

# YAMAHA

COMBO SYNTHESIZER

CS-60



## SERVICE MANUAL

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# SPECIFICATIONS

## KEYBOARD

61 Keys C ~ c4 (5 octaves)

## TONE SELECTORS

|                |             |
|----------------|-------------|
| STRING 1       | HARPSICHORD |
| STRING 2       | GUITAR 1    |
| BRASS 1        | GUITAR 2    |
| BRASS 2        | FUNKY 1     |
| FLUTE          | FUNKY 2     |
| ELECTRIC PIANO | MEMORY      |
| CLAVICHORD     | PANEL       |

## TONE SET LEVERS

- a. VCO: SPEED, PWM, PW,  $\square$ ,  $\nabla$ , NOISE
- b. VCF: HPF, RESH, LPF, RESL, IL, AL, A, D, R
- c. VCA: VCF LEVER,  $\sim$ , A, D, S, R, LEVEL

## EFFECT CONTROLS

- a. RING MODULATOR: ATTACK TIME  
DECAY TIME  
DEPTH  
SPEED  
MODULATION
- b. SUB OSCILLATOR: FUNCTION  
SPEED  
VCO  
VCF  
VCA
- c. RESONANCE
- d. BRILLIANCE
- e. TRANSPOSITION: 2 OCT DOWN  
1 OCT DOWN  
NORMAL  
1 OCT UP
- f. TOUCH RESPONSE: VCO  
VCF  
BRILLIANCE  
LEVEL
- g. KEYBOARD CONTROL: BRILLIANCE LOW  
HIGH
- h. FINGER BOARD
- i. FOOT SWITCH CONTROL: SUSTAIN  
PORTAMENTO  
GLISSANDO

- j. SUSTAIN I/SUSTAIN II : SUSTAIN TIME
- k. PORTAMENTO/GLISSANDO: PORTAMENTO  
GLISSANDO TIME

## OTHER CONTROLS

- PITCH
- POWER SWITCH
- MASTER VOLUME
- FOOT CONTROLLER (Pedal)
- FOOT SWITCH

## OTHER FITTINGS

- Head Phone Jack
- EXT. IN (LEVEL)
- OUTPUT Jack (HIGH/LOW Switch)
- FOOT SWITCH Jack

## CIRCUITRY

- Power Consumption : 85W
- Power Source : 50/60Hz, AC

## DIMENSIONS

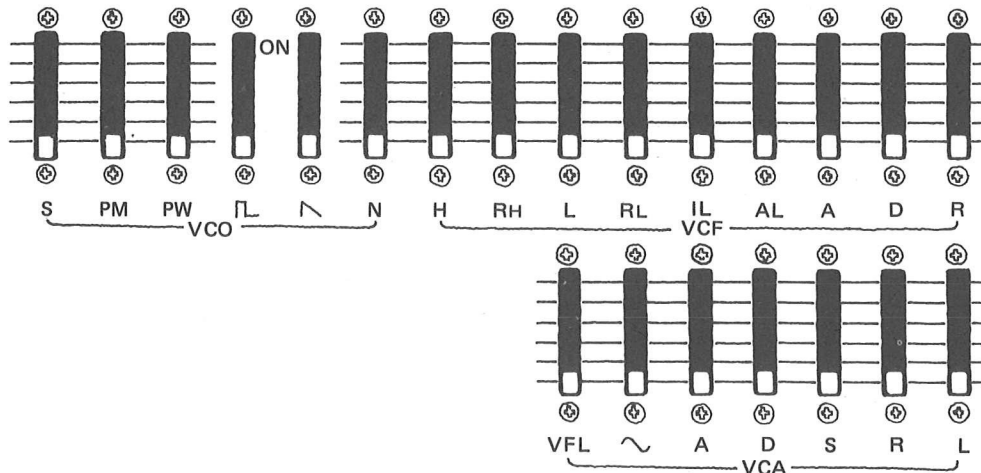
- Width : 1108 mm (43-5/8")
- Depth : 527.5 mm (20-3/4")
- Height : 255 mm (10")

WEIGHT: 40 kg (88 lbs)

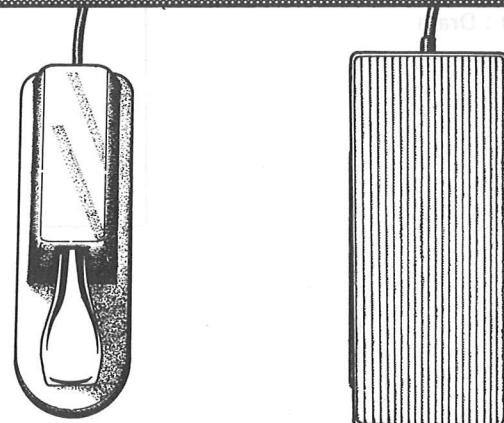
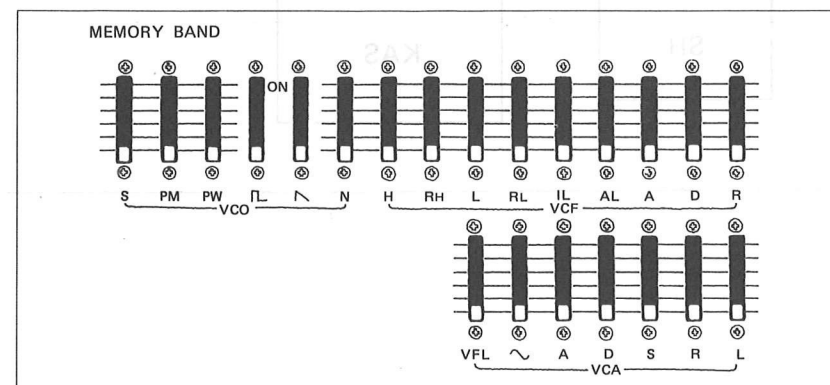
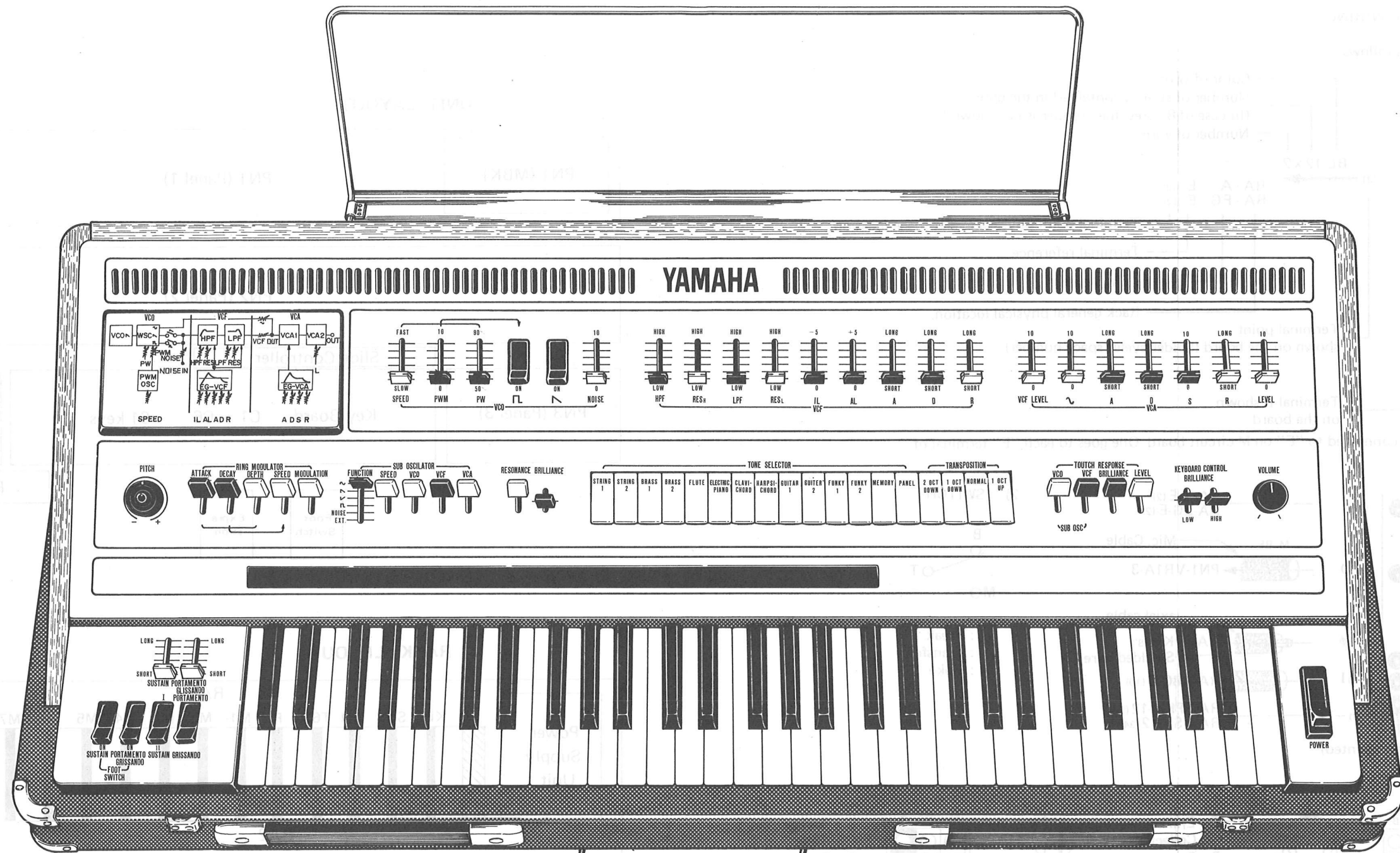
FINISH Black Leatherette

*Specifications subject to change without notice.*

## MEMORY BAND



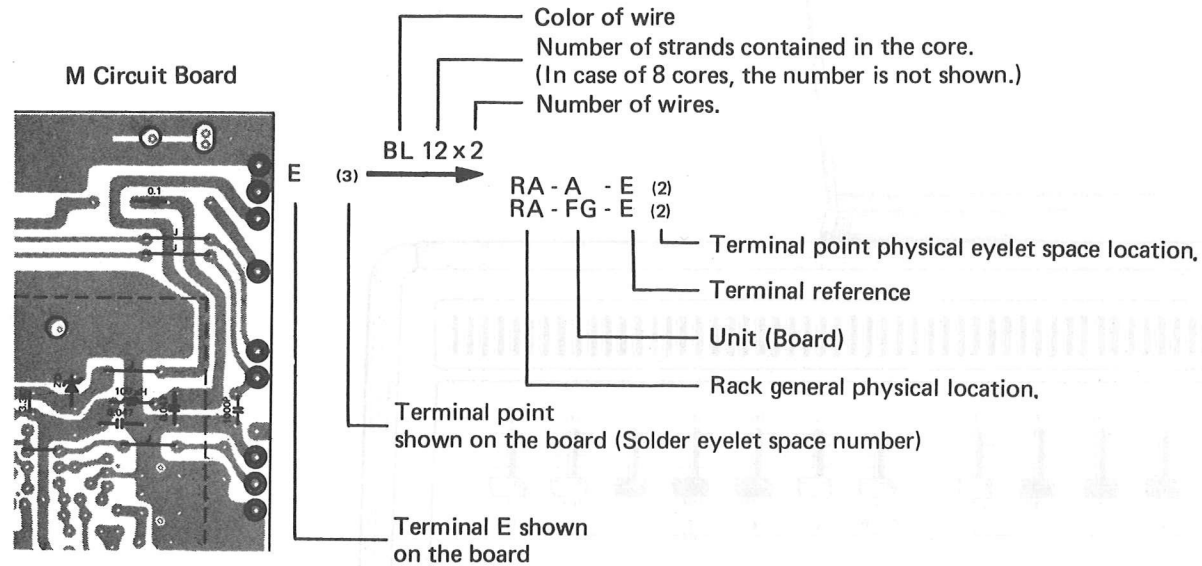
Panel Layout



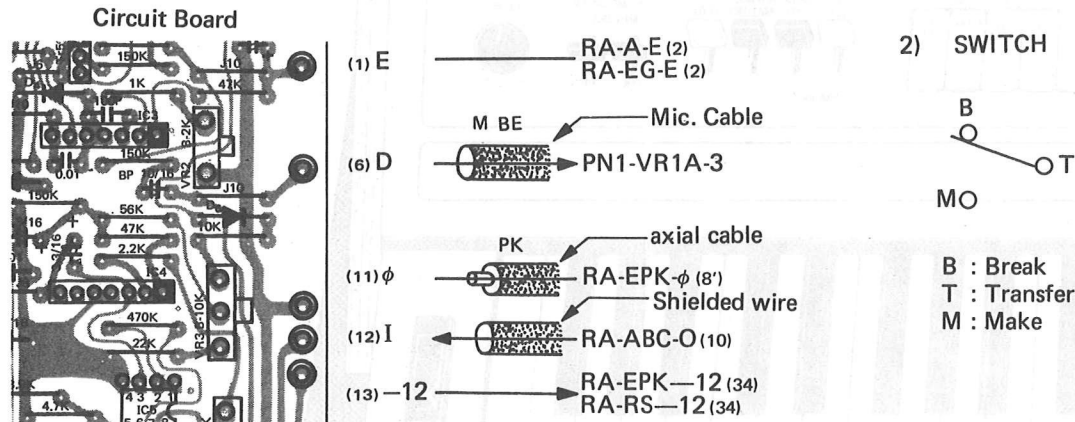
# CORDING GUIDE

## 1) CIRCUIT BOARD AND WIRING

The coding system is as follows

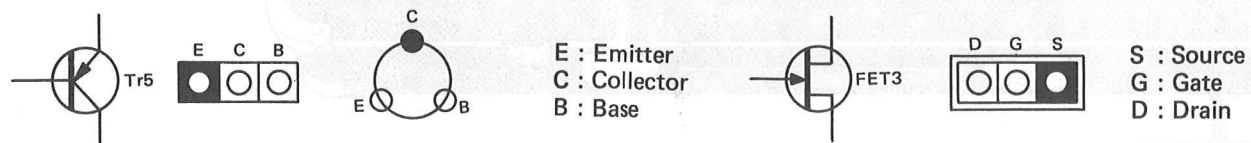


Two (2) black wires are connected to "E" on M circuit board. One goes to each "E" terminal of A and FG boards.



(View from the side points mounted)

## 3) Transistor and FET



## 4) 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 |                   |

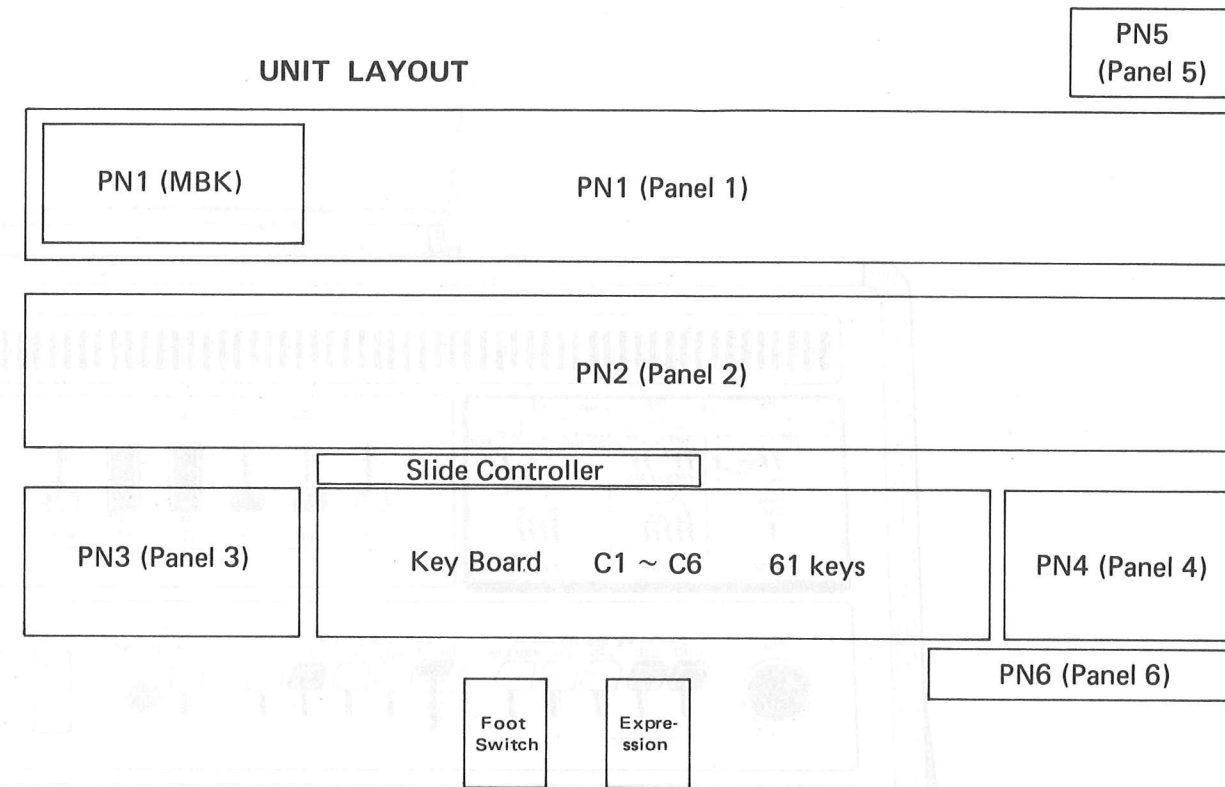
## 5) WIRE COLOR - Musical Note indication

|    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|
| C  | C# | D  | D# | E  | F  | F# | G  | G# | A  | A# | B  |
|    |    |    |    |    |    |    |    |    |    |    |    |
| BR | RE | OR | YE | GR | BE | VI | GY | WH | GG | SB | PK |

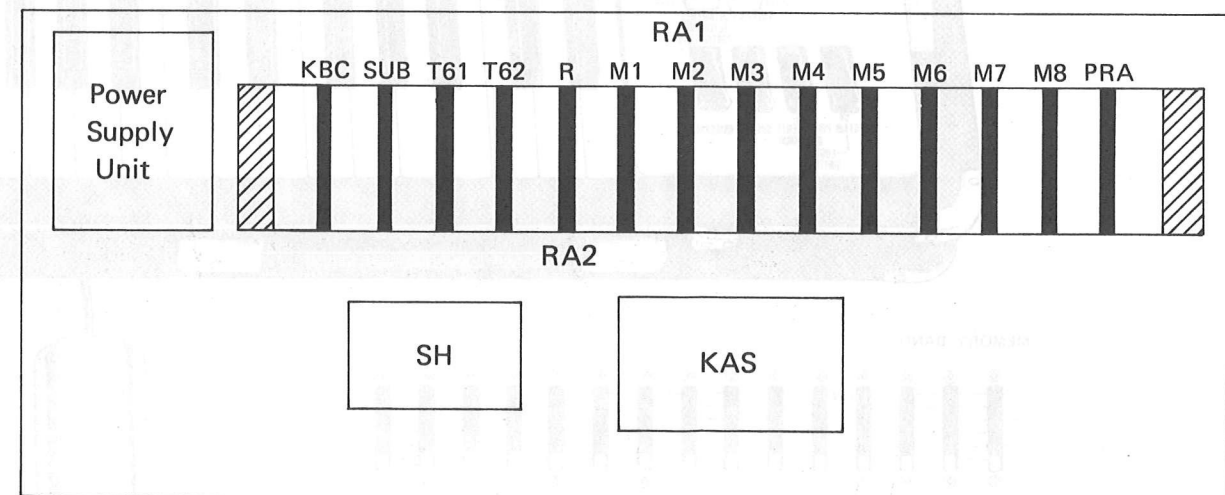
## 6) Logic Mark

| FUNCTION       | LOGIC MARK |        |
|----------------|------------|--------|
|                | MIL        | YAMAHA |
| NOT (INVERTER) |            |        |
| NOR            |            |        |
| NAND           |            |        |

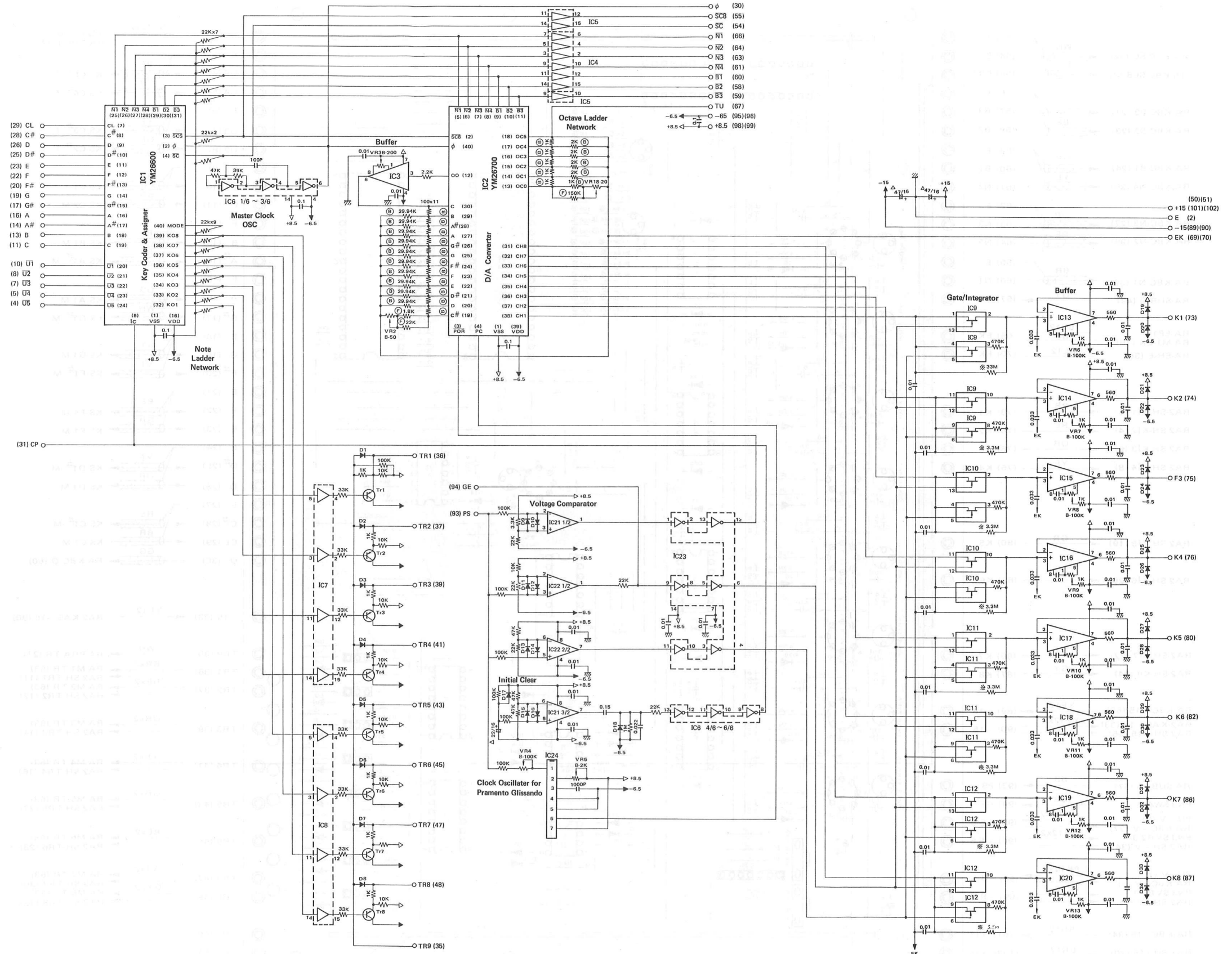
## UNIT LAYOUT



## RACK LAYOUT



# KAS (Key Assigner) Circuit



- Note) 1. IC1 : YM26600 (Dual 40P)  
 IC2 : YM26700 (Dual 40P)  
 IC3 : LM310 (Can 8P)  
 IC4,5,7,8 : TC4050P (Dual 16P)  
 IC6,23 : TC4069P (Dual 14P)  
 IC9~12 : TC4016P (Dual 14P)  
 IC13~20 : CA3140T (Can 8P)  
 IC21,22 : NJM4558D (Dual 8P)  
 IC24 : BA617 (Single 7P)

2. Transistor  
 Tr1~8 : 2SA561 (O)(Y)

3. Volume  
 VR1~3,6~13 : 3321H  
 VR4,5 : V10K4A-5-2

4. Resistor  
 (B) Mark : ±0.1%  
 (F) Mark : ±1%  
 \* Mark : Solid Resistor

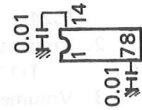
5. Capacitor  
 0.1 : Ceramic Capacitor  
 Δ Mark : Tantalum Capacitor

6. Diode  
 D : 1S1555

7. Power Supply  
 Dual 14P 14 ..... +8.5  
 7 ..... -6.5  
 Dual 16P 1 ..... +8.5  
 8 ..... -6.5

8. Connect 3, 5, 7 pins of IC5 to -6.5  
 Connect 7, 9 pins of IC7 to -6.5  
 Connect 7, 9 pins of IC8

9. Connect arrow-marks in this circuit as below  
 ↑ Mark to +15  
 ↑ Mark to -15

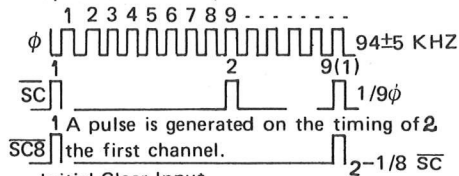




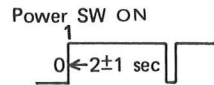
### KEY CODER & KEY ASSIGNER LSI (YM26600)

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. Pin
- No. Name
- 1. VSS ..... +8.5V Power Supply
- 2.  $\phi$  ..... Master Clock Input
- 3. SC ..... Synchro-clock Output
- 4. SC8 ..... Synchro-clock Output on the first channel.



- 5. IC ..... Initial Clear Input

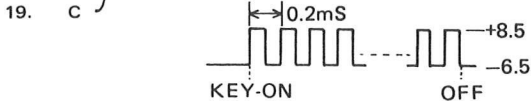


On this timing, C4# code is memoried.

- 6. VDD ..... -6.5V Power Supply Input

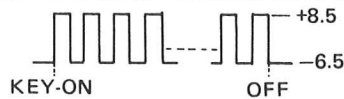
- 7. CL# } .... Note on data input
- 8. C# }

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



- 19. C }
- 20. V1 } .... Octave on data input
- 24. V5 }

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



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

1: -6.5V 0: +8.5V

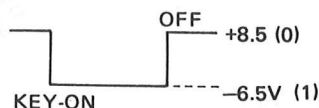
|    | C# | D | D# | E | F | F# | G | G# | A | A# | B | C |
|----|----|---|----|---|---|----|---|----|---|----|---|---|
| N1 | 1  | 0 | 1  | 1 | 0 | 1  | 1 | 0  | 1 | 1  | 0 | 1 |
| N2 | 1  | 1 | 0  | 1 | 1 | 0  | 1 | 1  | 0 | 1  | 1 | 0 |
| N3 | 1  | 1 | 1  | 0 | 0 | 0  | 1 | 1  | 1 | 0  | 0 | 0 |
| N4 | 1  | 1 | 1  | 1 | 1 | 1  | 0 | 0  | 0 | 0  | 0 | 0 |

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

1: -6.5V 0: +8.5V

|    | 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 } .... Key on Data Output
- 39. KO8 }



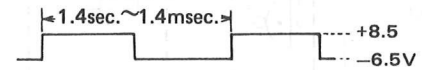
The number of note sounded is variable by using this pin.  
 i.e.) Up to 4 notes: Supply -6.5V to KO5.  
 Up to 3 notes: Supply -6.5V to KO4.

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

### 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. SC8 ..... Synchro-clock input on the first channel.
- 3. 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. N1 } .... Note code data input  
 Note code data is supplied to the pins from key coder LSI.
- 8. N4 }
- 9. B1 } .... Octave code data input  
 Octave code data is supplied to the pins from key coder LSI.
- 11. B3 }

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

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

\* 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# } .... Input for note key voltage
- 30. C }

OO pin: 4.0V

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

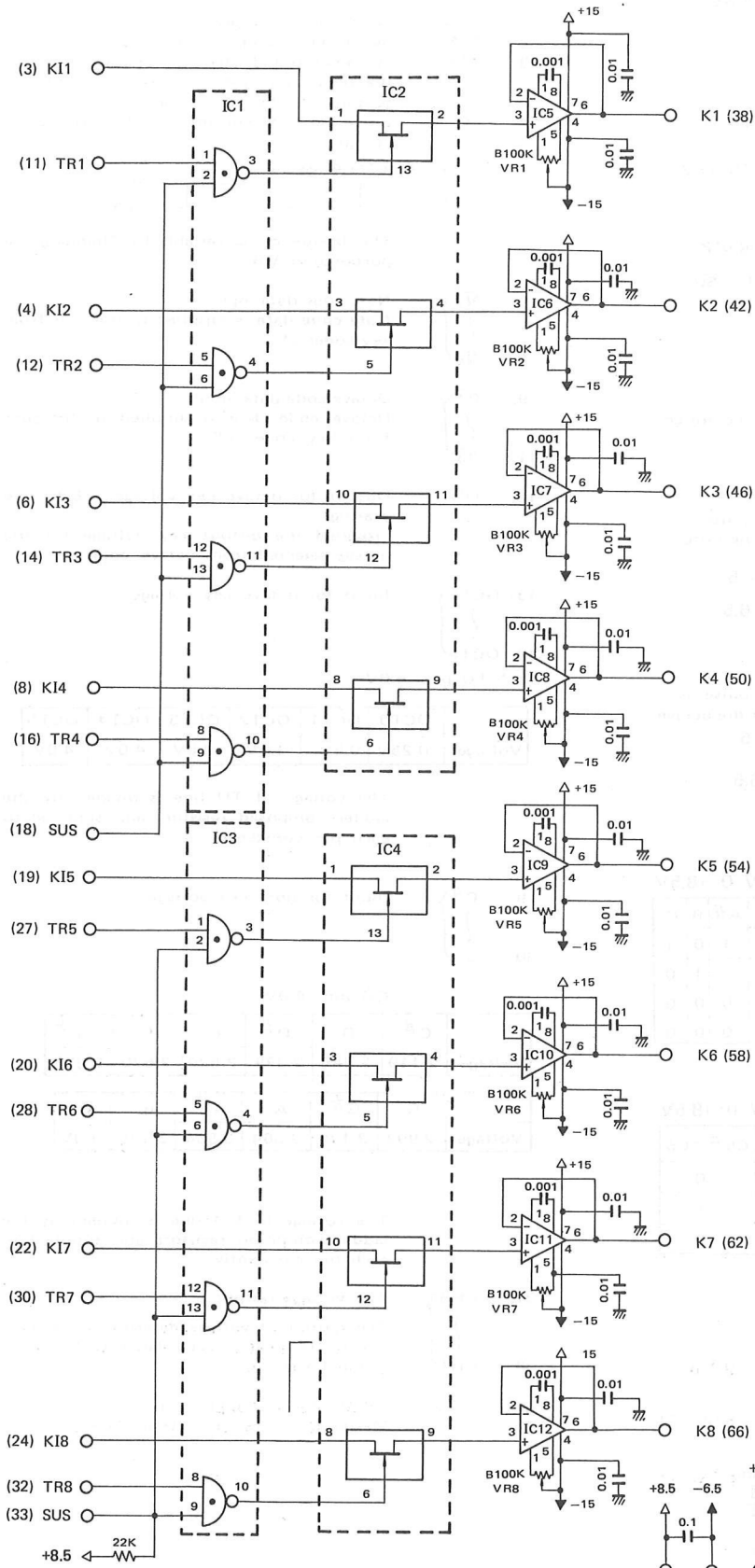
|         | G     | G#    | A     | A#    | B     | C    |
|---------|-------|-------|-------|-------|-------|------|
| Voltage | 2.997 | 3.175 | 3.364 | 3.564 | 3.775 | 4.0V |

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

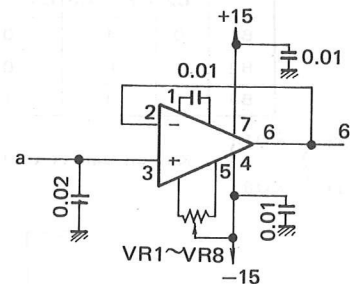
- 31. CH8 } .... Key voltage output  
 The output of voltage determined by each key is provided in accordance with the channel key code.
- 38. CH1 }
- 39. VDD .... -6.5V Power Supply, Input
- 40.  $\phi$  ..... Master Clock Input f=94±5KHz



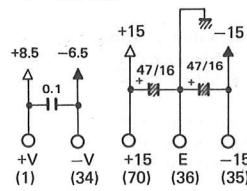
# SH (Sample Hold) Circuit



Note) 1. IC5~IC12 :CA3140P



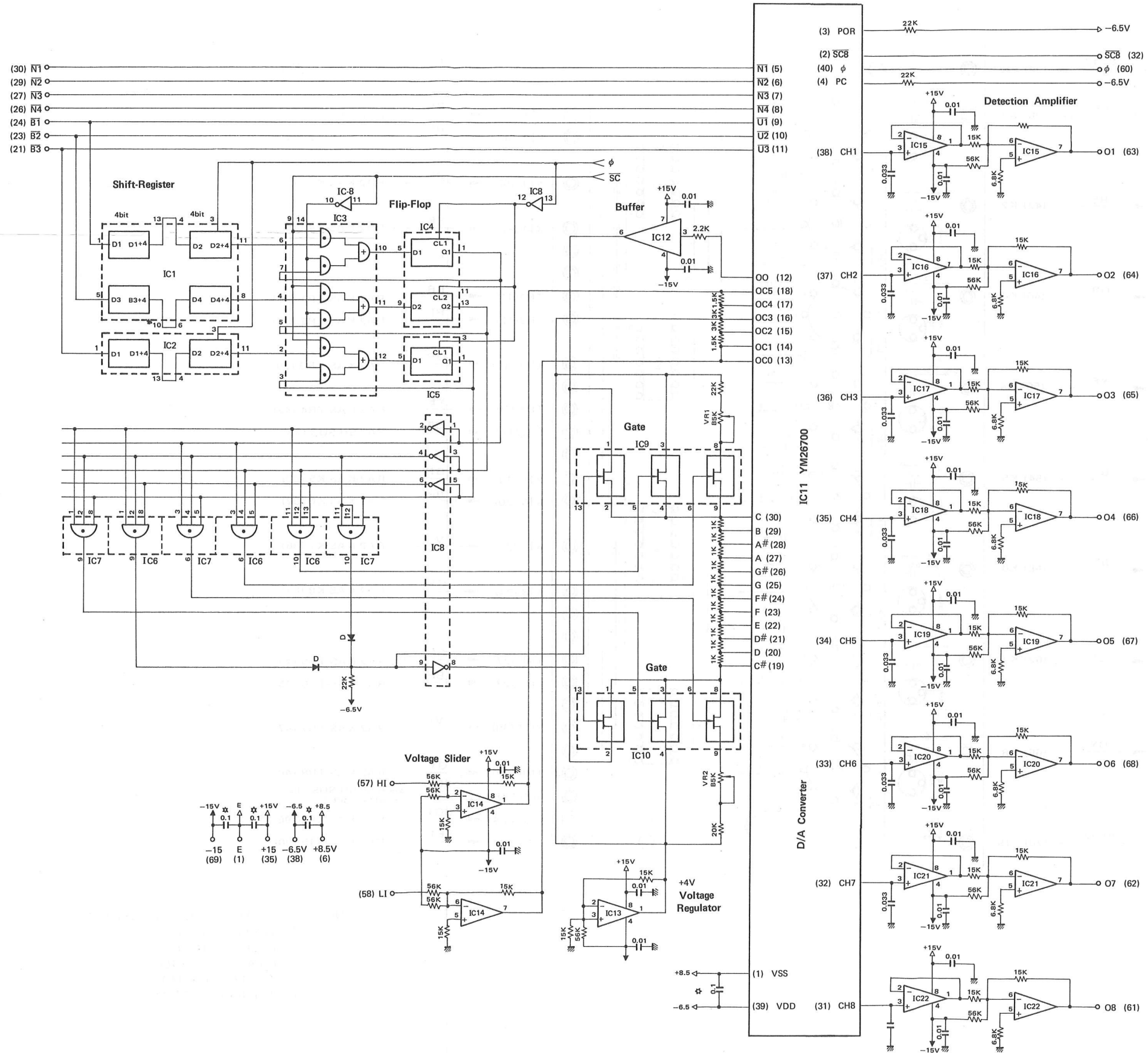
2. IC1,3: TC4011P  
 IC2,4: TC4016P  
 Power supply of IC  
 7 Pin ..... -6.5  
 14 Pin ..... +8.5



IC5 ~ IC12 : CA3140T  
 3. Capacitor  
 0.1 ..... Ceramic Capacitor  
 0.22 .... Mylar Capacitor  
 47/16 ... Electrolytic Capacitor

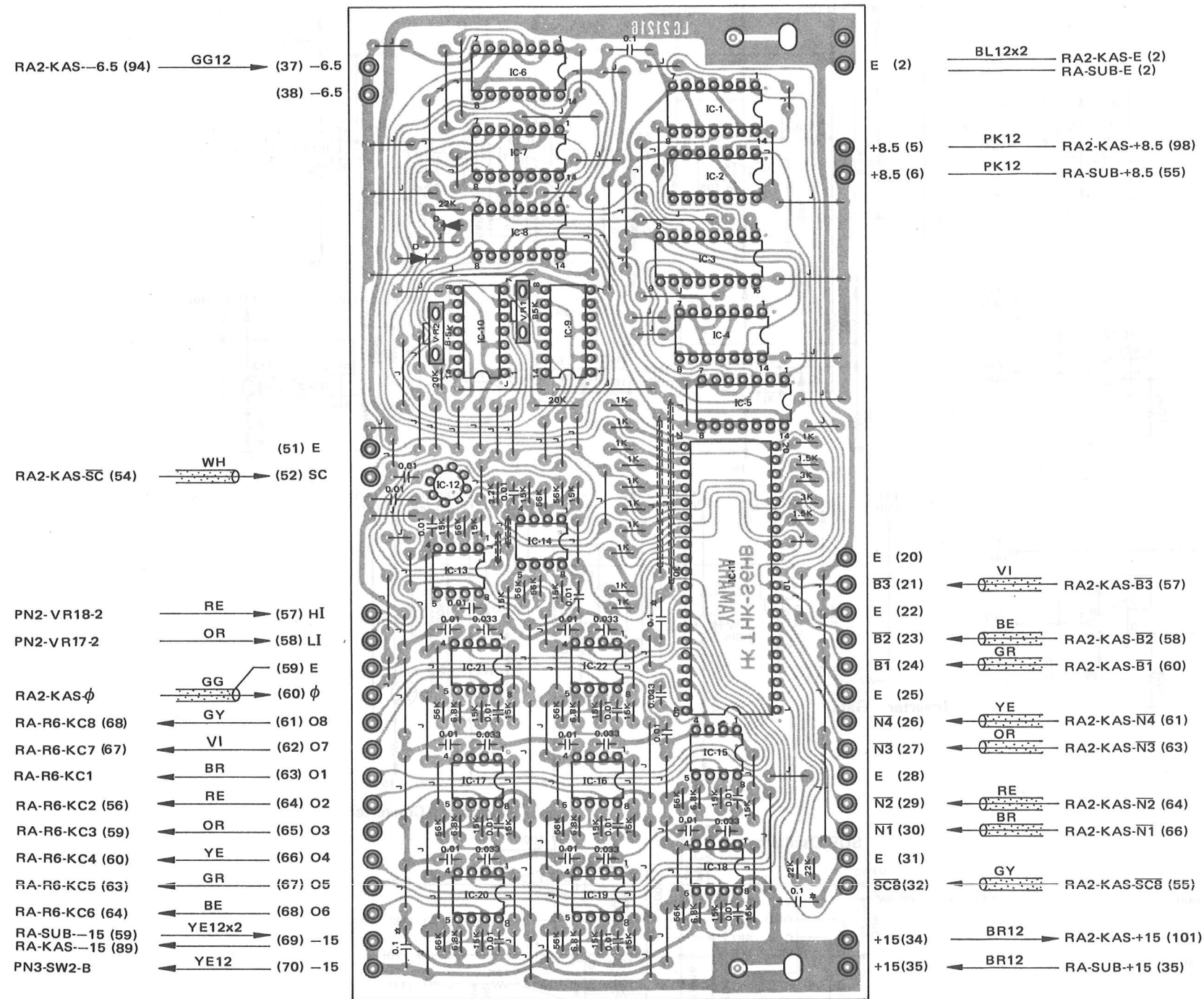


KBC Circuit



- Note) 1. IC1, 2 : CD4006AE (14)  
 IC3 : TC4019P (16)  
 IC4,5 : TC4013P (14)  
 IC6,7 : TC4073P (14)  
 IC8 : TC4069P (14)  
 IC9,10 : TC4016P (14)  
 IC11 : YM26700 (40)  
 IC12 : LM310 (CAN 8)  
 IC13~22 : NJM4558 (DUAL8)
2. Diode  
 1S1555
3. Capacitor  
 ☆ Mark : Ceramic Capacitor  
 Other : Mylar Capacitor
4. Resistor  
 22K : ± 5%  
 Other : ± 2%
5. VR
6. Power Supply  
 14 pin ( 7 .....-6.5V  
 14 .....+8.5V  
 16 pin ( 8 .....-6.5V  
 16 .....+8.5V
7. Connect to -6.5V  
 IC2 ..... 5, 6  
 IC3 ..... 1, 15  
 IC4 ..... 4, 6, 8, 10  
 IC5 ..... 4, 6, 8, 9, 10, 11  
 IC9,10 ..... 12

KBC Circuit Board



- RA2-KAS-6.5 (94) → GG12 → (37) -6.5
- (38) -6.5
- RA2-KAS-SC (54) → WH → (51) E
- (52) SC
- PN2-VR18-2 → RE → (57) H1
- PN2-VR17-2 → OR → (58) LI
- RA2-KAS-φ → GG → (59) E
- (60) φ
- RA-R6-KC8 (68) → GY → (61) O8
- RA-R6-KC7 (67) → VI → (62) O7
- RA-R6-KC1 → BR → (63) O1
- RA-R6-KC2 (56) → RE → (64) O2
- RA-R6-KC3 (59) → OR → (65) O3
- RA-R6-KC4 (60) → YE → (66) O4
- RA-R6-KC5 (63) → GR → (67) O5
- RA-R6-KC6 (64) → BE → (68) O6
- RA-SUB-15 (59) → YE12x2 → (69) -15
- RA-KAS-15 (89) → YE12 → (70) -15
- PN3-SW2-B

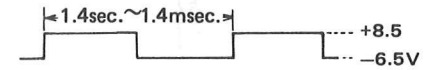
- E (2) → BL12x2 → RA2-KAS-E (2)
- RA-SUB-E (2)
- +8.5 (5) → PK12 → RA2-KAS+8.5 (98)
- +8.5 (6) → PK12 → RA-SUB+8.5 (55)
- E (20) → VI → RA2-KAS-B3 (57)
- B3 (21)
- E (22) → BE → RA2-KAS-B2 (58)
- B2 (23)
- B1 (24) → GR → RA2-KAS-B1 (60)
- E (25) → YE → RA2-KAS-N4 (61)
- N4 (26) → OR → RA2-KAS-N3 (63)
- N3 (27)
- E (28) → RE → RA2-KAS-N2 (64)
- N2 (29) → BR → RA2-KAS-N1 (66)
- N1 (30)
- E (31) → GY → RA2-KAS-SC8 (55)
- SC8 (32)
- +15 (34) → BR12 → RA2-KAS+15 (101)
- +15 (35) → BR12 → RA-SUB+15 (35)

- Note) 1. Print Board LC21216
- 2. Resistor
    - 22K : ±5%
    - Other : ±1%
  - 3. Diode 1S1555
  - 4. VR1,2 (V10K4A-5-2)
  - 5. IC1, 2 : CD4006AE
  - IC3 : TC4019P
  - IC4,5 : TC4013P
  - IC6,7 : TC4073P
  - IC8 : TC4069P
  - IC9,10 : TC4016P
  - IC11 : YM26700
  - IC12 : LM310
  - IC13~22 : NJM4558
  - 6. ☆ Mark : Ceramic Capacitor
  - Other : Mylar Capacitor

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. SC8 ..... Synchro-clock input on the first channel.
3. POR ..... Portamento and Glissando operation. When the portamento VR is turned on, +8.5V is supplied to the pin and actuate.
4. PC ..... Clock input for Portamento and Glissando operation.



The frequency is variable by Changing the portamento VR.

5. N1 } ..... Note code data input  
Note code data is supplied to the pins from key coder LSI.
8. N4 }
9. B1 } ..... Octave code data input  
Octave code data is supplied to the pins from key coder LSI.
11. B3 }
12. OO ..... Output for octave key voltage. (8ch time sharing)  
Provided the output key voltage for the octave selected from octave code.

13. OCT0 } ..... Input for octave key voltage.

18. OCT5 }  
\* 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# } ..... Input for note key voltage

30. C }

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 |

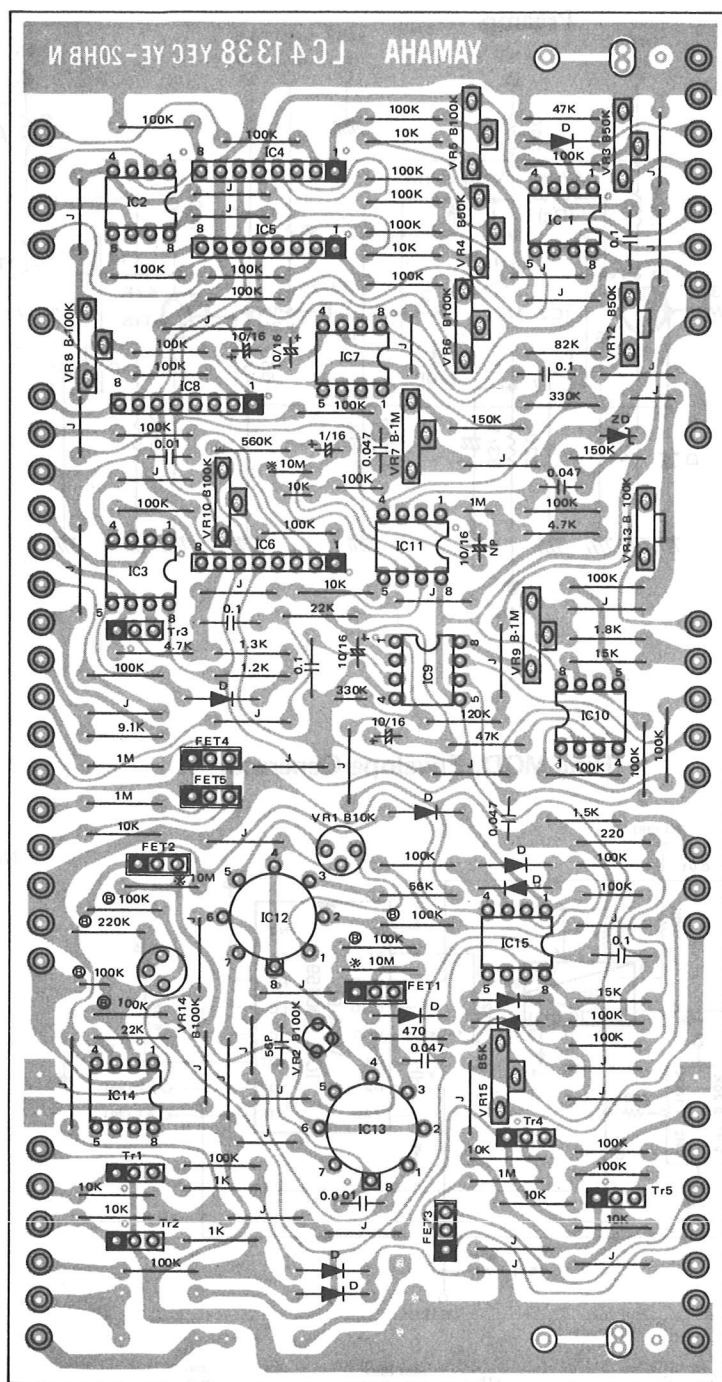
The voltage of OO line is divided by the ladder composed resistors and supplied to each pin constantly.

31. CH8 } ..... Key voltage output  
The output of voltage determined by each key is provided in accordance with the channel key code.
38. CH1 }
39. VDD ..... -6.5V Power Supply, Input
40. φ ..... Master Clock Input f=94±5KHz



SUB Circuit Board (LC41338)

- PN2-VR13-2 → OR → (38) OD
- RA-R6-V2 ← BE → (39) OO
- RA-R6-VCF (70) ← BR → (40) FO
- PN2-VR14-2 → RE → (41) FD
- RA-T61-b (32) → RE → (43) D
- RA-M1-PWM (41) ← YE → (45) P
- RA-T61-f (28) ← BE → (46) C
- RA-M1-NI (43) ← BR → (47) E
- RA-KAS-TU (67) ← GY → (49) O
- PN2-VR1A-2 → BR → (50) I
- (51) E
- PN2-VR1A-1 ← OR → (52) PL
- PN3-SW2-T → GR → (53) TS2
- PN2-SW1-5 ← WH → (54) N
- RA-KBC-+8.5(6) → PK12 → (55) +8.5
- PN3-SVR2-2 → VI → (56) TV2
- RA2-KAS-PS (93) ← SB → (57) PS
- PU-15S (4) ← YE12x2 → (58) -15
- PU-15 (5) ← YE12x2 → (59) -15
- RA-M1-15 (39) ← YE12x2 → (59) -15
- RA-KBC-15 (69) ← WH → (60) T1
- PN2-VR1B-3 ← WH → (60) T1
- (63) TP1
- (64) TP2
- RA-T61-O (17) → OF → (65) 2DF
- RA-M1-RF (60) ← BE → (66) 2FO
- RA-M1-RA (65) ← RE → (67) 2AO
- RA-T61-U (10) → WH → (68) 2DA



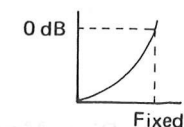
- E (1) ← BL12x2 → RA-KBC-E (2)
- E (2) ← BR → RA-EP2
- TRO(3) → PN2-VR13-3
- TRI (4) ← RE12 → TS-4
- SUI (5) ← OR → PN2-SW1-7
- SUO (6) → YE → PN2-VR8-3
- +15 (7)
- +15 (8)
- VC1 (11) ← BR → RA-T61-a (33)
- VC2 (16) ← RE → PN2-VR7-2
- PO (17) → GR → PN2-SW1-4
- SO (18) → YE → PN2-SW1-2
- S $\bar{O}$  (19) → GY → PN2-SW1-3
- SIO (20) → BE → PN2-SW1-1
- I3 (22) → OR → SC-I3
- I2 (23) ← RE → SC-I2
- I1 (24) → BR → SC-I1
- TP3
- TS3 (29) ← VI → PN5-EJ3-1
- TS1 (30) ← BE → PN3-SW1-T
- SUS (31)
- TV1 (32) ← GR → PN3-SVR1-2
- TS4 (33) → VI → PN3-SW1-M
- +15 (34)
- +15 (35) ← BR12x2 → RA-M1+15 (35)
- RA-KBC+15 (35)

- Note)
1. Print Board LC41338
  2. Transistor
    - Tr1,2,3,4: 2SC458
    - Tr5 : 2SA561
    - FET1~5: 2SK30A
  3. Diode
    - D : 1S1555
    - ZD : 1S1715P
  4. Volume
    - VR1,2,14: 3321H
    - Other : 10KVR

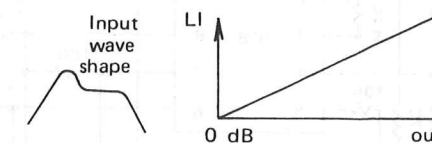
5. IC
  - IC12 : TA7504M
  - IC13 : CA3140T(RCA)
  - IC1~3,10,11,14,15 : NJM4558D
  - IC4 ~6,8 : IG00151
  - IC7,9 : IG00150
6. Resistor
  - Ⓟ Mark : 0.1% Metal Film Resistor
  - ※ Mark : Solid Resistor

VCA IC (IG00151)

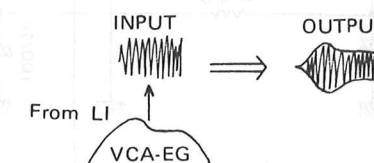
1. EI ..... Input voltage for level control. Input of the control voltage is provided for changing the level exponentially.



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

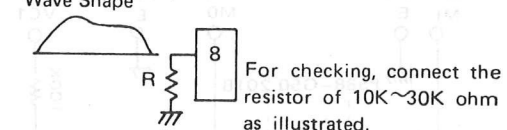


3. +IN ..... Input. Input of the level modulated signal is provided.



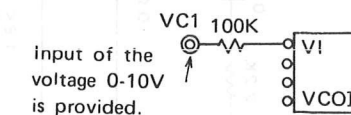
4. -IN ..... Negative feed back. Normally unused.
5. Vee ..... -15V input power source.
6. Vcc ..... +15V input power source.
7. GND ..... Earth
8. OUT ..... Output

Output of the following wave shape is produced.

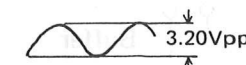


VCOII IC (IG00150)

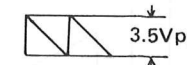
1. VI ..... Input of the control voltage. The frequency is variable in accordance with the voltage supplied.



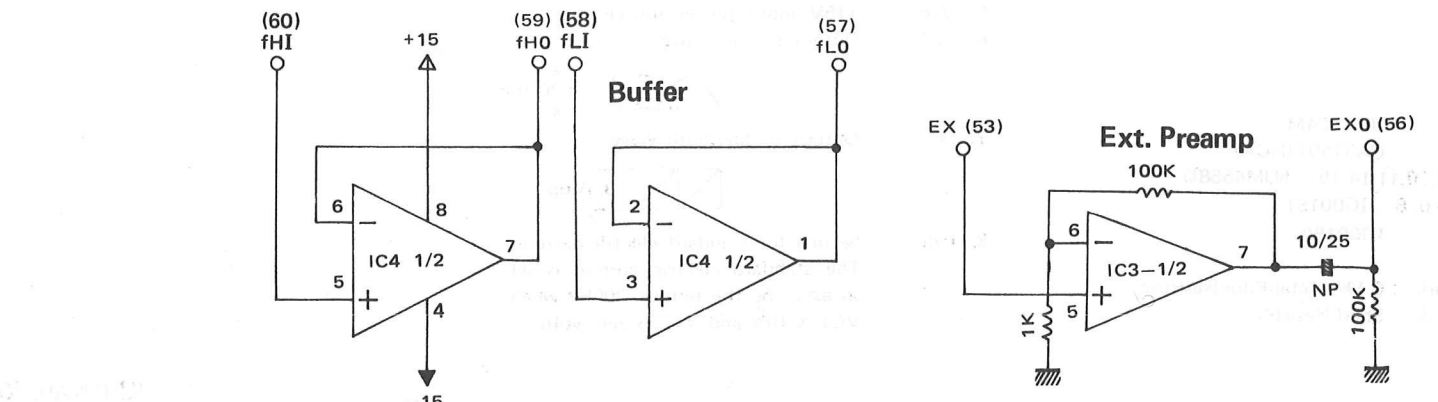
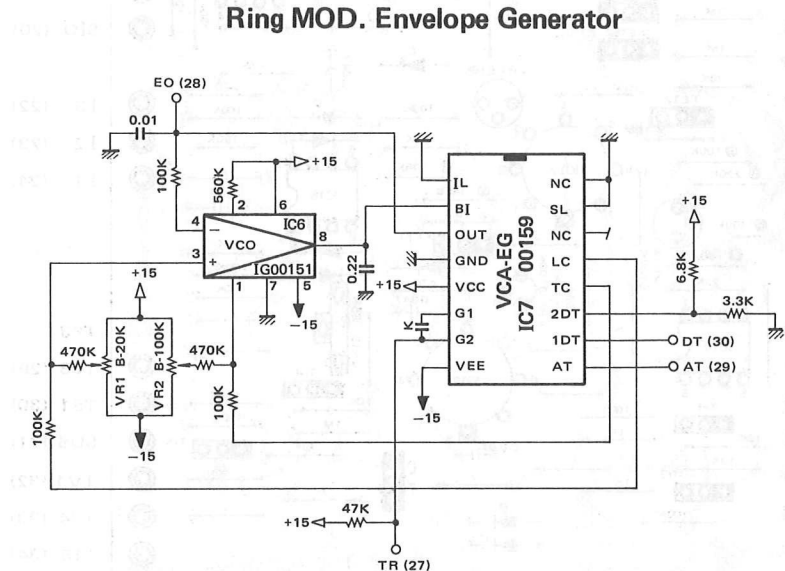
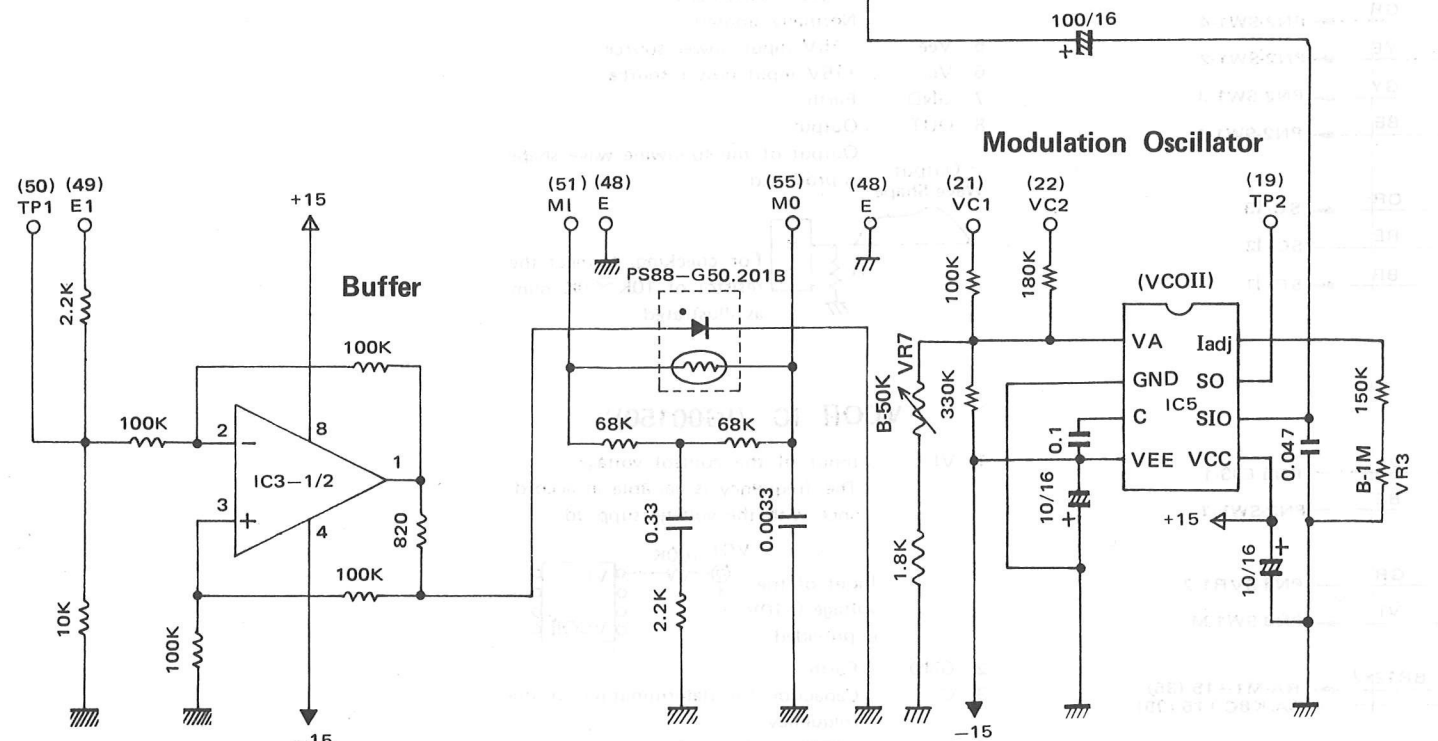
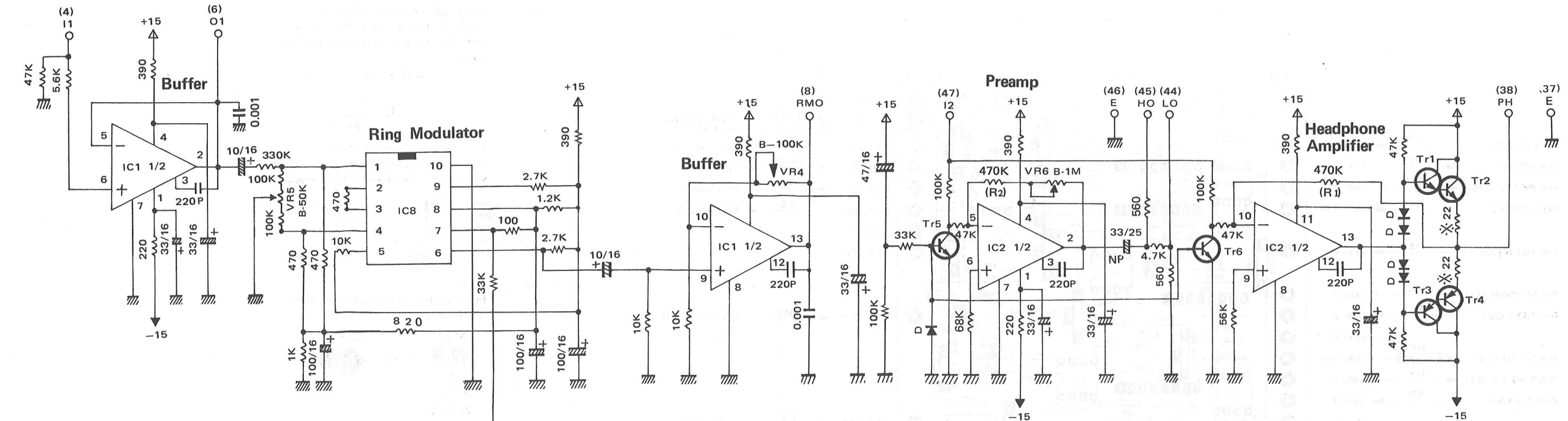
2. GND ..... Earth
3. C ..... Capacitor for determination of the frequency.
4. Vee ..... -15V input power source.
5. Vcc ..... +15V input power source.
6. SIO ..... Output of sine wave.



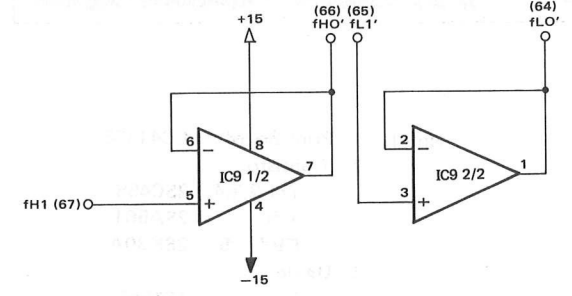
7. SO ..... Output of sawtooth wave



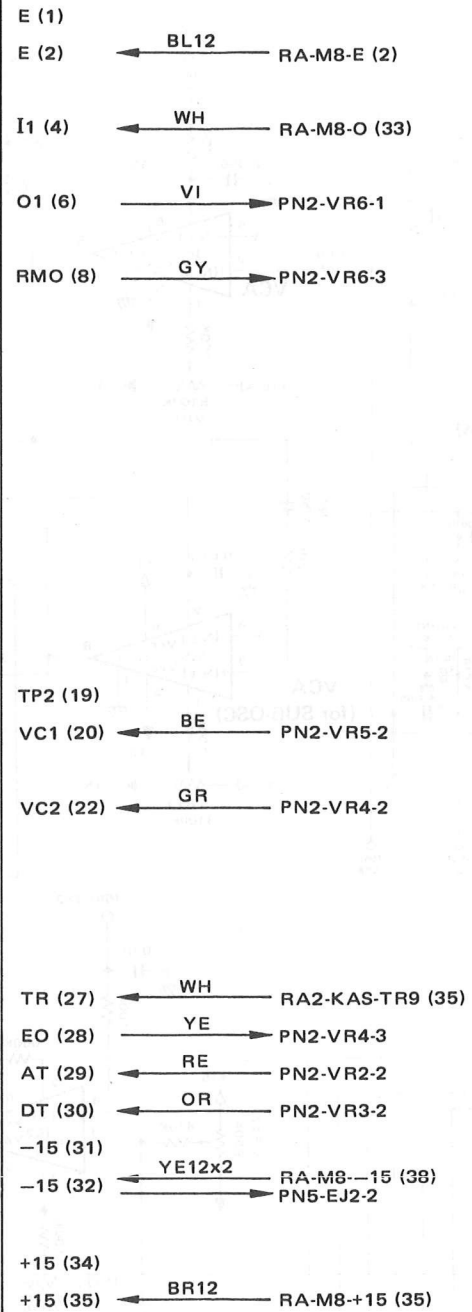
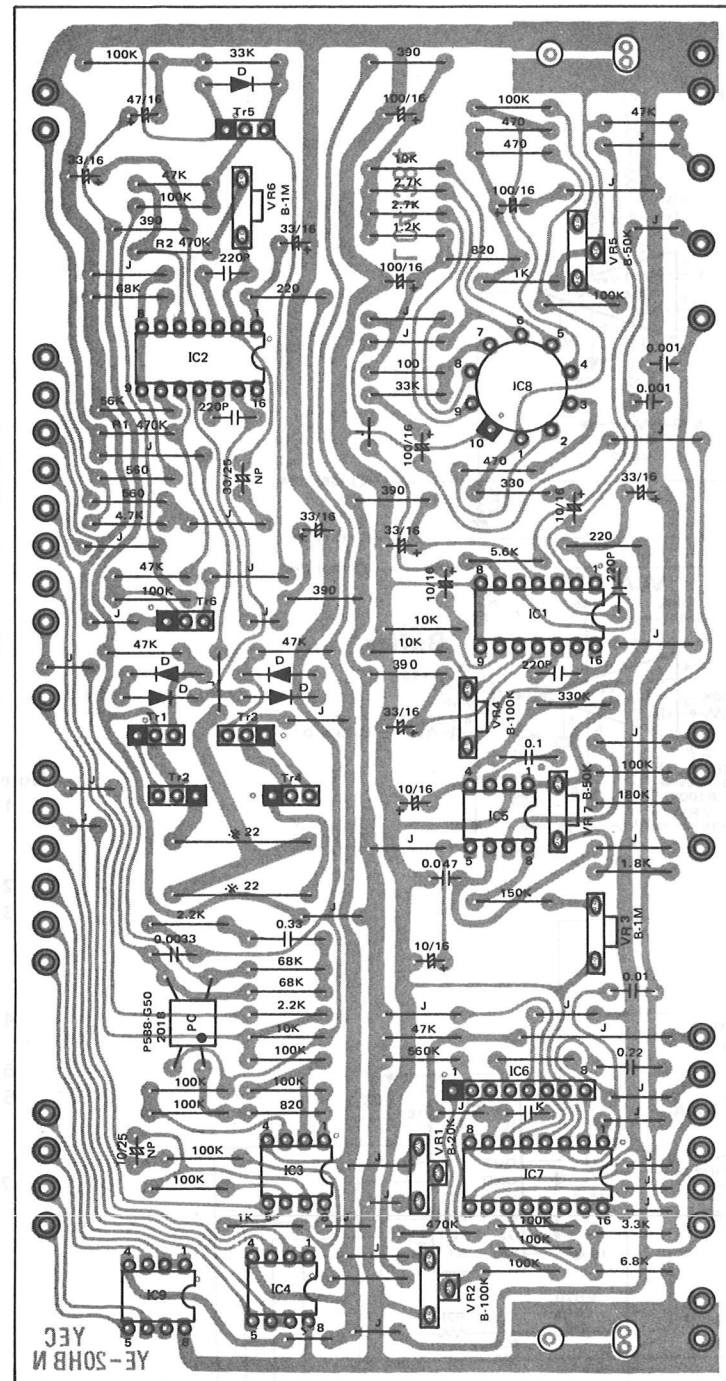
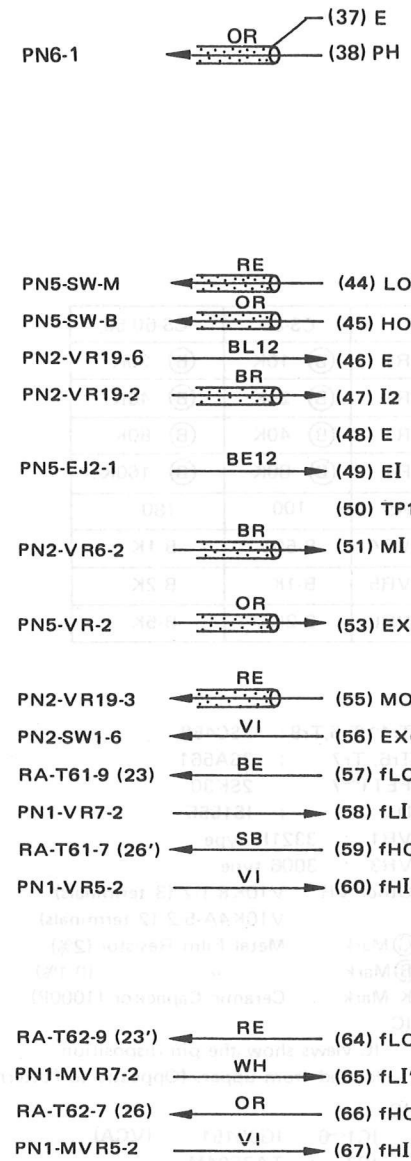
8. Iadj ..... Setting for standard electric current. The standard electric current is set so as to be the output 200Hz when VC1 is 10V and VC2 is zero volt.



- Note)
- IC
    - IC1,2 : HA1452
    - IC3,4,9 : NJM4558D
    - IC5 : IG00150
    - IC6 : IG00151
    - IC7 : IG00159
    - IC8 :  $\mu$  A796HC
  - Tr
    - Tr1,5,6 : 2SC458
    - Tr2 : 2SD234
    - Tr3 : 2SA561
    - Tr4 : 2SA490
  - ⊗ Mark : 2W Metal Oxide Resistor
  - VR : V10K
  - △ Mark : Tantalum Capacitor
  - D : IS1555
  - IC9 is used for CS-60 only
  - Value of R1
    - CS-50 : 270K
    - CS-60 : 470K
  - Value of R2
    - CS-50 : 150K
    - CS-60 : 470K



PRA Circuit Board

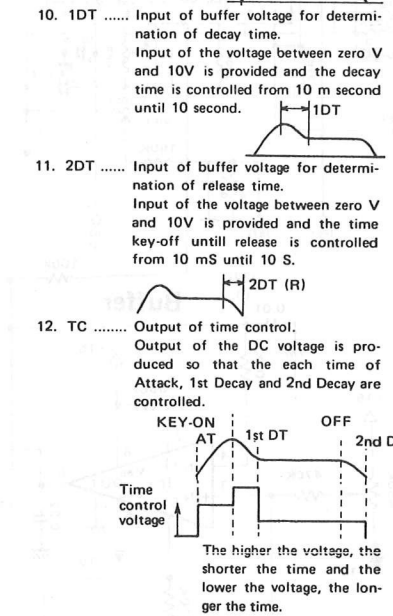
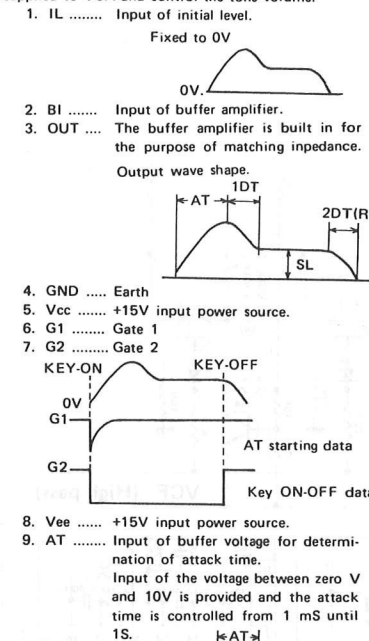


- Note) 1. Print Board LC41384  
 2. Transistor  
 Tr1, 5, 6 : 2SC458  
 Tr2 : 2SD234  
 Tr3 : 2SA561  
 Tr4 : 2SA490  
 3. IC  
 IC1, 2 : MA1452  
 IC3,4,9 : NJM4558  
 IC5 : IG00150  
 IC6 : IG00151  
 IC7 : IG00159  
 IC8 :  $\mu$ A796HC

4. Diode  
 D : 1S1555  
 5.  
 \* Mark : 2W Metal Film Resistor  
 $\Delta$  Mark : Tantalum Capacitor

VCA-EG IC (IG00159)

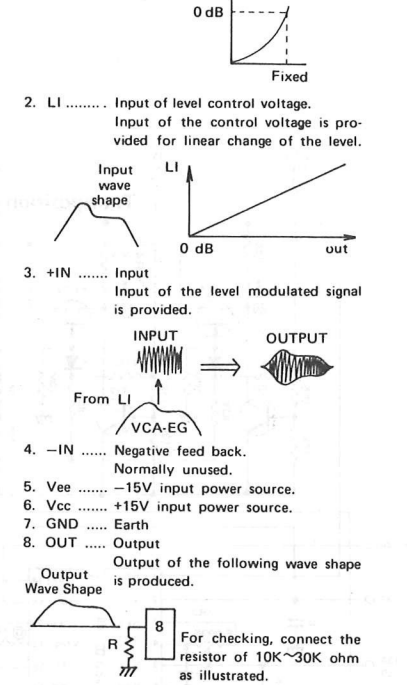
This IC generates envelope wave shape which is supplied to VCA and control the tone volume.



16. NC (Not connected).

VCA IC (IG00151)

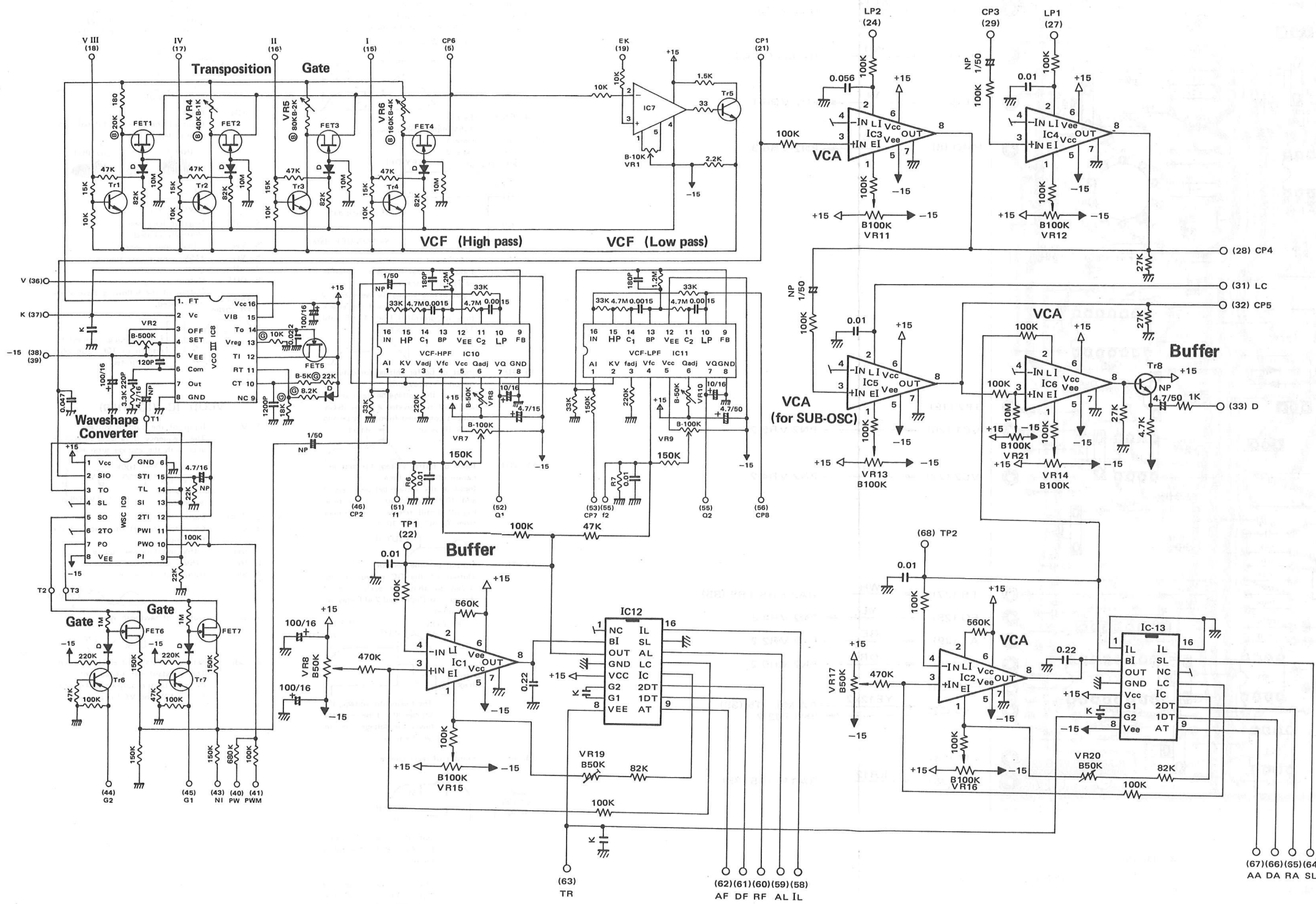
1. EI (Input voltage for level control. Input of the control voltage is provided for changing the level exponentially.)  
 2. LI (Input of level control voltage. Input of the control voltage is provided for linear change of the level.)



VCOII 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.)





|     | 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)

- Tr1~Tr5, Tr8 : 2SC458  
Tr6, Tr7 : 2SA561  
FET1~7 : 2SK30
- D : IS1555
- VR1 : 3321H type  
VR3 : 3006 type  
Other VR : V10K8-1-2 (3 terminals)  
: V10K4A-5-2 (2 terminals)
- Ⓞ Mark : Metal Film Resistor (2%)  
Ⓟ Mark : " (0.1%)
- K Mark : Ceramic Capacitor (1000P)
- IC views show the pin disposition looked from upper. (Opposite to Pattern)
- IC1~6: IG00151 (VCA)  
IC7 : TA7504M  
IC8 : IG00153 (VCOIII)  
IC9 : IG00158  
IC10,11: IG00156  
IC12 : IG00152  
IC13 : IG00159

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    |    |

VCO III IC (IG00153)

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

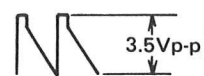
- 1. FT ..... Resistor for determination of the feet. The electric current is provided to the pin from transposition changing circuit so that the octave can be determined.
- 2. KV ..... Input of the key voltage. The input of the voltage is provided to the pin in corporation with the keys held down.

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. OFF-SET ..... Zero adjustment of input buffer circuit
- 4. 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



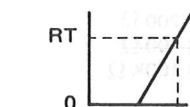
As to the frequency, refer to the Pin No.2 (KV).

- 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.

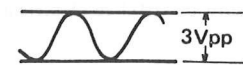


Determines the discharging voltage level.

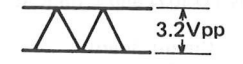
- 12. T1 ..... Input for the comparator. Input of the wave shape (N) is provided. from the pin no. 14 (TO).
- 13. Iref ..... Input of the standard electronic current
- 14. TO ..... Output from time constant circuit. The following wave shape is produced.
- 15. VIB ..... Input for vibrato control wave. Input of the control wave is provided by VCO lever of SUB-OSC.
- 16. Vcc ..... +15V input power source.

WSC IC (IG00158)

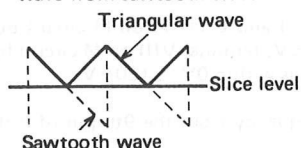
- 1. Vcc ..... +15V input power source
- 2. SIO ..... Output of the sine wave



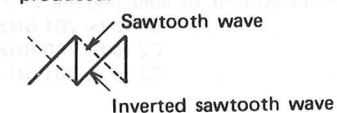
- 3. TO ..... Output of triangular wave.



- 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. 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.

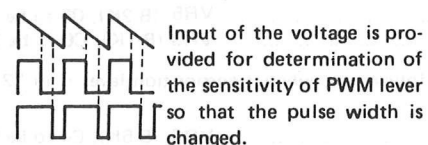
- 7. PO ..... Output of pulse wave.

- 8. Vee ..... -15V input power source.

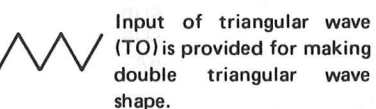
- 9. PI ..... Input of pulse wave. Input of sawtooth wave is provided.

- 10. PWO ..... Output of OP amplifier.

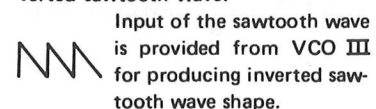
- 11. PWI ..... Input of OP amplifier.



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



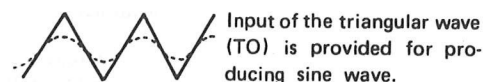
- 13. ST ..... Input of the pulse for producing inverted sawtooth wave.



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



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



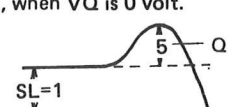
- 16. GND ..... Earth

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 current 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.

- 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.

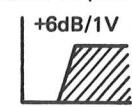
- 10. LP ..... Low-pass output. The output of lower frequencies are produced.



- 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 frequencies 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.



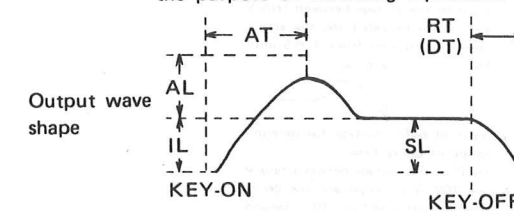
- 16. IN ..... Input of feed back. The input signal for determination of cut off frequency.

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 amplifier.

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

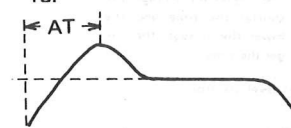


- 4. GND ..... Earth
- 5. Vcc ..... +15V input power source.
- 6. G1 ..... Gate 1
- 7. G2 ..... Gate 2

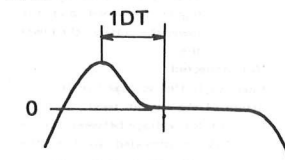
AT starting data

Key ON-OFF data

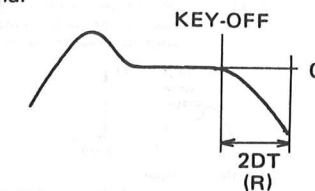
- 8. Vee ..... -15V input power source.
- 9. AT ..... Input of buffer voltage for determination of the attack time. Input of the voltage between zero V and 10V is provided and the attack time is controlled from 1 mS until 1S.



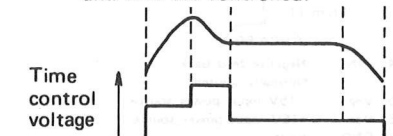
- 10. 1DT ..... Input of buffer voltage for determination of the decay time. Input of the voltage between zero V and 10V is provided and the first decay time is controlled from 10mS until 10 S.



- 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.

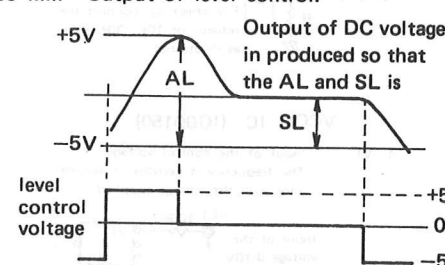


- 12. TC ..... Output of the time control. Output of DC voltage is produced so that the each time of attack, 1DT and 2DT are controlled.



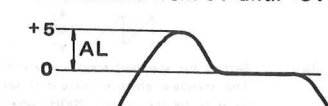
The higher the voltage, the shorter the time and the lower the voltage the longer the time.

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

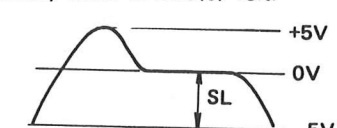


The higher the voltage, the higher the level and the lower the voltage the lower the level.

- 14. AL ..... Input of buffer voltage for determination of attack level. Input of the voltage between (0V~10V) is provided and the attack level is controlled from 0V until +5V.



- 15. SL ..... Input of buffer voltage for determination of the sustain level. Normally fixed to zero(0) volt.



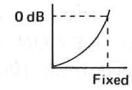
- 16. IL ..... Input of buffer voltage for determination of the initial level. Input of the voltage between zero 0V and ten 10V is provided and the initial level is controlled from zero to minus 5 volt.



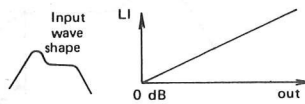
Pitch Adjustment

VCA IC (IG00151)

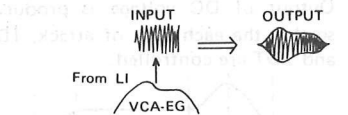
1. EI ..... Input voltage for level control.  
Input of the control voltage is provided for changing the level exponentially.



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.



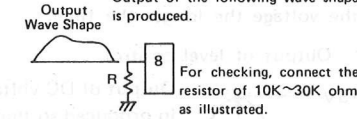
4. -IN ..... Negative feed back.  
Normally unused.

5. Vee ..... -15V input power source.

6. Vcc ..... +15V input power source.

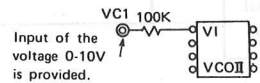
7. GND ..... Earth

8. OUT ..... Output  
Output of the following wave shape is produced.



VCOII IC (IG00150)

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



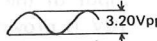
2. GND ..... Earth

3. C ..... Capacitor for determination of the frequency.

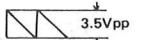
4. Vee ..... -15V input power source.

5. Vcc ..... +15V input power source.

6. SIO ..... Output of sine wave.



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

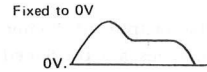


8. Iadj ..... Setting for standard electric current.  
The standard electric current is set so as to be the output 200Hz when VC1 is 10V and VC2 is zero volt.

VCA-EG IC (IG00159)

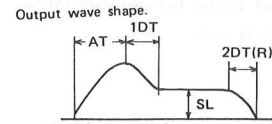
This IC generates envelope wave shape which is supplied to VCA and control the tone volume.

1. IL ..... Input of initial level.  
Fixed to 0V



2. BI ..... Input of buffer amplifier.

3. OUT ..... The buffer amplifier is built in for the purpose of matching impedance.

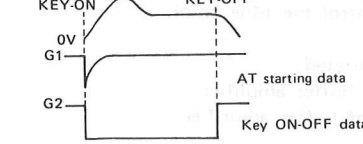


4. GND ..... Earth

5. Vcc ..... +15V input power source.

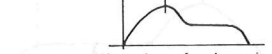
6. G1 ..... Gate 1

7. G2 ..... Gate 2



8. Vee ..... +15V input power source.

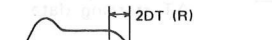
9. AT ..... Input of buffer voltage for determination of attack time.  
Input of the voltage between zero V and 10V is provided and the attack time is controlled from 1 mS until 1S.



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.

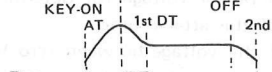


11. 2DT ..... Input of buffer voltage for determination of release time.  
Input of the voltage between zero V and 10V is provided and the time key-off until release is controlled from 10 mS until 10 S.



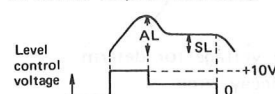
12. TC ..... Output of time control.

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 time.

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

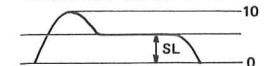


Output of the DC voltage for AL and SL control is provided.

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

14. NC ..... Not connected.

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.



16. NC ..... Not connected.

\*Before carrying out pitch adjustment, be sure to stabilize electrical circuits of your synthesizer more than 10 minutes after power switch is turned on.

1. Adjust the following variable resistors, when tuning knob on the panel is in the center position, so that the voltage of TU terminal is +4V ± 0.1% between the terminals TU (67) and E on KAS circuit board.

|       | Circuit Board | VR No. |         |
|-------|---------------|--------|---------|
| CS-50 | SUB           | VR11   | B-200Ω  |
| CS-60 | SUB           | VR14   | B-100KΩ |
| CS-80 | BA            | VR3    | B-100KΩ |

\*Make sure, all the levers on the panel are in "OFF" position.

2. Short circuit terminals EK (19) and E (1)(2) on M circuit board when tone selector is set to "FLUTE" and transposition lever is in "OCT-UP (2' on CS-80) (+15V, terminal VIII on M circuit board) position. Then, adjust VR1 (B-10K) on M circuit board so that the voltage of terminal Cp (5) is within 0V ± 120μV.

3. With checking the output frequency from the 9th pin of IC9 (WSC) on M circuit board, adjust the VR3 (B-5K) to have the certain highest note.

|           |   |
|-----------|---|
| CS-50, 60 | C7 to be 4186 Hz ± 1 cent when C6 key is depressed. |
| CS-80     | C8 to be 8372 Hz ± 1 cent when C6 key is depressed. |

In the same manner, set the lowest note by adjusting the VR2 (B-500) as follows.

|       |   |
|-------|---|
| CS-50 | C3 to be 261.6Hz ± 1 cent when C2 key is depressed. |
| CS-60 | C2 to be 130.8Hz ± 1 cent when C1 key is depressed. |
| CS-80 | C3 to be 261.6Hz ± 1 cent when C1 key is depressed. |

Note:

(1) You can easily find out which M circuit board is corresponding to the key depressed by hearing the subtle change of the tone with hum modulation when you are adjusting VR2 on A M circuit board.

(2) The order the possible sounds when keys are depressed in turn is:

① → ② → ③ → ④ → ⑤ → ⑥ → ⑦ → ⑧

When keys are depressed at a time:

① → ② → ③ → ④ → ⑤ → ⑥ → ⑦ → ⑧ → ①

Therefore, when you adjust the M8 circuit board, depress the 8th key while 7th key is holding down, then release the 7th key. In this way, you can take out the sound of 8th key depressed.

4. Adjust the following variable resistors, when transposition lever is in "NORMAL" ("4'" on CS-80) position (+15V at terminal IV) as below.

|           |   |
|-----------|---|
| CS-50, 60 | VR4 (B-1K); C6 to be 2093Hz ± 1 cent when C6 key is depressed.  |
| CS-80     | VR4 (B-500); C7 to be 4186Hz ± 1 cent when C6 key is depressed. |

5. Adjust the following variable resistors, when transposition lever is in "1 OCT-DOWN" ("8'" on CS-80) position (+15V at terminal II) as below.

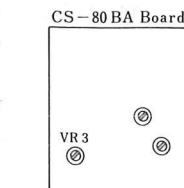
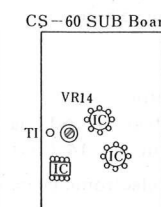
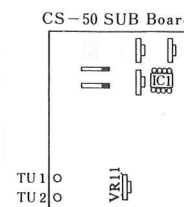
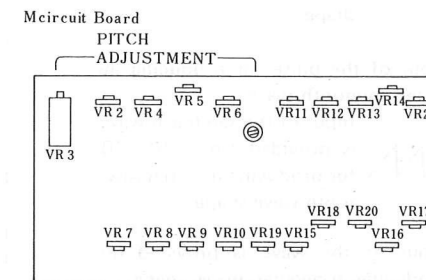
|           |  |
|-----------|--|
| CS-50, 60 | VR5 (B-2K); C5 to be 1046Hz ± 1 cent when C6 key is depressed. |
| CS-80     | VR5 (B-1K); C6 to be 2093Hz ± 1 cent when C6 key is depressed. |

6. Likewise, adjust the followings, when transposition lever is in "2 OCT-DOWN" ("16'" on CS-80) position (+15V at terminal I) as below.

|           |  |
|-----------|--|
| CS-50, 60 | VR6 (B-5K); C4 to be 523.2Hz ± 1 cent when C6 key is depressed.  |
| CS-80     | VR6 (B-2K); C5 to be 1046.4Hz ± 1 cent when C6 key is depressed. |

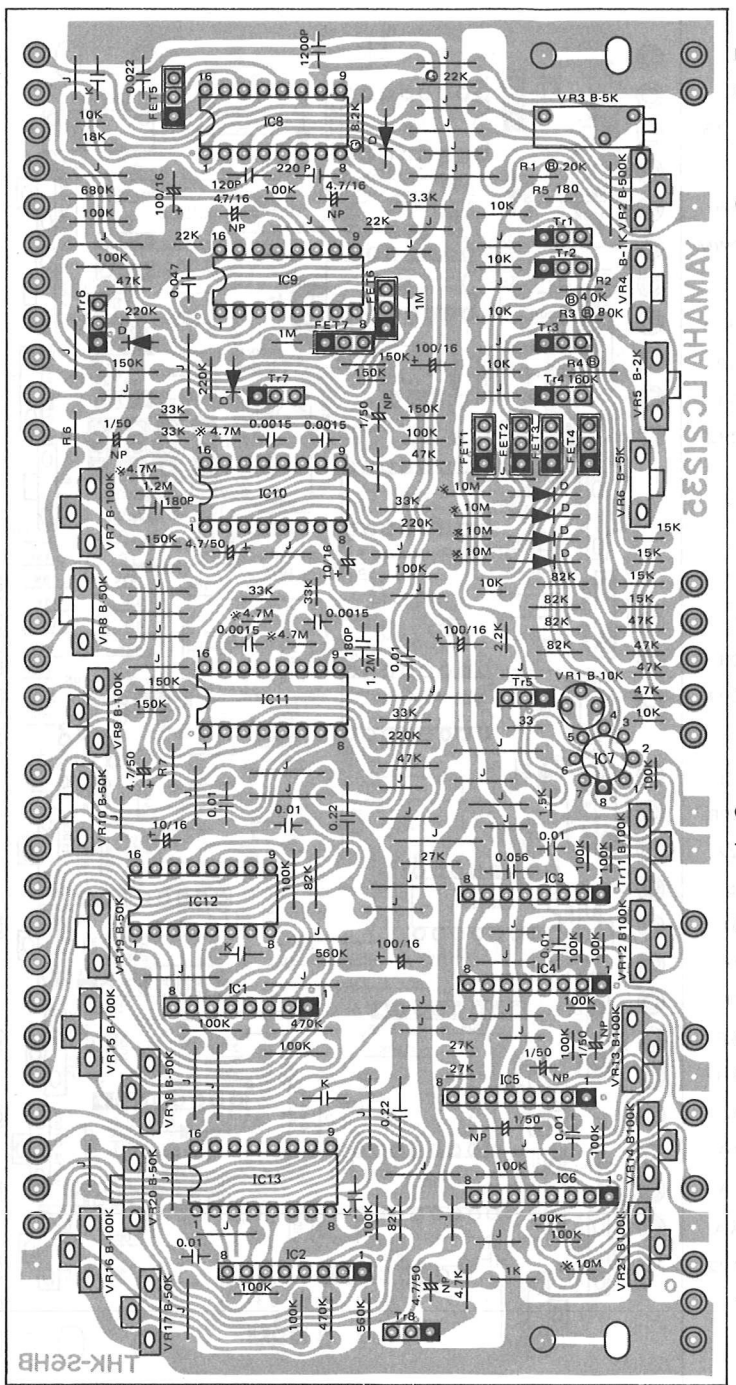
7. Finally, adjust the generating circuit for tuning standard voltage, when A3 key is depressed, so that the output is 443 Hz.

|       | Circuit Board | VR. No. |         |
|-------|---------------|---------|---------|
| CS-50 | SUB           | VR11    | B-200Ω  |
| CS-60 | SUB           | VR14    | B-100Ω  |
| CS-80 | BA            | VR3     | B-100KΩ |



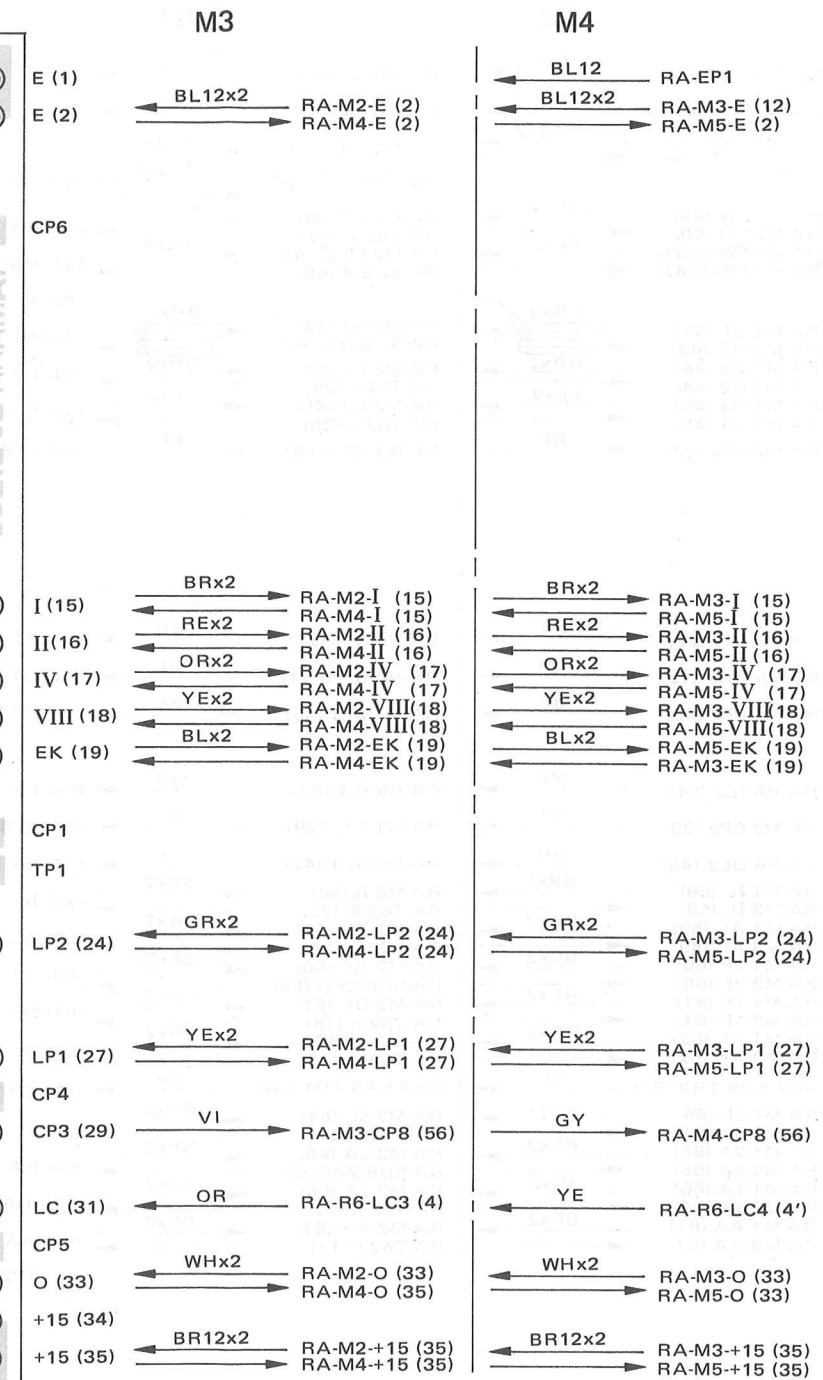
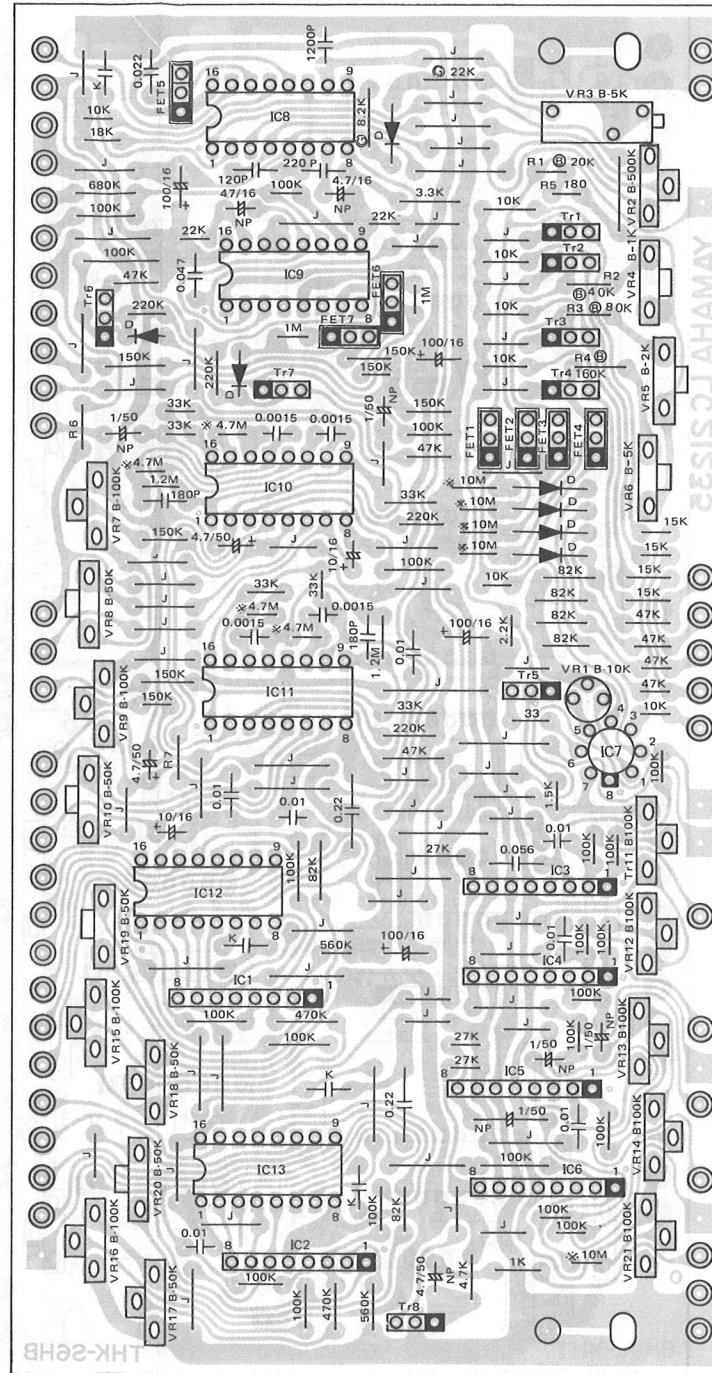
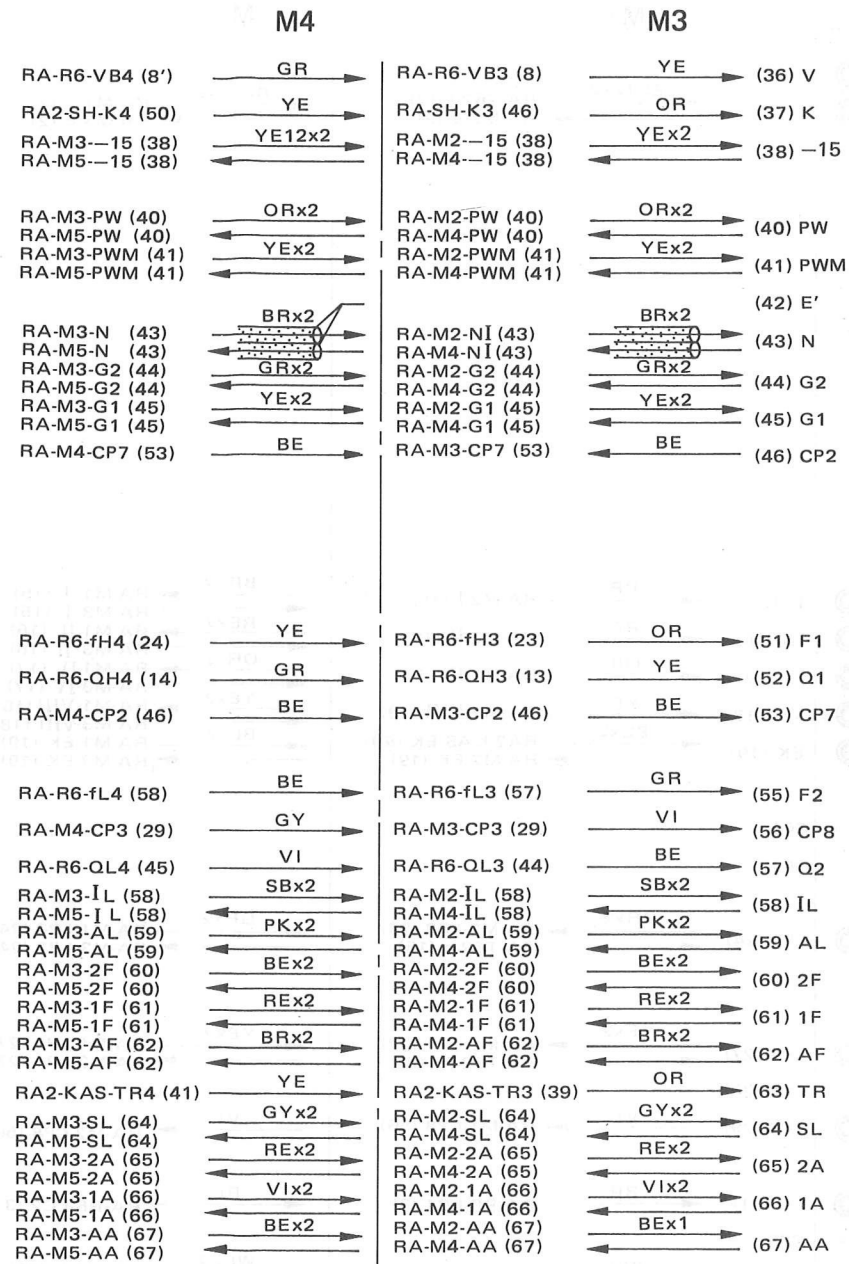
# M1, M2 Circuit Board

| M2               |          | M1               |                   |
|------------------|----------|------------------|-------------------|
| RA-R6-VB2 (7')   | OR →     | RA-R6-VB1 (7)    | RE → (36) V       |
| RA2-SH-K2 (42)   | RE →     | RA2-SH-K1 (38)   | BR → (47) K       |
| RA-M1-15 (38)    | YE12x2 → | RA-M2-15 (38)    | YE12 → (38) -15   |
| RA-M3-15 (38)    | ← YE12x2 | RA-SUB-15 (59)   | ← YE12x2 (39) -15 |
| RA-M1-PW (40)    | ORx2 →   | RA-M2-PW (40)    | ORx2 → (40) PW    |
| RA-M3-PW (40)    | ← ORx2   | RA-T62-C (31)    | ← ORx2 (41) PWM   |
| RA-M1-PWM (41)   | YEEx2 →  | RA-M2-PWM (41)   | YEEx2 → (41) PWM  |
| RA-M3-PWM (41)   | ← YEEx2  | RA-SUB-P (45)    | ← YEEx2 (42) E    |
| RA-M1-NI (43)    | BRx2 →   | RA-M2-NI (43)    | BRx2 → (43) NI    |
| RA-M3-NI (43)    | ← BRx2   | RA-SUB-NO (41)   | ← BRx2 (44) G2    |
| RA-M1-G2 (44)    | GRx2 →   | RA-M2-G2 (44)    | GRx2 → (44) G2    |
| RA-M3-G2 (44)    | ← GRx2   | RA-T62-e (29)    | ← GRx2 (45) G1    |
| RA-M1-G1 (45)    | YEEx2 →  | RA-M2-Q1 (45)    | YEEx2 → (45) G1   |
| RA-M3-G1 (45)    | ← YEEx2  | RA-T62-d (30)    | ← YEEx2 (46) CP2  |
| RA-M1-G1 (45)    | BE →     | RA-M1-CP7 (53)   | BE → (46) CP2     |
| RA-M2-CP7 (53)   | ← BE     |                  |                   |
| RA-R6-fH2 (22)   | RE →     | RA-R6-fH1 (21)   | BR → (51) F1      |
| RA-R6-QH2 (12)   | OR →     | RA-R6-QH1 (11)   | RE → (52) Q1      |
| RA-M2-CP2 (46)   | BE →     | RA-M1-CP2 (46)   | BE → (53) CP7     |
| RA-R6-fL2 (54)   | YE →     | RA-R6-fL1 (53)   | OR → (55) F2      |
| RA-M2-CP3 (29)   | VI →     | RA-M1-CP3 (29)   | VI → (56) CP8     |
| RA-R6-QL2 (43)   | GR →     | RA-R6-QL1 (42)   | YE → (57) Q2      |
| RA-M1-IL (58)    | SBx2 →   | RA-M2-IL (58)    | ← SBx2 (58) IL    |
| RA-M3-IL (58)    | ← SBx2   | RA-T62-K (22)    | ← SBx2 (59) AL    |
| RA-M1-AL (59)    | PKx2 →   | RA-M2-AL (59)    | PKx2 → (59) AL    |
| RA-M3-AL (59)    | ← PKx2   | RA-T62-L (21)    | ← PKx2 (60) RF    |
| RA-M1-2F (60)    | BEEx2 →  | RA-M2-RF (60)    | BEEx2 → (60) RF   |
| RA-M3-2F (60)    | ← BEEx2  | RA-SUB-2FO (66)  | ← BEEx2 (61) DF   |
| RA-M1-1F (61)    | REEx2 →  | RA-M2-DF (61)    | REEx2 → (61) DF   |
| RA-M3-1F (61)    | ← REEx2  | RA-T62-n (18)    | ← REEx2 (62) AF   |
| RA-M1-AF (62)    | BRx2 →   | RA-M2-AF (62)    | BRx2 → (62) AF    |
| RA-M3-AF (62)    | ← BRx2   | RA-T62-m (19)    | ← BRx2 (63) TR    |
| RA2-KAS-TR2 (37) | RE →     | RA2-KAS-TR1 (36) | BR → (63) TR      |
| RA-M1-SL (64)    | GYx2 →   | RA-M2-SL (64)    | GYx2 → (64) SL    |
| RA-M3-SL (64)    | ← GYx2   | RA-T62-t (11)    | ← GYx2 (65) RA    |
| RA-M1-2A (65)    | REEx2 →  | RA-M2-2A (65)    | REEx2 → (65) RA   |
| RA-M3-2A (65)    | ← REEx2  | RA-SUB-2AO (67)  | ← REEx2 (66) DA   |
| RA-M1-1A (66)    | VIX2 →   | RA-M2-1A (66)    | VIX2 → (66) DA    |
| RA-M3-1A (66)    | ← VIX2   | RA-T62-S (12)    | ← VIX2 (67) AA    |
| RA-M1-AA (67)    | BEEx2 →  | RA-M2-AA (67)    | BEEx2 → (67) AA   |
| RA-M3-AA (67)    | ← BEEx2  | RA-T62-r (13)    | ← BEEx2 (67) AA   |

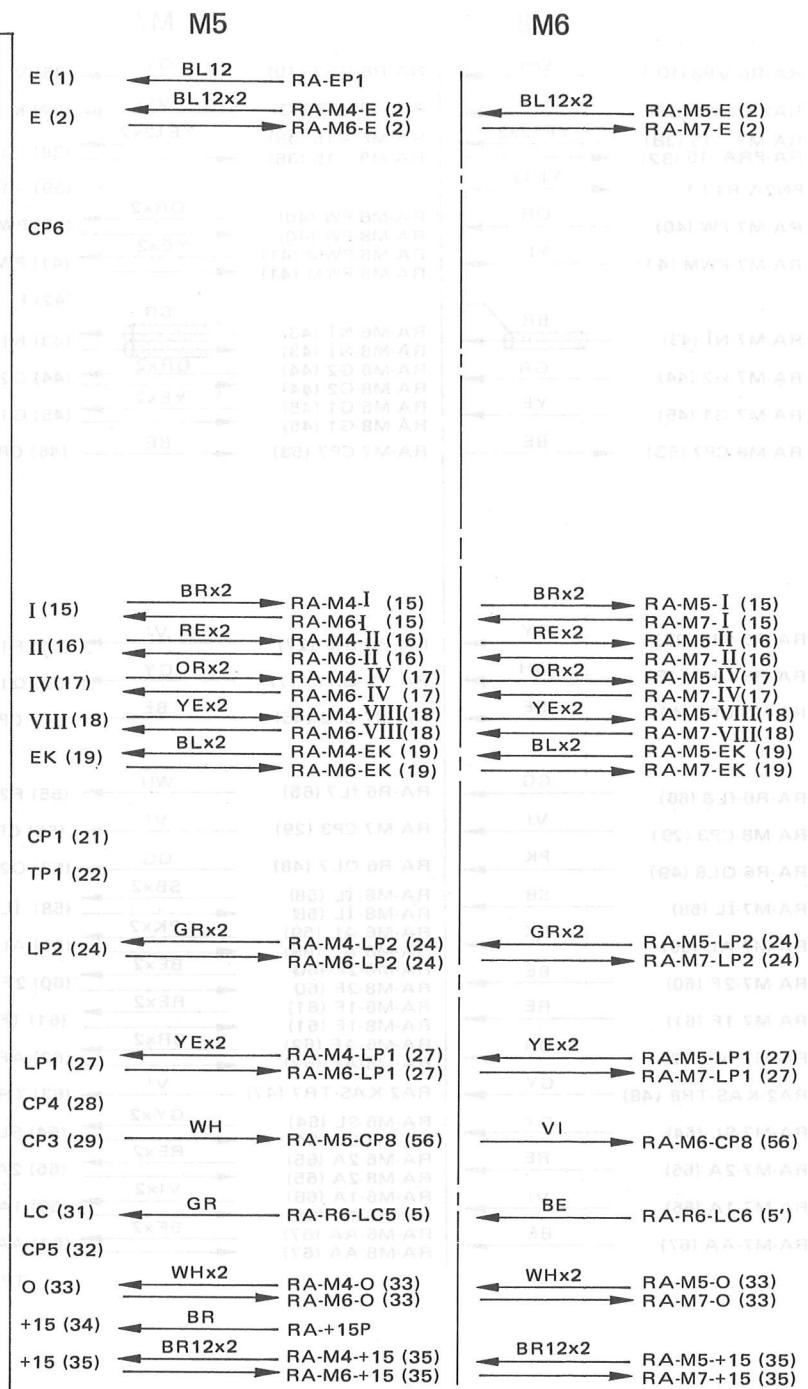
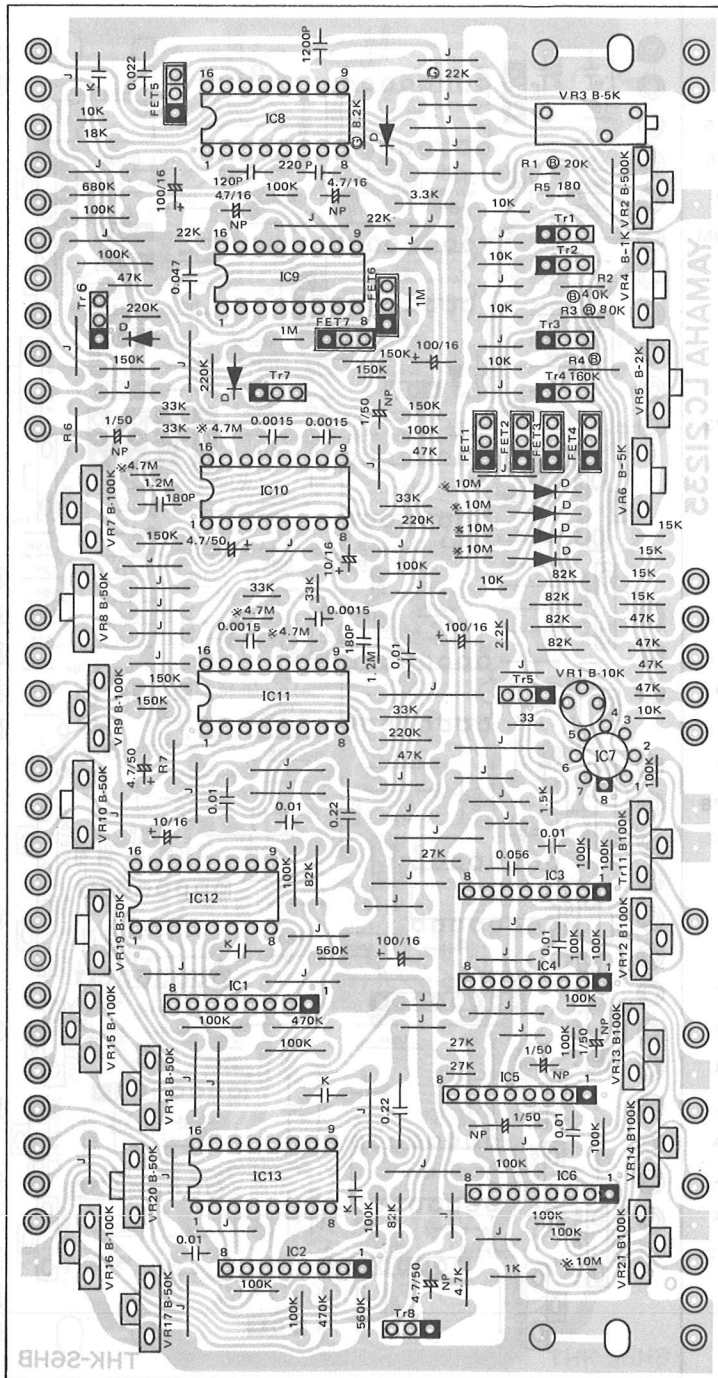
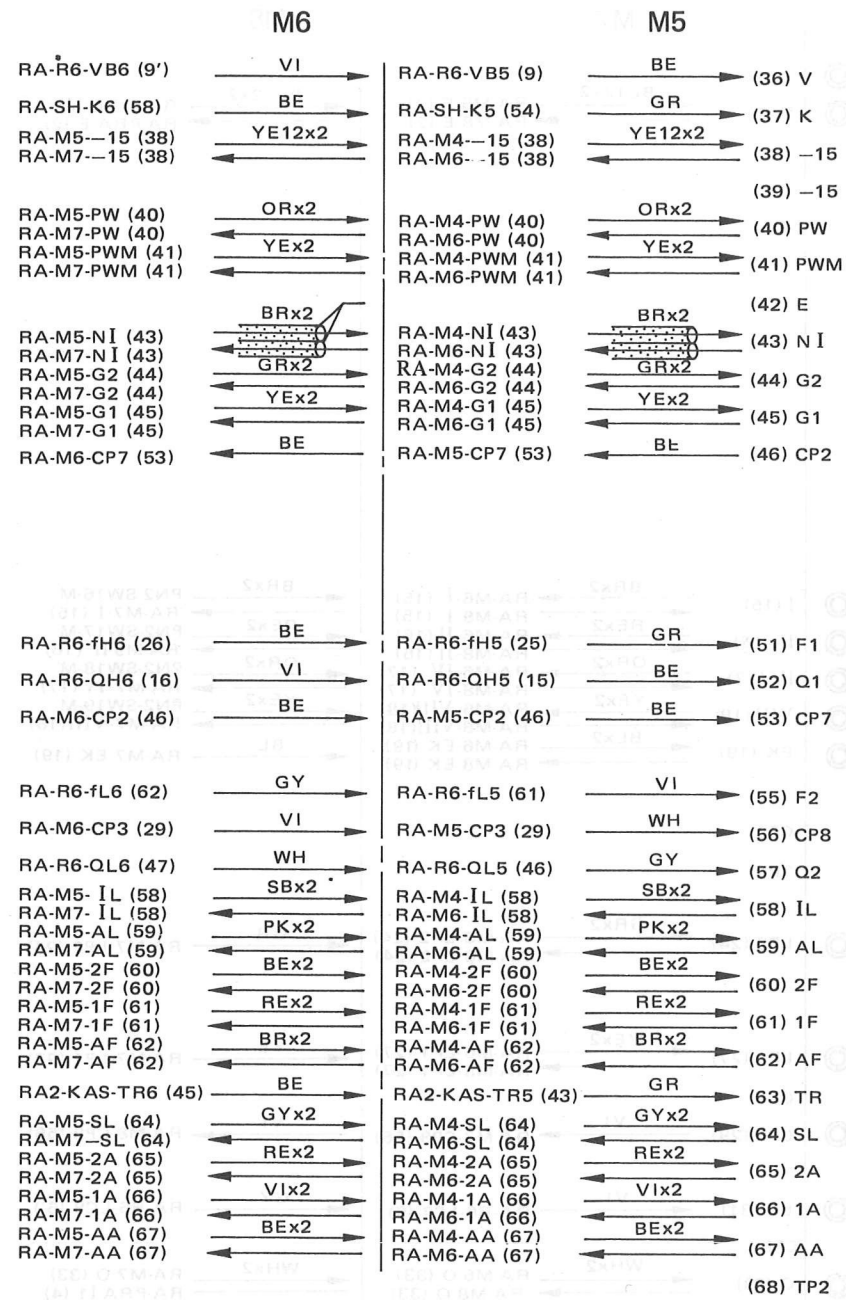


| M1        |          | M2              |                         |
|-----------|----------|-----------------|-------------------------|
| E (1)     | BL12x2 → | RA-T62-E (2)    | ← BL12x2 RA-M1-E (2)    |
| E (2)     | ← BL12x2 | RA-M2-E (2)     | ← BL12x2 RA-M3-E (2)    |
| CP6       |          |                 |                         |
| I (15)    | BR →     | RA-M2-I (15)    | ← BRx2 RA-M1-I (15)     |
| III (16)  | RE →     | RA-M2-II (16)   | ← REx2 RA-M3-I (15)     |
| IV (17)   | OR →     | RA-M2-IV (17)   | ← ORx2 RA-M1-II (16)    |
| VIII (18) | YE →     | RA-M2-VIII (18) | ← YEEx2 RA-M3-II (16)   |
| EK (19)   | BLx2 →   | RA2-KAS-EK (69) | ← BLx2 RA-M1-IV (17)    |
|           |          | RA-M2-EK (19)   | ← BLx2 RA-M3-IV (17)    |
| CP1       |          |                 | ← BLx2 RA-M1-VIII (18)  |
| TP1       |          |                 | ← BLx2 RA-M3-VIII (18)  |
| LP2 (24)  | GRx2 →   | RA-M2-LP2 (24)  | ← GRx2 RA-M1-EK (19)    |
|           | ← GRx2   | RA-T62-q (15)   | ← GRx2 RA-M3-EK (19)    |
| LP1 (27)  | YEEx2 →  | RA-M2-LP1 (27)  | ← YEEx2 RA-M1-LP2 (24)  |
| CP4 (28)  | ← YEEx2  | RA-T62-P (16)   | ← YEEx2 RA-M3-LP2 (24)  |
| CP3 (29)  | VI →     | RA-M1-CP8 (56)  | ← VI RA-M1-LP1 (27)     |
| LC (31)   | BR →     | RA-R6-LC1 (3)   | ← VI RA-M3-LP1 (27)     |
| CP5       |          |                 | ← RE RA-R6-LC2 (3')     |
| O (33)    | WH →     | RA-M2-O (33)    | ← WHx2 RA-M1-O (33)     |
| +15 (34)  | ← WHx2   |                 | ← WHx2 RA-M3-O (33)     |
| +15 (35)  | BR12x2 → | RA-SUB-+15 (35) | ← BR12x2 RA-M1-+15 (35) |
|           | ← BR12x2 | RA-M2-+15 (35)  | ← BR12x2 RA-M3-+15 (35) |

M3, M4 Circuit Board

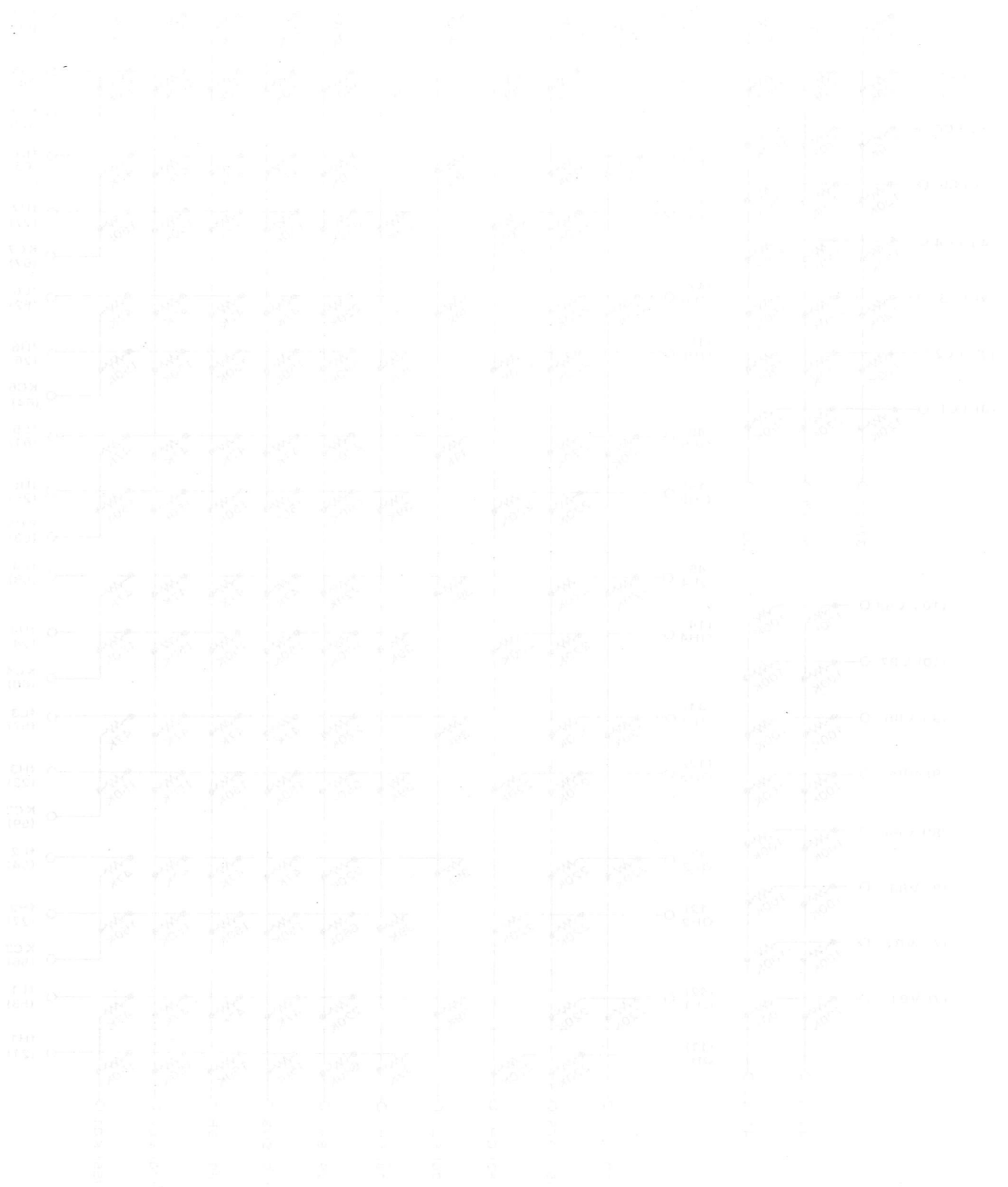


# M5, M6 Circuit Board



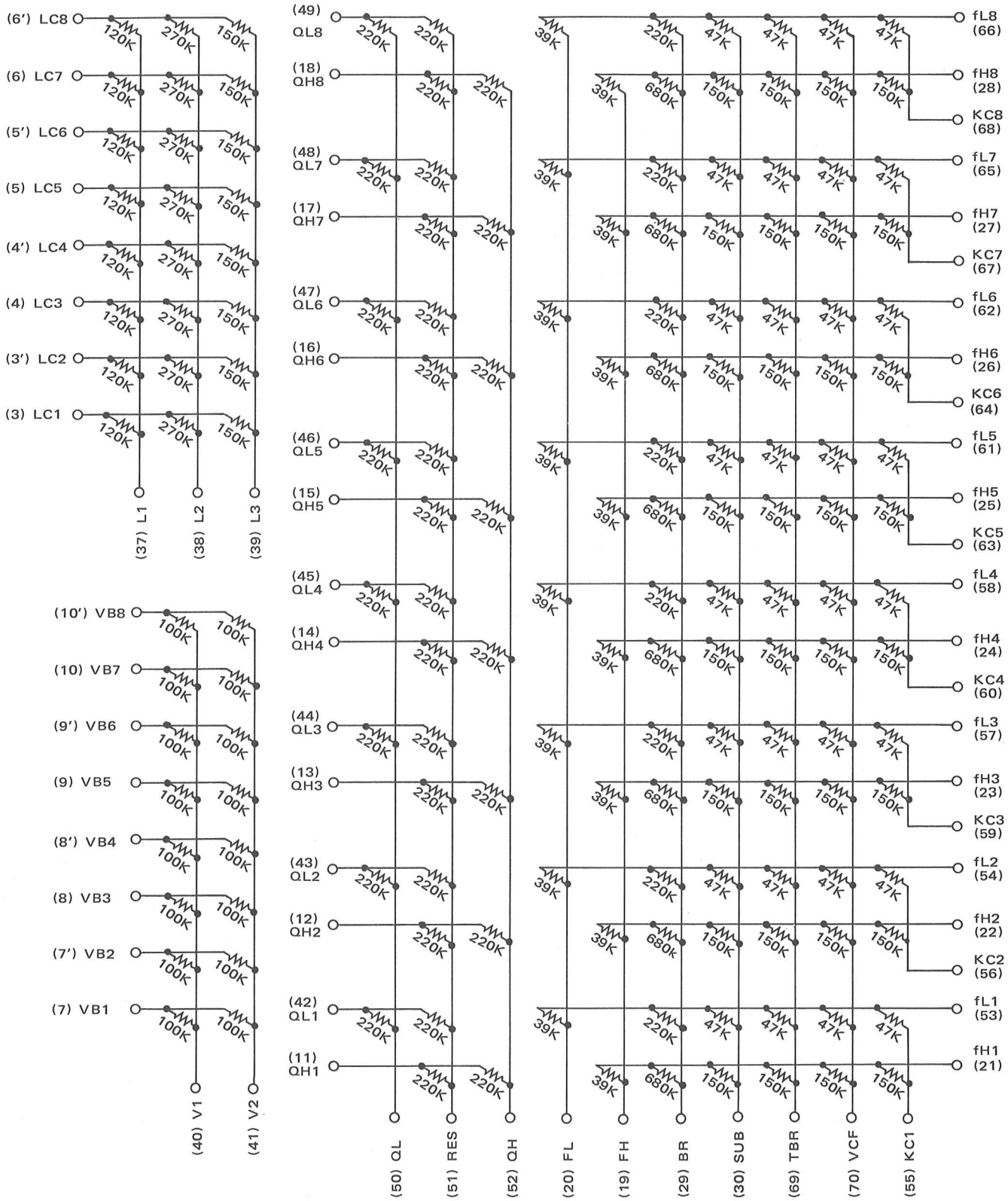


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### R6 (Register) Circuit



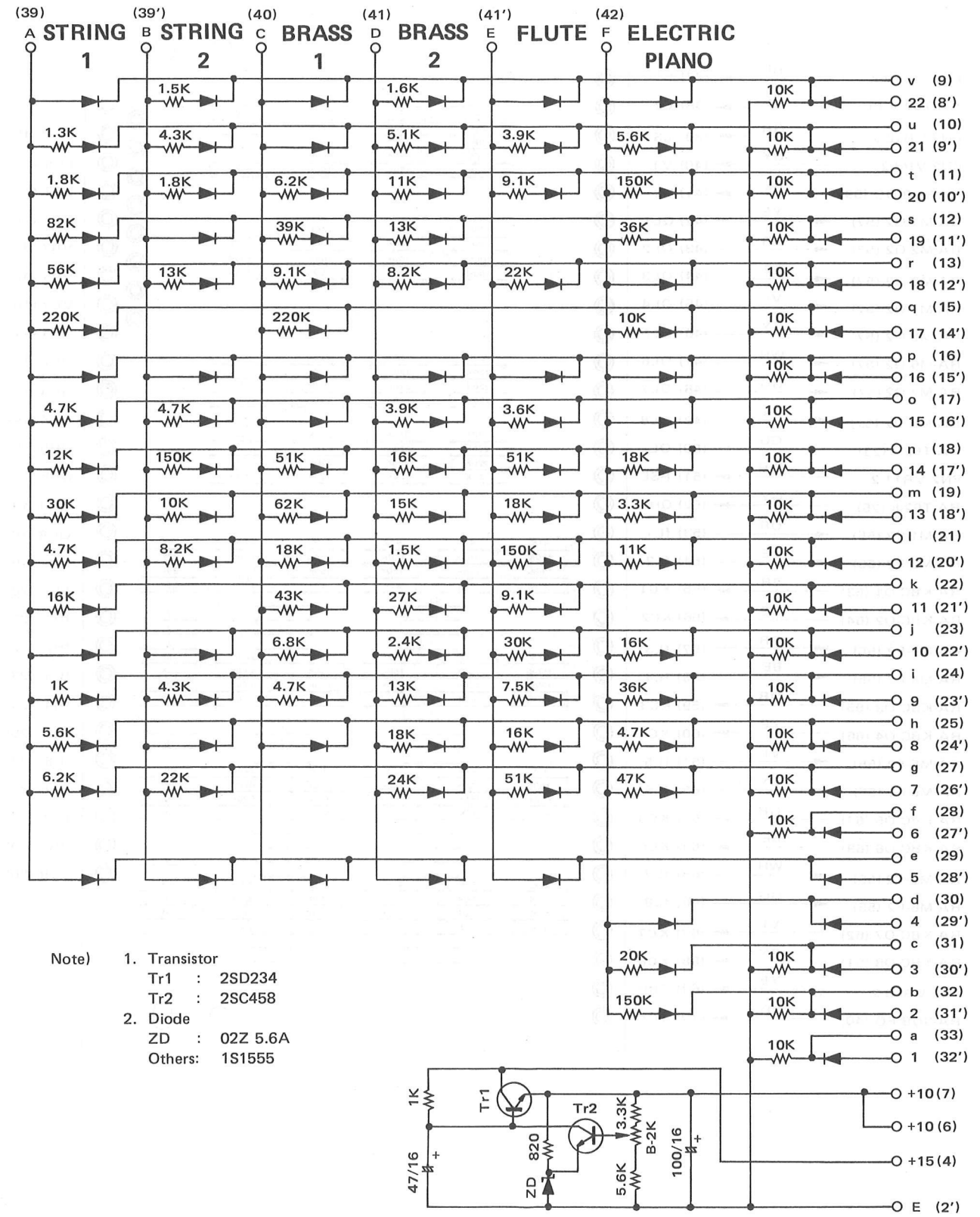


### T61 (Tone Preset 1) Circuit

INPUT: 10V

|                | out<br>in  | a<br>(33) | b<br>(32) | c<br>(31) | d<br>(30) | e<br>(29) | f<br>(28) | g<br>(27) | h<br>(25) | i<br>(24) | j<br>(23) | k<br>(22) | l<br>(21) | m<br>(19) | n<br>(18) | o<br>(17) | p<br>(16) | q<br>(15) | r<br>(13) | s<br>(12) | t<br>(11) | u<br>(10) | v<br>(9) |
|----------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| STRING 1       | A<br>(39)  | 0         | 0         | 0         | 0         | 9.3       | 0         | 3.2       | 5.3       | 7.2       | 9.4       | 3.5       | 5.5       | 2.3       | 4.2       | 6.4       | 9.4       | 0.4       | 1.4       | 1.0       | 7.9       | 8.3       | 9.4      |
| STRING 2       | B<br>(39') | 0         | 0         | 0         | 0         | 9.4       | 0         | 1.2       | 9.4       | 4.0       | 9.4       | 0         | 4.1       | 4.7       | 0.6       | 6.4       | 9.4       | 0         | 4.0       | 9.4       | 7.1       | 6.5       | 7.9      |
| BRASS 1        | C<br>(40)  | 0         | 0         | 0         | 0         | 9.4       | 0         | 0         | 9.4       | 3.8       | 4.9       | 1.6       | 2.5       | 1.3       | 1.6       | 9.4       | 9.4       | 0.4       | 4.9       | 1.9       | 5.8       | 9.4       | 9.4      |
| BRASS 2        | D<br>(41)  | 0         | 0         | 0         | 0         | 9.3       | 0         | 1.1       | 2.7       | 1.9       | 7.1       | 2.4       | 7.6       | 3.7       | 3.6       | 6.7       | 9.4       | 0         | 5.1       | 4.0       | 4.5       | 6.2       | 7.8      |
| FLUTE          | E<br>(41') | 0         | 0         | 0         | 0         | 9.4       | 0         | 0.5       | 3.0       | 2.8       | 1.9       | 4.8       | 0.4       | 3.3       | 1.6       | 6.9       | 9.4       | 0         | 2.9       | 0         | 4.9       | 6.8       | 9.4      |
| ELECTRIC PIANO | F<br>(42)  | 0         | 0.6       | 2.9       | 9.3       | 0         | 0         | 0.6       | 5.7       | 0.7       | 3.0       | 0         | 3.4       | 7.0       | 3.3       | 9.4       | 9.4       | 3.6       | 9.4       | 2.0       | 0.6       | 6.0       | 9.4      |

(Unit: V)



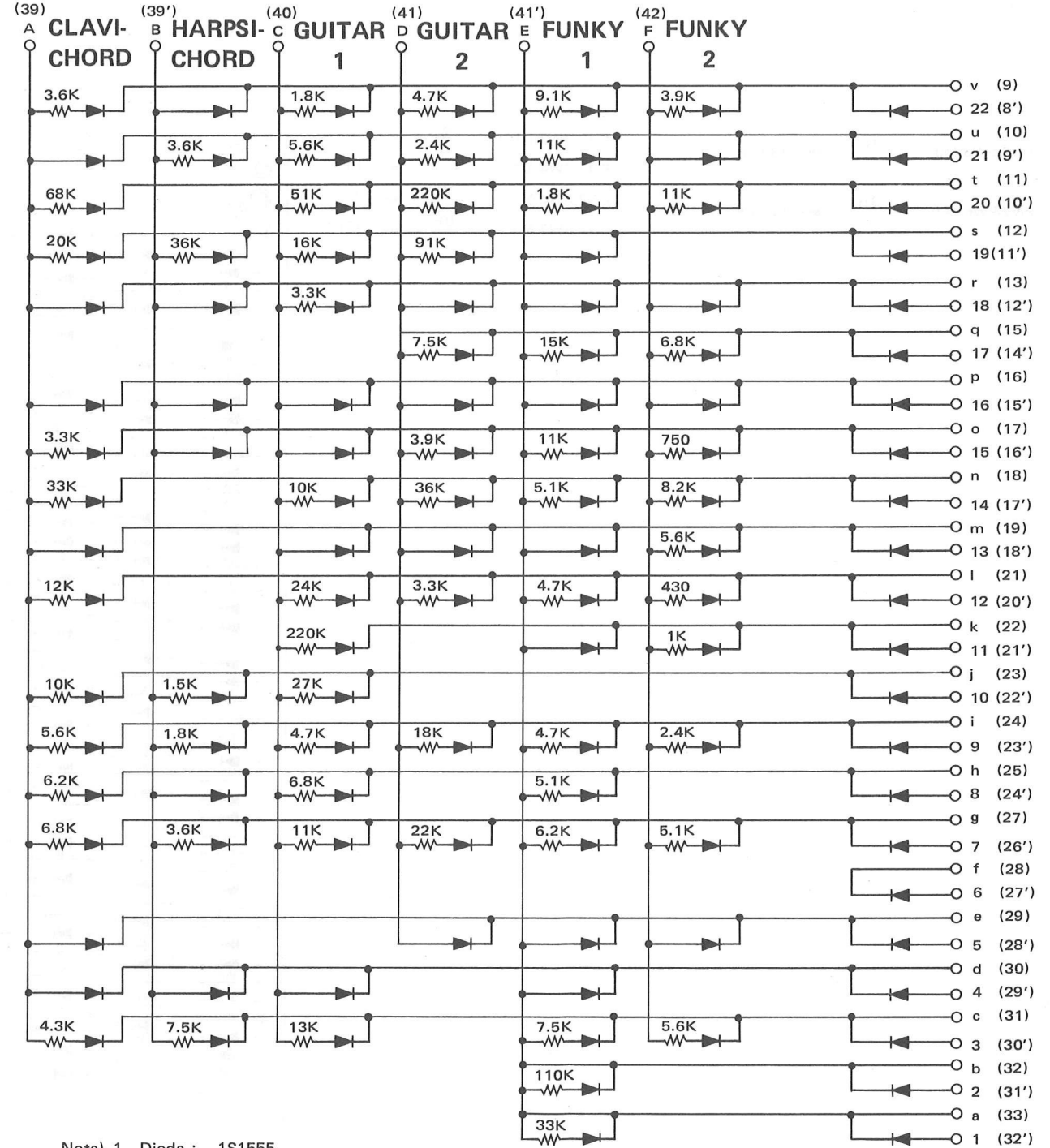


### T62 (Tone Preset 2) Circuit

INPUT: 10

|                  | out<br>in  | a<br>(33) | b<br>(32) | c<br>(31) | d<br>(30) | e<br>(29) | f<br>(28) | g<br>(27) | h<br>(25) | i<br>(24) | j<br>(23) | k<br>(22) | l<br>(21) | m<br>(19) | n<br>(18) | o<br>(17) | p<br>(16) | q<br>(15) | r<br>(13) | s<br>(12) | t<br>(11) | u<br>(10) | v<br>(9) |
|------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| CLAVI-<br>CHORD  | A<br>(39)  | 0         | 0         | 6.4       | 9.4       | 9.4       | 0         | 3.0       | 5.0       | 3.5       | 4.0       | 0         | 3.3       | 9.4       | 2.2       | 7.0       | 9.4       | 0         | 9.4       | 3.0       | 1.2       | 9.4       | 6.5      |
| HARPSI-<br>CHORD | B<br>(39') | 0         | 0         | 5.1       | 9.4       | 0         | 0         | 4.5       | 9.4       | 6.1       | 7.8       | 0         | 0         | 0         | 0         | 0         | 9.4       | 0         | 9.4       | 2.0       | 0         | 6.9       | 9.4      |
| GIJTAR<br>1      | C<br>(40)  | 0         | 0         | 3.9       | 9.4       | 4.9       | 0         | 2.1       | 4.9       | 3.9       | 2.0       | 0.2       | 2.0       | 9.4       | 4.7       | 9.4       | 9.4       | 0         | 7.0       | 3.6       | 1.6       | 6.0       | 7.7      |
| GIJTAR<br>2      | D<br>(41)  | 0         | 0         | 0         | 0         | 9.4       | 0         | 1.2       | 0         | 1.4       | 0         | 0         | 6.2       | 9.4       | 2.0       | 6.8       | 9.4       | 4.2       | 9.4       | 0.9       | 0.4       | 7.5       | 6.0      |
| FUNKY<br>1       | E<br>(41') | 2.0       | 0.8       | 5.1       | 9.4       | 9.4       | 0         | 3.2       | 5.6       | 3.9       | 0.6       | 9.4       | 5.5       | 9.4       | 6.2       | 4.4       | 9.4       | 2.8       | 9.4       | 9.4       | 7.9       | 4.5       | 4.5      |
| FUNKY<br>2       | F<br>(42)  | 0         | 0         | 5.8       | 0         | 9.4       | 0         | 3.7       | 0         | 5.4       | 0         | 8.5       | 8.8       | 6.0       | 5.1       | 8.7       | 9.4       | 4.5       | 9.4       | 0         | 4.5       | 9.4       | 6.3      |

(UNIT: V)

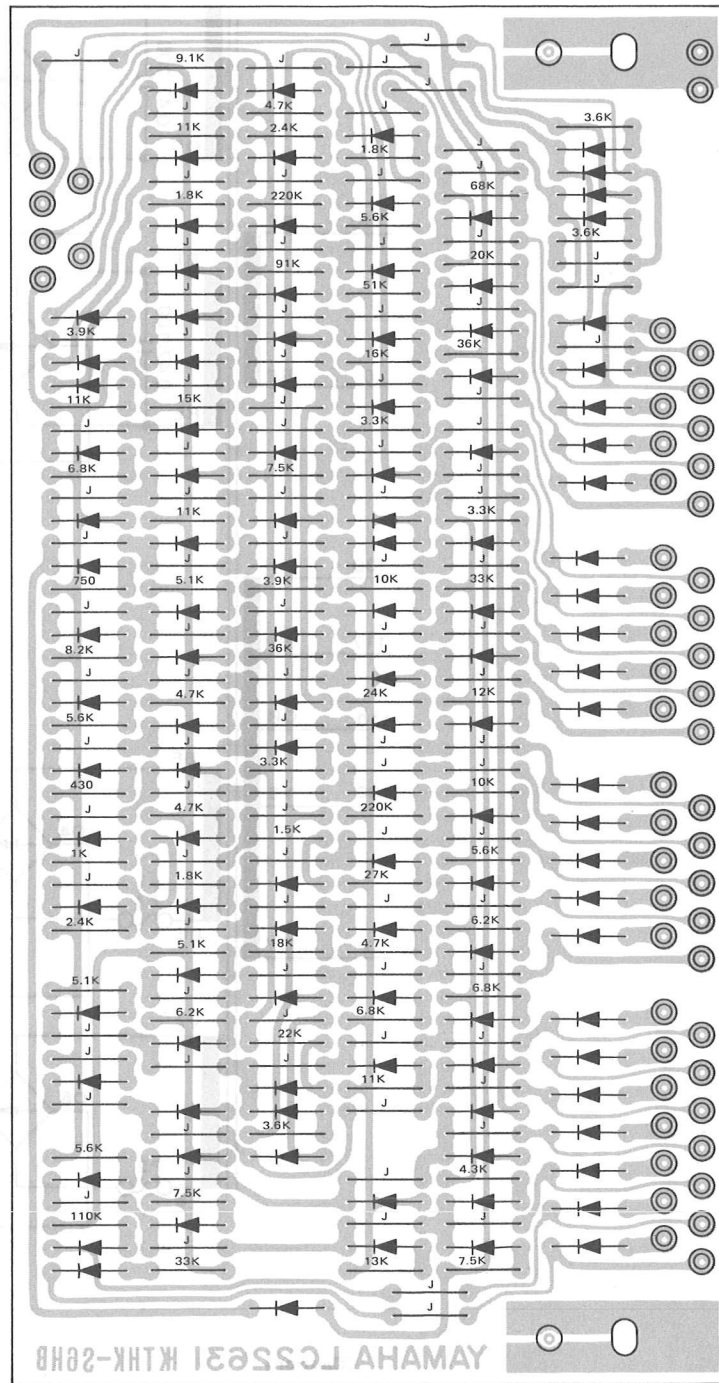


Note) 1. Diode : 1S1555

# T62 Circuit Board

PN2-SW9-M1 → GY → (39') B  
 PN2-SW12-M1 → SB → (41') E

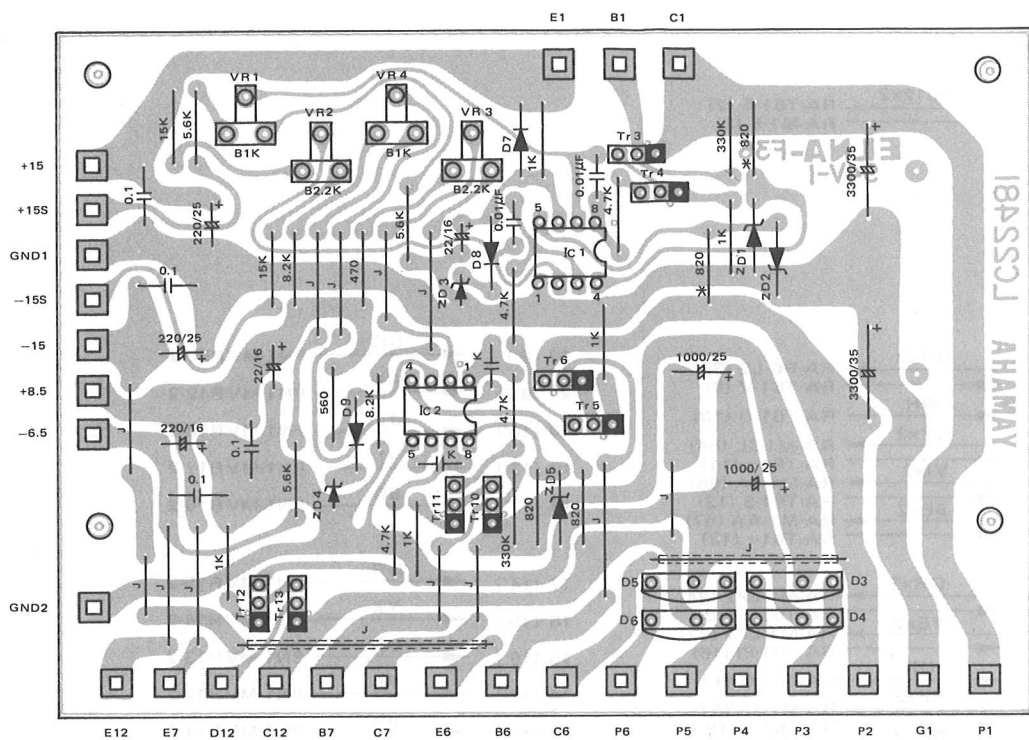
PN2-SW8-M1 → VI → (39) A  
 PN2-SW10-M1 → WH → (40) C  
 PN2-SW11-M1 → GG → (41) D  
 PN2-SW13-M1 → PK → (42) F



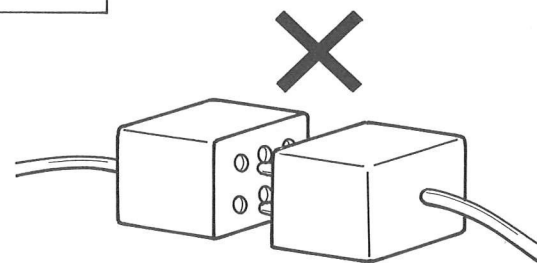
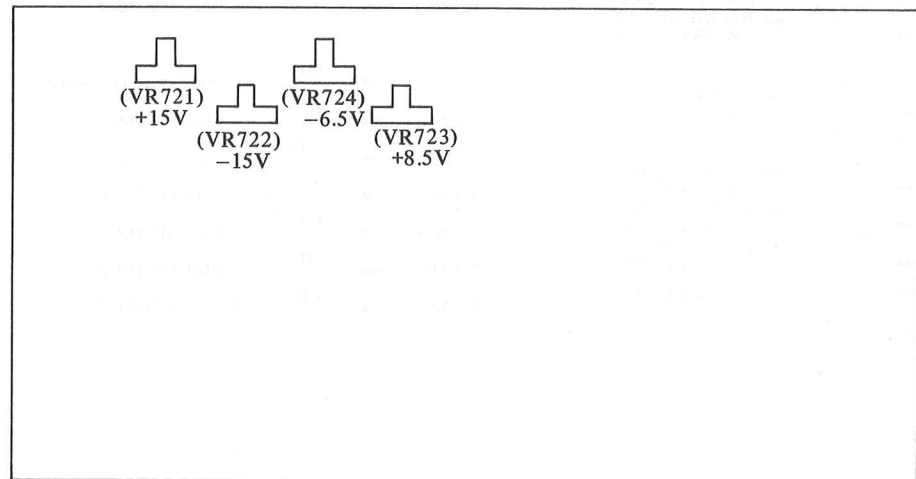
|        |        |                                  |                                 |
|--------|--------|----------------------------------|---------------------------------|
| E (2)  | BL12x2 | RA-T61-E (2)<br>RA-M1-E (2)      |                                 |
| V (9)  | GGx2   | RA-R6-L2 (38)<br>RA-T61-V (9)    | 22 (8') ← GG → PN1-MVR20-2      |
| u (10) | WH     | RA-T61-U (10)                    | 21 (9') ← WH → PN1-MVR19-2      |
| t (11) | GYx2   | RA-M1-SL (64)<br>RA-T61-t (11)   | 20 (10') ← GY → PN1-MVR18-2     |
| S (12) | VIx2   | RA-M1-1A (66)<br>RA-T61-S (12)   | 19 (11') ← VI → PN1-MVR17-2     |
| r (13) | BEx2   | RA-M1-AA (67)<br>RA-T61-r (13)   | 18 (12') ← BE → PN1-MVR16-2     |
| q (15) | GRx2   | RA-M1-LP2 (24)<br>RA-T61-q (15)  | 17 (14') ← GR → PN1-MVR15-2     |
| p (16) | YEx2   | RA-M1-LP1 (27)<br>RA-T61-P1 (16) | 16 (15') ← YE → PN1-MVR14-2     |
| o (17) | OR     | RA-T61-O (17)                    | 15 (16') ← OR → PN1-MVR13-2     |
| n (18) | REx2   | RA-M1-1F (61)<br>RA-T61-n (18)   | 14 (17') ← RE → PN1-MVR12-2     |
| m (19) | BRx2   | RA-M1-AF (62)<br>RA-T61-m (19)   | 13 (18') ← BR → PN1-MVR11-2     |
| L (21) | PKx2   | RA-M1-AL (59)<br>RA-T61-L (21)   | 12 (20') ← PK → PN1-MVR10-2     |
| K (22) | SBx2   | RA-M1-IL (58)<br>RA-T61-K (22)   | 11 (21') ← SB → PN1-MVR9-2      |
| j (23) | GGx2   | RA-R6-QL (50)<br>RA-T61-J (23)   | 10 (22') ← GG → PN1-MVR8-2      |
| i (24) | WHx2   | RA-R6-FL (20)<br>RA-T61-i (24)   | 9 (23') ← RE → RA-PRA-fLO' (64) |
| h (25) | GYx2   | RA-R6-QH (52)<br>RA-T61-h (25)   | 8 (24') ← GY → PN1-MVR6-2       |
| g (27) | VIx2   | RA-R6-FH (19)<br>RA-T61-g (27)   | 7 (26') ← OR → RA-PRA-fHO' (66) |
| f (28) | BE     | RA-T61-f (28)                    | 6 (27') ← BE → PN1-MVR4-2       |
| e (29) | GRx2   | RA-M1-G2 (44)<br>RA-T61-e (29)   | 5 (28') ← GR → PN1-MSW2-T       |
| d (30) | YEx2   | RA-M1-G1 (45)<br>RA-T61-d (30)   | 4 (29') ← YE → PN1-MSW1-T       |
| c (31) | ORx2   | RA-M1-PW (40)<br>RA-T61-C (31)   | 3 (30') ← OR → PN1-MVR3-2       |
| b (32) | RE     | RA-T61-b (32)                    | 2 (31') ← RE → PN1-MVR2-2       |
| a (33) | BR     | RA-T61-a (33)                    | 1 (32') ← BR → PN1-MVR1-2       |

Note) 1. Print Board LC22631  
 2. Diode  
 D : 1S1555

### SVU Circuit Board

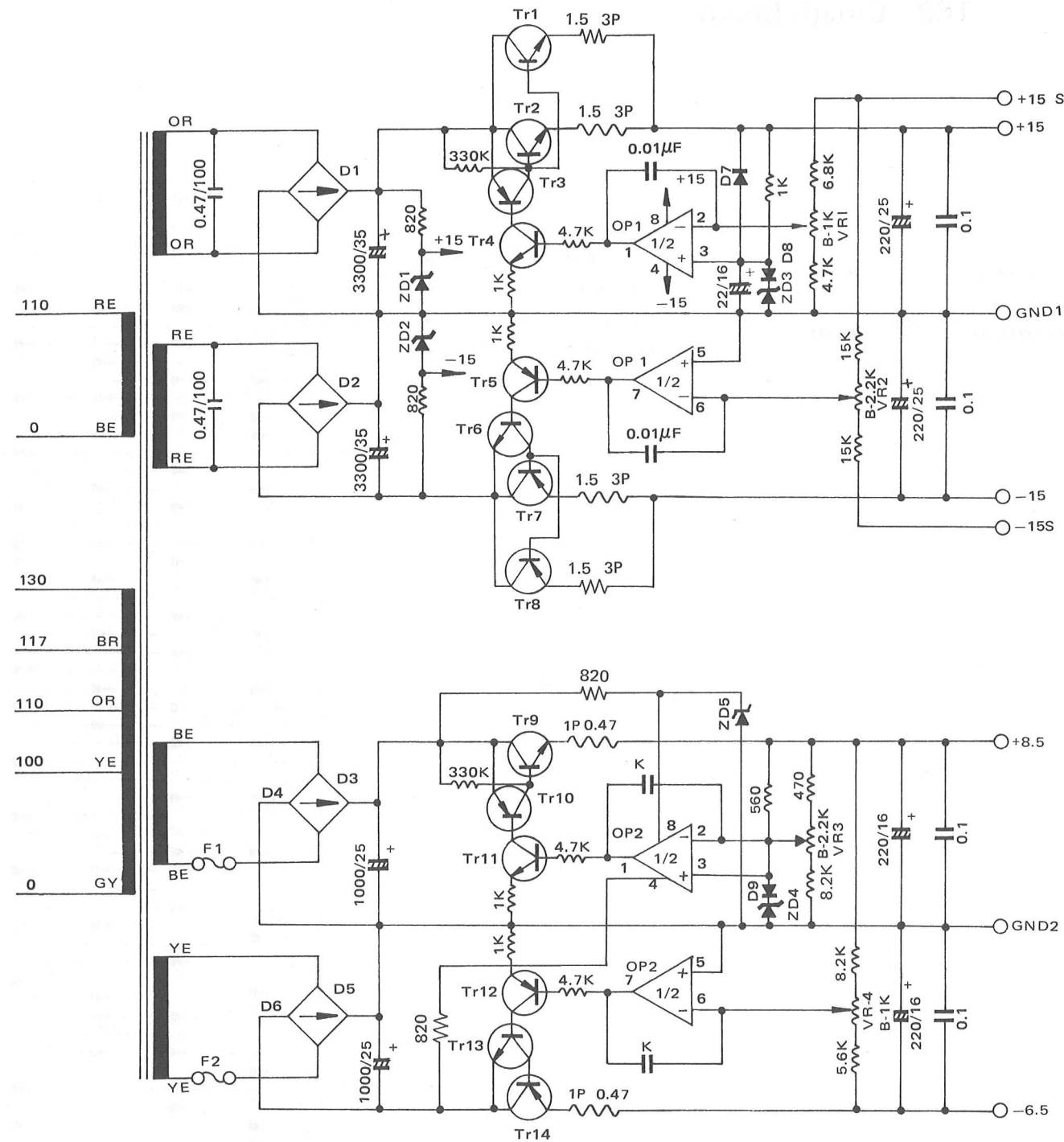


### Adjustment



NA03769-6Y Δ

### SVU Circuit



#### Note)

- |                    |                  |
|--------------------|------------------|
| 1. Transistor      | 4. OP Amplifier  |
| Tr1,2 : 2SD203     | OP1,2 : NJM4558. |
| Tr3,14 : 2SA490    | 5. Fuse          |
| Tr4,11,13 : 2SC828 | F1 : 0.5A        |
| Tr5,10,12 : 2SA561 | F2 : 0.5A        |
| Tr6,9 : 2SD234     | 6. VR : SR-29D   |
| Tr7,8 : 2SA745     |                  |
| 2. Diode           |                  |
| D1,D2 : 5B2        |                  |
| D3,D5 : 10DC-4     |                  |
| D4,D6 : 10DC-4R    |                  |
| D7~D9 : 1S1555     |                  |
| 3. Zener Diode     |                  |
| ZD1,2,5 : WZ150    |                  |
| ZD4 : 1S1715       |                  |
| ZD3 : 02Z5.6A      |                  |

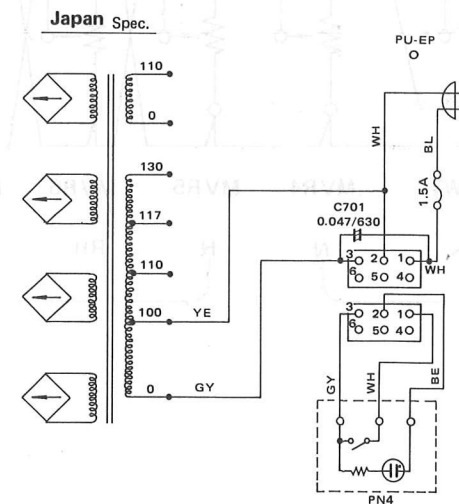
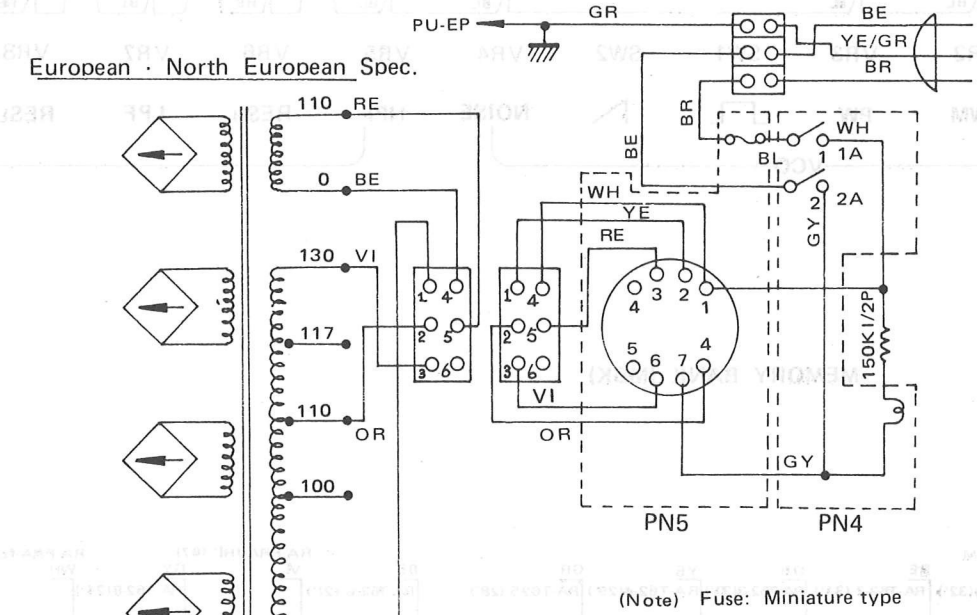
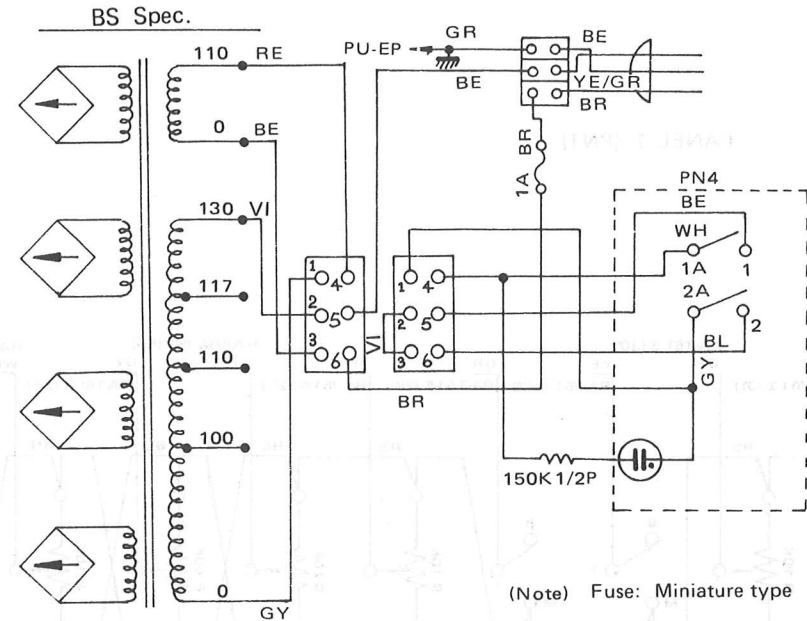
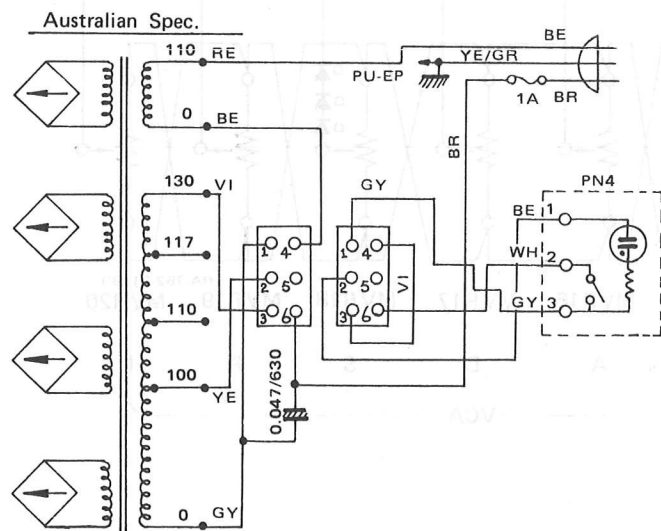
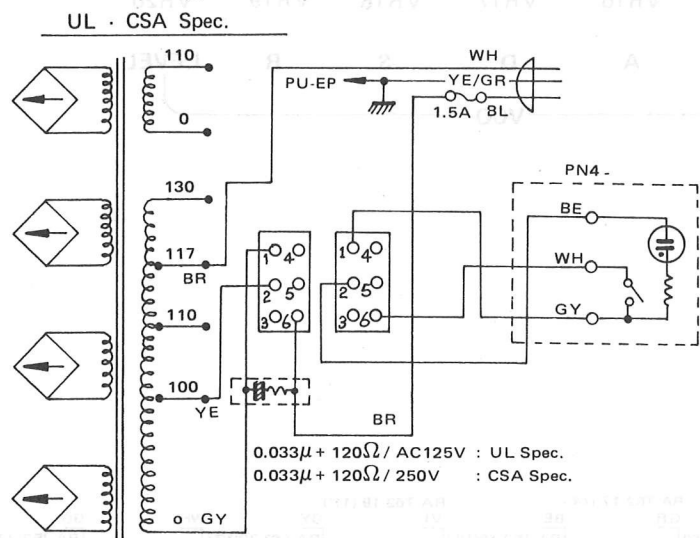
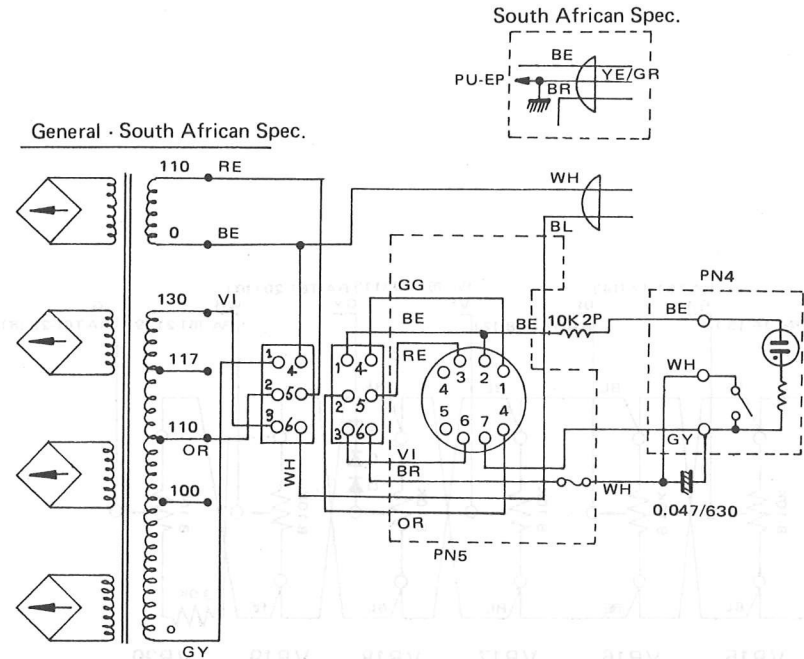
#### [Caution]

When you carry out inspection on Power Supply Unit, be sure to make complete connection of the connector or Short Circuit both +15 ↔ +15S and -15 ↔ -15S. Otherwise, the circuit can break with the power on.

#### [注意]

電源ユニットの点検などで、コネクタを取外したままで電源を入れますと回路を壊す恐れがありますのでコネクタを取付けたまま、又は+15 ↔ +15S、-15 ↔ -15Sをショートさせて点検を行なう様お願いします。

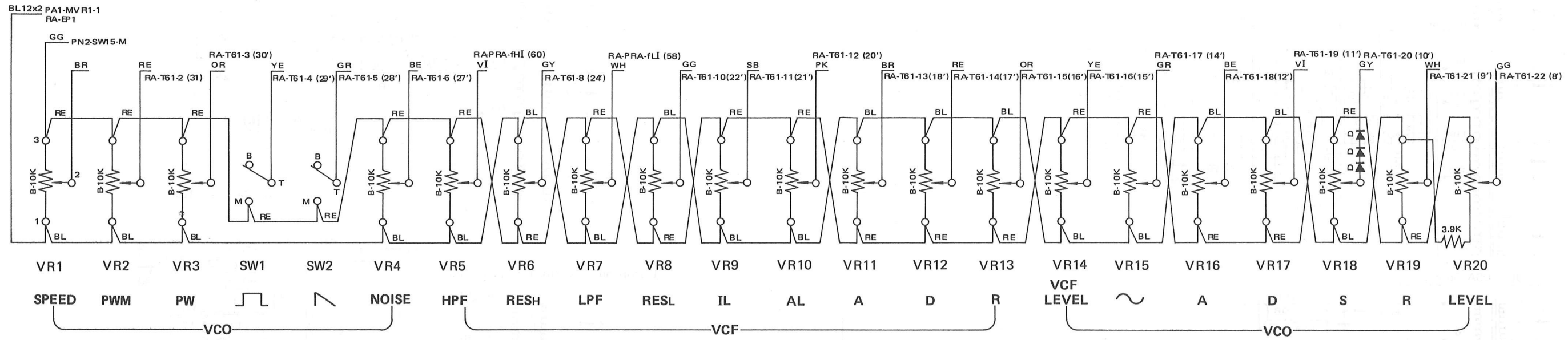
# Power Supply NP0013Z (Primary) Circuit



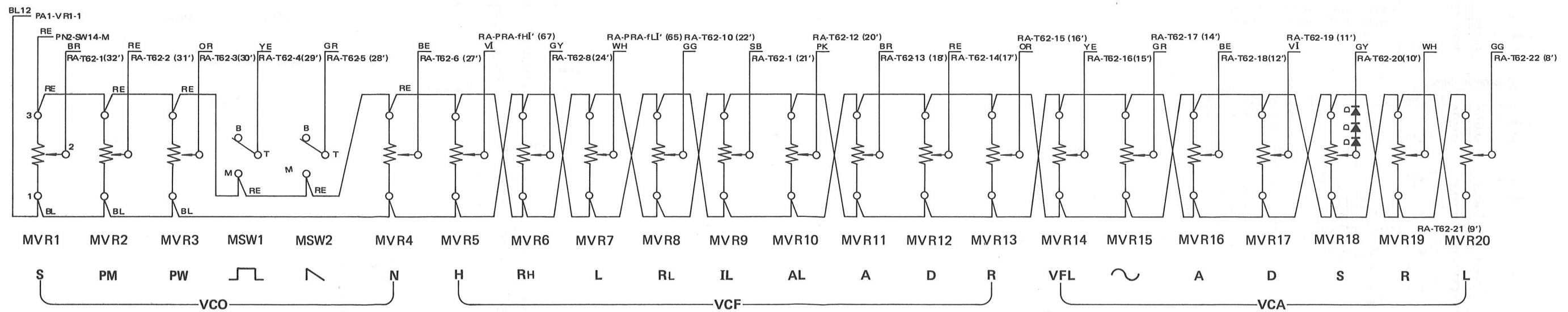


PN<sub>1</sub> (Panel 1) Circuit

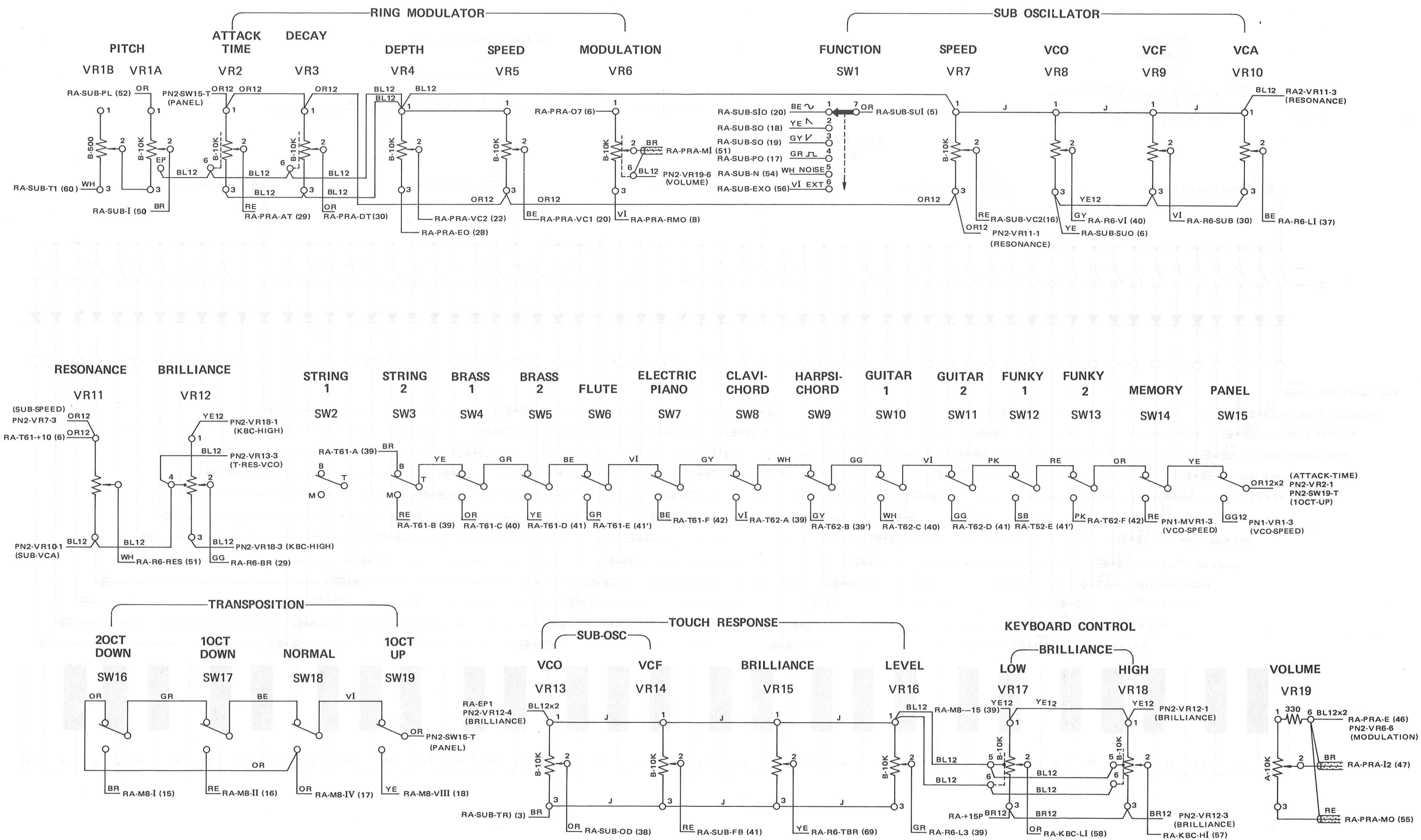
PANEL 1 (PN1)



MEMORY BANK (MBK)

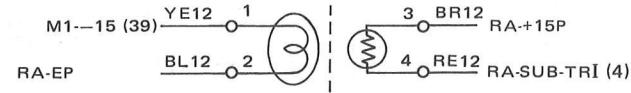


PN<sub>2</sub> (Panel 2) Circuit

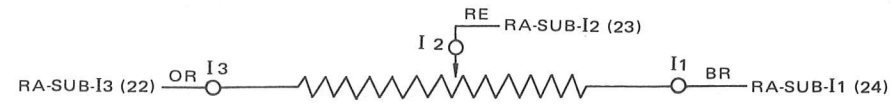


# KS (Key Switch) Circuit

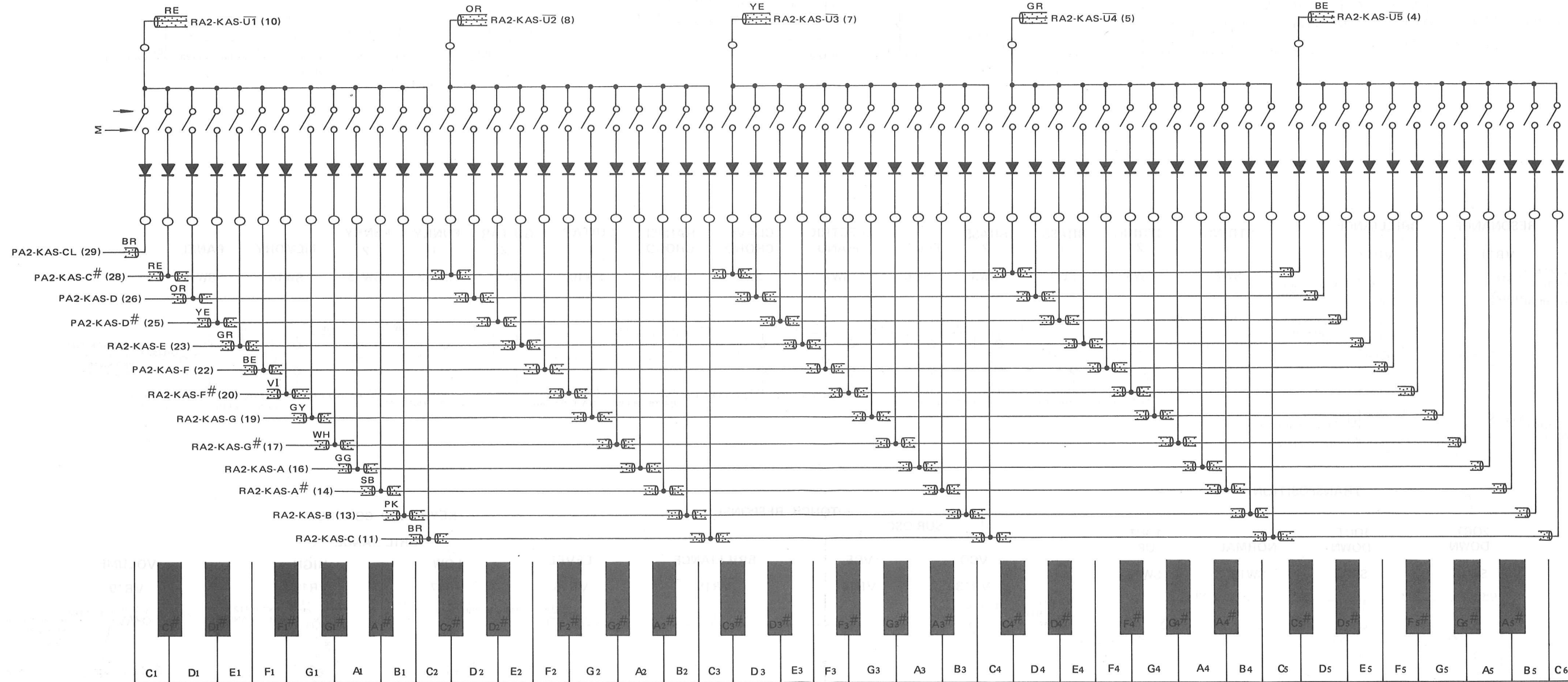
## TOUCH SENSOR (TS)



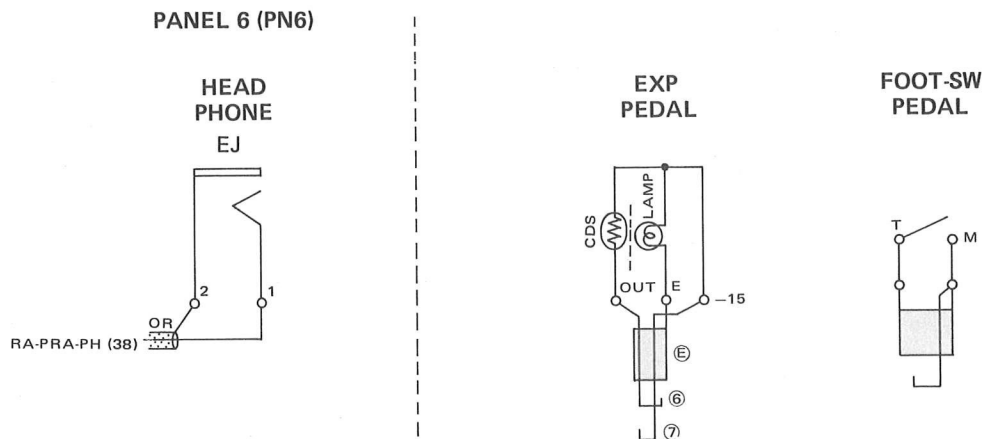
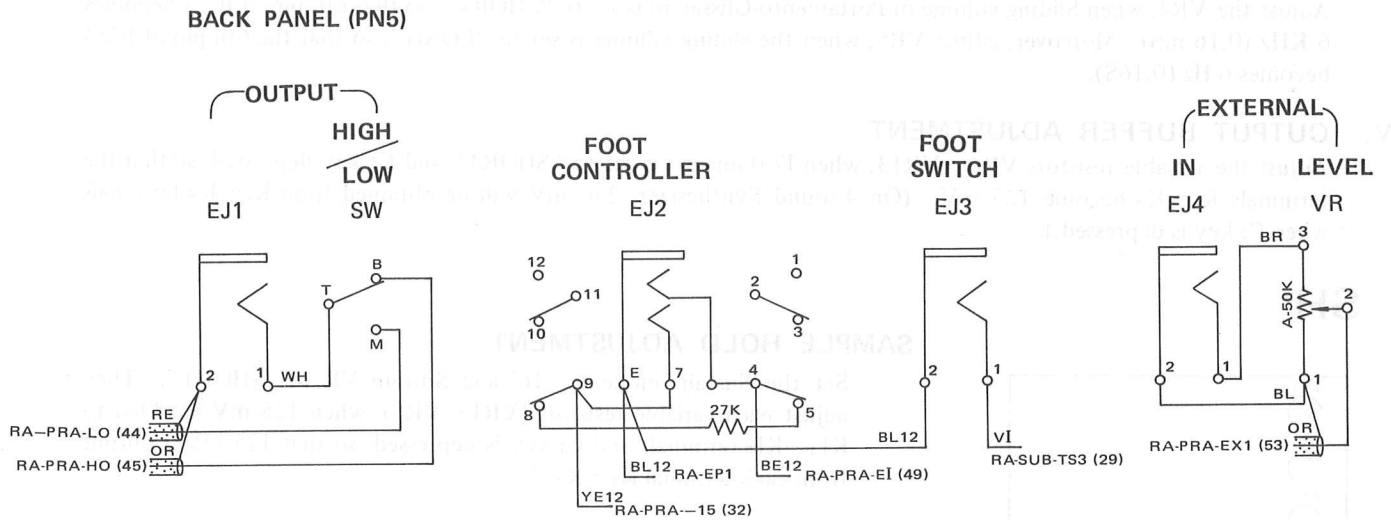
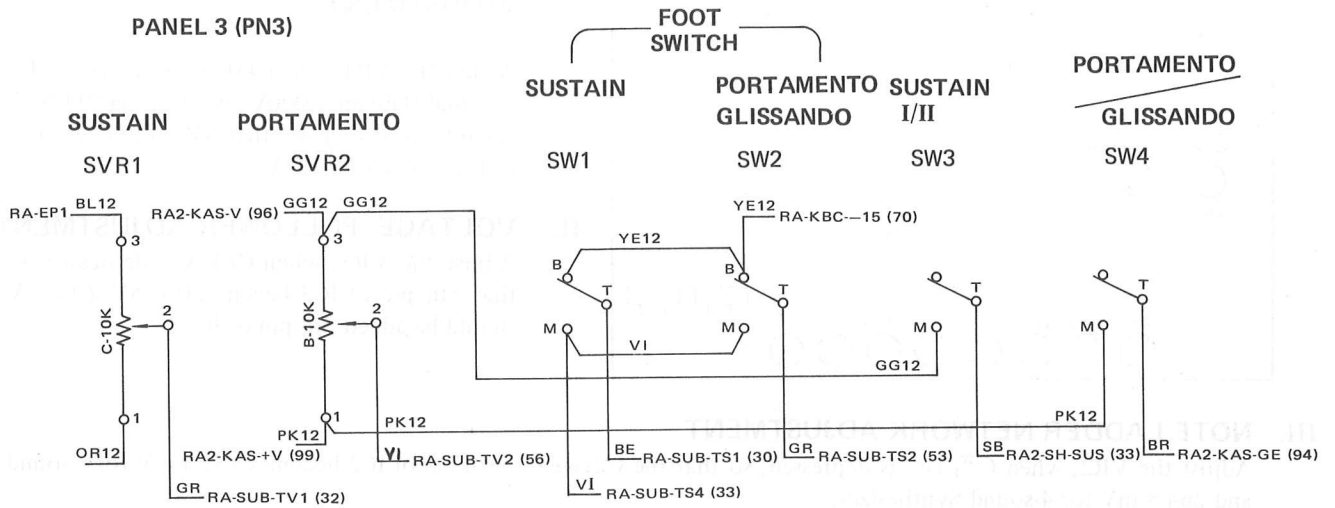
## SLIDE CONTROLLER (SC)



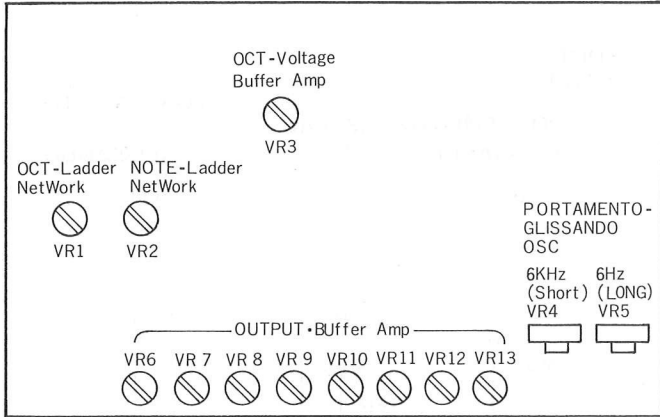
## KEY SWITCH (KS)



# PN<sub>3</sub>, PN<sub>5</sub>, PN<sub>6</sub>, PU, EXP, FOOT SW



# KAS



## I. OCTAVE LADDER NETWORK ADJUSTMENT

Adjust the VR1, when 4.000V is added to TU terminal (Obtain 4.000V by adjusting "TUNE" variable resistor.) so that OC<sub>o</sub> (13) terminal of IC2 becomes 0.125V.

## II. VOLTAGE FOLLOWER ADJUSTMENT

Adjust the VR3, when C<sub>1</sub> key is depressed, so that 6th pin of IC3 becomes 0.125V. (0.125V should be added 3rd pin of IC3)

## III. NOTE LADDER NETWORK ADJUSTMENT

Adjust the VR2, when C<sub>1</sub> key is depressed, so that the voltage of 38th pin of IC2 becomes 132.4 mV for 8-sound and 264.8 mV for 4-sound Synthesizer.

## IV. PORTAMENTO (GLISSANDO) CLOCK ADJUSTMENT

Adjust the VR4, when Sliding volume of Portamento-Glissando is set to "SHORT", so that 6th pin of IC24 becomes 6 KHz (0.16 mS). Moreover, adjust VR5, when the sliding volume is set to "LONG", so that the 6th pin of IC24 becomes 6 Hz (0.16S).

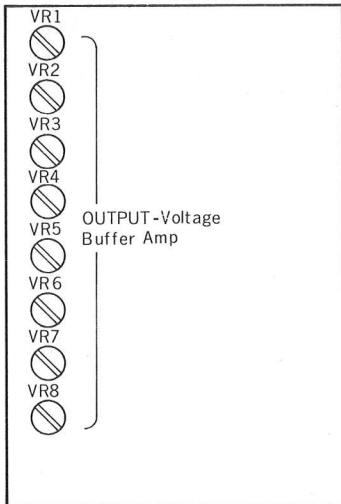
## V. OUTPUT BUFFER ADJUSTMENT

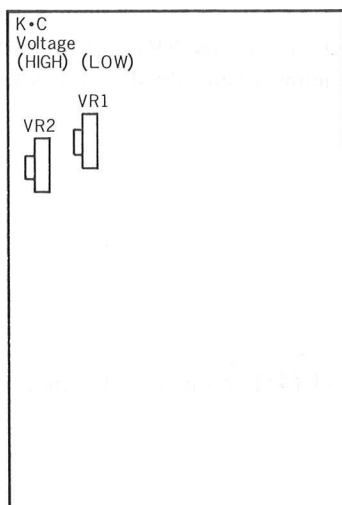
Adjust the variable resistors VR6 ~VR13, when Portamento is set to "SHORT" and C<sub>1</sub> key depressed, so that the terminals K<sub>1</sub> ~ K<sub>8</sub> become 125 mV. (On 4-sound Synthesizer, 250 mV will be obtained from K<sub>1</sub> ~ K<sub>4</sub> terminals when C<sub>2</sub> key is depressed.).

# SH

## SAMPLE HOLD ADJUSTMENT

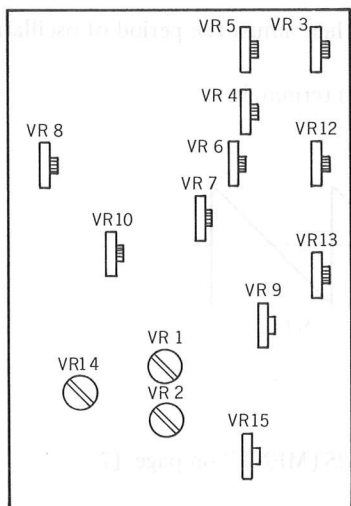
Set the Sustain mode to "II" and Sustain VR to "SHORT". Then adjust each variable resistors (VR1 ~ VR8), when 125 mV is added to KI<sub>1</sub> ~ KI<sub>8</sub> terminals and C<sub>1</sub> key is depressed, so that 125 mV is output from each terminal K<sub>1</sub> ~ K<sub>8</sub>.



**KBC****VOLTAGE ADJUSTMENT**

**LOW** ..... Adjust the VR1, when "LOW" lever of KEYBOARD CONTROL is fully lowered ( $-15\text{V}$  is input into LI terminal) and  $C_2$  key is depressed, so that the  $O_1 \sim O_8$  terminals become  $-2.76 \pm 0.12\text{V}$ . Also make certain that those terminals become  $+2.76\text{V}$  when the lever is fully raised ( $+15\text{V}$  is input).

**HIGH** ..... Adjust the VR2, when "HIGH" lever of KEYBOARD CONTROL is fully lowered ( $-15\text{V}$  is input into HI terminal) and  $C_5\#$  key is depressed, so that the  $O_1 \sim O_8$  terminals become  $-2.76 \pm 0.12\text{V}$ . Also make certain that those terminals become  $+2.76\text{V}$  when the lever is fully raised ( $+15\text{V}$  is input).

**SUB****I. SLIDE CONTROL ADJUSTMENT**

1. Adjust VR1, when slide control is turned on and  $2.000 \pm 0.001\text{V}$  is fed into the  $I_2$  (23) terminal, so that the voltage of TP1 (63) terminal becomes  $-2.000 \pm 0.002\text{V}$ .
2. Adjust VR2 so that the same voltage of TP2 (64) terminal is obtained that of TP1 (63).
3. Adjust VR14 so that TI (60) terminal becomes  $6.15\text{V} \pm 0.05\text{V}$ . Then, make certain that the voltage fluctuation of the TI terminal is within  $\pm 20\text{mV}$  when Slide control is repeatedly switched to ON and OFF.
4. Adjust VR15 so that the voltage of  $I_1$  (24) terminal becomes  $9.5\text{V} \pm 0.1\text{V}$ .

**II. TOUCH RESPONSE AMPLIFIER CIRCUIT**

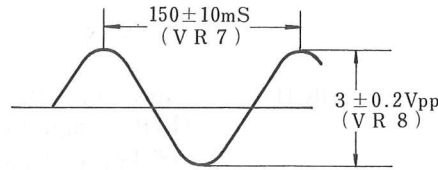
Adjust VR3, when keys are hardly pressed, so that the voltage of TRO (3) terminal becomes  $6\text{V}$ .

**III. TOUCH RESPONSE CONTROL CIRCUIT**

1. First of all, make sure that  $100 \pm 1\text{Hz}$  and  $3 \pm 0.1\text{V}$  is added to SUI (5) terminal by moving "SPEED" lever when SUB-OSC "FUNCTION" is set to "V".
2. Adjust VR5, when  $6 \pm 0.1\text{V}$  is added to OD (38) terminal, so that the output from OO (39) terminal becomes  $3 \pm 0.1\text{V}$ .
3. Moreover, adjust VR4, so that the center voltage of OO output terminal becomes  $0.5 \pm 0.1\text{V}$ .
4. With the above situation, adjust VR6, when  $6 \pm 0.1\text{V}$  is added to FD (41) terminal through Touch Response "VCF" lever, so that the output from FO (40) terminal becomes  $3 \pm 0.1\text{V}$ .

#### IV. PWM CIRCUIT

1. Add  $5 \pm 0.1V$  to VC1 (11) terminal with PWM "SPEED" lever. Then adjust the period by VR7 and peak level by VR8, so that the output from P (45) terminal has the waveform shown below when "PWM" lever is fully raised and  $10 \pm 0.1V$  is added to D (43) terminal.



2. Adjust VR12, when PWM "SPEED" lever is fully raised, so that the output from P (45) becomes  $5 \pm 0.5$  mS.

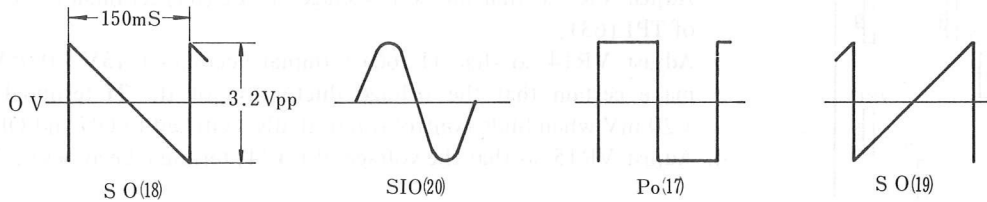
#### NOISE GENERATOR CIRCUIT

Adjust VR10, when "NOISE" lever is fully raised [ $10 \pm 0.1V$  is given to C (40) terminal], so that the 3 Vpp Noise wave is output from NO (48) terminal.

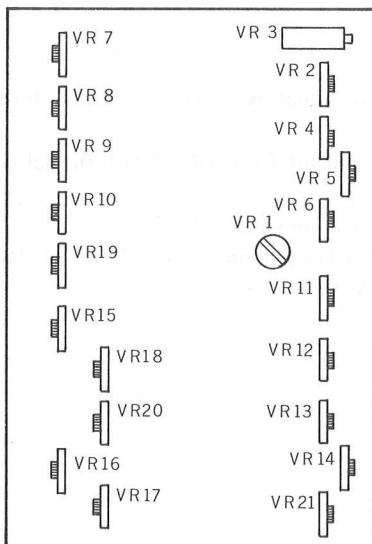
#### OSCILLATOR CIRCUIT FOR MODULATION

Add  $5 \pm 0.1V$  to VC2 (16) terminal by moving "SPEED" lever of SUB-OSC. Then adjust the period of oscillation waveform of SO (18) terminal with VR9 as follows.

At the same time, make sure the waveform of each SIO (20), PO (17) and  $\overline{SO}$  (19) terminals.



## M

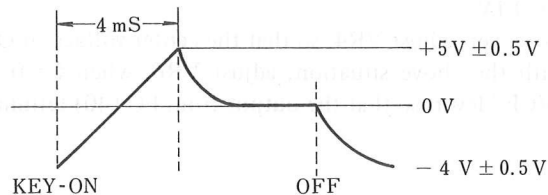


#### I. PITCH ADJUSTMENT

VR1~ VR6 (Refer to "PITCH ADJUSTMENT" on page 17)

#### II. EG-VCF CIRCUIT

1. Set the preset button to "PANEL". Add 10V to terminals AL, IL, DF, RF and 8V to AF (62) terminal. Depress a key and adjust attack time of the waveform of TP1 (22) terminal as follows.



2. With the above mentioned setting, when 3V is fed into AF terminal, adjust VR19 to the direction the time is lengthened if the attack time is longer than 125 m seconds and vice versa. Then carry out the adjustment stated in item 1 again.
3. Adjust the VR18, when key is depressed, so that output voltage of TP1 (22) terminal becomes  $0 \pm 0.01V$ .

### III. VCF—HPF CIRCUIT

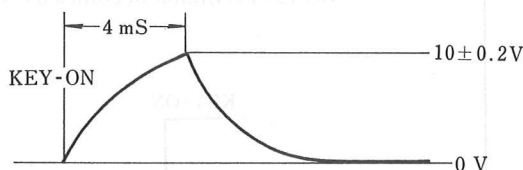
Set preset tone to "PANEL". Turn on the switch "∩". Set the "HPF" lever to the center position. Then, place the levers "LPF", "RESL" and RESH" in the High position. Adjust VR7 for cut off frequency and VR8 for Q so that the tone color of the M circuit board may be the same as that of other M circuit boards.

### IV. VCF—LPF CIRCUIT

In the same manner, set preset tone to "PANEL" and "LPF" to center position and levers "RESL", "HPF" "RESH" to Low, then adjust VR9 for Q so that the tone color of the M circuit may be the same as that of ther M circuit board.

### V. EG—VCA CIRCUIT

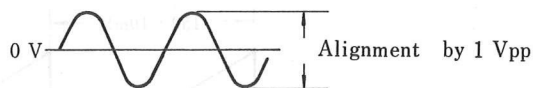
1. Set preset tone to "PANEL". Depress a key and adjust the VR17, when 10V is fed into the terminals AA, DA, RA and 0V to SL through each volume of VCA section, so that the DC voltage of TP2 (68) terminal becomes  $-200 \pm 20$  mV.
2. Likewise, add 8V to AA terminal and 10V to DA, RA terminals as well as 0V to SL terminal. Depress a key and adjust the attack time of the waveshape appeared on TP2 (68) terminal as below.



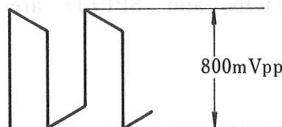
3. With the above mentioned setting (item 2), when 3V is fed into AA (67) terminal, adjust VR20 to the direction the time is lengthened if the attack time is longer than 125 mS and vice versa. Then carry out the adjustment stated in item 1 again.

### VI. VCA CIRCUIT

1. Set the transposition lever to "2 OCT-DOWN" (16' for CS-80) and preset button to "PANEL". Adjust the VR11, when "∩" is set to 10 [10V is added to LP2 (24) terminal] and key is depressed, so that the output waveform from CP4 (28) becomes 1 Vp-p.



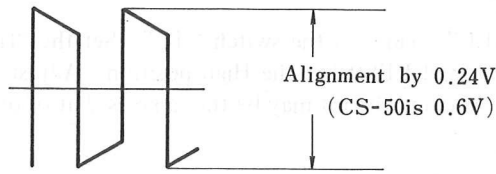
2. Set the transposition lever to "NORMAL" (8' for CS-80) and preset button to "PANEL". Turn the switch "∩" on and set "VCF LEVEL" lever to 10. Then, set the levers "RESH" and "RESL" to Low position and "LPF" to High position. Depress a key and adjust the VR12 so that the output of the terminal CP4 (28) becomes the following waveshape with the rated output level.



3. With the above condition, adjust the VR3, when "LEVEL" is set to 10, so that the output waveform of CP5 (32) terminal becomes as follow.

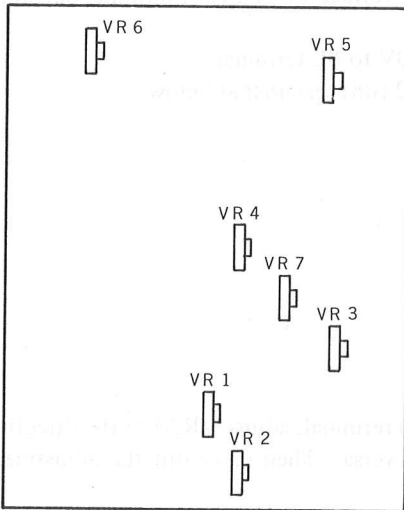


4. Leave the setting of item 3 as it is, set each "A", "D", "S" and "R" to Short or 10. Depress a key and adjust Output waveform level with VR14 as follows.



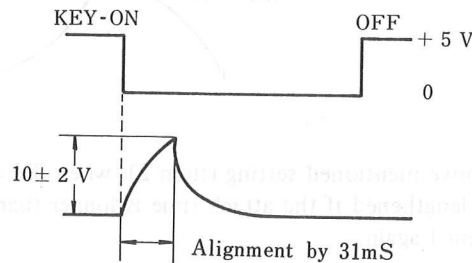
5. Return only "LEVEL" lever to 0 with other condition remaining unchanged from item 4. Adjust VR21, when key is depressed, so that the output of O terminal becomes minimum level.

## PRA



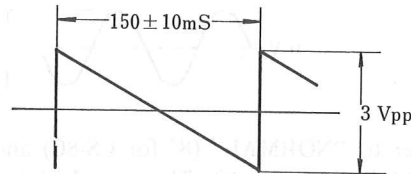
### I. ENVELOPE GENERATOR CIRCUIT

1. Move the levers "ATTACK TIME" and "DECAY TIME" on the RING-MOD so as the voltage of terminals AT (29) and DT (30) to be  $10V \pm 0.1V$  (on SHORT side).
2. Then adjust the VR1, when key is pressed on, so that the voltage of EO (28) terminal becomes  $0 \pm 0.01V$ .



### II. RING MODULATOR CIRCUIT

1. Add  $5 \pm 0.1V$  to the terminal VC1 (20) by moving the "SPEED" lever of RING-MOD. Then adjust VR3, when "DEPTH" lever is "0" (VC2 (22) terminal is 0 volt.), so that the output frequency and waveform of TP2 (19) become as follows.



Moreover, adjust VR7, when "SPEED" lever is in MAX (VC1 terminal is 10V) position, so that the period of the above waveform becomes  $5 \pm 1$  mS.

2. Adjust VR5, when only "MODULATION" and "SPEED" are in MAX position, so that the signal leak level of RMO (8) terminal is within 3 mV.

### III. OUTPUT AMPLIFIER CIRCUIT

Adjust VR6, when "Λ", "S" and "LEVEL" in VCA block is in MAX position and "PANEL" is set during all keys are pressed, so that the output of OUT JACK becomes  $0 \pm 1$  dBm.

# YAMAHA

## COMBO SYNTHESIZER

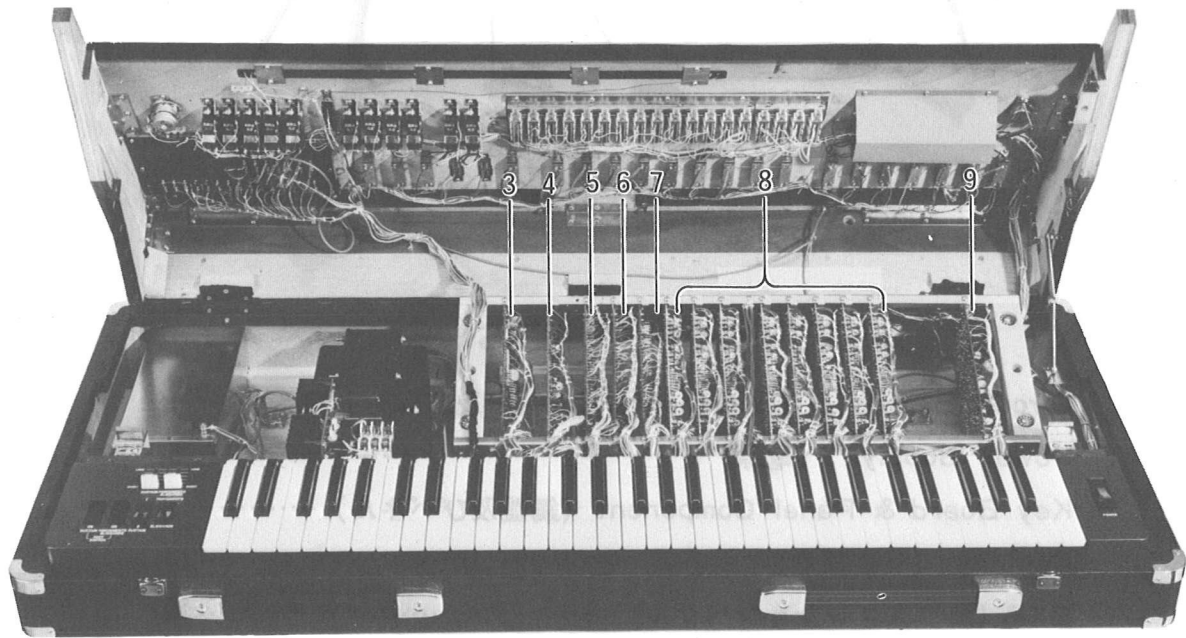
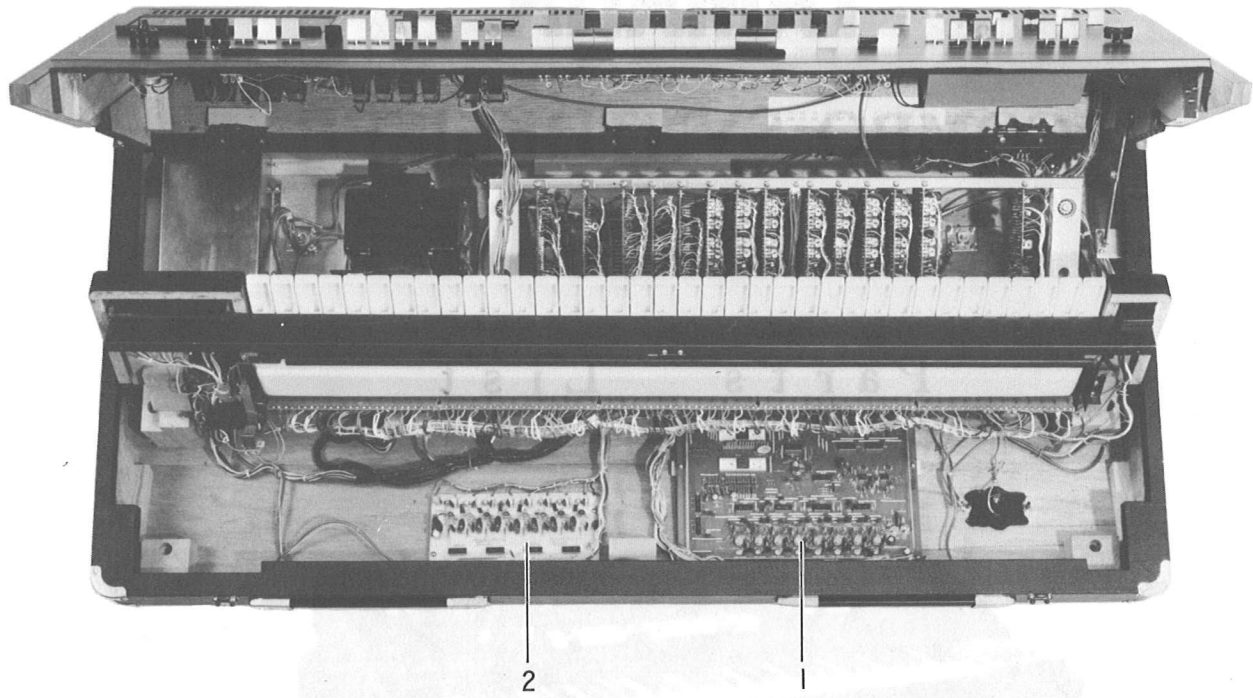
CS-60

### Parts List



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|   |    |
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| Key Board & Panel Component (鍵盤及びパネル).....    | 7  |
| Cabinet (外装部品).....                           | 10 |
| EXP (エクスペションペダル).....                         | 12 |
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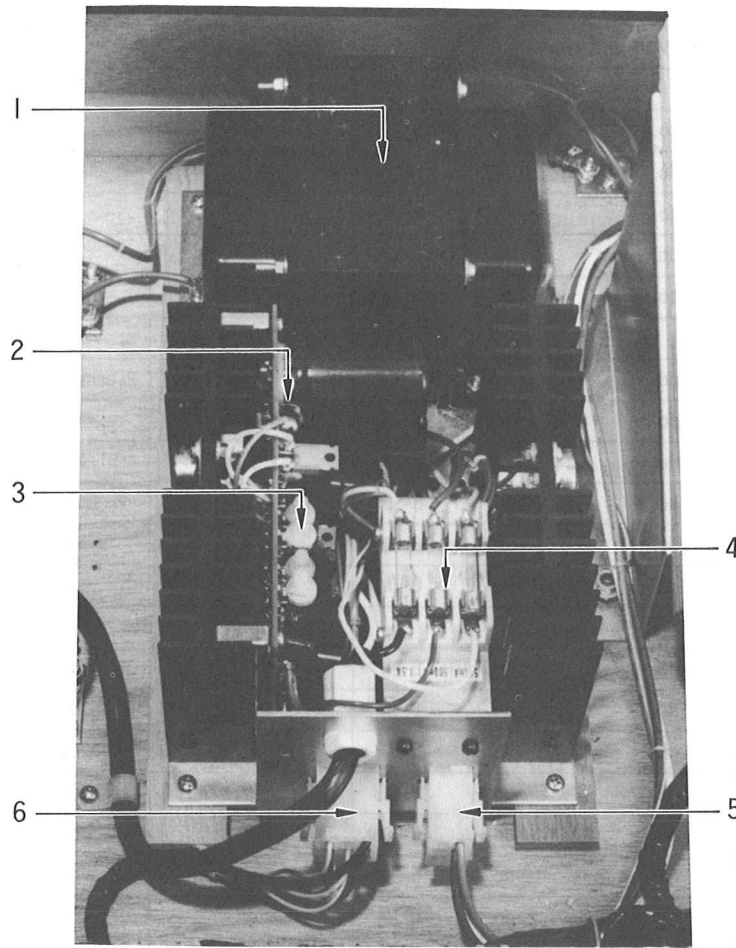


| Ref No. | Part No. (パーツ番号)     | Description (部品名)        | Remarks (備考) | Common Models (共通モデル) |
|---------|----------------------|--------------------------|--------------|-----------------------|
| 1       | 30:12:80:NA:03:58:00 | KAS Circuit board #21264 | KAS シート      | CS-80                 |
| 2       | 30:12:60:NA:03:79:30 | SH -do.- #22544          | SH シート       |                       |
| 3       | 30:12:80:NA:03:56:20 | KBC -do.- #21216         | KBC シート      | CS-80                 |
| 4       | 30:12:60:NA:03:70:00 | SUB -do.- #41338         | SUB シート      |                       |
| 5       | 30:12:60:NA:03:70:10 | T61 -do.- #21184         | T61 シート      |                       |
| 6       | 30:12:60:NA:03:70:20 | T62 -do.- #22631         | T62 シート      |                       |
| 7       | 30:12:60:NA:03:70:30 | R6 -do.- #41361          | R6 シート       |                       |
| 8       | 30:12:50:NA:04:48:50 | M -do.- #21235           | M シート        |                       |
| 9       | 30:12:60:NA:03:70:40 | PRA -do.- #41384         | PRA シート      |                       |
|         | 30:10:00:YM:26:60:00 | LSI YM26600              | L S I        |                       |
|         | 30:10:00:YM:26:70:00 | -do.- YM26700            | "            |                       |
|         | 40:10:00:iG:00:05:10 | IC CD4006AE              | I C          |                       |
|         | 40:10:00:iG:00:10:20 | -do.- HA1452             | "            |                       |
|         | 40:10:00:iG:00:10:40 | -do.- TA7504M            | "            |                       |
|         | 40:10:00:iG:00:11:80 | -do.- TC4013P            | "            |                       |
|         | 40:10:00:iG:00:12:10 | -do.- LM310              | "            |                       |
|         | 40:10:00:iG:00:12:40 | -do.- TC4011P            | "            |                       |
|         | 40:10:00:iG:00:12:60 | -do.- TC4049P            | "            |                       |
|         | 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            | "            | VCO II                |
|         | 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            | "            | VCO III               |
|         | 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:00:17:30 | -do.- TC4073P            | "            |                       |
|         | 40:10:00:iG:00:17:40 | -do.- TC4050P            | "            |                       |
|         | 40:10:00:iG:00:22:20 | -do.- CA3140T            | "            |                       |
|         | 40:10:00:iA:04:90:10 | 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:02:34:10 | -do.- 2SD234             | "            |                       |
|         | 40:10:00:iE:00:00:10 | FET 2SK30                | F E T        |                       |
|         | 40:10:00:iF:00:00:40 | Diode IS1555             | ダイオード        |                       |
|         | 40:10:00:iF:00:03:00 | -do.- IS1715P            | "            |                       |
|         | 40:10:00:iF:00:04:20 | Zener diode O2Z5、6A      | ツェナー         |                       |

| Ref. No. | Part No. (パーツ番号) | Description (部品名)                        | Remarks (備考) | Common Models (共通モデル) |
|----------|------------------|--|--------------|-----------------------|
| 40:10:00 | iK 00:01:10      | Phone coupler P588-G50-201B              | フォトカプラー      |                       |
| 40:10:00 | HU 36:68:20      | Metal film resistor 2% 8.2K $\Omega$     | 金属被膜抵抗       |                       |
| 40:10:00 | HU 36:71:00      | -do.- -do.- 10K $\Omega$                 | "            |                       |
| 40:10:00 | HU 36:71:80      | -do.- -do.- 18K $\Omega$                 | "            |                       |
| 40:10:00 | HU 36:72:20      | -do.- -do.- 22K $\Omega$                 | "            |                       |
| 40:10:00 | HU 57:61:00      | -do.- 1% 1 K $\Omega$                    | "            |                       |
| 40:10:00 | HU 57:61:50      | -do.- -do.- 1.5K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:61:80      | -do.- -do.- 1.8K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:62:20      | -do.- -do.- 2.2K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:66:80      | -do.- -do.- 6.8K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:71:50      | -do.- -do.- 15 K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:72:00      | -do.- -do.- 20 K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:72:20      | -do.- -do.- 22 K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:75:60      | -do.- -do.- 56 K $\Omega$                | "            |                       |
| 40:10:00 | HU 57:81:50      | -do.- -do.- 150K $\Omega$                | "            |                       |
| 40:10:00 | HU 19:51:00      | -do.- 0.1% 100 $\Omega$                  | "            |                       |
| 40:10:00 | HU 19:61:00      | -do.- -do.- 1 K $\Omega$                 | "            |                       |
| 40:10:00 | HU 19:62:00      | -do.- -do.- 2 K $\Omega$                 | "            |                       |
| 40:10:00 | HU 19:72:00      | -do.- -do.- 20 K $\Omega$                | "            |                       |
| 40:10:00 | HU 19:74:00      | -do.- -do.- 40 K $\Omega$                | "            |                       |
| 40:10:00 | HU 19:78:00      | -do.- -do.- 80 K $\Omega$                | "            |                       |
| 40:10:00 | HU 19:81:00      | -do.- -do.- 100 K $\Omega$               | "            |                       |
| 40:10:00 | HU 19:81:60      | -do.- -do.- 160 K $\Omega$               | "            |                       |
| 40:10:00 | HZ 00:08:60      | -do.- -do.- 29.94K $\Omega$              | "            |                       |
| 40:10:00 | HL 32:42:20      | Metal oxide film resistor 22 $\Omega$ 2W | 酸化金属被膜       |                       |
| 40:10:00 | Hi 30:93:30      | Solid resistor 3.3M                      | ソリッド抵抗       |                       |
| 40:10:00 | Hi 20:94:70      | -do.- 4.7M                               | "            |                       |
| 40:10:00 | Hi 20:99:90      | -do.- 10M                                | "            |                       |
| 40:10:00 | Hi 00:08:40      | -do.- 18M                                | "            |                       |
| 40:10:00 | FF 04:31:20      | Polystyrene capacitor 1200p              | スチロールコンデンサ   |                       |
| 40:10:00 | FP 13:72:20      | Tantalum capacitor 16V 22 $\mu$ F        | タンタルコンデンサ    |                       |
| 40:10:00 | FM 09:64:70      | Nonpolar capacitor 16V 4.7 $\mu$ F       | N P コンデンサ    |                       |
| 40:10:00 | FM 09:71:00      | -do.- -do.- 10 $\mu$ F                   | "            |                       |
| 40:10:00 | FM 22:71:00      | -do.- 25V 10 $\mu$ F                     | "            |                       |
| 40:10:00 | FM 22:73:30      | -do.- -do.- 33 $\mu$ F                   | "            |                       |
| 40:10:00 | FM 11:61:00      | -do.- 50V 4.1 $\mu$ F                    | "            |                       |
| 40:10:00 | FM 11:64:70      | -do.- -do.- 7 $\mu$ F                    | "            |                       |



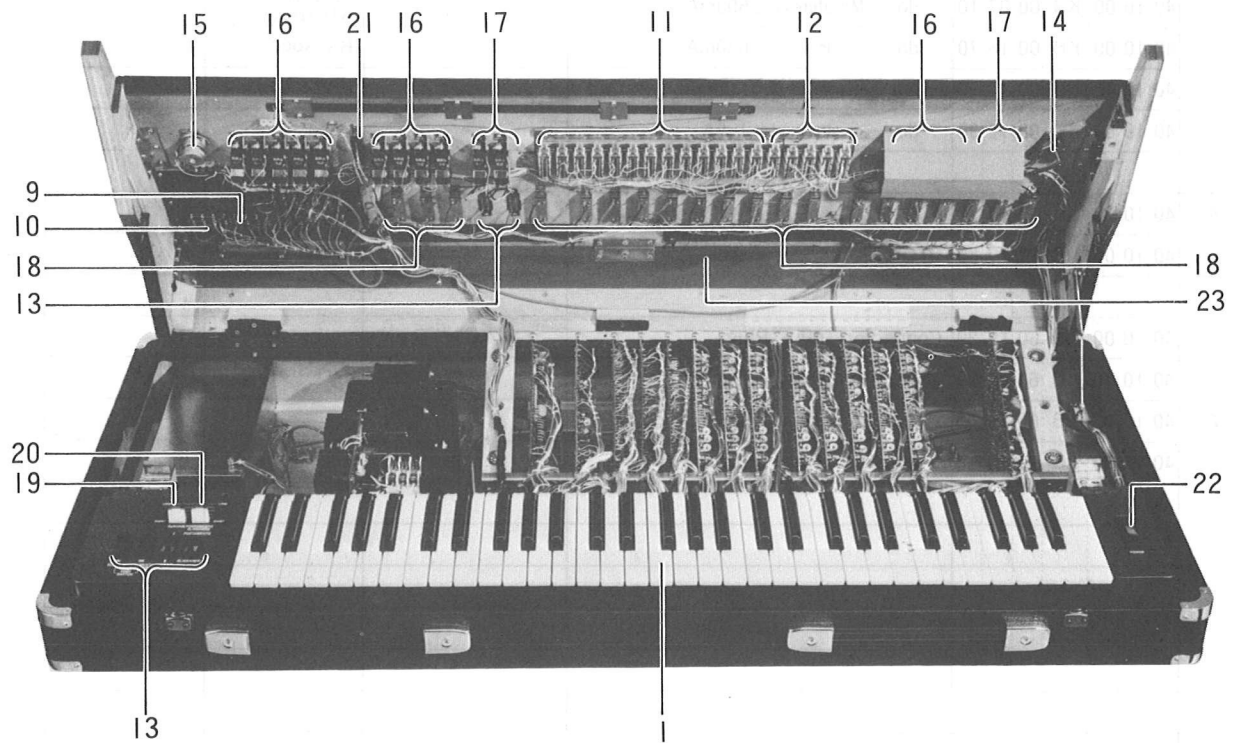
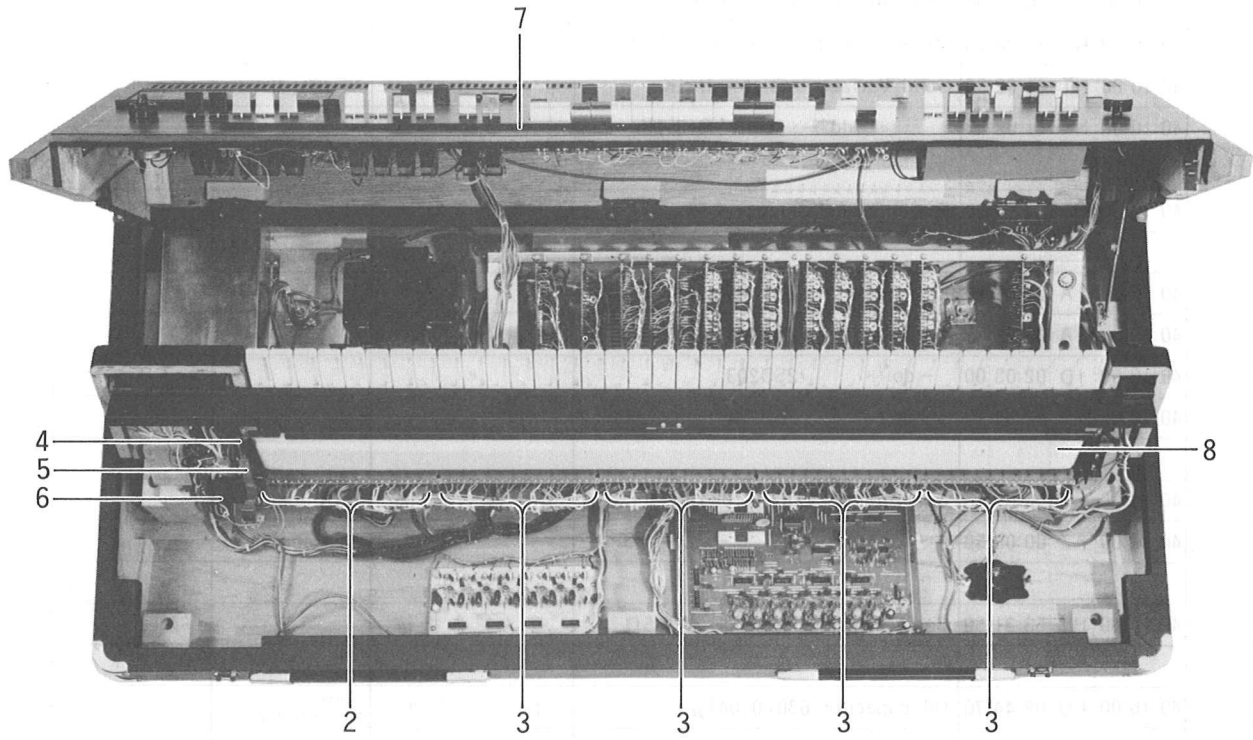
2 . Power Supply (電源)



| Ref No. | Part No. (パーツ番号)     | Description (部品名)        | Remarks (備考) | Common Model (共通モデル) |
|---------|----------------------|--------------------------|--------------|----------------------|
|         | 30:12:00 NP 00:17:00 | Power Supply Unit        | 電源ユニット       | BS                   |
|         | 30:12:00 NP 00:17:10 | - do. -                  | "            | Japan                |
|         | 30:12:00 NP 00:17:20 | - do. -                  | "            | General              |
|         | 30:12:00 NP 00:17:30 | - do. -                  | "            | USA                  |
|         | 30:12:00 NP 00:17:40 | - do. -                  | "            | S.African            |
|         | 30:12:00 NP 00:17:50 | - do. -                  | "            | Australian           |
|         | 30:12:00 NP 00:17:60 | - do. -                  | "            | European             |
|         | 30:12:00 NP 00:17:70 | - do. -                  | "            | N.European           |
|         | 30:12:00 NP 00:17:80 | - do. -                  | "            | CSA                  |
| 2       | 30:12:00 NA 03:55:90 | SVU circuit board #22481 | SUV シート      |                      |
|         | 40:10:00 iA 04:90:20 | Transistor 2SA490        | トランジスタ       | Tr703                |
|         | 40:10:00 iA 05:61:70 | - do. - 2SA561           | "            | Tr705、710、712        |
|         | 40:10:00 iC 08:28:90 | - do. - 2SC828           | "            | Tr704、711、713        |
|         | 40:10:00 iD 02:34:10 | - do. - 2SD234           | "            | Tr706                |
|         | 40:10:00 iF 00:00:40 | Diode 1S1555             | ダイオード        | D705、706、712         |
|         | 40:10:00 iF 00:01:00 | - do. - 1S1715           | "            | D707、713             |
|         | 40:10:00 iH 00:01:40 | - do. - 10DC-4           | "            | D708、710             |
|         | 40:10:00 iH 00:01:50 | - do. - 10DC-4R          | "            | D709、711             |

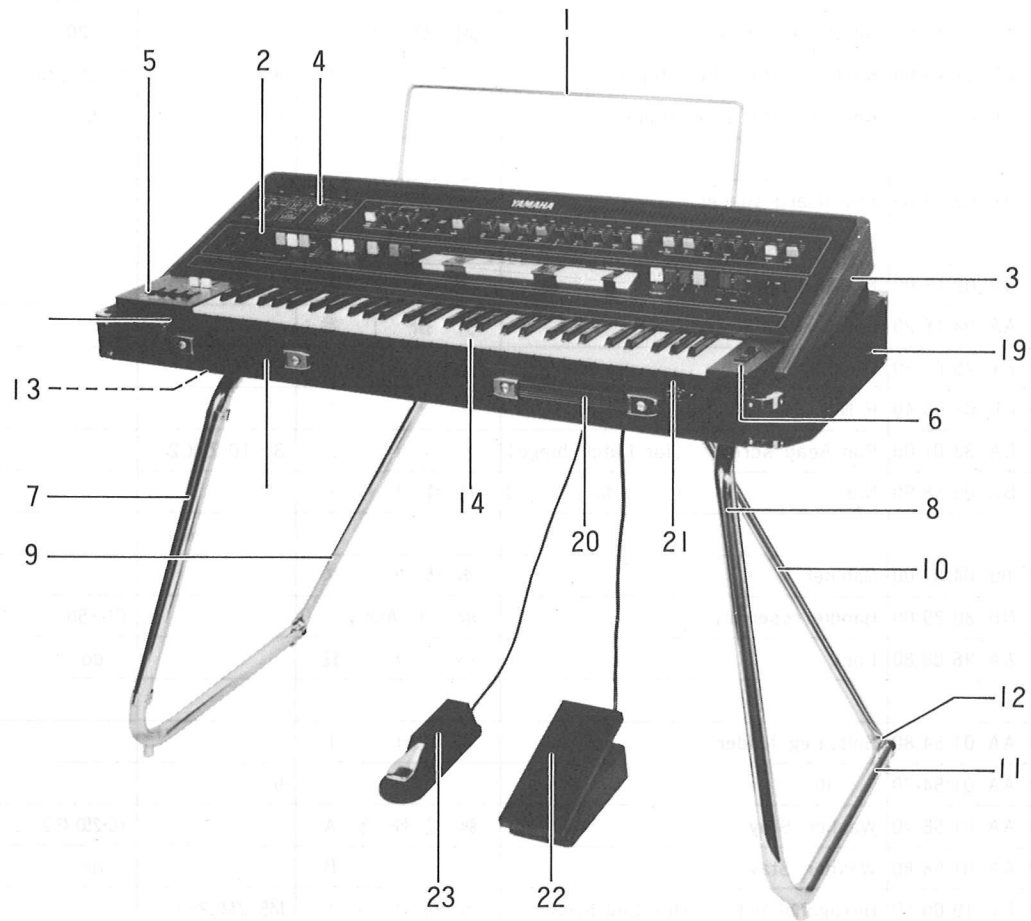






| Ref No. | Part No. (パーツ番号) |       |             | Description (部品名)                        | Remarks (備考)          | Common Models (共通モデル) |
|---------|------------------|-------|-------------|--|-----------------------|-----------------------|
| 1       | 30               | 12:60 | NB:04:80:90 | Key board assembly                       | 鍵盤 Ass'y              |                       |
| 2       | 30               | 10:00 | NB:04:51:60 | Switch assembly Key Switch IU            | スイッチ Ass'y            | 13Keys<br>CS-50       |
| 3       | 30               | 10:00 | NB:04:51:70 | -do.- -do.- 2,3,4,5u                     | "                     | 12Keys<br>-do.-       |
|         | 30               | 10:00 | CB:01:11:70 | White Key C.F                            | 白 鍵                   | CS-50                 |
|         | 30               | 10:00 | CB:01:11:80 | -do.- D                                  | "                     | -do.-                 |
|         | 30               | 10:00 | CB:01:11:90 | -do.- E.B                                | "                     | -do.-                 |
|         | 30               | 10:00 | CB:01:12:00 | -do.- G                                  | "                     | -do.-                 |
|         | 30               | 10:00 | CB:01:12:10 | -do.- A                                  | "                     | -do.-                 |
|         | 30               | 10:00 | CB:01:12:20 | -do.- C'                                 | "                     | -do.-                 |
|         | 30               | 10:00 | CB:01:12:30 | Black Key                                | 黒 鍵                   | -do.-                 |
|         | 30               | 10:00 | AA:03:56:70 | Key spring for White Key                 | キースプリング               | CS-50                 |
|         | 30               | 10:00 | AA:00:56:80 | -do.- for Black Key                      | "                     | -do.-                 |
|         |                  |       | 3           |  |                       |                       |
| 4       | 30               | 10:00 | AA:01:24:40 | Plate for Shatter                        | シャッター取付板              | CS-50                 |
| 5       | 30               | 10:00 | BC:0:27:90  | Shatter Plate                            | シャッター板                | -do.-                 |
| 6       | 30               | 11:50 | NX:40:11:00 | Touch Control pick-up assembly           | T.C.ピックアップ Ass'y      | -do.-                 |
| 7       | 30               | 10:00 | NB:01:79:70 | Slide Controller assembly                | スライド<br>コントローラー Ass'y | YC-45D、E-5            |
| 8       | 30               | 10:00 | CB:01:86:50 | Dust cover                               | ダストカバー                |                       |
|         | 30               | 10:00 | CB:02:86:00 | Knob White                               | ツマミ 白                 | CS-50                 |
|         | 30               | 10:00 | CB:02:86:10 | -do.- Black                              | " 黒                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:20 | -do.- Red                                | " 赤                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:30 | -do.- Green                              | " 緑                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:40 | -do.- Yellow                             | " 黄                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:50 | -do.- Gray                               | " 灰                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:60 | -do.- Black                              | " 黒                   | for Volume<br>-do.-   |
|         | 30               | 10:00 | CB:02:86:70 | TVR Knob White                           | " 白                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:80 | -do.- Black                              | " 黒                   | -do.-                 |
|         | 30               | 10:00 | CB:02:86:90 | -do.- Red                                | " 赤                   | -do.-                 |
|         | 30               | 10:00 | CB:02:87:00 | -do.- Green                              | " 緑                   | -do.-                 |
|         | 30               | 10:00 | CB:02:87:10 | -do.- Gray                               | " 灰                   | -do.-                 |
|         | 30               | 10:00 | CB:02:01:20 | Knob Black (out side)                    | " (外側)                | for Pitch<br>-do.-    |
|         | 30               | 10:00 | CB:02:01:30 | -do.- -do.- (inside)                     | " (内側)                | -do.-<br>-do.-        |
| 9       | 40               | 10:00 | KA:40:04:80 | Slide Switch TPS-2P Black                | スライドSW 黒              | for Memory Bank       |
| 10      | 40               | 10:00 | HP:50:01:50 | Slide variable resistor TPR B-10KΩ Black | スライドVR 黒              | -do.-                 |
|         | 40               | 10:00 | HP:50:01:60 | -do.- -do.- Gray                         | " 灰                   | -do.-                 |
|         | 40               | 10:00 | HP:50:01:70 | -do.- -do.- White                        | " 白                   | -do.-                 |
|         | 40               | 10:00 | HP:50:01:80 | -do.- -do.- Green                        | " 緑                   | -do.-                 |
|         | 40               | 10:00 | HP:50:01:90 | -do.- -do.- Red                          | " 赤                   | -do.-                 |
|         | 40               | 10:00 | HP:50:02:00 | -do.- -do.- Yellow                       | " 黄                   | -do.-                 |

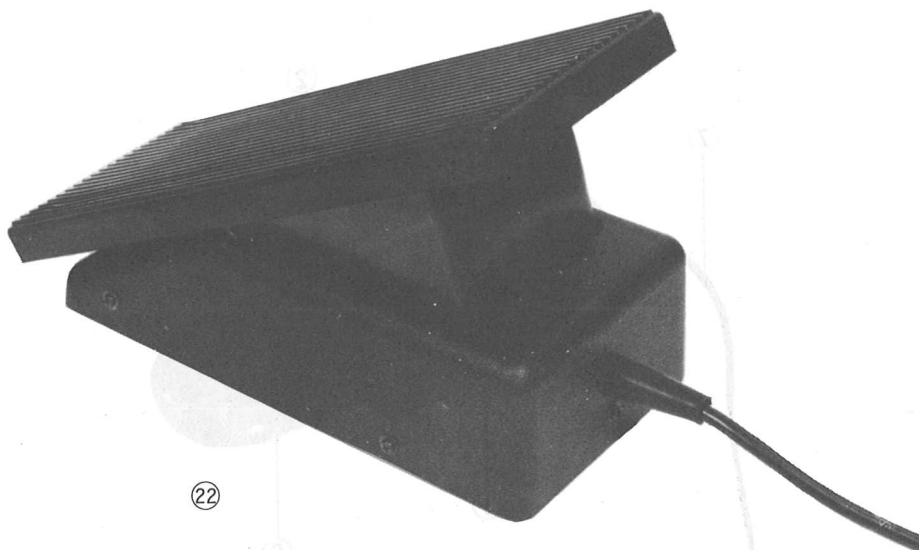
| Ref No. | Part No. (パーツ番号)     | Description (部品名)                            | Remarks (備考)        | Common models (共通モデル)                               |
|---------|----------------------|--|---------------------|---|
| 11      | 40:10:00:KA:90:05:90 | Push switch 14channels                       | プ ッ シュSW            | for Tone selector CS-50                             |
| 12      | 40:10:00:KA:90:04:30 | —do.— 4 channels                             | "                   | for Transposition —do.—                             |
| 13      | 40:10:00:KA:10:00:90 | See saw switch                               | シーソー SW             | CS-50   |
| 14      | 40:10:00:HR:20:00:20 | Variable resister A-10KΩ                     | ボ リ ウ ム             | for Volume CS-50                                    |
| 15      | 40:10:00:HR:60:00:20 | —do.— B-10KΩ +B-500Ω<br>(Center click type)  | "                   | for Pitch —do.—                                     |
| 16      | 40:10:00:HP:70:00:10 | TVR B-10KΩ                                   | トーンポリウム             | CS-50   |
| 17      | 40:10:00:HP:70:0:20  | —do.— —do.—<br>(Center click type)           | "                   | for Brilliance —do.—                                |
| 18      | 40:10:00:HQ:30:00:10 | Slide variable resister B-10KΩ               | スライドポリウム            | CS-50   |
| 19      | 40:10:00:HQ:30:01:70 | —do.— C-10KΩ                                 | "                   | for Sustain   |
| 20      | 40:10:00:HQ:30:01:50 | —do.— B-10KΩ                                 | "                   | for Portament or Glissand                           |
| 21      | 40:12:00:KA:40:02:90 | Slide Switch                                 | スライドスイッチ            | for SUB-OSC   |
|         | 30:10:00:AA:03:83:40 | Back Pannel                                  | バックパネル              | General, South African models                       |
|         | 30:10:00:AA:03:83:30 | —do.—  | "                   | 国内,UL,CSA,BS, Australian models                     |
|         | 30:10:00:AA:03:83:50 | —do.—  | "                   | North European, European models                     |
|         | 40:10:00:LB:20:04:80 | Holder for fuse SNI30I Screw type            | ヒューズホルダー            | General, South African models CS-50                 |
|         | 40:10:00:LB:20:05:90 | —do.— FEB 031,1401                           | "                   | North European European models —do.—                |
|         | 30:10:00:CB:01:91:30 | Knob for EXTERNAL-LEVEL                      | ツ マ ミ               | —do.—   |
|         | 40:10:00:HR:20:01:90 | Variable resister A-50KΩ —do.—               | ボ リ ウ ム             | —do.—   |
|         | 40:10:00:LB:20:02:50 | Voltage selector                             | 電圧切換器               | General, South African, North European models —do.— |
|         | 40:10:00:KA:40:00:00 | Slide switch High↔Low                        | スライド SW             | —do.—   |
|         | 40:10:00:LB:20:06:30 | Phone jack Out put, External IN, Foot switch | ヘッドフォンジャック          | —do.—   |
|         | 40:10:00:LB:40:01:00 | —do.— LJ-070 Foot controller                 | "                   | —do.—   |
| 22      | 40:10:00:KA:10:00:60 | Power switch RLM106AS2                       | パワ ー SW             | 国内 CS-50  |
|         | 40:10:00:KA:10:00:70 | —do.— SLM106AS1                              | "                   | Ather —do.—   |
|         | 40:10:00:KA:10:03:40 | —do.—  | "                   | European, North European models —do.—               |
|         | 40:10:00:JB:00:01:80 | Neon lamp NE-2                               | ネオン管                | CS-50   |
|         | 30:10:00:CB:00:77:70 | Lamp holder                                  | ランプホルダー             | CS-50 B-2, B-4B                                     |
|         | 23                   | 30:10:00:AA:04:01:70                         | Grille for radiator | 放熱グリル   |



| Ref No. | Part No. (パーツ番号)     | Description (部品名)      | Remarks (備考) | Common Models (共通モデル) |
|---------|----------------------|------------------------|--------------|-----------------------|
| 1       | 30:10:00:AA:03:69:70 | Music rest             | 譜面台          | CS-50                 |
| 2       | 30:12:60:00:04:45:10 | Control panel          | コンパネ         |                       |
|         | 30:13:00:AA:01:65:00 | Stay for control panel | ステー          | ML-PT                 |
| 3       | 30:12:60:92:05:55:00 | 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      | CS-50                 |
| 4       | 30:10:00:CB:02:92:80 | Lid                    | メモリーバンク蓋     | for Memoly bank       |
|         | 30:10:00:AA:03:83:70 | Memoly Panel           | メモリーパネル      | -do-                  |
| 5       | 30:12:60:00:04:55:10 | End block Left         | 拍子木(式)       |                       |
| 6       | 30:12:60:00:04:55:30 | -do- Right             | " (右)        |                       |
|         | 30:12:60:00:04:55:50 | -do- -do-              | " (右)        | North European model  |
| 7       | 30:10:00:NB:04:84:40 | Leg assembly Left      | 脚柱(左)        |                       |
| 8       | 30:10:00:NB:04:84:50 | -do- Right             | " (右)        |                       |
| 9       | 30:10:00:AA:03:87:60 | Stay for Leg Left      | 支柱(右)        |                       |
| 10      | 30:10:00:AA:03:87:70 | -do- Right             | " (右)        |                       |
|         | 30:10:00:CB:01:03:80 | Cap (Leg)              | 脚用キャップ       | YC-20                 |

CS60 (S/# 1001~)

| Paf No. | Part No. (パーツ番号)     | Description (部品名)                                   | Remarks (備考)               | Common Models (共通モデル) |
|---------|----------------------|---|----------------------------|-----------------------|
| 11      | 30:10:00 AA:01:39:90 | Adjusting screw 調整ネジ                                |                            | YC-20                 |
| 12      | 40:10:00 CB:01:14:00 | Knob bolt fo Stay stopper ノブボルト                     | 8×25                       | YC-20,30              |
| 13      | 40:10:00 CB:01:03:50 | Knob bolt for Leg stopper "                         | 6×20                       | -do.-                 |
| 14      | 30:10:00 AA:03:83:60 | Key board spacer 口金                                 |                            |                       |
| 15      | 30:12:60 00:02:13:00 | External cover ケース蓋                                 |                            |                       |
| 16      | 30:10:00 AA:98:18:20 | Latch hinge 引掛丁番                                    |                            |                       |
| 17      | 40:10:00 EV:75:01:50 | Wing bolt 蝶ネジ                                       | 5×15                       |                       |
|         | 40:10:00 CB:01:06:40 | P Nut Pナット  |                            |                       |
|         | 40:10:00 EA:33:01:00 | Pan Aead screw (for Latch hinge) ナベ小ネジ              | 3×10 ZMC2-□                |                       |
| 18      | 30:10:00 BB:00:18:90 | Nut ( -do.- ) 特殊ナット                                 |                            |                       |
| 19      | 30:12:60 00:04:07:00 | Cabinet 本体ケース                                       |                            |                       |
| 20      | 30:10:00 NB:80:29:00 | Handle rssembly 取手 Ass'y                            |                            | CS-50                 |
| 21      | 40:10:00 AA:96:08:80 | Lock パッチン錠  |                            | -do.-                 |
|         | 30:10:00 AA:01:54:80 | Bolt, Leg holder 脚用ナット                              |                            |                       |
|         | 30:10:00 AA:01:54:70 | -do.- "   | 6∅                         |                       |
|         | 30:10:00 AA:01:58:70 | Washer, Stay 脚受座金 A                                 |                            | YC-25D,45D            |
|         | 30:10:00 AA:01:58:80 | Washer, Stay " B                                    |                            | -do.-                 |
|         | 40:10:00 EV:10:00:50 | Hexagonal nut (for Leg holder) 六角ナット                | M5 ZMC2-Y                  |                       |
|         | 40:10:00 EV:20:00:50 | Plain washer ( -do.- ) 平座金                          | M5 -do.-                   |                       |
|         | 40:10:00 EB:04:02:00 | Flat head screw ( -do.- ) 皿小ネジ                      | 4×20 -do.-                 |                       |
|         | 40:10:00 EP:33:11:00 | Flat head wooden screw (for Washer Stay & Leg) 皿木ネジ | 3.1×10 ZMC2-B <sup>l</sup> |                       |
|         | 30:12:60 00:05:07:10 | Lid AC cord コード収納蓋                                  |                            |                       |
|         | 30:10:00 AA:03:41:70 | Hinge 丁番  | ZMC2-B <sup>l</sup>        |                       |
|         | 30:10:00 BB:00:18:90 | Special nut (for Hinge) 特殊ナット                       | 3∅                         | EL,LM Common          |
|         | 40:10:00 EB:33:01:00 | Flat head screw ( -do.- ) 皿小ネジ                      | 3×10 ZMC2-B <sup>l</sup>   |                       |
|         | 30:10:00 AA:01:39:80 | Stopper holder 止め金具                                 |                            | YC-25D,45D            |
|         | 40:10:00 EQ:23:11:00 | Round head wooden screw (for Stopper Holder) 丸木ネジ   | 3.1×10 FCrM3-3g            |                       |
|         | 30:10:00 BB:10:17:60 | Locking Plate コード収納蓋止                               | ZMC2-B <sup>l</sup>        |                       |
|         | 40:10:00 EQ:33:11:30 | Round head wooden screw (for Locking Plate) 丸木ネジ    | 3.1×13 ZMC2-B <sup>l</sup> |                       |
|         | 30:15:00 AA:80:18:50 | Grille radiator 放熱グリル                               |                            | J-100B                |

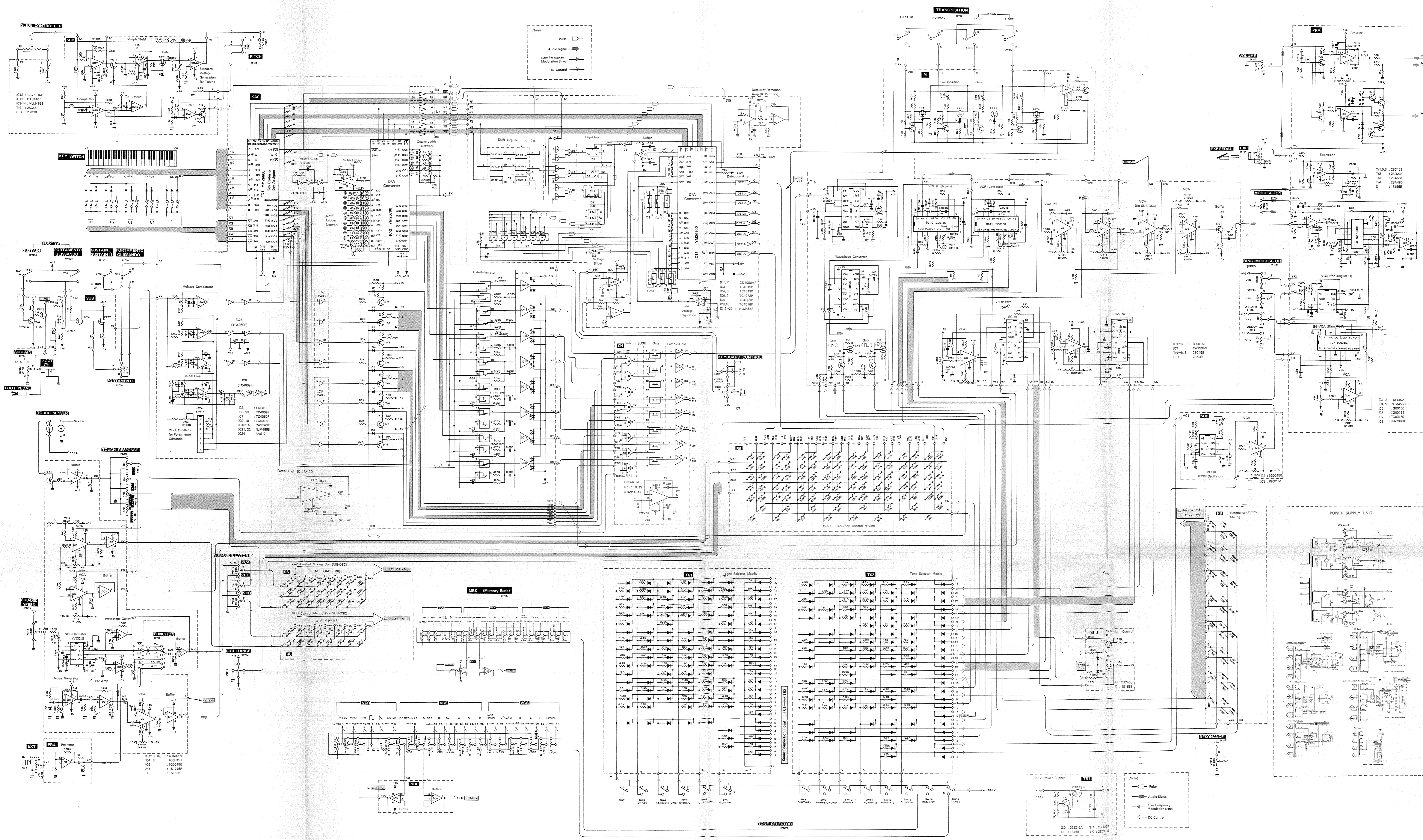


| Ref No. | Part No. (パーツ番号)     | Description (部品名)  | Remarks (備考) | Common models (共通モデル) |  |
|---------|----------------------|--------------------|--------------|-----------------------|--|
| 22      | 30:12:00 NB 04:53:60 | EXP Pedal          | EXP ペダル      | Cs-50                 |  |
|         | 30:10:00 CB 01:02:60 | Case               | ケース          | -do.-                 |  |
|         | 30:10:00 AA 01:37:70 | Flame              | フレーム         | -do.-                 |  |
|         | 30:10:00 DB 03:00:40 | Rubber for Stopper | すべり止ゴム       | -do.-                 |  |
|         | 30:10:00 AA 01:38:00 | Pedal              | 踏板           | -do.-                 |  |
|         | 30:10:00 CB 00:36:80 | Rubber Pedal mat   | マット          | -do.-                 |  |
|         |                      |                    |              |                       |  |
|         | 40:10:00 EV 10:00:40 | Hexagonal nut 4s   | 六角ナット        | Cs-50                 |  |
|         | 40:10:00 EV 10:00:60 | -do.- 6s           | "            | -do.-                 |  |
|         |                      |                    |              |                       |  |
|         | 30:10:00 AA 01:08:10 | Shatler Plate      | シャッター板       | Cs-50                 |  |
|         | 40:10:00 CG 00:00:10 | Frosted Glass      | スリガラス        | -do.-                 |  |
|         |                      |                    |              |                       |  |
|         | 40:10:00 iK 00:00:30 | Photocell, Cds     | C d s        | Cs-50                 |  |
|         | 30:10:00 CB 00:76:30 | Photocell holder   | Cds ホルダー     | -do.-                 |  |
|         |                      |                    |              |                       |  |
|         | 40:10:00 JB 00:01:70 | Lamp, 24V5W        | ランプ          | Cs-50                 |  |
|         | 30:10:00 CB 00:76:40 | Lamp holder        | ランプホルダー      | -do.-                 |  |
|         | 30:10:00 CB 00:76:20 | Cover for Lamp     | ランプカバー       | -do.-                 |  |
|         |                      |                    |              |                       |  |
|         | 40:10:00 LB 20:01:20 | Lam socket         | ブラケット        | Cs-50                 |  |
|         |                      |                    |              |                       |  |
|         |                      |                    |              |                       |  |
|         |                      |                    |              |                       |  |
|         |                      |                    |              |                       |  |
|         |                      |                    |              |                       |  |
|         |                      |                    |              |                       |  |



# CS-60 OVERALL CIRCUIT DIAGRAM

## CS-60 OVERALL CIRCUIT DIAGRAM







SINCE 1887  **YAMAHA**  
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN