIZER BLOCK DIAGRAM

KEYBOARD (C2 ～ C6)

SUB BOARD 1/6

REFERENCE VOLTAGE ADJUST

COARSE CONTROL (-500 ～ +700 CENTS)

FINE CONTROL (±50 CENTS)

PITCH (PN2)

KAS BOARD

MASTER CLOCK OSC (4±1.5 MHz)

OCTAVE LADDER NETWORK

NOTE LADDER NETWORK

BUFFER

KEY CODER

KEY ASSIGNER

[IC1 YM2600]

[IC-2 YM2700]

GLISSANDO CIRCUIT

D/A CONVERTER

D/A CONVERTER

GATE/INTEGRATOR 4

GATE/INTEGRATOR 3

GATE/INTEGRATOR 2

GATE/INTEGRATOR 1

2.5M

4.6kΩ

INITIAL CLEAR CIRCUIT

BUFFERS

COMPARATOR FUNCTION

VCO -PWM/GLISS CLOCK OSC

VOLTAGE COMPARATORS

"1" ------ +8.5V

"0" ------ -6.5V

Key on signal

KEY ON OFF +8.5V -6.5V

PORTAMENTO GLISSANDO (PN3)

PORTAMENTO GLISSANDO (PN3)

SH BOARD

SAMPLE/HOLD CIRCUIT

SUSTAIN

M4 BOARD

M3 BOARD

M2 BOARD

M1 BOARD

VCO (1G00153)

WAVESHAPE CONVERTER (1G00156)

GATE

VCF -HIGH PASS FILTER (1G00154)

VCF -LOW PASS FILTER (1G00156)

VCA (1G00151)

VCA (1G00151)

VCA (1G00151)

TRANS-POSITION CIRCUIT

ENVELOPE GEN-FILTER (1G 00152)

ENVELOPE GEN-AMP (1G00154)

+15V

1OCT NORMAL 1OCT UP 1OCT DOWN 2OCT DOWN

TRANSPOSITION (PN2)

FOOT PEDAL

FOOT CONTROLLER

PRA BOARD 5/6

PRA BOARD 5/5

PRA BOARD 5/4

(PN2) MODULATION

(PN2) VOLUME

(PN2) SPEED

(PN2) DEPTH

(PN2) ATTACK TIME

(PN2) DECAY TIME

RING MODULATOR

VCO (1G00150) OSC

DELAY CIRCUIT

HEAD-PHONE AMP

OUT

AMP/SPEAKER

HEAD-PHONE

ENVELOPE GEN -RING MOD (1G00159)

R7 BOARD 1/2

To terminal V on M2 through M4 board.

To terminal Q1 to Q2 on M2 through M4 board.

To terminal f1 to f3 on M2 through M4 board.

CONTROL VOLTAGE MIXING CIRCUIT -VCO

CONTROL VOLTAGE MIXING CIRCUIT -RESONANCE

CONTROL VOLTAGE MIXING CIRCUIT -CUTOFF FREQ

SUB BOARD 5/6

VCA -LEVEL CONTROL (1G00151)

VCO -PWM OSC (1G00153)

To terminal LC on M2 through M4 board.

R7 BOARD 1/2

CONTROL VOLTAGE MIXING CIRCUIT -VCA

SUB BOARD 3/6

SUSTAIN CONTROL CIRCUIT

SUSTAIN (PN4)

T71 BOARD 3/3

VOLTAGE REGULATOR

DC POWER SUPPLY

RESONANCE (PN2)

BRILLIANCE (PN2)

SUB OSC (PN3)

VCO VCF VCA

TOUCH RESPONSE LEVEL BRILLIANCE VCO VCF

SUB BOARD 4/6

SUB BOARD 5/6

SUB BOARD 2/6

VCA -LEVEL CONTROL (1G00151)

VCA -LEVEL CONTROL (1G00151)

SUB BOARD 4/6

WAVESHAPE CONVERTER

VCA -LEVEL CONTROL

VCO -SUB OSC (1G00150)

LPF

NOISE GENERATION

EXT. IN

LEVEL (PN5)

PRA BOARD 3/6

EXT. NOISE

FL

H

L

FUNCTION (PN3)

SPEED (PN3)

RESISTOR MATRIX T71 BOARD 1/2

RESISTOR MATRIX T72 BOARD

To terminal 1 through 22 on T71 board.

To terminal 1 on T91 board.

To terminal 22 on T71 board.

PRA BOARD 5/5

PRA BOARD 5/4

STRING 1 STRING 2 BRASS 1 BRASS 2 FLUTE ELECTRIC PIANO CLAVI-CHORD HARPSI-CHORD GUITAR 1 GUITAR 2 FUNKY 1 FUNKY 2 FUNKY 3 PANEL

TONE SELECTOR (PN2)

SPEED PWM PW FL H NOISE HPF RES LPF RES IL AL A D R VCF LEVEL A D S R LEVEL

VCO VCF (PN1) VCA

REAR PANEL (PN5)

TRIGG IN LEVEL MIDI HIGH LOW

(PN1)

(PN2)

PITCH RING MODULATOR ATTACK DECAY TIME DEPTH SPEED MODU-LATION RESO-NANCE BRILLI-ANCE TONE SELECTOR TRANSPOSITION TOUCH RESPONSE VOLUME

STR-ING 1 STR-ING 2 BRASS 1 BRASS 2 FLUTE ELEC-CHORD CLAVI-CHORD HARPSI-CHORD GUI-TAR 1 GUI-TAR 2 FUN-KY 1 FUN-KY 2 FUN-KY 3 PANEL

1OCT DOWN 1OCT NORM-AL 1OCT UP

VCO VCF BRILLI-ANCE LEVEL

SUB OSC

(PN3)

SUSTAIN PORTA-MENTO GLISS-ANDO

EXT. NOISE

FUNCTION SPEED VCO VCF VCA SUSTAIN PORTAMENTO GLISSANDO

(PN4)

FOOT PEDAL

HEAD-PHONE

SHOW TO PULSE AUDIO SIGNAL LOW FREQUENCY MODULATION SIGNAL DC CONTROL SIGNAL

CS-50 OVERALL CIRCUIT DIAGRAM