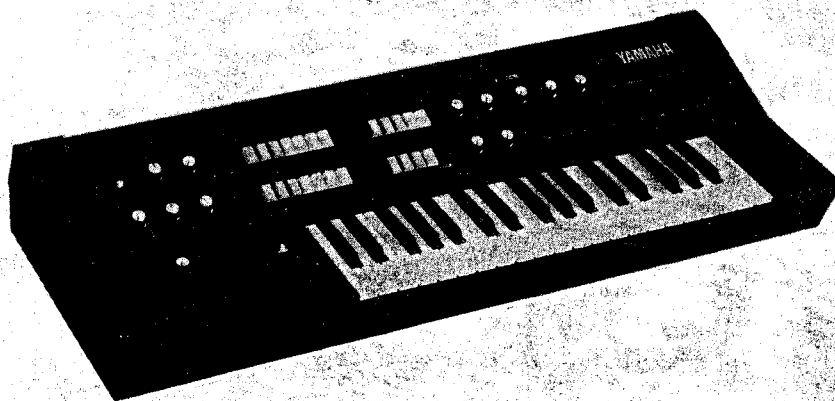


# YAMAHA

## DUAL CHANNEL SYNTHESIZER CS15D



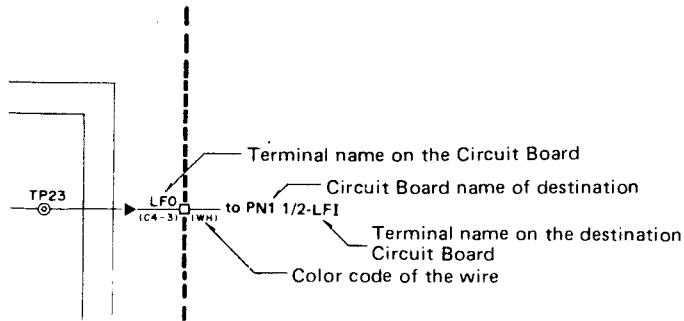
# SERVICE MANUAL

## CONTENTS

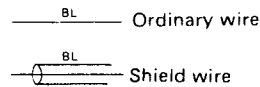
CODING GUIDE .....	1
DISASSEMBLY PROCEDURES .....	2
SPECIFICATIONS .....	3
PANEL LAYOUT .....	4
<b>SSK, PN1 &amp; PN2</b> Circuit diagram .....	6
<b>SSK, PN1 &amp; PN2</b> Circuit Board & Wiring .....	8
<b>VCO</b> Circuit Diagram .....	11
<b>VCO</b> Circuit Board & Wiring .....	14
<b>PM1, PM2 &amp; PSW</b> Circuit Diagram .....	17
<b>PM1, PM2 &amp; PSW</b> Circuit Board & Wiring .....	20
<b>VCF</b> Circuit Diagram .....	23
<b>VCF</b> Circuit Board & Wiring .....	26
<b>JK &amp; DC</b> Circuit Diagram .....	28
<b>JK &amp; DC</b> Circuit Board & Wiring .....	30
ADJUSTING INSTRUCTION .....	34
PARTS LIST	

# CODING GUIDE

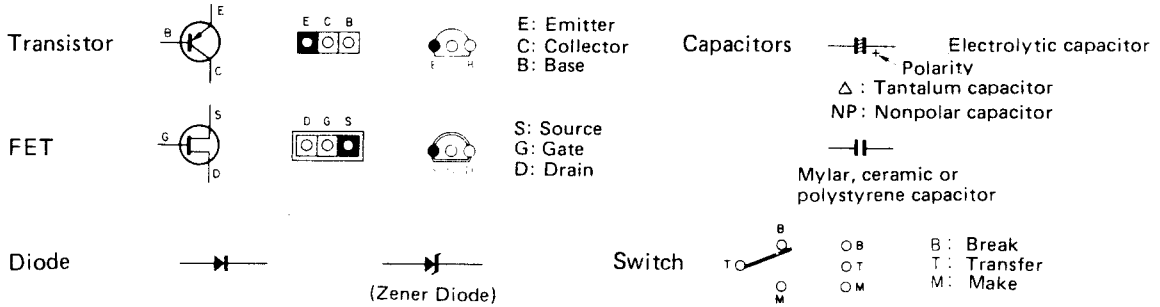
## 1 Wiring Notation



Note: Types of wire



## 2 Symbol Description



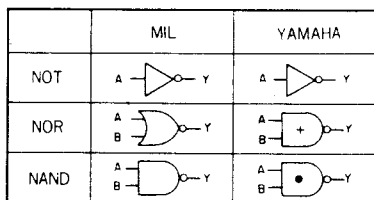
## 3 Abbreviations of Wire Color Codes

BLACK (クロ).....BL	BROWN (チャ).....BR	RED (アカ).....RE
ORANGE (タイ).....OR	YELLOW (キイ).....YE	GREEN (ミト).....GR
BLUE (アオ).....BE	VIOLET (ムラ).....VI	GRAY (ハイ).....GY
WHITE (シロ).....WH	GRASS GREEN (クサ).....GG	SKY BLUE (ソラ).....SB
PINK (モモ).....PK	TRANSPARENT (トウメイ).....TR	

## 4 Relation of Color Coding and Notes

C	C≠	D	D≠	E	F	F≠	G	G≠	A	A≠	B
BR	RE	OR	YE	GR	BE	VI	GY	WH	GG	SB	PK
(チャ)	(アカ)	(タイ)	(キイ)	(ミト)	(アオ)	(ムラ)	(ハイ)	(シロ)	(クサ)	(ソラ)	(モモ)

## 5 Logic Symbols



OR

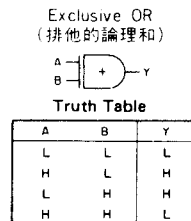
Truth Table

A	B	Y
L	L	L
H	L	H
L	H	H
H	H	H

NOR

Truth Table

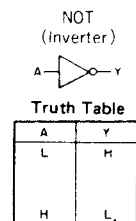
A	B	Y
L	L	H
H	L	L
L	H	L
H	H	L



AND

Truth Table

A	B	Y
L	L	L
H	L	L
L	H	L
H	H	H



NAND

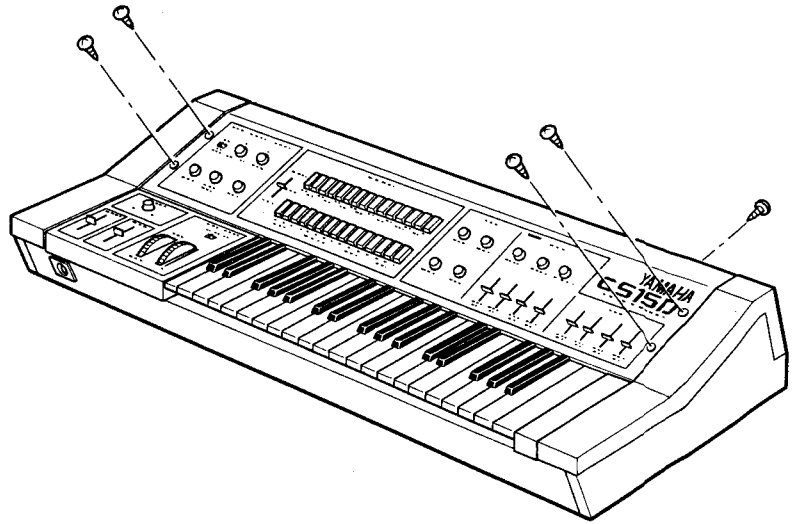
Truth Table

A	B	Y
L	L	H
H	L	H
L	H	H
H	H	L

## DISASSEMBLY PROCEDURES

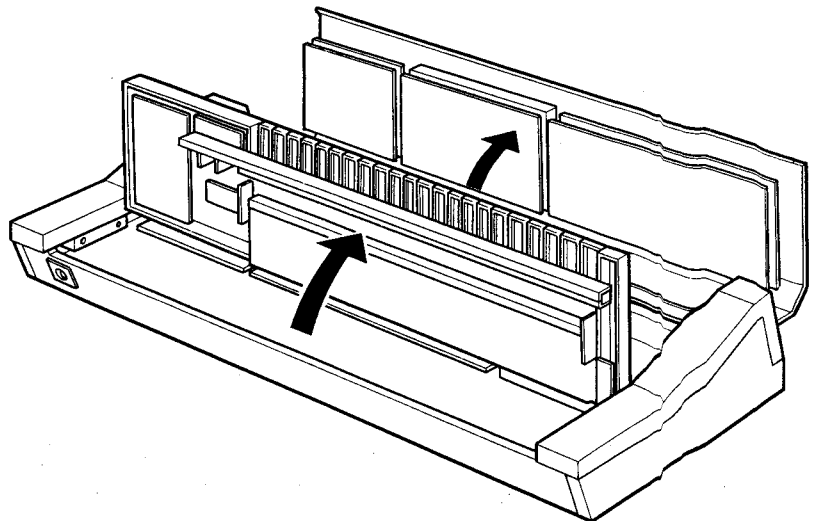
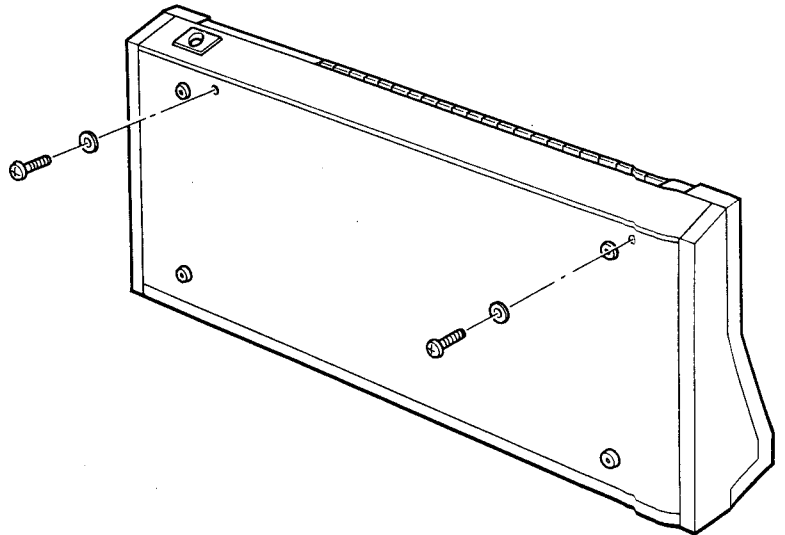
### OPENING OF PANEL SECTION

The panel section can be opened by removing the 5 screws used for fixing the panel section.



### OPENING OF KEYBOARD SECTION

After removing the two screws provided at the bottom, the keyboard section can be opened by turning it downward as shown in the drawing.

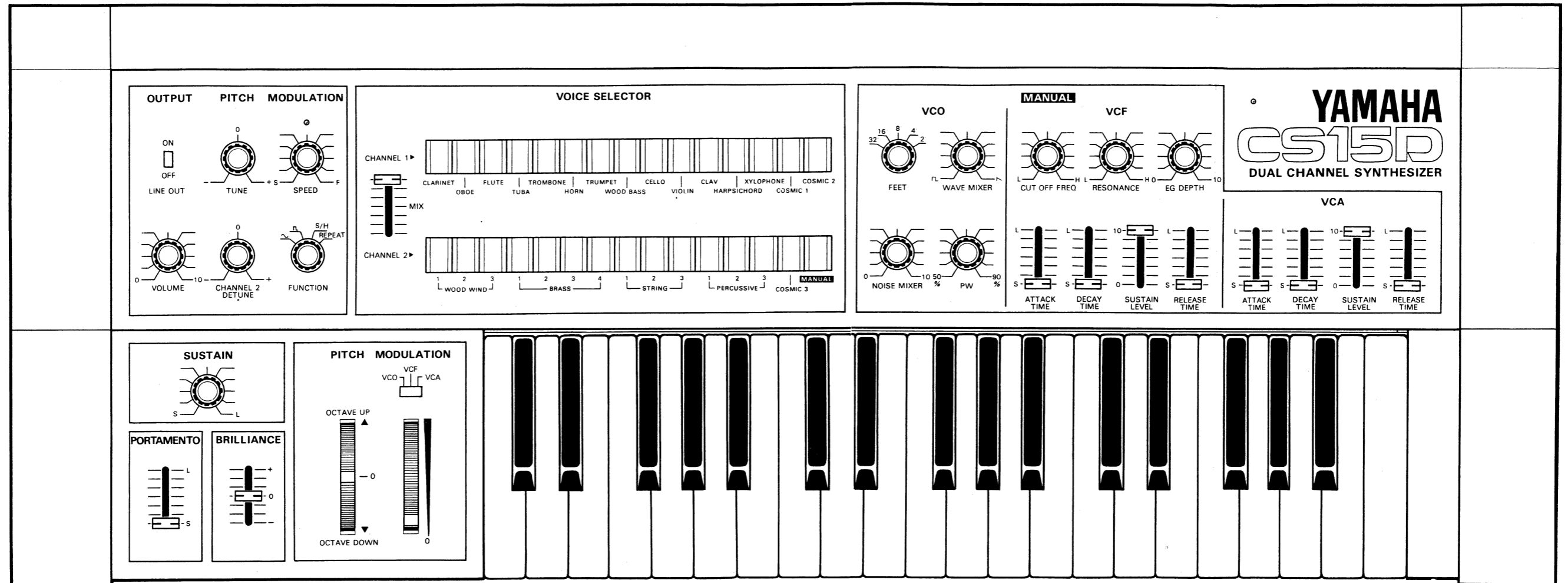


## SPECIFICATIONS

<b>KEYBOARD</b>	37 keys . . . . .	3 octaves C <sub>2</sub> ~ C <sub>5</sub>
<b>CONTROL</b>	PITCH . . . . .	TUNE : -75 ~ +75 cents
		CHANNEL 2 DETUNE : -750 ~ +850 cents
	MODULATION (LFO) . . . . .	SPEED : 0.1 ~ 100Hz
		FUNCTION : ~, □, S/H, REPEAT
	SUSTAIN . . . . .	S ~ L (Max. 6.5 ± 2 sec.)
	PORTAMENTO . . . . .	S ~ L (Max. 3.5 sec)
	BRILLIANCE . . . . .	- ~ 0 ~ +
	PITCH WHEEL . . . . .	OCTAVE UP ~ OCTAVE DOWN (± 1200 cents)
	MODULATION WHEEL . . . . .	VCO/VCF/VCA
	OUTPUT . . . . .	LINE OUT ON/OFF
VOLUME		
<b>VOICE SELECTOR</b>	MIX . . . . .	CHANNEL 1, CHANNEL 2 : BALANCE
	CHANNEL 1 . . . . .	CLARINET/OBOE/FLUTE/TUBA/TROMBONE/HORN/ TRUMPET/WOOD BASS/CELLO/VIOLIN/CLAV/HARPSI- CHORD/XYLOPHONE/COSMIC 1/COSMIC 2
	CHANNEL 2 . . . . .	WOOD WIND 1, 2, 3/BRASS 1, 2, 3, 4/STRING 1, 2, 3 PERCUSSIVE 1, 2, 3/COSMIC 3/MANUAL
<b>MANUAL</b>	VCO . . . . .	FEET : 32'/16'/8'/4'/2'
		WAVE MIXER : ~ ▽
		NOISE MIXER : 0 ~ 10
		PW : 50% ~ 90%
		VCF . . . . .
	RESONANCE . . . . .	Q=0.5 ~ 10
		EG DEPTH : 0 ~ 10
		ATAACK TIME : 0.001 ~ 1 sec
		DECAY TIME : 0.01 ~ 10 sec
		SUSTAIN LEVEL : 0 ~ 10
VCA . . . . .	RELEASE TIME : 0.01 ~ 10 sec	
	ATTACK TIME : 0.001 ~ 1 sec	
	DECAY TIME : 0.1 ~ 10 sec	
	SUSTAIN LEVEL : 0 ~ 10	
<b>TERMINALS</b>	RELEASE TIME : 0.01 ~ 10 sec	
	LINE OUT . . . . .	1,2/MIX (-9.5dBm)
	CONTROL VOLT . . . . .	IN 1/2 (0.125V ~ 4V)
<b>OTHERS</b>		OUT (OFF : +3V, ON : -7V)
	PHONES . . . . .	.8 Ohms
	POWER SOURCE . . . . .	U.S and Canadian models : 120V, 60Hz General models : 220V or 240V selectable, 50/60Hz
	POWER CONSUMPTION . . . . .	20 Watts
	DIMENSIONS . . . . .	854 x 134.3 x 346 (mm) 33-½ x 5-¼ x 13-½ (in)
	WEIGHT . . . . .	12 kg, 26.4 lbs
	FINISH . . . . .	Semi-gloss black panels, rosewood grain cabinet

*Specifications subject to change without notice.*

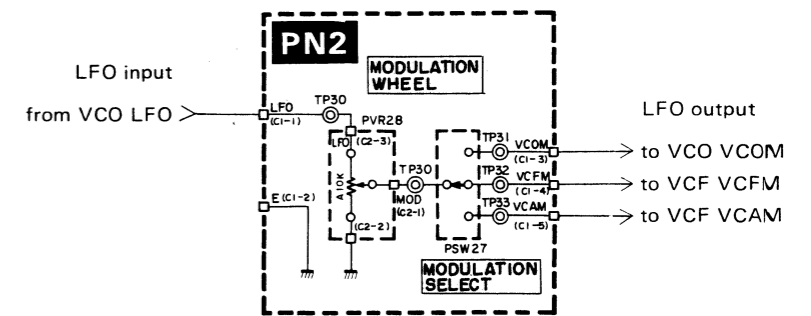
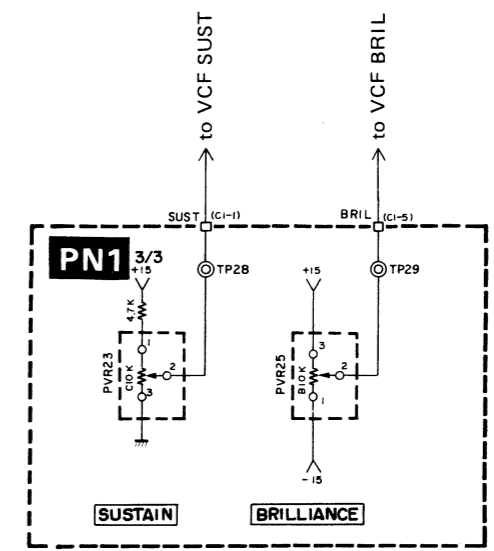
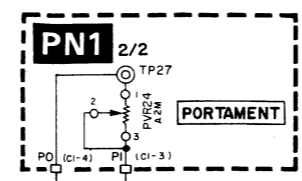
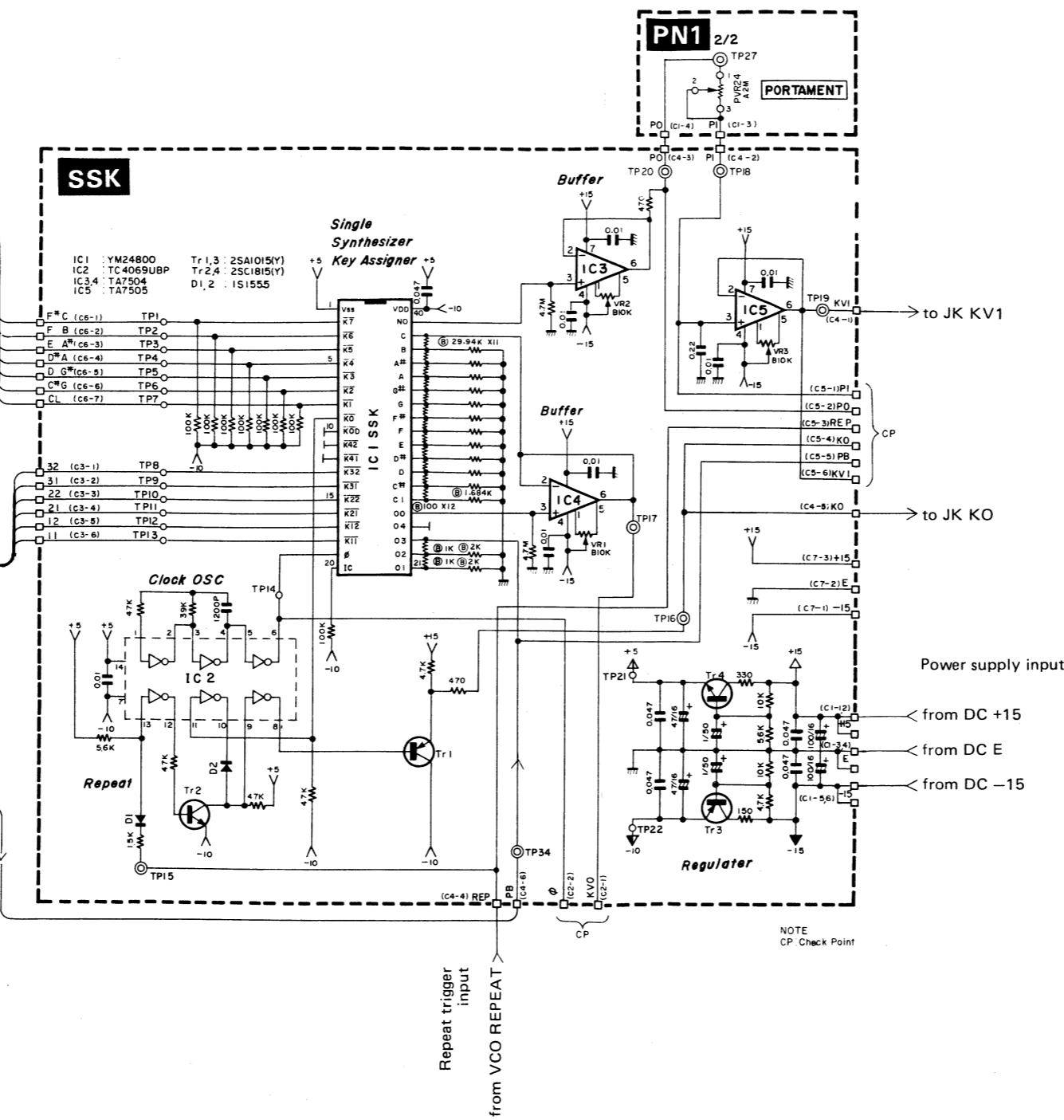
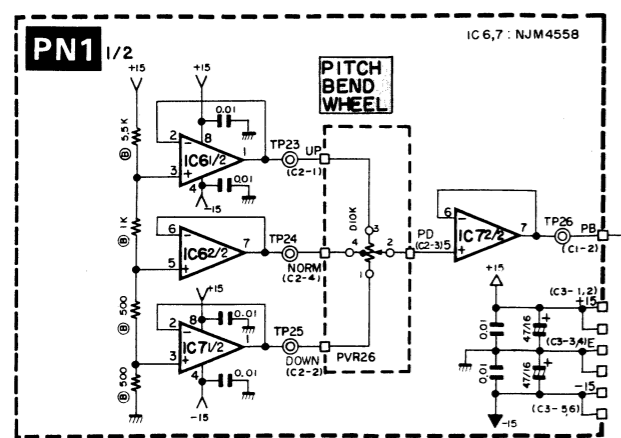
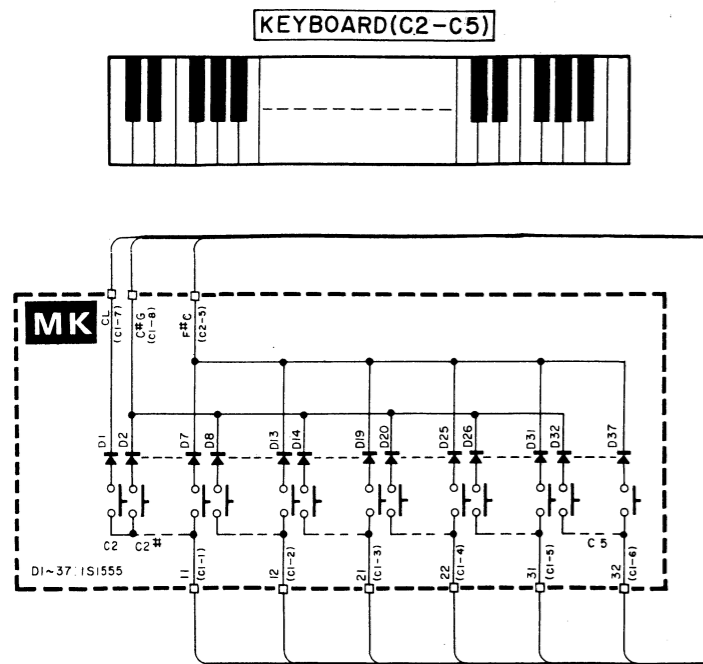
PANEL LAYOUT



MK

# SSK, PN1 , PN2 & MK Circuit Diagram

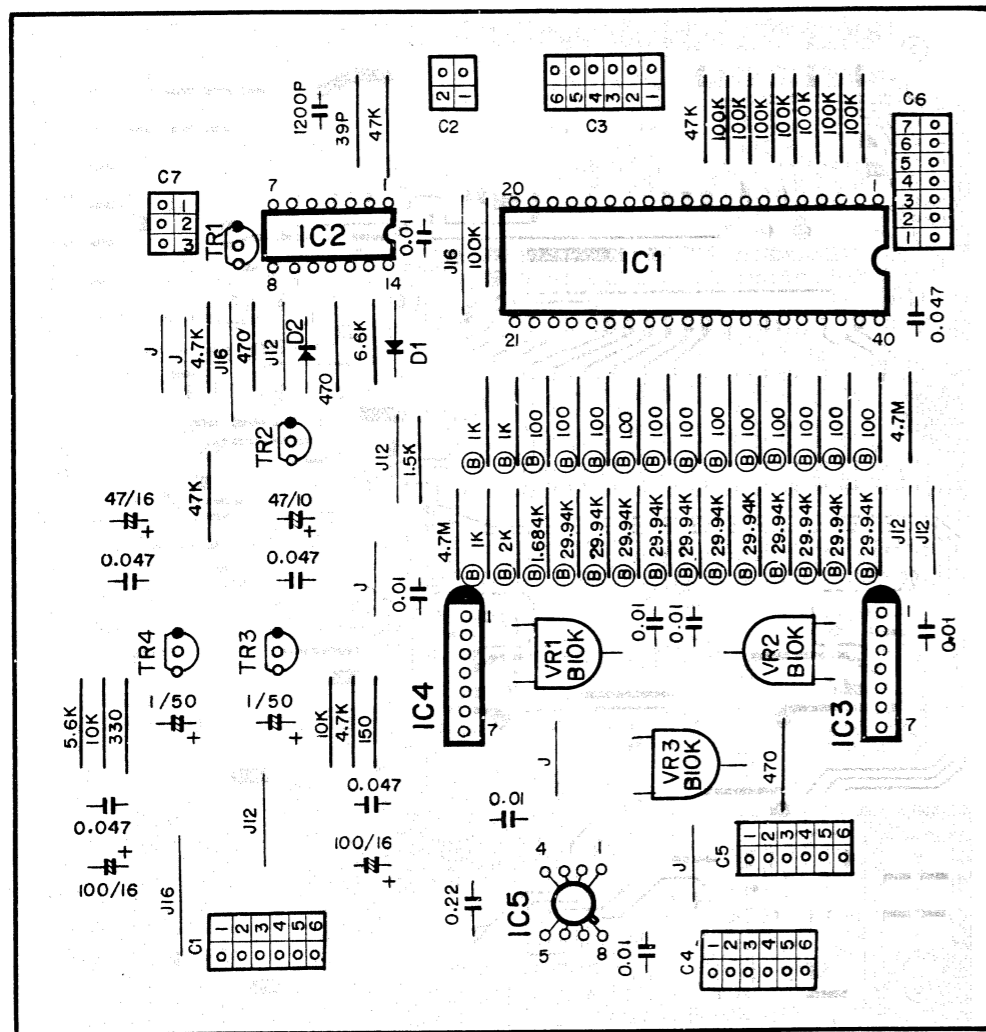
C1				C2			
Pin No.	Pin Name	Wire Color	Destination	Pin No.	Pin Name	Wire Color	Destination
1	11	OR	SSK (C3-6)	1	D,G#	OR	SSK (C6-5)
2	12	YE	SSK (C3-5)	2	D#,A	YE	SSK (C6-4)
3	21	GR	SSK (C3-4)	3	E,A#	GR	SSK (C6-3)
4	22	BE	SSK (C3-3)	4	F,B	BE	SSK (C6-2)
5	31	VI	SSK (C3-2)	5	F#,C	VI	SSK (C6-1)
6	32	GY	SSK (C3-1)				
7	CL	BR	SSK (C6-7)				
8	C#,G	RE	SSK (C6-6)				



SSK

C7 (CP)

1	-15
2	E
3	+15



C1

1	+15
2	+15
3	E
4	E
5	-15
6	-15

C4

1	KV1
2	PI
3	PO
4	REP
5	KO
6	PB

C2 (CP)

2	∅
1	KV0

C3

6	11
5	12
4	21
3	22
2	31
1	32

C6

7	CL
6	C#-G
5	D-G#
4	D#-A#
3	E-A#
2	F-B
1	F#-C

C5 (CP)

1	PI
2	PO
3	REP
4	KO
5	PB
6	KV1

C1

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	PN1 (C3-1)
2	+15	BR	DC (C-12)
3	E	BL	DC (C-7)
4	E	BL	PN1 (C3-3)
5	-15	YE	PN1 (C3-6)
6	-15	YE	DC (C-3)

C3

Pin No.	Pin Name	Wire Color	Destination
1	32	GY	MK (C1-6)
2	31	VI	MK (C1-5)
3	22	BE	MK (C1-4)
4	21	GR	MK (C1-3)
5	12	YE	MK (C1-2)
6	11	OR	MK (C1-1)

C4

Pin No.	Pin Name	Wire Color	Destination
1	KV1	S-BE	JK (C2-6)
2	PI	RE	PN1 (C1-3)
3	PO	YE	PN1 (C1-4)
4	REP	VI	VCO (C7-2)
5	KO	GY	JK (C2-3)
6	PB	BR	PN1 (C1-2)

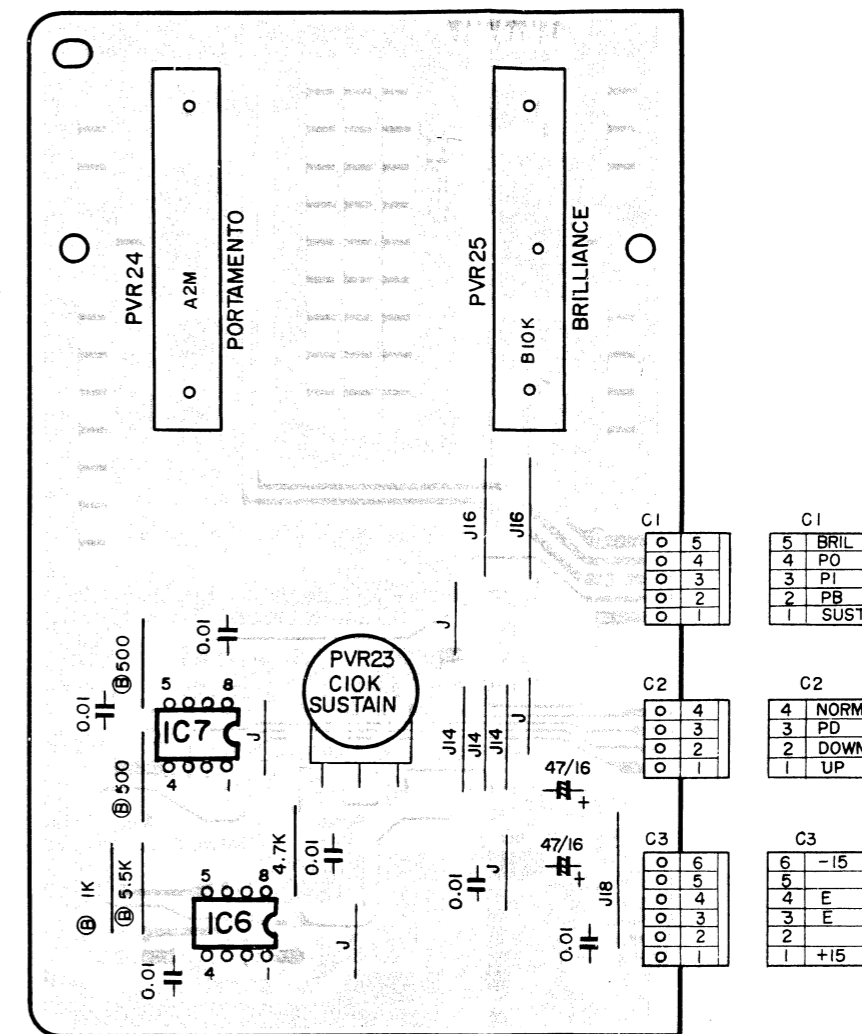
C6

Pin No.	Pin Name	Wire Color	Destination
1	F#,C	VI	MK (C2-5)
2	F,B	BE	MK (C2-4)
3	E,A#	GR	MK (C2-3)
4	D#,A	YE	MK (C2-2)
5	D,G#	OR	MK (C2-1)
6	C#,G	RE	MK (C1-8)
7	CL	BR	MK (C1-7)

NOTE)

- Circuit Board : LC85152
- IC
  - IC1 : YM24800
  - IC2 : TC4069UBP
  - IC3,4 : TA7504S
  - IC5 : TA7505M
  - IC6,7 : NJM4558
- Transistor
  - Tr1,3 : 2SA1015
  - Tr2,4 : 2SC1815
- Diode
  - D1,2 : 1S1555 (or 1S2473)

PN1



View from the printed pattern side of the circuit board

C1

Pin No.	Pin Name	Wire Color	Destination
1	SUST	GR	VCF (C6-1)
2	PB	BR	SSK (C4-6)
3	PI	RE	SSK (C4-2)
4	PO	YE	SSK (C4-3)
5	BRIL	OR	VCF (C2-4)

C2

Pin No.	Pin Name	Wire Color	Destination
1	UP	OR	PVR26-3
2	DOWN	BR	PVR26-1
3	PD	RE	PVR26-2
4	NORM	BL	PVR26-4

C3

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	SSK (C1-1)
2			
3	E	BL	SSK (C1-4)
4	E	BL	PN2 (C1-2)
5			
6	-15	YE	SSK (C1-5)



# SSK, PN1 & PN2 Circuit Board & Wiring

0.047  
0.01

**C6**

7	CL
6	C#-G
5	D-G#
4	D#-A
3	E-A#
2	F-B
1	F#-C

**C5(CP)**

1	PI
2	PO
3	REP
4	KO
5	PB
6	KVI

**C1**

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	PN1 (C3-1)
2	+15	BR	DC (C-12)
3	E	BL	DC (C-7)
4	E	BL	PN1 (C3-3)
5	-15	YE	PN1 (C3-6)
6	-15	YE	DC (C-3)

**C3**

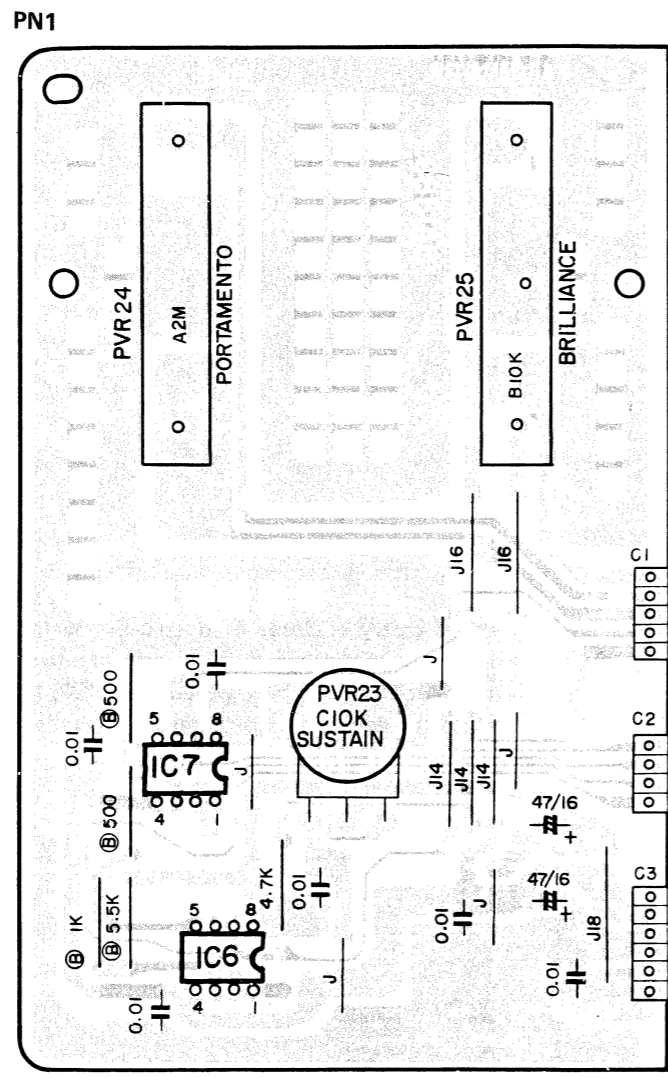
Pin No.	Pin Name	Wire Color	Destination
1	32	GY	MK (C1-6)
2	31	VI	MK (C1-5)
3	22	BE	MK (C1-4)
4	21	GR	MK (C1-3)
5	12	YE	MK (C1-2)
6	11	OR	MK (C1-1)

**C4**

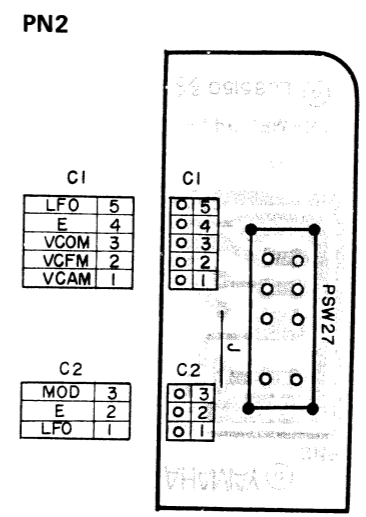
Pin No.	Pin Name	Wire Color	Destination
1	KV1	S-BE	JK (C2-6)
2	PI	RE	PN1 (C1-3)
3	PO	YE	PN1 (C1-4)
4	REP	VI	VCO (C7-2)
5	KO	GY	JK (C2-3)
6	PB	BR	PN1 (C1-2)

**C6**

Pin No.	Pin Name	Wire Color	Destination
1	F#,C	VI	MK (C2-5)
2	F,B	BE	MK (C2-4)
3	E,A#	GR	MK (C2-3)
4	D#,A	YE	MK (C2-2)
5	D,G#	OR	MK (C2-1)
6	C#,G	RE	MK (C1-8)
7	CL	BR	MK (C1-7)



View from the printed pattern side of the circuit board



View from the printed pattern side of the circuit board

**C1**

Pin No.	Pin Name	Wire Color	Destination
1	LFO	RE	VCO (C7-3)
2	E	BL	PN1 (C3-4)
3	VCOM	OR	VCO (C7-1)
4	VCFM	YE	VCF (C2-3)
5	VCAM	BE	VCF (C4-1)

**C2**

Pin No.	Pin Name	Wire Color	Destination
1	MOD	BR	PVR28-2
2	E	BL	PVR28-1
3	LFO	RE	PVR28-3

**C1**

5	BRIL
4	PO
3	PI
2	PB
1	SUST

**C2**

4	NORM
3	PD
2	DOWN
1	UP

**C3**

6	-15
5	E
4	E
3	E
2	E
1	+15

**C1**

Pin No.	Pin Name	Wire Color	Destination
1	SUST	GR	VCF (C6-1)
2	PB	BR	SSK (C4-6)
3	PI	RE	SSK (C4-2)
4	PO	YE	SSK (C4-3)
5	BRIL	OR	VCF (C2-4)

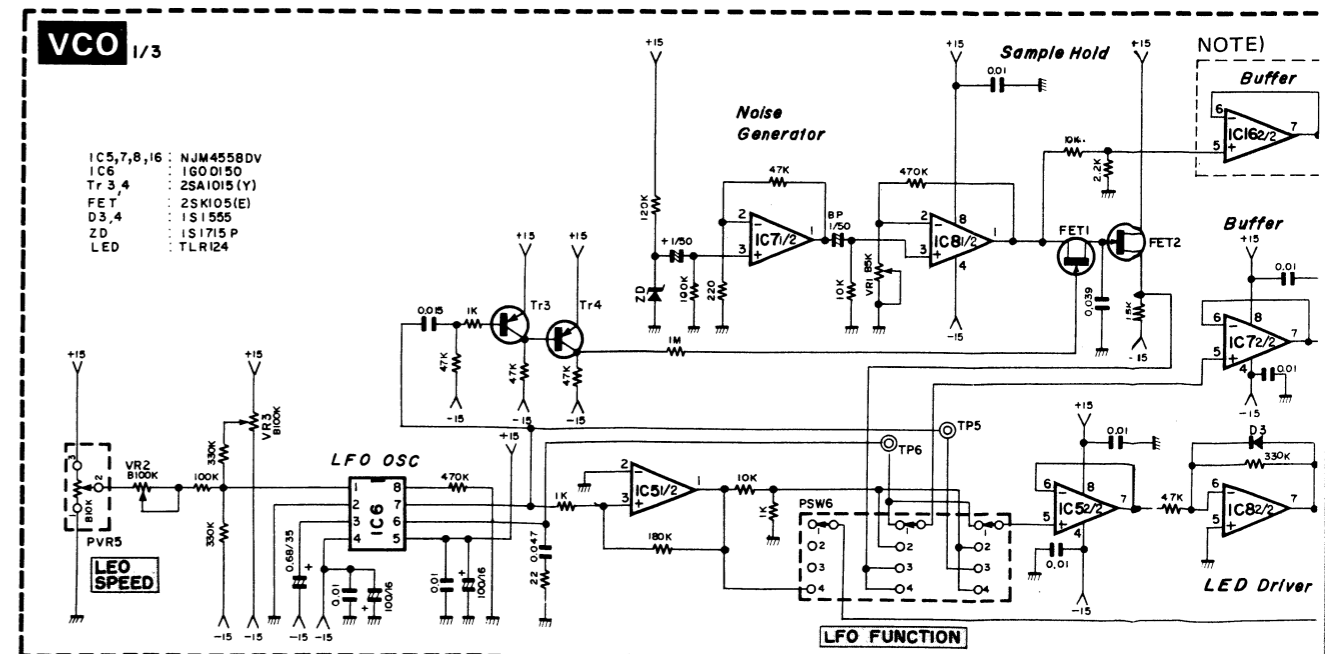
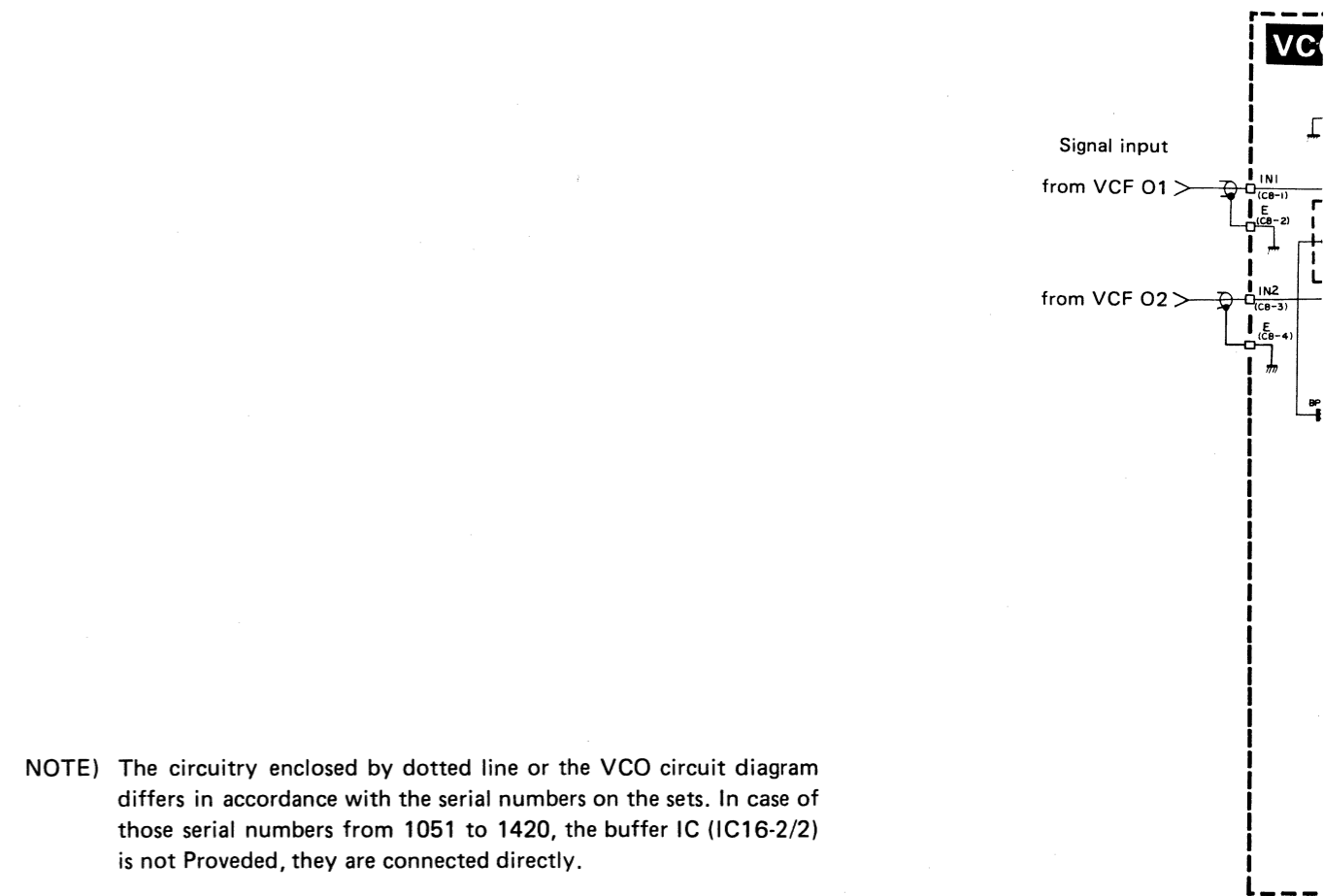
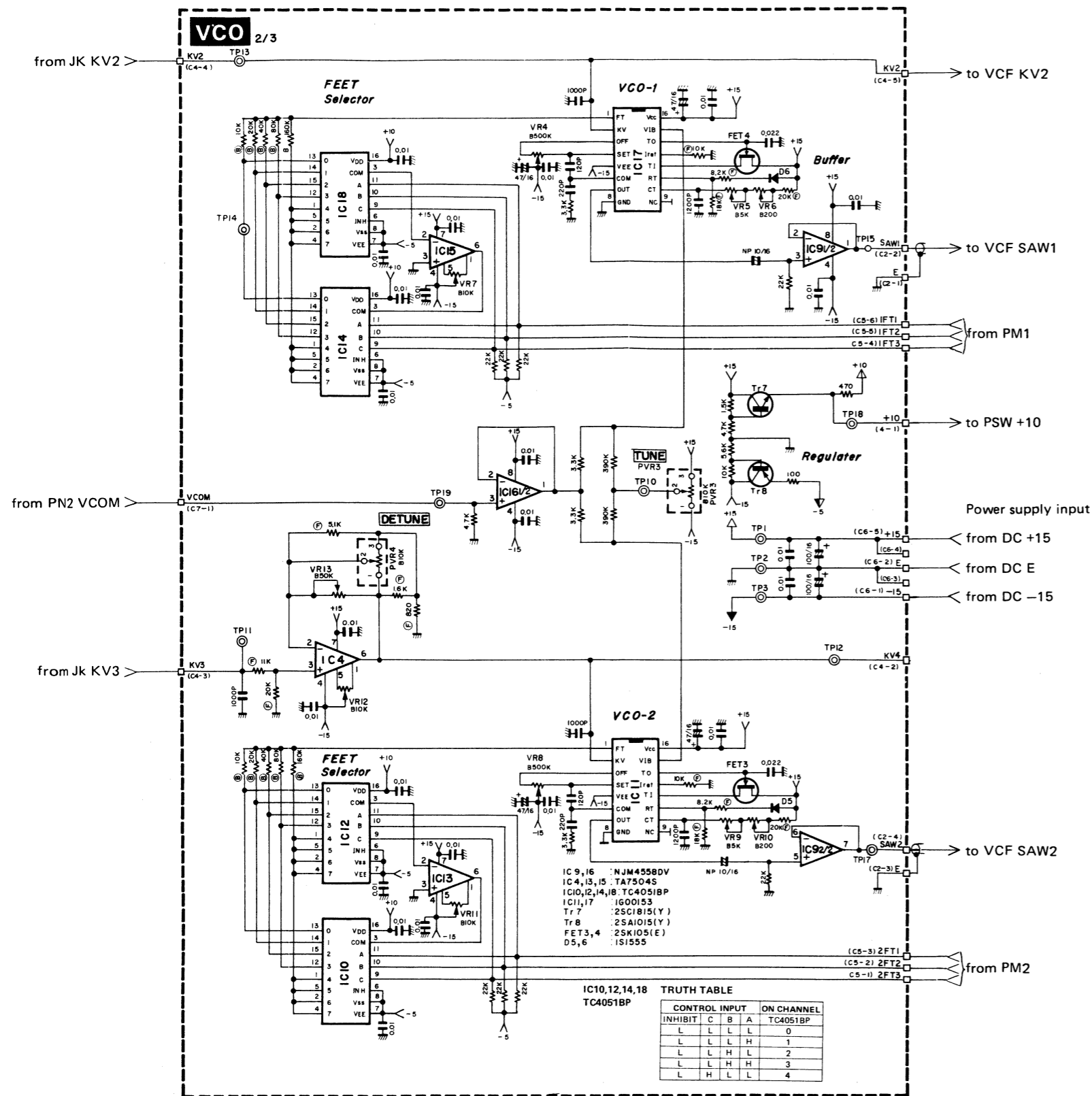
**C2**

Pin No.	Pin Name	Wire Color	Destination
1	UP	OR	PVR26-3
2	DOWN	BR	PVR26-1
3	PD	RE	PVR26-2
4	NORM	BL	PVR26-4

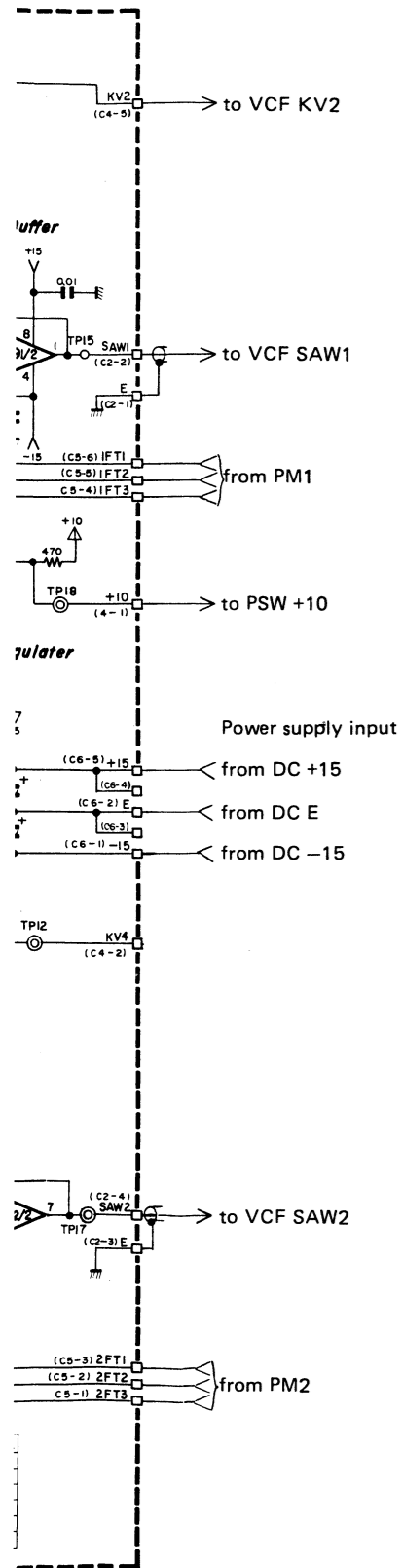
**C3**

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	SSK (C1-1)
2			
3	E	BL	SSK (C1-4)
4	E	BL	PN2 (C1-2)
5			
6	-15	YE	SSK (C1-5)

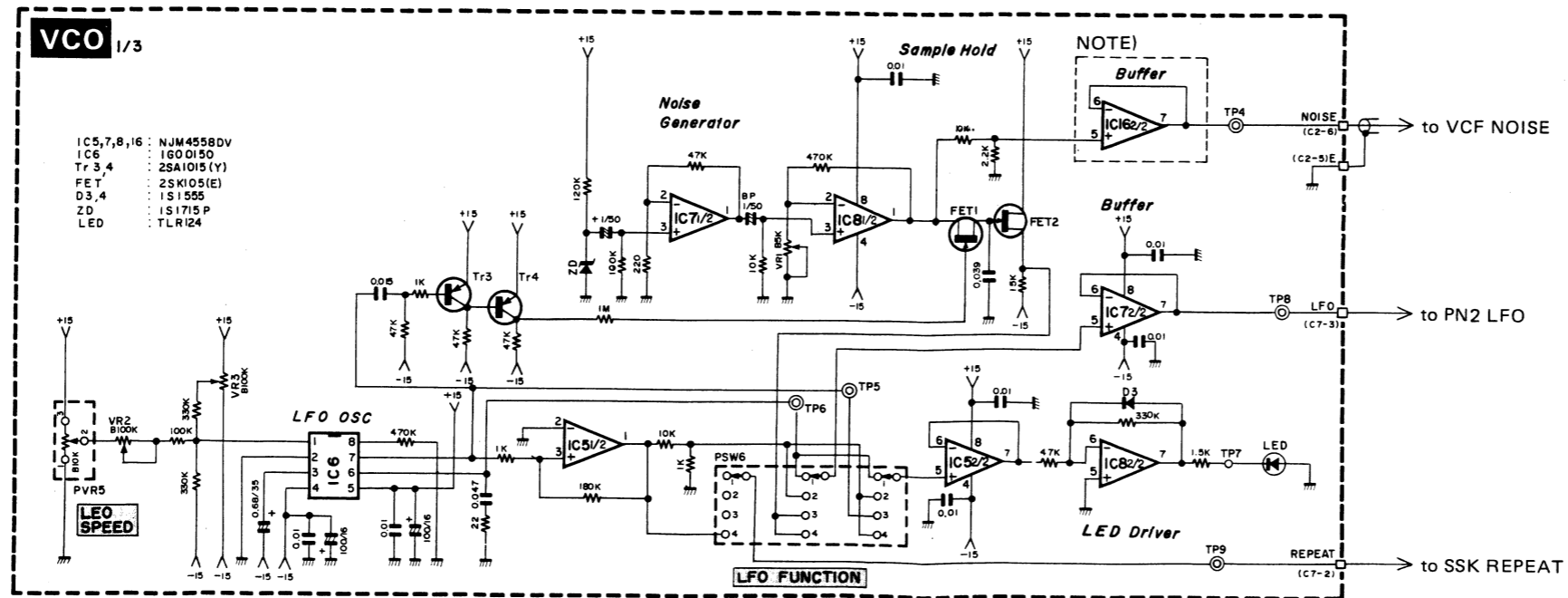
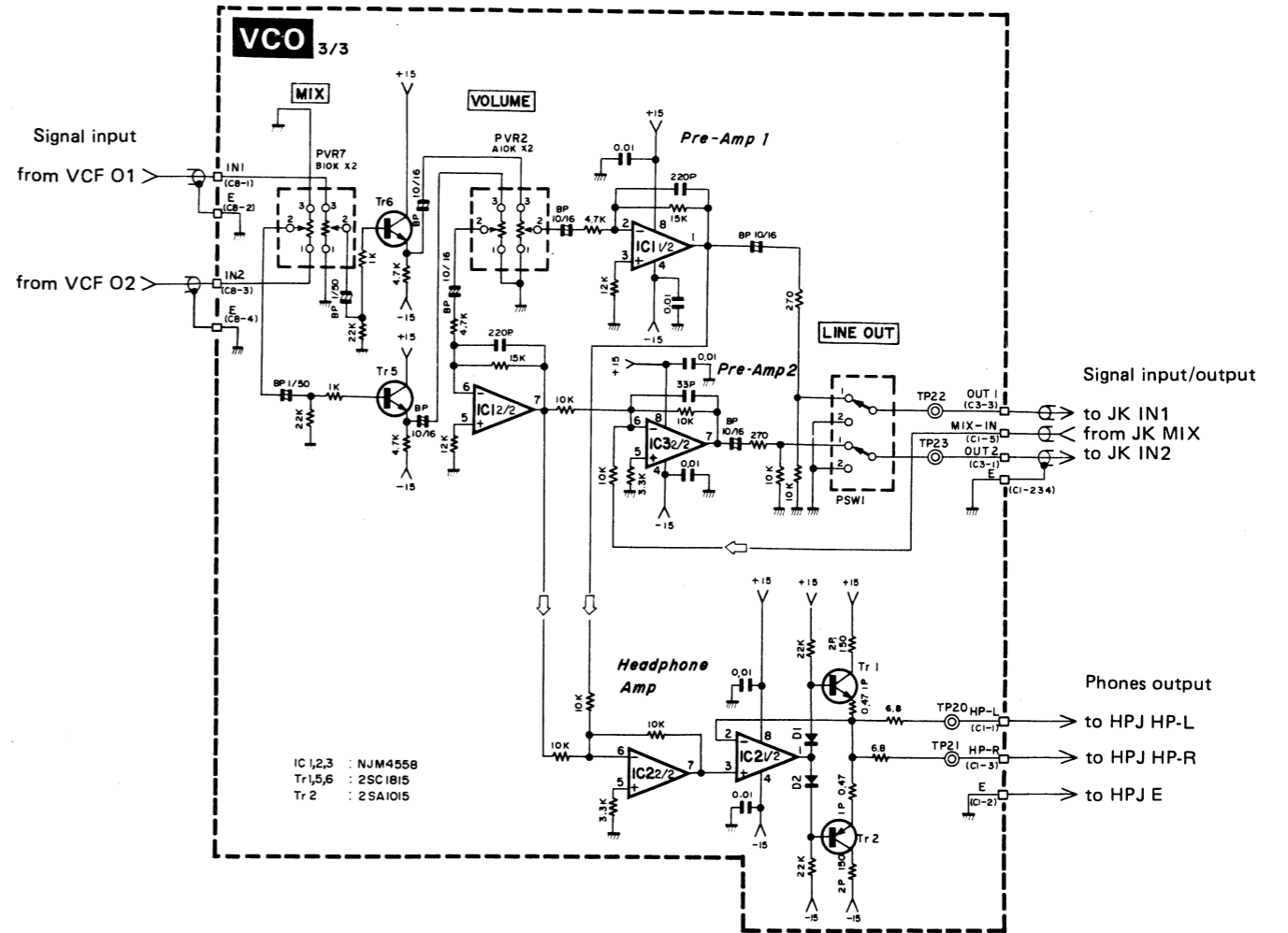
- NOTE)
- Circuit Board : LC85152
  - IC
    - IC1 : YM24800
    - IC2 : TC4069UBP
    - IC3,4 : TA7504S
    - IC5 : TA7505M
    - IC6,7 : NJM4558
  - Transistor
    - Tr1,3 : 2SA1015
    - Tr2,4 : 2SC1815
  - Diode
    - D1,2 : 1S1555 (or 1S2473)

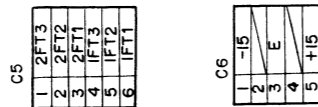


# VCO Circuit Diagram



NOTE) The circuitry enclosed by dotted line or the VCO circuit diagram differs in accordance with the serial numbers on the sets. In case of those serial numbers from 1051 to 1420, the buffer IC (IC16-2/2) is not provided, they are connected directly.





C2

E	1
SAW1	2
E	3
SAW2	4
E	5
NOISE	6

C1

HP-L	1
HP-R	2
E	3
MIX IN	5

C5

1	OUT2
2	OUT1
3	E
4	E

C4

1	IO
2	KV4
3	KV3
4	KV2
5	KV2

C8

4	E
3	IN2
2	E
1	IN1

C7

1	VCOM
2	REPEAT
3	LFO

C1

Pin No.	Pin Name	Wire Color	Destination
1	HP-L	YE	HPJ-L
2	HP-G	BL	HPJ-G
3	HP-R	GR	HPJ-R
4		S-GY-S	
5	MIX	S-GY	JK (C1-2)

C5

Pin No.	Pin Name	Wire Color	Destination
1	2FT3	PK	PM2 (C4-5)
2	2FT2	SB	PM2 (C4-3)
3	2FT1	GG	PM2 (C4-1)
4	1FT3	OR	PM1 (C4-5)
5	1FT2	RE	PM1 (C4-3)
6	1FT1	BR	PM1 (C4-1)

C2

Pin No.	Pin Name	Wire Color	Destination
1			
2	SAW1	S-BR	VCF (C3-2)
3			
4	SAW2	S-RE	VCF (C1-4)
5			
6	NOISE	S-OR	VCF (C1-11)

C6

Pin No.	Pin Name	Wire Color	Destination
1	-15	YE	DC (C-2)
2	E	BL	DC (C-6)
3			
4			
5	+15	BR	DC (C-11)

C3

Pin No.	Pin Name	Wire Color	Destination
1	OUT-II	S-VI	JK (C1-5)
2	E	S-VI-S	
3	OUT-I	S-BE	JK (C1-3)

C7

Pin No.	Pin Name	Wire Color	Destination
1	VCOM	OR	PN2 (C1-3)
2	REPEAT	VI	SSK (C4-4)
3	LFO	RE	PN2 (C1-1)

C4

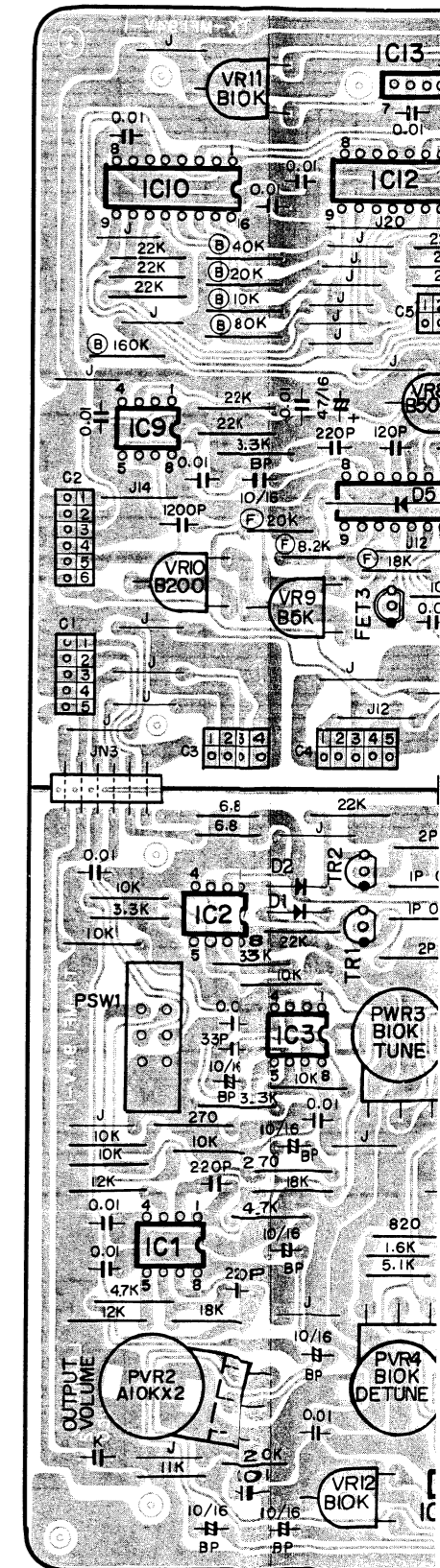
Pin No.	Pin Name	Wire Color	Destination
1	+10	BE	PSW (C1-1)
2	KV4	BR	VCF (C2-7)
3	KV3	PK	JK (C2-5)
4	KV2	SB	JK (C2-4)
5	KV2	SB	VCF (C2-5)

C8

Pin No.	Pin Name	Wire Color	Destination
1	IN1	S-YE	VCF (C2-1)
2	E	S-YE-S	VCF (C2-2)
3	IN2	S-GR	VCF (C4-4)
4	E	S-GR-S	VCF (C4-3)

NOTE)

- Circuit Board : LC85124
- IC
  - IC1~3,5, 7~9,16 : NJM4558DV
  - IC4,13,15 : TA7504S
  - IC6 : IG00150
  - IC11,17 : IG00153 (Pair)
  - IC10,12,14,18: TC4051BP
- Transistor
  - Tr1,5~7 : 2SC1815
  - Tr2~4,8 : 2SA1015
  - FET1~4 : 2SK105(E)
- Diode
  - D1~6 : 1S1555 (or 1S2473)
  - D7 : 1S1715P (Selected)
- Resistor
  - ⓑ marked : 0.1% (metal film)
  - ⓕ marked : 1% (metal film)



# VCO Circuit Board & Wiring

#1051 ~ #1420

C1				C5			
Pin No.	Pin Name	Wire Color	Destination	Pin No.	Pin Name	Wire Color	Destination
1	HP-L	YE	HPJ-L	1	2FT3	PK	PM2 (C4-5)
2	HP-G	BL	HPJ-G	2	2FT2	SB	PM2 (C4-3)
3	HP-R	GR	HPJ-R	3	2FT1	GG	PM2 (C4-1)
4		S-GY-S		4	1FT3	OR	PM1 (C4-5)
5	MIX	S-GY	JK (C1-2)	5	1FT2	RE	PM1 (C4-3)
				6	1FT1	BR	PM1 (C4-1)

C2				C6			
Pin No.	Pin Name	Wire Color	Destination	Pin No.	Pin Name	Wire Color	Destination
1				1	-15	YE	DC (C-2)
2	SAW1	S-BR	VCF (C3-2)	2	E	BL	DC (C-6)
3				3			
4	SAW2	S-RE	VCF (C1-4)	4			
5				5	+15	BR	DC (C-11)
6	NOISE	S-OR	VCF (C1-11)				

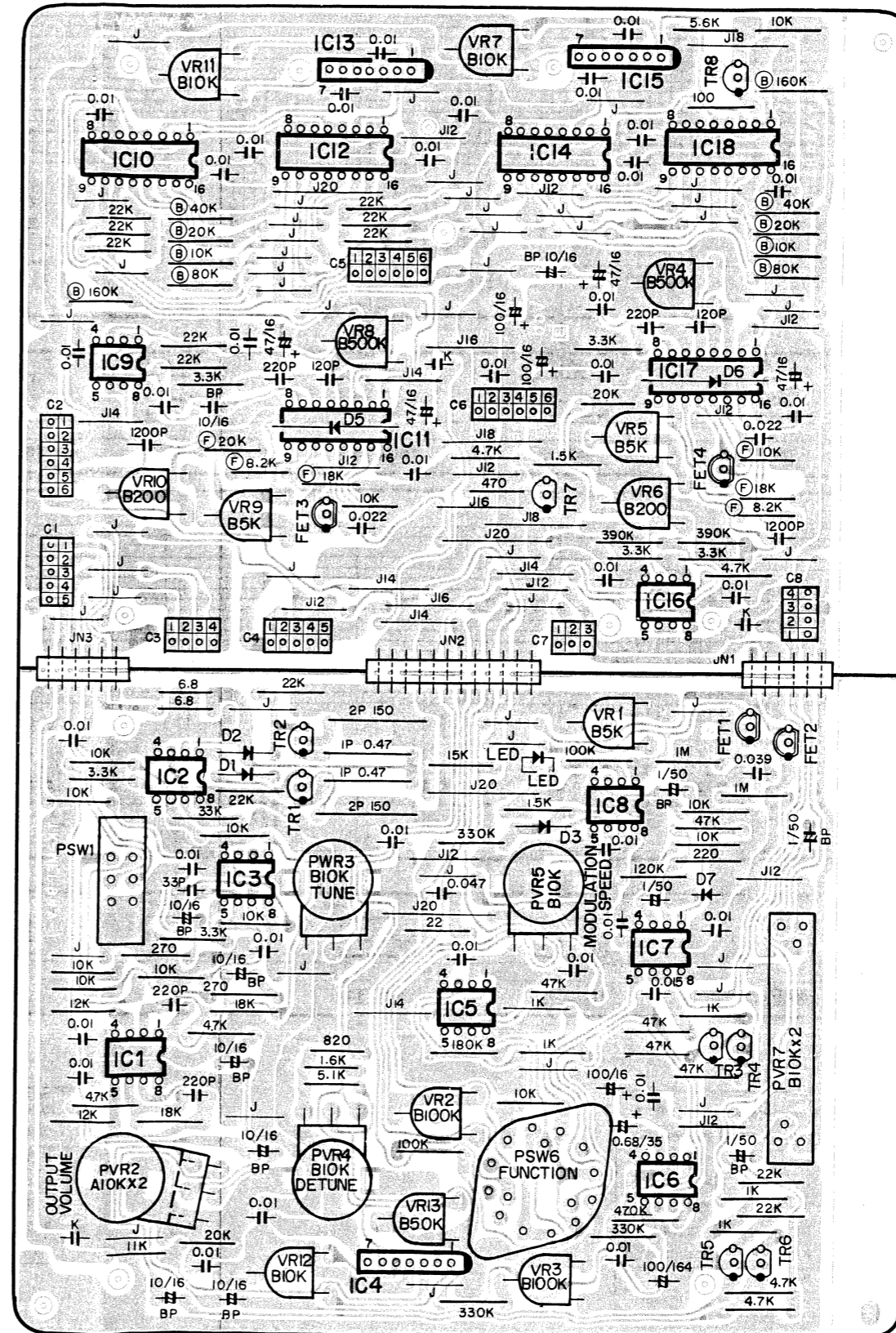
C3				C7			
Pin No.	Pin Name	Wire Color	Destination	Pin No.	Pin Name	Wire Color	Destination
1	OUT-II	S-VI	JK (C1-5)	1	VCOM	OR	PN2 (C1-3)
2	E	S-VI-S		2	REPEAT	VI	SSK (C4-4)
3	OUT-I	S-BE	JK (C1-3)	3	LFO	RE	PN2 (C1-1)

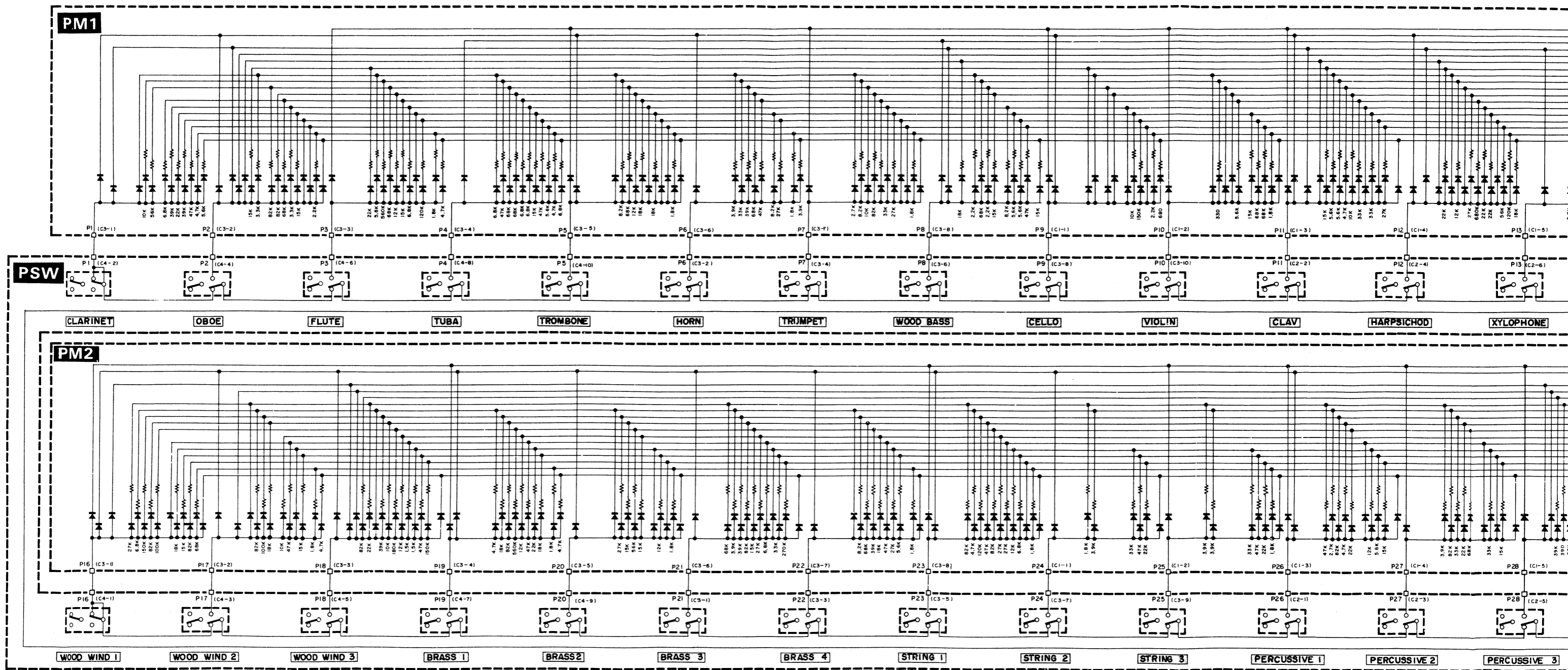
  

C4				C8			
Pin No.	Pin Name	Wire Color	Destination	Pin No.	Pin Name	Wire Color	Destination
1	+10	BE	PSW (C1-1)	1	IN1	S-YE	VCF (C2-1)
2	KV4	BR	VCF (C2-7)	2	E	S-YE-S	VCF (C2-2)
3	KV3	PK	JK (C2-5)	3	IN2	S-GR	VCF (C4-4)
4	KV2	SB	JK (C2-4)	4	E	S-GR-S	VCF (C4-3)
5	KV2	SB	VCF (C2-5)				

**NOTE)**

- Circuit Board : LC85124
- IC
  - IC1~3,5, 7~9,16 : NJM4558DV
  - IC4,13,15 : TA7504S
  - IC6 : IG00150
  - IC11,17 : IG00153 (Pair)
  - IC10,12,14,18: TC4051BP
- Transistor
  - Tr1,5~7 : 2SC1815
  - Tr2~4,8 : 2SA1015
  - FET1~4 : 2SK105(E)
- Diode
  - D1~6 : 1S1555 (or 1S2473)
  - D7 : 1S1715P (Selected)
- Resistor
  - ⓑ marked : 0.1% (metal film)
  - ⓕ marked : 1% (metal film)





PM1

Pin No.	Pin Name	Wire Color	Destination
1	P-9	WH	PSW (C3-8)
2	P-10	GG	PSW (C3-10)
3	P-11	SB	PSW (C2-2)
4	P-12	PK	PSW (C2-4)
5	P-13	BR	PSW (C2-6)
6	P-14	RE	PSW (C2-8)
7	P-15	OR	PSW (C2-10)

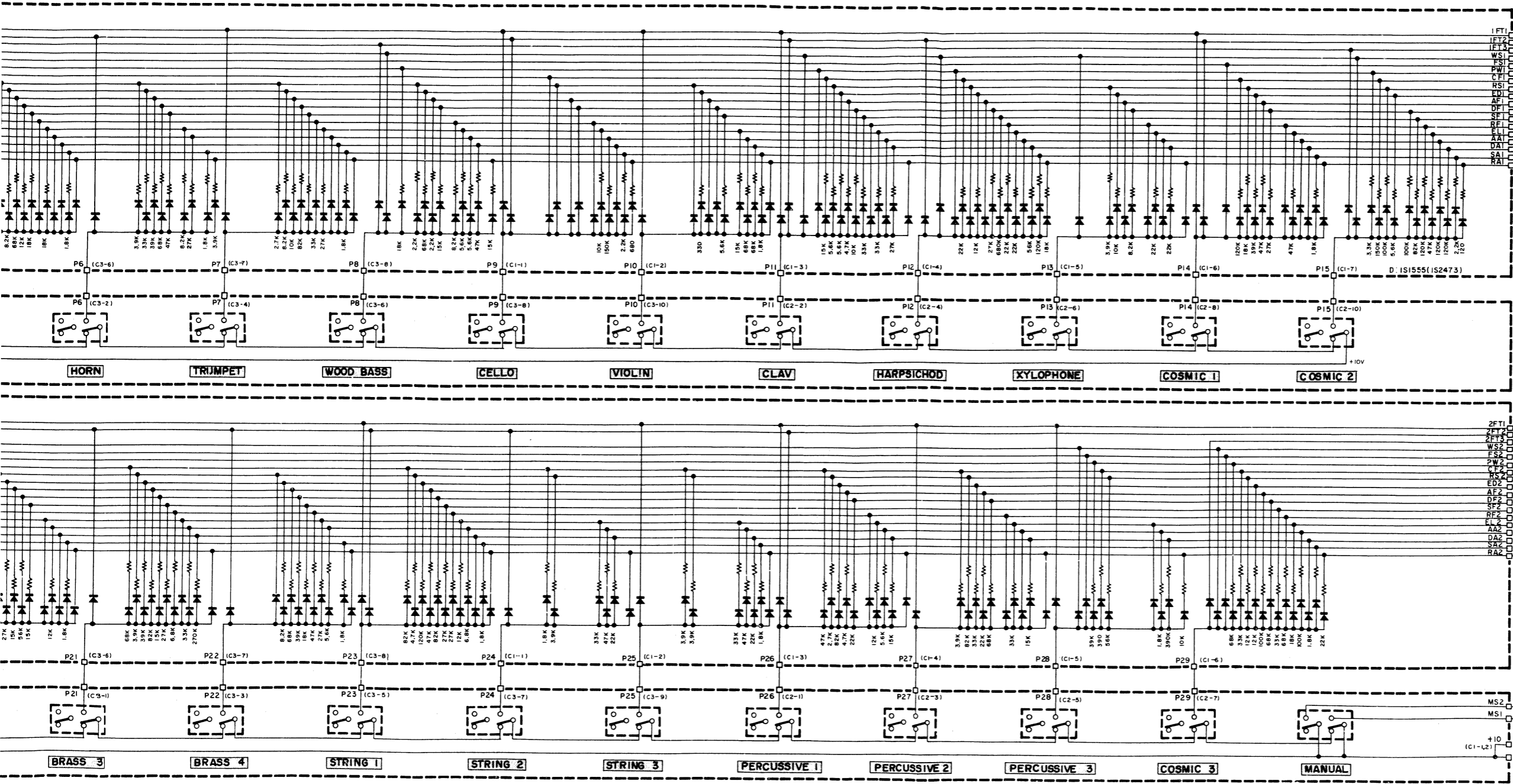
Pin No.	Pin Name	Wire Color	Destination
1	P-1	BR	PSW (C4-2)
2	P-2	RE	PSW (C4-4)
3	P-3	OR	PSW (C4-6)
4	P-4	YE	PSW (C4-8)
5	P-5	GR	PSW (C4-10)
6	P-6	BE	PSW (C3-2)
7	P-7	VI	PSW (C3-4)
8	P-8	GY	PSW (C3-6)

PM2

Pin No.	Pin Name	Wire Color	Destination
1	P-24	RE	PSW (C3-7)
2	P-25	OR	PSW (C3-9)
3	P-26	YE	PSW (C2-1)
4	P-27	GR	PSW (C2-3)
5	P-28	BE	PSW (C2-5)
6	P-29	VI	PSW (C2-7)

Pin No.	Pin Name	Wire Color	Destination
1	P-16	BE	PSW (C4-1)
2	P-17	VI	PSW (C4-3)
3	P-18	GY	PSW (C4-5)
4	P-19	WH	PSW (C4-7)
5	P-20	GG	PSW (C4-9)
6	P-21	SB	PSW (C3-1)
7	P-22	PK	PSW (C3-3)
8	P-23	BR	PSW (C3-5)

# PM1, PM2 & PSW Circuit Diagram



### PM1

C4			
Pin No.	Pin Name	Wire Color	Destination
1	1FT1	BR	VCO (C5-6)
2			
3	1FT2	RE	VCO (C5-5)
4			
5	1FT3	OR	VCO (C5-4)
6			
7	WS1	YE	VCF (C3-4)
8	FS1	GR	VCF (C1-2)
9	PW1	BE	VCF (C3-1)

C2			
Pin No.	Pin Name	Wire Color	Destination
1	CF1	VI	VCF (C2-6)
2	RS1	GY	VCF (C1-1)
3	ED1	WH	VCF (C7-10)
4	AF1	GG	VCF (C7-6)
5	DF1	SB	VCF (C7-7)
6	SF1	PK	VCF (C7-8)
7	RF1	BR	VCF (C7-9)
8	EL1	RE	VCF (C7-5)
9	AA1	OR	VCF (C7-1)
10	DA1	YE	VCF (C7-2)
11	SA1	GR	VCF (C7-3)
12	RA1	BE	VCF (C7-7)

### PM2

C4			
Pin No.	Pin Name	Wire Color	Destination
1	2FT1	GG	VCO (C5-3)
2	2FT1	GG	VCF (C1-6)
3	2FT2	SB	VCO (C5-2)
4	2FT2	SB	VCF (C1-7)
5	2FT3	PK	VCO (C5-1)
6	2FT3	PK	VCF (C1-8)
7	WS2	BR	VCF (C1-5)
8	FS2	RE	VCF (C4-7)
9	PW2	OR	VCF (C4-2)

C2			
Pin No.	Pin Name	Wire Color	Destination
1	CF2	YE	VCF (C4-5)
2	RS2	GR	VCF (C4-6)
3	ED2	BE	VCF (C6-8)
4	AF2	VI	VCF (C6-4)
5	DF2	GY	VCF (C6-5)
6	SF2	WH	VCF (C6-6)
7	RF2	GG	VCF (C6-7)
8	EL2	SB	VCF (C8-6)
9	AA2	PK	VCF (C8-2)
10	DA2	OR	VCF (C8-3)
11	SA2	RE	VCF (C8-4)
12	RA2	BR	VCF (C8-5)

### PM2

C1			
Pin No.	Pin Name	Wire Color	Destination
1	P-24	RE	PSW (C3-7)
2	P-25	OR	PSW (C3-9)
3	P-26	YE	PSW (C2-1)
4	P-27	GR	PSW (C2-3)
5	P-28	BE	PSW (C2-5)
6	P-29	VI	PSW (C2-7)

C3			
Pin No.	Pin Name	Wire Color	Destination
1	P-16	BE	PSW (C4-1)
2	P-17	VI	PSW (C4-3)
3	P-18	GY	PSW (C4-5)
4	P-19	WH	PSW (C4-7)
5	P-20	GG	PSW (C4-9)
6	P-21	SB	PSW (C3-1)
7	P-22	PK	PSW (C3-3)
8	P-23	BR	PSW (C3-5)

PM1

C4

IFT1	1
IFT1	2
IFT2	3
IFT2	4
IFT3	5
IFT3	6
WS1	7
FS1	8
PW1	9

C3

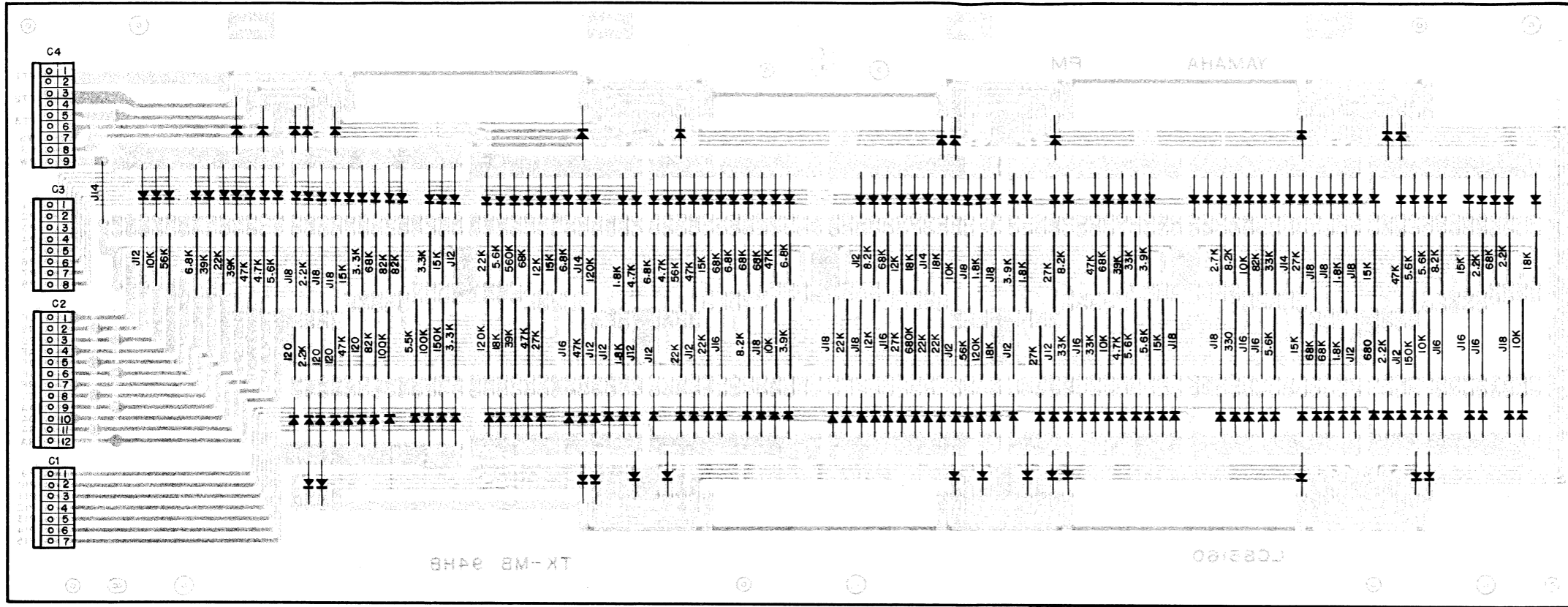
P1	1
P2	2
P3	3
P4	4
P5	5
P6	6
P7	7
P8	8

C2

CF1	1
RS1	2
ED1	3
AF1	4
DF1	5
SF1	6
RF1	7
AL1	8
AA1	9
DA1	10
SA1	11
RA1	12

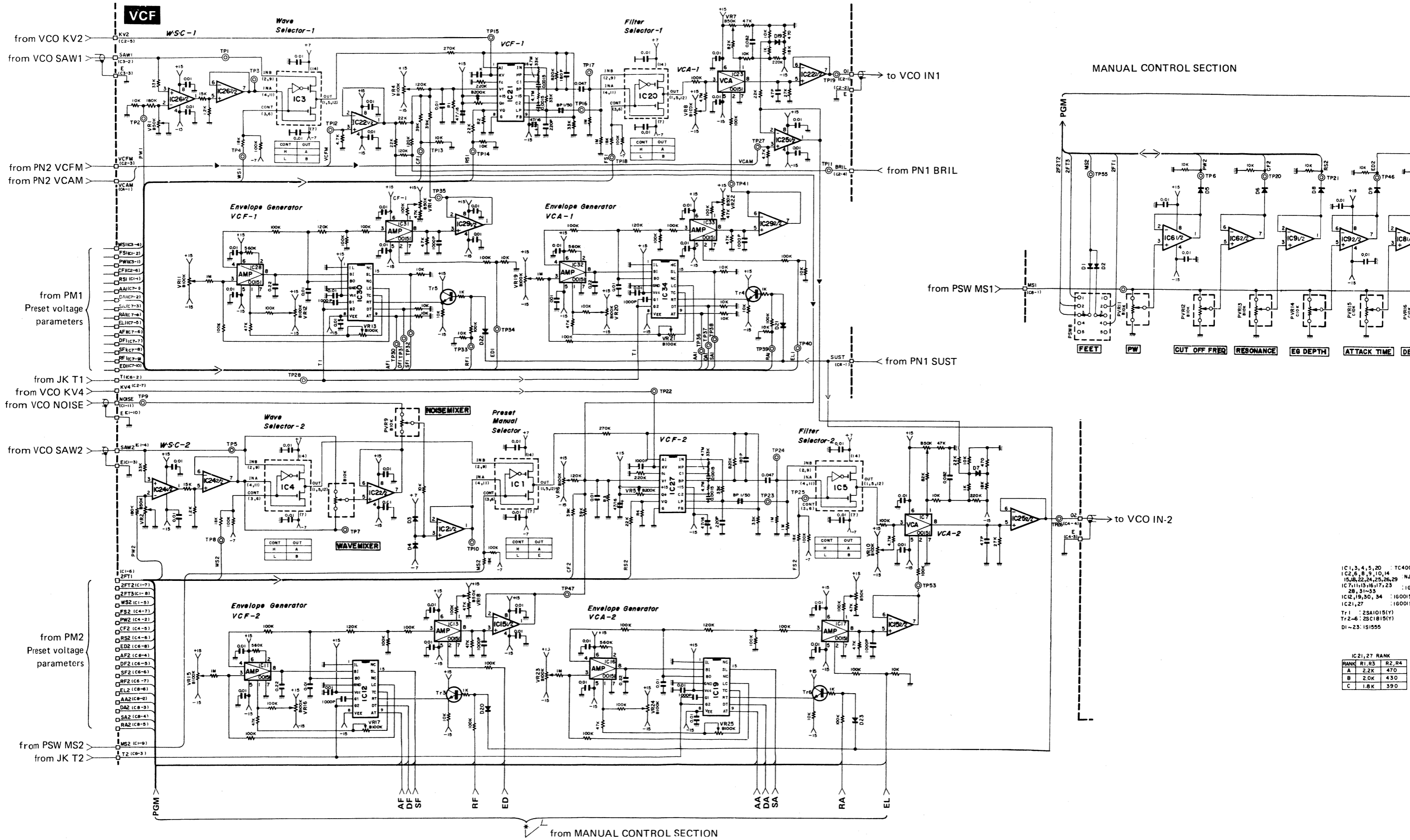
C1

P9	1
P10	2
P11	3
P12	4
P13	5
P14	6
P15	7





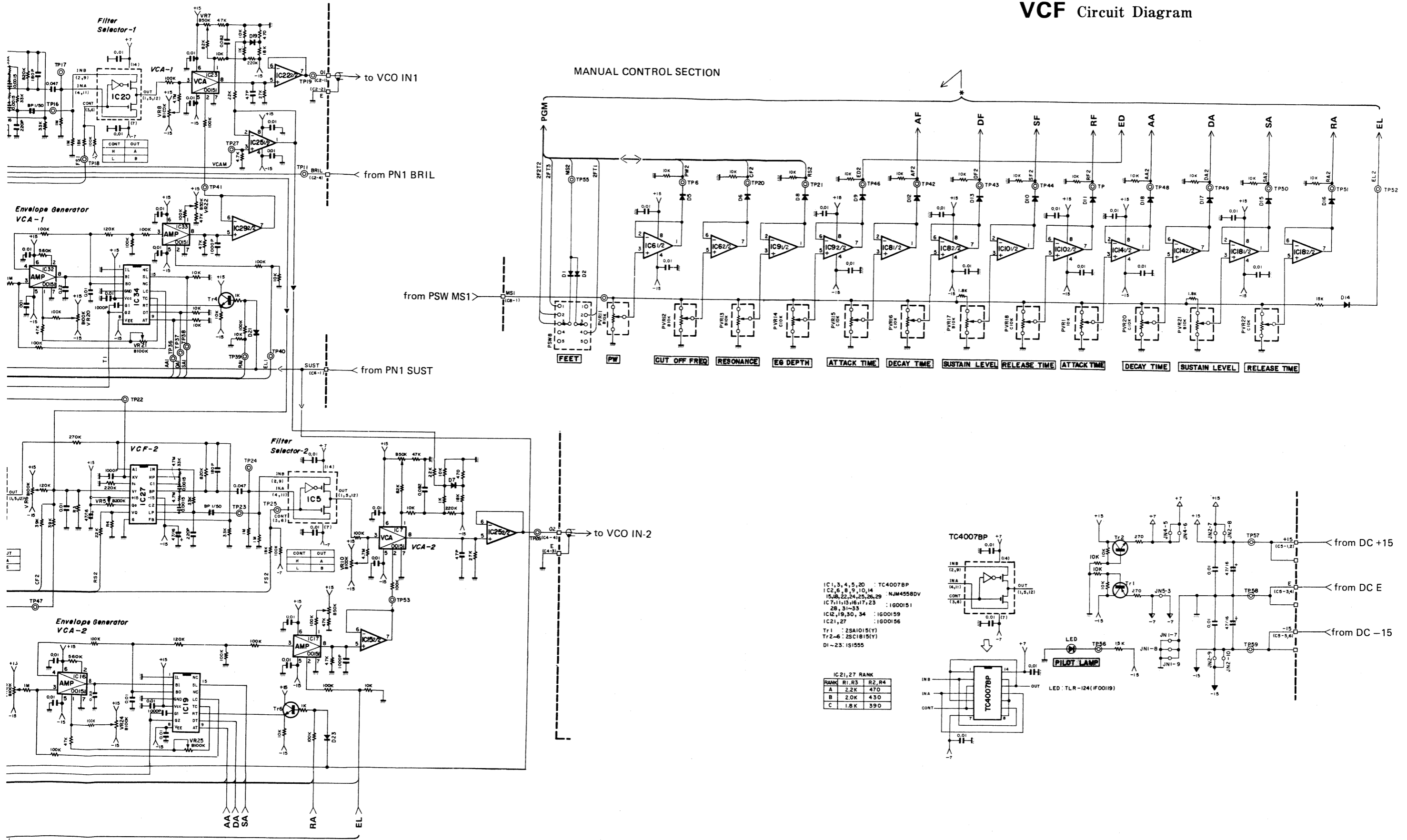




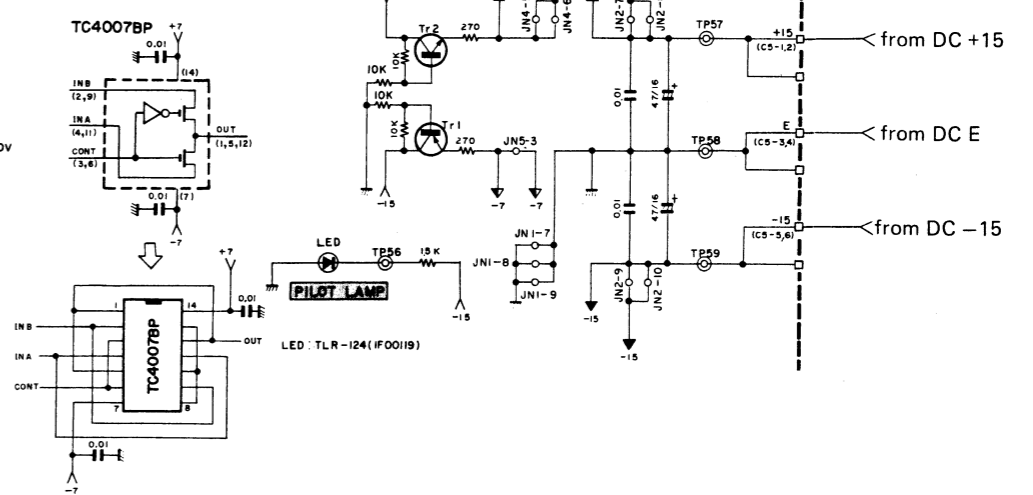
IC1,3,4,5,20 : TC40C  
 IC2,6,8,9,10,14 : NJ  
 IC15,16,22,24,25,26,29 : NJ  
 IC7,11,13,16,17,23 : 1G  
 28,31-33 : 1G  
 IC12,19,30,34 : 1G001  
 IC21,27 : 1G001  
 Tr1 : 2SA1015(Y)  
 Tr2-6 : 2SC1815(Y)  
 D1-23 : 1S1555

IC21,27 RANK			
RANK	R1,R3	R2,R4	
A	2.2K	470	
B	2.0K	430	
C	1.8K	390	

# VCF Circuit Diagram



- IC1, 3, 4, 5, 20 : TC4007BP  
 IC2, 6, 8, 9, 10, 14 : NJM4558DV  
 IC7, 11, 13, 16, 17, 23 : 1G00151  
 IC8, 31-33 : 1G00151  
 IC12, 19, 30, 34 : 1G00159  
 IC21, 27 : 1G00156  
 Tr1 : 2SA1015(Y)  
 Tr2-6 : 2SC1815(Y)  
 DI-23 : 1S1555
- | IC21, 27 RANK |        |        |  |
|---------------|--------|--------|--|
| RANK          | R1, R3 | R2, R4 |  |
| A             | 2.2K   | 470    |  |
| B             | 2.0K   | 430    |  |
| C             | 1.8K   | 390    |  |



from MANUAL CONTROL SECTION

# VCF Circuit Board & Wiring

**C1**

Pin No.	Pin Name	Wire Color	Destination
1	RS1	GY	PM1 (C2-2)
2	FS1	GR	PM1 (C4-8)
3	E	S-RE-S	VCO (C2-3)
4	SAW2	S-RE	VCO (C2-4)
5	WS2	BR	PM2 (C4-7)
6	2FT1	GG	PM2 (C4-2)
7	2FT2	SB	PM2 (C4-4)
8	2FT3	PK	PM2 (C4-6)
9	MS2	WH	PSW (C1-3)
10	E	S-OR-S	VCO (C2-5)
11	NOISE	S-OR	VCO (C2-6)

**C2**

Pin No.	Pin Name	Wire Color	Destination
1	O1	S-YE	VCO (C8-1)
2	E	S-YE-S	VCO (C8-2)
3	VCFM	YE	PN2 (C1-4)
4	BR1L	OR	PN1 (C1-5)
5	KV2	SB	VCO (C4-5)
6	CF1	VI	PM1 (C2-1)
7	KV4	BR	VCO (C4-2)

**C3**

Pin No.	Pin Name	Wire Color	Destination
1	PW1	BE	PM1 (C4-9)
2	SAW1	S-BR	VCO (C2-2)
3	E	S-BR-S	VCO (C2-1)
4	WS1	YE	PM1 (C4-7)

**C4**

Pin No.	Pin Name	Wire Color	Destination
1	VCAM	BE	PN2 (C1-5)
2	PW2	OR	PM2 (C4-9)
3	E	S-GR-S	VCO (C8-4)
4	O2	S-GR	VCO (C8-3)
5	CF2	YE	PM2 (C2-1)
6	RS2	GR	PM2 (C2-2)
7	FS2	RE	PM2 (C4-8)

**C2**

1	O1
2	VCFM
3	BR1L
4	KV2
5	CF1
6	KV4

**C4**

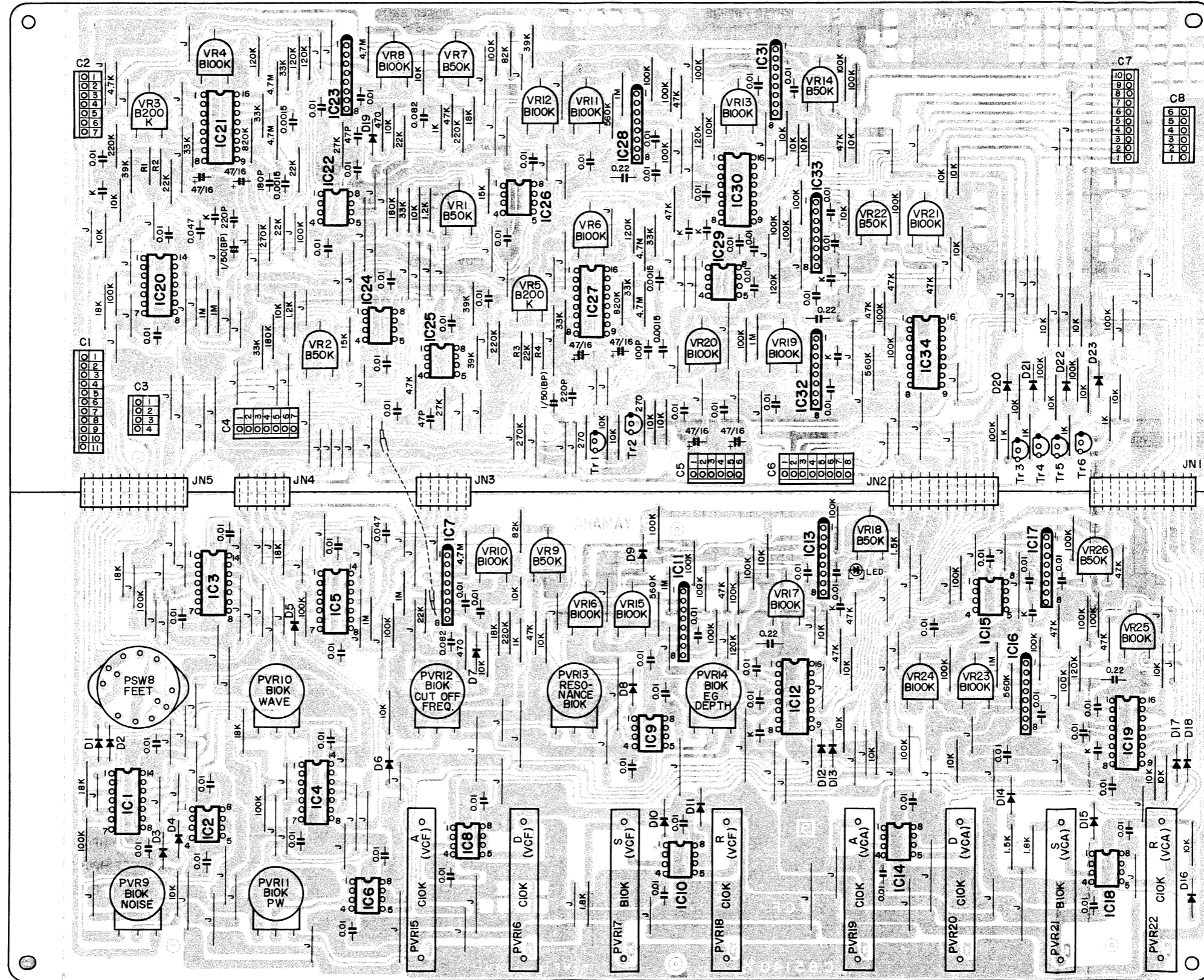
1	VCAM
2	PW2
3	E
4	O2
5	CF2
6	RS2
7	FS2

**C1**

1	RS1
2	FS1
3	E
4	SAW2
5	WS2
6	2FT1
7	2FT2
8	2FT3
9	MS2
10	E
11	NOISE

**C3**

1	PW1
2	SAW1
3	E
4	WS1



**C7**

10	ED1
9	RF1
8	SF1
7	DF1
6	AF1
5	EL1
4	RA1
3	SA1
2	DA1
1	AA1

**C8**

6	EL2
5	RA2
4	SA2
3	DA2
2	AA2
1	MS1

NOTE)

- Circuit Board : LC85143
- IC
  - IC1,3~5,20 : TC4007BP
  - IC2,6,8~10,15,18,22,24~26,29 : NJM4558DV
  - IC7,11,13,16,17,23,28,31~33 : IG00151
  - IC12,19,30,34 : IG00159
  - IC21,27 : IG00156
- Transistor
  - Tr1 : 2SA1015
  - Tr2~6 : 2SC1815
- Diode
  - D1~23 : 1S1555 (or 1S2473)
  - LED : TLR-124 (IF00119)

**C5**

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	DC (C-10)
2			
3	E	BL	DC (C-5)
4			
5			
6	-15	YE	DC (C-1)

**C6**

Pin No.	Pin Name	Wire Color	Destination
1	SUST	GR	PN1 (C1-1)
2	T1	GG	JK (C2-1)
3	T2	WH	JK (C2-2)
4	AF2	VI	PM2 (C2-4)
5	DF2	GY	PM2 (C2-5)
6	SF2	WH	PM2 (C2-6)
7	RF2	GG	PM2 (C2-7)
8	ED2	BE	PM2 (C2-3)

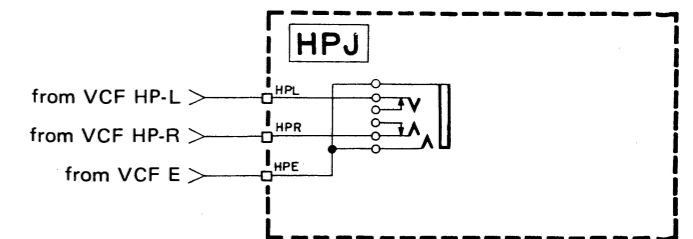
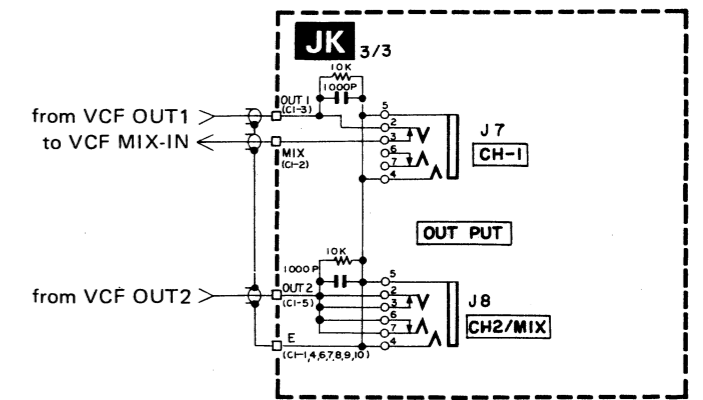
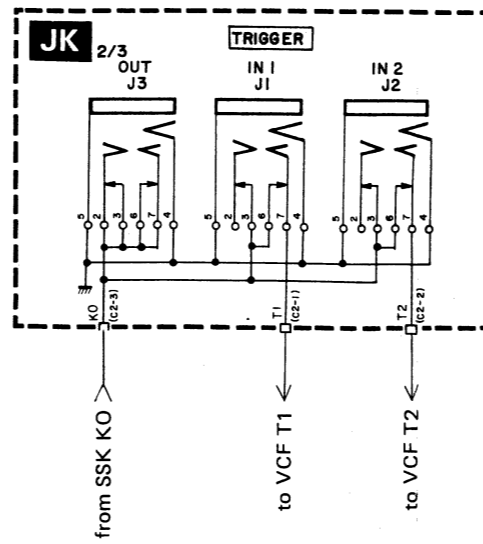
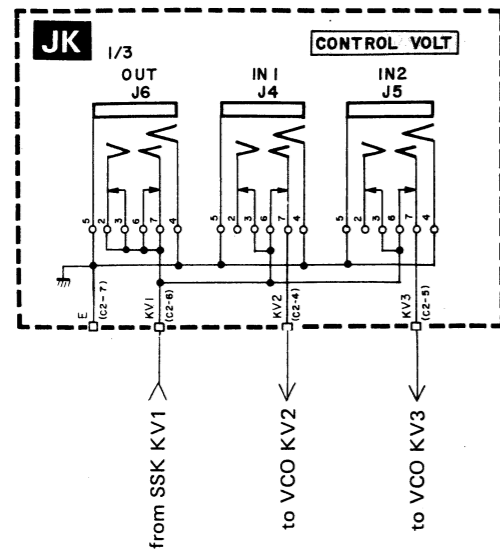
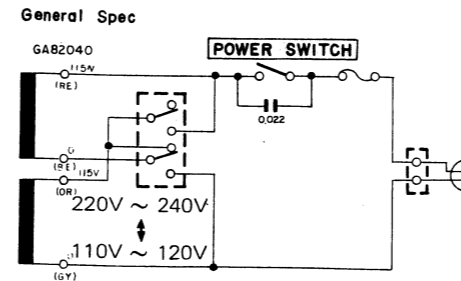
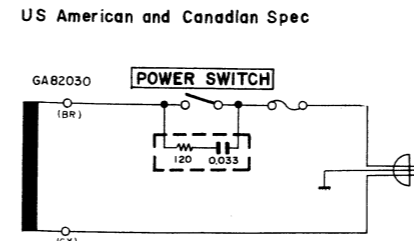
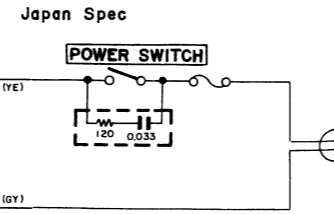
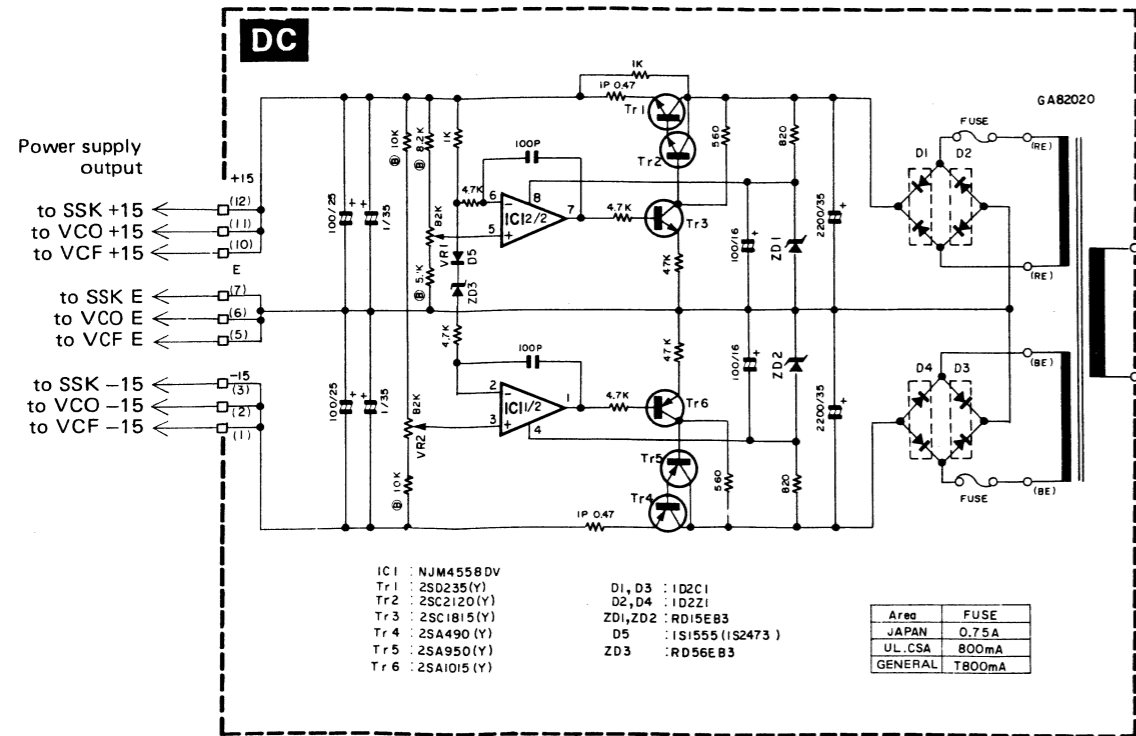
**C7**

Pin No.	Pin Name	Wire Color	Destination
1	AA1	OR	PM1 (C2-9)
2	DA1	YE	PM1 (C2-10)
3	SA1	GR	PM1 (C2-11)
4	RA1	BE	PM1 (C2-12)
5	EL1	RE	PM1 (C2-8)
6	AF1	GG	PM1 (C2-4)
7	DF1	SB	PM1 (C2-5)
8	SF1	PK	PM1 (C2-6)
9	RF1	BR	PM1 (C2-7)
10	ED1	WH	PM1 (C2-3)

**C8**

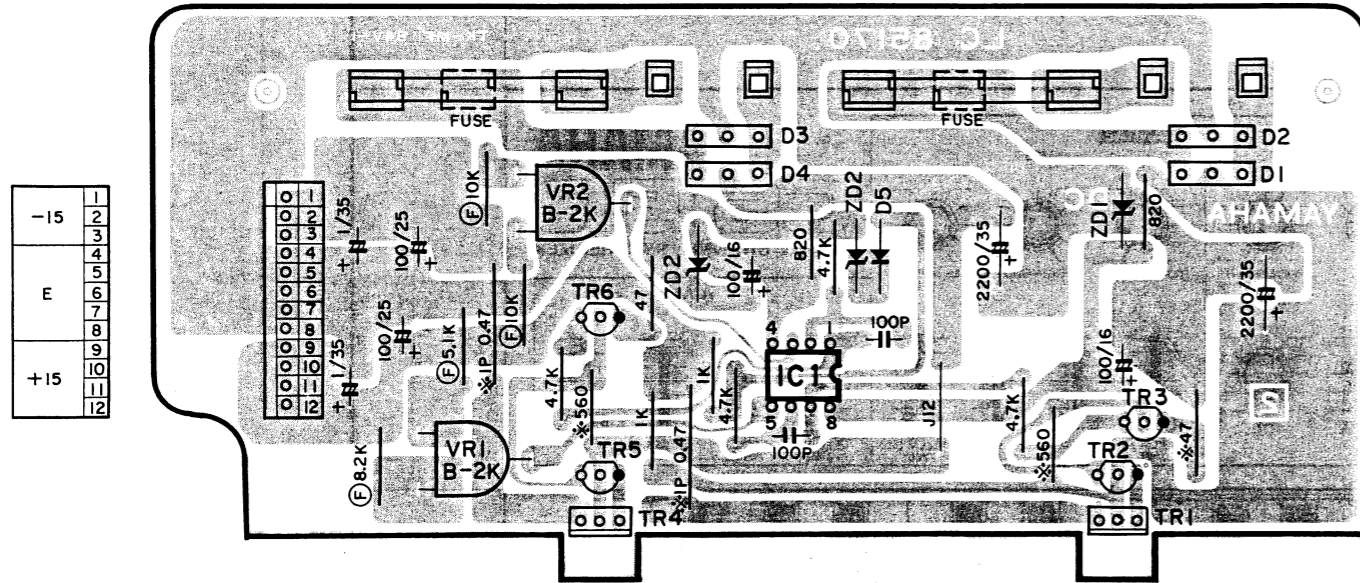
Pin No.	Pin Name	Wire Color	Destination
1	MS1	GY	PSW (C2-9)
2	AA2	PK	PM2 (C2-9)
3	DA2	OR	PM2 (C2-10)
4	SA2	RE	PM2 (C2-11)
5	RA2	BR	PM2 (C2-12)
6	EL2	SB	PM2 (C2-8)

# JK & DC Circuit Diagram



# JK & DC Circuit Board & Wiring

DC

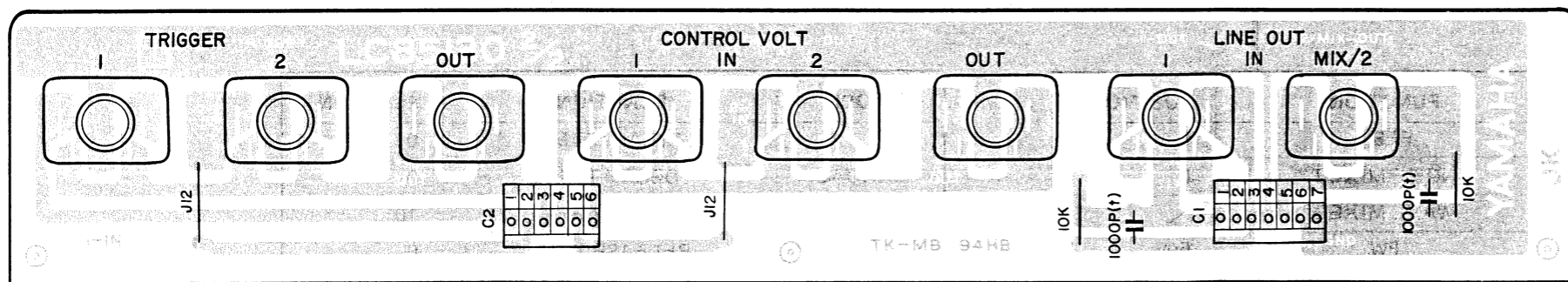


Pin No.	Pin Name	Wire Color	Destination
1	-15	YE	VCF (C5-6)
2	-15	YE	VCO (C6-1)
3	-15	YE	SSK (C1-6)
4			
5	E	BL	VCF (C5-3)
6	E	BL	VCO (C6-3)
7	E	BL	SSK (C1-3)
8			
9			
10	+15	BR	VCF (C5-1)
11	+15	BR	VCO (C6-5)
12	+15	BR	SSK (C1-2)

NOTE)

- Circuit Board : LC85172
- IC  
IC1 : NJM4558DV
- Transistor  
Tr1 : 2SD235  
Tr2 : 2SC2120  
Tr3 : 2SC1815  
Tr4 : 2SA490  
Tr5 : 2SA950  
Tr6 : 2SA1015
- Diode  
D1,3 : 1D2C1  
D2,4 : 1D2Z1  
D5 : 1S1555 (or 1S2473)  
ZD1,2 : RD15EB3  
ZD3 : RD5.6EB3

JK



Pin No.	Pin Name	Wire Color	Destination
1	T1	GG	VCF (C6-2)
2	T2	WH	VCF (C6-3)
3	KO	GY	SSK (C4-5)
4	KV2	SB	VCO (C4-4)
5	KV3	PK	VCO (C4-3)
6	KV1	S-BE	SSK (C4-1)
7	-	S-BE-S	-

View from the printed pattern side of the circuit board

Pin No.	Pin Name	Wire Color	Destination
1	MIX	S-GY	VCO (C1-5)
2	OUTI	S-BE	VCO (C3-3)
3	OUTII	S-VI	VCO (C3-1)
4	E	BL	VCF (C9-1)
5	E	BL	VCF (C9-2)
6	E	BL	VCF (C9-3)
7	E	BL	VCF (C9-4)

C1

Pin No.	Pin Name	Wire Color	Destination
1			
2	MIX	S-GY	VCO (C1-5)
3	OUTI	S-BE	VCO (C3-3)
4	-	S-BE-S	-
5	OUTII	S-VI	VCO (C3-1)
6	-	S-VI-S	-
7	E	BL	VCF (C9-1)
8	E	BL	VCF (C9-2)
9	E	BL	VCF (C9-3)
10	E	BL	VCF (C9-4)

NOTE)

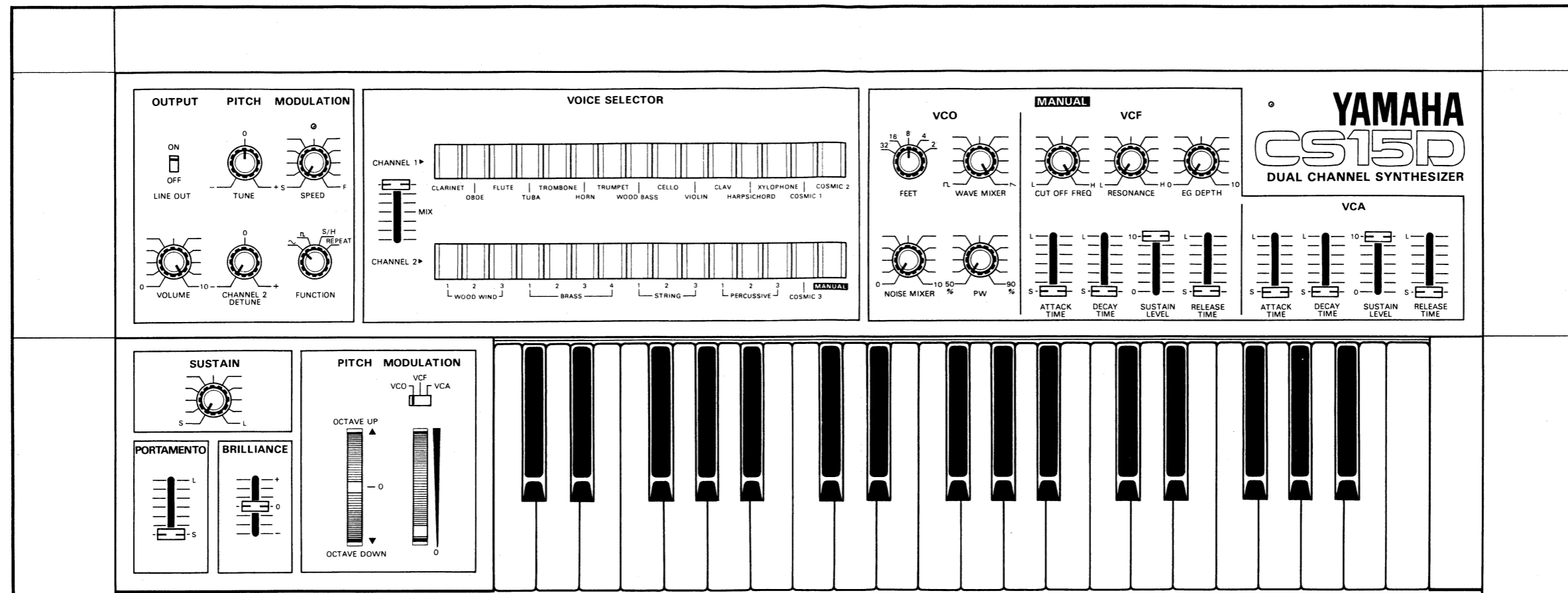
- Circuit Board : LC85132 (/PSW)

C2

Pin No.	Pin Name	Wire Color	Destination
1	T1	GG	VCF (C6-2)
2	T2	WH	VCF (C6-3)
3	KO	GY	SSK (C4-5)
4	KV2	SB	VCO (C4-4)
5	KV3	PK	VCO (C4-3)
6	KV1	S-BE	SSK (C4-1)
7	-	S-BE-S	-

# PANEL SETTING

## パネルの初期セッティング/INITIAL SETTING



## 各ツマミの位置/CONTROLS POSITION

BLOCK	FUNCTION	POSITION
OUTPUT	LINE OUT	ON
	VOLUME	10
PITCH	TUNE	0
	CHANNEL 2 DETUNE	0
MODULATION	SPEED	S
	FUNCTION	ANY
VOICE SELECTOR	CHANNEL 1	ANY
	CHANNEL 2	MANUAL
	MIX	CH1 or CH2

BLOCK	FUNCTION	POSITION
MANUAL VCO	FEET	8'
	NOISE MIXER	0
	WAVE MIXER	∩
	PW	50%
MANUAL VCF	CUT OFF FREQ	H
	RESONANCE	L
	EG DEPTH	0
	ATTACK TIME	0
	DECAY TIME	0
	SUSTAIN LEVEL	10
	RELEASE TIME	0

BLOCK	FUNCTION	POSITION
MANUAL VCA	ATTACK TIME	0
	DECAY TIME	0
	SUSTAIN LEVEL	10
	RELEASE TIME	0
EFFECT	SUSTAIN	S
	PORTAMENTO	S
	BRILLIANCE	0
	PITCH WHEEL	0
	MODULATION SWITCH	ANY
	MODULATION WHEEL	0

## ADJUSTING INSTRUCTIONS

### TUNING

Tuning should be performed after completing adjustments described in "SSK CIRCUIT BOARD 1. POWER SUPPLY VOLTAGE AND KEY VOLTAGE ADJUSTMENTS (DC SSK CIRCUIT BOARD).

On completion of adjustment for Ch1, adjust Ch2 similarly. Figures indicated in parentheses are those for Ch-2. The output is observed at "2/MIX of the rear panel.

### PROCEDURES

1. Depress "HORN (BRASS 2)" of the VOICE SELECTOR buttons.
2. Bring the MIXING lever fully to the top (bottom) of Ch1 (Ch2).
3. Other controls should be set in accordance with the panel setting shown in P 33.
4. Using VR5 (VR9) on the VCO circuit board, roughly adjust so that it will be C5 +12 cent at KEY-ON of C5. Then, using VR6 (VR10) perform fine adjustment.
5. Adjust VR4 (VR8) of the VCO circuit board so that it will be C2 +12 cent at KEY-ON of C2.
6. Repeat alternating adjustments of the C5 key (Step 4) and C2 key (Step 5).

Step	KEY	Measuring Point	Rated Value	Adjusting Point		Remarks
				Ch1	Ch2	
1	Select "HORN" for Ch1 and "BRASS 2" for Ch2. Set MIXING lever to either Ch1, or Ch2, either of the channels which is to be adjusted.					
2	C5 (Highest note)	Output terminal MIX 2	C5 + 12 cent	VR 5	VR 9	Rough adjustment
				VR 6	VR 10	Fine adjustment
3	C2 (Lowest note)		C2 + 12 cent	VR 4	VR 8	
4	Repeat steps 2 & 3 to bring C5 and C2 to rated values.					



## SSK CIRCUIT BOARD

### 1. POWER SUPPLY VOLTAGE AND KEY VOLTAGE ADJUSTMENTS (DC, SSK CIRCUIT BOARD)

Adjustments are to be performed after the set has been let to age for 15 minutes following power switch-on.

Measuring point (SSK)	Rated value (V)	Adjustment (DC)
+15 (C7-3) ↔ E (C7-2)	+15.00±0.01	VR 1
-15 (C7-1) ↔ E (C7-2)	-15.00±0.01	VR 2
PB (C5-5) ↔ E (C7-2)	+2.000±0.002*	(Confirmation) VR 1

\* Confirm that the PITCH BEND wheel is at the click-stop position.

Voltages as listed below should be obtained at the respective terminals at KEY-ON of C2 (Lowest note)

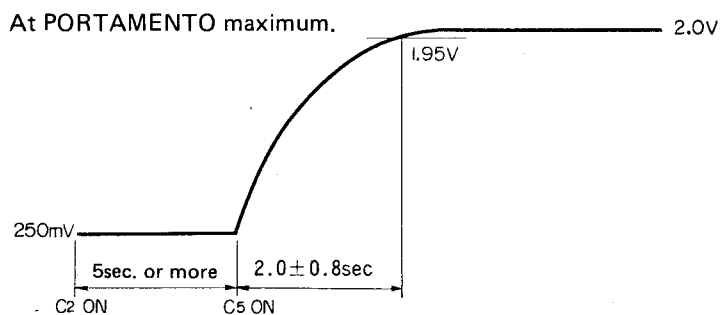
Measuring point (SSK)	Rated value	Adjustment (SSK)
KV0 (C2-1) ↔ E (C7-2)	500±0.4mV	VR 1
P0 (C5-2) ↔ E (C7-2)	250±0.2mV	VR 2
KV 1 (C5-6) ↔ E (C7-2)	250±0.2mV	VR 3

Confirm that the voltages corresponding to the respective keys as listed below are obtained at the KV1 (C5-6) E (CR-2) terminals.

KEY	C2	C3	C4	C5
Voltage	250±0.2mV	500±0.5mV	1.000±0.002V	2.000±0.002V

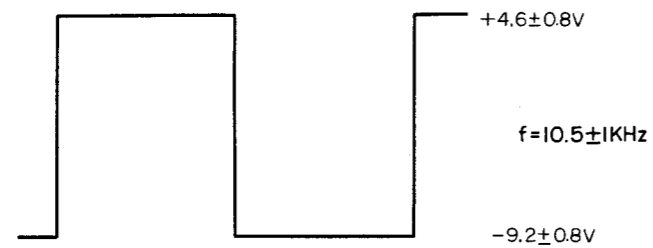
### 2. CONFIRMATION OF PORTAMENTO FUNCTIONS

With the PORTAMENTO lever set to maximum (top), effect KEY-ON for C2. Then wait for at least 5 seconds and effect KEY-ON for C5. Confirm that the time it takes for the voltage at KV1 (C5-6) ↔ E(C7-2) to rise from 1.95V to 0.25V is shown in the following graph.



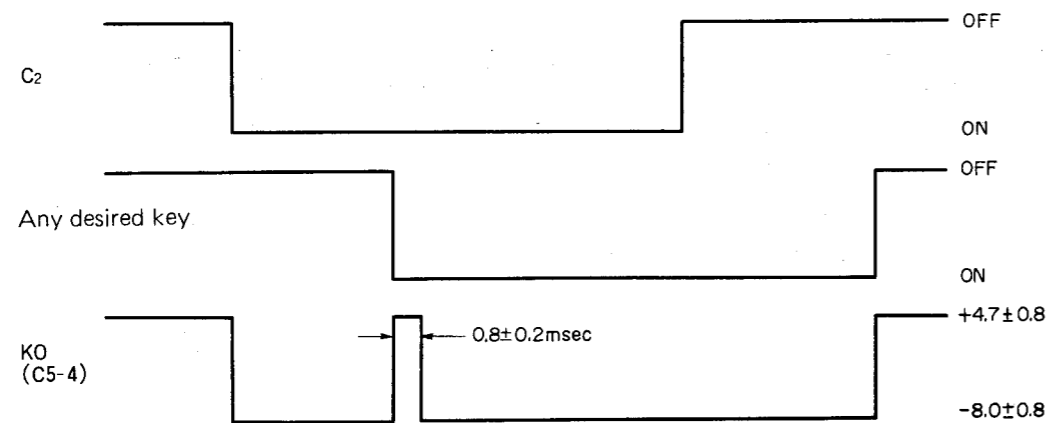
### 3. CONFIRMATION OF CLOCK SIGNAL

The CLOCK waveform as shown below should be obtained at the  $\phi$  (C2-1) terminal.



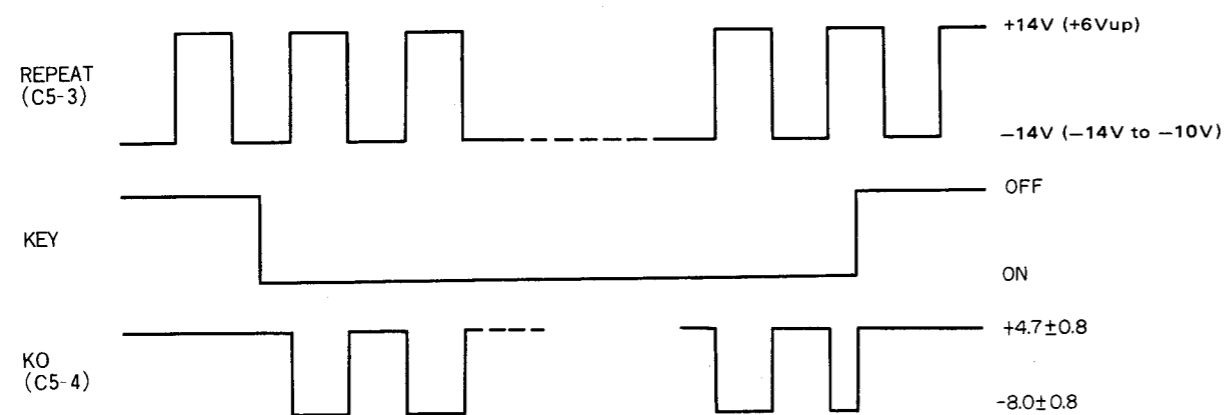
### 4. CONFIRMATION OF TRIGGER SIGNAL

Confirm that the waveforms as shown below are obtained at terminal KO (C5-4), when KEY-ON is effected for any desired key, with C2 kept in the KEY-ON mode.

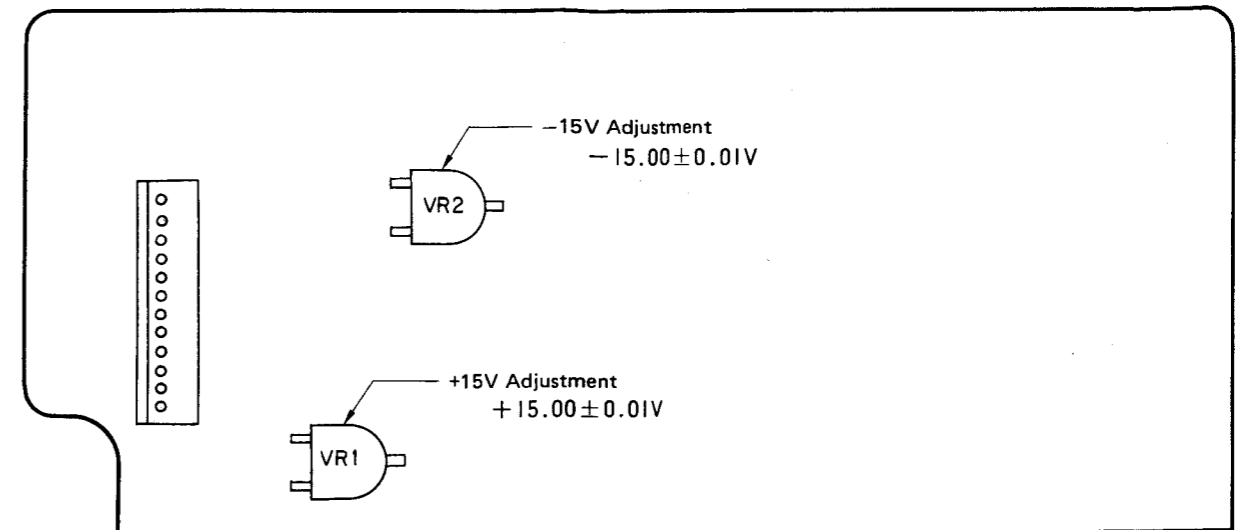


### 5. CONFIRMATION OF REPEAT TRIGGER

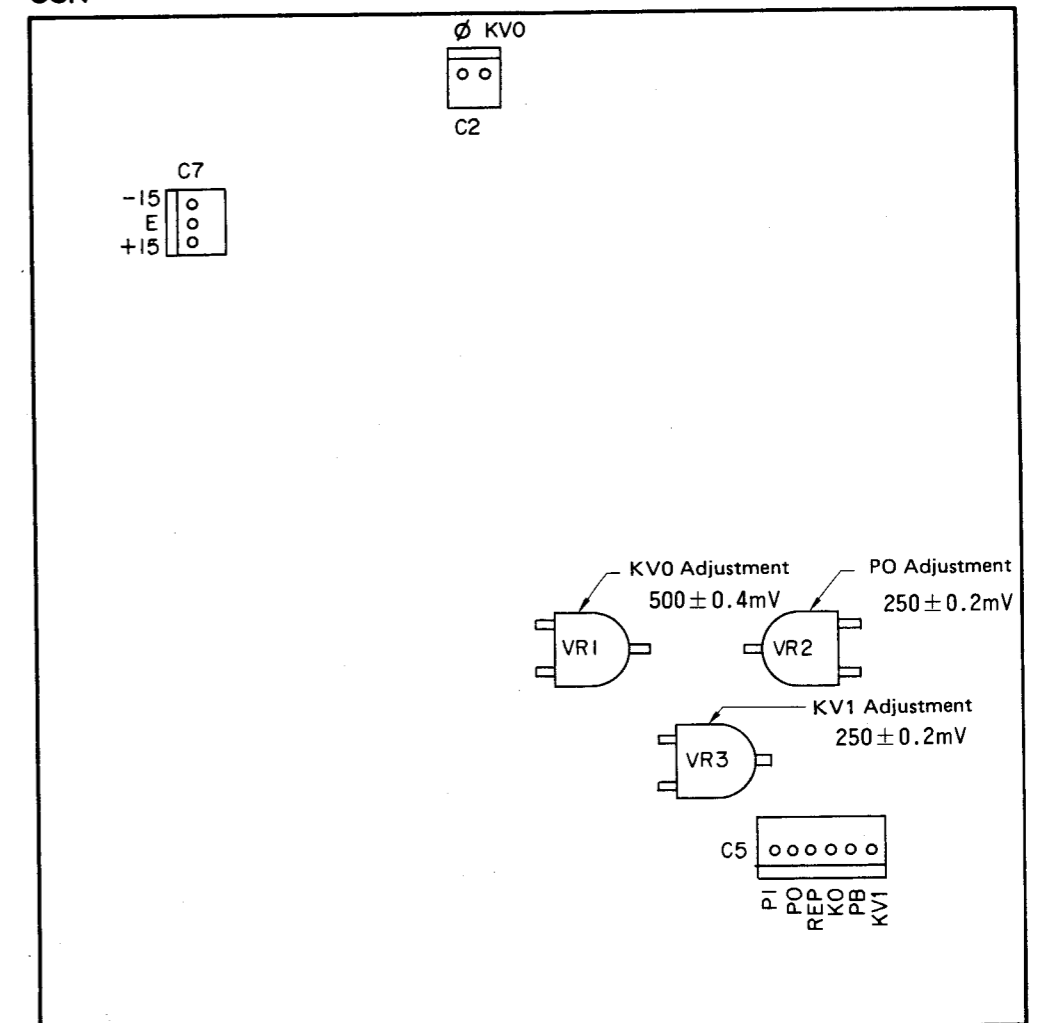
With the MODULATION FUNCTION switch positioned to "REPEAT", effect KEY-ON and KEY-OFF for any desired key. Confirm that the waveform as shown below is obtained.



### DC



### SSK



## VCO CIRCUIT BOARD

### 1. ADJUSTMENT OF LFO CIRCUIT

Following the table given below, adjust the oscillating frequency and confirm and adjust the waveform and level.

Step	Mesuring Point	Setting	Rating	Adjustment	Waveform
1	Oscillating Frequency TP6	SPEED S (Fully counter-clockwise)	0.1 ± 0.02Hz	VR3	
2	IC 6 ⑥ Pin	SPEED F (Fully clockwise)	100 ± 10Hz	VR2	
3	TP5 (IC 6 ⑦ Pin) TP8 (IC 7 ⑦ Pin)	TP5 (sawtooth wave) TP8 (Square wave) TP9 (REPEAT)	+1.8V±0.3 -1.8V±0.3 +1.2±0.2 -1.2±0.2 ±3±1V		
4	TP4 Noise Level		-3 ± 1dBm	VR1	
5	TP8	FUNCTION	Specified waveform must be obtained by switching the FUNCTION.		

## 2. VCO CIRCUIT

### 2-1. CONFIRMATION OF LFO MODULATION DEPTH

Set the LFO SPEED to "S", FUNCTION to "□", modulation to VCO section and Feet to "4" (Ch1 to FLUTE). Key-on C5 then confirm that the width of the oscillating frequency variation is within the range shown in the following table when the wheel is turned up to maximum.

Measuring point		Frequency variation by LFO		TUNE, DETUN: Center LFO SPEED: S FUNCTION: □ } * MODULATION: VCO WHEEL: Max.
CH 1	Ch 2	MIN	MAX	
TP 15	TP 17	1180±150Hz	3100±200Hz	

\* To facilitate measurement by frequency counter.

### 2-2. ADJUSTING OSCILLATING FREQUENCY RANGE

Step	KEY	Measuring point		Rated Value	Adjusting point		Remarks
		Ch 1	Ch 2		Ch 1	Ch 2	
1		TP10		0±0.1V	Turn TUNE of panel and bring voltage to rated voltage.		
1' (For Ch2 only)	C5 KV3 : 2±0.001 VOLT.		TP12	0±50μV		VR12	After disconnecting connector C4, bring voltage to rated voltage when KV3 (C4-3) is grounded.
			TP12 (KV4)	2±0.001V (1.29±0.1V) (3.30 <sup>+0.2</sup> <sub>-0.4</sub> V)		VR13	Set DETUNE to the 12-o'clock position and equalize KV3 and KV4. Confirm DETUNE's variable range.
2		Set FEET to "2". * When adjusting Ch1, disconnect connector C5.					
3		TP14	TP16	0±0.1mV	VR7	VR11	IC14 (1), IC13 (2) offset
4	C5 (Highest note)			4214.5±1Hz	VR5 VR6	VR 9 VR10	Rough adjustment Fine adjustment
5	C2 (Lowest note)	TP15	TP17	526.9±0.5Hz	VR4	VR 8	Repeat steps 4 to 5.

### 2-3. CONFIRMATION OF OSCILLATING FREQUENCY BY SWITCHOVER OF FEET

FEET is switched over by bringing the three control terminals 1FT1 ~ 3 (Ch1) and 2FT1 ~ 3 (Ch2), either to H (10V), or L (OPEN). Switching of FEET for Ch1 is effected by the VOICE SELECTOR and by attaching or detaching the connectors. For Ch2, the same is effected through MANUAL control using the FEET switch.

FEET	1FT/2FT			Ch1 (TP15) Measuring point Ch2 (TP17)	Setting of Ch1
	3	2	1		
Confirm that the oscillating frequency for each FEET is as shown below.					
2'	L	L	L	4,215 [Hz]	Disconnect connector C5.
4'	L	L	H	2,107	FLUTE
8'	L	H	L	1,053.6	CLARINET
16'	L	H	H	526.8	TROMBONE
32'	H	L	L	263.4	TUBA

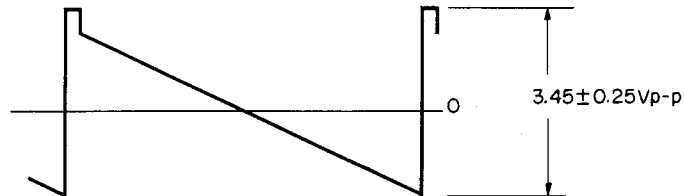
H : +9.8V (ON)  
L : -5V (OPEN)

### 2.4. CONFIRMATION OF VARIABLE RANGE AND OUTPUT WAVEFORM OF TUNE CONTROL

Confirm that the variation width and waveform as shown in the following diagram can be obtained.

Adjusting Points		Frequency Range by TUNE (at 4')			
Ch 1	Ch 2	Fully Counterclockwise	Center	Fully Clockwise	Center
TP 15	TP 17	$2010 \pm 20\text{Hz}$	2107Hz	$2205 \pm 20\text{Hz}$	Following waveform should be obtained.

With Ch 1 set to "FLUTE" and Ch 2 to "MANUAL", select "4 FEET". Then, effect KEY-ON for the C5 key.

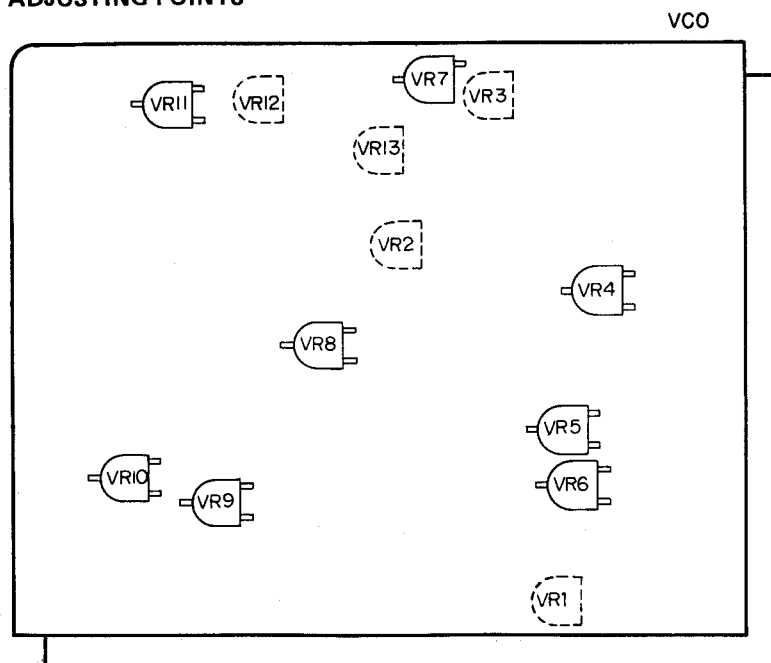


### 3. CONFIRMATION OF OUTPUT CIRCUIT FUNCTIONS

Check and confirm normal functions of the LINE OUT switch of the output circuit, VOLUME knob and mixer lever of the VOICE SELECTOR section. Also confirm that normal output signals are being obtained at each output terminal.

Output	Input Terminals		Input Level	Output Level
	Ch 1	Ch 2		
LINE	IN 1	IN 2	$1.75 \pm 0.02\text{V}_{p-p}$	$5.5 \pm 0.5\text{V}_{p-p}$
PHONES	(C8-1)	(C8-3)	$300 \pm 10\text{mV}_{rms}$	$500 \pm 20\text{mV}_{rms}/8\Omega$

### ADJUSTING POINTS

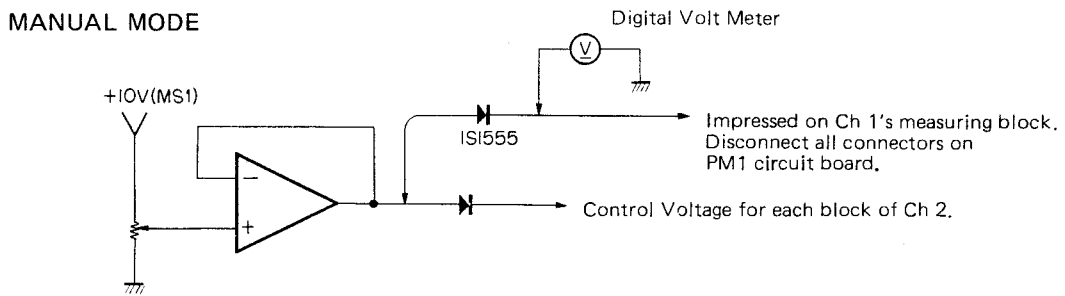


NOTE: As the circuit board is a folded circuit board, the VRs shown in dotted lines are located on the circuit board's panel side. Since an access hole for adjustment is provided, there is no need to dismount the circuit board.

## VCF CIRCUIT BOARD

The VCF circuit board is adjusted, with the specified voltage added to each block. Ch2 can be adjusted by setting the VOICE SELECTOR to "MANUAL" and then setting the voltages with the levers to the specified voltage. But for Ch1, this is not possible. Accordingly, when measuring the voltage for Ch1, use the control voltage obtained by setting Ch2 to MANUAL, dividing it by means of a diode. However, 10V is applied directly from terminal MS1 (C8-1), while 0V is obtained by connecting it to the earth pattern. For this reason, an adjusting voltage as shown in the following drawing is to be made available for that marked ☆. In this case, all the connectors of the PM1 circuit board should be disconnected so as to prevent the control voltage from being impressed.

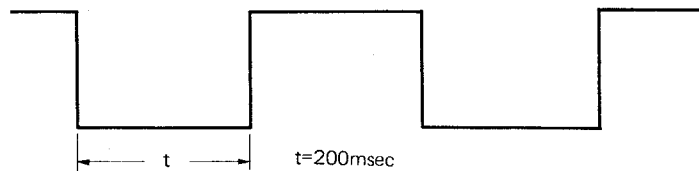
### ☆ VARIABLE POWER SUPPLY FOR ADJUSTMENT



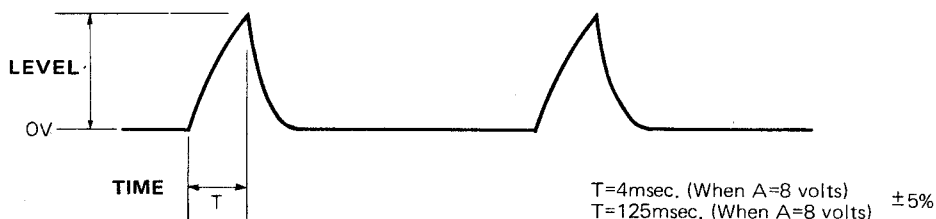
### 1. ADJUSTMENT OF ENVELOPE GENERATOR (VCF & VCA)

Adjust each VR so that the rated rise time at ATTACK and the level will be obtained when the initial set voltage as given below is impressed on A, D, S and R and ED (for VCF). Here, using the REPEAT trigger as the trigger, adjust LFO's SPEED control so that the "t" of the waveform at terminal T1 (C6-2) be  $t = 200$  msec. Here, keep depressed any desired key.

#### REPEAT TRIGGER WAVEFORMS



#### ENVELOPE WAVE FORMS



## ADJUSTMENT OF DC VOLTAGE FOR ADJUSTMENT AND IMPRESSING POINTS

Step	Details			Channel 1		Channel 2 (MANUAL)	
				EG-VCF 1	EG-VCA 1	EG-VCF 2	EG-VCA 2
Initial setting	A	8/3V☆	Variable	AF 1 (C7-6) TP30	AA 1 (C7-1) TP36	AF 2 (C6-4) TP42	AA 2 (C8-2) TP48
	D	10V	Constant	DF 1 (C7-7) TP31	DA 1 (C7-2) TP37	DF 2 (C6-5) TP43	DA 2 (C8-3) TP49
	S	0V		SF 1 (C7-8) TP32	SA 1 (C7-3) TP38	SF 2 (C6-6) TP44	SA 2 (C8-4) TP50
	R	10V		RF 1 (C7-9) TP33	RA 1 (C7-4) TP39	RF 2 (C6-7) TP45	RA 2 (C8-5) TP51
	ED			ED 1 (C7-10) TP34	EL 1 (C7-5) TP40	ED 2 (C6-8) TP46	EL 2 (C8-5) TP52
Measuring point (Oscilloscope)		Envelope		TP35	TP41	TP47	TP53
		Trigger		T 1 (C6-2)		T 2 (C6-3)	
Adjusting point	Level		10±0.5V	VR14	VR22	VR18	VR26
	T	A = 8V	4 msec	VR12	VR20	VR16	VR24
		A = 3V	125msec	VR13	VR21	VR17	VR25
	0-point level		0 Volt	VR11	VR19	VR15	VR23
			Rated value	The rise time tolerance is ±5%.			

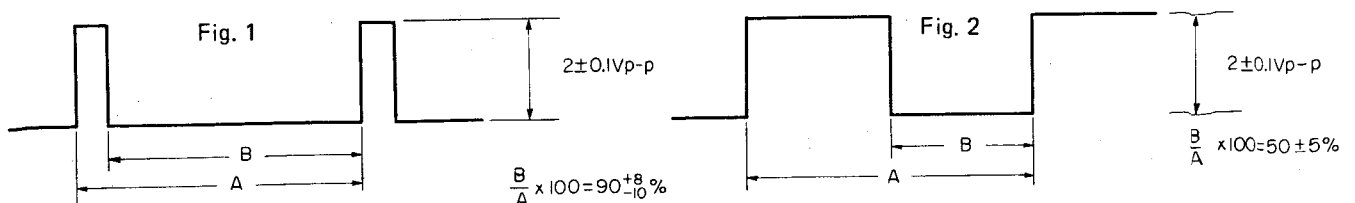
\* When A = 3V, adjust it so that the time will become shorter when it is shorter than 125msec and longer when longer than 125msec.

### 2. PW CIRCUIT

When +10V, or 0V is impressed on terminal PW1, or PW2, the following WSC output waveform should be obtained.



Voltage	Voltage impressing terminal		Measuring point		Adjusting point		Rated values
	Ch 1	Ch 2*	Ch 1	Ch 2	Ch 1	Ch 2	
10V	PW 1 (C3-1)	PW 2 (C4-2)	TP 3	TP 7	VR 1	VR 2	Fig. 1
0V	TP 2	TP 6			Confirm that the waveforms in fig. 2 is obtained.		

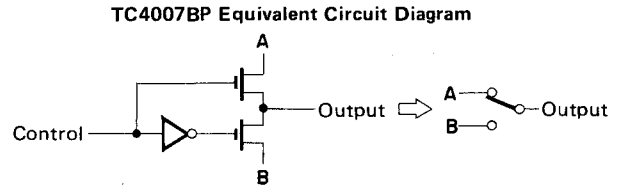
\* In case of the Ch 2, it is possible to confirm by turning PW control on the panel.



### 3. CONFIRMATION OF FUNCTIONS OF WAVEFORM SELECTOR CIRCUIT

The IC: TC4007BP employed for the waveform selector circuit, etc. is an analog switch that functions to select the signal that is being fed into A (Pins 4,11) and B (Pins, 2, 9) by using the voltage (H: 10V, or L: OPEN) applied to the Control terminal (WS1, WS2), IC3 and IC4 feed out square waves or sawtooth waves to the Output terminal. Confirm that the output changes over as shown in the following table, when the VOICE SELECTOR is changed over.

Control	VOICE SELECTOR		Control (Pins 1, 5, 12) Output waveform
	Ch 1 (IC 3)	Ch 2 (IC 4)	
H	CLARINET	WOOD WIND 1	 (Square waves)
L	FLUTE	WOOD WIND 2	 (Sawtooth waves)



Using the WAVE MIXER control, confirm that the waveform of the IC1 output will change as shown below during the MANUAL mode of Ch2, and that noise waveforms are obtained when the NOISE MIXER control is turned to the direction of 0 → 10.



### 4. ADJUSTMENTS OF VCF AND VCA CIRCUITS

After connecting a audio frequency oscillator to the SAW 1 terminal (Ch1), or SAW2 (Ch2), apply sine waves. (Connector C2 of the VCO circuit board should be disconnected so that no sawtooth wave will be fed in from the VCO.) As for the key Voltage used for VCF adjustment, 250mV generated by KEY-ON of C2 will be used. (Ch2's KV4 is adjusted by means of DETUNE.)

#### 4-1. DC VOLTAGE AND IMPRESSING POINT FOR VCF ADJUSTMENT

Adjusting Item		Details	Impressing Voltage		Voltage Impressing Point		Remarks	
4-2	4-3				Ch 1	Ch 2		
○	○	Key Volt	250mV	Fixed	KV 2 (C2-5) TP15	KV 4 (C2-7) TP22	C2 Key ON	
	○	BRILLIANCE	0V	Fixed	BRIL (C2-4) TP11		Adjust with lever	
○	☆	EG DEPTH	0, 0 ~ 10V		ED 1 (C7-10) TP34	ED 2 (C6-8) TP46		
☆	☆	CUTOFF FREQ	5, 7, 3V	Variable	CF 1 (C2-6) TP13	CF 2 (C4-5) TP20	MANUAL control is used for Ch2.	
☆	☆	RESONANCE	5, 10, 0V	Variable	RS 1 (C1-1) TP14	RS 2 (C4-6) TP21		
	○	MODULATION	1.5V	Fixed	VCFM (C2-3) TP12		Use square waves of LFO.	
	○	ENVELOPE	AF	10V	Fixed	AF 1 (C7-6) TP30	AF 2 (C6-4) TP42	MANUAL control is used for Ch2.
	○		DF	10V	Fixed	DF 1 (C7-7) TP31	DF 2 (C6-5) TP43	
	☆		SF	8.3, 0 ~ 8.3	Variable	SF 1 (C7-8) TP32	SF 2 (C6-6) TP44	
	○		RF	10V	Fixed	RF 1 (C7-9) TP33	RF 2 (C6-7) TP45	
○	○	TRIGGER	OFF 3±0.5 V ON -9.5±1 V		T 1 (C6-2) TP28	T 2 (C6-3)	Use KEY trigger.	
○	○	SAW	1K, 100 ~ 10KHz		SAW1 (C3-2) TP 1	SAW2 (C1-4) TP 5	Sine wave input*: 4Vp-p	

\* WS1 & 2 and MS2 at "OPEN". In MANUAL control, MIXER to "  " and NOISE MIXER to "0".  
Use "☆": Variable DC Power Supply for Adjustment".

#### 4-2. ADJUSTMENT OF CUT OFF FREQUENCY AND RESONANCE

KV:250mV (C2 Key-on)  
ED=0V, WS:OPEN

Step	Input Frequency Ch1 → SAW1 Ch2 → SAW2	CF Voltage Ch1 → CF1 Ch2 → CF2	RS Voltage Ch1 → RS1 Ch2 → RS2	Measuring point		Adjusting point		Rated value
				Ch1	Ch2	Ch1	Ch2	
1			5.0V	TP16 <sub>*1</sub>	TP23	VR4	VR6	Peak point (Maximum output)
2	1 KHz	5.0V*				VR3	VR5	1.75±0.02V <sub>p-p</sub>
3				TP17 <sub>*2</sub>	TP24	Sample level as above.		
4	Variable	7±0.1V*		TP16	TP23	Frequency that brings output level to peak level should agree with rated value when CF voltage is changed.		
5	Variable	3±0.1V*				4±1 KHz		
6	1 kHz	5.0V*		10V <sub>*3</sub>				0.3±0.005V <sub>p-p</sub>
7				0V <sub>*4</sub>				6±1.5V <sub>p-p</sub>

\*1 LPF output      \*2 HPF output  
\*3 RESONANCE 0,    \*4 RESONANCE 10.

#### 4-4. DC VOLTAGE FOR VCA ADJUSTMENT AND IMPRESSING POINTS

Details	Impressing Voltage		Voltage Impressing Point		Remarks	
	Ch1	Ch2	Ch1	Ch2		
EG LEVEL	0/8.3/10V*		EL 1 (C7-5) TP40	EL 2 (C8-6) TP52		
ENVELOPE	AA	10V	Fixed	AA 1 (C7-1) TP36	AA 2 (C8-2) TP48	MANUAL control possible for Ch2.
	DA	10V	Fixed	DA 1 (C7-2) TP37	DA 2 (C8-3) TP49	
	SA	0/8.3V*		SA 1 (C7-3) TP38	SA 2 (C8-4) TP50	
	RA	10V	Fixed	RA 1 (C7-4) TP39	RA 1 (C8-5) TP51	
MODULATION	1.5V (DC) 100Hz3V <sub>p-p</sub>			VCAM (C4-1) TP27		Use of LFO (SPEED max) possible. (~ and □)
TRIGGER	OFF 3±0.5V ON -9.5±1V		T1 (C6-2) TP28	T 2 (C6-3)	Use KEY trigger	

\* FS at "OPEN", LPF output fed into VCA.

#### 4-5. VCA A With th

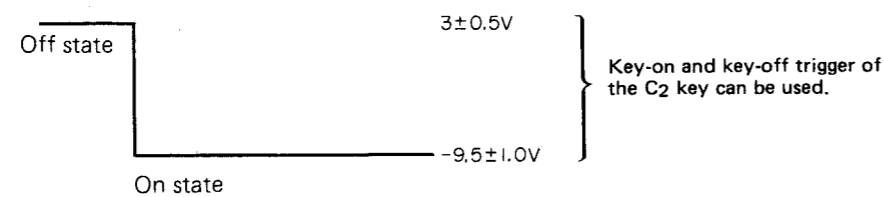
Step	Im Ch
	EL
10	SA
	T 1
11	When holder With E
12	
13	(

#### 4-3. CONFIRMATION OF VCF MODULATION AND EG DEPTH

Set it to the state described in Step 2 of 4-2, and perform the following adjustments.

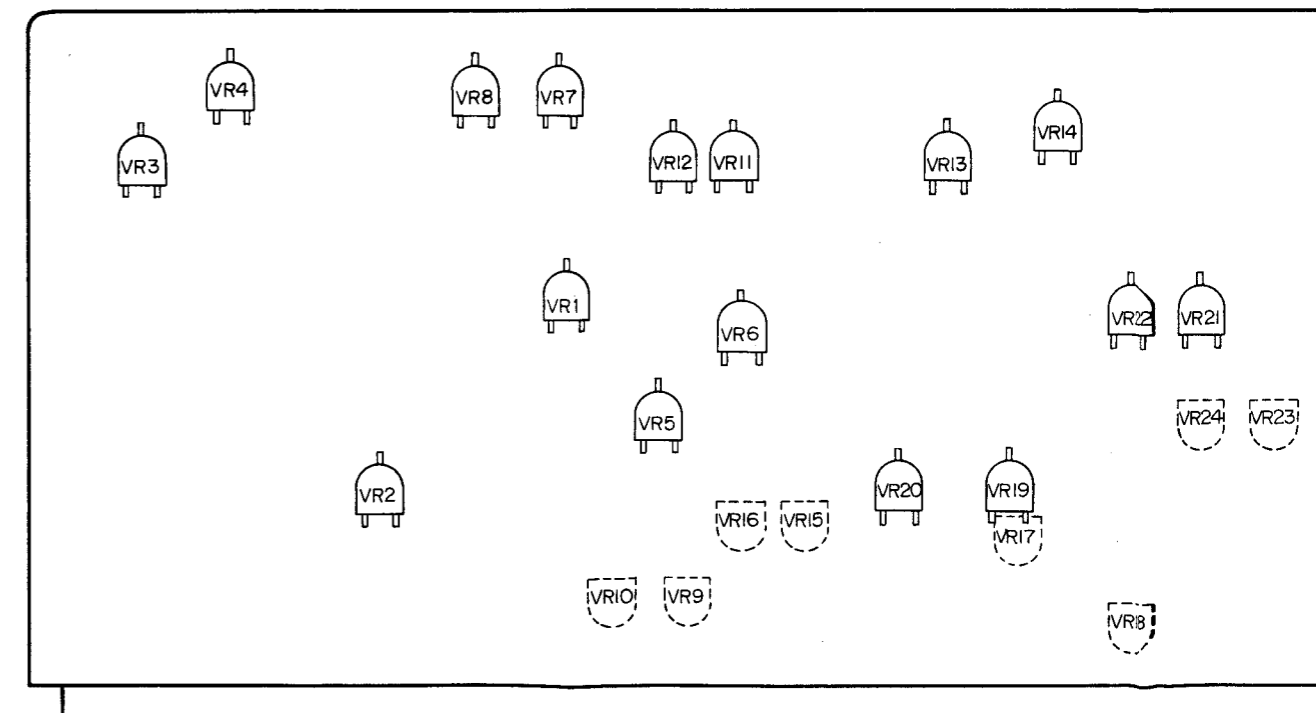
Step	Impressing Terminal		Voltage	Measuring Point		Details	Rated values	
	Ch1	Ch2		Ch1	Ch2			
8	VCFM (TP12)		1.5±0.1V			Should agree with rated value.	0.7±0.2V <sub>p-p</sub>	
9	AF 1	AF 2	10V Constant	TP16	TP23	1. Set ED to 10V, and SF to 0 ~ 8.3V 2. Set SF to 8.3. ED variable between 0 ~ 10V. When varied as 1, or 2, the value should change according to the rated value during KEY-ON mode.	1.75±0.02V <sub>p-p</sub>	
	DF 1	DF 2						
	RF 1	RF 2						
	SF 1	SF 2						0 ~ 8.3V*
	ED 1	ED 2						10 ~ 0V*
	T 1	T 2	Trigger *			0.7±0.2V <sub>p-p</sub>		

#### \* TRIGGER



#### ADJUSTING POINTS

#### VCF



NOTE: As the circuit board is a folded circuit board, the VRs shown in dotted lines are located on the circuit board's panel side. Since an access hole for adjustment is provided, there is no need to dismount the circuit board.



1mV (C2 Key-on)  
WS:OPEN

Rated value
Peak point (Maximum output)
1.75±0.02V <sub>p-p</sub>
4±1 KHz
250±100Hz
0.3±0.005V <sub>p-p</sub>
6±1.5V <sub>p-p</sub>

#### 4-4. DC VOLTAGE FOR VCA ADJUSTMENT AND IMPRESSING POINTS

Details	Impressing Voltage		Voltage Impressing Point		Remarks
			Ch1	Ch2	
EG LEVEL	0/8.3/10V*		EL 1 (C7-5) TP40	EL 2 (C8-6) TP52	
ENVELOPE	AA	10V Fixed	AA 1 (C7-1) TP36	AA 2 (C8-2) TP48	MANUAL control possible for Ch2.
	DA	10V Fixed	DA 1 (C7-2) TP37	DA 2 (C8-3) TP49	
	SA	0/8.3V*	SA 1 (C7-3) TP38	SA 2 (C8-4) TP50	
	RA	10V Fixed	RA 1 (C7-4) TP39	RA 1 (C8-5) TP51	
MODULATION	1.5V (DC) 100Hz3V <sub>p-p</sub>		VCAM (C4-1) TP27		Use of LFO (SPEED max) possible. (∧ and □)
TRIGGER	OFF 3±0.5V ON -9.5±1V		T1 (C6-2) TP28	T 2 (C6-3)	Use KEY trigger

\* FS at "OPEN", LPF output fed into VCA.

#### 4-5. VCA ADJUSTMENT

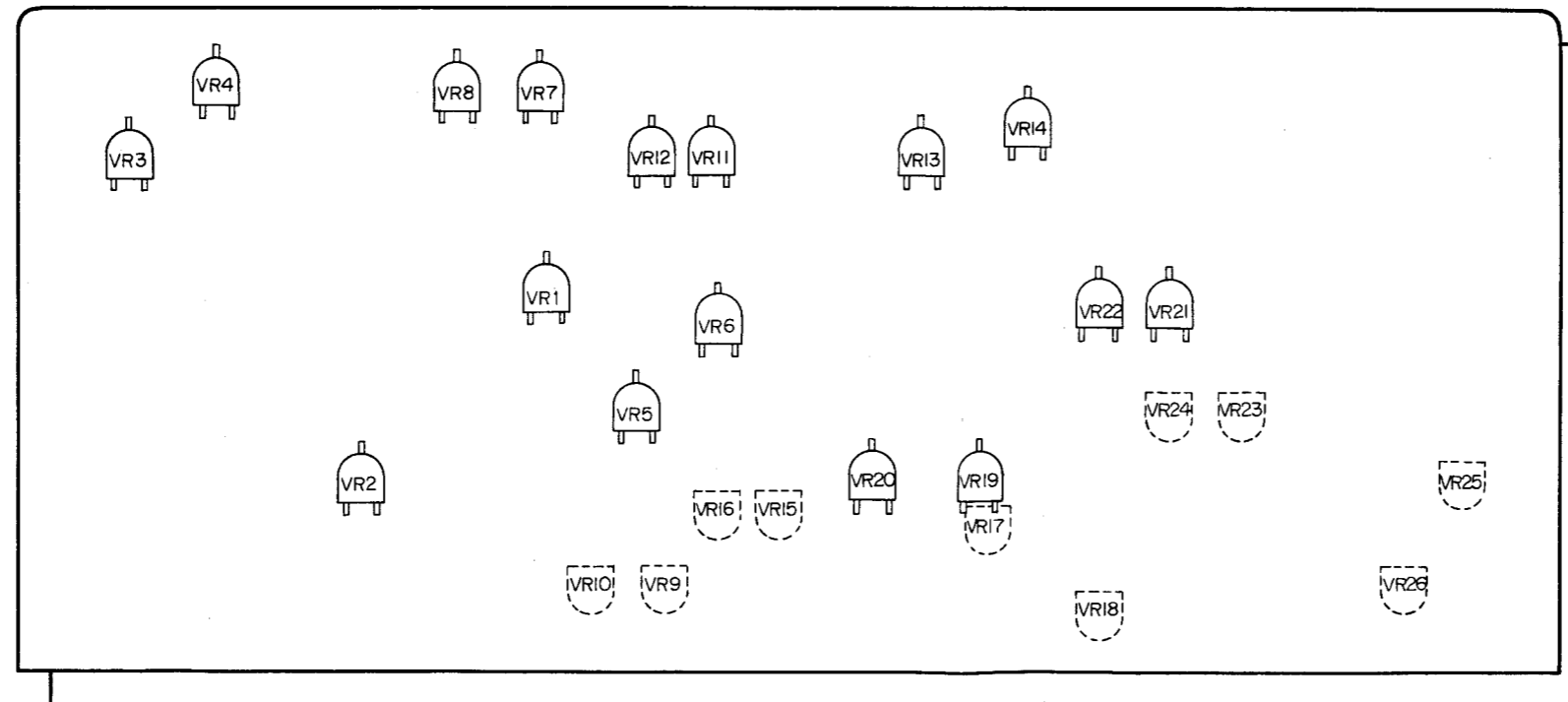
With the VCA set in the state of Step 2 of 4-2, perform the following adjustments.

Step	Impressing terminal		Voltage	Measuring point		Adjusting point		Rated value
	Ch1	Ch2		Ch1	Ch2	Ch1	Ch2	
10	EL 1	EL 2	10V	TP19	TP26	VR 7	VR9	1.75±0.02V <sub>p-p</sub>
	SA 1	SA 2	8.3V*					
	T 1	T 2	Trigger					
11	When changed from the above condition, output should change from 75 ~ 0 when SA is changed from 8.3 ~ 0V while holding EL at constant 10V, and when EL is changed from 10 ~ 0V while holding SA at constant 8.3V. With EL at 8.3V, perform the following adjustments.							
12	VCAM		1.5±0.1V	TP19	TP26	To agree with rated voltage		5.8±0.4V <sub>p-p</sub>
13	VCAM (100Hz sine wave or LFO ~)		3V <sub>p-p</sub>			VR 8	VR 10	Minimum output
Adjust so that output will be minimum when oscillator input to SAW terminal has been disconnected and the terminal is grounded to E (C3-3), or (C1-3).								

Rated values
0.7±0.2V <sub>p-p</sub>
1.75±0.02V <sub>p-p</sub>
0.7±0.2V <sub>p-p</sub>

#### ADJUSTING POINTS

VCF



NOTE: As the circuit board is a folded circuit board, the VRs shown in dotted lines are located on the circuit board's panel side. Since an access hole for adjustment is provided, there is no need to dismount the circuit board.

# LIST OF PM CIRCUIT BOARD CONTROL VOLTAGES

The control voltage for each voice for the PM1 and PM2 circuit boards are as listed below. The voltages are those obtained with the connector attached. H and L will be as shown below.

1 FT1 ~ 1FT3, 2FT1 ~ 2 FT3 ..... H : 9.8V  
 L : -4.5V  
 WS1 ~ FS1, WS2 ~ FS2 ..... H : 9.8V  
 L : -6.8V

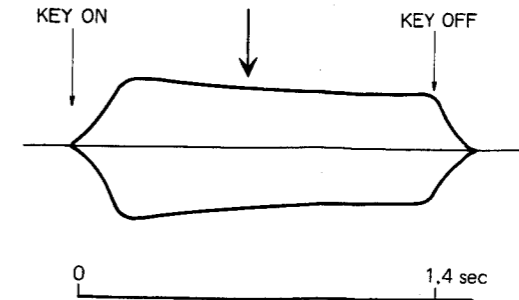
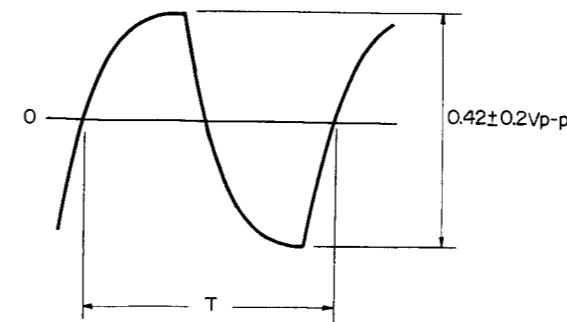
## PM1 CIRCUIT BOARD

Voices Terminal	Clari- net	Oboe	Flute	Tuba	Trom- bone	Horn	Trum- pet	Wood Bass	Cello	Violin	Clav	Harpsi- chord	Xylo- phone	Cosmic 1	Cosmic 2
	P1 C3-1	P2 C3-2	P3 C3-3	P4 C3-4	P5 C3-5	P6 C3-6	P7 C3-7	P8 C3-8	P9 C1-1	P10 C1-2	P11 C1-3	P12 C1-4	P13 C1-5	P14 C1-6	P15 C1-7
1FT1 (C4-1)	L	L	H	L	H	L	H	L	H	H	H	L	L	H	L
1FT2 (C4-3)	H	H	L	L	H	H	L	L	H	L	H	H	L	H	L
1FT3 (C4-5)	L	L	L	H	L	L	L	H	L	L	L	L	L	L	H
WS1 (C4-7)	H	H	L	L	L	L	L	H	L	L	H	H	H	L	H
FS1 (C4-8)	L	H	L	L	L	L	L	L	L	L	L	L	L	H	L
PW1 (C4-9)	0	10	0	0	0	0	0	3.54	0	0	10	10	0	0	7.44
CF1 (C2-1)	0	3.96	3.09	0	0	0	0	0	4.95	0	3.96	3.09	0	0.76	0.62
RS1 (C2-2)	10	7.44	6.35	5.89	10	7.12	7.80	8.11	10	10	6.35	10	7.12	3.54	0.90
ED1 (C2-3)	4.95	0	0.17	1.74	5.44	2.30	5.44	1.27	0	9.58	6.35	4.50	4.95	2.02	6.35
AF1 (C2-4)	1.50	1.08	1.27	1.27	1.27	2.02	4.95	8.11	10	10	6.73	10	10	1.74	0
DF1 (C2-5)	0	1.08	4.50	1.27	4.50	1.27	1.08	3.96	10	10	4.95	2.68	5.44	2.68	0.90
SF1 (C2-6)	5.89	1.27	3.96	5.89	3.54	1.74	2.30	0	0	6.35	2.30	0.14	0	0	1.08
RF1 (C2-7)	2.02	7.44	5.89	1.27	10	0	10	5.44	10	0	10	3.09	10	10	9.78
EL1 (C2-8)	3.09	3.96	10	3.96	3.54	5.44	2.68	6.35	4.95	3.96	2.30	3.09	3.09	1.74	1.74
AA1 (C2-9)	2.02	10	0.76	1.74	4.93	2.68	10	6.35	0.62	1.27	10	10	10	10	9.78
DA1 (C2-10)	1.74	10	0	1.50	10	0	10	1.74	10	1.27	2.68	1.50	3.09	10	9.78
SA1 (C2-11)	6.73	8.11	8.39	6.73	8.39	8.39	8.39	0	8.11	8.39	0	0.76	0	8.39	8.11
RA1 (C2-12)	6.35	10	6.73	5.89	10	7.12	10	3.96	9.27	10	10	3.54	10	10	9.78

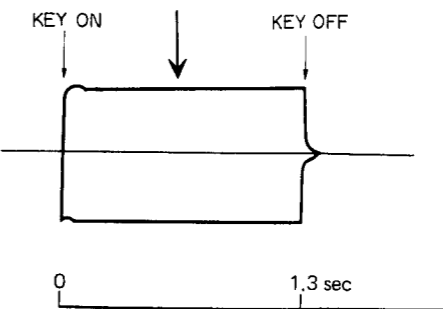
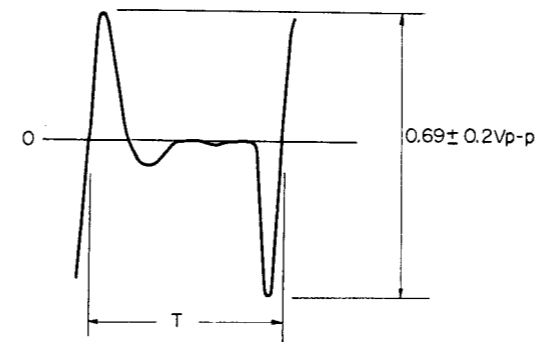
## OUTPUT WAVEFORMS AND ENVELOPE WAVEFORMS

The output waveform diagram shows the waveform sampled at the ↓ position of the envelope following K  
 \* The waveform voltage and envelope time are reference values.

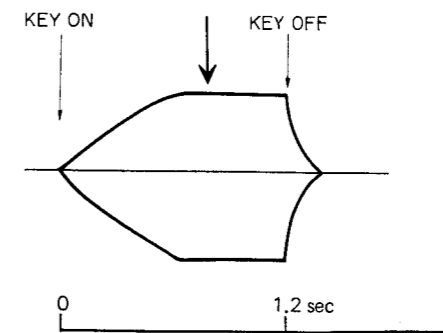
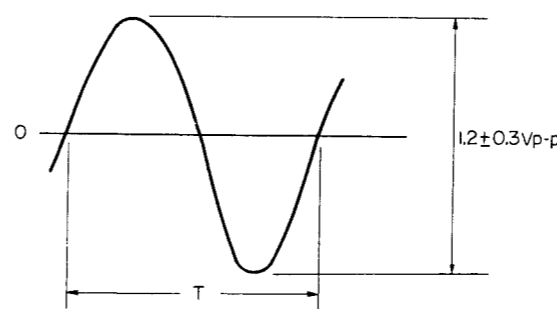
### VOICE 1 CLARINET



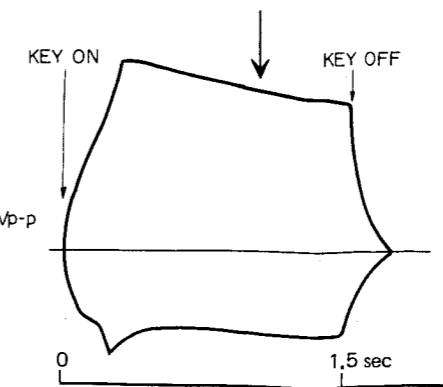
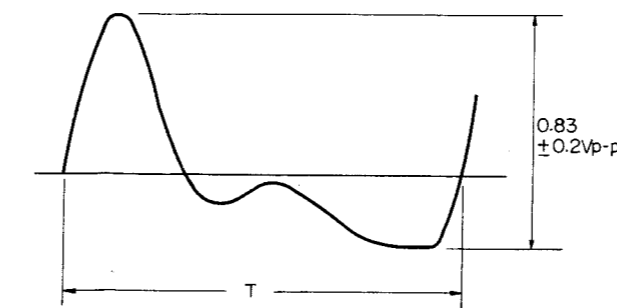
### VOICE 2 OBOE



### VOICE 3 FLUTE



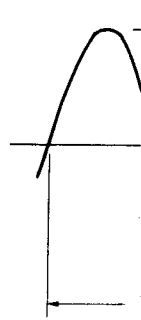
### VOICE 4 TUBA



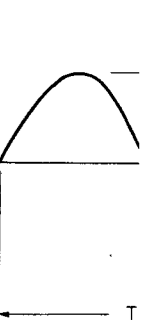
### VOICE 5 TROMBONE



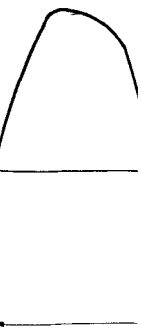
### VOICE 6 HORN



### VOICE 7 TRUMPET



### VOICE 8 WOODWIND

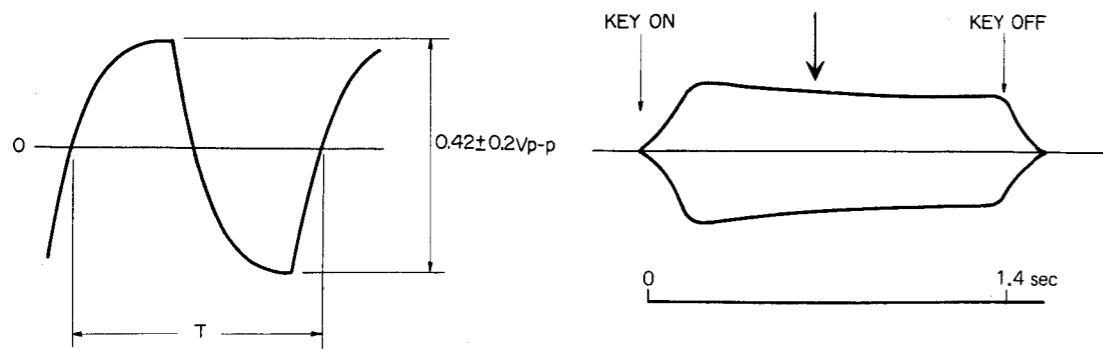


**OUTPUT WAVEFORMS AND ENVELOPE WAVEFORMS**

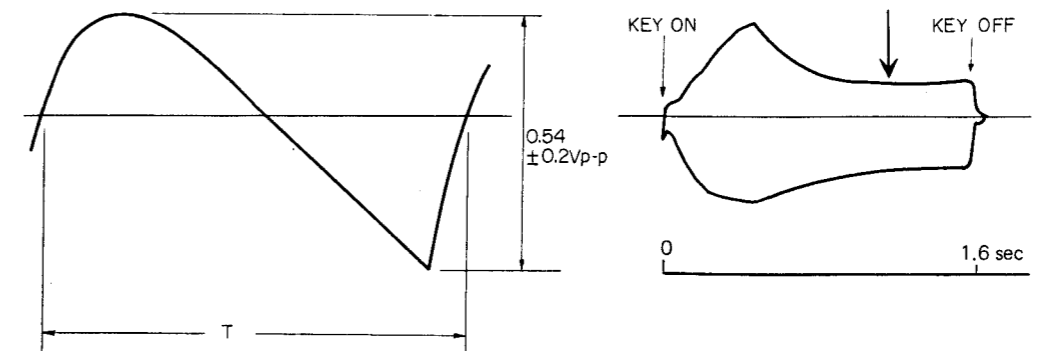
The output waveform diagram shows the waveform sampled at the ↓ position of the envelope following KEY-ON.  
 \* The waveform voltage and envelope time are reference values.

s are those

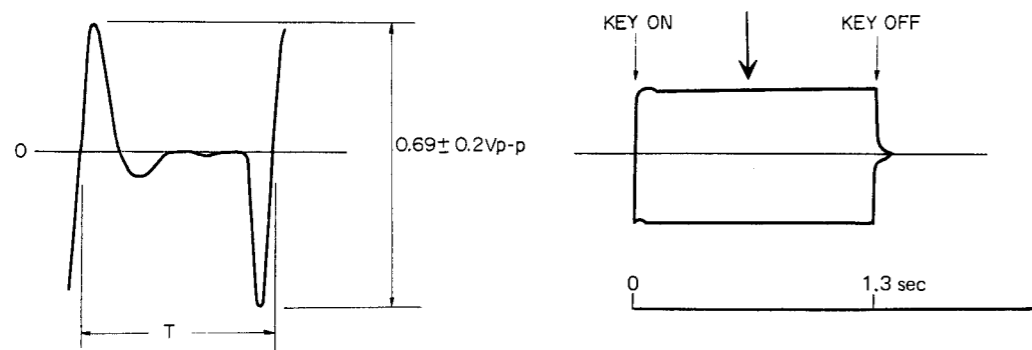
**VOICE 1 CLARINET**



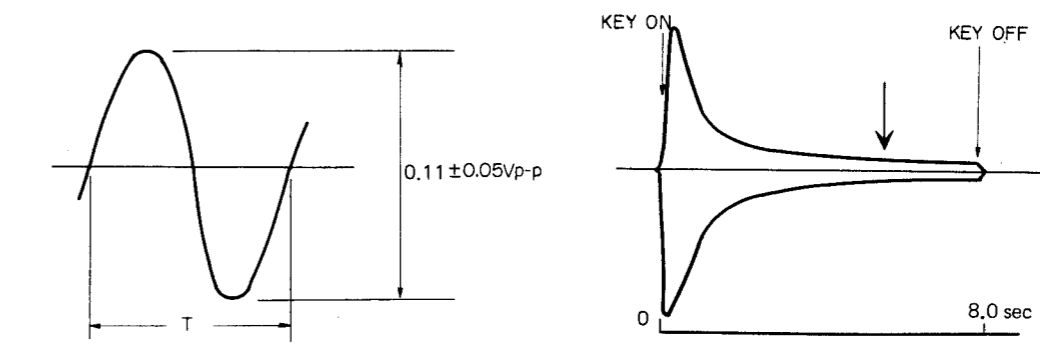
**VOICE 5 TROMBONE**



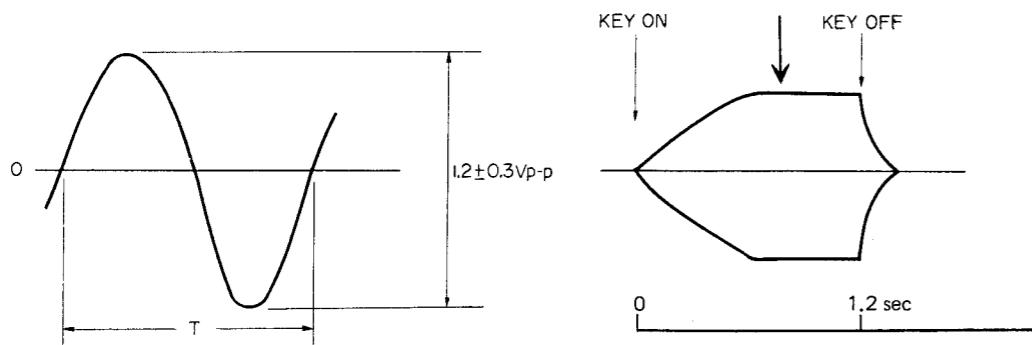
**VOICE 2 OBOE**



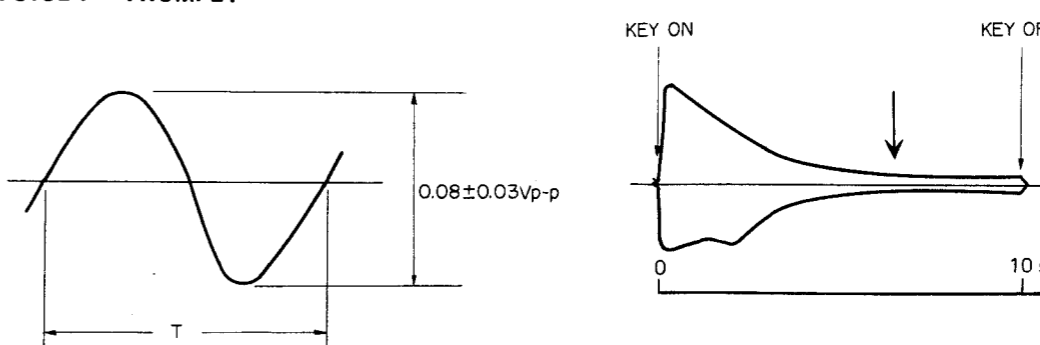
**VOICE 6 HORN**



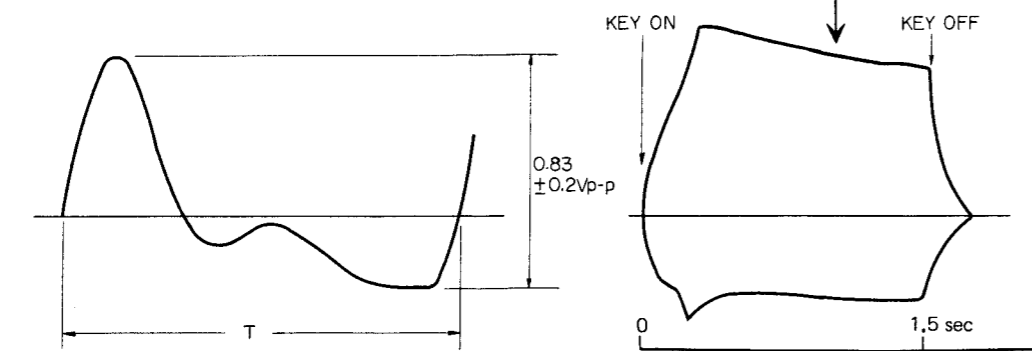
**VOICE 3 FLUTE**



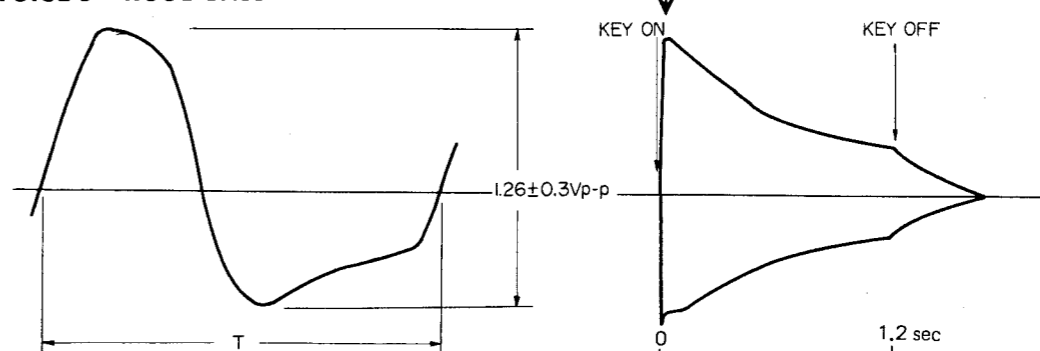
**VOICE 7 TRUMPET**



**VOICE 4 TUBA**

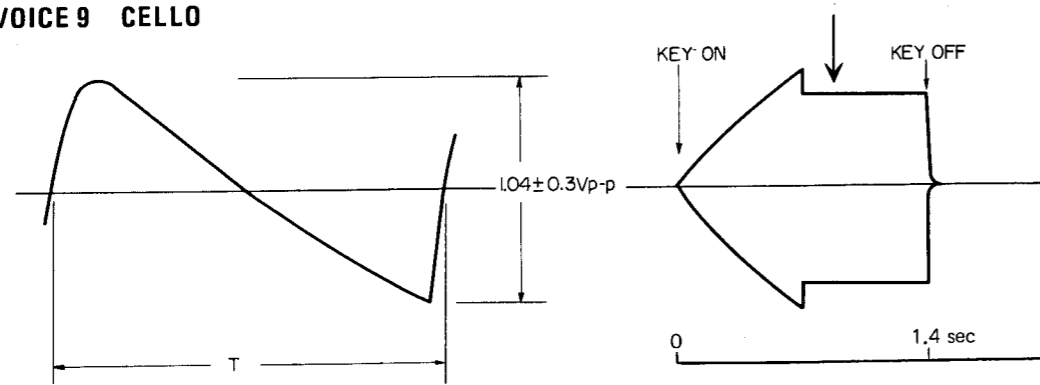


**VOICE 8 WOOD BASS**

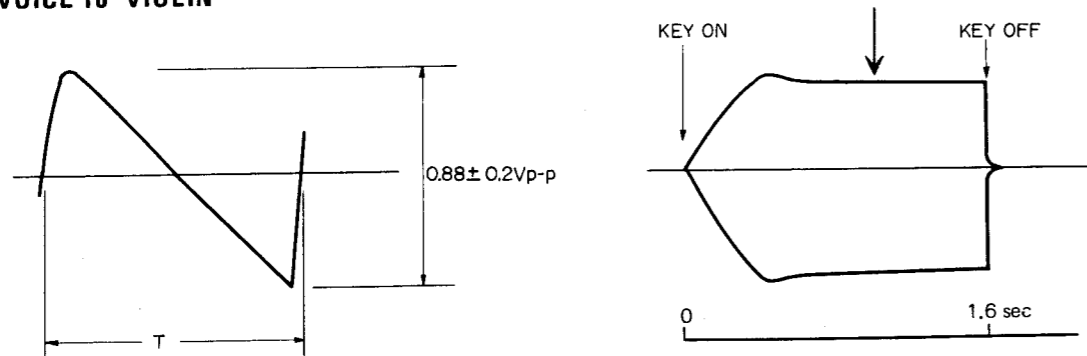


Cosmic 1	Cosmic 2
P14 C1-6	P15 C1-7
H	L
H	L
L	H
L	H
H	L
0	7.44
0.76	0.62
3.54	0.90
2.02	6.35
1.74	0
2.68	0.90
0	1.08
10	9.78
1.74	1.74
10	9.78
10	9.78
8.39	8.11
10	9.78

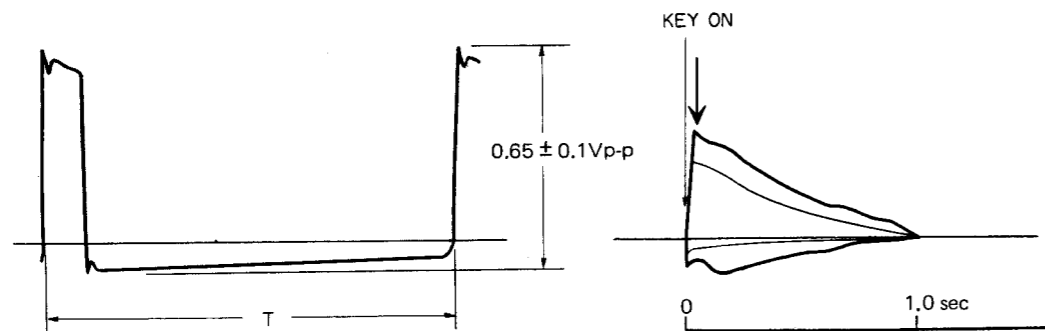
**VOICE 9 CELLO**



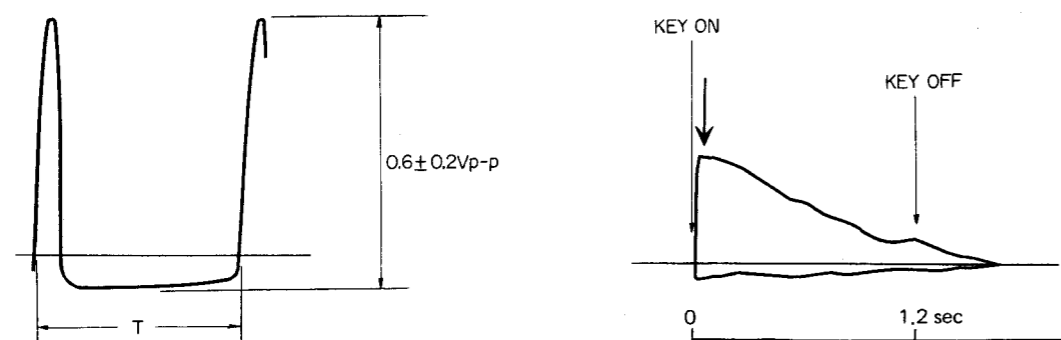
**VOICE 10 VIOLIN**



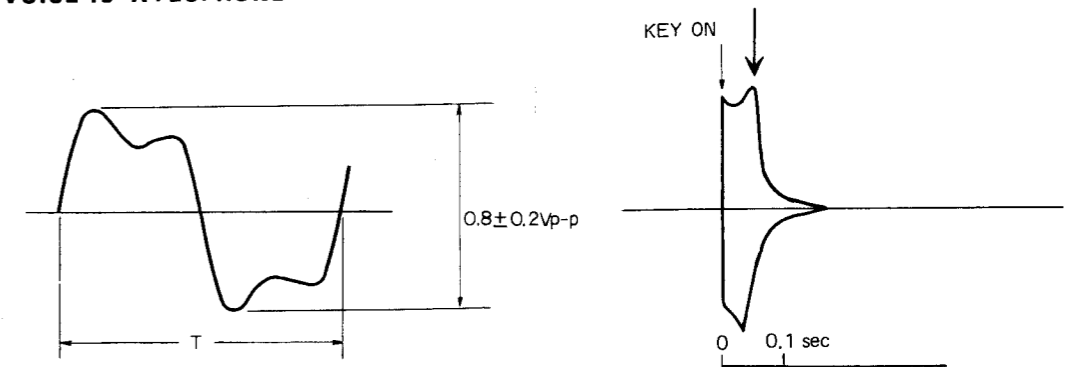
**VOICE 11 CLAV**



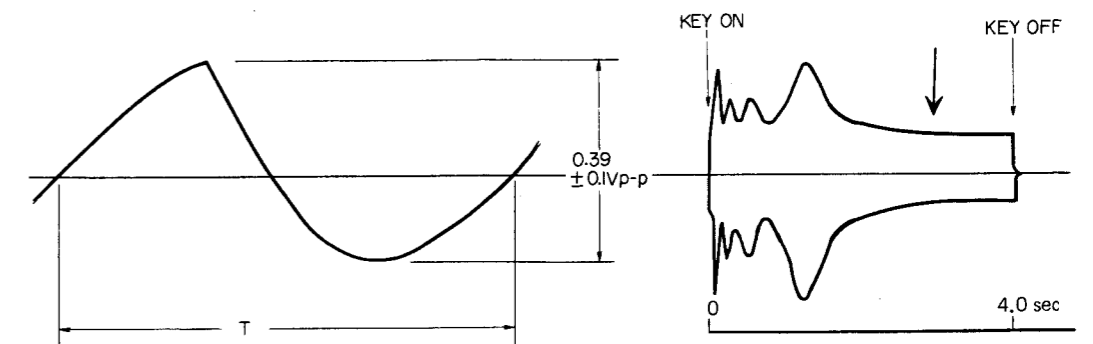
**VOICE 12 HARPSOCHODE**



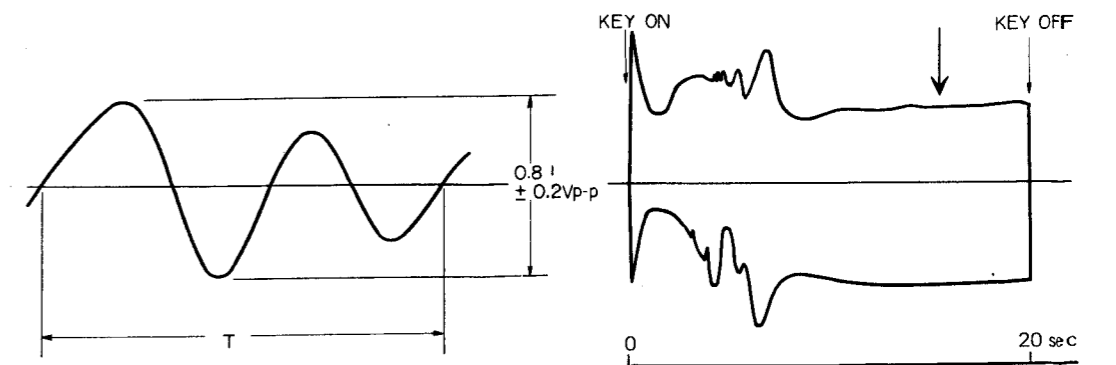
**VOICE 13 XYLOPHONE**



**VOICE 14 COSMIC 1**



**VOICE 15 COSMIC 2**

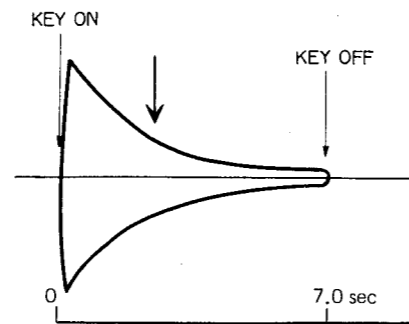
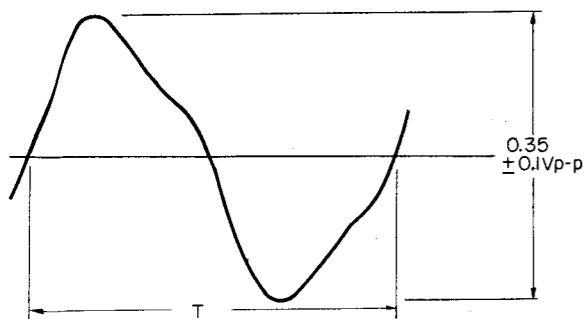


PM2 CIRCUIT BOARD

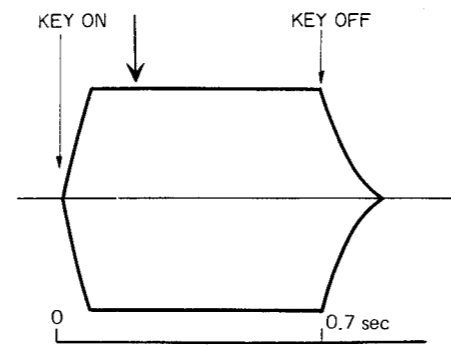
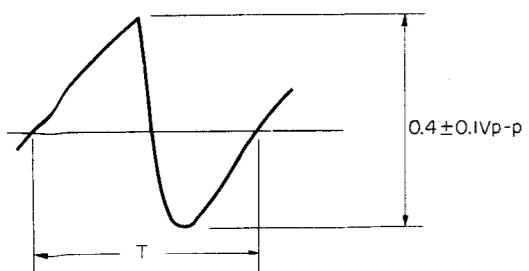
Voices Terminal	Wood Wind1	Wood Wind2	Wood Wind3	Brass 1	Brass 2	Brass 3	Brass 4	String 1	String 2	String 3	Percus- sive 1	Percus- sive 2	Percus- sive 3	Cosmic 3
	P16 C3-1	P17 C3-2	P18 C3-3	P19 C3-4	P20 C3-5	P21 C3-6	P22 C3-7	P23 C3-8	P24 C1-1	P25 C1-2	P26 C1-3	P27 C1-4	P28 C1-5	P29 C1-6
2FT1 (C4-1)	H	L	L	H	L	L	L	H	L	H	H	H	H	L
2FT2 (C4-3)	H	H	H	H	H	H	H	H	H	L	H	L	L	L
2FT3 (C4-5)	L	L	L	L	L	L	L	L	L	L	L	L	L	H
WS2 (C4-7)	H	L	H	L	L	L	L	L	L	L	L	L	H	H
FS2 (C4-8)	L	H	H	L	L	L	L	L	L	L	L	L	H	H
PW2 (C4-9)	0	0	5.44	0	0	0	0	0	0	0	0	0	2.02	1.27
CF2 (C2-1)	2.68	1.08	3.09	0	0	1.27	0	1.08	8.39	7.12	1.74	7.12	9.53	2.30
RS2 (C2-2)	5.89	10	10	6.73	10	7.12	10	6.73	7.12	7.12	7.80	1.08	1.50	4.50
ED2 (C2-3)	0.62	0.90	2.02	3.54	2.68	2.02	5.44	0.76	0	0	1.08	2.30	0	4.50
AF2 (C2-4)	1.08	3.54	4.95	1.08	3.96	1.08	1.27	1.74	0	0	6.73	3.09	0	0.76
DF2 (C2-5)	0.90	0	9.72	0.17	1.50	3.96	2.02	1.08	0	0	3.09	1.27	0	1.27
SF2 (C2-6)	0	4.95	4.50	4.50	3.96	2.68	3.54	2.68	0	0	0	0	0	2.30
RF2 (C2-7)	10	1.74	8.61	6.73	0	5.89	1.74	2.68	0	0	10	10	0	1.27
EL2 (C2-8)	3.54	10	8.61	3.09	10	10	2.68	3.54	2.30	2.30	4.50	2.30	10	3.54
AA2 (C2-9)	3.96	3.96	1.74	3.54	4.50	2.30	6.35	5.89	1.74	1.74	6.35	10	8.39	0.90
DA2 (C2-10)	1.08	0	0.62	0	10	0.35	0	10	3.09	3.09	3.96	3.96	0.25	10
SA2 (C2-11)	1.27	8.39	0	8.39	8.39	0	8.39	8.39	0	8.39	0	0	0	8.39
RA2 (C2-12)	10	6.73	10	6.73	10	10	10	10	10	10	10	10	4.95	3.09

OUTPUT WAVEFORMS AND ENVELOPE WAVEFORMS

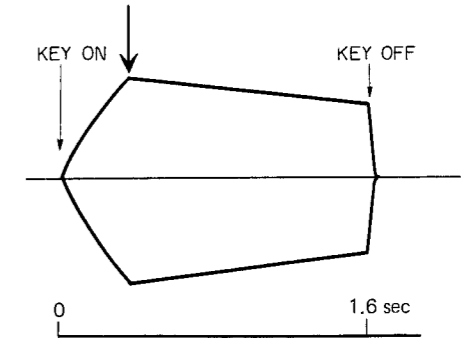
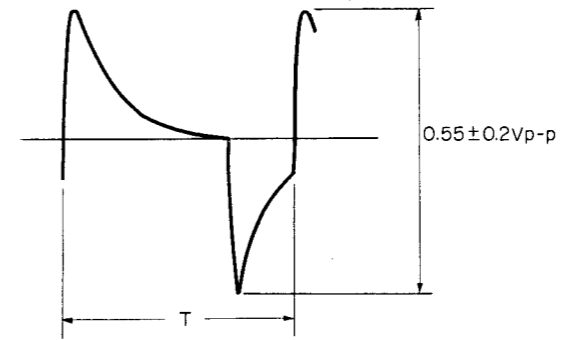
VOICE16 WOOD WIND 1



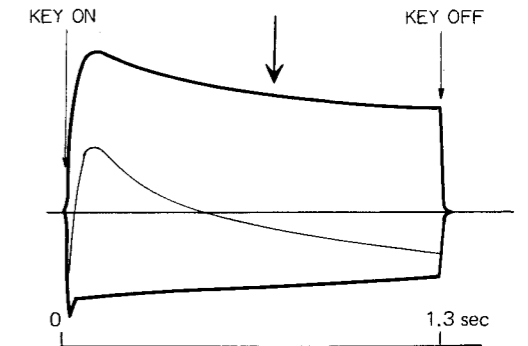
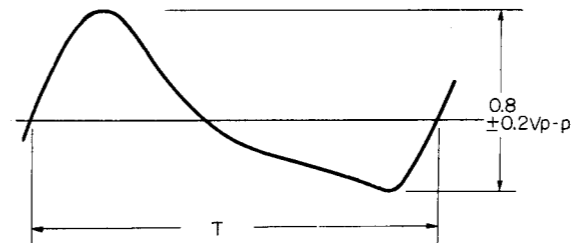
VOICE17 WOOD WIND 2



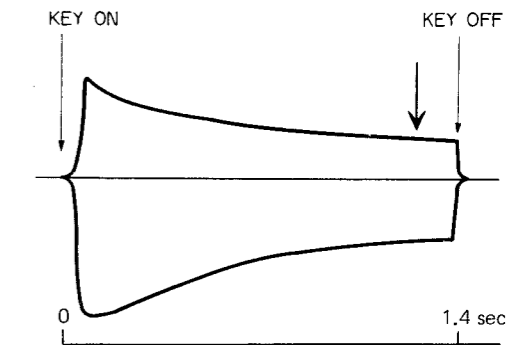
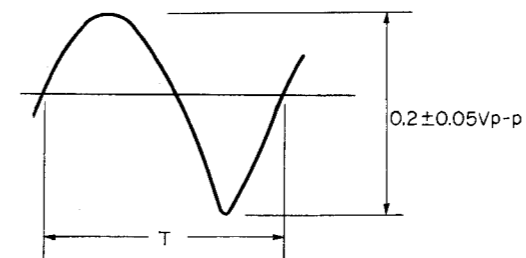
VOICE 18 WOOD WIND 3



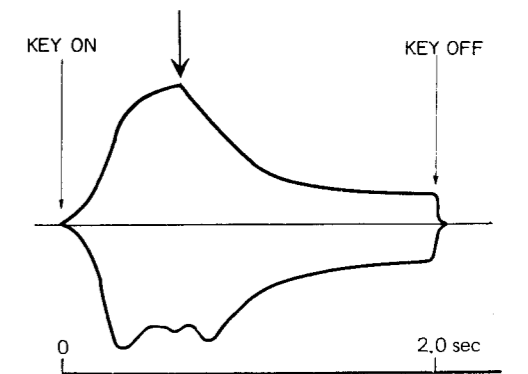
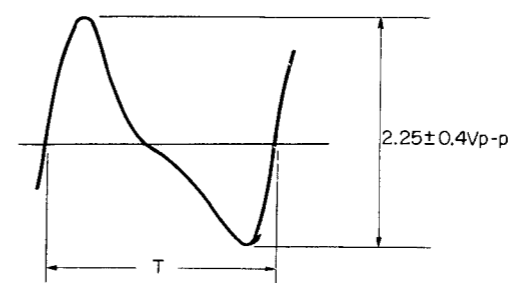
VOICE 19 BRASS 1



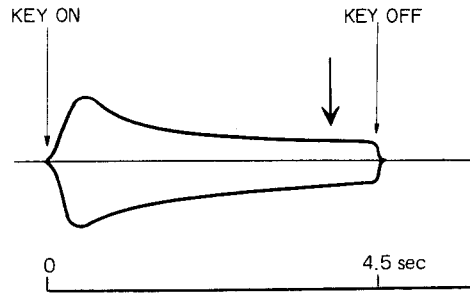
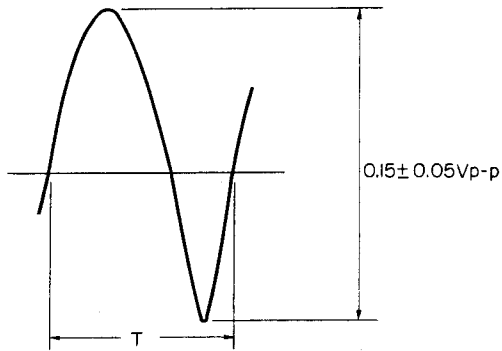
VOICE 20 BRASS 2



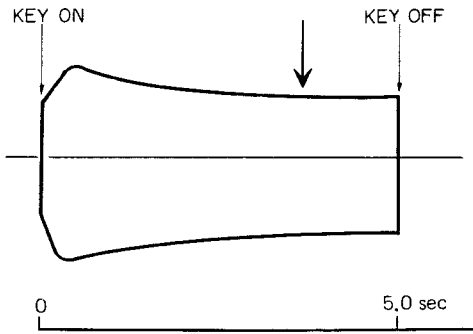
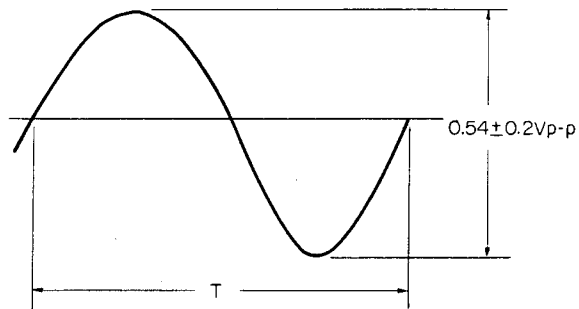
VOICE 21 BRASS 3



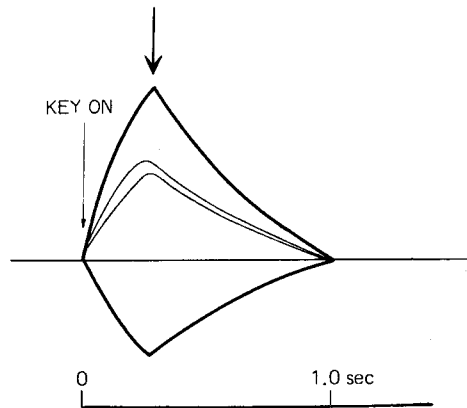
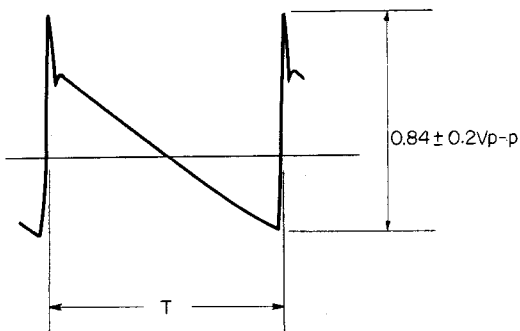
**VOICE 22 BRASS 4**



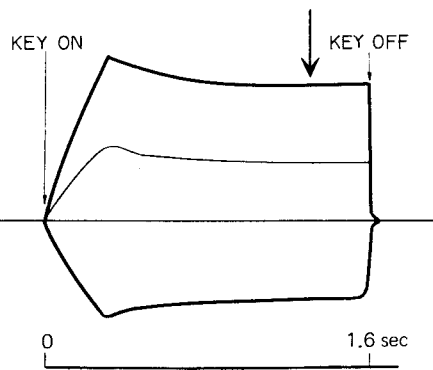
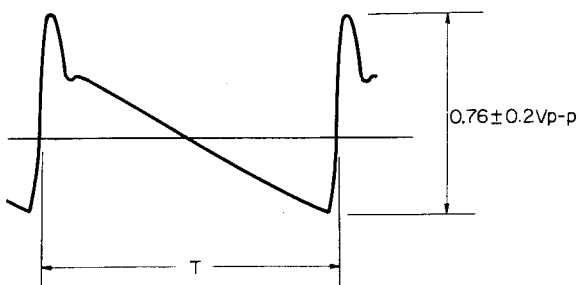
**VOICE 23 STRING 1**



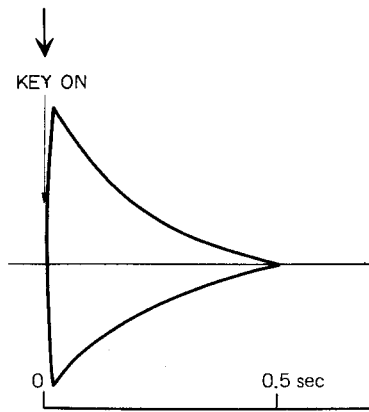
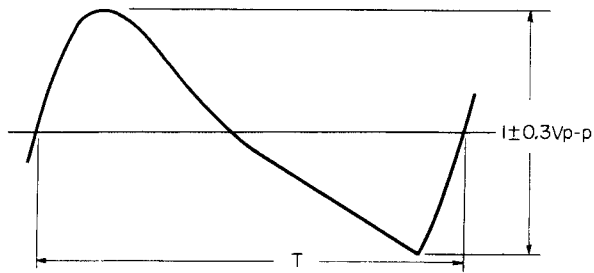
**VOICE 24 STRING 2**



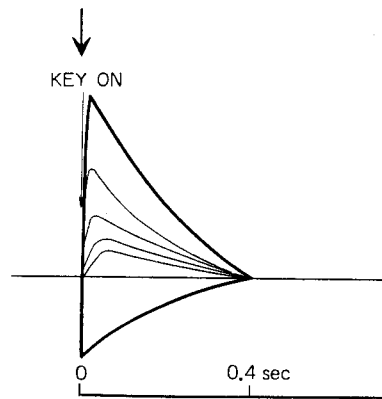
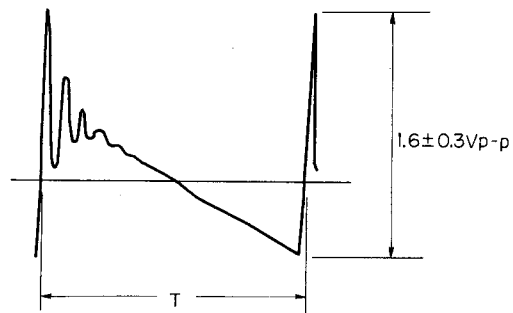
**VOICE 25 STRING 3**



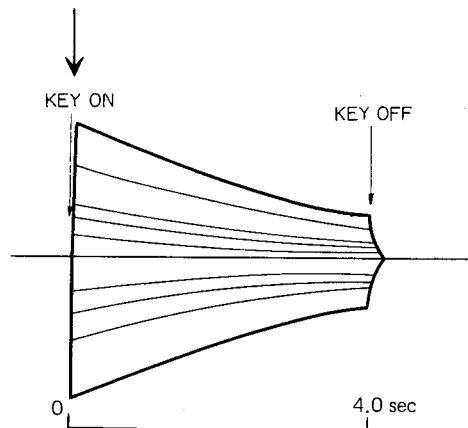
**VOICE 26 PERCUSSIVE 1**



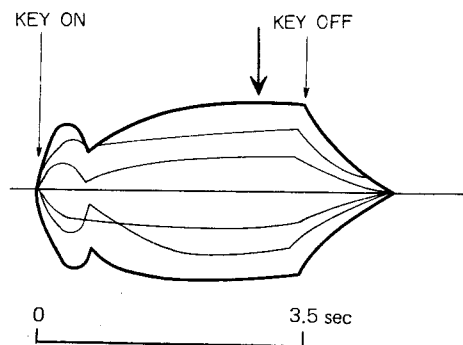
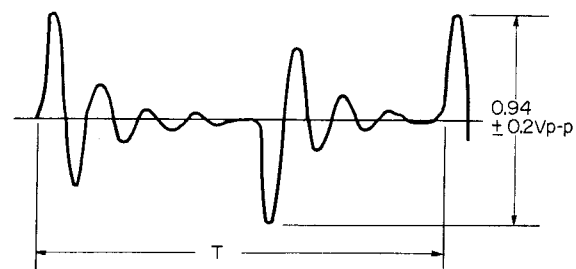
**VOICE 27 PERCUSSIVE 2**



**VOICE 28 PERCUSSIVE 3**



**VOICE 29 COSMIC 3**



# YAMAHA

## DUAL CHANNEL SYNTHESIZER CS15D

# PARTS LIST

### CONTENTS

A. Electronic Components .....	2
B. Control Panel Assembly .....	6
C. Keyboard Assembly & Cabinet Assembly .....	8



A. Electronic Components

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model
※	30:12:00 NB:81:48:30	PSW Unit	P S W ユ ニ ッ ト		
※	30:12:43 NA:80:57:90	Circuit Board, VCO	V C O シ ー ト		
※	30:12:43 NA:80:58:20	-- do. -- , VCF	V C F "		
※	30:12:43 NX:80:58:30	-- do. -- , PN-1	P N - 1 "		
※	30:12:43 NA:80:58:40	-- do. -- , PN-2	P N - 2 "		
※	30:12:43 NA:80:58:50	-- do. -- , SSK	S S K "		
※	30:12:43 NA:80:58:60	-- do. -- , PM-1	P M - 1 "		
※	30:12:43 NA:80:58:70	-- do. -- , PM-2	P M - 2 "		
※	30:12:00 NA:80:58:80	-- do. -- , DC	D C "	Japan	
※	30:12:00 NA:80:58:90	-- do. -- , -- do. --	" "	U.S.American Canadian	
※	30:12:00 NA:80:59:00	-- do. -- , -- do. --	" "	General	
	30:10:00 NA:10:21:90	-- do. -- , MK	M K "		
	40:10:00 iG:00:13:90	I C NJM4558DV	I C	OP Amp.	
	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:00:15:30	-- do. -- iG00153	"	VCO III	
	40:10:00 iG:00:15:60	-- do. -- iG00156	"	(+IVCF	
	40:10:00 iG:00:15:90	-- do. -- iG00159	"	EG-VCA	
	40:10:00 iG:00:17:20	-- do. -- TC4069UBP	"	Inverter	
	40:10:00 iG:00:17:70	-- do. -- TC4051BP	"	8ch Analog SW	
	40:10:00 iG:00:17:80	-- do. -- TC4007UBP	"	Switch	
	40:10:00 iG:02:55:00	-- do. -- TA7504S	"	OP Amp	
	40:10:00 iG:02:56:00	-- do. -- TA7505M	"	OP Amp	
	30:10:00 YM:24:80:00	-- do. -- YM24800	"	SSK	
	40:10:00 iA:04:90:10	Transistor 2SA490 (Y)	ト ラ ン ジ ス タ		
	40:10:00 iA:09:50:00	-- do. -- 2SA950 (Y)	"		
	40:10:00 iA:10:15:20	-- do. -- 2SA1015 (Y)	"		
	40:10:00 iC:18:15:20	-- do. -- 2SC1815 (Y)	"		
	40:10:00 iC:21:20:00	-- do. -- 2SC2120 (Y)	"		
	40:10:00 iD:02:35:10	-- do. -- 2SD235 (Y)	"		
	40:10:00 iE:10:12:00	FET 2SK105 (E)	F E T		
	40:10:00 iF:00:00:40	Diode 1S1555	ダ イ オ ー ド		
	40:10:00 iF:00:03:00	-- do. -- 1S1715P	"		
	40:10:00 iF:00:16:90	Zener Diode RD5.6EB3	ツ ェ ナ ー ダ イ オ ー ド		
	40:10:00 iF:00:17:00	-- do. -- RD15EB3	"		
	40:10:00 iH:00:02:80	-- do. -- 1D2C1	ダ イ オ ー ド		
	40:10:00 iH:00:02:90	-- do. -- 1D2Z1	"		
	40:10:00 HT:19:01:40	Semi Variable Resistor B-200Ω	半 固 定 抵 抗	V10K	
	40:10:00 HT:19:01:30	-- do. -- B-2KΩ	"	-- do. --	
	40:10:00 HT:19:00:40	-- do. -- B-5KΩ	"	V10K8-4-2	
	40:10:00 HT:19:00:50	-- do. -- B-10KΩ	"	-- do. --	
	40:10:00 HT:19:00:70	-- do. -- B-50KΩ	"	-- do. --	
	40:10:00 HT:19:00:80	-- do. -- B-100KΩ	"	-- do. --	
	40:10:00 HT:19:00:90	-- do. -- B-200KΩ	"	-- do. --	
	40:10:00 HT:19:01:00	-- do. -- B-500KΩ	"	-- do. --	
	40:10:00 HQ:42:00:40	Slide Variable Resistor A-2MΩ	ス ラ イ ド ボ リ ュ ー ム		
	40:10:00 HQ:42:00:30	-- do. -- B-10KΩ	"		
※	40:10:00 HQ:42:01:10	-- do. -- B-10KΩ x 2	"		

※ New Parts

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model
	40:10:00 HO:42:00:60	Slide Variable Resistor C-10K $\Omega$	スライドボリューム		
*	40:10:00 HR:50:00:20	Rotary Variable Resistor B-10K $\Omega$	ロータリーボリューム	Pitch	
*	40:10:00 HS:42:03:00	- do. - D-10K $\Omega$	"	Modulation	
*	40:10:00 HS:31:09:90	- do. - A-10K $\Omega$ x 2	"		
	40:10:00 HS:31:05:70	- do. - B-10K $\Omega$	"		
*	40:10:00 HS:31:09:80	- do. - C-10K $\Omega$	"		
	40:10:00 HL:31:24:70	Metal Oxide Film Resistor 1W 0.47 $\Omega$	酸 金 抵 抗		
	40:10:00 HL:32:51:50	- do. - 2W 150 $\Omega$	"		
	40:10:00 HU:59:51:00	Metal Film Resistor 100 $\Omega$	金 属 被 膜 抵 抗		
	40:10:00 HU:59:55:00	- do. - 500 $\Omega$	"		
	40:10:00 HU:57:58:20	- do. - 820 $\Omega$	"		
	40:10:00 HU:59:61:00	- do. - 1K $\Omega$	"		
	40:10:00 HU:57:61:60	- do. - 1.6K $\Omega$	"		
	40:10:00 HZ:00:11:50	- do. - 1.684K $\Omega$	"		
	40:10:00 HU:59:62:00	- do. - 2K $\Omega$	"		
	40:10:00 HU:57:65:10	- do. - 5.1K $\Omega$	"		
	40:10:00 HU:59:65:50	- do. - 5.5K $\Omega$	"		
	40:10:00 HU:57:68:20	- do. - 8.2K $\Omega$	"		
	40:10:00 HU:57:71:00	- do. - 10K $\Omega$	"		
	40:10:00 HU:57:71:10	- do. - 11K $\Omega$	"		
	40:10:00 HU:57:71:80	- do. - 18K $\Omega$	"		
	40:10:00 HU:57:72:00	- do. - 20K $\Omega$	"		
	40:10:00 HZ:00:11:40	- do. - 29.94K $\Omega$	"		
	40:10:00 HU:59:74:00	- do. - 40K $\Omega$	"		
	40:10:00 HU:59:78:00	- do. - 80K $\Omega$	"		
	40:10:00 HU:59:81:60	- do. - 160K $\Omega$	"		
	40:10:00 FF:04:31:20	Polystyrene Capacitor 50V 1200P	スチロールコンデンサ		
	40:10:00 FM:09:71:00	Nonpolar Capacitor 16V 10 $\mu$ F	ノンポーラコンデンサ		
	40:10:00 FM:11:61:00	- do. - 50V 1 $\mu$ F	"		
	40:10:00 FJ:13:74:70	Chemical Capacitor 16V 47 $\mu$ F	ケミカルコンデンサ		
	40:10:00 FJ:23:81:00	- do. - -do.- 100 $\mu$ F	"		
	40:10:00 FJ:14:81:00	- do. - 25V -do.-	"		
*	40:10:00 FM:80:92:20	- do. - 35V 2200 $\mu$ F	"		
	40:10:00 FJ:16:61:00	- do. - 50V 1 $\mu$ F	"		
	40:10:00 FP:35:56:80	Tantalum Capacitor 35V 0.68 $\mu$ F	タンタルコンデンサ		
	40:10:00 FP:35:61:00	- do. - -do.- 1 $\mu$ F	"		
	40:10:00 FZ:00:01:10	Spark Killer Capacitor 500V 0.33 $\mu$ F+120 $\Omega$	スパークキラーコンデンサ		
	40:10:00 FZ:00:09:50	- do. -	"		
	40:10:00 KA:40:04:10	Slide Switch	スライドスイッチ	General	
	40:10:00 KA:40:05:90	- do. -	"	Modulation	
	40:10:00 KA:40:06:00	- do. -	"	Line Out	
	40:10:00 KA:50:10:90	Rotary Switch	ロータリースイッチ		
	40:10:00 KA:50:14:60	- do. -	"		

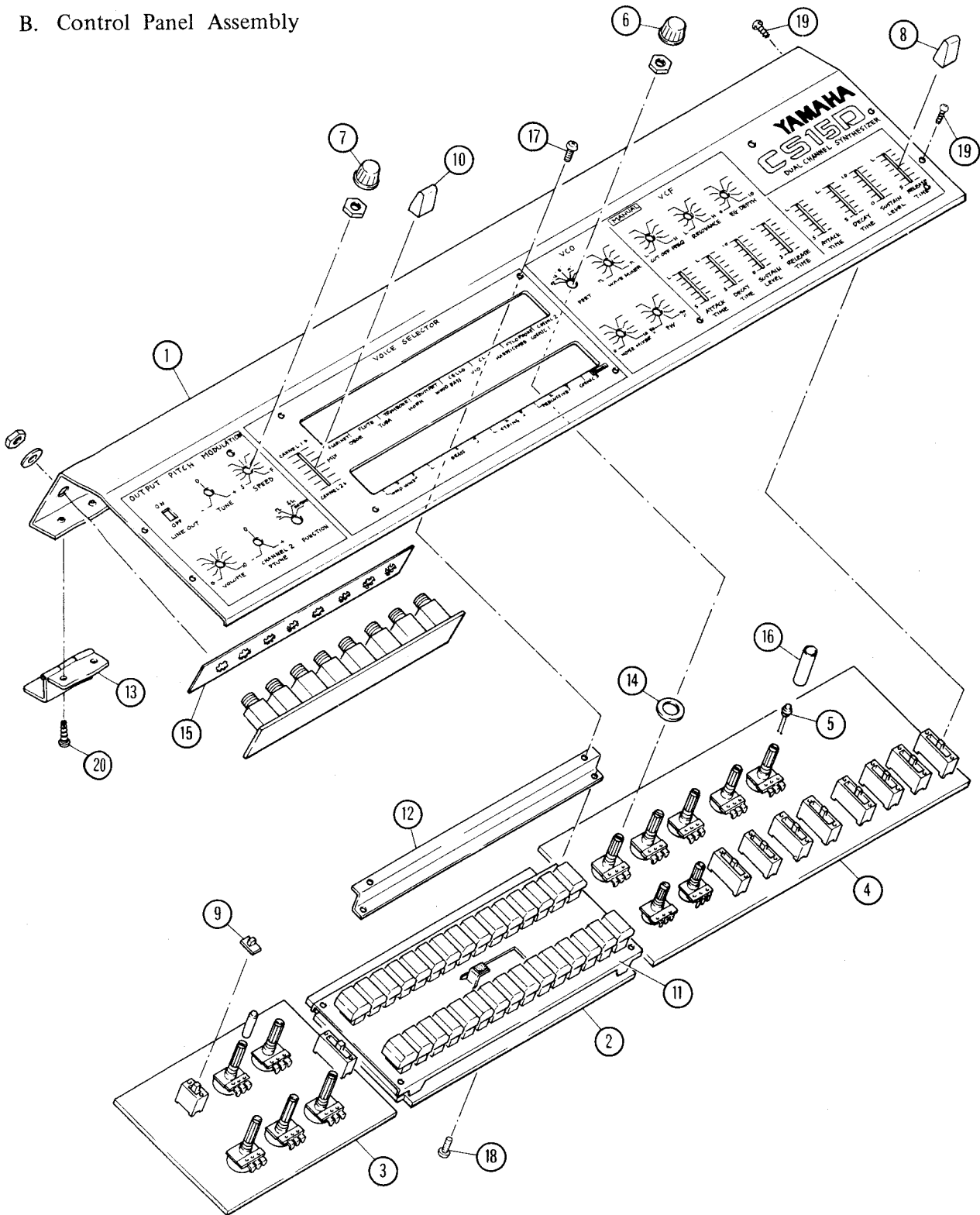
\* New Parts

Ref. No.	Part No.		Description	部 品 名	Remarks	Common Model		
* 40:10:00	KA:70:14:50	Push Switch	Channel 1	プッシュスイッチ	Voice Selector			
* 40:10:00	KA:70:14:60	- do. -	Channel 2	"	- do. -			
40:10:00	KA:30:04:30	Toggle Switch		トグルスイッチ	Japan			
40:10:00	KA:30:04:70	- do. -		"	General			
40:10:00	KA:30:05:00	- do. -		"	Canadian			
40:10:00	KA:30:05:40	- do. -		"	U.S.American			
40:10:00	KB:00:03:10	Fuse	250V 0.5A	ヒューズ	Japan			
40:10:00	KB:00:03:20	- do. -	-do.- 0.75A	"	- do. -			
40:10:00	KB:00:11:50	- do. -	-do.- 0.5A	"	U.S.American Canadian			
40:10:00	KB:00:15:80	- do. -	800mA	"	- do. -			
40:10:00	KB:00:06:50	- do. -, Miniature Type	250V 315mA	ミニチュアヒューズ	General			
40:10:00	KB:00:07:20	- do. -, - do. -	-do.- 800mA	"	- do. -			
40:10:00	LB:20:15:30	Pin, Fuse Holder		ヒューズホルダーピン				
30:10:00	NB:81:42:80	Switch Unit	MK	スイッチユニット				
* 40:10:00	GA:82:02:00	Power Transformer		電源トランス	Japan			
* 40:10:00	GA:82:03:00	- do. -		"	U.S.American Canadian			
* 40:10:00	GA:82:04:00	- do. -		"	General			
40:10:00	MG:00:02:70	AC Cord, with Plug		電源コード	U.S.American Canadian			
40:10:00	MG:00:06:00	- do. -, - do. -		"	Japan			
40:10:00	MG:00:08:60	- do. -, - do. -		"	General			
40:10:00	LB:20:11:20	Phone Jack		ホンジャック				
40:10:00	LB:20:15:40	- do. -		"				
40:10:00	IF:00:11:90	L. E. D		L. E. D				
40:10:00	LB:60:26:90	Flat Cable Socket	20P	フラットケーブルソケット				
40:10:00	LB:60:27:00	- do. -	30P	"				
40:10:00	LB:20:13:90	Base Post, Top Type	2P	トップ型ベースポスト				
40:10:00	LB:30:07:30	- do. -	3P	"				
40:10:00	LB:40:05:70	- do. -	4P	"				
40:10:00	LB:50:02:50	- do. -	5P	"				
40:10:00	LB:60:29:40	- do. -	6P	"				
40:10:00	LB:60:24:60	- do. -	7P	"				
40:10:00	LB:60:24:90	- do. -	8P	"				
40:10:00	LB:60:30:40	- do. -	9P	"				
40:10:00	LB:60:31:30	- do. -	12P	"				
40:10:00	LB:30:07:50	Base Post, Side Type	3P	サイド型ベースポスト				
40:10:00	LB:60:25:00	- do. -	7P	"				
40:10:00	LB:60:25:10	- do. -	10P	"				
40:10:00	LB:30:09:60	Base Post, Bottom Type	3P	ボトム型ベースポスト				
40:10:00	LB:40:06:30	- do. -	4P	"				
40:10:00	LB:50:03:70	- do. -	5P	"				
40:10:00	LB:60:29:90	- do. -	6P	"				
40:10:00	LB:20:13:80	Connector Housing Plug	2P	ハウジング				
40:10:00	LB:30:07:20	- do. -	3P	"				
40:10:00	LB:40:05:60	- do. -	4P	"				

\* New Parts



B. Control Panel Assembly



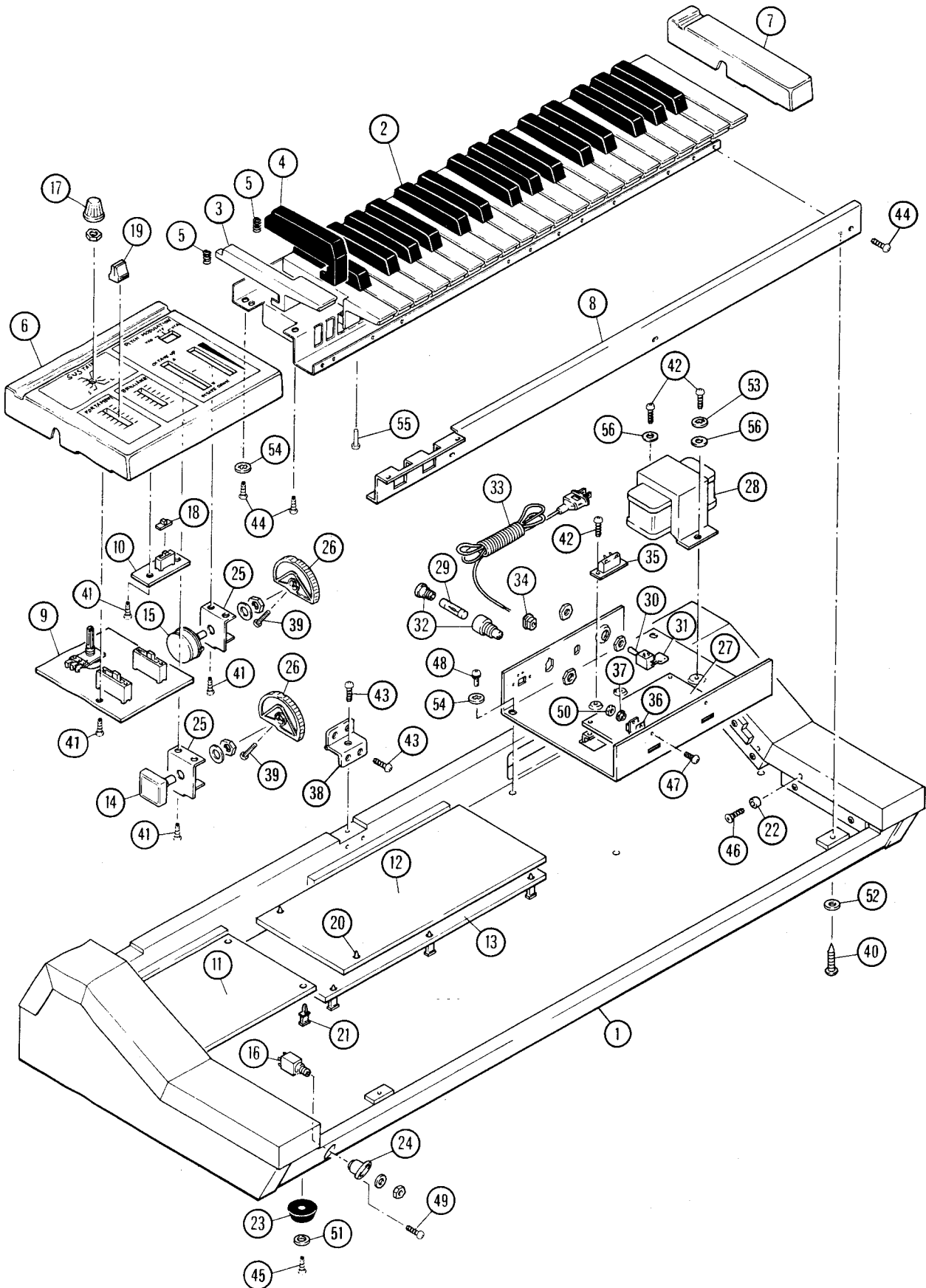
Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model		
* 1	30 10:00 AA:81:30:10	Control Panel	コントロールパネル				
* 2	30 12:00 NB:81:48:30	PSW Unit	P S W ユ ニ ッ ト				
* 3	30 12:43 NA:80:57:90	Circuit Board, VCO	V C O シ ー ト				
* 4	30 12:43 NA:80:58:20	- do. - , VCF	V C F 〃				

\* New Parts

Ref. No.	Part No.		Description	部 品 名	Remarks	Common Model		
	40:10:00	iG:00:13:90	I C	NJM4558DV	I C	OP Amp		
	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:00:15:30	- do. -	iG00153	"	VCO III		
	40:10:00	iG:00:15:60	- do. -	iG00156	"	(+)VCF		
	40:10:00	iG:00:15:90	- do. -	iG00159	"	EG-VCA		
	40:10:00	iG:00:17:70	- do. -	TC4051BP	"	Analog SW		
	40:10:00	iG:00:17:80	- do. -	TC4007BP	"	Switch		
	40:10:00	iG:02:55:00	- do. -	TA7504S	"	OP Amp		
	40:10:00	iA:10:15:20	Transistor	2SA1015 (Y)	ト ラ ン ジ ス タ			
	40:10:00	iC:18:15:20	- do. -	2SC1815 (Y)	"			
	40:10:00	iE:10:12:00	FET	2SK105 (E)	F E T			
	40:10:00	iF:00:00:40	Diode	1S1555	ダ イ オ ー ド			
5	40:10:00	iF:00:11:90	L. E. D	TLR124	L. E. D			
	40:10:00	HQ:42:00:30	Slide Variable Resistor	B-10K $\Omega$	ス ラ イ ド ボ リ ュ ーム			
	40:10:00	HQ:42:01:10	- do. -	B-10K $\Omega$ x 2	"			
	40:10:00	HQ:42:00:60	- do. -	C-10K $\Omega$	"			
*	40:10:00	HS:31:09:90	Rotary Variable Resistor	A-10K $\Omega$ x 2	ロ ー タ リ ー ボ リ ュ ーム			
	40:10:00	HS:31:05:70	- do. -	B-10K $\Omega$	"			
	40:10:00	KA:40:06:00	Slide Switch		ス ラ イ ド ス イ ッ チ			
	40:10:00	KA:50:10:90	Rotary Switch		ロ ー タ リ ー ス イ ッ チ			
	40:10:00	KA:50:14:60	- do. -		"			
*	40:10:00	KA:70:14:50	Push Switch	Channel 1	15連プッシュスイッチ	Voice Selector		
*	40:10:00	KA:70:14:60	- do. -	Channel 2	"	- do. -		
6	30:56:00	CB:81:21:30	Knob		ツ マ ミ	Yellow		
7	30:56:00	CB:81:21:40	- do. -		"	Ivory		
8	30:10:00	CB:81:40:40	- do. -		"	Yellow		
9	30:10:00	CB:81:46:90	- do. -		"	Ivory		
*	10	30:10:00	CB:81:51:90	- do. -		Ivory		
11	30:10:00	AA:81:30:30	Sub Chassis		サ ブ シ ャ ー シ			
*	12	30:10:00	AA:81:30:40	Rail, Chassis		シ ャ ー シ レ ー ル		
13	30:10:00	AA:81:12:40	Hinge		蝶 番			
14	30:10:00	AA:80:58:20	Spacer		ス ペ ー サ ー			
*	15	30:10:00	AA:86:36:10	Spacer, Jack		ジャックスペーサー		
*	16	30:10:00	CB:81:54:20	Spacer, L.E.D.		L. E. D スペーサー		
17	40:10:00	EC:33:00:50	Truss Head Screw	M3 x 5	ト ラ ス 小 ネ ジ	FCM3-BI		
18	40:10:00	ED:33:00:60	Bind Head Screw	M3 x 6	バ イ ン ド 小 ネ ジ	ZMC2-BI		
19	40:10:00	EH:33:51:00	Truss Head Tapping Screw	3.5 x 10	トラスタップネジ1種	FCM3-BI		
20	40:10:00	EM:13:00:60	Oval Head Tapping Screw	3 x 6	丸皿タップネジ2種	FNM3-3g		

\* New Parts

C. Keyboard Assembly & Cabinet Assembly



Ref. No.	Part No.		Description	部 品 名	Remarks	Common Model
* 1	30:12:43	00:00:00:10	Bottom Case	外 装		
2	30:10:00	NB:81:42:90	Keyboard Assembly	鍵盤 Ass'y		
	30:10:00	NB:81:42:80	Switch Unit	スイッチユニット		
	30:10:00	NA:10:21:90	Circuit Board, MK	M K シ ー ト		
	40:10:00	CB:03:22:90	Rubber Contact	可 動 導 電 ゴ ム		
	30:10:00	CB:03:35:50	Spacer	5 Keys	絶縁スペーサー (E)	
	30:10:00	CB:03:35:60	- do. -	8 Keys	" (H)	
	30:10:00	CB:03:35:70	- do. -	12 Keys	" (Q)	
	30:10:00	CB:03:23:80	Holder	5 Keys	基板ホルダー (E)	
	30:10:00	CB:03:23:90	- do. -	8 Keys	" (H)	
	30:10:00	CB:03:24:00	- do. -	12 Keys	" (Q)	
	40:10:00	CB:03:35:40	End Plate	エンドプレート		
3	30:10:00	CB:03:22:10	White Key	C, F	白 鍵	
	30:10:00	CB:03:22:20	- do. -	D	"	
	30:10:00	CB:03:22:30	- do. -	B, E	"	
	30:10:00	CB:03:22:40	- do. -	G	"	
	30:10:00	CB:03:22:50	- do. -	A	"	
	30:10:00	CB:03:22:60	- do. -	C'	"	
4	30:10:00	CB:03:22:70	Black Key		黒 鍵	
5	30:10:00	AA:04:37:20	Coil Spring		コイルスプリング	
* 6	30:10:00	CB:81:53:60	Endblock	(Left)	拍子木 (左)	
* 7	30:10:00	CB:81:53:70	-- do. --	(Right)	" (右)	
* 8	30:10:00	AA:81:30:20	Keyboard Spacer		口 金	
* 9	30:12:43	NX:80:58:30	Circuit Board, PN-1		P N - 1 シ ー ト	
* 10	30:12:43	NA:80:58:40	- do. - , PN-2		P N - 2 "	
* 11	30:12:43	NA:80:58:50	- do. - , SSK		S S K "	
* 12	30:12:43	NA:80:58:60	- do. - , PM-1		P M - 1 "	
* 13	30:12:43	NA:80:58:70	- do. - , PM-2		P M - 2 "	
	40:10:00	HQ:42:00:30	Slide Variable Resistor	B-10K $\Omega$	スライドボリューム	
	40:10:00	HQ:42:00:40	- do. -	A-2M $\Omega$	"	
* 14	40:10:00	HR:50:00:20	Rotary Variable Resistor	B-10K $\Omega$	ロータリーボリューム	Pitch
* 15	40:10:00	HS:42:03:00	- do. -	D-10K $\Omega$	"	Modulation
* 16	40:10:00	HS:31:09:80	- do. -	C-10K $\Omega$	"	
	40:10:00	KA:40:05:90	Slide Switch		スライドスイッチ	
16	40:10:00	LB:40:01:00	Head Phone Jack		ヘッドホンジャック	
17	30:56:00	CB:81:21:40	Knob		ツ マ ミ	

\* New Parts



Ref. No.	Part No.		Description	部 品 名	Remarks	Common Model		
18	30:10:00	CB:81:46:90	Knob	ツ マ ミ				
19	30:10:00	CB:81:51:90	- do. -	"				
20	40:10:00	CB:03:53:90	Support	サ ポ ー ト				
21	30:56:00	CB:08:70:00	Holder, Circuit Board	シ ー ト ホ ル ダ ー				
22	30:10:00	CB:03:30:70	Stopper	回 転 止 め				
23	30:54:00	CB:80:12:70	Yielding Rubber	ゴ ム 脚				
24	30:10:00	CB:81:42:30	Panel, Phone	ホ ー ン パ ネ ル				
* 25	30:10:00	AA:81:12:90	Frame	フ レ ー ム				
* 26	30:10:00	CB:81:40:50	Wheel	ホ イ ー ル				
* 27	30:12:00	NA:80:58:80	Circuit Board, DC	D C シ ー ト	Japan			
* 30:12:00	NA:80:58:90	- do. -	"	"	U.S.American Canadian			
* 30:12:00	NA:80:59:00	- do. -	"	"	General			
* 28	40:10:00	GA:82:02:00	Power Transformer	電 源 ト ラ ン ス	Japan			
* 40:10:00	GA:82:03:00	- do. -	"	"	U.S.American Canadian			
* 40:10:00	GA:82:04:00	- do. -	"	"	General			
29	40:10:00	KB:00:03:10	Fuse 250V 0.5A	ヒ ュ ー ズ	Japan			
40:10:00	KB:00:11:50	- do. -	-do.- -do.-	"	U.S.American Canadian			
40:10:00	KB:00:06:50	- do. -, Miniature Type	-do.- 315mA	ミニチュアヒューズ	General			
30	40:10:00	KA:30:04:30	Toggle Switch	ト グ ル ス イ ッ チ	Japan			
40:10:00	KA:30:04:70	- do. -	"	"	General			
40:10:00	KA:30:05:00	- do. -	"	"	Canadian			
40:10:00	KA:30:05:40	- do. -	"	"	U.S.American			
31	40:10:00	FZ:00:01:10	Spark Killer Capacitor	ス パ ー ク キ ラ ー コ ン デ ン サ	Japan U.S.American			
40:10:00	FZ:00:09:50	- do. -	"	"	Canadian			
40:10:00	CB:07:21:90	Cover	"	コ ン デ ン サ ー カ バ ー	Japan U.S.American			
40:10:00	CB:07:98:90	- do. -	"	"	Canadian			
32	40:10:00	LB:20:04:90	Holder, Fuse	ヒ ュ ー ズ ホ ル ダ ー	Japan, U.S.American Canadian			
40:10:00	LB:20:05:90	- do. -	"	"	General			
33	40:10:00	MG:00:02:70	AC Cord, with Plug	電 源 コ ー ド	U.S.American Canadian			
40:10:00	MG:00:06:00	- do. -, - do.-	"	"	Japan			
40:10:00	MG:00:08:60	- do. -, - do.-	"	"	General			
34	40:10:00	CB:06:86:30	Bush, AC Cord	コ ー ド ブ ッ シ ュ	Japan			
40:10:00	CB:07:27:50	- do. -	"	"	General			
40:10:00	CB:80:68:50	- do. -	"	"	U.S.American Canadian			
35	40:10:00	LA:00:29:50	Terminal (2P)	中 継 端 子 台 ( 2 P )				
36	40:10:00	IL:00:02:70	Base	マ イ カ ベ ー ス				
37	30:54:00	CB:07:28:80	Bush	絶 縁 ブ ッ シ ュ				

\* New Parts

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model
	40:10:00 iF:00:00:40	Diode 1S1555	ダイオード		
	40:10:00 KA:40:04:10	Slide Switch	スライドスイッチ	General	
	40:10:00 CB:81:42:50	Stopper	ストッパー	- do. -	
	40:10:00 AA:03:15:80	Washer, Fuse Holder	ワッシャー	- do. -	
	30:54:00 AA:81:40:60	Shield Cover	シールドカバー	- do. -	
	40:10:00 LB:60:26:90	Flat Cable Socket 20P	フラットケーブルソケット		
	40:10:00 LB:60:27:00	- do. - 30P	〃		
38	30:10:00 AA:81:12:40	Hinge	蝶 番		
39	40:10:00 EA:03:01:80	Pan Head Screw M3 x 18	ナベ小ネジ	ZMC2-Y	
	40:10:00 ED:33:00:60	Bind Head Screw M3 x 6	バインド小ネジ	General ZMC2-BI	
40	40:10:00 ED:95:02:00	- do. - M5 x 20	尖先バインド小ネジ	ZMC2-BI	
41	40:10:00 E1:33:00:60	Bind Head Tapping Screw 3 x 6	バインドタッピンネジ2種	- do. -	
42	40:10:00 E1:33:00:80	- do. - 3 x 8	〃	- do. -	
43	40:10:00 E1:33:01:20	- do. - 3 x 12	〃	- do. -	
44	40:10:00 E1:34:01:00	- do. - 4 x 10	〃	- do. -	
45	40:10:00 EJ:33:51:60	Flat Head Tapping Screw 3.5 x 16	ナベタッピンネジ1種	- do. -	
46	40:10:00 EO:04:01:60	- do. - 4 x 16	皿タッピンネジ1種	- do. -	
47	40:10:00 EL:02:60:80	Sems Screw M2.6 x 8	セムス小ネジ	- do. -	
48	40:10:00 EL:34:01:40	- do. - M4 x 14	〃	- do. -	
49	40:10:00 EM:33:11:20	Oval Head Tapping Screw 3.1 x 12	丸皿タッピンネジ	ZMC2-BI	
50	40:10:00 EV:10:02:60	Hexagonal Nut M2.6	六角ナット	ZMC2-Y	
51	40:10:00 EV:20:30:40	Flat Washer M4	平座金	ZMC2-BI	
52	40:10:00 EV:20:30:50	- do. - M5	〃	- do. -	
53	40:10:00 EV:42:00:30	Toothed Lock Washer B3M	歯付座金	- do. -	
54	40:10:00 EV:42:30:40	- do. - B4M	〃	- do. -	
55	40:10:00 EZ:33:01:40	Bind Head Screw M3 x 14	エバータイトバインドネジ		
56	30:54:00 AA:80:44:90	Washer	平座金		

✦ New Parts

## CS15D SERVICE MANUAL

1980年3月 初版発行

発行所：日本楽器製造株式会社  
電音サービス課

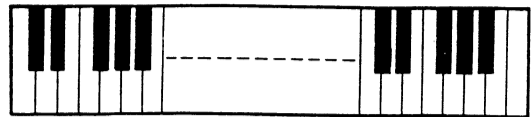
本文：(株)プロダクトブレーン

パーツリスト：(株)豊立設計事務所

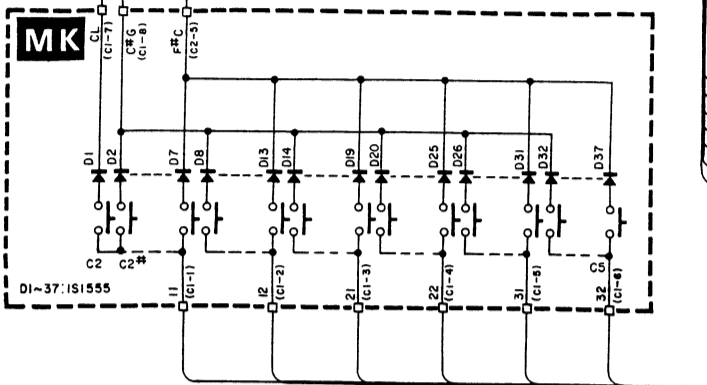
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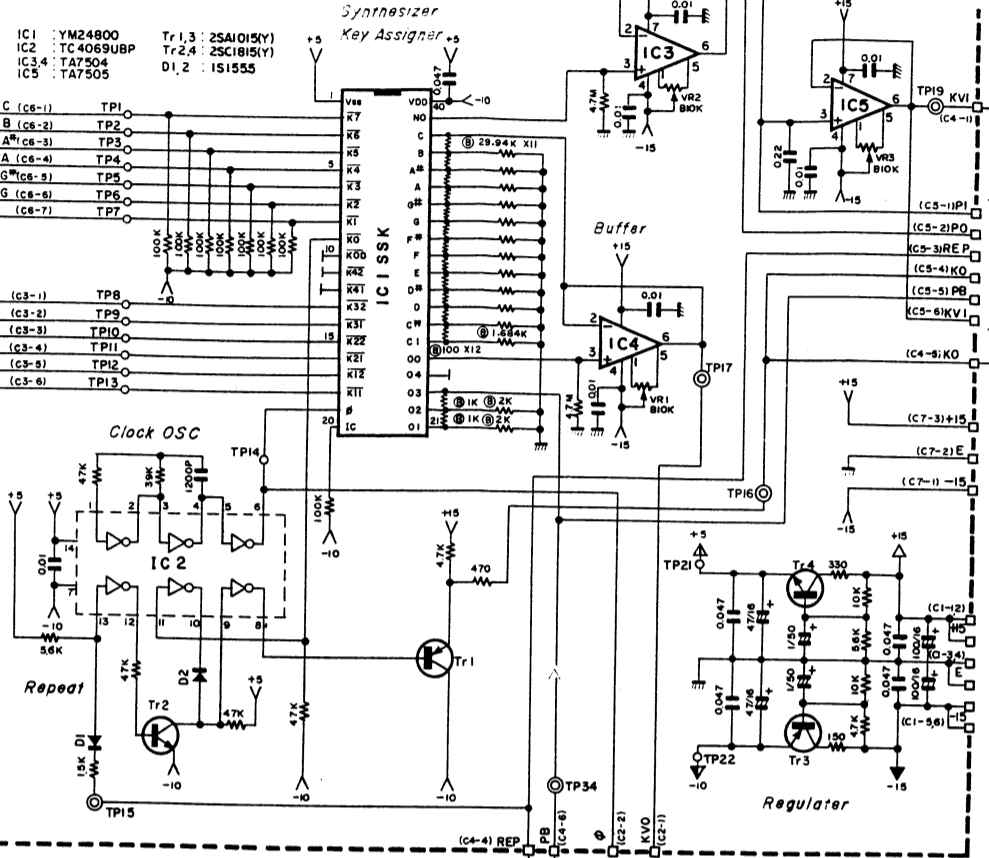
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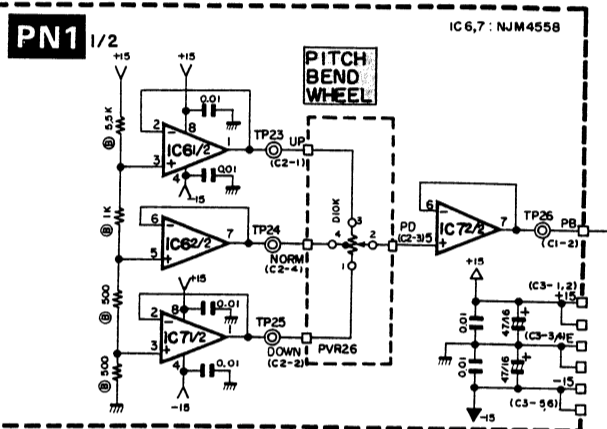
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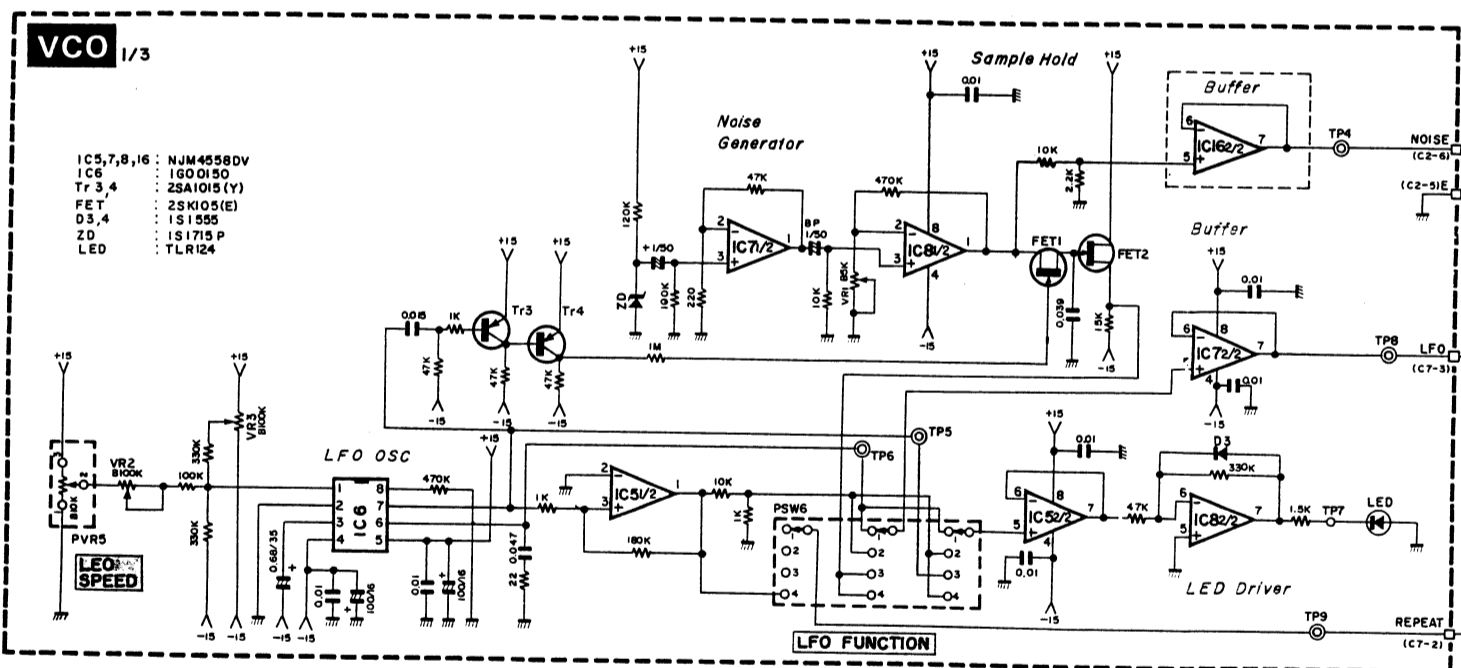
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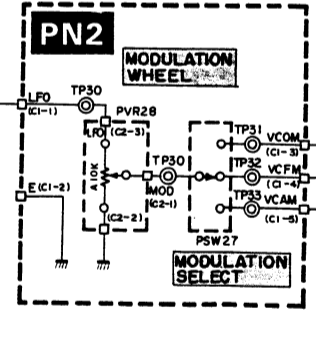
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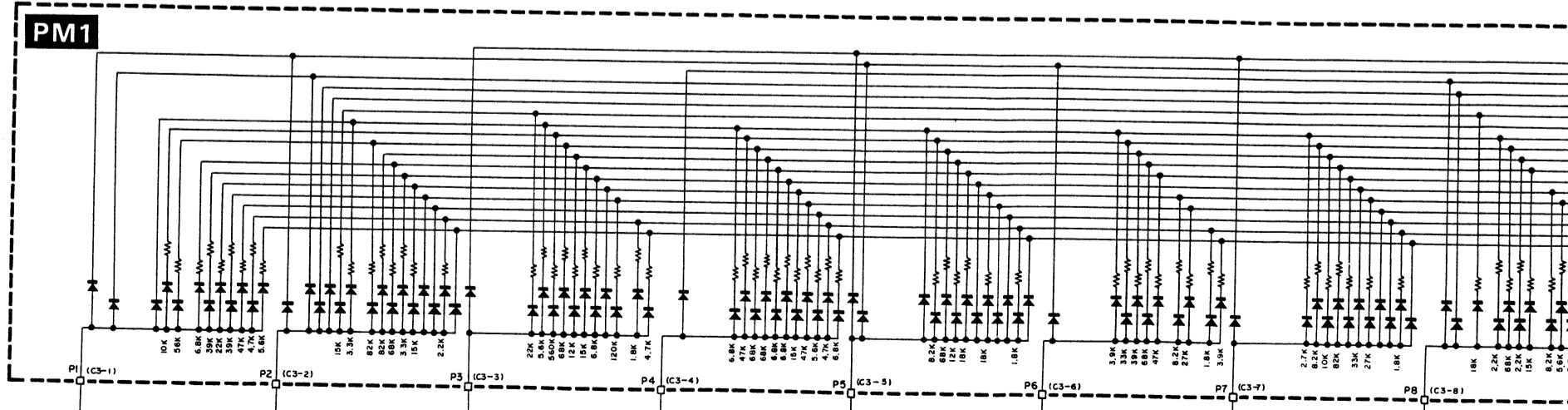
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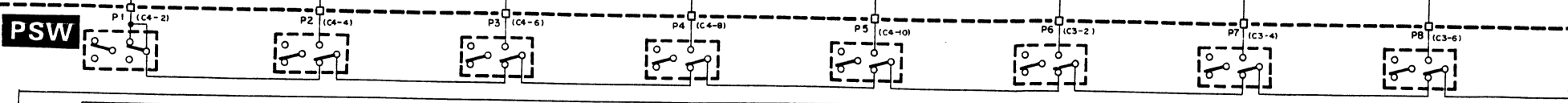
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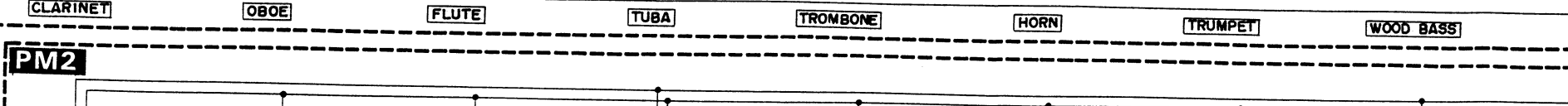
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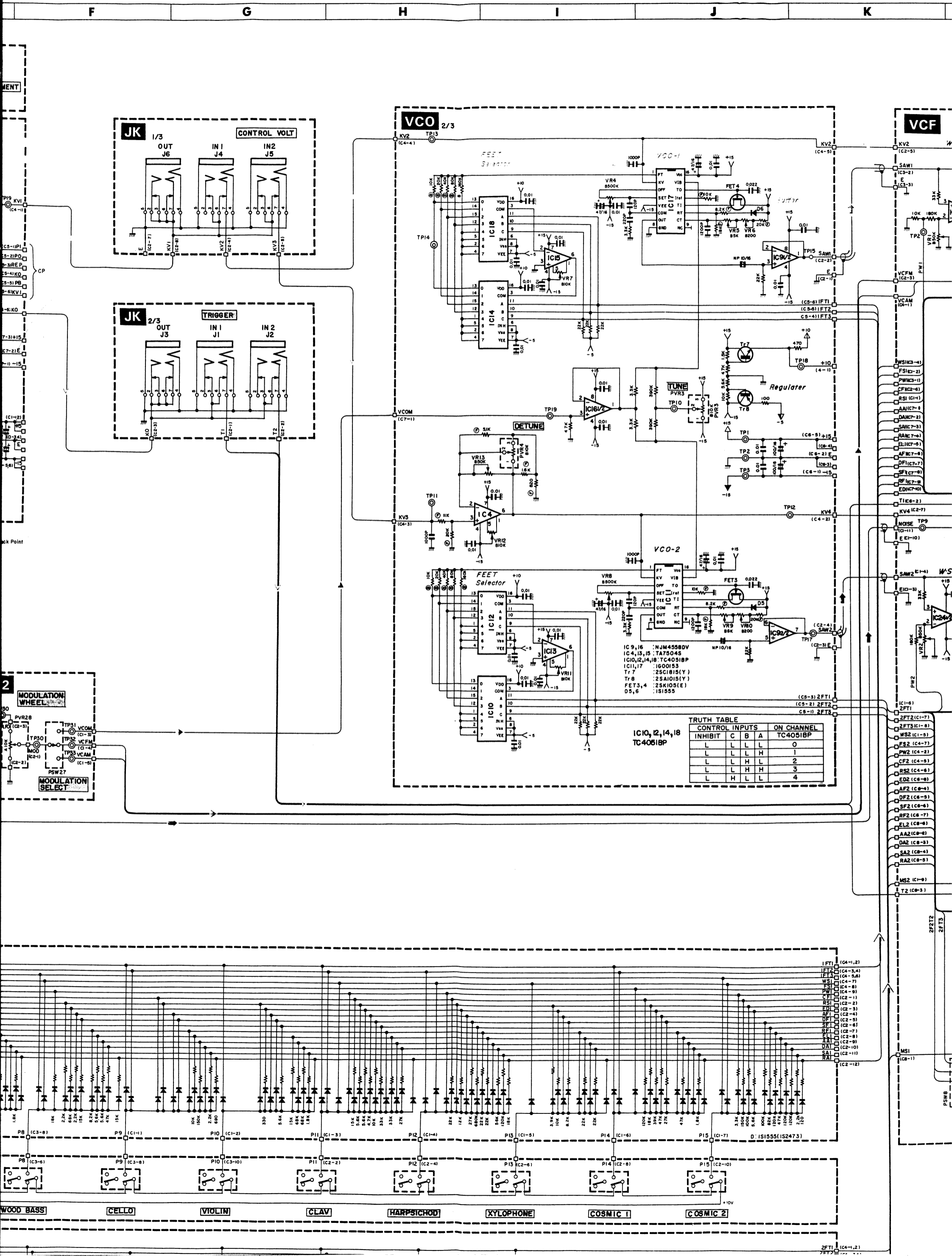
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CLARINET OBOE FLUTE TUBA TROMBONE HORN TRUMPET WOOD BASS

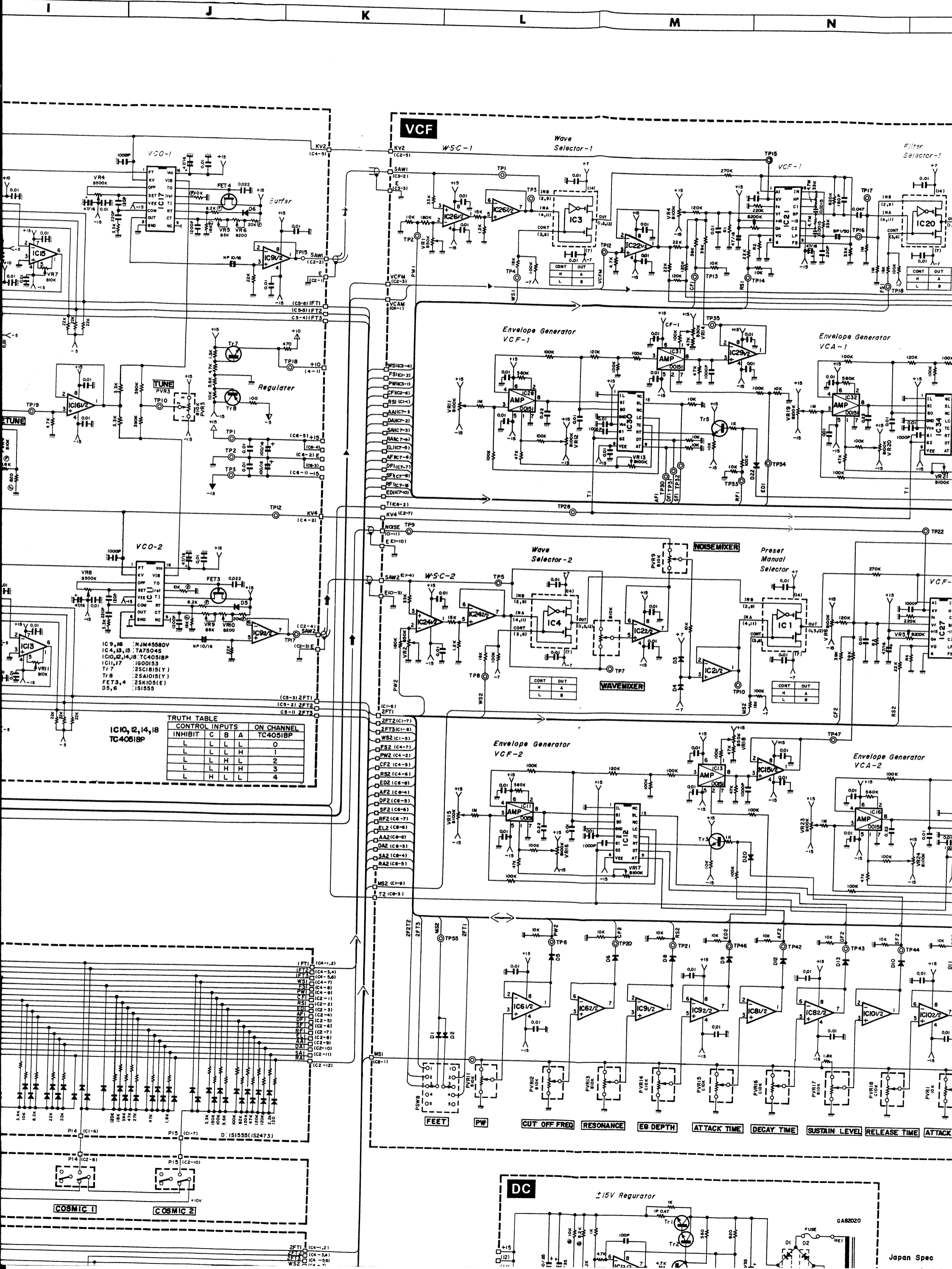
NOTE CP: Check Point

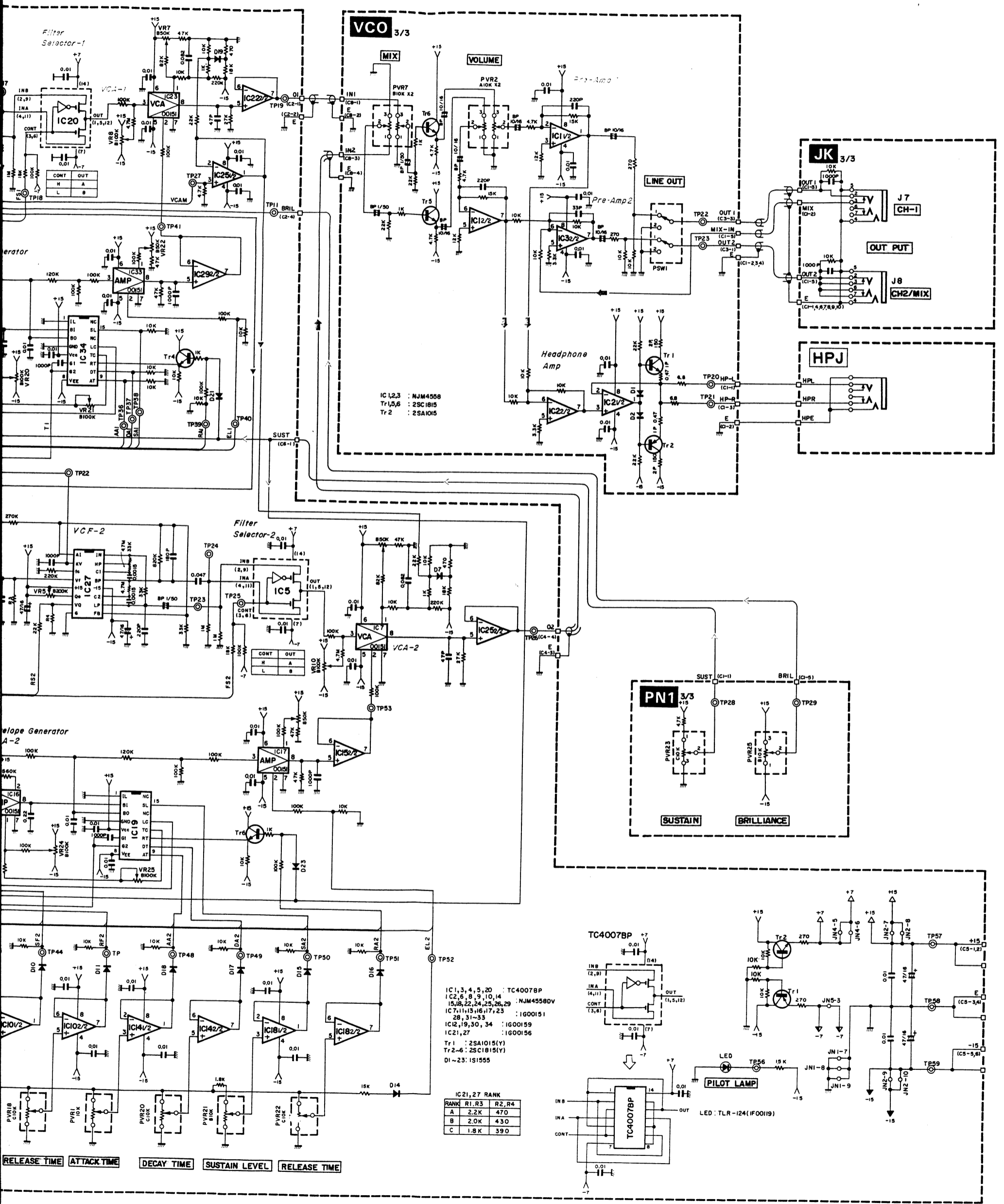
# CS15D OVERALL CIRCUIT



# OVERALL CIRCUIT DIAGRAM

006883



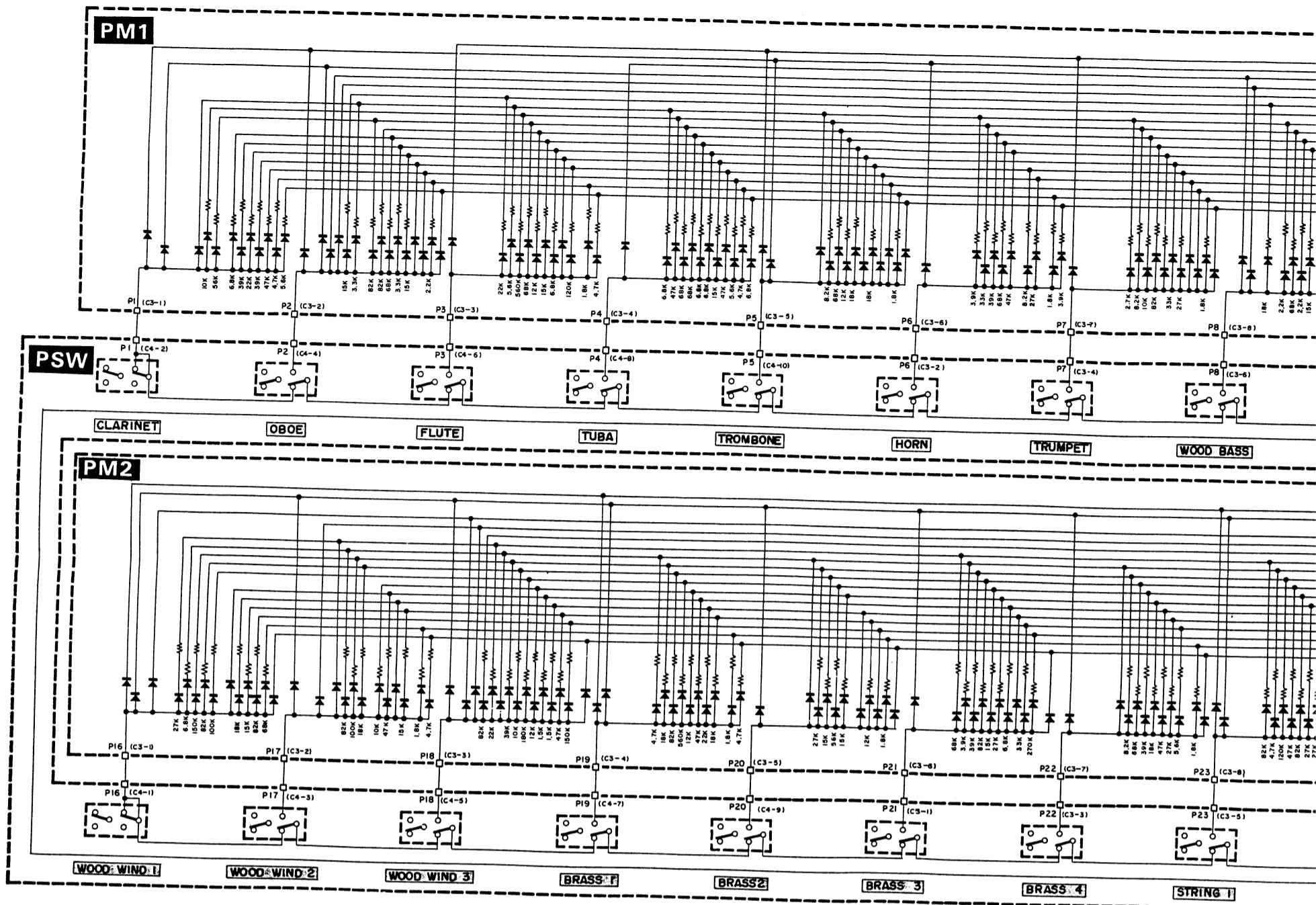


IC 1,2,3 : NJM4558  
 Tr 1,5,6 : 2SC1815  
 Tr 2 : 2SA1015

IC 1, 3, 4, 5, 20 : TC4007BP  
 IC 2, 6, 8, 9, 10, 14 : NJM4558DV  
 IC 7, 11, 13, 16, 17, 23 : 1G00151  
 28, 31-33 : 1G00159  
 IC 12, 19, 30, 34 : 1G00156  
 IC 21, 27 : 1G00156  
 Tr 1 : 2SA1015(Y)  
 Tr 2-6 : 2SC1815(Y)  
 DI ~23 : 1S1555

IC 21, 27 RANK			
RANK	R1, R3	R2, R4	
A	2.2K	470	
B	2.0K	430	
C	1.8K	390	

RELEASE TIME    ATTACK TIME    DECAY TIME    SUSTAIN LEVEL    RELEASE TIME



**MK**

Pin No.	Pin Name	Wire Color	Destination
1	11	OR	SSK (C3-6)
2	12	YE	SSK (C3-5)
3	21	GR	SSK (C3-4)
4	22	BE	SSK (C3-3)
5	31	VI	SSK (C3-2)
6	32	GY	SSK (C3-1)
7	CL	BR	SSK (C6-7)
8	C#,G	RE	SSK (C6-6)

Pin No.	Pin Name	Wire Color	Destination
1	D,G#	OR	SSK (C6-5)
2	D#,A	YE	SSK (C6-4)
3	E,A#	GR	SSK (C6-3)
4	F,B	BE	SSK (C6-2)
5	F#,C	VI	SSK (C6-1)

**SSK**

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	PN1 (C3-1)
2	+15	BR	DC (C-12)
3	E	BL	DC (C-7)
4	E	BL	PN1 (C3-3)
5	-15	YE	PN1 (C3-6)
6	-15	YE	DC (C-3)

Pin No.	Pin Name	Wire Color	Destination
1	32	GY	MK (C1-6)
2	31	VI	MK (C1-5)
3	22	BE	MK (C1-4)
4	21	GR	MK (C1-3)
5	12	YE	MK (C1-2)
6	11	OR	MK (C1-1)

Pin No.	Pin Name	Wire Color	Destination
1	KV1	S-BE	JK (C2-6)
2	PI	RE	PN1 (C1-3)
3	PO	YE	PN1 (C1-4)
4	REP	VI	VCO (C7-2)
5	KO	GY	JK (C2-3)
6	PB	BR	PN1 (C1-2)

Pin No.	Pin Name	Wire Color	Destination
1	F#,C	VI	MK (C2-5)
2	F,B	BE	MK (C2-4)
3	E,A#	GR	MK (C2-3)
4	D#,A	YE	MK (C2-2)
5	D,G#	OR	MK (C2-1)
6	C#,G	RE	MK (C1-8)
7	CL	BR	MK (C1-7)

**PN1**

Pin No.	Pin Name	Wire Color	Destination
1	SUST	GR	VCF (C6-1)
2	PB	BR	SSK (C4-6)
3	PI	RE	SSK (C4-2)
4	PO	YE	SSK (C4-3)
5	BRIL	OR	VCF (C2-4)

Pin No.	Pin Name	Wire Color	Destination
1	UP	OR	PVR26-3
2	DOWN	BR	PVR26-1
3	PD	RE	PVR26-2
4	NORM	BL	PVR26-4

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	SSK (C1-1)
2			
3	E	BL	SSK (C1-4)
4	E	BL	PN2 (C1-2)
5			
6	-15	YE	SSK (C1-5)

**HPJ**

Pin No.	Pin Name	Wire Color	Destination
L	HP-L	YE	VCO (C1-2)
G	HP-E	BL	VCO (C1-3)
R	HP-R	GR	VCO (C1-4)

**PN2**

Pin No.	Pin Name	Wire Color	Destination
1	LFO	RE	VCO (C7-3)
2	E	BL	PN1 (C3-4)
3	VCOM	OR	VCO (C7-1)
4	VCFM	YE	VCF (C2-3)
5	VCAM	BE	VCF (C4-1)

Pin No.	Pin Name	Wire Color	Destination
1	MOD	BR	PVR28-2
2	E	BL	PVR28-1
3	LFO	RE	PVR28-3

7

8

9

10

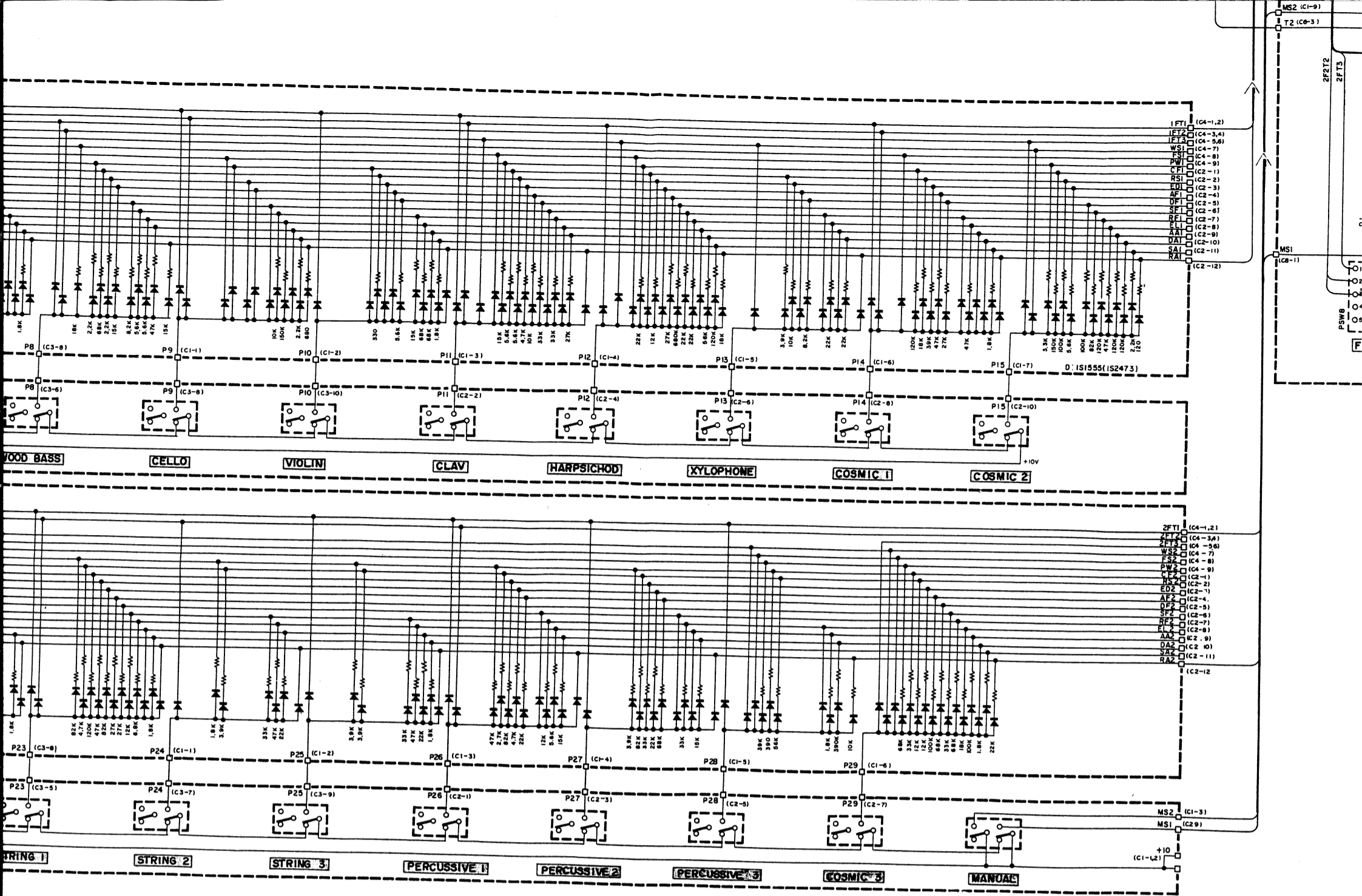
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12

13

14





VCO

C1

Pin No.	Pin Name	Wire Color	Destination
1	HP-L	YE	HPJ-L
2	HP-G	BL	HPJ-G
3	HP-R	GR	HPJ-R
4		S-GY-S	
5	MIX	S-GY	JK (C1-2)

C2

Pin No.	Pin Name	Wire Color	Destination
1			
2	SAW1	S-BR	VCF (C3-2)
3	SAW2	S-RE	VCF (C1-4)
5			
6	NOISE	S-OR	VCF (C1-11)

C3

Pin No.	Pin Name	Wire Color	Destination
1	OUT-II	S-VI	JK (C1-5)
2	E	S-VI-S	
3	OUT-I	S-BE	JK (C1-3)

C4

Pin No.	Pin Name	Wire Color	Destination
1	+10	BE	PSW (C1-1)
2	KV4	BR	VCF (C2-7)
3	KV3	PK	JK (C2-5)
4	KV2	SB	JK (C2-4)
5	KV2	SB	VCF (C2-5)

C5

Pin No.	Pin Name	Wire Color	Destination
1	2FT3	PK	PM2 (C4-5)
2	2FT2	SB	PM2 (C4-3)
3	2FT1	GG	PM2 (C4-1)
4	1FT3	OR	PM1 (C4-5)
5	1FT2	RE	PM1 (C4-3)
6	1FT1	BR	PM1 (C4-1)

C6

Pin No.	Pin Name	Wire Color	Destination
1	-15	YE	DC (C-2)
2	E	BL	DC (C-6)
3			
4			
5	+15	BR	DC (C-11)

C7

Pin No.	Pin Name	Wire Color	Destination
1	VCOM	OR	PN2 (C1-3)
2	REPEAT	VI	SSK (C4-4)
3	LFO	RE	PN2 (C1-1)

C8

Pin No.	Pin Name	Wire Color	Destination
1	IN1	S-YE	VCF (C2-1)
2	E	S-YE-S	VCF (C2-2)
3	IN2	S-GR	VCF (C4-4)
4	E	S-GR-S	VCF (C4-3)

PM1

C1

Pin No.	Pin Name	Wire Color	Destination
1	P-9	WH	PSW (C3-8)
2	P-10	GG	PSW (C3-10)
3	P-11	SB	PSW (C2-2)
4	P-12	PK	PSW (C2-4)
5	P-13	BR	PSW (C2-6)
6	P-14	RE	PSW (C2-8)
7	P-15	OR	PSW (C2-10)

C2

Pin No.	Pin Name	Wire Color	Destination
1	CF1	VI	VCF (C2-6)
2	RS1	GY	VCF (C1-1)
3	ED1	WH	VCF (C7-10)
4	AF1	GG	VCF (C7-6)
5	DF1	SB	VCF (C7-7)
6	SF1	PK	VCF (C7-8)
7	RF1	BR	VCF (C7-9)
8	EL1	RE	VCF (C7-5)
9	AA1	OR	VCF (C7-1)
10	DA1	YE	VCF (C7-2)
11	SA1	GR	VCF (C7-3)
12	RA1	BE	VCF (C7-7)

C3

Pin No.	Pin Name	Wire Color	Destination
1	P-1	BR	PSW (C4-2)
2	P-2	RE	PSW (C4-4)
3	P-3	OR	PSW (C4-6)
4	P-4	YE	PSW (C4-8)
5	P-5	GR	PSW (C4-10)
6	P-6	BE	PSW (C3-2)
7	P-7	VI	PSW (C3-4)
8	P-8	GY	PSW (C3-6)

C4

Pin No.	Pin Name	Wire Color	Destination
1	1FT1	BR	VCO (C5-6)
2			
3	1FT2	RE	VCO (C5-5)
4			
5	1FT3	OR	VCO (C5-4)
6			
7	WS1	YE	VCF (C3-4)
8	FS1	GR	VCF (C1-2)
9	PW1	BE	VCF (C3-1)

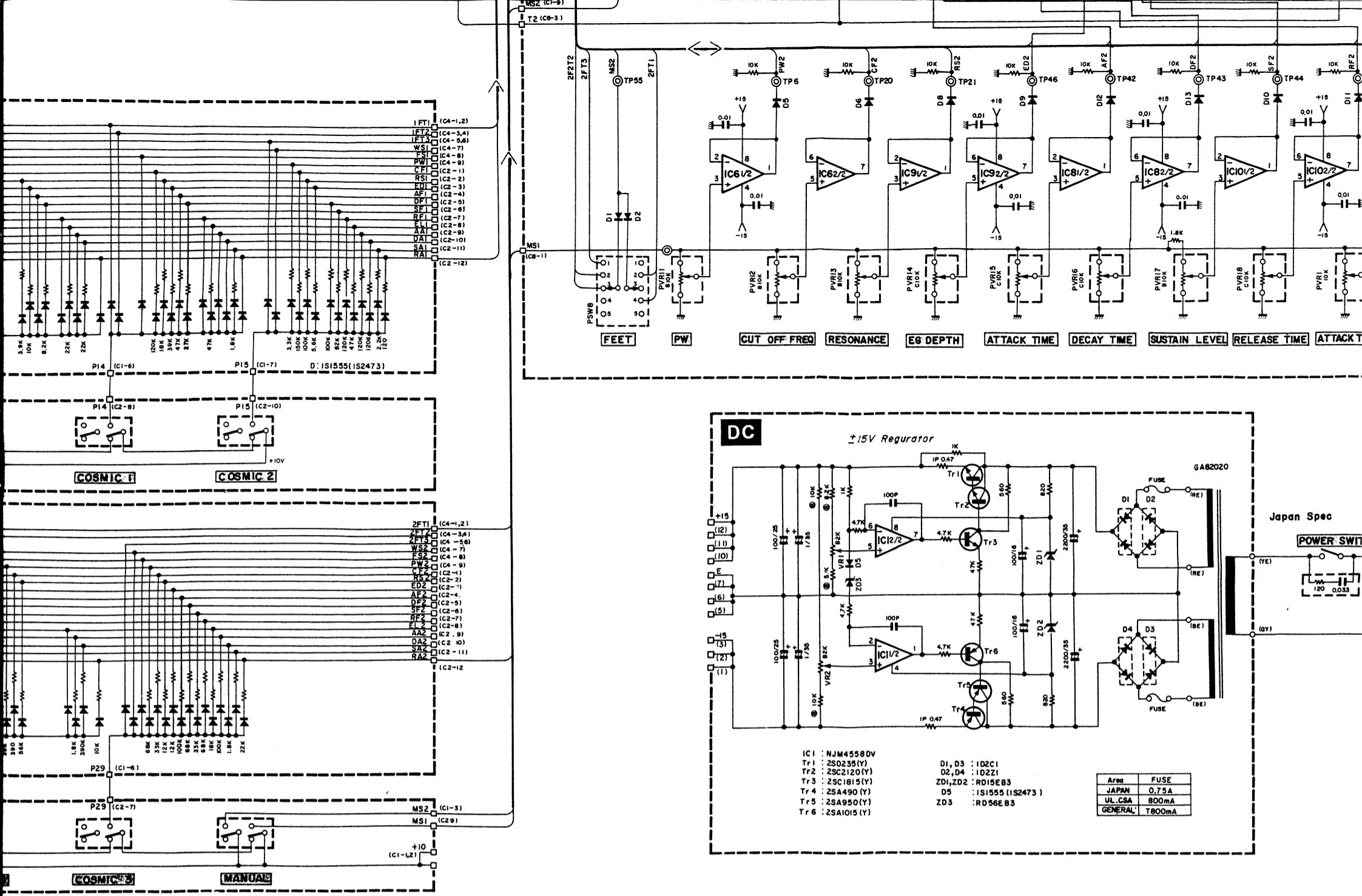
PM2

C1

Pin No.	Pin Name	Wire Color	Destination
1	P-24	RE	PSW (C3-7)
2	P-25	OR	PSW (C3-9)
3	P-26	YE	PSW (C2-1)
4	P-27	GR	PSW (C2-3)
5	P-28	BE	PSW (C2-5)
6	P-29	VI	PSW (C2-7)

C2

Pin No.	Pin Name	Wire Color	Destination
1	CF2	YE	VCF (C4-5)
2	RS2	GR	VCF (C4-6)
3	ED2	BE	VCF (C6-8)
4	AF2	VI	VCF (C6-4)
5	DF2	GY	VCF (C6-5)
6	SF2	WH	VCF (C6-6)
7	RF2	GG	VCF (C6-7)
8	EL2	SB	VCF (C8-6)
9	AA2	PK	VCF (C8-2)
10	DA2	OR	VCF (C8-3)
11	SA2	RE	VCF (C8-4)
12	RA2	BR	VCF (C8-5)



Destination	Pin No.	Pin Name	Wire Color	Destination
PSW (C3-8)	1	P-1	BR	PSW (C4-2)
PSW (C3-10)	2	P-2	RE	PSW (C4-4)
PSW (C2-2)	3	P-3	OR	PSW (C4-6)
PSW (C2-4)	4	P-4	YE	PSW (C4-8)
PSW (C2-6)	5	P-5	GR	PSW (C4-10)
PSW (C2-8)	6	P-6	BE	PSW (C3-2)
PSW (C2-10)	7	P-7	VI	PSW (C3-4)
	8	P-8	GY	PSW (C3-6)

Destination	Pin No.	Pin Name	Wire Color	Destination
VCF (C2-6)	1	1FT1	BR	VCO (C5-6)
VCF (C1-1)	2			
VCF (C7-10)	3	1FT2	RE	VCO (C5-5)
VCF (C7-6)	4			
VCF (C7-7)	5	1FT3	OR	VCO (C5-4)
VCF (C7-8)	6			
VCF (C7-9)	7	WS1	YE	VCF (C3-4)
VCF (C7-5)	8	FS1	GR	VCF (C1-2)
VCF (C7-1)	9	PW1	BE	VCF (C3-1)
VCF (C7-2)				
VCF (C7-3)				
VCF (C7-7)				

Pin No.	Pin Name	Wire Color	Destination
1	P-24	RE	PSW (C3-7)
2	P-25	OR	PSW (C3-9)
3	P-26	YE	PSW (C2-1)
4	P-27	GR	PSW (C2-3)
5	P-28	BE	PSW (C2-5)
6	P-29	VI	PSW (C2-7)

Pin No.	Pin Name	Wire Color	Destination
1	CF2	YE	VCF (C4-5)
2	RS2	GR	VCF (C4-6)
3	ED2	BE	VCF (C6-8)
4	AF2	VI	VCF (C6-4)
5	DF2	GY	VCF (C6-5)
6	SF2	WH	VCF (C6-6)
7	RF2	GG	VCF (C6-7)
8	EL2	SB	VCF (C8-6)
9	AA2	PK	VCF (C8-2)
10	DA2	OR	VCF (C8-3)
11	SA2	RE	VCF (C8-4)
12	RA2	BR	VCF (C8-5)

Pin No.	Pin Name	Wire Color	Destination
1	P-16	BE	PSW (C4-1)
2	P-17	VI	PSW (C4-3)
3	P-18	GY	PSW (C4-5)
4	P-19	WH	PSW (C4-7)
5	P-20	GG	PSW (C4-9)
6	P-21	SB	PSW (C3-1)
7	P-22	PK	PSW (C3-3)
8	P-23	BR	PSW (C3-5)

Pin No.	Pin Name	Wire Color	Destination
1	2FT1	GG	VCO (C5-3)
2	2FT1	GG	VCF (C1-6)
3	2FT2	SB	VCO (C5-2)
4	2FT2	SB	VCF (C1-7)
5	2FT3	PK	VCO (C5-1)
6	2FT3	PK	VCF (C1-8)
7	WS2	BR	VCF (C1-5)
8	FS2	RE	VCF (C4-7)
9	PW2	OR	VCF (C4-2)

Pin No.	Pin Name	Wire Color	Destination
1	+10	BE	VCO (C4-1)
2			
3	MS2	WH	VCF (C1-9)

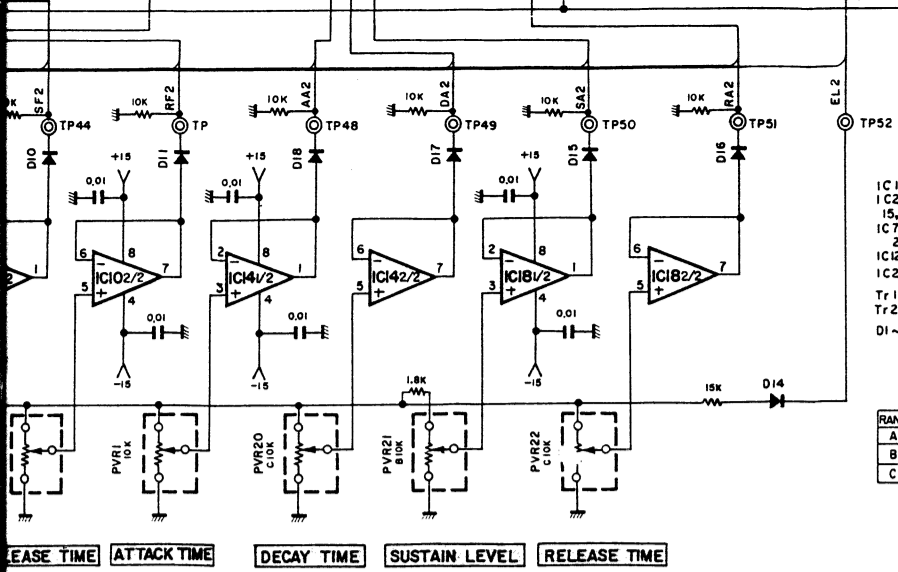
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1	P-26	YE	PM2 (C1-3)
2	P-11	SB	PM1 (C1-3)
3	P-27	GR	PM2 (C1-4)
4	P-12	PK	PM1 (C1-4)
5	P-28	BE	PM2 (C1-5)
6	P-13	BR	PM1 (C1-5)
7	P-29	VI	PM2 (C1-6)
8	P-14	RE	PM1 (C1-6)
9	MS1	GY	VCF (C8-1)
10	P-15	OR	PM1 (C1-7)

Pin No.	Pin Name	Wire Color	Destination
1	P-21	SB	PM2
2	P-6	BE	PM1
3	P-22	PK	PM2
4	P-7	VI	PM1
5	P-23	BR	PM2
6	P-8	GY	PM1
7	P-24	RE	PM2
8	P-9	WH	PM1
9	P-25	OR	PM2
10	P-10	GG	PM1

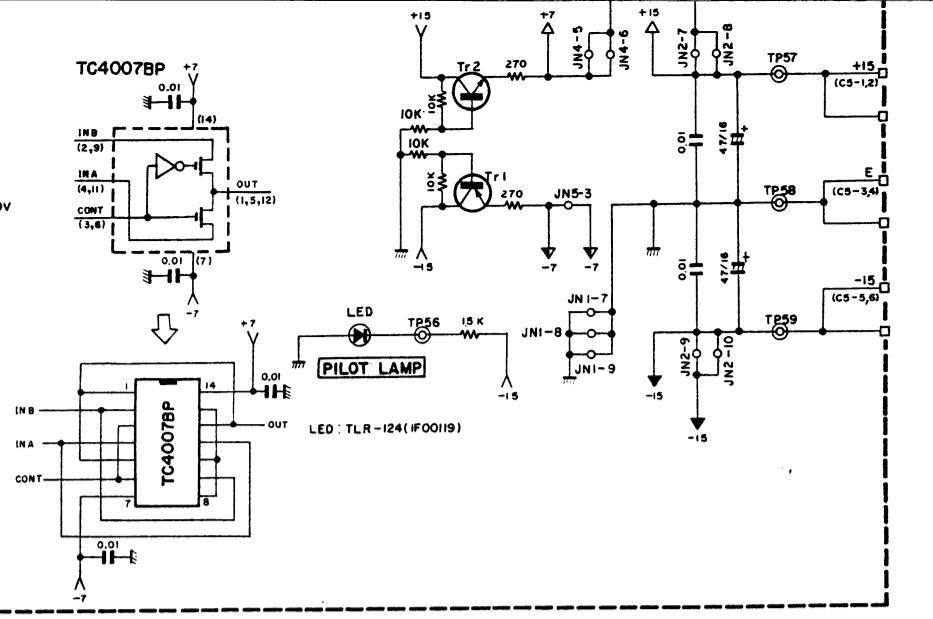
  

Pin No.	Pin Name	Wire Color	Destination
1	P-16	BE	PM2
2	P-1	BR	PM1
3	P-17	VI	PM2
4	P-2	RE	PM1
5	P-18	GY	PM2
6	P-3	OR	PM1
7	P-19	WH	PM2
8	P-4	YE	PM1
9	P-20	GG	PM2
10	P-5	GR	PM1

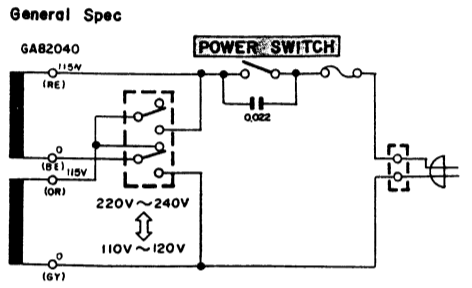
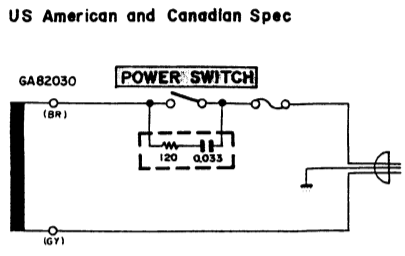
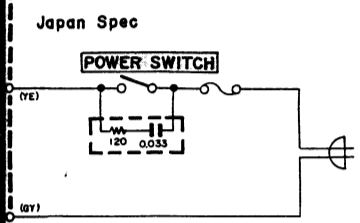


IC 1,3,4,5,20 : TC4007BP  
 IC 2,6,8,9,10,14 : NJM45580V  
 IC 15,19,22,24,25,26,29 : 1G00151  
 IC 7,11,13,16,17,23 : 1G00151  
 28,31-33 : 1G00159  
 IC 12,19,30,34 : 1G00159  
 IC 21,27 : 1G00156  
 Tr 1 : 2SA1015(Y)  
 Tr 2-6 : 2SC1815(Y)  
 Di ~23 : 1S1555

IC 21, 27 RANK			
RANK	R1, R3	R2, R4	
A	2.2K	470	
B	2.0K	430	
C	1.8K	390	



LEASE TIME    ATTACK TIME    DECAY TIME    SUSTAIN LEVEL    RELEASE TIME



	Audio Signal
	Clock Pulse
	DC Control
	Low Frequency Modulation Data

**C3**

Pin Name	Wire Color	Destination
P-21	SB	PM2 (C3-6)
P-6	BE	PM1 (C3-6)
P-22	PK	PM2 (C3-7)
P-7	VI	PM1 (C3-7)
P-23	BR	PM2 (C3-8)
P-8	GY	PM1 (C3-8)
P-24	RE	PM2 (C1-1)
P-9	WH	PM1 (C1-1)
P-25	OR	PM2 (C1-2)
P-10	GG	PM1 (C1-2)

**VCF**

Pin No.	Pin Name	Wire Color	Destination
1	RS1	GY	PM1 (C2-2)
2	FS1	GR	PM1 (C4-8)
3	E	S-RE-S	VCO (C2-3)
4	SAW2	S-RE	VCO (C2-4)
5	WS2	BR	PM2 (C4-7)
6	2FT1	GG	PM2 (C4-2)
7	2FT2	SB	PM2 (C4-4)
8	2FT3	PK	PM2 (C4-6)
9	MS2	WH	PSW (C1-3)
10	E	S-OR-S	VCO (C2-5)
11	NOISE	S-OR	VCO (C2-6)

**C4**

Pin No.	Pin Name	Wire Color	Destination
1	VCAM	BE	PN2 (C1-5)
2	PW2	OR	PM2 (C4-9)
3	E	S-GR-S	VCO (C8-4)
4	O2	S-GR	VCO (C8-3)
5	CF2	YE	PM2 (C2-1)
6	RS2	GR	PM2 (C2-2)
7	FS2	RE	PM2 (C4-8)

**C7**

Pin No.	Pin Name	Wire Color	Destination
1	AA1	OR	PM1 (C2-9)
2	DA1	YE	PM1 (C2-10)
3	SA1	GR	PM1 (C2-11)
4	RA1	BE	PM1 (C2-12)
5	EL1	RE	PM1 (C2-8)
6	AF1	GG	PM1 (C2-4)
7	DF1	SB	PM1 (C2-5)
8	SF1	PK	PM1 (C2-6)
9	RF1	BR	PM1 (C2-7)
10	ED1	WH	PM1 (C2-3)

**DC**

Pin No.	Pin Name	Wire Color	Destination
1	-15	YE	VCF (C5-6)
2	-15	YE	VCO (C6-1)
3	-15	YE	SSK (C1-6)
4			
5	E	BL	VCF (C5-3)
6	E	BL	VCO (C6-3)
7	E	BL	SSK (C1-3)
8			
9			
10	+15	BR	VCF (C5-1)
11	+15	BR	VCO (C6-5)
12	+15	BR	SSK (C1-2)

**C4**

Pin Name	Wire Color	Destination
P-16	BE	PM2 (C3-1)
P-1	BR	PM1 (C3-1)
P-17	VI	PM2 (C3-2)
P-2	RE	PM1 (C3-2)
P-18	GY	PM2 (C3-3)
P-3	OR	PM1 (C3-3)
P-19	WH	PM2 (C3-4)
P-4	YE	PM1 (C3-4)
P-20	GG	PM2 (C3-5)
P-5	GR	PM1 (C3-5)

**C2**

Pin No.	Pin Name	Wire Color	Destination
1	O1	S-YE	VCO (C8-1)
2	E	S-YE-S	VCO (C8-2)
3	VCFM	YE	PN2 (C1-4)
4	BRIL	OR	PN1 (C1-5)
5	KV2	SB	VCO (C4-5)
6	CF1	VI	PM1 (C2-1)
7	KV4	BR	VCO (C4-2)

**C5**

Pin No.	Pin Name	Wire Color	Destination
1	+15	BR	DC (C-10)
2			
3	E	BL	DC (C-5)
4			
5			
6	-15	YE	DC (C-1)

**C8**

Pin No.	Pin Name	Wire Color	Destination
1	MS1	GY	PSW (C2-9)
2	AA2	PK	PM2 (C2-9)
3	DA2	OR	PM2 (C2-10)
4	SA2	RE	PM2 (C2-11)
5	RA2	BR	PM2 (C2-12)
6	EL2	SB	PM2 (C2-8)

**JK**

Pin No.	Pin Name	Wire Color	Destination
1			
2	MIX	S-GY	VCO (C1-5)
3	OUTI	S-BE	VCO (C3-3)
4	-	S-BE-S	-
5	OUTII	S-VI	VCO (C3-1)
6	-	S-VI-S	-
7	E	BL	VCF (C9-1)
8	E	BL	VCF (C9-2)
9	E	BL	VCF (C9-3)
10	E	BL	VCF (C9-4)

**C3**

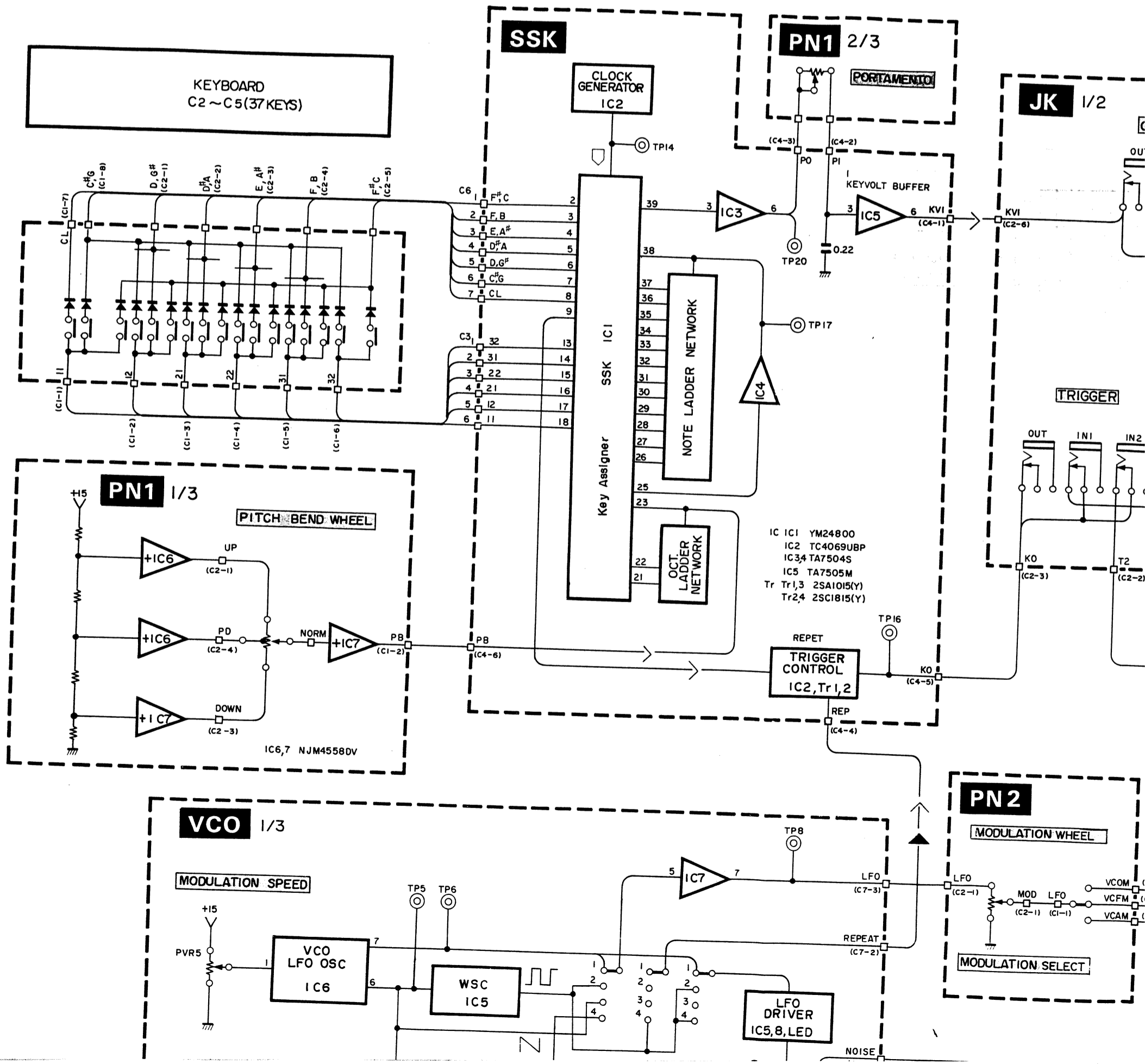
Pin No.	Pin Name	Wire Color	Destination
1	PW1	BE	PM1 (C4-9)
2	SAW1	S-BR	VCO (C2-2)
3	E	S-BR-S	VCO (C2-1)
4	WS1	YE	PM1 (C4-7)

**C6**

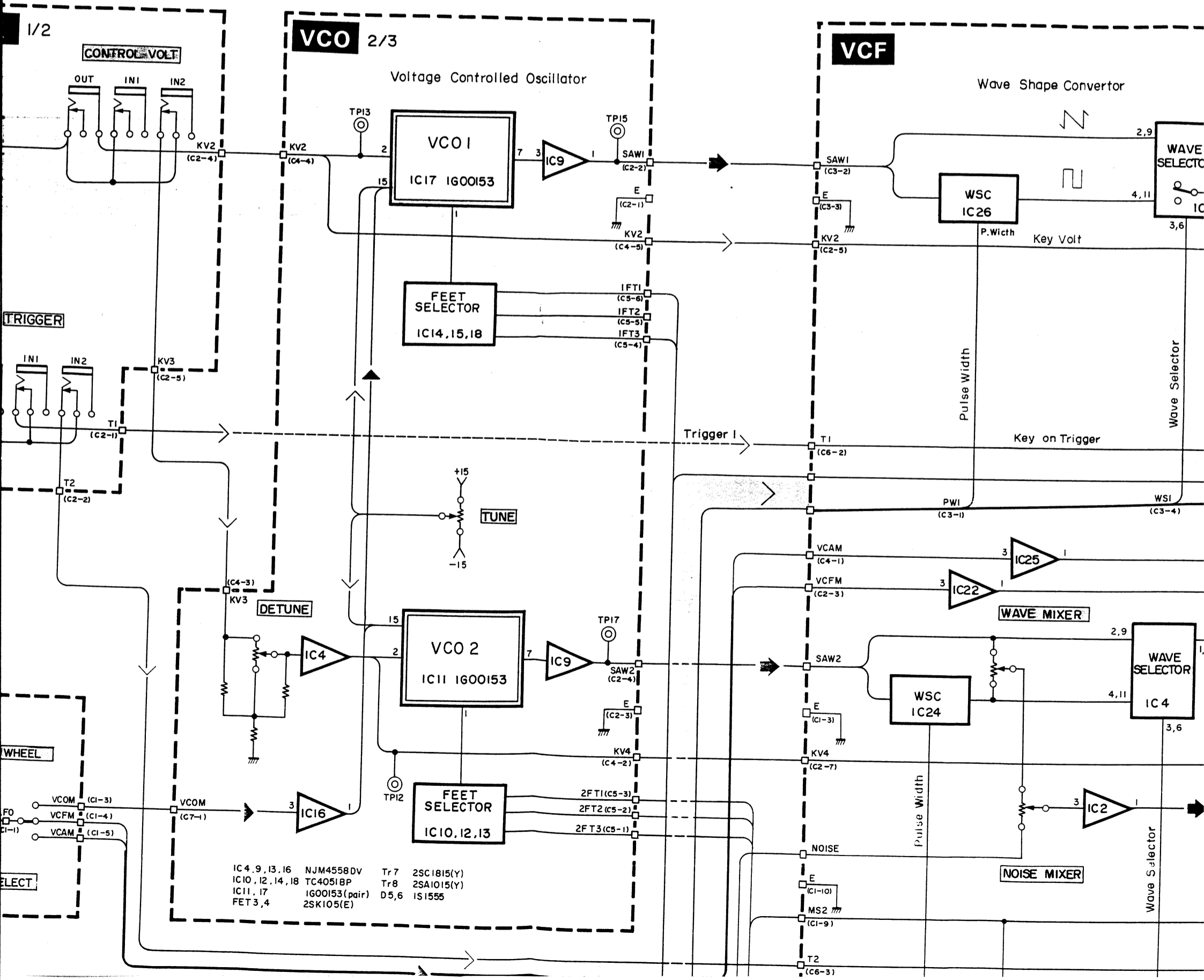
Pin No.	Pin Name	Wire Color	Destination
1	SUST	GR	PN1 (C1-1)
2	T1	GG	JK (C2-1)
3	T2	WH	JK (C2-2)
4	AF2	VI	PM2 (C2-4)
5	DF2	GY	PM2 (C2-5)
6	SF2	WH	PM2 (C2-6)
7	RF2	GG	PM2 (C2-7)
8	ED2	BE	PM2 (C2-3)

**C2**

Pin No.	Pin Name	Wire Color	Destination
1	T1	GG	VCF (C6-2)
2	T2	WH	VCF (C6-3)
3	KO	GY	SSK (C4-5)
4	KV2	SB	VCO (C4-4)
5	KV3	PK	VCO (C4-3)
6	KV1	S-BE	SSK (C4-1)
7	-	S-BE-S	-

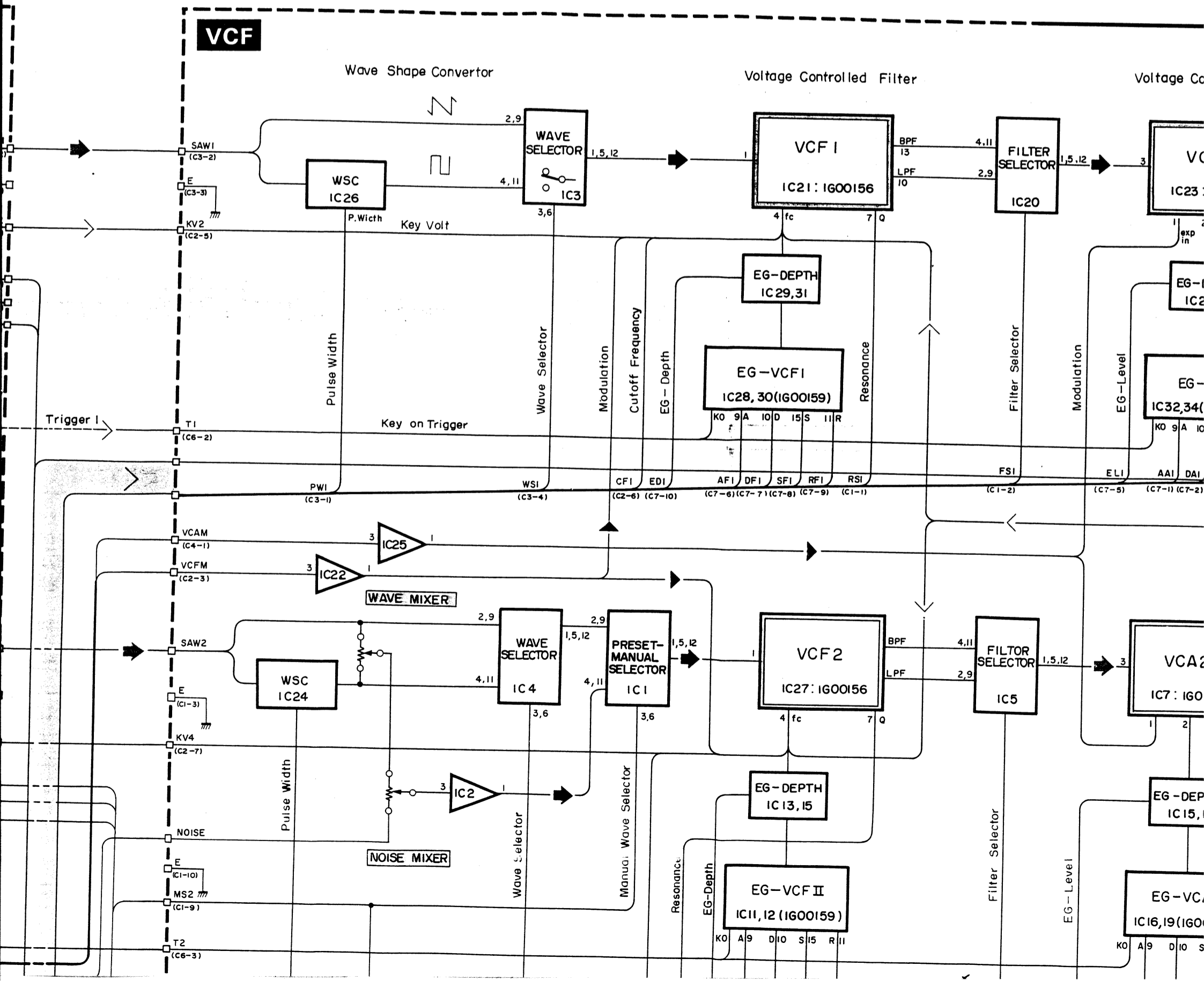


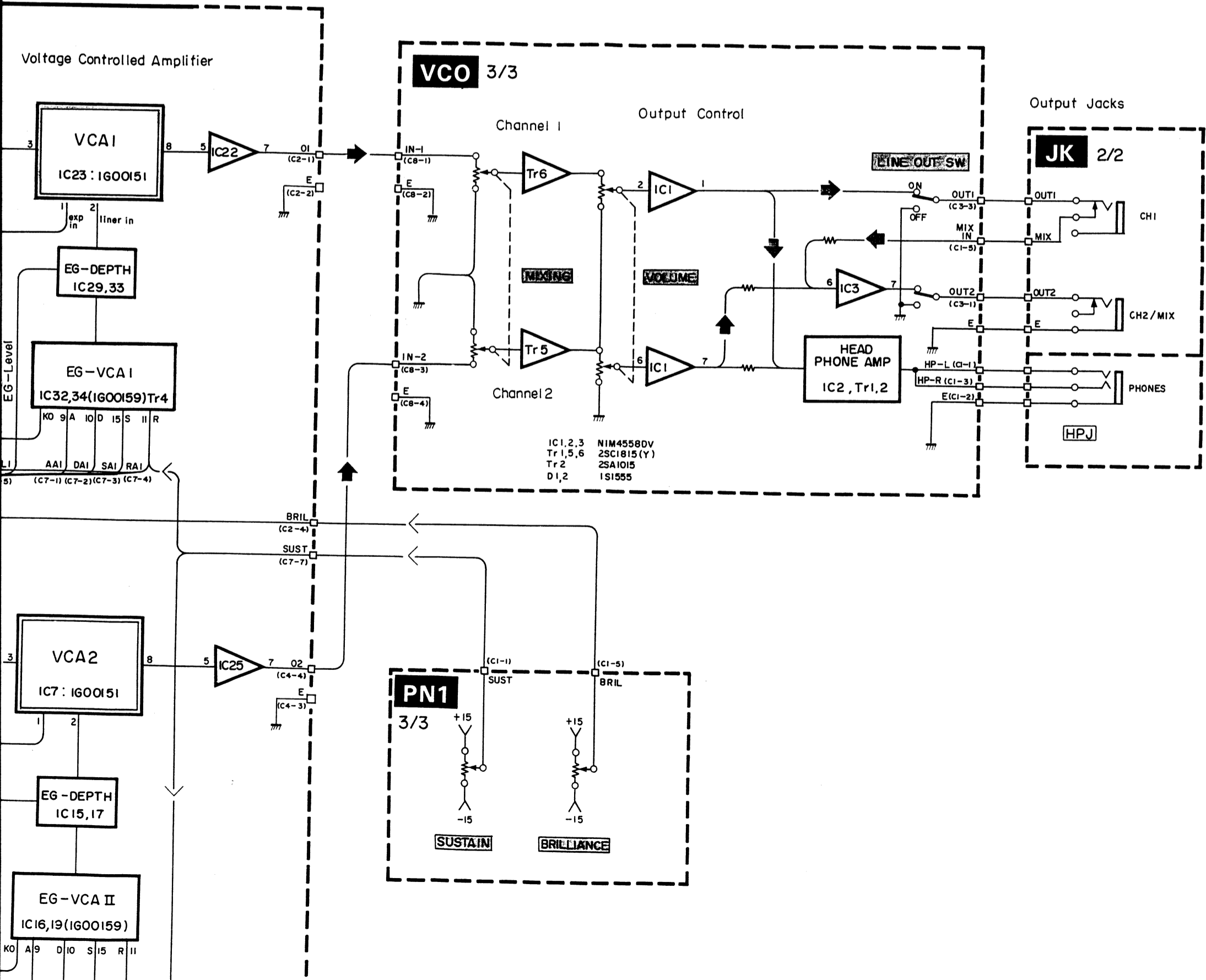
# CS15D BLOCK DIAG

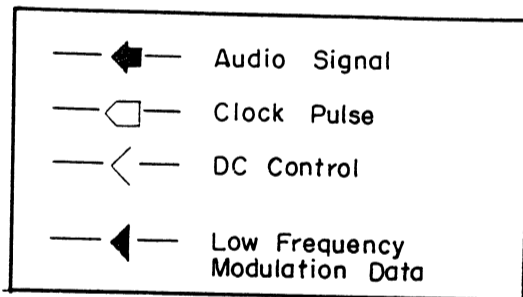
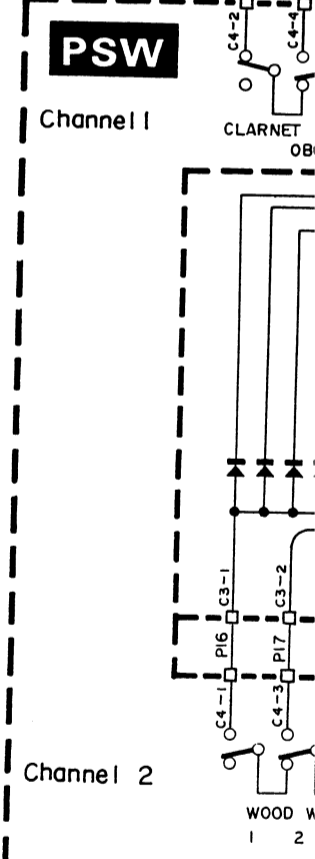
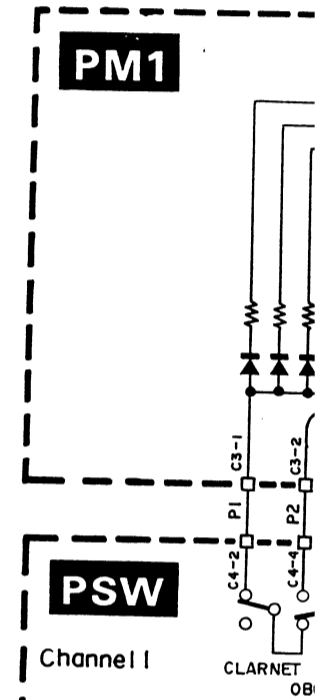
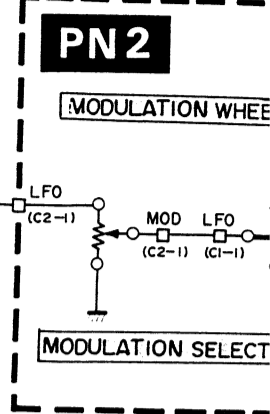
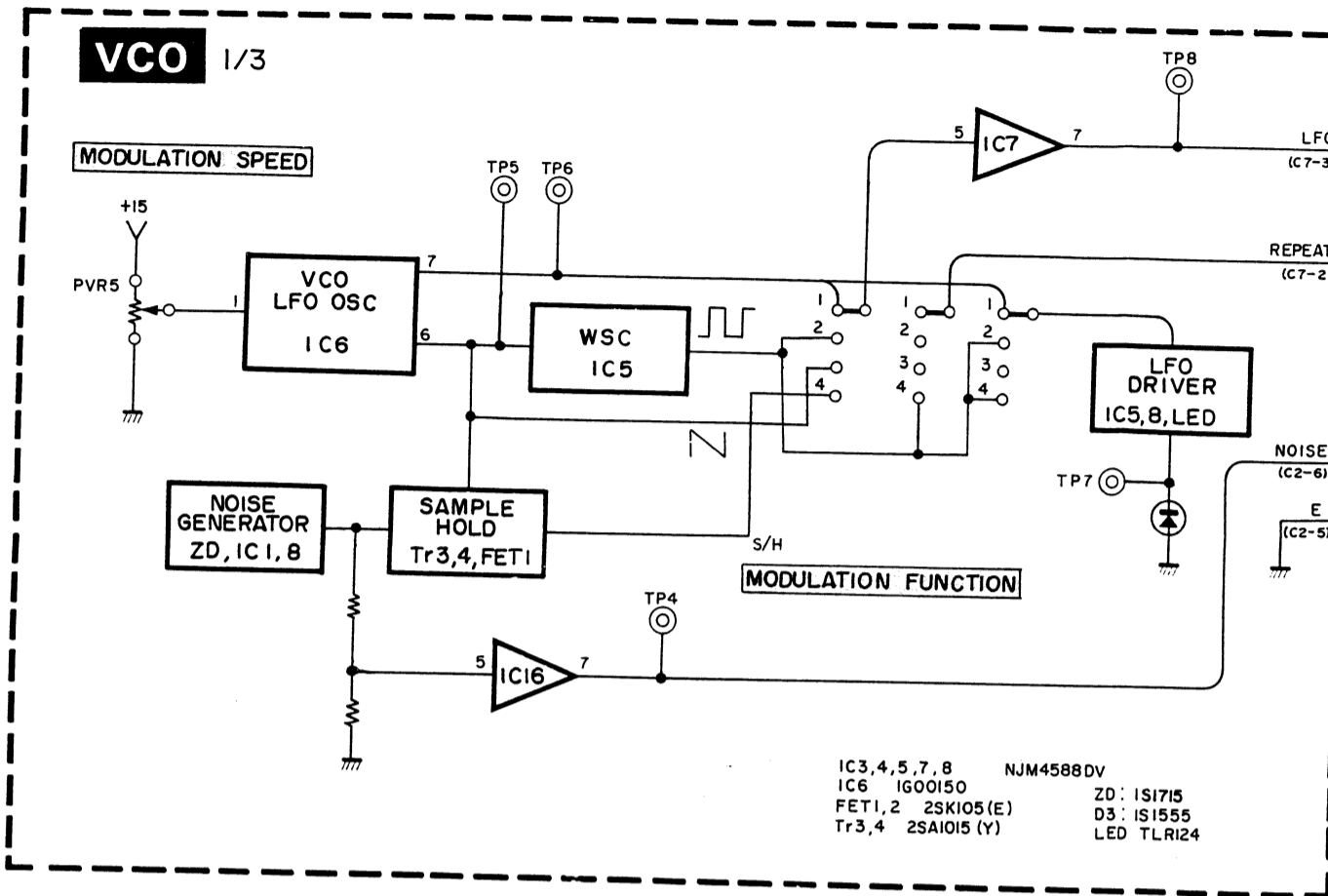
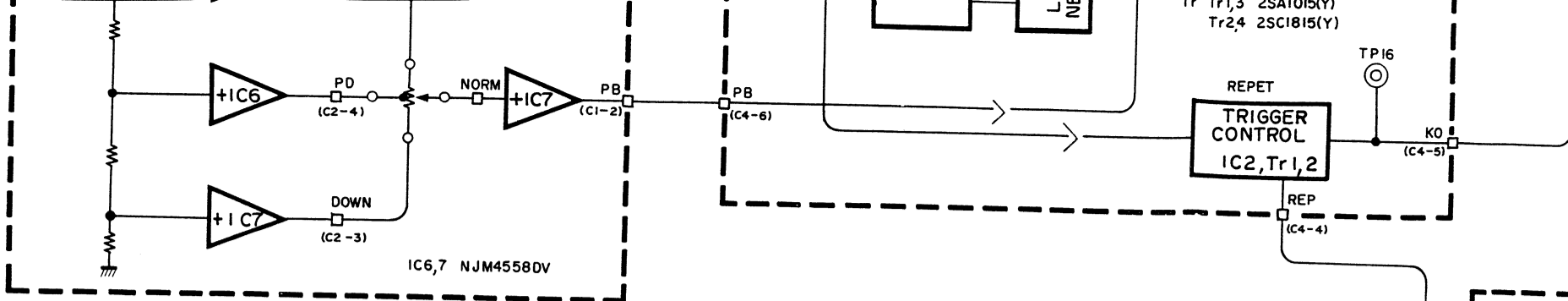


# 15D BLOCK DIAGRAM

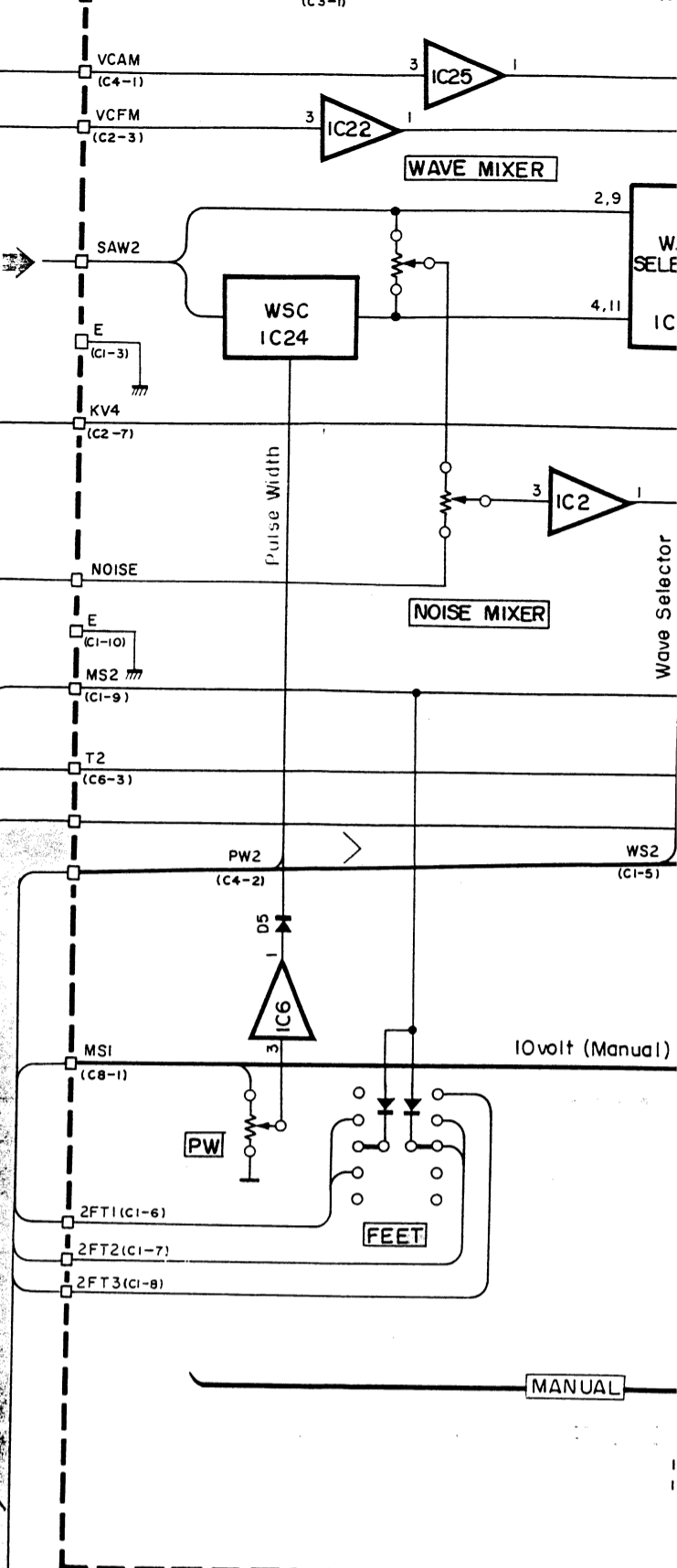
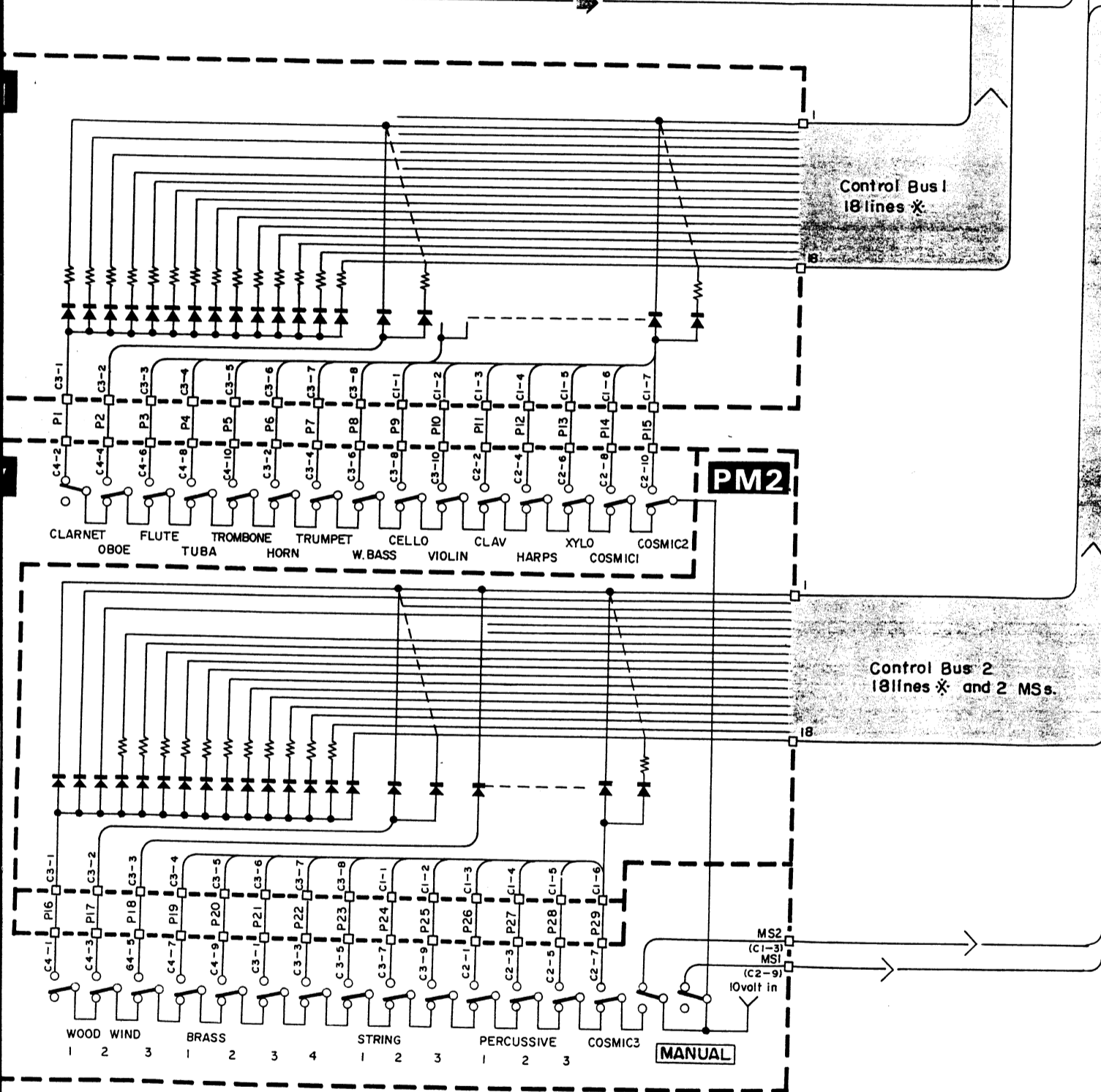
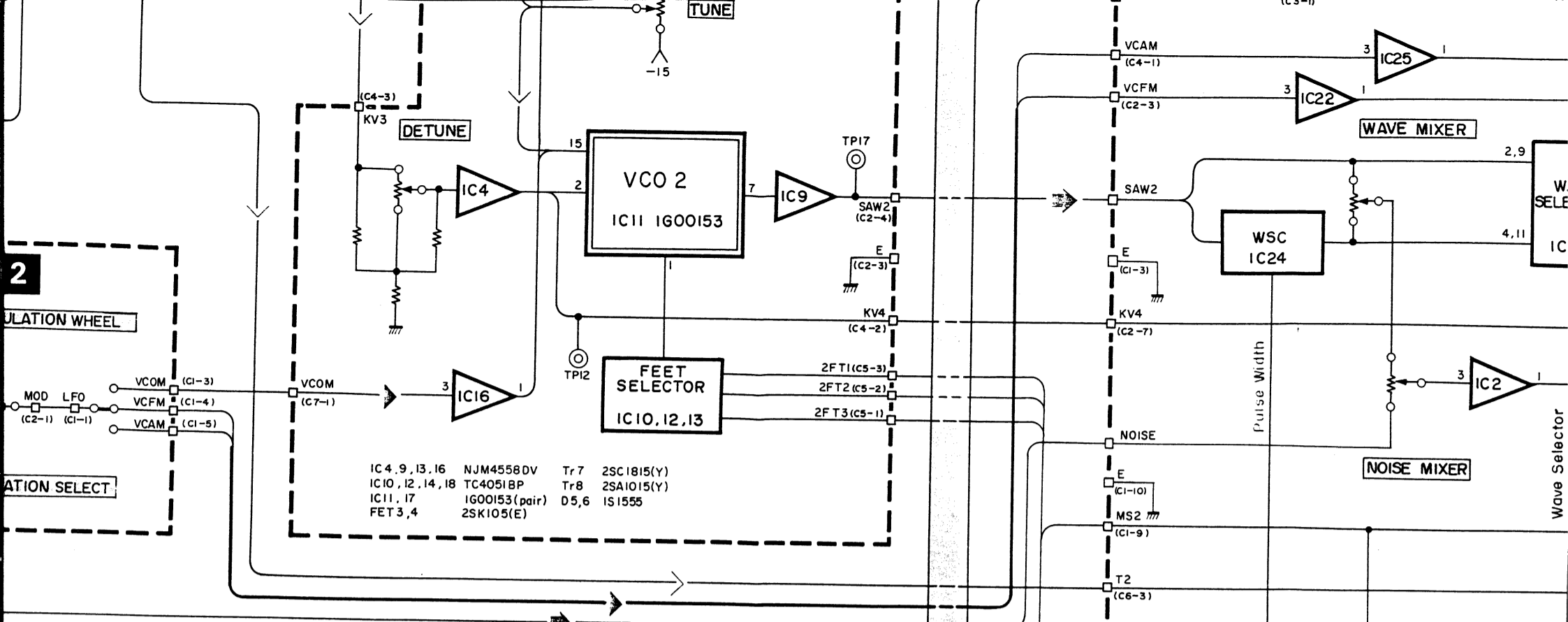
006883





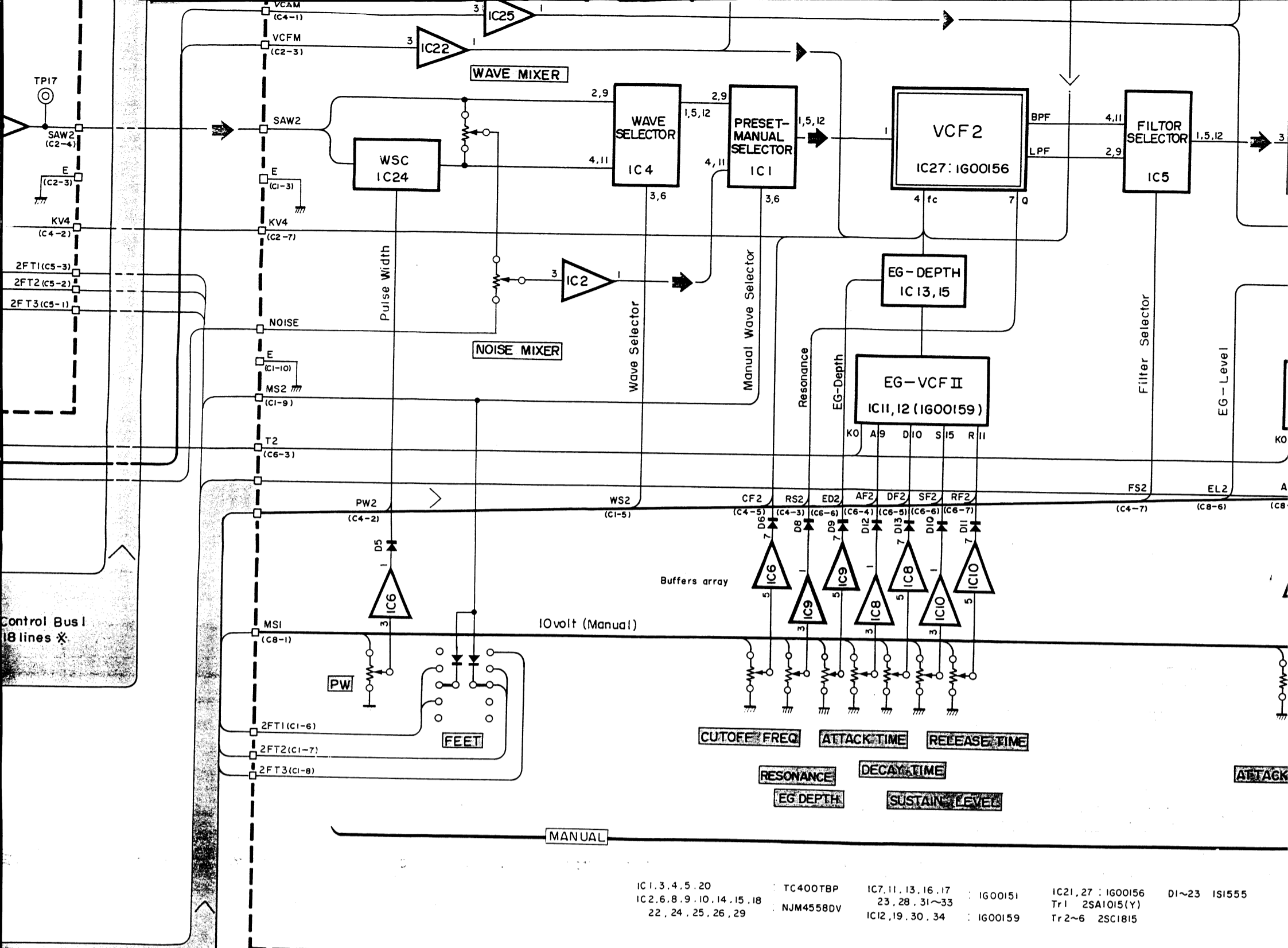






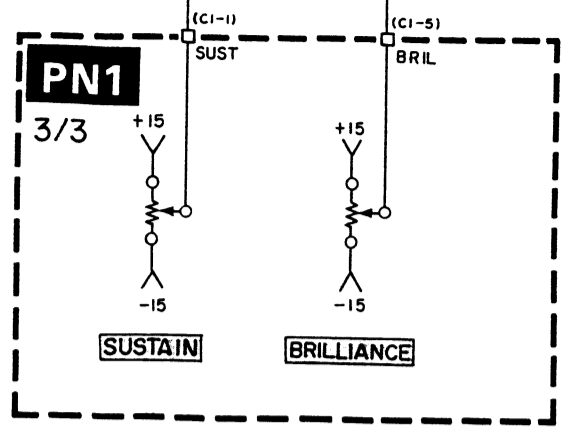
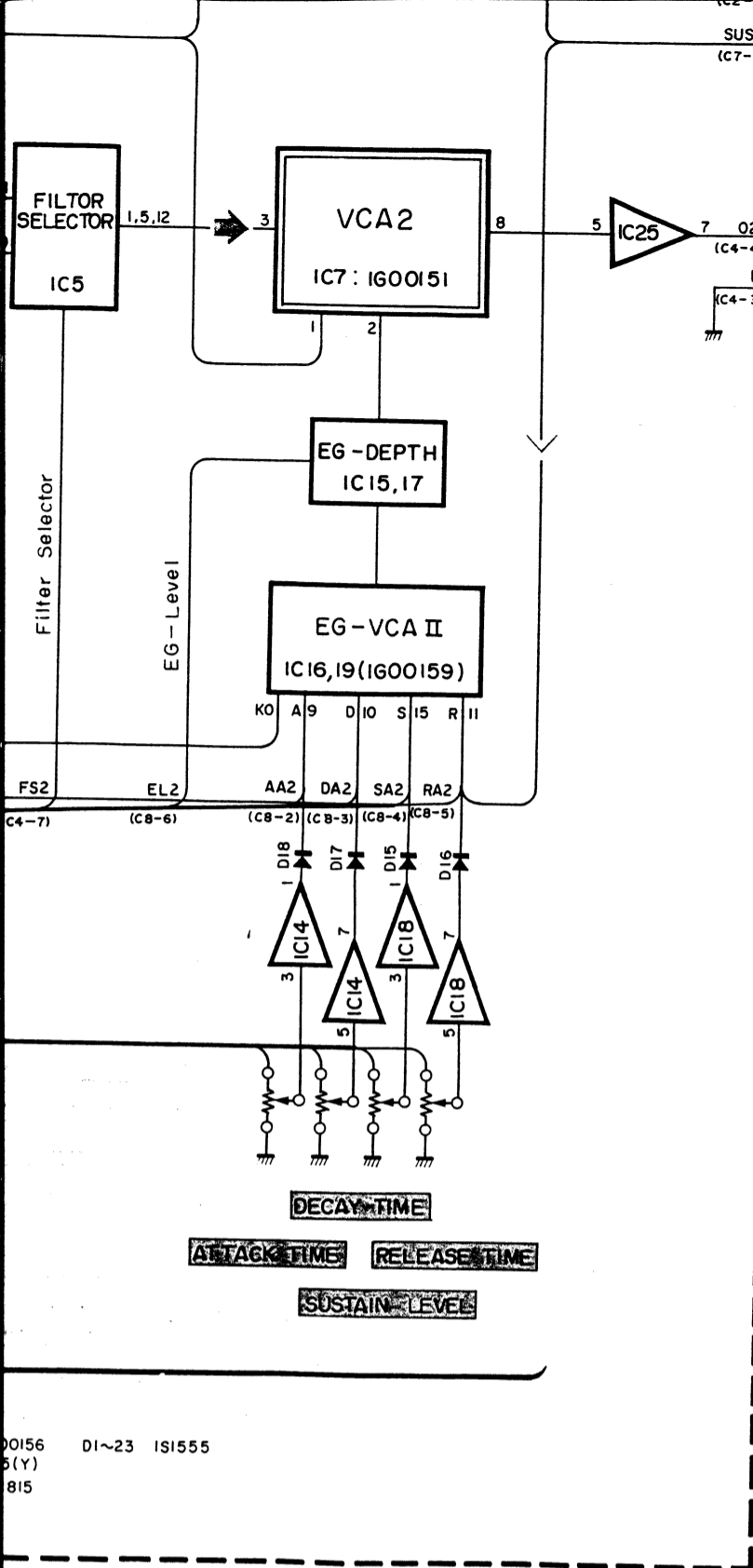
Terminals identification of Control Buss

Name	Connector	Name	Connector
I FT 1	C 4 - 1,2	2 FT 1	C 4 - 1,2
I FT 2	C 4 - 3,4	2 FT 2	C 4 - 3,4
I FT 3	C 4 - 5,6	2 FT 3	C 4 - 5,6
W S 1	C 4 - 7	W S 2	C 4 - 7
F S 1	C 4 - 8	F S 2	C 4 - 8
P W 1	C 4 - 9	P W 2	C 4 - 9
C F 1	C 2 - 1	C F 2	C 2 - 1
R S 1	C 2 - 2	R S 2	C 2 - 2
E D 1	C 2 - 3	E D 2	C 2 - 3
A F 1	C 2 - 4	A F 2	C 2 - 4
D F 1	C 2 - 5	D F 2	C 2 - 5
S F 1	C 2 - 6	S F 2	C 2 - 6
R F 1	C 2 - 7	R F 2	C 2 - 7
E L 1	C 2 - 8	E L 2	C 2 - 8
A A 1	C 2 - 9	A A 2	C 2 - 9
D A 1	C 2 - 10	D A 2	C 2 - 10
S A 1	C 2 - 11	S A 2	C 2 - 11
R A 1	C 2 - 12	R A 2	C 2 - 12



Terminals identification of Control Busses

Name	Connector	Name	Connector
1FT1	C4-1,2	2FT1	C4-1,2
1FT2	C4-3,4	2FT2	C4-3,4
1FT3	C4-5,6	2FT3	C4-5,6
WS1	C4-7	WS2	C4-7
FS1	C4-8	FS2	C4-8
PW1	C4-9	PW2	C4-9
CF1	C2-1	CF2	C2-1
RS1	C2-2	RS2	C2-2
ED1	C2-3	ED2	C2-3
AF1	C2-4	AF2	C2-4
DF1	C2-5	DF2	C2-5
SF1	C2-6	SF2	C2-6
RF1	C2-7	RF2	C2-7
EL1	C2-8	EL2	C2-8
AA1	C2-9	AA2	C2-9
DA1	C2-10	DA2	C2-10
SA1	C2-11	SA2	C2-11
RA1	C2-12	RA2	C2-12



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