

# VP-330 SERVICE NOTES

Second Edition

APPLICABLE SERIAL NUMBERS & UNITS

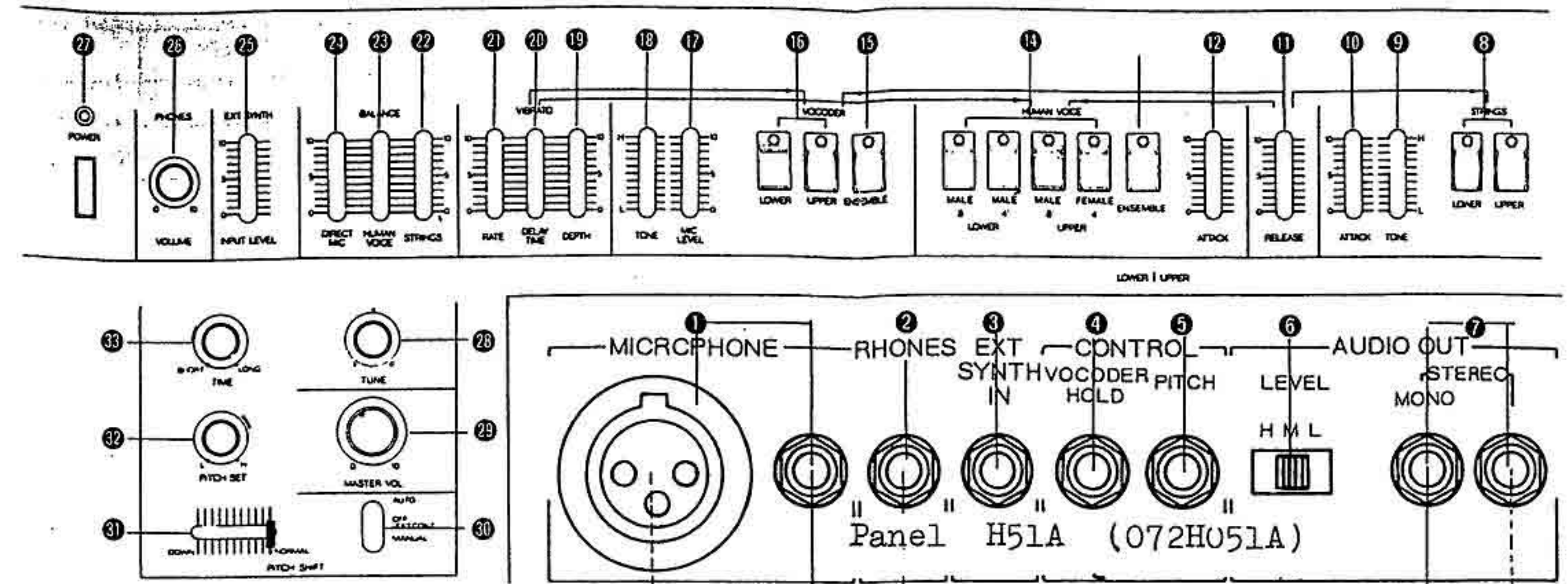
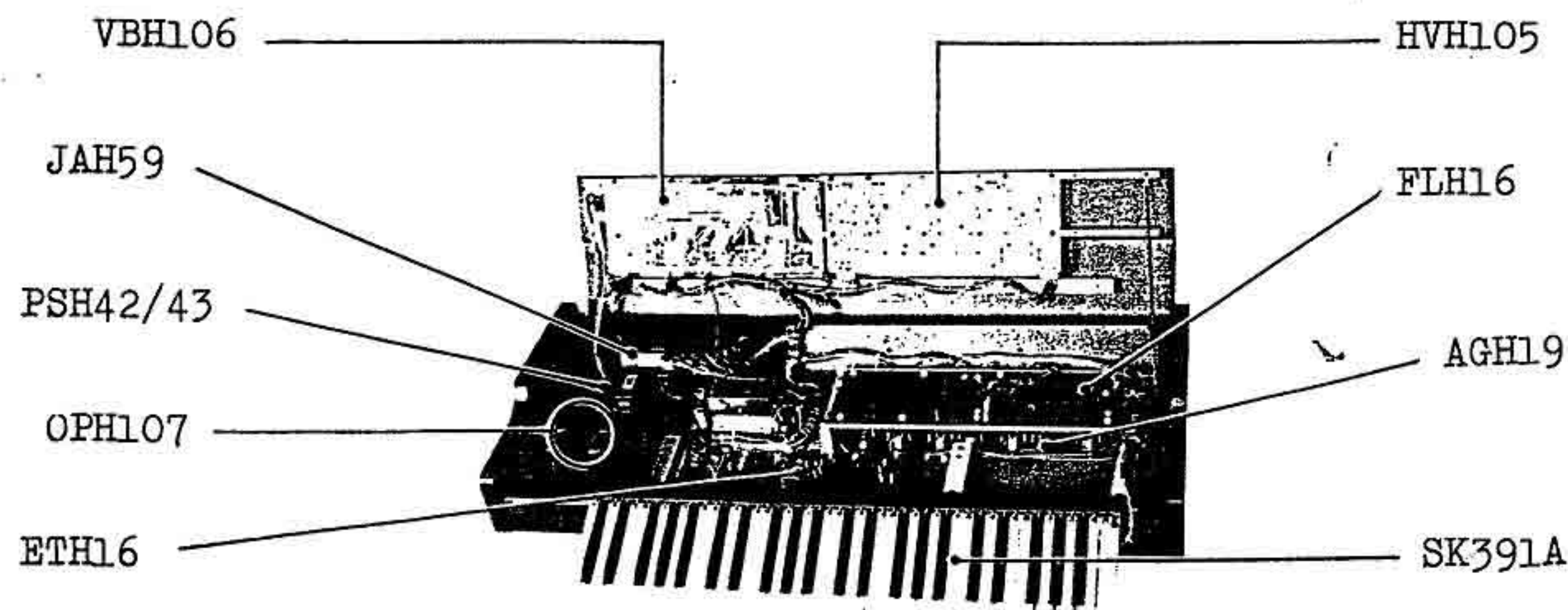
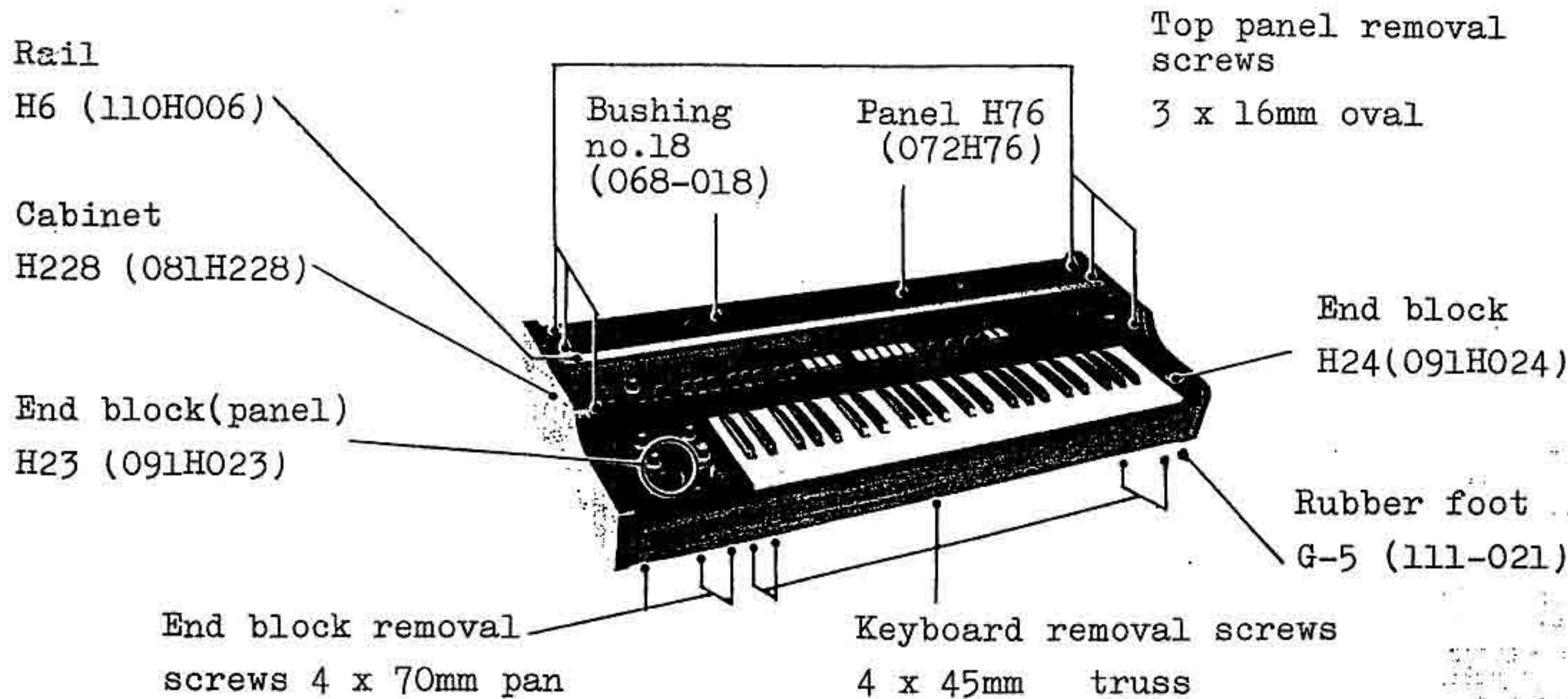
FLH16 SECTION: 901200- or MOUNTING FLH16 "C" VERSION

ENTIRETY: 961450-



**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
Power Consumption-	26 watts	L: -30dBm, 2.2k ohms
Dimensions -----	905 (W) x 370 (D) x 145 (H)mm	Weight -- 14kg



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
15, 16	016H010	tablet white	tablet H10
	016H012	tablet orange	tablet H12
	016H014	tablet green	tablet H14
	016H017	tablet yellow	tablet H17
9, 11	029-447	pot. knob	LFE3R-C20A14 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. knob	10KA, VR10 VM10EK25A14 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. knob	10KB x 2, gang, VR5 GM70RK20B14 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

# 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)	FLH16 C	YES A and C require different adjustment.
HUMAN VOICE	HVH56	HVH105	NO
VIBRATO	VBH58	VBH106	NO

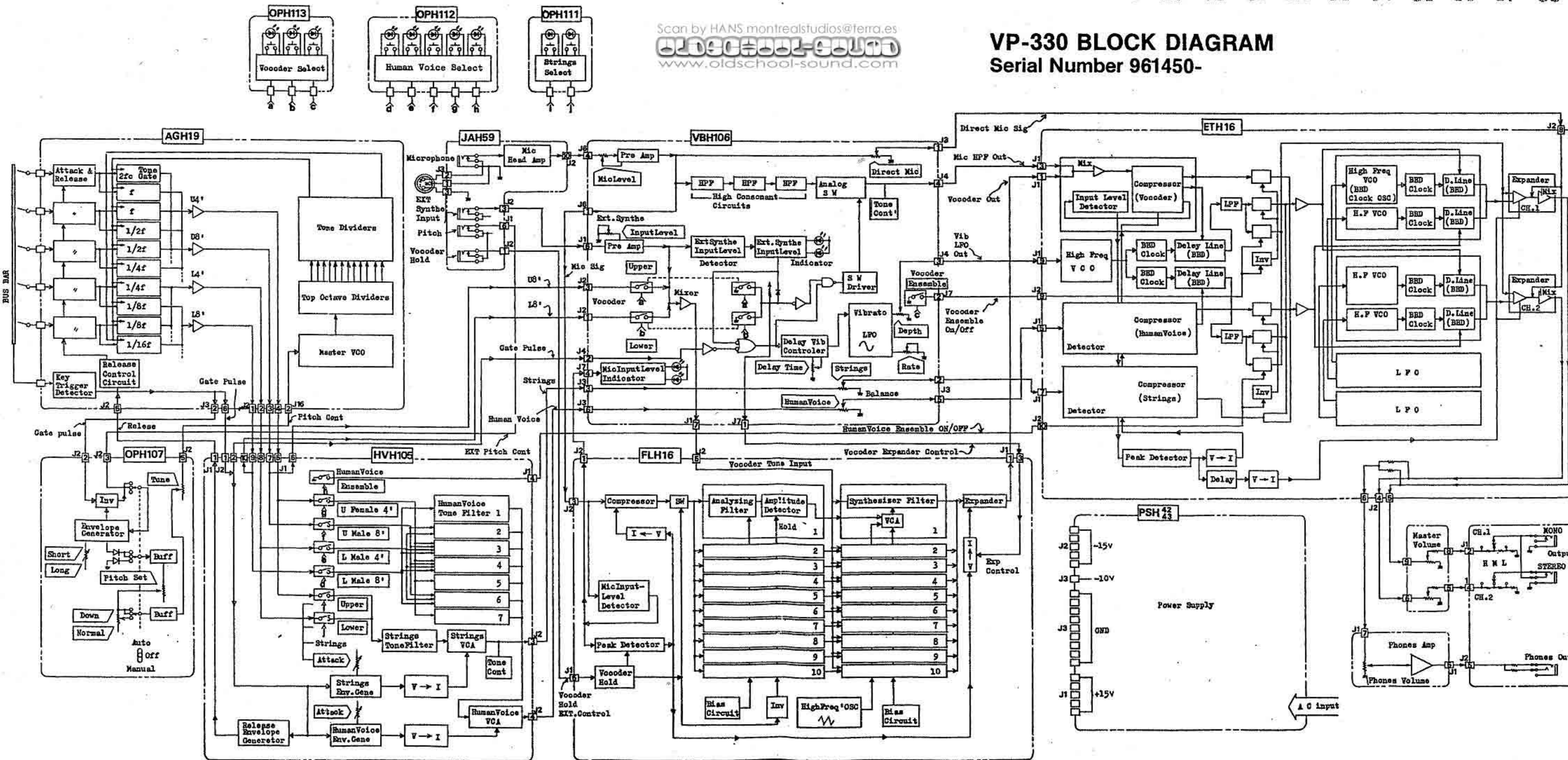
	SERIAL NUMBERS		
	UP TO 951449	WITH 961450	COMPATIBILITY & REMARKS
PITCH	OPH60	OPH107	NO Circuit: identical
	.	OPH111	
	.	OPH112	Pertain to Tab switches
	.	OPH113	
	.	OPH118	Sub-circuit to FLH16C S/N 981500 --
FUSE PCB	OPH67 (100V) OPH68 (117V) OPH69 (220/240V)		
JACK PCB	JAH59		
POWER SUPPLY	PSH42 (100/117V)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

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 40

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O

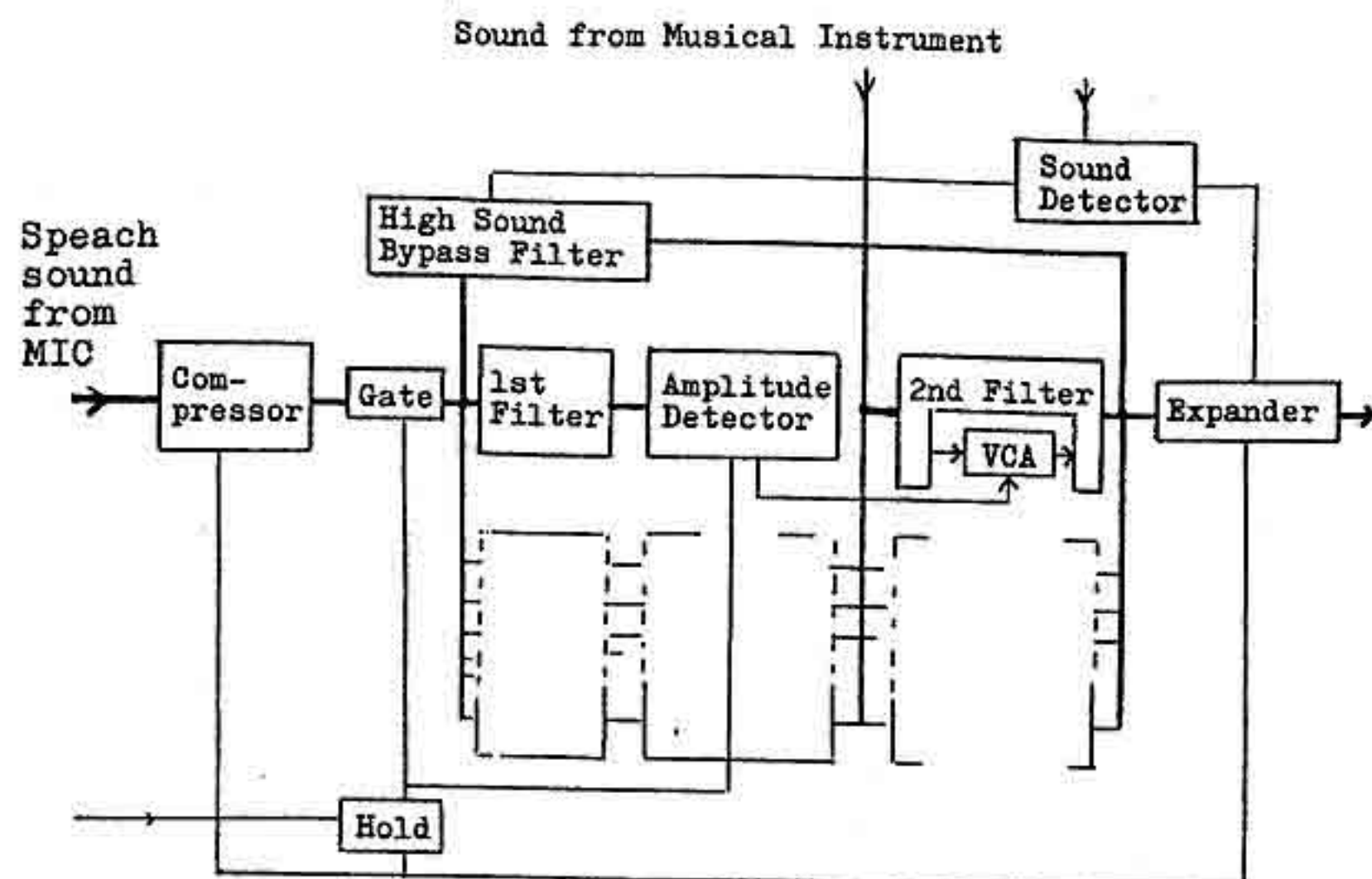
Scan by HANS montrealstudios@terra.es  
www.oldschool-sound.com

## VP-330 BLOCK DIAGRAM Serial Number 961450-



**CIRCUIT DESCRIPTION**

—General—



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 facsimile human voice with musical instrument sound.

**1. ANALYZING (FIRST) FILTER AND AMPLITUDE DETECTOR**

A mic signal is resolved by a group of filters into frequency 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 corresponding 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 components 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 reproduction of human voice, but it is no longer of a musical sound.

**3. COMPANDER**

The compander is a combination of a compressor and an expander. The compressor reduces input signal range in amplitude, 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 original 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 interruption 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 volumes 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, variable 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 repairing 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 original 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 particular transistor choppers, Q2, Q3, etc. (hereafter 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 discharge rate, generating an envelope for the Tone Gate according to the gate signal and the signal from HVH105, Release Control Generator.

When the key is pressed, a ground is placed on Q155 collector for approximately 50ms, discharging capacitor C1 to zero volt. This erases remaining envelopes of precedently played keys, and then, Q155 and Q156 develop a new envelope voltage 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 Componder**

This Componder system is composed of the Mic Input Detector IC2 (full-wave rectifier), Peak Detector IC1, V-1 Converters IC3, Q5, IC8 and Q12, Compressor IC3, IC4, and Expander IC8, IC9. One half (positive or negative) of compressor 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**

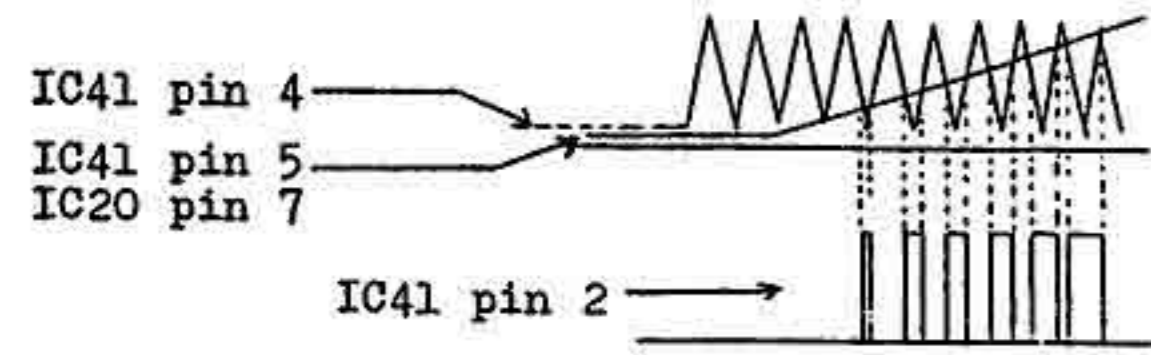
Ten BPFs with a high Q, composed of ICs (e.g. IC10 and IC15) and associated Rs and Cs, divide an input signal among them, covering 170Hz-7kHz, and let particular bands pass through. A mic signal from Compressor is preemphasized, accommodated by BPFs corresponding to the spectrums, routed to D1 for peak 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 circuit 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 discharge time constant, thus the charging 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 speech 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.



When the voltage from IC20 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 are smoothed while they are passing through the 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 not 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 Decay Time 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	SLE-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		180pH
022H025C-A	PT.H25C-A		117V
022H025D	PT.H25D		220/240V

POTENTIOMETER

Rotary

132119234	VM10RK20B24	20KB	TUNE
13219309	VM10EK25A14(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 Slider pot!

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			
13829801MO	10 ohms		flame retardant

CAPACITOR

035-145	50pF	50V J	polystyrene
035-156	150pF	50V J	polystyrene
032-241	10pF	16V	electro. bi-polar
13639943MO	2.2pF	50V	electro. bi-polar
Mylar 50V G (2%)			
13549201Y0	0018pF	13549207Y0	012pF
13549202Y0	0027pF	13549208Y0	018pF
13549203Y0	0033pF	13549209Y0	027pF
13549204Y0	0039pF	13549210Y0	039pF
13549205Y0	0056pF	13549211Y0	047pF
13549206Y0	0082pF	13549212Y0	056pF

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

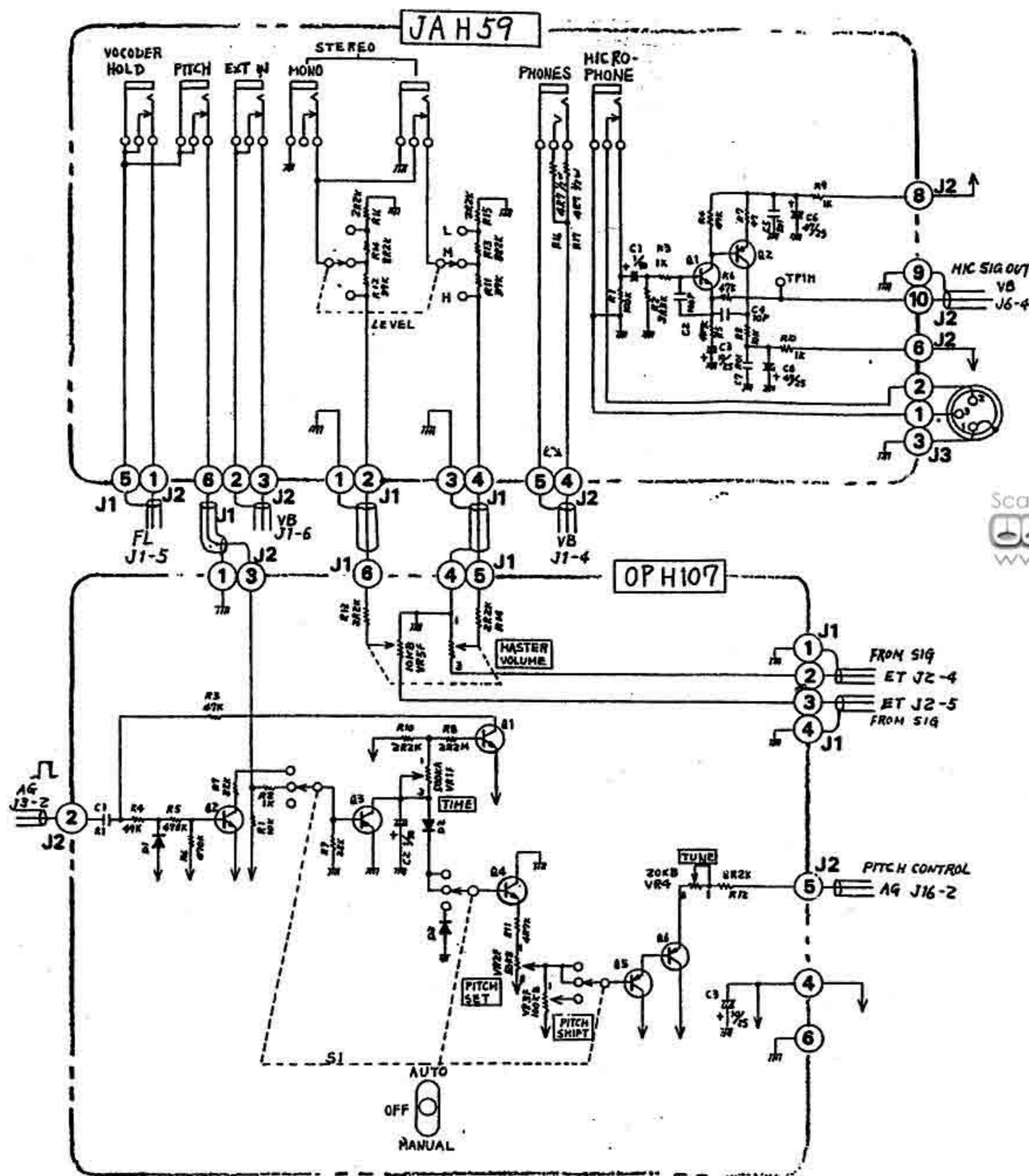
Diode

- 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

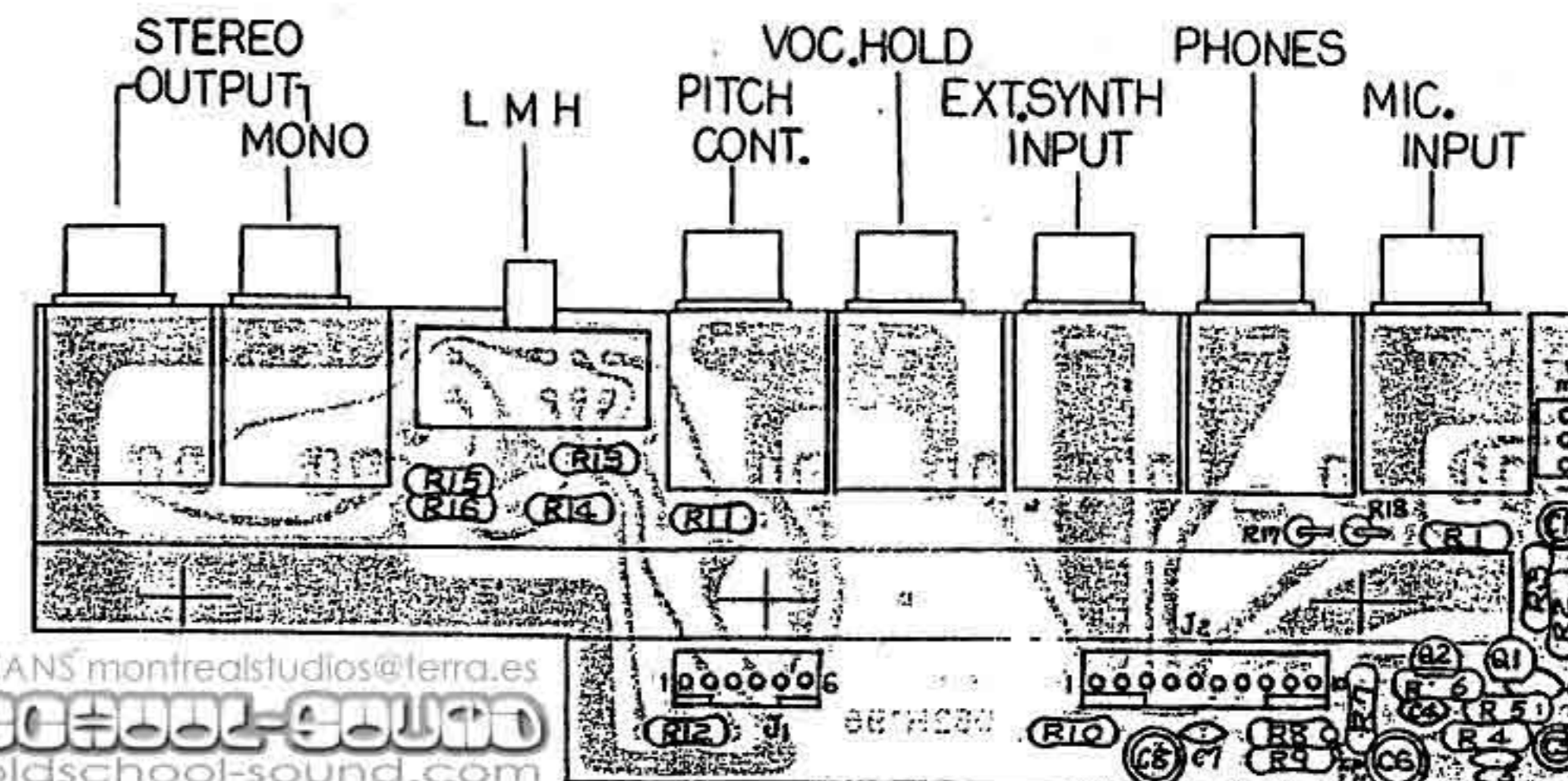
IC

- 020-156 AY-3-0214 chromatic divider
- 15159124TO TC4093BP quadruple 2-in NAND
- 15159115NO  $\mu$ PD4066C quad bilateral switch
- 020-227 TC4520BP dual binal up counter
- 020-041 TC4013BP dual D flip flop
- 020-064  $\mu$ PC4558C dual op amp
- 020-208 LF353 dual op amp FET
- 020-100 TLO82CP 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

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

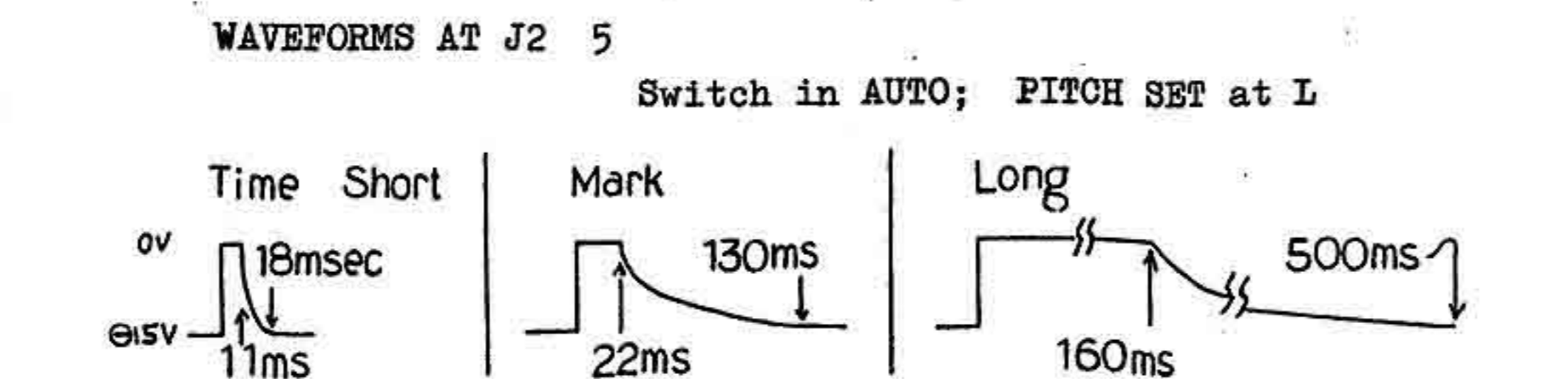


JAH59(149H059)  
(Etch mask 052H196)



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

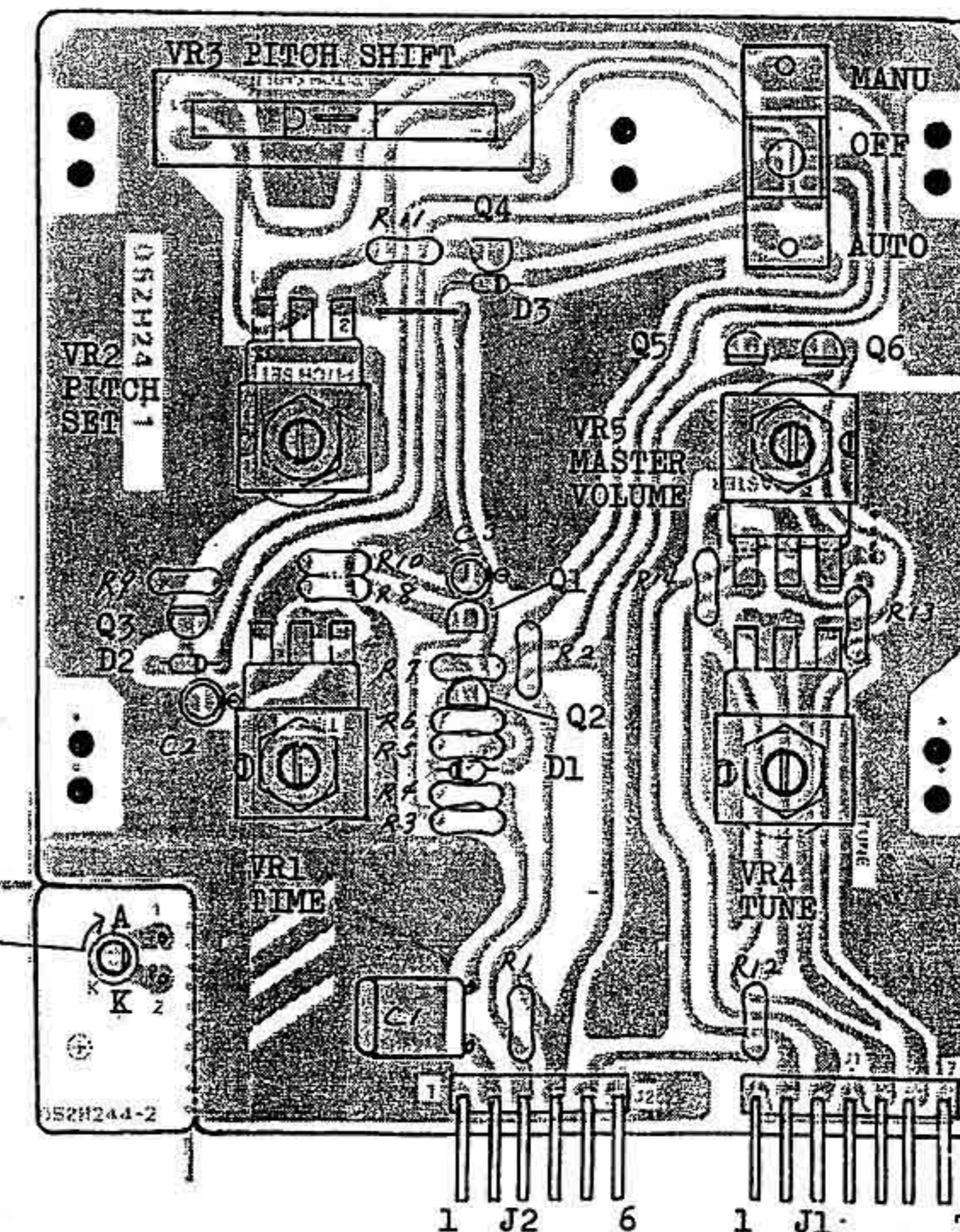
OPH107 (149H107)  
(Etch mask 052H244)  
View from foil side



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

- 2SA1015-GR
- 2SC1815-GR
- Diode 1S2473
- LED TLR-124 (red)
- Pipe  
H:18mm  
longer lead



A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U

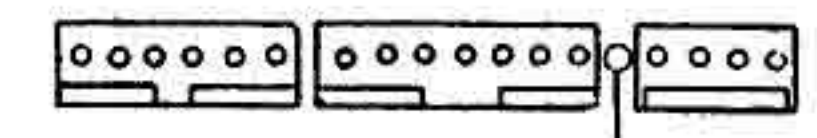
F E D D' C' C

**AGH19 (144H019)**  
(Etch mask 052H187)

Interchangeable with AGH17

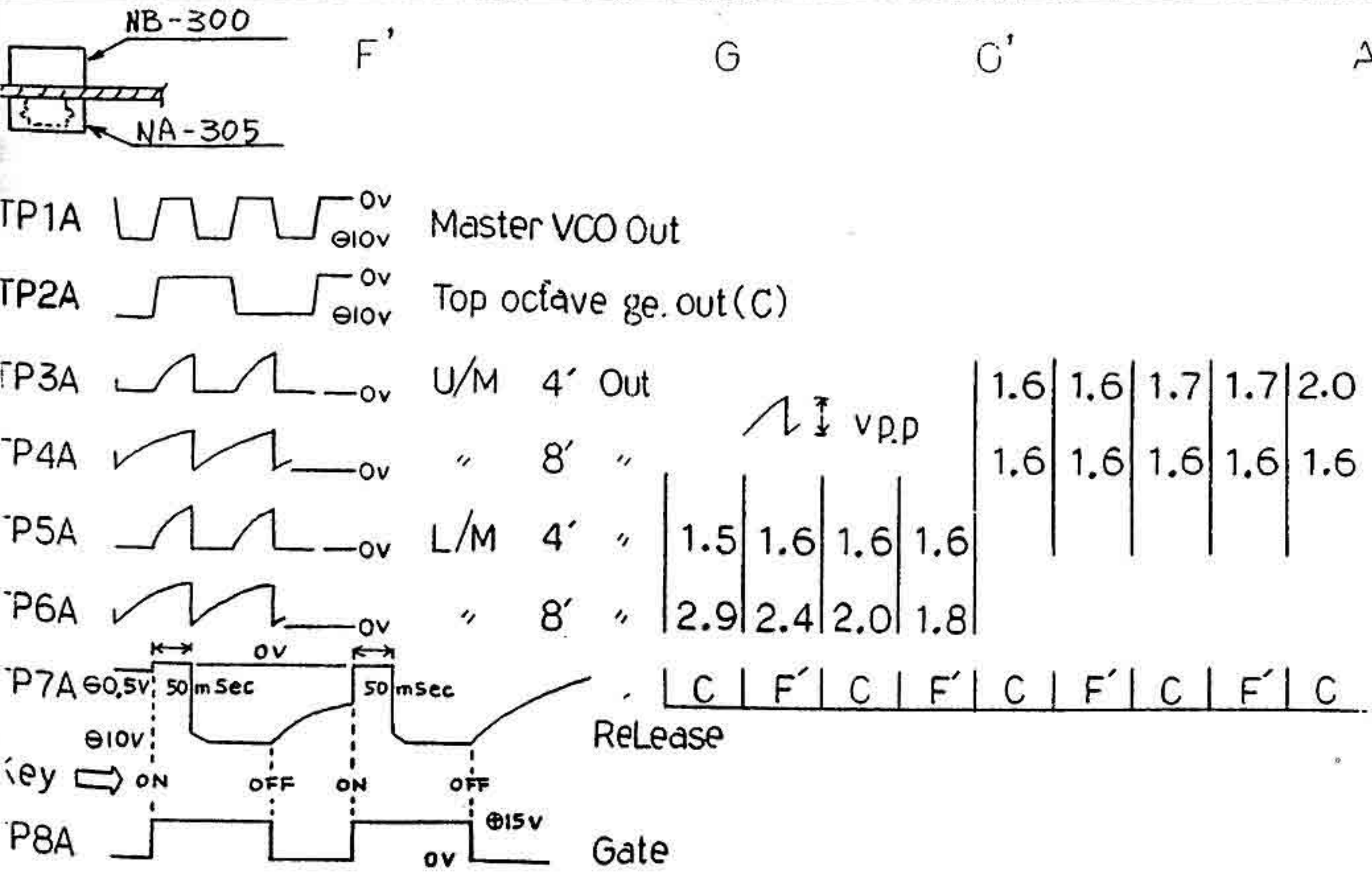
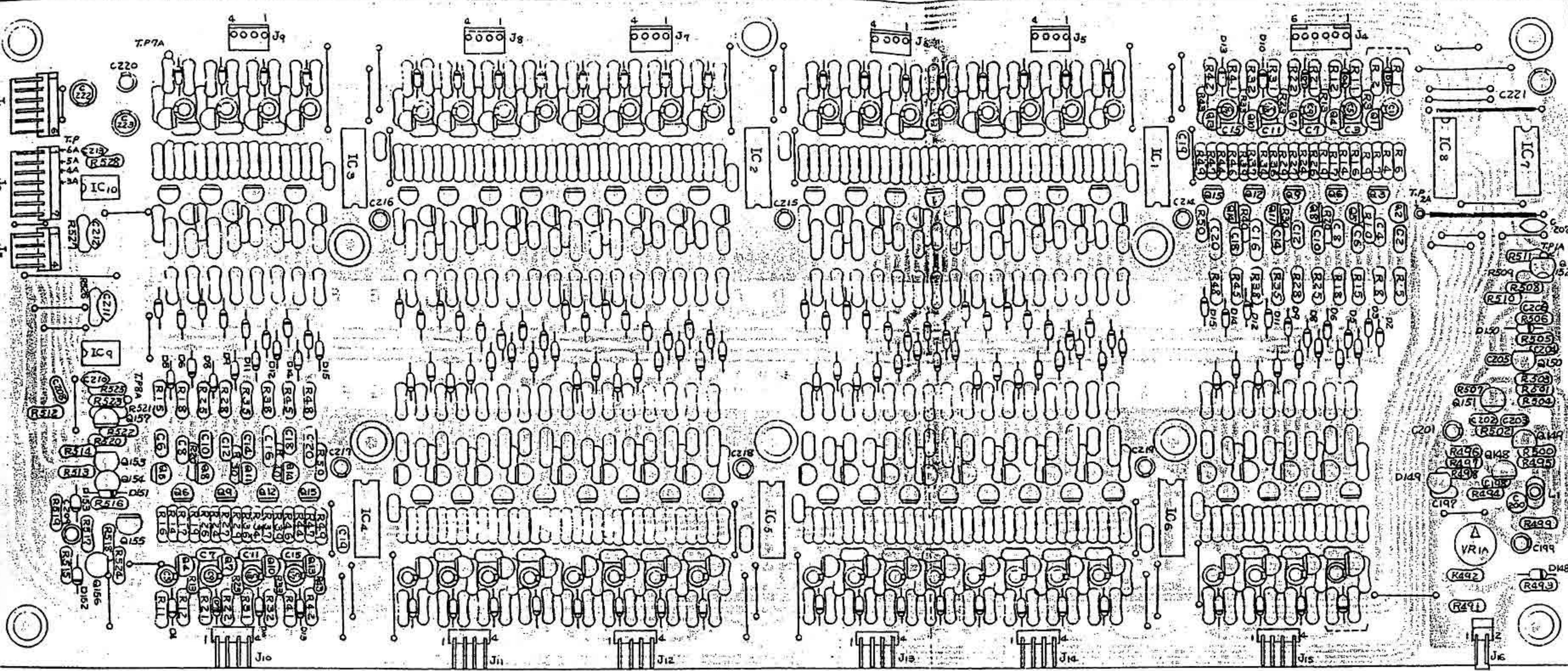
Left, J1-3, J10-16 show wafer terminals on AGH17 in old model, which are, on AGH19, of the styles shown below.

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

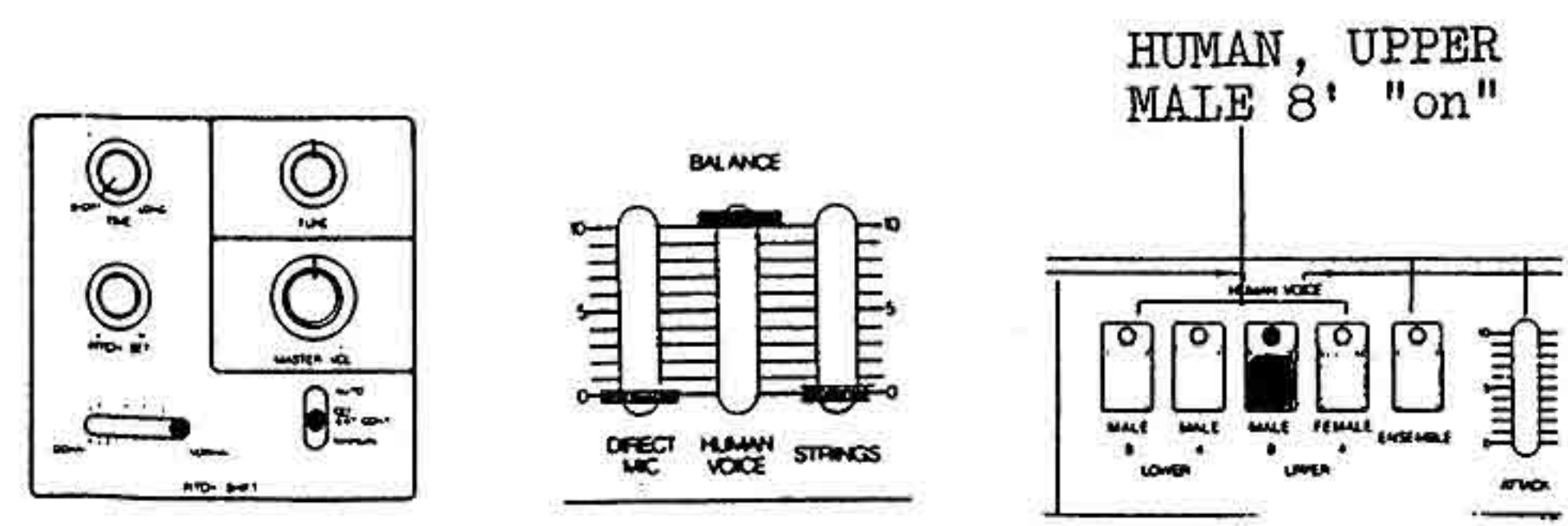


Scan by HANS montrealstudios@terra.es  
www.oldschool-sound.com

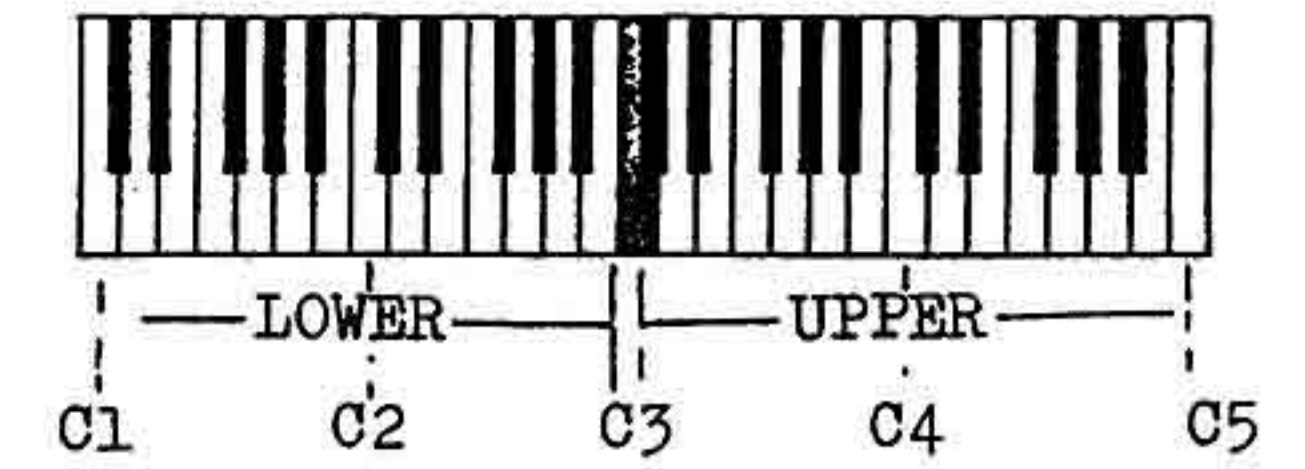
- SR-19R wiper
- 2SC752G-0
- 2SC381-R
- 2SC1815-GR
- 2SA733 -P(R)  
2SA1015-GR
- Polystyrene cap.
- Ceramic capacitor
- Mylar capacitor
- Electrolytic cap.
- 1S2473 or 1S1555



**TUNING**



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.

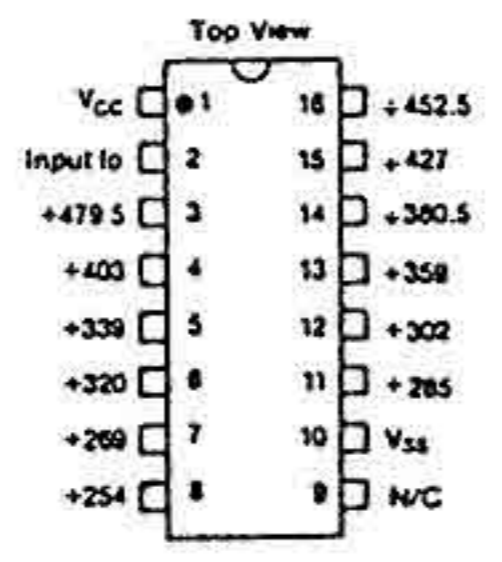
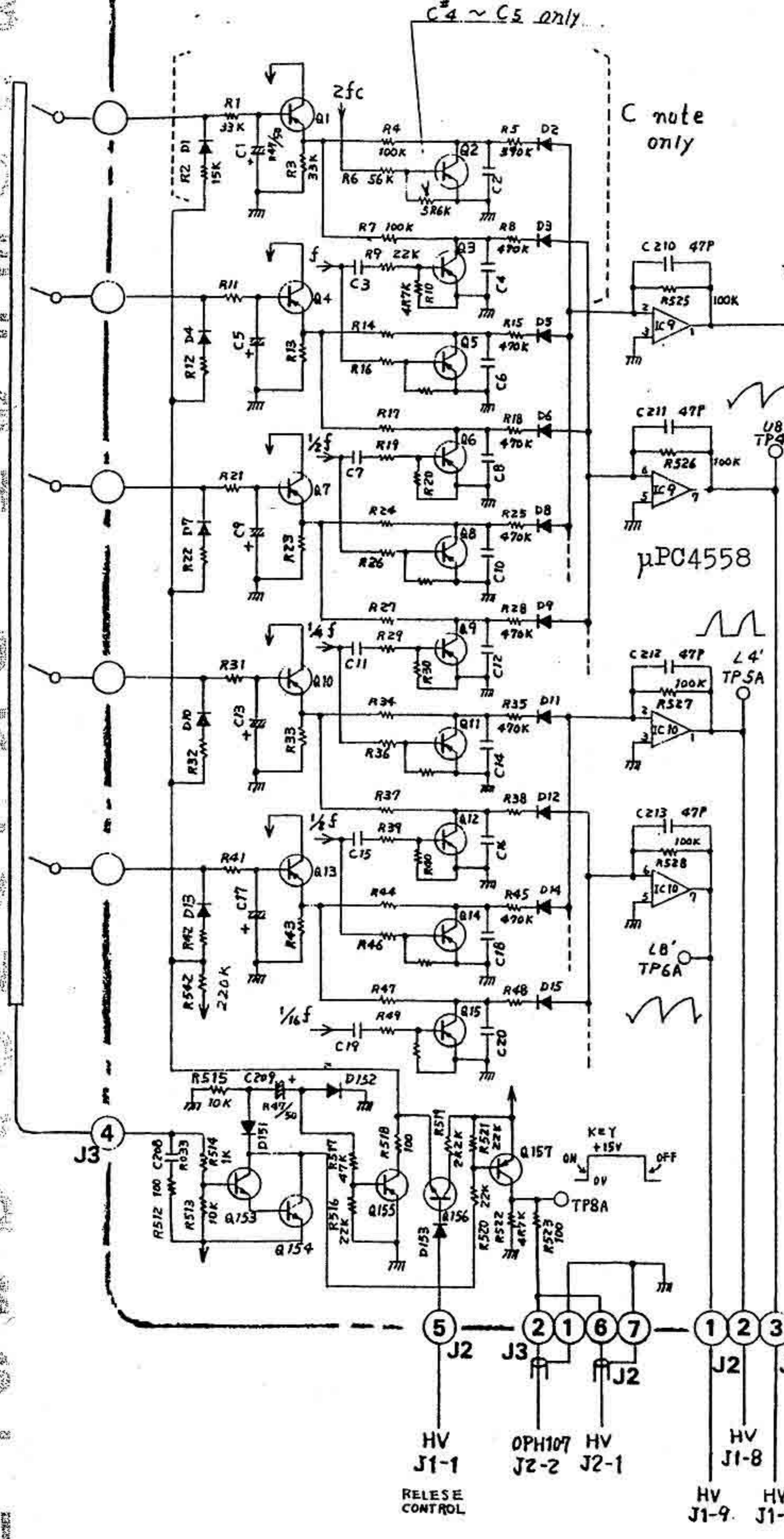


**AGH19**

surface mounting

AY-3-0214

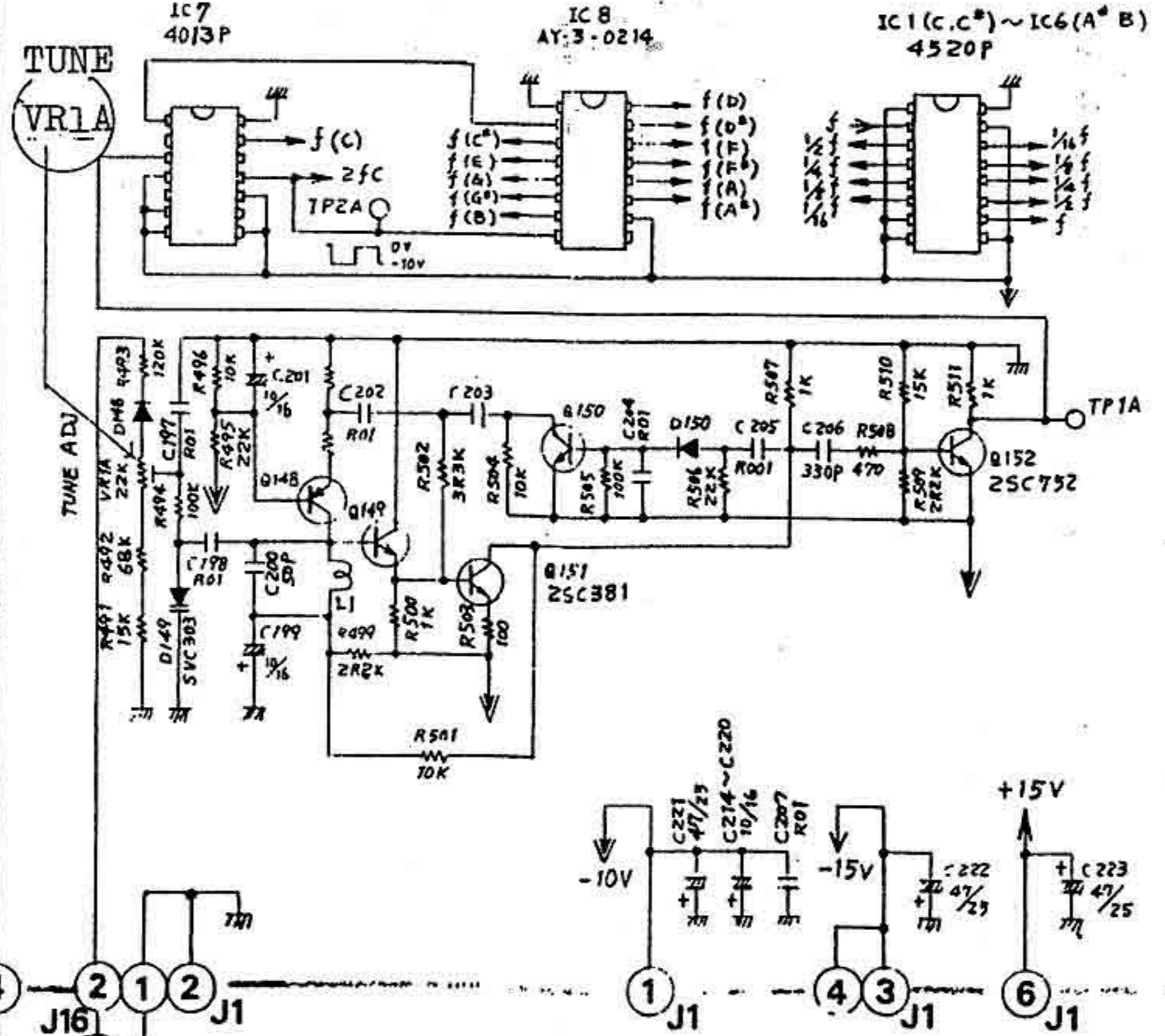
VP-330 KEYBOARD SK-391A PARTS



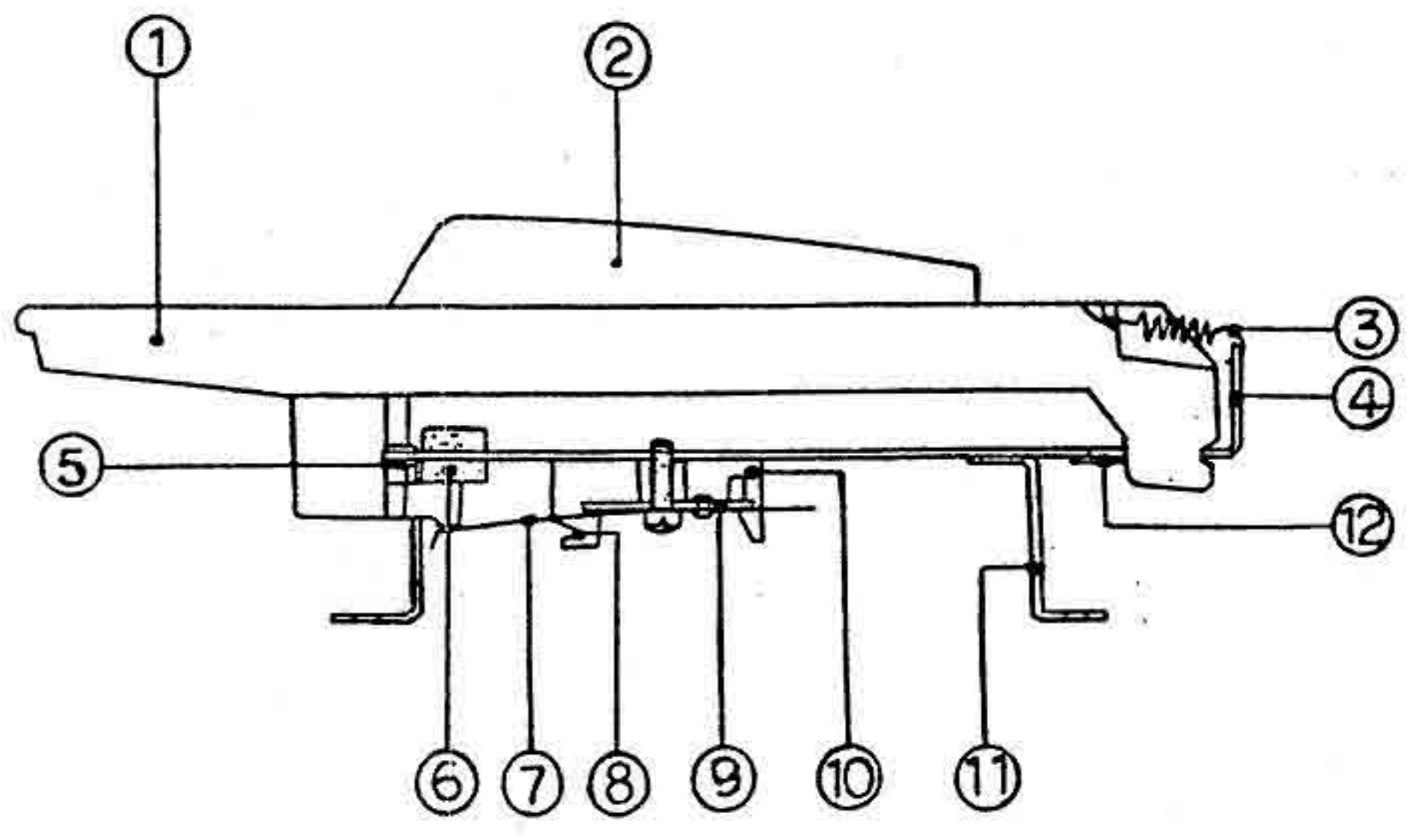
R refers to Radix (decimal) point.

	C	C# ~ F	F, G	G, A	A, B
C2	R0015				
C4	R0068				
C6	R0033	←	R0022	R0018	R0015
C8	R015	←	R01		
C10	R0068	←	R0047		
C12	R033	←	R022		
C14	R015	←	R01		
C16	R068	←	R047		
C18	R033	←	R022		
C20	R12	←	R1		
C3	R001				
C7	R001	←			
C11	R001	←			
C15	R0022	←	R0015		
C19	R0039	←	R0027		
R38	330K	←	390K		
R48	220K	←	270K		

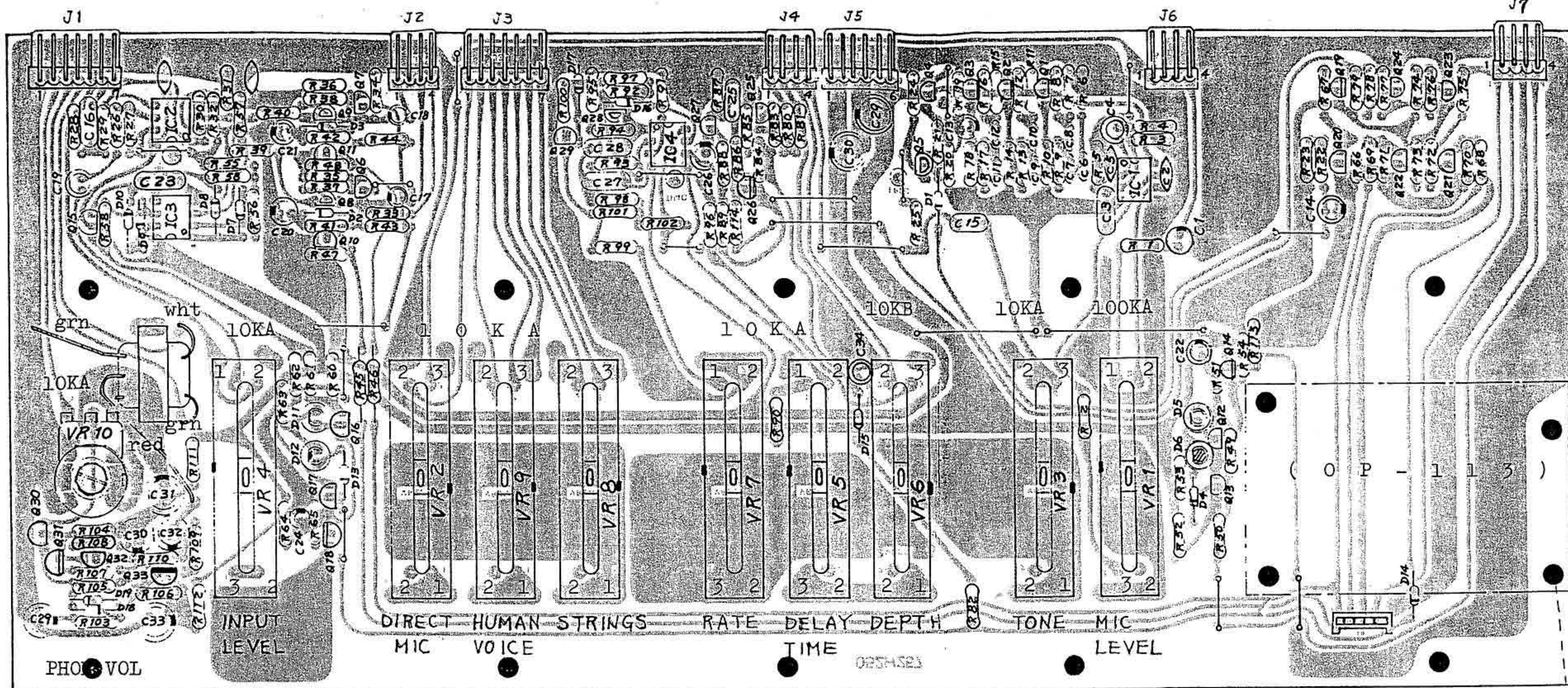
Scan by HANS montrealstudios@terra.es  
www.oldschool-sound.com



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



UNLESS OTHERWISE NOTED:  
 PNP transistors - 2SA733-P or 2SA1015-GR  
 NPN transistors - 2SC1815-GR  
 Diodes ----- 1S2473 or 1S1555



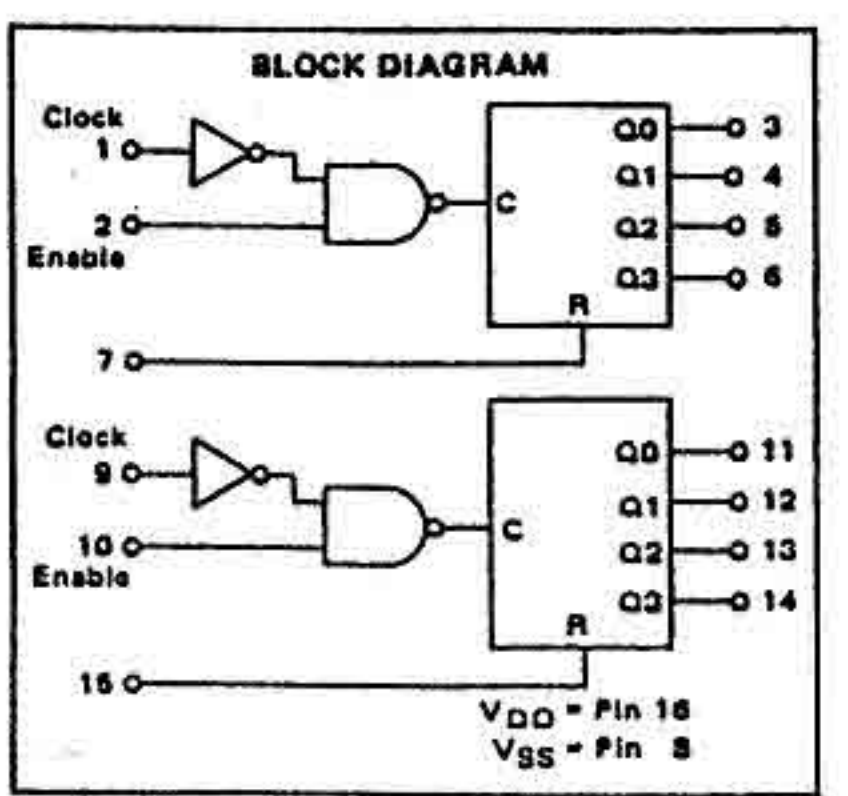
**VBH106 (149H106)**  
(pcb 052H257)

- 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

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

**4520B (AGH19)**

DUAL BINARY UP COUNTER



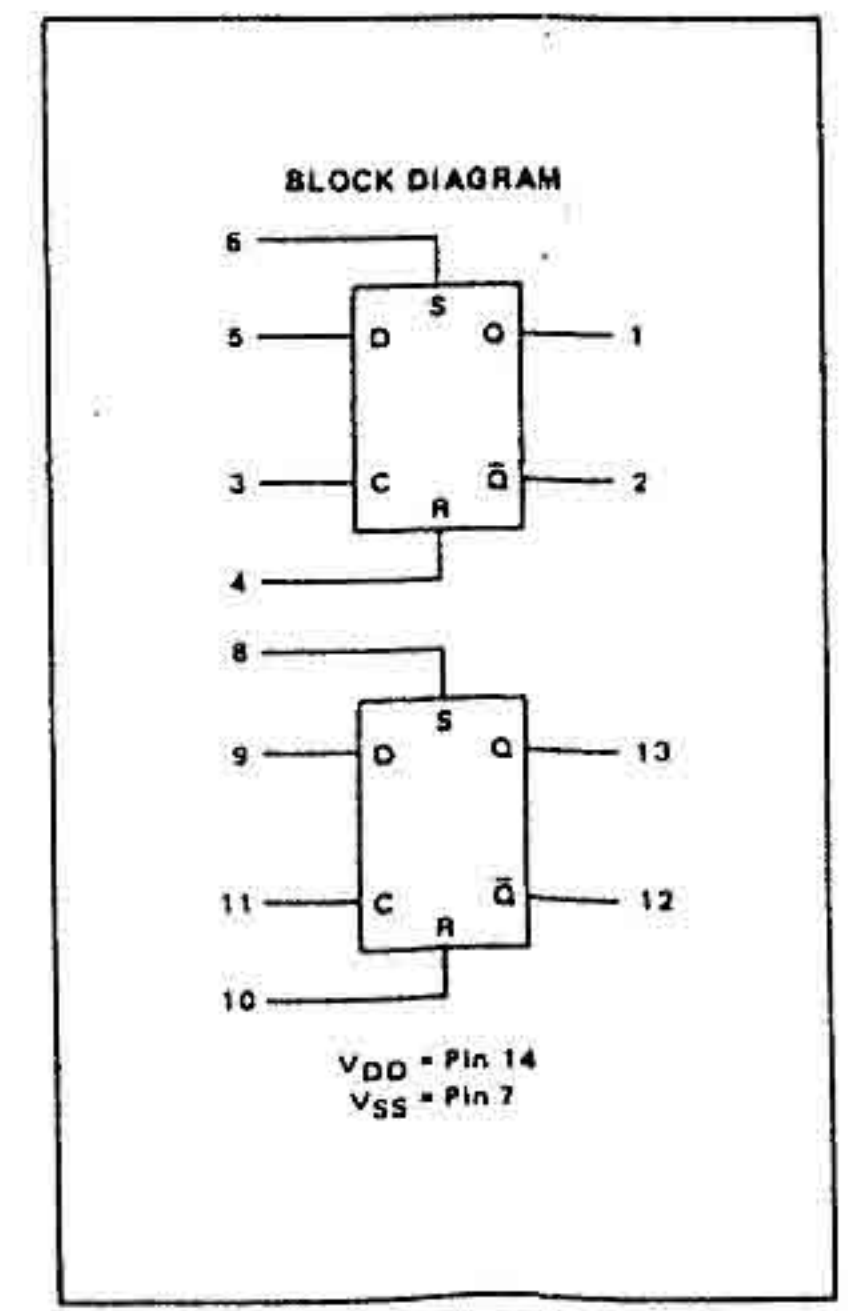
**4013B**

DUAL TYPE D FLIP-FLOP

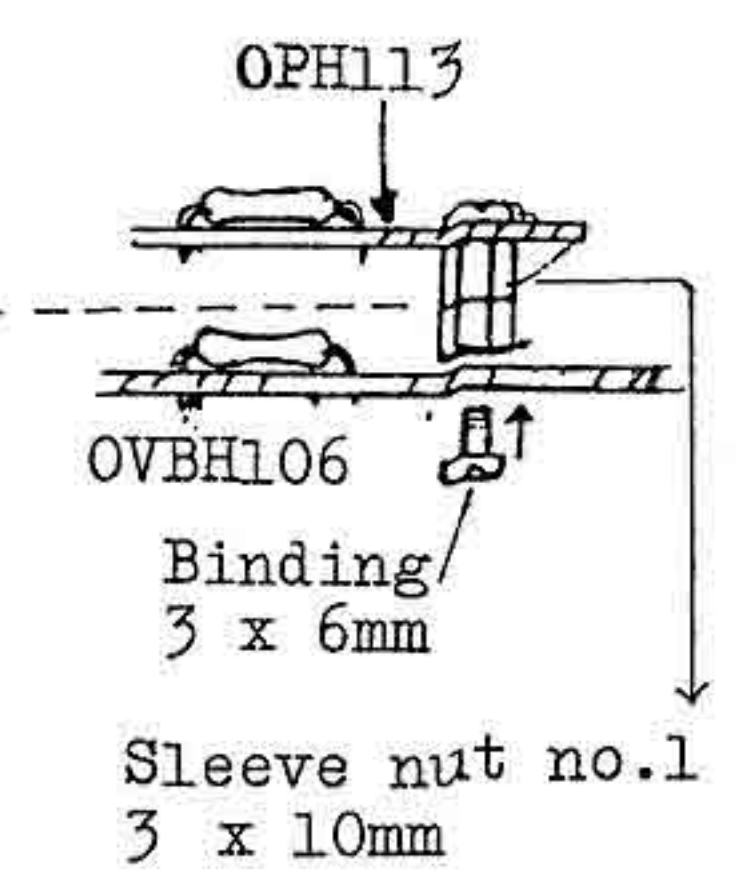
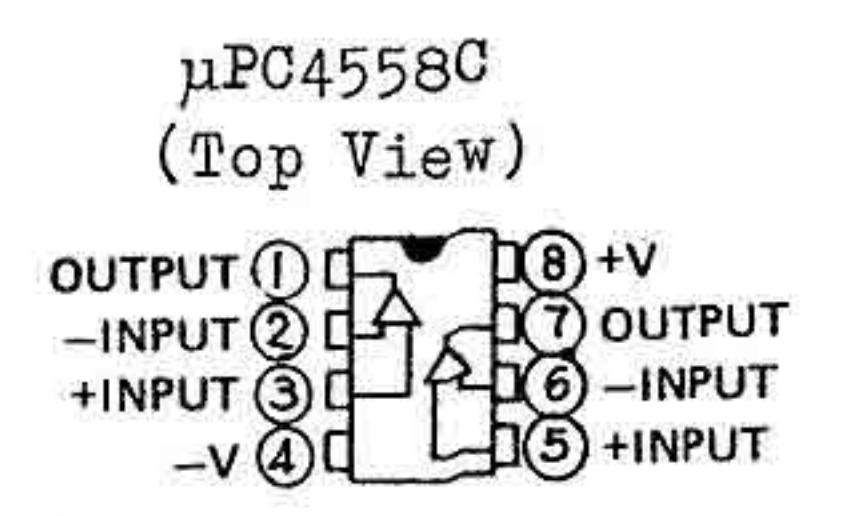
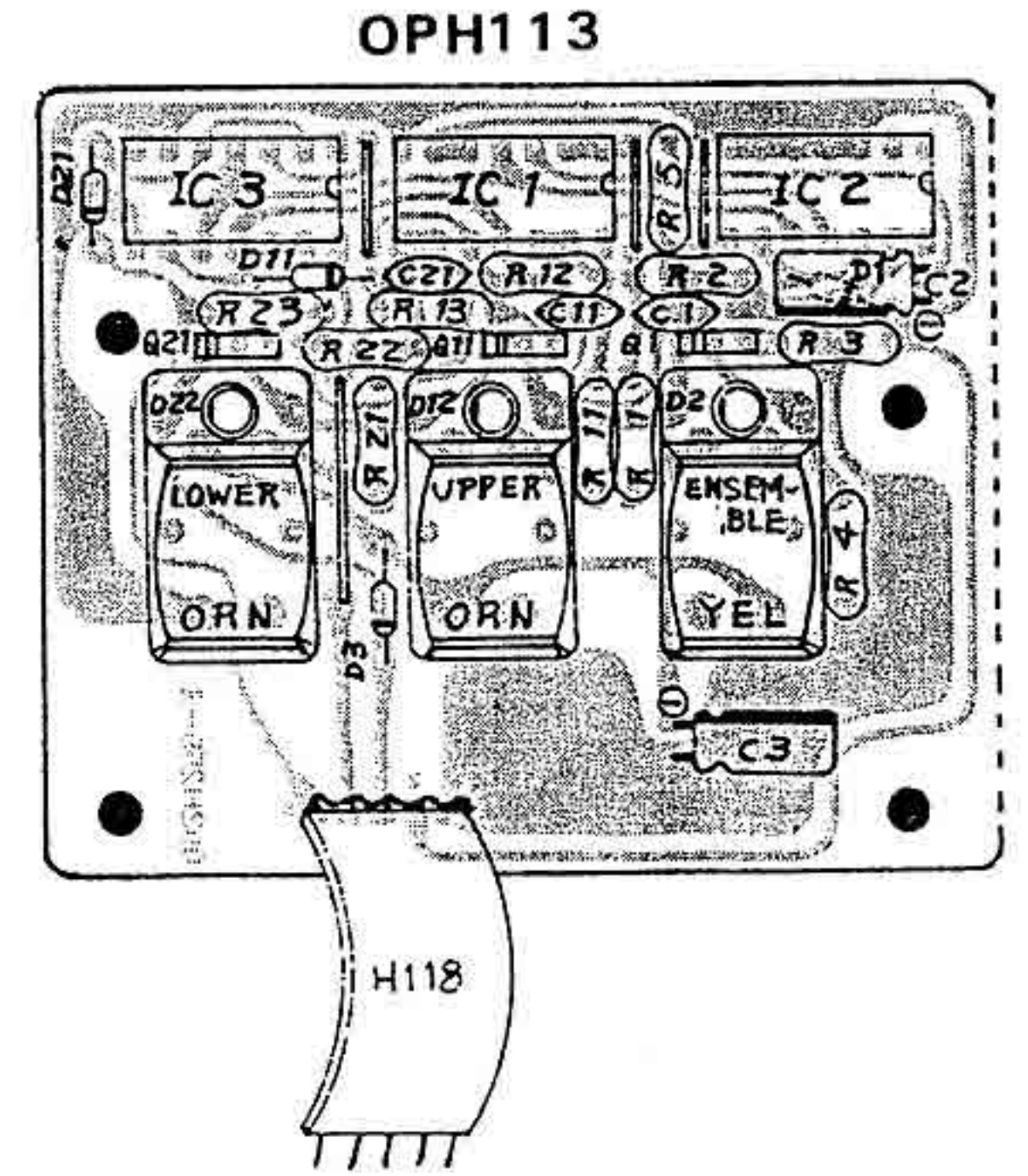
**TRUTH TABLE**

INPUTS				OUTPUTS	
CLOCK <sup>†</sup>	DATA	RESET	SET	Q	Q̄
↑	0	0	0	0	1
↑	1	0	0	1	0
↑	X	0	0	Q	Q̄
X	X	1	0	0	1
X	X	0	1	1	0
X	X	1	1	1	1

X = Don't Care  
† = Level Change



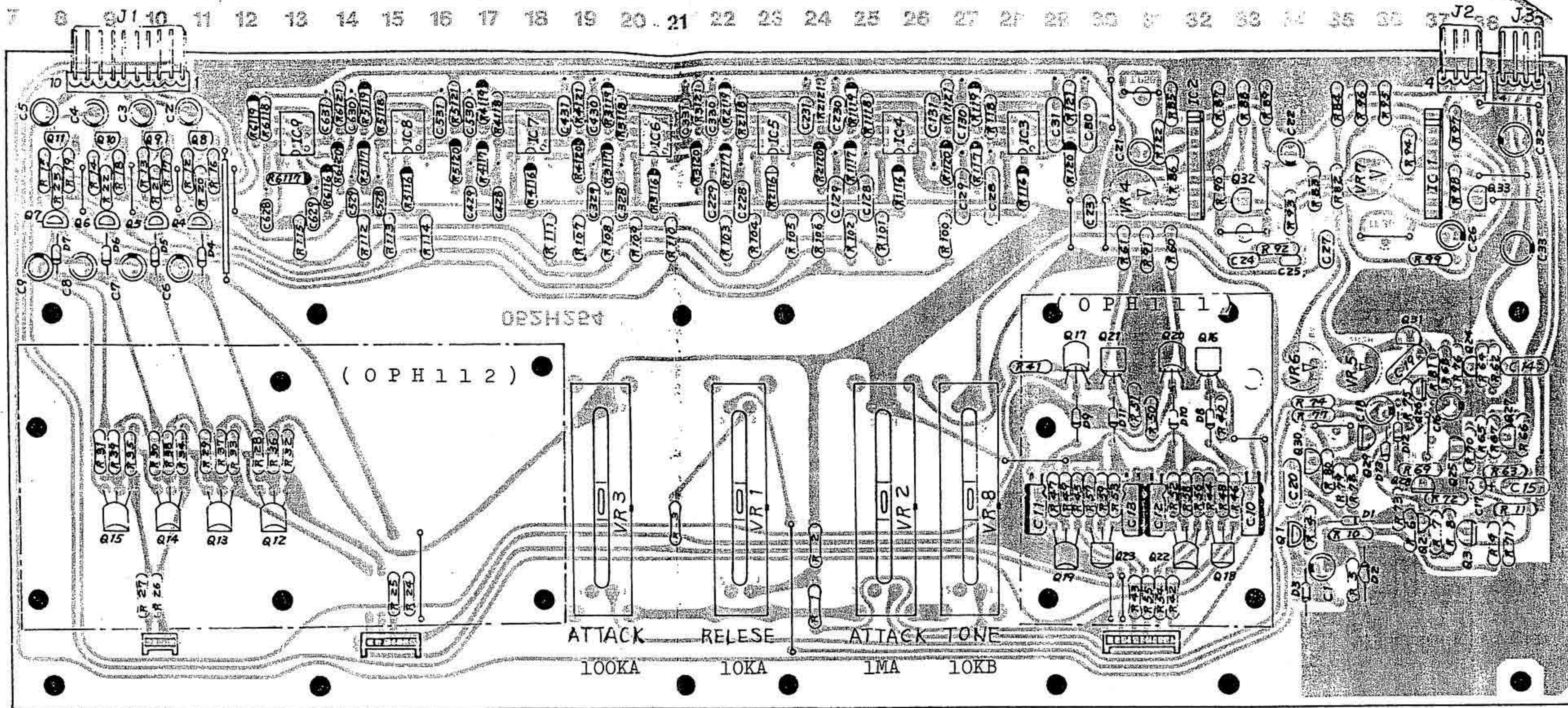
**OPH113 (149H113)**  
(Etch mask 052H255-3)







- 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 40 41 42 43 44 45 46 47 48 49 50
- bi-polar
- μPC4558C
- tantalum
- SR19R
- mylar G 2%
- mylar K 10%
- metal film CRB25 FX
- R25J
- 1S2473
- 2SK30A-GR
- 2SC1815-GR
- 2SA1015-GR



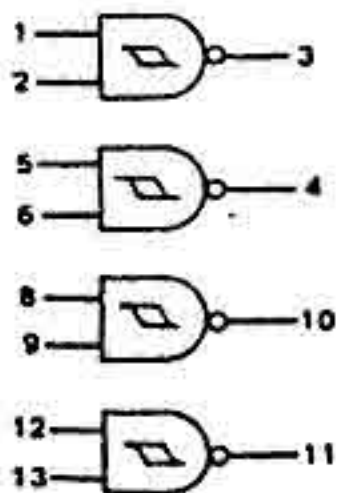
4093B

QUAD 2-INPUT "NAND" SCHMITT TRIGGER

EQUIVALENT CIRCUIT SCHEMATIC (1/4 OF CIRCUIT SHOWN)



LOGIC DIAGRAM

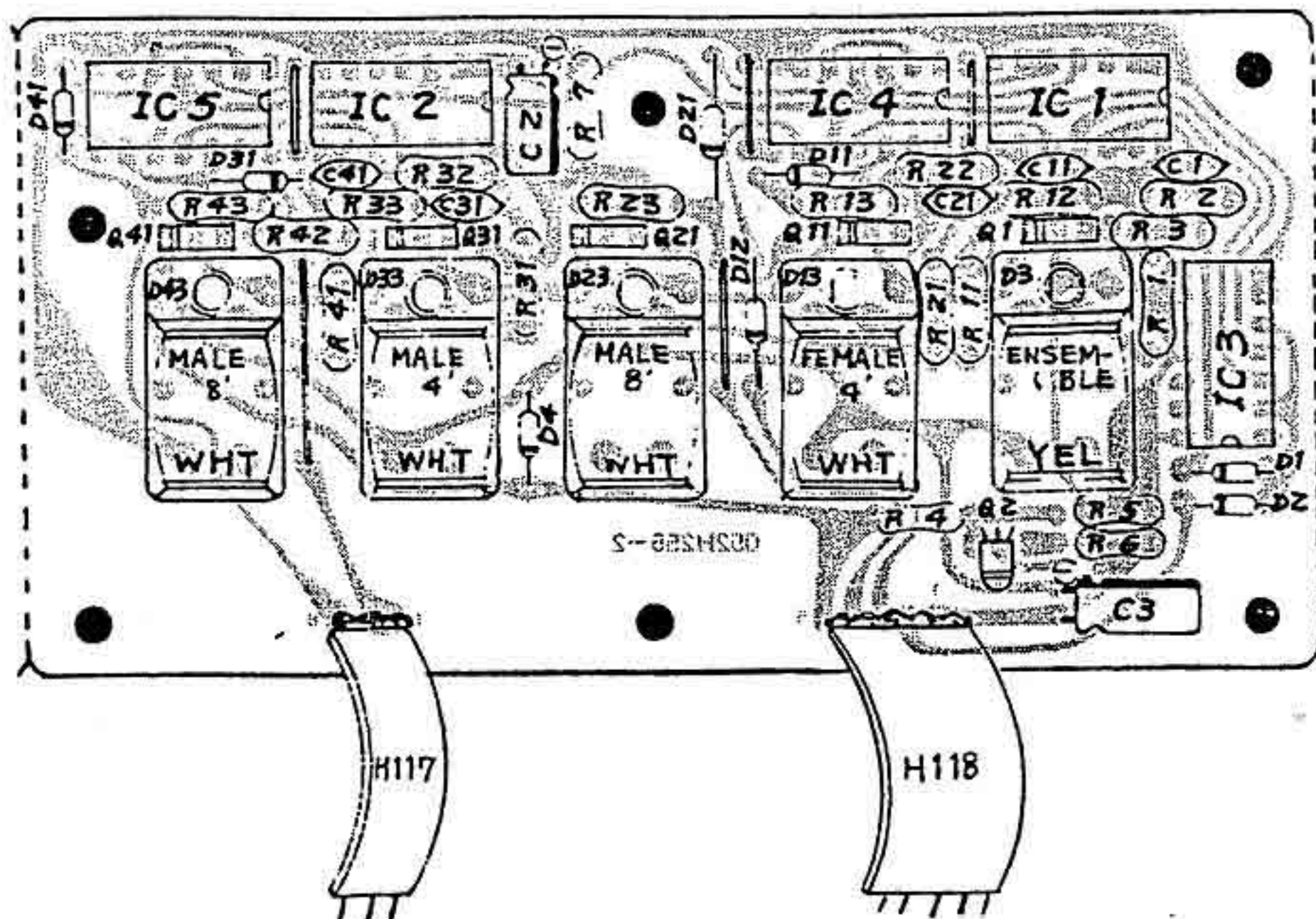


VDD = Pin 14  
VSS = Pin 7

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

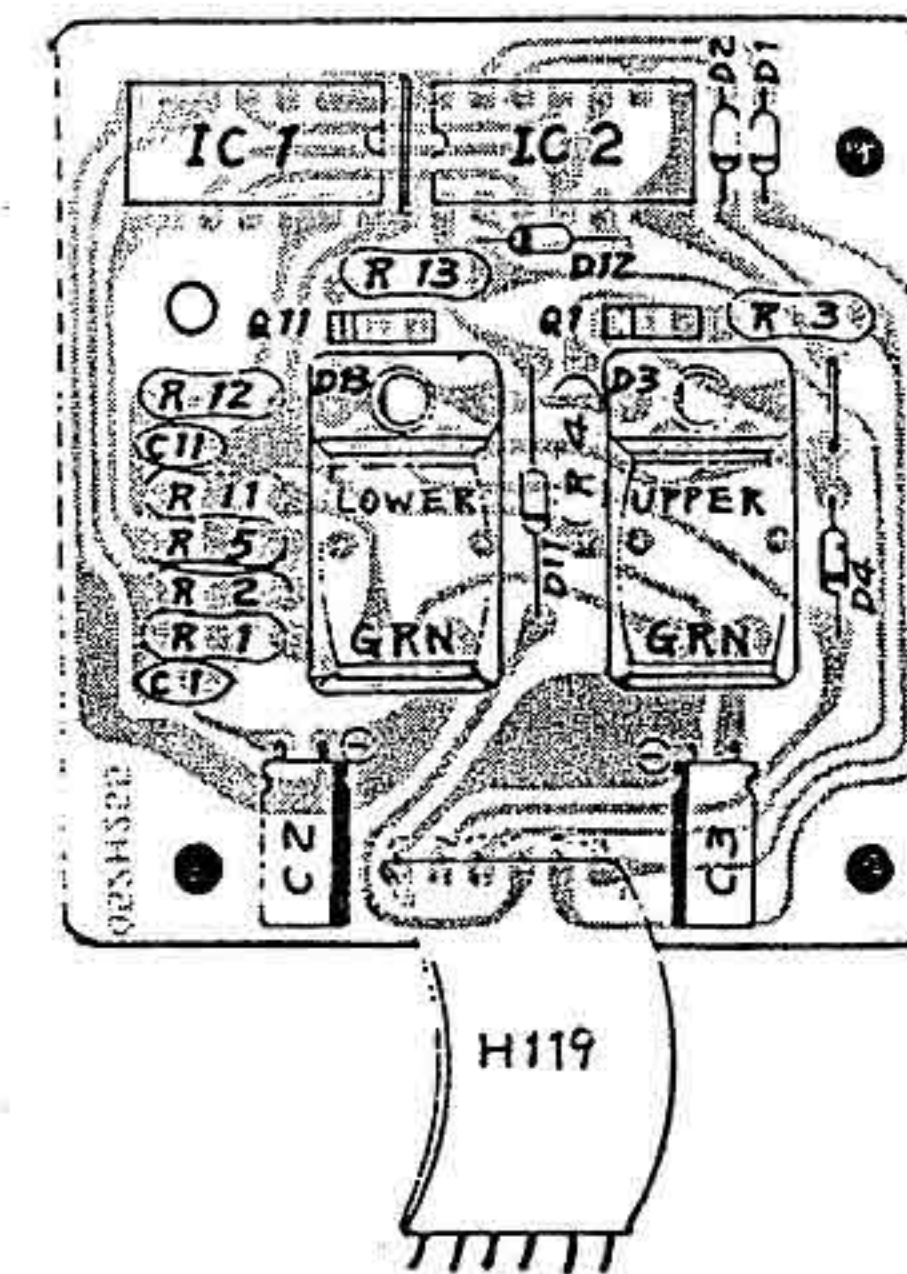
HVH105 (149H105) (Etch mask 052H254)

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

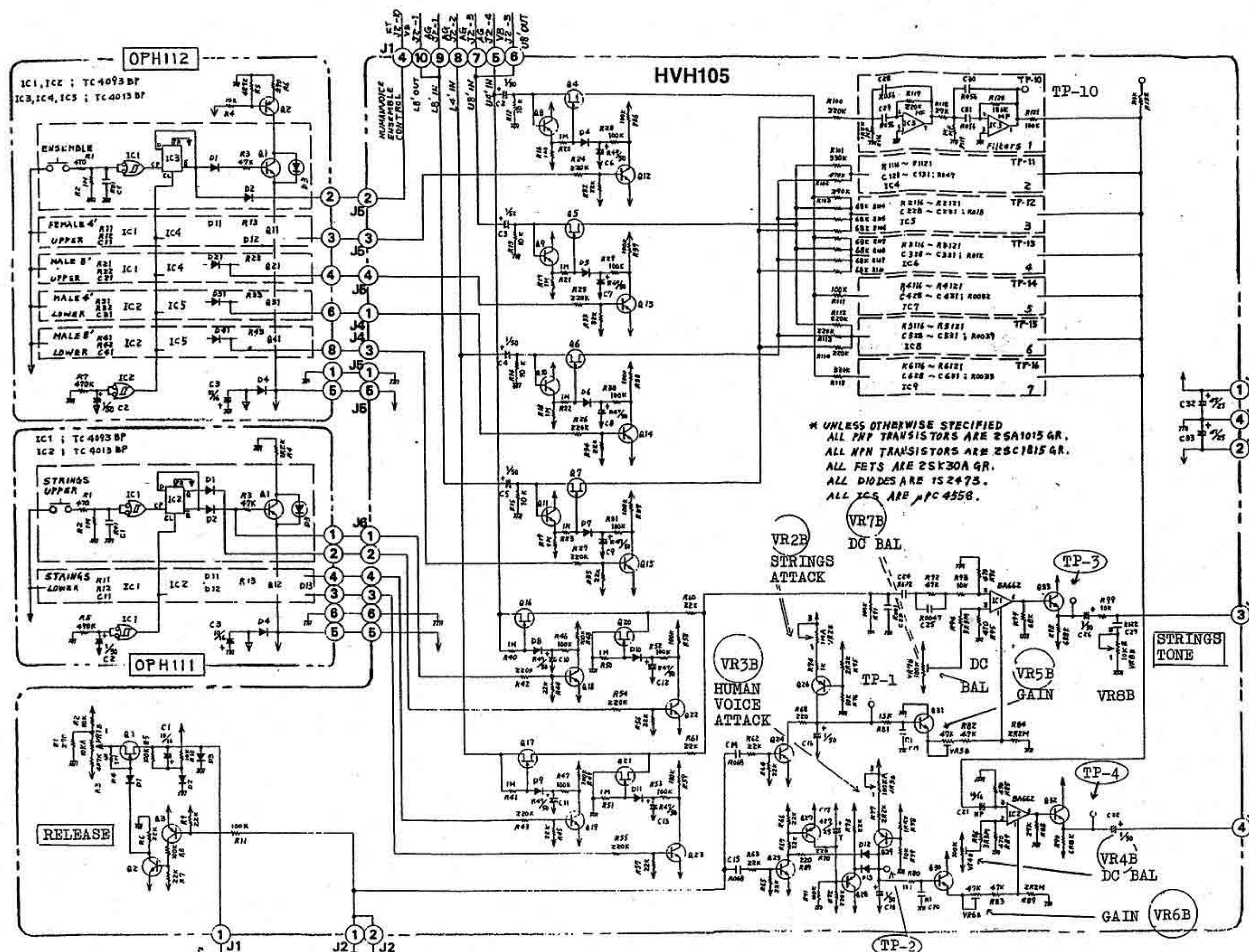


OPH111 (149H111)

(Etch mask 052H255-1)



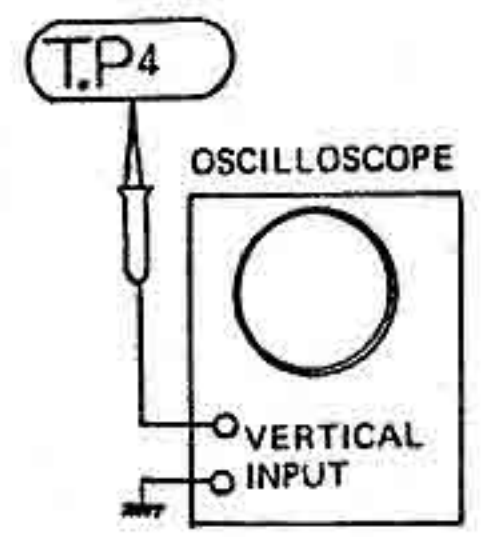
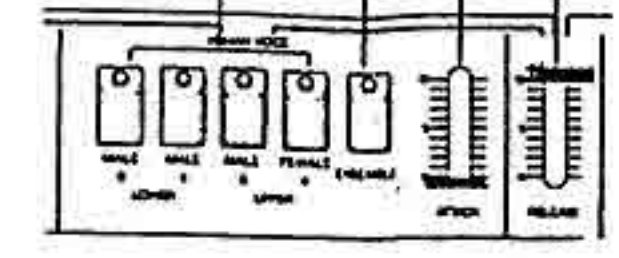
A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V



HUMAN VOICE VCA (IC 2)

3. H. VOICE VCA DC BALANCE

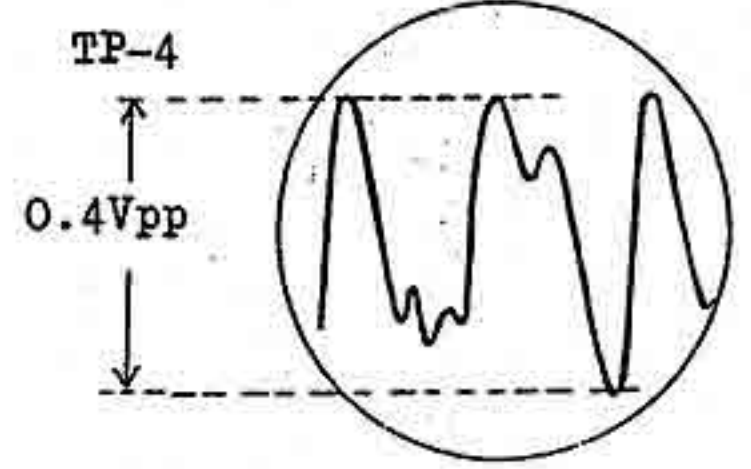
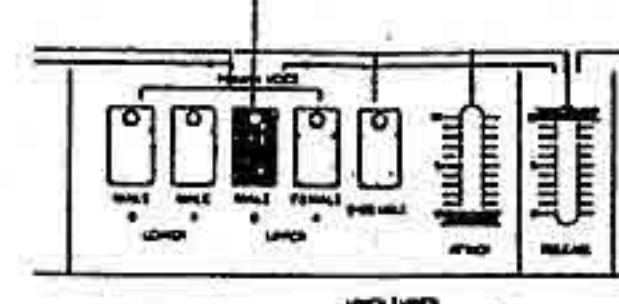
Tab all "off" A RELEASE



While tapping a key, adjust VR4B for the least DC level variation.

4. H. VOICE VCA GAIN

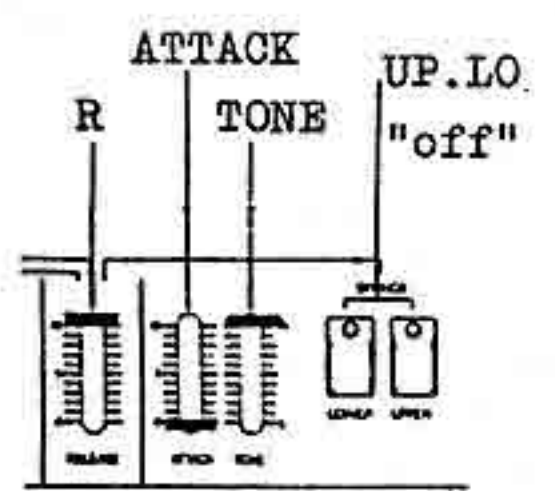
UPPER MALE 8' "on"



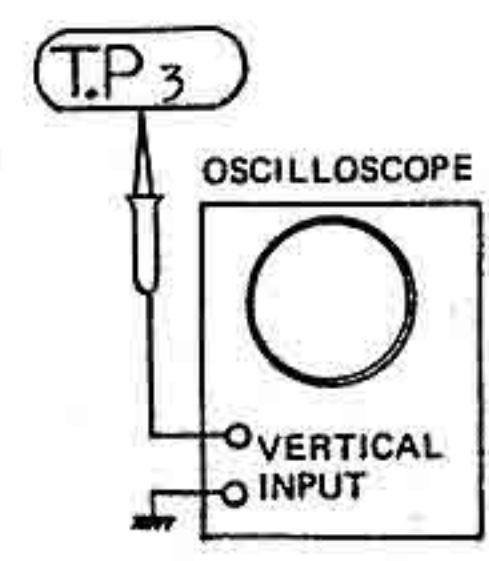
While holding C3 key down, adjust VR6B for the waveform shown above.

STRINGS VCA (IC 1)

1. STRINGS VCA DC BALANCE

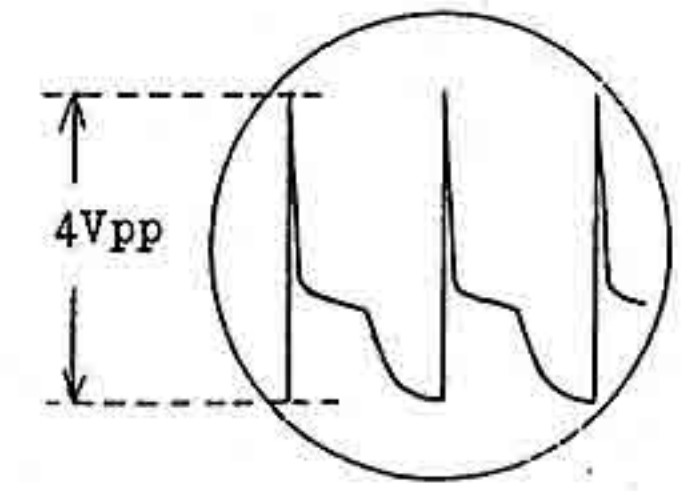
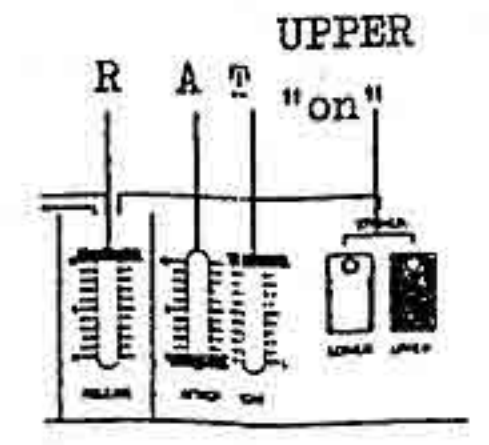


While tapping a key repeatedly, quickly, adjust VR7B for the least DC level variation.



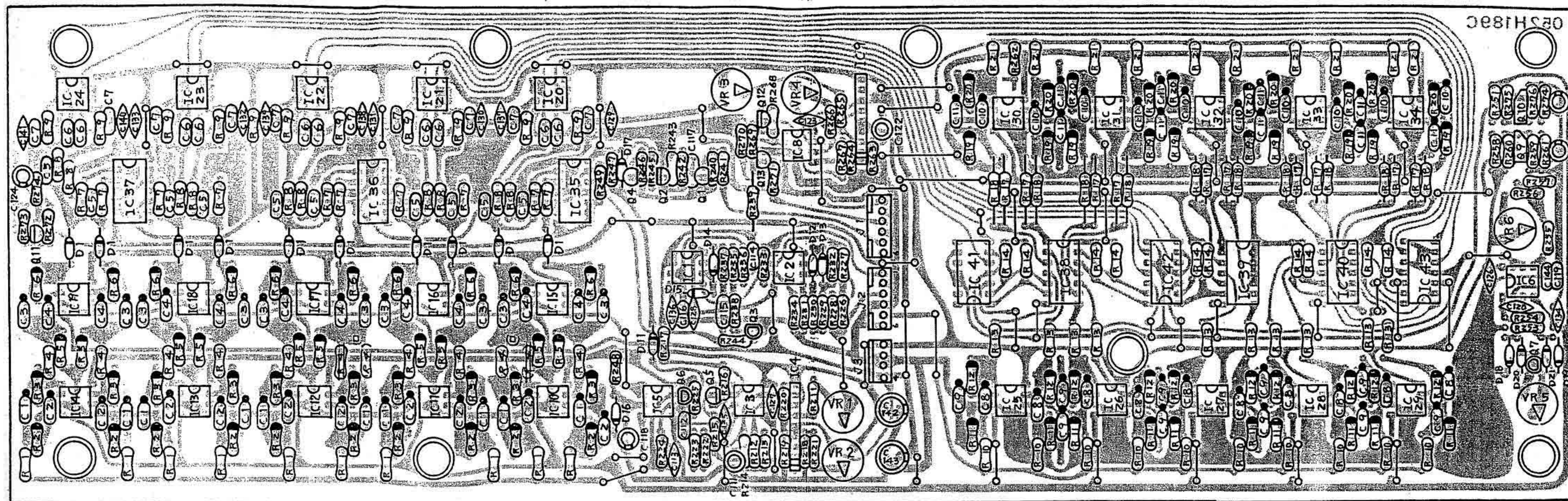
2. STRINGS VCA GAIN

(TP-3)



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

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



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

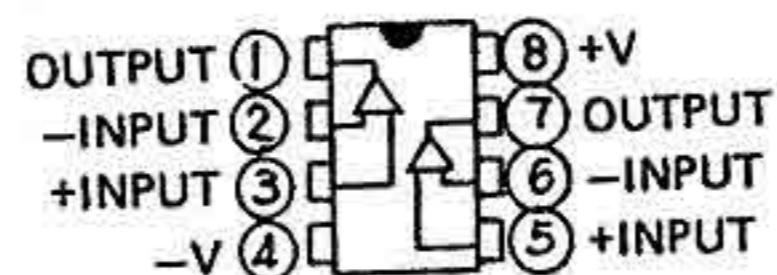
For the products bearing Serial Number from 901200 to 951499, or furnished with FLH16C, this and next pages are applicable in combination with the previously issued (Sept. 21, 1979) Service Notes which lacks necessary information on FLH16C.

Scan by HANS montrealstudios@terra.es  
[www.oldschool-sound.com](http://www.oldschool-sound.com)

- carbon 1/4w 5%
- metal film 1%
- 2SA1015-GR
- 2SC1815-GR
- 2SK30A-Y
- mylar 10%, K
- mylar or polypropylene 2%, G
- 1S2473
- ceramic
- electrolytic
- electro.bi-polar
- SR-19R (2) wiper
- TL082
- uPC4558C
- BA662A
- 2SB605
- 2SD571

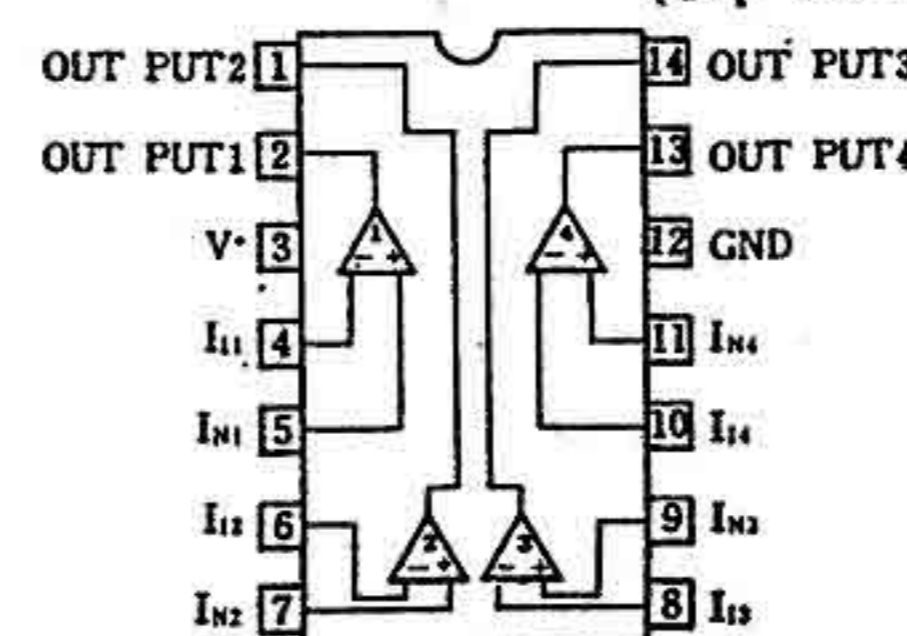
**uPC4558C**  
**TL082CP**  
**LF353N**

TOP VIEW



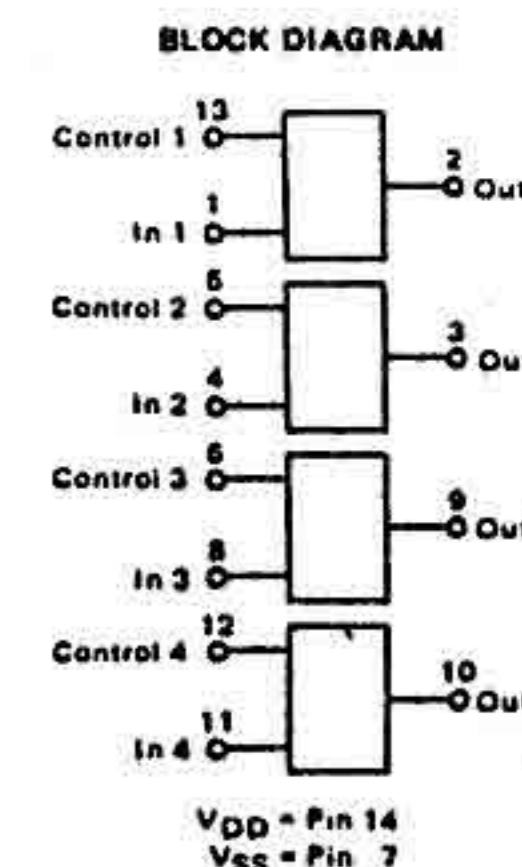
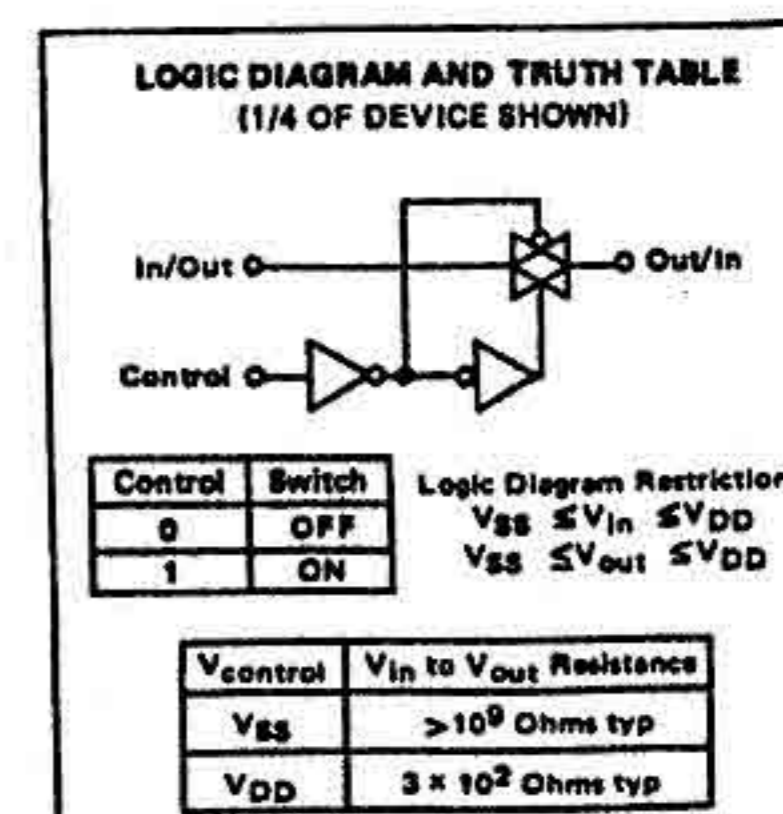
**μPC177C, AN6912**  
**Quad Comparator**

Connection Diagram (Top View)



**4016B 4066B**

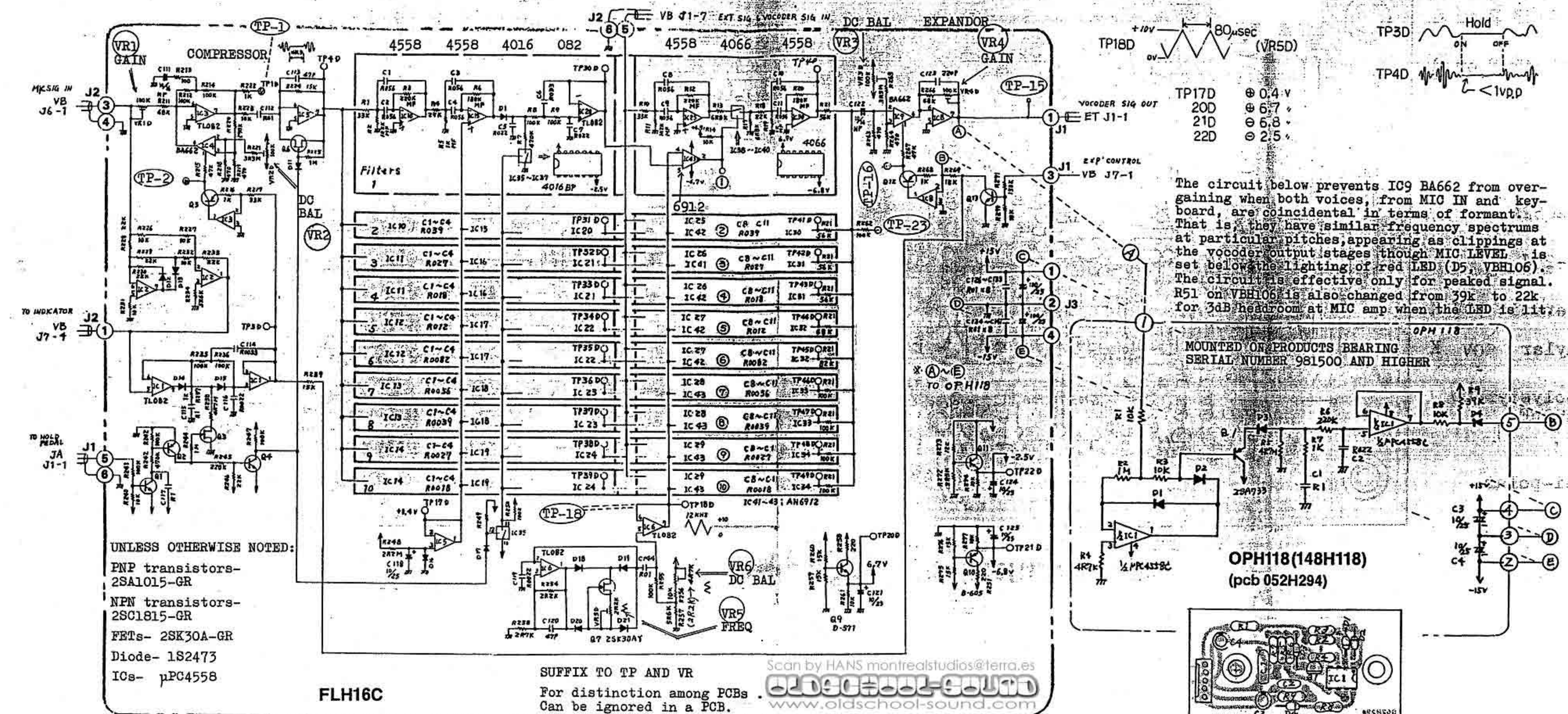
QUAD ANALOG SWITCH  
 QUAD MULTIPLEXER



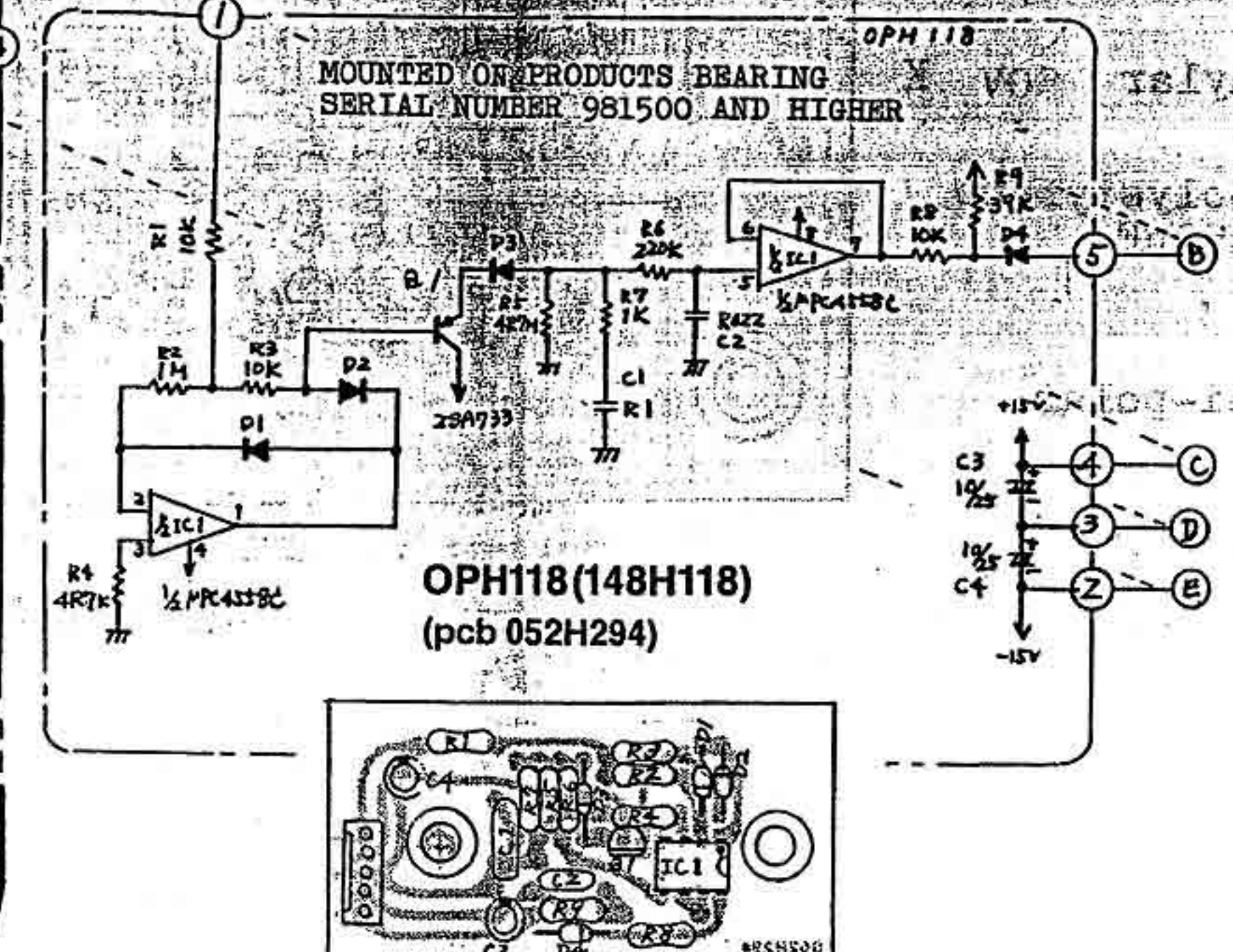
TC4016BP -- TC4066BP : interchangeable  
 LF353, XR082, TL082 : functional equivalence.  
 TL082 predominantly in use.

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 40

A B C D E F G H I J K L M N O P Q R S T U V

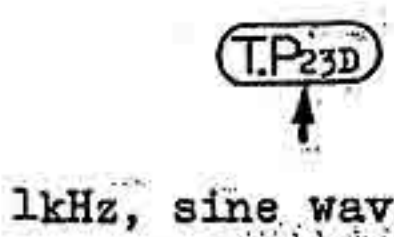
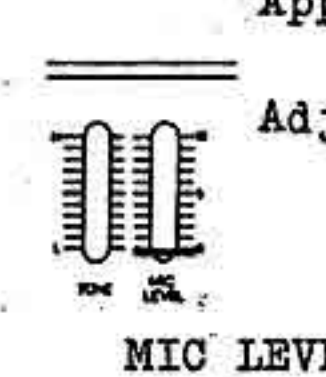
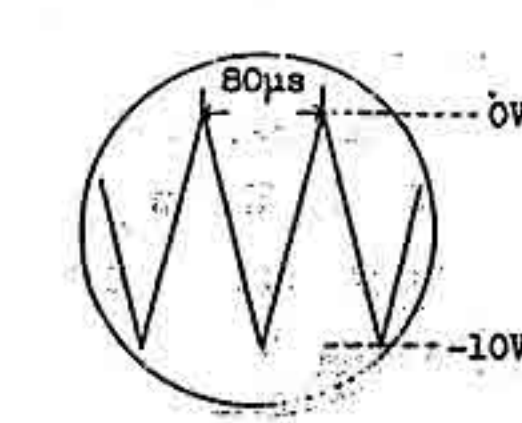
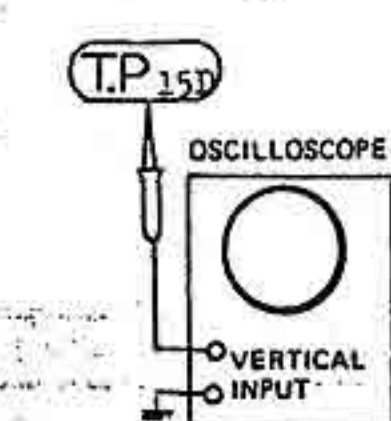
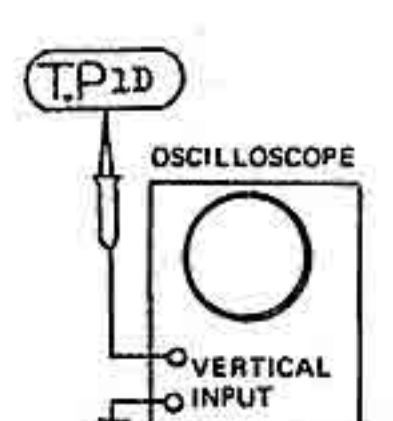


The circuit below prevents IC9 BA662 from over-gaining when both voices, from MIC IN and keyboard, are coincidental in terms of formant. That is, they have similar frequency spectrums at particular pitches, appearing as clippings at the vocoder output stages though MIC LEVEL is set below the lighting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



FLH16 ADJUSTMENT

- COMPRESSOR (IC3, IC4) DC BALANCE**  
 (No input signals)  
 Set VR2 at its midpoint.  
 While placing intermittent 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.
- COMPRESSOR GAIN**  
 Apply the signal into MIC IN.  
 Adjust VR1 for 20Vpp at TP-1.
- EXPANDER (IC8, IC9) DC BALANCE**  
 (No Input signal)  
 While placing intermittent ground to TP-16 (refer to step 1, COMPRESSOR), adjust VR3 for minimum DC variation.
- EXPANDER GAIN**  
 Feed the signal into TP-23.  
 Adjust VR4 for 12Vpp at TP15.
- TRIANGLE WAVEFORM (IC6) FREQUENCY**  
 Connect oscilloscope to TP-18 through 10:1 probe for the least ill effect to the circuit.  
 Set VR5 for 80 $\mu$ s/cycle.
- VCA CUTOFF BIAS (IC6)**  
 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 disappearance of the waveform from screen. Excessive turn to set the bias below cutoff point will result in relatively low VCA output voltage.



A (Top View)

B 2SA733 P or Q

C 2SC945 P or Q

D 1S2473

E uPC4558C

F BA662A

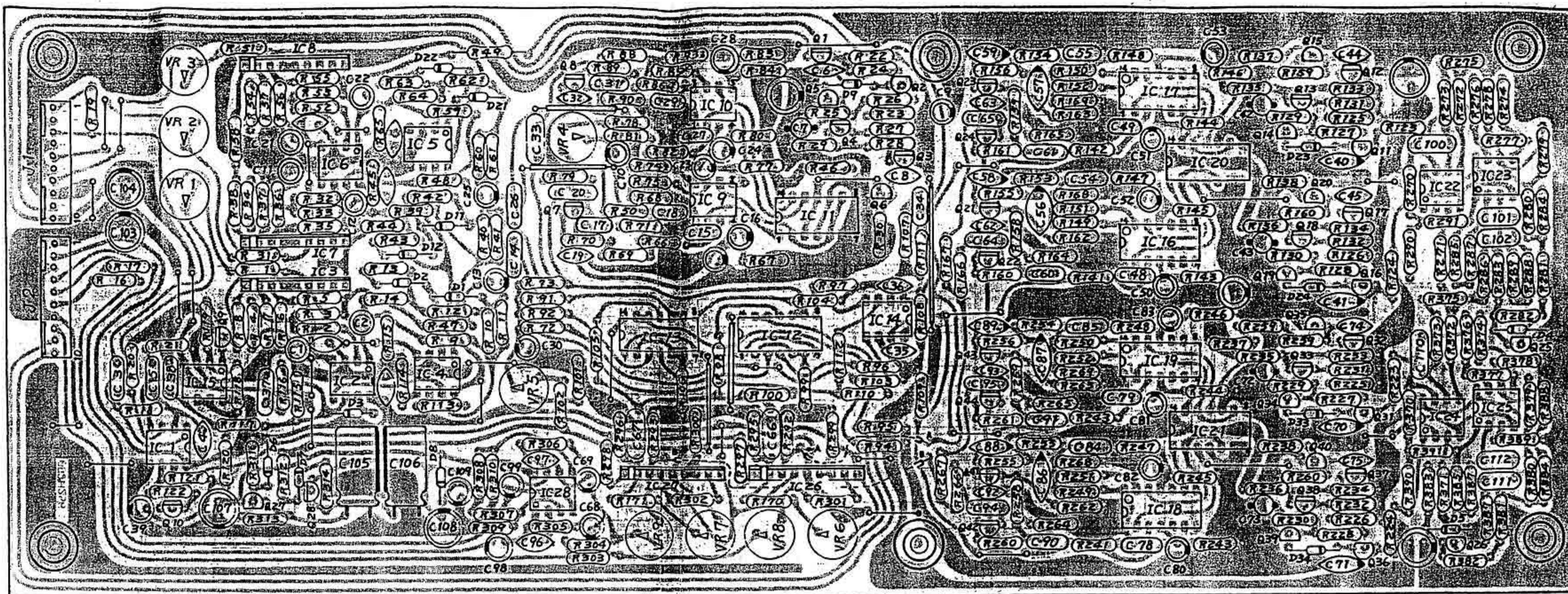
G R-25J

H ceramic 50V K

I mylar 50V K

J polystyrene 150pF

K NP bi-polar



ETH16 (151H016) (Etch mask 052H256)

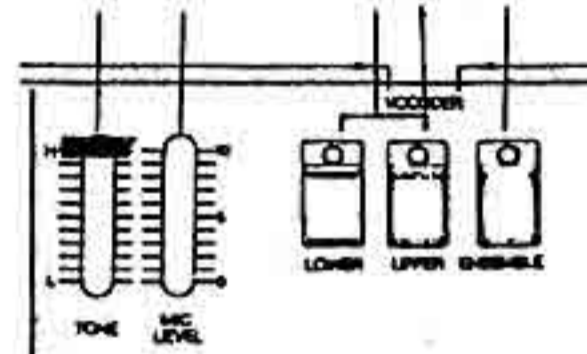
Scan by HANS montrealstudios@terra.es  
www.oldschool-sound.com

1. VOCODER COMPRESSOR (IC2, IC4) GAIN

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

Adjust VR1 for 18Vpp at TP-1.

TONE MIC "off"



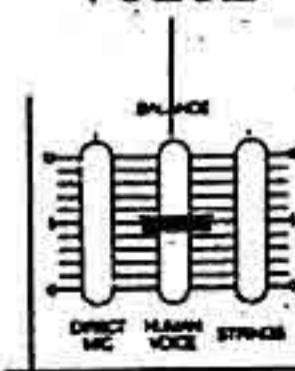
VOCODER

2. HUMAN VOICE COMPRESSOR (IC6, IC7) GAIN

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

Adjust VR2 for 18Vpp at TP-2.

VOICE



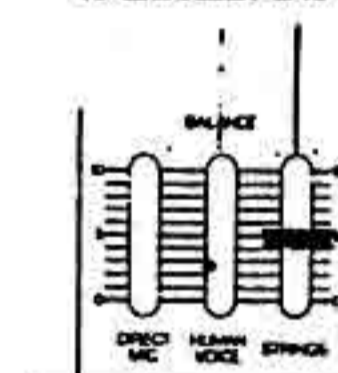
BALANCE

3. STRINGS COMPRESSOR (IC6, IC8) GAIN

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

Adjust VR3 for 18Vpp at TP-3.

STRINGS



BALANCE

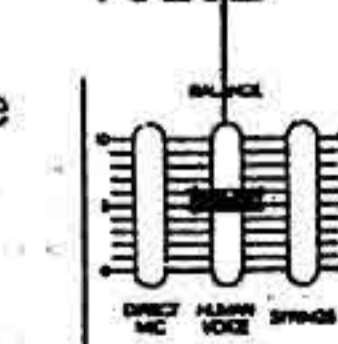
4. MIXING AMP EXPANDERS

- CH-1 (IC26, IC28) CH-2 (IC27, IC28) -

4a. DC BALANCE

While placing intermittent 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

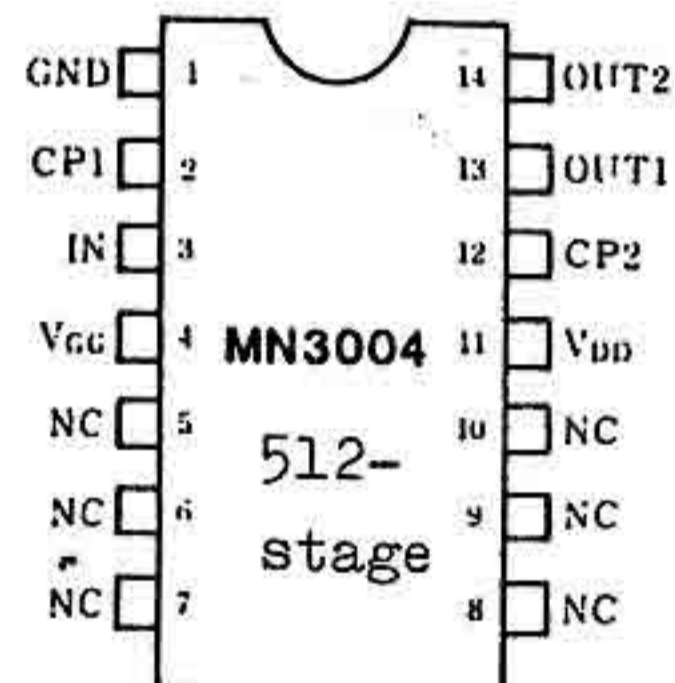
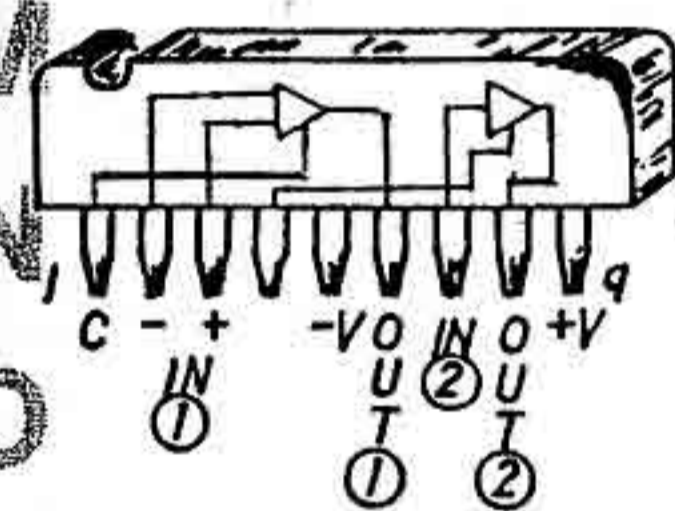


BALANCE

4b. GAIN

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

BA662



(Top View)

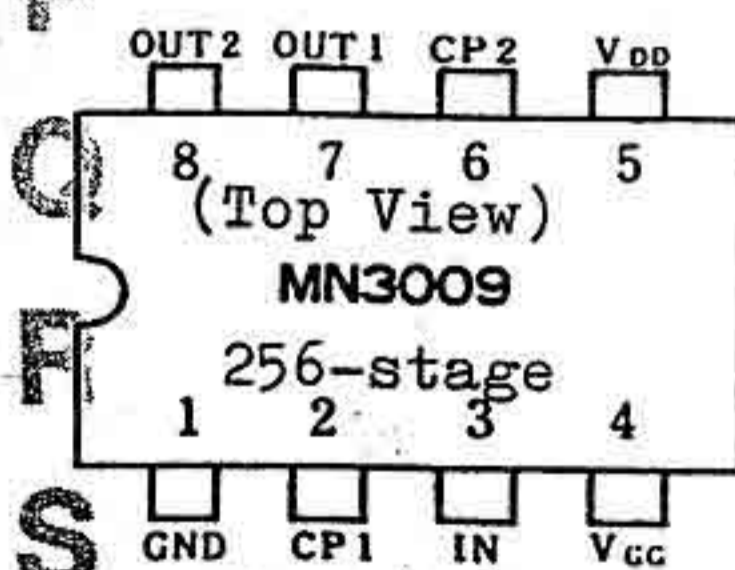
Delay range

2.56-25.6ms

S/N 85dB

Clock Freq.

10-100kHz



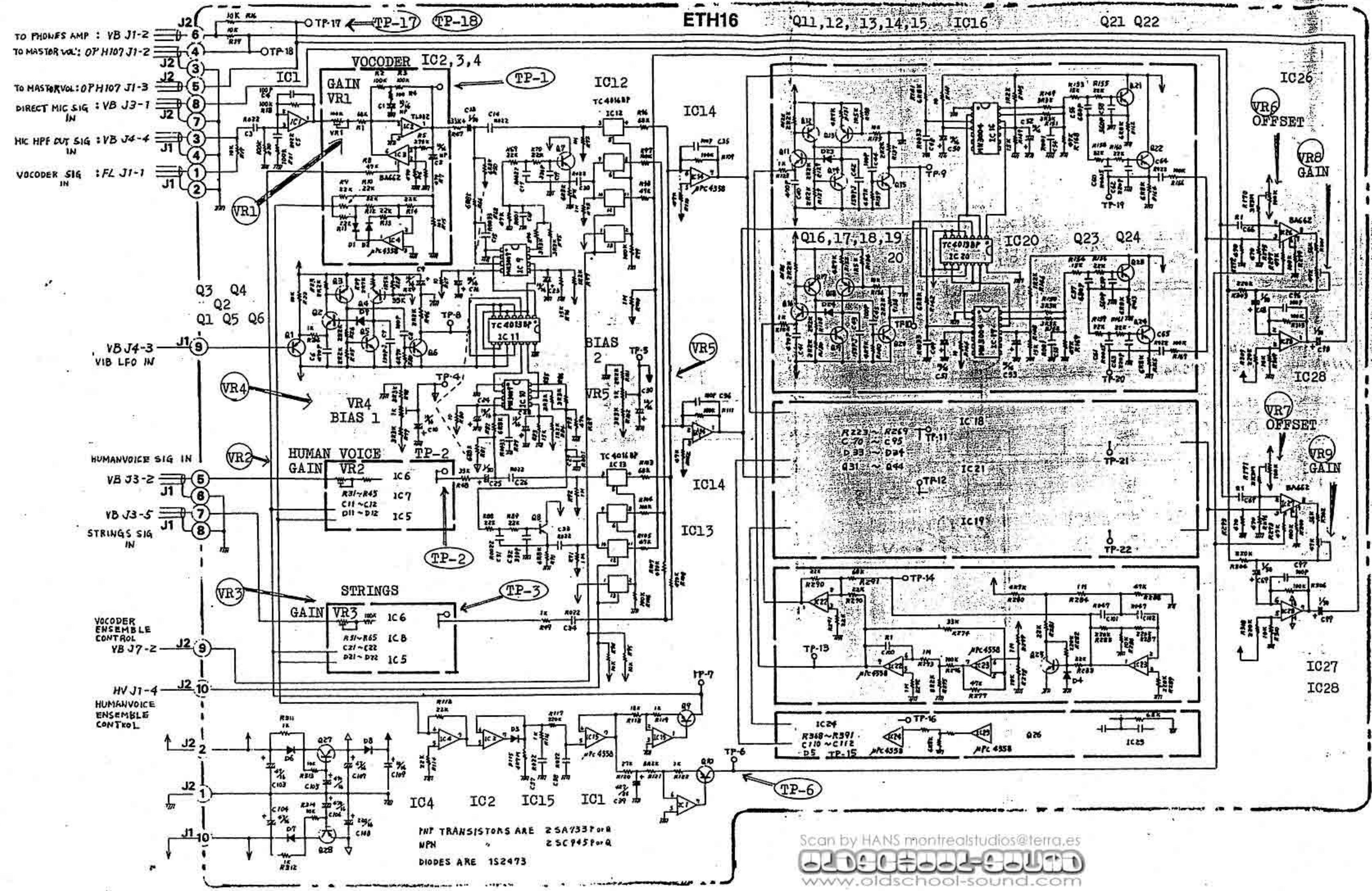
Audio signal delay variable range

0.64-12.8ms

S/N 88dB typ.

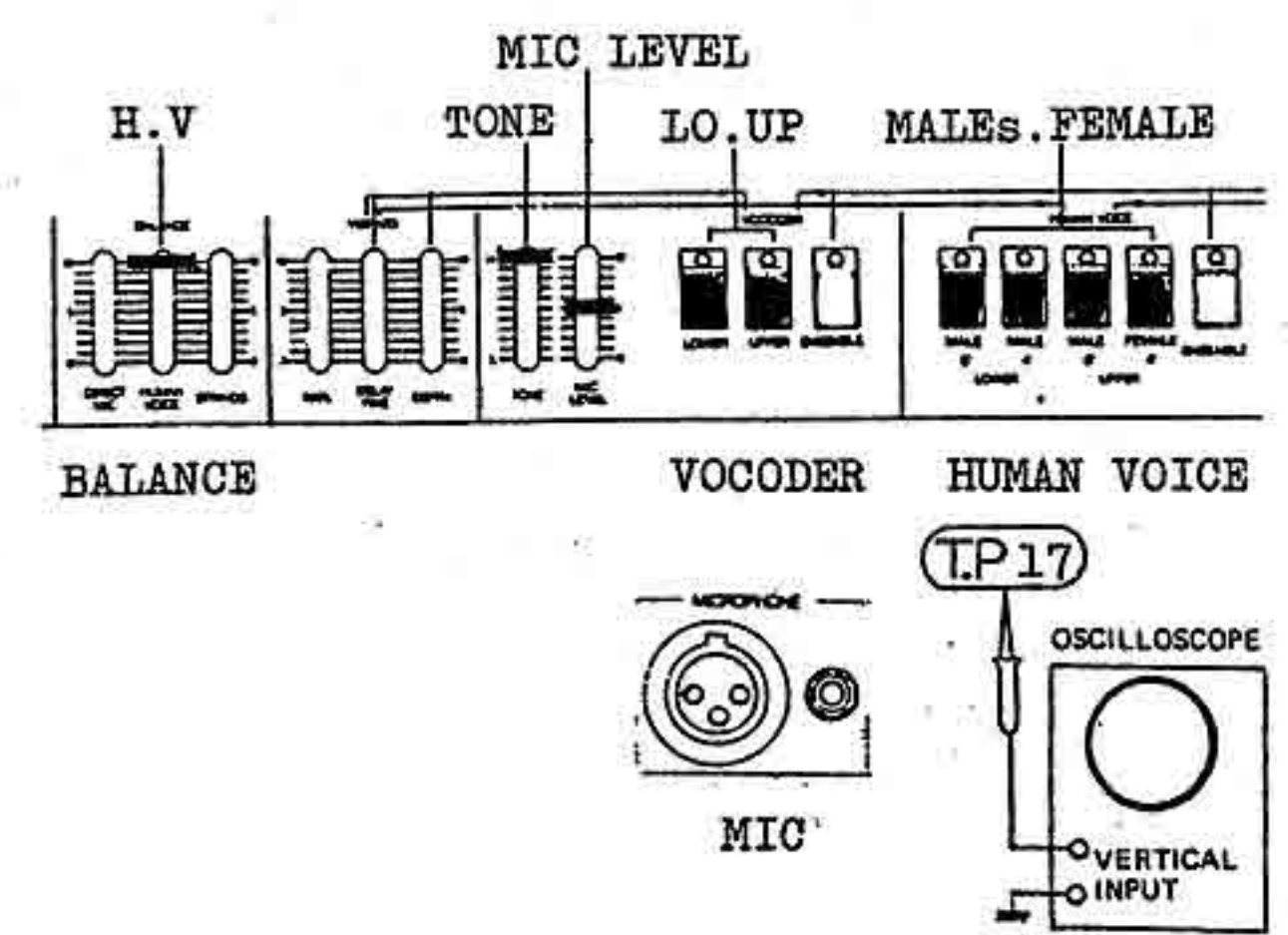
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

A B C D E F G H I J K L M N O P Q R S T U V



PNP TRANSISTORS ARE 2SA733P or A  
 NPN 2SC945P or A  
 DIODES ARE 1S2473

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

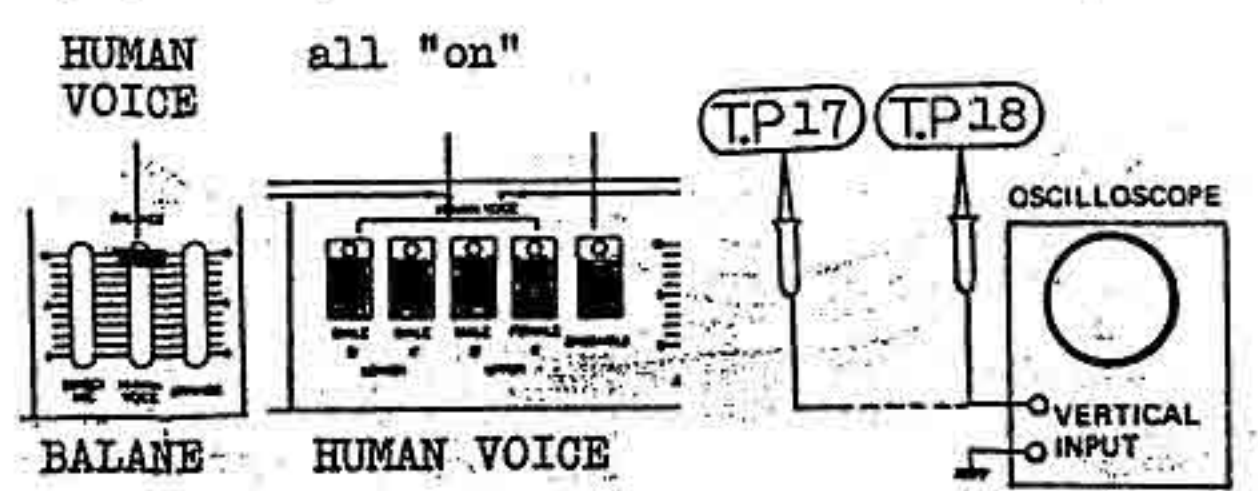


5. BBD BIAS 1 (VIBRATO) IC9, IC10

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. Adjust VR4 for the clear tones.

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 horn-cone speaker or the like. Adjust VR4 for the clear tones.

6. BBD BIAS 2 (ENSEMBLE) IC16, IC17, IC18, IC19



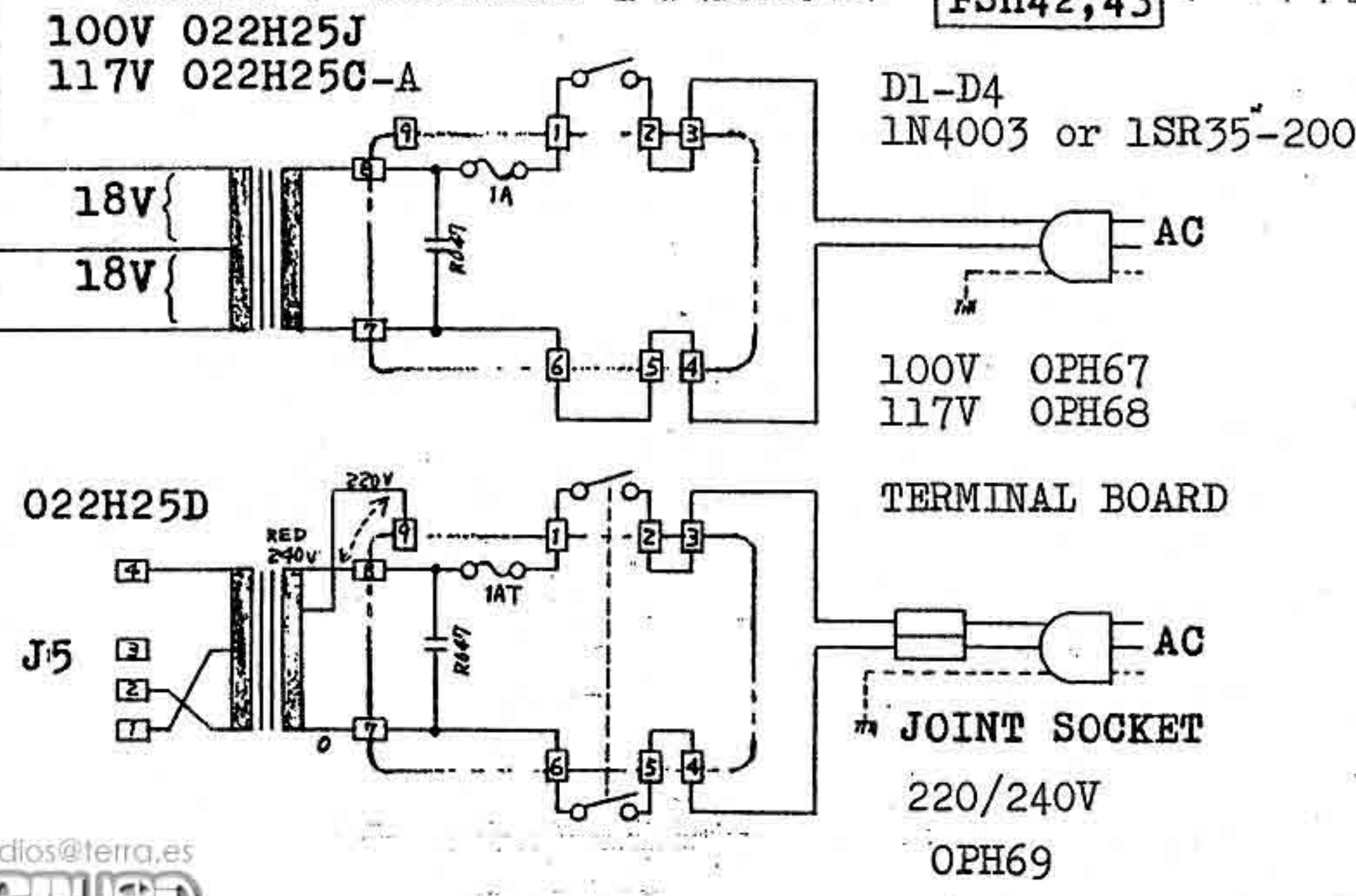
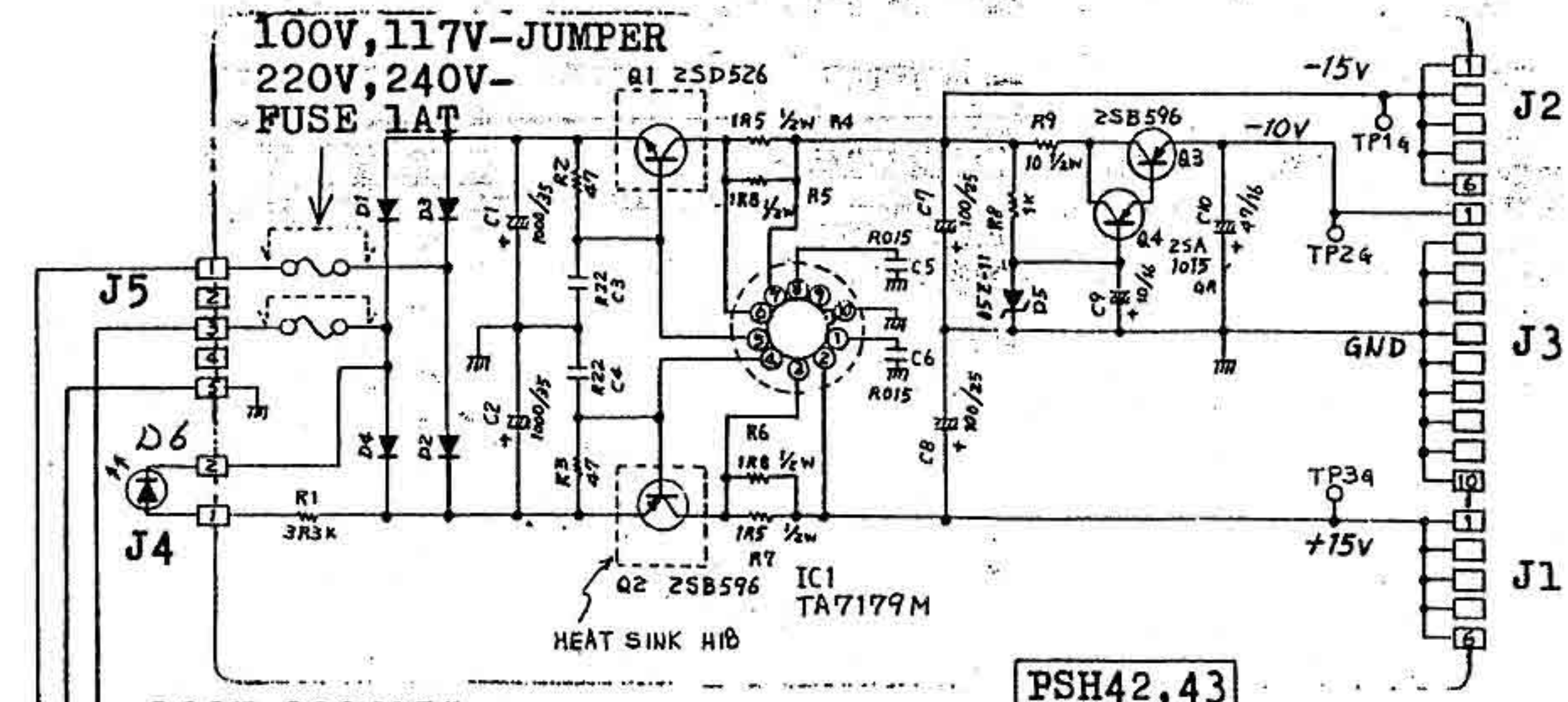
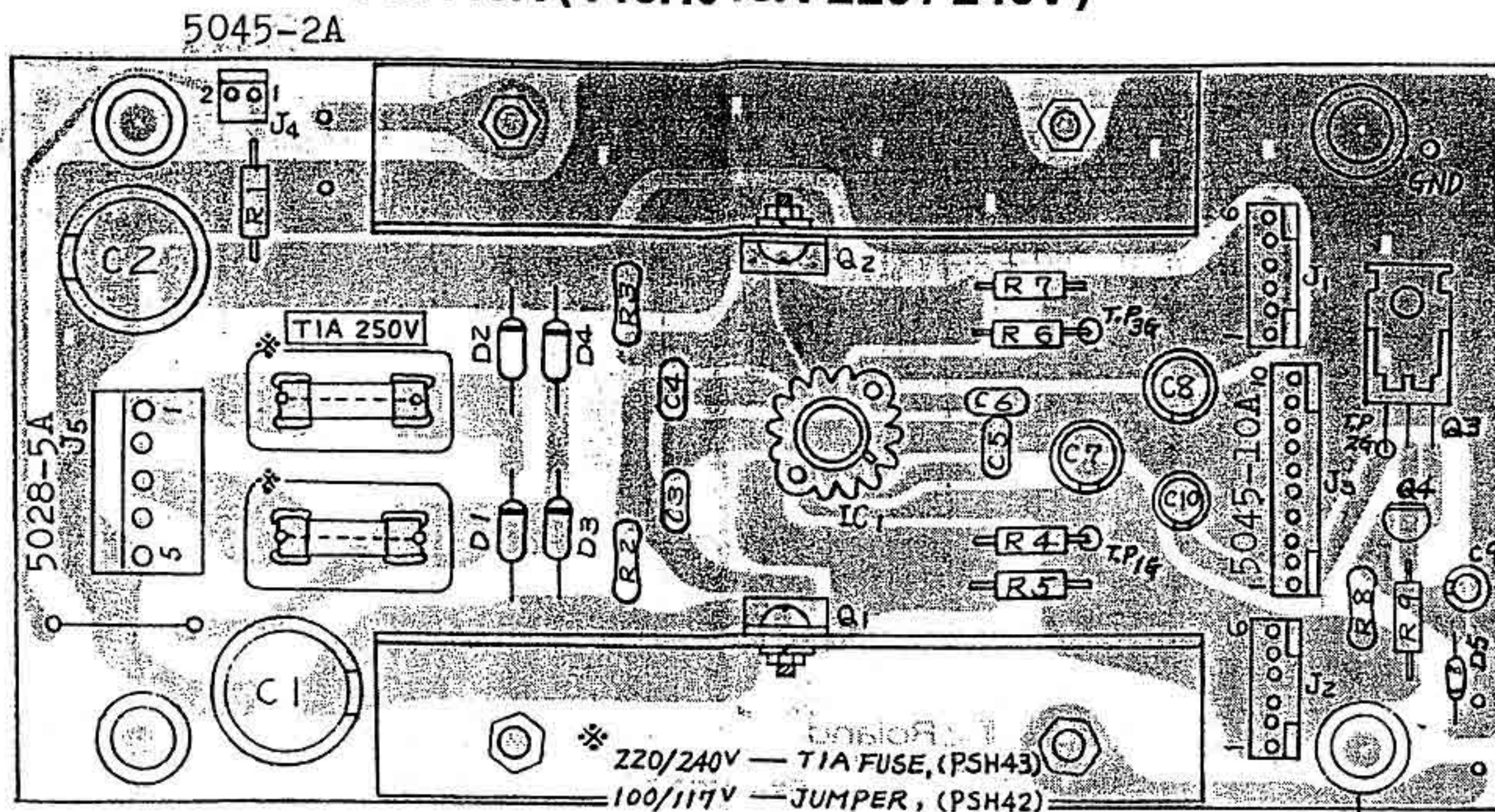
Apply the same procedure described in BIAS 1. Adjust VR5.

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V

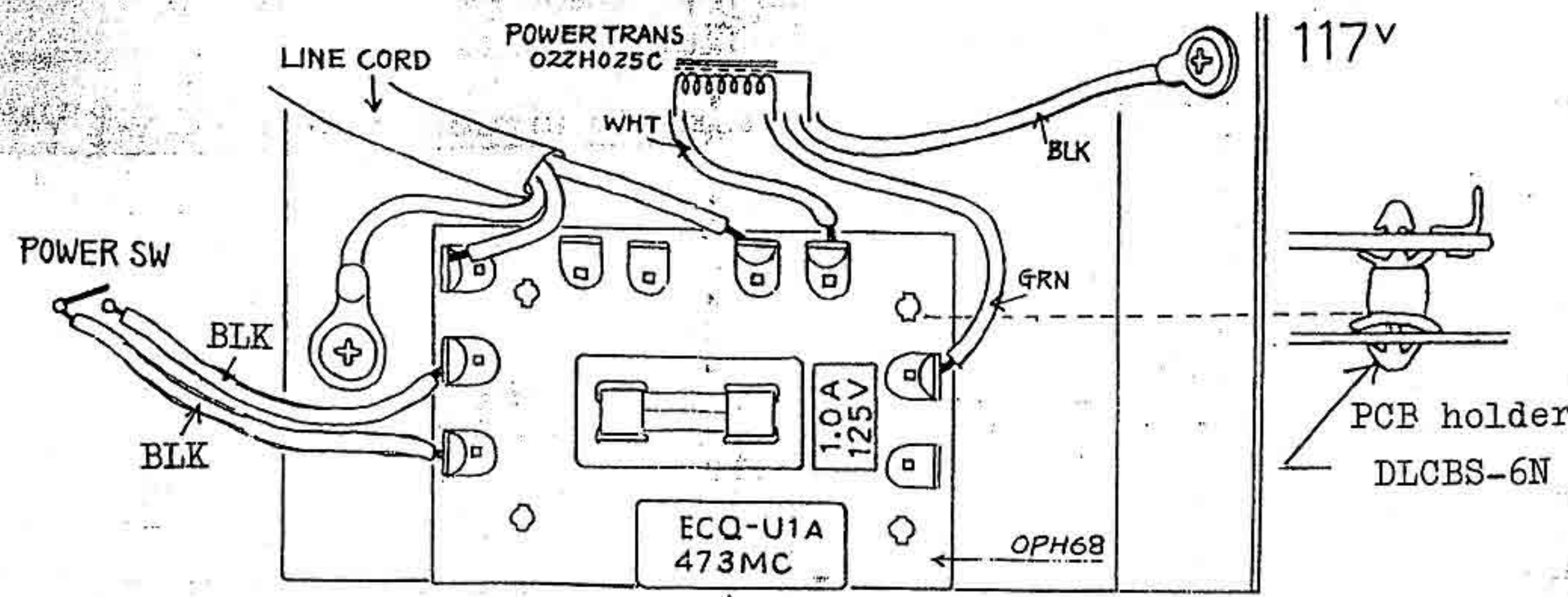
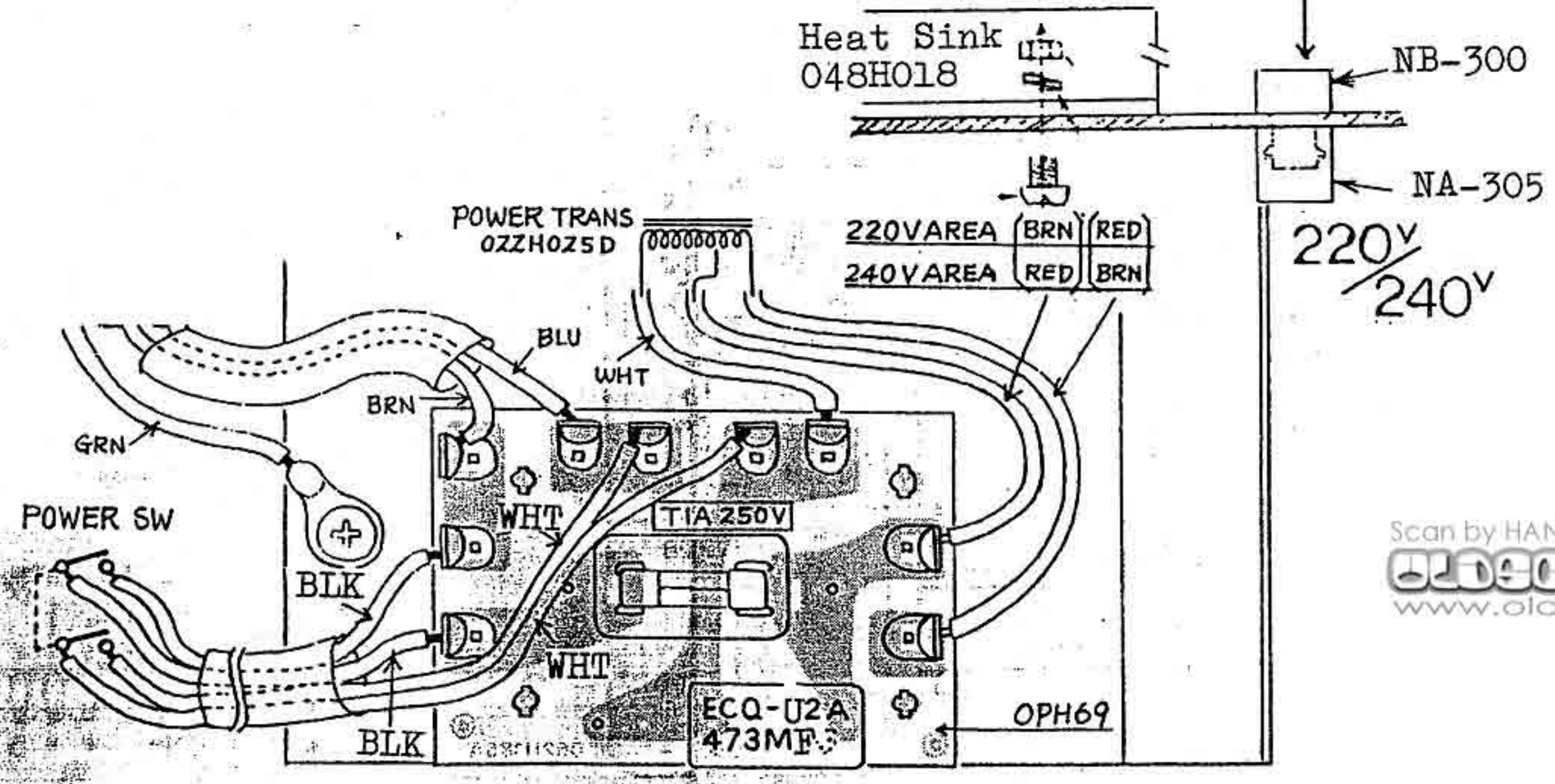
PSH42A (146H042A 100/117V)  
PSH43A (146H043A 220 / 240V) (Etch mask 052H183A)

VP-330

OCT 25 1980

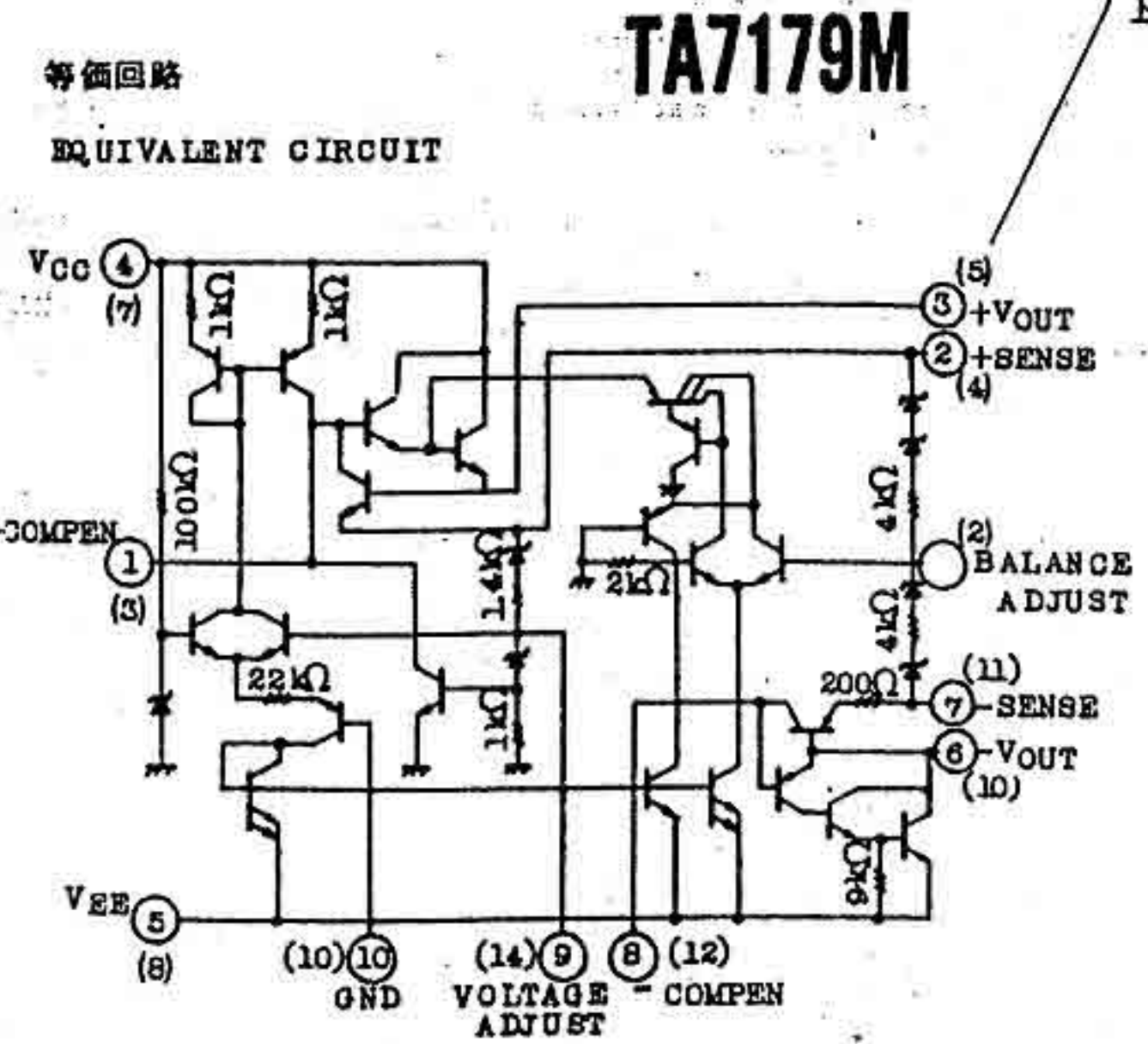


SECONDARY RATINGS  
DC  
700mA at 21V



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

Pin numbers in parentheses are for the plastics type TA7179P only.



最大定格 (Ta=25°C)  
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTICS	SYMBOL	RATING	UNIT
入力電圧 Input Voltage	+VIN	30	V
	-VIN	-30	
出力電流 Output Current	+IOUT	100	mA
	-IOUT	-100	
消費電力 Power Dissipation	PD	TA7179P	625
		TA7179M	500
動作温度 Operating Temperature	Topr	TA7179P	-30 ~ 75
		TA7179M	-30 ~ 75
保存温度 Storage Temperature	Tstg	TA7179P	-55 ~ 150
		TA7179M	-65 ~ 150