SYNTHESIZER
SH-1 SERVICE NOTES

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KEYBOARD PARTS

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SPECIFICATIONS

■KEYBOARD.....32 keys, 2-1/2 Octaves

■VCO (Voltage Controlled Oscillator)
Modulator
Autobend Depth
Autobend Time (8msec-360msec)
VCO Range (32', 16', 8', 4', 2')
Waveform (⟋ , ⊓ , ⊓)
Pulsewidth Modulation (5%-50%)
PWM Mode Switch (ENV-1/Manual/LFO)

■SUB OSC (Sub-oscillator)
1 OCT DOWN ⊓ /2 OCT DOWN ⊓ /2 OCT DOWN ⊓

■NOISE GENERATOR
White/Pink Selector

■AUDIO MIXER
VCO/SUB OSC/NOISE/EXT SIG
Overload Indicator (EXT SIG)

■HPF (High Pass Filter)
Cutoff Frequency Control (25Hz-5KHz)

■VCF (Voltage Controlled Filter)
Cutoff Frequency Control (5Hz-20KHz)
Resonance (Min-Self Oscillation)
ENV-1 Polarity Switch (∩/∪)
ENV-1 Control
MOD Control
KYBD Control
EXT SIG ENV FOLLR Control

■VCA (Voltage Controlled Amplifier)
Hold Control
Envelope Switch (ENV-1/ENV-2)

■ENVELOPE GENERATOR
ENV-1
Attack Time (1.5msec-2.5sec)
Decay Time (1.5msec-8sec)
Sustain Level (0-100%)
Release Time (1.5msec-8sec)
Gate Trigger Selector Switch
(Gate+Trig/Gate/LFO)
ENV-2
Attack Time (1.5msec-3sec)
Release Time (1.5msec-8sec)
Gate Selector Switch (Gate/LFO)

■MODULATOR
Modulation Mode Switch (Random/⊓/∿)
Rate (0.2Hz-25Hz)
Delay Time (0-3sec)
Rate Indicator

■KYBD/EXT CV GATE SWITCH

■TUNING (±700 cents)

■PORTAMENTO (0-2.5sec)

■VOLUME

■TRANSPOSE SWITCH (L/M/H)

■BENDER
Bender Lever (-35° - $+35^{\circ}$)
Bender Sensitivity (VCO, VCF)

■POWER SWITCH
Power Indicator

■CONNECTION JACKS
Output Jack
Output Level Switch (L/M/H)
(standard -20dBm/-8dBm/+4dBm)
Phones Jack (8Ω, stereo)
Phones Output Level Switch
(L=-30dBm/M=-23dBm/H=-18dBm)
External Signal Jack
External Signal Level Switch (L/M/H)
(standard 0dBm/-20dBm/-40dBm)
External Control Voltage Input Jack
(1V/oct)
External Gate Voltage Input Jack
(ON with +7.5V or over)
Keyboard Control Voltage Output Jack
(F1=1.417V, C3=4.000V, 1V/oct)
Keyboard Gate Output Jack
(OFF - 0V, ON - +14V)

■GENERAL
Power Consumption.....10W
Dimensions.....610(W) x 370(D) x 135(H)mm
24(W) x 14.6(D) x 5.3(H)in
Weight.....6.4kg, 14.1 lbs
Accessory.....2.5m connection cord

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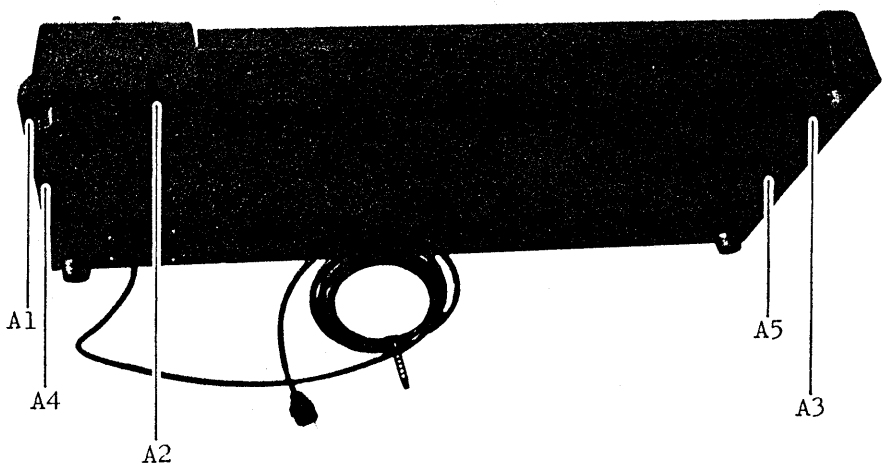
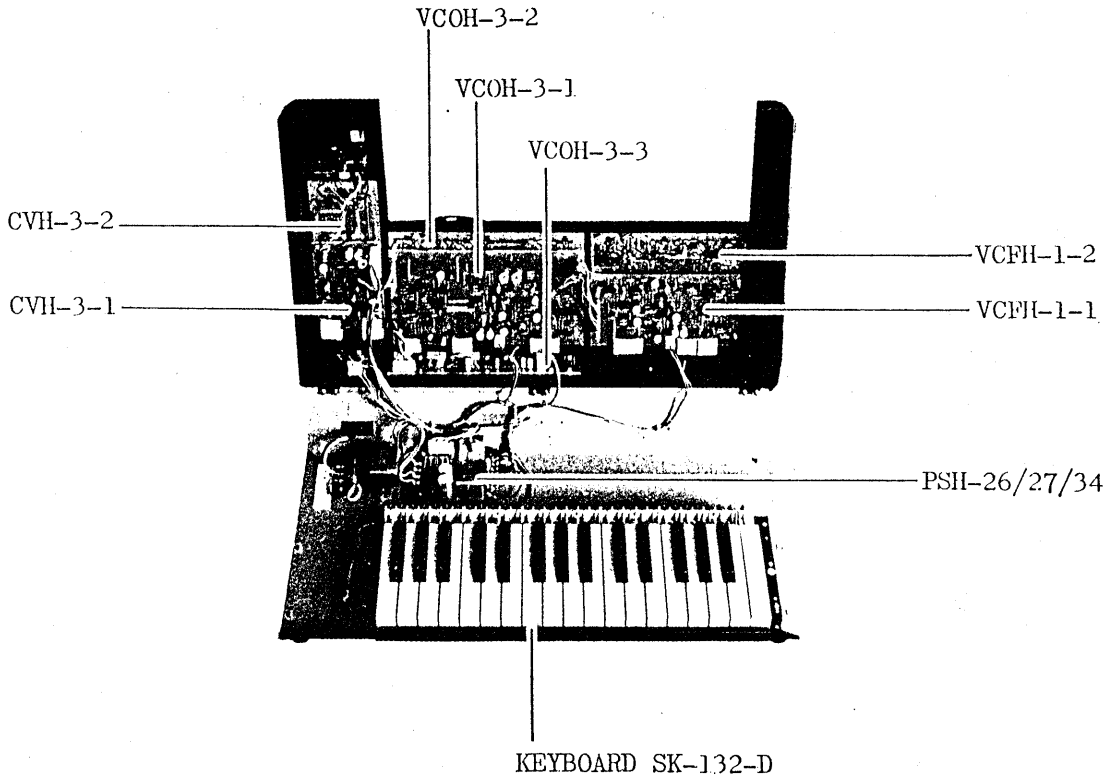
DISASSEMBLY

Be sure to keep the power plug off from the outlet.
To open the top cover, remove five screws (A1 - A5) at the bottom of the unit.

A1, 3-5: Bind 3x12 Br
A2: Bind 3x6 FeBr





CIRCUIT DESCRIPTION

1. KCV BOARD ASSEMBLY (CVH-3)

1. 1. The current from the constant current source is fed to the resistor chain of 31 resistors connected in series. When a key is depressed, the key voltage developes at the corresponding resistor. (When two keys are depressed, lower key voltage is taken.) The voltage is held by the capacitor in the S & H circuit after the key is released.
The voltage is sent to the portamento circuit. Portamento effect is added by the CR circuit (portamento control pot and the above-mentioned capacitor). The portamento time is varied by changing the time constant with the portamento control.

1. 2. When a lower key is depressed or released while one or more higher keys are held down, the change in the key voltages is detected and differentiated to generate a pulse, which triggers the envelope generator, during legato keying.

1. 3. Bender circuit output voltage can be varied by moving the bender lever, smoothly changing pitch and tone color. The control voltages that are distributed to VCO and VCF can be varied by Sensitivity sliders.

2. VCO BOARD ASSEMBLY (VCOH-3)

2. 1. The VCO is a highly stable and precise oscillator whose frequency is controlled by KCV or EXT CV. Linear voltage at KCV or EXT CV is converted by the exponential convertor to exponential current, which generates sawtooth wave.
The sawtooth wave is changed to square waves, too, by waveform convertor. One is the 50% square wave and the other is the square wave whose pulse width is modulated by LFO, ENV-1 or MANUAL.
To produce sub-oscillator sound, the square wave frequency is divided into 1/2 or 1/4 by dividers. The two resulting square waves are combined to produce the third wave. Thus three waves are obtained and one wave selected is applied to Mixer as one of the sound sources.

2. 2. The LFO is a modulating signal oscillator which generates triangular, square and sine waves of low frequencies. Besides, random note is generated by sampling and holding noise signal with LFO frequency. The sine wave only is affected by Delay Time control.

2. 3. Noise is generated from reversely biased base-emitter junction of a transistor. The noise is amplified to the required level and passed through a filter where it is converted to white or pink noise. The resulting noise is used to obtain various effects sounds.

2. 4. The Autobend is a voltage generator which is triggered with GATE+TRIG pulse and has DEPTH and DELAY TIME controls. A resulting voltage envelope controls the VCO.

2. 5. The overload indicator (LED) lights when the external signal level is excessively high.

2. 6. The Mixer has VCO, SUB-OSC, NOISE, and EXT SIG controls.

2. 7. The Envelope Follower integrates external signals to make the voltage envelope. This is used to control the VCF, causing wah effects.

2. 8. The Headphones amplifier is a Class A amplifier that uses an output transformer.

3. VCF/VCA BOARD ASSEMBLY (VCFH-1)

3. 1. The VCF is a voltage-controlled low pass filter. It comprises the 4-stage Operational Transconductance Amplifier circuits, in which the outoff frequency varies in proportion to the bias current.
When Resonance control is raised up beyond a predetermined position, it provides a feed back necessary to start and sustain oscillation.

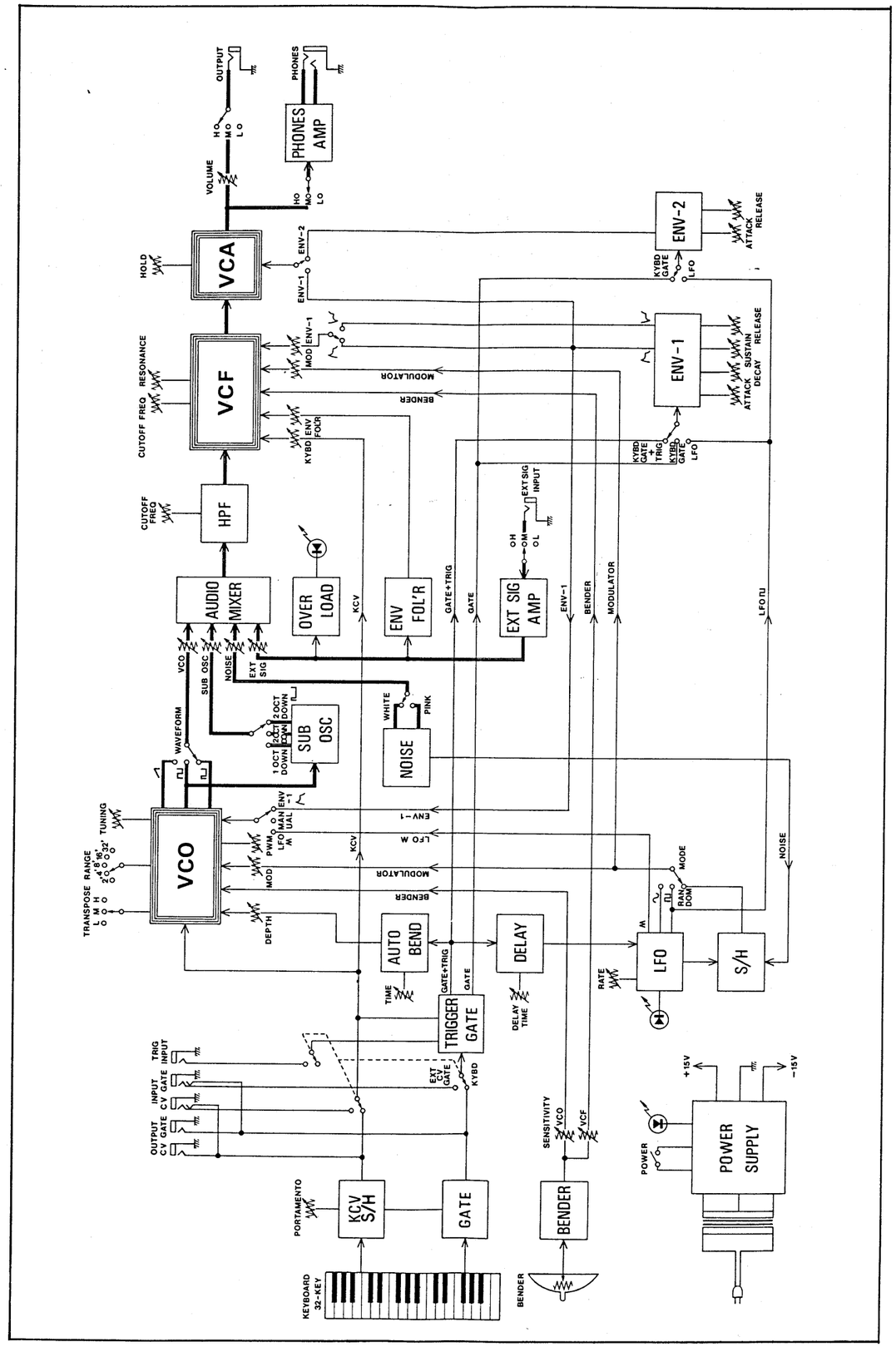
3. 2. The VCA is an amplifier whose gain is controlled by the control voltage from ENV-1 or ENV-2.

3. 3. The ENV-1 is triggered with GATE+TRIG, GATE, and LFO signals. The ENV-1 generates the control voltage which varies with time according to the four control settings: Attack Time, Decay Time, Sustain Level, and Release Time. The resulting voltage envelope is used to control the VCO (PWM), VCF, and VCA.

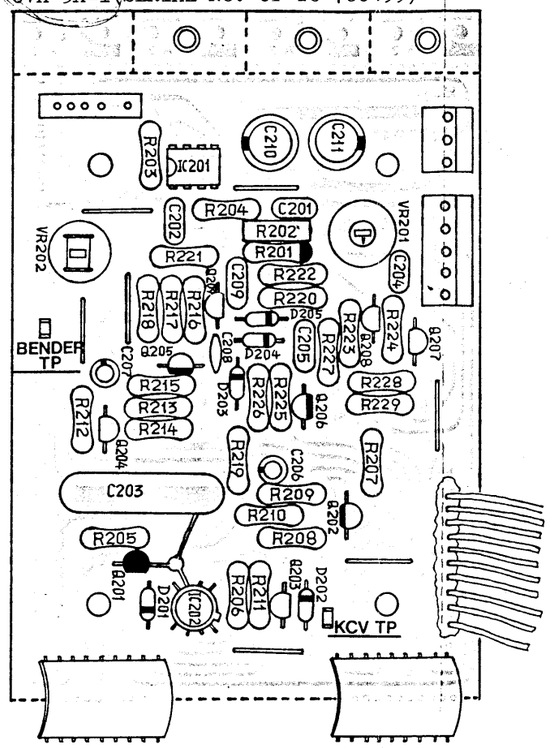
3. 4. The ENV-2 is triggered with GATE and LFO signals. The ENV-2 has two control settings: Attack Time and Release Time. The resulting voltage envelope is used to control the VCA.

4. POWER SUPPLY BOARD ASSEMBLY (PSH-26, PSH-34, PSH-27)

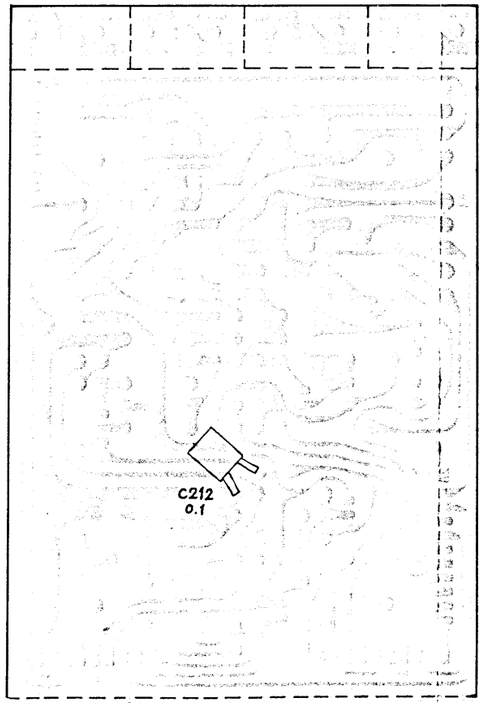
Provides regulated, stable +15V and -15V.
PSH-26 (AC 100V), PSH-34 (AC 117V), or PSH-27 (AC 220/240V) is used.



CVH-3A-1(SERIAL NO. UP TO 700499)



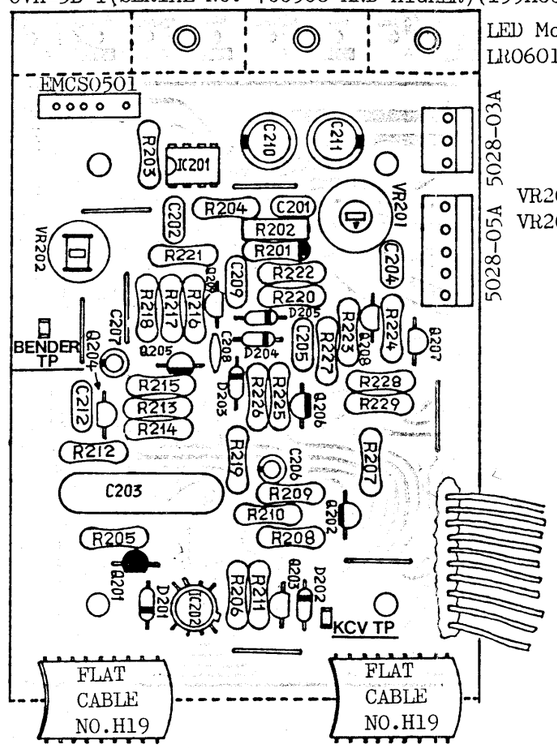
CVH-3A-1 - PARTS ON THE FOIL SIDE



CVH-3B-1(SERIAL NO. 700500 AND HIGHER)(159H003B-1)

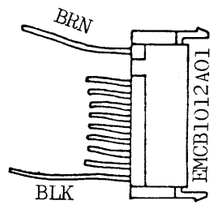
LED Mounting PCB
LR0601 x 3

VR201: F1 ADJ
VR202: BENDER ADJ



TO CVH-3-2(1-9)

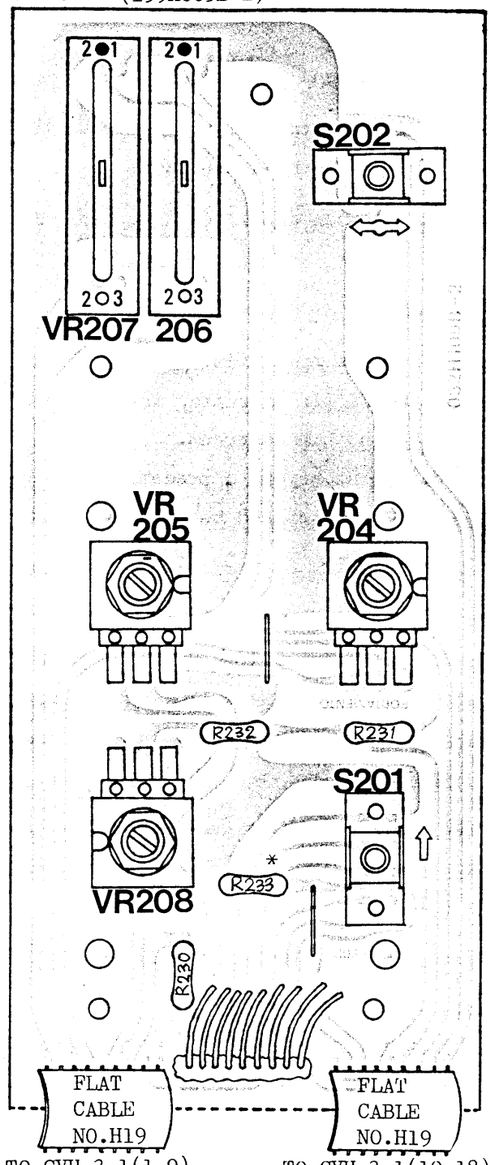
TO CVH-3-2(19-27)



2SC1740(Q) or 2SC945(Q)
2SA826(Q) or 2SA733(Q)
2SK30A(GR)
1S2473
Test Point 59BS8806
1/4W Resistor
Metal Film Resistor
1/2W Resistor
Electrolytic
Mylar
Ceramic

CAUTION: Be careful when moving the flat cable connections.

CVH-3B-2 (159H003B-2)

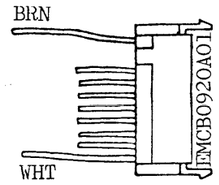


TO CVH-3-1(1-9)

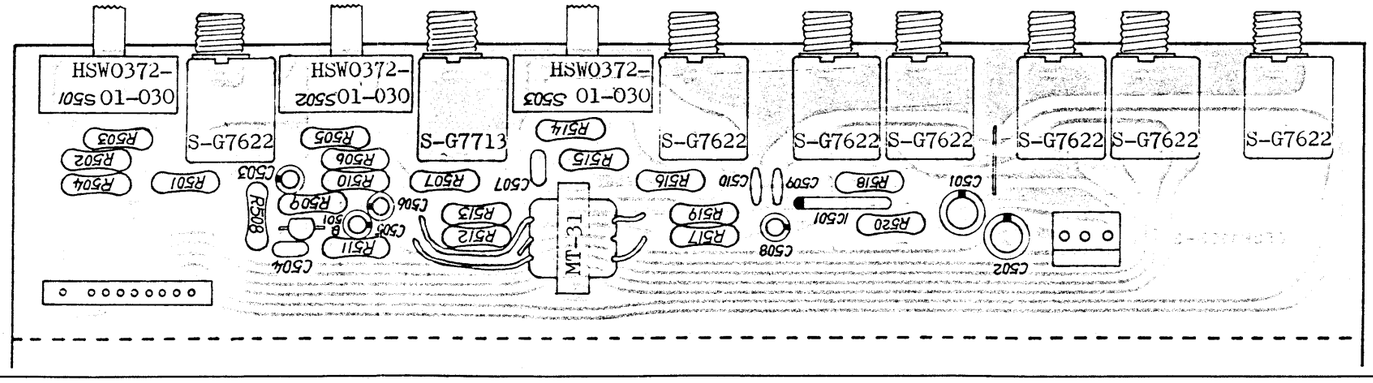
TO CVH-3-1(10-18)

S201 (SLE642-18P): KYBD/EXT CV GATE
S202 (SLE623-18P): TRANSPOSE
VR204 (VM10R-K15A26 2MA): PORTAMENTO
VR205 (VM10R-K20A14 10KA): VOLUME
VR206 (LFE9R-C16 100KB): VCF(SENSITIVITY)
VR207 (LFE9R-C16 100KB): VCO(SENSITIVITY)
VR208 (VM10R-K15B15 100KB): TUNING

*R233: On the foil side of CVH-3A-2



VCOH-3B(3A)-3 (152H002B-3)



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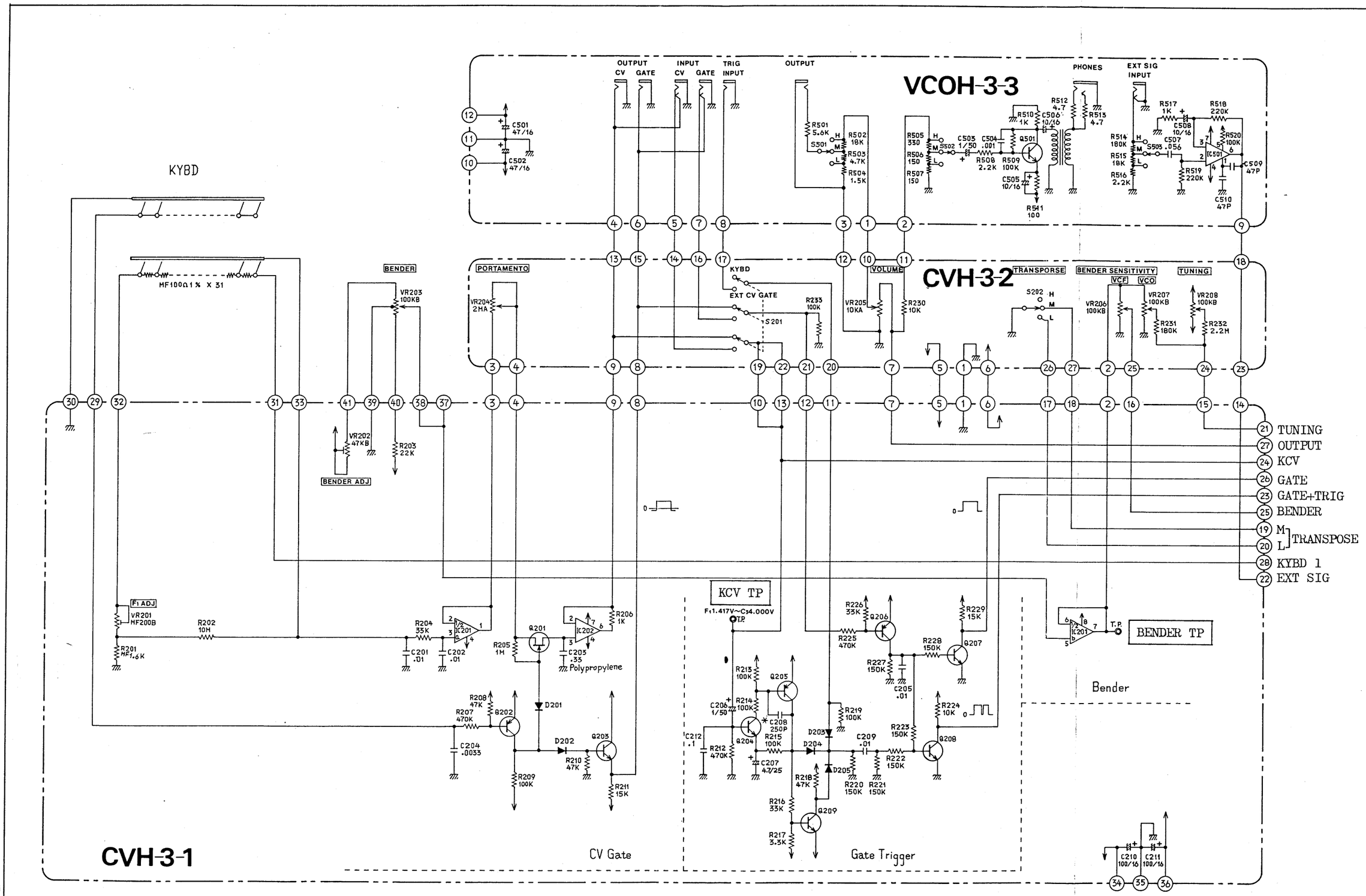

VCOH-3-3
CVH-3-2
CVH-3-1
KYBD
MF100Ω1% X 31
BENDER
VR203 100KB
VR202 47KB
R203 22K
BENDER ADJ
F1 ADJ
VR201 MF200B
R201 MF1.6K
R202 10H
PORTAMENTO
VR204 2MA
OUTPUT CV GATE
INPUT CV GATE
TRIG INPUT
OUTPUT
C501 47/16
C502 47/16
R501 5.6K
R502 18K
R503 4.7K
R504 1.5K
S501
KYBD
EXT CV GATE
S201
R233 100K
VOLUME
VR205 10KA
R230 10K
PHONES
EXT SIG INPUT
R505 330
R506 150
R507 150
S502
C503 1/50
C504 .001
R508 2.2K
R509 100K
Q501
R510 1K
C506 10/16
R512 4.7
R513 4.7
C505 10/16
R541 100
R514 180K
R515 18K
R516 2.2K
S503
C507 .056
R517 1K
C508 10/16
R518 220K
R519 220K
R520 100K
IC501
C509 47P
C510 47P
TRANSPORSE
S202
BENDER SENSITIVITY
VCF
VCO
VR206 100KB
VR207 100KB
R231 180K
TUNING
VR208 100KB
R232 2.2M
21 TUNING
27 OUTPUT
24 KCV
26 GATE
23 GATE+TRIG
25 BENDER
19 M
20 L
TRANSPOSE
28 KYBD 1
22 EXT SIG
IC201 µPC1458C
IC202 LF13741H
IC501 TA7136P
R202 10H
R204 35K
R205 1H
R206 1K
C201 .01
C202 .01
C203 .35 Polypropylene
Q201
IC201
IC202
D201
D202
Q202
Q203
R207 470K
R208 47K
C204 .0033
R209 100K
R210 47K
R211 15K
CV Gate
KCV TP
F=1.417V~C=4.000V
T.P
R213 100K
R214 100K
C206 1/50
C212 .1
R212 470K
Q204
Q205
C208 250P
R215 100K
C207 4.7/25
R216 35K
R217 3.3K
R218 47K
Q209
D203
D204
D205
R219 100K
C209 .01
R220 150K
R221 150K
R222 150K
R223 150K
R224 10K
Q208
R225 470K
R226 33K
Q206
R227 150K
C205 .01
R228 150K
Q207
R229 15K
Gate Trigger
BENDER TP
Bender
C210 100/16
C211 100/16
All diodes are 1S2473.
All PNP Tr's are 2SA826-Q.
All NPN Tr's are 2SC1740-Q.
*C208: 47p (Up To 711099)

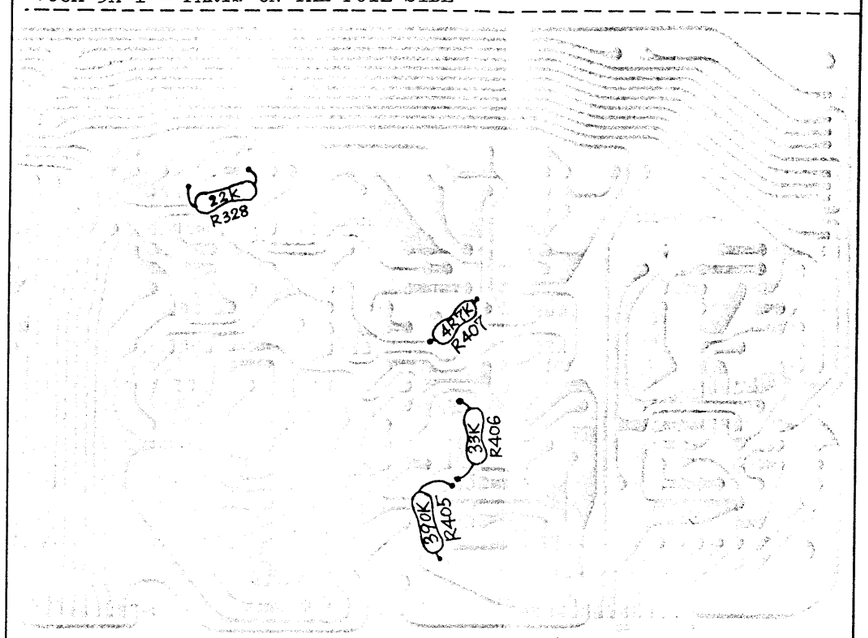
VR307 (LFE9R-C16 100KA): RATE
VR308 (LFE9R-C16 500KB): DELAY TIME
VR309 (LFE9R-C16 100KA): TIME
VR310 (LFE9R-C16 1MA): DEPTH
VR311 (LFE9R-C16 20KA): MOD

VR314 (LFE9R-C16 100KB): PULSE WIDTH
VR315 (LFE9R-C16 100KA): NOISE
VR316 (LFE9R-C16 100KA): SUB OSC
VR317 (LFE9R-C16 100KA): VCO
VR318 (LFE9R-C16 100KA): EXT SIG

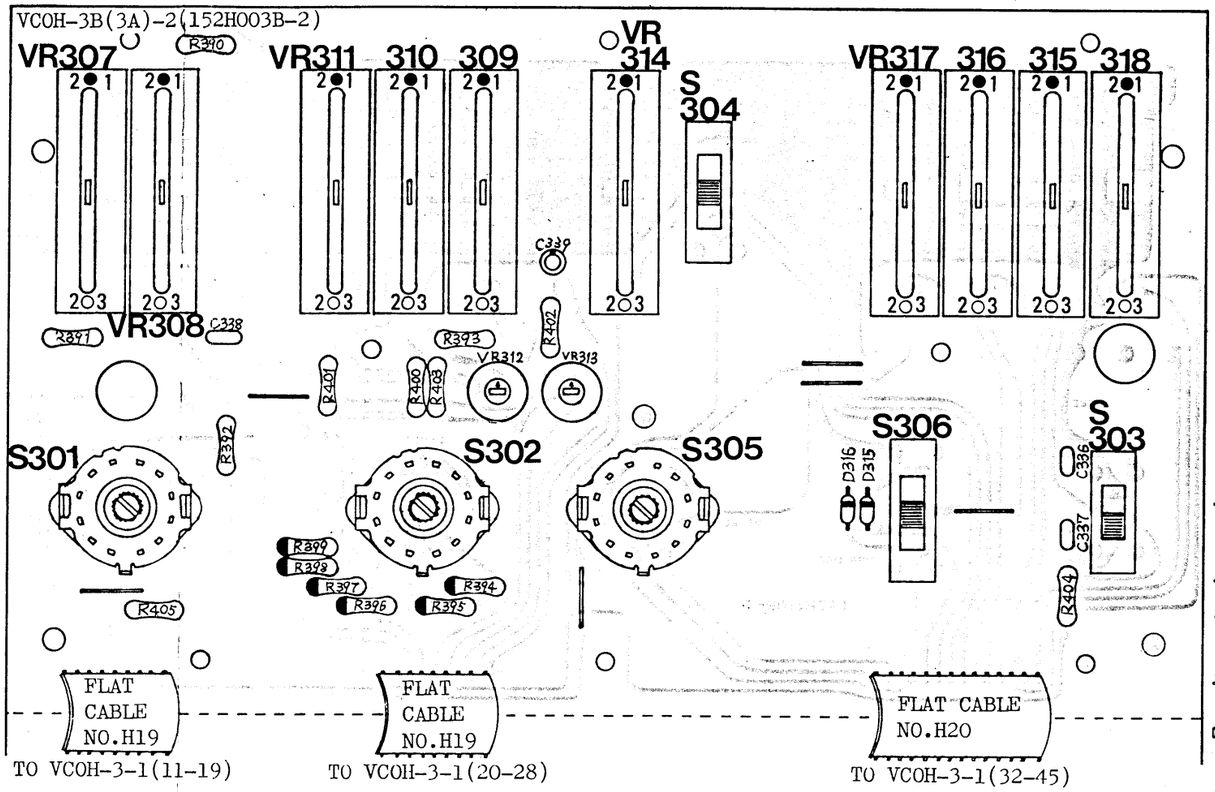
S301 (SRM1033-K15): MODE
S302 (SRM1025-K15): RANGE
S303 (SSB022-12P): NOISE
S304 (SSB023-12P): PWM MODE
S305 (SRM1033-K15): WAVEFORN
S306 (SSB023-12P): SUB OSC

VR301: NOISE
VR302: RANGE
VR303: KCV
VR304: PWM 5%
VR305: LINEARITY
VR306: PWM 50%
VR312: FREQ
VR313: WIDTH

VCOH-3A-1 - PARTS ON THE FOIL SIDE



VCOH-3B(3A)-2(152H003B-2)



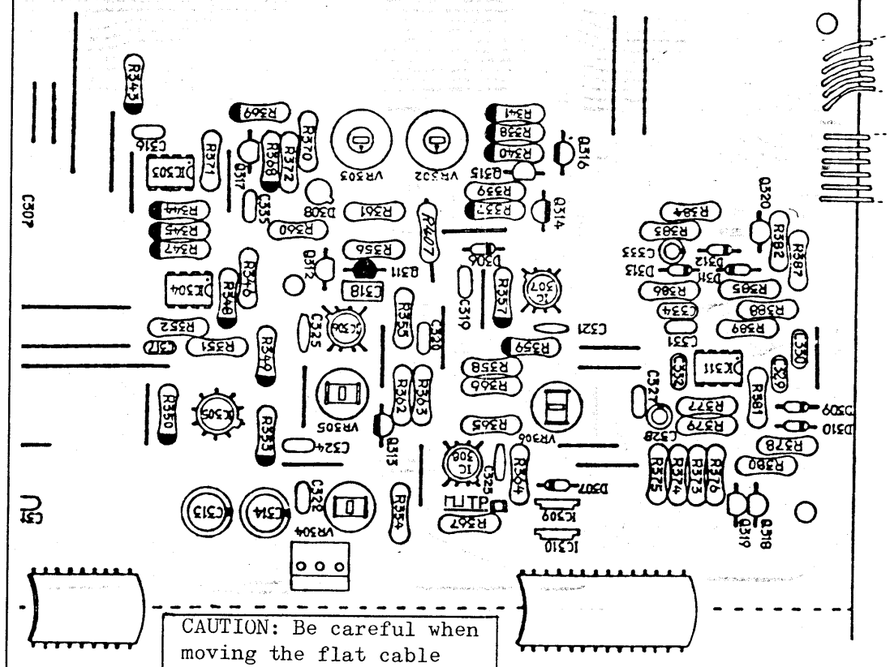
TO VCOH-3-1(11-19)

TO VCOH-3-1(20-28)

TO VCOH-3-1(32-45)

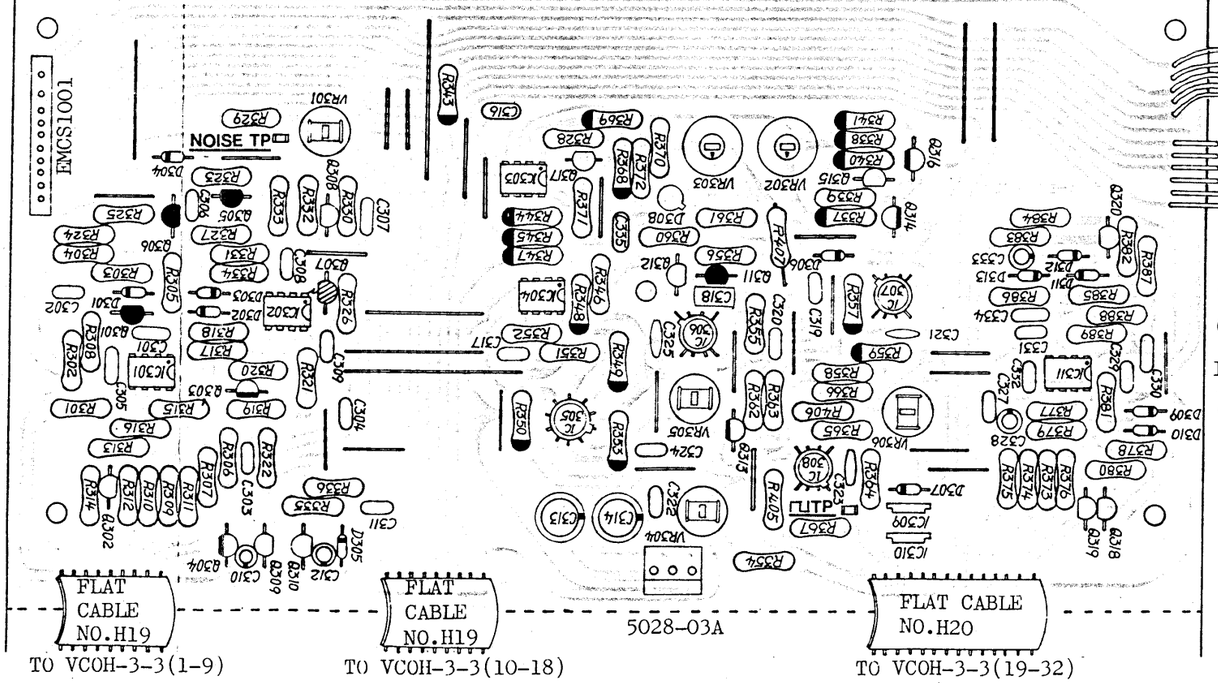
2SC1740(Q)
2SA826(Q)
2SK30A(GR)
1S2473
Test Point 59BS8806
2SC828

VCOH-3A-1(SERIAL NO. UP TO 710749) Parts not shown are the same as VCOH-3B-1.



CAUTION: Be careful when moving the flat cable connections.

VCOH-3B-1(SERIAL NO. 710750 AND HIGHER)(152H003B-1)



TO VCOH-3-3(1-9)

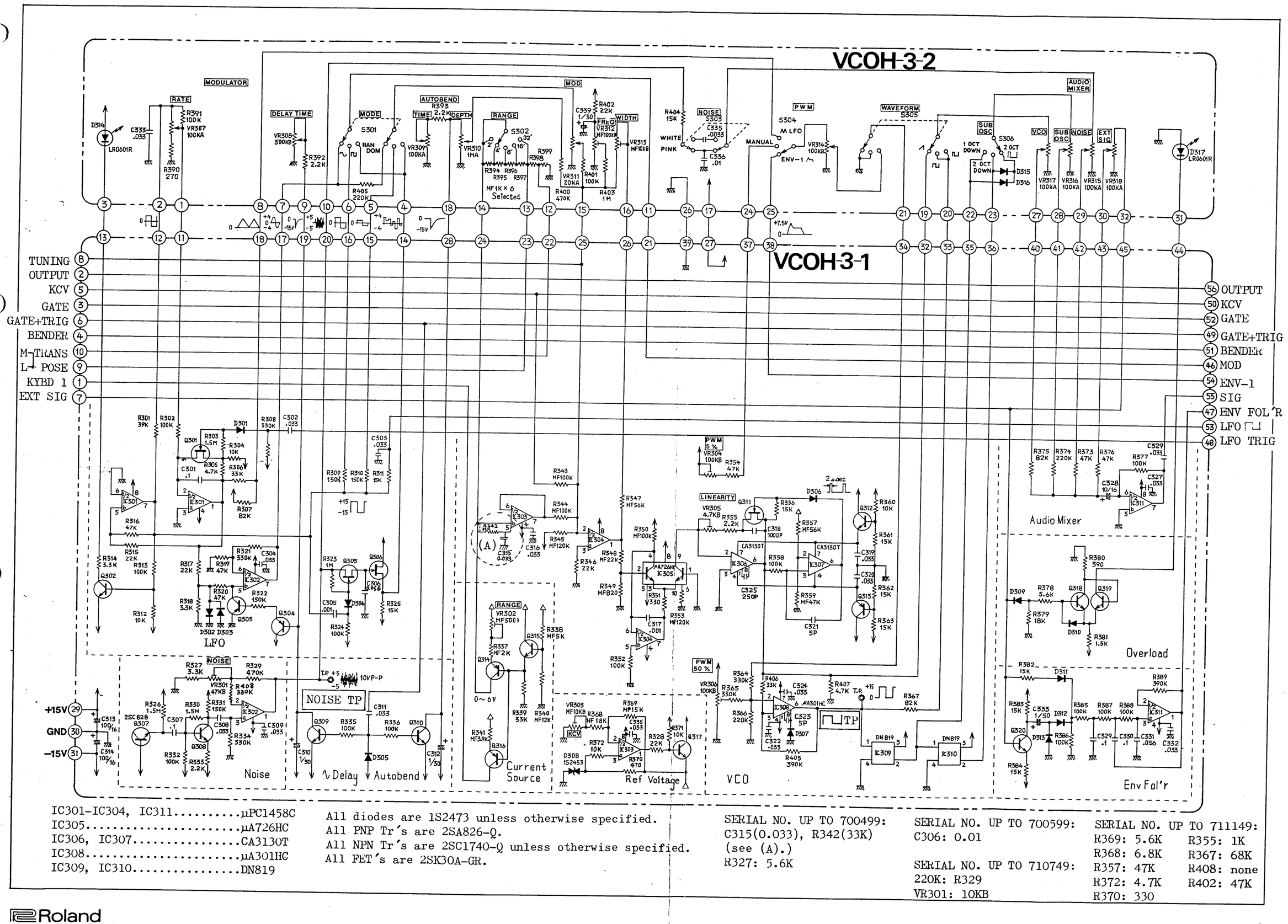
TO VCOH-3-3(10-18)

TO VCOH-3-3(19-32)

BRN
GRN
BLU
BRN

1S2453
1/4W Resistor
Metal Film Pesistor
Electrolytic
Mylar
Ceramic
Styrol

Roland



IC301–IC304, IC311.....μPC1458C
IC305.....μA726HC
IC306, IC307.....CA3130T
IC308.....μA301HC
IC309, IC310.....DN819

All diodes are 1S2473 unless otherwise specified.
All PNP Tr's are 2SA826-Q.
All NPN Tr's are 2SC1740-Q unless otherwise specified.
All FET's are 2SK30A-GR.

SERIAL NO. UP TO 700499:
C315(0.033), R342(33K) (see (A).)
R327: 5.6K

SERIAL NO. UP TO 700599:
C306: 0.01

SERIAL NO. UP TO 710749:
220K: R329
VR301: 10KB

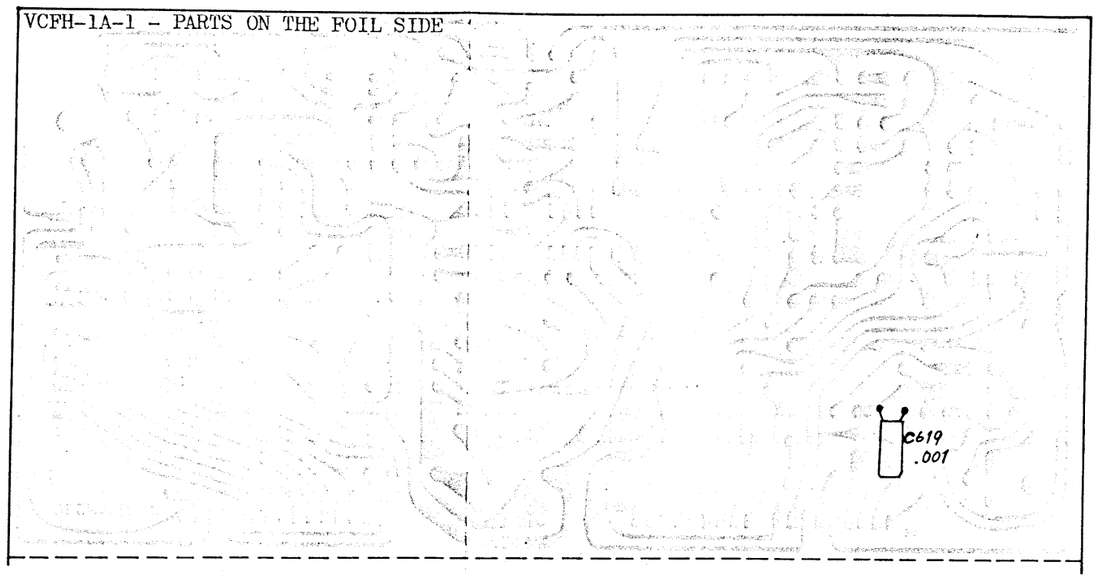
SERIAL NO. UP TO 711149:
R369: 5.6K
R368: 6.8K
R357: 47K
R372: 4.7K
R370: 330
R355: 1K
R367: 68K
R408: none
R402: 47K

S601 (SSB022-12P): VCF
S602 (SSB022-12P): ENV-1/ENV-2
S603 (SSB023-12P): GATE+TRIG/GATE/LFO (ENV-1)
S604 (SSB022-12P): GATE/LFO (ENV-2)
VR606 (LFE9R-C16 500KD): CUTOFF FREQ (HPF)
VR607 (LFE9R-C16 100KB): CUTOFF FREQ (VCF)
VR608 (LFE9R-C16 100KB): KYBD
VR609 (LFE9R-C16 100KA): MOD
VR610 (LFE9R-C16 10CKB): EXT SIG/ENV FCL R
VR611 (LFE9R-C16 100KB): ENV-1
VR612 (LFE9R-C16 100KA): RESONANCE
VR613 (LFE9R-C16 100KB): HOLD

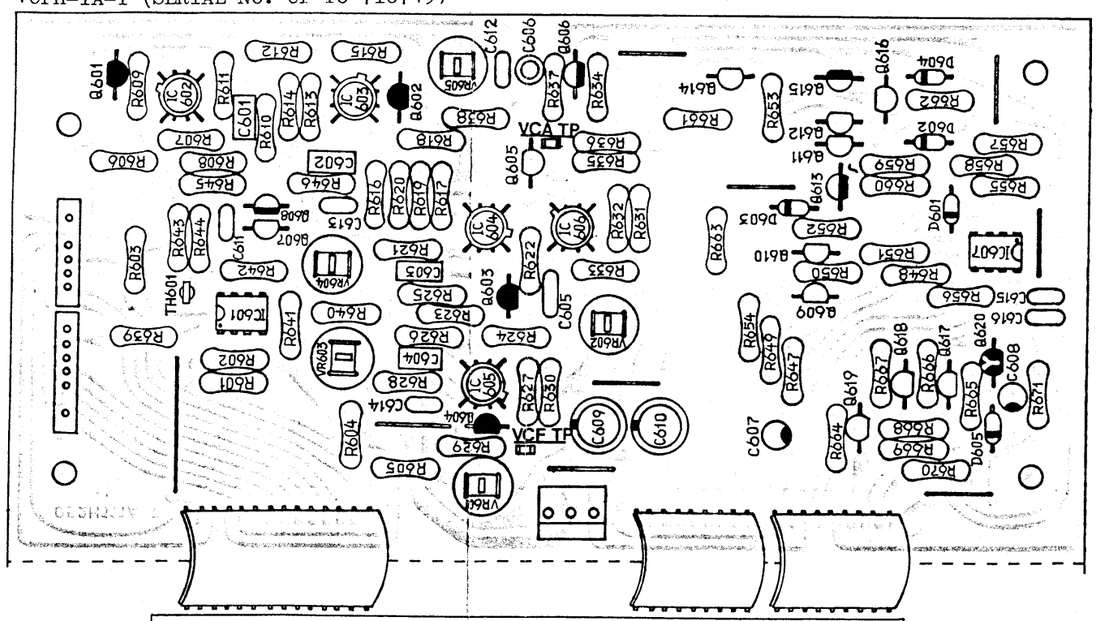
VR614 (LFE9R-C16 100KB): S(ENV-1)
VR615 (LFE9R-C16 1MA): R(ENV-1)
VR616 (LFE9R-C16 500KA): A(ENV-1)
VR617 (LFE9R-C16 1MA): D(ENV-1)
VR618 (LFE9R-C16 1MA): R(ENV-2)
VR619 (LFE9R-C16 500KA): A(ENV-2)

VR601: RESONANCE
VR602: DC BALANCE
VR603: FREQ
VR604: WIDTH
VR605: VCA CUTOFF

VCFH-1A-1 - PARTS ON THE FOIL SIDE

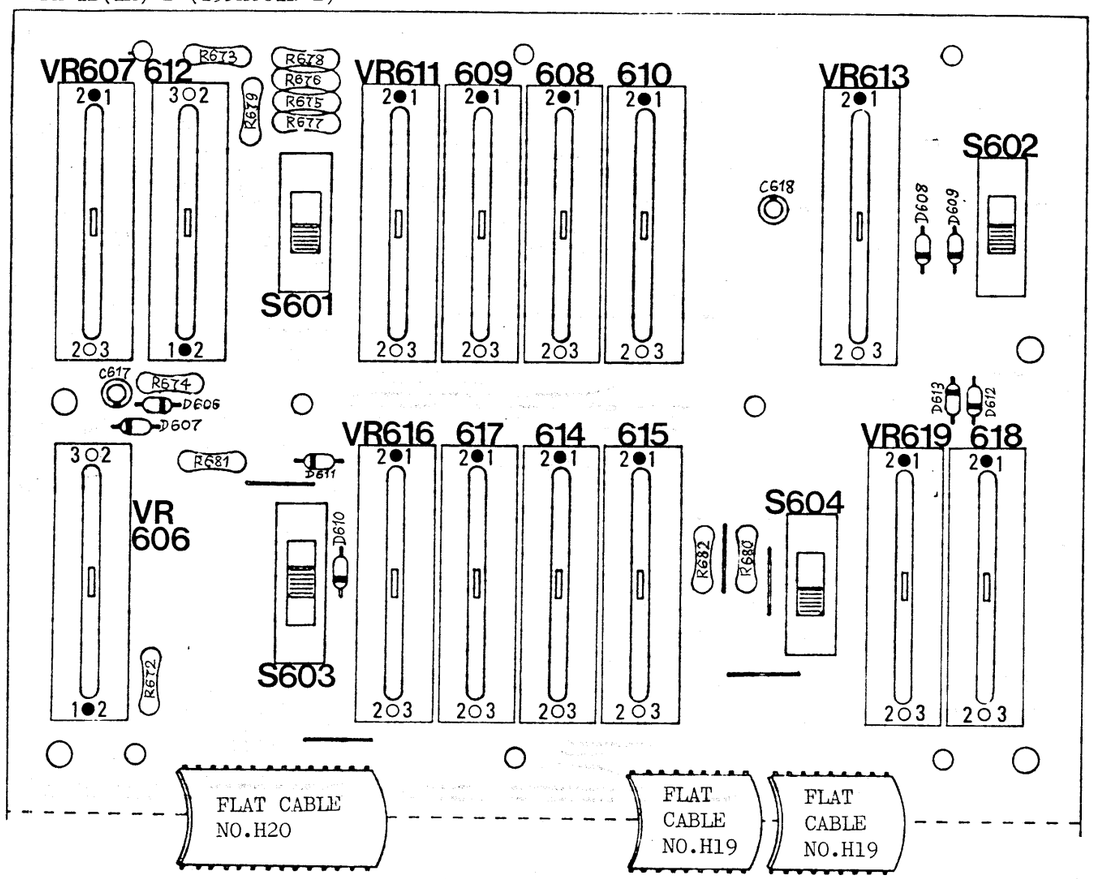


VCFH-1A-1 (SERIAL NO. UP TO 710749)



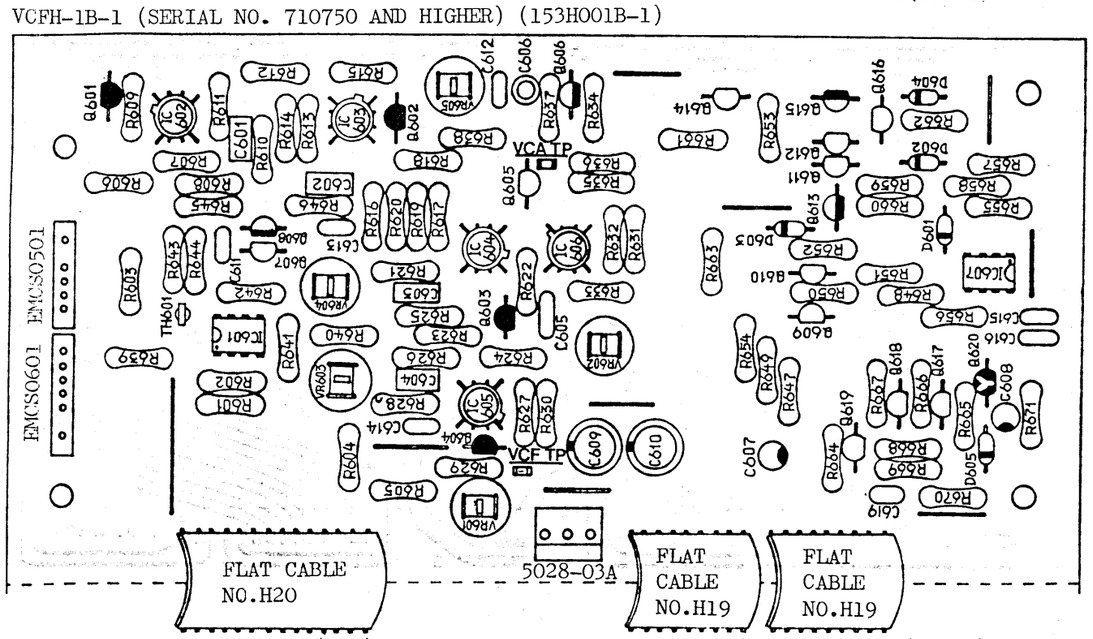
CAUTION: Be careful when moving the flat cable connections.

VCFH-1B(1A)-2 (153H001B-2)



TO VCFH-1-1(12-25) TO VCFH-1-1(29-37) TO VCFH-1-1(38-46)

VCFH-1B-1 (SERIAL NO. 710750 AND HIGHER) (153H001B-1)



TO VCFH-1-2(1-4) TO VCFH-1-2(15-23) TO VCFH-1-2(24-32)

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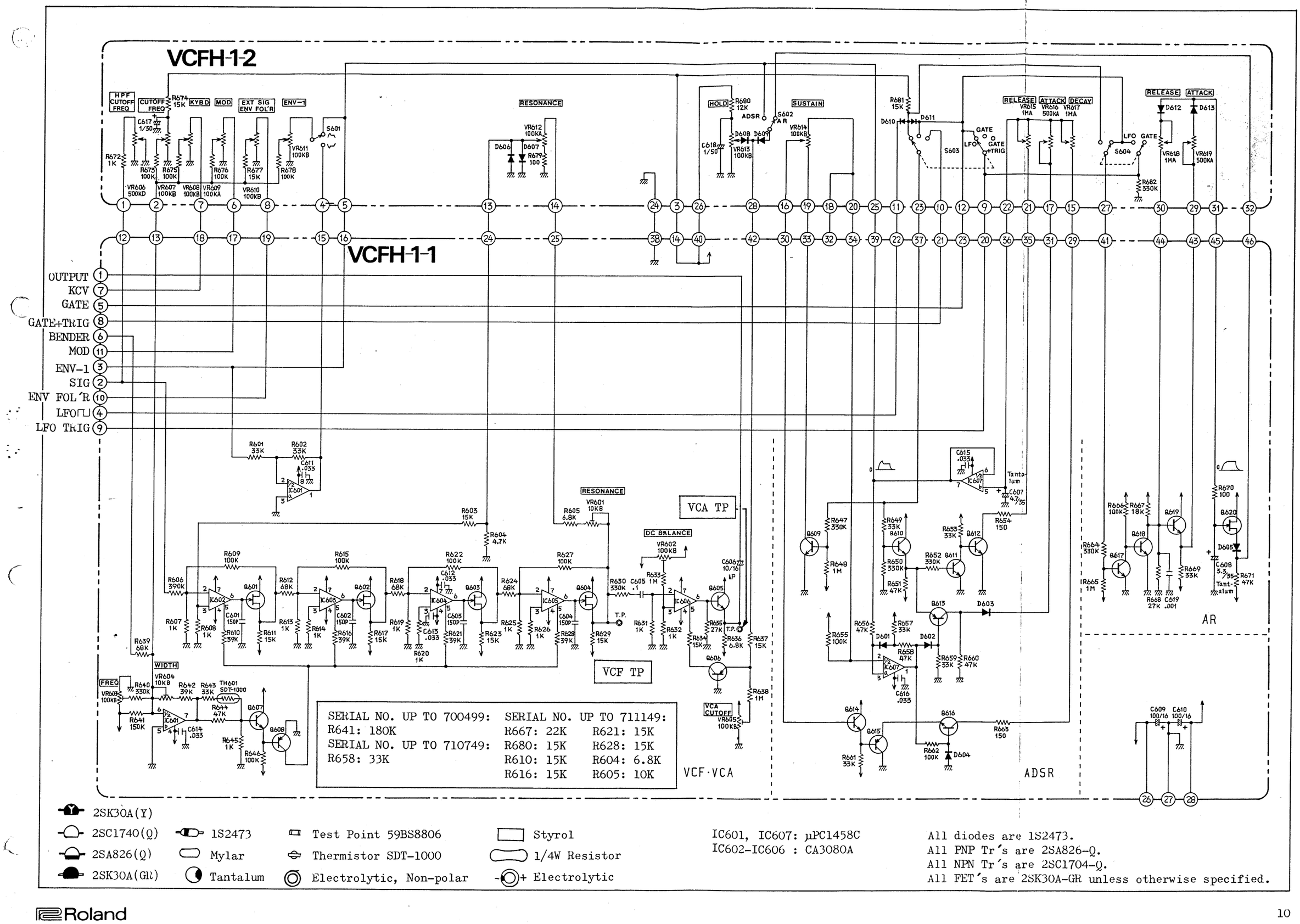
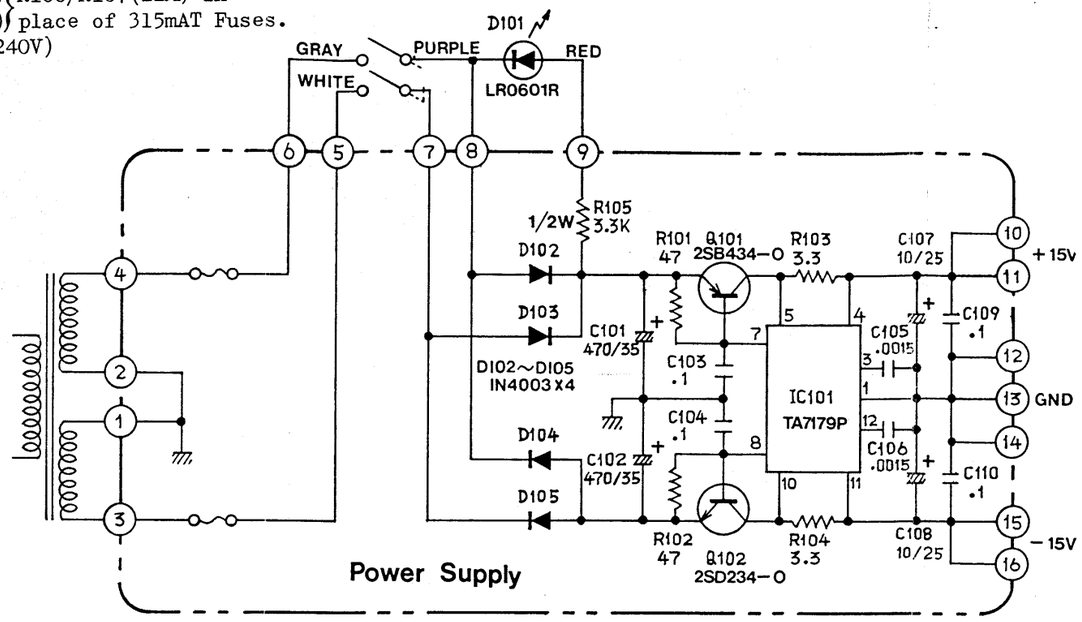
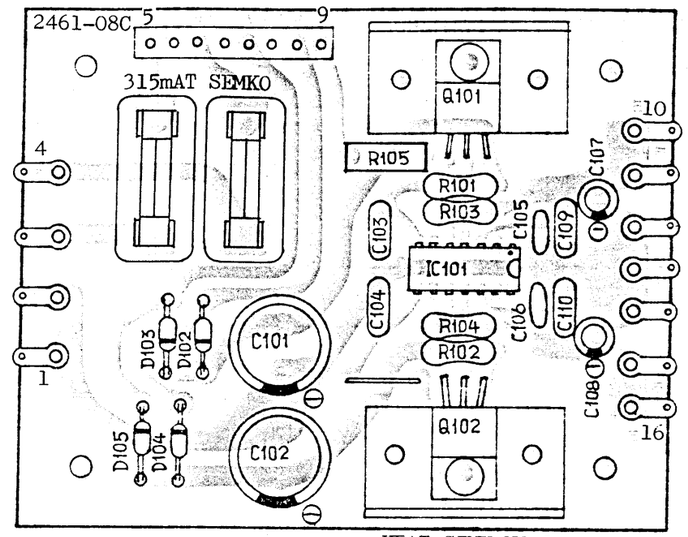

VCFH-1-2
VCFH-1-1
HPF CUTOFF FREQ
CUTOFF FREQ
KYBD
MOD
EXT SIG ENV FOL'R
ENV-1
RESONANCE
HOLD
ADSR
SUSTAIN
RELEASE
ATTACK
DECAY
GATE
LFO
GATE TRIG
OUTPUT
KCV
GATE
GATE+TRIG
BENDER
MOD
ENV-1
SIG
ENV FOL'R
LFO
LFO TRIG
VCA TP
VCF TP
DC BALANCE
WIDTH
FREQ
VCA CUTOFF
T.P.
VCF·VCA
ADSR
AR
SERIAL NO. UP TO 700499:
R641: 180K
SERIAL NO. UP TO 710749:
R658: 33K
SERIAL NO. UP TO 711149:
R667: 22K
R680: 15K
R610: 15K
R616: 15K
R621: 15K
R628: 15K
R604: 6.8K
R605: 10K
2SK30A(Y)
2SC1740(Q)
2SA826(Q)
2SK30A(GR)
1S2473
Mylar
Tantalum
Test Point 59BS8806
Thermistor SDT-1000
Electrolytic, Non-polar
Styrol
1/4W Resistor
+ Electrolytic
IC601, IC607: μPC1458C
IC602-IC606 : CA3080A
All diodes are 1S2473.
All PNP Tr's are 2SA826-Q.
All NPN Tr's are 2SC1704-Q.
All FET's are 2SK30A-GR unless otherwise specified.

PSH-26(100V)
PSH-34(117V)
PSH-27(220/240V)
} R106/R107(22Ω) in place of 315mAT Fuses.



PSH-26(146H026)
PSH-27(146H027)
PSH-34(146H034)



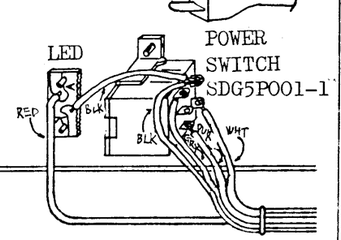
HEAT SINK NO.1

100V
SDG-5P001-1

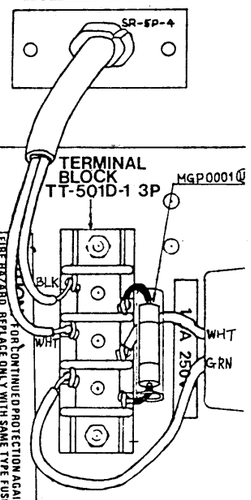
117V 2P
CSA規格
SDG-5P001-1

ULA規格
SDG-5P001-1

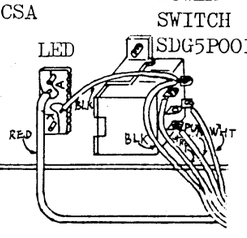
117V



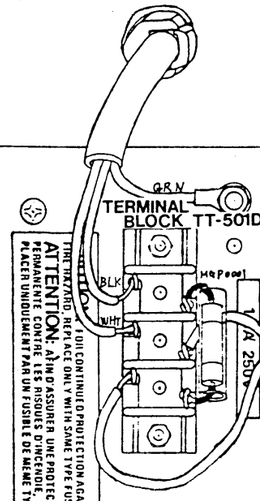
HCLDER NO.146



117V CSA

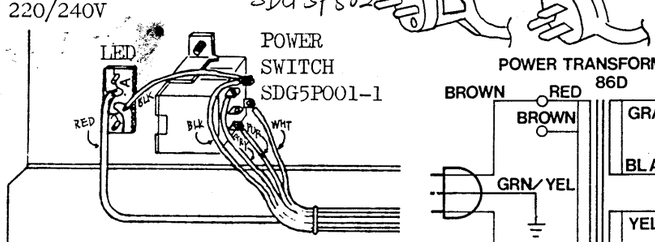


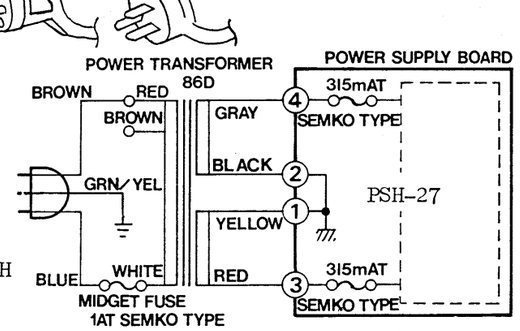
SR-6N3-4



220/240V

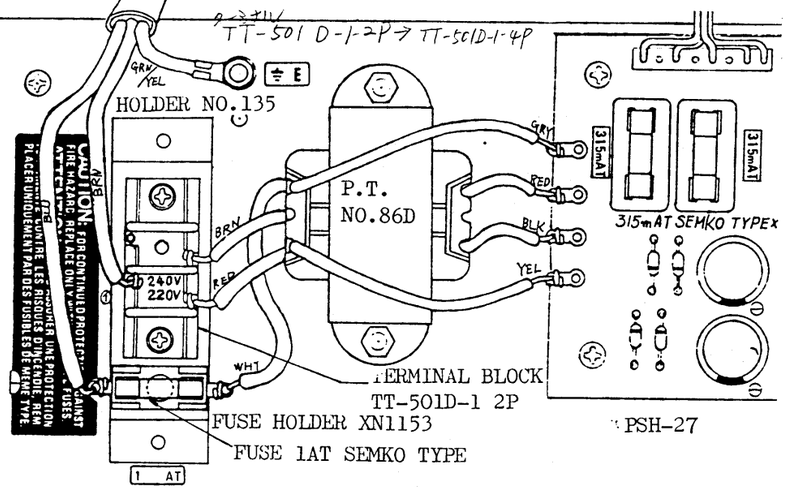
240V
SDG-5P502





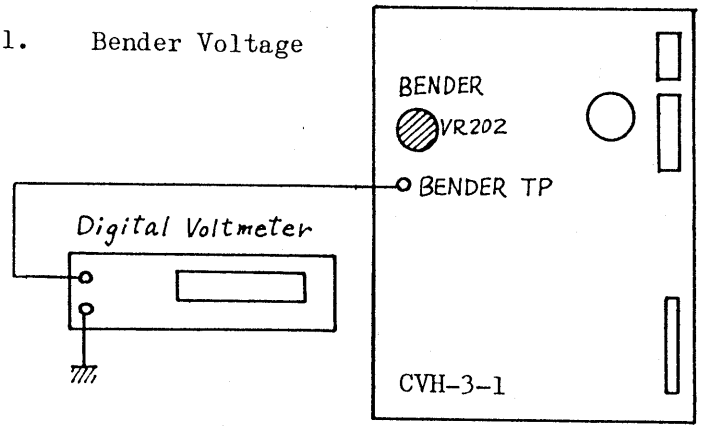
HOLDER NO.134
CORD BUSH
1702B

TT-501D-1-2P → TT-501D-1-4P



ADJUSTMENT

1. Bender Voltage



Make adjustment under temperatures where the SH-1 is usually used.

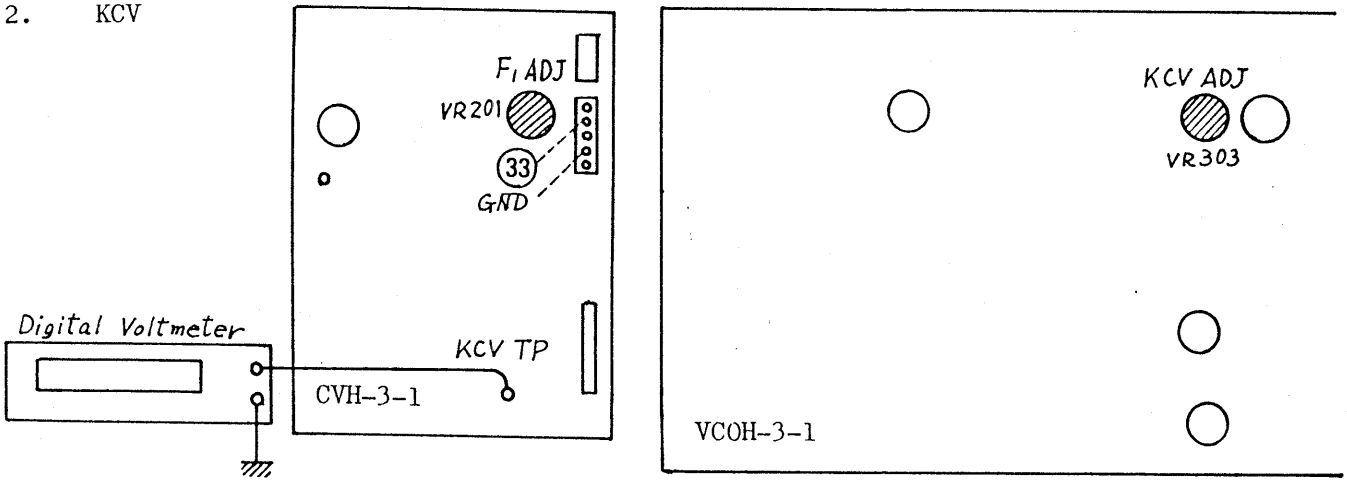
Allow at least 5 minutes as a warm-up period.

Connect a digital voltmeter to BENDER TP.

Set Bender Lever at full - position and read the value (negative).

Then set the Bender Lever at full + position and adjust VR202 so that the same reading (positive) is obtained. Tolerance is ±30mV.

2. KCV

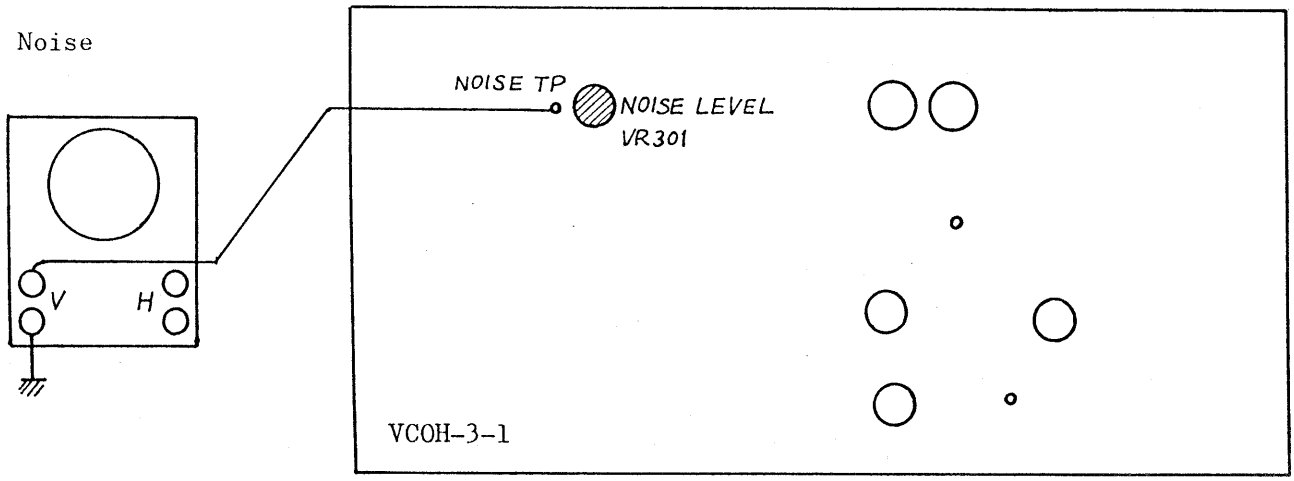


Connect a digital voltmeter to KCV TP.

Connect No.33 terminal to GND. While depressing F1, F2, and F3 in order, adjust VR303 to obtain 1V/oct relation. Tolerance is ±2mV.

Next, disconnect F1 from GND. While depressing F1, adjust VR201 to obtain 1.417V. Tolerance is ±1mV.

3. Noise

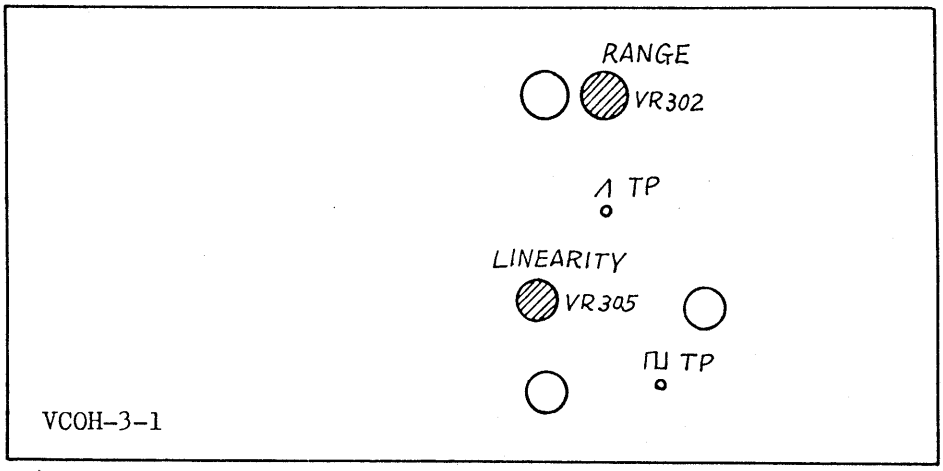


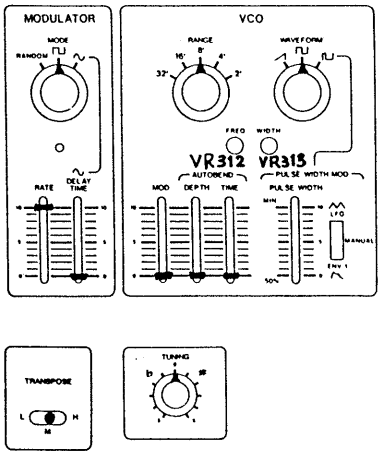
Connect an oscilloscope to NOISE TP.

Adjust VR301 to obtain noise slightly over 10Vp-p.

4. VCO

When adjusting VCO, be sure to continue to depress respective key.





For the adjustment that follows, use a completely tuned electronic instrument or a tuning meter. Adjustment can be made either by checking for the beat sound or by consulting the Lissajous figure on the oscilloscope.

4. a. WIDTH ADJUSTMENT

1) Set controls on the control panel as shown above.
2) Tune F1 to pitch with TUNING control on the control panel.
   (If this tuning is difficult only with TUNING control, adjust VR312 FREQ control, too.)
3) Tune F2 to pitch with VR313 WIDTH control.
4) Again, tune F1 to pitch with TUNING control.
5) Check to see to which F2 is out of tune, to higher pitch or to lower pitch.
6) Turn VR313 WIDTH control to make the margin of mistune still bigger.
   (If F2 is broadly out of tune, turn VR313 largely.
   If F2 is slightly out of tune, turn VR313 only slightly.)
7) Tune F1 to pitch over again.
8) Repeat steps 5 thru 7 until both F1 and F2 are tuned to pitch roughly.
9) Tune F3 to pitch with VR313 WIDTH control.
10) Tune F1 to pitch with TUNING control.
11) Check to see to which F3 is out of tune, to higher pitch or to lower pitch.
12) Turn VR313 WIDTH control to make the margin of mistune still bigger.
   (If F3 is broadly out of tune, turn VR313 largely.
   If F3 is slightly out of tune, turn VR313 only slightly.)
13) Tune F1 to pitch over again.
14) Repeat steps 11 thru 13 until F1 and F3 are tuned correctly.
15) Set TUNING control the control panel at CENTER position.
16) Tune F1 to pitch with VR312 FREQ control.

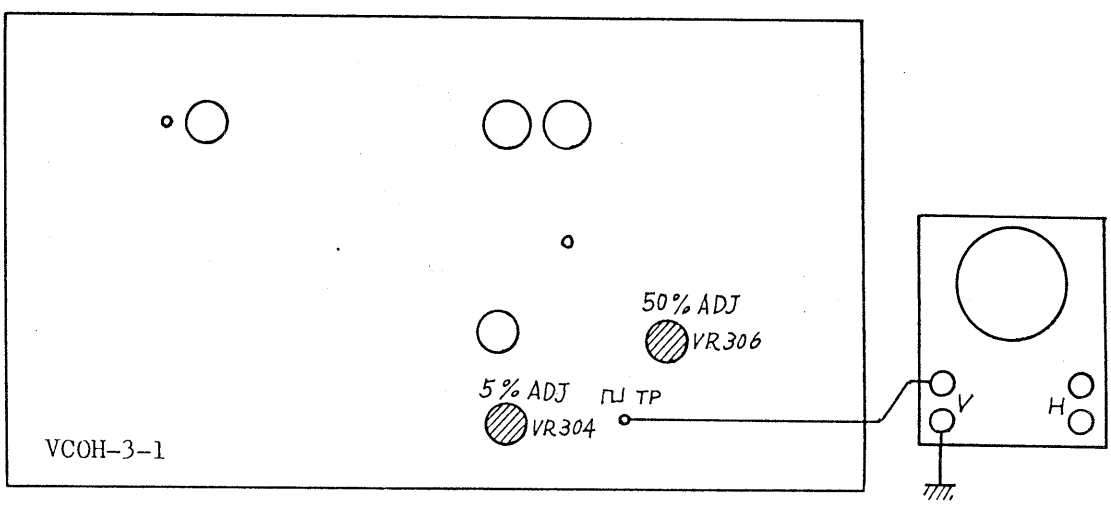
4. b. LINEARITY ADJUSTMENT

1) Set Range at 2' and Transpose at M.
2) Tune F1 to pitch with TUNING control on the control panel.
3) Check to see to which F2 (F3) is out of tune, to higher pitch or to lower pitch.
4) Turn VR305 LINEARITY control so that F2 (F3) is out of tune in the opposite side to the above.
   (If F2 (F3) has been out of tune to a higher pitch, set it to a little lower pitch than standard pitch with VR305 LINEARITY control.
   If F2 (F3) has been out of tune to a lower pitch, set it to a little higher pitch than standard pitch with VR305 LINEARITY control.)
5) Repeat above steps 2 thru 4 until each of F1, F2 and F3 is tuned to pitch.

4. c. RANGE ADJUSTMENT

1) Set Range at 32' and Transpose at L.
2) Tune F1 to pitch with TUNING control on the control panel.
3) Raise Range and Transpose switches step by step and adjust VR302 RANGE adj control to tune F1 to pitch.
4) Set Range at 8' and Transpose at M.
5) Tune F1 to pitch with TUNING control on the control panel.
6) Raise Range and Transpose switches step by step and check to see to which the note is out of tune, higher or lower. Then turn VR302 RANGE adj control so that the note is slightly out of tune in the opposite side.
   That is, set VR302 RANGE adj control so that the mistune is bigger at the lower Range/Transpose position.
7) Repeat steps 4 thru 6 until the notes are tuned to pitch at every position of the Range/Transpose switches.
8) If it is very difficult to perfectly tune the note at all positions of Range/Transpose switches, adjustment should be done so that the notes are out of tune in the same side with Range - 8' and Transpose - M position as the center, and that the mistune is smaller in the higher pitch positions.

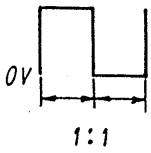
5. Square Wave

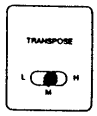


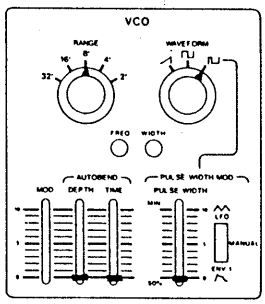
5. a. 50%

Set controls on the control panel and connect an oscilloscope.

Depress a key around the middle of keyboard and adjust VR306 to obtain 50% duty square wave.



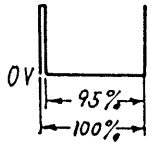


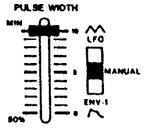


5. b. 5%

Set PULSE WIDTH control at 10.

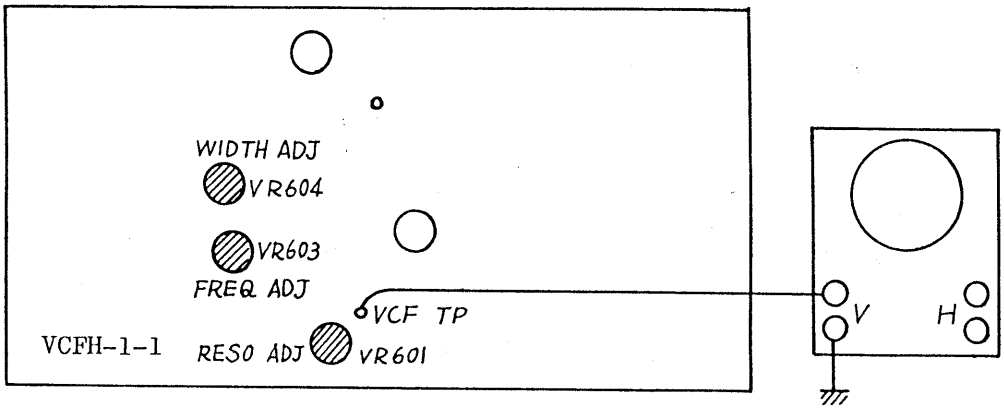
Depress a key around the middle of keyboard and adjust VR304 to obtain 5% duty square wave.





6. VCF

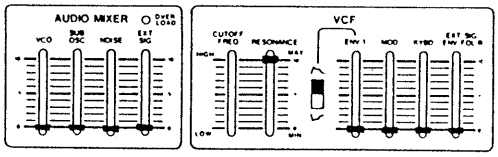
6. a. Resonance

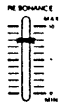


Connect an oscilloscope and set controls on the control panel as shown.

Adjust FREQ control so that VCF oscillates at about 1KHz.

Adjust VR601 so that VCF is at the onset of oscillating with RESONANCE control at 8 as shown at right.



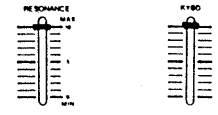


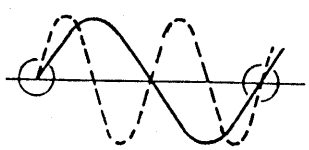
6. b. Width

Set KYBD and RESONANCE controls at MAX.

Depress A2 and adjust FREQ control so that VCF oscillates at about 1KHz.

While depressing C1 and C2 alternately, adjust VR604 to obtain octave relations.





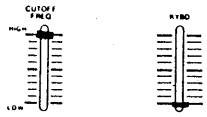
Roland

6. c. Frequency

Set KYBD control at 0.

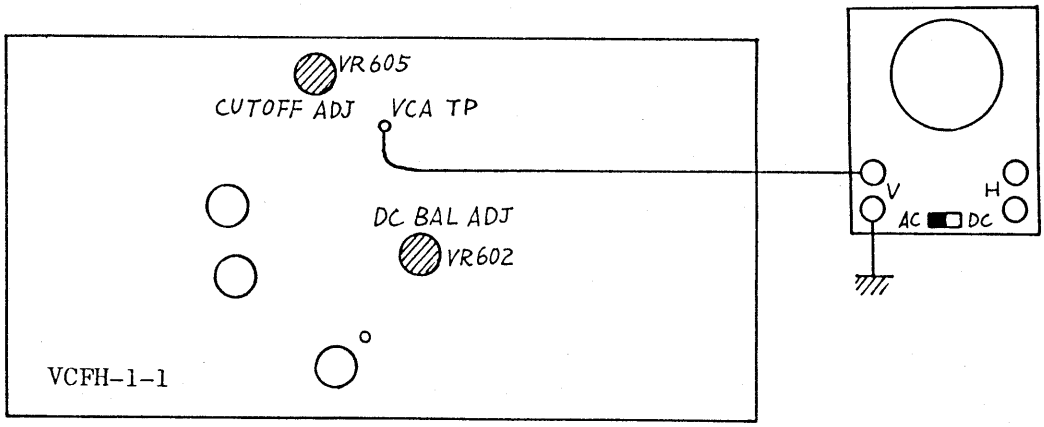
Set CUTOFF FREQ control at HIGH.

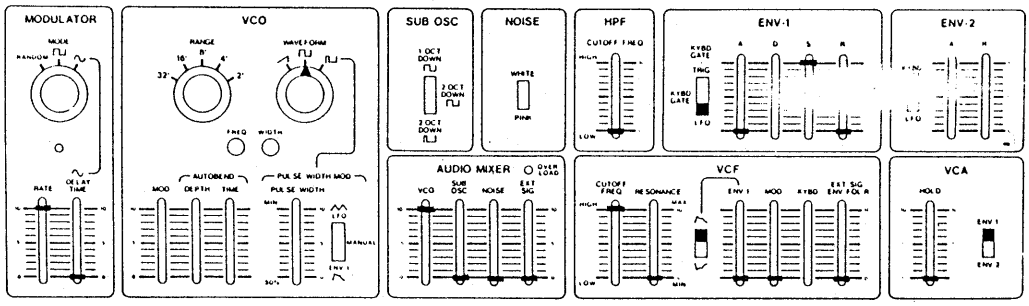
Adjust VR603 so that VCF oscillates at 20KHz.



7. VCA

7. a. Cutoff





Connect an oscilloscope to VCA TP.

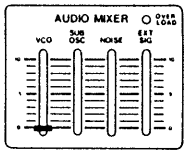
Set controls on the control panel as shown.

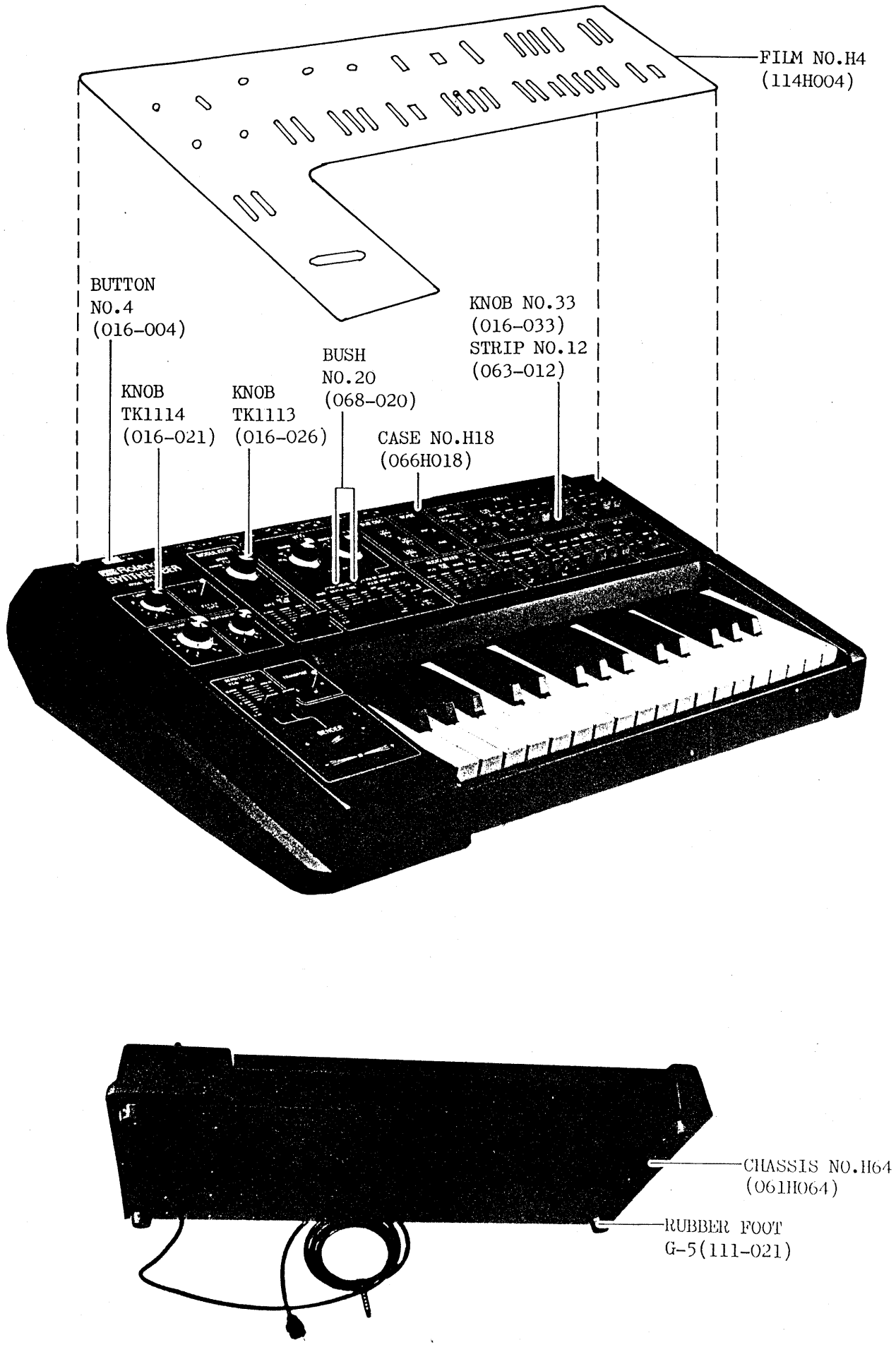
While gradually raising the oscilloscope gain to the maximum, adjust VR605 so that output signal is just about to disappear.

7. b. DC Balance

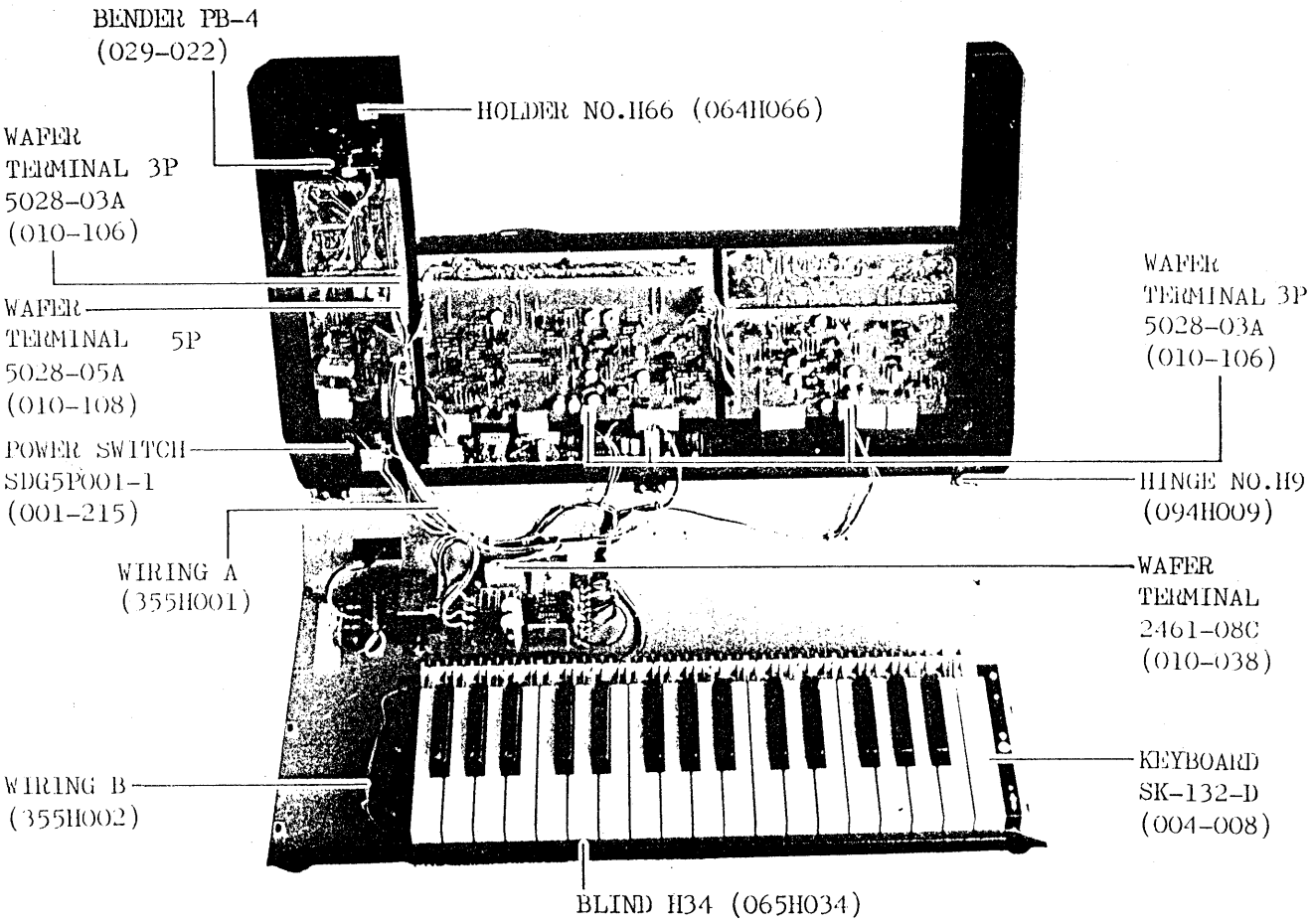
Set VCO control on AUDIO MIXER control panel at 0.

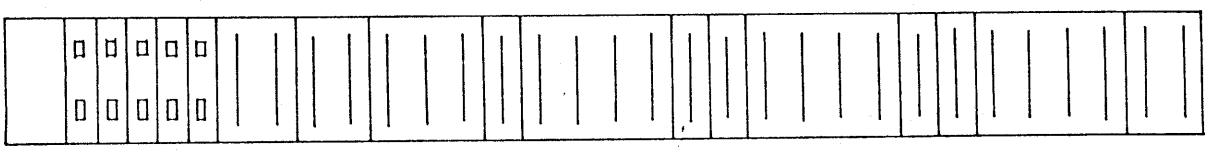
While depressing a key, adjust VR602 so that output variation is minimum.

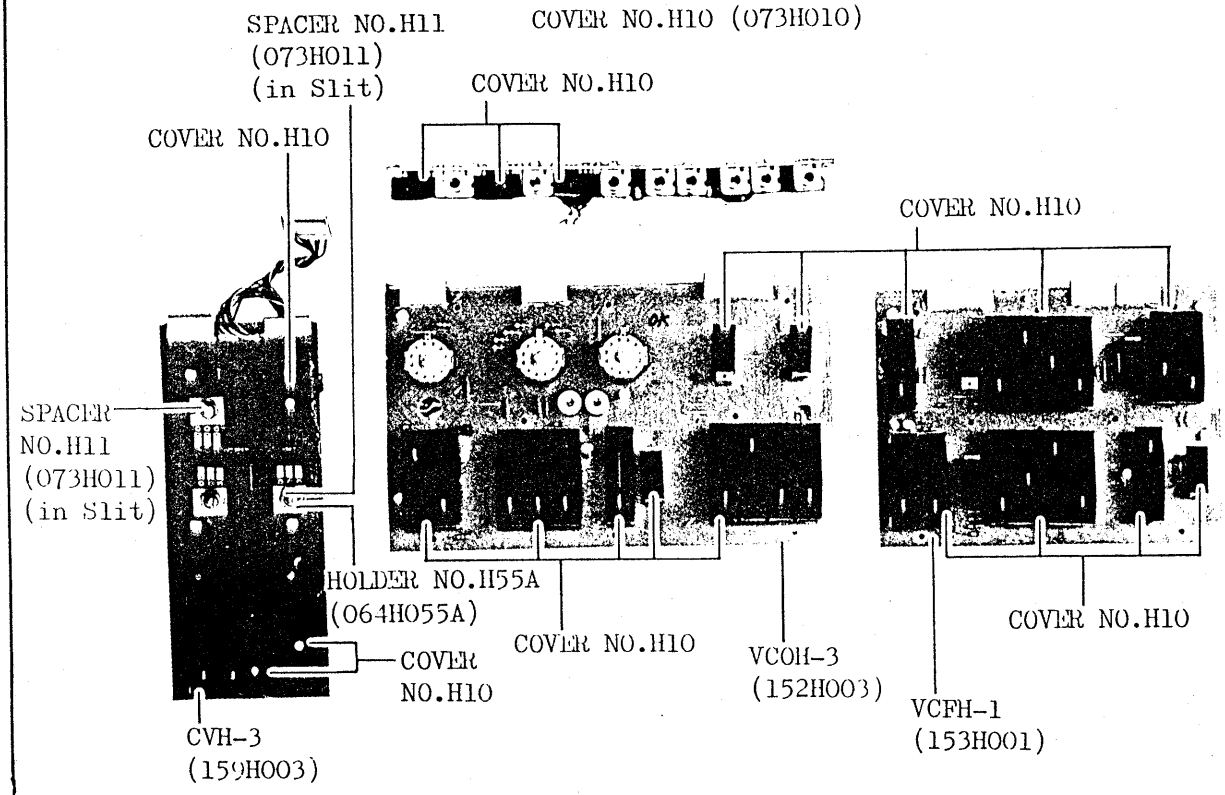



FILM NO.H4
(114H004)
BUTTON
NO.4
(016-004)
KNOB
TK1114
(016-021)
KNOB
TK1113
(016-026)
BUSH
NO.20
(068-020)
CASE NO.H18
(066H018)
KNOB NO.33
(016-033)
STRIP NO.12
(063-012)
CHASSIS NO.H64
(061H064)
RUBBER FOOT
G-5(111-021)

Roland


BENDER PB-4
(029-022)
HOLDER NO.H66 (064H066)
WAFER
TERMINAL 3P
5028-03A
(010-106)
WAFER
TERMINAL 5P
5028-05A
(010-108)
POWER SWITCH
SDG5P001-1
(001-215)
WIRING A
(355H001)
WAFER
TERMINAL 3P
5028-03A
(010-106)
HINGE NO.H9
(094H009)
WAFER
TERMINAL
2461-08C
(010-038)
KEYBOARD
SK-132-D
(004-008)
WIRING B
(355H002)
BLIND H34 (065H034)




SPACER NO.H11
(073H011)
(in Slit)
COVER NO.H10 (073H010)
COVER NO.H10
COVER NO.H10
COVER NO.H10
SPACER
NO.H11
(073H011)
(in Slit)
HOLDER NO.H55A
(064H055A)
COVER
NO.H10
CVH-3
(159H003)
COVER NO.H10
VCOH-3
(152H003)
VCFH-1
(153H001)
COVER NO.H10

PART NO.	PART AND DESCRIPTION
	IC
020-015	CA3080BL, GR
020-024	µA301H
020-025	CA3130T
020-027	TA7136P
020-032	µA726HC
020-039	DN819
020-062	µPC1458C
020-102	LF13741H
020-103	TA7179
018-015	Thermistor SDT-1000
	Transistor
017-010	2SD234-0
017-022	2SB434-0
017-046	2SC828 (NZ)
017-097	2SA826-Q
017-118	2SC1740-Q
019-009	LED LR0601
	Diode
018-014	1S2473
018-022	1N4003
018-078	1S2453, Zener 1501/9625
	FET
017-014	2SK30A-Y
017-016	2SK30A-GR
	Resistor
044-829	820-ohm CRB-1/4FX 1%
044-908	1.6Kohm CRB-1/4FX 1%
044-909	2Kohm CRB-1/4FX 1%
044-834	3.9Kohm CRB-1/4FX 1%
044-864	5Kohm CRB-1/4FX 1%
044-913	5.6Kohm CRB-1/4FX 1%
044-836	6.8Kohm CRB-1/4FX 1%
044-915	12Kohm CRB-1/4FX 1%
044-840	22Kohm CRB-1/4FX 1%
044-842	47Kohm CRB-1/4FX 1%
044-843	56Kohm CRB-1/4FX 1%
044-846	100Kohm CRB-1/4FX 1%
044-847	120Kohm CRB-1/4FX 1%
044-830	1Kohm CRB-1/4FX 0.1% selected
044-839	15Kohm CRB-1/4FX 1%
044-905	18Kohm CRB-1/4FX 1%
044-132	3.3Kohm ERC-12GK (117V)
044-592	22-ohm ERC-1GK (117V)
	Trimmer Pot
029-114	200-ohm PNB04C3A201H (Metal Film)
029-113	2Kohm PNB04C3A202H (Metal Film)
029-106	10Kohm PNB04C3A103H (Metal Film)
029-109	100Kohm PNB04C3A104H (Metal Film)
030-463	4.7Kohm SR19R 4.7KB (Carbon Film)
030-465	10Kohm SR19R 10KB (Carbon Film)
030-469	47Kohm SR19R 47KB (Carbon Film)
030-471	100Kohm SR19R 100KB (Carbon Film)
	16ø Pot
028-749	10KA VM10RK20A14
028-727	100KB VM10RK15B15
028-756	2MA VM10RK15A26

PART NO.	PART AND DESCRIPTION
	Slide Pot
029-304	20KA LFE9R-C16
029-306	100KA LFE9R-C16
029-317	100KB LFE9R-C16
029-308	500KA LFE9R-C16
029-319	500KB LFE9R-C16
029-340	500KD LFE9R-C16
029-309	1MA LFE9R-C16
	Lever Switch
001-201	SLE623-18P
001-203	SLE642-18P
	Rotary Switch
001-213	SRM1033-K15
001-214	SRM1025-K15
	Slide Switch
001-182	SSB022-12PN
001-183	SSB023-12PN
001-206	HSW0372-01-030
001-215	Power Switch SDG5P-001-1
	Jack SDG5P-502 240V
009-012	S-G7622 No.08
009-036	S-G7713 No.08
	Wafer Terminal
010-106	5028-03A
010-108	5028-05A
010-038	2461-08C
042-015	Pin Terminal 2578T
	Connector Housing
010-118	EMCB0516A01
010-123	EMCB0616A01
010-134	EMCB0920A01
010-137	EMCB1012A01
	I-type Plug
010-143	EMC-S0501
010-144	EMC-S0601
010-146	EMC-S0901
010-147	EMC-S1001
	Flat Cable
053H019	No.H19
053H020	No.H20
022-122	Output Transformer MT-31
064H055A	Holder No.H55A (Pot)
	Capacitor
032-228	4.7µ 35V Tantalum
032-227	3.3µ 35V Tantalum
035-091	0.33µ ECQF-2334M Polypropylene
035-188	1000P Styrole
035-156	150P Styrole
032-191	10µ 16V ECEA16N10 (Non-polar)
008-061	315mAT SEMKO Midget Fuse (220/240V)
008-066	1AT SEMKO Midget Fuse (220/240V)
008-041	1A MGP0001 Pig-tail Fuse (117V)
012-003	TF758 Fuse Holder (220/240V, Sec)
012-018	XN1153

Roland