OCT 25, 1980   VP-330

VP-330 SERVICE NOTES

Second Edittion

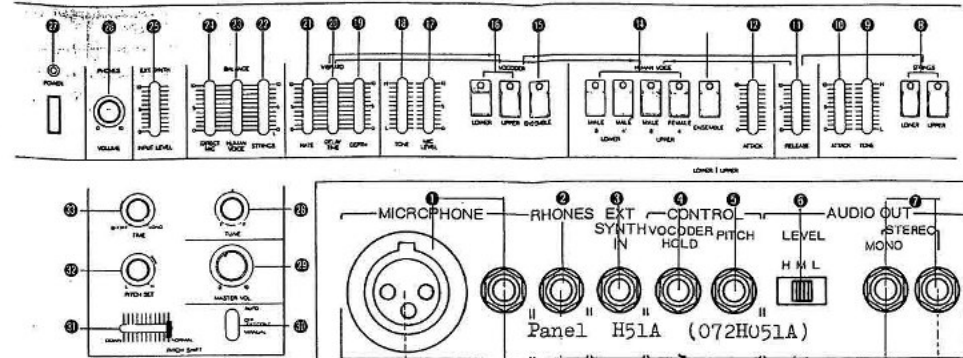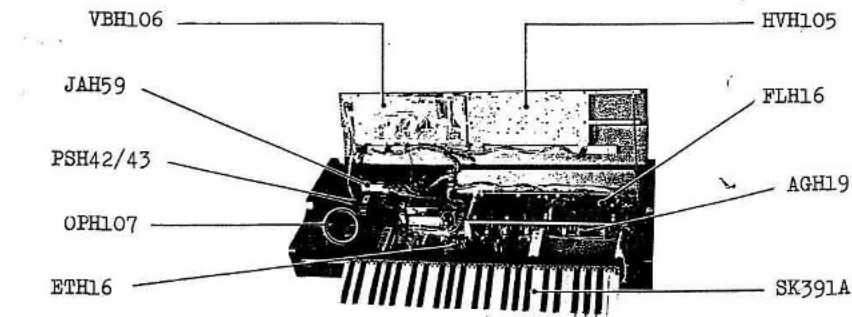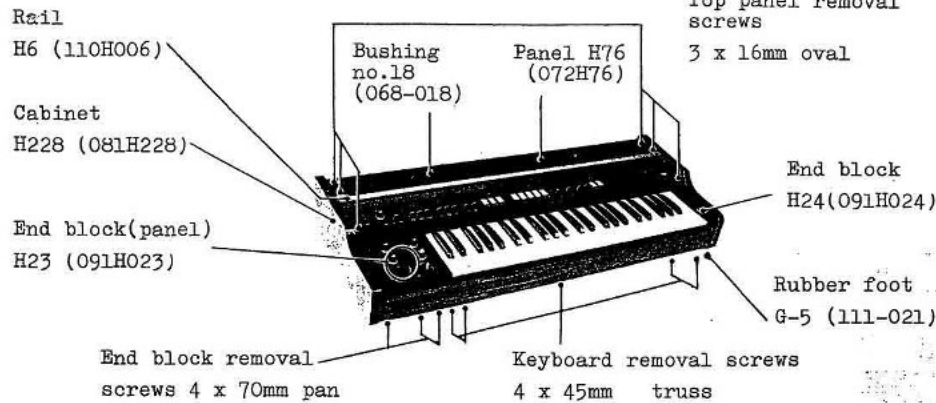### APPLICABLE SERIAL NUMBERS & UNITS

FLH16 SECTION: 901200— or MOUNTING FLH16 "C" VERSION

ENTIRETY: 961450-

Scan by HANS montrealstudios@terra.es
OLDSCHOOL-SOUND
www.oldschool-sound.com

SPECIFICATIONS

Keyboard -------	49 keys, C-C	Output	(max. 10Vpp)
Tunable Range --	±50 cents	H: 0dBm (0.775V rms), 6.3k ohms	
Microphone Input Impedance	3k ohms	M: -15dBm, 8.6k ohms	
		L: -30dBm, 2.2k ohms	
Power Consumption-	26 watts	Weight --	14kg
Dimensions ------	905 (W) x 370 (D) x 145 (H)mm		

Rail
H6 (110H006)

Cabinet
H228 (081H228)

End block(panel)
H23 (091H023)

Bushing no.18 (068-018)

Panel H76 (072H76)

Top panel removal screws
3 x 16mm oval

End block
H24(091H024)

Rubber foot
G-5 (111-021)

End block removal screws 4 x 70mm pan

Keyboard removal screws
4 x 45mm   truss

VBH106

JAH59

PSH42/43

OPH107

ETH16

HVH105

FLH16

AGH19

SK391A

Panel H51A   (072H051A)

NO	PART NUMBER	DESCRIPTION		PART NAME	
1	010-264	receptacle	female	NC-3FP or D-3M	
2	009-036	jack	stereo	SG-7713	
1,3,4 5,7	009-012	jack	mono	SG-7622	
6	001-297	switch	slide	HSW-0372-01-030	
8, 14	13129712	switch	tablet-push w/LED	KHC-11901	
	016H010	tablet	white	tablet	H10
	016H012	tablet	orange	tablet	H12
15, 16	016H014	tablet	green	tablet	H14
	016H017	tablet	yellow	tablet	H17
9, 11	029-447	pot.	10kA, VR1, VR8	LFE3R-C20A14	
	016H004	knob		knob	H4
10	029-453	pot.	1MA, VR2	LFE3R-C20A16	
12, 17	029-450	pot.	100KA, VR1, VR3	LFE3R-C20A15	
18, 20-25	029-447	pot.	10KA, VR1-4, VR7-9	LFE3R-C20A14	
19	029-459	pot.	10KB, VR6	LFE3R-C20B14	
26	13219309	pot.	10KA, VR10	VM10EK25A14	
	016-056	knob	small	knob no.56	
27	019-028	LED	red	TLR-124	
	001-	switch	power	SDA- detail P/LIST	
28	13219234	pot.	20KB, VR4	VM10RK20B24	
29	13219759	pot.	10KB x 2, gang, VR5	GM70RK20B14	
	016-057	knob	large	knob no.57	
30	001-202	switch	lever	SLE-643-18P	
31	029-472	pot.	lide, 100KB, VR3	LFE3R-C16B15L	
32	028-762	pot.	50KB, VR2	VM10RK20B54	
33	13219231	pot.	500KA, VR1	VM10RK20A55	

Roland   Printed in Japan   AE-2   1

COMPARISON BETWEEN VERSIONS

	SERIAL NUMBERS		
	UP TO 951449	WITH 961450	COMPATIBILITY & REMARKS
KEYBOARD	SK-191B	SK-361A	NO
TABLET SW.	Rocker	Push with LED	NO
GENERATOR (Wafer terminal)	AGH17 (Vertical & L)	AGH19 (All vertical)	YES Modification needs Connector housing conversions
MODULATOR (BBD)	ETH09 (SAD512, SAD1024)	ETH16 (MN3004, MN3009)	NO
FILTER	FLH16 A/C (C version S/N 901200 -)(B not in use)	FLH16C	YES A and C require different adjustment.
HUMAN VOICE	HVH56	HVH105	NO
VIBRATO	VBH58	VBH106	NO

	SERIAL NUMBERS		
	UP TO 951449	WITH 961450	COMPATIBILITY & REMARKS
PITCH	OPH60	OPH107	NO Circuit: identical
	. . .	OPH111 OPH112 OPH113	Pertain to Tab switches
	. . .	OPH118	Sub-circuit to FLH16C S/N 981500 --
FUSE PCB	OPH67 (100V) OPH68 (117V) OPH69 (220/240V)		
JACK PCB	JAH59		
POWER SUPPLY	PSH42 (100/117V)	PSH43 (220/240V)	

VP-330 BLOCK DIAGRAM
Serial Number 961450-
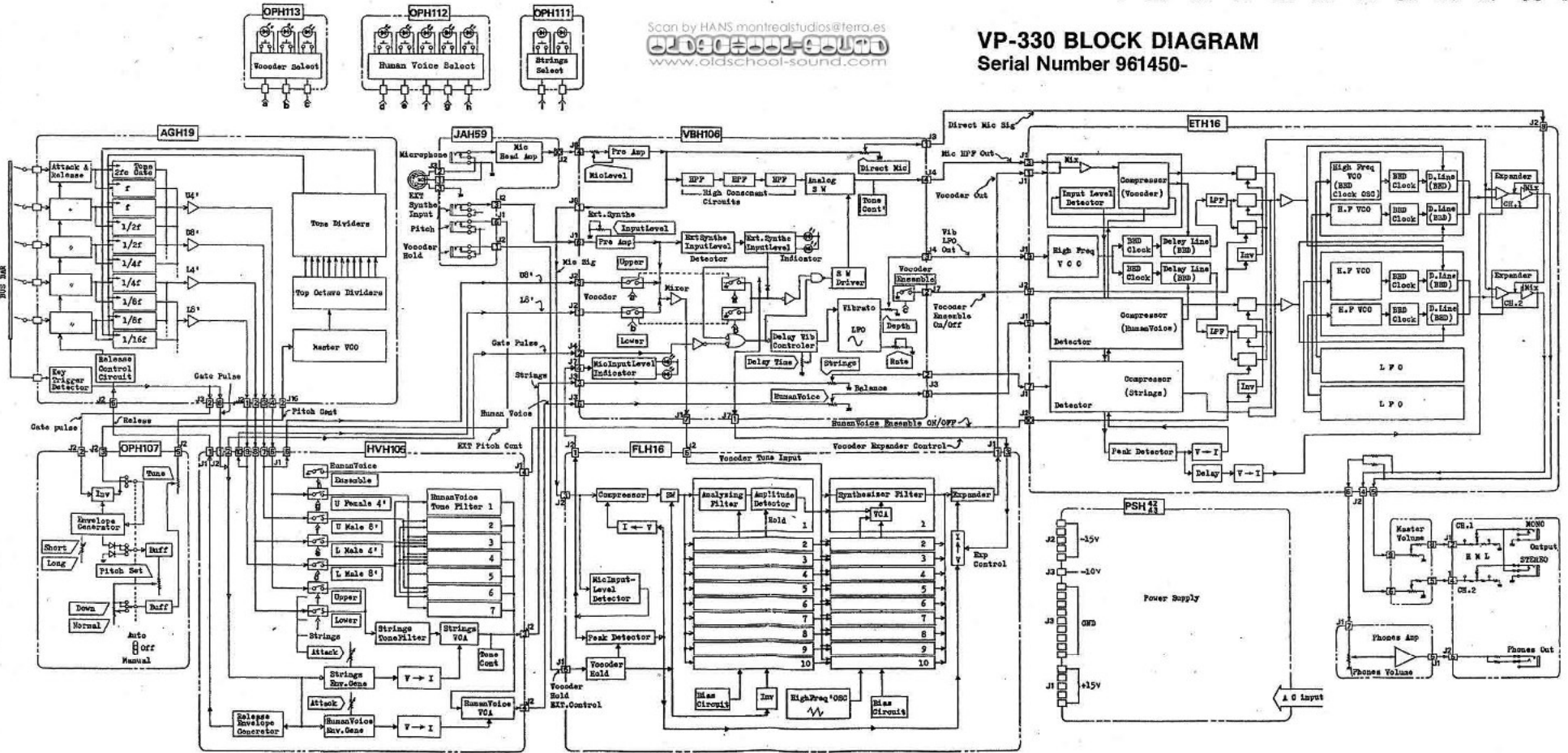
CIRCUIT DESCRIPTION

—General—

Sound from Musical Instrument
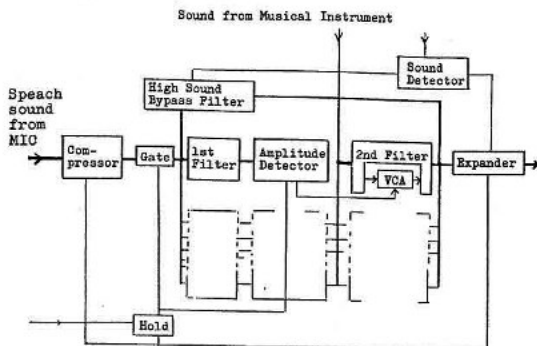
In the vocoder, a signal from a mic is frequency-analyzed through a group of filters to provide a frequency spectrum featuring human voice. Then the spectrum is duplicated at another group of musical sound filters to obtain the functions equivalent to human mouth and throat and thus to fac-simile human voice with musical instrument sound.

1. ANALYZING (FIRST) FILTER AND AMPLITUDE DETECTOR

A mic signal is resolved by a group of filters into fre-quency band components which are amplitude-detected and routed to the VCAs of the Synthesizer (second) Filters. Passing through the 2nd filters, signals are controlled in volume at VCA by the control voltage coming from corres-ponding frequency band of the 1st filter.

2. SYNTHESIZER (SECOND) FILTER AND VCA

Like the 1st filter, a musical sound being supplied into the 2nd filters is resolved into frequency spectrum compo-nents which are proportional to the 1st filters' output in amplitude. The resultant sound spectrum and volume of 2nd filters outputs are analogous to those of the mic signal. Thus, uniform sound spectrum would be ideal for reproduc-tion of human voice, but it is no longer of a musical sound.

3. COMPANDER

The compander is a combination of a compressor and an ex-pander. The compressor reduces input signal range in ampli-tude, outputting voltages smaller in amplitude range than that of its input voltage. On the contrary, the expander, for a given range of amplitude input voltages, produces a larger amplitude range of output voltages. Thus, restores signal voltages to their orginal amplitudes.

4. HIGH SOUND BYPASS FILTER (RESONANT FILTER)

Since sounds from musical instruments rarely include high frequency components such as "fricative" in human voice, the 2nd filter has no spectrum to respond to. Furthermore, such a sound hardly relating to musical intervals, is separated from a mic signal, routed to this circuit and re-mixed with the 2nd filter outputs.

5. MUSICAL SOUND DETECTOR

This circuit obstructs the 2nd filter outputs as long as a musical instrument sound is absent and drives the compander and the bypass filter when the sound is sensed.

6. HOLD CIRCUIT

This enables vocoder to hold its output during an inter-ruption in the mic signal, e.g. while the singer inspires. This effect can find some other useful applications. In hold mode, Hold circuit retains sound spectrums and vol-umes by maintaining voltages constant; at Amplitude Detector and at Expander. The Compressor gain is minimized and the voice Gate is turned off so as to keep voice unchanged even though mic input signal is changing.

CIRCUIT DESCRIPTION   —Detail—

1. AGH19

1-1 Master Oscillator

The frequency is determined by the capacitance of D149, var-iable diode. The pitch is shiftable one octave with the change of voltage across D149 and is stable within 15 cents at the working temperatures of 0° to 40°c (+32° to 104° F). After replacing the components or reparing at VCO or power supply stages, frequency check or re-tuning may be required, but they should be made only after soldered portions are restored to their orginal temperature.

1-2 Tone Divider, Tone Gate

The Master VCO output is divided into one half in IC7 and then subdivided into twelve top octave notes in IC8. The lower octaves for each of the 12 notes are provided by frequency dividers, IC1-IC6, and are distributed to the base of paticular transistor choppers, Q2, Q3, etc. (hearafter upmost circuit in the diagrams represents the same family). Q2 in this case serves as a Tone Gate.

1-3 Key Trigger Detector

Consists of Q153, Q154 and Q157, detects current variables along the bus bar caused by the on/off of the key contacts, which are transferred to Q157 collector,shaped into gate signal.

1-4 Release Control

This circuit, composed of Q155 and Q156, controls the C1 dis-charge rate, generating an envelope for the Tone Gate accord-ing to the gate signal and the signal from HVH105, Release Control Generator. When the key is pressed, a ground is placed on Q155 collec-tor for approximately 50ms, discharging capacitor C1 to zero volt. This erases remaining envelopes of precedently played keys, and then, Q155 and Q156 develope a new envelope volt-age proportional to a signal from Envelope Generator.

2. HVH105

2-1 Release Envelope Generator

The circuit consists of Q1, Q2 and Q3. While key(s) is pressed, connection terminal J1-1 on HVH105 is held at a voltage set by RELEASE knob. When the key is released,the voltage decays along with the envelope shaped by the circuit constant, causing the Release Control on AGH19 to discharge C1 through D1.

3. FLH16

3-1 Compander

This Compander system is composed of the Mic Input Detec-tor IC2 (full-wave rectifier), Peak Detector IC1, V-1 Con-verters IC3, Q5, IC8 and Q12, Compressor IC3, IC4,and Ex-pander IC8, IC9. One half (positive or negative) of com-pressor output is 10V maximum. Gains of the Expander and Compressor are controlled by the voltages from IC1, whose directions are opposite to each other. That is, when the amplitude of one circuit increases, that of the other decreases. When the tablets "Vocoder-UPPER –LOWER" are off, and the EXT. SYNTH input is less than a certain level, the Expander output remains at the minimum since the EXPANDER control Q13 turns on.

3-2 Analyzing Filter

Ten BPFs with a high Q, composed of ICs (e.g. IC10 and IC15) and associated Rs and Cs, divide an input signal among them, covering 170Hz-7kHz, and let particular bands pass through. A mic signal from Compressor is preemphasized, accommodated by BPFs corresponding to the spectrums, routed to D1 for peak amplitude detection and smoothed. The voltage connects to VCA in the next filter, Synthesizer Filter.

3-3 Vocoder Hold

Q1, Q2, Q3 and Q4 make up this circuit. When Hold jack cir-cuit opens, and 50ms later, the Q4 output increases in the positive direction to turn on Q6, which in turn places a ground on IC10 -input pin, while the voltage through D17 turns off FET switch IC35 connected to R7 and increases dis-charge time constant, thus the charing voltage from D1 is held for 2-3sec.

3-4 Synthesizer Filter, VCA

The filter bank slices up instrument sound spectrum into bands in the same way Analyzer Filter does on the speach spectrum. Each slice then connects to voltage-controlled amplifier - VCA IC38, whose gain is proportional to the voltage from the 1st filter amplitude detector. During an absence of signal from Analyzer filter, negative peaks of triangular wave on pin 4 of IC41 is kept plus - determined by VR6 setting, with respect to pin 5, disabling IC38 to switch its gate.

IC41 pin 4 ——
IC41 pin 5 ——
IC20 pin 7 ——
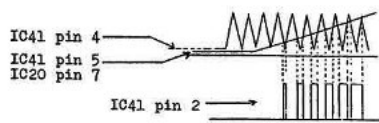
IC41 pin 2 ——

When the voltage from I C 2 0 increases to a some extent, it exceeds lower portion of triangular wave, causing IC41 pin 2 turns to "H" which in turn gates IC38 on. When positive going triangular wave reaches above the voltage on pin 5, pin 2 turns to "L" and IC38 turns off. Thus signal flow rate through IC38 depends on the width of pulse from IC41 and pulse width is proportional to controll voltage from IC20.

Pulsating rectified signals a r e smoothed while they are passing through t h e next smoothing filter consisting of IC30 and are sent to Expander.

Since the switching cycle of IC38 on and off is sufficiently faster than those of musical signals, the filter gain is proportional· to the on/off time ratio of the switching. Overall frequency response of the synthesizer filter is made to equal de-emphasized characteristics: the higher the frequency, the higher resistance has R21 (the same number for the resistors in ten bands).

3-5 Expander

Like the compressor, the gain of Expander, IC8 and IC9, is controlled by the voltage from IC1 whose direction is opposite to that for the compressor.

4. VBH106

This HPF allows only high-frequency components of the signal from the mike amp to pass so as to compensate for high-frequency ranges incapable of reproduction by vocoder circuits. Similar to expander output on and off circuit on FLH16, the gate switch Q5 is provided not to output signals from the HPF while the vocoder circuit operating conditions are n o t readily prepared.

5. OPH107

This circuit has basically the same configuration with the OPH29 in the RS505 Roland String Ensemble.See the diagram on page 11 of RS505 Service Notes for easier understanding.

5-1 AUTO

Envelope Generator Q1 and Q3 outputs voltage, when triggered by the gate signal, increases up to the voltage set by PITCH SET and then decays. Level Sustain and DecayTime are made longer as TIME knob being set toward LONG.

5-2 OFF (EXTERNAL CONT)

When the EXT PITCH jack connection is not made, TIME, PITCH SET and NORMAL-DOWN settings are invalid.
When PITCH jack opens, the Q6 collector holds the voltage according to PITCH SET setting and when the jack is closed, the voltage varies in accordance with TIME set.

5-3 MANUAL

In this mode, the trigger and TIME are independent of the GATE. The maximum shift voltage is determined by PITCH SHIFT. Thus, manual range variation is possible within the range by controlling the knob.

6. JAH59

The gain of mike head amp is 20dB.

PARTS LIST

CASING

072H076	Panel	H76	top
072H051A	Panel	H51A	rear
081H228	Cabinet assy	H228	
059H008	Hinge	H8	
111-021	Rubber foot	G-5	
091H023	End block	H23	L/H
091H024	End block	H24	R/H
068-018	Bushing no.18		musick rack
110H006	Rail	H6	musick rack
004H004	Keyboard		SK-391A

KNOB. TABLET

016H004	Knob	H4	slide pot.
016H010	Tablet	H10	white
016H012	Tablet	H12	orange
016H014	Tablet	H14	green
016H017	Tablet	H17	yellow
016-056	Knob	no.56	small
016-057	Knob	no.57	large

SOCKET

009-012	Jack	SG-7622	pc mount.
009-036	Jack	SG-7713	stereo
13429601	Receptacle		female
	HA-16PR-3S or		
	(NC-3FP or D-3M)		

SWITCH

001-258	SDA1S-A-1	power	100V
001-259	SDA2S-A-1	power	117V
001-260	SDA4S-A-1	power	220/240V
001-297	HSW-0372-1-30	slide, LEVEL	
001-202	SLB-643-18P	lever, AUT/NORM	
13129712	KHC-11901	push, tablet	

PCB ASSY

114H019	AGH19	(pcb 052H187)
149H105	HVH105	(pcb 052H254)
149H106	VBH106	(pcb 052H257)
149H107	OPH107	(pcb 052H244)
149H111	OPH111	(pcb 052H255-1)
149H112	OPH112	(pcb 052H255-2)
149H113	OPH113	(pcb 052H255-3)
149H118	OPH118	(pcb 052H294)
145H016C	FLH16C	(pcb 052H189C)
146H042A	PSH42A	(pcb 052H183A)100/117V
146H043A	PSH43A	(pcb 052H183A)220/240V
151H016	ETH16	(pcb 052H256)
149H067A	OPH67A	(pcb 052H185A) 100V
149H068A	OPH68A	(pcb 052H185A) 117V
149H069A	OPH69A	(pcb 052H185A)220/240V

FUSE

008-041	SGA 1.0A	CSA	117V
008-066	SEMKO T1A		220/240V

COIL. TRANSFORMER

022-129	RC-855	180µH
022H025C-A	PT.H25C-A	117V
022H025D	PT.H25D	220/240V

POTENTIOMETER

Rotary

132119234	VM10RK20B24	20KB	TUNE
13219309	VM10RK25A14(L)	10KA	PHN-VOL
13219759	GM70RK20B14(L)	10KB x 2	
	gang		MASTER-VOL
13219231	VM10RK20A55(L)	500KA	TIME
028-762	VM10RK20B54(L)	50KB	PTC-SET

13339434 not !

Slider

029-447	LFE3R-C20A14	10KA	
029-459	LFE3R-C20B14	10KB	VIB-DPTH
020-450	LFE3R-C20A15	100KA	MIK-LEVEL HUM-ATTCK
029-472	LFE3R-C16B15L	100KB	PTCH-SHFT
029-453	LFE3R-C20A16	1MA	STRN-ATCK

Trimmer

030-467	SR-19R	22KB
030-461	SR-19R	2.2KB
030-463	SR-19R	4.7KB
030-471	SR-19R	100KB
030-459	SR-19R	1KB
030-469	SR-19R	47KB

RESISTOR

Metal film 1/4W 1%

044-830	CRB25FX	1K
044-862	CRB25FX	1.2K
044-849	CRB25FX	220K

Carbon 1/2W

13829801M0	10 ohms	flame retardant

CAPACITOR

035-145	50pF 50V J	polystyrene
035-156	150pF 50V J	polystyrene
032-241	10µF 16V	electro. bi-polar
13639943M0	2.2µF 50V	electro. bi-polar

Mylar 50V G (2%)

13549201Y0	0018µF	13549207Y0	012µF
13549202Y0	0027µF	13549208Y0	018µF
13549203Y0	0033µF	13549209Y0	027µF
13549204Y0	0039µF	13549210Y0	039µF
13549205Y0	0056µF	13549211Y0	047µF
13549206Y0	0082µF	13549212Y0	056µF

SEMICONDUCTOR

Transistor

017-024	2SA733-P
15129122	2SC1923-R (2SC381-R)
017-129	2SC752G-0
15119805	2SB834-0
15129121	2SC2021-R
15119602	2SB647-C
15129602	2SD667-C
017-106	2SC1815-GR
017-155	2SA1015-GR
017-146	2SB605-L
017-072	2SD571-L
017-023	2SC945-P
017-010	2SD880-0
017-014	2SK30A-Y FET
017-016	2SK30A-GR FET

Diode

15019626	05Z-11U zener
018-086	SVC303 varicap
018-014	1S2473
019-028	TLR-124 LED red
019-029	TLG-124 LED green
018-114	1SR35-200
or	1N4003

IC

020-156	AY-3-0214 chromatic divider
15159124TO	TC4093BP quadruple 2-in NAND
15159115NO	µPD4066C quad bilateral switch
020-227	TC4520BP dual binal up counter
020-041	TC4013BP dual D flip flop
020-064	µPC4558C dual op amp
020-208	LF353 FET dual op amp
020-100	TL082CP dual FET op amp
020-160	BA662A op amp transconductance
020-083	TC4016BP quad bilateral switch
020-215	MN3009 BBD 256-stage
020-063	MN3004 BBD 512-stage
020-228	TA7179M regulator
15189113	AN6912 quad comparator

OTHERS

048-084	Heatsink	RH-15
048H018	Heat sink	no.18
068-032	Collar bushing	NA-305
068-034	Collar bushing	NB-300
064H200	Pcb holder	DLC-BS-6N

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
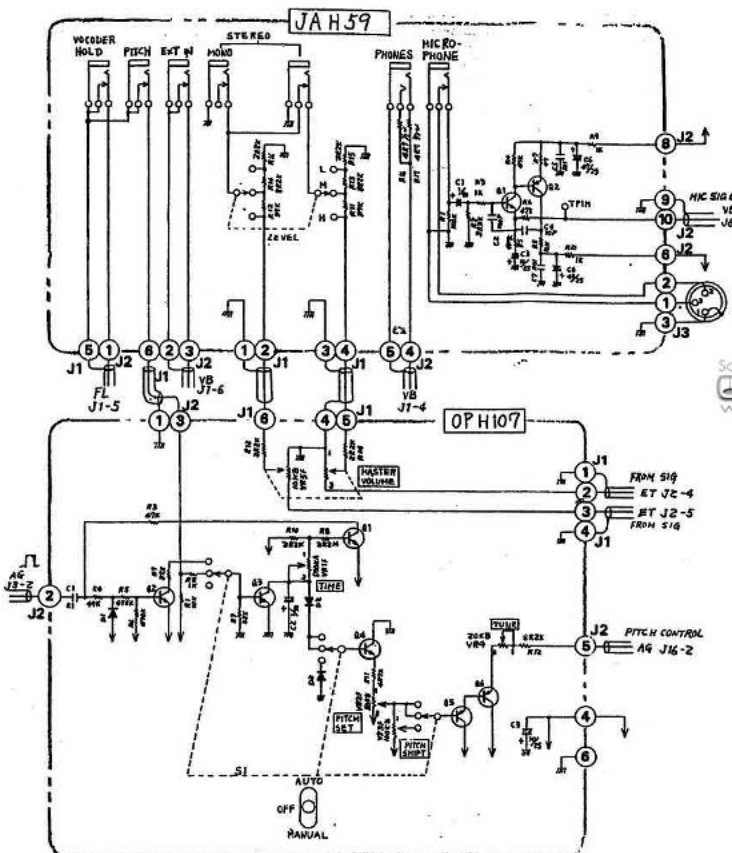
JAH59

JAH59 (149H059)
(Etch mask 052H196)
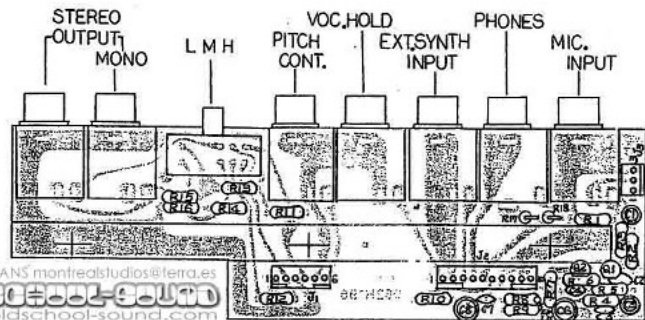
STEREO OUTPUT MONO   L M H   VOC. HOLD PITCH CONT.   EXT.SYNTH INPUT   PHONES   MIC. INPUT
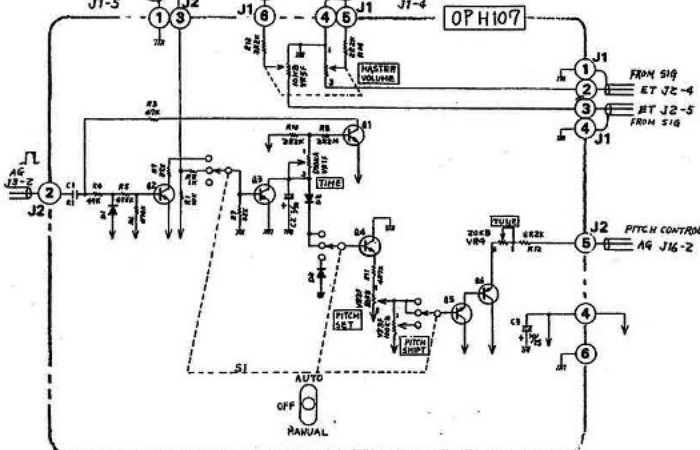
OPH107

OPH107 (149H107)
(Etch mask 052H244)
View from foil side

VR5 PITCH SHIFT   MANU
VR2 PITCH SET   VR3 MASTER VOLUME
VR1 TIME   VR4 TUNE

2SA1015-GR
2SC1815-GR
Diode 1S2473

LED TLR-124 (red)
Pipe H:18mm
longer lead

WAVEFORMS AT J2 5

Switch in AUTO; PITCH SET at L

Time Short	Mark	Long
18msec / 11ms	130ms / 22ms	500ms / 160ms

F   E   D   D   C'   C

AGH19 (144H019)
(Etch mask 052H187)

Interchangeable with AGH17

Left, J1-3, J10-16 show wafer terminals on AGH-17 in old model, which are, on AGH19, of the styles shown below.

When used as a replacement for AGH17, AGH19 needs some new connector housings to mate the vertical pins.

SR-19R wiper

2SC752G-0

2SC381-R

2SC1815-GR .

2SA733 -P(R)
2SA1015-GR

Polystyrene cap.

Ceramic capacitor

Mylar capacitor

Electrolytic cap.

1S2473 or 1S1555

NB-300
NA-305

F'   G   C'   A   A'   B

TUNING

TP1A	Master VCO Out
TP2A	Top octave ge. out (C)
TP3A	U/M 4' Out
TP4A	" 8' "
TP5A	L/M 4' "
TP6A	" 8' "
TP7A	ReLease
P8A	Gate

$\frac{1}{2}$ v p.p

| 1.6 | 1.6 | 1.7 | 1.7 | 2.0 |
| 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |

| 1.5 | 1.6 | 1.6 | 1.6 |
| 2.9 | 2.4 | 2.0 | 1.8 |

| C | F' | C | F' | C | F' | C | F' | C |

key → ON   OFF   ON   OFF

HUMAN, UPPER
MALE 8' "on"

BALANCE

DIRECT MIC   HUMAN VOICE   STRINGS
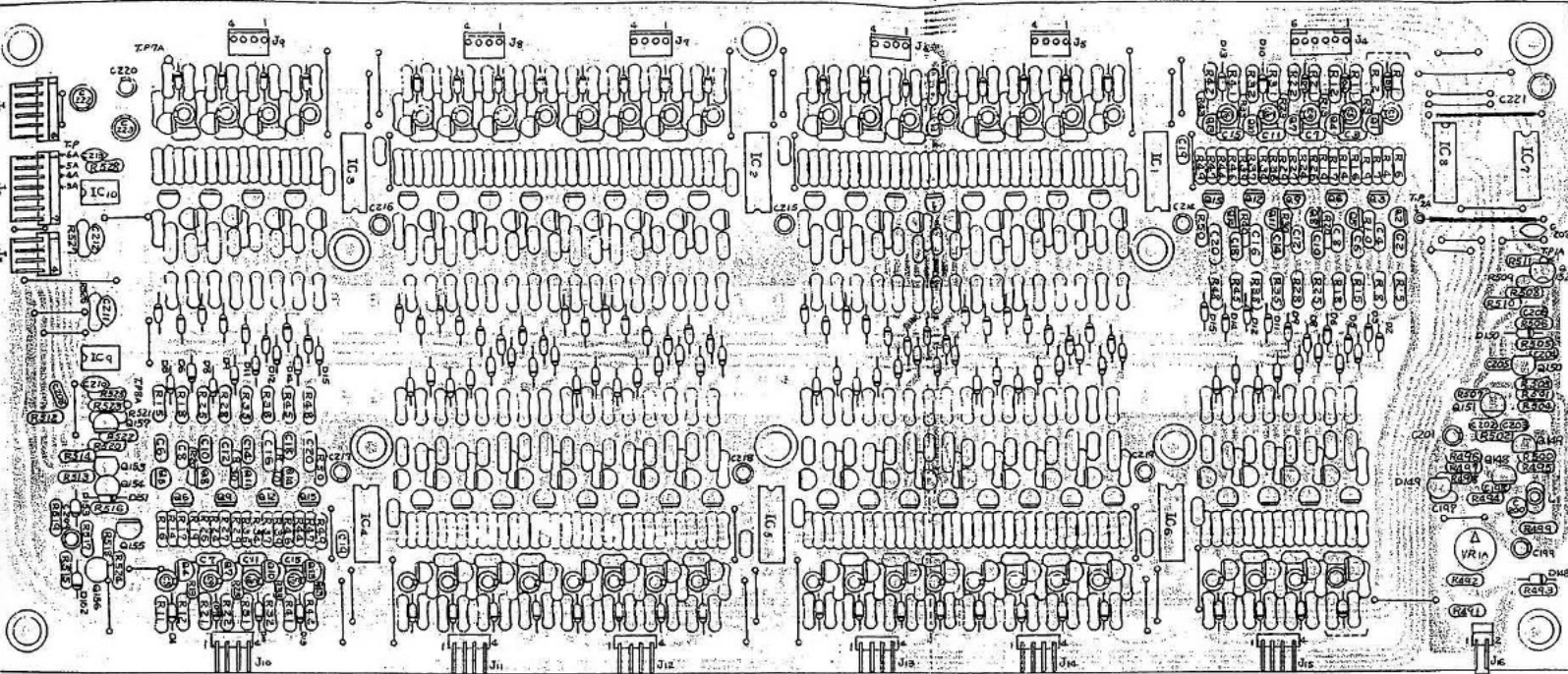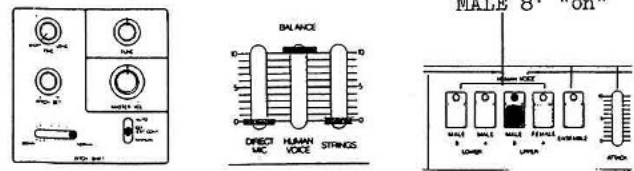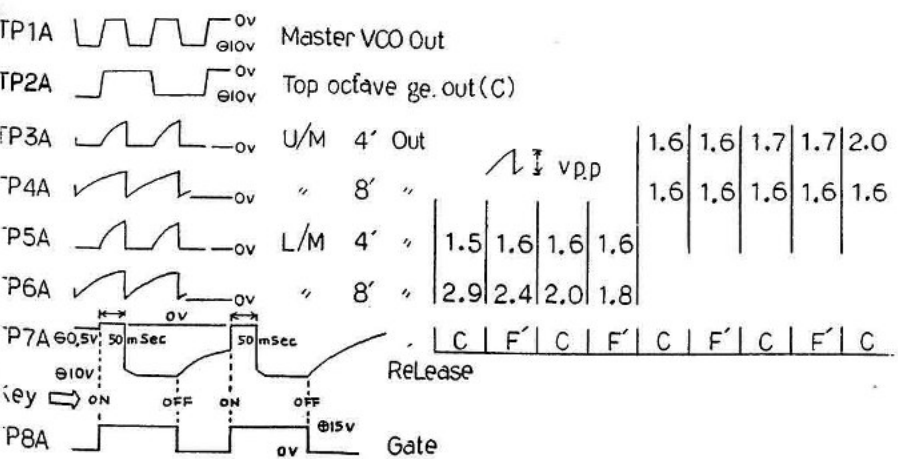
The Master VCO should be retuned when,

1. voltages changed in DC lines after modification or repairs at the power supplies;

2. components in the VCO stage are replaced.

When soldered, allow for few minutes to dissipate.

Set controls as illustrated above.

Set VR1A for 442Hz at OUTPUT jack with A3 key being pressed.

LOWER ——— UPPER

C1   C2   C3   C4   C5
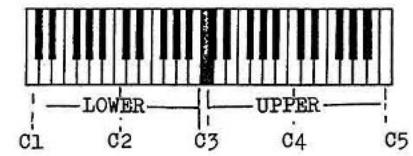
AGH19

surface mounting
$C^{\#}_4 \sim C_5$ only

AY-3-0214
Top View

R refers to Radix (decimal) point.

μPC4558

	V_{CC}	1	18	+452.5
	Input Io	2	17	+427
	+479.5	3	16	+380.5
	+403	4	15	+358
	+338	5	14	+302
	+330	6	13	+285
	+269	7	12	V_{SS}
	+254	8	10	N/C

C		$C^{\#} \sim F$	$F^{\#}, G$	$G^{\#}, A$	$A^{\#}, B$
C 2	R0015				
C 4	R0068				
C 6	R0033	←	R0022	R0018	R0015
C 8	R015	←	R01.	←	←
C 10	R0068	←	R0047	←	←
C 12	R033	←	R022	←	←
C 14	R015	←	R01	←	←
C 16	R068	←	R047	←	←
C 18	R033	←	R022	←	←
C 20	R12	←	R1	←	←
C 3	R001				
C 7	R001	←			
C 11	R001	←			
C 15	R0022	←	R0015	←	←
C 19	R0039	←	R0027	←	←
R38	330K	←	390K		
R48	220K	←	270K	←	←

Scan by HANS montrealstudios@terra.es
OLDSCHOOL-SOUND
www.oldschool-sound.com

IC7 4013P
IC8 AY-3-0214
IC1 (C.C#) ~ IC6 (A# B) 4520P

TUNE VR1A
TUNE ADJ

VP-330 KEYBOARD SK-391A PARTS

NO	PART NO	DESCRIPTION		
1	106H026	Natural key	C	F
1	106H027	Natural key		D
1	106H028	Natural key	E	B
1	106H029	Natural key		G
1	106H030	Natural key		A
1	106H031	Natural key	C'	F'
2	106H032	Sharp key	black	
3	070H029	Key spring	H29	
4	061H085	Chassis	H85	
5	068H004	Guide bushing	H4	
6	101H142	Level felt	H142	
7	071H044	Contact leaf	H44	
8	071H048	Bus bar 49p	H48	
9	043H007	Switch unit 12p	H7	
9	043H008	Switch unit 13p	H8	
10	104H029	Bus bar holder	H29	
11	062H024	Chassis bracket	H24	
12	098H006	Key stopper	H6	

J2 J3 J2 J2 J2 J16 J1

HV J1-1
RELEASE CONTROL

OPH107 J2-2

HV J2-1

HV J1-9

HV J1-8

HV J1-7

HV J1-5

OPH107 J2-5
TO PITCH CONTROL

J1 J1 J1
-10V -15V +15V
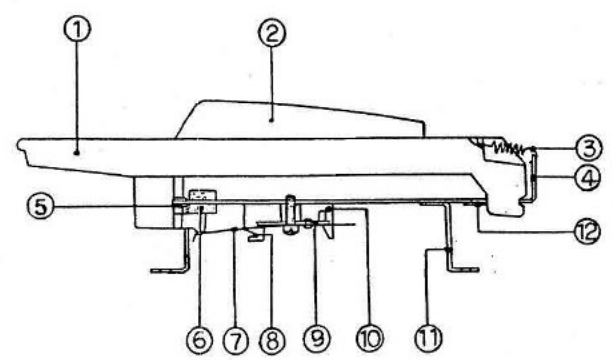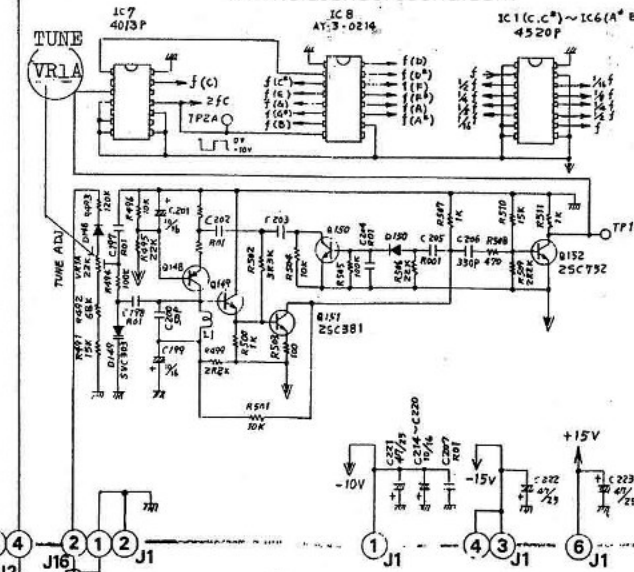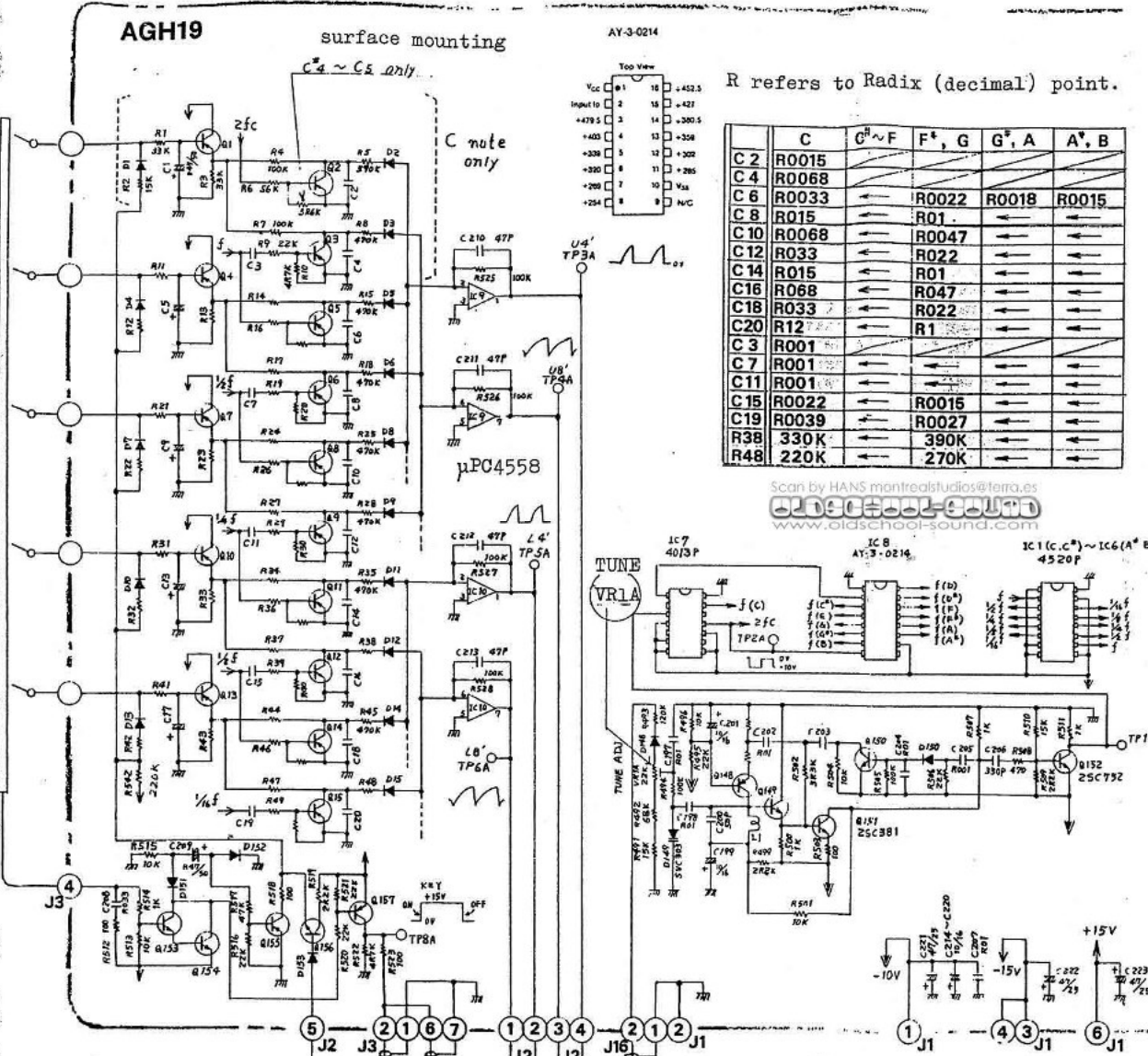
UNLESS OTHERWISE NOTED:

PNP transistors - 2SA733-P or 2SA1015-GR

NPN transistors - 2SC1815-GR

Diodes --------- 1S2473 or 1S1555

7
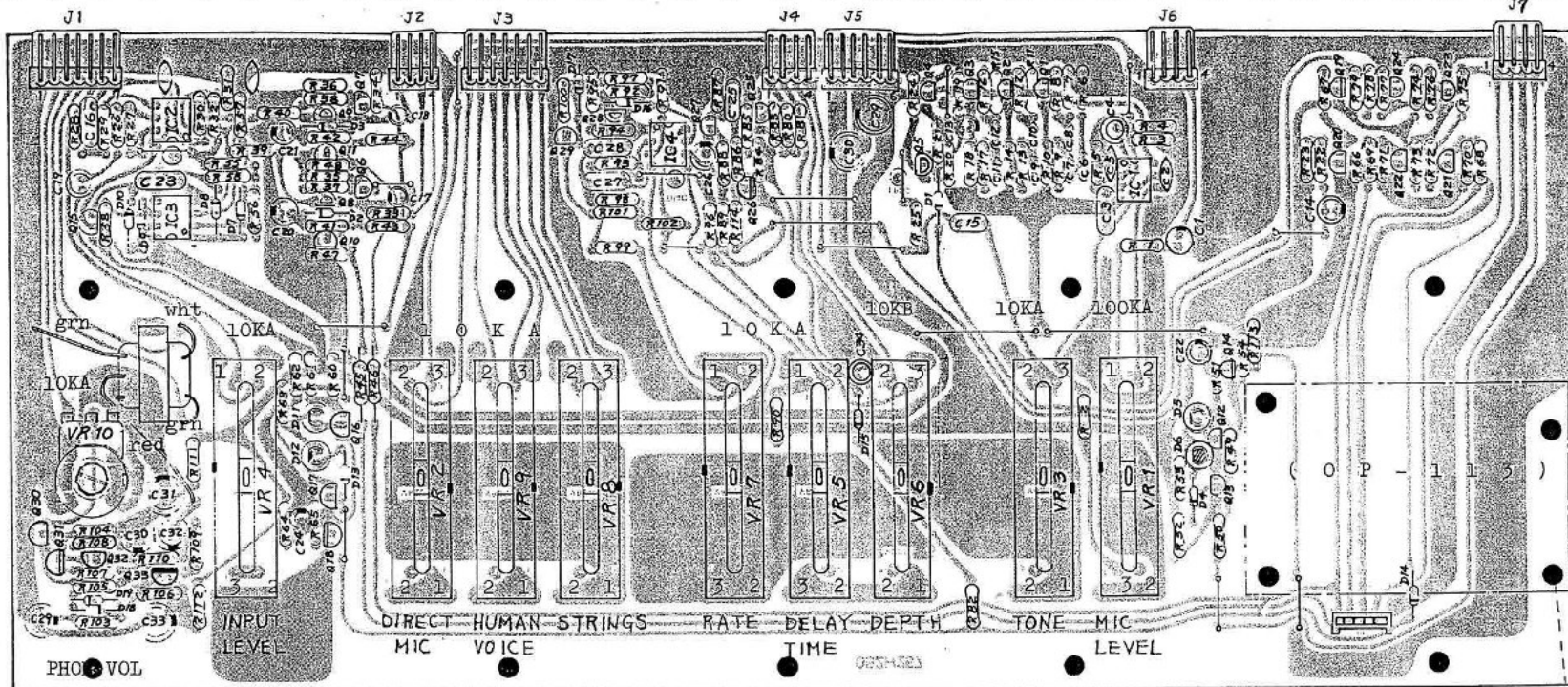
VBH106 (149H106)
(pcb 052H257)

2SA1015- GR or Y
2SC1815- GR or Y
1S2473 or 1S1555
Mylar R0022uF Mylar
2SK30A-GR
R25J
Ceramic cap.
Longer lead LED TLR124 red
Pipe 6 x 18mm LED TLG124 green

μPC4558C (Top View)

OUTPUT ①		⑧ +V
−INPUT ②		⑦ OUTPUT
+INPUT ③		⑥ −INPUT
−V ④		⑤ +INPUT

OPH113 (149H113)
(Etch mask 052H255-3)

OPH113
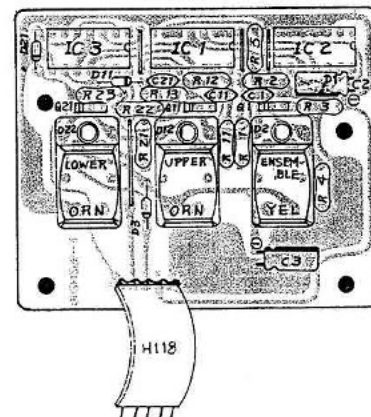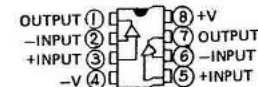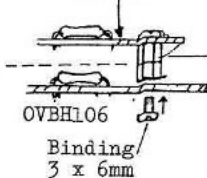
OPH113
OVBH106
Binding 3 x 6mm
Sleeve nut no.1 3 x 10mm

4520B (AGH19)
DUAL BINARY UP COUNTER

BLOCK DIAGRAM

Clock 1	Q0 3
2 Enable	Q1 4
	Q2 5
7	Q3 6
	R
Clock 9	Q0 11
10 Enable	Q1 12
	Q2 13
15	Q3 14
	R

V_DD - Pin 16
V_SS - Pin 8

TRUTH TABLE

CLOCK	ENABLE	RESET	ACTION
⌐	1	0	Increment Counter
0	⌐	0	Increment Counter
⌐	X	0	No Change
X	⌐	0	No Change
⌐	⌐	0	No Change
⌐	⌐	0	No Change
X	X	1	Q0 thru Q3 = 0

X = Don't Care

4013B

DUAL TYPE D FLIP-FLOP

TRUTH TABLE

INPUTS				OUTPUTS	
CLOCK†	DATA	RESET	SET	Q	Q̄
⌐	0	0	0	0	1
⌐	1	0	0	1	0
X	X	0	0	Q	Q̄	No Change
X	X	1	0	0	1
X	X	0	1	1	0
X	X	1	1	1	1

X = Don't Care
† = Level Change

BLOCK DIAGRAM

V_DD - Pin 14
V_SS - Pin 7

BLOCK DIAGRAM

8

Roland VP-330 Schematic Diagram — VBH106 / OPH113 board (page 9)
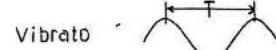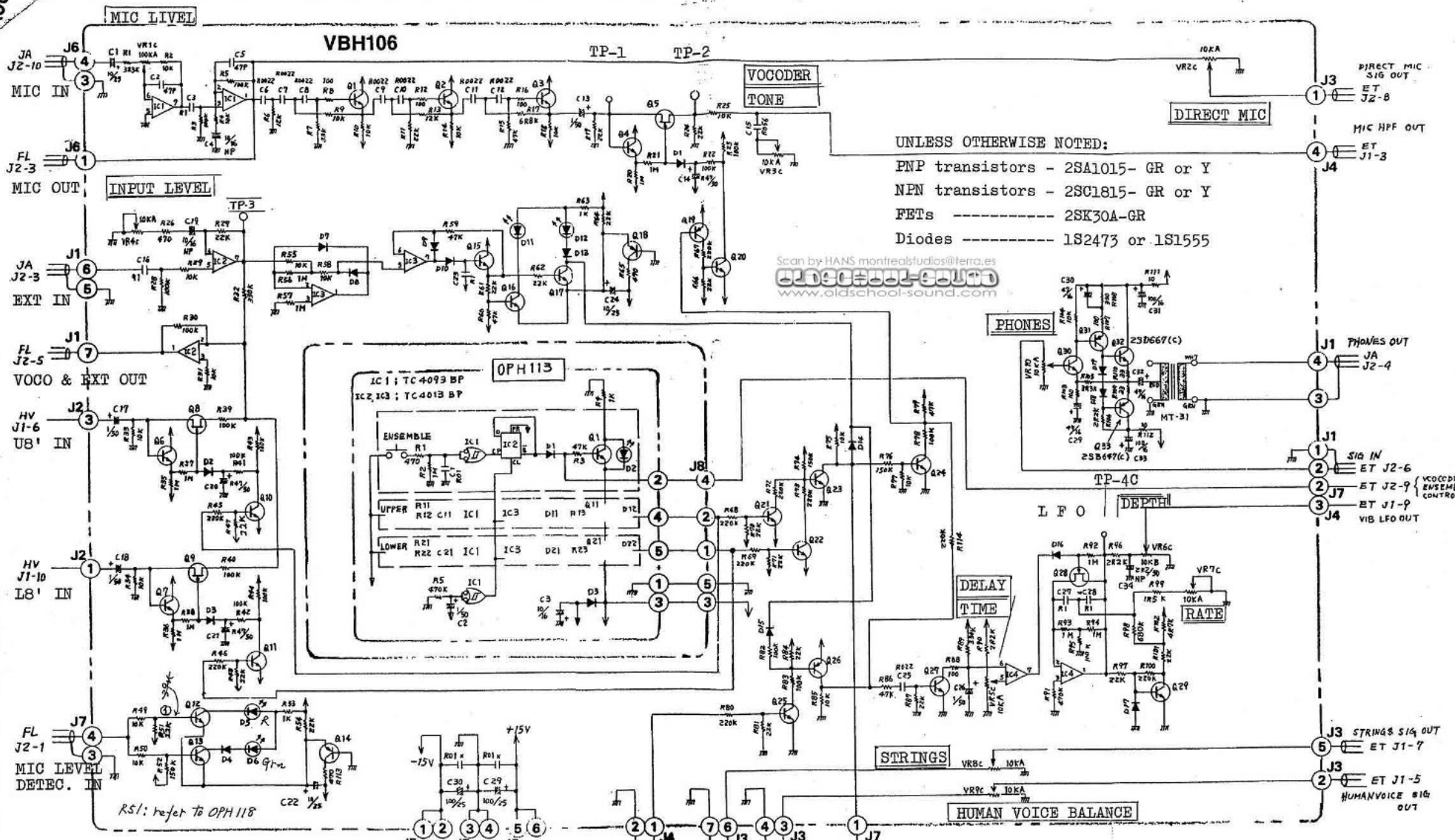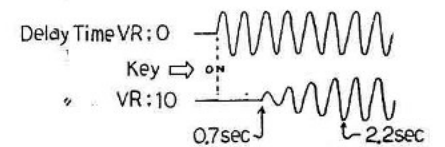
bi-polar

μPC4558C

tantalum

SR19R

mylar G 2%

mylar K 10%

metal film
CRB25 FX

R25J

1S2473

2SK30A-GR

2SC1815-GR

2SA1015-GR

(O P H 1 1 2)

(O P H 1 1 1)

VR 3   VR 1   VR 2   VR 8

ATTACK   RELESE   ATTACK TONE
100KA   10KA   1MA   10KB

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HVH105 (149H105)   (Etch mask 052H254)

OPH111 (149H111)
(Etch mask 052H255-1)

OPH112 (149H112)   (Etch mask 052H255-2)
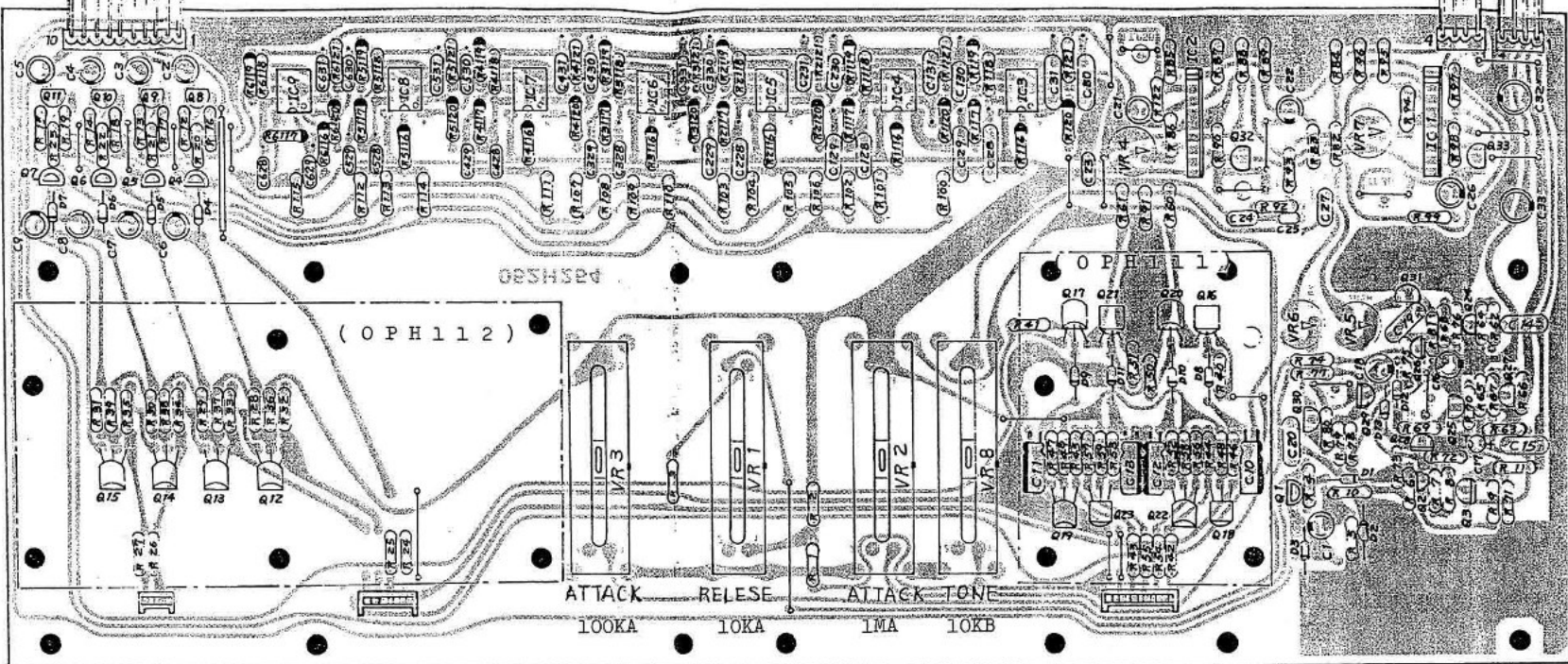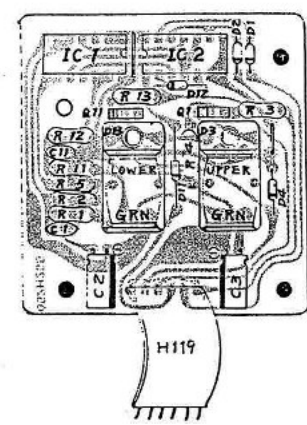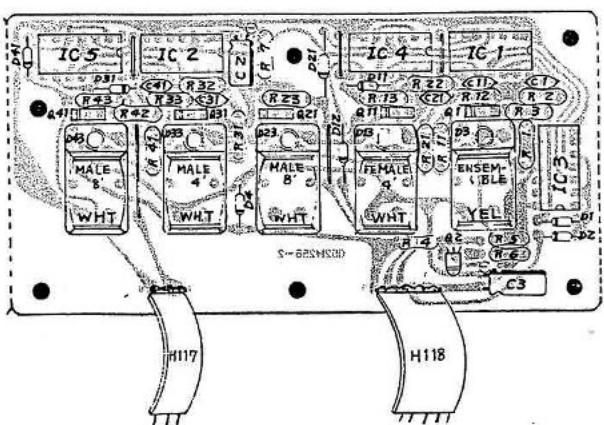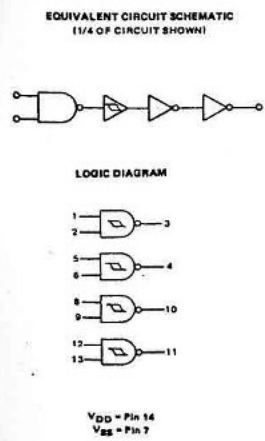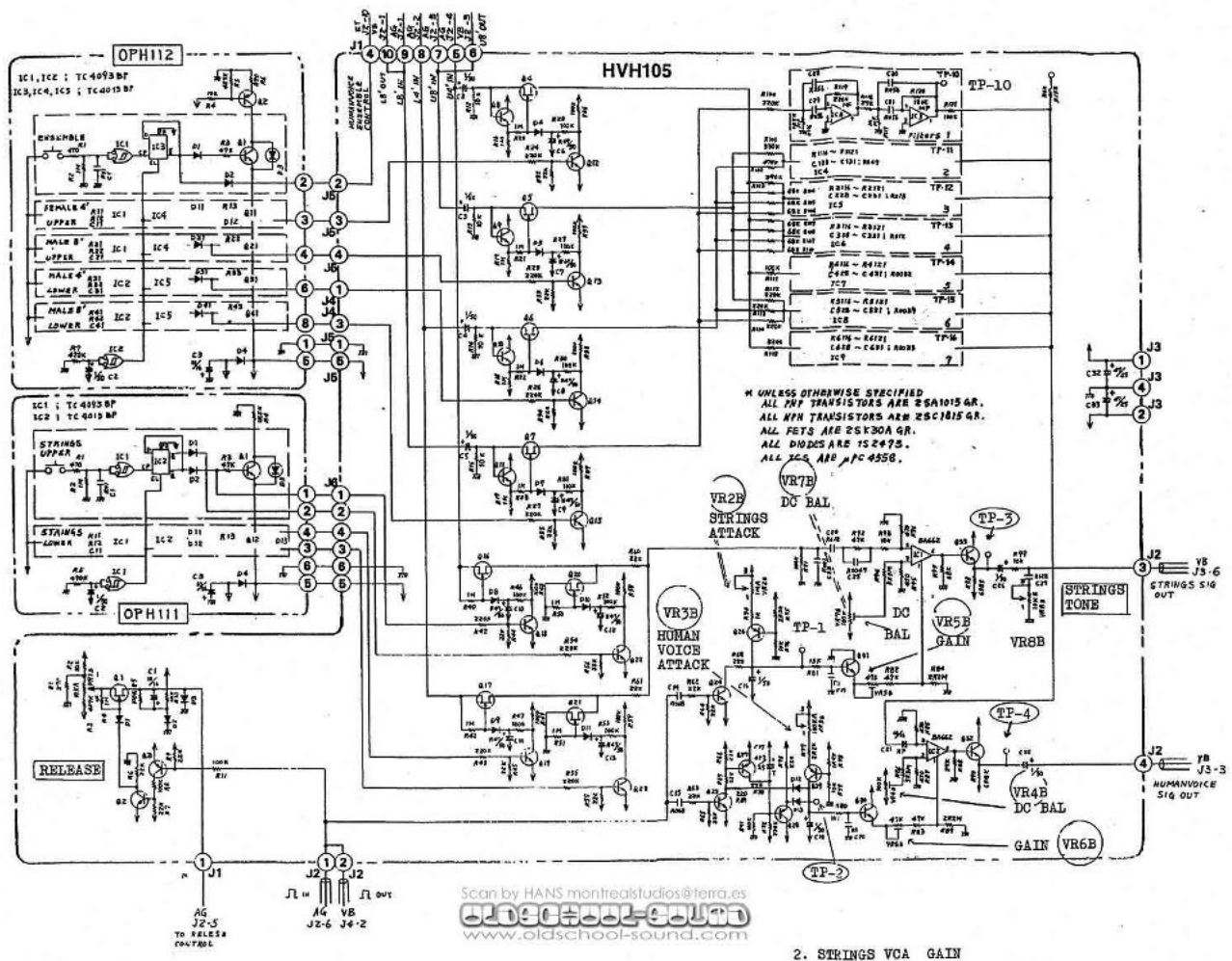
4093B

QUAD 2-INPUT "NAND"
SCHMITT TRIGGER

EQUIVALENT CIRCUIT SCHEMATIC
(1/4 OF CIRCUIT SHOWN)

LOGIC DIAGRAM

1
2 — 3

5
6 — 4

8
9 — 10

12
13 — 11

V_{DD} = Pin 14
V_{SS} = Pin 7

IC 5   IC 2   IC 4   IC 1

MALE
8'

MALE
4'

MALE
8'

FEMALE
4'

ENSEM-
BLE

WHT   WHT   WHT   WHT   YEL

IC 7   IC 2

LOWER   UPPER

GRN   GRN

H117   H118

H119

This page is a full-page electronic schematic diagram (HVH105, OPH111, OPH112 boards) with adjustment procedures.

HUMAN VOICE VCA (IC 2)

3. H. VOICE VCA DC BALANCE

Tabs all "off"   A RELEASE
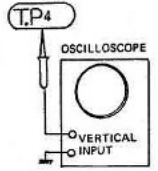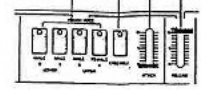
While tapping a key, adjust VR4B for the least DC level variation.

4. H. VOICE VCA GAIN

UPPER MALE 8' "on"

0.4Vpp
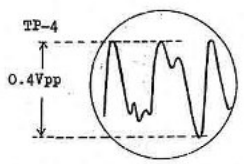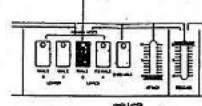
While holding C3 key down, adjust VR6B for the waveform shown above.

2. STRINGS VCA GAIN   (TP-3)

UPPER "on"

4Vpp

While holding C3 key down, adjust VR5B for the waveform as shown above.

STRINGS VCA (IC 1)

1. STRINGS VCA DC BALANCE

ATTACK TONE UP.LO "off"

While tapping a key repeatedly, quickly, adjust VR7B for the least DC level variation.

OSCILLOSCOPE

VERTICAL INPUT

11
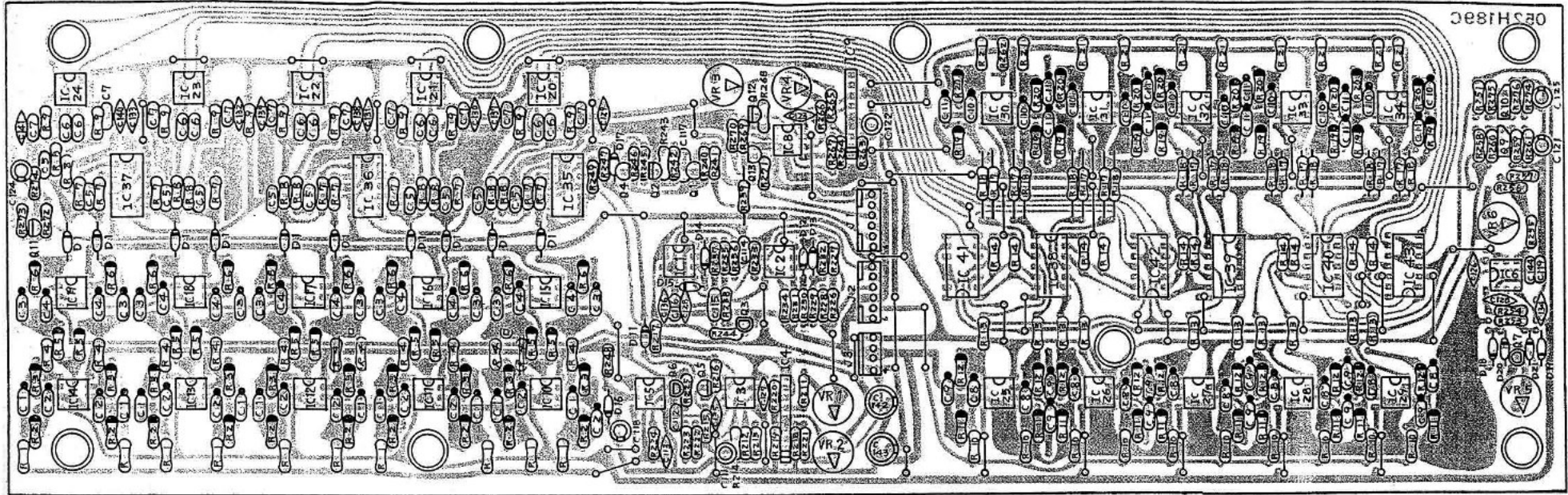
FLH16C (145H016C)
(Etch mask 052H189C)

For the products bearing Serial Number from 901200 to 951499, or furnished with FLH16C, this and next pages are applicable in combination with the previously issued (Sept. 21, 1979) Service Notes which lacks necessary information on FLH16C.
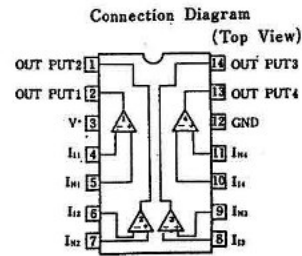
⬭ carbon ¼w 5%

⬭ metal film 1%

▨ 2SA1015-GR

◗ 2SC1815-GR

◖ 2SK30A-Y

⬭ mylar 10%, K

⬭ mylar or polypropylene 2%, G

◗ 1S2473

◇ ceramic

◎ electrolytic

◎NP electro.bi-polar

◯ SR-19R
(2) wiper

□ TL082
uPC4558C
(top view)

▭ BA662A

◣ 2SB605
2SD571

TC4016BP — TC4066BP : interchangeable
LF353, XR082, TL082 : functional equivalence.
TL082 predominantly in use.

µPC4558C
TLO82CP
LF353N

TOP VIEW

µPC177C, AN6912
Quad Comparator
Connection Diagram
(Top View)

4016B   **4066B**

QUAD ANALOG SWITCH
QUAD MULTIPLEXER

12

FLH16C

UNLESS OTHERWISE NOTED:
PNP transistors- 2SA1015-GR
NPN transistors- 2SC1815-GR
FETs- 2SK30A-GR
Diode- 1S2473
ICs- µPC4558

SUFFIX TO TP AND VR
For distinction among PCBs
Can be ignored in a PCB.
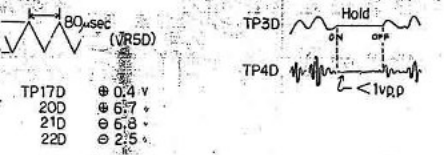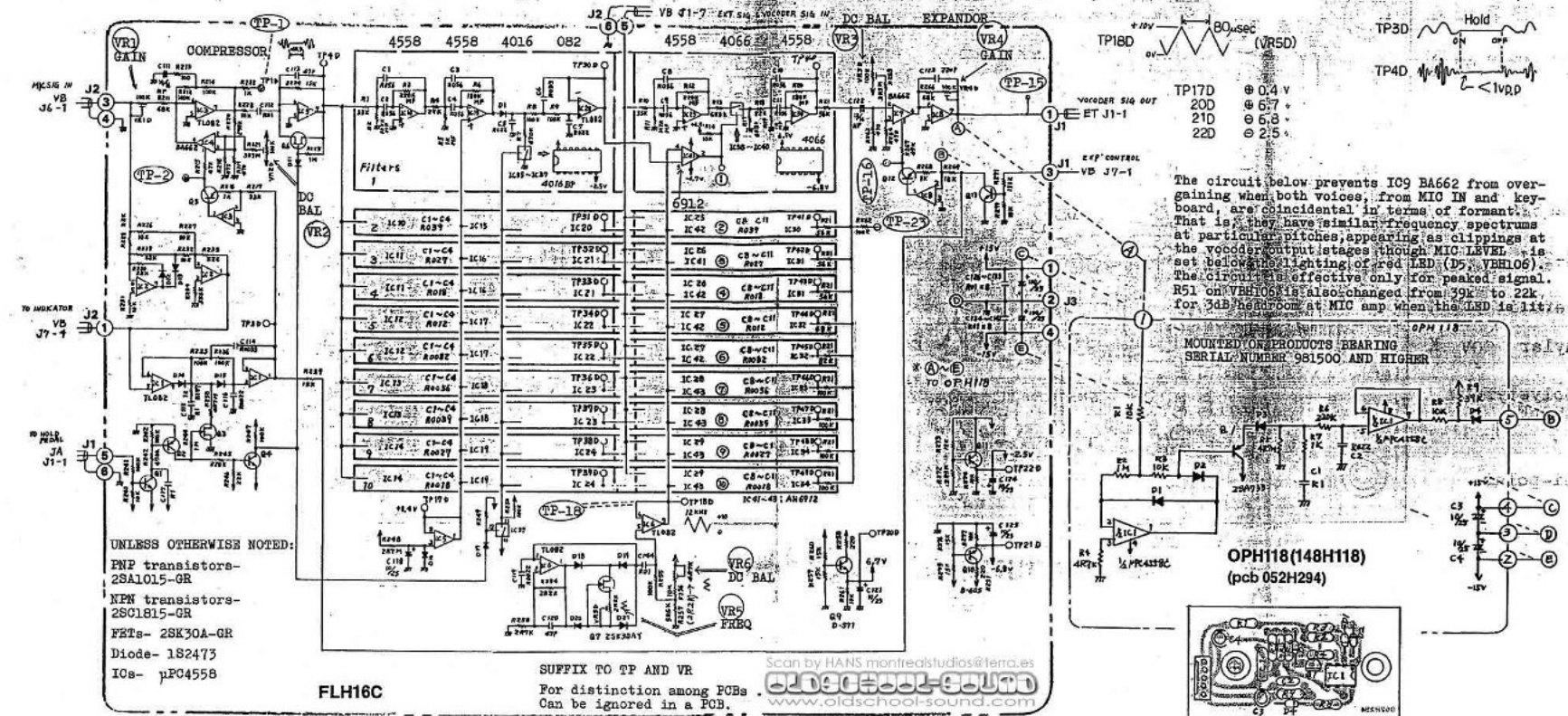
The circuit below prevents IC9 BA662 from over-gaining when both voices, from MIC IN and keyboard, are coincidental in terms of formant. That is they have similar frequency spectrums at particular pitches, appearing as clippings at the vocoder output stages though MIC LEVEL is set below the lighting of red LED (D5, VBH106). The circuit is effective only for peaked signal. R51 on VBH106B18 also changed from 39k to 22k for 3dB headroom at MIC amp when the LED is lit.

MOUNTED ON PRODUCTS BEARING
SERIAL NUMBER 981500 AND HIGHER

OPH118
OPH118(148H118)
(pcb 052H294)
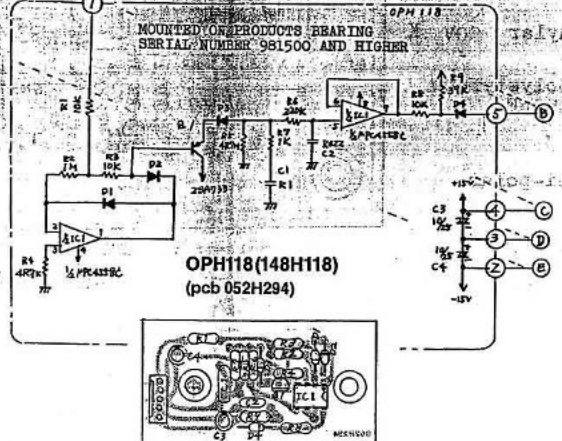
FLH16 ADJUSTMENT

1. COMPRESSOR (IC3, IC4) DC BALANCE
(No input signals)

Set VR2 at its midpoint.
While placing intermitent ground on TP-2 by touching one lead end to the chassis with the other end connected to TP-2, adjust VR2 for minimum DC level variation.
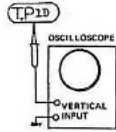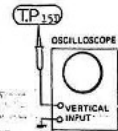
2. COMPRESSOR GAIN

Apply the signal into MIC IN.
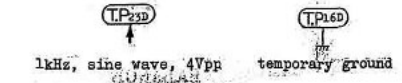Adjust VR1 for 20Vpp at TP-1.

0.15Vpp
MIC LEVEL
1kHz, sine wave
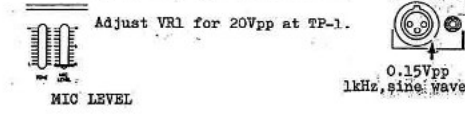
3. EXPANDER (IC8, IC9) DC BALANCE
(No Input signal)

While placing intermitent ground to TP-16(refer to step 1, COMPRESSOR), adjust VR3 for minimum DC variation.
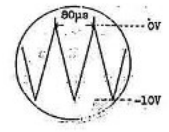
4. EXPANDER GAIN

Feed the signal into TP-23.
Adjust VR4 for 12Vpp at TP-15.

1kHz, sine wave, 4Vpp
temporary ground

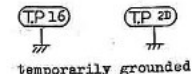### 5. TRIANGLE WAVEFORM (IC6) FREQUENCY

Connect oscilloscope to TP-18 through 10:1 probe for the least ill effect to the circuit.
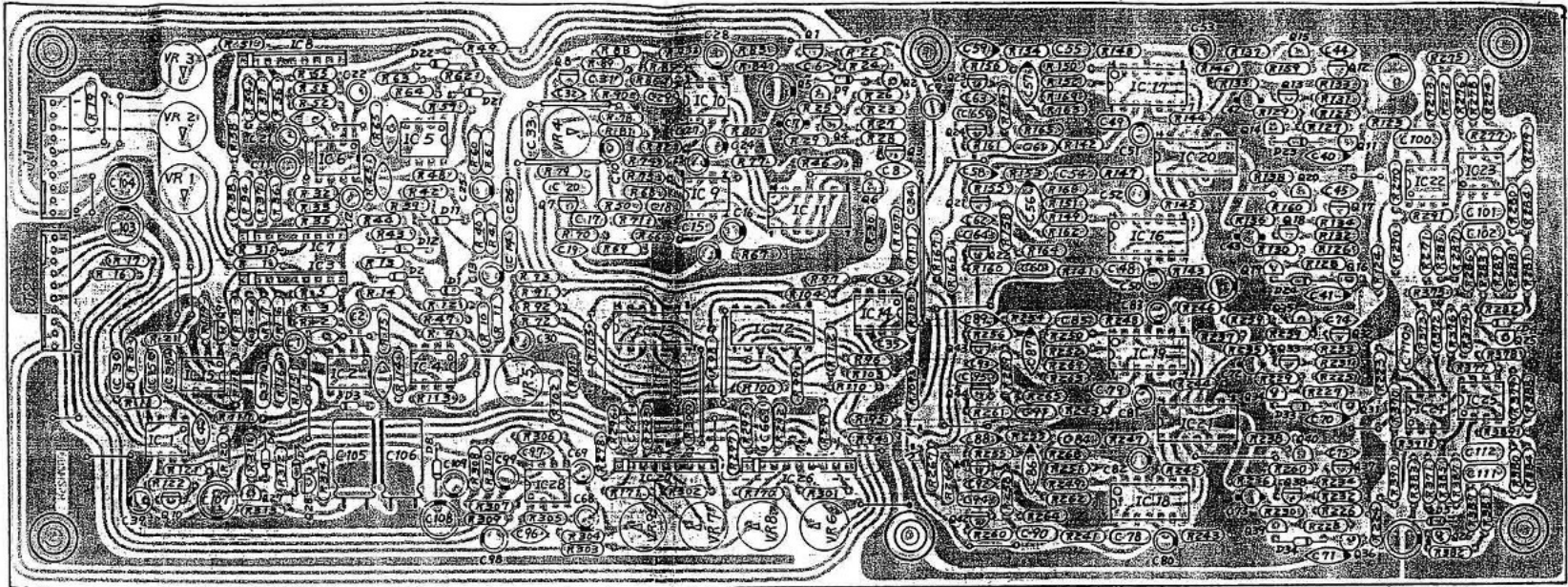
Set VR5 for 80µs/cycle.

80µs   0V
        -10V

6. VCA CUTOFF BIAS (IC6)

TP 16   TP 2D
temporarily grounded

Feed white signal, not less than 0.4Vpp, into EXT SYNTH IN at rear. Adjust EXT SYNTH-INPUT LEVEL at front so that the red LED is in the condition between flicker and complete light cutoff.
Since VR6 determines bias voltage for all filter channels, checking each channel for malfunction is necessary before VR6 is set in place. Set VR6 for the highest duty ratio and check TP-40 thru TP-49 with scope for the signal level. Connect scope to TP-15. Adjust VR6 for the dis appearance of the waveform from screen. Excessive turn to set the bias below cutoff point will result in relatively low VCA output voltage.

VERTICAL INPUT
OSCILLOSCOPE

TP17D ⊕ 0.4 V
20D   ⊕ 6.7 "
21D   ⊕ 6.8 "
22D   ⊖ 2.5 "

TP18D   80sec (VR5D)
TP3D   Hold
TP4D   <1Vpp

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

A
B (Top View)
   2SA733 P or Q
C 2SC945 P or Q
   1S2473
D uPC4558C
   8
E BA662A
F R-25J
G ceramic 50V K
H mylar 50V K
I polystyrene
   150pF
J bi-polar
K
L BA662
M
N C - + -VO IN O +V
        IN OUT2 OUT2
        (1) (2) (1) (2)
O
P OUT2 OUT1 CP2 VDD
   8   7   6   5
Q (Top View)
   MN3009
   256-stage
R 1   2   3   4
   GND CP1 IN VGG
S Audio signal delay
T variable range
   0.64-12.8ms
U S/N 88dB typ.
V

MN3004
GND 1   14 OUT2
CP1 2   13 OUT1
IN   3   12 CP2
VGG 4 MN3004 11 VDD
NC   5 512-   10 NC
NC   6 stage   9 NC
NC   7   8 NC

(Top View)

Delay range
2.56-25.6ms

S/N 85dB

Clock Freq.
10-100kHz

ETH16(151H016) (Etch mask 052H256)

1. VOCODER COMPRESSOR (IC2, IC4) GAIN

Feed 1kHz, sine wave,
5Vpp into J1-3.

Adjust VR1 for 18Vpp at TP-1.

TONE MIC   "off"

VOCODER
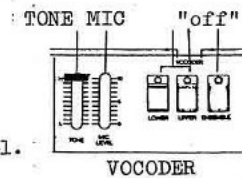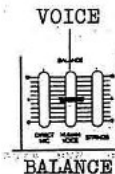
2. HUMAN VOICE COMPRESSOR (IC6, IC7) GAIN

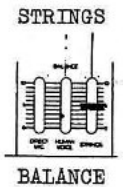Feed 1kHz,sine wave, 10Vpp
into J1-5.

Adjust VR2 for 18Vpp at TP-2.

VOICE

BALANCE

3. STRINGS COMPRESSOR (IC6, IC8) GAIN

Feed 1kHz, sine wave, 15Vpp
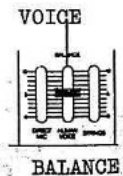into J1-7.

Adjust VR3 for 18Vpp at TP-3.

STRINGS

BALANCE

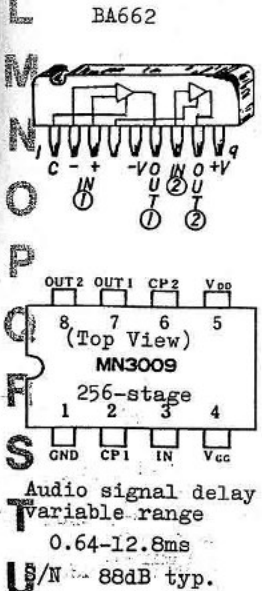### 4. MIXING AMP EXPANDERS
   - CH-1 (IC26, IC28)   CH-2 (IC27, IC28) -

4a. DC BALANCE
While placing intermitent ground
on TP-6 by touching a lead end to the
chassis with the other end connected
to TP-6, adjust VR6(VR7) for the
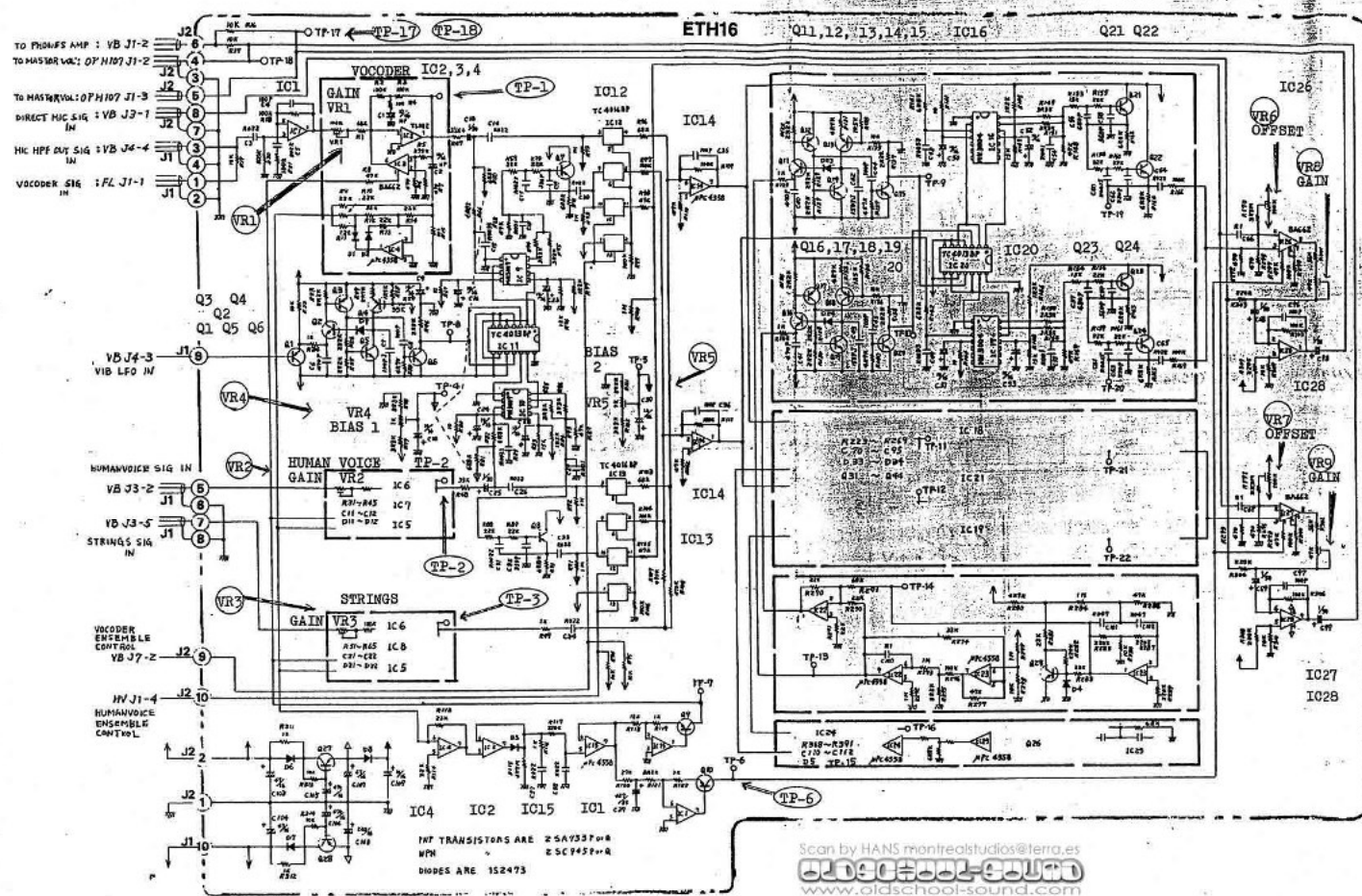least DC level variation at TP-17
(TP-18).

VOICE

BALANCE

4b. GAIN
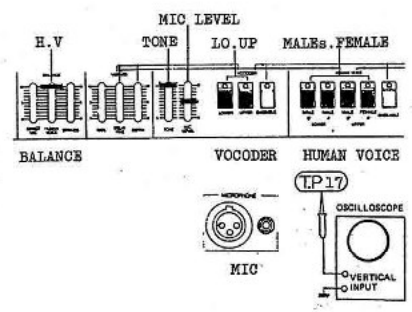Feed 1kHz, sine wave, 10Vpp into J1-5.
Adjust VR8(VR9) for 5Vpp at TP-17(TP-18).

VP-330 service manual schematic diagram with grid coordinates (columns 1–39, rows A–V).

5. BBD BIAS 1 (VIBRATO) IC9, IC10

The purpose of this adjustment is to set BBD operating point to the center.

First, make an adjustment in either mode:

VOCODER or HUMAN VOICE then, check the waveform in the other mode for saturation.

While pressing many keys, adjust VR4 so that both positive and negative peaks are distortion free or, if not, flattened to the same degree or symmetrically(depends on MIC LEVEL set or the number of the keys being played). This adjustment can be made by listening to the sound through a speaker. The signal at BBD input pin should be set to the level at which BBD output is more or less than distortion. Off-centered operating point causes the sound to be heard as if it were coming from a torn-cone speaker or the like. Adjust VR4 for the clear tones.

6. BBD BIAS 2(ENSEMBLE) IC16,IC17,IC18,IC19
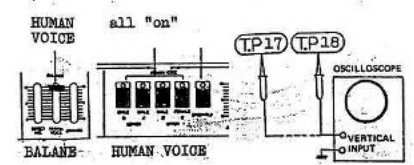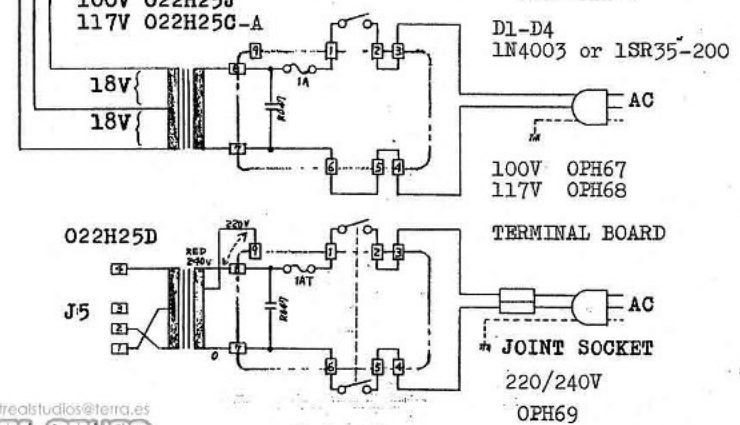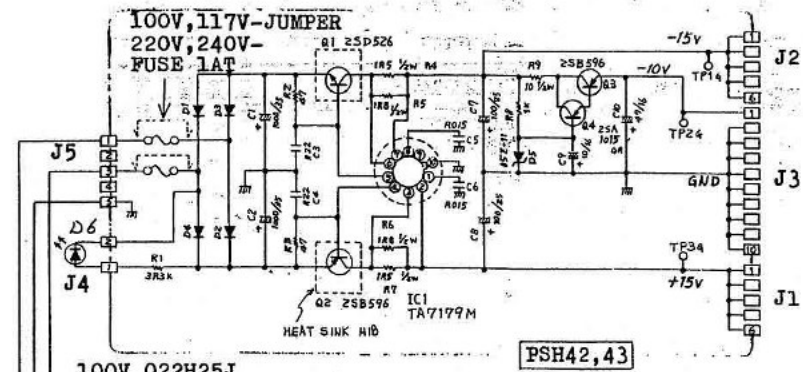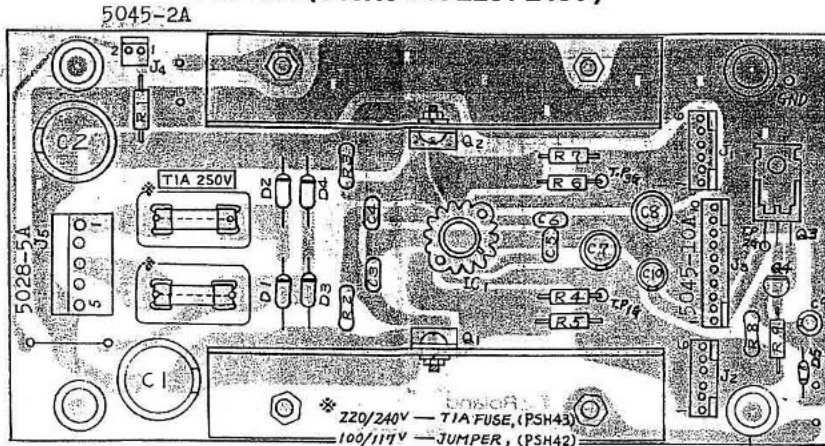
Apply the same procedure described in BIAS 1. Adjust VR5.

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

PSH42A (146H042A 100/117V)
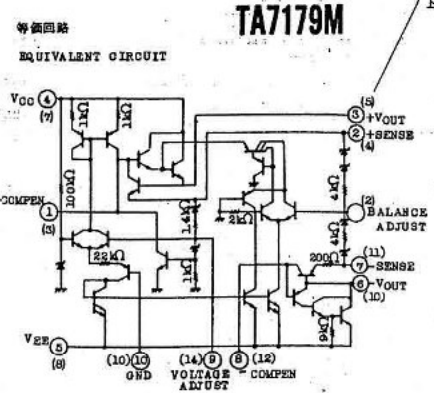PSH43A (146H043A 220/240V) (Etch mask 052H183A)

5045-2A

J4

GND

C2

Q2

R7   R6

T1A 250V

D2   D4

5028-5A

J5

C3   IC1   C6   C8

D1   D3   C7   C10

R4   TP1

R5   5045

C1

* 220/240V → T1A FUSE (PSH43)
100/117V → JUMPER (PSH42)

Heat Sink
048H018

NB-300

NA-305

220ᵛ/240ᵛ

POWER TRANS
0ZZH025D

220V AREA | BRN | RED
240V AREA | RED | BRN

BLU
WHT
BRN

GRN

POWER SW

BLK

WHT   T1A-250V

WHT

BLK   ECQ-U2A
473MF   OPH69

LINE CORD   POWER TRANS
0ZZH025C   117ᵛ

WHT   BLK

POWER SW   GRN

BLK   1.0A 125V

BLK   ECQ-U1A
473MC   OPH68

PCB holder
DLCBS-6N

100V,117V-JUMPER
220V,240V-FUSE 1AT

Q1 2SD526   R9 2SB596   -15V   J2

D7   R4   TP14   -10V

J5   R5   R015   TP24

D6   R6   GND   J3

J4   R1   Q3 2SB596   TP34

R7   IC1 TA7179M   +15V   J1

HEAT SINK H10

PSH42,43

100V 022H25J
117V 022H25C-A

18V

18V

022H25D

J5

220V
RED
240V

1AT

R447

D1-D4
1N4003 or 1SR35-200

AC

100V OPH67
117V OPH68

TERMINAL BOARD

AC

JOINT SOCKET
220/240V
OPH69

SECONDARY
RATINGS
DC

700mA at
21V
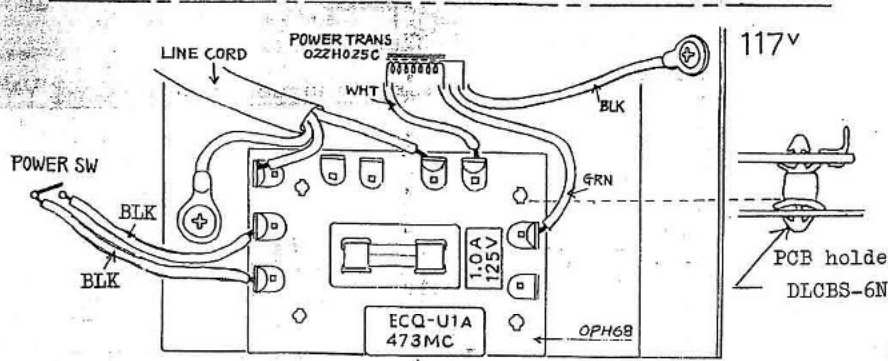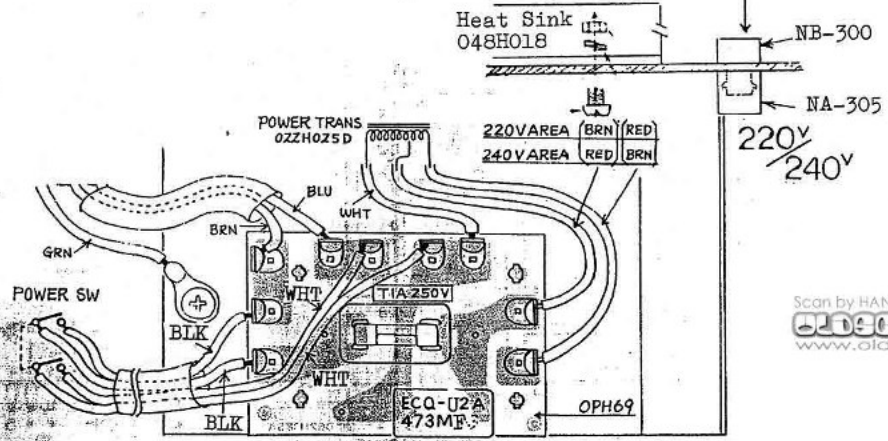
Pin numbers in parentheses are for the
plastics type TA7179P only.

等価回路
EQUIVALENT CIRCUIT

TA7179M

最大定格 （Ta=25℃）
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTICS		SYMBOL	RATING	UNIT
入 力 電 圧 Input Voltage		$+V_{IN}$	30	V
		$-V_{IN}$	-30	
出 力 電 流 Output Current		$+I_{OUT}$	100	mA
		$-I_{OUT}$	-100	
消費電力 Power Dissipation	TA7179P	P_D	625	mW
	TA7179M		500	
動作温度 Operating Temperature	TA7179P	T_{opr}	-30～75	℃
	TA7179M		-30～75	
保存温度 Storage Temperature	TA7179P	T_{stg}	-55～150	℃
	TA7179M		-65～150	