ELECTRONIC MUSICAL INSTRUMENT

ROLAND SYNTHESIZER

SH-3A

SERVICE NOTES

THE 5th EDITION
Printed in Japan. '76.Apr.
APPLIED FROM SERIAL No.270800

Roland

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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 (⩘/⊓/∿) 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/⩘/⩘/⩘/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 (⩘/⊓/∿) 1
  - Modulation Depth Control (GROWL) 1
  - Envelope Selector (ADSR/⎍/⩘) 1
  - Envelope Sensitibity Control (SENS) 1
* VCA Assembly (Voltage Controlled Amplifier)
  - Modulation Waveform Selector (⩘/⊓/∿) 1
  - Modulation Depth Control (TREMOLO)..... 1
  - Envelope Selector (ADSR/⎍/⩘/⎍) 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

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Voltage Changer (for changing AC voltage) 1

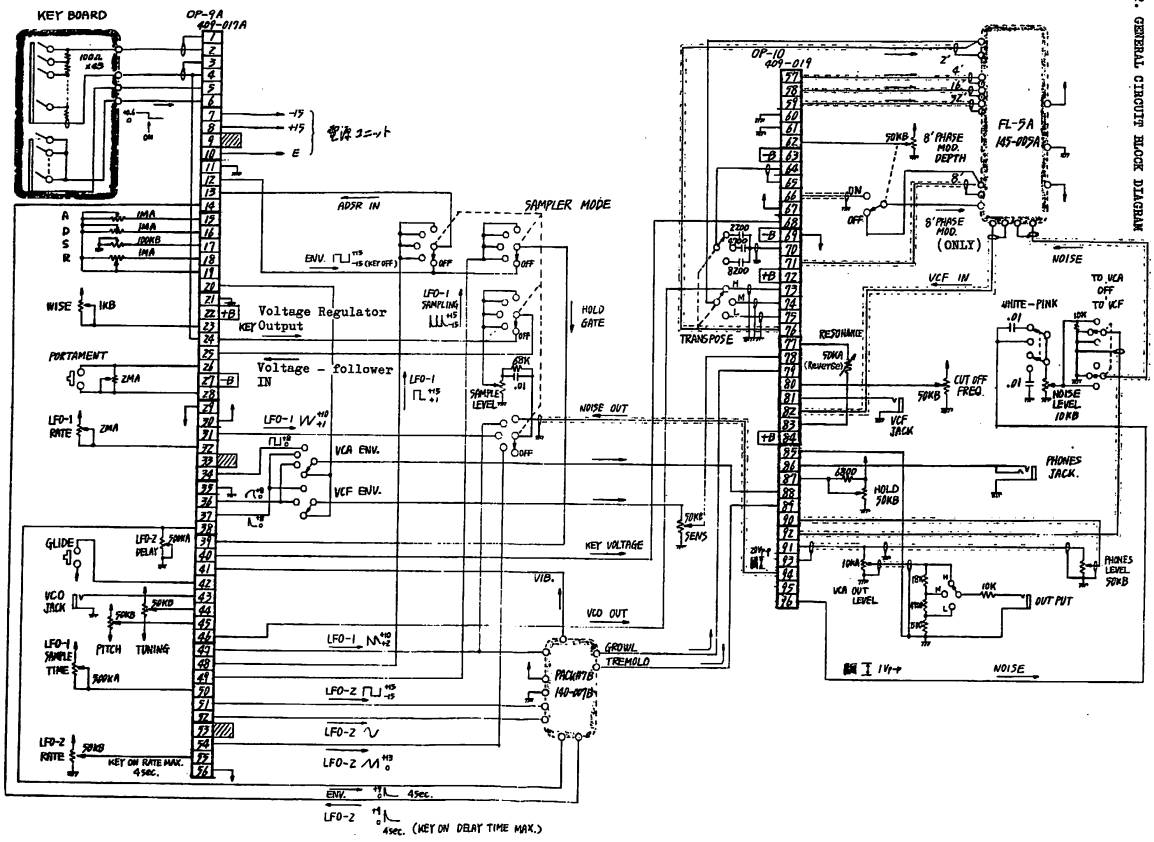
* Power Source	AC 100, 117, 220, 250V 50/60Hz
* Power Consumption	9VA
* Dimensions	W ; 1005mm (40.2")
	D ; 320mm (12.8")
	H ; 150mm (6.0")
* Weight(Net)	14.5 Kg (32 Lbs.)
* Accessories	Music Rack
	Conection Cord
	(2.5m with Pin-Plug Adaptor)
** Accessories(optional)	Volume Control Pedal FV-1
	(for controlling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

****

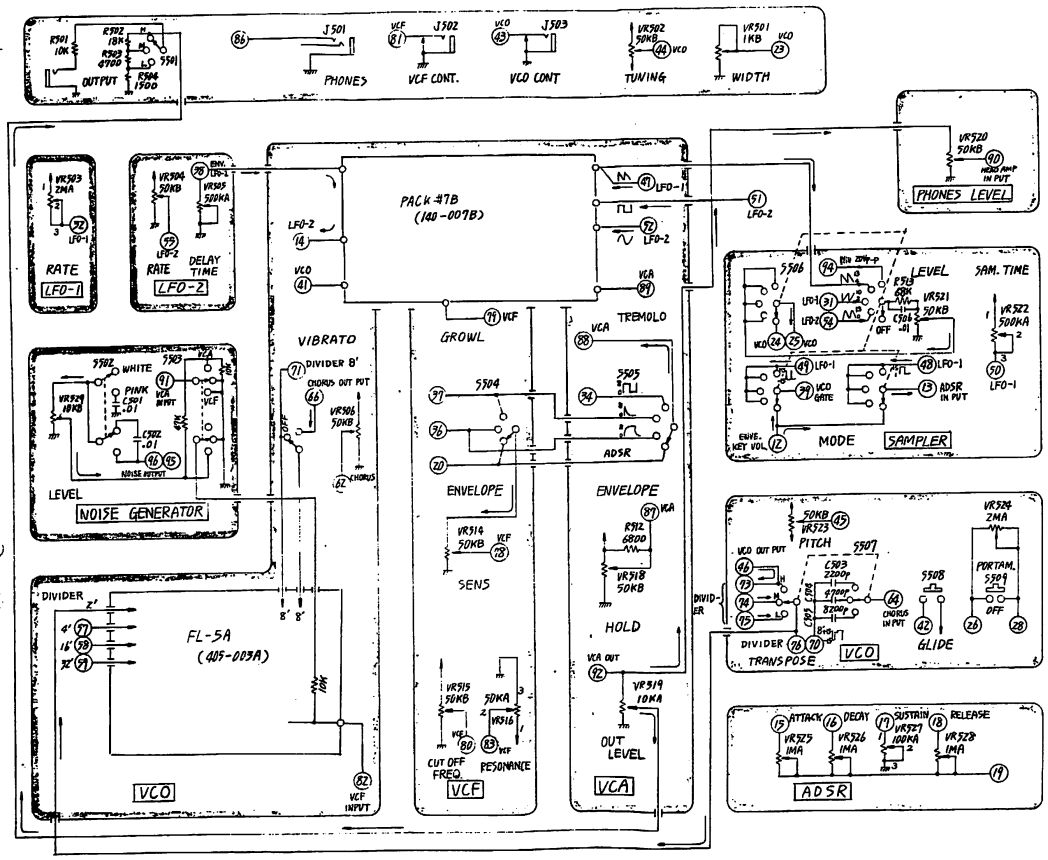
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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

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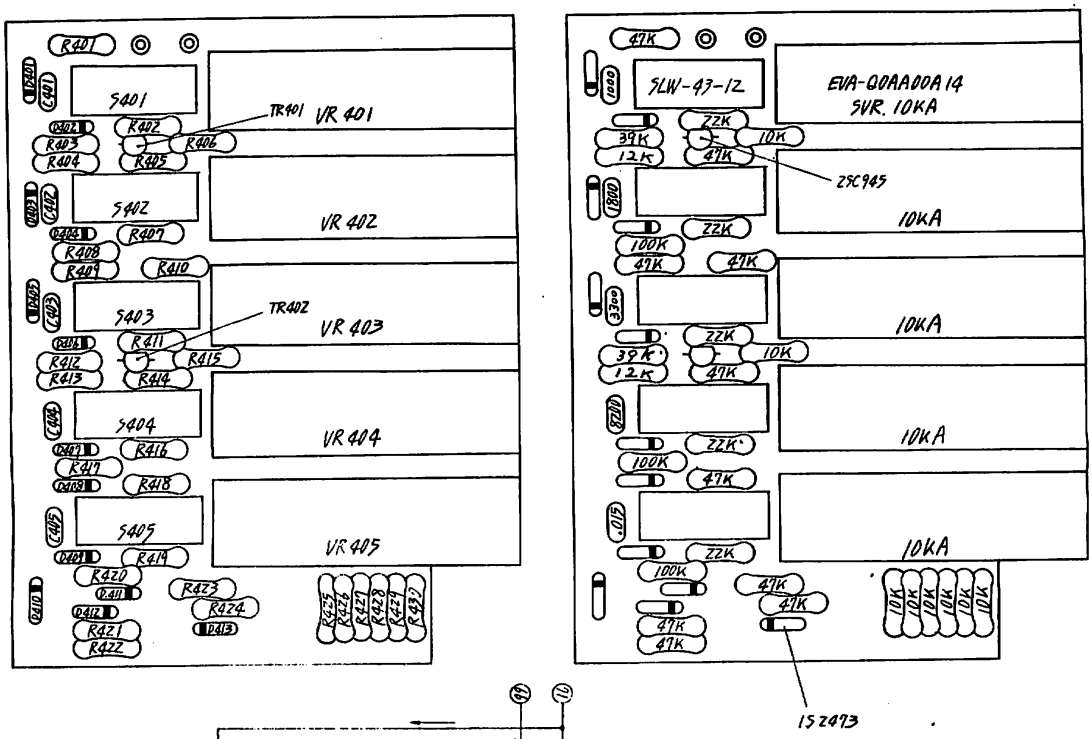


VCO PULSE BOARD (P.W.B. No. 405-003A) ~ (P.W.B. No. 405-007A)
VCF-VCA BOARD (P.W.B. No. 100-007B)

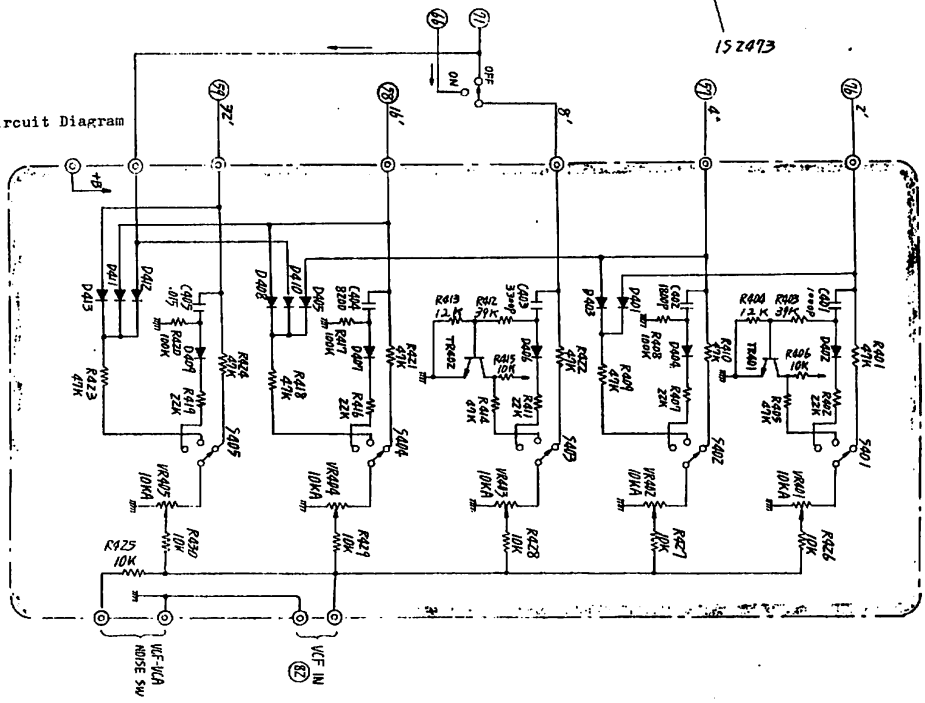
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3-2 FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2549 and below)

A. Parts Layout



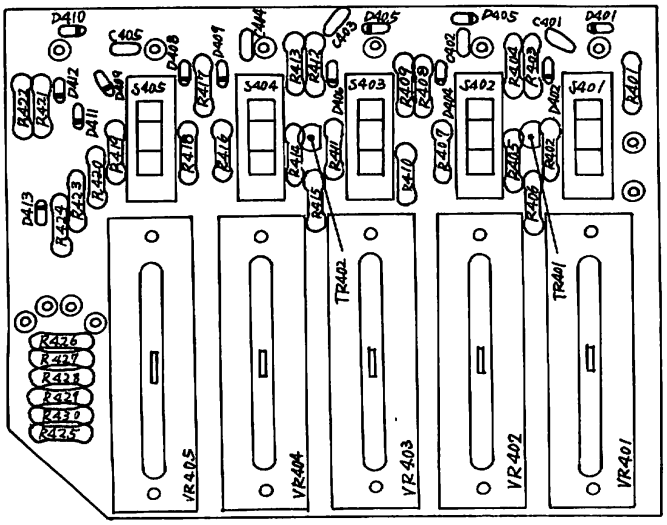
B. Circuit Diagram

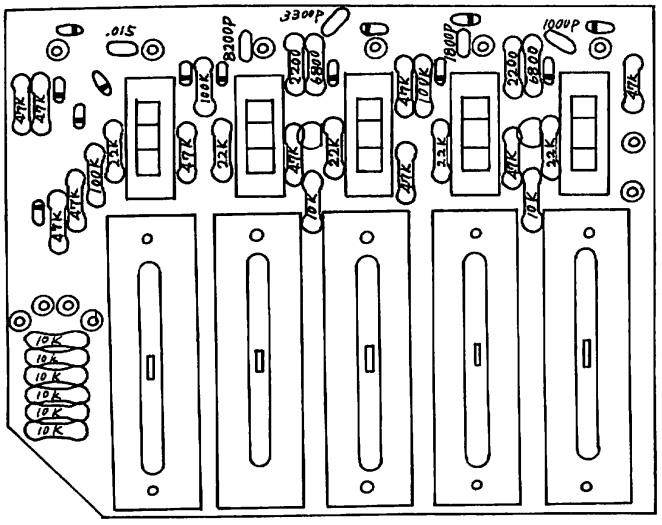


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3-2. FILTER BOARD ASSEMBLY (FL-5) (Serial number XX2550 and above)

A. Parts Layout



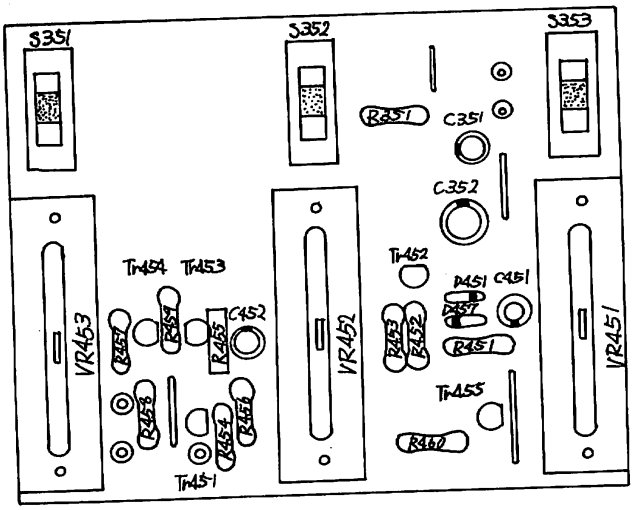


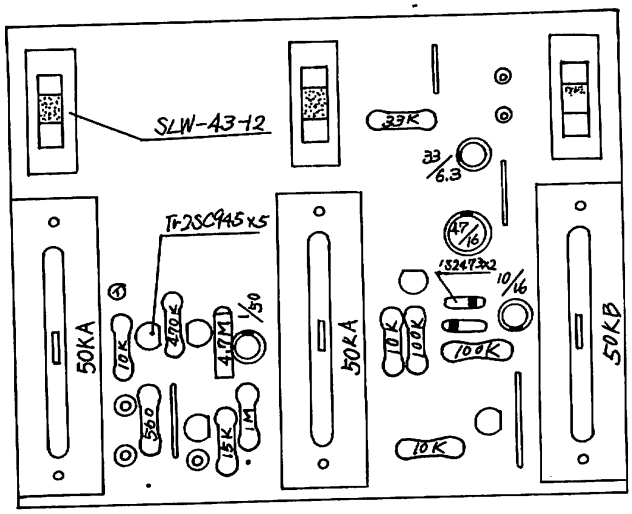
Tr. : 2SC945
D. : 1S2473
SW. : SLW-43-12
VR : SVR 10K A
EVA-G0AA00A14

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

A. Parts Layout

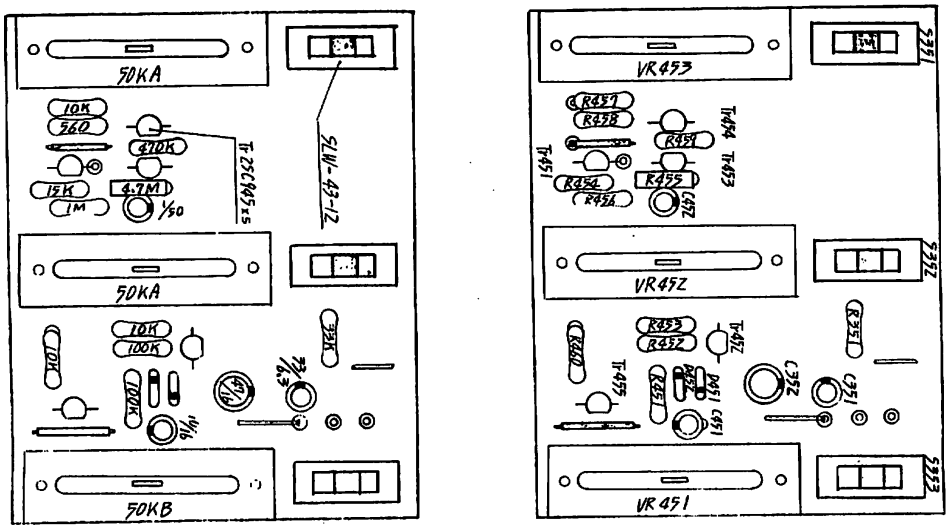




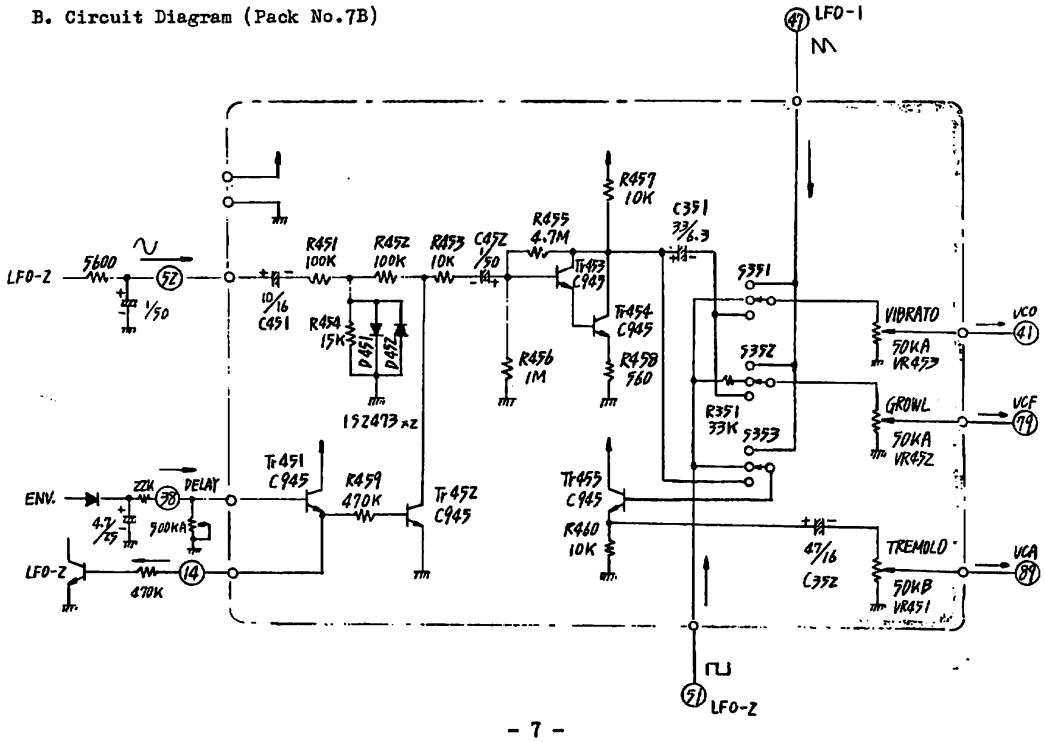
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3-3. PACK №7B ASSEMBLY (Serial Number XX2549 and below)

A. Parts Layout



B. Circuit Diagram (Pack No.7B)

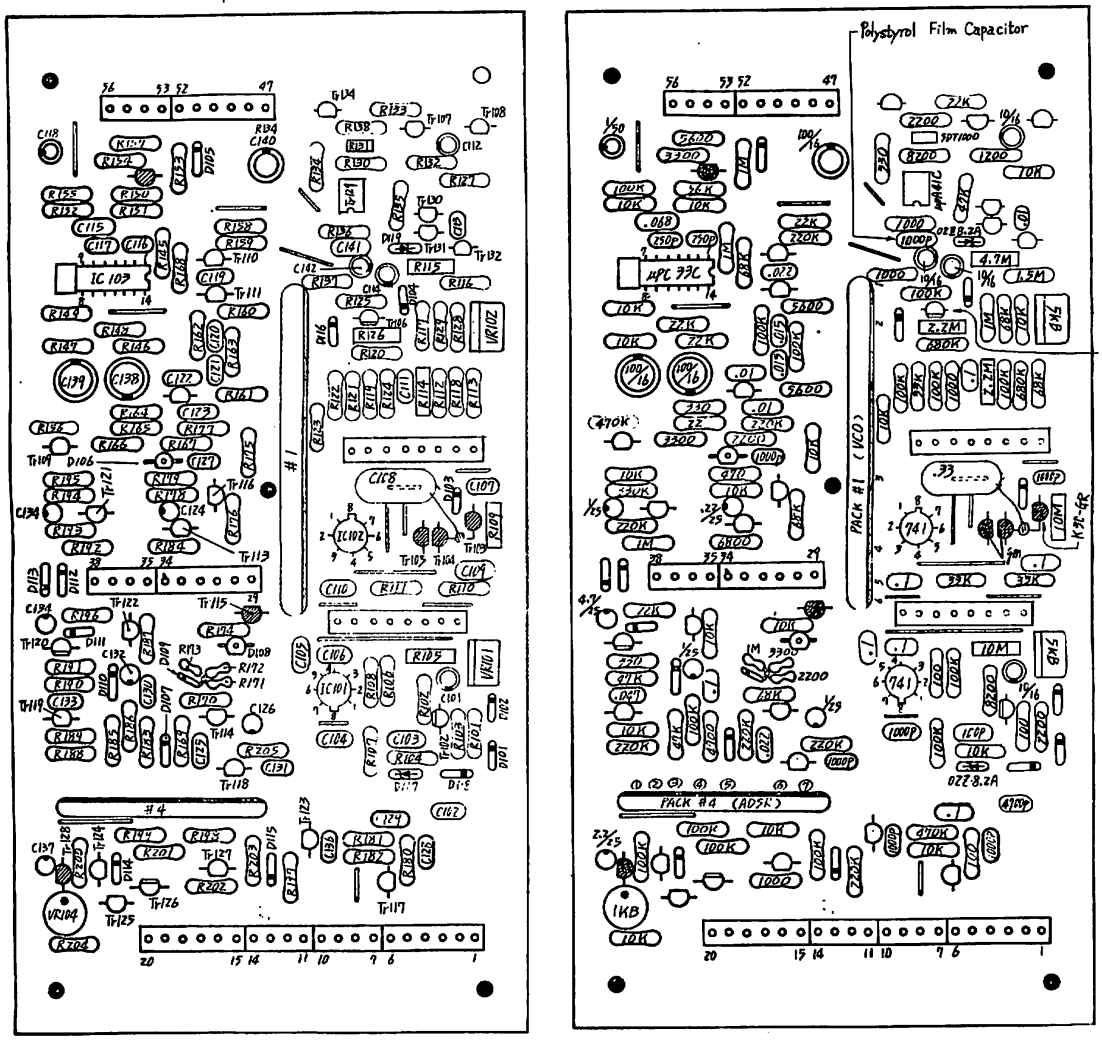


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4. VCO CIRCUIT

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

A. Parts Layout



Tantalume Capacitor

Tr. 2SA733P or Q

Tr. 2SC945P or Q

PUT. N13T2

FET. 2SK30A-Y

D. 1S2473

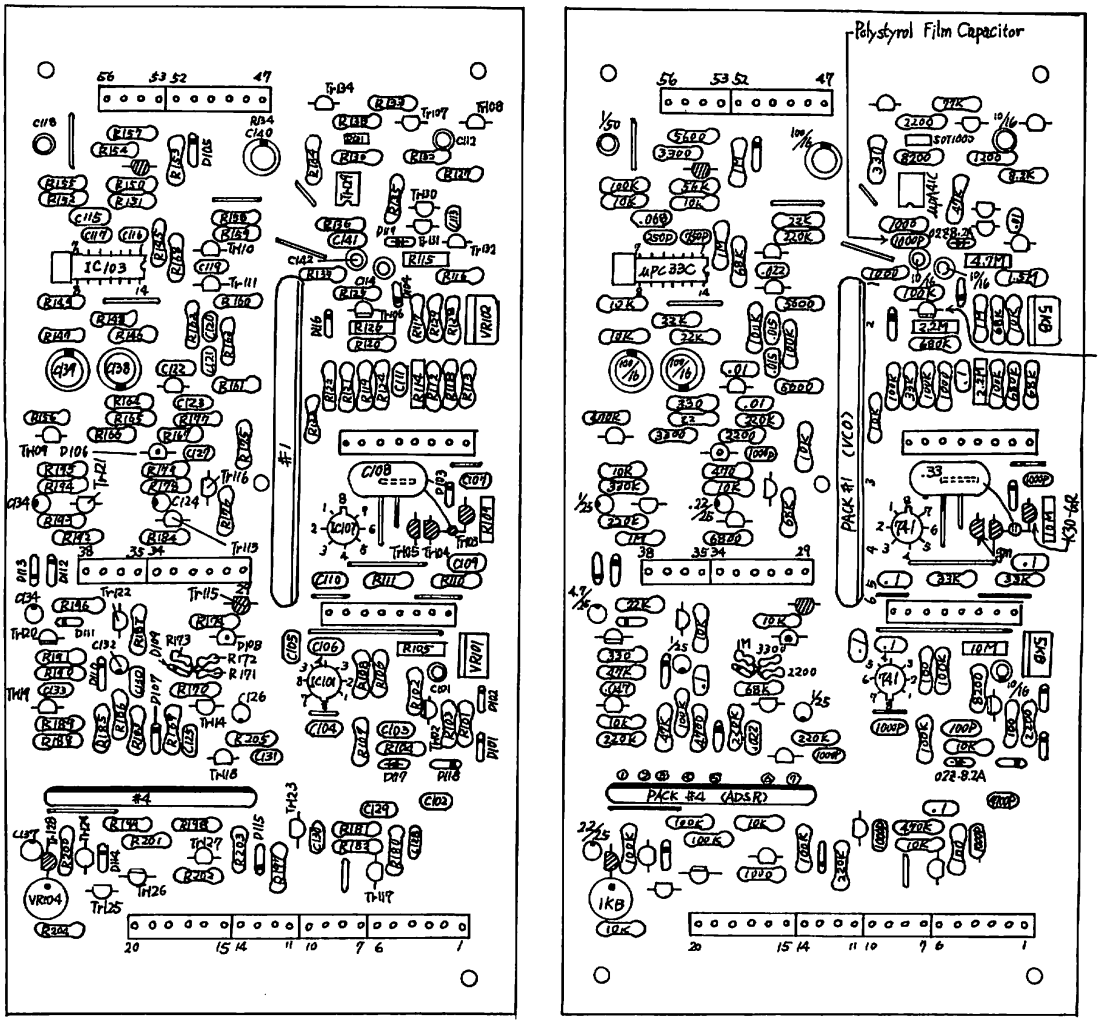
Electrolytic Capacitor

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4. VCO CIRCUIT

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

A. Parts Layout



Tantalume Capacitor

Tr. 2SA733 Pair Q

Tr. 2SC945 Pair Q

PVT. N13T2

FET. 2SK30A-Y

D. 1S2473

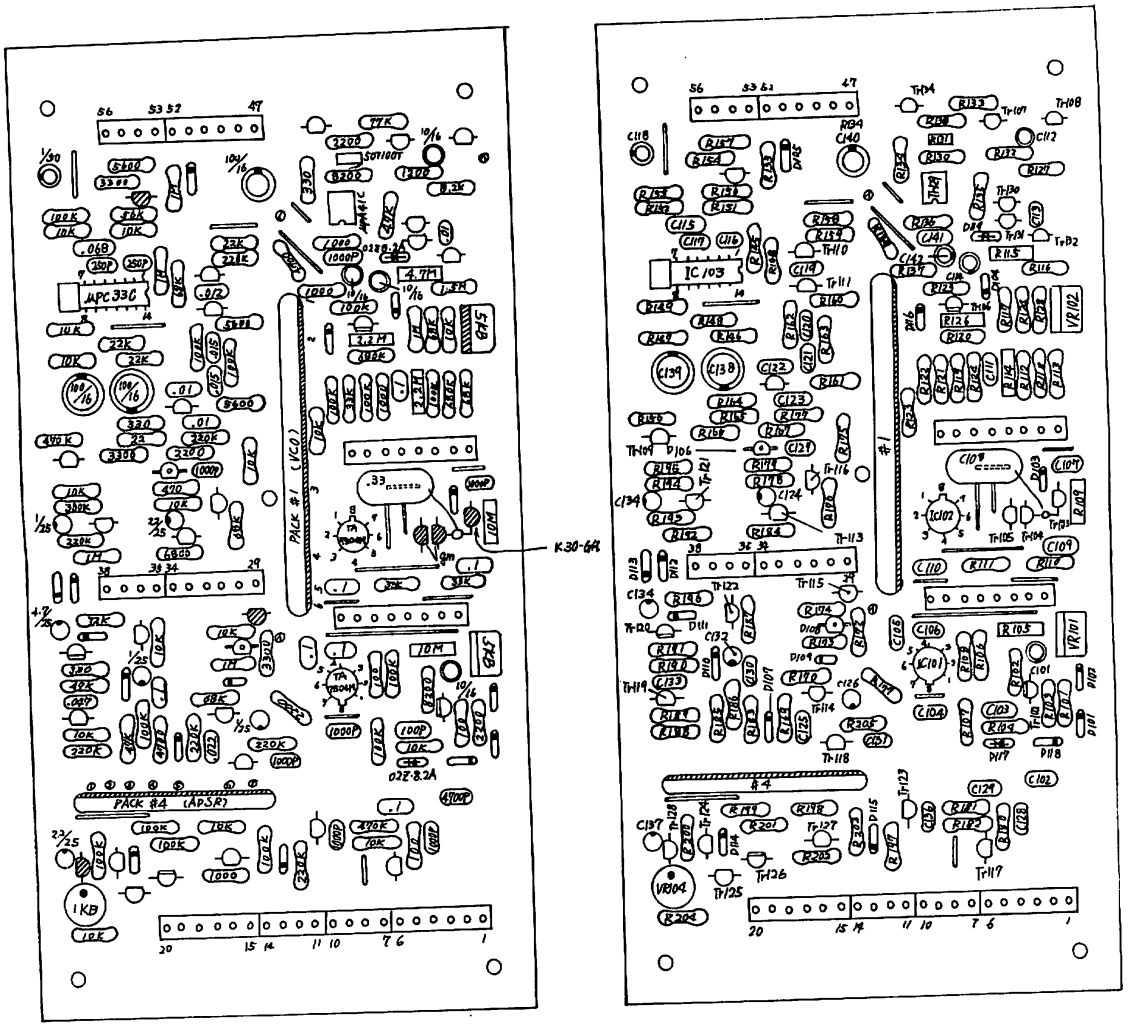
Electrolytic capacitor

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4. VCO CIRCUIT

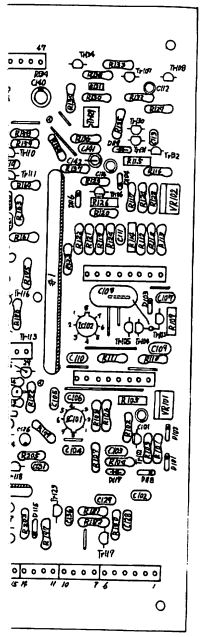
4-1. UCO PULSE BOARD ASSEMBLY(OP-9A) (Serial Number XX2559 and above)

A.Parts Layout

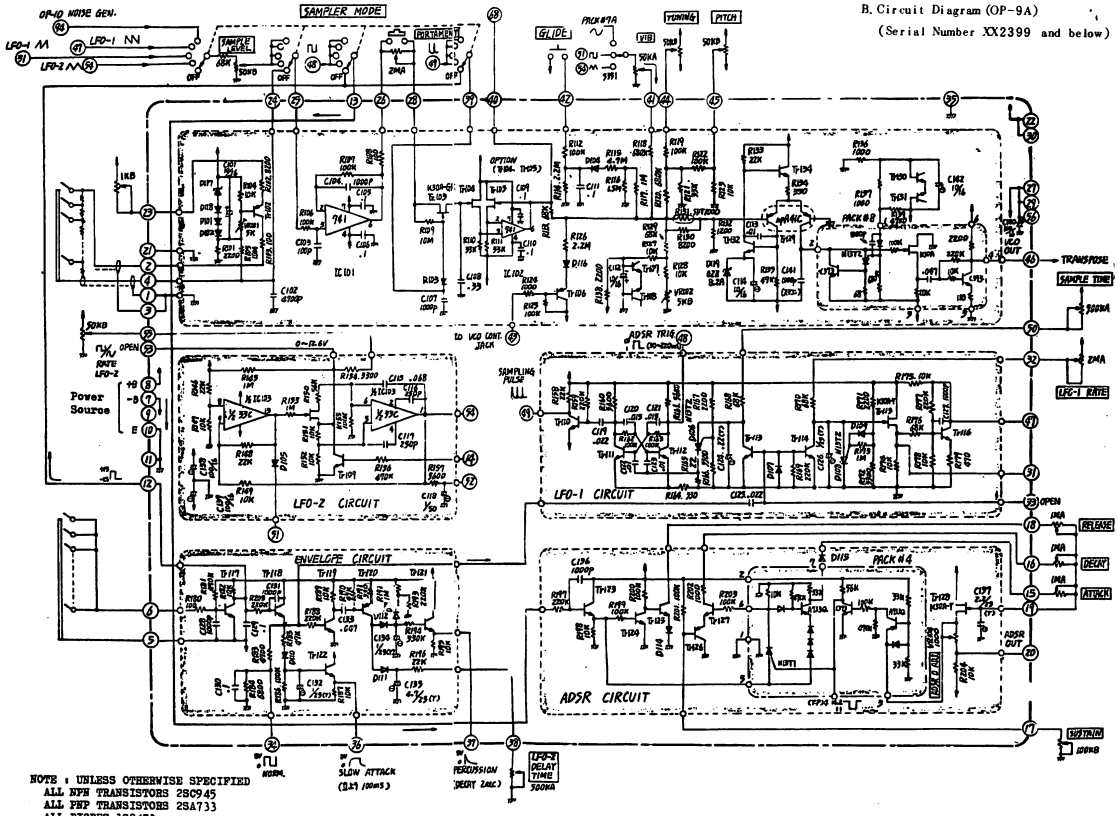


Tantalume Capacitor
Tr: 2SA733 Pot Q
Tr: 2SC945 Pot Q
PUT: N13T2
FET: 2SK30A-Y
D: 1S2473
Electrolytic capacitor

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

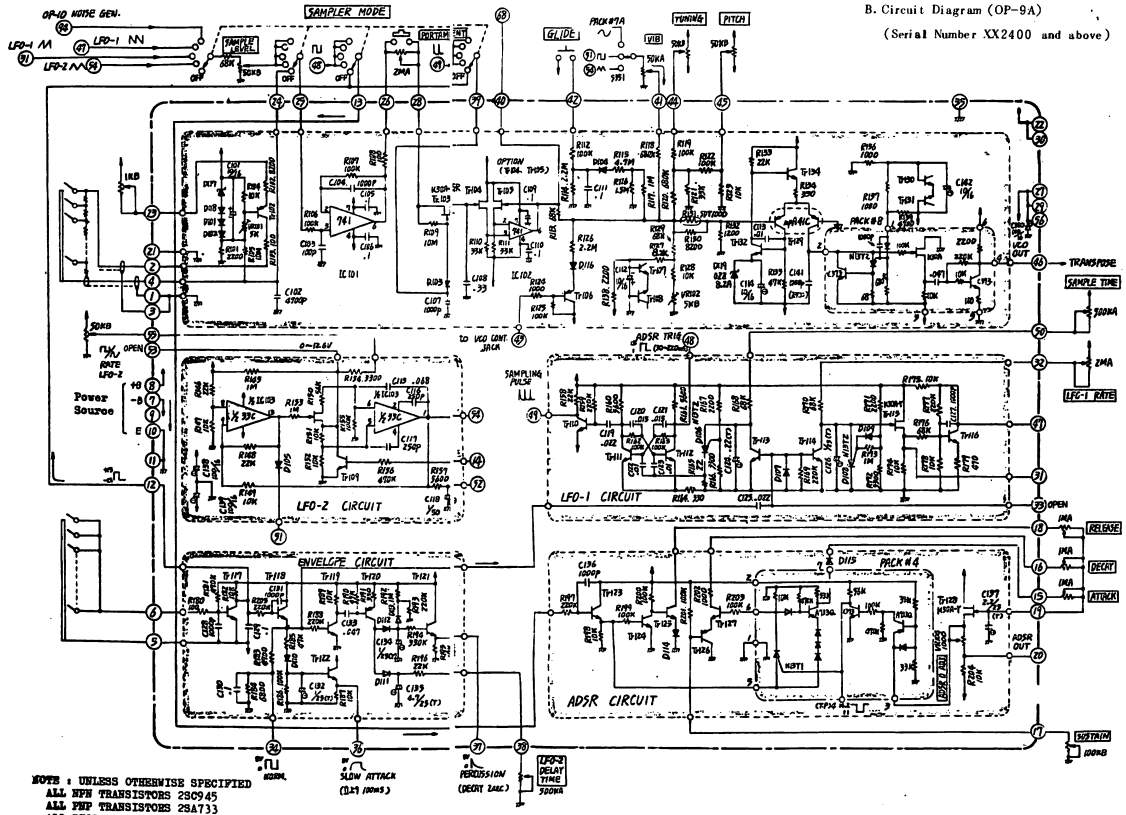


NOTE : UNLESS OTHERWISE SPECIFIED
ALL NPN TRANSISTORS 2SC945
ALL PNP TRANSISTORS 2SA733
ALL DIODES 1S2473

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B. Circuit Diagram (OP-9A)

(Serial Number XX2400 and above)

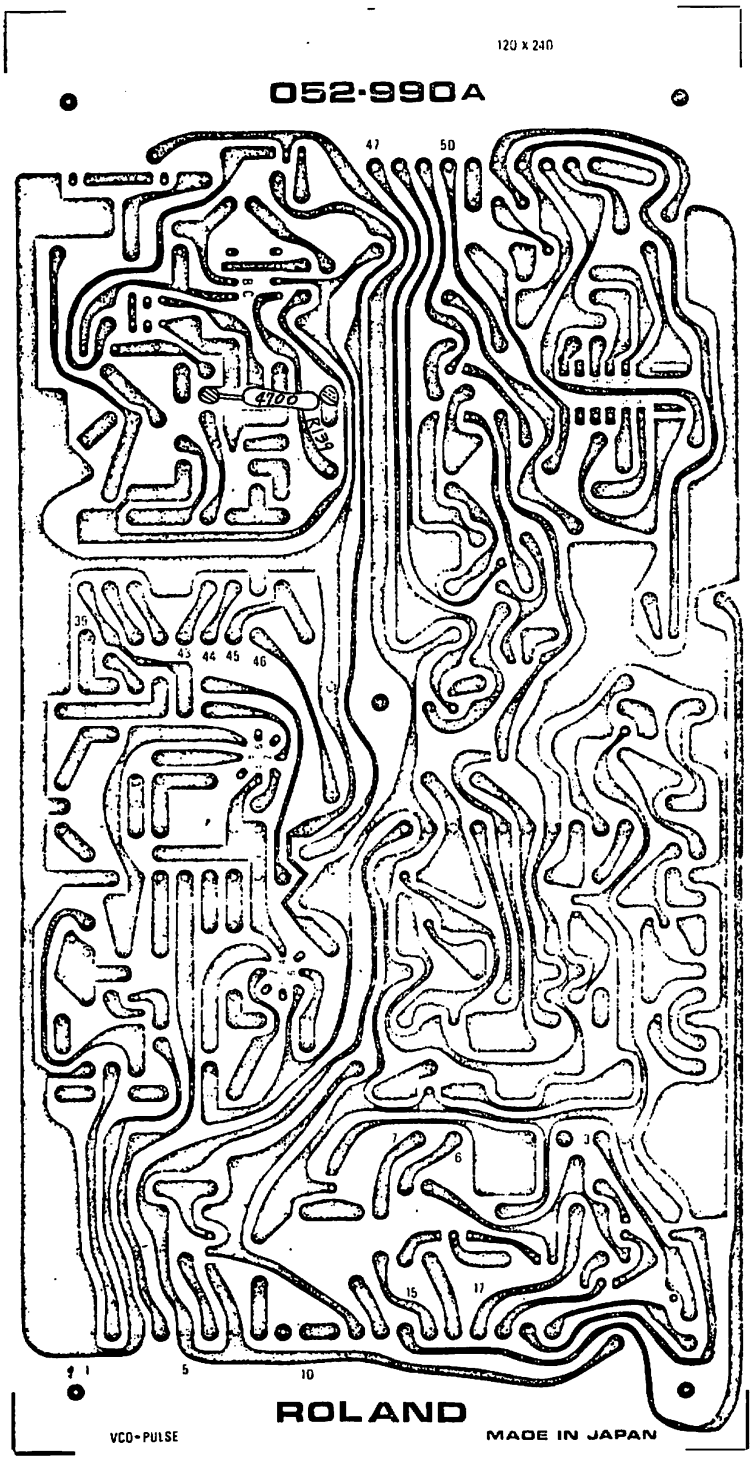


NOTE : UNLESS OTHERWISE SPECIFIED
ALL NPN TRANSISTORS 2SC945
ALL PNP TRANSISTORS 2SA733
ALL DIODES 1S2473

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

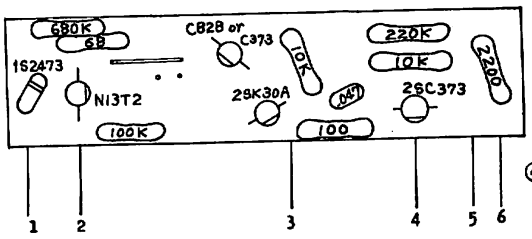
(Serial Number XX2549 and below)



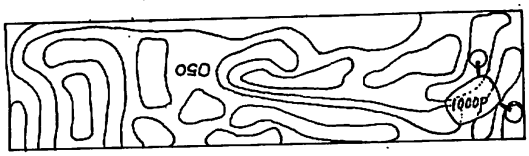
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4-2. PACK No.8 ASSEMBLY

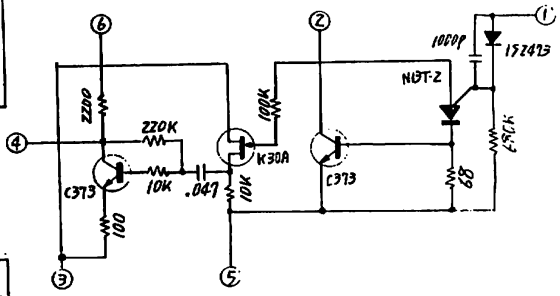
A. Parts Layout



B. Rear side (PACK No.8)



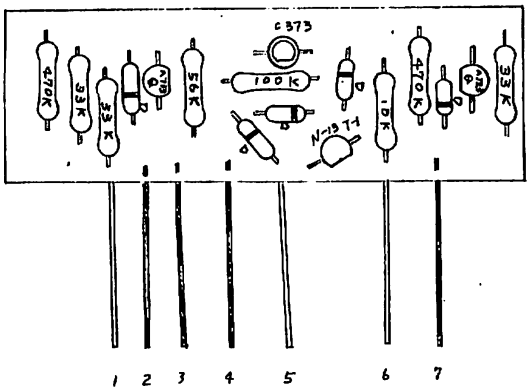
C. Circuit Diagram (PACK No.8)



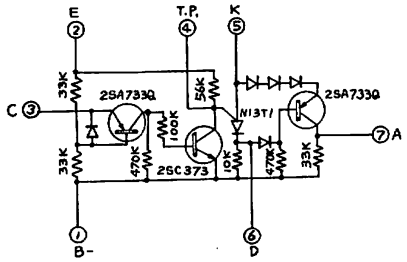
D : 1S2473

4-3. PACK No.4 ASSEMBLY

A. Parts Layout



B. Circuit Diagram (PACK No.4)



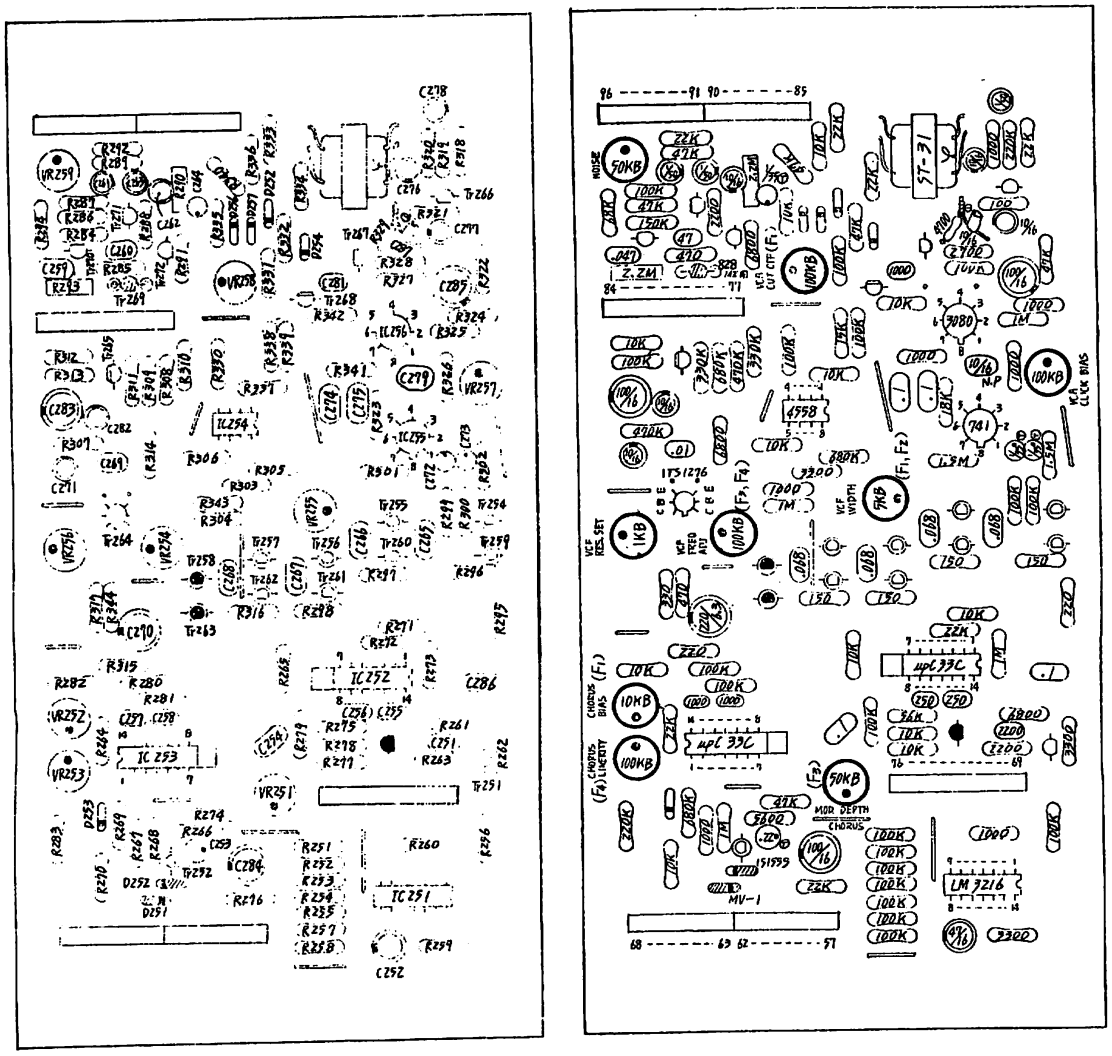
D : 1S2473

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5. VCF VCA CIRCUIT

5-1. VCF-VCA BOARD ASSEMBLY (OP-10B) (Serial Number XX2549 and below)

A. Parts Layout



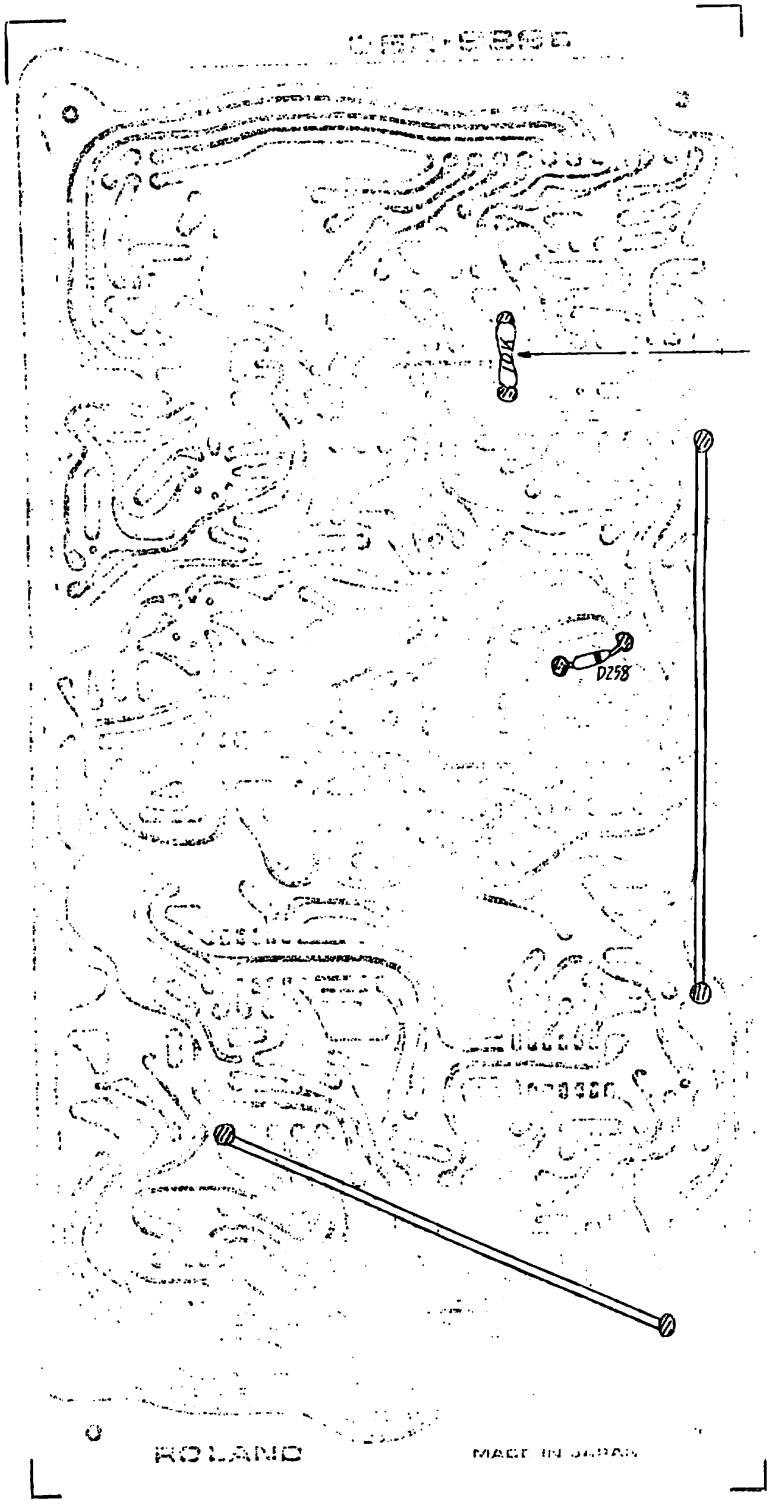
2SC1000 GR　　2SA733

2SC945　　1S2473

2SK30A-Y　　2SC1000 GR OPTION

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

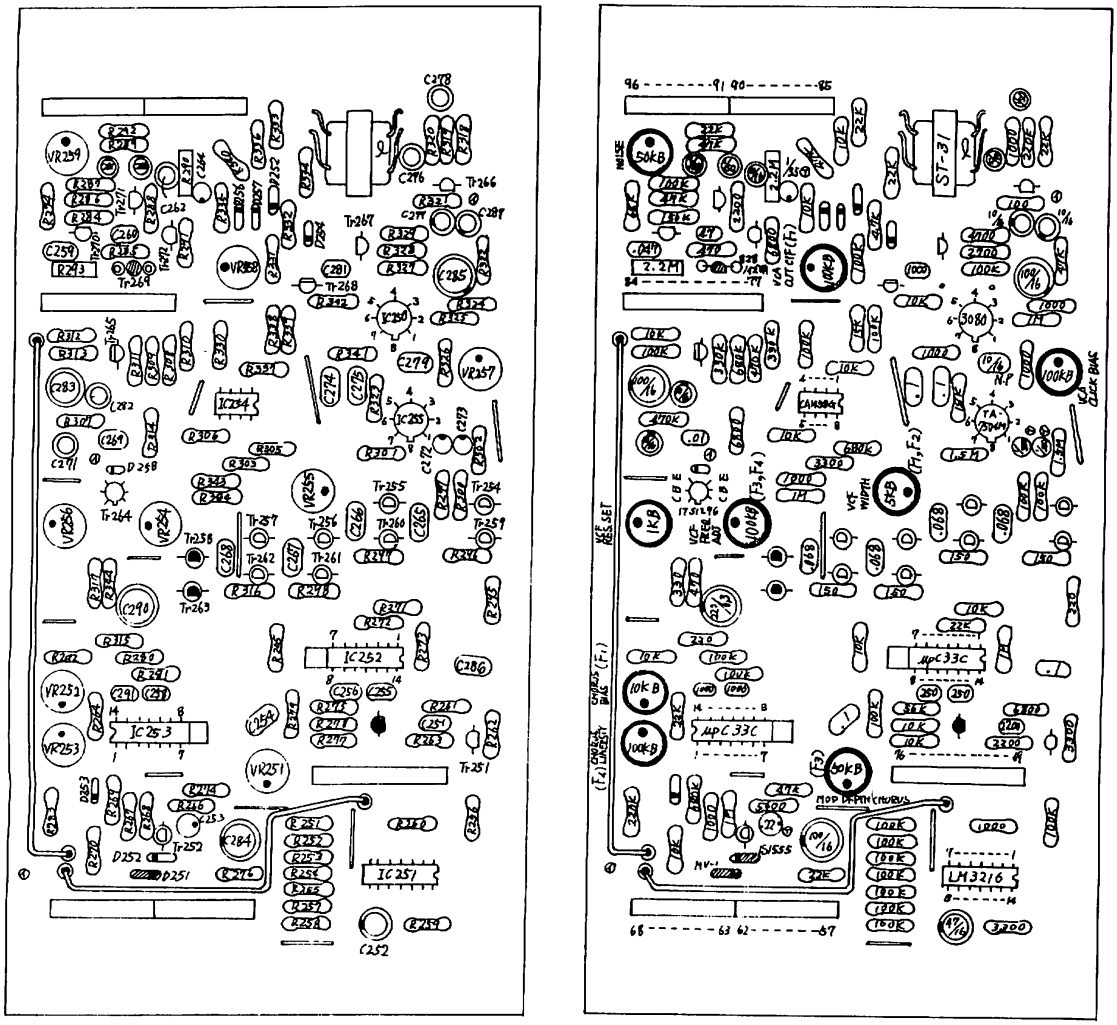


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5. VCF-VCA CIRCUIT

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

A. Parts Layout



2SC1000 GR　　2SA733

2SC945　　1S2473

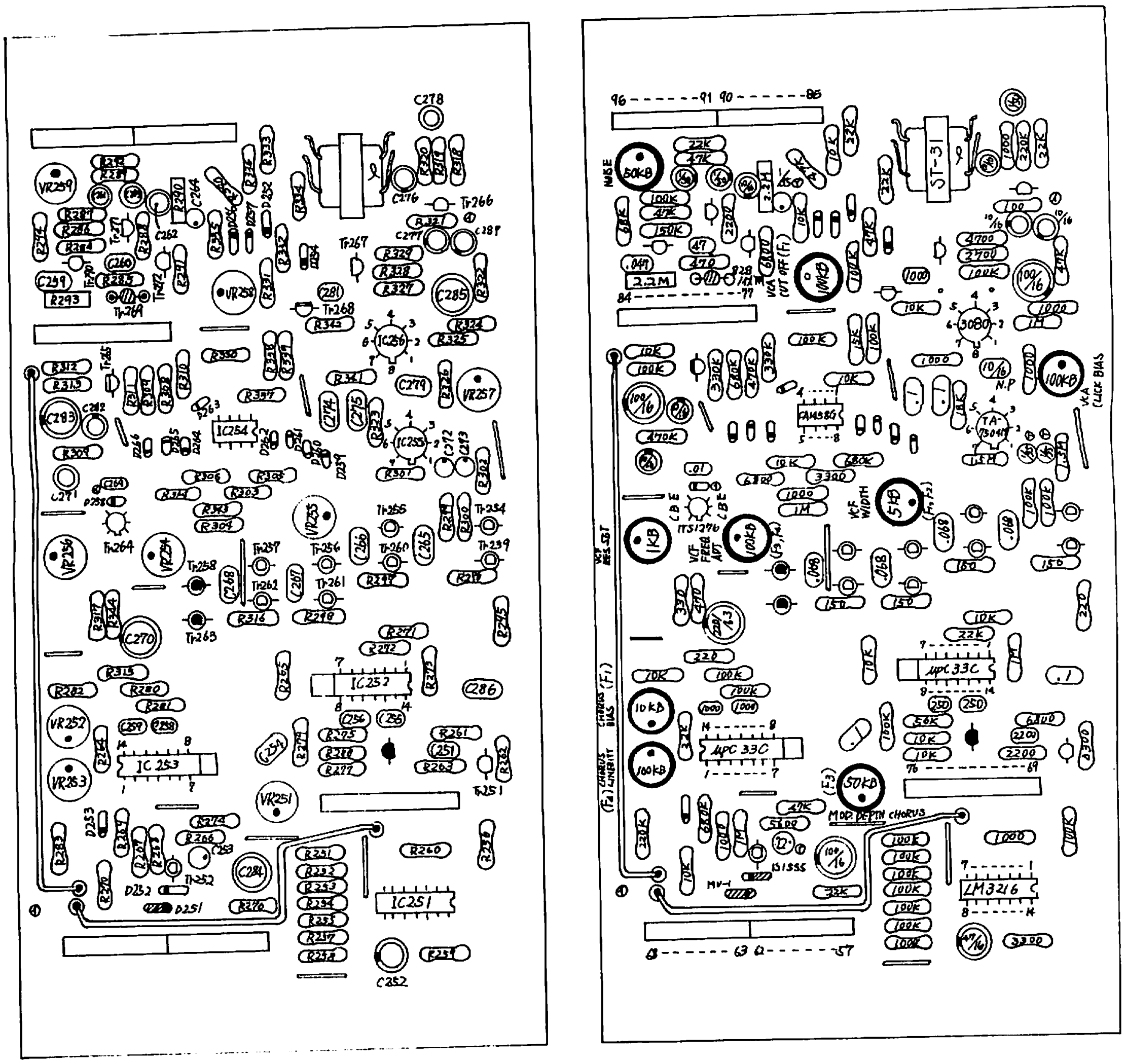
2SK30A-Y　　2SC1000 GR OPTION

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5. VCF VCA.CIRCUIT

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

A. Parts Layout



2SC1000GR   2SA733

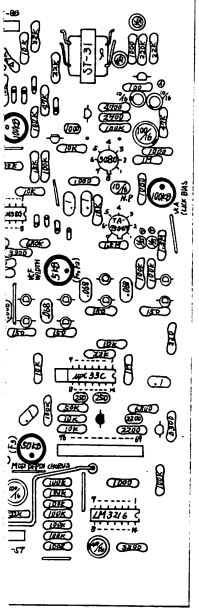
2SC945   1S2473

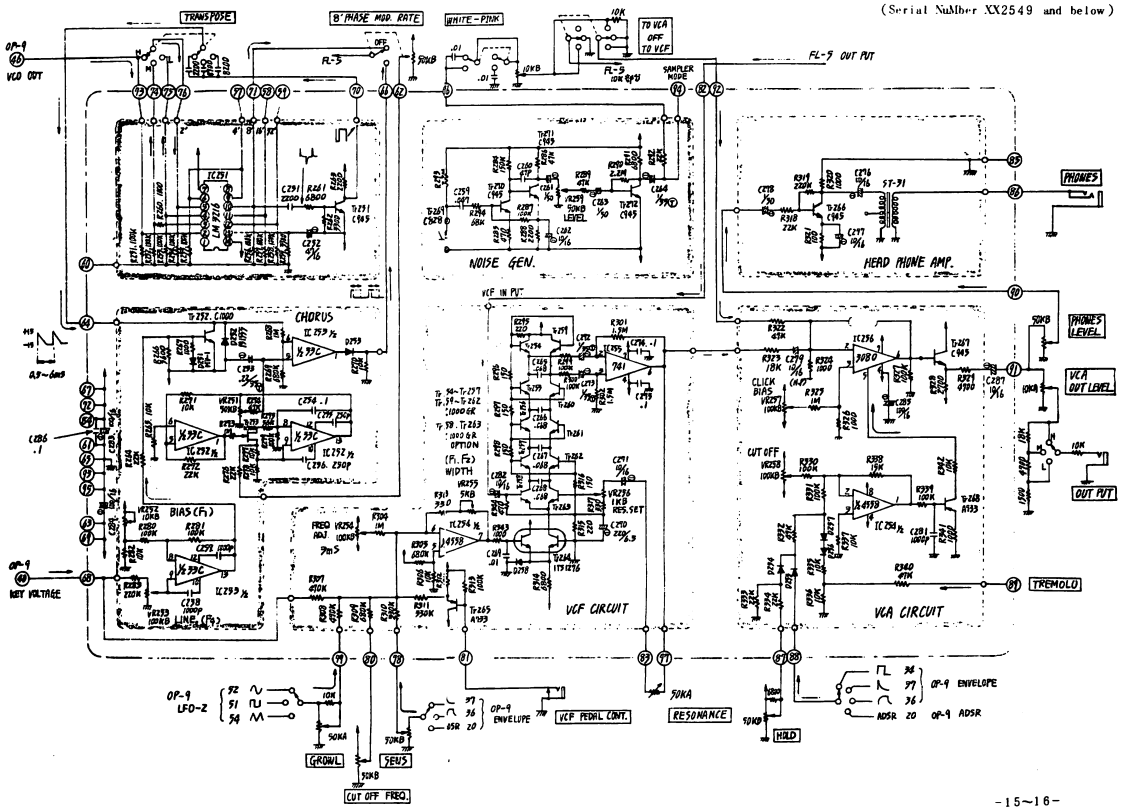
2SK30A-Y   2SC1000GR OPTION

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C. Circuit diagram (OP-10B)

(Serial Number XX2549 and below)

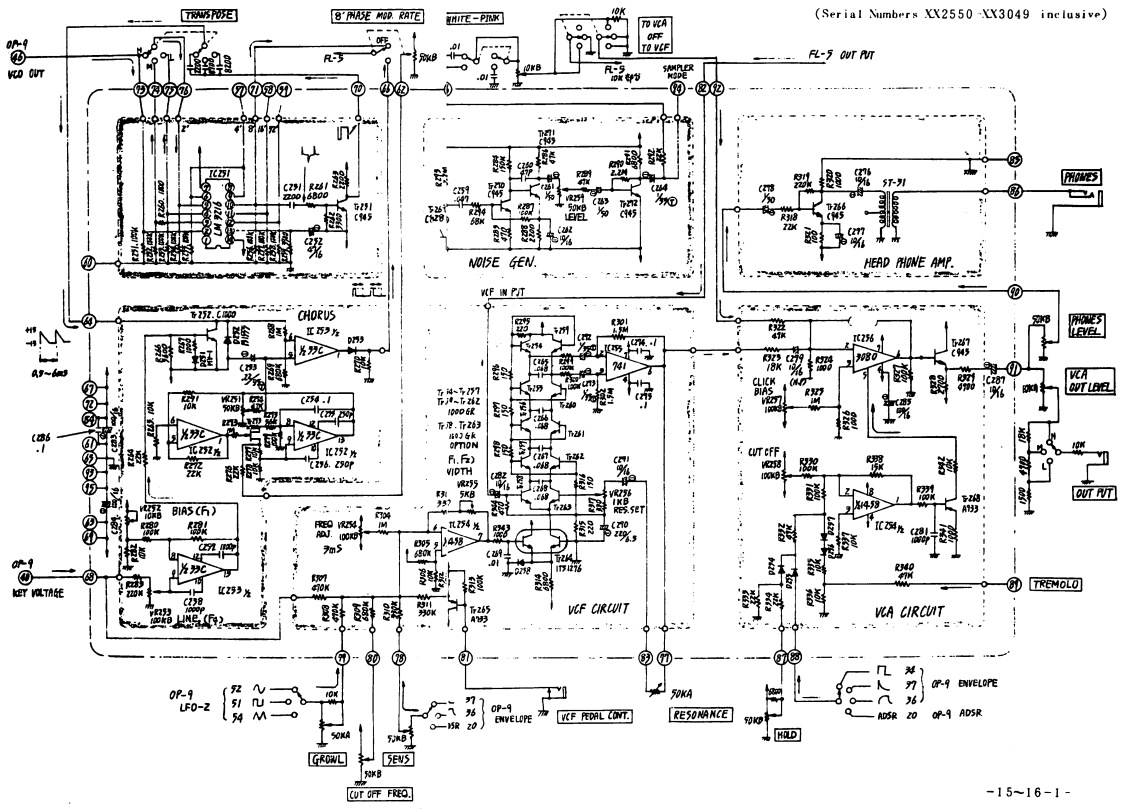




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C. Circuit diagram (OP-10B)

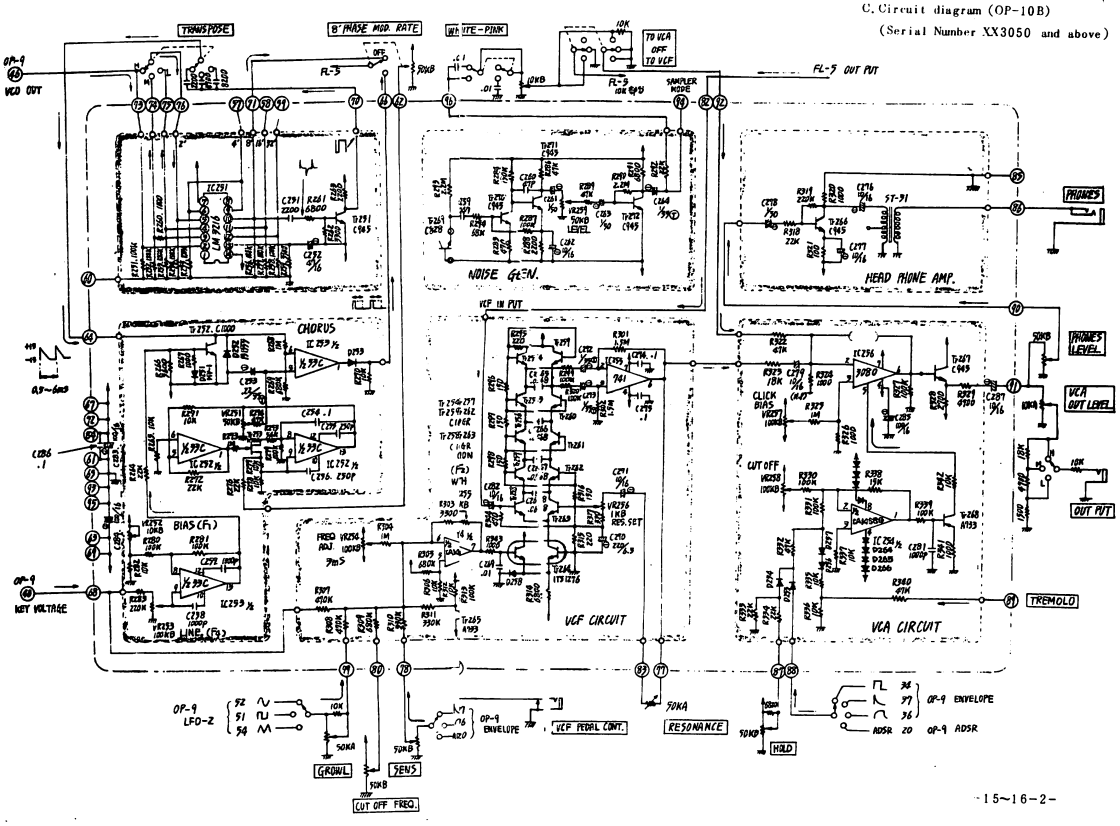
(Serial Numbers XX2550 -XX3049 inclusive)



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C. Circuit diagram (OP-10B)

(Serial Number XX3050 and above)

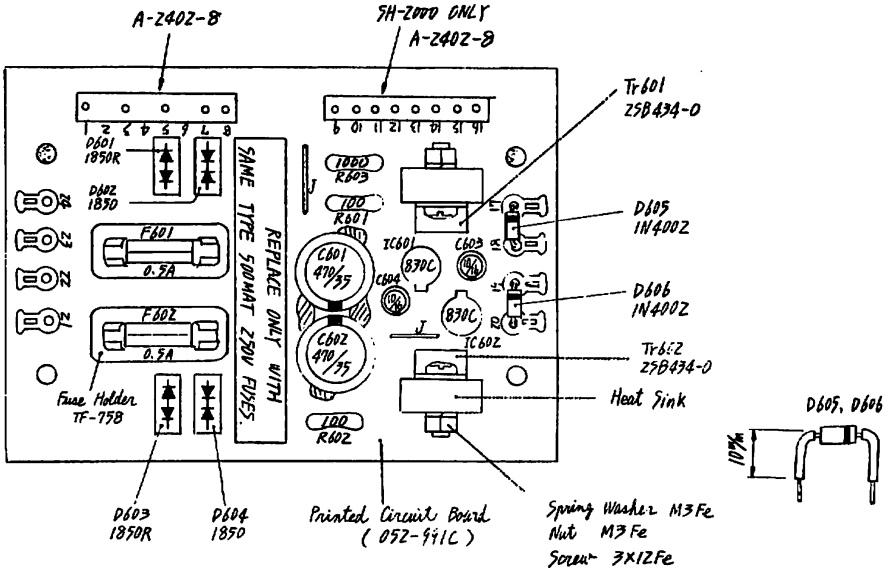


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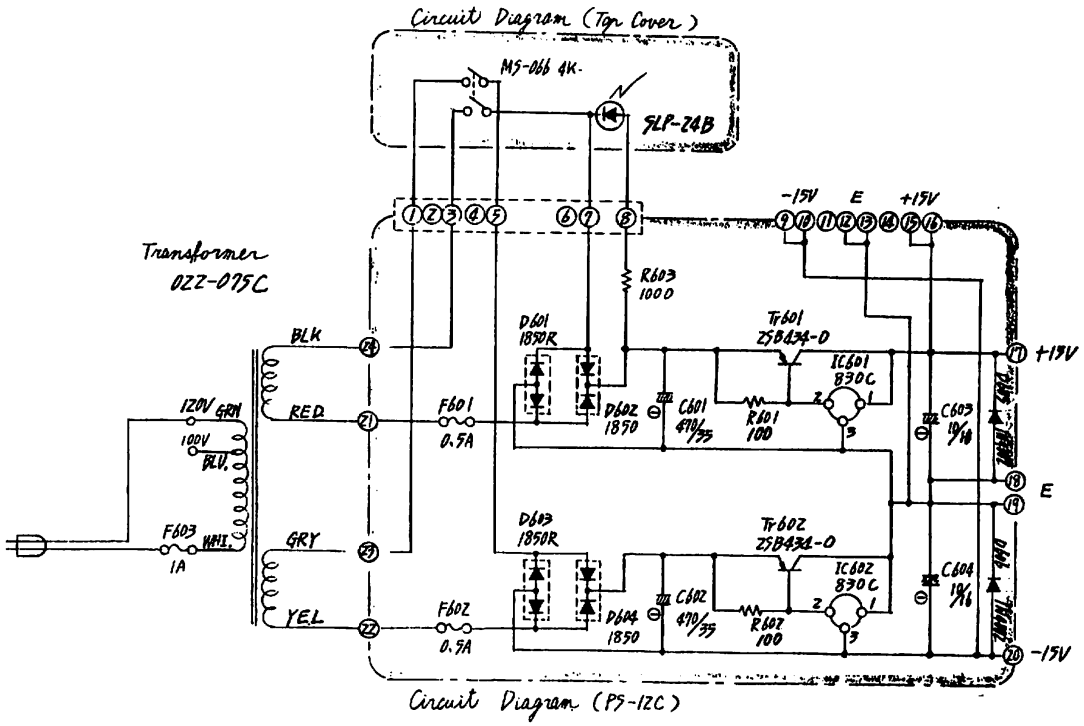
6. POWER SUPPLY CIRCUIT

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

A. Parts Layout



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



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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 ⊓⊔ 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⊓⊔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 ..... ⌐¬

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(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.

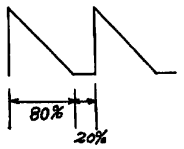
(4) Stepping (2) affects one octave difference between F2 and F3, so repeat step (1) and (2).

7-8. CHORUS Adjustment

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

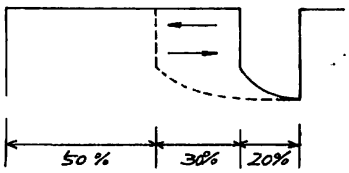
(2) Setting 8' ..... ON
VCO 8' Control 10

(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.



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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.



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*GENERAL ASSEMBLY
cabinet (Complete)
Control Chassis Assembly
Top Cover Assembly

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 } including the following parts	
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)
016-021	Knob	TK-1114 (serrated,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 (on-off-on)
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	8ø (for Potentiometer)

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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 lens	No.4
	Speed Nut spring 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 K- serrated shaft
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
020-010	IC	741 or TA7504M
	IC	uPC33C (020-059 uPC-1016 substitutive)
	IC	uPA41C (IT-132 020-055 substitutive)
020-015	IC	CA3080
020-007	IC	LM3216
017-013	Silicon Transistor	2SC945 P or Q
017-012	"	2SA733 "
017-046	"	2SC828 (for Noise)
017-005	"	2SC1000 GR
017-048	"	2SC1000 (Selected)
017-011	"	2SC373
017-022	"	2SB434 O
020-021	Pair Transistor	ITS1276
017-018	PUT	N13T1
017-019	PUT	N13T2
017-014	FET	2SK30A Y
	FET	2SK30A GR or Y (Selected)
018-015	Thermister	SDT1000
018-018	Diode	1N4002
018-005	"	1S1555
018-014	"	1S2473
018-008	"	02Z8.2A

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018-020	Diode	MV-1	
018-003	"	1850	
018-004	"	1850R	
	Potentiometer	1 Kohm(B)	EVR20AS15B13
	"	50 Kohm(B)	EVCB0AK20B54 (V24L5N20KC-)
	"	50 Kohm(B)	EVCB0AS15B54 (V24L5N15R-)
	"	50 Kohm(B)	EVCB0HK20B54
	"	2 Mohm(A)	EVCB0AK20A26
028-035	Slide Potentiometer	50 Kohm(A)	EVAQ0AA00A54 (EVAQ0AC16-)
028-024	"	50 Kohm(B)	EVAQ0AA00B54
028-036	"	100Kohm(A)	EVAQ0AA00A15
028-038	"	500Kohm(A)	EVAQ0AA00A55
028-039	"	1 Mohm(A)	EVAQ0AA00A16
028-040	"	2 Mohm(A)	EVAQ0AA00A26
	Trim Potentiometer	500 ohm(B)	EVLR4XA00B52
	"	1 Kohm	EVLR4XA00B13
	"	5 Kohm	PNB04C3A502V (for OP-9A)
	"	5 Kohm(B)	EVLR4XA00B53
	"	10 Kohm(B)	EVLR4XA00B14
	"	50 Kohm(B)	EVLR4XA00B54
	"	100Kohm(B)	EVLR4XA00B15
	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	"

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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
	"	1000mfd 16V	ECE-A16V1000
	"	1000mfd 25V	ECE-A25V1000
	Plastic Film Capacitor	470 pfd 50V V Type (+ 10% or 20%)	
035-005	"	1000pfd " "	
	"	2200pfd " "	
	"	4700pfd " "	
	"	8200pfd " "	
	"	.01 mfd " "	
	"	.015mfd " "	
	"	.022mfd " "	
035-024	"	.047mfd " "	
	"	.068mfd " "	
	"	.1 mfd " "	
	"	.33 mfd " "	
	Polystyrol Film Capacitor	1000pfd	
	"	47 pfd 50V V Type (+ 20%)	
	Ceramic Capacitor	50 pfd 50V V Type (+ 10% or 20%)	
	"	250 pfd " "	
	"	470 pfd " " (+ 20%)	
	Diped Tantalume Capacitor	.22mfd 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.

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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 interchangable with OP-10 (SH-3).

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