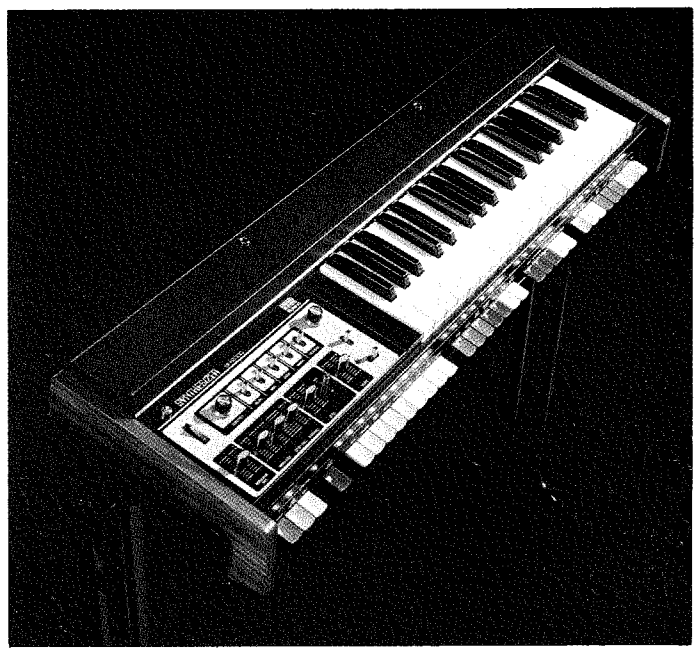
SYNTHESIZER

SH-2000



Roland

Printed in Japan

CONTENTS

GUIDE ON ENGINEERING CHANGES

Details of engineering changes are described in each section concerned. The gist of them are summarized here for quick comprehension.

1. **VCO-2**
   IT132 is used in place of μPA41C formerly used. These are interchangeable each other.

2. **OP-12**
   OP-12C is used in place of OP-12B. The difference is that R575, 47KΩ on foil side of OP-12B is brought onto parts side on OP-12C. Therefore, the foil pattern differs slightly each other. The two PCB's are perfectly interchangeable.
   Also, in recent products, 2SK30A GR's are used in stead of 2SK30A Y in hold circuit of older products. In conjunction with this change, R513 and R514 are changed to 100KΩ from 33KΩ. When replacing the FET's, change the resistors, too. This change has been made with a view to reducing the leakage voltage.

3. **MOUNTING SCREW**
   In order to increase structural strength, two mounting screws are added in recent products.
   One is to secure: control unit (left) to side board.
   The other is to secure: keyboard chassis (right) to side board.

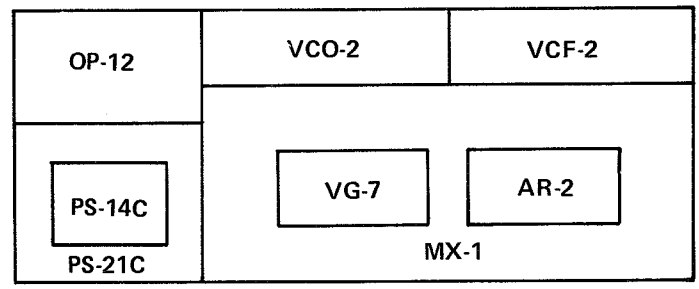
4. **AR-2, VG-7, MX-1**
   For increased reliability, FET's 2SK44 C and 2SK44 D are changed to 2SK30A O and 2SK30A Y respectively, on PCB's AR-2, VG-7 and MX-1 of recent products. The FET's, accordingly the PCB's, are interchangeable each other.

5. **PS-14C – PS-14C-D**
   IC 830C used on PS-14C is no longer available.
   Instead μA78M15UC is used on PS-14C-D of present products. In conjunction with this change, R601 and R602 are changed to 33Ω from 100Ω of PS-14C. The two PCB's are interchangeable.
   Also, interchanging the IC's is also possible by taking into account that:
   1) the pins are slightly different, and
   2) R601 and R602 values are different.

CHANGES OF PCB's

SERIAL NO.

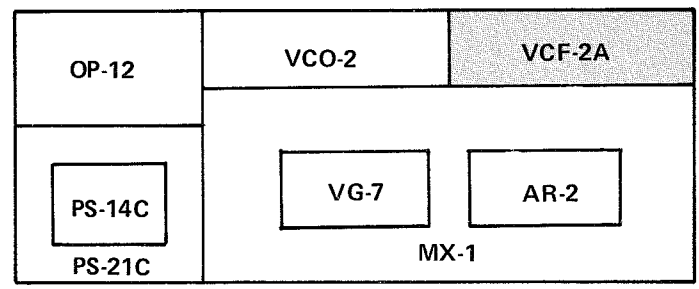
578049



VCF-2 → VCF-2A
*Interchangeable. Value of R819 on MX-1 differs for each. See Circuit Diagram. Tone differs slightly.

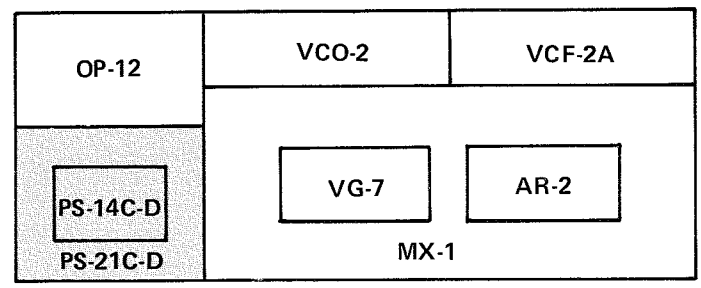
578050

608899



PS-14C → PS-14C-D
PS-21C → PS-21C-D
*Interchangeable.

608900



Roland

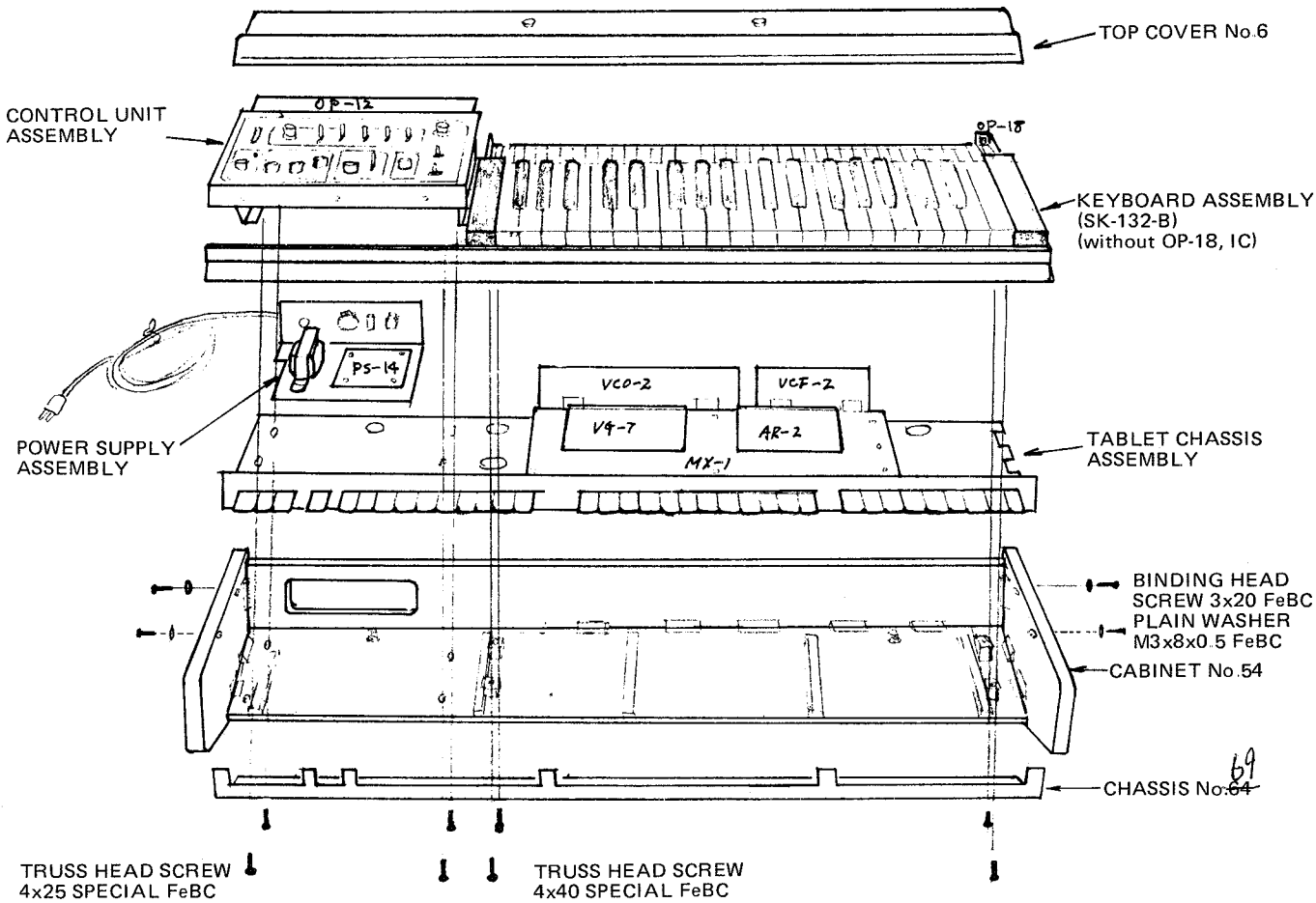
1. SPECIFICATIONS

- 37 Keys (F scale)
- Transpose Changeover Switch (L/M/H) 1
- Preset Tablet

TUBA	CELLO	PIANO	SINGING VOICE
TROMBONE	VIOLIN	HARPSICHORD	SONG WHISTLE
FRENCH HORN	BASS GUITAR	ACCORDION	POPCORN
TRUMPET	HAWAIIAN GUITAR	VIBRAPHONE	SPACE REED
SAXOPHONE	BANJO	XYLOPHONE	PLANET
BASSOON	FUZZ GUITAR 1		FROG MAN
OBOE	FUZZ GUITAR 2		FUNNY CAT
FLUTE			GROWL WOW
CLARINET			WIND

- Envelope Tablet 3
  HOLD, LONG SUSTAIN, REPEAT
- Filter Manual Tablet 1
- Filter Control 3
  CUTOFF FREQUENCY, RESONANCE, MODULATION
- Touch Effect Control 6
  PITCH BEND (UP/OFF/DOWN), VIBRATO (ON/OFF), GROWL (ON/OFF), WOW (ON/OFF), VOLUME (ON/OFF), SENSITIVITY
- Portamento Control 2
  Portamento Selector Switch (ON/OFF/SLOW)
  SPEED
- Other Control
  MODULATION RATE, PITCH, RANDOM NOTE (AUTO/OFF/KEY), VOLUME, TUNING, POWER
- Output Jack
- Output Voltage Changeover Switch (L/M/H)
  Level/Impedance: L – 2Vp-p max/50KΩ; M – 4Vp-p max/40KΩ; H – 8Vp-p max/80KΩ
- Power Consumption: 10W
- Dimensions: 865mm (34") W x 133mm (5.2") H x 266mm (10.5") D
- Net Weight: 11kg (24.2 lbs)
- Accessories: Music Rack; Connection Cord (2.5m with Pin-Plug Adaptor)

2. DISASSEMBLY AND UNIT LOCATION

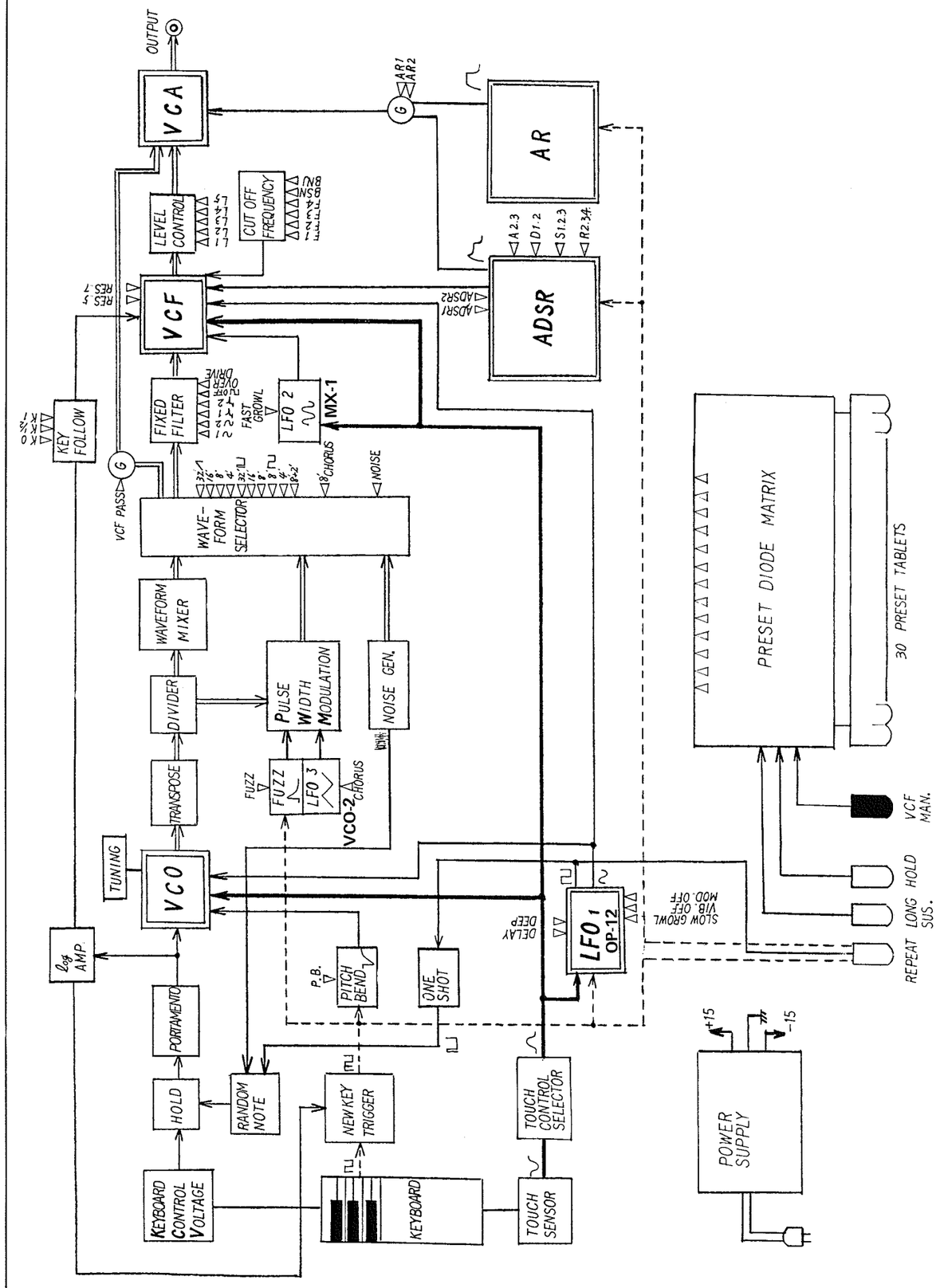


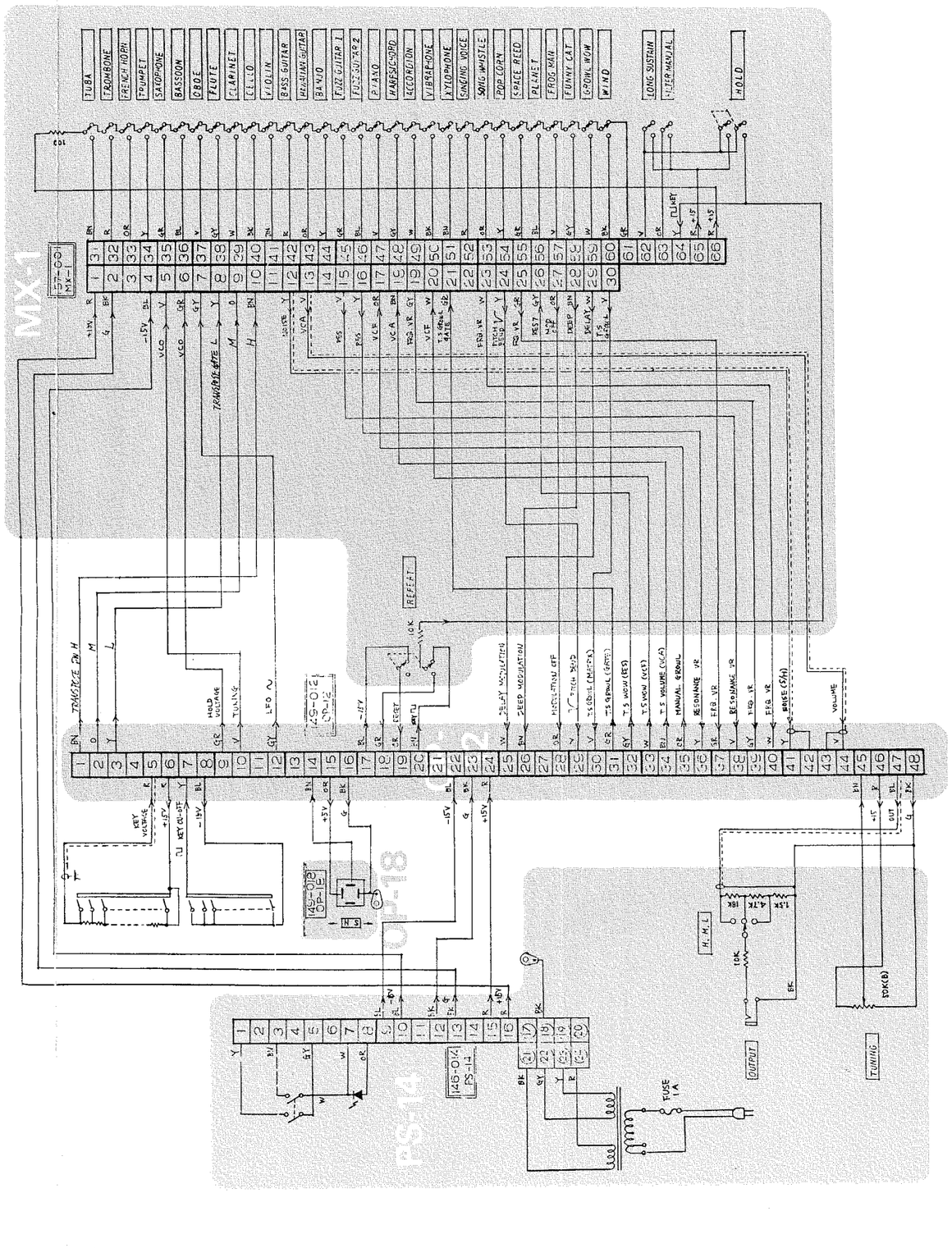
(1) For adjusting VCO and/or VCF boards, dismount Top Cover No.6 (086-006) by removing four screws on its sides.

(2) To dismount Control Unit Assembly and/or Keyboard, remove four screws at the bottom of the cabinet and two on the side which correspond to each section.

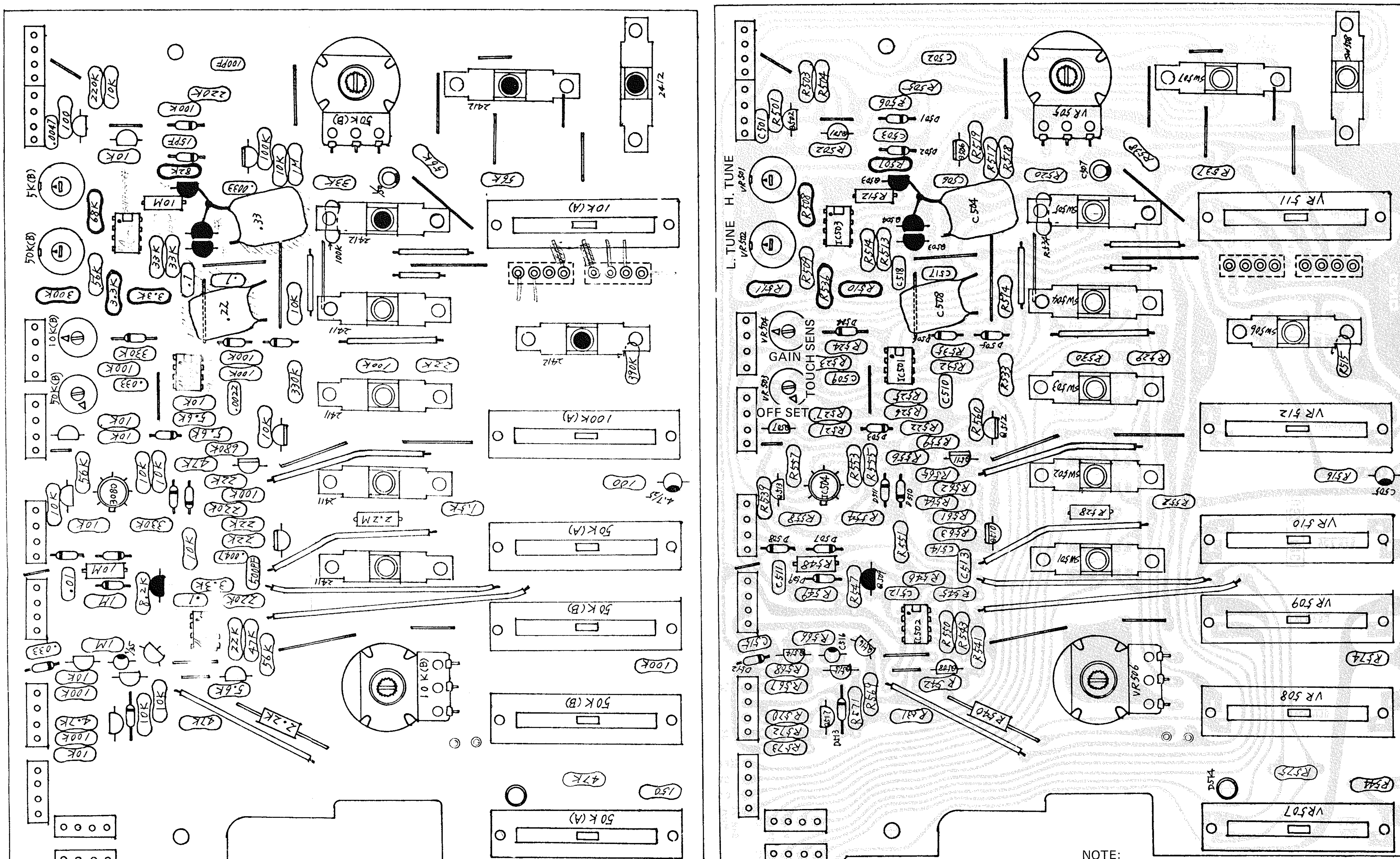
NOTE: When it is clear that Control Unit Assembly and Keyboard must be dismounted in addition to top cover No.6, it is recommended to dismount Top Cover No.6 afterwards, because it prevents Control Unit Assembly and Keyboard from falling.
Products of earlier phase do not have two screws on the sides of the cabinet.

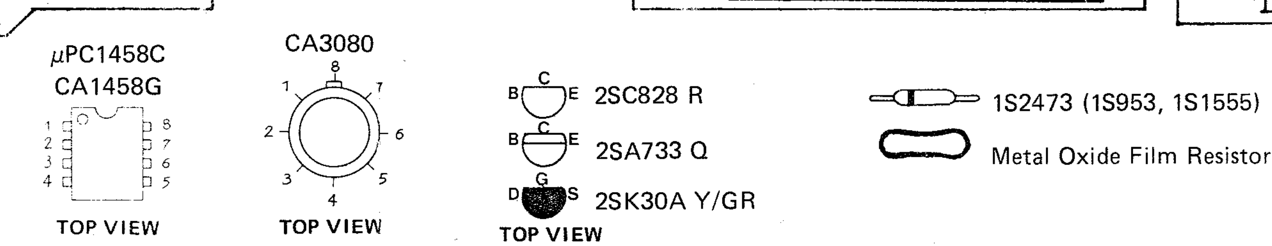
3. BLOCK DIAGRAM AND WIRING DIAGRAM





4. OP-12C (OP-12C: 149-012C; OP-12B: 149-012B)

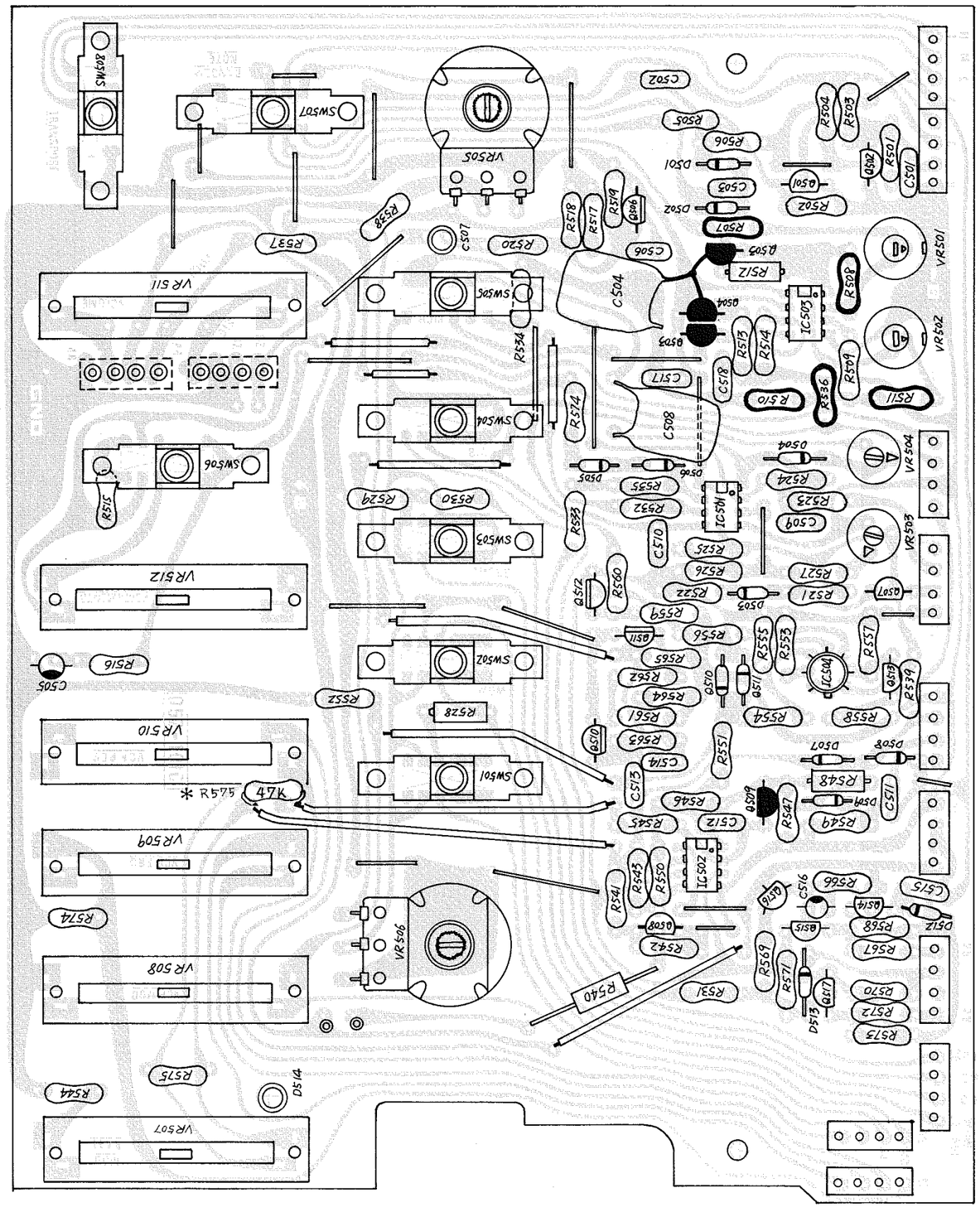




NOTE:

1. At present, FET 2SK30A GR is used for Q 504 and 505. In older products 2SK30A Y is used, which can be changed to 2SK30A GR by changing R513 and 514 (33KΩ) to 100KΩ, at the same time.
2. R575, 47KΩ is mounted on foil pattern side in older PCB (OP-12B). Difference between OP-12C and B is solely that point. They are interchangeable.

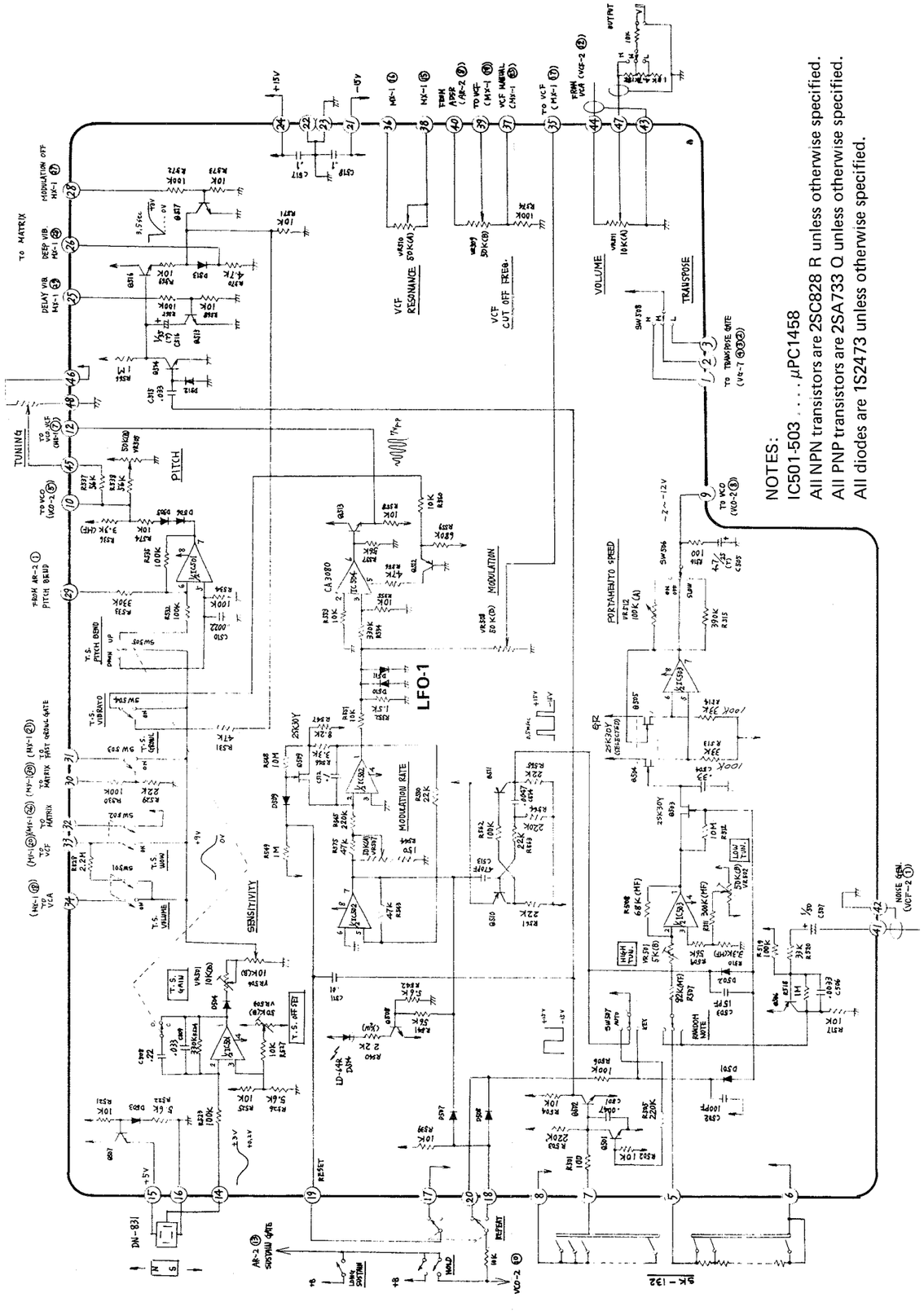
VIEW FROM THE FOIL SIDE



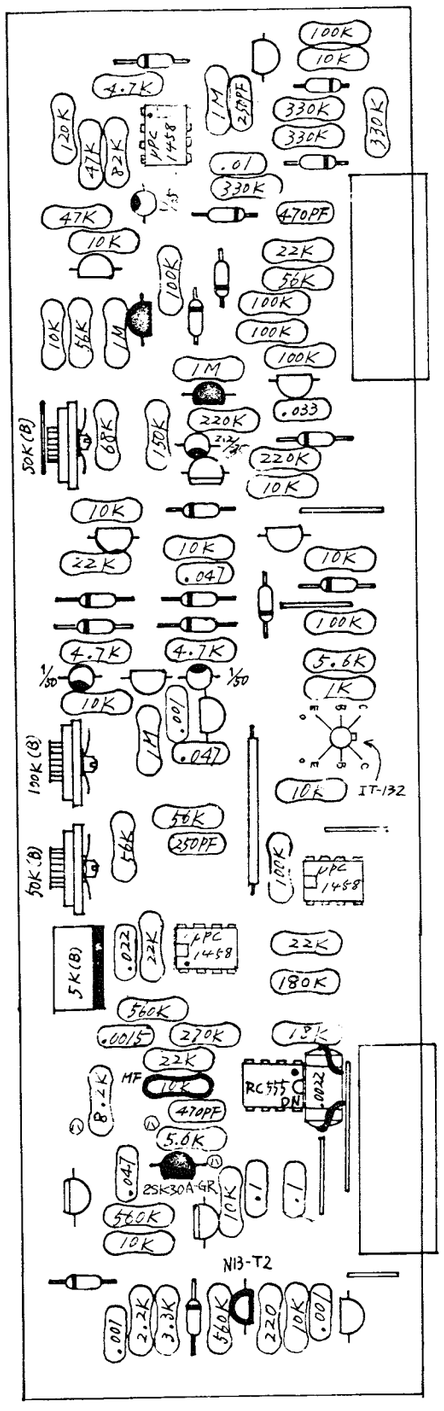
With older PCB, OP-12B, R575, 47KΩ is mounted on foil pattern side (marked * in above drawing). The foil pattern, therefore, slightly differs, which is, however, the sole difference. They can be completely interchangeable.

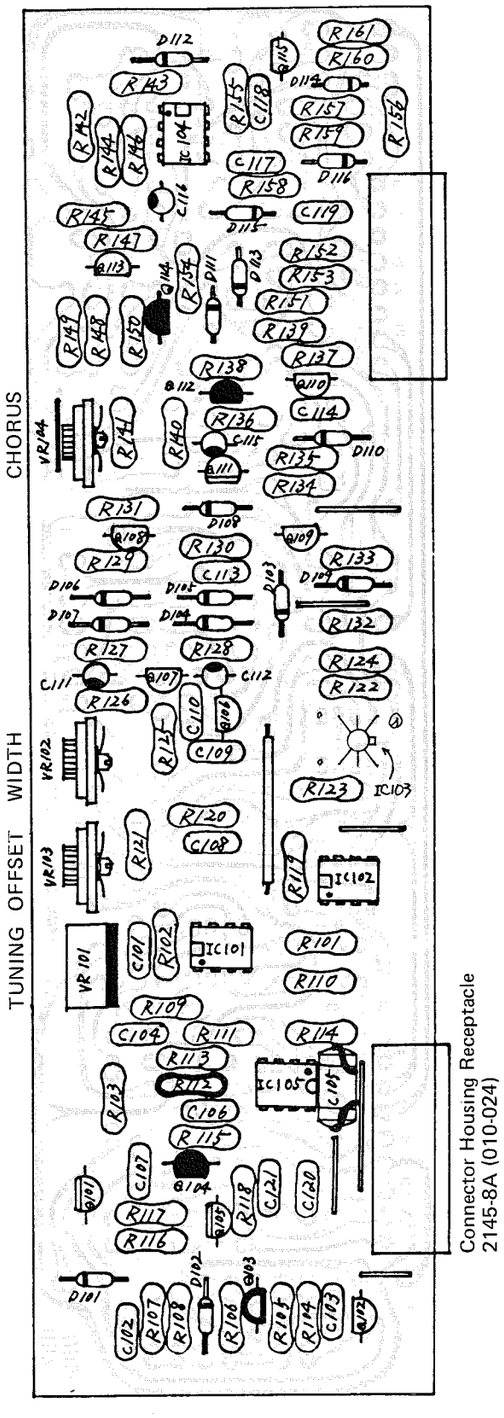
FROM SERIAL NO. 413850:

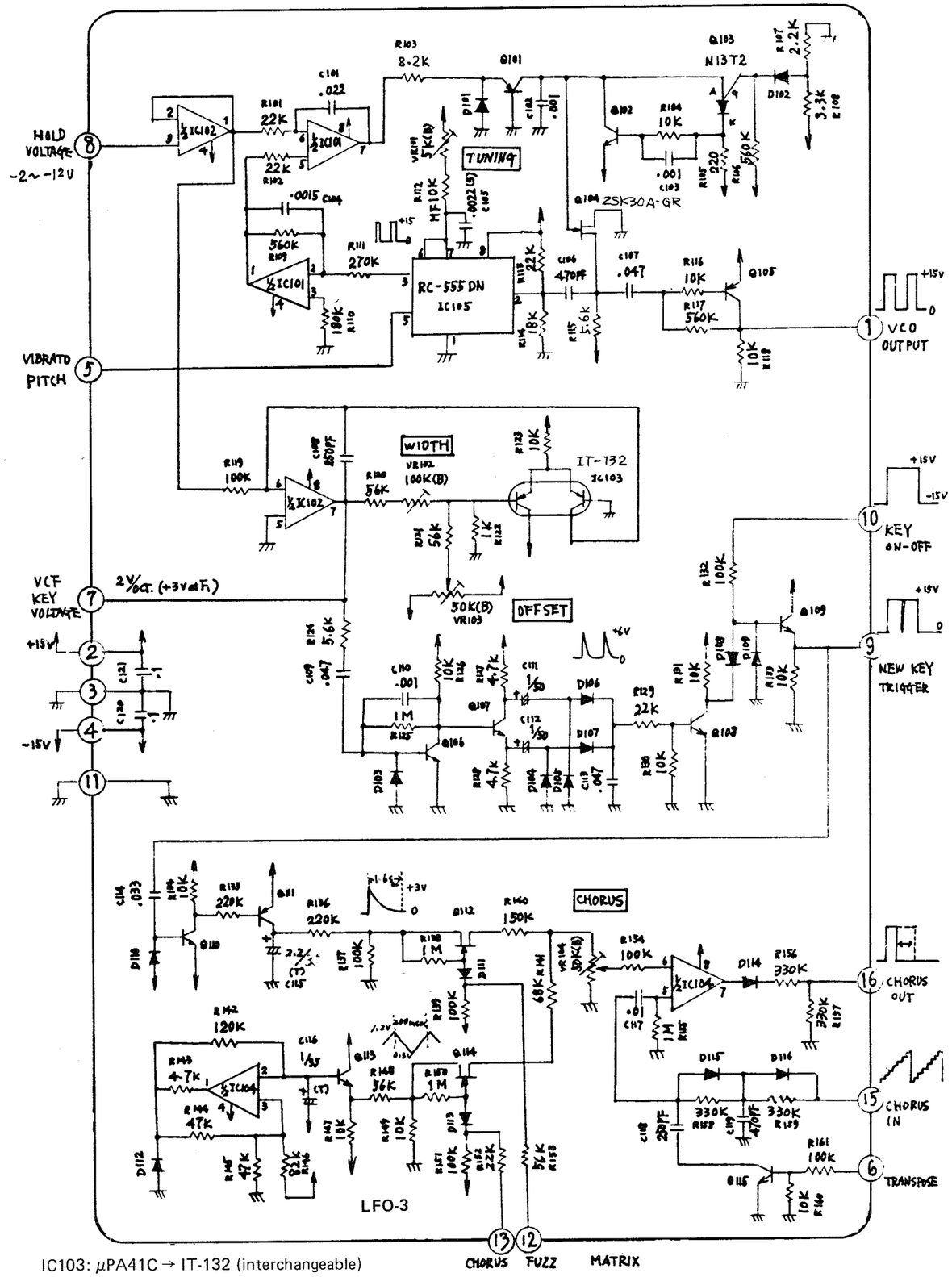
Q504/505	2SK30A Y	⟶ 2SK30A GR
R513/514	33K	⟶ 100K



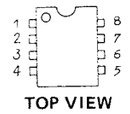
5. VCO-2 (152-002)





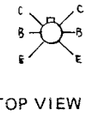


μPC1458C



TOP VIEW

IT132



TOP VIEW

2SC828 R

2SC733 Q

2SK30A Y

TOP VIEW

1S2473 (1S953, 1S1555)

Metal Oxide Film Resistor

IC103: μPA41C → IT-132 (interchangeable)
IT-132 is out of stock. When replacing use μPA41C.

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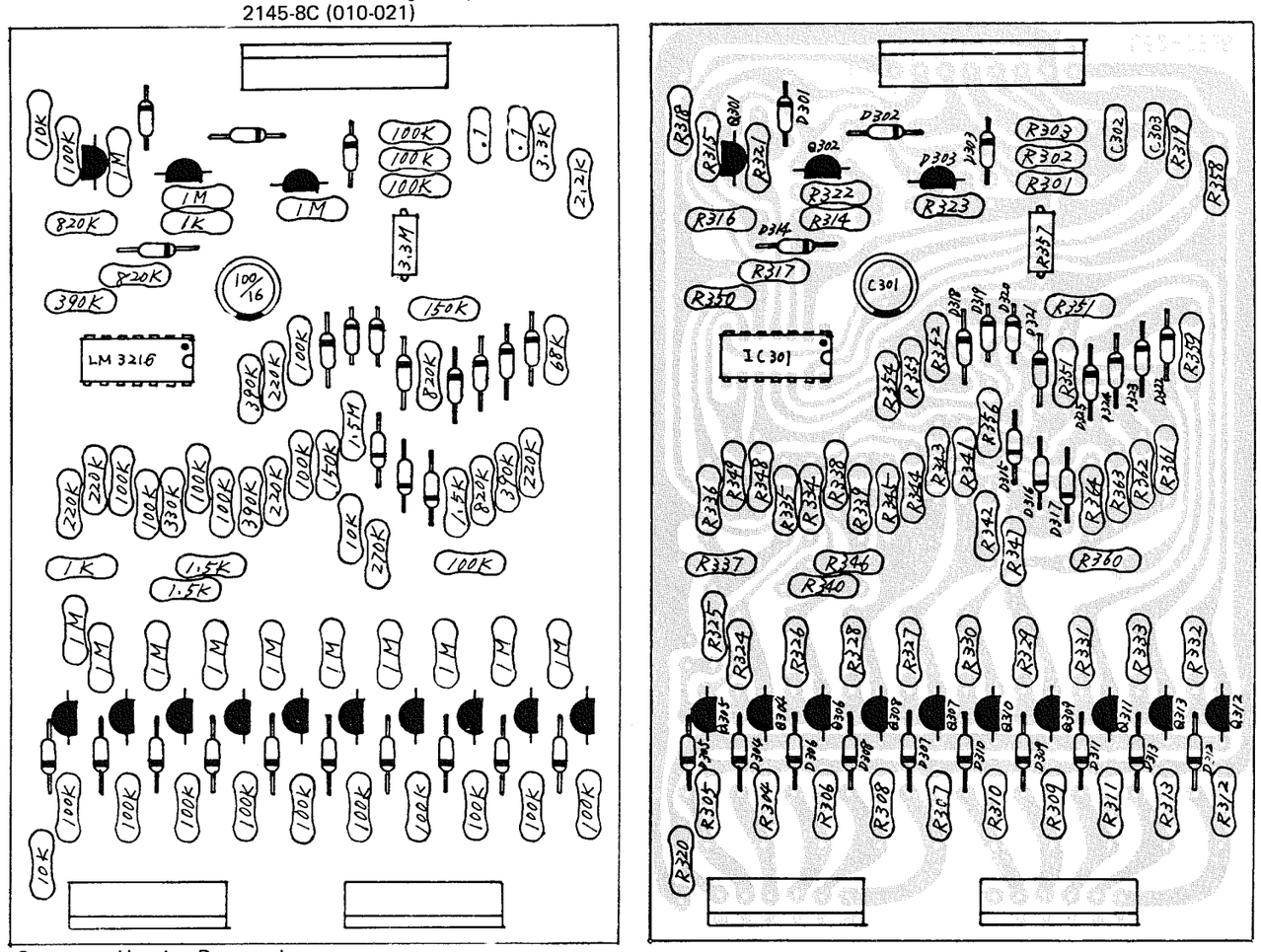
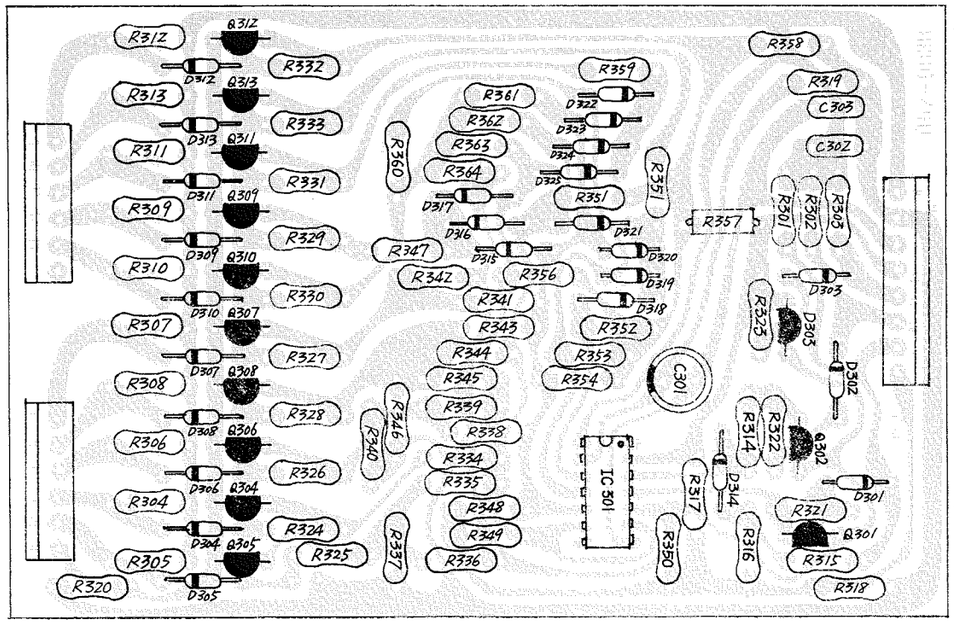
6. VG-7 (143-007)

Connector Housing Receptacle
2145-8C (010-021)

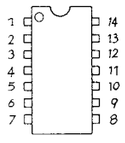


Connector Housing Receptacle
2145-6C (010-020)

VIEW FROM THE FOIL SIDE



LM3216

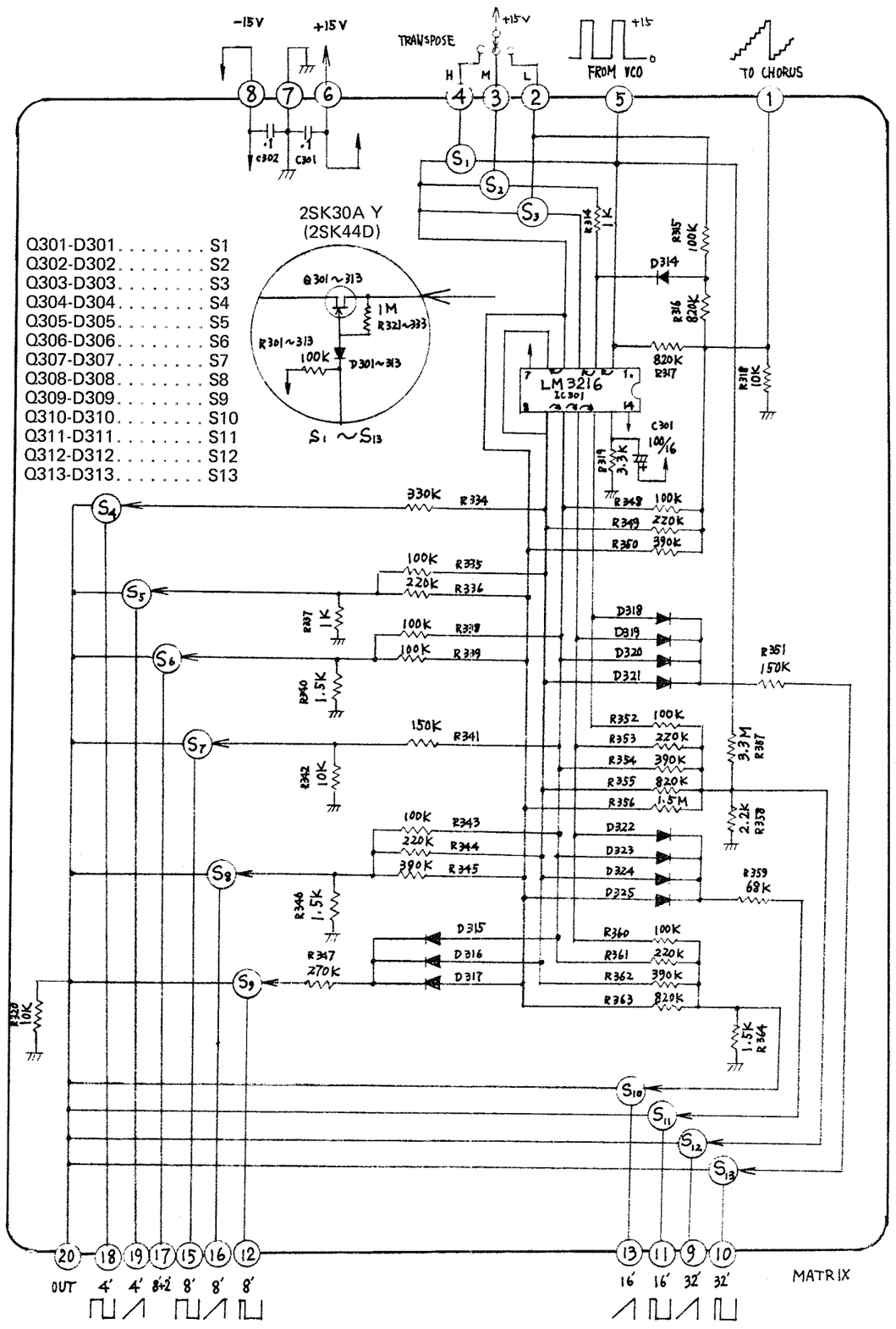


TOP VIEW

2SK30A Y (2SK44D)

1S2473 (1S953, 1S1555)

Use 2SK30A Y
in place of 2SK44D.

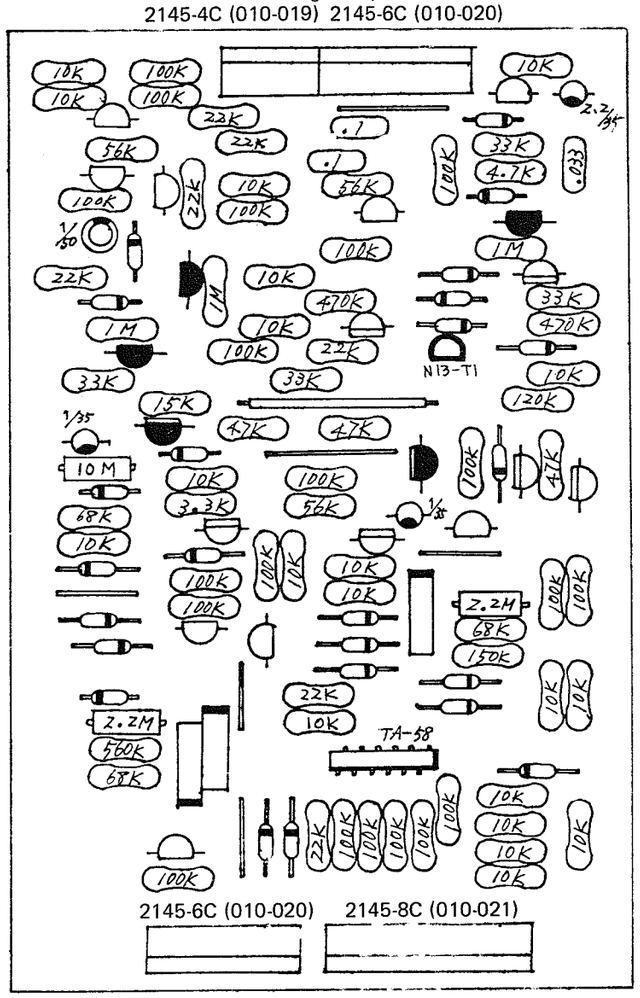


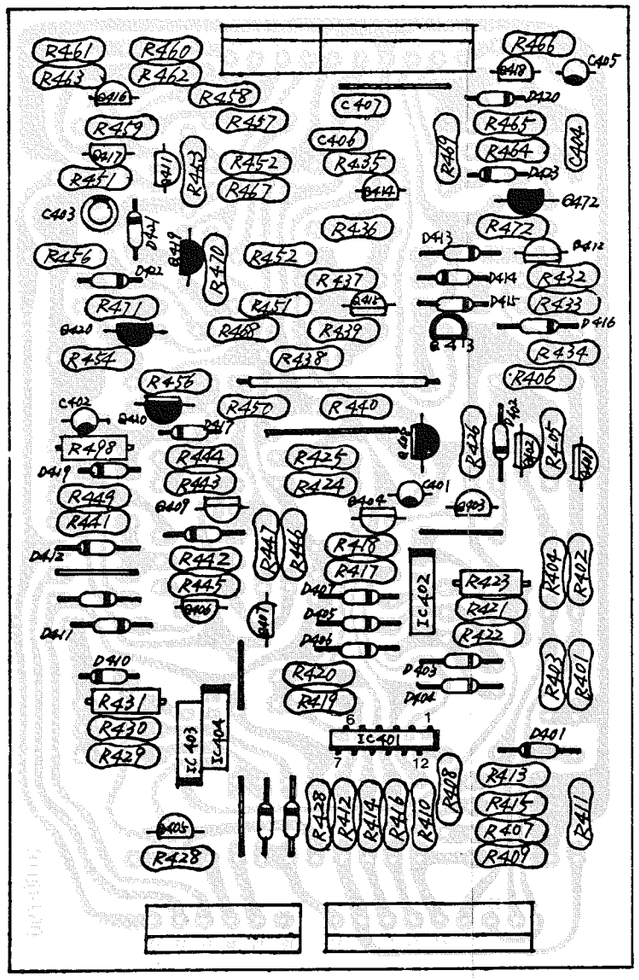
Q301-D301	S1
Q302-D302	S2
Q303-D303	S3
Q304-D304	S4
Q305-D305	S5
Q306-D306	S6
Q307-D307	S7
Q308-D308	S8
Q309-D309	S9
Q310-D310	S10
Q311-D311	S11
Q312-D312	S12
Q313-D313	S13

NOTE: All diodes are 1S2473 (or 1S953, 1S1555) unless otherwise specified.

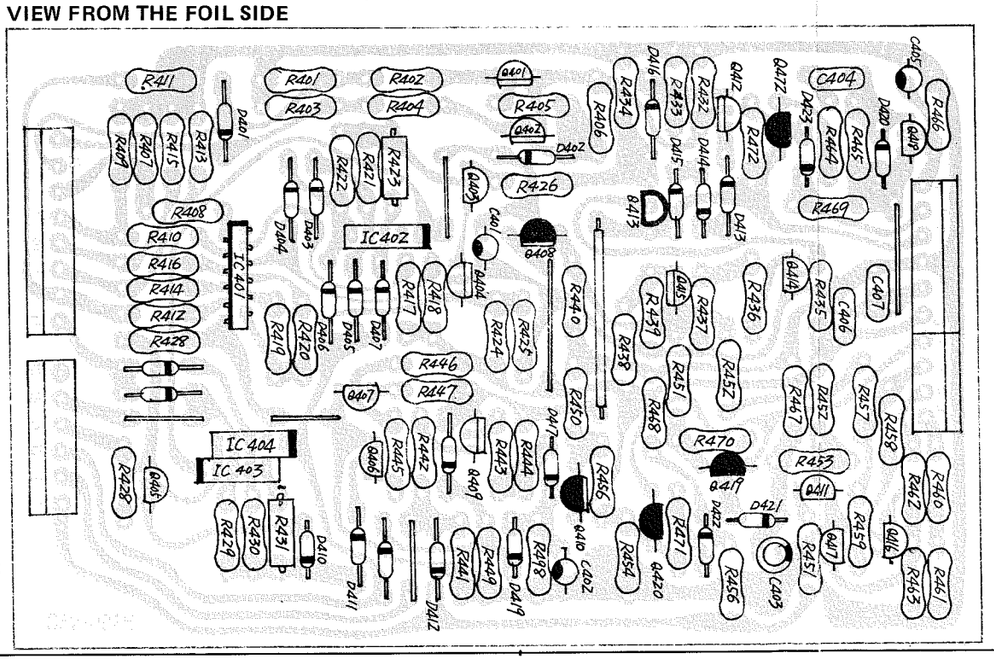
7. AR-2 (155-002)

Connector Housing Receptacle
2145-4C (010-019) 2145-6C (010-020)





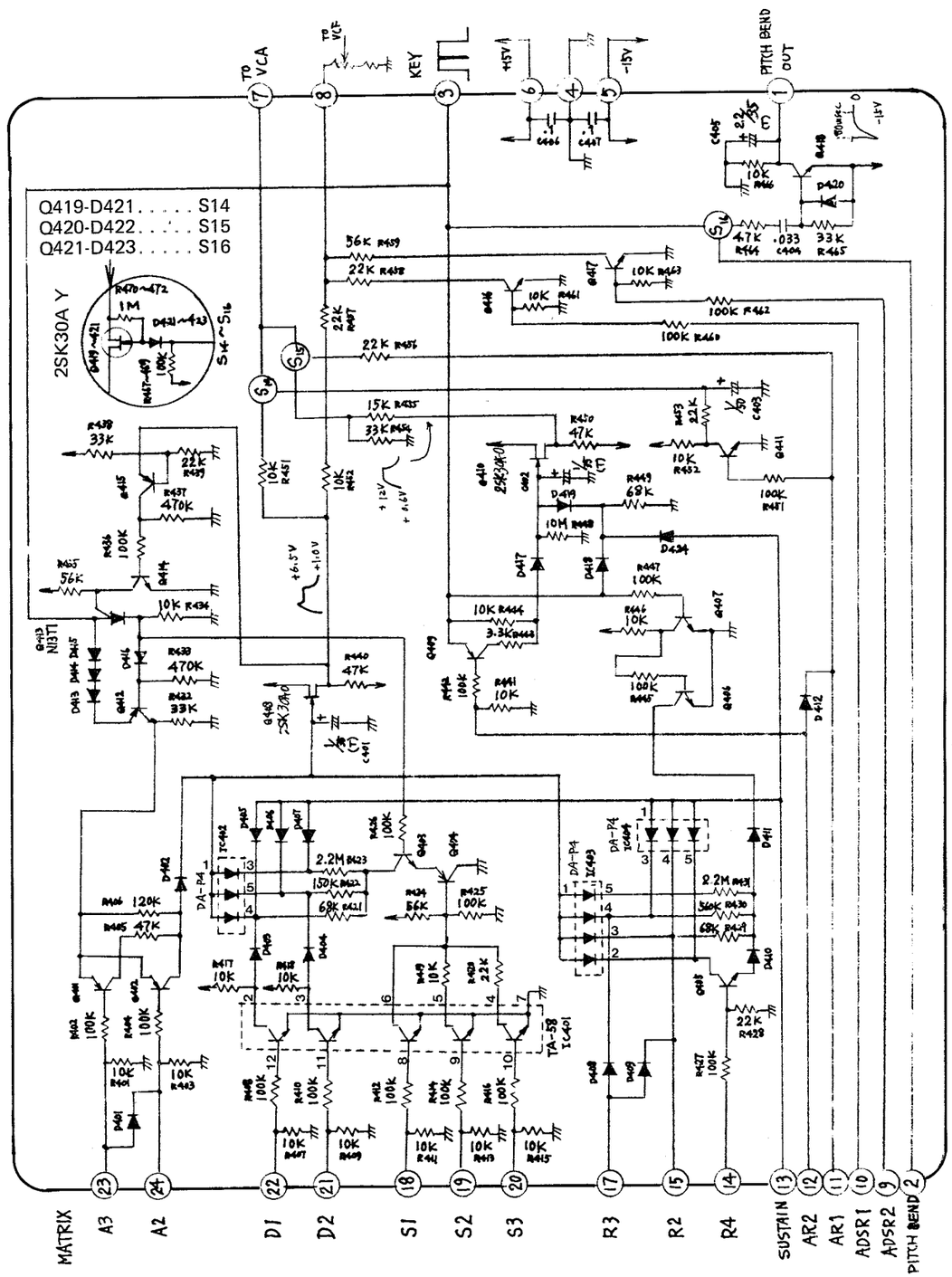
VIEW FROM THE FOIL SIDE



TOP VIEW

- TA-58 (TA-78)
- DA-P4
- 2SC828 R
- 2SA733 Q
- 2SK30A Y (2SK44D)
- 2SK30A O (2SK44C)
- 1S2473 (1S953, 1S1555)

Use 2SK30A Y and 2SK30A O in place of 2SK44D and 2SK44C respectively.



NOTE:
All NPN transistors are 2SC828 R unless otherwise specified.
All PNP transistors are 2SA733 Q unless otherwise specified.
All diodes are 1S2473 (or 1S953, 1S1555) unless otherwise specified.

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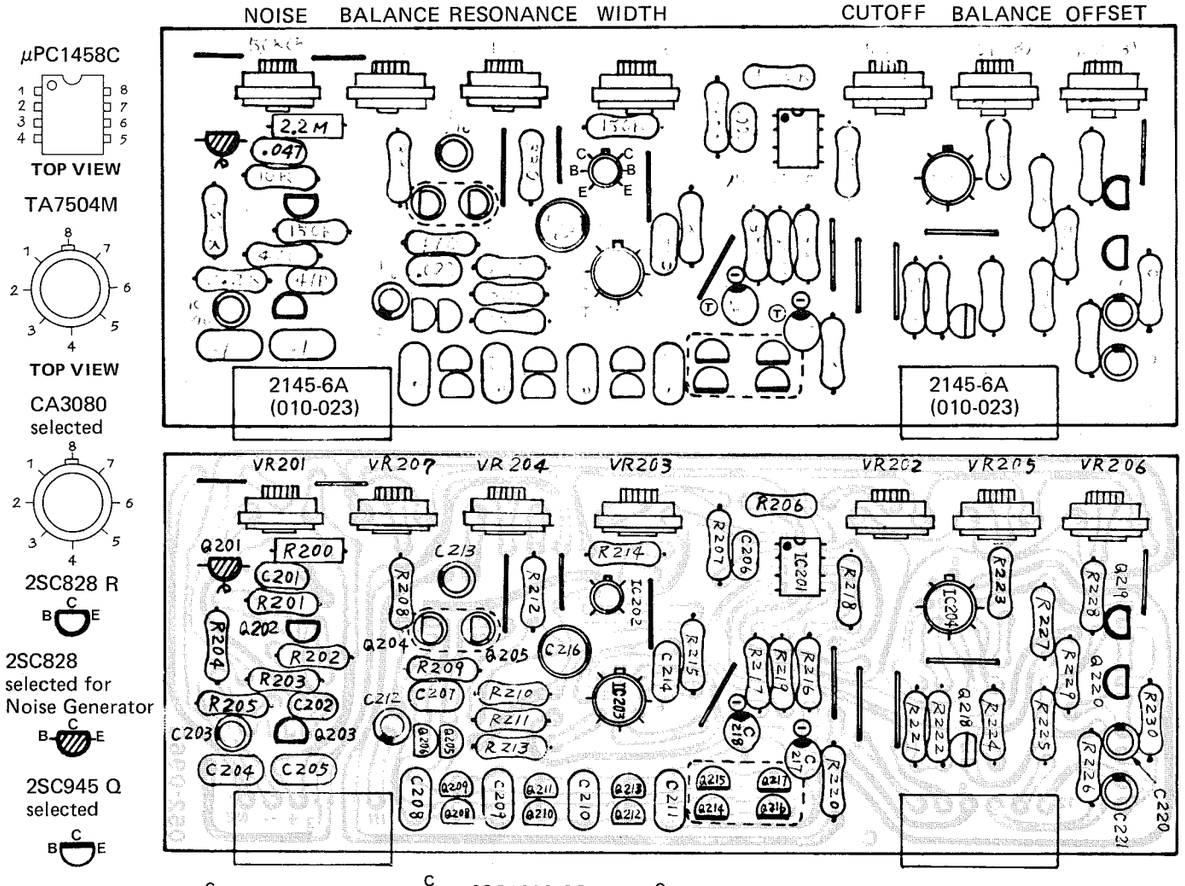
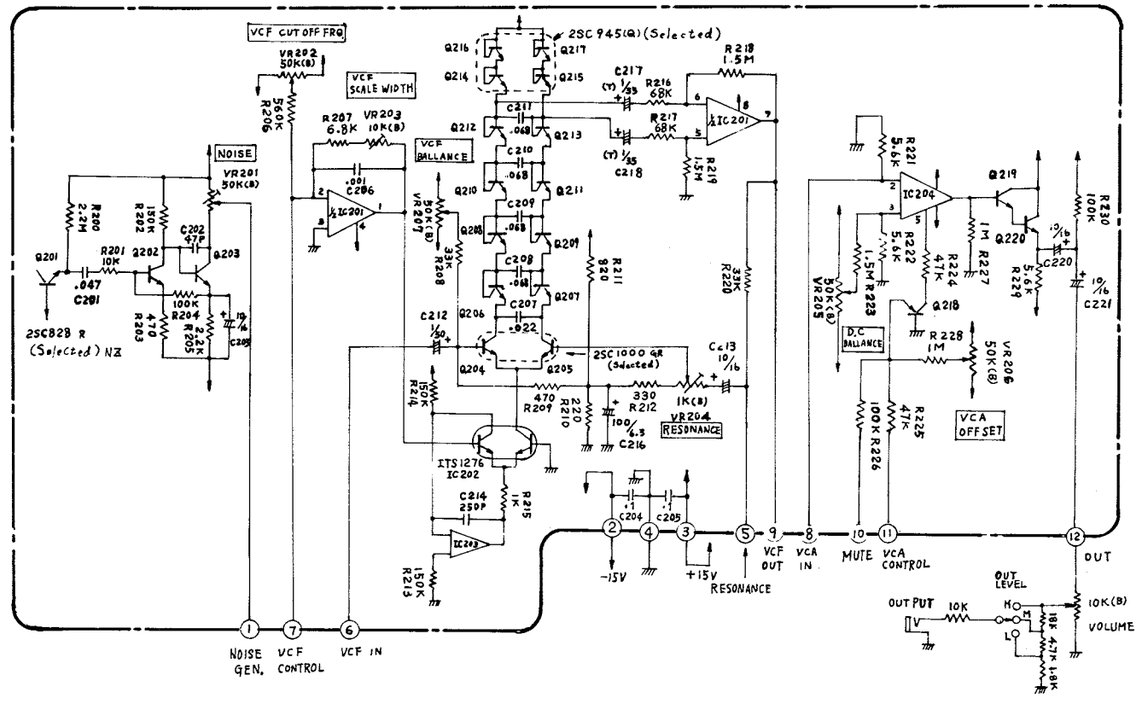
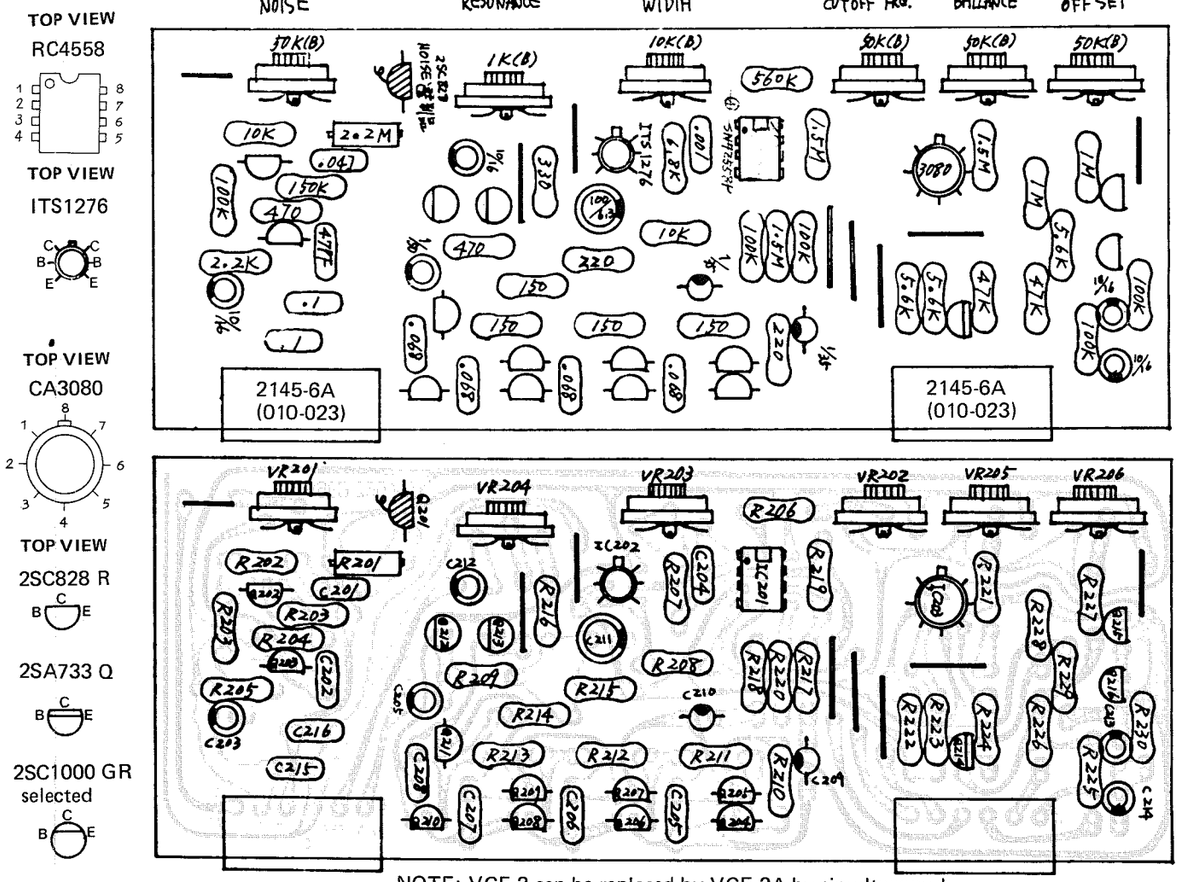
8. VCF-2A (153-002A) SERIAL NO. 578050 AND HIGHER

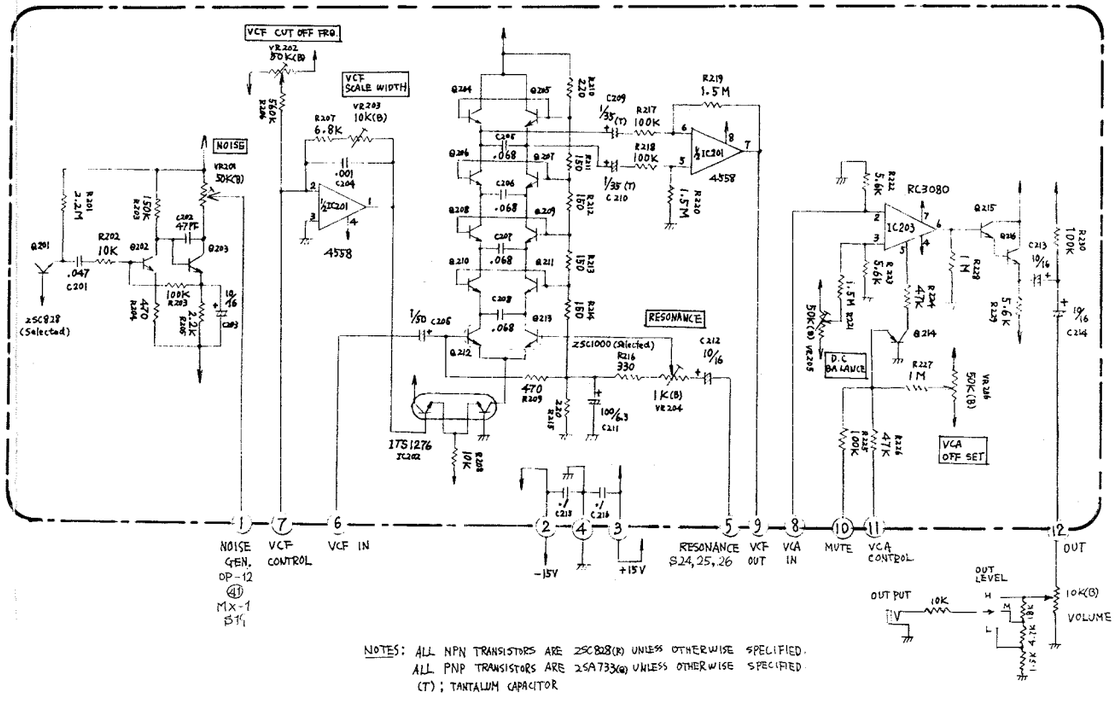




VCF-2 (153-002) SERIAL NO. UP TO 578049

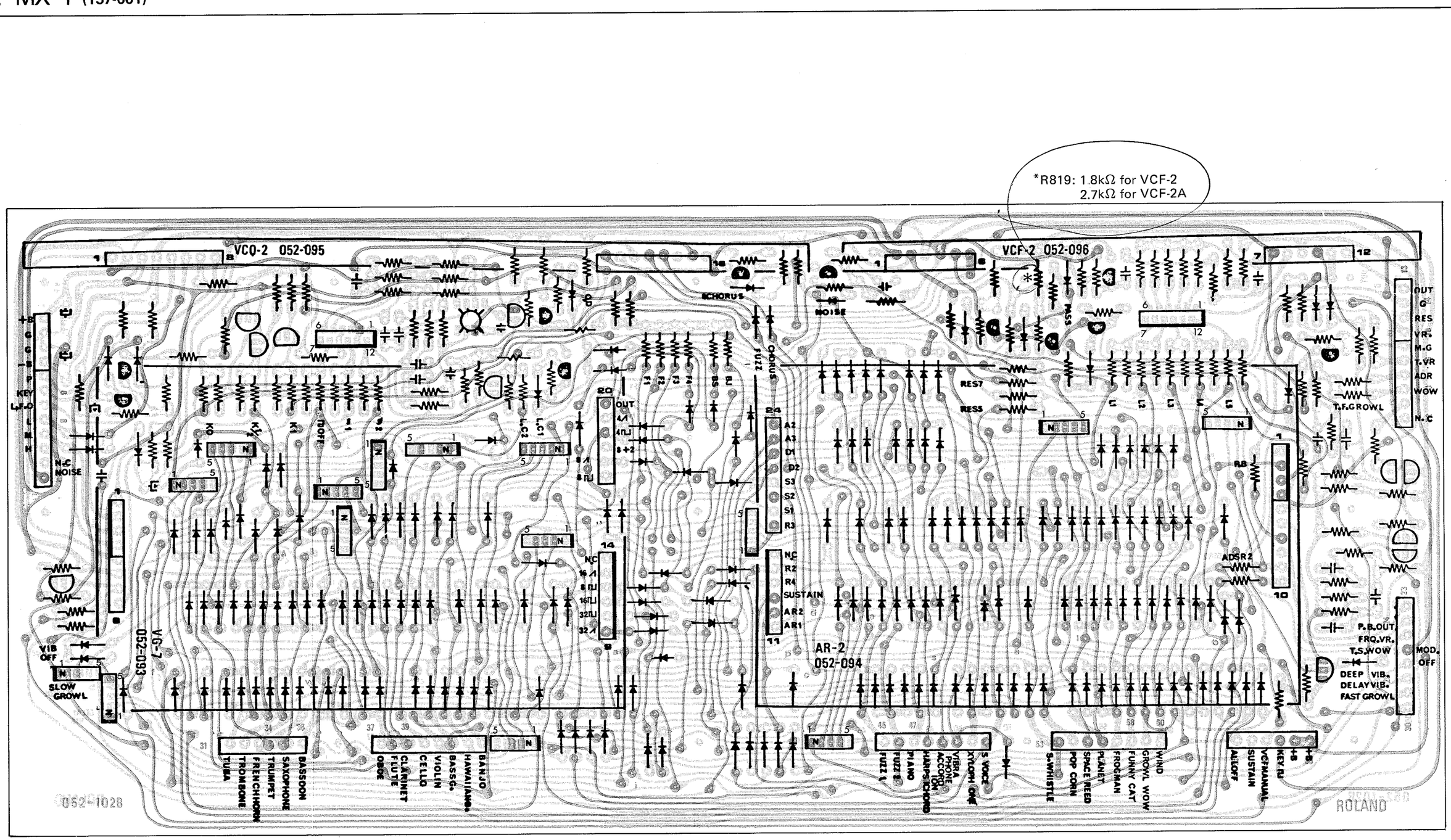


NOTE: VCF-2 can be replaced by VCF-2A by simultaneously changing R819 (1.8KΩ) on MX-1 to 2.7KΩ.



NOTES: ALL NPN TRANSISTORS ARE 2SC828(R) UNLESS OTHERWISE SPECIFIED.
ALL PNP TRANSISTORS ARE 2SA733(Q) UNLESS OTHERWISE SPECIFIED.
(T); TANTALUM CAPACITOR

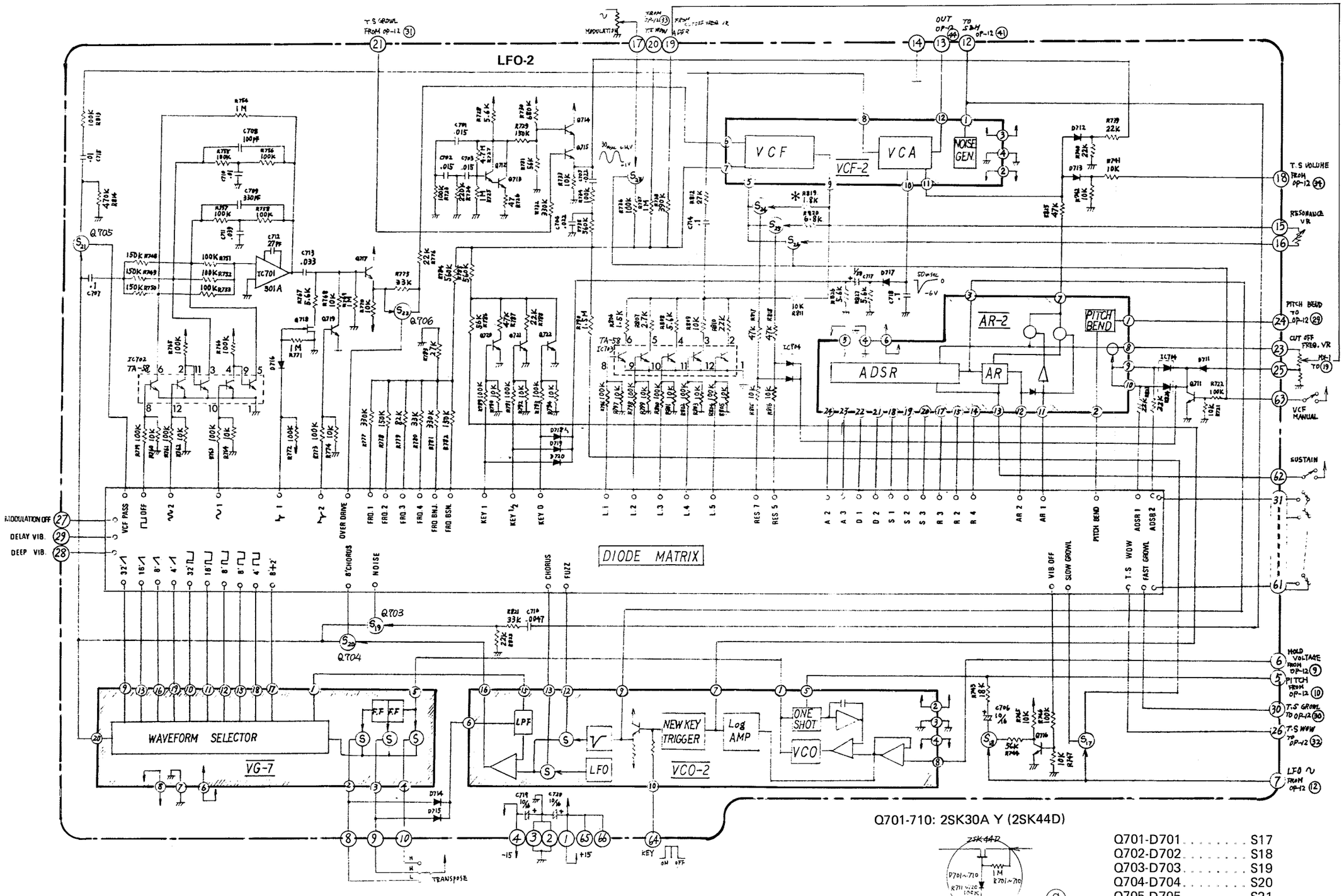
9. MX-1 (157-001)



FOIL PATTERN IN GRAY . . . . . BACK SIDE OF PCB

FOIL PATTERN IN RED . . . . . PARTS SIDE OF PCB

*R819: 1.8kΩ for VCF-2
2.7kΩ for VCF-2A



Q701-710: 2SK30A Y (2SK44D)

Use 2SK30A Y in place of 2SK44D.

Q701-D701	S17
Q702-D702	S18
Q703-D703	S19
Q704-D704	S20
Q705-D705	S21
Q706-D706	S22
Q707-D707	S23
Q708-D708	S24
Q709-D709	S25
Q710-D710	S26

CONNECTORS

A 2461-4C
(010-036)

B 2461-6C
(010-037)

C 2461-8C
(010-038)

D 5028-4A
(Friction type)

E 5028-6A
(Friction type)

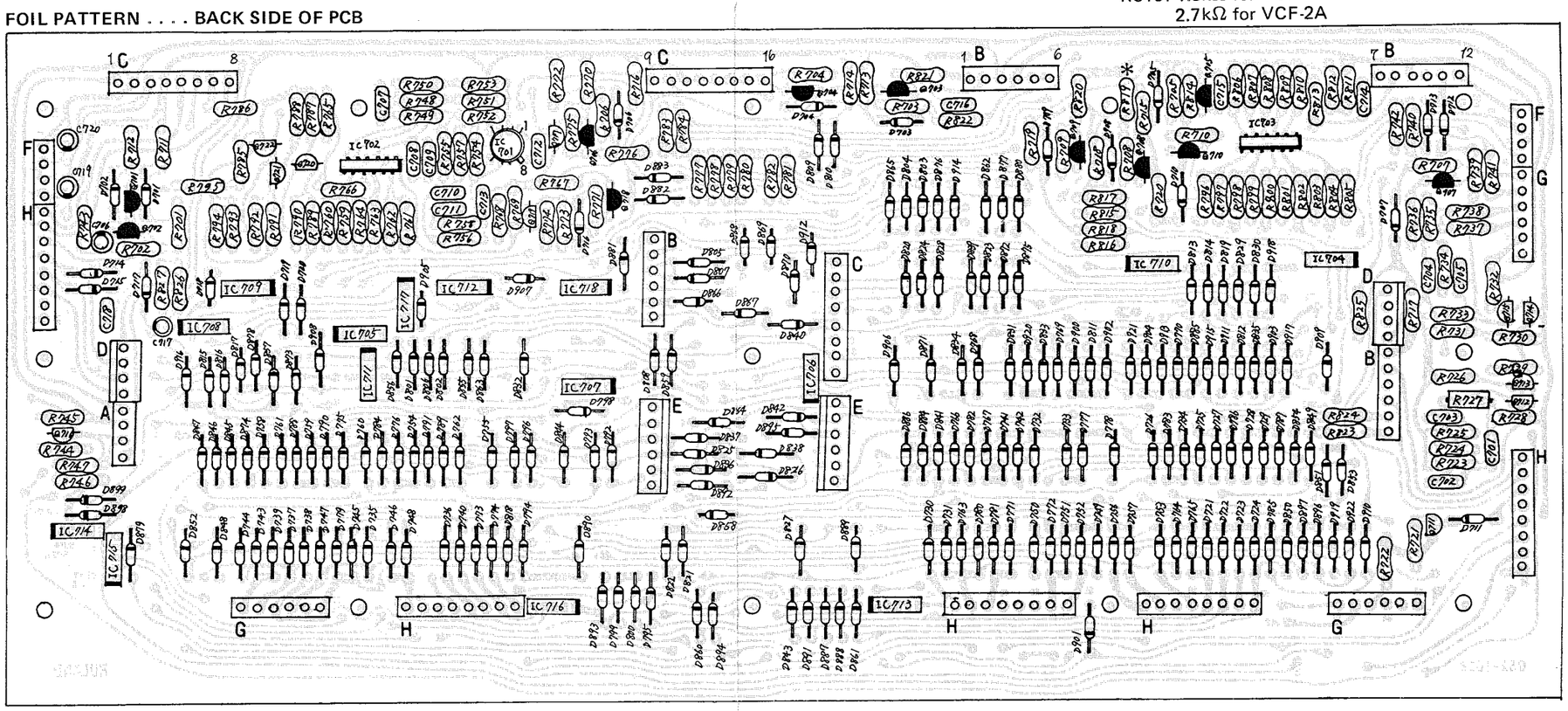
F 2373-4A
(010-016)

G 2373-6A
(010-017)

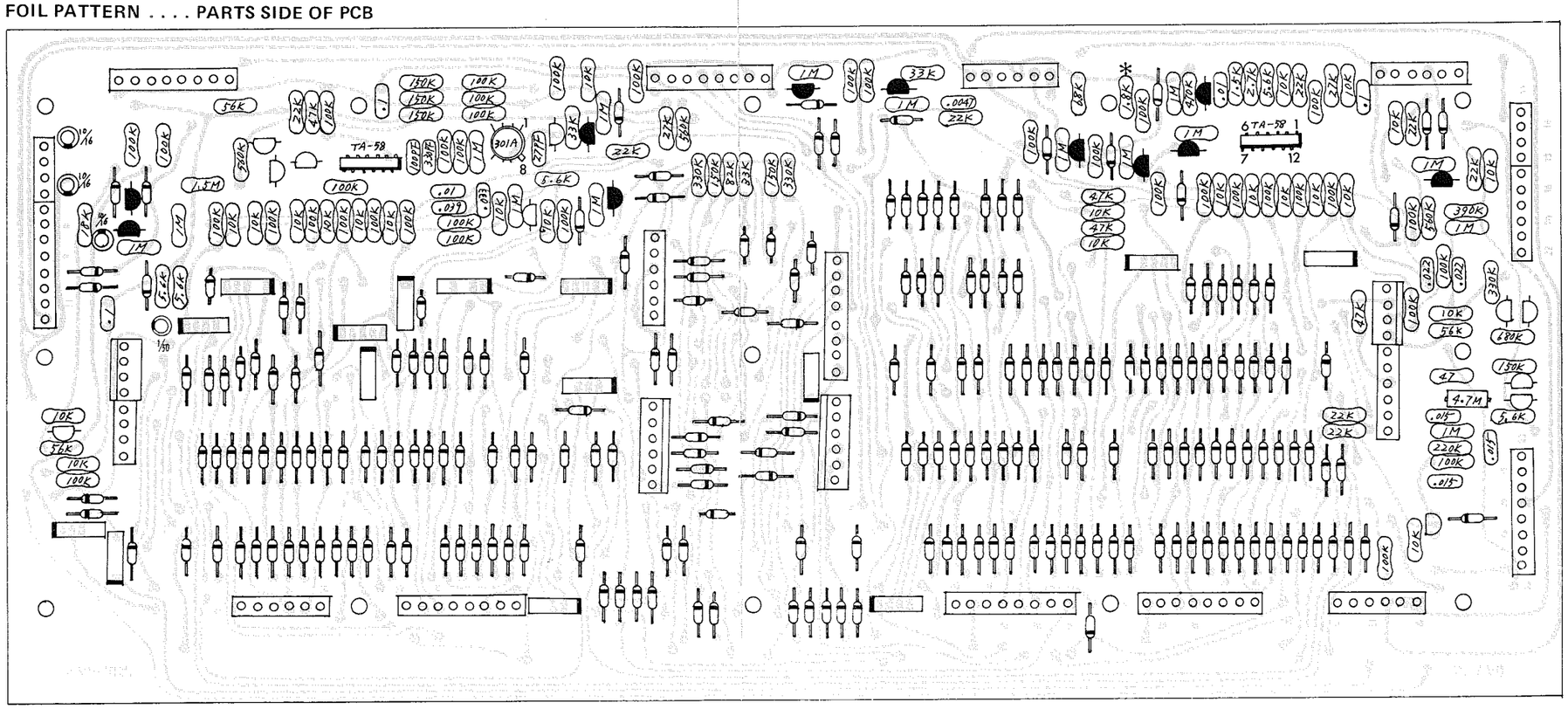
H 2373-8A
(010-018)

FOIL PATTERN . . . . BACK SIDE OF PCB

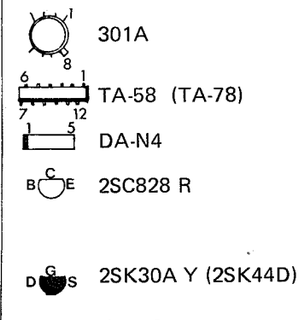
*R819: 1.8kΩ for VCF-2
2.7kΩ for VCF-2A



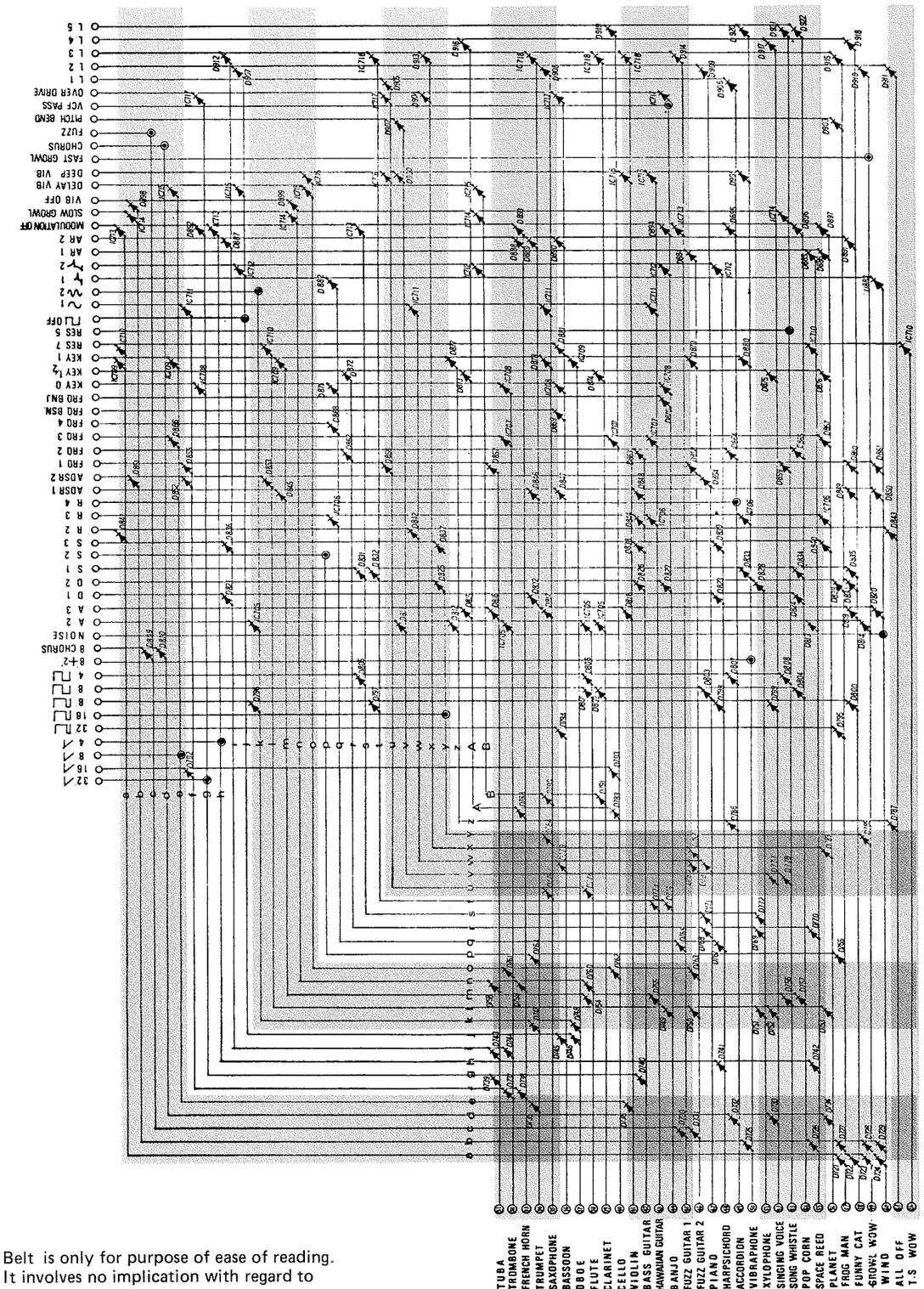
FOIL PATTERN . . . . PARTS SIDE OF PCB



TOP VIEW

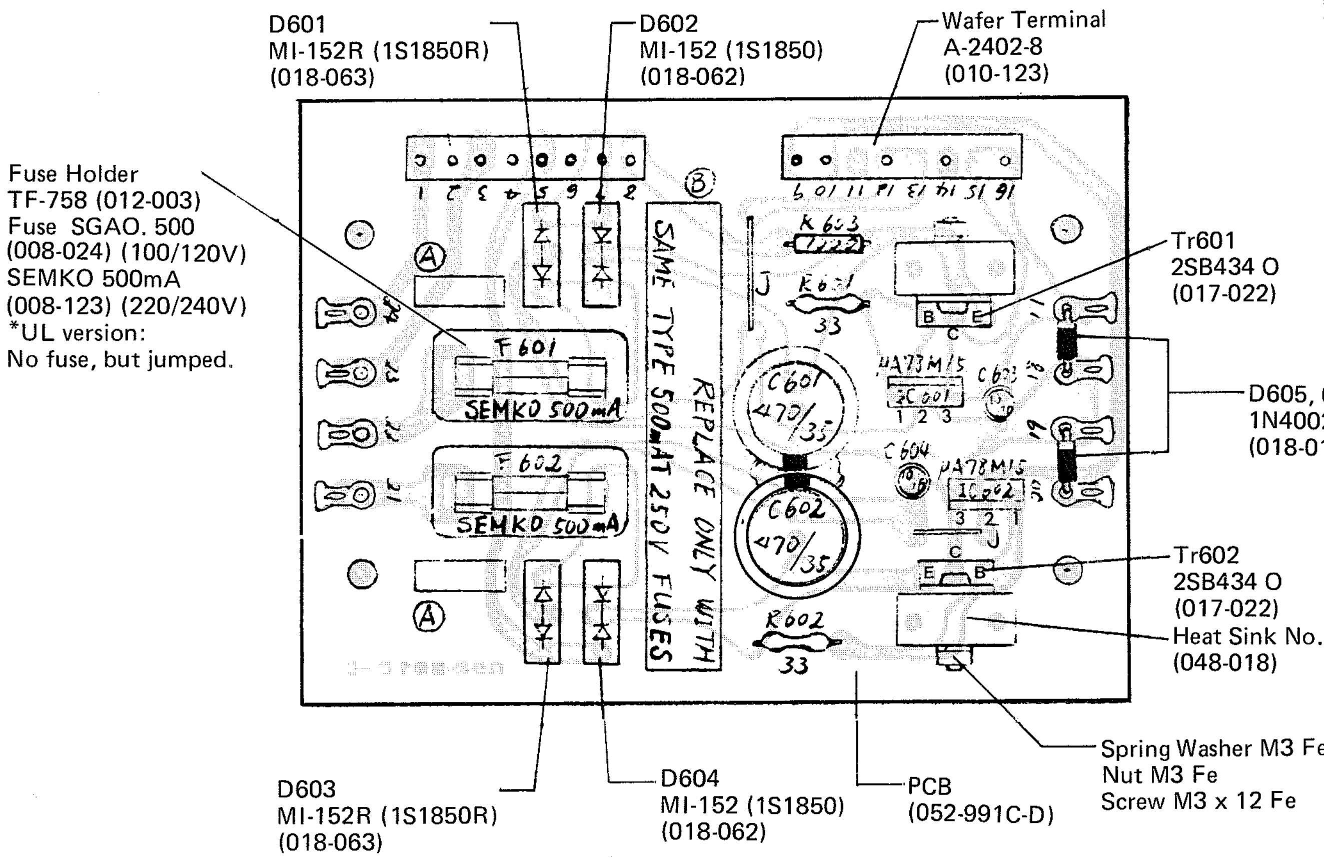


Use 2SK30A Y
in place of 2SK44D.

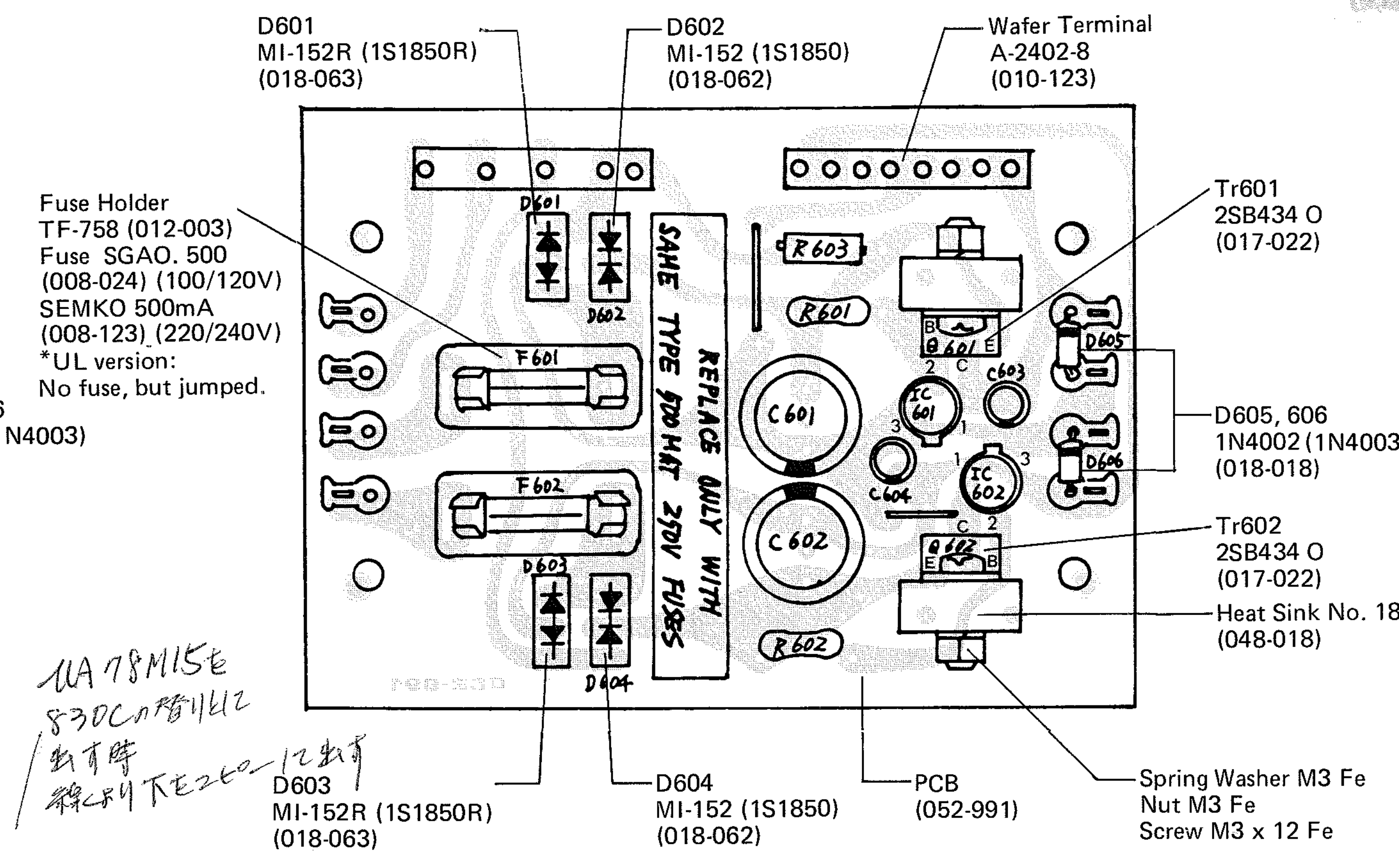


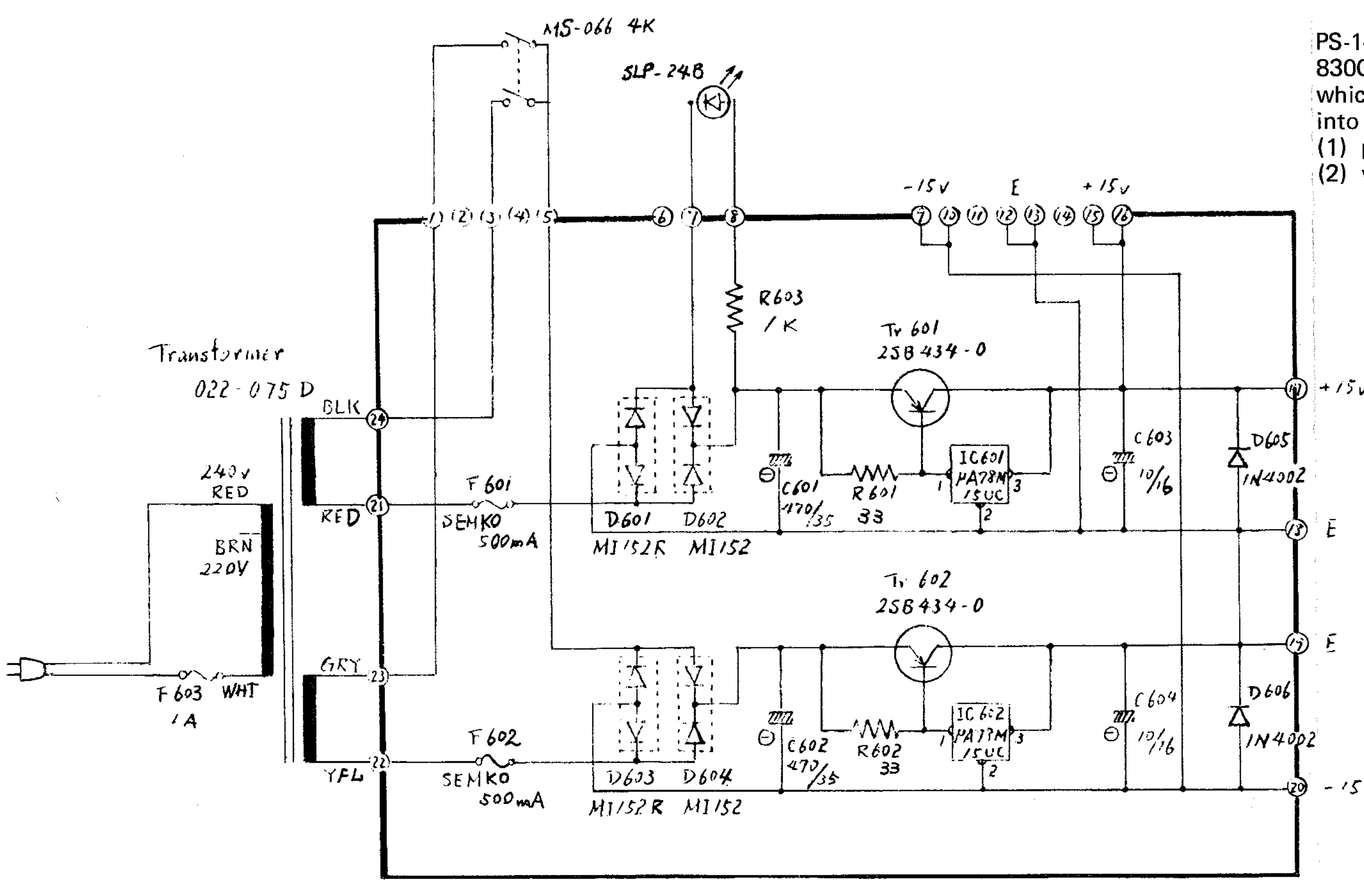
*Belt is only for purpose of ease of reading. It involves no implication with regard to circuit and function.

10. PS-14C-D (146-014C-D) SERIAL NO. 608900 AND HIGHER

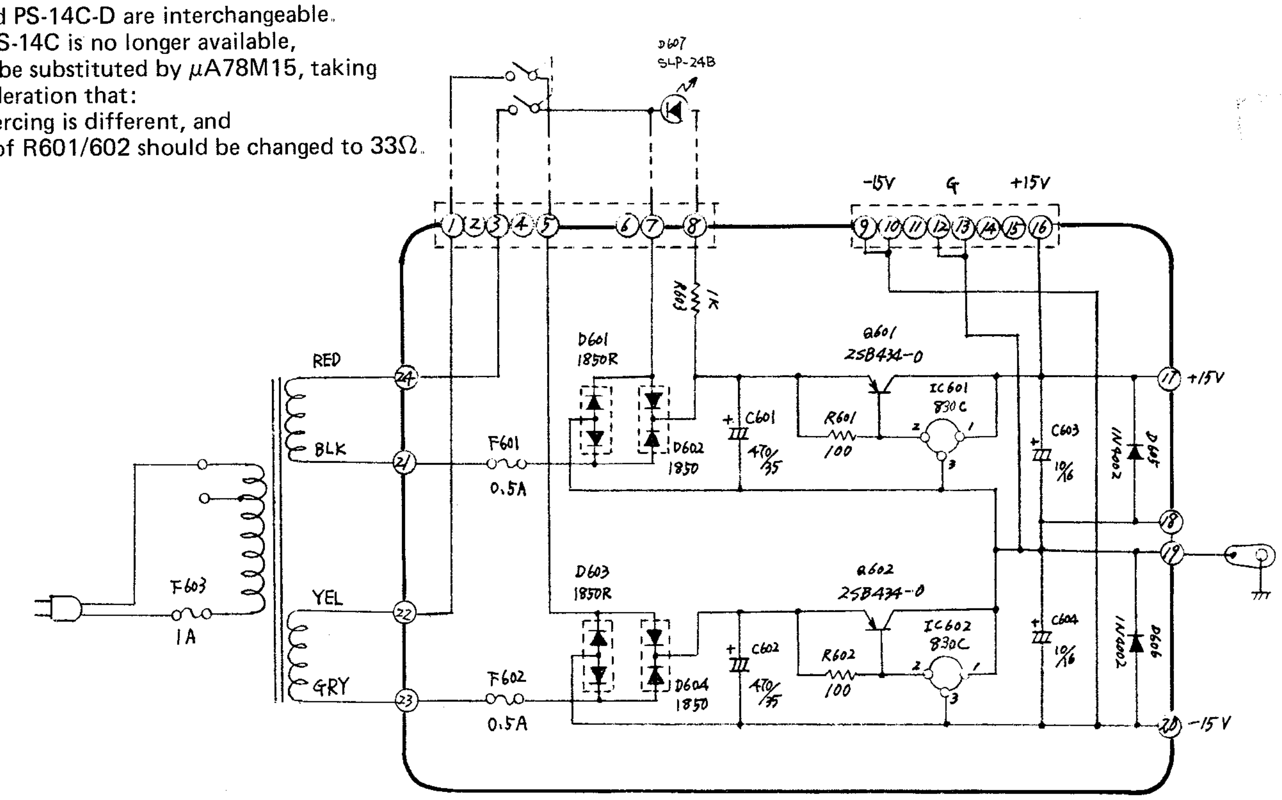


PS-14C (146-014C) SERIAL NO. UP TO 608899





PS-14C and PS-14C-D are interchangeable.
830C on PS-14C is no longer available, which can be substituted by μA78M15, taking into consideration that:
(1) pin piercing is different, and
(2) value of R601/602 should be changed to 33Ω.



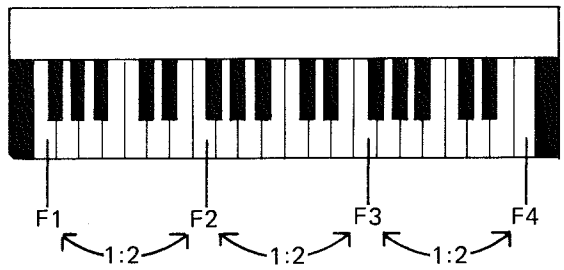
11. ADJUSTMENT AND CHECKING

PRECAUTIONS

1. Before attempting adjustment, it is required to heat-run the unit at least for five minutes.
2. Set Tuning Control on the Rear Panel at Center (slot-horizontal).

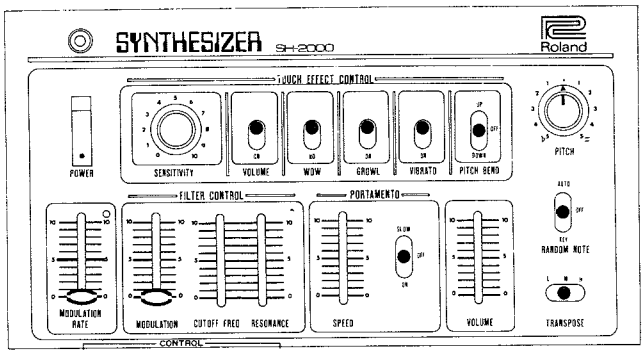
3. Connecting Oscilloscope
   1) Apply to HOR IN of the oscilloscope a signal of 174.61Hz or output of another accurately tuned instrument that corresponds to F2 of SH-2000.
   2) Unless otherwise instructed, connect to VERT IN of the oscilloscope, No.12 of VCF board, No.13 of MX-1 board or the output jack on SH-2000 rear panel. (with SW at HIGH, VOL at max.)
4. When adjusting, set all touch effect controls to OFF, unless otherwise specified.

NAME OF SH-2000 KEYS

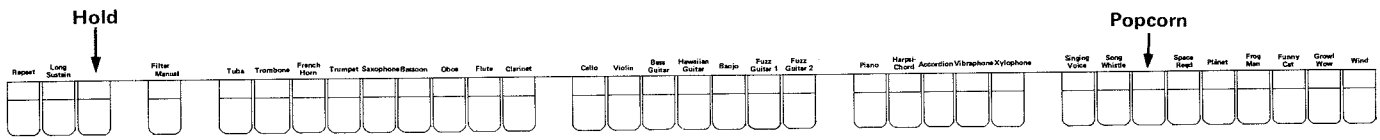


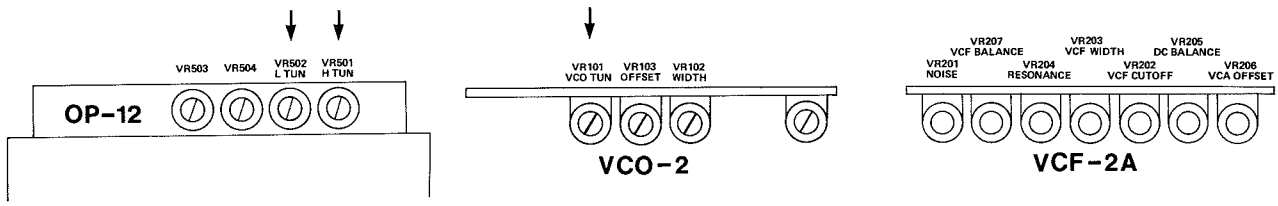
IMPORTANT: *PCB's are adjusted as a single unit at factory before shipment for replacement, however, VCO-2, VCF-2 and OP-12 must be re-adjusted after mounting on the entire assembly.*

1. TUNING

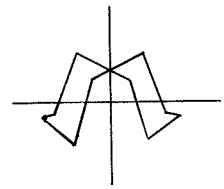


Setting: Tablet . . . . . Hold – on
Popcorn – on
Panel . . . . . Pitch – center
Random Note – off
Transpose – M

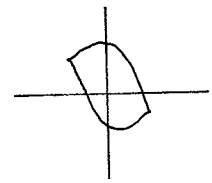




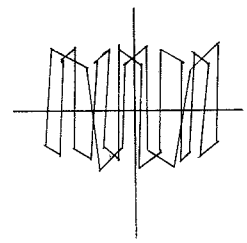
1) With F2 key held down, adjust VR101 (VCO TUN) on VCO-2 board so that the Lissajous' figure is static.



2) With F1 key held down, adjust VR502 (L TUN) on OP-12 control board so that the Lissajous' figure is static.



3) Repeat adjustment of steps 1 and 2, until both Lissajous' figures are static. Then with F4 key held down, adjust VR501 (H TUN) on OP-12 control board so that the Lissajous' figure is static.



4) Repeat adjustment of steps 1, 2 and 3 until the Lissajous' figures of F1, F2 and F4 are static. Then check to see that F3 Lissajous' figure is static, too.

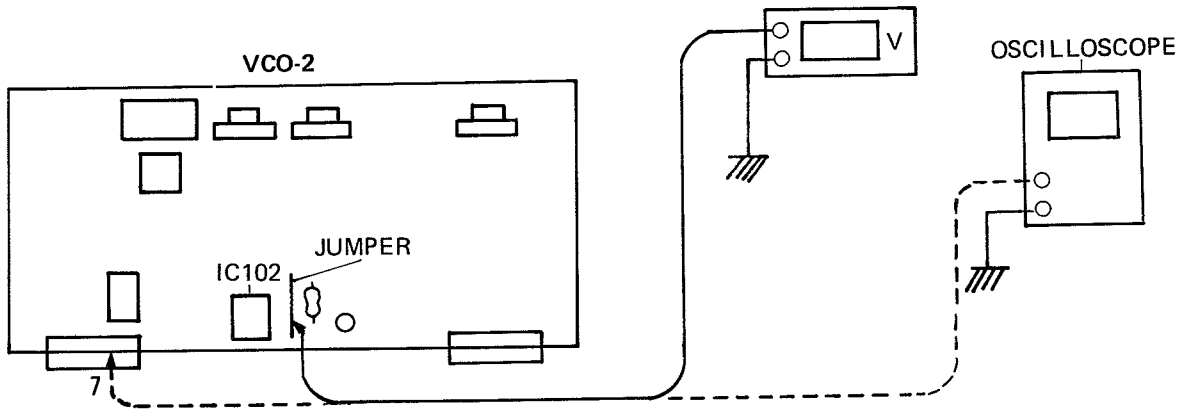
The above figures show the waveforms when 174.61Hz triangular wave is applied to HOR IN of the oscilloscope.

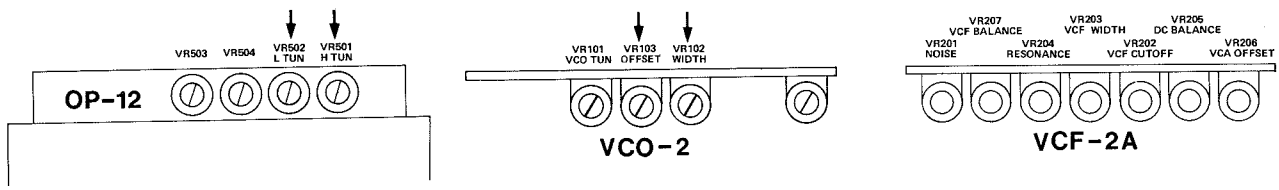
*The adjustment can also be completed by beat note method. In this case connect SH-2000 to an amplifier and adjust VR's of each step so that zero-beat (in place of static Lissajous' figure) results between the SH-2000 note and the note as the criteria.

2. ADJUSTING KEY VOLTAGE

Setting: Tablet . . . . . Hold – on
Popcorn – on
Panel . . . . . Pitch – center
Random Note – off
Oscilloscope Range: 1V/cm

Set VERT IN switch of the oscilloscope to GND and adjust VERT POSITION so that the fly-back line comes on –3 graduation. Then set the switch to DC.



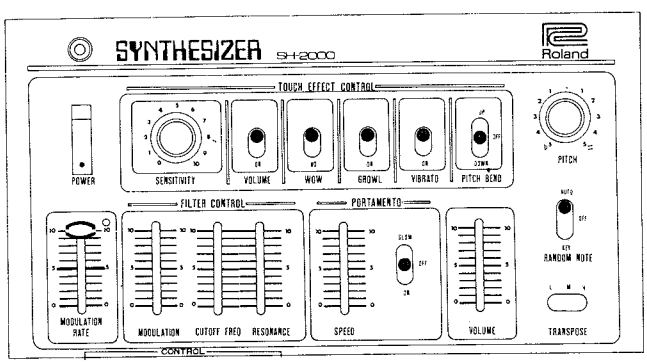


1) With F1 key held down, adjust VR103 (Offset control) on VCO-2 to obtain +3V (±20mV). (0V line when deviated to –3V).

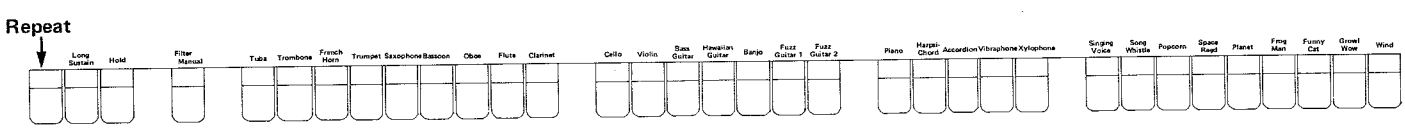
2) With F4 key held down, adjust VR102 (Width control) on VCO-2 board to obtain +9V (±20mV) (+6V line when deviated to –3V).

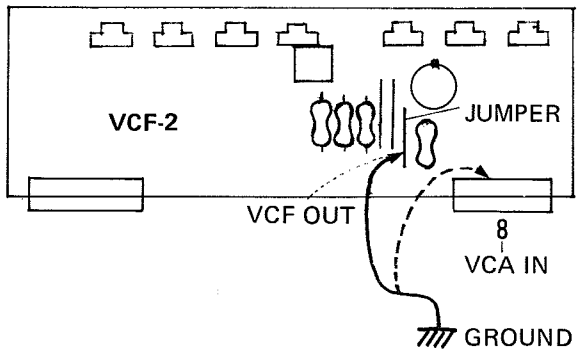
3) Repeat adjustment of steps 1 and 2 until +3V and +9V are obtained. Then check that 5V (±50mV) and +7V (±50mV) are obtained for F2 and F3 respectively.

3. ADJUSTING VCA BALANCE

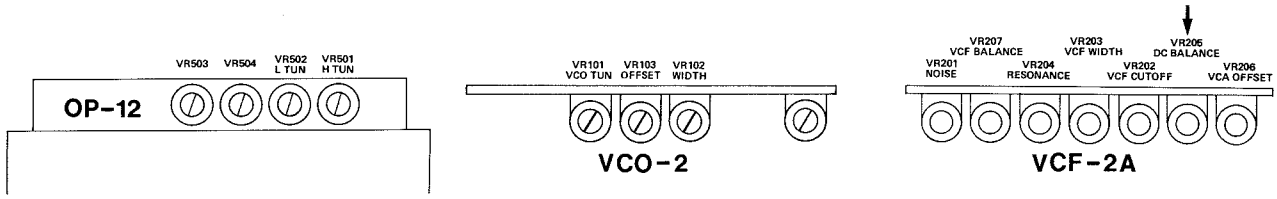


Setting: Tablet . . . . . Repeat – on
Panel . . . . . Random Note – Auto
Modulation Rate – 10

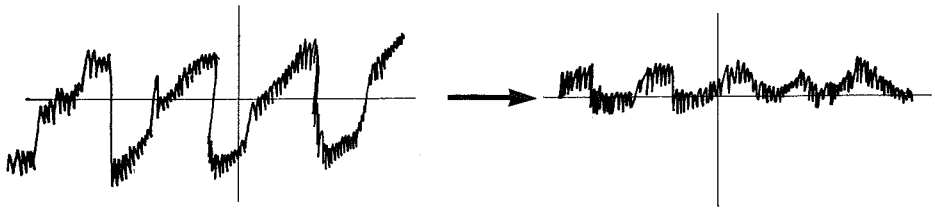




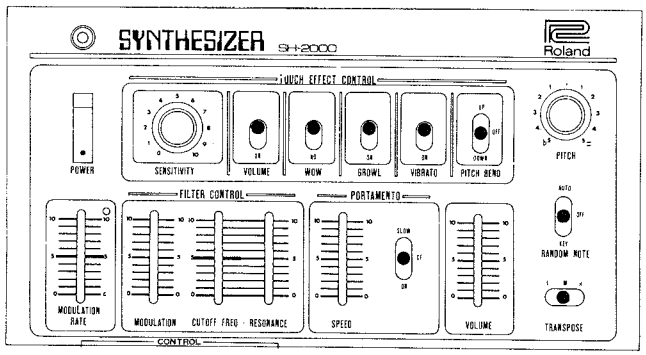
Oscilloscope Range: 0.02V/cm, 10ms/cm



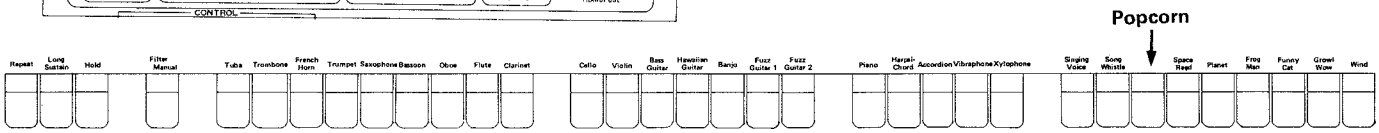
Adjust VR205 (DC Balance control) so that the amplitude is minimum.

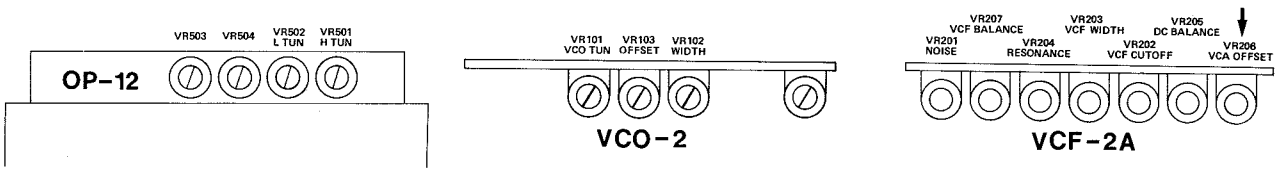


4. ADJUSTING VCA OFFSET

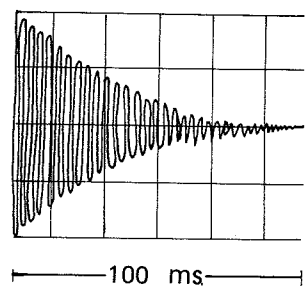


Setting: Tablet . . . . . Popcorn – on
Panel . . . . . Random Note – off
Transpose – M
Oscilloscope Range: 0.2V/cm, 10ms/cm





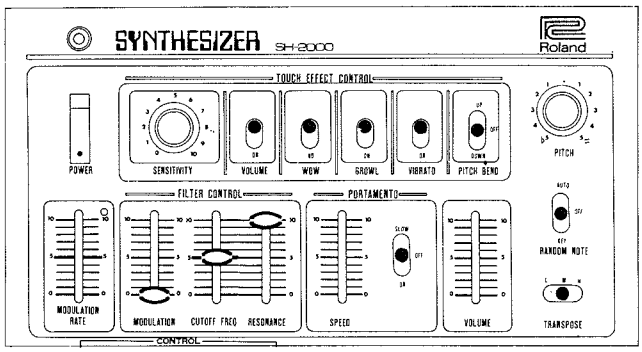
While repetitively holding down C2 key, adjust VERT Gain so that the maximum amplitude expands just over the entire graticule and adjust VR206 (VCF Offset) on VCF-2 board so that the waveform disappears at 100ms.



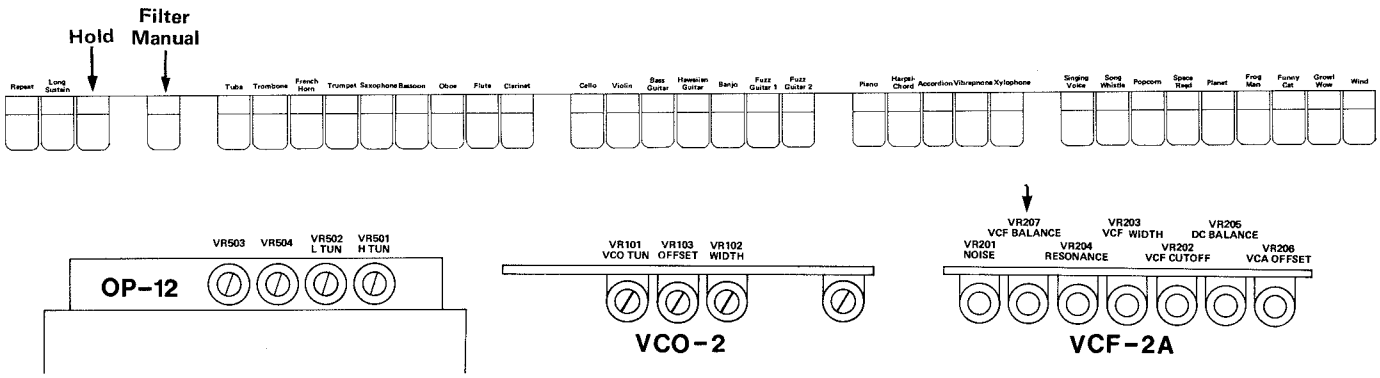
Roland

5. ADJUSTING VCF DC BALANCE

*This adjustment applies only for VCF-2A. For unit with VCF-2, this adjustment is unnecessary.



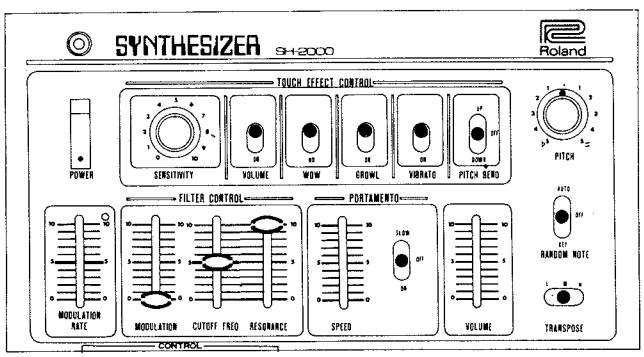
Setting: Tablet . . . . . Hold – on
Filter Manual – on
Panel . . . . . .Cutoff Freq – 5
Resonance – 10
Modulation – 0
Oscilloscope Range: 0.02V/cm, 10ms/cm



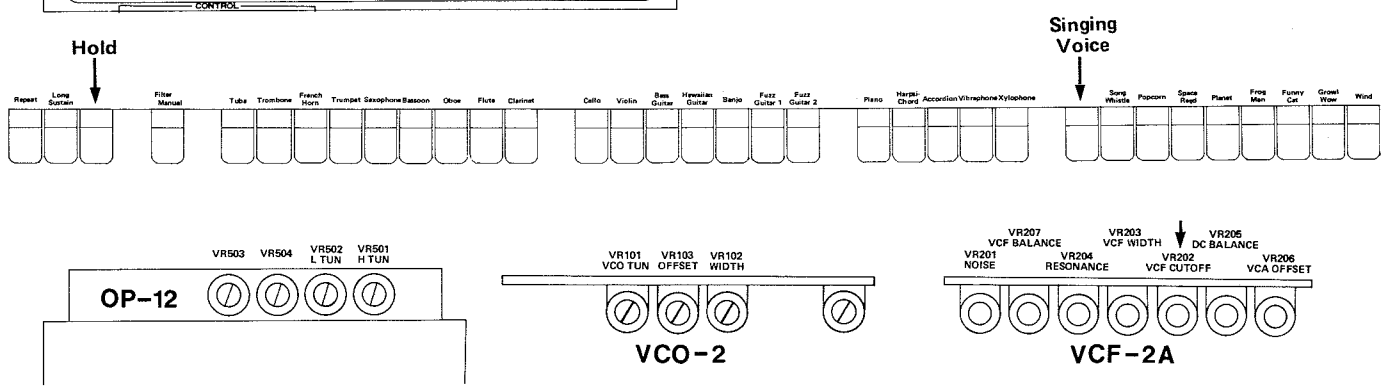
With C2 key down, set VR207 (VCF BALANCE control) on VCF-2A board so that the maximum oscillation frequency is obtained without distortion,.

*Depress F1 and F4 keys alternatively and make sure that no "swing" occurs before the frequencies are stabilized.

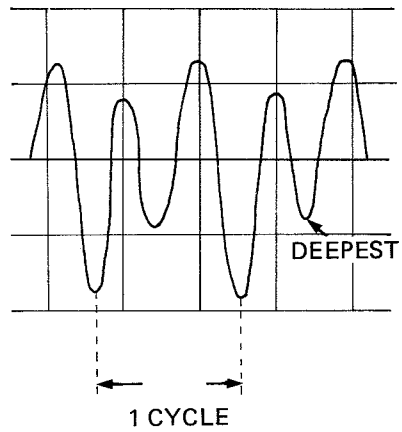
6. ADJUSTING VCF CUTOFF FREQUENCY



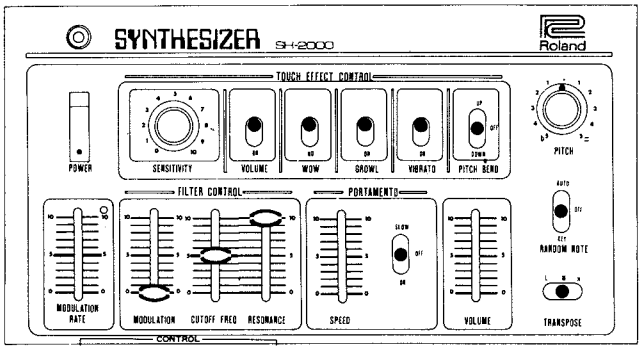
Setting: Tablet . . . . . Singing Voice – on
Hold – on
Panel . . . . . Cutoff Freq – 5
Resonance – 10
Modulation – 0
Oscilloscope Range: 0.5V/cm, 1ms/cm



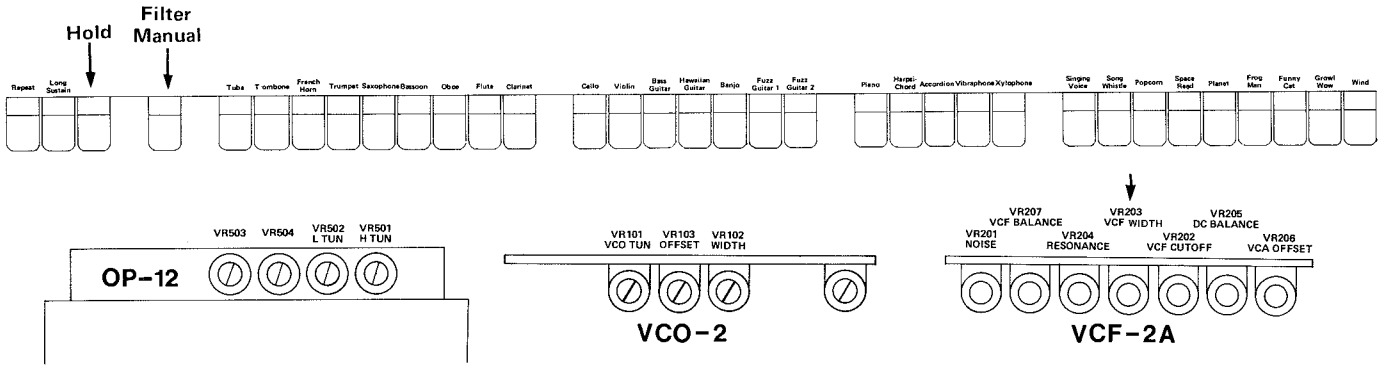
With C2 key down, adjust VR202 (VCF CUTOFF FREQ) so that two peaks appear in one cycle.



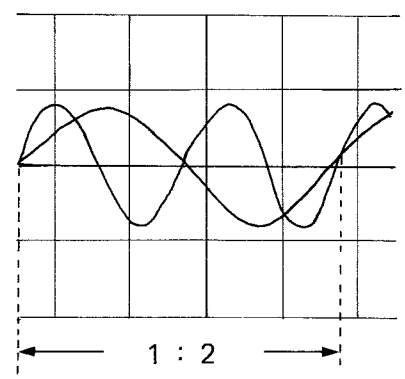
7. ADJUSTING VCF SCALE WIDTH



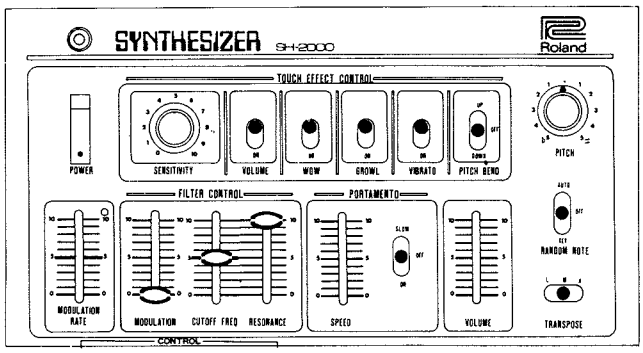
Setting: Tablet . . . . . Hold – on
Filter Manual – on
Panel . . . . . Resonance – 10
Cutoff Freq – 5
Modulation – 0
Oscilloscope Range: 0.2V, 0.1ms/cm



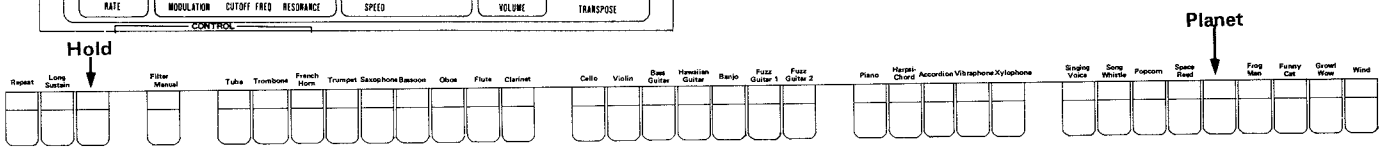
1) Depress F2 and F3 keys alternatively and adjust VR203 so that the frequency ratio is 1 : 2.
2) After adjustment of step (1), check to see that the frequency ratio of F1:F2 and F3:F4 is also 1 : 2.
3) After the ratios of F1 : F2, F2 : F3 and F3 : F4 are adjusted to 1 : 2, repeat adjustment of section 6.
4) Then repeat adjustment of Section 7.

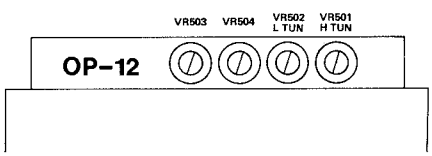


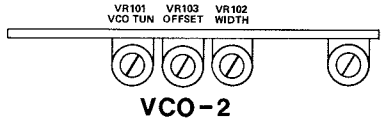
8. ADJUSTING RESONANCE

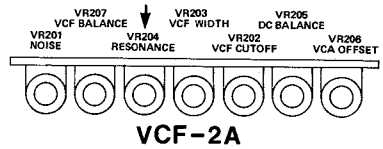


Setting: Tablet . . . . . Hold – on
Planet – on
Panel . . . . . Resonance – 10
Cutoff Freq – 5
Modulation – 0
Oscilloscope Range: 0.5V/cm, 0.5ms/cm



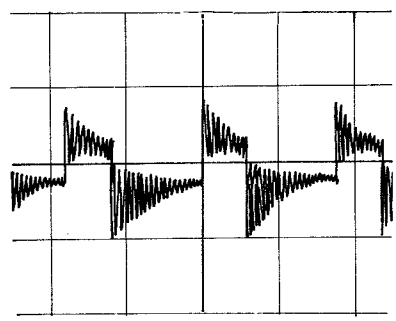


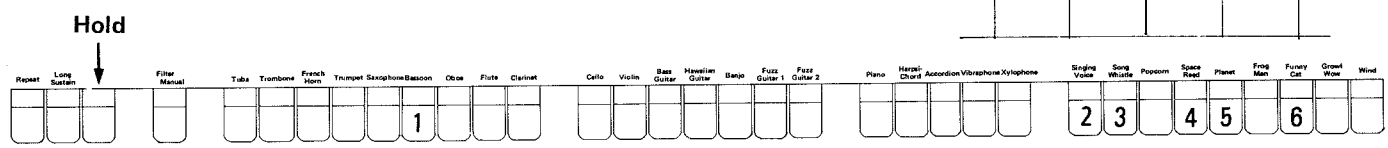




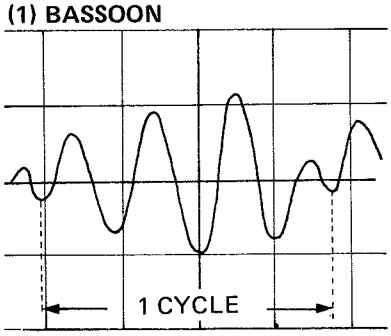
1) With C2 key down, adjust VR204 so that lower ringing of the waveform is close to a straight line.

2) After adjustment of sections 6, 7, and 8, confirm that the entire VCF adjustment is perfect consulting the waveforms as illustrated below.



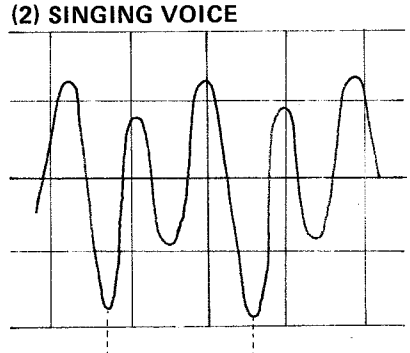


(1) BASSOON



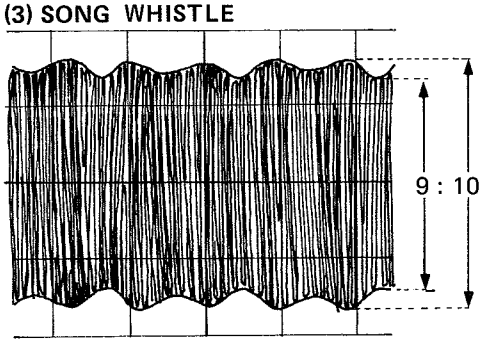
4 PEAKS 0.5V/cm, 1ms/cm

(2) SINGING VOICE



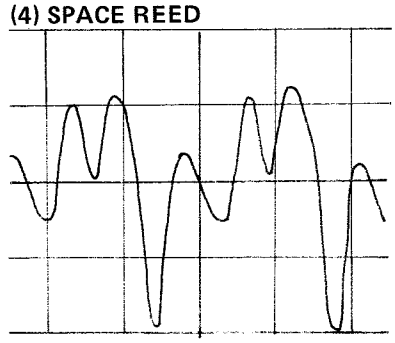
0.5v/cm, 0.2ms/cm

(3) SONG WHISTLE



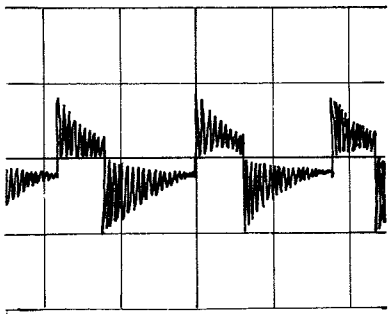
0.5v/cm, 10ms/cm

(4) SPACE REED



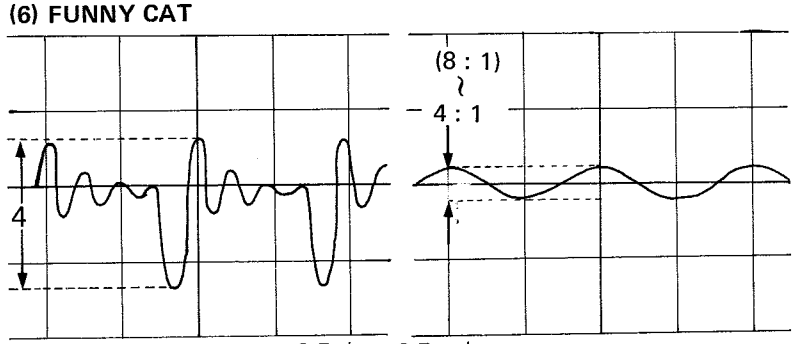
0.5V/cm, 0.2ms/cm

(5) PLANET



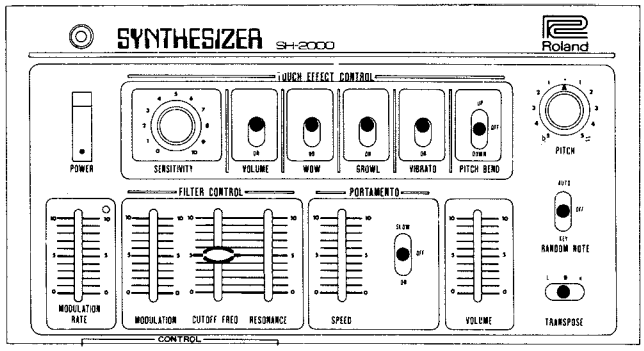
0.5V/cm, 0.5ms/cm

(6) FUNNY CAT

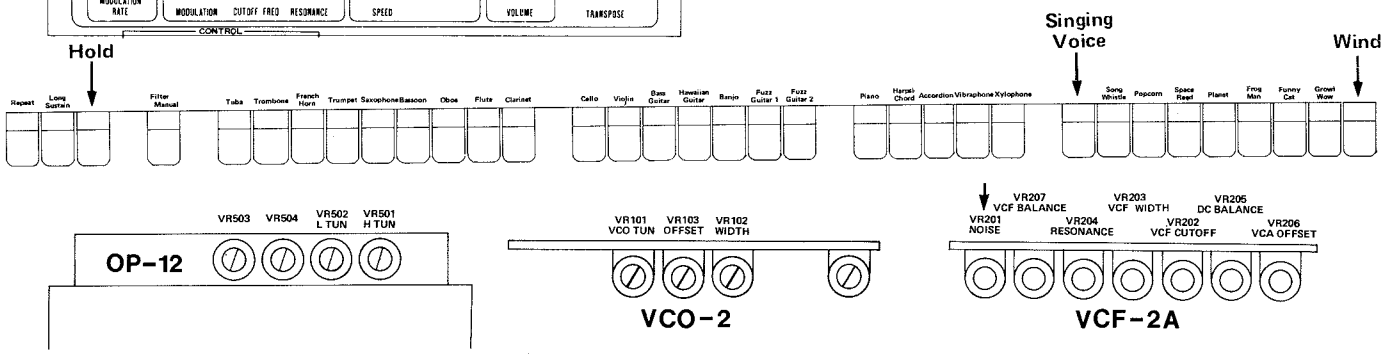


0.5v/cm, 0.5ms/cm

9. ADJUSTING NOISE

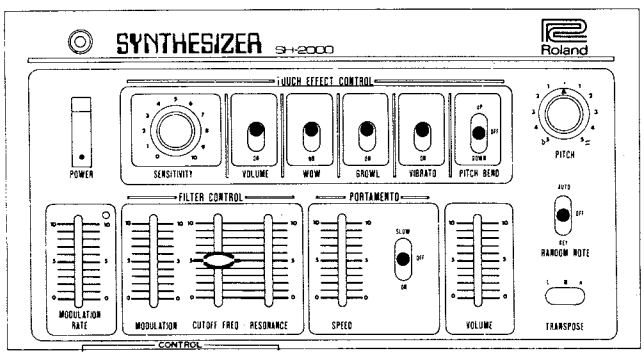


Setting: Tablet . . . . . Hold – on
Wind – on
Singing Voice – on
Panel . . . . . Cutoff Freq – 5
Oscilloscope Range: 0.5V/cm,

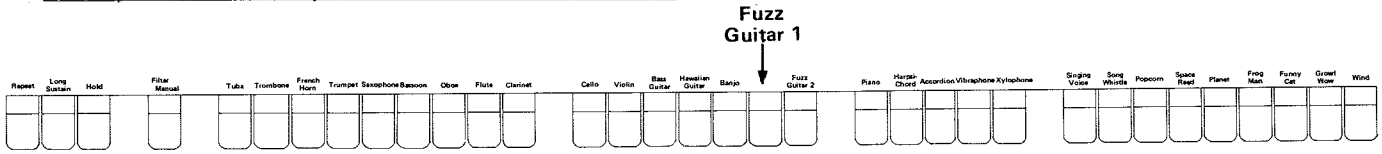


With Singing Voice tablet set at on (down), and while depressing a key, set Wind tablet on and off. Adjust VR201 so that the amplitude of Wind and Singing Voice are equal.

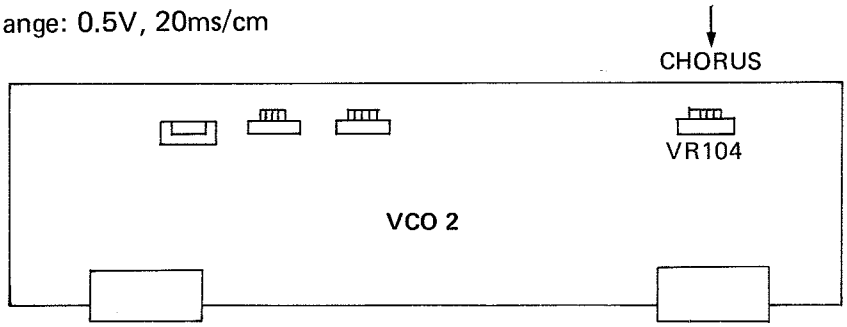
10. ADJUSTING CHORUS



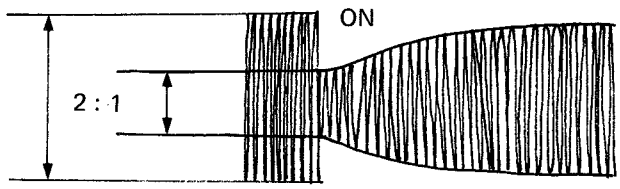
Setting: Tablet . . . . . Fuzz Guitar 1 – on
Panel . . . . . Transpose – H → L



1) Oscilloscope Range: 0.5V, 20ms/cm

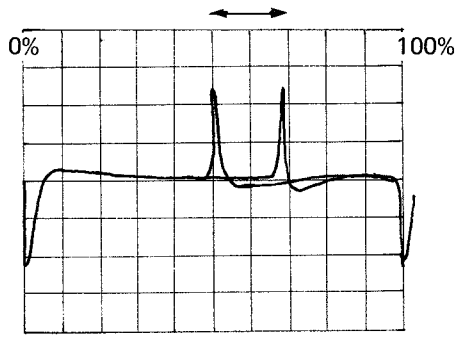


While repeatedly depressing (on) and releasing (off) F4, adjust VR104 (Chorus) on VCO-2 to obtain the waveform as illustrated below.



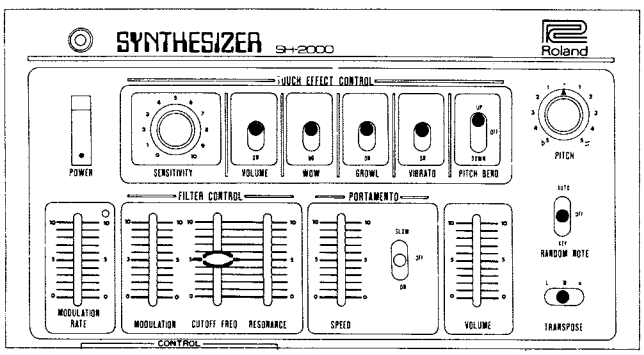
2) Oscilloscope Range: 0.5V/cm, 1ms/cm

Set transpose to L. While repeatedly depressing (on) and releasing (off) F1, adjust triggering level and sweep time (time/cm) to obtain 1 cycle over 10cm. Confirm that the waveform as illustrated below appears.

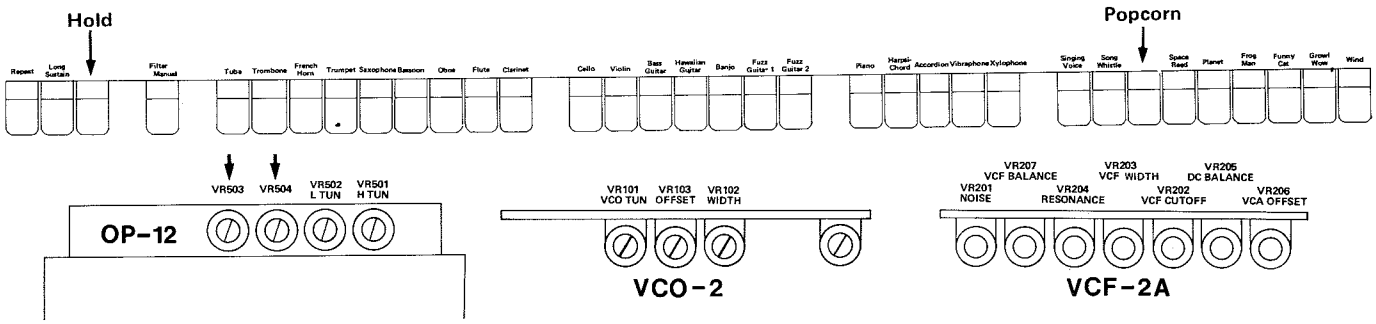


11. ADJUSTING TOUCH SENS

Adjustment of Touch Sens should be made in the state that the keyboard is secured to the cabinet with bolts.



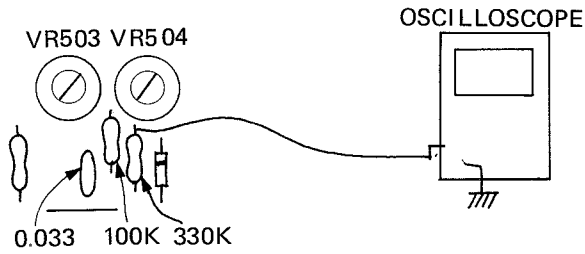
Setting: Tablet . . . . . Hold – on
Pop Corn – on
Panel . . . . . Transpose – M
Sensitivity – 10
Pitch Bend – UP



11-A) Adjusting Offset

Oscilloscope Range: 0.1mV/cm

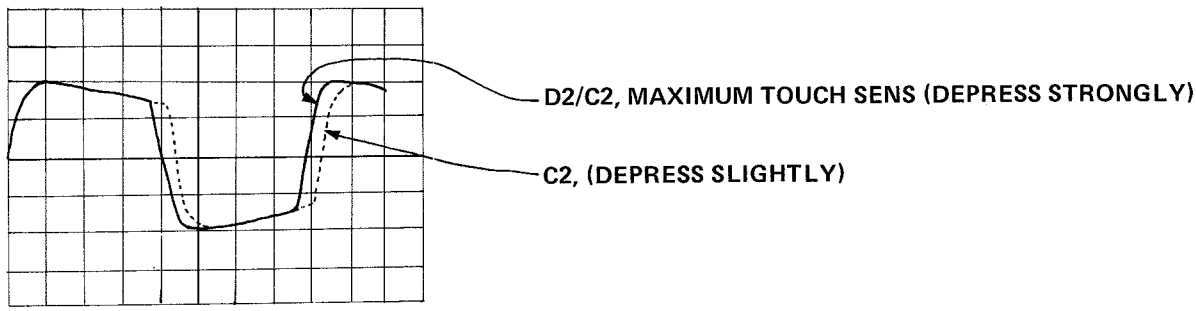
1) Adjust VR503 to obtain offset voltage of −0.2V with no key down.



11-B) Adjusting Touch Sens Gain

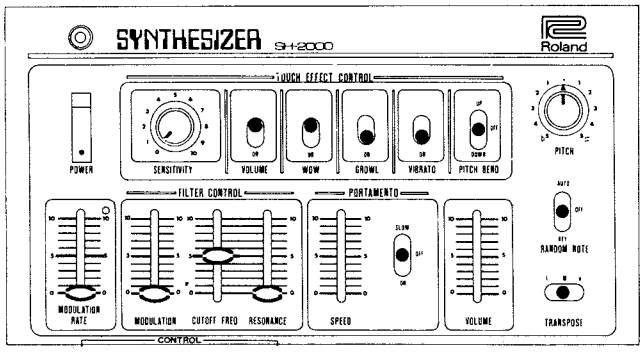
Oscilloscope Range: 0.1V/cm, 0.2ms/cm (Connect No.12 of VCF-2.)

1) Depress D2 lightly and adjust oscilloscope so that one cycle can be clearly displayed. Adjust VR504 so that the equal wave length is displayed when C2 is depressed strongly to effect Touch Sens for one-note upper tone.



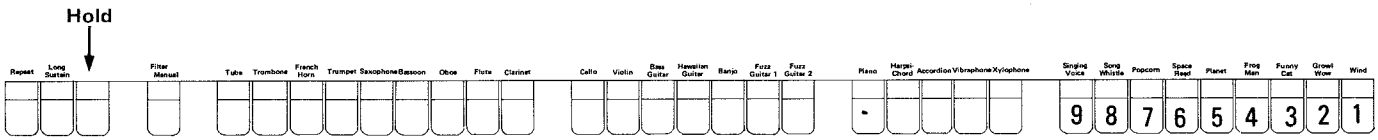
WAVEFORMS FROM EACH TABLET

•The following waveforms should result when each tablet is activated with the panel setting as shown. The waveforms are those of the unit employing VCF-2A. For units with VCF-2, there will be some difference from the waveforms shown.

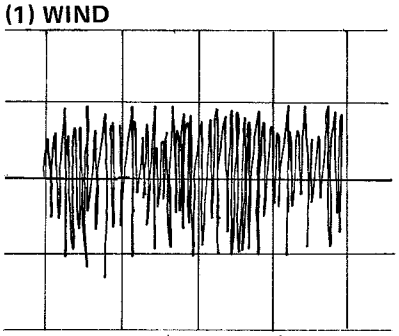


KEYBOARD C2

VCF-2A (12) OR MX-1(13) → V

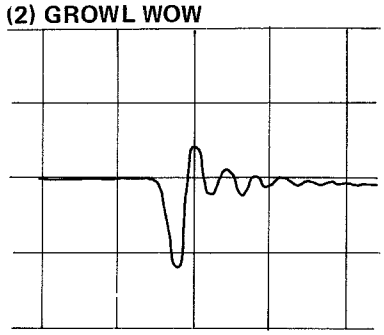


(1) WIND



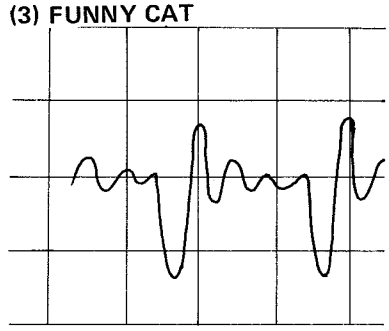
0.5V/cm, 10ms/cm

(2) GROWL WOW



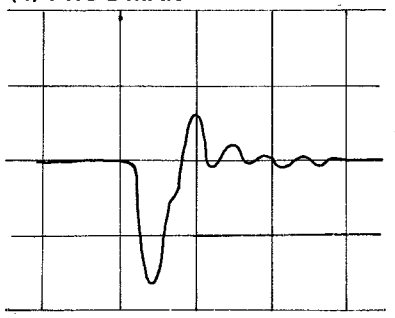
0.5V/cm, 1ms/cm

(3) FUNNY CAT



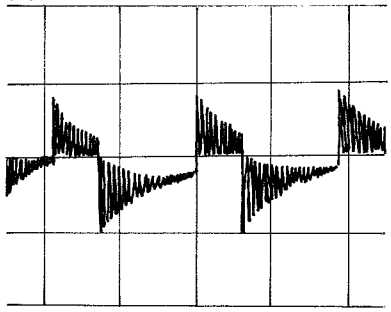
0.5V/cm, 1ms/cm

(4) FROG MAN



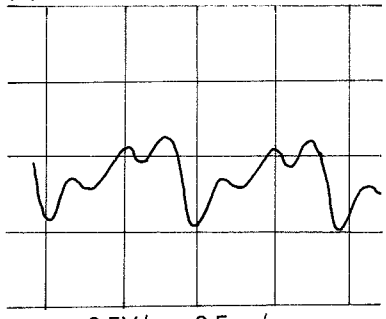
0.5V/cm, 1ms/cm

(5) PLANET



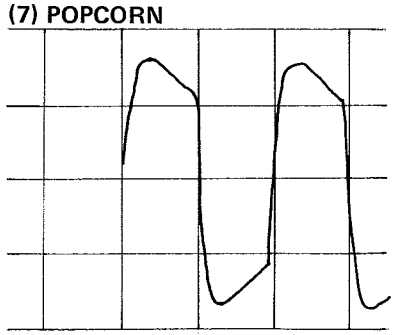
1V/cm, 0.5ms/cm

(6) SPACE REED



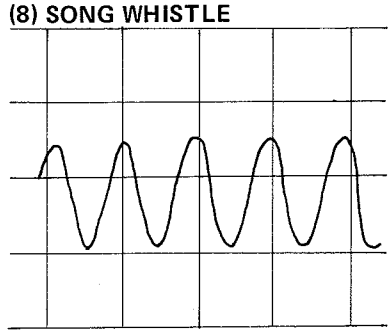
0.5V/cm, 0.5ms/cm

(7) POPCORN



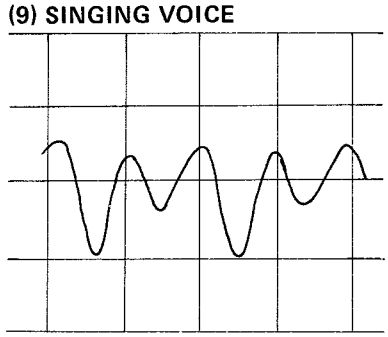
1V/cm, 1ms/cm

(8) SONG WHISTLE



0.5V/cm, 1ms/cm

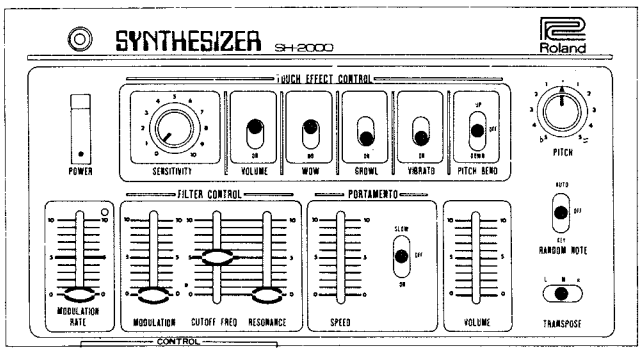
(9) SINGING VOICE



0.5V/cm, 1ms/cm

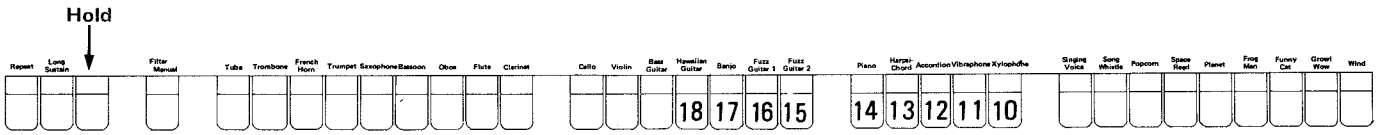
WAVEFORMS FROM EACH TABLET

- The following waveforms should result when each tablet is activated with the panel setting as shown. The waveforms are those of the unit employing VCF-2A. For units with VCF-2, there will be some difference from the waveforms shown.

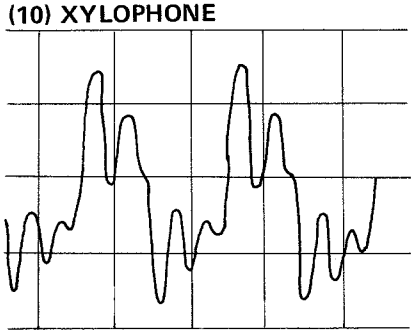


KEYBOARD C2

VCF-2A (12) OR MX-1(13) → V

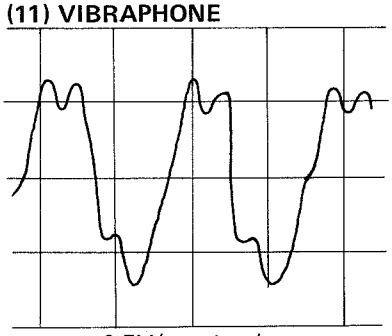


(10) XYLOPHONE



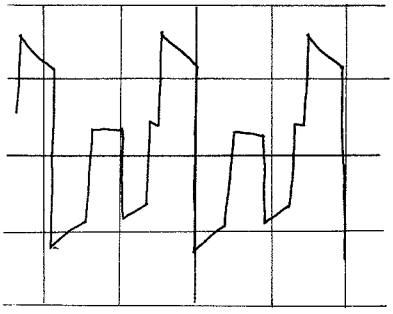
0.5v/cm, 0.5ms/cm

(11) VIBRAPHONE



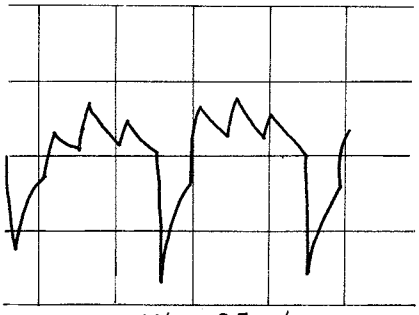
0.5V/cm, 1ms/cm

(12) ACCORDION



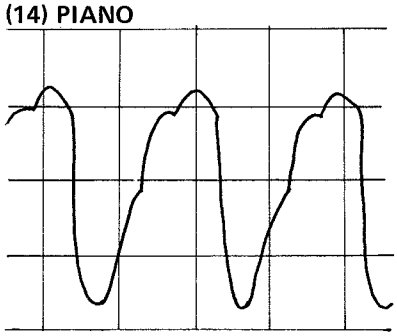
0.5V/cm, 1ms/cm

(13) HARPSICHORD



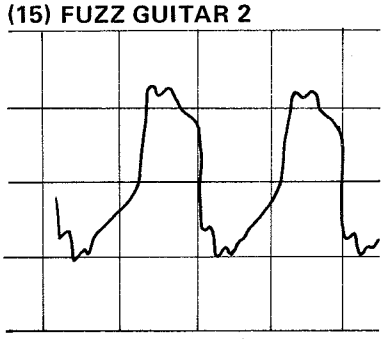
1V/cm, 0.5ms/cm

(14) PIANO



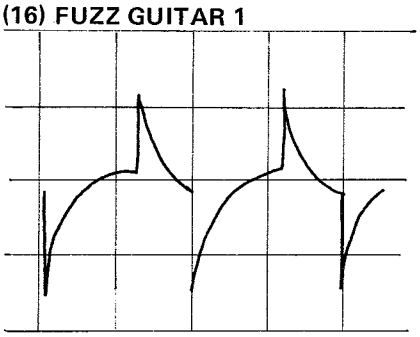
1V/cm, 1ms/cm

(15) FUZZ GUITAR 2



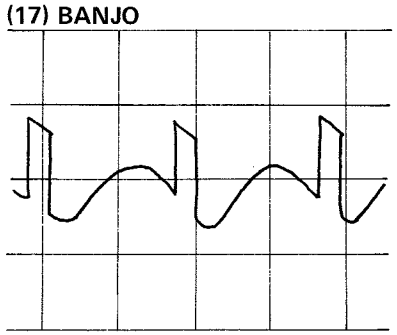
1V/cm, 1ms/cm

(16) FUZZ GUITAR 1



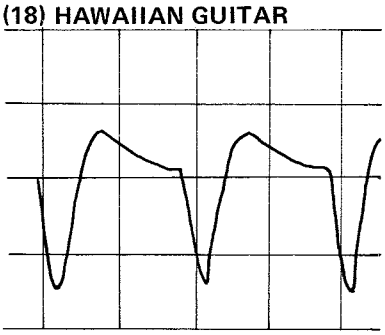
1V/cm, 1ms/cm

(17) BANJO



1V/cm, 1ms/cm

(18) HAWAIIAN GUITAR

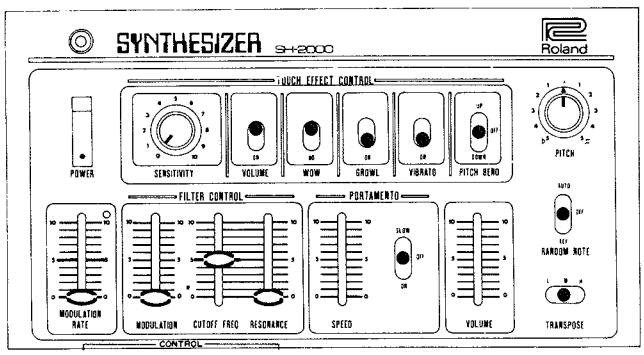


1V/cm, 1ms/cm

Roland

WAVEFORMS FROM EACH TABLET

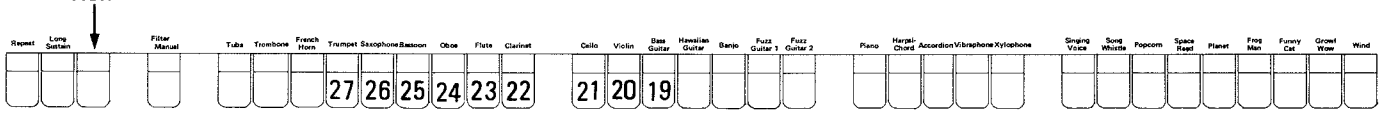
●The following waveforms should result when each tablet is activated with the panel setting as shown. The waveforms are those of the unit employing VCF-2A. For units with VCF-2, there will be some difference from the waveforms shown.



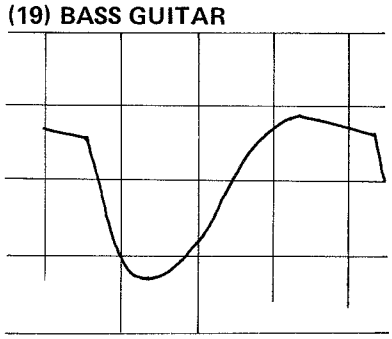
KEYBOARD C2

VCF-2A(12) OR MX-1(13) → V

Hold

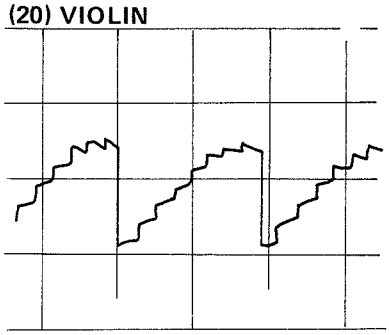


(19) BASS GUITAR



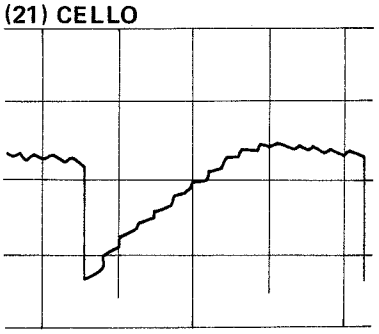
2V/cm, 2ms/cm

(20) VIOLIN



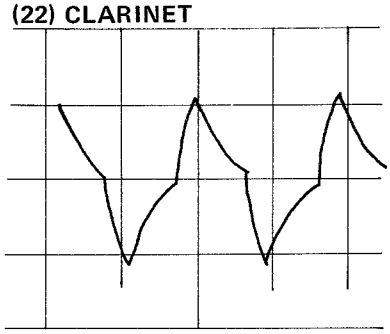
1V/cm, 1ms/cm

(21) CELLO



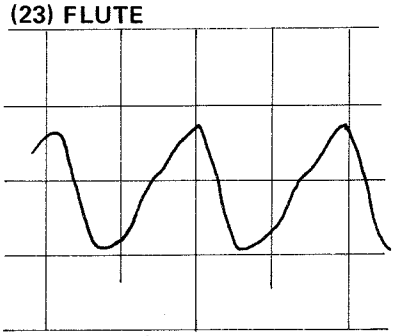
1V/cm, 1ms/cm

(22) CLARINET



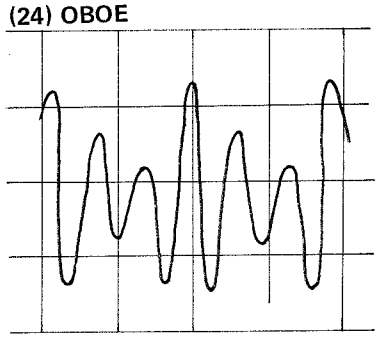
1V/cm, 1ms/cm

(23) FLUTE



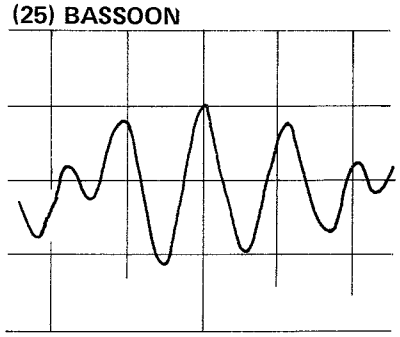
1V/cm, 1ms/cm

(24) OBOE



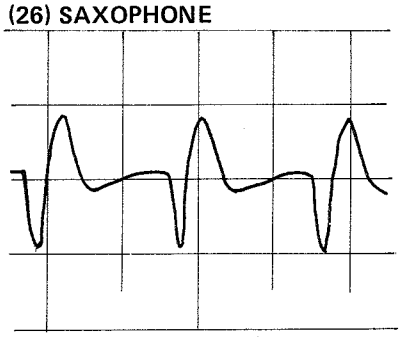
1V/cm, 1ms/cm

(25) BASSOON



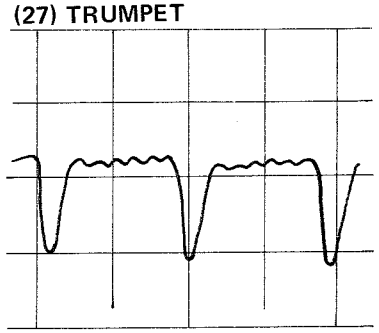
1V/cm, 2ms/cm

(26) SAXOPHONE



2V/cm, 2ms/cm

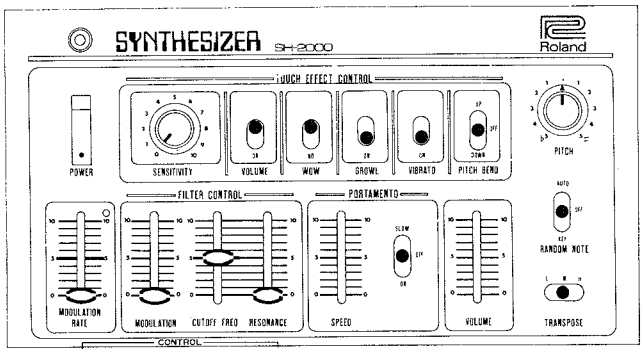
(27) TRUMPET



2V/cm, 1ms/cm

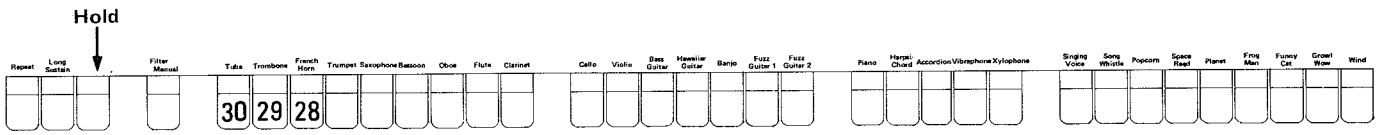
WAVEFORMS FROM EACH TABLET

●The following waveforms should result when each tablet is activated with the panel setting as shown. The waveforms are those of the unit employing VCF-2A. For units with VCF-2, there will be some difference from the waveforms shown.

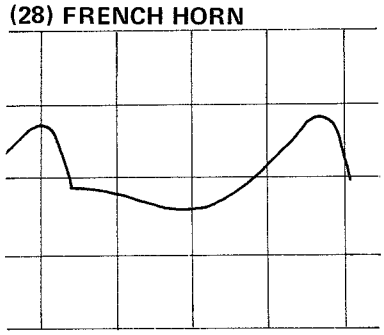


KEYBOARD C2

VCF-2A (12) OR MX-1(13) → V

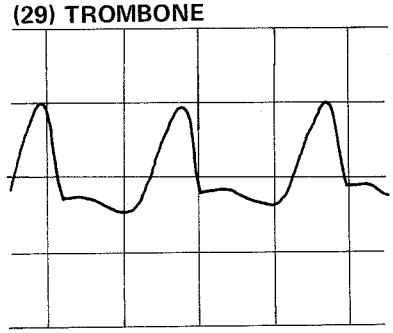


(28) FRENCH HORN



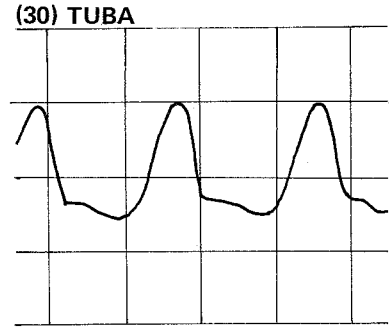
2V/cm, 2ms/cm

(29) TROMBONE



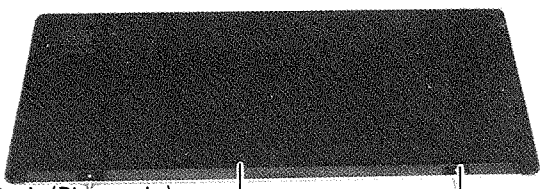
2V/cm, 2ms/cm

(30) TUBA



5V/cm, 2ms/cm

12. PARTS ILLUSTRATED



Music Rack (Plate only)
(092-002)

Holder No.26
(064-026)

Plate Nut No.38
(120-038)

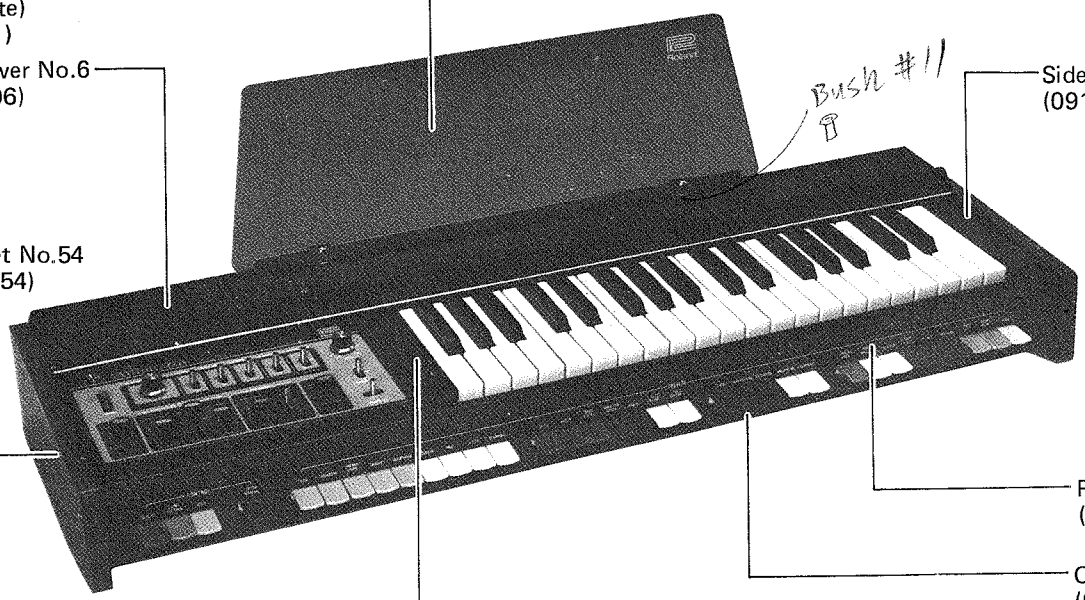
When ordering Music Rack,
be sure to specify "Complete" or "Not".

Music Rack No.2
(Complete)
(173-001)

Top Cover No.6
(086-006)

Side Block No.6
(091-006)

Cabinet No.54
(081-054)

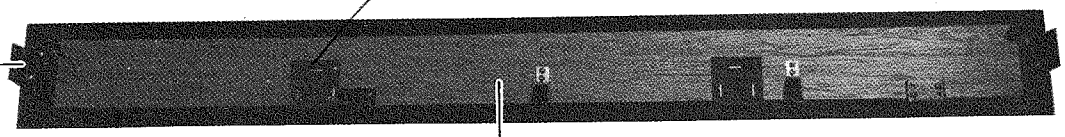


Panel No.68
(072-068)

Chassis No.69
(061-069)

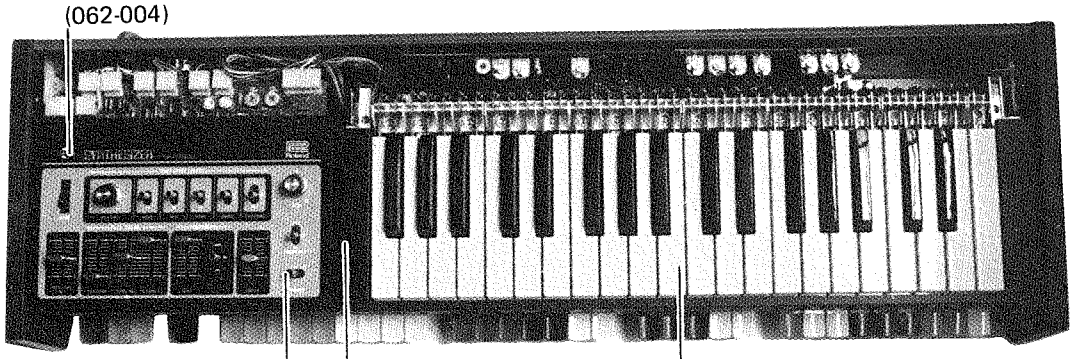
Side Block No.5
(091-005)

Holder
(064-H002)



Top Cover No.6
(086-006)

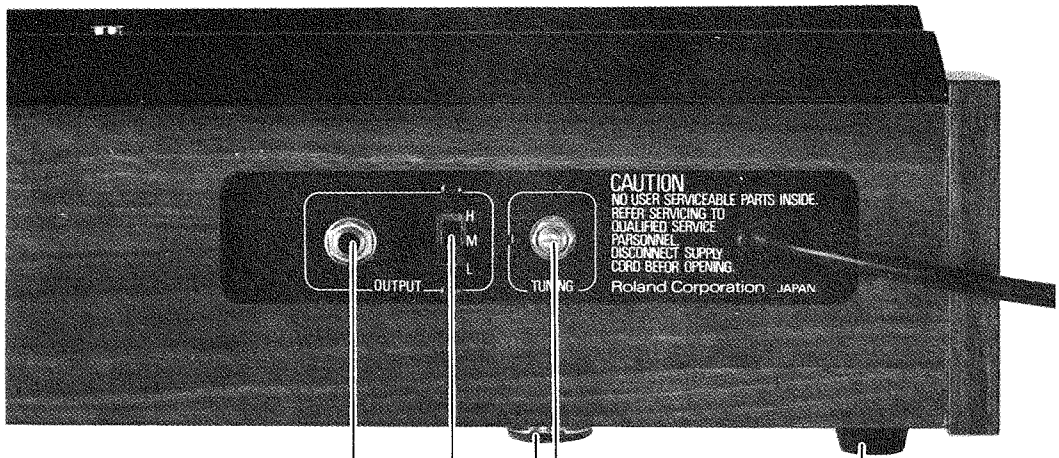
Bracket No.4 (lens)
(062-004)



Panel No.67
(072-067)

Side Block No.5
(091-005)

Keyboard Assy SK-132B



Jack SG-7615
(009-001)

Slide Switch SW-321
(001-018)

Rubber Foot G-7
(111-023)

Pot EVCBOAS10B54 50KB
(028-262)

Leveler, plapart No.5

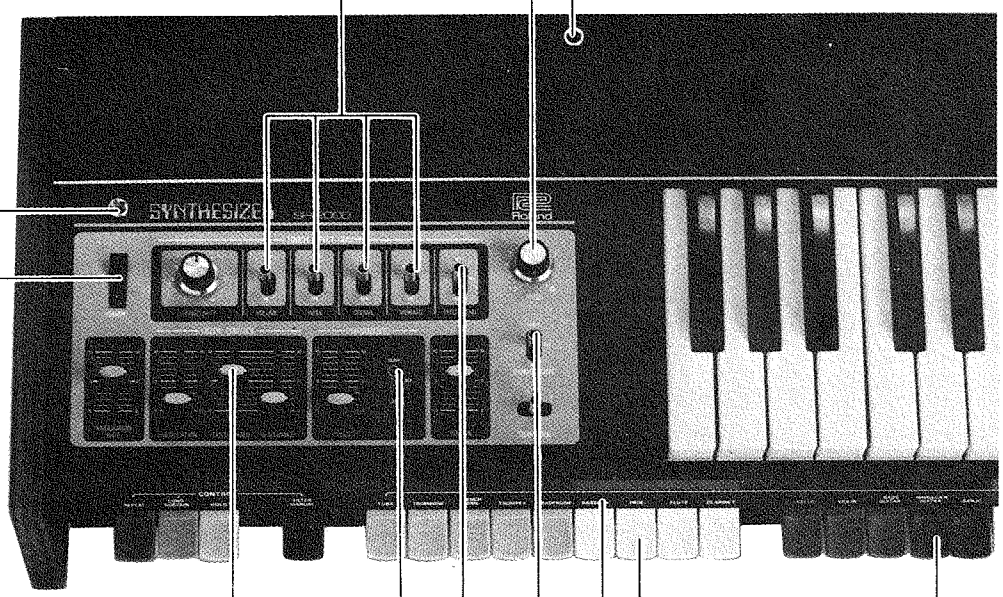
Lever Switch ESL-2411
(001-065)

Seesaw Switch T-811
(001-047)

Knob TK-1114
(016-021)

Bracket No.4 (Lens)
(062-004)

Bush No.11
(068-011)



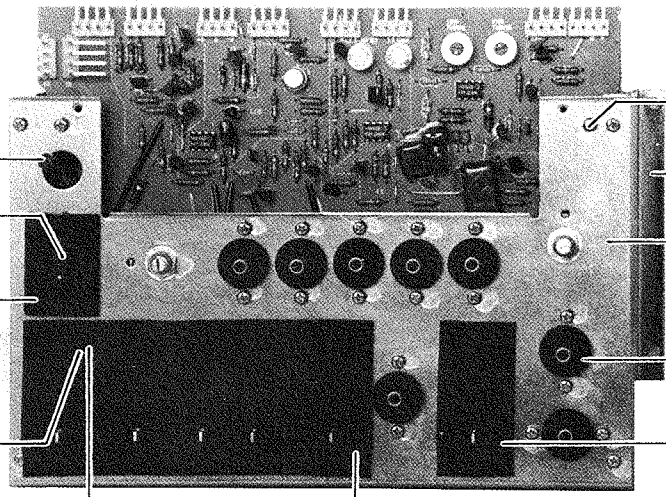
Knob No.3 (016-003)
Strip No.1 (063-001)

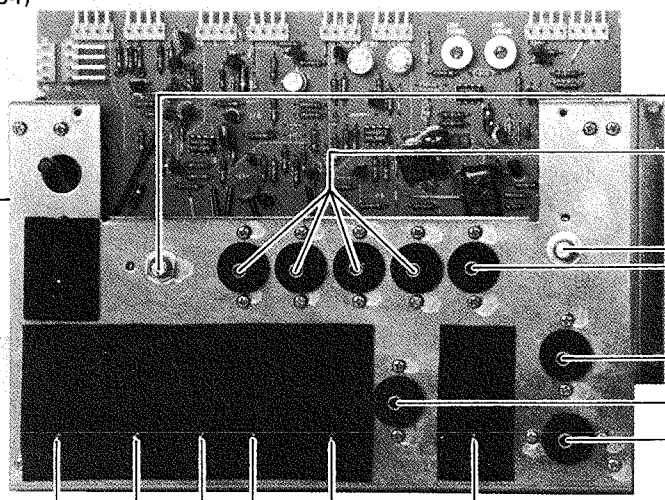
Lever Switch ESL-2412
(001-064)

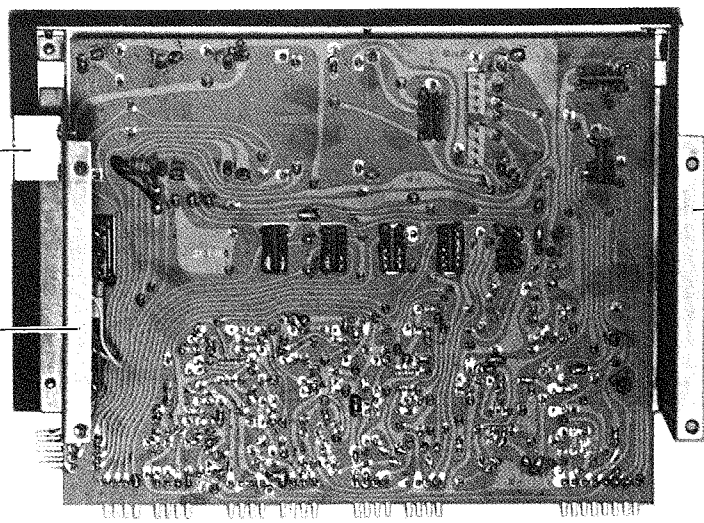
Panel No.68
(072-068)

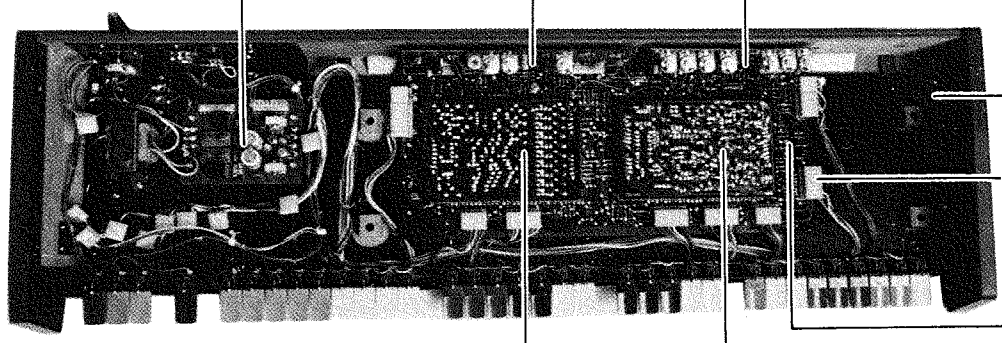
Lever Switch ESL-2413 (001-088)
Spring Pin (Lock) 1.6mm
Tab No.1 Ivory (030-001)
No.2 Maroon (030-002)
No.3 Yellow (030-003)
No.4 Green (030-004)
No.5 Gray (030-005)

Roland

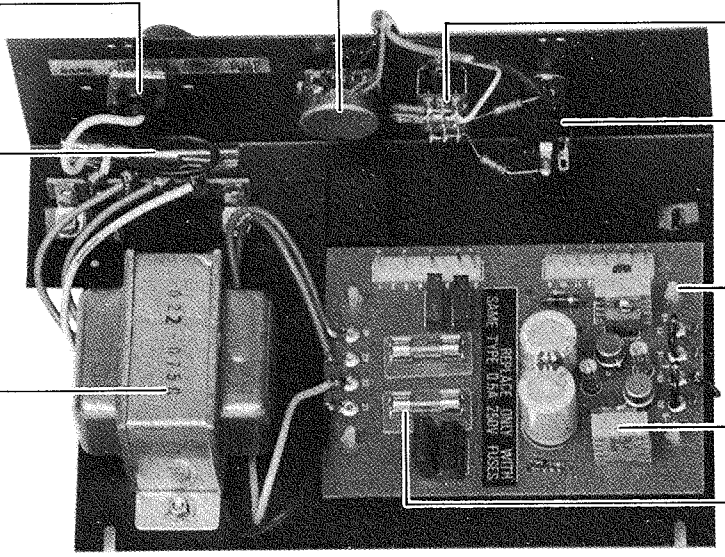

Sleeve Nut No.9 13mm (120-009)
LED SLP-24B (019-003)
Chassis No.70 (061-070)
Seesaw Switch T-811 (001-047)
Chassis No.67 (061-067)
Cover No.37 (065-037)
Holder No.98 (064-098)
Cover No.34 (065-034)
Cover No.57 (065-057)
Cover No.50 (065-050)
LED LR-0601R (019-009), or LD-64R (019-004)
Cover No.51 (065-051)


Pot EVCBOAK1510KB (028-331)
Chassis No.70 (side) (061-070)
Lever Switch ESL-2411 (001-065)
Pot BOAK1550KB (028-333)
Holder No.98 (064-098)
Lever Switch ESL-2412 (001-064)
Pot EVA-QOAAOO (C16) A1410KA, 30mm slide (028-033)
Pot EVA-QOAAOO (C16) A15100KA, 30mm slide (028-036)
Pot EVA-QOAAOO (C16) A5450KA, 30mm slide (028-035)
Pot EVAQOAAOO (C16) B5450KB, 30mm slide (028-024)

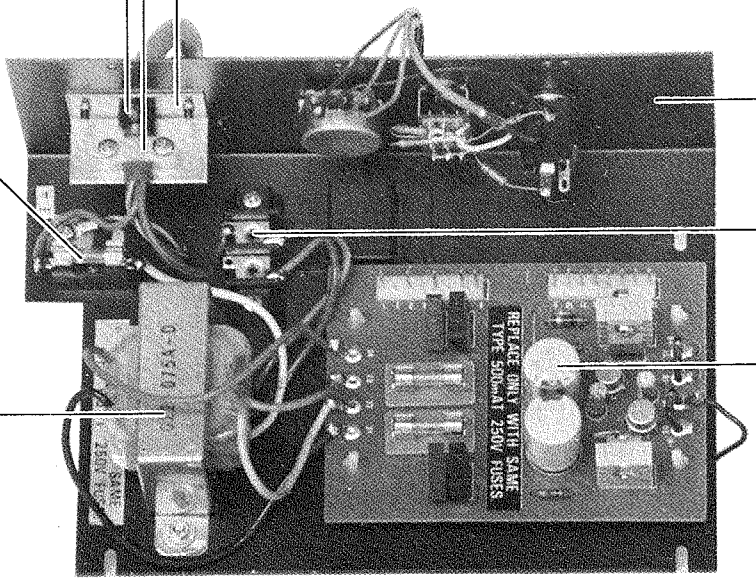

Holder No.98 (064-098)
Chassis No.70 (061-070)
Chassis No.70 (061-070)



POWER SUPPLY 100/120V



POWER SUPPLY 220/240V



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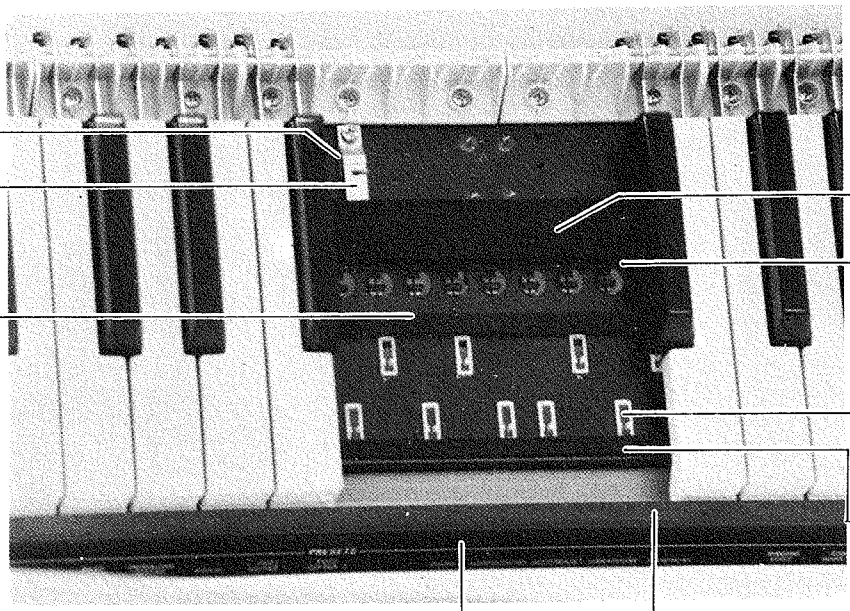
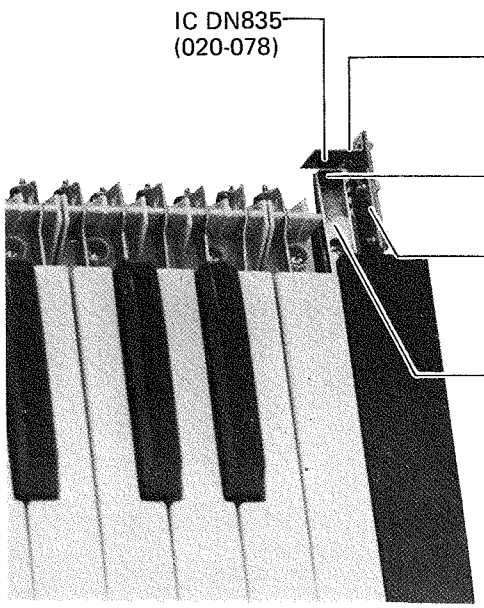
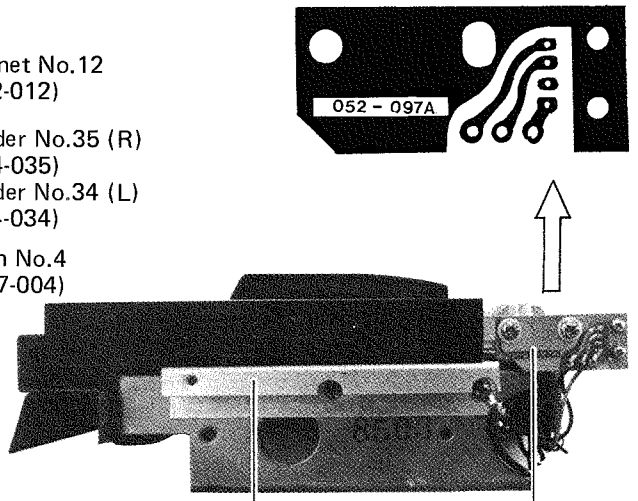
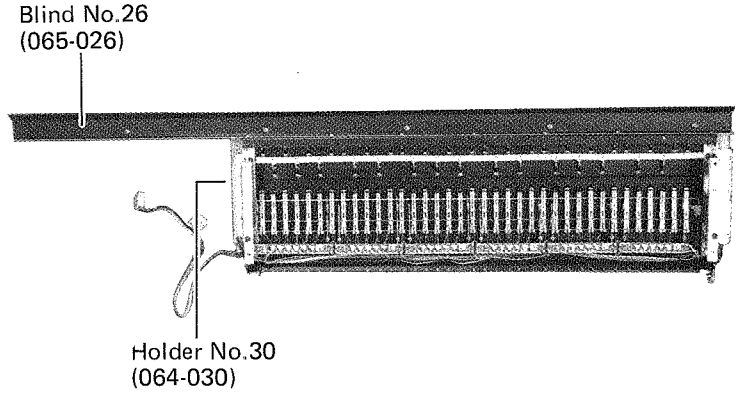
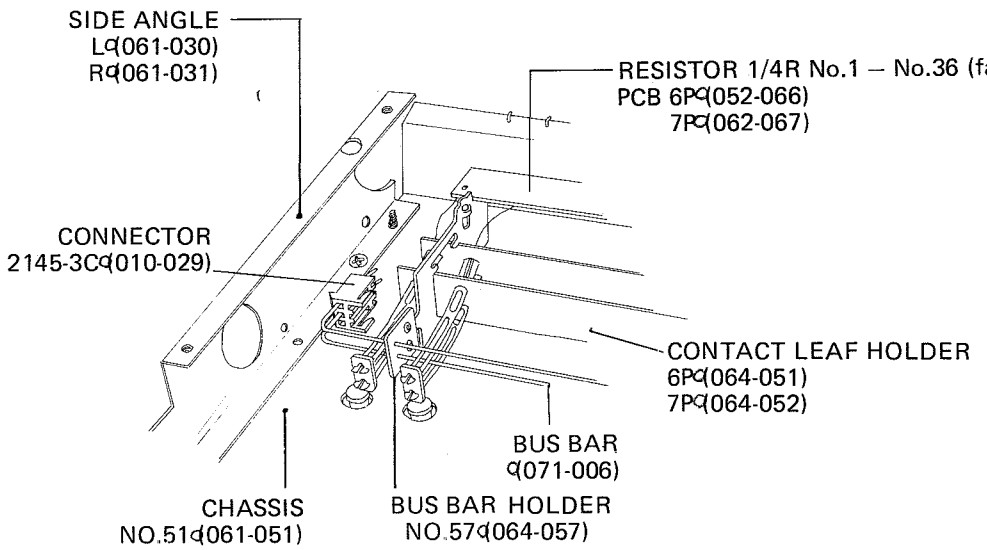

Holder No.36
(064-036)
Arm No.6
(077-006)
Cushion No.36
(107-036)
Felt No.21
(107-021)
Arm No.5
(077-005)
Guide Bushing No.16
(068-016)
Cushion No.37
(107-037)
Panel No.68
(072-068)
Blind No.26
(065-026)

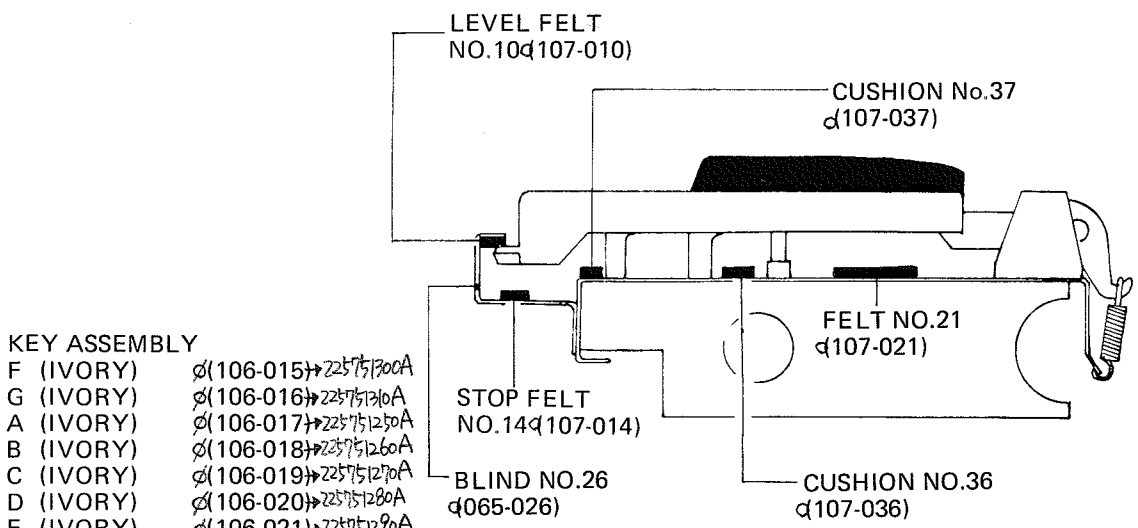

IC DN835
(020-078)
Holder No.37
(064-037)
Magnet No.12
(172-012)
Holder No.35 (R)
(064-035)
Holder No.34 (L)
(064-034)
Arm No.4
(077-004)


052 - 097A
Holder No.90
(064-090)
PCB Assy OP-18 (149-018)
PCB (less parts) (052-097A)

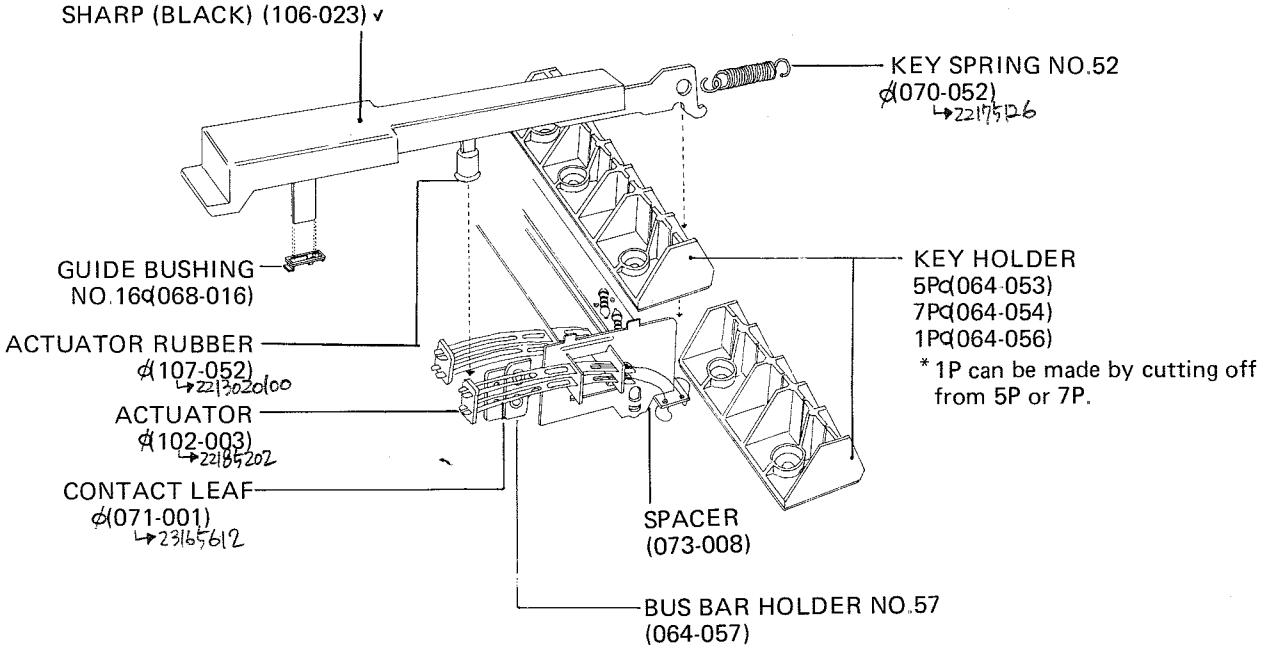

Blind No.26
(065-026)
Holder No.30
(064-030)

KEYBOARD ASSEMBLY





KEY ASSEMBLY
F (IVORY) (106-015)→22575130OA
G (IVORY) (106-016)→22575131OA
A (IVORY) (106-017)→22575125OA
B (IVORY) (106-018)→22575126OA
C (IVORY) (106-019)→22575127OA
D (IVORY) (106-020)→22575128OA
E (IVORY) (106-021)→22575129OA
F' (IVORY) (106-022)→22575132OA
SHARP (BLACK) (106-023) v



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PARTS LIST

PARTS ORDERING INFORMATION

Name of part number of some of the parts is changed from those printed on previously issued parts list. When ordering replacement parts, be sure to follow the description on the present issue.

When ordering parts, be sure to include the following information:

1. Model and Serial Number
2. Part Number
3. A Description of the Part

This parts list includes all standard stock replacement parts. No attempt has been made to include every nut, bolt and screw. If the necessity for a non-listed part arises, please write describing the parts location and function as well as model and serial number of the unit.

PART NO.	PART NAME AND DESCRIPTION
	CABINET
○081-054	Cabinet No.54
○086-006	Top Cover
○091-005	Side Block No.5 (L)
○091-006	Side Block No.6 (R)
○130-098	Carton No.98
○173-001	Music Rack No.2, complete (includes the following)
092-002 v	Music Rack No.2
○064-026	Holder No.26
○120-038	Plate Nut, No.38
	Screw 3 x 6mm
	Keyboard SK-132B Assy (excludes OP-18, DN-835, Holder No.37)
	COVER
○086-006	Top Cover
○065-056	Cover No.56, Holder No.61
○065-058	Cover No.58, Bush No.11 天板
○065-034	Cover No.34, Lever Switch
○065-050	Cover No.50 Pot (Slide Pot)
○065-051	Cover No.51, (Volume)
○065-057	Cover No.57, LED LR0601R
○065-037	Cover No.37, Power Switch T-811
○065-026	Blind No.26, Keyboard
	PANEL
○072-067	Control Panel No.67
○072-068	Panel No.68, Tab Switches
	CHASSIS
○061-051	Chassis No.51, Keyboard
○061-069	Chassis No.69, below Tab Switches
○061-066	Chassis No.66, Main (MX-1)
○061-067	Chassis No.67, Control, Main
○061-070	Chassis No.70, Control, Side
○061-065A	Chassis No.65A, Power Supply
	HOLDER
○064-053	Key Holder 5P
○064-054	Key Holder 7P
○064-056	Key Holder 1P (by cutting off from 7P or 5P)
○064-036	Holder, Keyboard
○064-034	Holder, Keyboard (L)
○064-035	Holder, Keyboard (R)
○064-090	Holder No.90, Cabinet-Keyboard Right
○064-098	Holder No.98, Cabinet-Chassis No.70
○064-030	Holder No.30, Side Block No.5-Keyboard
○064H002	Holder, Top Cover-Cabinet
○064-037	Holder No.37, Keyboard-IC DN835
○064-061	Holder, Top Cover-PCB
○064-026	Holder No.26, Music Rack
◇064-033	Holder LCBS-4N, PCB → 1219501
○064-057	Bus Bar Holder No.57, Key
○064-134	Holder No.134, Line Cord Strain Relief (220/240V)
◇012-018	Fuse Holder XN-1153 (220/240V) → 1219509
◇012-003	Fuse Holder TF-758 (100/120V) → 1219519
	BUSHING
○068-011	Bushing No.11, Pipe, Music Rack
○068-005	Insulating Washer, Jack
○068-016	Guide Bushing No.16, Keyboard
◇047-003	Line Cord Strain Relief BU4801 (220/240V) → 1235511
◇047-022	Line Cord Strain Relief SR-5P-4 (100/120V) → 1235505
○047-023	Cord Clamp 1702B (220/240V)
	NUT
◇120-009	Sleeve Nut No.9, 13mm → 2215010900
○121-007	Spring Nut M8P, Bracket No.4
○120-038	Plate Nut No.38, Music Rack
◇062-004	Bracket No.4, (Lens), LED → 2216029200
○111-023	Rubber Foot G-7
○048-018	Heatsink No.18, SB-7, 2SB-434

PART NO.	PART NAME AND DESCRIPTION
	KNOB & TABLET
ϕ 016-003	Knob No.3 スライドつまみ
○ 063-001	Strip No.1, Knob No.3
ϕ 016-021	Knob TK-1114 丸つまみ
003-001	Tablet No.1 YG, Ivory
003-002	Tablet No.2 MR, Maroon
003-003	Tablet No.3 YE, Yellow
003-004	Tablet No.4 GN, Green
003-005	Tablet No.5 GY, Gray
	Spring Pin, 1.6mmW (Tab-Lever Switch)
	SWITCH
○ 001-088	Lever Switch, ESL-2413, 4P-ST, Tablet
ϕ 001-064	Lever Switch, ESL-2412, DP-DT
ϕ 001-065	Lever Switch, ESL-2411, 4P-ST
ϕ 001-047	Seesaw Switch T-811, Power
ϕ 001-018	Slide Switch SW-321, Output
ϕ 009-001	Jack SG-7615
	CONNECTOR
○ 010-008	Housing Receptacle A2139-4
○ 010-009	Housing Receptacle A2139-6
○ 010-010	Housing Receptacle A2139-8
○ 042-015	Terminal Pin 2578T, A2139
○ 010-019	Housing Receptacle 2145-4C (AR-2)
○ 010-020	Housing Receptacle 2145-6C (AR-2, VG-7)
○ 010-021	Housing Receptacle 2145-8C (VG-7)
○ 010-023	Housing Receptacle 2145-6A (VCF-2)
○ 010-024	Housing Receptacle 2145-8A (VCO-2)
	PCB ASSY
152-002	VCO-2
153-002	VCF-2 (see "changes of PCB's)
153-002A	VCF-2A (see "changes of PCB's)
143-007	VG-7
157-001	MX-1
155-002	AR-2
149-012C	OP-12C (see "changes of PCB's)
149-018	OP-18
146-014C	PS-14C (see "changes of PCB's)
146-014CD	PS-14CD (see "changes of PCB's)
ϕ 022-075AC	Power Transformer (100/120V)
ϕ 022-075AD	Power Transformer (220/240V)
	SEMICONDUCTOR
○ 017-046	2SC828 R, selected for Noise Generator
○ 017-008	2SC828 R
ϕ 017-012	2SA733 Q
○ 017-013	2SC945 Q
○ 017-047	2SC945 Q, selected for VCF
○ 017-048	2SC1000GR, h_{fe}-selected
ϕ 017-022	2SB434 O
○ 017-014	2SK30A Y (2SK44D)
○ 017-016	2SK30A GR
○ 017-016	2SK30A GR (pair), selected for OP-12
○ 017-091	2SK30A O (2SK44C)
○ 017-018	N13-T1
○ 017-019	N13-T2
ϕ 018-014	1S2473 (1S953, 1S1555)
ϕ 018-048	DA-P4
ϕ 018-049	DA-N4
ϕ 018-062	MI-152 (1S1850)
ϕ 018-063	MI-152R (1S1850R)
ϕ 018-018	1N4002 (1N4003)
	(1S1850 and 1S1850R are no longer manufactured. Use MI-152 and 152R when replacing.)

PART NO.	PART NAME AND DESCRIPTION
ϕ 019-003	LED SLP-24B, pilot lamp
ϕ 019-009	LED LR0601R (LD64R)
○ 020-078	DN835, Hall (DN831)
ϕ 020-062	μPC1458 (CA1458, MC1458, RC4558)
○ 020-015C	CA3080 C (Red), selected for OP-12
○ 020-015B	CA3080 B (Green), selected for VCF-2A
○ 020-011	TA-58 (TA-78)
ϕ 020-007	LM3216
ϕ 020-024	301A
○ 020-035	RC555DN 又は MC-1455
○ 020-010	TA7504M (VCF-2A only)
○ 020-021	ITS-1276
○ 020-073	μA78M15UC or 830C (020-014)
	(830C is no longer manufactured. Use μA78M15UC when replacing.)
ϕ 020-055	IT132 or μPA41C
	(μPA41C is no longer manufactured. Use IT132 when replacing.)
○ 172-012	Magnet No.12
	POTENTIOMETER
	SLIDE POT (30mm stroke)
ϕ 028-033	EVA Q0A A00 (C16) A14 10KA
ϕ 028-035	EVA Q0A A00 (C16) A54 50KA
ϕ 028-036	EVA Q0A A00 (C16) A15 100KA
ϕ 028-024	EVA Q0A A00 (C16) B54 50KB
	ROTARY
ϕ 028-331	EVC B0A K15 B14 10KB (V24L5N15KC)
ϕ 028-333	EVC B0A K15 B54 50KB (V24L5N15KC)
○ 028-262	EVC B0A S10 B54 50KB (V24L5N10S)
	TRIMMER
○ 028-004	EVT (L)-R4A A00 B14 10KB (SR-19R)
○ 028-006	EVT (L)-R4A A00 B54 50KB (SR-19R)
ϕ 029-105	PNB04C3A-502H 5K flat
ϕ 029-108	PNB04C3A-503H 50K flat
ϕ 029-120	PNB04C3A-502V 5K erect
029-138	EVT (L) J0A S05 B13 1K erect
029-140	EVT (L) J0A S05 B14 10K erect
029-142	EVT (L) J0A S05 B54 50K erect
029-143	EVT (L) J0A S05 B15 100K erect
	RESISTOR
○ 044-833	3.3KΩ, CRB-1/4 FX
○ 044-838	10KΩ, CRB-1/4 FX
○ 044-844	68KΩ, CRB-1/4 FX
○ 044-845	82KΩ, CRB-1/4 FX
○ 044-853	300KΩ, CRB-1/4 FX
	1/4W, 10%
○ 044-090	1KΩ, ERC-12GK
○ 044-094	2.2KΩ, ERC-12GK
○ 044-166	2.2MΩ, ERC-12GK
○ 044-168	3.3MΩ, ERC-12GK
○ 044-170	4.7MΩ, ERC-12GK
○ 044-599	10MΩ, ERC-12GK
	1/2W 5%
	CAPACITOR
○ 032-099	1μ 35V, Tantalum
○ 032-214	2.2μ 35V, Tantalum
○ 032-216	4.7μ 35V, Tantalum
○ 032-071	1μ 50V, Electrolytic
○ 032-033	10μ 16V, Electrolytic
○ 032-009	100μ 6.3V, Electrolytic
○ 032-037	100μ 16V, Electrolytic
○ 032-068	470μ 35V, Electrolytic
	20%
○ 035-140	0.0022μ 50V, Polystyrol film ECQ
	FUSE
ϕ 008-032	SLA0001 1A, pigtailed, prim (100/120V) 5 x 20mm
ϕ 008-014	MGP0001 1A, pigtailed, prim (UL only) 6 x 30mm
ϕ 008-066	SEMKO 1A, midget, prim (220/240V J) 5 x 20mm
ϕ 008-026	SGA0001 1A, midget, prim (220/240V) 5 x 20mm
ϕ 008-024	SGA0.500 0.5A, midget, sec (PS-14) 5 x 20mm

* Resistors of 1/4W and mylar capacitors are omitted.

17059485 SERVICE NOTES (COPY)

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