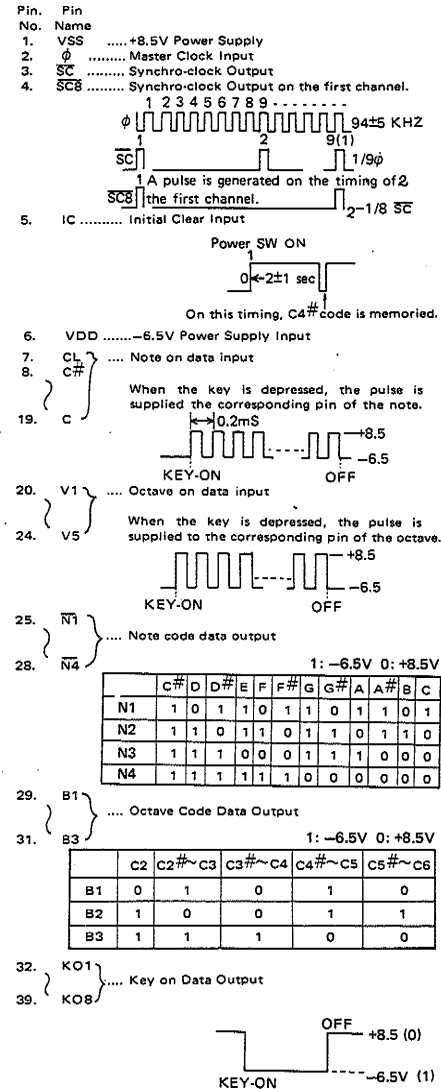


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KEY CODER & KEY ASSIGNER LSI (YM26600)

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.

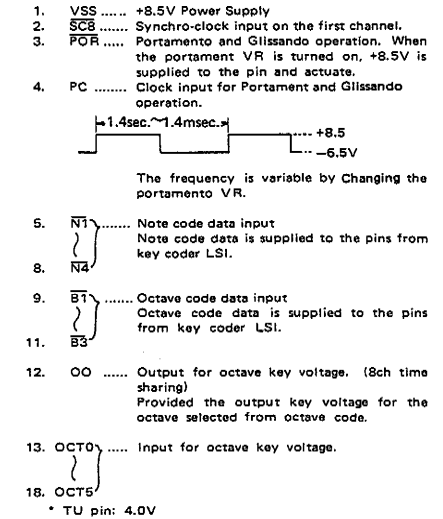


The number of note sounded is variable by using this pin.
i.e.) Up to 4 notes: Supply -6.5V to KO5.
Up to 3 notes: Supply -6.5V to KO4.

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.



	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 Input for note key voltage

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

SPECIFICATIONS

KEYBOARD

61 keys C₁ ~ c₄ (5 octaves)

TONE SELECTORS

Channel I	Channel II
STRING 1	STRING 2
STRING 3	STRING 4
BRASS 1	BRASS 2
FLUTE	BRASS 3
ELECTRIC PIANO	BASS
CLAVICHORD 1	CLAVICHORD 2
HARPSICHORD 1	HARPSICHORD 2
ORGAN 1	ORGAN 2
GUITAR 1	GUITAR 2
FUNKY 1	FUNKY 2
FUNKY 3	FUNKY 4
MEMORY 1	MEMORY 2
MEMORY 3	MEMORY 4
PANEL	PANEL

TONE SLIDE CONTROLS

VCO (Voltage Controlled Oscillator) Section

SPEED

PWM (Pulse Width Modulation)

PW (Pulse Width)

□ (Square Wave) Switch (On/Off)

△ (Sawtooth Wave) Switch (On/Off)

NOISE

VCF (Voltage Controlled Filter) Section

HPF (High Pass Filter)

RESH (Resonance High)

LPF (Low Pass Filter)

RESL (Resonance High)

IL (Initial Level)

AL (Attack Level)

A (Attack Time)

D (Decay Time)

R (Release Time)

VCA (Voltage Controlled Oscillator) Section

VCF LEVEL

~ (Sine Wave)

A (Attack Time)

D (Decay Time)

S (Sustain Level)

R (Release Time)

LEVEL

TOUCH RESPONSE Section

INITIAL Controls

BRILLIANCE

LEVEL

AFTER Controls

BRILLIANCE

LEVEL

MEMORY BANKS (VCO, VCF, VCA, TOUCH RESPONSE)

Memory 1

Memory 2

Memory 3

Memory 4

EFFECT CONTROLS

RING MODULATOR

ATTACK TIME

DECAY TIME

DEPTH

SPEED

MODULATION

TOUCH RESPONSE

INITIAL Control

PITCH BEND

AFTER Controls

SUB. OSCILLATOR

SPEED

VCO

VCF

SUB. OSCILLATOR

FUNCTION Selector (△, □, △, □ NOISE, EXTERNAL)

SPEED

VCO

VCF

VCA

SUSTAIN

Select Switch (I/II)

SUSTAIN Time

PORTAMENTO/GLISSANDO

Select Switch (PORTAMENTO/GLISSANDO)

PORTAMENTO/GLISSANDO Time

FINGER BOARD

RESONANCE

BRILLIANCE

KEYBOARD CONTROLS

BRILLIANCE

LOW

HIGH

LEVEL

LOW

HIGH

ORCHESTRA EFFECT

Voice Selector (ON/OFF)

TREMULO

CHORUS

SPEED

DEPTH

FEET levers (Channels I & II)

(16', 8', 5-1/3', 4', 2-2/3', 2')

OTHER CONTROLS

PITCH (Coarse & Fine Controls)

DETUNE (Channel II only)

CH. I/CH. II MIX

Master VOLUME

FOOT CONTROLLER (Pedal)

EXTERNAL IN LEVEL

FOOT PEDAL Selectors

(EXP./EXP. & WAH)

FOOT SWITCH Selectors (On/Off)

SUSTAIN

PORTAMENTO/GLISSANDO

POWER SWITCH (with Indicator)

OTHER FITTINGS

EXTERNAL IN Jack

OUTPUT Jacks with Selector (HIGH/LOW)

Headphone Jack

FOOT CONTROLLER Jack

FOOT SWITCH Jack

Carrying Straps

Metal Corners

Slip Fittings

Power Cord Storage Space

OUTPUT SPECIFICATIONS

Nominal Levels

High: 0 dBm (800 mVrms)

Low: -20 dBm (80 mVrms)

Headphones: -10 dBm (250 mVrms)

Nominal Impedance

Output Jacks: 600 ohms

Headphone Jack: 8 ohms

CIRCUITRY

Solid State

Power Consumption: 180 Watts

Power Source: AC, 50/60 Hz

DIMENSIONS (W x H x D)

Assembled: 1,205 x 945 x 702 mm (47-1/2 x 37-1/4 x 27-5/8")

In Case: 1,205 x 290 x 702 mm (47-1/2 x 11-3/8 x 27-5/8")

Height to Keyboard: 842 mm (33-1/8")

WEIGHT

100 kg (220.5 lbs) Including Standard Accessories

FINISH

Black Leatherette with Walnut Veneer Panel Siding

STANDARD ACCESSORIES

Removable Cover

Vinyl Carrying Bag

Foot Controller (Expression Pedal)

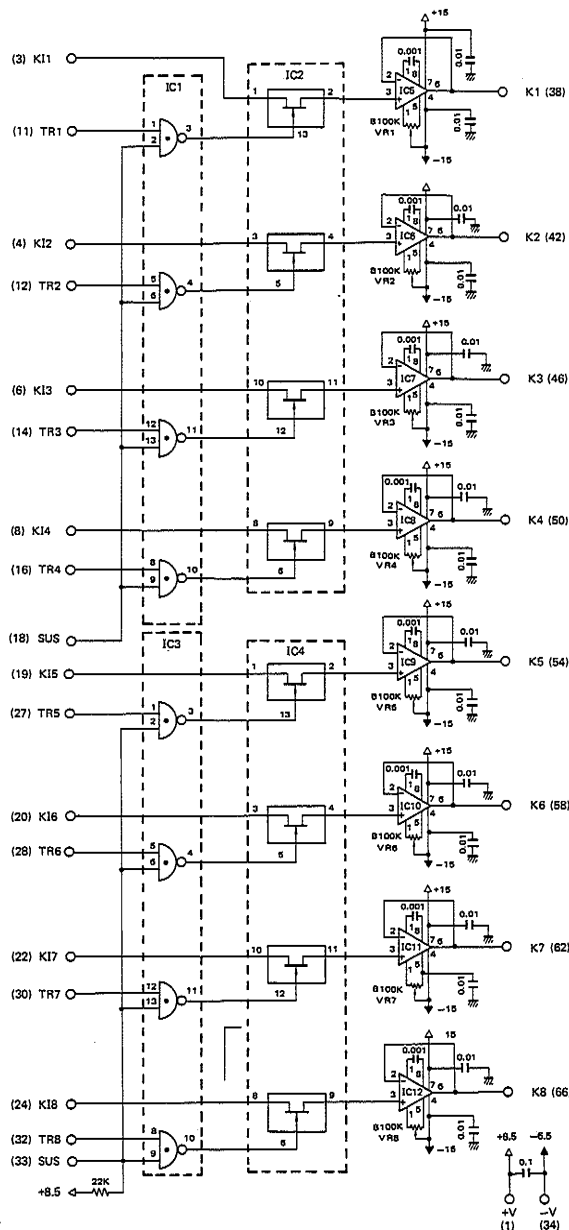
Foot Switch Pedal

Music Rest

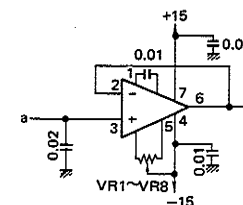
Detachable Casters

Specification subject to change without notice.

SH Circuit Diagram



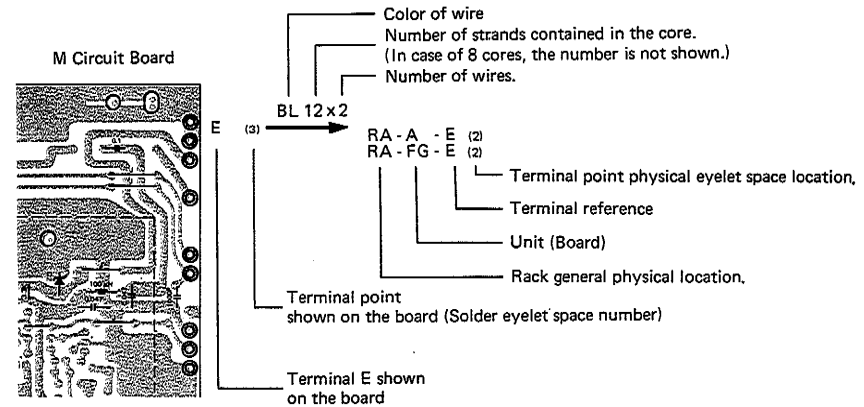
Note) 1. IC5~IC12 :CA4016P



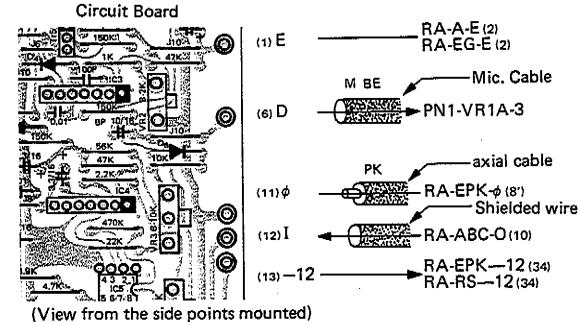
CORDING GUIDE

1) CIRCUIT BOARD AND WIRING

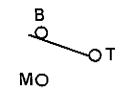
The coding system is as follows



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

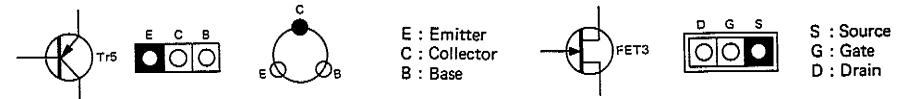


2) SWITCH



B : Break
T : Transfer
M : Make

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	

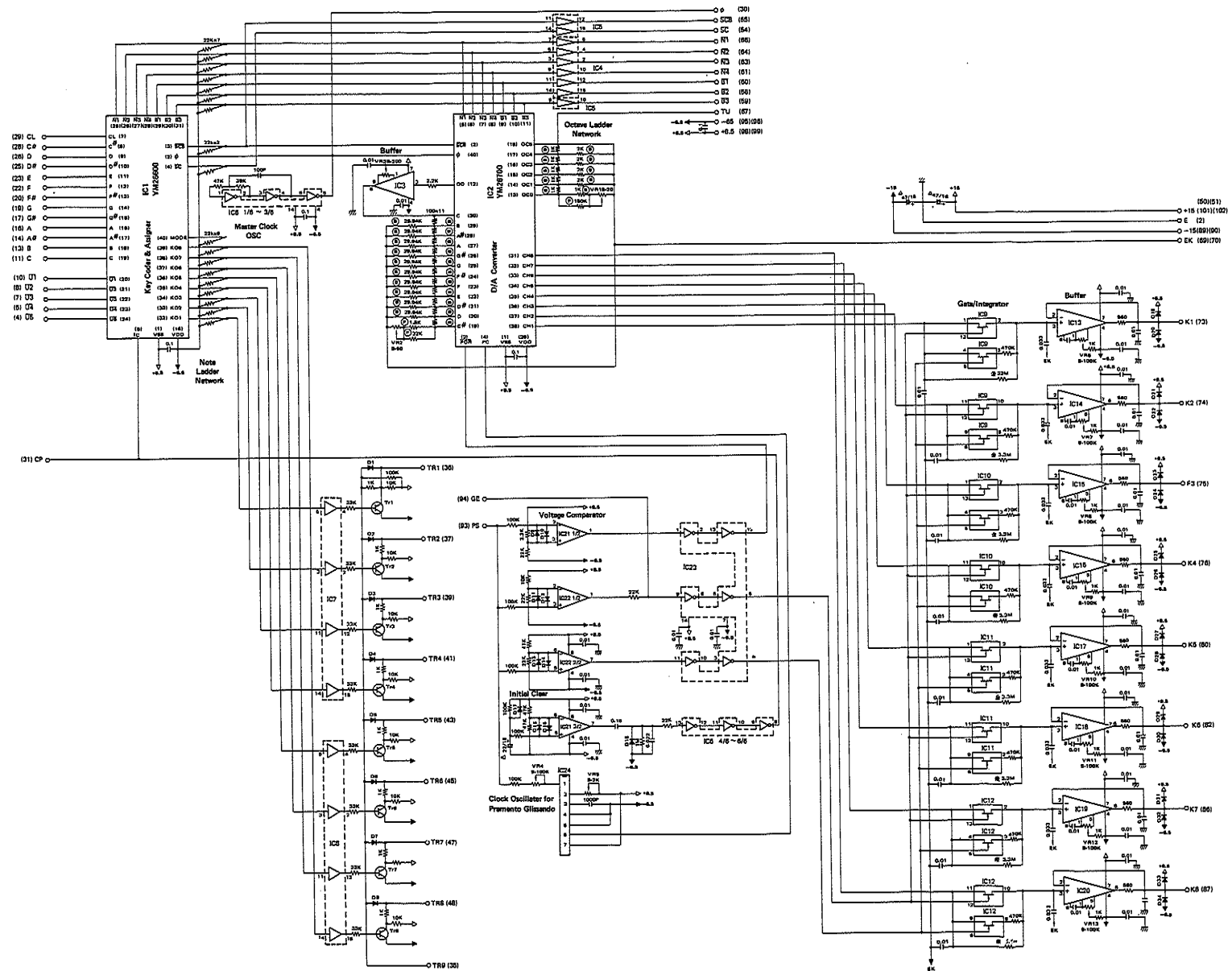
5) WIRE COLOR - Musical Note indication

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

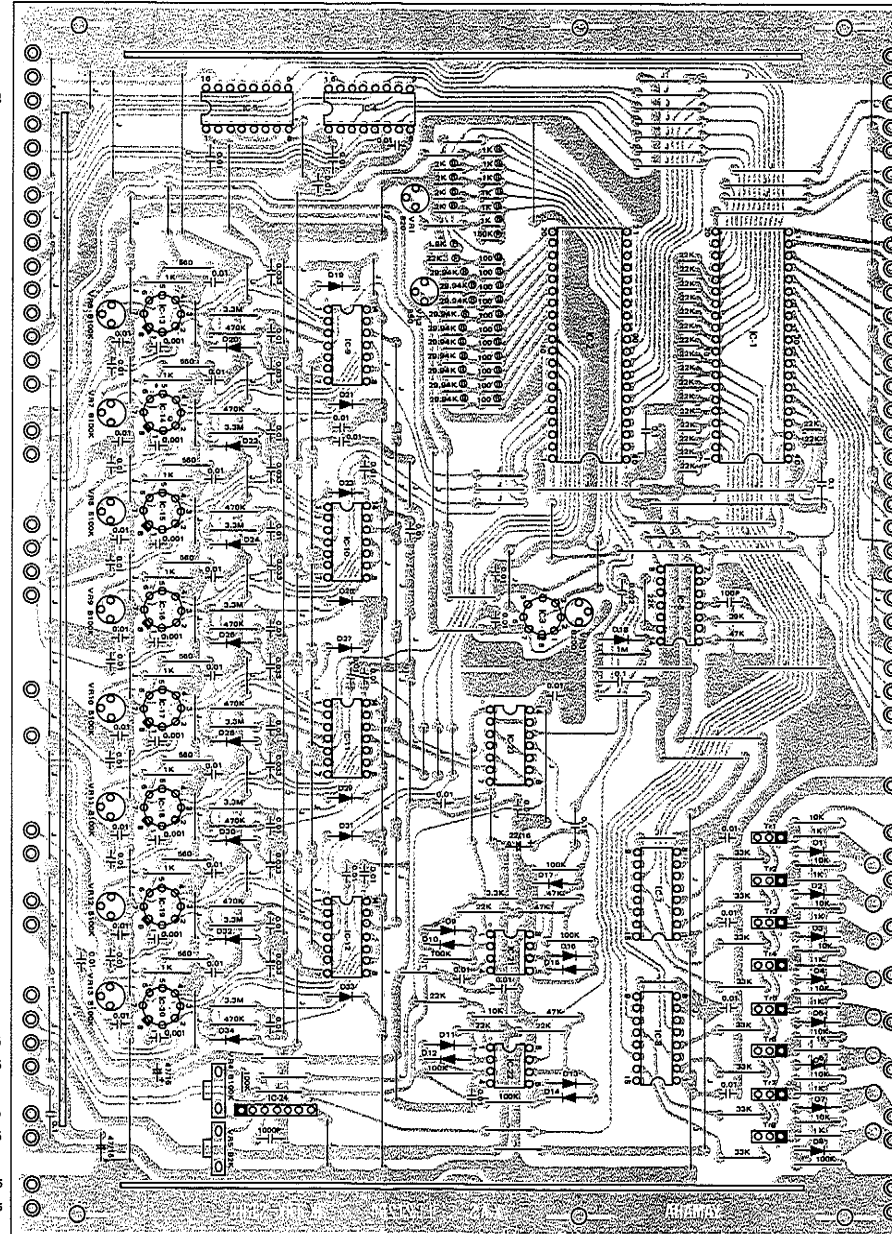
FUNCTION	LOGIC MARK	
	MIL	YAMAHA
NOT (INVERTER)		
NOR		
NAND		

KAS Circuit Diagram



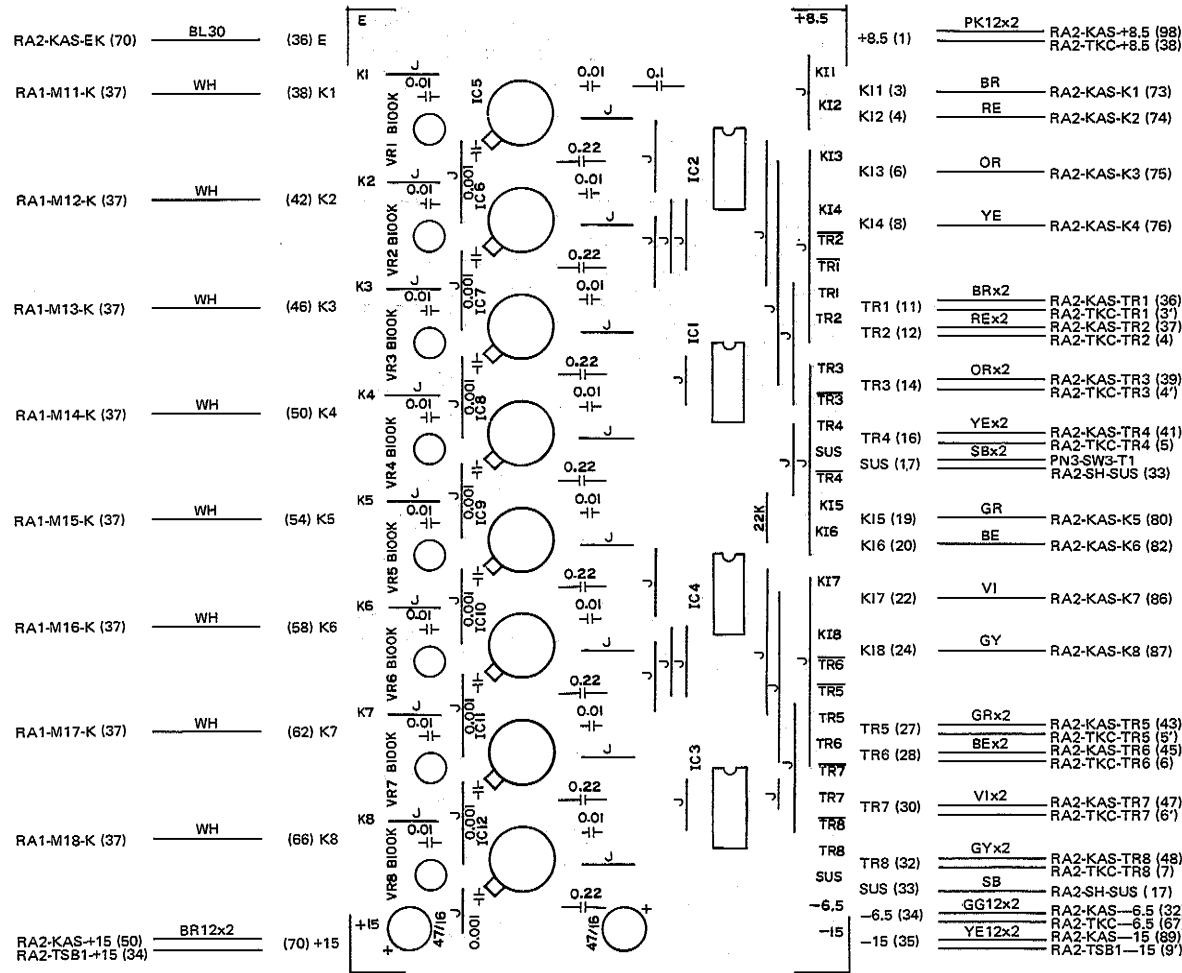
KAS Circuit Board & Wiring

RA1-KBC1-SC (52)	WHx2	(53) E
RA2-TKC-SC (58)	GYx2	(54) SC
RA1-KBC1-SC8 (32)		(55) SCB
RA2-TKC-SC8 (59)		
RA1-KBC1-B3 (21)	VIx2	(56) E
RA2-TKC-B3 (66)	BEx2	(57) B3
RA1-KBC1-B2 (23)		(58) B2
RA2-TKC-B2 (65)		
RA1-KBC1-B1 (24)	GRx2	(59) E
RA2-TKC-B1 (64)	YEx2	(60) B1
RA1-KBC1-N4 (26)		(61) N4
RA2-TKC-N4 (63)		(62) E
RA1-KBC1-N3 (27)	ORx2	(63) N3
RA2-TKC-N3 (62)	REx2	(64) N2
RA1-KBC1-N2 (29)		(65) E
RA2-TKC-N2 (61)	BRx2	(66) NT
RA1-KBC1-N1 (30)	GY	(67) TU
RA2-TKC-N1 (60)		
RA1-BA-0 (69)		
RA1-EP	BL30	(69) EK
RA2-KAS-E (2)	BL12	(70) EK
RA1-M11-EK (19)	BL	
RA2-SH-E (36)	BL30	
RA2-SH-K11 (3)	BR	(73) K1
RA2-SH-K12 (4)	RE	(74) K2
RA2-SH-K13 (6)	OR	(75) K3
RA2-SH-K14 (8)	YE	(76) K4
RA2-SH-K15 (19)	GR	(80) K5
RA2-SH-K16 (20)	BE	(82) K6
RA2-SH-K17 (22)	VI	(86) K7
RA2-SH-K18 (24)	GY	(87) K8
RA1-M11-15 (39)	YE30	(89) -15
RA2-SH-15 (35)	YE12	(90) -15
RA2-KAS-15 (33)	YE12	
RA1-SUB-PS (29)	SB	(93) PS
PN3-SW4-T1	GY	(94) GE
PU-9C1P-9	GG12x2	(95) -6.5
RA2-SH-6.5 (34)	GG12x2	(96) -6.5
PN3-VR2-9		
RA1-KBC1-6.5 (37)		
PU-9C1P-7	PK12x2	(98) +8.5
RA2-SH+8.5 (1)	PK12x2	(99) +8.5
PN3-VR2-1		
RA1-KBC1+8.5 (5)		
		(101) +15
		(102) +15



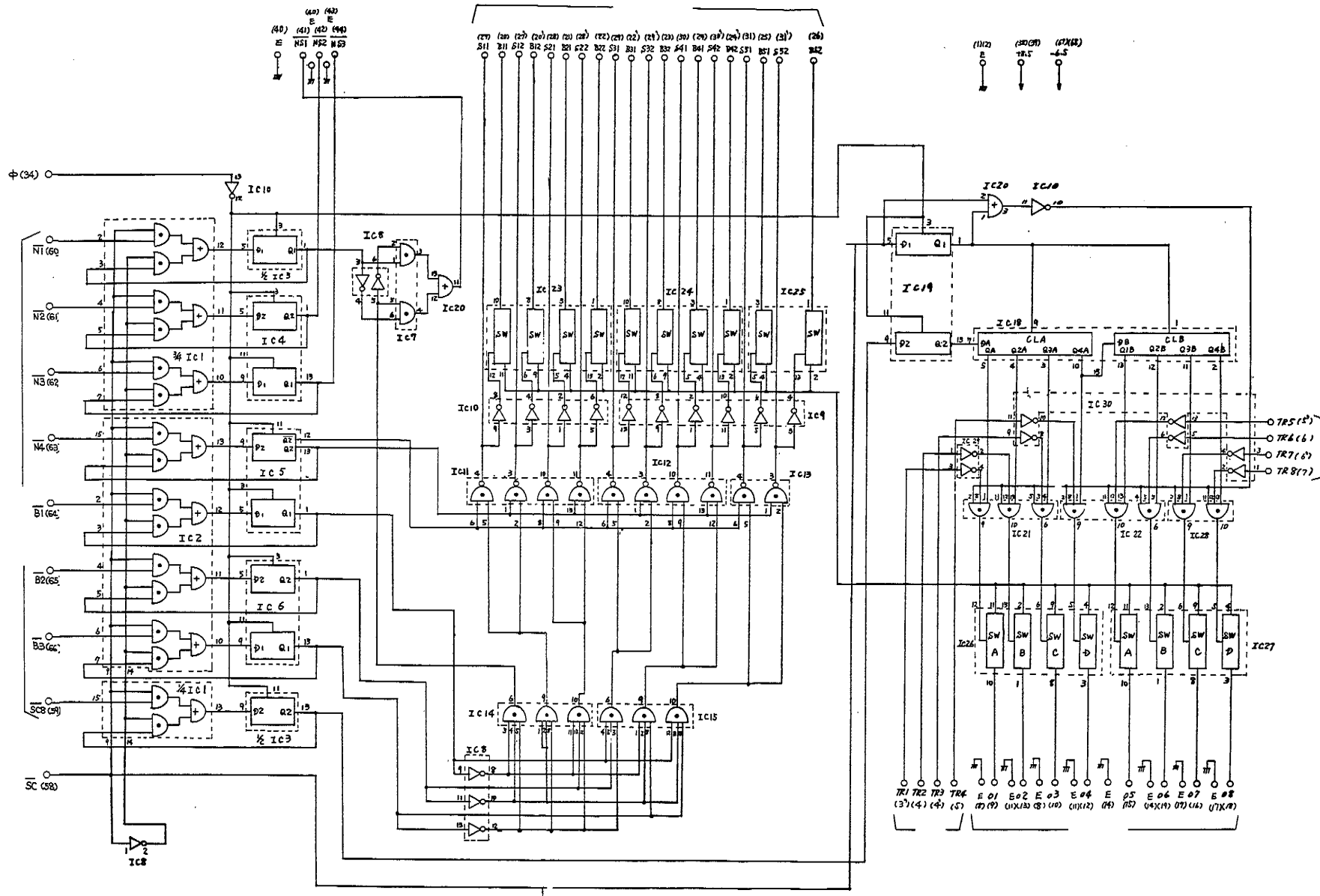
E (2)	BL12x2	RA2-KAS-EK (69)
E (3)	BE	RA2-TKC-E (3)
U5 (4)	GR	K-T1-C#5
U4 (5)		K-T1-C#4
E (6)	YE	K-T1-C#3
U3 (7)	OR	K-T1-C#2
U2 (8)		
E (9)	RE	K-T1-C1
U1 (10)	BR	K-M1-C2
C (11)		
E (12)	PK	K-M1-B1
B (13)	SB	K-M1-A#1
A# (14)		
E (15)	GG	K-M1-A1
A (16)	WH	K-M1-G#1
G# (17)		
E (18)	GY	K-M1-G1
G (19)	VI	K-M1-F#1
F# (20)		
E (21)	BE	K-M1-F1
F (22)	GR	K-M1-E1
E (23)		
E (24)	YE	K-M1-D#1
D# (25)	OR	K-M1-D1
D (26)		
E (27)	RE	K-M1-C#1
C# (28)	BR	K-M1-C1
CL (29)	GGx2	RA1-KBC1-φ (60)
φ (30)		RA2-TKC-φ (34)
-15 (33)	YE12	RA2-KAS-15 (90)
TR9 (35)	WH	RA1-PRA-TR (19)
TR1 (36)	BRx2	RA1-TWS-T1 (31)
TR2 (37)	REx2	RA2-SH-TR1 (11)
		RA1-TWS-T2 (30)
		RA2-SH-TR2 (12)
TR3 (39)	ORx2	RA1-TWS-T3 (32)
		RA2-SH-TR3 (14)
TR4 (41)	YEx2	RA1-TWS-T4 (29)
		RA2-SH-TR4 (16)
TR5 (43)	GRx2	RA1-TWS-T5 (66)
		RA2-SH-TR5 (27)
TR6 (45)	BEx2	RA1-TWS-T6 (63)
		RA2-SH-TR6 (28)
TR7 (47)	VIx2	RA1-TWS-T7 (65)
TR8 (48)	GYx2	RA2-SH-TR7 (30)
		RA1-TWS-T8 (64)
		RA2-SH-TR8 (32)
+15 (50)	BR30	RA1+15P
+15 (51)	BR12	RA2-SH+15 (70)

SH Circuit Board & Wiring

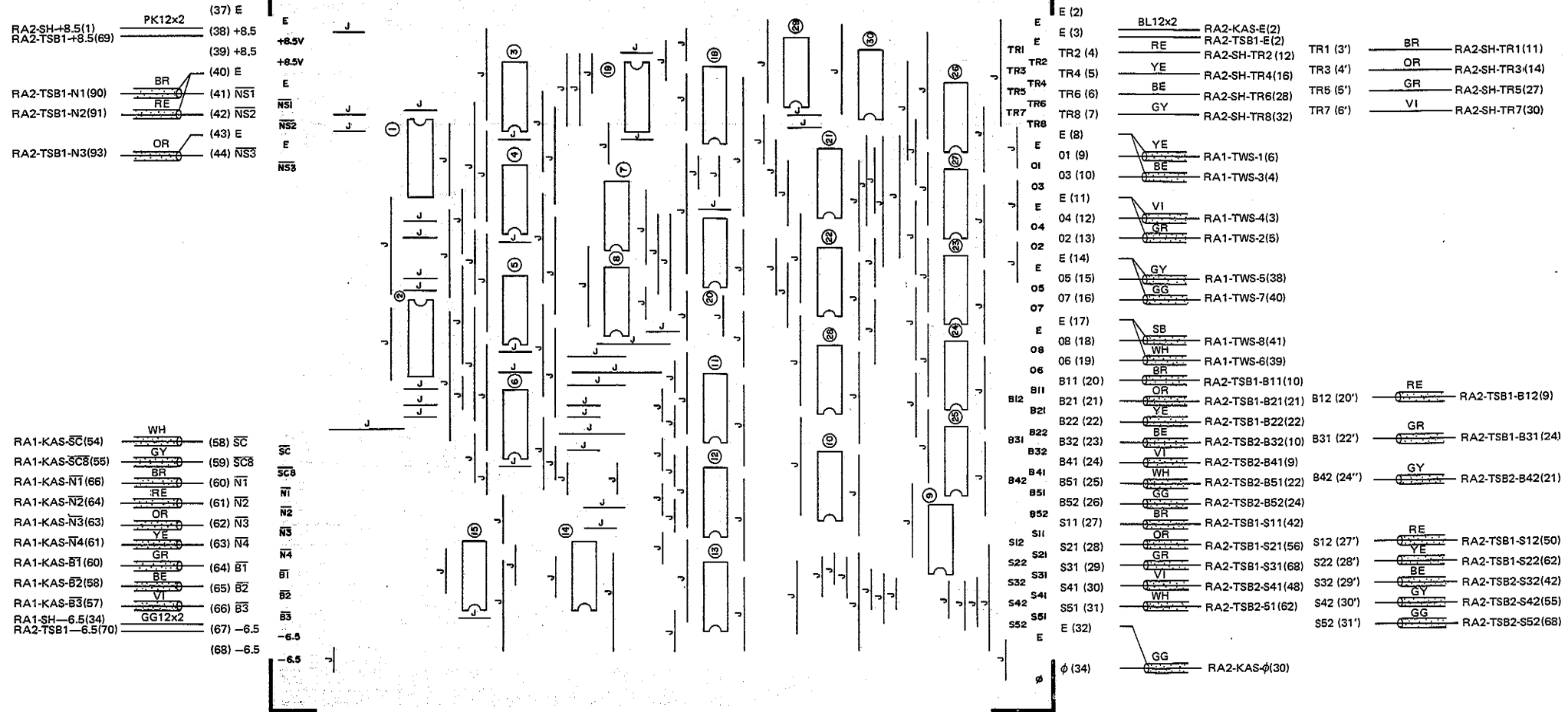


- Note) 1. ※ Mark : Ceramic Capacitor 0.1
 2. Volume : 332H
 3. IC1,3 : TC4011P
 IC2,4 : TC4016P
 IC5~12 : CA3140T
 4. Print Board #22544

KEC-4456-6Y

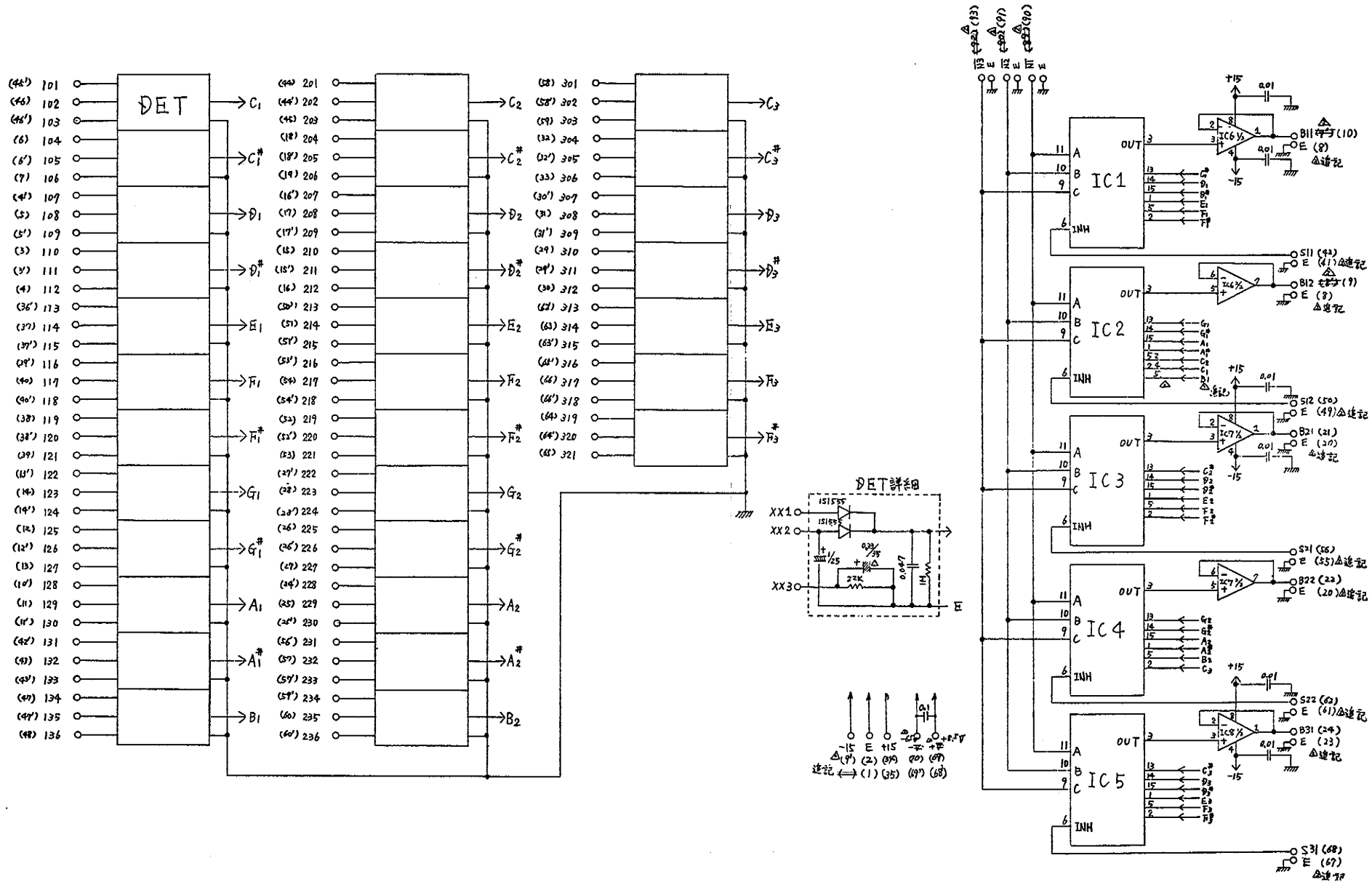


TKC Circuit Board & Wiring



- Note) 1. Print Board : LC21053
 2. IC 1, 2 : TC4019P
 IC 3 ~ 6, 19 : TC4013P
 IC7 : TC4081P
 IC 8 ~ 10, 29, 30 : TC4069P
 IC 11 ~ 13 : TC4011P
 IC 14, 15, 21, 22, 28 : TC4073P
 IC 18 : TC4015P
 IC 20 : TC4071P
 IC 23 ~ 27 : TC4016P
 3. Camber-stop Hardware : #03992

TSB 1 Circuit Diagram



TSB 1 Circuit Board & Wiring

K-M2-E1 GR (36') 113
 K-T2-E1 GR (37') 115
 K-T3-F#1 VI (38') 120
 K-M2-F1 BE (39') 116
 K-T2-F1 BE (40') 118

K-M2-A#1 SB (42') 131
 K-T2-A#1 SB (43') 133
 K-T3-C2 BR (44') 202
 K-M2-C1 BR (45') 101
 K-T2-C1 BR (46') 103
 K-T3-B1 PK (47') 135

K-M2-E2 GR (50') 213
 K-T2-E2 GR (51') 215
 K-T3-F#2 VI (52') 220
 K-M2-F2 BE (53') 216
 K-T2-F2 BE (54') 218

K-M2-A#2 SB (56') 231
 K-T2-A#2 SB (57') 233
 K-T3-C3 BR (58') 302
 K-M2-B2 PK (59') 234
 K-T2-B2 PK (60') 236

K-M2-E3 GR (62') 313
 K-T2-E3 GR (63') 315
 K-T3-F#3 VI (64') 320
 K-M2-F3 BE (65') 316
 K-T2-F3 BE (66') 318

(68') +8.5
 (69') -6.5

K-T3-E1 GR (37) 114
 K-M2-F#1 VI (38) 119
 K-T2-F#1 VI (39) 121
 K-T3-F1 BE (40) 117

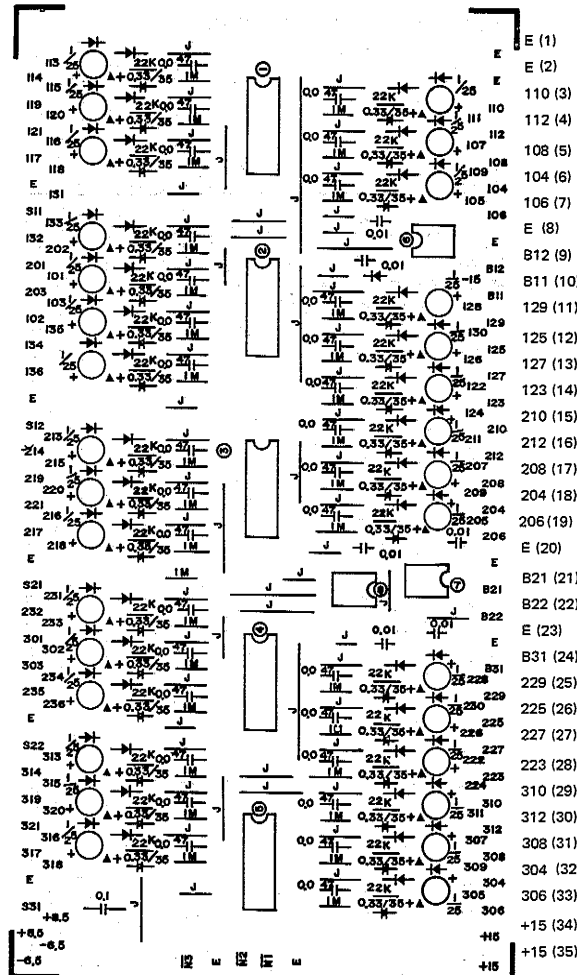
RA2-TKC-S11(27') BR (41) E
 K-T3-A#1 SB (42) S11
 K-M2-C2 BR (43) 132
 K-T2-C2 BR (44) 201
 K-T3-C1 BR (45) 203
 K-M2-B1 BR (46) 102
 K-T2-B1 PK (47) 134
 K-T3-B1 PK (48) 136

RA2-TKC-S12 (27') RE (49) E
 K-T3-E2 GR (50) S12
 K-M2-F#2 VI (51) 214
 K-T2-F#2 VI (52) 219
 K-T3-F2 VI (53) 221
 K-T2-F2 BE (54) 217

RA2-TKC-S21(28') OR (55) E
 K-T3-A#2 SB (56) S21
 K-M2-C3 BR (57) 232
 K-T2-C3 BR (58) 301
 K-T3-B2 BR (59) 303
 K-T2-B2 PK (60) 235

RA2-TKC-S22(28') YE (61) E
 K-T3-E3 GR (62) S22
 K-M2-F#3 VI (63) 314
 K-T2-F#3 VI (64) 319
 K-T3-F3 VI (65) 321
 K-T2-F3 BE (66) 317

RA2-TKC-S31(26) GR (67) E
 RA2-TKC+8.5(38) PK12x2 (68) S31
 RA2-TSB2+8.5(69) GG12x2 (69) +8.5
 RA2-TKC-6.5(67) GG12x2 (70) -6.5
 RA2-TSB2-6.5(70)



BL12x2
 RA2-TKC-E(3)
 RA2-TSB2-E(2)
 YE K-M2-D#1
 YE K-T2-D#1
 OR K-T3-D1
 RE K-M2-C#1
 RE K-T2-C#1

RE RA2-TKC-B12(20')
 BR RA2-TKC-B11(20)
 GG K-T3-A1
 WH K-M2-G#1
 WH K-T2-G#1
 GY K-T3-G1
 YE K-M2-D#2
 YE K-T2-D#2
 OR K-T3-D2
 RE K-M2-C#2
 RE K-T2-C#2

OR RA2-TKC-B21(21)
 YE RA2-TKC-B22(22)

GR RA2-TKC-B31(22')
 GG K-T3-A2
 WH K-M2-G#2
 WH K-T2-G#2
 GY K-T3-G2
 YE K-M2-D#3
 YE K-T2-D#3
 OR K-T3-D3
 RE K-M2-C#3
 RE K-T2-C#3
 BR12x2 RA2-SH+15(70)
 RA2-TSB2+15(34)

111 (3') YE K-T3-D#1
 107 (4') OR K-M2-D1
 109 (5') OR K-T2-D1
 105 (6') RE K-T3-C#1

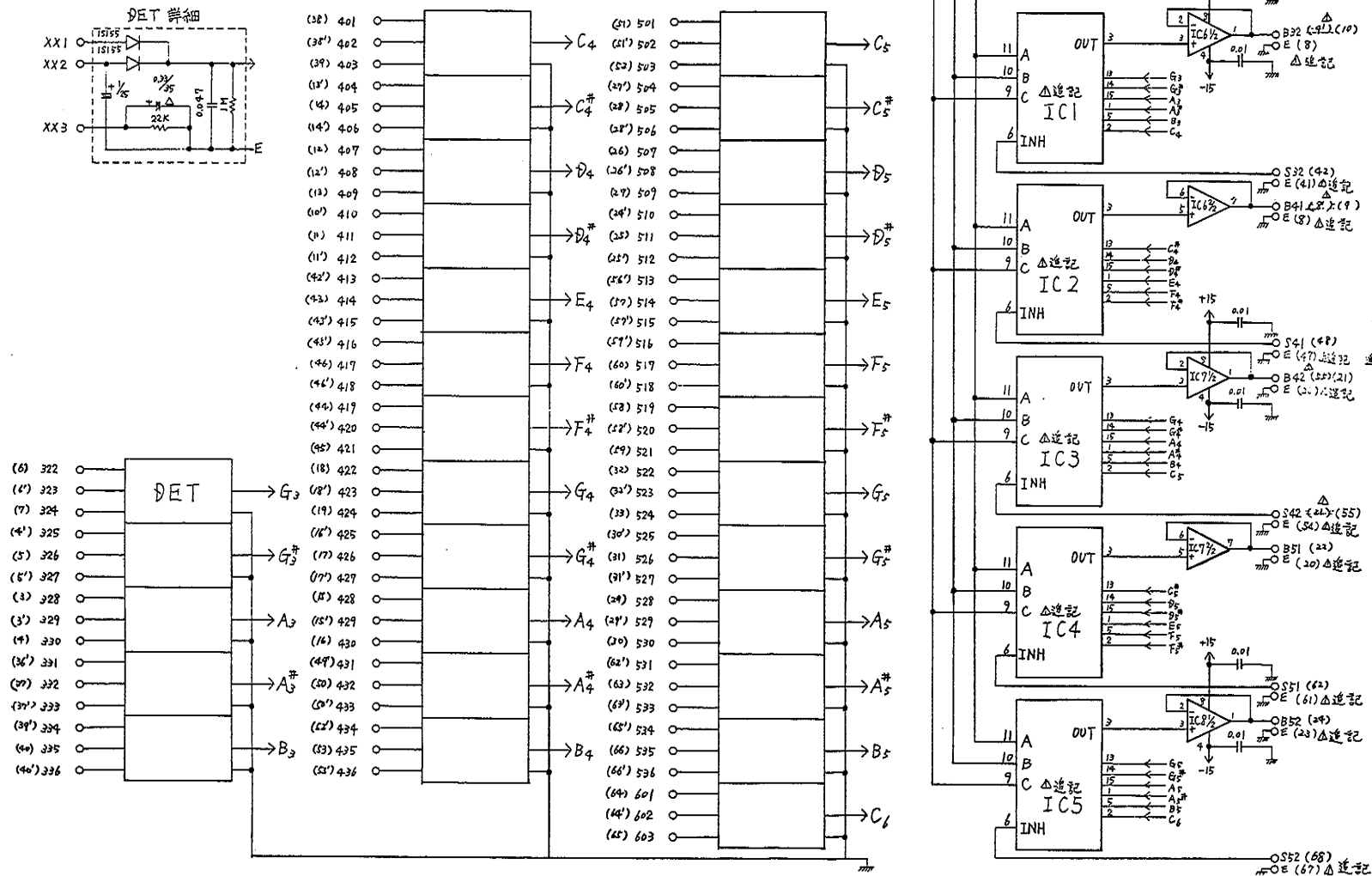
YE12x2 RA2-SH-15(35)
 RA2-TSB2-15(9')
 GG K-M2-A1
 GG K-T2-A1
 WH K-T3-G#1
 GY K-M2-G1
 GY K-T2-G1
 YE K-T3-D#2
 OR K-M2-D2
 OR K-T2-D2
 RE K-T3-C#2

228 (24') GG K-M2-A2
 230 (25') GG K-T2-A2
 226 (26') WH K-T3-G#2
 GY K-M2-G2
 GY K-T2-G2
 YE K-T3-D#3
 OR K-M2-D3
 OR K-T2-D3
 RE K-T3-C#3

ORx2 RA2-TSB2-N3(93)
 RA2-TKC-NS3(44)
 E (92)
 REx2 RA2-TSB2-N2(91)
 RA2-TKC-NS2(41)
 N2 (93)
 BRx2 RA2-TSB2-N1(90)
 RA2-TKC-NS1(41)
 N1 (92)
 E (89)

Note) 1. Print Board : LC21191
 2. Diode : IS1555
 3. ▲ Mark : Tantalum Capacitor 0.33/35
 Nothing Mark : Electrolytic Capacitor 1/25
 4. IC 1 ~ 5 : TC4051P
 IC6 ~ 8 : NJM4558

TSB 2 Circuit Diagram



TSB 2 Circuit Board & Wiring

K-M2-A#3 SB (36') 331
K-T2-A#3 SB (37') 333
K-T3-C4 BR (38') 402
K-M2-B3 PK (39') 334
K-T2-B3 PK (40') 336

K-M2-E4 GR (42') 413
K-T2-E4 GR (43') 415
K-T3-F#4 VI (44') 420
K-M2-F4 BE (45') 416
K-T2-F4 BE (46') 418

K-M2-A#4 SB (49') 431
K-T2-A#4 SB (50') 433
K-T3-C5 BR (51') 502
K-M2-B4 PK (52') 434
K-T2-B4 PK (53') 436

K-M2-E5 GR (56') 513
K-T2-E5 GR (57') 515
K-T3-F#5 VI (58') 520
K-M2-F5 BE (59') 516
K-T2-F5 BE (60') 518

K-M2-A#5 SB (62') 531
K-T2-A#5 SB (63') 533
K-T3-C6 BR (64') 602
K-M2-B5 PK (65') 534
K-T2-B5 PK (66') 536

K-T3-A#3 SB (37) 332
K-M2-C4 BR (38) 401
K-T2-C4 BR (39) 403
K-T3-B3 PK (40) 335
(41) E

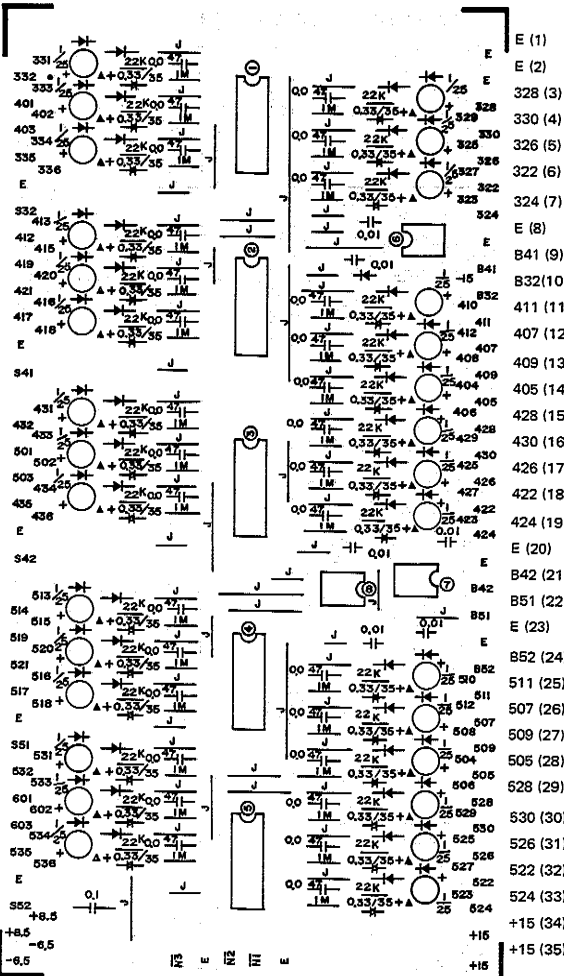
RA2-TKC-S32(29') BE (42) S32
K-T3-E4 GR (43) 414
K-M2-F#4 VI (44) 419
K-T2-F#4 VI (45) 421
K-T3-F4 BE (46) 417
(47) E
RA2-TKC-S41(30) VI (48) S41

K-T3-A#4 SB (50) 432
K-M2-C5 BR (51) 501
K-T2-C5 BR (52) 503
K-T3-B4 PK (53) 435
(54) E
RA2-TKC-S42(30') GY (55) S42

K-T3-E5 GR (57) 514
K-M2-F#5 VI (58) 519
K-T2-F#5 VI (59) 521
K-T3-F5 BE (60) 517
(61) E

RA2-TKC-S51(31) WH (62) S51
K-T3-A#5 SB (63) 532
K-M2-C6 BR (64) 601
K-T2-C6 BR (65) 603
K-T3-B5 PK (66) 535
(67) E

RA2-TKC-S52(31') GG (68) S52
RA2-TSB1+8.5(69) PK12 (69) +8.5
RA2-TSB1-6.5(70) GG12 (70) -6.5



BL12 RA2-TSB1-E(2)
GG K-M2-A3
GG K-T2-A3
WH K-T3-G#3
GY K-M2-G3
GY K-T2-G3

VI RA2-TKC-B41(24)
BE RA2-TKC-B32(23)
YE K-T3-D#4
OR K-M2-D4
OR K-T2-D4
RE K-T3-C#4
GG K-M2-A4
GG K-T2-A4
WH K-T3-G#4
GY K-M2-G4
GY K-T2-G4

GY RA2-TKC-B42(24')
WH RA2-TKC-B51(25)

GG RA2-TKC-B52(26)
YE K-T3-D#5
OR K-M2-D5
OR K-T2-D5
RE K-T3-C#5
GG K-M2-A5
GG K-T2-A5
WH K-T3-G#5
GY K-M2-G5
GY K-T2-G5
BR12 RA2-TSB1+15(34)

GG K-T3-A3
WH K-M2-G#3
WH K-T2-G#3
GY K-T3-G3

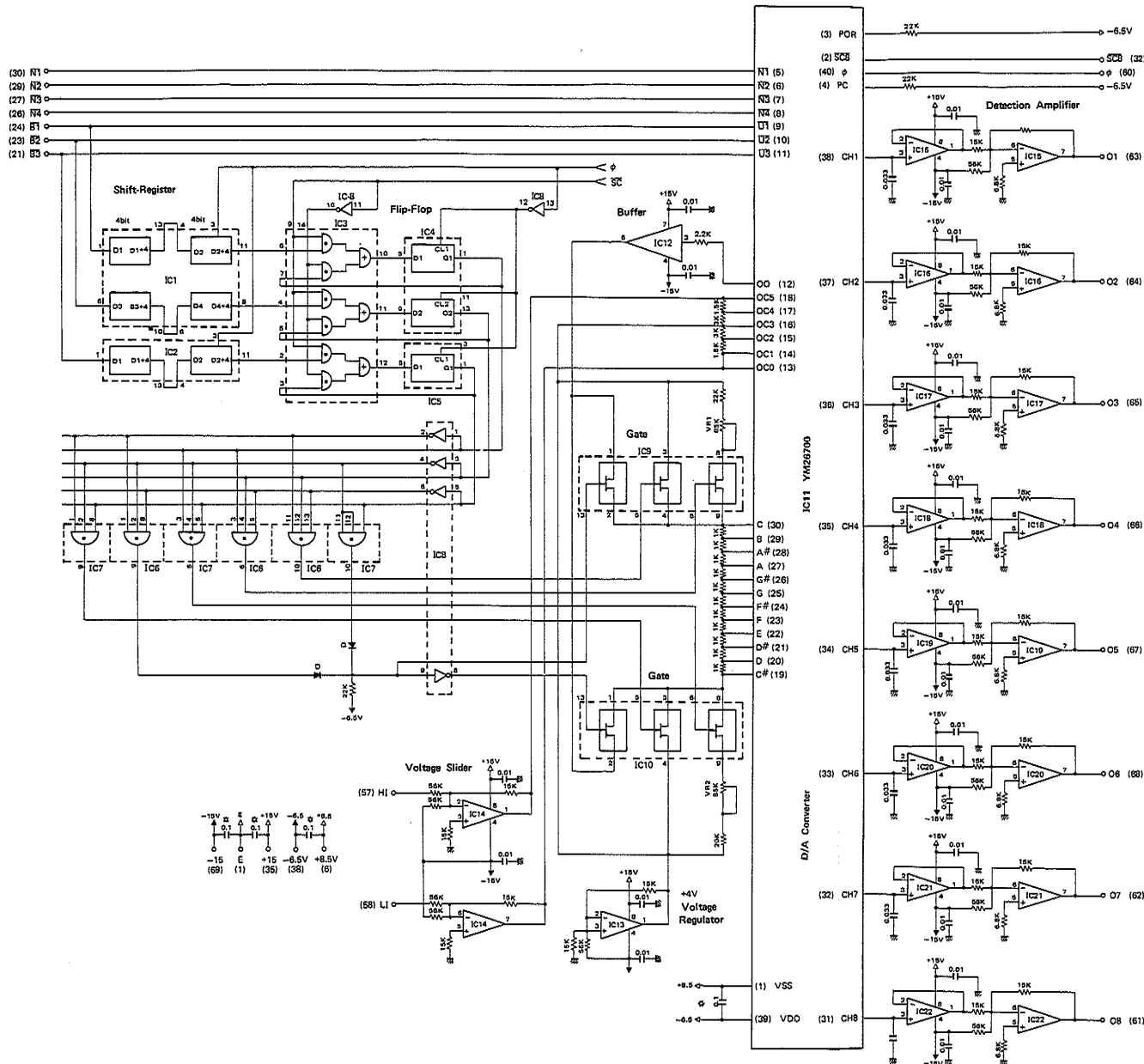
YE12 RA2-TSB1-15(9')
YE K-M2-D#4
YE K-T2-D#4
OR K-T3-D4
RE K-M2-C#4
RE K-T2-C#4
GG K-T3-A4
WH K-M2-G#4
WH K-T2-G#4
GY K-T3-G4

YE K-M2-D#5
YE K-T2-D#5
OR K-T3-D5
RE K-M2-C#5
RE K-T2-C#5
GG K-T3-A5
WH K-M2-G#5
WH K-T2-G#5
GY K-T3-G5

N3 (93) OR RA2-TSB1-N3 (93)
E (92) RE RA2-TSB1-N2 (91)
N2 (91) BR RA2-TSB1-N1 (90)
N1 (90)
E (89)

- Note) 1. Print Board : LC21201
2. Diode : IS1555
3. ▲ Mark : Tantalum Capacitor 0.33/35
Nothing Mark : Electrolytic Capacitor 1/25
4. IC 1 ~ 5 : TC4051P
IC 6 ~ 8 : NJM4558

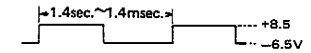
KBC 1 - 2 Circuit Diagram



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. SCB 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. CH3 Key voltage output
38. CH1
39. VDD -6.5V Power Supply, Input
40. phi Master Clock Input f=94.5KHz

KBC 1 - 2 Circuit Board & Wiring

RA1-KBC1-6.5(37) — GG12 (37) -6.5
(38) -6.5

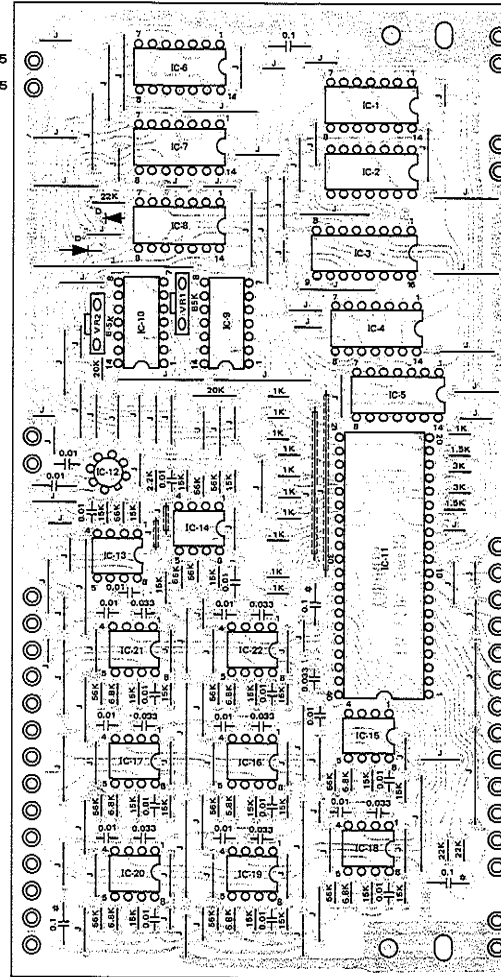
RA1-KBC1-SC(52) — WH (51) E
(52) SC

PN2-VR22-2 — OR (57) HI
PN2-VR21-2 — GR (58) LI
(59) E
RA1-KBC1-φ(60) — GG (60) φ
RA1-R51-KB8(69) — WH (61) O8
RA1-R51-KB7(67') — GY (62) O7
RA1-R51-KB1(58') — RE (63) O1
RA1-R51-KB2(60) — OR (64) O2
RA1-R51-KB3(61') — YE (65) O3
RA1-R51-KB4(63) — GR (66) O4
RA1-R51-KB5(64') — BE (67) O5
RA1-K51-KB6(66) — VI (68) O6
RA1-KBC1-15(69) — BR12x2 (69) -15
RA1-TWS-15(57) (70) -15

RA2-KAS-6.5(96) — G12x2 (37) -6.5
RA1-KBC2-6.5(37) (38) -6.5

RA2-KAS-SC(54) — WHx2 (51) E
RA1-KBC2-SC(52) (52) SC

PN2-VR20-2 — BE (57) HI
PN2-VR19-2 — VI (58) LI
(59) E
RA2-KAS-φ(30) — GGx2 (60) φ
RA1-KBC2-φ(60) (61) O8
RA1-R51-KC8(54') — WH (62) O7
RA1-R51-KC1(20') — OR (63) O1
RA1-R51-KC2(15) — YE (64) O2
RA1-R51-KC3(10') — GR (65) O3
RA1-R51-KC4(5) — BE (66) O4
RA1-R51-KC5(42) — VI (67) O5
RA1-R51-KC6(47) — GY (68) O6
PN3-SW2-B1 — YE12x2 (69) -15
RA1-KBC2-15(69) (70) -15



E (1) — BL12 RA1-KBC2-E(2)
E (2)

+8.5 (5) — PK12x2 RA2-KAS+8.5(99)
+8.5 (6) — PK12 RA1-KBC2+8.5(5)
K-BR2

E (20) — V1x2 RA2-KAS-B3(57)
B3 (21) RA1-KBC2-B3(21)
E (22)

B2 (23) — BEx2 RA2-KAS-B2(58)
B1 (24) — GRx2 RA1-KBC2-B2(23)
RA2-KAS-B1(60)
RA1-KBC2-B1(24)

E (25) — YE1x2 RA2-KAS-N3(61)
N4 (26) — ORx2 RA1-KBC2-N4(26)
N3 (27) — GRx2 RA2-KAS-N3(63)
RA1-KBC2-N3(27)

E (28) — REx2 RA2-KAS-N2(64)
N2 (29) — BRx2 RA1-KBC2-N2(29)
N1 (30) — GRx2 RA2-KAS-N1(66)
RA1-KBC2-N1(30)

E (31) — GYx2 RA2-KAS-SC8(55)
SC8 (32) RA1-KBC2-SC8(32)

+15 (34) — BR12x2 PN3-SW9-T1
+15 (35) — BR12 RA1-KBC2+15(34)
K-T3+15

E (1) — RA1-KBC1-E(2)
E (2) RA1-TWS-E(1)

+8.5 (5) — PK12x2 RA1-KBC1+8.5(5)
+8.5 (6) RA1-SUB+8.5(27)

E (20) — V1 RA1-KBC1-B3(21)
B3 (21)

E (22) — BE RA1-KBC1-B2(23)
B2 (23) — GR RA1-KBC1-B1(24)
B1 (24)

E (25) — OR RA1-KBC1-N4(26)
N4 (26) — YE RA1-KBC1-N3(27)
N3 (27)

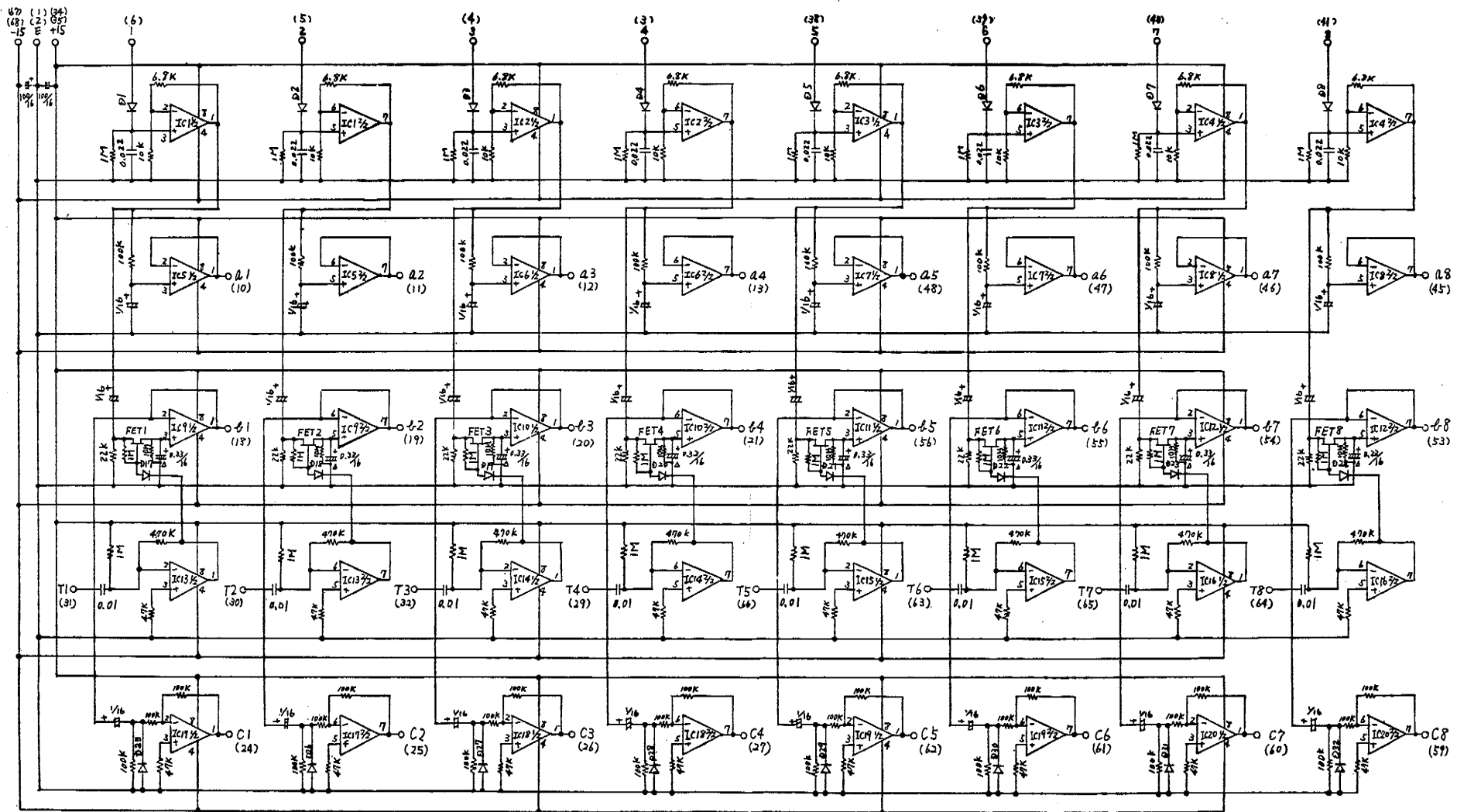
E (28) — RE RA1-KBC1-N2(29)
N2 (29) — BR RA1-KBC1-N1(30)
N1 (30)

E (31) — GY RA1-KBC1-SC8(32)
SC8 (32)

+15 (34) — BR12x2 RA1-KBC1+15(34)
+15 (35) RA1-TWS+15(34)

- 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



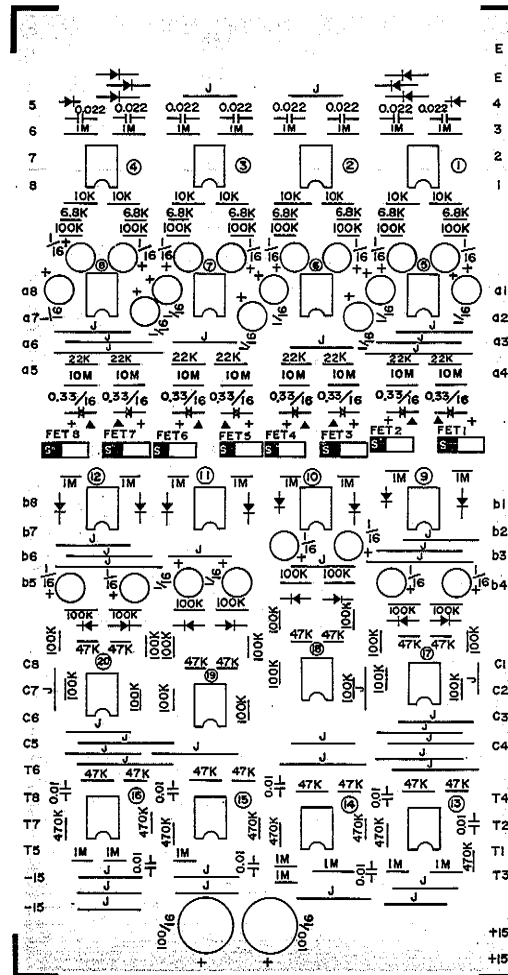
TWS Circuit Board & Wiring

RA2-TKC-05(15) — GY — (38) 5
 RA2-TKC-06(19) — WH — (39) 6
 RA2-TKC-07(16) — GG — (40) 7
 RA2-TKC-08(18) — SB — (41) 8

RA1-TRG2-a8(31) — PK — (45) a8
 RA1-TRG2-a7(28) — SB — (46) a7
 RA1-TRG2-a6(24) — GG — (47) a6
 RA1-TRG2-a5(21) — WH — (48) a5

RA1-TRG1-b8(31) — BR — (53) b8
 RA1-TRG1-b7(28) — PK — (54) b7
 RA1-TRG1-b6(24) — SB — (55) b6
 RA1-TRG1-b5(21) — GG — (56) b5

RA1-TRG4-c8(65) — OR — (59) c8
 RA1-TRG4-c7(63) — RE — (60) c7
 RA1-TRG4-c6(59) — BR — (61) c6
 RA1-TRG4-c5(55) — PK — (62) c5
 RA2-KAS-TR6(45) — BEx2 — (63) T6
 RA1-M16-TR(63) — GYx2 — (64) T8
 RA2-KAS-TR8(48) — Vix2 — (65) T7
 RA1-M18-TR(63) — GRx2 — (66) T5
 RA2-KAS-TR7(47) — YEx2 — (67) -15
 RA1-M17-TR(63) — YEx2 — (68) -15
 RA2-KAS-TR5(43) — YEx2 — (67) -15
 RA1-M15-TR(63) — YEx2 — (67) -15
 RA1-KBC1-15(69) — YEx2 — (67) -15
 RA1-TRG1-15(67) — YEx2 — (67) -15



E (1)
 E (2)
 4 (3)
 3 (4)
 2 (5)
 1 (6)

BL12x2 — RA1-KBC2-E(2)
 RA1-TRG1-E(1)
 VI — RA2-TKC-04(12)
 BE — RA2-TKC-03(10)
 GR — RA2-TKC-02(13)
 YE — RA2-TKC-01(9)

a1 (10)
 a2 (11)
 a3 (12)
 a4 (13)

GR — RA1-TRG2-a1(6)
 BE — RA1-TRG2-a2(9)
 VI — RA1-TRG2-a3(13)
 GY — RA1-TRG2-a4(16)

b1 (18)
 b2 (19)
 b3 (20)
 b4 (21)

BE — RA1-TRG1-b1(6)
 VI — RA1-TRG1-b2(9)
 GY — RA1-TRG1-b3(13)
 WH — RA1-TRG1-b4(16)

c1 (24)
 c2 (25)
 c3 (26)
 c4 (27)

GY — RA1-TRG4-c1(40)
 WH — RA1-TRG4-c2(44)
 GG — RA1-TRG4-c3(47)
 SB — RA1-TRG4-c4(51)

T4 (29)
 T2 (30)
 T1 (31)
 T3 (32)

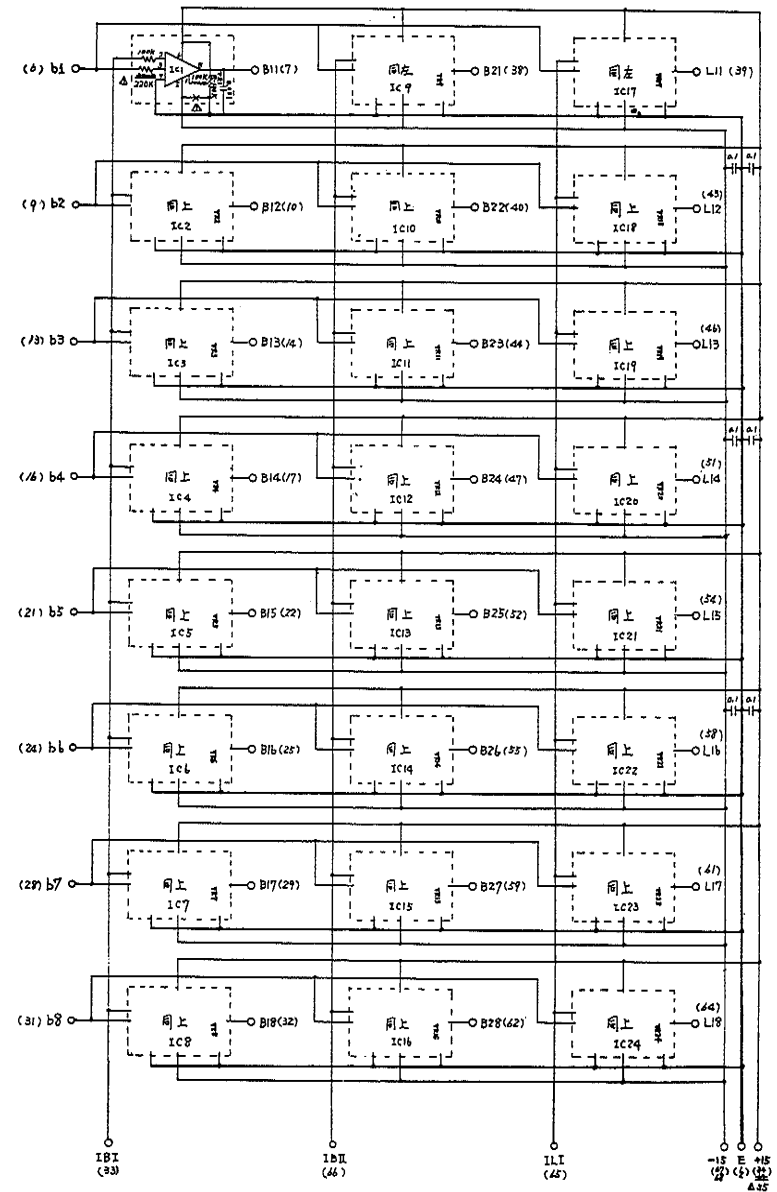
YEx2 — RA2-KAS-TR4(41)
 REx2 — RA1-M14-TR(63)
 RA2-KAS-TR2(37)
 BRx2 — RA1-M12-TR(63)
 RA2-KAS-TR1(36)
 RA1-M11-TR(63)
 ORx2 — RA2-KAS-TR3(39)
 RA1-M13-TR(63)

+15 (34)
 +15 (35)

BR12x2 — RA1-KBC2-15(34)
 RA1-TRG1-15(34)

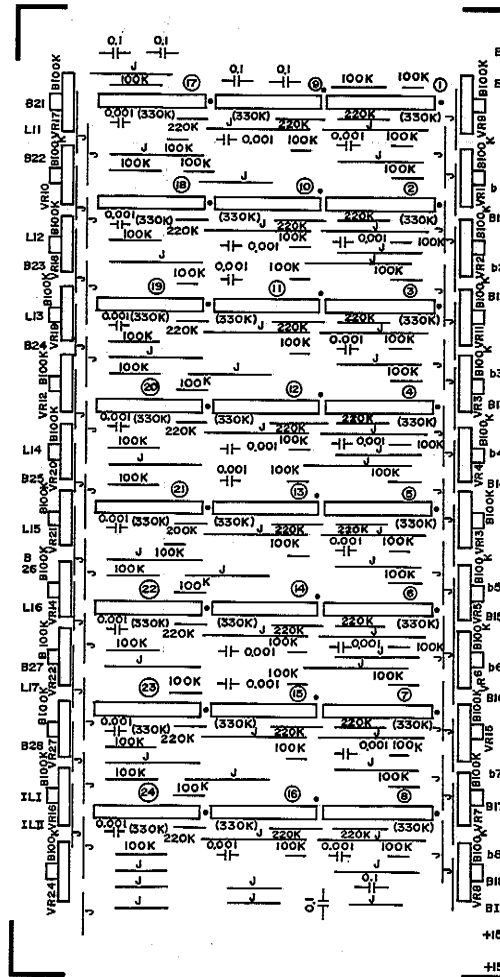
Note) 1. Print Board : LC21223
 2. FET 1 ~ 8 : 2SK30
 3. Diode 1 ~ 32 : IS1555
 4. IC 1 ~ 20 : NJM4558
 5. Δ Mark : Tantalum Capacitor

TRG 1-2 Circuit Diagram



KEP-NA03564-6Y, KEP-NA03565-6Z

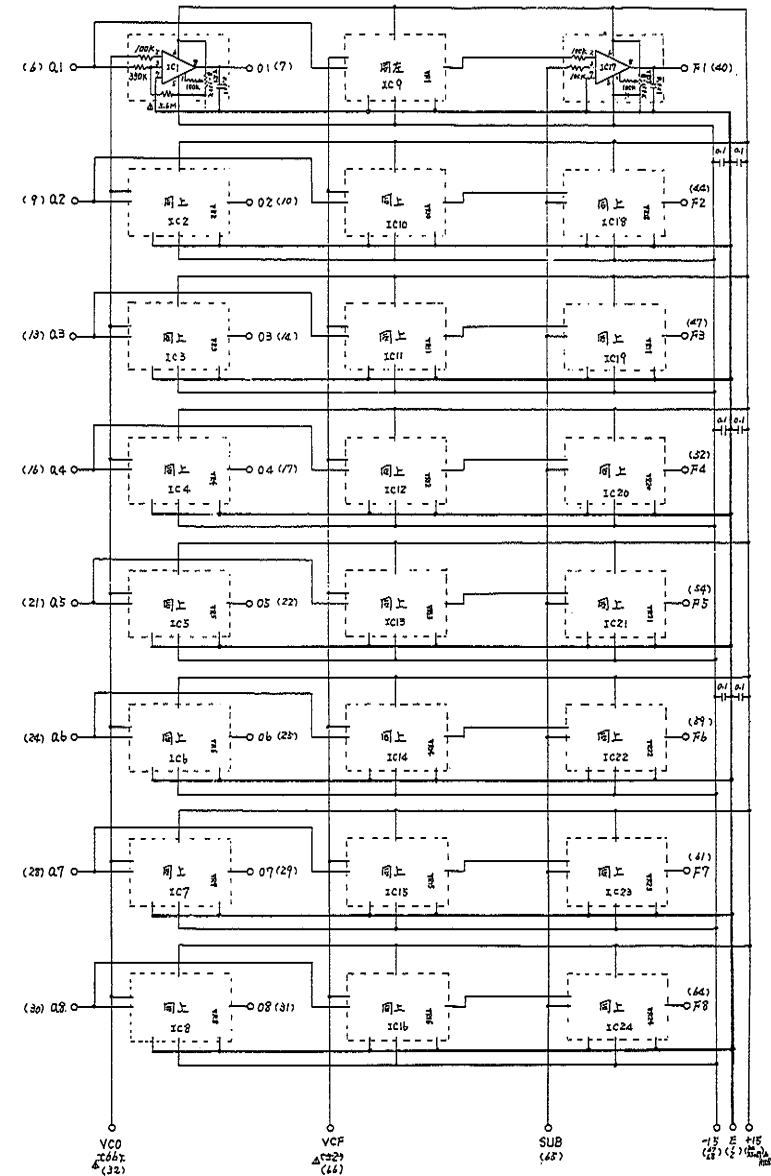
RA1-R52-1B1(18')	GR	(38) B21
RA1-R51-T11(57')	SB	(39) L11
RA1-R52-1B2(13)	BE	(40) B22
RA1-R51-T12(59)	PK	(43) L12
RA1-R52-1B3(8)	VI	(44) B23
RA1-R51-T13(60')	BR	(46) L13
RA1-R52-1B4(3)	GY	(47) B24
RA1-R51-T14(62)	RE	(51) L14
RA1-R52-1B5(38)	WH	(52) B25
RA1-R51-T15(63')	OR	(54) L15
RA1-R52-1B6(43)	GG	(55) B26
RA1-R51-T16(65)	YE	(58) L16
RA1-R52-1B7(48)	SB	(59) B27
RA1-R51-T17(66')	GR	(61) L17
RA1-R52-1B8(52')	PK	(62) B28
RA1-R51-T18(68)	BE	(64) L18
RA1-T51-24(6)	PK	(65) L11
RA1-T53-23(7)	SB	(66) B111
RA1-TWS-15(67)	YE12x2	(67) -15
RA1-TRG2-15(67)		(68) -15



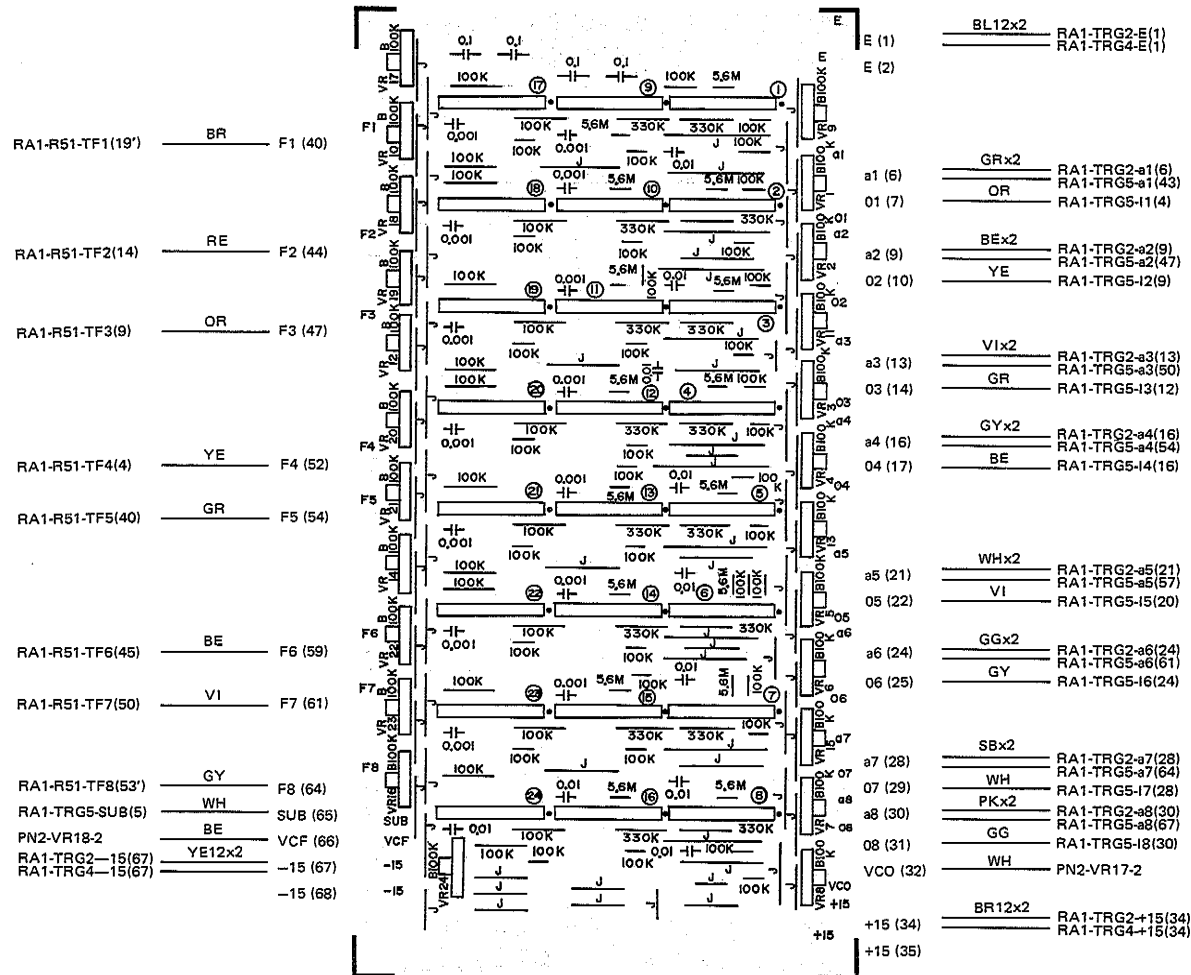
E (1)	<u>BL12x2</u>	RA1-TRG1-E(1) RA1-TRG3-E(1)
E (2)		
a1 (6)	<u>GRx2</u>	RA1-TWS-a1(10) RA1-TRG3-a1(6)
B11 (7)	<u>QR</u>	RA1-R51-AB1(19)
a2 (9)	<u>BEx2</u>	RA1-TWS-a2(11) RA1-TRG3-a2(9)
B12 (10)	<u>YE</u>	RA1-R51-AB2(13')
a3 (13)	<u>Vlx2</u>	RA1-TWS-a3(12) RA1-TRG3-a3(13)
B13 (14)	<u>GR</u>	RA1-R51-AB3(8')
a4 (16)	<u>GYx2</u>	RA1-TWS-a4(13) RA1-TRG3-a4(16)
B14 (17)	<u>BE</u>	RA1-R51-AB4(3')
a5 (21)	<u>WHx2</u>	RA1-TWS-a5(48) RA1-TRG3-a5(21)
B15 (22)	<u>VI</u>	RA1-R51-AB5(39)
a6 (24)	<u>GGx2</u>	RA1-TWS-a6(47) RA1-TRG3-a6(24)
B16 (25)	<u>GY</u>	RA1-R51-AB6(44)
a7 (28)	<u>S8x2</u>	RA1-TWS-a7(46) RA1-TRG3-a7(28)
B17 (29)	<u>WH</u>	RA1-R51-AB7(49)
a8 (31)	<u>PKx2</u>	RA1-TWS-a8(45) RA1-TRG3-a8(30)
B18 (32)	<u>GG</u>	RA1-R51-AB8(53)
ABI (33)	<u>BR</u>	RA1-T51-25(5)
+15 (34)	<u>BR12x2</u>	RA1-TRG1+15(34) RA1-TRG3+15(34)
+15 (35)		

Note) 1. Print Board : LC21072
2. IC 1 ~ 24 : 1G00151
3. Volume VR1 ~ 24 : 3 terminals (V10K8-1-2)

TRG 3 Circuit Diagram

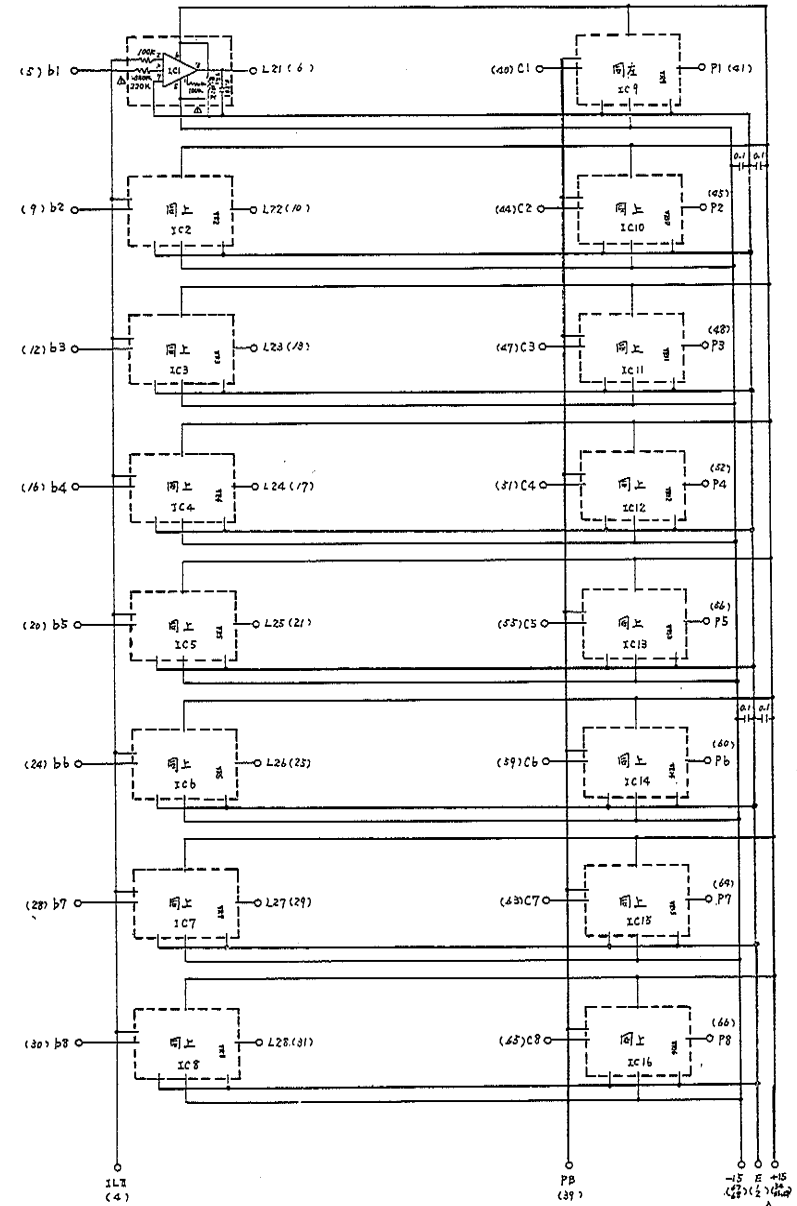


TRG 3 Circuit Board & Wiring

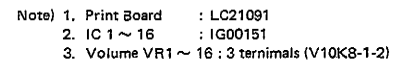


- Note) 1. Print Board : LC21082
 2. IC 1 ~ 24 : IG00151
 3. Volume VR1 ~ 24 : 3 terminals (V10K8-1-2)

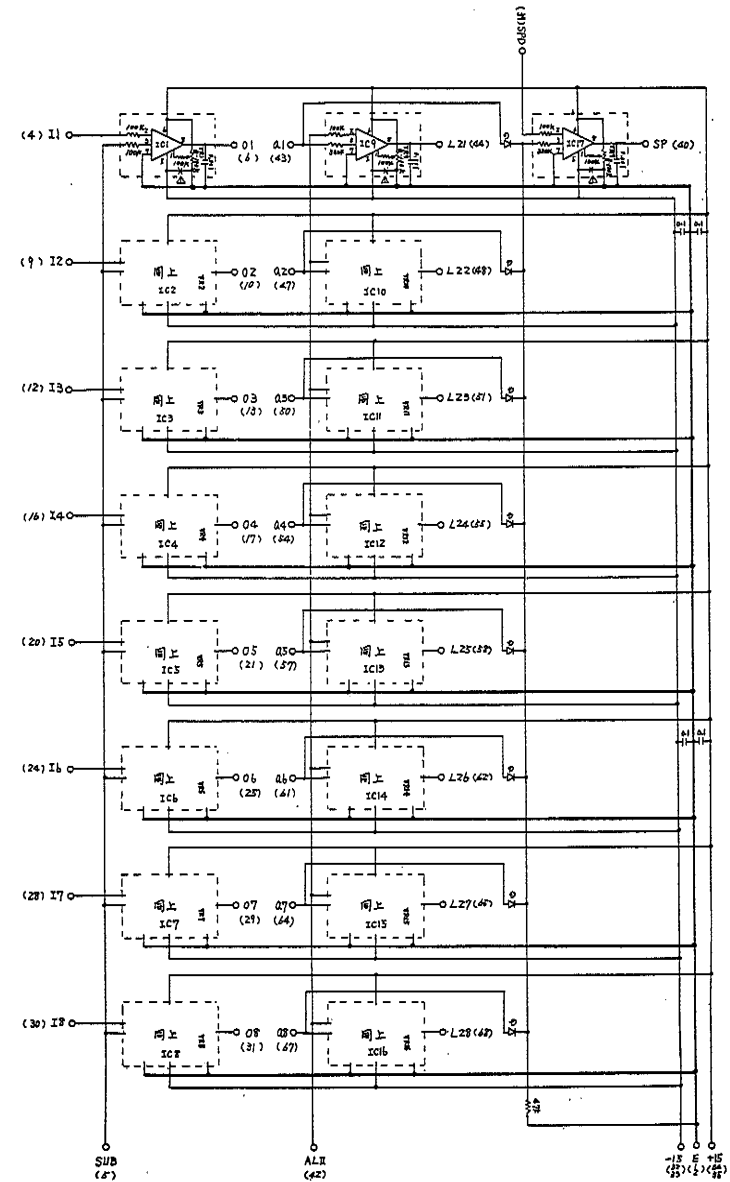
TRG 4 Circuit Diagram



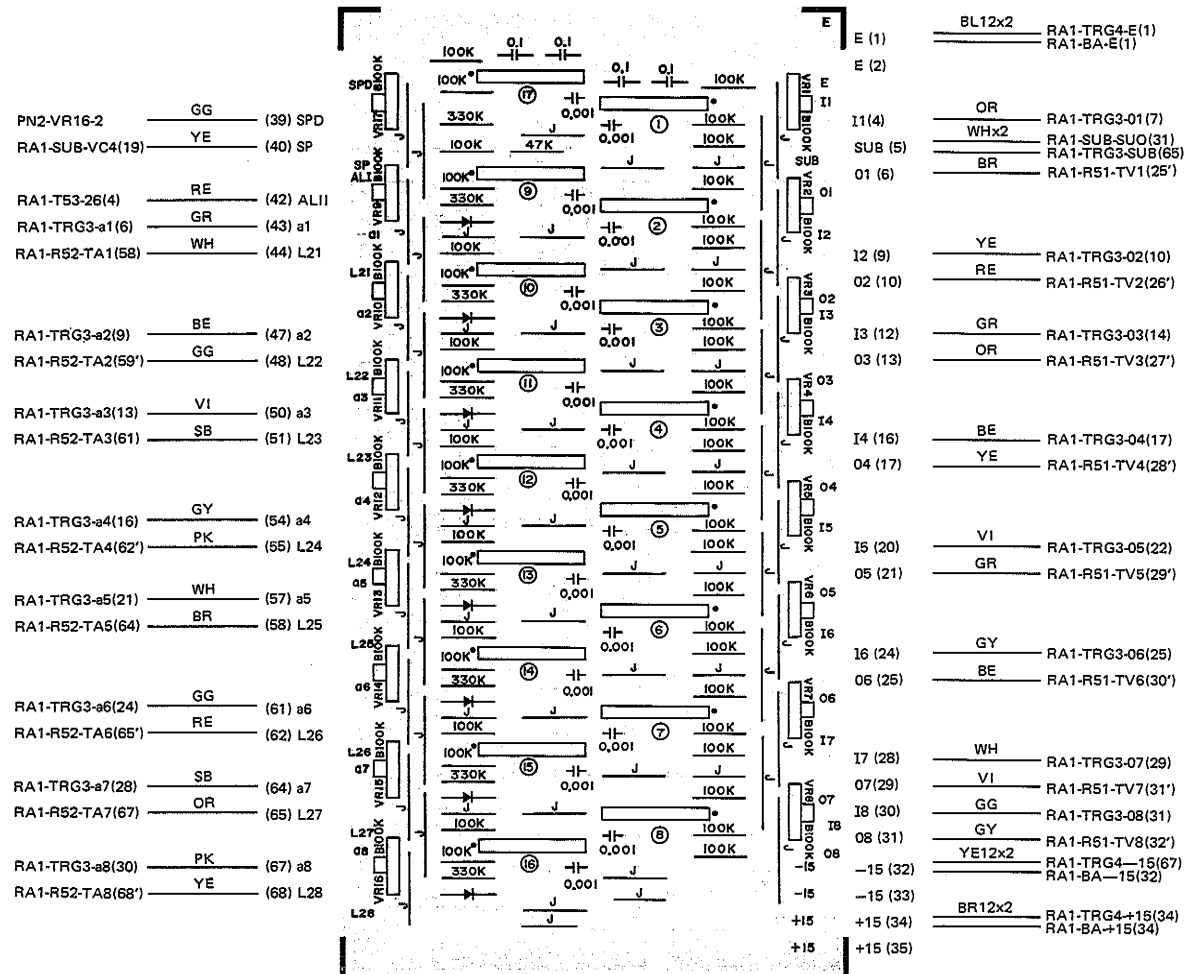
PN2-VR15-2	<u>SB</u>	(39) P _B
RA1-TWS-C1(24)	<u>GY</u>	(40) C1
RA1-R51-TP1(26)	<u>VI</u>	(41) P ₁
RA1-TWS-C2(25)	<u>WH</u>	(44) C2
RA1-R51-TP2(27)	<u>GY</u>	(45) P2
RA1-TWS-C3(26)	<u>GG</u>	(47) C3
RA1-R51-TP3(28)	<u>WH</u>	(48) P3
RA1-TWS-C4(27)	<u>SB</u>	(51) C4
RA1-R51-TP4(29)	<u>GG</u>	(52) P4
RA1-TWS-C5(62)	<u>PK</u>	(55) C5
RA1-R51-TP5(30)	<u>SB</u>	(56) P5
RA1-TWS-C6(61)	<u>BR</u>	(59) C6
RA1-R51-TP6(31)	<u>PK</u>	(60) P6
RA1-TWS-C7(60)	<u>RE</u>	(63) C7
RA1-R51-TP7(32)	<u>BR</u>	(64) P7
RA1-TWS-C8(59)	<u>OR</u>	(65) C8
RA1-R51-TP8(33)	<u>RE</u>	(66) P8
RA1-TRG3-15(67)	<u>YE12x2</u>	(67) -15
RA1-TRG5-15(32)		(68) -15



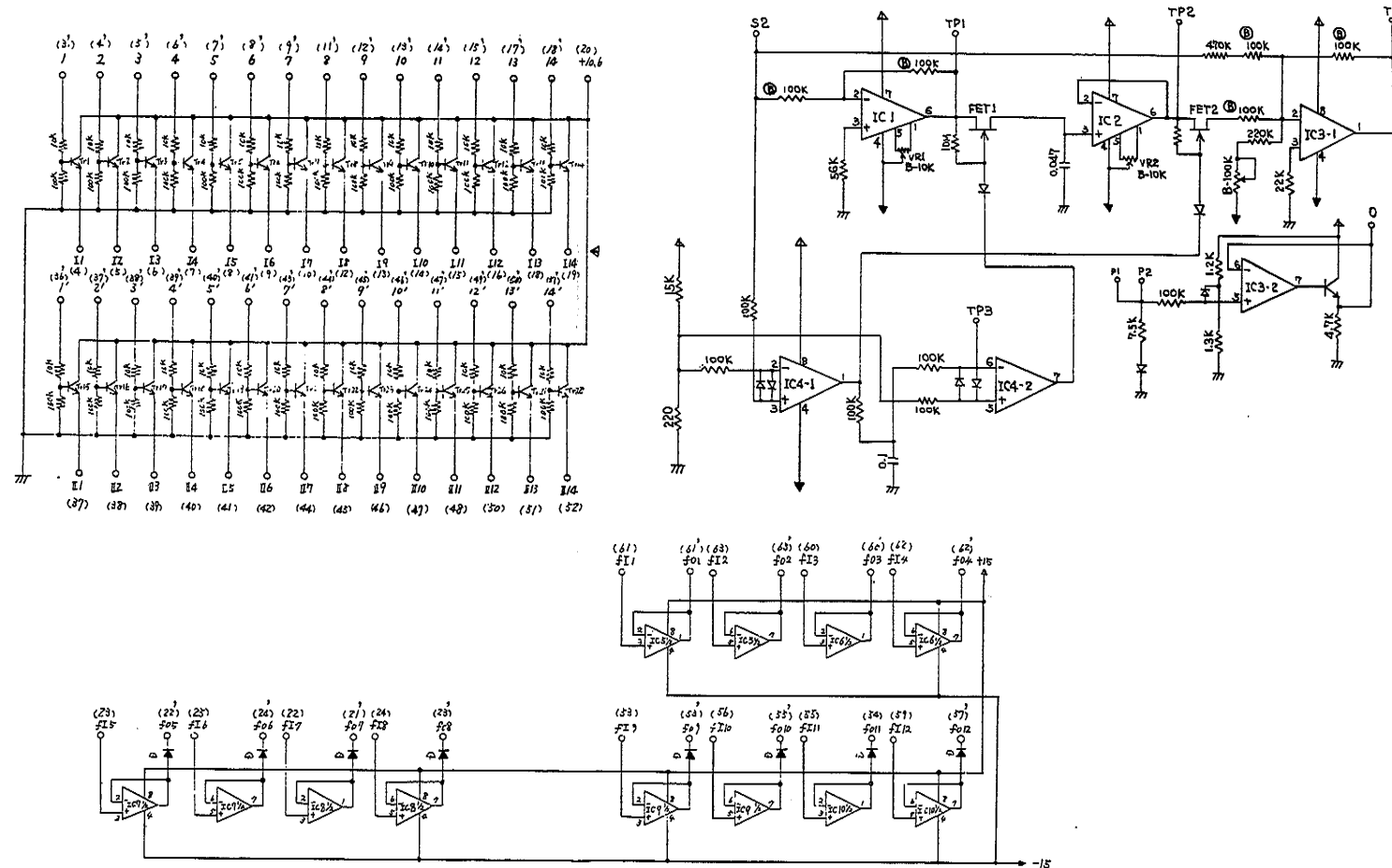
TRG 5 Circuit Diagram



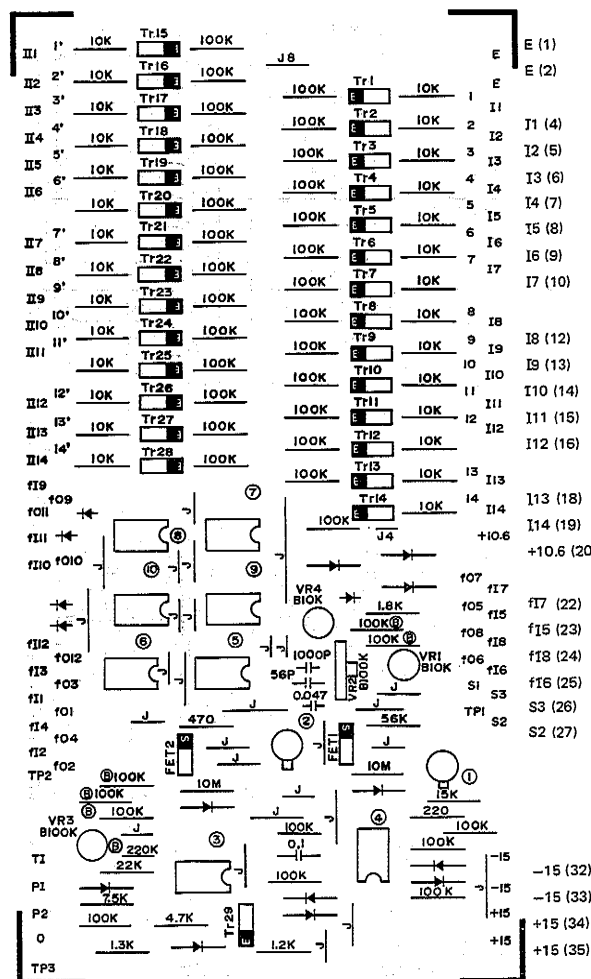
TRG 5 Circuit Board & Wiring



BA Circuit Diagram



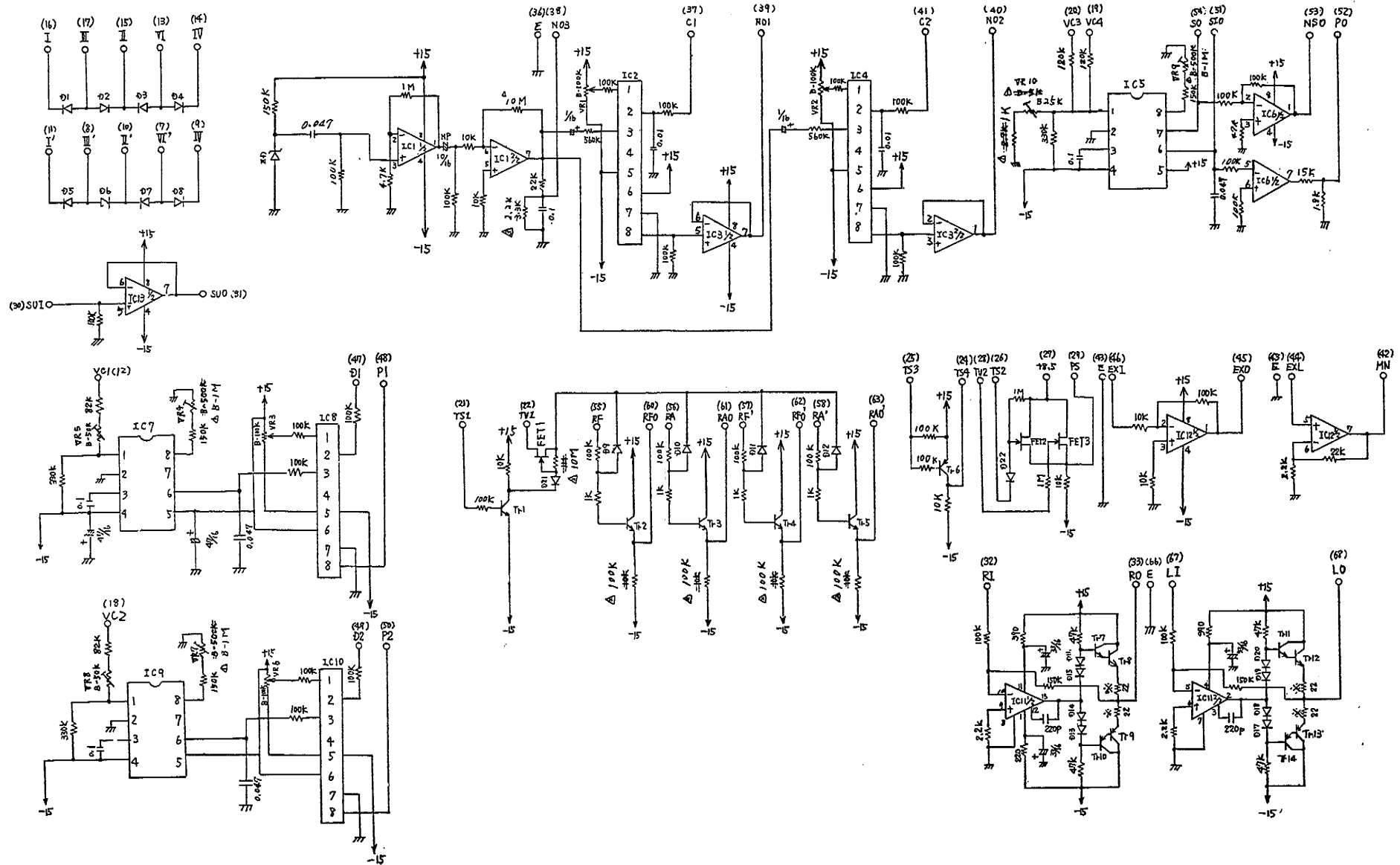
PN2-TS-1'	<u>RE</u>	(36') 1'	RA1-T53-A(91)	<u>BR</u>	(37) II1
PN2-TS-2'	<u>YE</u>	(37') 2'	RA1-T53-B(92)	<u>RE</u>	(38) II2
PN2-TS-3'	<u>BE</u>	(38') 3'	RA1-T53-C(93)	<u>OR</u>	(39) II3
PN2-TS-4'	<u>GY</u>	(39') 4'	RA1-T53-D(94)	<u>YE</u>	(40) II4
PN2-TS-5'	<u>GG</u>	(40') 5'	RA1-T53-E(95)	<u>GR</u>	(41) II5
PN2-TS-6'	<u>PK</u>	(41') 6'	RA1-T53-F(96)	<u>BE</u>	(42) II6
PN2-TS-7'	<u>RE</u>	(43') 7'	RA1-T54-A(91)	<u>BR</u>	(44) II7
PN2-TS-8'	<u>YE</u>	(44') 8'	RA1-T54-B(92)	<u>RE</u>	(45) II8
PN2-TS-9'	<u>BE</u>	(45') 9'	RA1-T54-C(93)	<u>OR</u>	(46) II9
PN2-TS-10'	<u>GY</u>	(46') 10'	RA1-T54-D(94)	<u>YE</u>	(47) II10
PN2-TS-11'	<u>GG</u>	(47') 11'	RA1-T54-E(95)	<u>GR</u>	(48) II11
PN2-TS-12'	<u>PK</u>	(49') 12'	PN1-MBK-M2-VR24-3	<u>BE</u>	(50) II12
PN2-TS-13'	<u>RE</u>	(50') 13'	PN1-MBK-M4-VR24-3	<u>VI</u>	(51) II13
PN2-TS-14'	<u>YE</u>	(51') 14'	PN1-VR24'-3	<u>YE</u>	(52) II14
RA1-BA-f05(22')	<u>OR</u>	(53') f09	PN1-MBK-M3-VR5-2	<u>VI</u>	(53) f09
RA1-BA-f06(24')	<u>YE</u>	(55') fo10	RA1-BA-fo7(21')	<u>BR</u>	(54) fo1'
			PN1-MBK-M3-VR5-2	<u>GG</u>	(55) f11
			PN1-MBK-M3-VR7-2	<u>WH</u>	(56) f110
RA1-BA-fo8(23')	<u>RE</u>	(57') fo12	PN1-MBK-M4-VR7-2	<u>SB</u>	(59) f112
RA1-T53-7'(26')	<u>OR</u>	(60') f03	PN1-VR5-2	<u>GG</u>	(60) f13
RA1-T51-7'(26')	<u>VI</u>	(61') fo1	PN1-VR5-2	<u>VI</u>	(61) f11
RA1-T53-9'(23')	<u>BR</u>	(62') fo4	PN1-VR7'-2	<u>SB</u>	(62) f14
RA1-T51-9'(23')	<u>WH</u>	(63') fo2	PN1-VR7-2	<u>WH</u>	(63) f12
					(64) TP2
					(65) TP4
			PN2-VR1A-3	<u>OR</u>	(66) TI
			PN2-VR1B-1	<u>BR</u>	(67) PI
			PN2-VR1B-2	<u>RE</u>	(68) P2
			RA2-KAS-TI(67)	<u>GY</u>	(69) 0
					(70) TI3



BL12x2	RA1-TRG5-E(1) PA1-SUB-E(1)		
BR	RA1-T51-A(91)	1 (3')	BR PN2-TS-1
RE	RA1-T51-B(92)	2 (4')	OR PN2-TS-2
OR	RA1-T51-C(93)	3 (5')	GR PN2-TS-3
YE	RA1-T51-D(94)	4 (6')	VI PN2-TS-4
GR	RA1-T51-E(95)	5 (7')	WH PN2-TS-5
BE	RA1-T51-F(96)	6 (8')	SB PN2-TS-6
BR	RA1-T52-A(91)	7 (9')	BR PN2-TS-7
RE	RA1-T52-B(92)	8 (11')	OR PN2-TS-8
OR	RA1-T52-C(93)	9 (12')	GR PN2-TS-9
YE	RA1-T52-D(94)	10 (13')	VI PN2-TS-10
GR	RA1-T52-E(95)	11 (14')	WH PN2-TS-11
WH	PN1-MBK-M1-VR24-3	12 (15')	SB PN2-TS-12
GY	PN1-MBK-M3-VR24-3	13 (17')	BR PN2-TS-13
BE	PN1-VR24-3	14 (18')	OR PN2-TS-14
OR12x2	PN3-VR1-1 PN2-VR18-3		
GG	PN1-MBK-M2-VR5-2	f07 (21')	BRx2 RA1-BA-f011(54) RA1-T53-7(27)
VI	PN1-MBK-M1-VR5-2	f05 (22')	ORx2 RA1-BA-f09(53) RA1-T51-7(27)
SB	PN1-MBK-M2-VR7-2	f08 (23')	REx2 RA1-BA-f012(57) RA1-T53-8(24)
WH	PN1-MBK-M1-VR7-2	f06 (24')	YEx2 RA1-BA-f010(55) RA1-T51-9(24)
OR	PN2-SK-3	S1 (25')	BR PN2-SK-1
RE	PN2-SK-2	TP1 (26')	
YE12x2	RA1-TRG5-15(32) RA1-SUB-15(5)		
BR12x2	RA1-TRG5+15(34) RA1-SUB+15(34)		

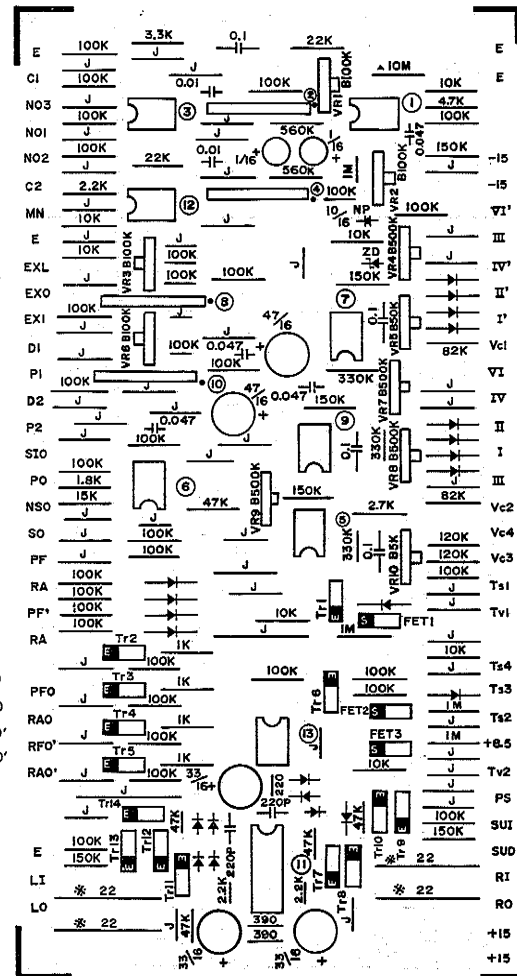
- KEP-NA03569-68

SUB Circuit Diagram



SUB Circuit Board & Wiring

RA1-T51-6(28')	BE	(36) E
PN2-SW1-M5	PK	(37) C1
RA1-M11-NI(43)	GG	(38) No3
RA1-M21-NI(43)	SB	(39) No1
RA1-T53-6(28)	BE	(40) No2
PN2-SW1-M6	GR	(41) C2
		(42) MN
PN5-EXT-2	GG	(43) E
PN5-EXT-VR1-3	SB	(44) EXL
PN5-EXT-J6	RE	(45) EXO
RA1-T51-2(32)	YE	(46) EXI
RA1-M11-PWM(41)	RE	(47) D1
RA1-T53-2(32)	YE	(48) P1
RA1-M21-PWM(41)	VI	(49) D2
PN2-SW1-M1	WH	(50) P2
PN2-SW1-M4	SB	(51) SIO
PN2-SW1-M3	GY	(52) P0
PN2-SW1-M2	OR	(53) NSO
RA1-T51-15(17)	WH	(54) SO
RA1-T51-21(10)	OR	(55) RF
RA1-T53-15(17)	WH	(56) RA
RA1-T53-21(10)	WH	(57) RF'
		(58) RA'
RA1-M11-RF(60)	OR	(60) RFO
RA1-M11-RA(65)	WH	(61) RAO
RA1-M21-RP(60)	OR	(62) RFO'
RA1-M21-RA(65)	WH	(63) RAO'
EJ-1	BL12	(66) E
RA1-PRA-HL(40)	YE	(67) LI
EJ-2	WH12	(68) LO

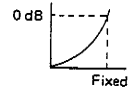


- Note) 1. Print Board : LC20983
 2. Transistor
 Tr6, 10, 14 : 2SA561
 Tr1 ~ 5, 7, 11 : 2SC828
 Tr8, 12 : 2SD234
 Tr9, 13 : 2SA490
 FET1, 2, 3 : 2SK30
 3. IC
 IC 2, 4, 8, 10 : IG00151
 IC 5, 7, 9 : IG00150
 IC 11 : HA1452
 IC 1, 3, 6, 12, 13 : NJM4558
 4. * Mark : 2W Metal Oxide Resistor
 5. Diode 1 ~ 22 : IS1555
 6. ZD : IS1715P
 7. Volume
 VR 4, 5, 7 ~ 10 : 2 terminals (V10K4A-5-2)
 VR 1 ~ 3, 6 : 3 terminals (V10K8-1-2)

CS-80 (S/#1001 ~)

VCA IC (IG00151)

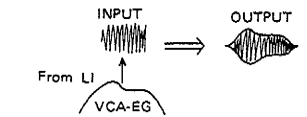
- EI Input voltage for level control.
Input of the control voltage is provided for changing the level exponentially.



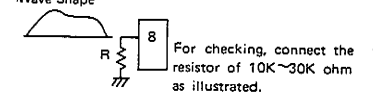
- LI Input of level control voltage.
Input of the control voltage is provided for linear change of the level.



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

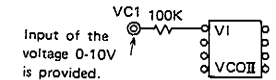


- IN Negative feed back.
Normally unused.
- Vee -15V input power source.
- Vcc +15V input power source.
- GND Earth
- OUT Output
Output of the following wave shape is produced.

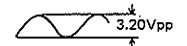


VCOII IC (IG00150)

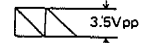
- VI Input of the control voltage.
The frequency is variable in accordance with the voltage supplied.



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

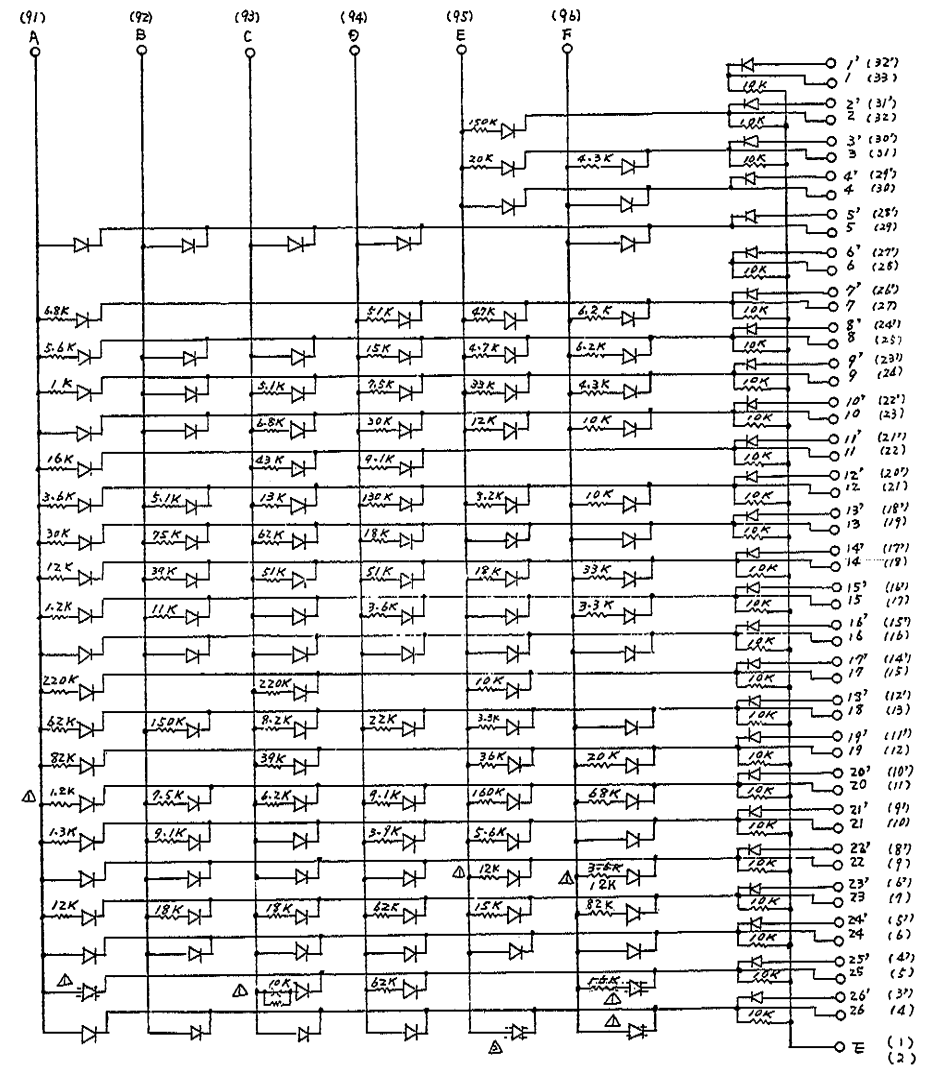


- SO Output of sawtooth wave

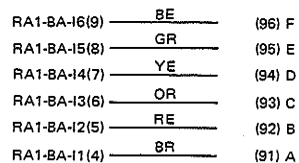


- Iadj Setting for standard electric current.
The standard electric current is set so as to be the output 200Hz when VC1 is 10V and VC2 is zero volt.

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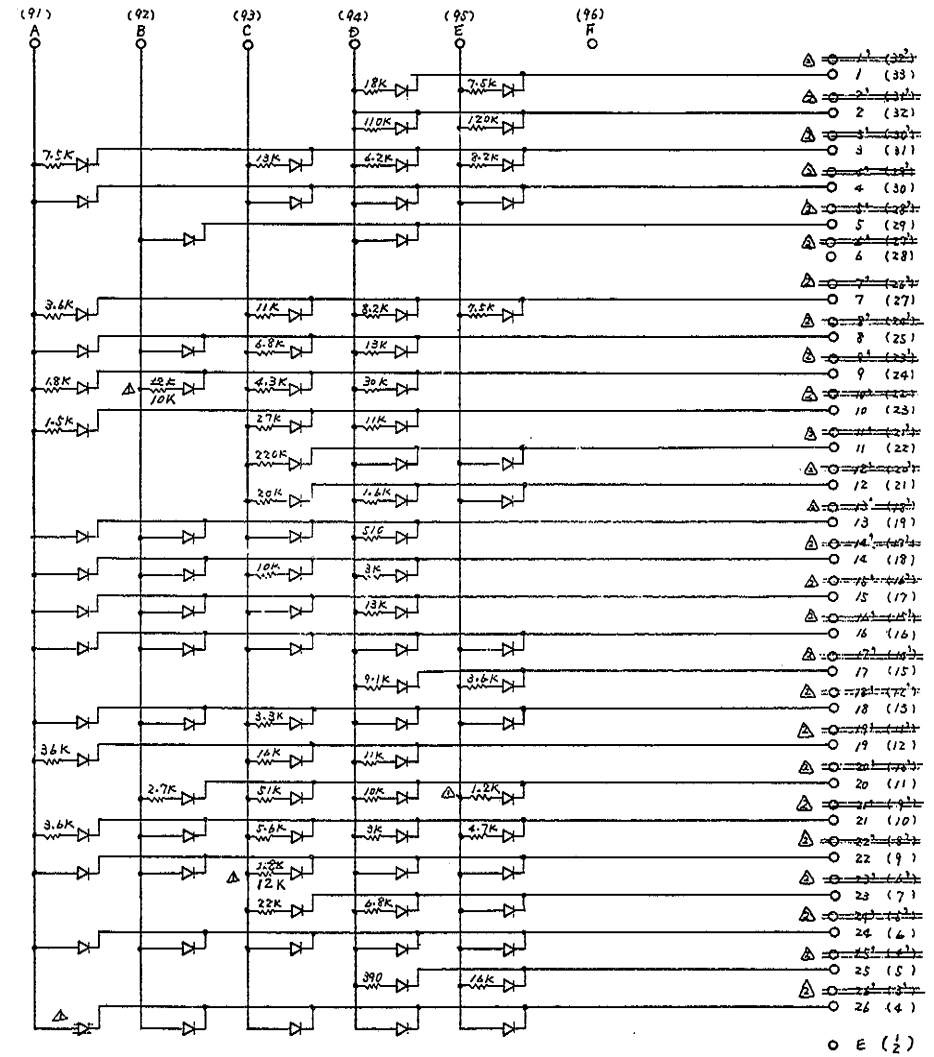


KEP-NA03573-6Y



Note) 1. Print Board : LC22612
2. Diode : 1S1555

T52 Circuit Diagram



	F	E	D	C	B	A	
()	()	()	()	()	()	()	26
390					J	J	
(56K06K)							
()	()	()	()	()	()	()	25
8.2K(6.8K)					J	J	
12K(J)					22K	J	
47K(J)					12K	J(3.6K)	23
()	()	()	()	()	()	()	22
J(5K)					27K(5.6K)	J	
J(47K)					330K(51K)	J	
33K(10K)					39K(2.7K)	J	21
12K(1.2K)					()	J	
13K(10K)					5.6K()	J	20
11K()					()	J	
3.6K(J)					82K(16K)	J	19
()	()	()	()	()	()	()	18
9.1K					6.8K	J	
(J(3.6K))					()	J	
()	()	()	()	()	()	()	17
J(13K)					J	J	
()					3.9K(J)	J	16
8.2K(3K)					J	J	
15K(J)					J	J	15
16K(51K)					36K(10K)	J	
16K(51K)					J	J	14
11K()					J	J	
4.7K(0.5K)					J	J	13
()	()	()	()	()	()	()	12
3.9K(J)					2.4K(20K)	J	
()	()	()	()	()	()	()	11
18K(1K)					27K	J(1.5K)	
51K()					J	J	10
4.3K(30K)					6.2K(10K)	J	
6.2K()					18K(4.3K)	1.8K	9
5.6K(0.5K)					J	J	
()	()	()	()	()	()	()	8
7.5K(8.2K)					6.8K	J	
6.8K(7.5K)					J	J	
()	()	()	(				

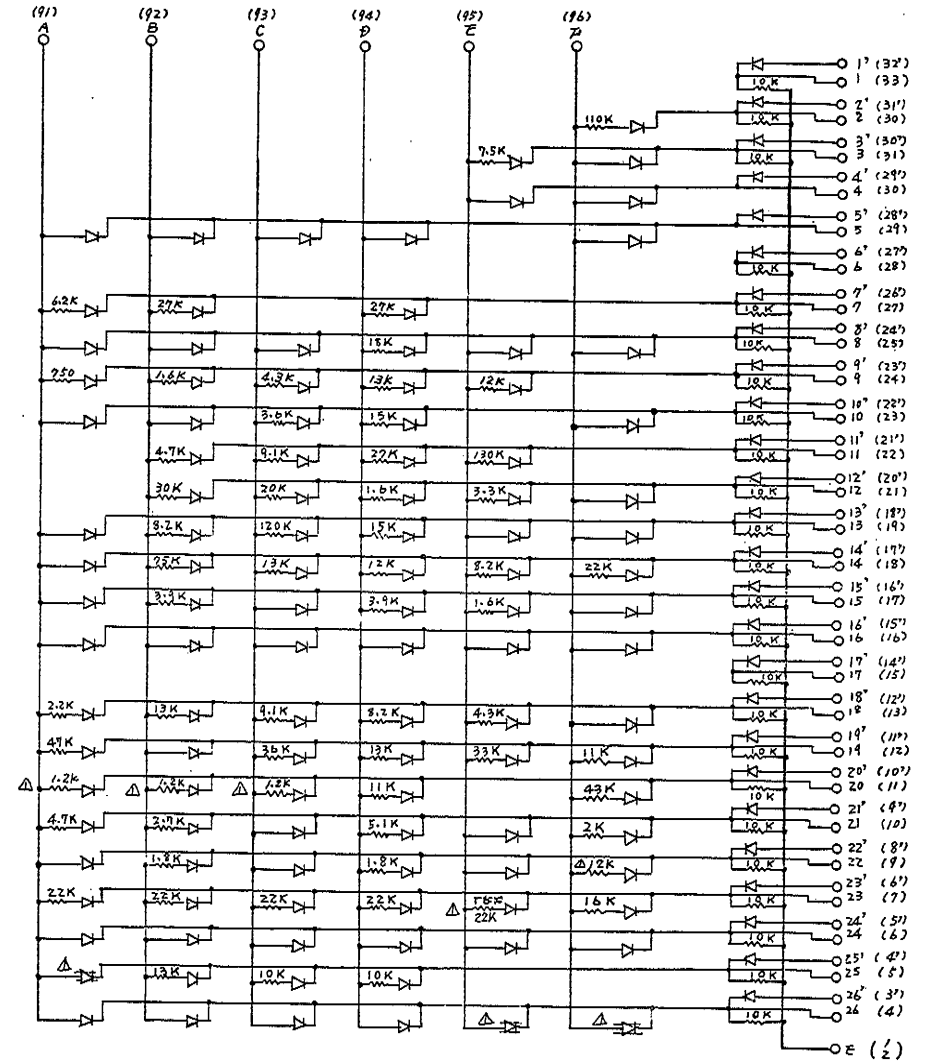
26	26 (4)
25	25 (5)
24	24 (6)
23	23 (7)
22	22 (9)
21	21 (10)
20	20 (11)
19	19 (12)
18	18 (13)
17	17 (15)
16	16 (16)
15	15 (17)
14	14 (18)
13	13 (19)
12	12 (22)
11	11 (22)
10	10 (23)
9	9 (24)
8	8 (25)
7	7 (27)
6	6 (28)
5	5 (29)
4	4 (30)
3	3 (31)
2	2 (32)
1	1 (33)

REx2	RA1-T51-26(4) PN1-MBK-M3-VR24
BRx2	RA1-T51-25(5) PN1-MBK-M3-VR23
PKx2	RA1-T51-24(6) PN1-MBK-M3-VR22
SBx2	RA1-T51-23(7) PN1-MBK-M3-VR21
GGx2	RA1-T51-22(9)
WHx2	RA1-R51-LV(93) RA1-T51-21(10)
GYx2	PN1-R51-CP(19) RA1-T51-20(11)
V1x2	RA1-M11-SL(64) RA1-T51-19(12)
BEx2	RA1-T51-18(13) RA1-M11-AA(67)
GRx2	RA1-T51-17(15) RA1-M11-LP2(24)
YEx2	RA1-T51-16(8) RA1-M11-LP1(27)
ORx2	RA1-T51-15(17) PN1-MBK-M3-VR13-4
REx2	RA1-T51-14(18) PN1-M11-CP(1)
BRx2	RA1-T51-13(19) RA1-M11-AF(62)
PKx2	RA1-T51-12(21) RA1-M11-AL(59)
SBx2	RA1-T51-11(22) RA1-M11-L(58)
GGx2	RA1-T51-10(23) RA1-R51-CP(15)
YEx2	RA1-R51-FL(55) RA1-T51-9(24)
GYx2	RA1-T51-8(25) RA1-T51-QH(57)
ORx2	RA1-R51-FH(55) RA1-T51-7(27)
BEx2	RA1-T51-6(28) PN1-MBK-M3-VR4
GRx2	RA1-T51-5(29) RA1-M11-GP(4)
YEx2	RA1-T51-4(30) RA1-M11-G1(45)
ORx2	RA1-T51-3(31) RA1-M11-PW(40)
REx2	RA1-T51-2(32) PN1-MBK-M3-VR2
BRx2	RA1-T51-1(33) PN1-MBK-M3-VR1

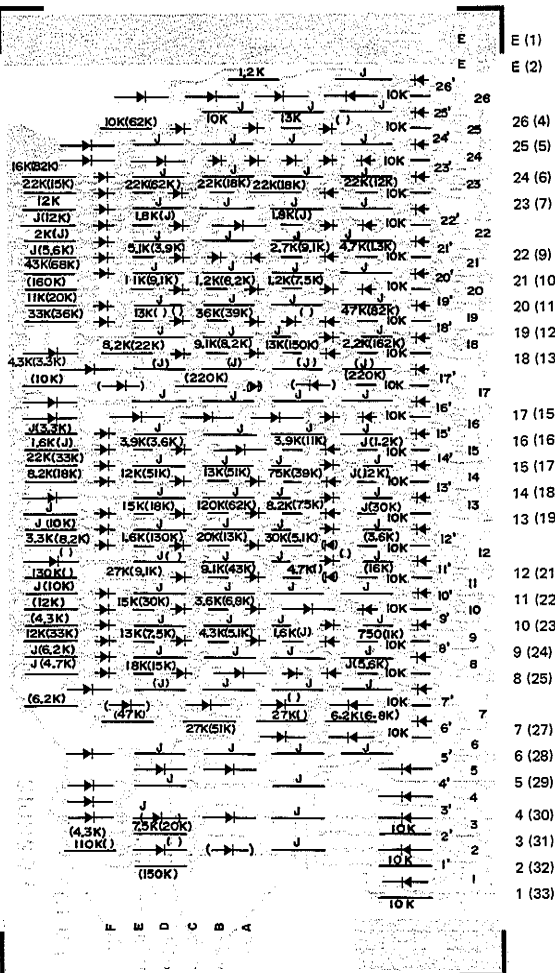
RA1-BA-111(15)	GR	(95) E
RA1-BA-110(14)	RE	(94) D
RA1-BA-19(13)	OR	(93) C
RA1-BA-18(12)	RE	(92) B
RA1-BA-17(10)	BR	(91) A

Note) 1. Print Board : LC22621
2. Diode : 1S1555
3. J : J10

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T53 Circuit Board & Wiring



RA1-BA-116(42)	BE	(96) F
RA1-BA-115(41)	GR	(95) E
RA1-BA-114(40)	YE	(94) D
RA1-BA-113(39)	OR	(93) C
RA1-BA-112(38)	RE	(92) B
RA1-BA-111(37)	BR	(91) A

BL12x2
RA1-M18-E(1)
RA1-T54-E(1)

E (1)
E (2)

REx2 RA1-TRG5-ALII(42)
BRx2 RA1-T54-26(4)
RA1-TRG2-ABII(66)
PKx2 RA1-T54-25(5)
RA1-T54-24(6)
RA1-T54-23(7)

GG RA1-T54-22(9)
WHx2 RA1-SUB-RA'(58)
RA1-T54-21(10)
GY RA1-T54-20(11)
VI RA1-T54-19(12)
BE RA1-T54-18(13)

GR RA1-T54-17(15)
YE RA1-T54-16(16)
ORx2 RA1-SUB-RF'(57)
RA1-T54-15(17)
RE RA1-T54-14(18)
BR RA1-T54-13(19)

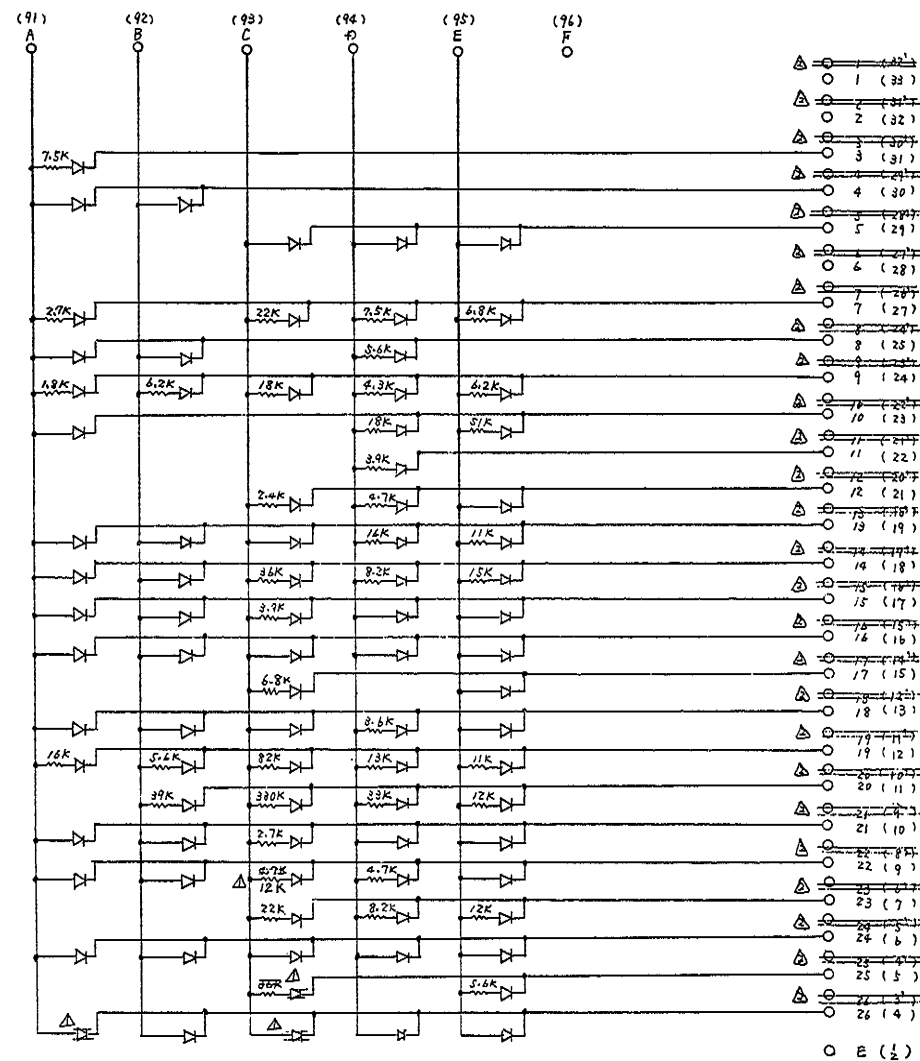
PK RA1-T54-12(21)
SB RA1-T54-11(22)
GG RA1-T54-10(23)
REx2 RA1-BA-f08(23')
RA1-T54-9(24)
GY RA1-T54-8(25)

BRx2 RA1-BA-f07(21')
RA1-T54-7(27)
BEx2 RA1-SUB-C2(41)
RA1-T54-6(28)
GR RA1-T54-5(29)
YE RA1-T54-4(30)
OR RA1-T54-3(31)
REx2 RA1-SUB-D2(49)
RA1-T54-2(32)
BRx2 RA1-SUB-VC2(18)
RA1-T54-1(33)

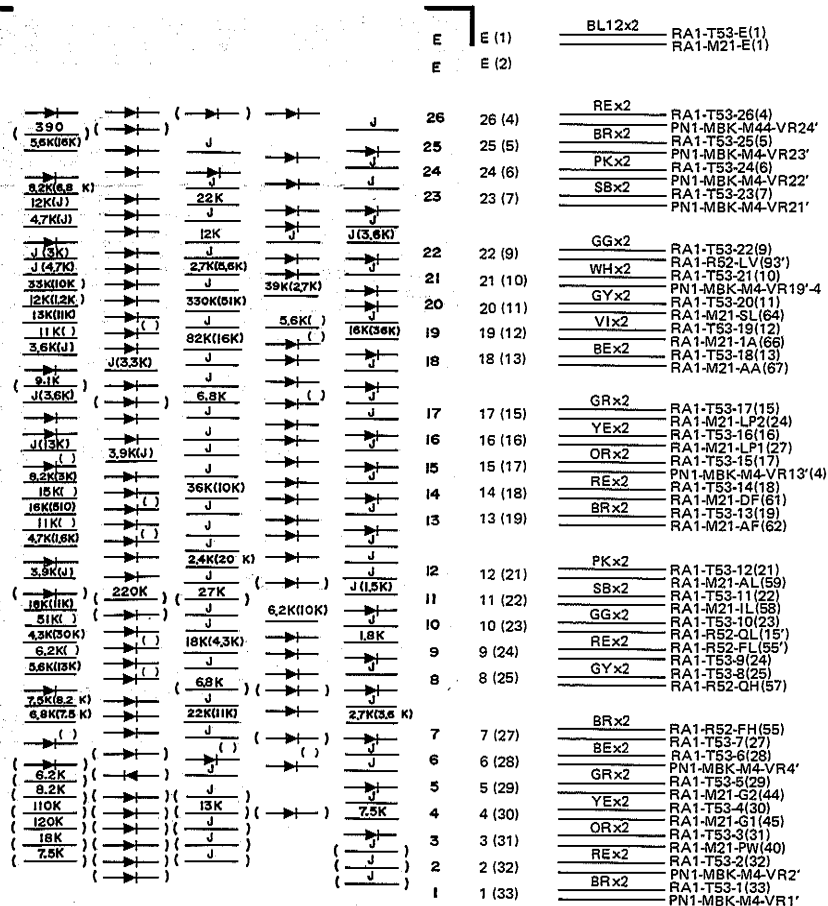
26' (3') RE PN1-VR24'-2
25' (4') BR PN1-VR23'-2
24' (5') PK PN1-VR22'-2
23' (6') SB PN1-VR21'-2
22' (8') GG PN1-VR20'-2
21' (9') WH PN1-VR19'-2
20' (10') GY PN1-VR18'-2
19' (11') VI PN1-VR17'-2
18' (12') BE PN1-VR16'-2
17' (14') GR PN1-VR15'-2
16' (15') YE PN1-VR14'-2
15' (16') OR PN1-VR13'-2
14' (17') RE PN1-VR12'-2
13' (18') BR PN1-VR11'-2
12' (20') PK PN1-VR10'-2
11' (21') SB PN1-VR9'-2
10' (22') GG PN1-VR8'-2
9' (23') BR RA1-BA-f04(62')
8' (24') GY PN1-VR6'-2
7' (26') OR RA1-BA-f03(60')
6' (27') BE PN1-VR4'-2
5' (28') GR PN1-SW2'-T
4' (29') YE PN1-SW1'-T
3' (30') OR PN1-VR3'-2
2' (31') RE PN1-VR2'-2
1' (32') BR PN1-VR1'-2

Note) 1. Print Board : LC22612
2. Diode : IS1555

T54 Circuit Diagram



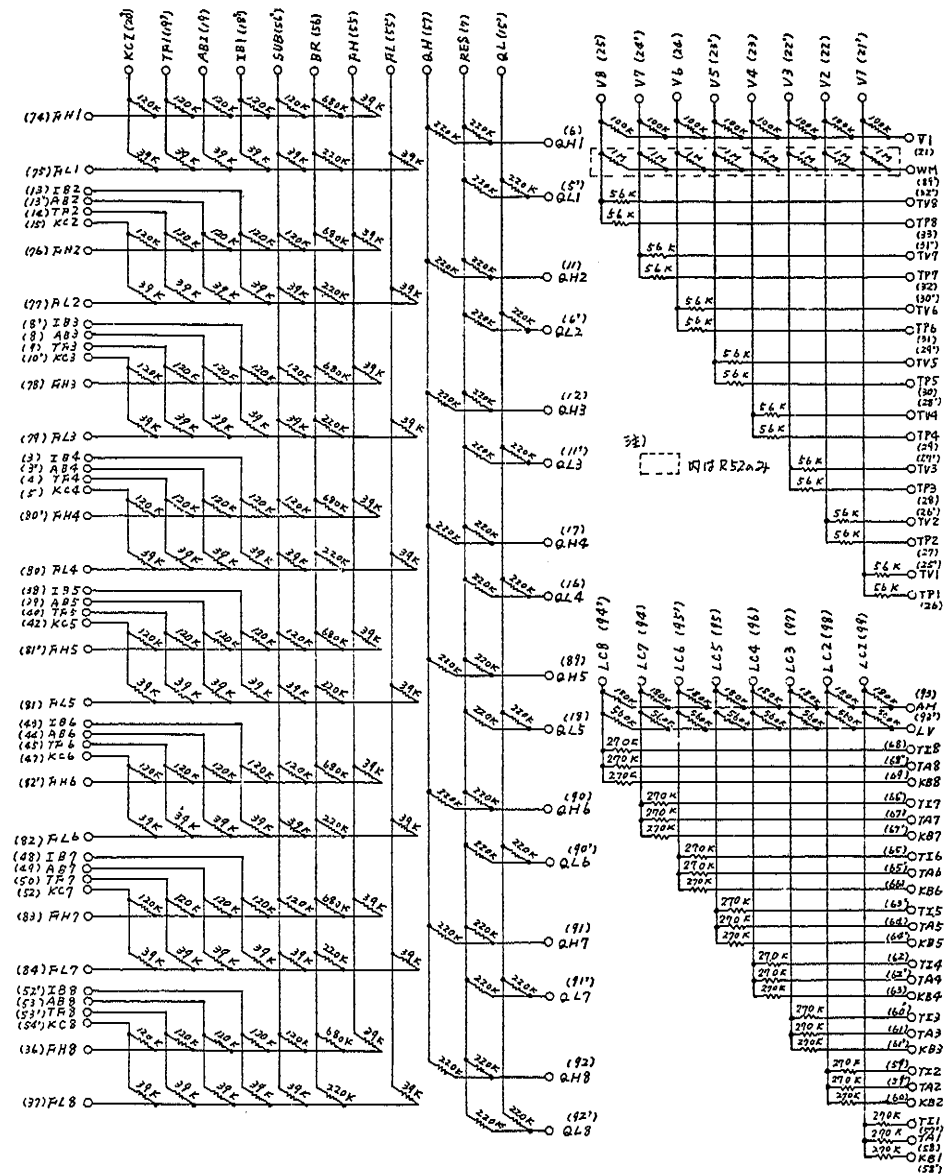
T54 Circuit Board & Wiring



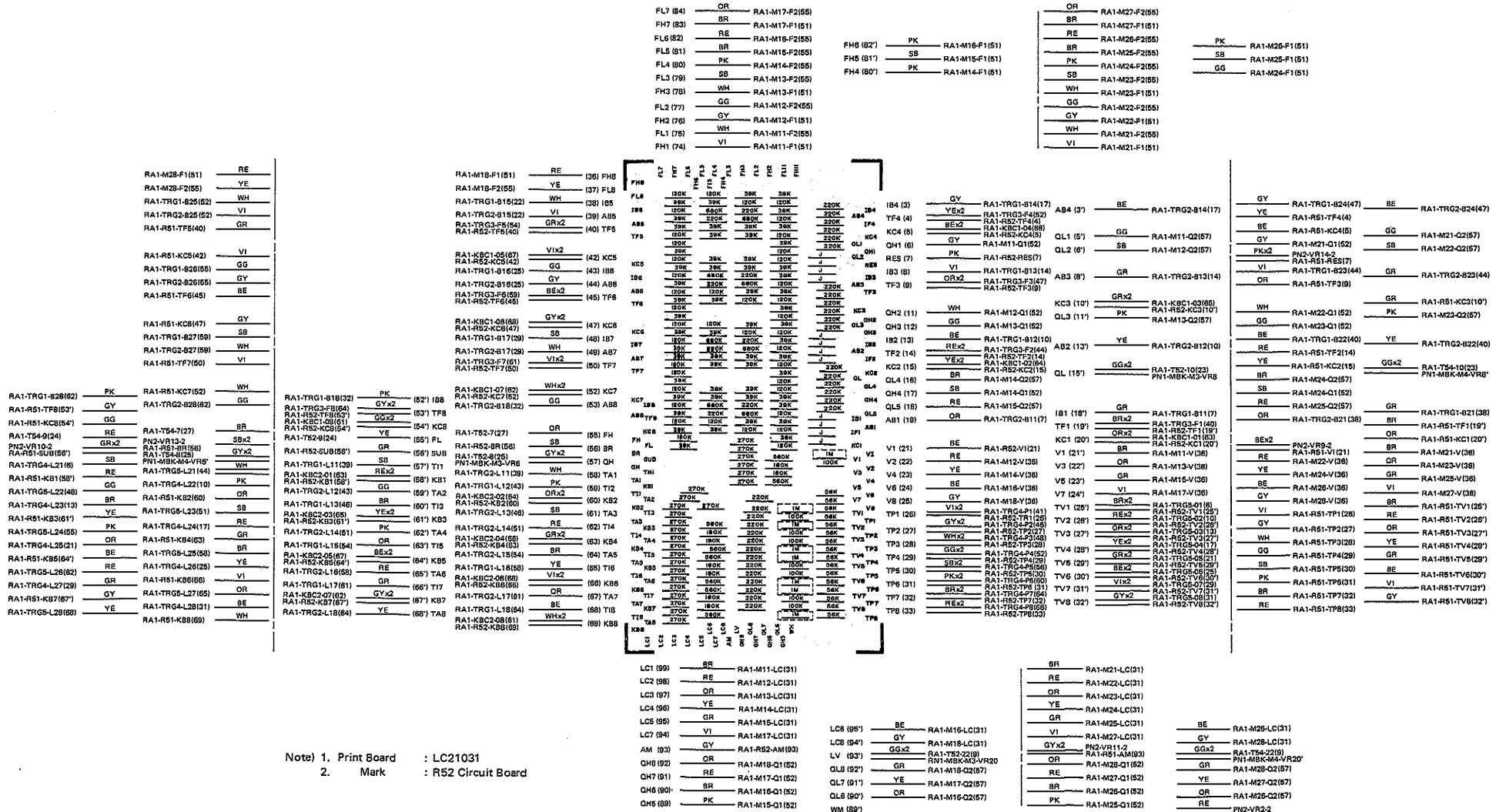
	GR	(96) F
RA1-BA-II11(48)		(95) E
	YE	(94) D
RA1-BA-II10(47)		(93) C
	OR	(92) B
RA1-BA-II9(46)		(91) A
	RE	
RA1-BA-II8(45)		
	BR	
RA1-BA-II7(44)		

Note) 1. Print Board :LC22621
2. Diode : 1S1555
3. J : J10

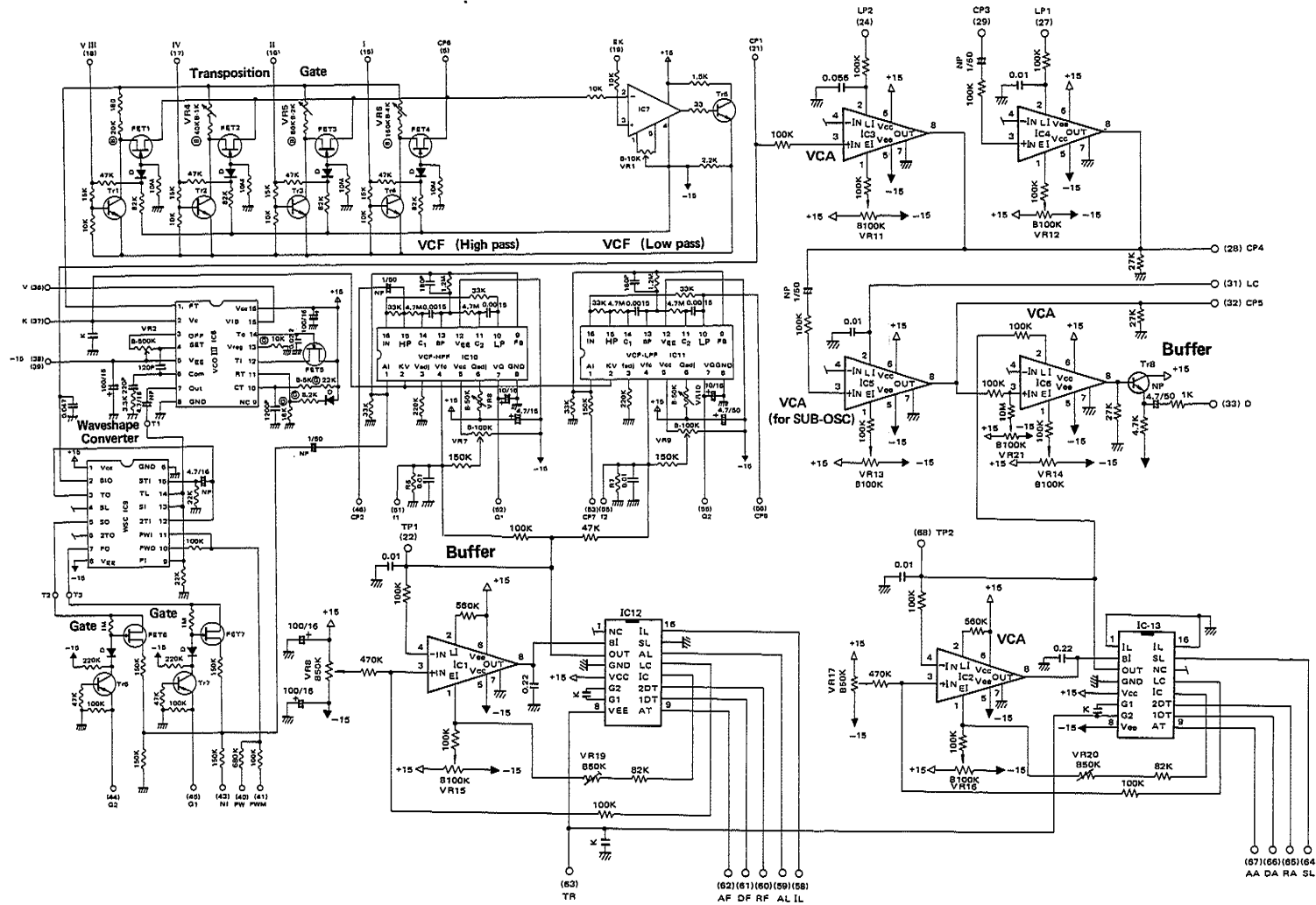
R51-52 Circuit Diagram



R51-52 Circuit Board & Wiring



M Circuit Diagram



	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
IC views show the pin disposition
looked from upper. (Opposite to Pattern)
- IC
IC1~6: IG00151 (VCA)
IC7: TA7504M (VCOIII)
IC8: IG00153
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.

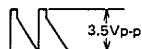
2. KV Input of the key voltage
The input of the voltage is provided to the pin in corporation with the keys held down.

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"

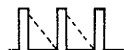
3. OFF-SET Zero adjustment of input buffer circuit
4. Vee -15V input power source.
6. Com Phase compensation for input buffer amplifier.
Normally, the output (KV + 1V) is supplied to the pin.
7. OUT Output



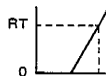
As to the frequency, refer to the Pin No.2 (KV).

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.

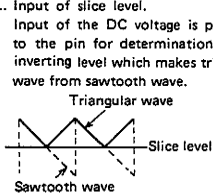
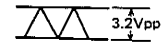
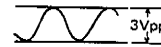


Determines the discharging voltage level.

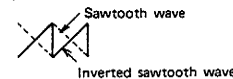
12. T1 Input for the comparator.
Input of the wave shape (N) is provided. from the pin no. 14 (TO).
13. Iref Input of the standard electronic current
14. TO Output from time constant circuit.
The following wave shape is produced.
15. VIB Input for vibrato control wave.
Input of the control wave is provided 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.



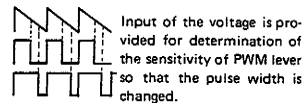
5. SO Output of the inverter wave
Output of inverted sawtooth wave is produced.



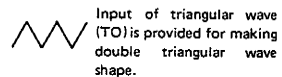
6. 2TO Output of double triangle wave
Double triangle wave is produced from triangle wave.

7. PO Output of pulse wave.
8. Vee -15V input power source.
9. PI Input of pulse wave
Input of sawtooth wave is provided.

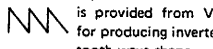
10. PWO Output of OP amplifier.
11. PWI Input of OP amplifier.



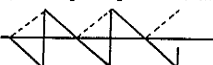
12. 2TI Input of triangular wave for producing double triangular wave shape.



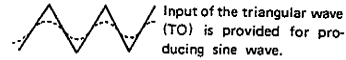
13. ST Input of the pulse for producing inverted sawtooth wave.
Input of the sawtooth wave is provided from VCO III for producing inverted sawtooth wave shape.



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



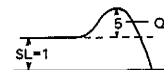
15. STI Input of the wave for producing sine wave.



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.
When the VK is 0.25V and Vf is 5V, the cut off frequency is set to just 1KHz.
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
-6dB/1V
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
+6dB/1V
The output of higher frequencies are produced.



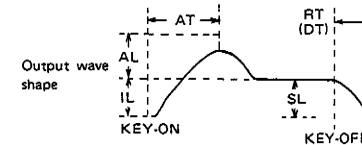
16. IN Input of feed back
The input signal for determination of cut off frequency.

VCF-EG IC (IG00152)

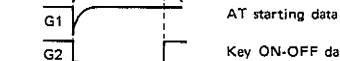
This IC generates envelope wave shape which is supplied to VCF and control the tone color.

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

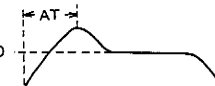
The buffer amplifier is built in for the purpose of matching impedance.



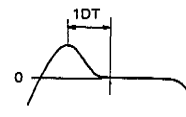
4. GND Earth
5. Vcc +15V input power source.
6. G1 Gate 1
7. G2 Gate 2



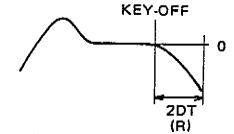
8. Vee -15V input power source.
9. AT Input of buffer voltage for determination of the attack time.
Input of the voltage between zero V and 10V is provided and the attack time is controlled from 1 mS until 1S.



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.

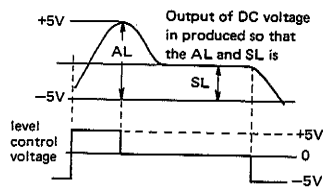


12. TC Output of the time control.
Output of DC voltage is produced so that the each time of attack, 1DT and 2DT are controlled.



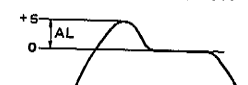
The higher the voltage, the shorter the time and the lower the voltage the longer the time.

13. LC Output of level control.

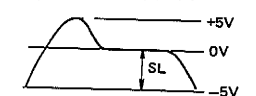


The higher the voltage, the higher the level and the lower the voltage the lower the level.

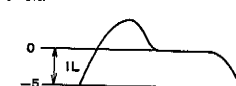
14. AL Input of buffer voltage for determination of attack level.
Input of the voltage between (0V~10V) is provided and the attack level is controlled from 0V until +5V.



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

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

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

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

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

- 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 $0V \pm 120\mu V$.

- 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:

- 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.
- The order the possible sounds when keys are depressed in turn is:

① $\rightarrow$ ② $\rightarrow$ ③ $\rightarrow$ ④ $\rightarrow$ ⑤ $\rightarrow$ ⑥ $\rightarrow$ ⑦ $\rightarrow$ ①

When keys are depressed at a time:

① $\rightarrow$ ② $\rightarrow$ ③ $\rightarrow$ ④ $\rightarrow$ ⑤ $\rightarrow$ ⑥ $\rightarrow$ ⑦ $\rightarrow$ ⑧ $\rightarrow$ 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.

- 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.

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

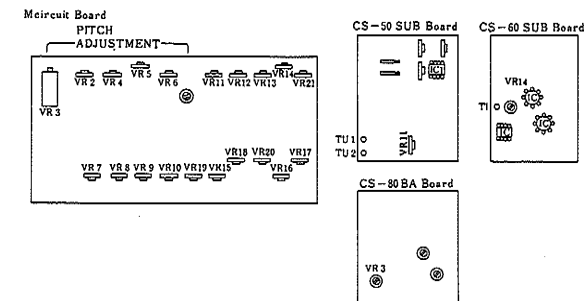
CS-50, 60	VR5 (B-2K); C5 to be 1046Hz ± 1 cent when C6 key is depressed.
CS-80	VR5 (B-1K); C6 to be 2093Hz ± 1 cent when C6 key is depressed.

- 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.

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

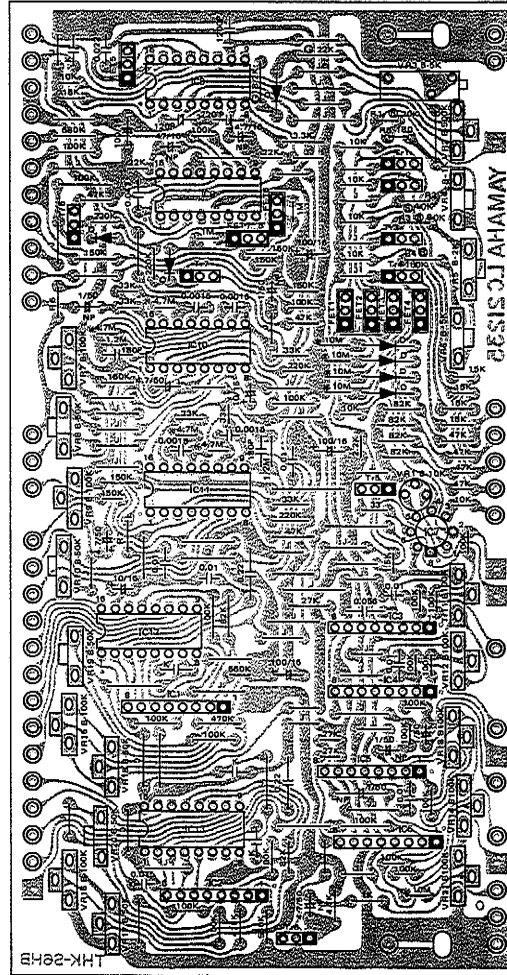
	Circuit Board	VR. No.	
CS-50	SUB	VR11	B-200 Ω
CS-60	SUB	VR14	B-100 Ω
CS-80	BA	VR3	B-100K Ω



M11-12 Circuit Board & Wiring

M12	
RA1-R51-V2 (22)	RE (36) V
RA2-SH-K2 (42)	WHx2 (37) K
RA1-M22-K (37)	YE12 (38) -15
RA1-M11-15 (38)	YE30 (39) -15
RA1-M16-15 (38)	YE12 (39) -15
RA1-M13-15 (38)	YE30 (40) PW
PU-9C1P-5	ORx2 (41) PWM
RA1-M11-PW (40)	YE2 (42) E'
RA1-M13-PW (40)	GGx2 (43) NI
RA1-M11-PWM (41)	GRx2 (44) G2
RA1-M13-PWM (41)	YEx2 (45) G1
	BE (46) CP2
RA1-M11-NI (43)	
RA1-M13-NI (43)	GGx2 (43) NI
RA1-M11-G2 (44)	GRx2 (44) G2
RA1-M13-G2 (44)	YEx2 (45) G1
RA1-M11-G1 (45)	BE (46) CP2
RA1-M13-G1 (45)	
RA1-M12-CP7 (53)	
RA1-R51-FH2 (76)	
RA1-R51-QH2 (11)	WH (52) Q1
RA1-M12-CP2 (46)	BE (53) CP7
RA1-R51-FL2 (77)	
RA1-M12-CP3 (29)	VI (56) CP8
RA1-R51-QL2 (6')	SB (57) Q2
RA1-M11-IL (58)	SBx2 (58) IL
RA1-M13-IL (58)	PKx2 (59) AL
RA1-M11-AL (59)	ORx2 (60) RF
RA1-M13-AL (59)	REx2 (61) DF
RA1-M11-RF (60)	BRx2 (62) AF
RA1-M13-RF (60)	REx2 (63) TR
RA1-M11-DF (61)	GYx2 (64) SL
RA1-M13-DF (61)	WHx2 (65) RA
RA1-M11-AF (62)	VIx2 (66) DA
RA1-M13-AF (62)	BEx2 (67) AA
RA1-TWS-T2 (30)	
RA1-M22-TR (63)	
RA1-M11-SL (64)	
RA1-M13-SL (64)	
RA1-M11-RA (65)	
RA1-M13-RA (65)	
RA1-M11-DA (66)	
RA1-M13-DA (66)	
RA1-M11-AA (67)	
RA1-M13-AA (67)	
	(68) TP2

M11	
RA1-R51-V1 (21')	BR (36) V
RA2-SH-K1 (38)	WHx2 (47) K
RA1-M21-K (37)	YE12x2 (38) -15
RA1-SUB-15 (5)	YE30 (39) -15
RA1-M12-15 (38)	ORx2 (40) PW
RA2-KAS-15 (89)	YE2 (41) PWM
RA1-T52-3 (31)	GGx2 (42) E
RA1-M12-PW (40)	GRx2 (43) NI
RA1-SUB-P1 (48)	YEx2 (44) G2
RA1-M12-PWM (41)	YEx2 (45) G1
	BE (46) CP2
RA1-SUB-NO1 (39)	
RA1-M12-NI (43)	GGx2 (43) NI
RA1-T52-5 (29)	GRx2 (44) G2
RA1-M12-G2 (44)	YEx2 (45) G1
RA1-T52-4 (30)	BE (46) CP2
RA1-M12-G1 (45)	
RA1-M11-CP7 (53)	
RA1-R51-FH1 (74)	
RA1-R51-QH1 (6)	VI (51) F1
RA1-M11-CP2 (46)	GY (52) Q1
	BE (53) CP7
RA1-R51-FL1 (75)	
RA1-M11-CP3 (29)	WH (55) F2
RA1-R51-QL1 (5')	VI (56) CP8
RA1-T52-11 (22)	GG (57) Q2
RA1-M12-IL (58)	SBx2 (58) IL
RA1-T52-12 (21)	PKx2 (59) AL
RA1-M12-AL (59)	ORx2 (60) RF
RA1-SUB-RE0 (60)	REx2 (61) DF
RA1-M12-RF (60)	BRx2 (62) AF
RA1-T52-14 (18)	REx2 (63) TR
RA1-M12-DF (61)	GYx2 (64) SL
RA1-T52-13 (19)	WHx2 (65) RA
RA1-M12-AF (62)	VIx2 (66) DA
RA1-TWS-T1 (31)	BEx2 (67) AA
RA1-M21-TR (63)	
RA1-T52-20 (11)	
RA1-M12-SL (64)	
RA1-SUB-RA0 (61)	
RA1-M12-RA (65)	
RA1-T52-19 (12)	
RA1-M12-DA (66)	
RA1-T52-18 (13)	
RA1-M12-AA (67)	
	TP2



M11	
E (1)	BL12x2 RA1-T52-E (1)
E (2)	RA1-M12-E (1)
CP6	
I (15)	BRx2 RA1-SUB-I (16)
III (16)	REx2 RA1-M12-I (15)
IV (17)	YEx2 RA1-SUB-II (15)
VIII (18)	RA1-M12-II (16)
EK (19)	RA1-SUB-IV (14)
	RA1-M12-IV (17)
	BE RA1-M12-VIII (18)
	BLx2 RA2-KAS-EK (70)
	RA1-M12-EK (19)
CP1	
TP1	
LP2 (24)	GRx2 RA1-T52-17 (15)
	RA1-M12-LP2 (24)
LP1 (27)	YEx2 RA1-T52-16 (16)
CP4 (28)	RA1-M12-LP1 (27)
CP3 (29)	VI RA1-M11-CP8 (56)
LC (31)	BR RA1-R51-LC1 (99)
CP5	
O (33)	WH RA1-M12-O (33)
+15 (34)	BR12x2 RA1-SUB+15 (34)
+15 (35)	RA1-M12+15 (34)

M12	
E (1)	BL12x2 RA1-M11-E (1)
E (2)	RA1-M13-E (1)
CP6 (5)	
I (15)	BRx2 RA1-M11-I (15)
II (16)	REx2 RA1-M13-I (15)
IV (17)	YEx2 RA1-M13-II (16)
VIII (18)	RA1-M11-IV (17)
EK (19)	BEx2 RA1-M11-VIII (18)
	BLx2 RA1-M13-VIII (18)
	RA1-M13-EK (19)
CP1 (21)	
TP1 (22)	
LP2 (24)	GRx2 RA1-M11-LP2 (24)
	RA1-M13-LP2 (24)
LP1 (27)	YEx2 RA1-M11-LP1 (27)
CP4 (28)	RA1-M13-LP1 (27)
CP3 (29)	VI RA-M12-CP8 (56)
LC (31)	RE RA-R51-LC2 (98)
CP5 (32)	
O (33)	WHx2 RA1-M11-O (33)
+15 (34)	BR12x2 RA1-M13-O (33)
+15 (35)	RA1-M11+15 (34)
	RA1-M13+15 (34)

M13-14 Circuit Board & Wiring

RA1-R51-V3 (22')	OR	(36) V
RA2-SH-K3 (46)	WHx2	(37) K
RA1-M23-K (39)	YE12x2	(38) -15
RA1-M12-15 (39)		(39) -15
RA1-M14-15 (38)		
RA1-M12-PW (40)	ORx2	(40) PW
RA1-M14-PW (40)	YEx2	(41) PWM
RA1-M12-PWM (41)		(42) E'
RA1-M14-PWM (41)		
RA1-M12-NI (43)	GGx2	(43) NI
RA1-M14-NI (43)	GRx2	(44) G2
RA1-M12-G2 (44)	YEx2	(45) G1
RA1-M14-G2 (44)		(46) CP2
RA1-M12-G1 (45)	BE	
RA1-M14-G1 (45)		
RA1-M13-CP7 (53)		

RA1-R51-FH3 (78)	WH	(51) F1
RA1-R51-QH3 (12)	GG	(52) Q1
RA1-M13-CP2 (46)	BE	(53) CP7
RA1-R51-FL3 (79)	SB	(55) F2
RA1-M13-CP3 (29)	VI	(56) CP8
RA1-R51-QL3 (11')	PK	(57) Q2
RA1-M12-IL (58)	SBx2	(58) IL
RA1-M14-IL (58)	PKx2	(59) AL
RA1-M12-AL (59)	ORx2	(60) RF
RA1-M12-RF (60)	REx2	(61) DF
RA1-M14-RF (60)	BRx2	(62) AF
RA1-M12-DF (61)	ORx2	(63) TR
RA1-M14-DF (61)	GYx2	(64) SL
RA1-M12-AF (62)	WHx2	(65) RA
RA1-M14-AF (62)	Vix2	(66) DA
RA1-TWS-T3 (62)	BEx2	(67) AA
RA1-M23-TR (63)		(68) TP2
RA1-M12-SL (64)		
RA1-M14-SL (64)		
RA1-M12-RA (65)		
RA1-M14-RA (65)		
RA1-M12-DA (66)		
RA1-M14-DA (66)		
RA1-M12-AA (67)		
RA1-M14-AA (67)		

M13

E (1)	BL12x2	RA1-M12-I (1)
E (2)		RA1-M14-I (1)
CP6 (5)		
I (15)	BLx2	RA1-M12-I (15)
II (16)	REx2	RA1-M14-I (15)
IV (17)	YEx2	RA1-M12-II (16)
VIII (18)	BEx2	RA1-M14-II (16)
EK (19)	BLx2	RA1-M12-IV (17)
		RA1-M14-IV (17)
		RA1-M12-VIII (18)
		RA1-M14-VIII (18)
		RA1-M12-EK (19)
		RA1-M14-EK (19)
CP1 (21)		
TP1 (22)		
LP2 (24)	GRx2	RA1-M12-LP2 (24)
		RA1-M14-LP2 (24)
LP1 (27)	YEx2	RA1-M12-LP1 (27)
		RA1-M14-LP1 (27)
CP4 (28)		
CP3 (29)	VI	RA-M13-CP8 (56)
LC (31)	OR	RA1-R51-LC3 (97)
CP5 (32)		
O (33)	WHx2	RA1-M12-O (33)
+15 (34)	BR12x2	RA1-M12-15 (34)
+15 (35)		RA1-M14-15 (34)

RA1-R51-V4 (23)	YE	(36) V
RA2-SH-K4 (50)	WHx2	(37) K
RA1-M24-K (37)	YE12x2	(38) -15
RA1-M13-15 (38)		(39) -15
RA1-M15-15 (38)		
RA1-M13-PW (40)	ORx2	(40) PW
RA1-M15-PW (40)	YEx2	(41) PWM
RA1-M13-PWM (41)		(42) E'
RA1-M15-PWM (41)		
RA1-M13-NI (43)	GGx2	(43) NI
RA1-M15-NI (43)	GRx2	(44) G2
RA1-M13-G2 (44)	YEx2	(45) G1
RA1-M15-G2 (44)		(46) CP2
RA1-M13-G1 (45)	BE	
RA1-M15-G1 (45)		
RA1-M14-CP7 (53)		

RA1-R51-FH4 (80')	PK	(51) F1
RA1-R51-QH4 (17)	SB	(52) Q1
RA1-M14-CP2 (46)	BE	(53) CP7
RA1-R51-FL4 (80)	PK	(55) F2
RA1-M14-CP3 (29)	VI	(56) CP8
RA1-R51-QL4 (16)	BR	(57) Q2
RA1-M13-IL (58)	SBx2	(58) IL
RA1-M15-IL (58)	PKx2	(59) AL
RA1-M13-AL (59)	ORx2	(60) RF
RA1-M15-AL (59)	REx2	(61) DF
RA1-M13-RF (60)	BRx2	(62) AF
RA1-M15-RF (60)	YEx2	(63) TR
RA1-M13-DF (61)	GYx2	(64) SL
RA1-M15-DF (61)	WHx2	(65) RA
RA1-M13-AF (62)	Vix2	(66) DA
RA1-M15-AF (62)	BEx2	(67) AA
RA1-TWS-T4 (29)		(68) TP2
TR1-M24-TR (63)		
RA1-M13-SL (64)		
RA1-M15-SL (64)		
RA1-M13-RA (65)		
RA1-M15-RA (65)		
RA1-M13-DA (66)		
RA1-M15-DA (66)		
RA1-M13-AA (67)		
RA1-M15-AA (67)		

M14

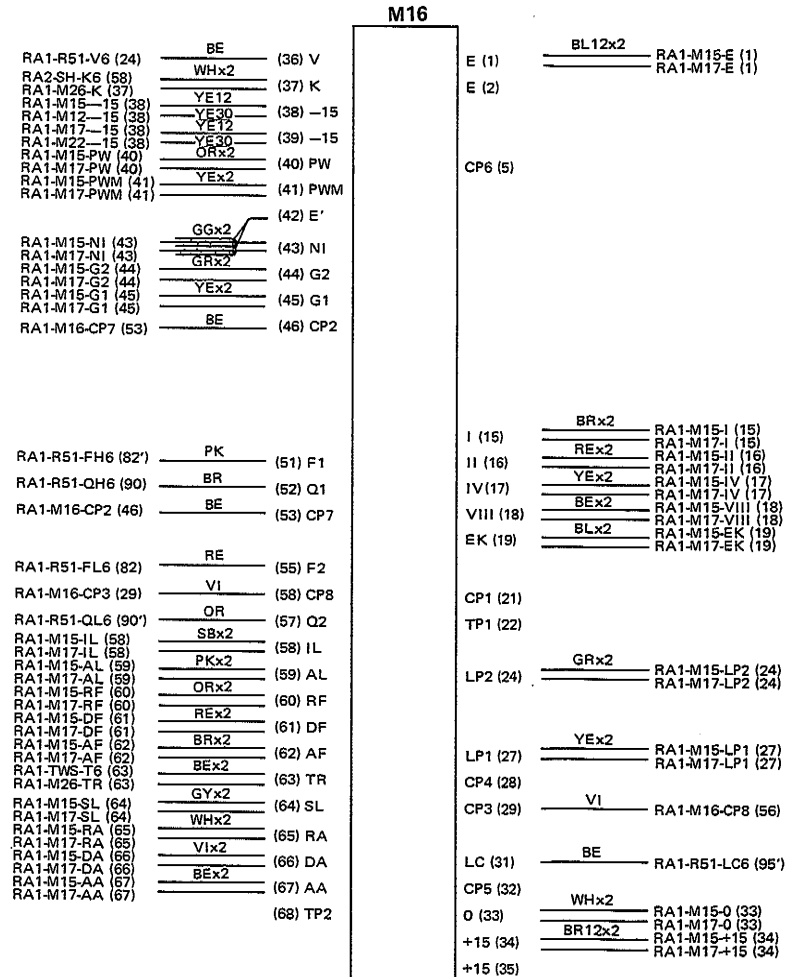
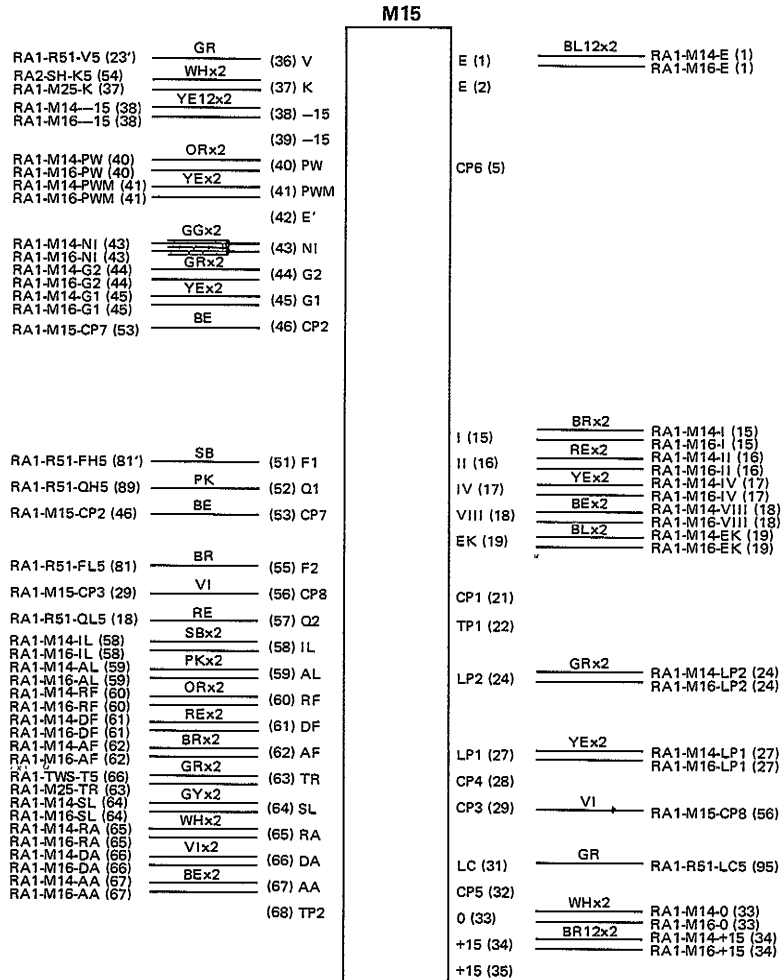
BL12x2	PN2-VR22-5
BL12x2	PN2-VR3-3
BL12x2	PN3-VR48-1
BL12	RA1-M14-E (2)
BL30	PN1-VR24-3
BL30x2	PN2-VR23B
	PN2-VR11-1
	RA2-KAS-EK (69)
	PU-9C1P-5
	PU-9C1P-3

E (1)	BL12x2	RA1-M13-E (1)
E (2)	BL12	RA1-M15-E (1)
CP6 (5)		RA1-EP
I (15)	BRx2	RA1-M13-I (15)
II (16)	REx2	RA1-M15-I (15)
IV (17)	YEx2	RA1-M13-II (16)
VIII (18)	BEx2	RA1-M15-II (16)
EK (19)	BLx2	RA1-M13-IV (17)
		RA1-M15-IV (17)
		RA1-M13-VIII (18)
		RA1-M15-VIII (18)
		RA1-M13-EK (19)
		RA1-M15-EK (19)
CP1 (21)		
TP1 (22)		
LP2 (24)	GRx2	RA1-M13-LP2 (24)
		RA1-M15-LP2 (24)
LP1 (27)	YEx2	RA1-M13-LP1 (27)
		RA1-M15-LP1 (27)
CP4 (28)		
CP3 (29)	VI	RA1-M14-CP8 (56)
LC (31)	YE	RA1-R51-LC4 (96)
CP5 (32)		
O (33)	WHx2	RA1-M13-O (33)
+15 (34)	BR12x2	RA1-M15-O (33)
+15 (35)	BR12	RA1-M13+15 (34)
		RA1-M15+15 (34)
		RA1+15P

+15P

BR30x2	PU-9C1P-1
BR12	PU-9C1P-2
BR30	RA1-M14+15 (35)
	RA2-KAS+15 (50)

M15-16 Circuit Board & Wiring





M21

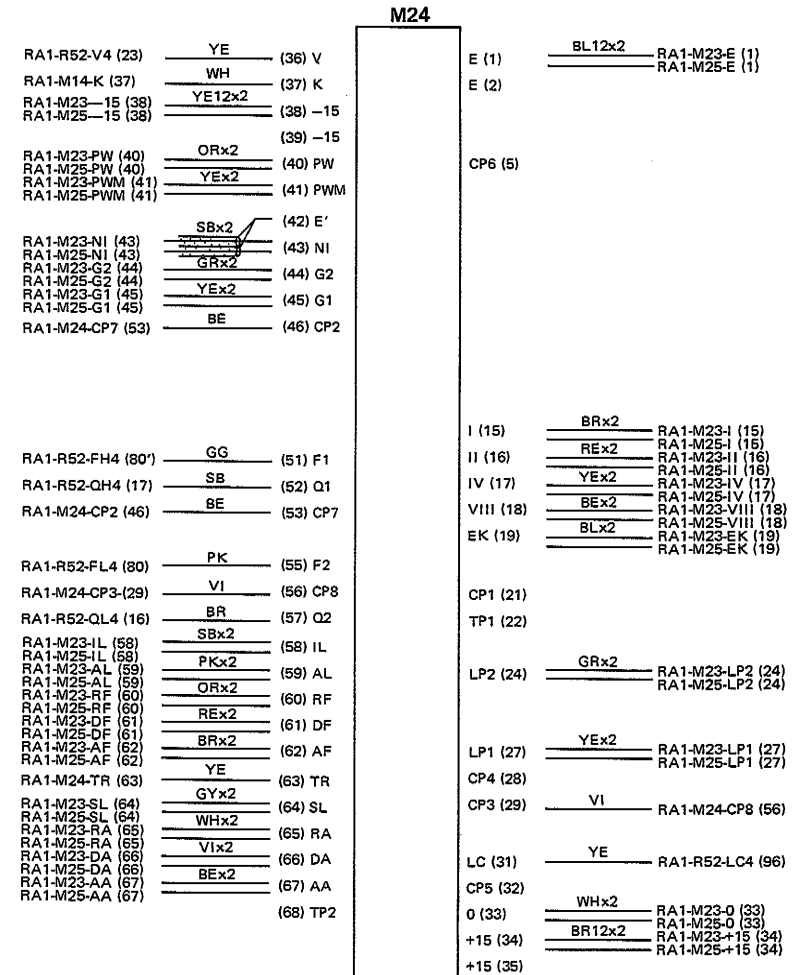
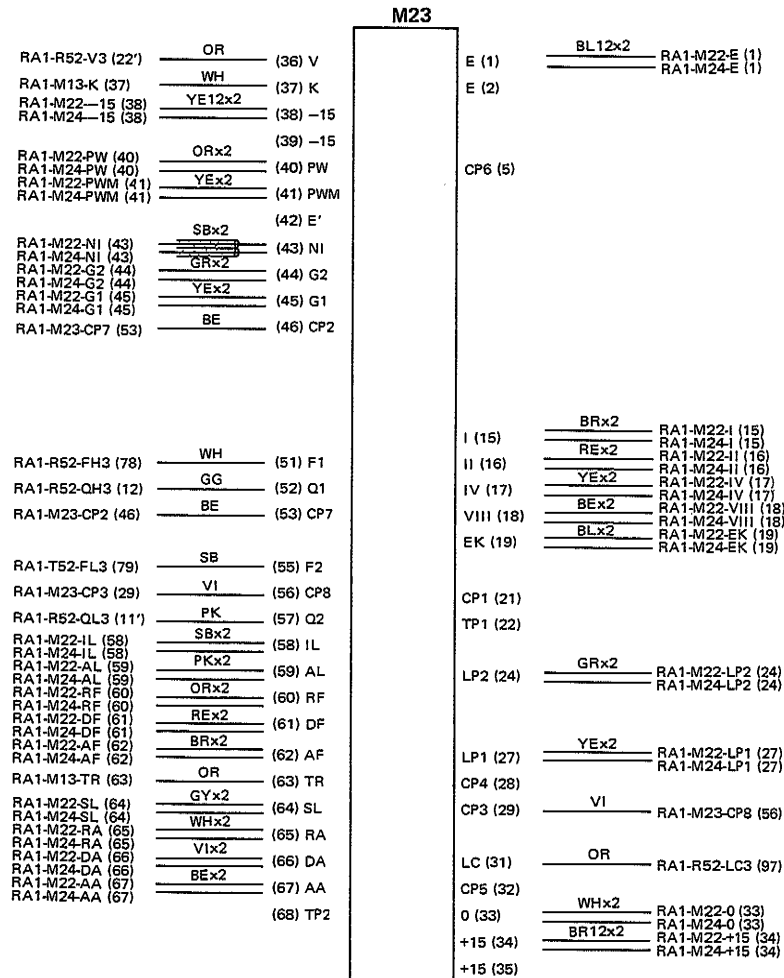
E (1)	<u>8L12x2</u>	RA1-T54-E (1)
E (2)		RA1-M22-E (1)
CP6 (5)		

I (15)	<u>BRx2</u>	RA1-SUB-I' (11) RA1-M22-I (15) RA1-SUB-III' (10)
II (16)	<u>REx2</u>	RA1-M22-II (16) RA1-SUB-IV' (9)
IV (17)	<u>YEx2</u>	RA1-M22-IV (17)
VIII (18)	<u>BE</u>	RA1-M22-VIII (18)
EK (19)	<u>BLx2</u>	RA1-M18-EK (19) RA1-M21-EK (19)
CP1 (21)		
TP1 (22)		
LP2 (24)	<u>GRx2</u>	RA1-T54-17 (15) RA1-M22-LP2 (24)
LP1 (27)	<u>YEx2</u>	RA1-T53-16 (16) RA1-M22-LP1 (27)
CP4 (28)		
CP3 (29)	<u>V1</u>	RA1-M21-CP8 (56)
LC (31)	<u>BR</u>	RA1-R52-LC1 (99)
CP5 (32)		
0 (33)	<u>WH</u>	RA1-M22-0 (33)
+15 (34)	<u>BR12x2</u>	RA1-M18+15 (34) RA1-M22+15 (34)
+15 (35)		

RA1-R52-FH2 (76)	<u>GY</u>	(51) F1
RA1-R52-QH2 (11)	<u>WH</u>	(52) Q1
RA1-M22-CP2 (46)	<u>BE</u>	(53) CP7
RA1-R52-FL2 (77)	<u>GG</u>	(55) F2
RA1-M22-CP3 (29)	<u>VI</u>	(56) CP8
RA1-R52-QL2 (6')	<u>SB</u>	(57) Q2
RA1-M21-IL (58)	<u>SBx2</u>	(58) IL
RA1-M23-IL (59)	<u>PKx2</u>	(59) AL
RA1-M23-IF (59)	<u>ORx2</u>	(60) RF
RA1-M23-RF (60)	<u>REx2</u>	(61) DF
RA1-M21-DF (61)	<u>BRx2</u>	(62) AF
RA1-M21-AF (62)	<u>RE</u>	(63) TR
RA1-M23-TR (63)	<u>Gyx2</u>	(64) SL
RA1-M21-SL (64)	<u>WHx2</u>	(65) RA
RA1-M21-RA (65)	<u>Vix2</u>	(66) DA
RA1-M23-RA (65)	<u>BEx2</u>	(67) AA
RA1-M21-DA (66)		(68) TP2
RA1-M23-DA (66)		
RA1-M21-AA (67)		
RA1-M23-AA (67)		

E (1)	<u>BL12x2</u>	RA1-M21-E (1)
E (2)	<u>RA1-M23-E (1)</u>	
CP6 (5)		
I (15)	<u>BRx2</u>	RA1-M21-I (15)
II (16)	<u>REx2</u>	RA1-M23-II (15)
IV (17)	<u>YEx2</u>	RA1-M23-II (16)
VIII (18)	<u>BRx2</u>	RA1-M21-IV (17)
EK (19)	<u>BLx2</u>	RA1-M21-VIII (18)
		RA1-M23-EK (19)
CP1 (21)		
TP1 (22)		
LP2 (24)	<u>GRx2</u>	RA1-M21-LP2 (24)
		RA1-M23-LP2 (24)
LP1 (27)	<u>YEx2</u>	RA1-M21-LP1 (27)
CP4 (28)		RA1-M23-LP1 (27)
CP3 (29)	<u>VI</u>	RA1-M22-CP8 (56)
LC (31)	<u>RE</u>	RA1-R52-LC2 (98)
CP5 (32)		
O (33)	<u>WHx2</u>	RA1-M21-O (33)
+15 (34)	<u>BR12x2</u>	RA1-M23-O (33)
+15 (35)		RA1-M21+15 (34)
		RA1-M23+15 (34)

M 23-24 Circuit Board & Wiring



M25-26 Circuit Board & Wiring

M25

RA1-R52-V5 (23')	GR	(36) V
RA1-M15-K (37)	WH	(37) K
RA1-M24-15 (38)	YE12x2	(38) -15
RA1-M26-15 (38)		(39) -15
RA1-M24-PW (40)	ORx2	(40) PW
RA1-M26-PW (40)	YE2	(41) PWM
RA1-M24-PWM (41)		(42) E'
RA1-M26-PWM (41)		
RA1-M24-NI (43)	SBx2	(43) NI
RA1-M26-NI (43)	GRx2	(44) G2
RA1-M24-G2 (44)	YE2	(45) G1
RA1-M26-G2 (44)		
RA1-M24-G1 (45)	BE	(46) CP2
RA1-M26-G1 (45)		
RA1-M25-CP7 (53)		

RA1-R52-FH5 (81')	SB	(51) F1
RA1-R52-QH5 (89)	PK	(52) Q1
RA1-M25-CP2 (46)	BE	(53) CP7

RA1-R52-FL5 (81)	BR	(55) F2
RA1-M25-CP3 (29)	VI	(56) CP8
RA1-R52-QL5 (18)	RE	(57) Q2
RA1-M24-IL (58)	SBx2	(58) IL
RA1-M26-IL (58)	PKx2	(59) AL
RA1-M24-AL (59)	ORx2	(60) RF
RA1-M26-AL (59)	REx2	(61) DF
RA1-M24-RF (60)	BRx2	(62) AF
RA1-M26-RF (60)	GR	(63) TR
RA1-M24-DF (61)	GYx2	(64) SL
RA1-M26-DF (61)	WHx2	(65) RA
RA1-M24-AF (62)	VIx2	(66) DA
RA1-M26-AF (62)	BEx2	(67) AA
RA1-M15-TR (63)		(68) TP2
RA1-M24-SL (64)		
RA1-M26-SL (64)		
RA1-M24-RA (65)		
RA1-M26-RA (65)		
RA1-M24-DA (66)		
RA1-M26-DA (66)		
RA1-M24-AA (67)		
RA1-M26-AA (67)		

E (1)	BL12x2	RA1-M24-E (1)
E (2)		RA1-M26-E (1)

CP6 (5)

I (15)	BRx2	RA1-M24-I (15)
II (16)	REx2	RA1-M26-I (15)
IV (17)	YE2	RA1-M24-II (16)
VIII (18)	BE2	RA1-M26-II (16)
EK (19)	BLx2	RA1-M24-IV (17)
		RA1-M26-IV (17)
		RA1-M24-VIII (18)
		RA1-M26-VIII (18)
		RA1-M24-EK (19)
		RA1-M26-EK (19)

CP1 (21)

TP1 (22)

LP2 (24)	GRx2	RA1-M24-LP2 (24)
		RA1-M26-LP2 (24)

LP1 (27)	YE2	RA1-M24-LP1 (27)
		RA1-M26-LP1 (27)

CP4 (28)

CP3 (29)

LC (31)	GR	RA1-R52-LC5 (95)
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CP5 (32)

O (33)

+15 (34)	WHx2	RA1-M24-O (33)
		RA1-M26-O (33)
+15 (35)	BR12x2	RA1-M24-+15 (34)
		RA1-M26-+15 (34)

M26

RA1-R52-V6 (24)	BE	(36) V
RA1-M16-K (37)	WH	(37) K
RA1-M25-15 (38)	YE12	(38) -15
RA1-M27-15 (39)	YE30	(39) -15
RA1-M27-15 (38)	YE12	(39) -15
RA1-M25-PW (40)	ORx2	(40) PW
RA1-M27-PW (40)	YE2	(41) PWM
RA1-M25-PWM (41)		(42) E'
RA1-M27-PWM (41)		
RA1-M25-NI (43)	SBx2	(43) NI
RA1-M27-NI (43)	GRx2	(44) G2
RA1-M25-G2 (44)	YE2	(45) G1
RA1-M27-G2 (44)		
RA1-M25-G1 (45)	BE	(46) CP2
RA1-M27-G1 (45)		
RA1-M26-CP7 (53)		

RA1-R52-FH6 (82')	PK	(51) F1
RA1-R52-QH6 (90)	BR	(52) Q1
RA1-M26-CP2 (46)	BE	(53) CP7

RA1-R52-FL6 (82)	RE	(55) F2
RA1-M26-CP3 (29)	VI	(56) CP8
RA1-R51-QL6 (90')	OR	(57) Q2
RA1-M25-IL (58)	SBx2	(58) IL
RA1-M27-IL (58)	PKx2	(59) AL
RA1-M25-AL (59)	ORx2	(60) RF
RA1-M27-AL (59)	REx2	(61) DF
RA1-M25-RF (60)	BRx2	(62) AF
RA1-M27-RF (60)	BE	(63) TR
RA1-M25-DF (61)	GYx2	(64) SL
RA1-M27-DF (61)	WHx2	(65) RA
RA1-M25-AF (62)	VIx2	(66) DA
RA1-M27-AF (62)	BEx2	(67) AA
RA1-M16-TR (63)		(68) TP2
RA1-M25-SL (64)		
RA1-M27-SL (64)		
RA1-M25-RA (65)		
RA1-M27-RA (65)		
RA1-M25-DA (66)		
RA1-M27-DA (66)		
RA1-M25-AA (67)		
RA1-M27-AA (67)		

E (1)	BL12x2	RA1-M25-E (1)
E (2)		RA1-M27-E (1)

CP6 (5)

I (15)	BRx2	RA1-M25-I (15)
II (16)	REx2	RA1-M27-I (15)
IV (17)	YE2	RA1-M25-II (16)
VIII (18)	BE2	RA1-M27-II (16)
EK (19)	BLx2	RA1-M25-IV (17)
		RA1-M27-IV (17)
		RA1-M25-VIII (18)
		RA1-M27-VIII (18)
		RA1-M25-EK (19)
		RA1-M27-EK (19)

CP1 (21)

TP1 (22)

LP2 (24)	GRx2	RA1-M25-LP2 (24)
		RA1-M27-LP2 (24)

LP1 (27)	YE2	RA1-M25-LP1 (27)
		RA1-M27-LP1 (27)

CP4 (28)

CP3 (29)

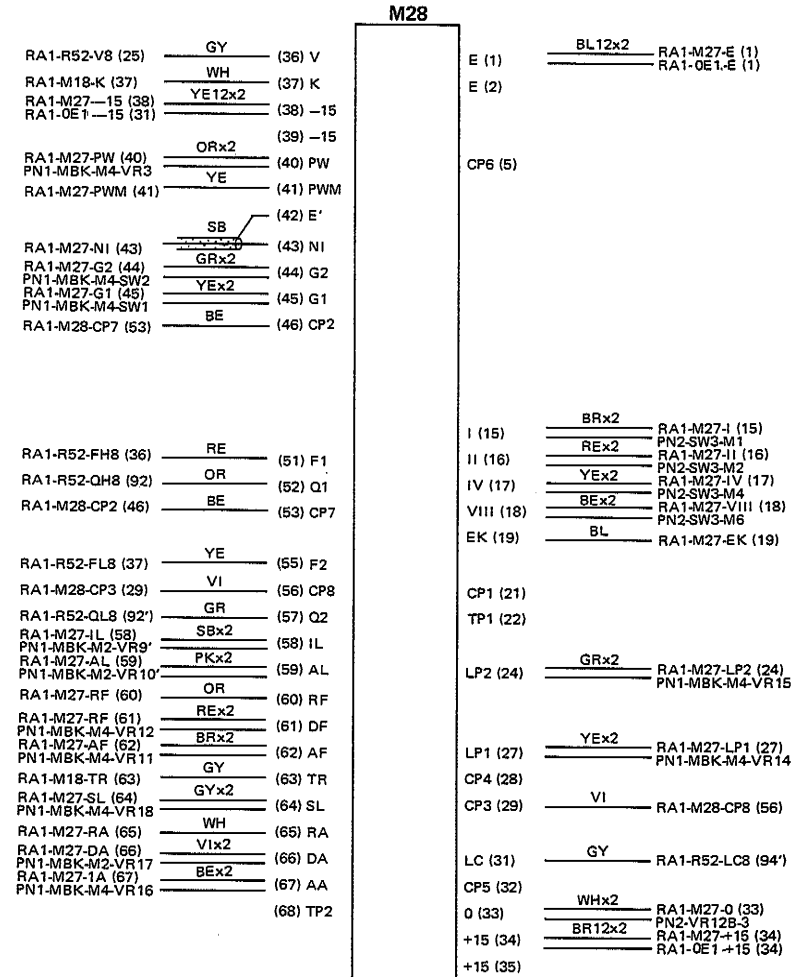
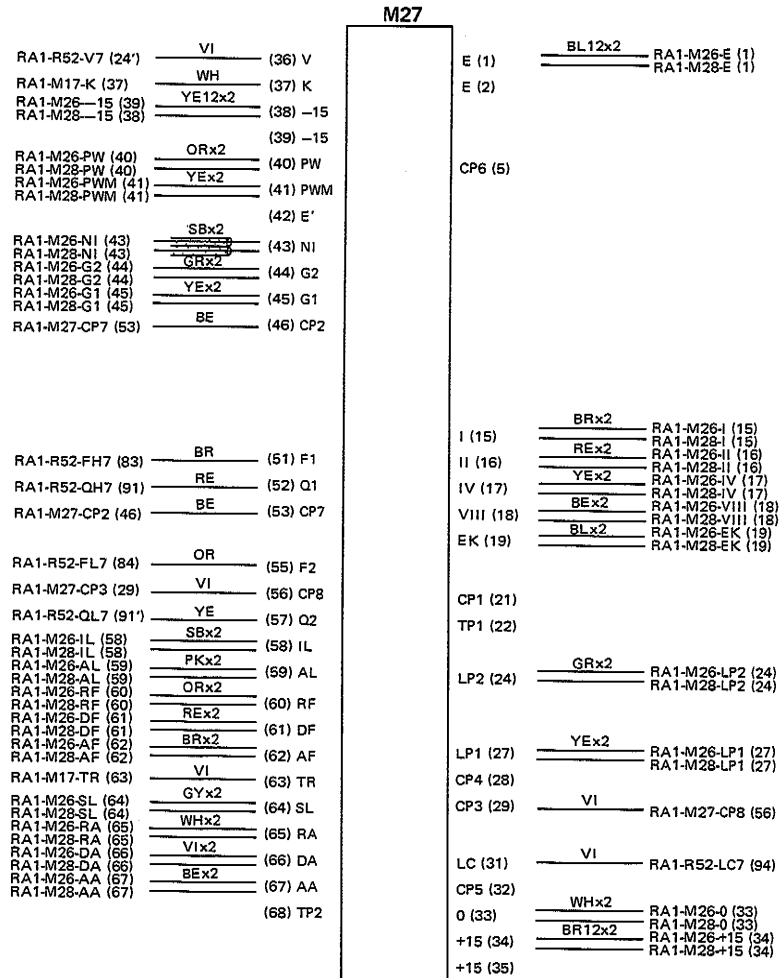
LC (31)	BE	RA1-R52-LC6 (95')
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CP5 (32)

O (33)

+15 (34)	WHx2	RA1-M25-O (33)
		RA1-M27-O (33)
+15 (35)	BR12x2	RA1-M25-+15 (34)
		RA1-M27-+15 (34)

M 27-28 Circuit Board & Wiring

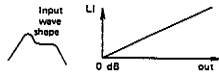


VCA IC (IG00151)

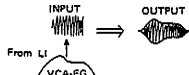
1. EI Input voltage for level control.
Input of the control voltage is provided for changing the level exponentially.



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



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

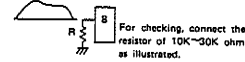


4. -IN Negative feed back.
Normally unused.

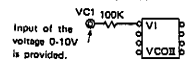
5. Vee -15V input power source.
6. Vcc +15V input power source.

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.



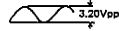
2. GND Earth

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)

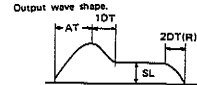
This IC generates envelope wave shape which is supplied to VCA and control the tone volume.

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.

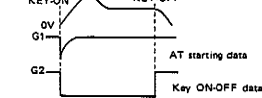


4. GND Earth

5. Vee +15V input power source.

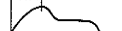
6. G1 Gate 1

7. G2 Gate 2

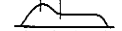


8. Vee +15V input power source.

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.



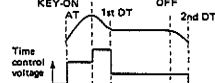
10. 1DT Input of buffer voltage for determination of decay time.
Input of the voltage between zero V and 10V is provided and the decay time is controlled from 10 m second until 10 second.



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.

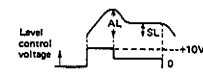


12. TC Output of time control.
Output of the DC voltage is produced so that the each time of Attack, 1st Decay and 2nd Decay are controlled.



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

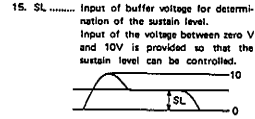
13. LC Output of level control



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

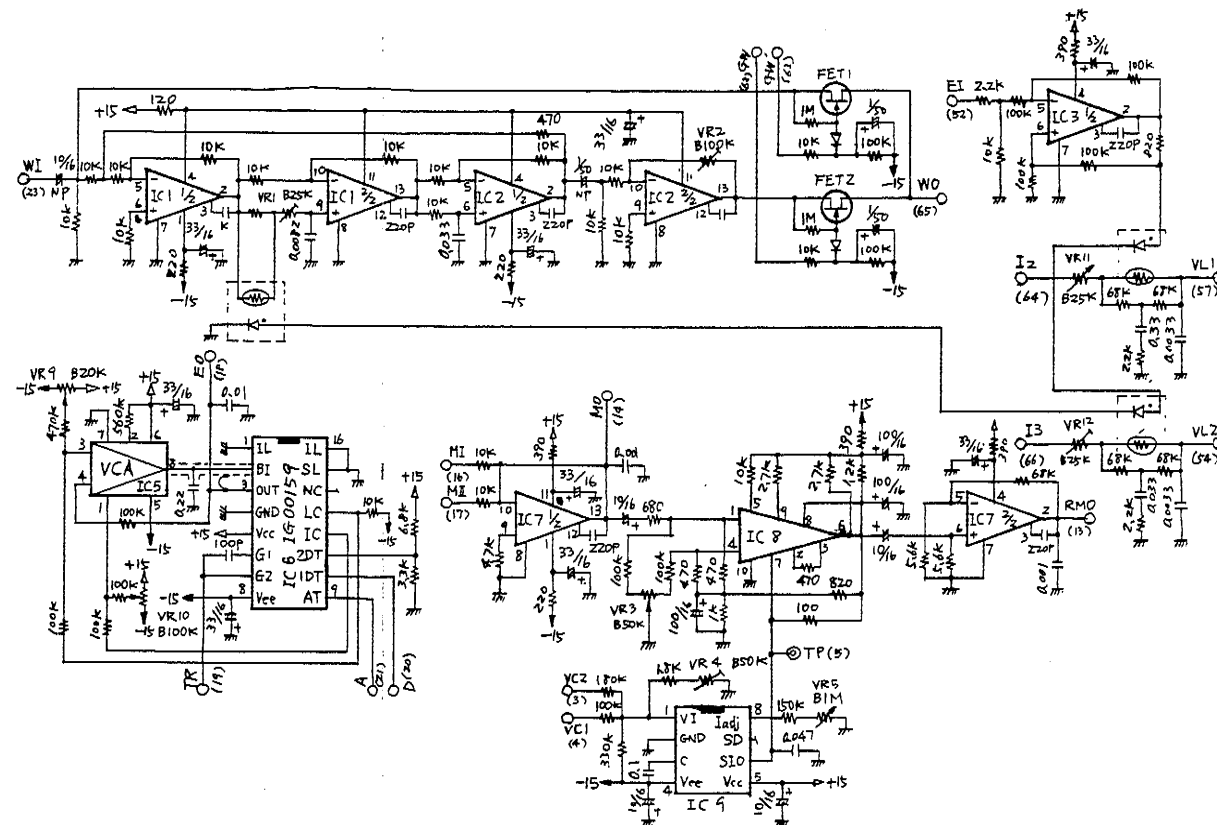
The higher the voltage, the higher the level and the lower the voltage, the lower the level.

14. NC Not connected.

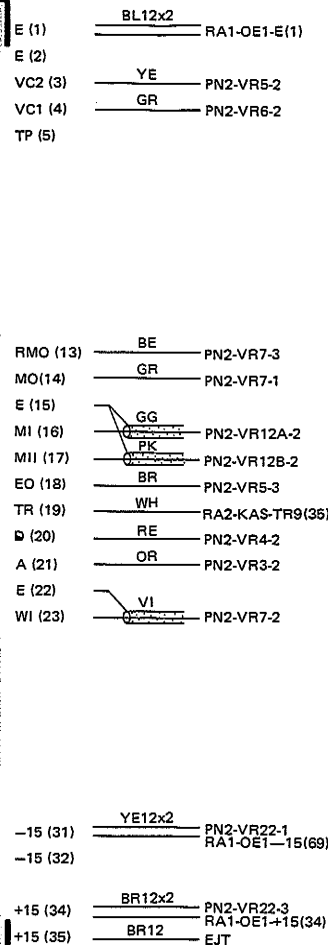
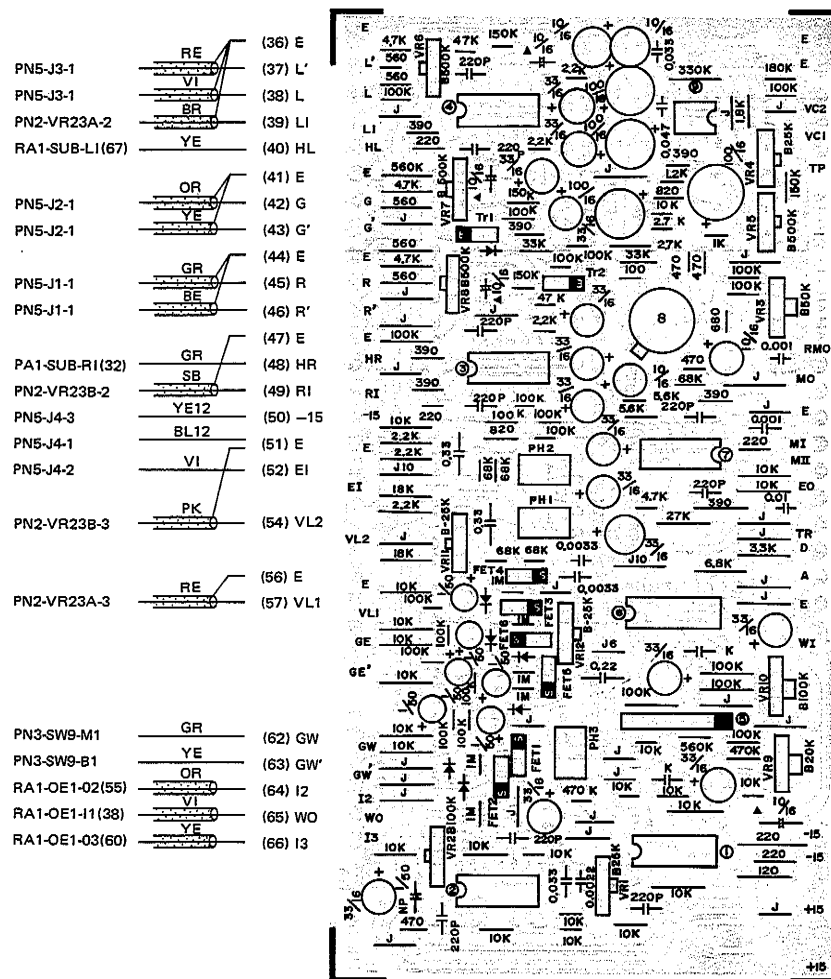


16. NC Not connected.

PRA Circuit Diagram



PRA Circuit Board & Wiring



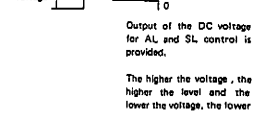
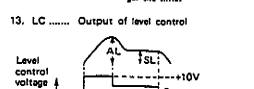
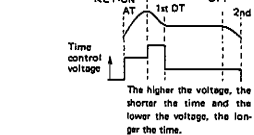
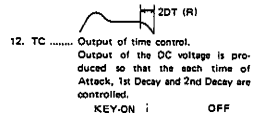
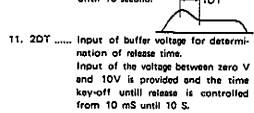
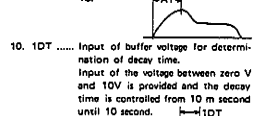
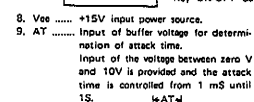
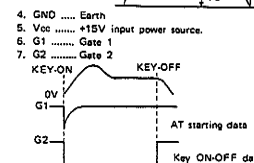
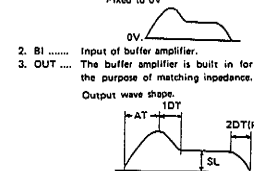
- Note 1. Print Board : LC21043
 2. Transistor
 Tr 1, 2 : 2SC828
 FET 1 ~ 6 : 2SK30A
 3. IC
 IC 1 ~ 4, 7 : HA1452T
 IC 5 : IG00151
 IC 6 : IG00159
 IC 8 : MA796HC
 IC 9 : IG00150
 4. Diode : IS1555
 5. Volume
 VR 3, 9, 10 : V10K8-1-2
 VR 1, 2, 4 ~ 8, 11, 12 : V10K4A-5-2

VCA-EG IC (IG00159)

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

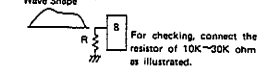
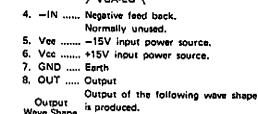
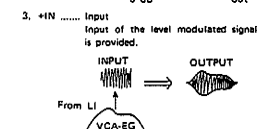
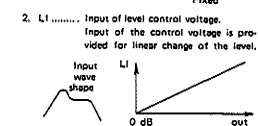
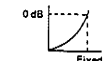
1. IL Input of initial level.

Fixed to 0V



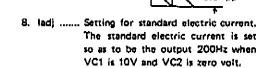
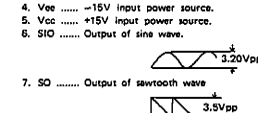
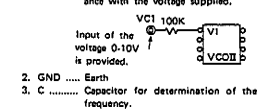
VCA IC (IG00151)

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

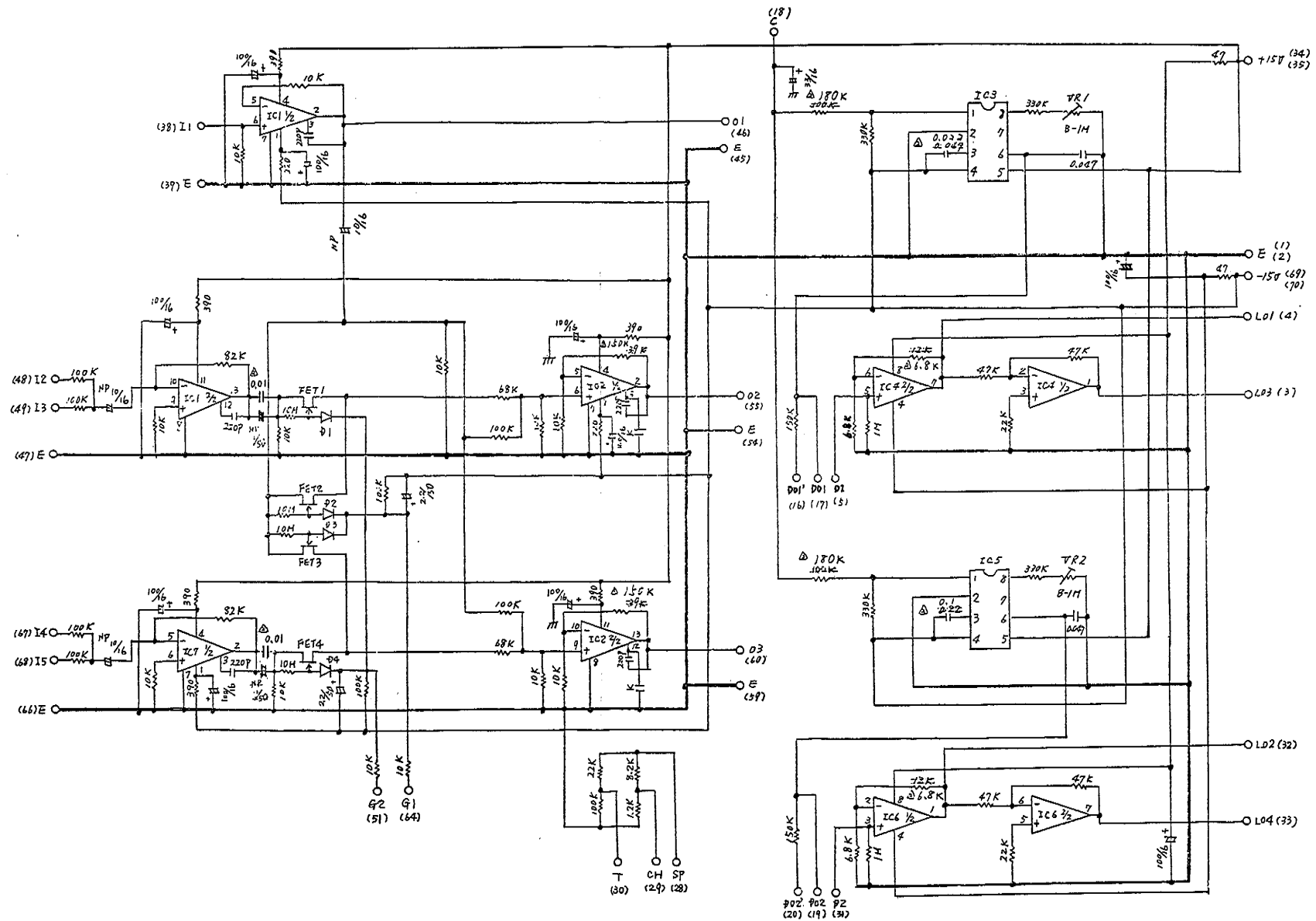


VCO II IC (IG00150)

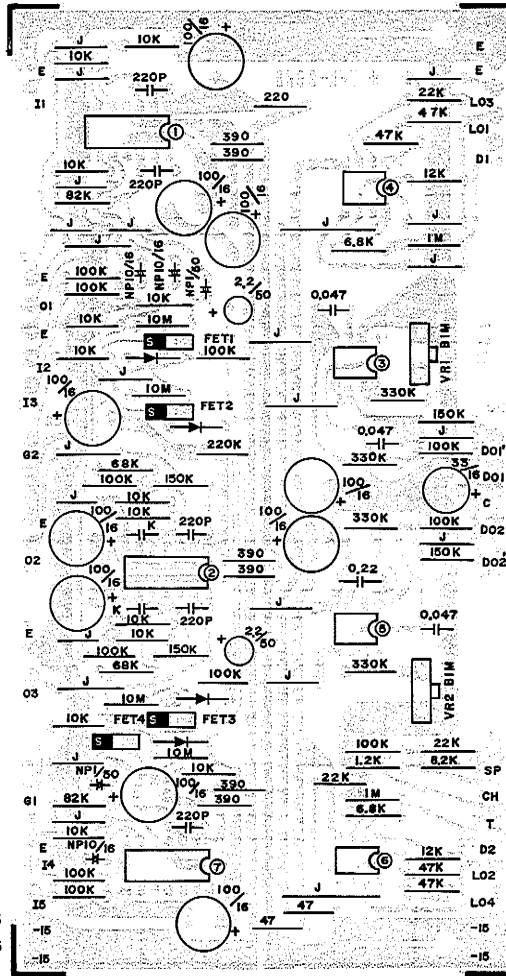
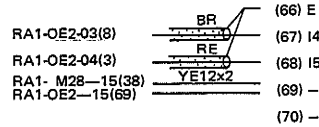
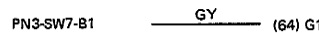
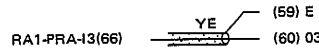
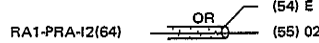
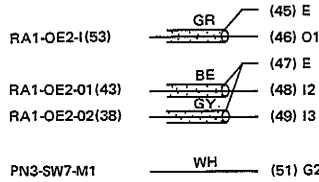
1. VI Input of the control voltage. The frequency is variable in accordance with the voltage supplied.



OE1 Circuit Diagram



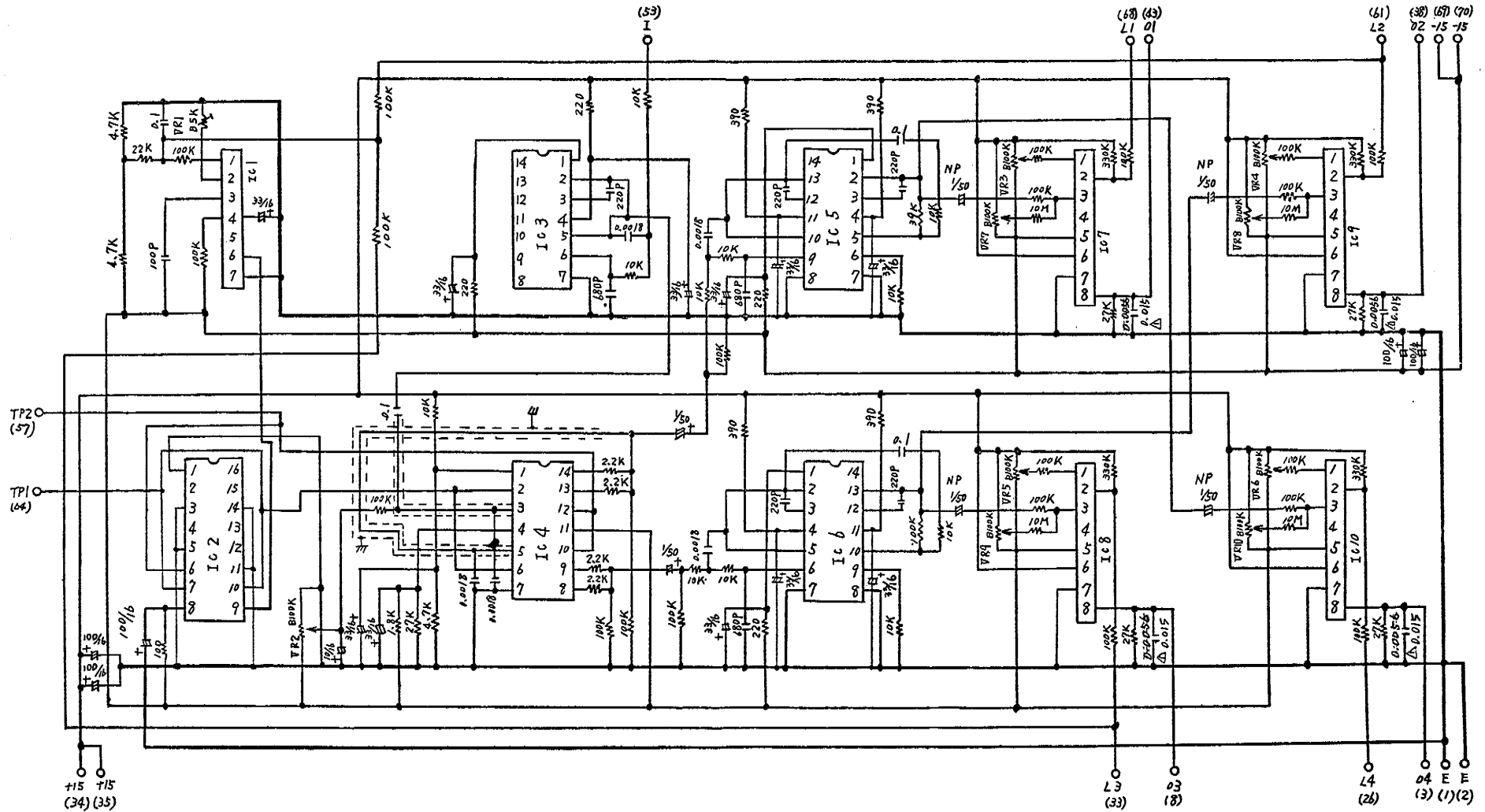
RA1-PRA-WO(65) (37) E
(38) II



D01 (16)	RE	PN3-SW5-M2
D01 (17)	VI	PN3-SW6-M2
C (18)	YE	PN3-SW5-T1
D02 (19)	WH	PN3-SW6-M3
D02' (20)	PK	PN3-SW5-M3

SP(28)	<u>GR</u>	PN3-VR3-2
CH (29)	<u>GY</u>	PN3-SW6-M1
T (30)	<u>OR</u>	PN3-SW5-M1
D2 (31)	<u>VI</u>	PN3-VR4B-2
L02 (32)	<u>RE</u>	RA1-OE2-L2(61)
L04 (33)	<u>YE</u>	RA1-OE2-L4(26)
+15 (34)	<u>BR12x2</u>	RA1- M28 +15(34)
+15 (35)		RA1-OE2+15(34)

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OE₂ Circuit Diagram

RA1-OE1-13(49) (37) E
(38) 02

RA1-OE1-12(48) (43) 01

RA1-OE1-01(46) (52) E
(53) I

RA1-OE1-L02(32) (60) E
(61) L2

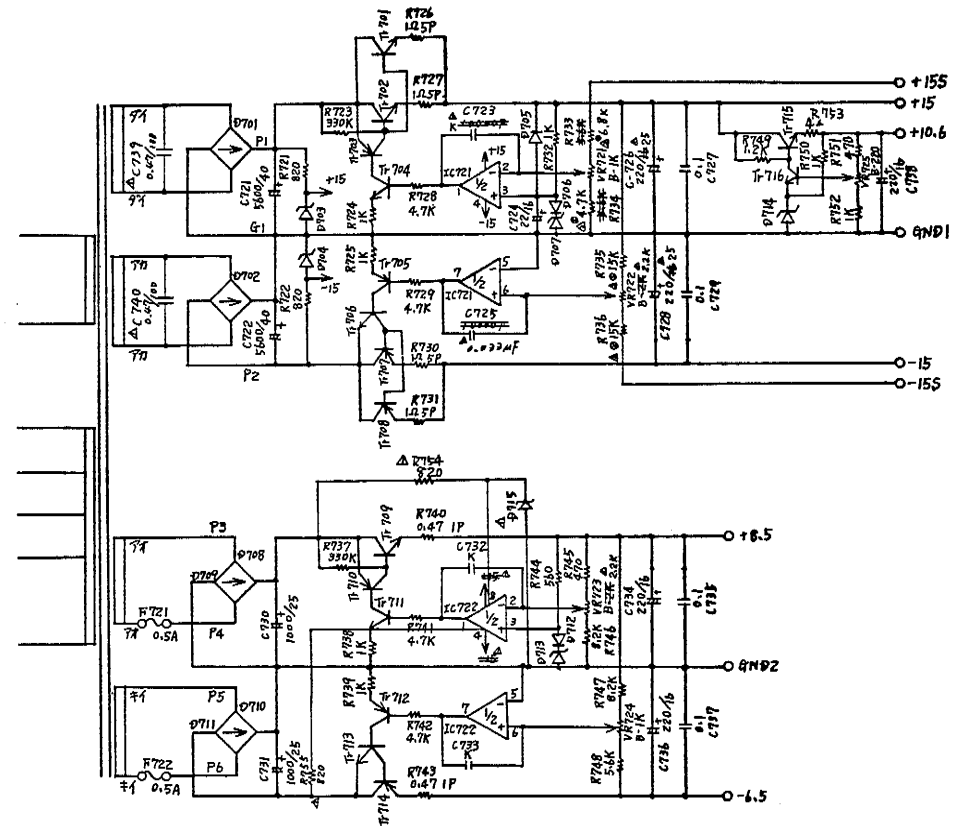
RA1-OE1-L01(4) (67) E
(68) L1
RA1-PRA-15(31) (69) -15
RA1-OE1-15(69) (70) -15

E (1) RA1-PRA-E(1)
RA1-OE1-E(1)
E (2) RA1-OE1-15(68)
04 (3)
03 (8) RA1-OE1-14(67)

E (25) RA1-OE1-L04(33)
L4 (26)
E (32) RA1-OE1-L03(3)
L3 (33) RA1-PRA-15(24)
+15 (34) RA1-OE1-15(34)
+15 (35)

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SVU Circuit Diagram

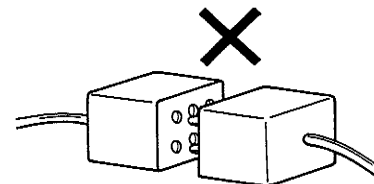


[Caution]

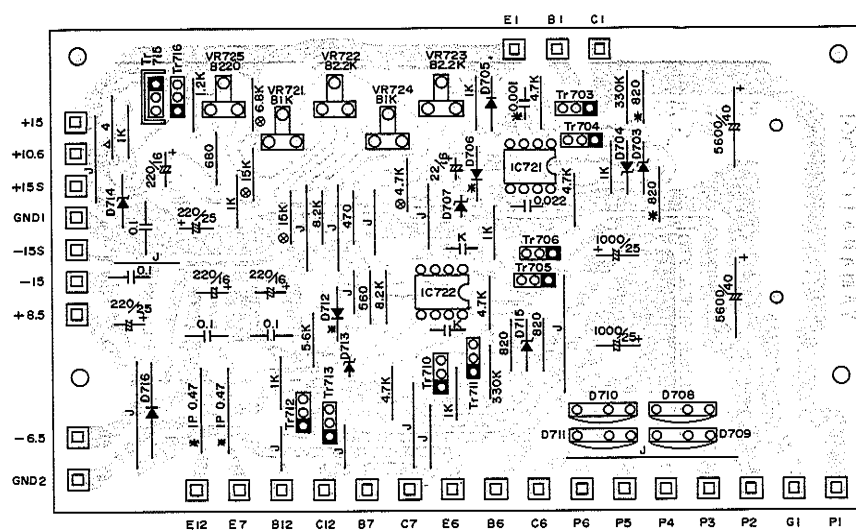
When you carry out inspection on Power Supply Unit, be sure to make complete connection of the connector or Short Circuit both +15 ↔ +15S and -15 ↔ -15S. Otherwise, the circuit can break with the power on.

[注意]

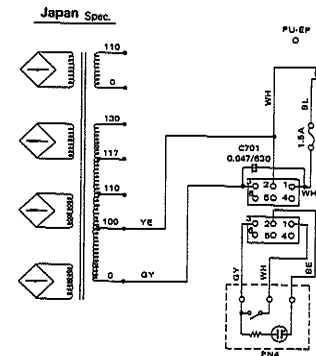
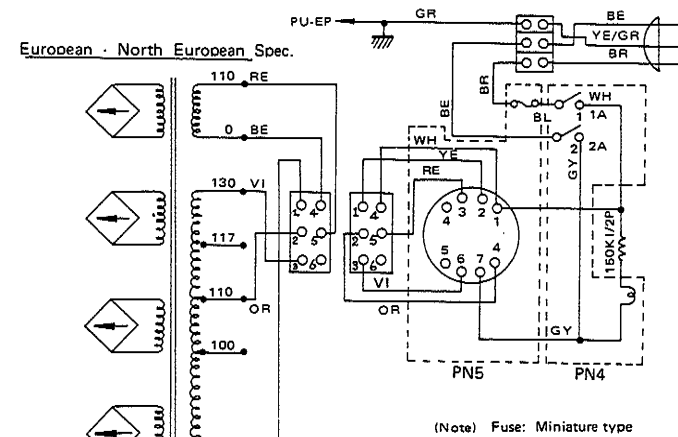
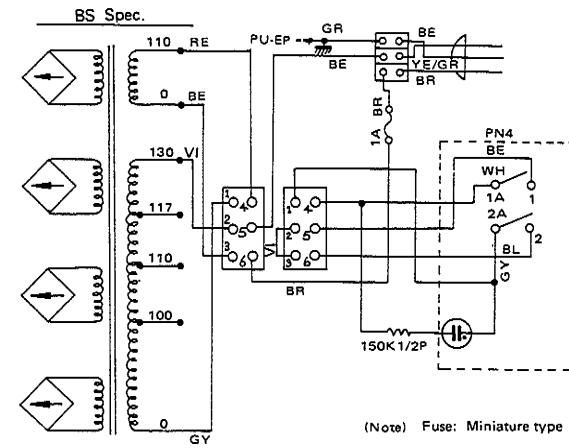
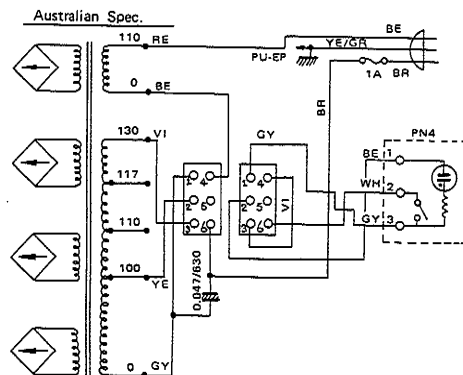
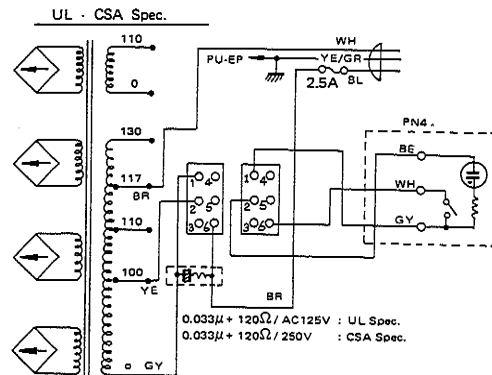
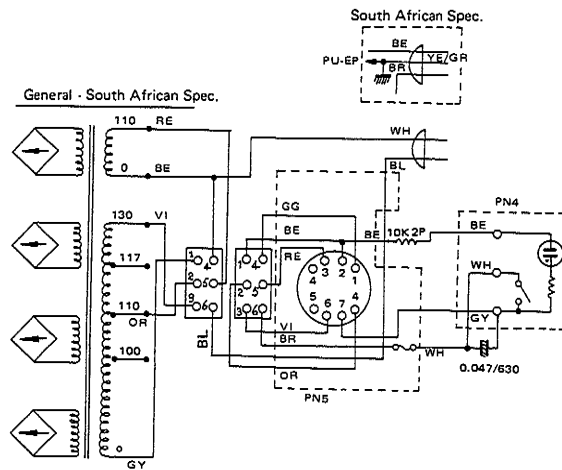
電源ユニットの点検などで、コネクタを取外したままでは電源を入れますと回路を壊す恐れがありますのでコネクタを取付けたまま、又は+15 ↔ +15S、-15 ↔ -15Sをショートさせて点検を行なう様お願いします。



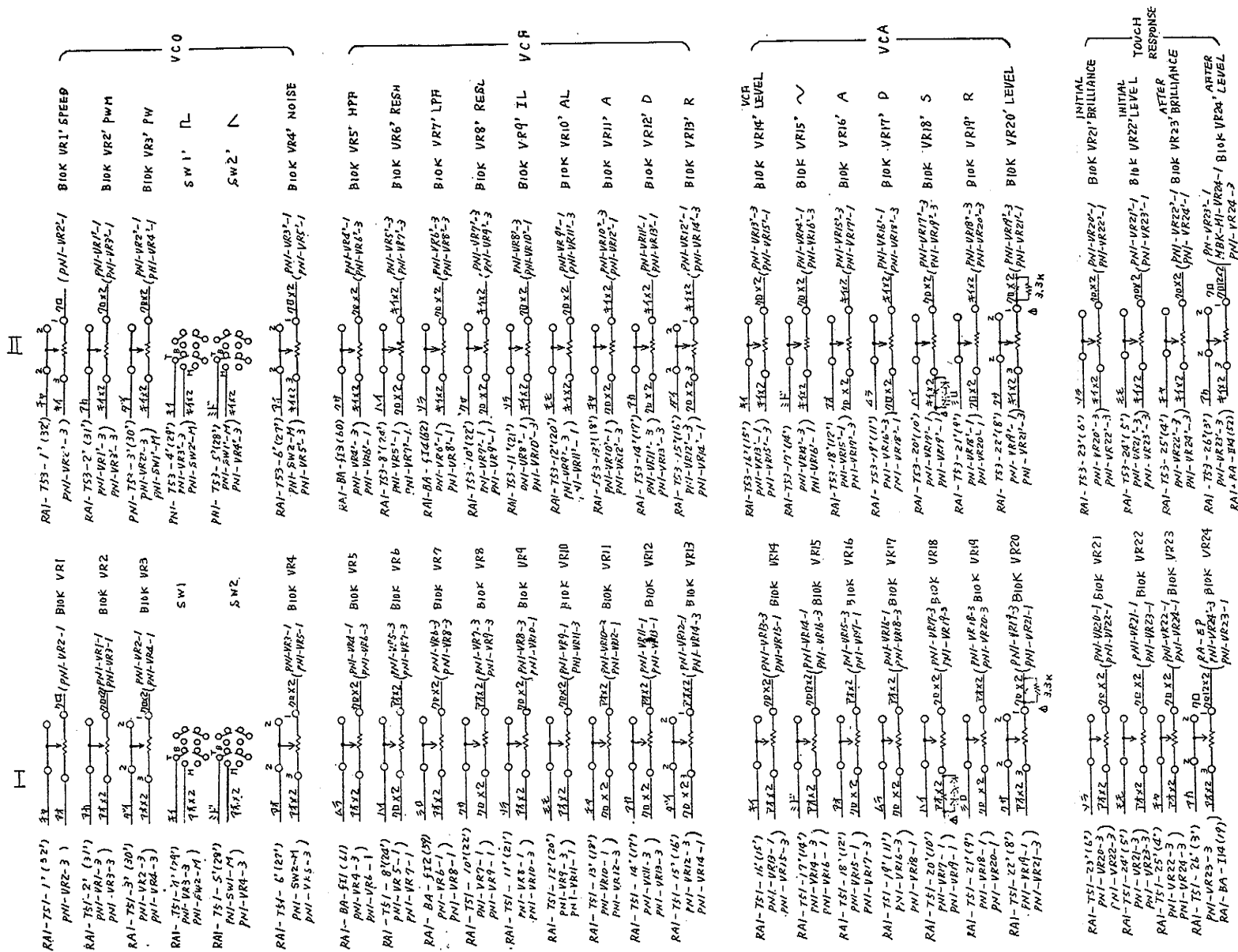
KEP-NA03794-6Y



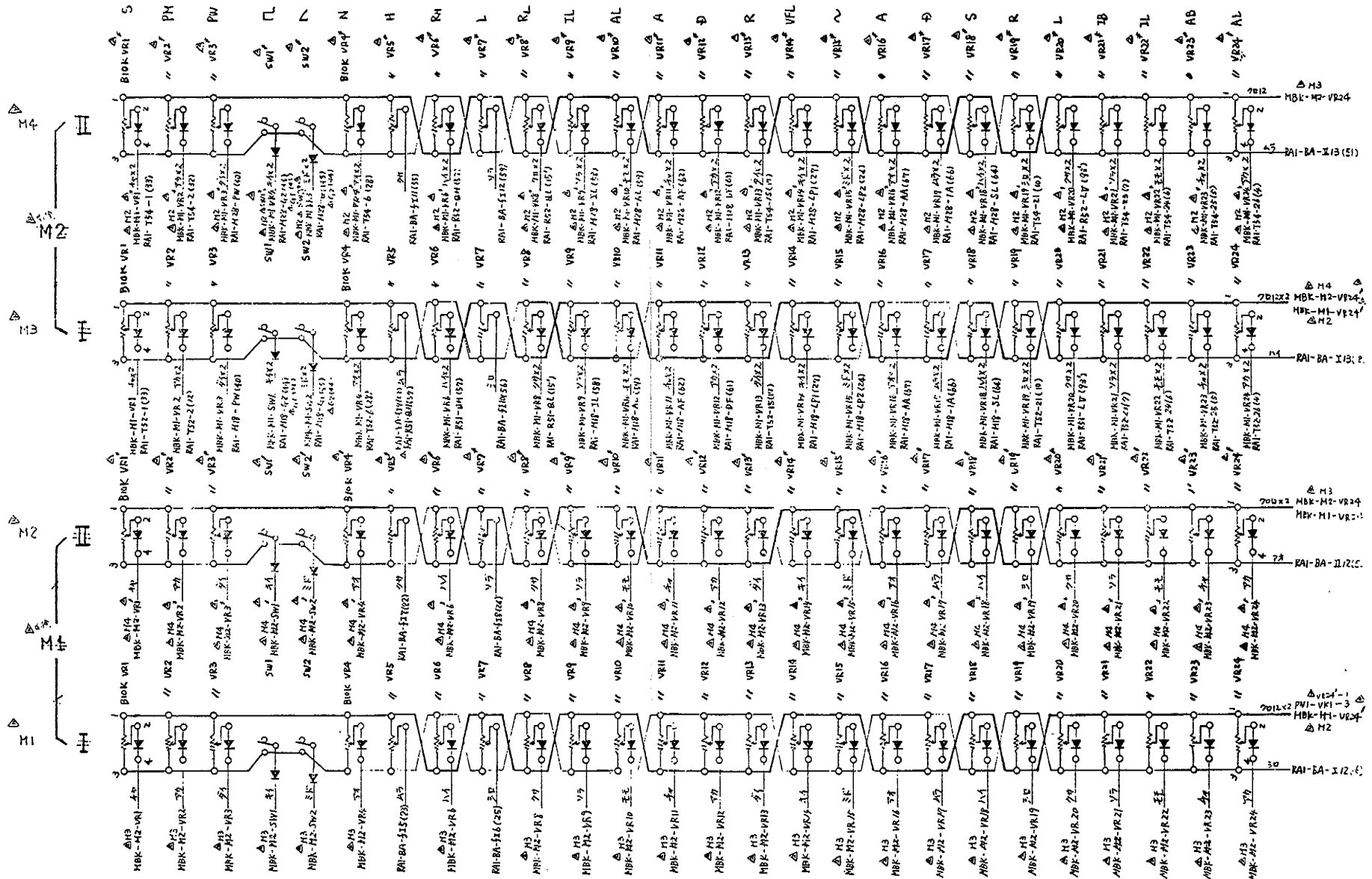
Power Supply NP0018Z (Primary) Circuit Diagram



Panel 1 Circuit Diagram

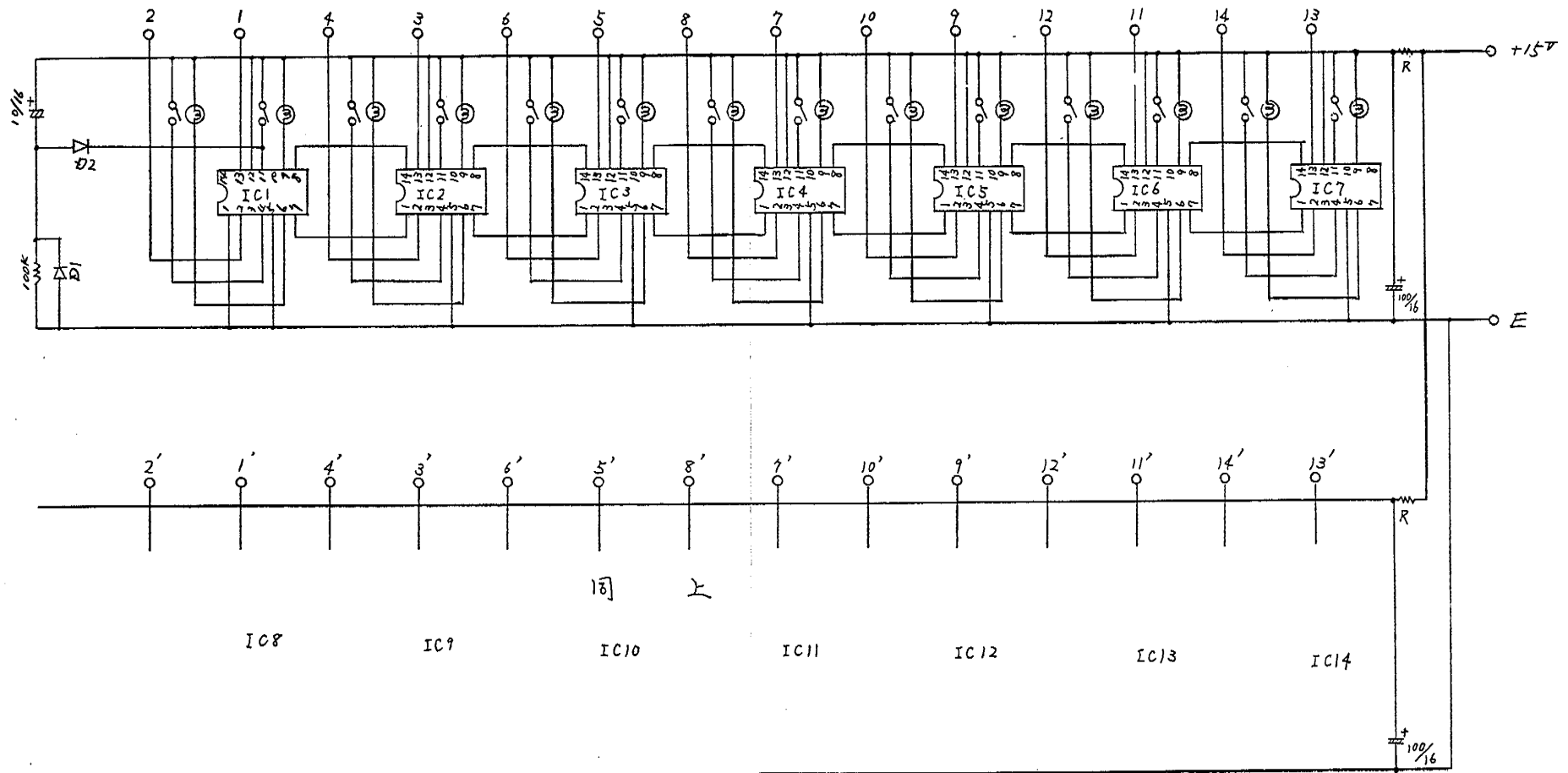


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[illegible]

Panel 2 (Tone Selector) Circuit Diagram

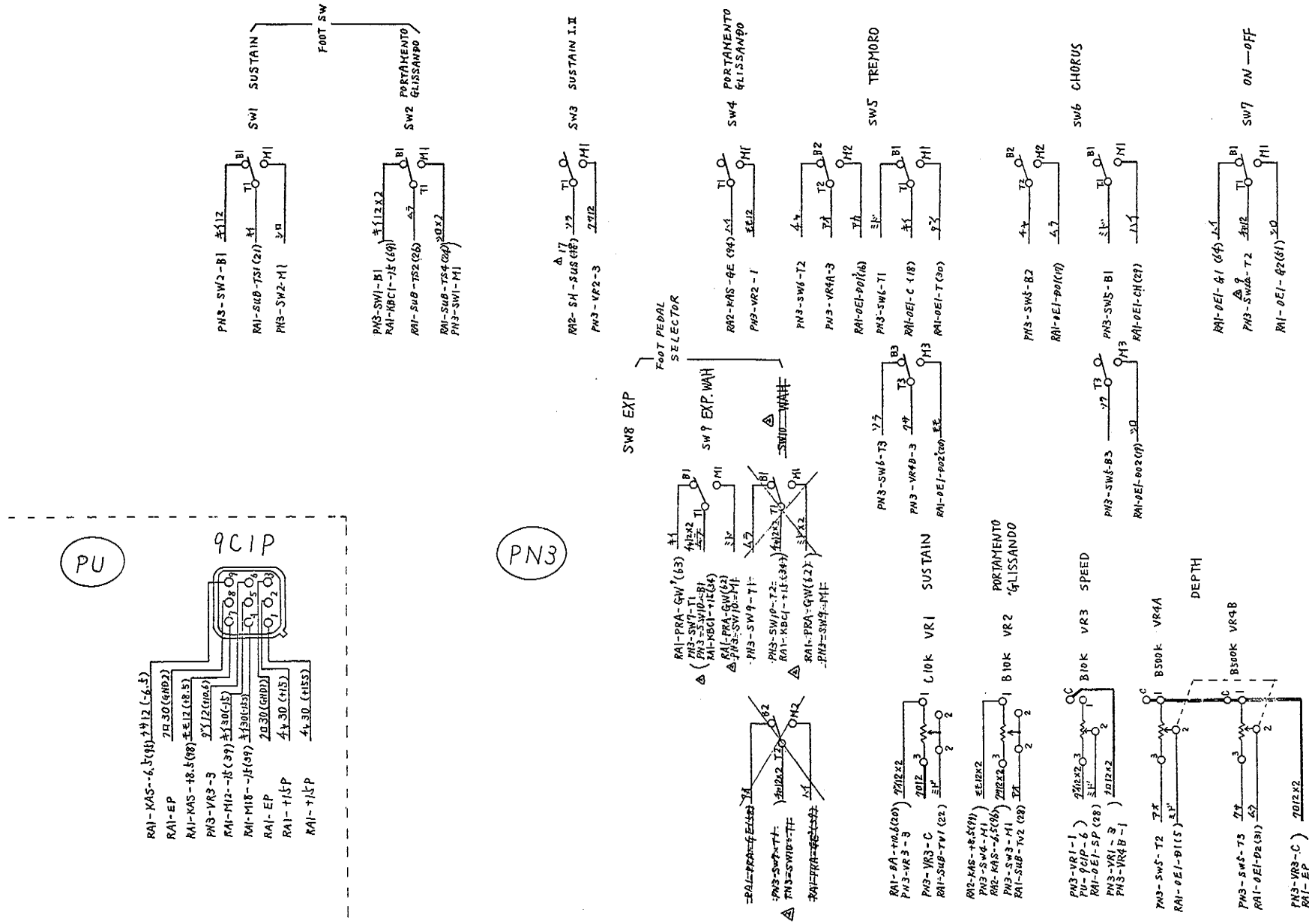


注) IC1~14 ; IG00157

① ; 151555

R ; 12 $\frac{1}{2}$ W

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Panel 5 (EJ, EXP, PFS) Circuit Diagram

