

ELECTRONIC MUSICAL INSTRUMENT

ROLAND SYNTHESIZER
SH-3A

SERVICE
NOTE

THE 5th EDITION

Printed in Japan. '76. Apr.

APPLIED FROM SERIAL No.270800



Roland Corporation

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ELECTRONIC MUSIC SYNTHESIZER MODEL SH - 3A

ROLAND SYNTHESIZER

1. SPECIFICATIONS

* 44Keys(F Scale)

Note can be raised or lowered by one octave via Transpose switch.

* VCO Assembly(Voltage Controlled Oscillator)

5 Octave Combination(32', 16', 8', 4', 2')	5
Waveform Selector	5
Modulation Waveform Selector (\wedge / \square / \sim)	1
Modulation Depth Control (VIBRATO)	1
Pitch Control	1
Glide Switch	1
Portamento Time (PORTAMENTO)	1
Portamento OFF Switch (OFF)	1
Transpose Changeover Switch (L/M/H)	1
8' Chorus Speed Control/OFF (8' CHORUS).....	1

Sampler

Sampled Waveform Selector (MODE - OFF/M/M/ \wedge /RANDOM)	1
Sampling Time (SAMPLE TIME)	1
Sampling Level Control (LEVEL)	1

* VCF Assembly (Voltage Controlled Filter)

Filter Resonance Control

CUTOFF FREQ	1
RESONANCE	1

Modulation Waveform Selector (\wedge / \square / \sim)	1
Modulation Depth Control (GROWL)	1
Envelope Selector (ADSR/ \wedge / \wedge)	1
Envelope Sensitivity Control (SENS)	1

* VCA Assembly (Voltage Controlled Amplifier)

Modulation Waveform Selector (\wedge / \square / \sim)	1
Modulation Depth Control (TREMOLO).....	1
Envelope Selector (ADSR/ \wedge / \wedge / \square)	1
Hold Control	1
OUTPUT Level Control (OUT LEVEL)	1

* Others

Envelope Control	4
Attack Time/Decay Time/Sustain Level/Release Time	
Low Frequency Oscillator 1 Rate	1
Low Frequency Oscillator 2 Rate	1
Low Frequency Oscillator 2 Delay Time Control	1
Noise Generator Level Control	1
White/Pink Noise Changer	1
Noise Input Selector	1
Phones Level Control	1
Tuning (on rear Panel)	1
OUTPUT Jack	1
OUTPUT VOLTAGE CHANGEOVER SWITCH (L/M/H)	1
PHONES Jack	1
Jack for VCO CONTROL	1
Jack for VCF CONTROL	1

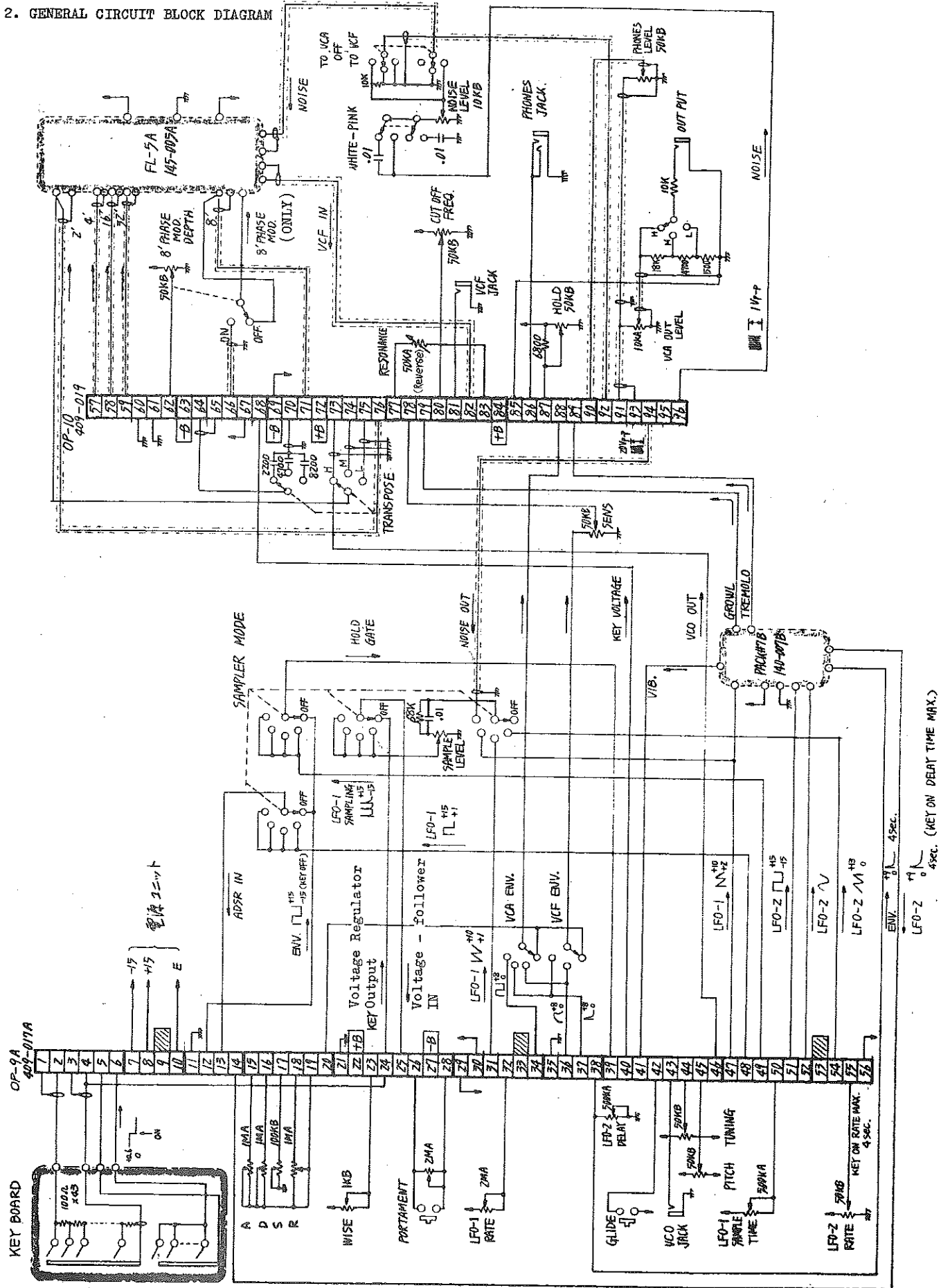
Voltage Changer (for changing AC voltage) 1

- * Power Source AC 100, 117, 220, 250V 50/60Hz
- * Power Consumption 9VA
- * Dimensions W ; 1005mm (40.2")
D ; 320mm (12.8")
H ; 150mm (6.0")
- * Weight(Net) 14.5 Kg (32 Lbs.)
- * Accessories Music Rack
Conection Cord
(2.5m with Pin-Plug Adaptor)
- ** Accessories(optional) Volume Control Pedal FV-1
(for controlling Sound Volume, VCO
GLIDE effect or VCF CUTOFF-
FREQUENCY)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

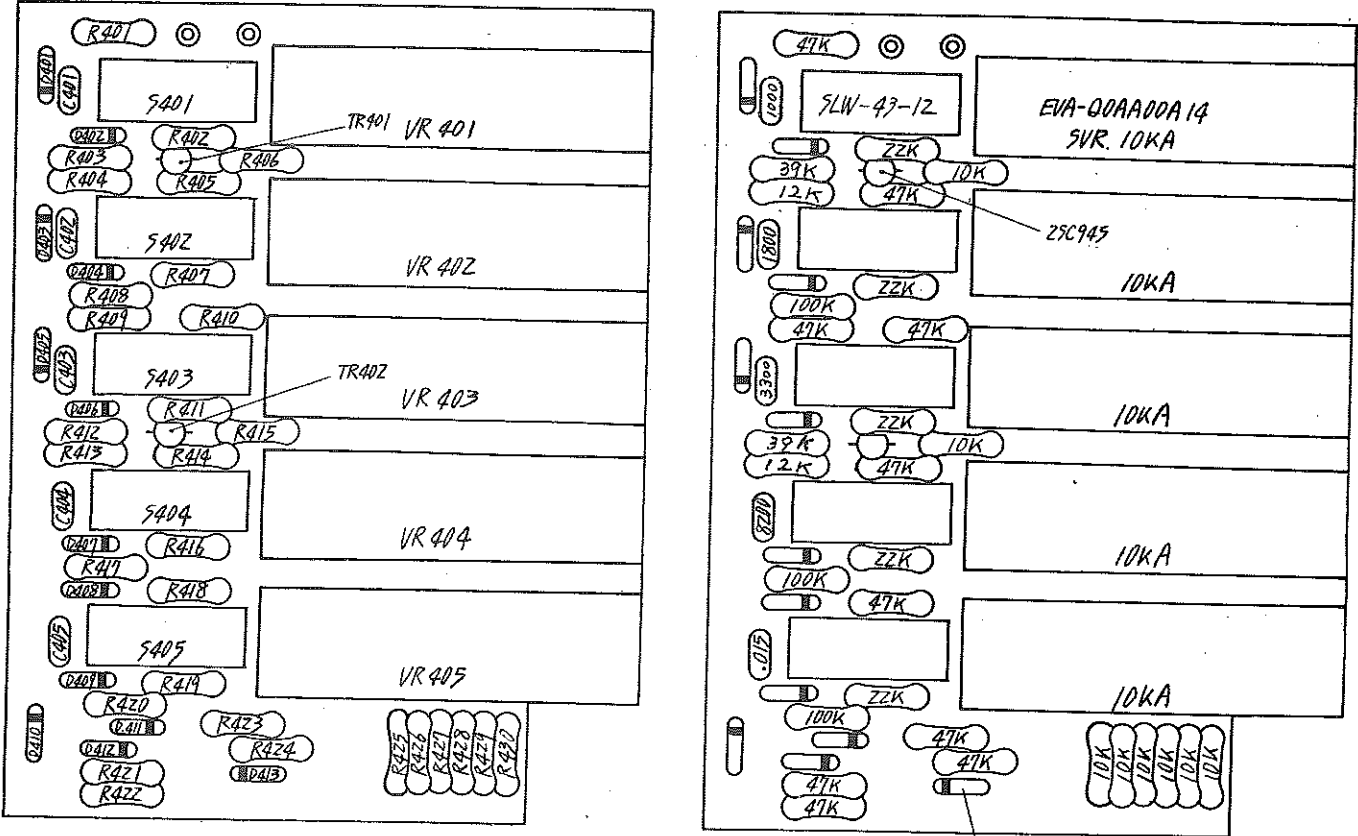
Note : Specifications changed from SH-3
VCF-VCA BOARD ASSEMBLY
Some Potentiometers
ADJUSTMENT

2. GENERAL CIRCUIT BLOCK DIAGRAM

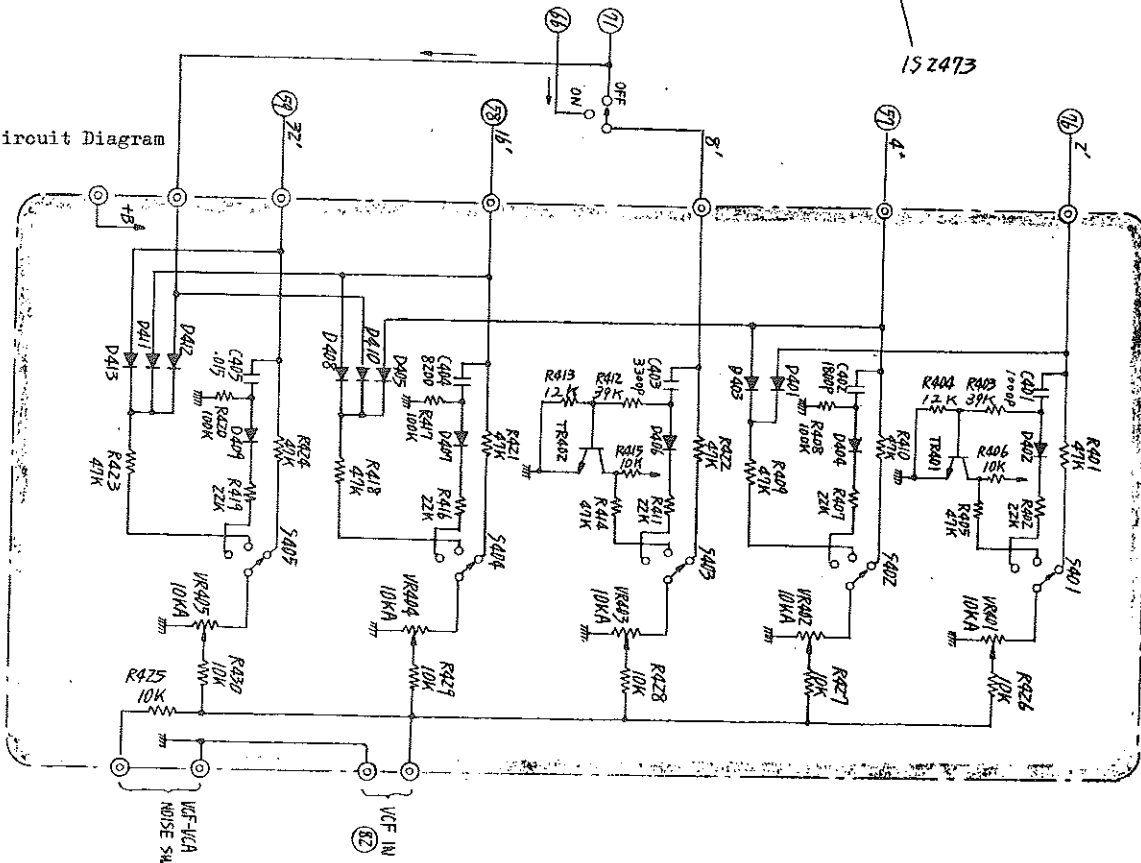


3-2 FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2549 and below)

A. Parts Layout

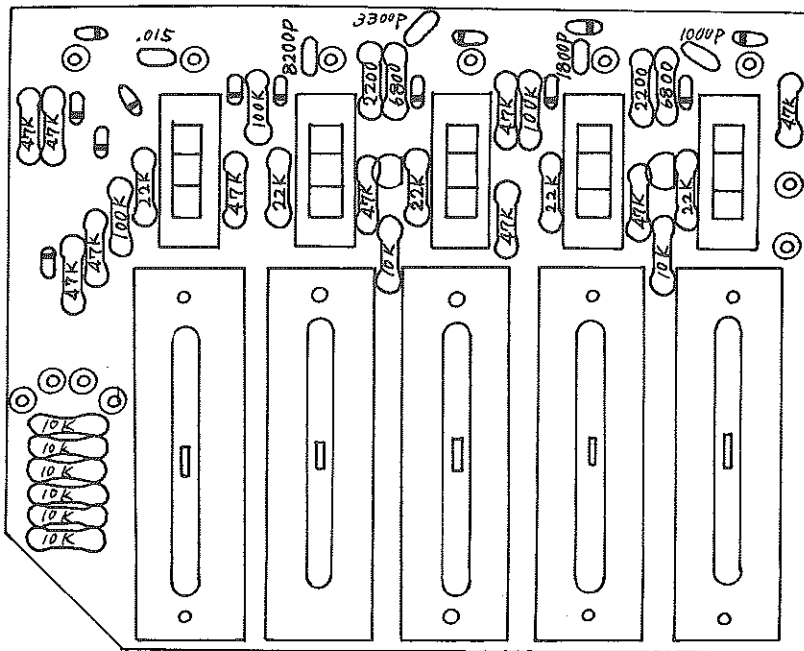
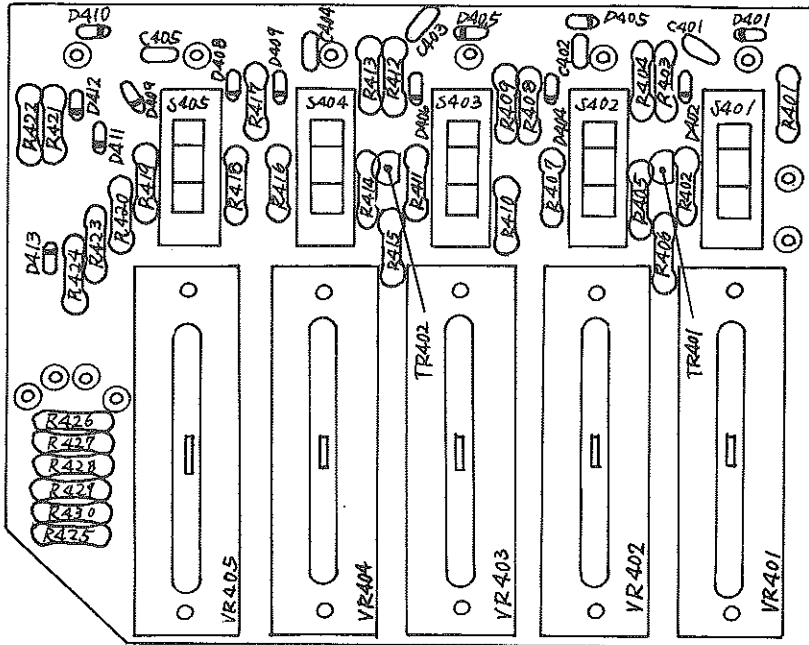


B. Circuit Diagram



3-2. FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2550 and above)

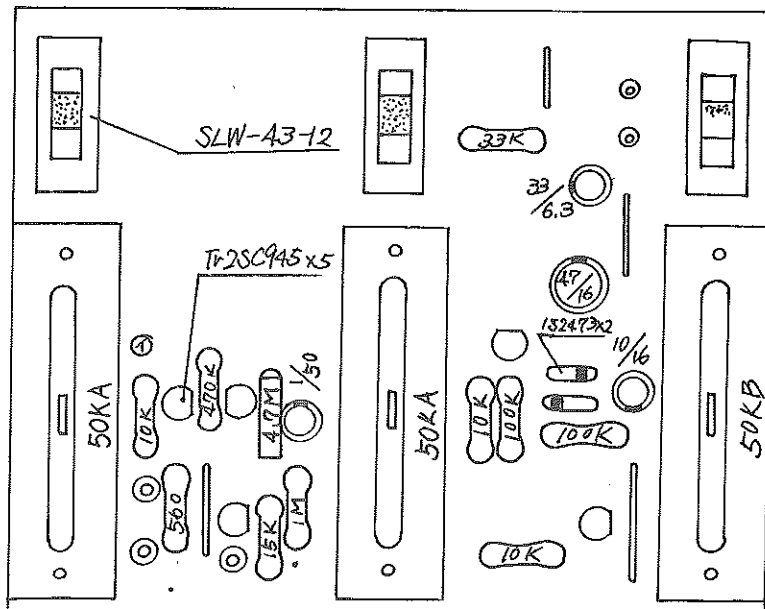
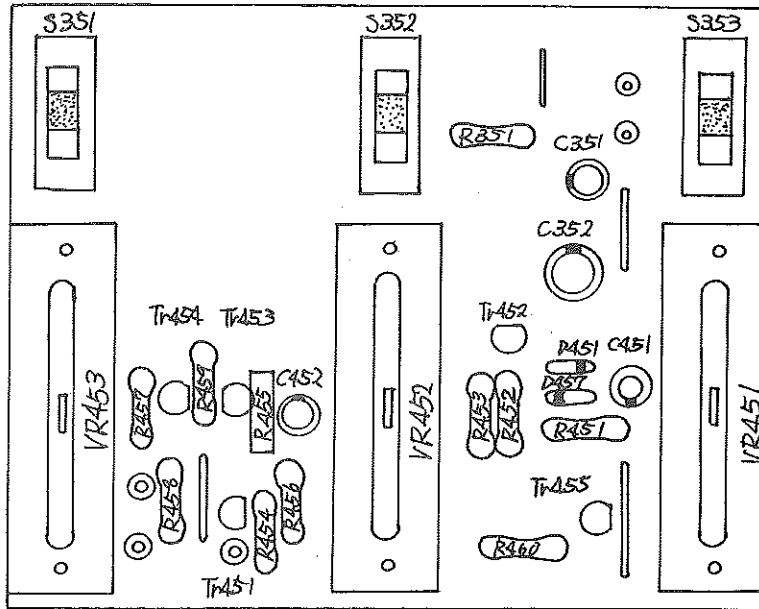
A. Parts Layout



Tr. : 2SC945
 D. : 1S2473
 SW. : SLW-43-12
 YR : SVR 10K A
 EYA-Q0AA00A14

3-2. FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2550 and above)

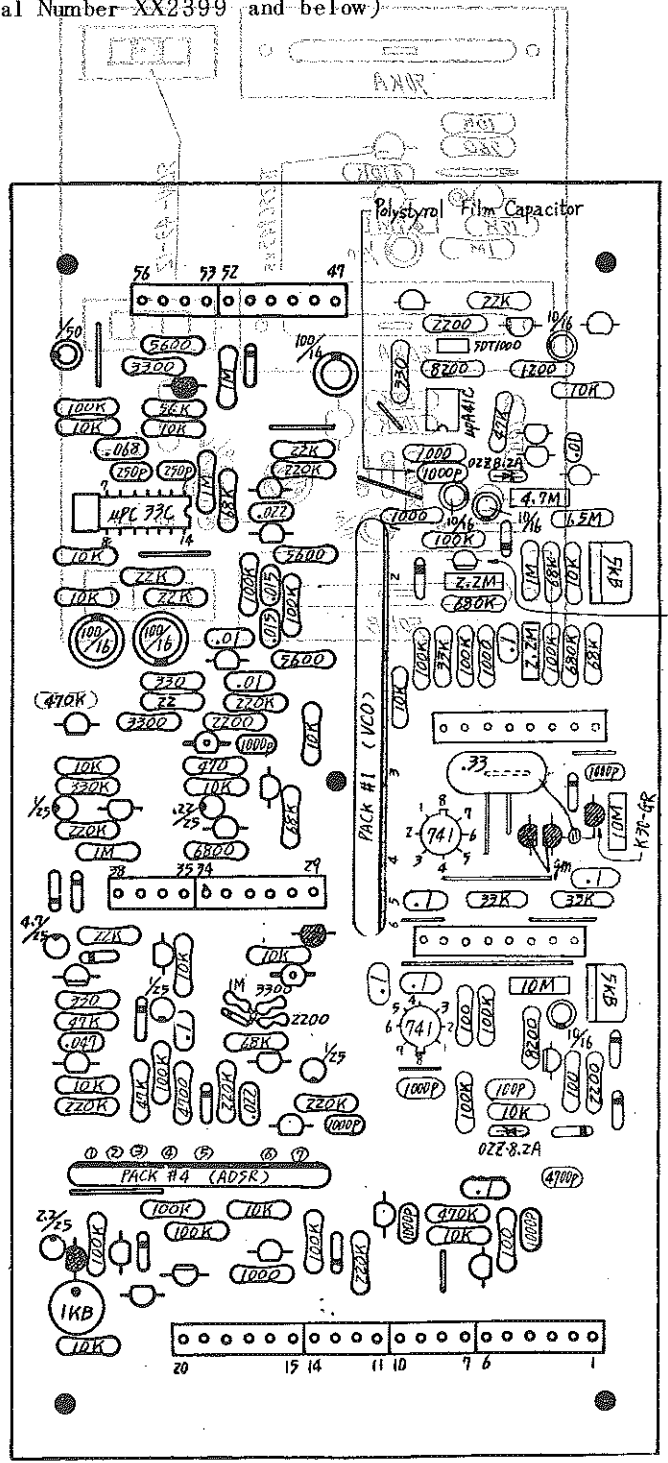
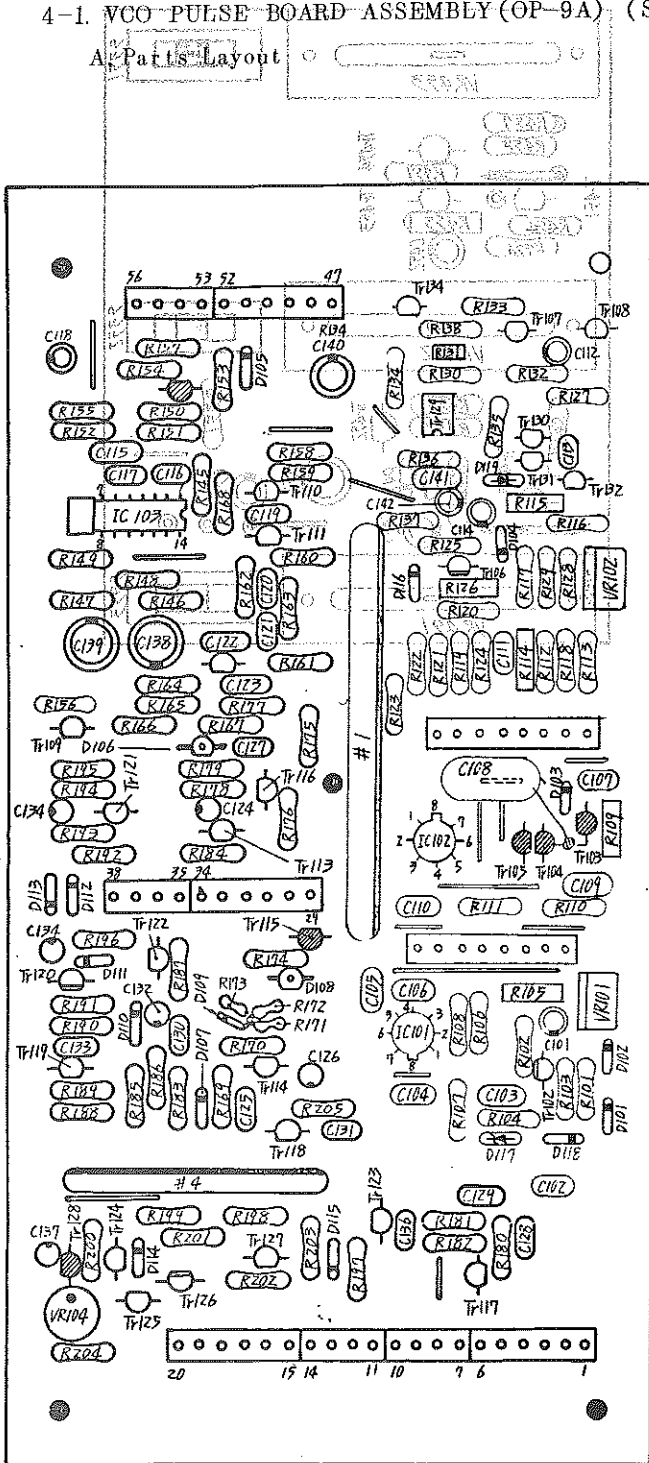
A. Parts Layout



4. VCO CIRCUIT

4-1. VCO PULSE BOARD ASSEMBLY (OP-9A) (Serial Number XX2399 and below)

A Parts Layout

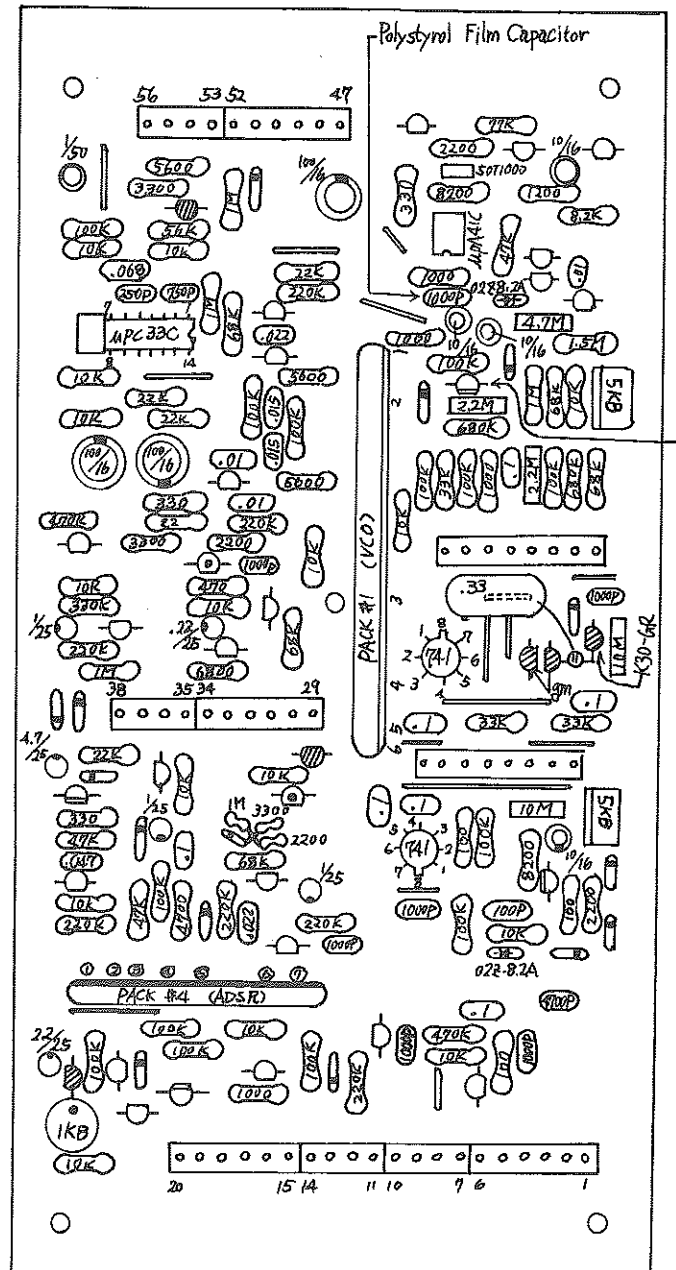
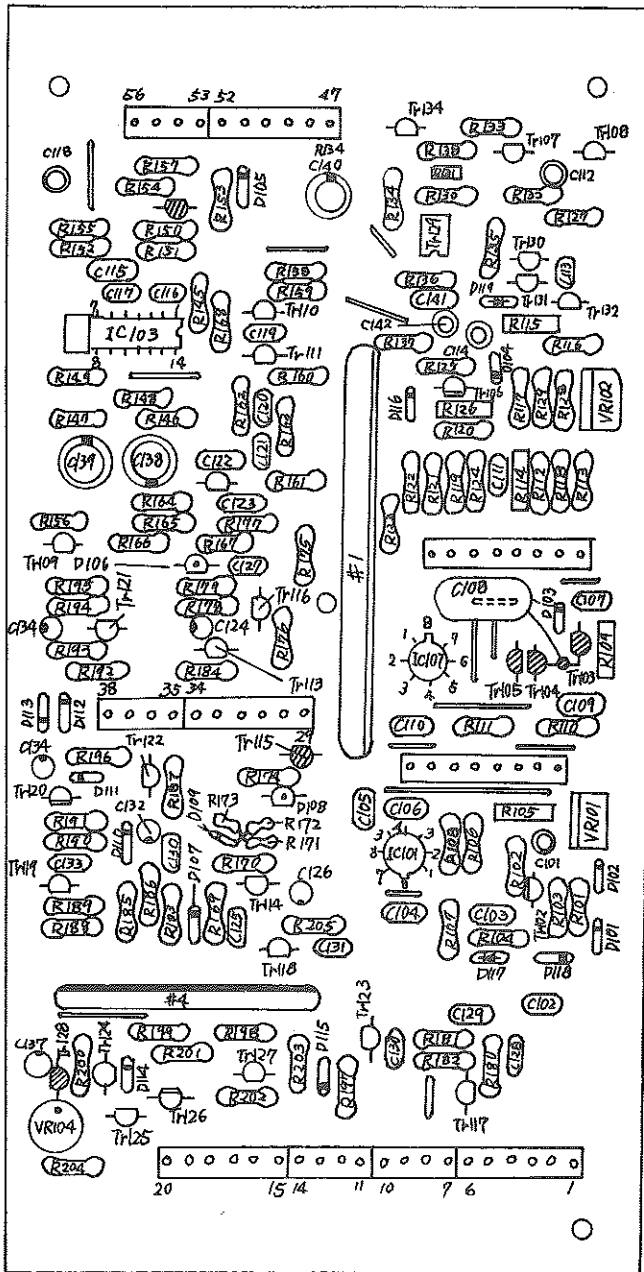


- Tantalum Capacitor
- ⊖ Tr. 25A735 P or Q
- ⊖ Tr. 25C945 P or Q
- ⊖ PVT. N137Z
- ⊖ FET. 25K30A-Y
- ⊖ D. 152473
- ⊖ Electrolytic Capacitor

4. VCO CIRCUIT

4-1 VCO PULSE BOARD ASSEMBLY (Serial Numbers XX2400-XX2549 inclusive)

A. Parts Layout

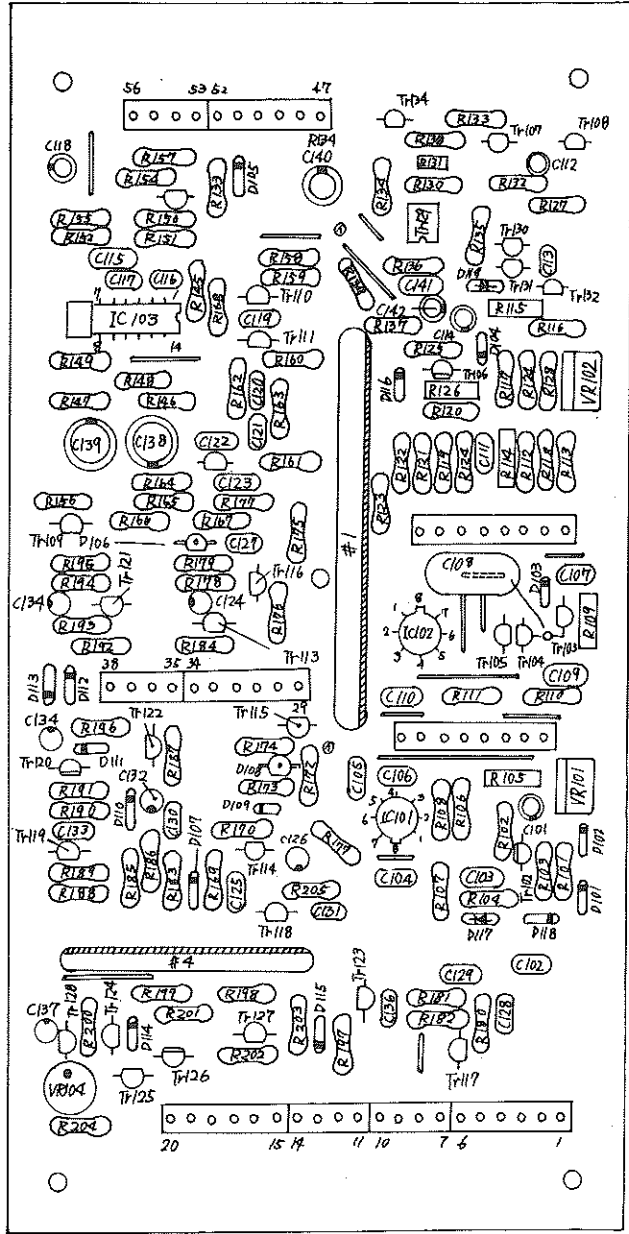
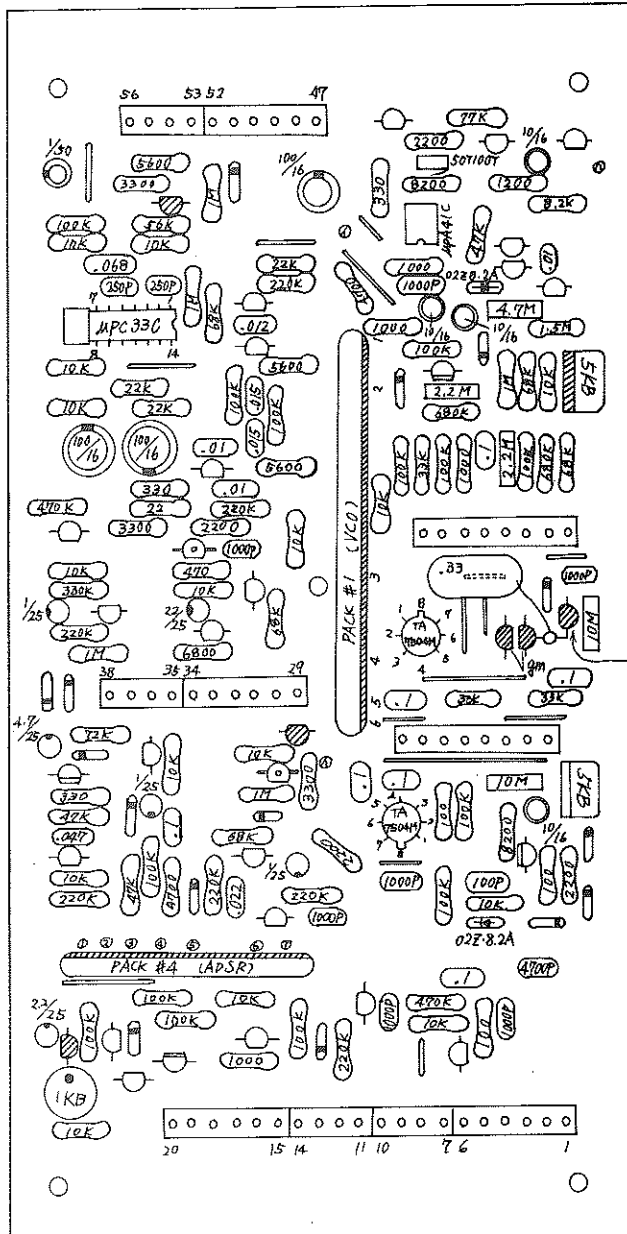


- Tantalum Capacitor
- Tr. 2SA733 Pwr Q. ○ PUT. N13T 2
- Tr. 2SC 945 Pwr Q. ○ FEY. 2SK30A-Y
- D. 1S2473 ○ Electrolytic Capacitor

4. VCO CIRCUIT

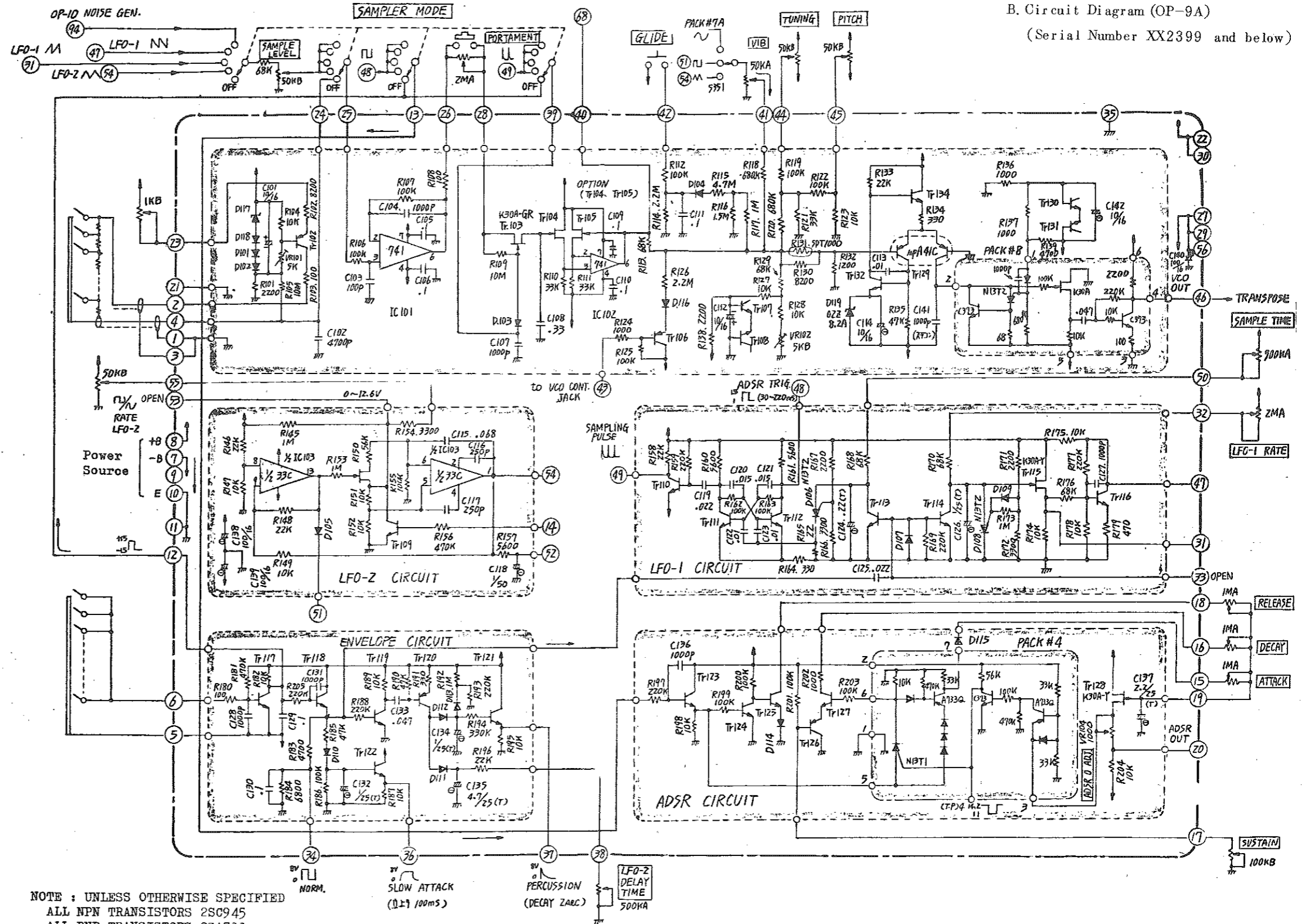
4-1. VCO PULSE BOARD ASSEMBLY(OP-9A) (Serial Number XX2550 and above)

A. Parts Layout



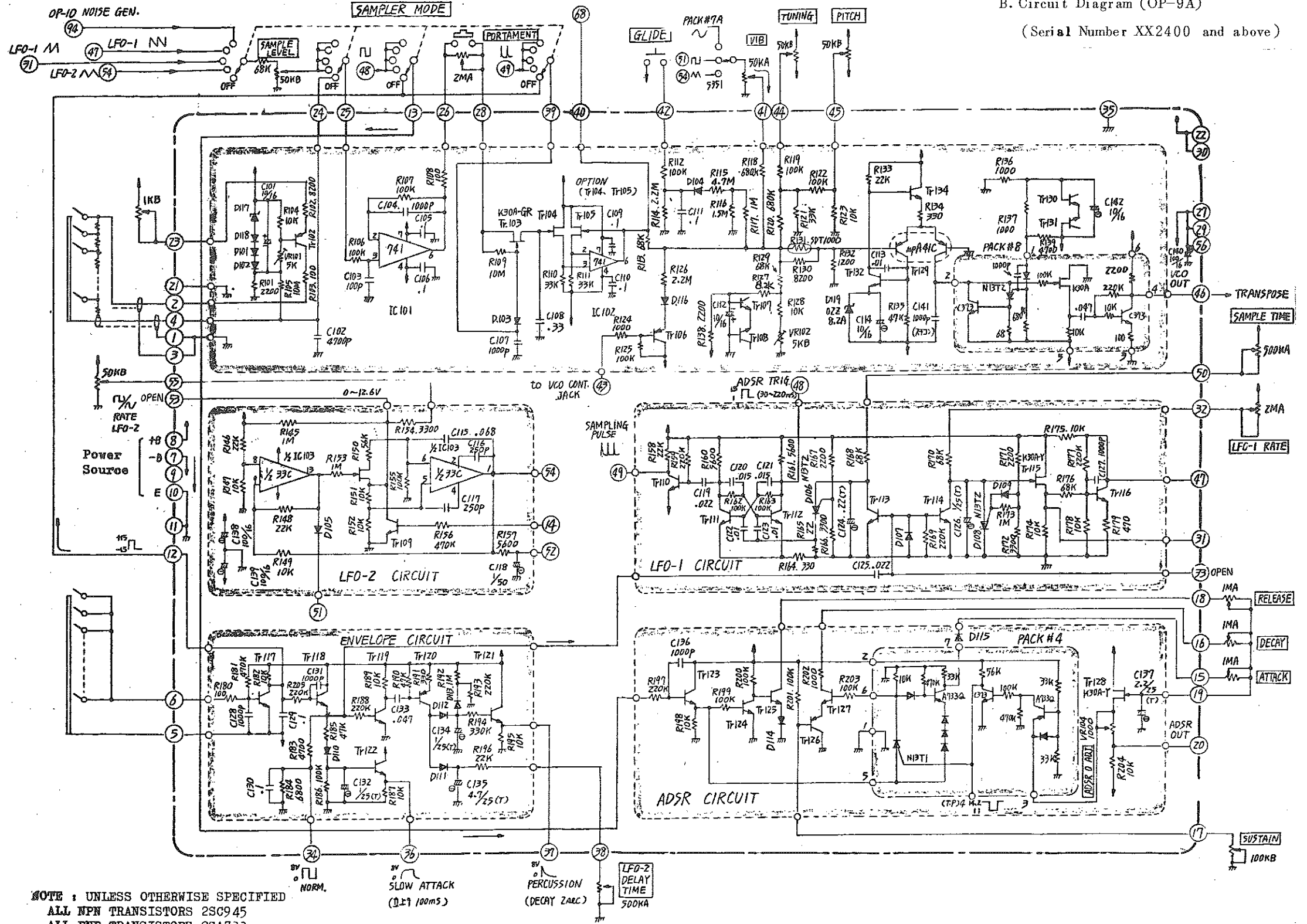
- Tantalum Capacitor
- Tr. 2SA733 Pm Q
- Tr. 2SC945 Pm Q
- PUT. N13T2
- FET. 25U30A-Y
- D. IS2473
- Electrolytic capacitor

B. Circuit Diagram (OP-9A)
(Serial Number XX2399 and below)



NOTE: UNLESS OTHERWISE SPECIFIED
 ALL NPN TRANSISTORS 2SC945
 ALL PNP TRANSISTORS 2SA733
 ALL DIODES 1S2473

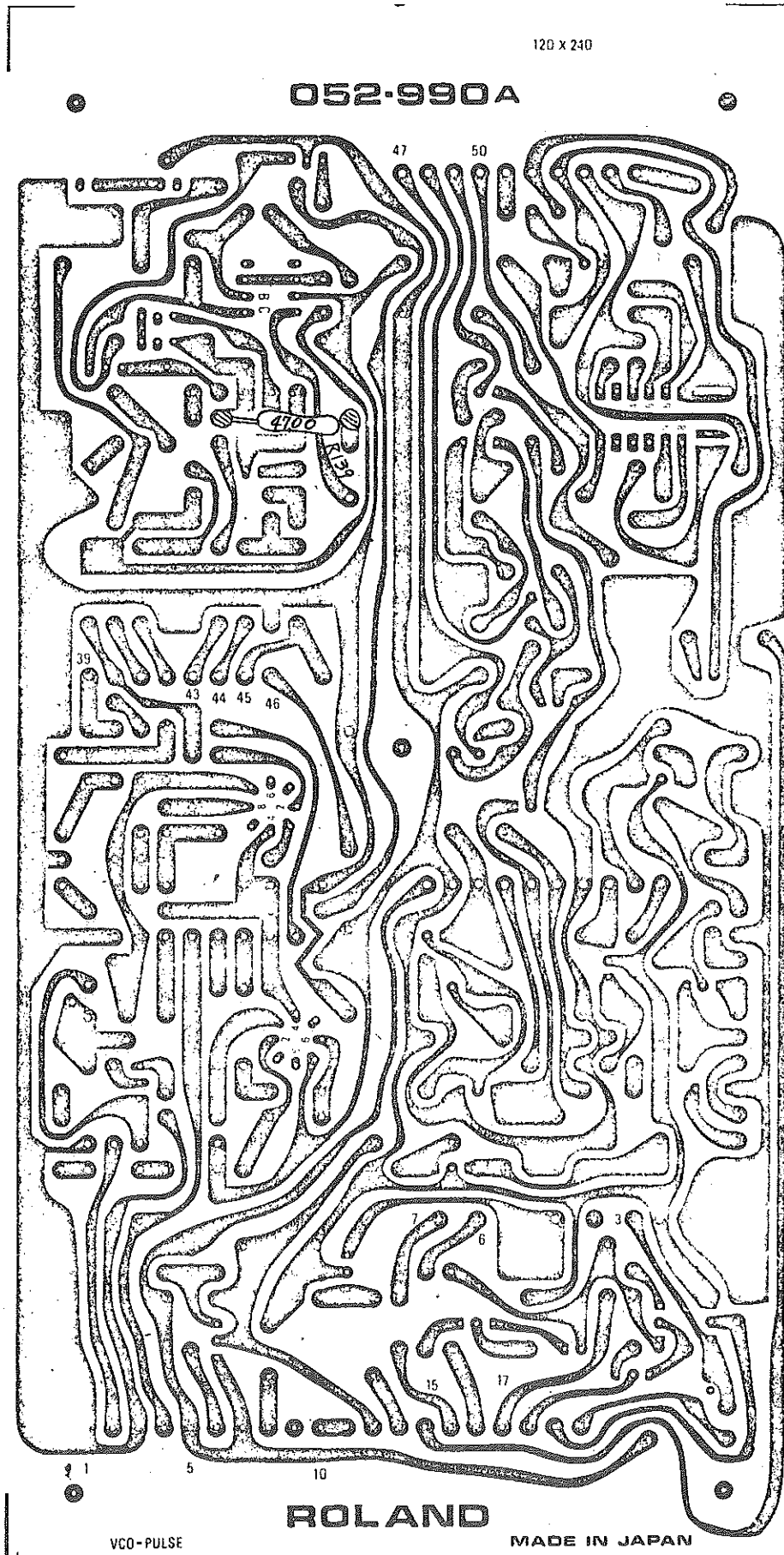
B. Circuit Diagram (OP-9A)
 (Serial Number XX2400 and above)



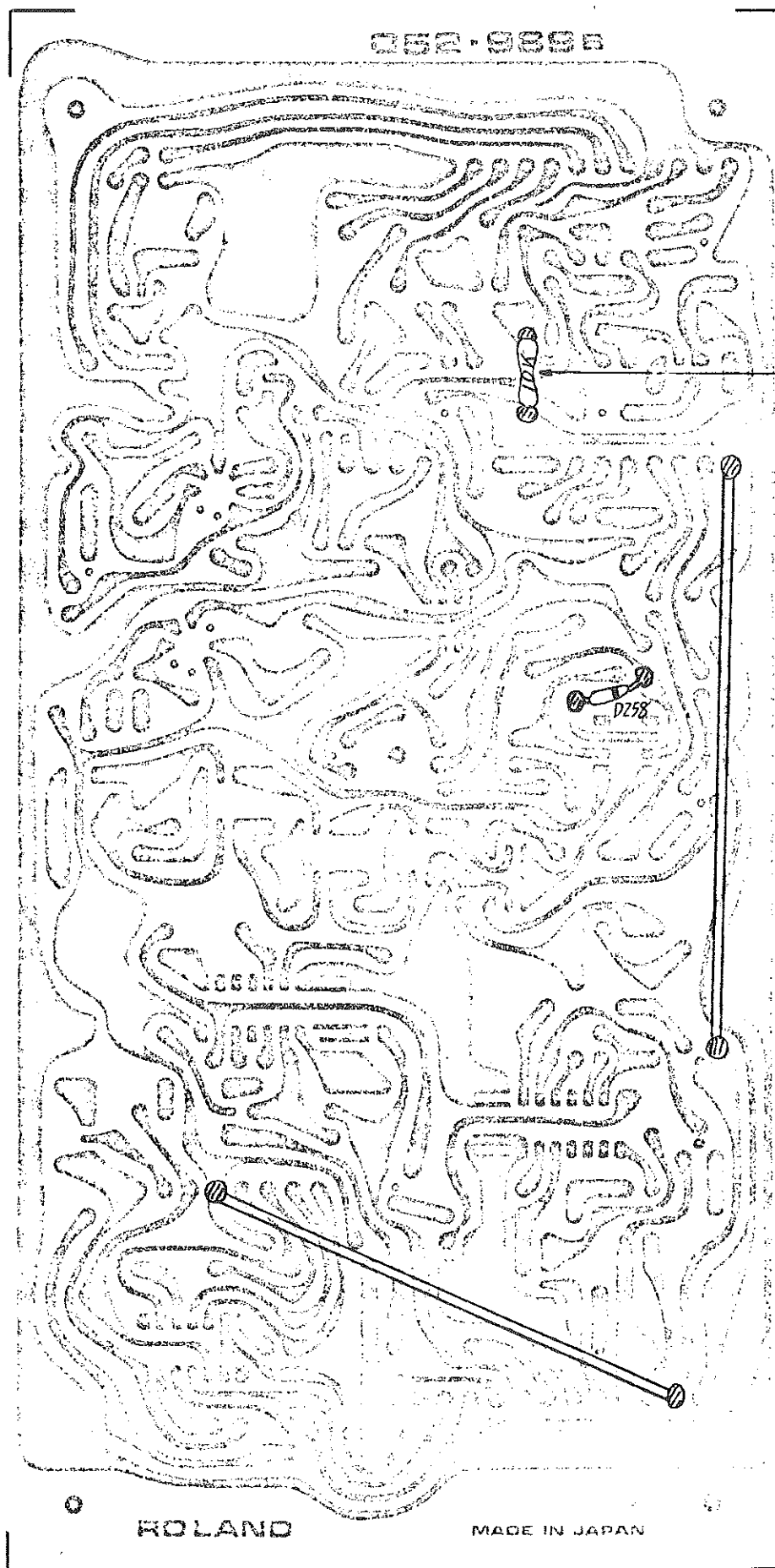
NOTE: UNLESS OTHERWISE SPECIFIED
 ALL NPN TRANSISTORS 2SC945
 ALL PNP TRANSISTORS 2SA733
 ALL DIODES 1S2473

C. Rear side parts layout (OP-9A)

(Serial Number XX2549 and below)



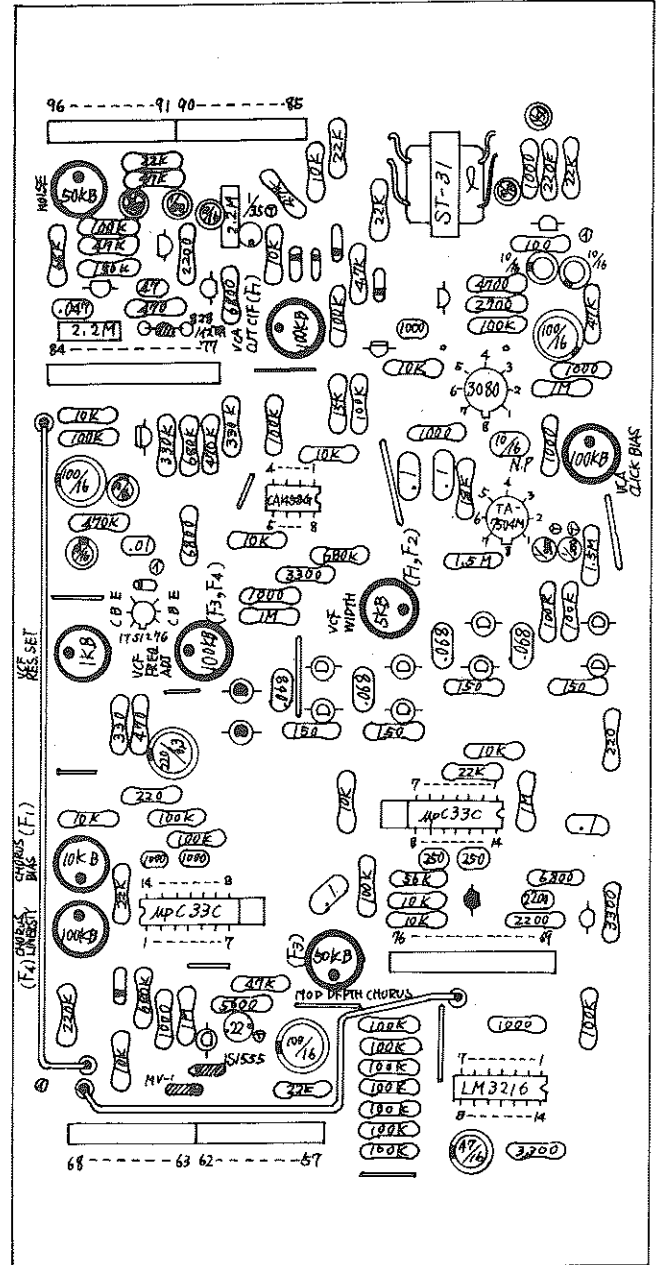
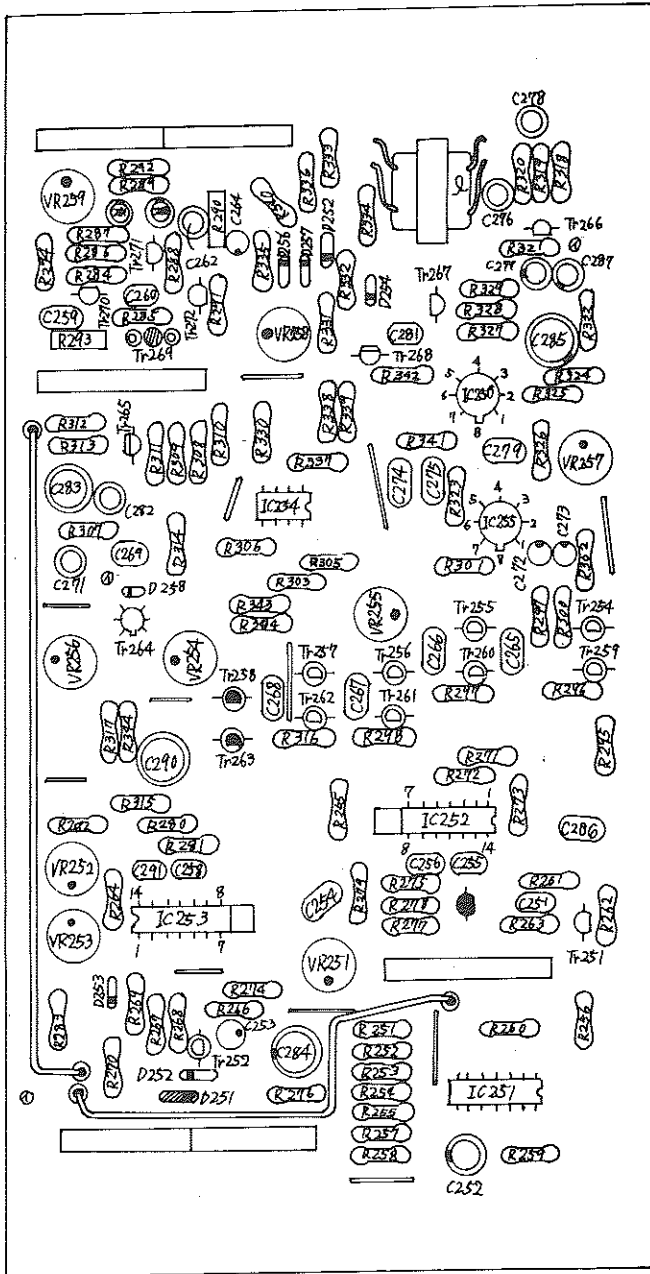
B. Rear parts layout(OP-10B) (Serial Number XX2549 and below)



5. VCF-VCA CIRCUIT

5-1. VCF-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX2550-XX3049 inclusive)

A. Parts Layout

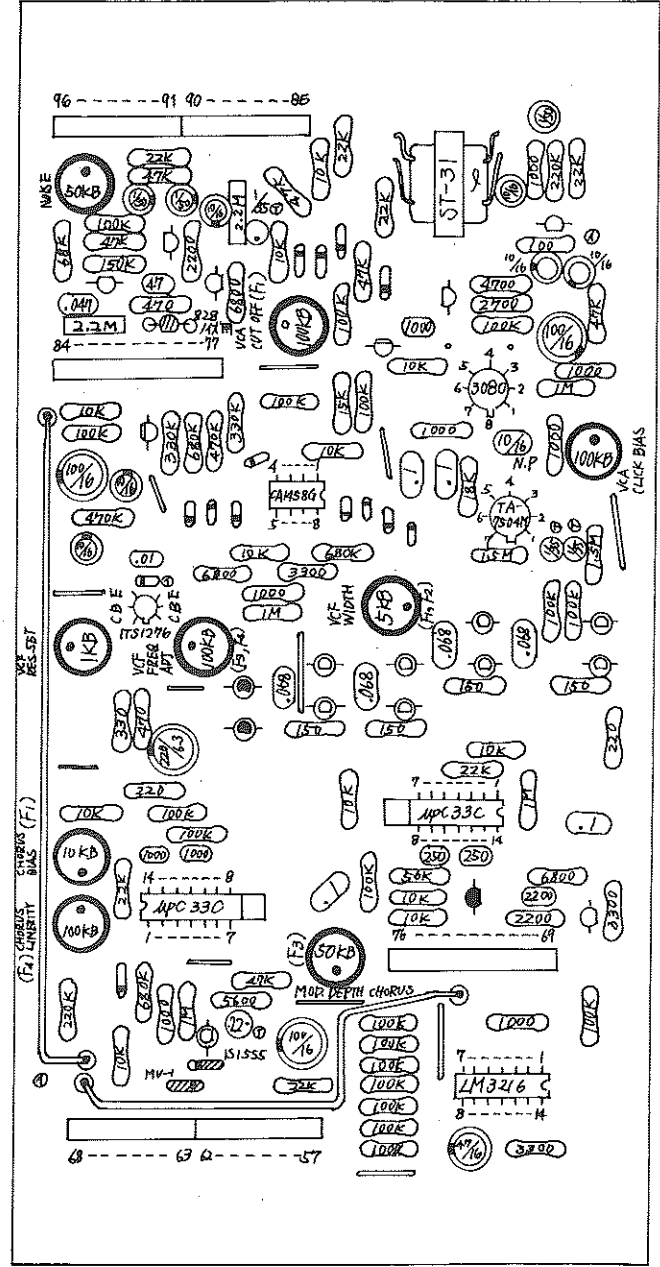
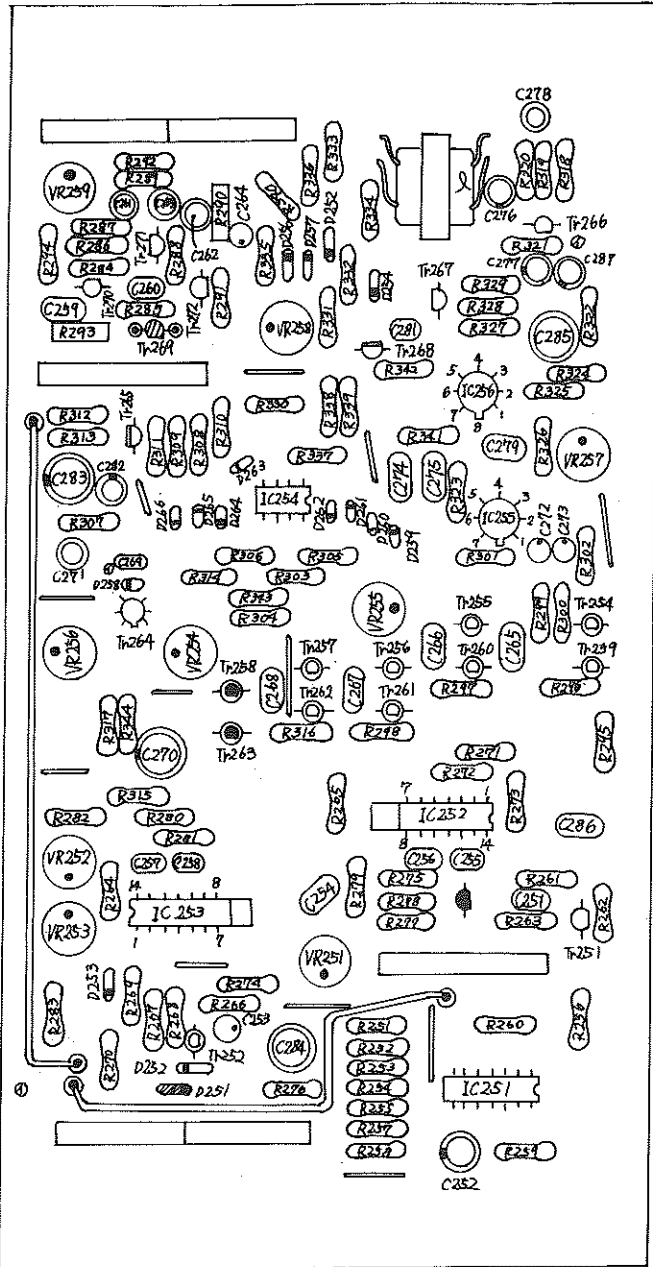


- ⊙ 25C1000 GR
- ⊙ 25C943
- ⊙ 25K30A-Y
- ⊙ 25A733
- ⊙ 152473
- ⊙ 25C1000 GR OPTION

5. VCF-VCA CIRCUIT

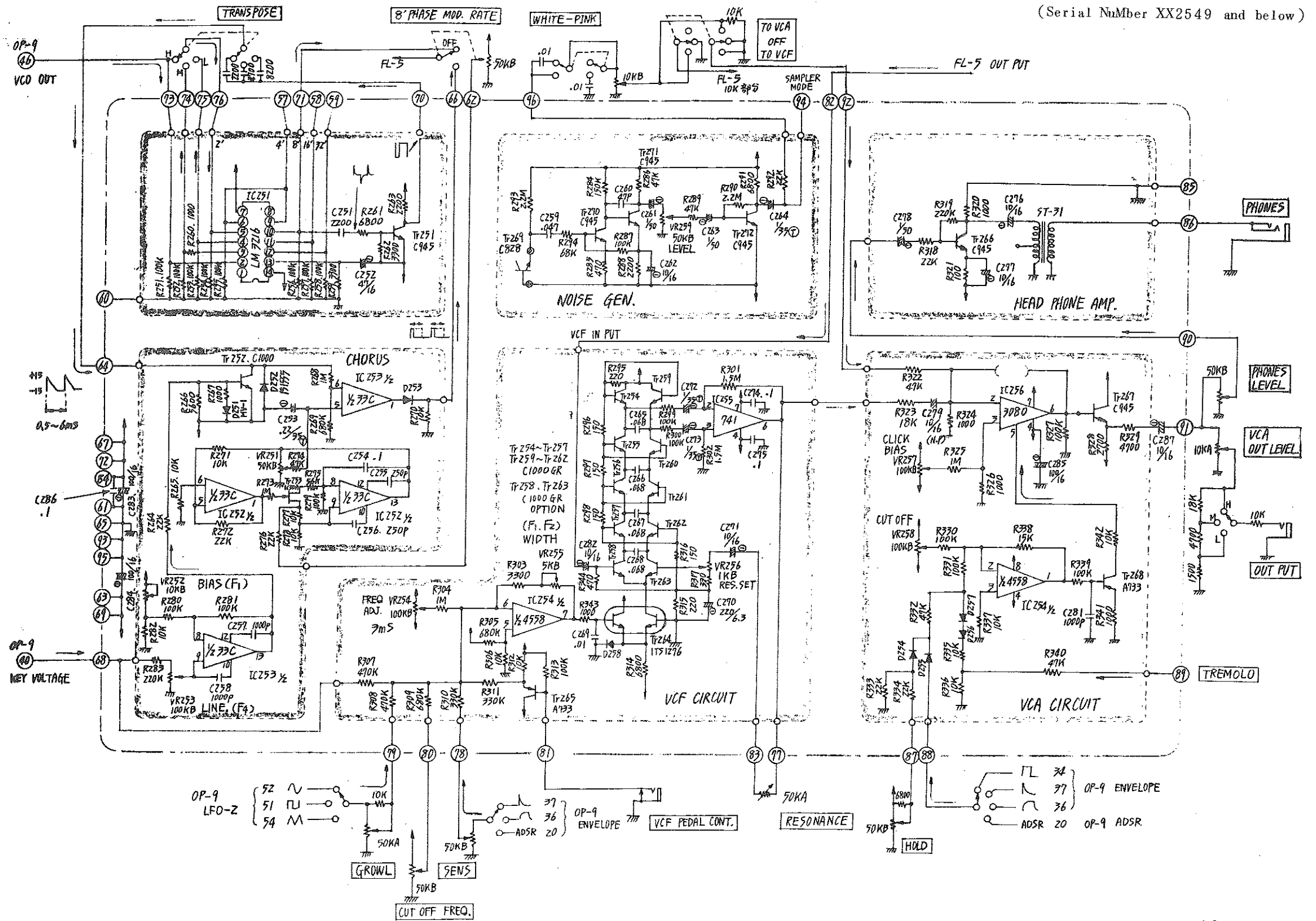
5-1. VCF-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX3050 and above)

A. Parts Layout



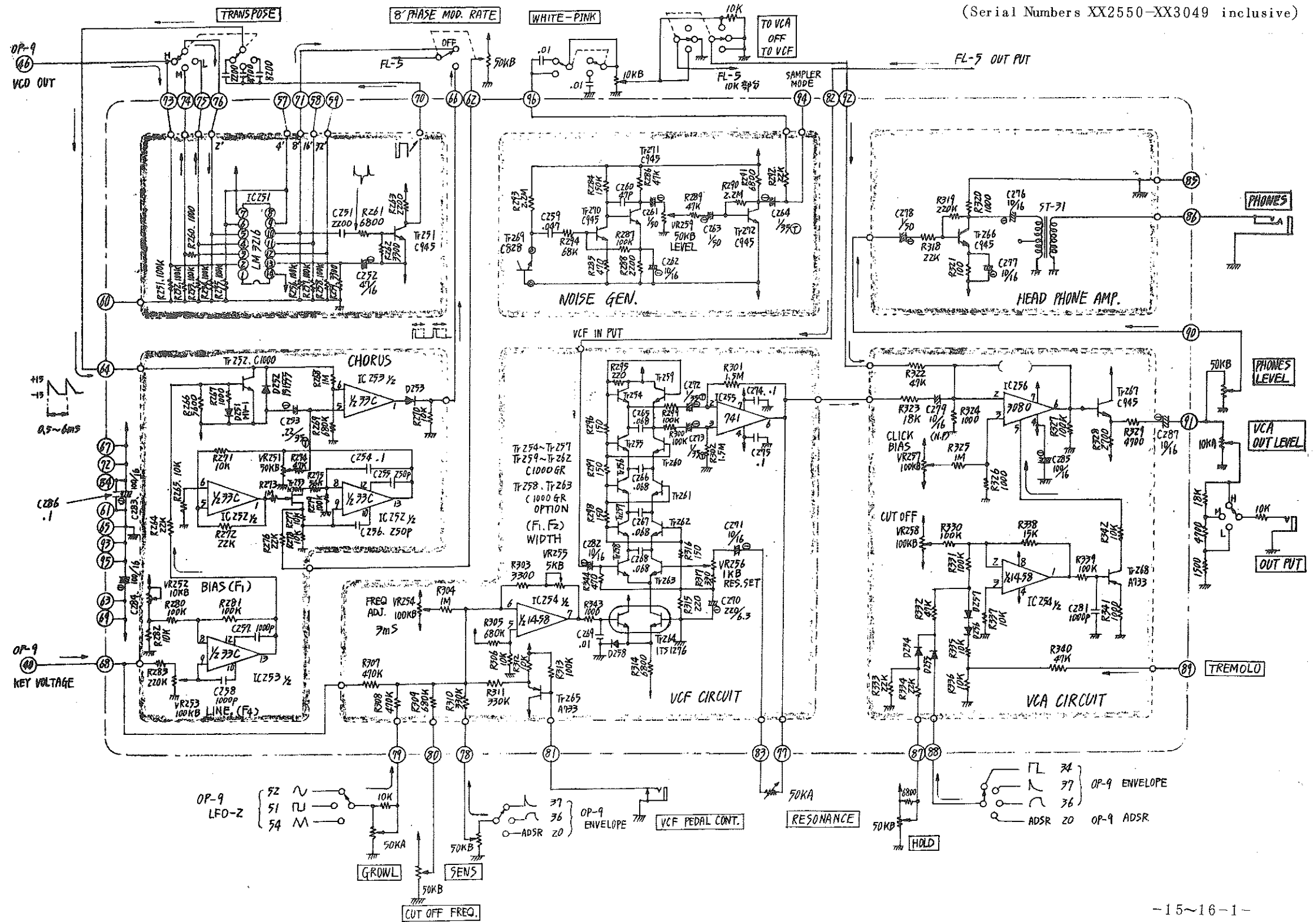
- 25C 1000 GR
- 25C 995
- 26K90A-Y
- 25A733
- 152473
- 25C 1000 GR OPTION

C. Circuit diagram (OP-10B)
 (Serial Number XX2549 and below)

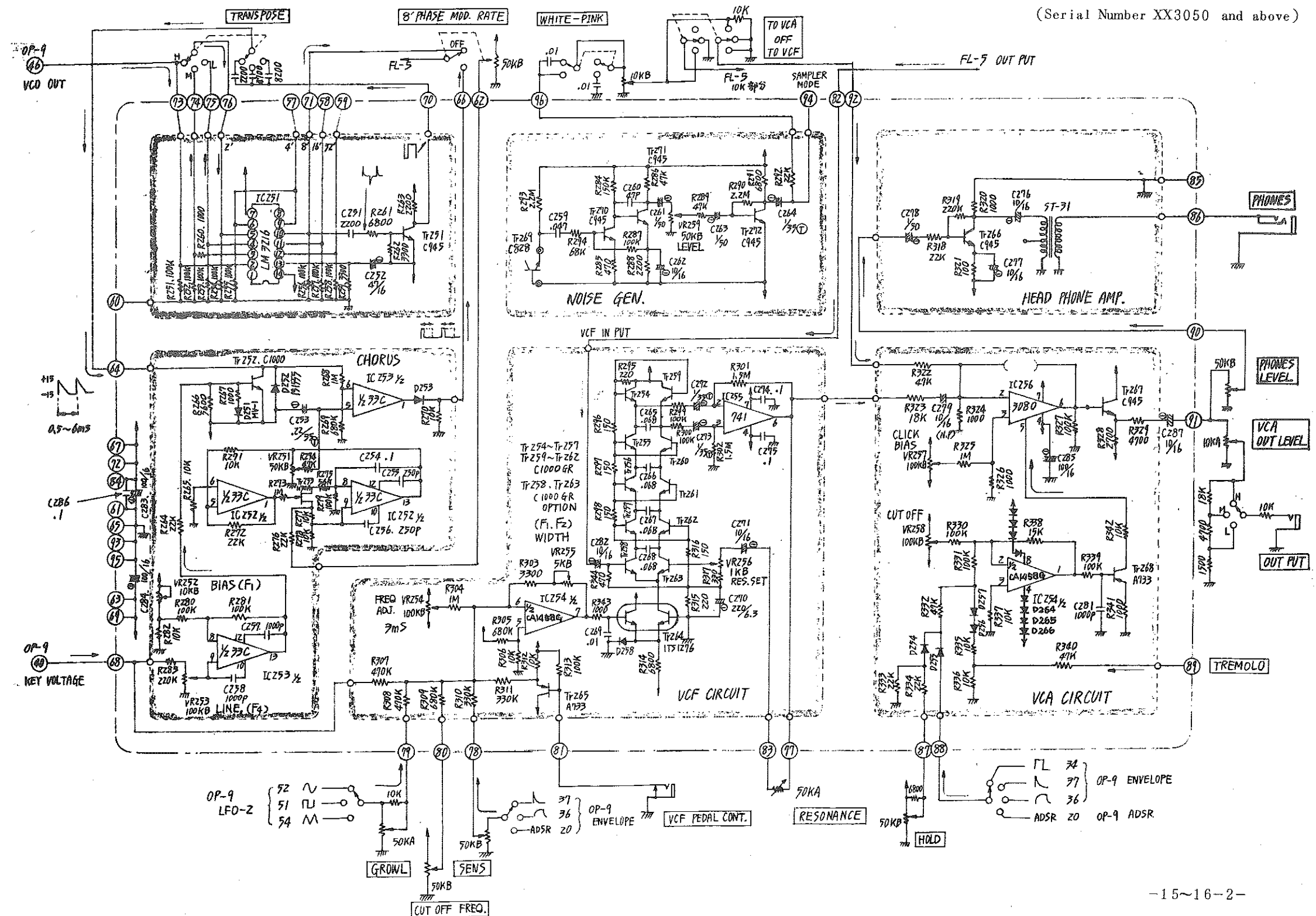


C. Circuit diagram (OP-10B)

(Serial Numbers XX2550-XX3049 inclusive)



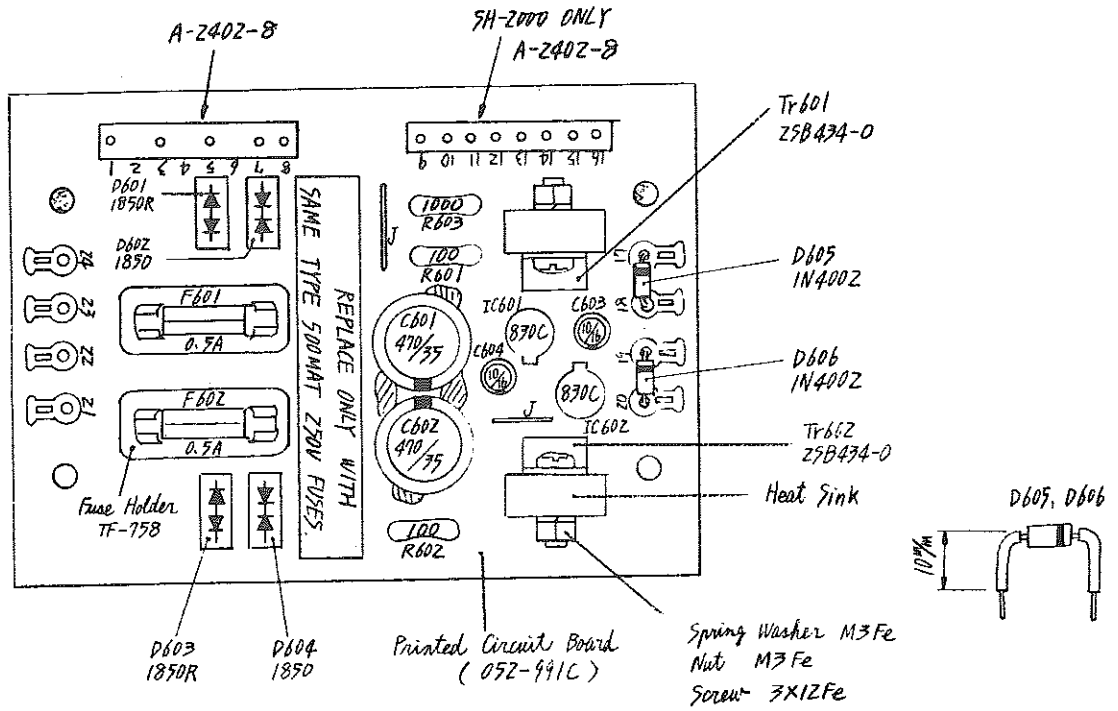
C. Circuit diagram (OP-10B)
 (Serial Number XX3050 and above)



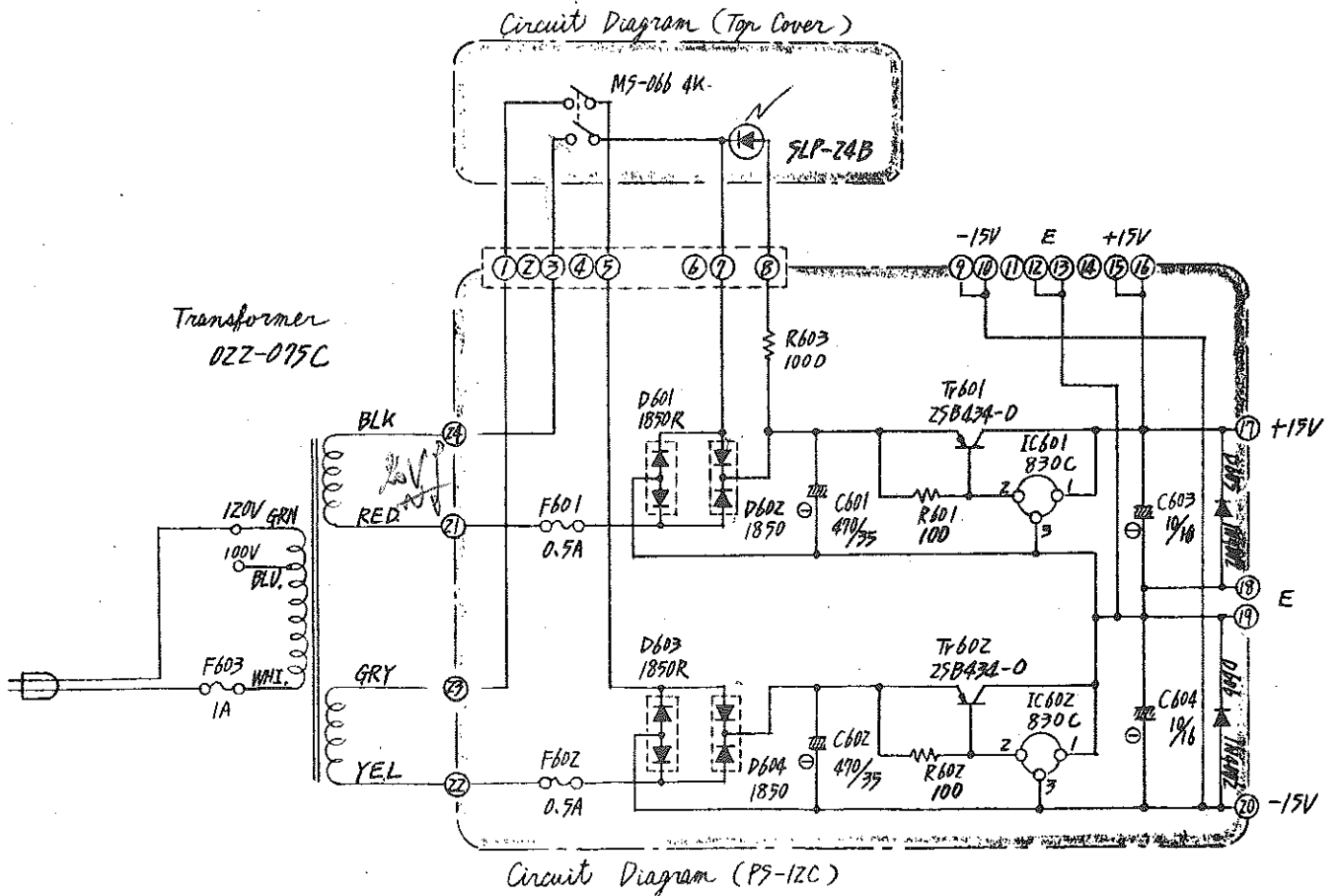
6. POWER SUPPLY CIRCUIT

6-1. POWER SUPPLY BOARD ASSEMBLY (PS -12C)

A. Parts Layout



B. Power Supply Circuit Diagram (PC-2B)



7. ADJUSTMENT

7-1. Preparation (Operation Check and Preadjustment)

(1) Position the control and switches as follows

VCO 8'	.....	10
VCF CUTOFF FREQ.	.....	10
VCA HOLD	.....	10
TRANSPOSE	.....	M
Phones Level	} Optimum Audio	
Output Level		

(2) If any note does not come out, adjust VR258(VCA CUTOFF) and VR254 (VCF FREQ.) so that the note is audible.

7-2. VCO TUNING

- (1) Connect a frequency counter to the 71st terminal on OP-10B.
- (2) Set the PITCH on the control panel at 0 position, and TUNING and WIDTH on the rear panel to the center position.
- (3) Depress the F1 key and tune its frequency to 174.61Hz by VR102.
- (4) Depress the F4 key and tune its frequency to 1396.9Hz by VR101.
- (5) Repeat steps (3) and (4).
- (6) Check the frequency of the F2(349.23Hz) and the F3(698.46Hz).
- (7) Check the following (effects)
 - a) PORTAMENTO ON/OFF
 - b) GLIDE Button and GLIDE PEDAL
 - c) PITCH, TUNING and WIDTH

7-3. VCA Adjustment

- (1) Adjust the HOLD control to set the 87th terminal(OP-10B) voltage at 1 volt.
- (2) Connect the oscilloscope to the 91st (OP-10B).
Set all the waveform selector switches at \square position and VCO controls to maximum position.
- (3) Adjust VR258(CUTOFF) so as to get the no output waveform on the scope.
- (4) Turn the HOLD fullclockwise.
- (5) Lower the VCO \square knobs except 8' to minimum position, and confirm the output level of 2Vp-p. If not, adjust VR258 within the condition of step(3).

7-4. CLICK BIAS adjustment

(1) Setting

VCO	.....	all 0
HOLD	.....	10
VCA ENVELOPE	.....	\square

- (2) Adjust VR257(CLICK BIAS) so that no pulse waveform is seen on the scope, repeating switch ON/OFF a key.

7-5. RESONANCE Adjustment

- (1) Setting VCO all 0
 CUTOFF FREQ. 5
 RESONANCE 8

Adjust VR256(RES SET) to get VCF oscillation, and then turn back the VR until the oscillation may just go off.

7-6. ADSR ZERO Adjustment

- (1) Adjust VR104(ADSR 0 ADJ.) to set the 20th terminal(OP-9A) voltage at 0 volt.

7-7. VCF OCTAVE Adjustment

- (1) Setting VCO all 0
 CUTOFF FREQ. 5
 RESONANCE 10

- (2) While depress F2 key and F3 key alternately, adjust VR255(VCF WIDTH) to get one octave difference between F2 and F3.

- (3) Setting CUTOFF FREQ. 0
 Depressing the C4 key, adjust VR254(FREQ.ADJ.) to set its frequency at 348Hz.

- (4) Stepping (2) affects one octave difference between F2 and F3, so repeat step (1) and (2).

7-8. CHORUS Adjustment

- (1) Connect the scope to the 64th on OP-10B.

- (2) Setting 8' ON
 VCO 8' Control 10

- (3) While holding the F1 key down, adjust VR252(BIAS) so that the output waveform looks like the figure.

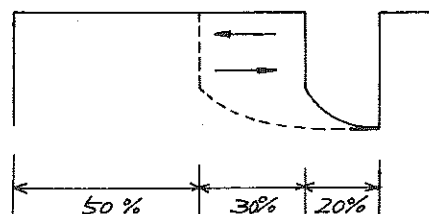
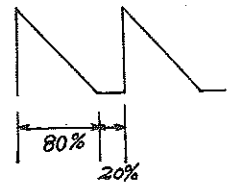
- (4) While holding the C4 key down, adjust VR253(LINEARITY) as the same way as step (2).

- (5) Connect the scope to the 66th on OP-10B.

- Setting CHORUS 2 - 3

Adjust VR251(MOD DEPTH) so that the waveform seen on the scope may be sailling and shuttling as shown in the figure.

However, the waveform height shouldn't be less than 1/2 of Max.



7-9. NOISE Adjustment

Connect the scope to the 91st on OP-10B.

Adjust VR259(NOISE) so as to get the NOISE output may reach 4Vp-p.



8. PARTS LIST

SH-3A PARTS LIST

*GENERAL ASSEMBLY

cabinet (Complete)
 Control Chassis Assembly
 Top Cover Assembly
 162-002B Power Supply Assembly PC-2B
 004-002 Keyboard Assembly SK-142A
 Connector Housing 2145-6C
 064-030 Holder No.30
 064-024 " No.24 (Common with EP-10)
 101-018 Felt No.18 30 x 610 x 1.5 Black
 091-997A Side Block No.997A(Common to left and right)

*CABINET ASSEMBLY

081-992 Cabinet
 081-993A " (Lid) } including the following parts
 Lock P-11A(Cr)
 Hooking Hinge T-32(Cr)
 Handle H-26(Black)
 Foot-Rubber G-7
 065-007 Lid (Rear, Cord Box) No.7
 074-025 Badge No.25
 Speed Nut(for Badge) M2
 047-018 Clamp No.18

*CONTROL CHASSIS ASSEMBLY

145-005 Filter Board Assembly FL-5A
 149-009A VCO Pulse Board Assembly OP-9A
 149-010B VCF-VCA Board Assembly OP-10B
 140-007B VIB Pack No.7B BX-7B
 072-060A Panel No.60A(Rear Panel)
 072-960A " No.960A(Control Panel)
 061-989 Chassis No.989 1.0t SPC-1
 064-996 Holder No.996 " (for width)
 064-993 " No.993 " (for PCB)
 065-996 Cover No.996 2.0t Black Sponge
 065-994 " No.994 "
 065-049 " No.49 2.0t Grey Sponge
 065-034 " No.34 " Black
 Output Transformer ST-45 or ST-31 (on OP-10B)
 016-028 Knob TK-1114A or TK-1114 (Grub screw fixing)
 016-003 " No.3 (for Slide Potentiometer)
 063-001 Plate No.1
 001-018 Slide Switch SW321
 001-064 Lever Switch ESL-2412 (Double-Pole, Double-Throw)
 001-065 " ESL-2411 (On-Off)
 001-049 Push Switch No.44 Red
 009-001 Jack SG7615 No.5
 009-002 " LJ-039-1-6
 121-005 Jack Washer BSP 1.6t Ni
 068-005 Insulation Bushing No.5 Black
 042-009 Lug Terminal 2L-6P
 120-007 Long Nut No.7 M3 x 52
 Connector Housing 2145-4C
 " 2145-6C
 " 2145-8C
 068-019 Rubber Bushing No.19
 121-001 Aluminum Washer 8φ (for Potentiometer)

SH-3A PARTS LIST

*TOP COVER ASSEMBLY

065-997	Top Cover	No.997
001-053	Power Switch	MS0664K Black
	Light Emitting Diode	SLP-24B
062-004	Bracket	No.4
	Speed Nut	M8
068-011	Bushing(for Music Rack)	No.11
064-995	Holder	No.995
	Connector Housing	2145-8C

*POWER SUPPLY ASSEMBLY PC-2B

146-012C	Power Supply Board Assembly	PS-12C
061-988B	Chassis	1t SPC-1
022-075	Power Transformer	No.75C (100-120V) No.75D(220-250V)
053-021	AC Cord	(3M)
047-001	Cord Binder	No.11
047-019	Cord Bushing	R-5
121-031	Washer	No.31
042-004	Lug Terminal	2L-4P
008-037	Wired in Fuse (Pig tail)	1A
010-019	Connector Housing	2145-4C
064-033	P.C.B. Holder	LCBS-4N
	Heat Sink	No.18

*VCO PULSE BOARD ASSEMBLY OP-9A

140-008	VCO Pack	No.8
140-004A	ADSR Pack	No.4
	Connector Wafer Pin	A2461-4C
	"	" -6C
	"	" -8C

*OTHERS

001-057	Slide Switch	SLW43-12P
001-054	Rotary Switch	ESR-E123K(R)20A
001-055	"	ESR-E114K(R)20B
001-056	"	ESR-E245K(R)20B
008-024	Midget Fuse	.5A
012-003	Fuse Holder	TF-758
020-014	IC	830C
	IC	741 or TA7504M
	IC	uPC33C
	IC	uPA41C
	IC	CA3080
	IC	LM3216
	Silicon Transistor	2SC945 P or Q
	"	2SA733 "
	"	2SC828 (for Noise)
	"	2SC1000 GR
	"	2SC1000 (Selected)
	"	2SC373
	"	2SB434 O
	Pair Transistor	ITS1276
017-018	PUT	N13T1
017-019	PUT	N13T2
017-014	FET	2SK30A Y
	FET	2SK30A GR or Y (Selected)
	Thermister	SDT1000
	Diode	1N4002
	"	1S1555
018-014	"	1S2473
	"	02Z8.2A

SH-3A PARTS LIST

	Diode	MV-1	
018-003	"	1850	
018-004	"	1850R	
	Potentiometer	1 Kohm(B)	EVR2OAS15B13
	"	50 Kohm(B)	EVCBOAK2OB54
	"	50 Kohm(B)	EVCBOAS15B54
	"	50 Kohm(B)	EVCBOHK2OB54
	"	2 Mohm(A)	EVCBOAK2OA26
028-035	Slide Potentiometer	50 Kohm(A)	EVAQOAA00A54
028-024	"	50 Kohm(B)	EVAQOAA00B54
028-036	"	100Kohm(A)	EVAQOAA00A15
028-038	"	500Kohm(A)	EVAQOAA00A55
028-039	"	1 Mohm(A)	EVAQOAA00A16
028-040	"	2 Mohm(A)	EVAQOAA00A26
	Trim Potentiometer	500 ohm(B)	EVL4XA00B52
	"	1 Kohm	EVL4XA00B13
	"	5 Kohm	PNB04C3A502V (for OP-9A)
	"	5 Kohm(B)	EVL4XA00B53
	"	10 Kohm(B)	EVL4XA00B14
	"	50 Kohm(B)	EVL4XA00B54
	"	100Kohm(B)	EVL4XA00B15
	Carbon Film Resistor	22 ohm	1/4 R J
	"	47 ohm	"
	"	68 ohm	"
	"	82 ohm	"
	"	100 ohm	"
	"	330 ohm	"
	"	470 ohm	"
	"	560 ohm	"
	"	1000ohm	"
	"	1200ohm	"
	"	1500ohm	"
	"	2200ohm	"
	"	3300ohm	"
	"	4700ohm	"
	"	5600ohm	"
	"	6800ohm	"
	"	8200ohm	"
	"	10 Kohm	"
	"	12 Kohm	"
	"	15 Kohm	"
	"	18 Kohm	"
	"	22 Kohm	"
	"	33 Kohm	"
	"	47 Kohm	"
	"	56 Kohm	"
	"	68 Kohm	"
	"	100Kohm	"
	"	150Kohm	"
	"	220Kohm	"
	"	330Kohm	"
	"	470Kohm	"
	"	680Kohm	"
	"	1 Mohm	"
	"	1.5Mohm	"
044-098	Carbon Solid Resistor	4.7 ohm	ERC12GK4R7
	"	1.5Mohm	1/4 R J or ERC12GK
	"	2.2Mohm	ERC12GK
	"	4.7Mohm	"
	"	10 Mohm	"

SH-3A PARTS LIST

	Electrolytic Capacitor	1	mfd	50V	ECE-A50V1
	"	4.7	mfd	25V	ECE-A25V4.7
	"	10	mfd	16V	ECE-A16V10
	"	33	mfd	6.3V	ECE-A6.3V33
	"	47	mfd	16V	ECE-A16V47
	"	100	mfd	16V	ECE-A16V100
	"	1000	mfd	16V	ECE-A16V1000
	"	1000	mfd	25V	ECE-A25V1000
	Plastic Film Capacitor	470	pf	50V V Type (+ 10% or 20%)	
035-005	"	1000	pf	" "	
	"	2200	pf	" "	
	"	4700	pf	" "	
	"	8200	pf	" "	
	"	.01	mfd	" "	
	"	.015	mfd	" "	
	"	.022	mfd	" "	
035-024	"	.047	mfd	" "	
	"	.068	mfd	" "	
	"	.1	mfd	" "	
	"	.33	mfd	" "	
	Polystyrol Film Capacitor	1000	pf		
	"	47	pf	50V V Type (+ 20%)	
	Ceramic Capacitor	50	pf	50V V Type (+ 10% or 20%)	
	"	250	pf	" "	
	"	470	pf	" "	(+ 20%)
	Diped Tantalume Capacitor	.22	mfd	25V V Type	
	"	1	mfd	" "	
	"	2.2	mfd	" "	
	"	4.7	mfd	" "	

*MISCELLANEOUS PARTS

130-999A	Interior Packing Case	No.999A
132-087	Pat	No.87
132-088	Pat	No.88
092-999	Music Rack	092-999

See next page.

NOTE : Be sure to confirm the serial number of them shown below
before requirement.

Potentiometer	Knob	Rotary Switch	Serial Number
EVCBC□S...	TK-1114	ESR-E123R...	XXX800 - XX949
EVCBC□K...	TK-1114A	ESR-E123K...	XXX950 - XX1599
EVCBC□K...	TK-1114A		XX1600 - XX1829
	TK-1114 (for Rotary SW.)	ESR-E123R...	XX1600 - XX1829
EVCBC□K...	TK-1114A	ESR-E123K...	XX1830 -

* P.C.B. OP-10B (SH-3A) is not interchangeable with OP-10 (SH-3).