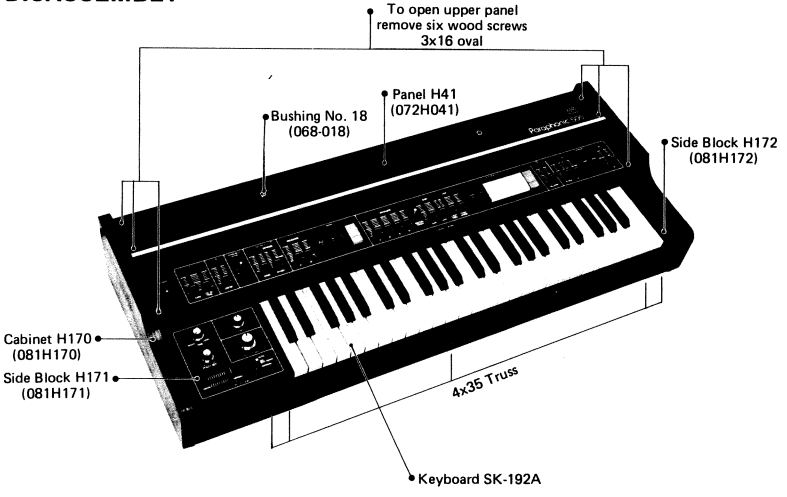
PARAPHONIC

RS-505 SERVICE NOTES

CONTENTS

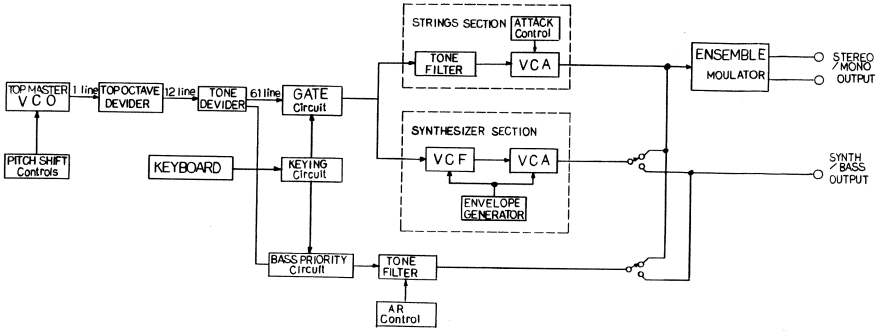
DISASSEMBLY



SPECIFICATIONS

Keyboard:	49-Note C Scale
Strings Section	
Tablets:	Upper Strings, Lower Strings
Controls:	4'–8' Mix (U/L), Attack
Strings/Synthesizer Section	
Control:	Release
Synthesizer Section	
Tablets:	Upper 4', Upper 8', Lower 4', Lower 8', Bass 8', Bass 16', Ensemble
Controls:	Resonance, Cutoff Frequency, LFO Sensitivity, Envelope Sensitivity, Attack, Decay, Sustain, Release
Switch:	Second Touch On/Off
Bass Section	
Tablets:	Cello 8', Tuba 16', Contra Bass 16', Ensemble
Controls:	Attack, Release
Balance Control:	Strings-Synthesizer, Bass Volume
Ensemble Switch:	Mode Selection
Vibrato Control:	Depth
LFO Controls:	Rate, Delay Time
Pitch Shift	
Controls:	Manual, Time, Pitch Set
Switch:	Auto/Off/Manual Selection
General	
Controls:	Tune, Master Volume
Switch:	Power
Rear Panel	
Control:	Ensemble Tone
Switches:	Output Level . . . . . Synth/Bass, Stereo/Mono
Jacks:	Output . . . . . Stereo, Mono, Bass/Synth, Trig, Gate
	Input . . . . . Ext, Sustain, Pitch, VCF
Power Consumption:	14W
Dimensions:	905 (W) x 370 (D) x 145 (H) mm
Weight:	14Kg

PCB & CIRCUIT DESCRIPTION



RS-505 CIRCUIT DESCRIPTION

PCB AND CIRCUIT DESCRIPTION

1. Mother Board OPH-28

1-1. Master VCO

This is basically an LC oscillator whose frequency is variable by changing the voltage applied to varicap diode.

Maximum pitch shift range is 1 octave.

Frequency stability is within 15 cents at normal working temperature.

1-2. Top Octave Divider

The VCO output is divided to create 12 notes by IC6. The notes are octave downed several times by the tone dividers at the next stage and routed to the corresponding tone gates.

The top octave notes themselves are not supplied to the tone gates.

1-3. Tone Divider, Tone Gate (GTH-9, 10, 11)

Pressing a keyswitch applies negative voltage to the transistor keying circuit Q1 (Q4, Q7 ....). This negative voltage is applied to the collectors of Q2, Q3 (Q5, Q6 ....) where they are chopped by the signal outputs from the dividers TC-4024's applied to the bases.

The negative voltage from a keyswitch also charges C2 (C5, C8 ....) which discharges upon releasing a key and holds Q1 on. The discharge rate of this capacitor is controlled by the frequency of the pulse that comes from Release Pulse Generator via terminal No.4.

1-4. Bass Priority

Three 8-bit priority encoders TC-4532 generate 6-bit codes by the on/off action of the bass keyswitches. These coded signals are fed to the two IC's (TC4042) and latched. At the same time, the output of TC-4042 is sent to the 8-bit priority decoders at the next stage and one out of 24 bass notes is selected. The latched signals are held until a next bass key signal is given.

The bass gate signals for the bass AR envelope generator are also generated by this priority circuit.

2. String Voicing & Synthesizer VCFH-2

The VCF of the synthesizer section is an LPF of 24dB/oct. Its control voltage is supplied through an Anti-log circuit. The control voltage of the VCA is also supplied through an Anti-log circuit. The level adjusting trimmer pot is mounted on each circuit.

3. Bass Voicing LFO LFOH-2

3-1. Bass Tone Gate

The output signals of the Bass AR Env (Q1, Q2) are chopped by the bass tones at Q5, Q6, and Q7. The output is sent to the tone filters and the VCF of synthesizer section.

3-2. LFO

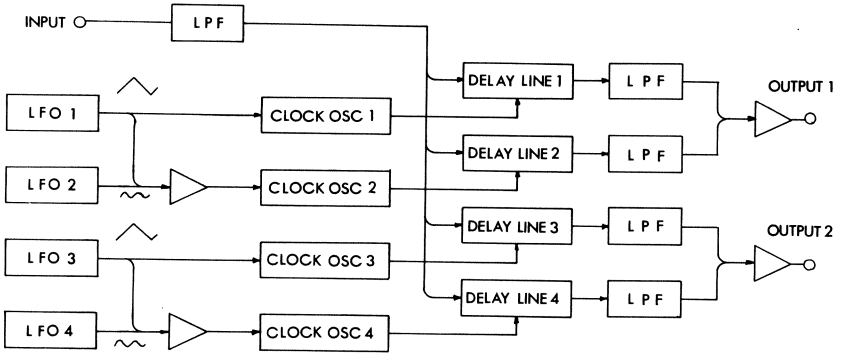
This is an R-C sine wave oscillator whose frequency is varied from about 1Hz to 15Hz by the RATE control. Its oscillation is once stopped by the gate signal which is generated by depressing a key, then it starts again and the amplitude is gradually increased. The oscillation stop time until the start of oscillation is adjusted by the DELAY TIME control.

4. Key Trigger Detector, Envelope Generator ARH-1

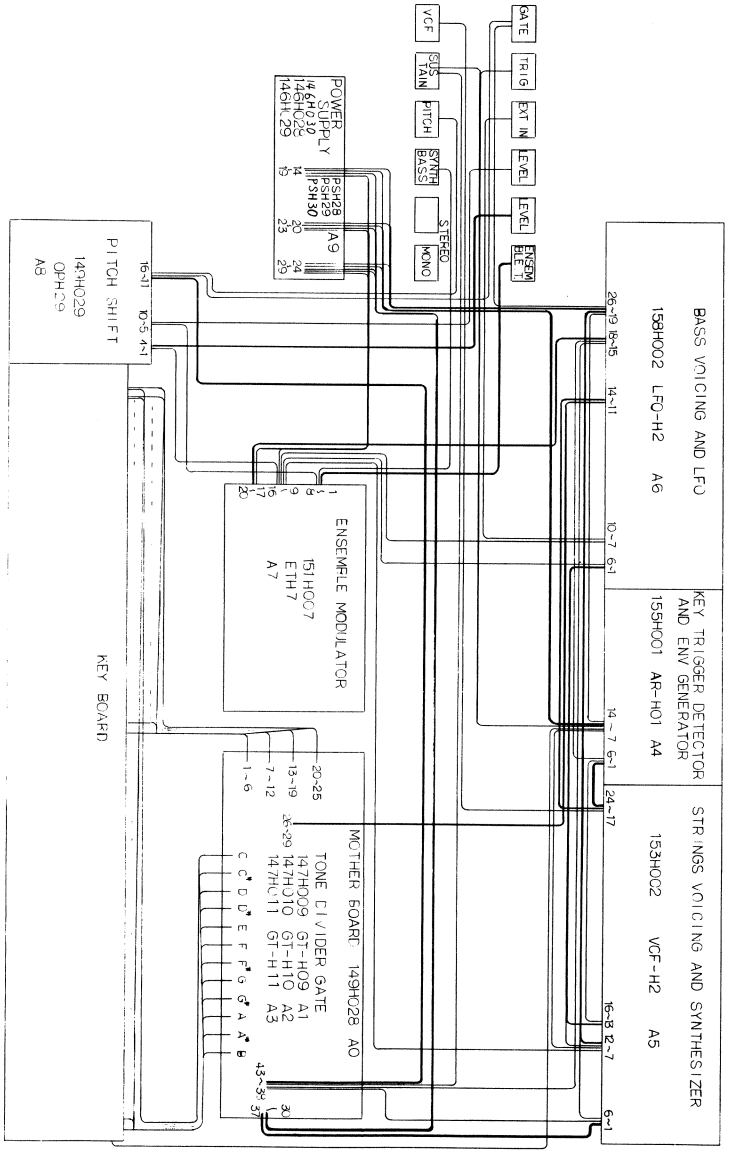
The key trigger detector detects change in key bus current, and it generates pulses by the key on-off operation and trigger pulses by the key on operation.
The envelope generator is triggered by the gate pulse, or by the trigger pulse when the second touch switch is activated.

5. Ensemble Modulator ETH-7

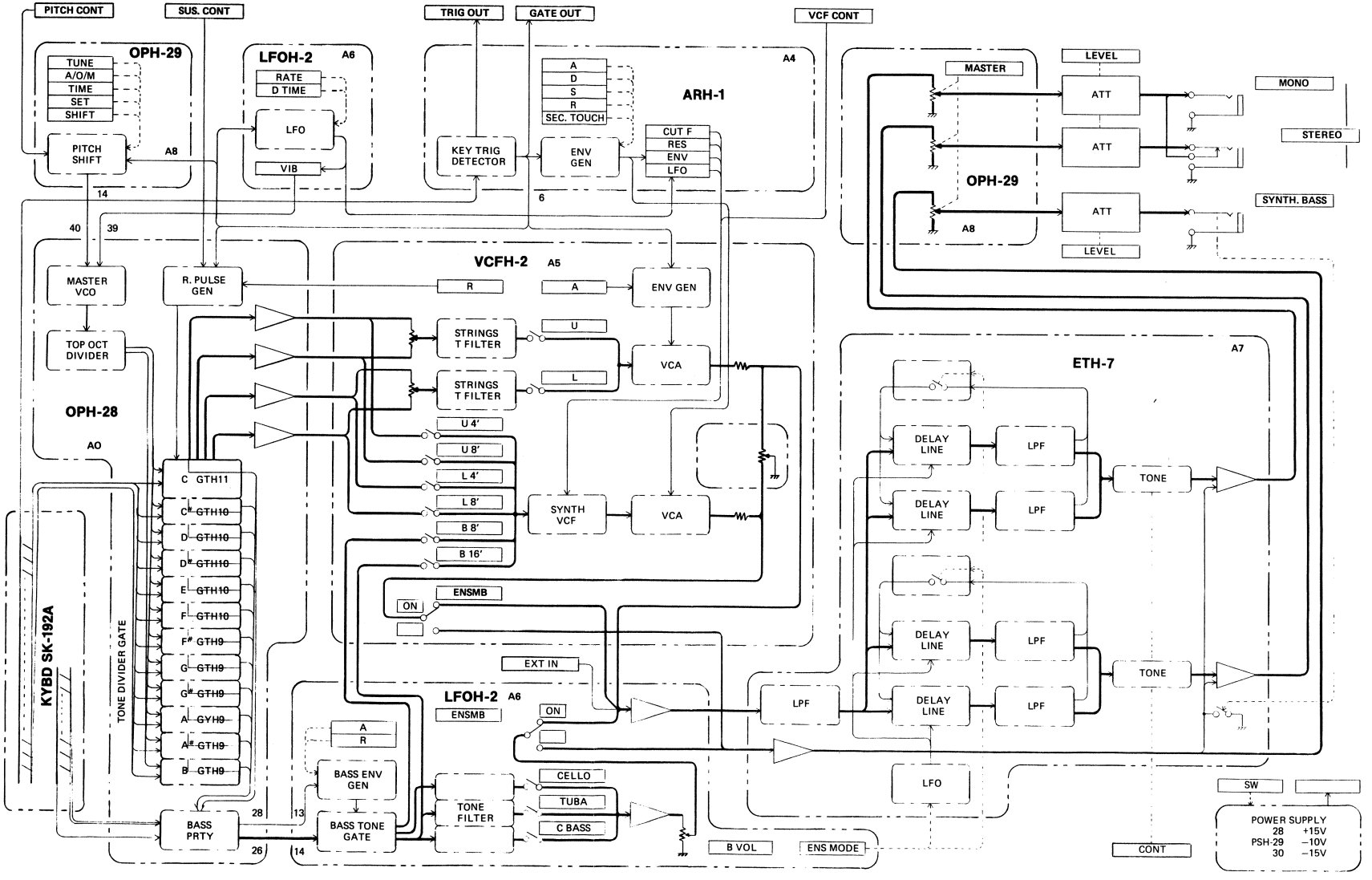
IC's (2AD512D) are used in the 4 sets of acudio delay lines. The clock frequency range is 40KHz to 250KHz.
To get various output signals, the processing conditions are different for each of the delay lines: the clock generators are modulated by four different waves, that is, two different triangular waves and two different waves of anti-phase triangular wave plus sine wave.



PCB LOCATIONS & INTERWIRING



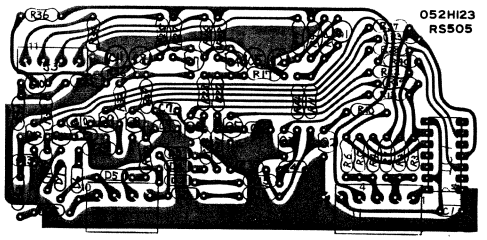
BLOCK DIAGRAM

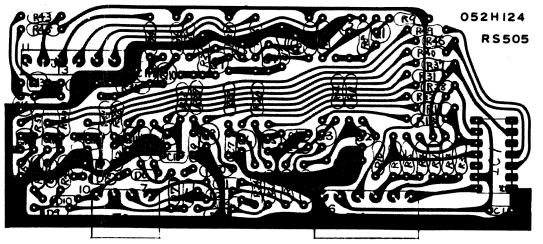


A1. 2. 3

GTH-9 (147H009)
F# ~ B

GTH-10 (147H010)
C# ~ F

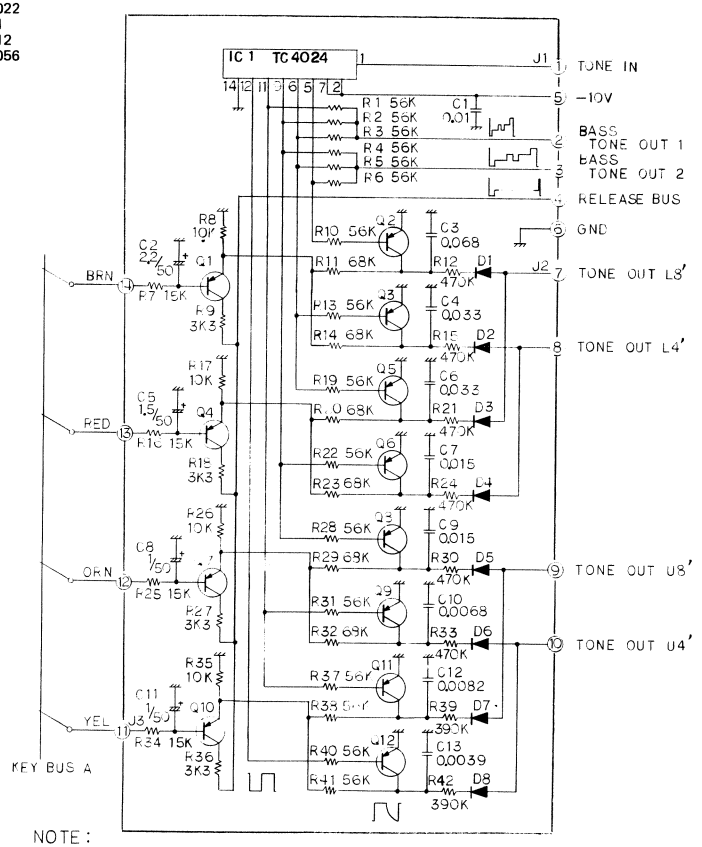




TONE DIVIDER & GATE
GTH-11 (147H011)
C

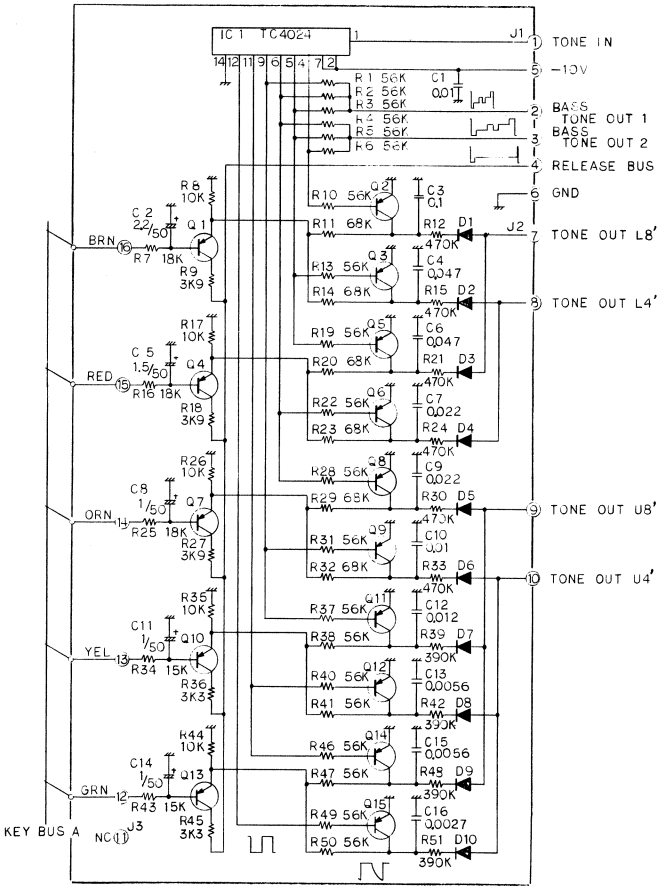
Connectors
- J_1 5145-06A
- J_2 5145-04A
- J_3 2373-06A

VALUES FOR GTH-10
R7, 16, 25 = 18K
R9, 18, 27 = 3K9
C3 = 0.1
C4, 6 = 0.047
C7, 9 = 0.022
C10 = 0.01
C12 = 0.012
C13 = 0.0056



NOTE:
1. UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF

Q ARE 2SA495 GR-TM or 2SA1015 GR
D ARE 1S1555 or M8555or 1S2473



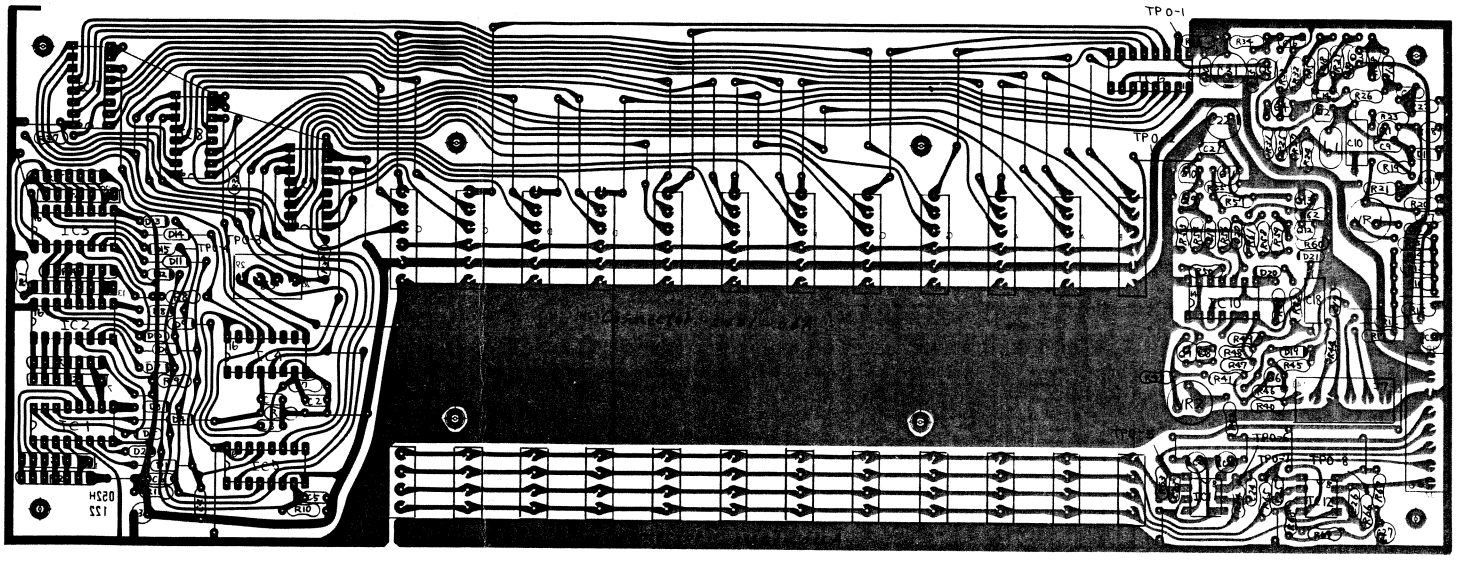
AO

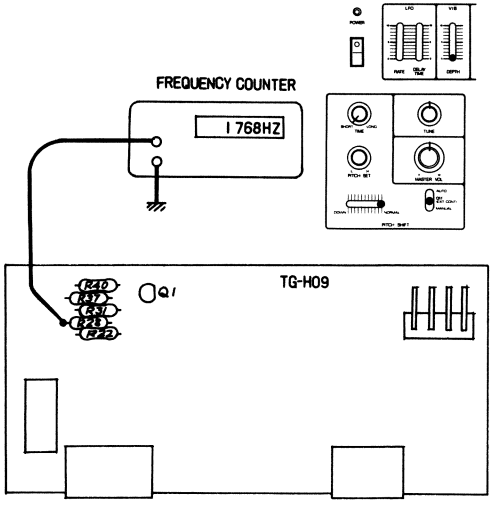
MOTHER BOARD OPH-28 (149H028)

L_1	RC-855 (180μH) (181K)
D_{17}	SVC-303

Connectors

J_5	5028-04A
J_1, J_2, J_4, J_7	5028-06A
J_3	5028-07A
J_6	5028-08A





TUNING

The Master VCO should be retuned after:

1. Secondary voltage varies (modification or repairing around the power supply).
2. Components in the VCO are replaced.

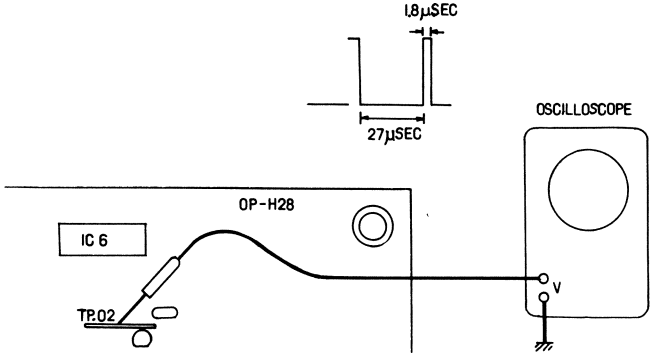
When soldered, allow them to dissipate heat for several minutes.

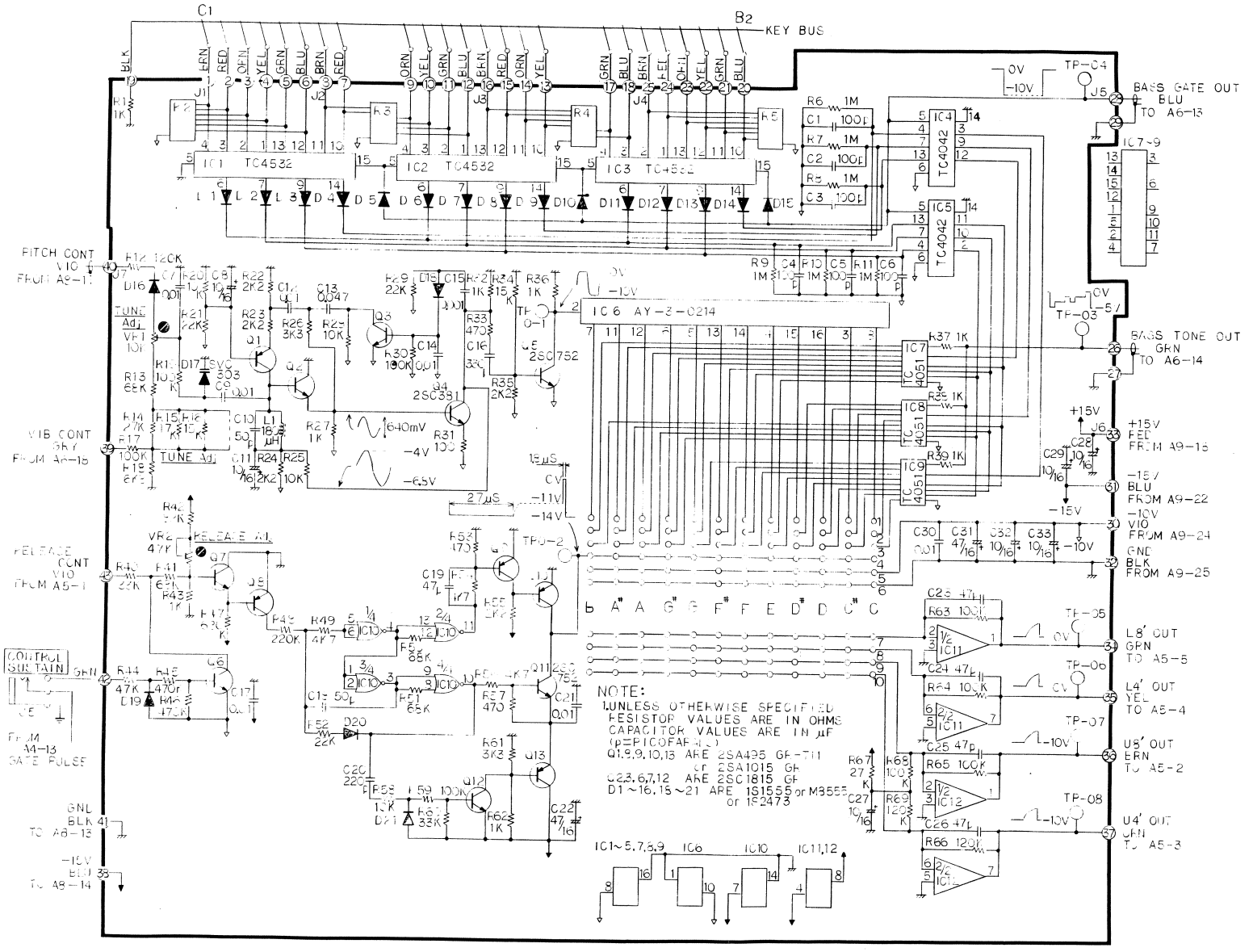
Set Knobs and Switch as shown.
Adjust VR-1 (OPH-28) for 1768Hz at "A" Tone Divider.

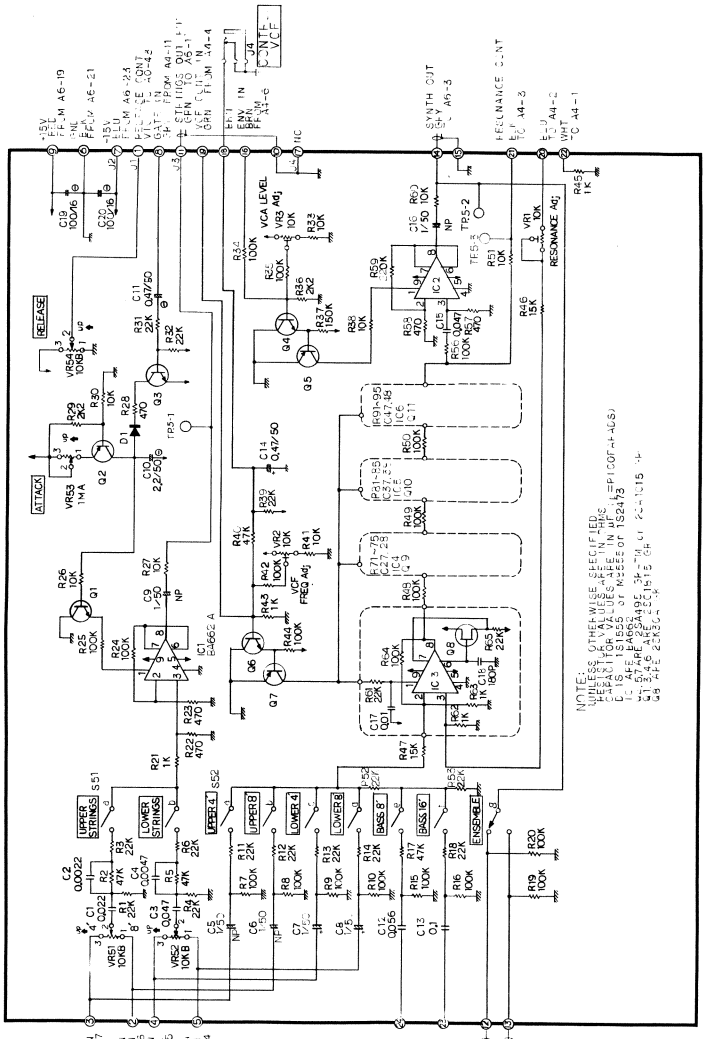
RELEASE PULSE FREQUENCY ADJUSTMENT

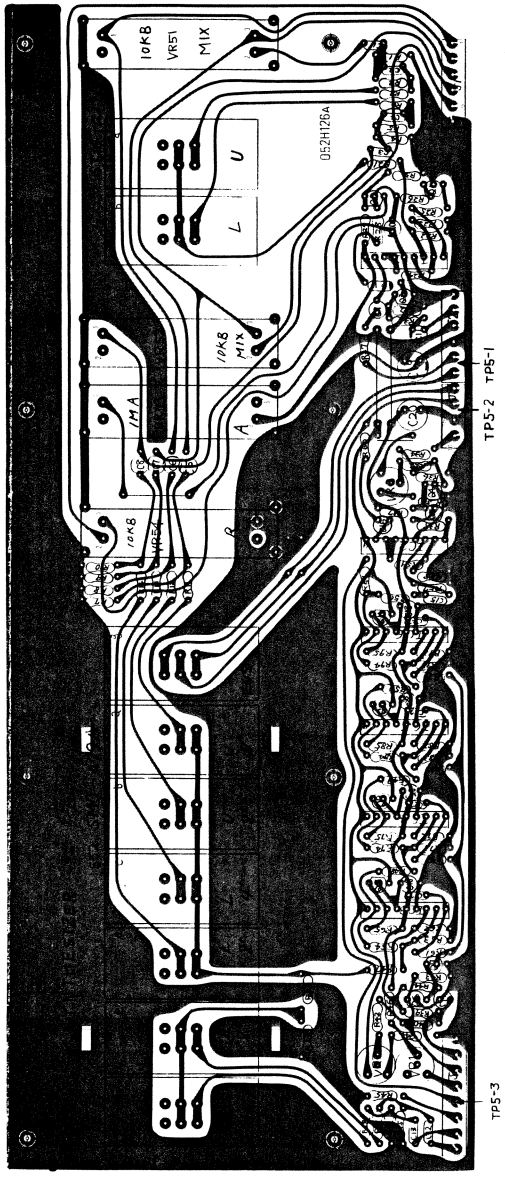
Place a closed plug or DP-1 in SUSTAIN jack on the rear panel.

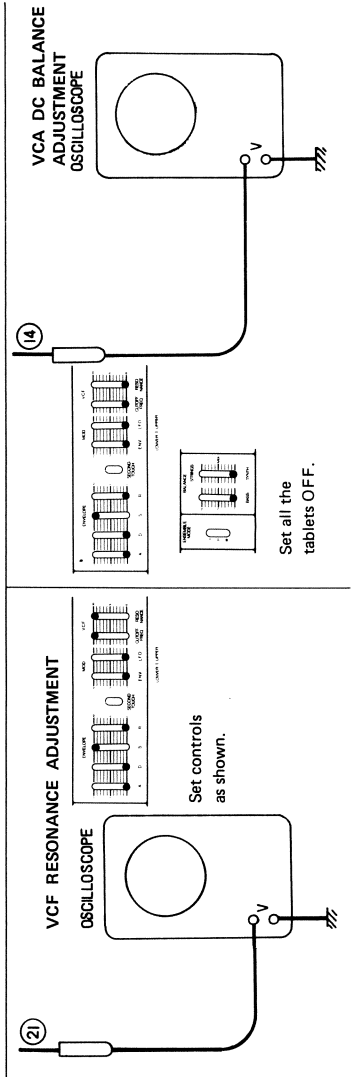
Adjust VR-2 (OPH-28) for:



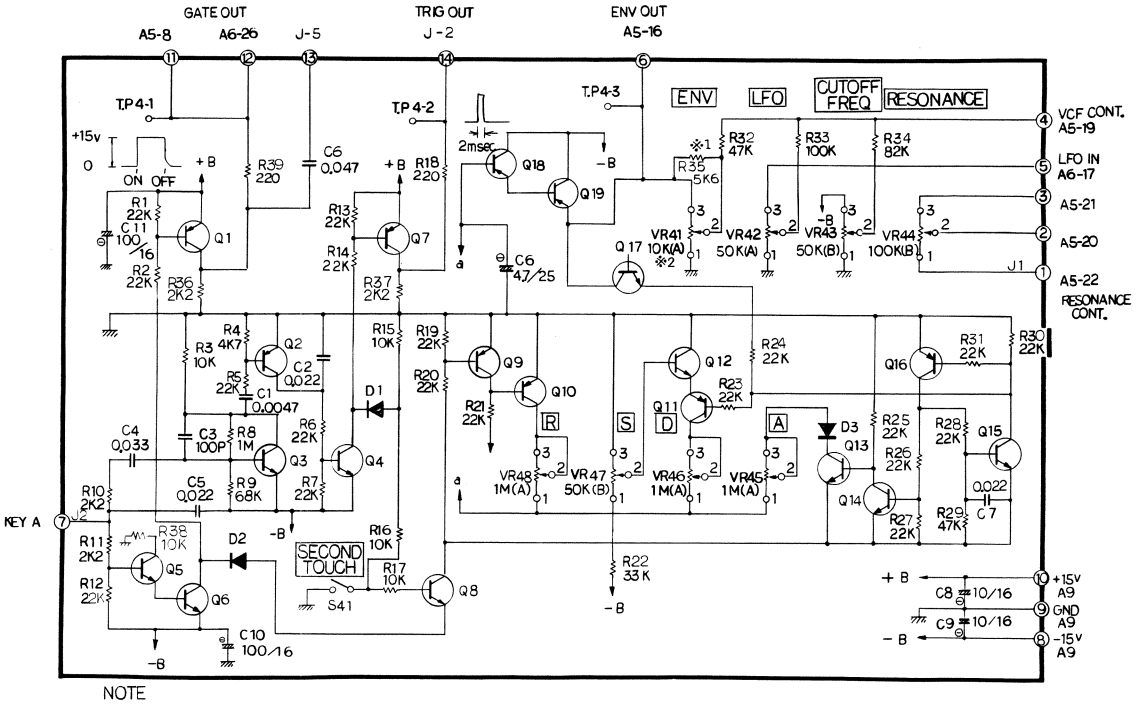

KEY BUS
BASS GATE OUT
BLU
TO A6-13
BASS TONE OUT
GRN
TO A6-14
+15V
FED
FROM A9-13
-15V
BLU
FROM A9-22
-10V
VIO
FROM A9-24
GND
BLK
FROM A9-25
L8' OUT
GRN
TO A5-5
L4' OUT
YEL
TO A5-4
U8' OUT
ERN
TO A5-2
U4' OUT
GRN
TO A5-3
PITCH CONT
VIO
FROM A8-17
VIB CONT
GRY
FROM A8-15
RELEASE CONT
VIO
FROM A5-1
CONTROL SUSTAIN
GRN
FROM A4-13
GATE PULSE
GND
BLK 41
TO A8-13
-10V
BLU 38
TO A8-14
IC 6 AY-3-0214
IC1 TC4532
IC2 TC4532
IC3 TC4532
TC4042
TC4051
TUNE Adj
TUNE Adj
RELEASE Adj
640mV
-4V
-6.5V
15μS
27μS
-1.1V
-14V
NOTE:
1.UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
(p=PICOFARAD)
Q1,9,9,10,13 ARE 2SA495 GR-T11
or 2SA1015 GR
Q23,6,7,12 ARE 2SC1815 GR
D1~16,15~21 ARE 1S1555 or M3555
or 1S2473



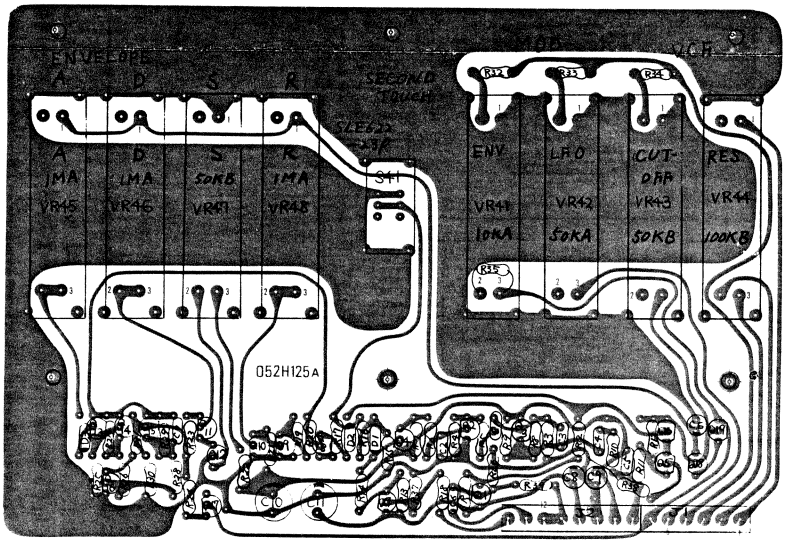



VCA DC BALANCE
ADJUSTMENT
OSCILLOSCOPE
14
Set all the
tablets OFF.
VCF RESONANCE ADJUSTMENT
OSCILLOSCOPE
21
Set controls
as shown.

KEY TRIGGER & ENVELOPE GENERATOR



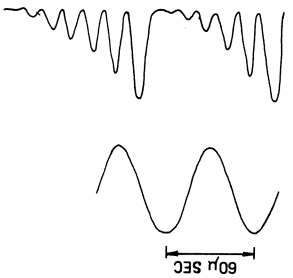
ARH-1A (155H001A)



SW S41: SLE-622-23P

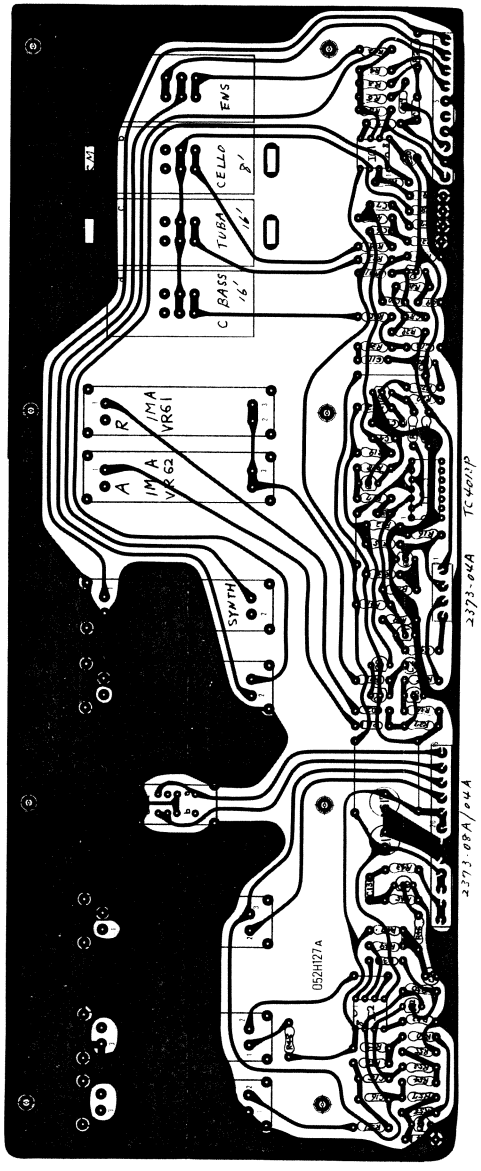
Connectors: J_1 2373-06A
J_2 2373-08A

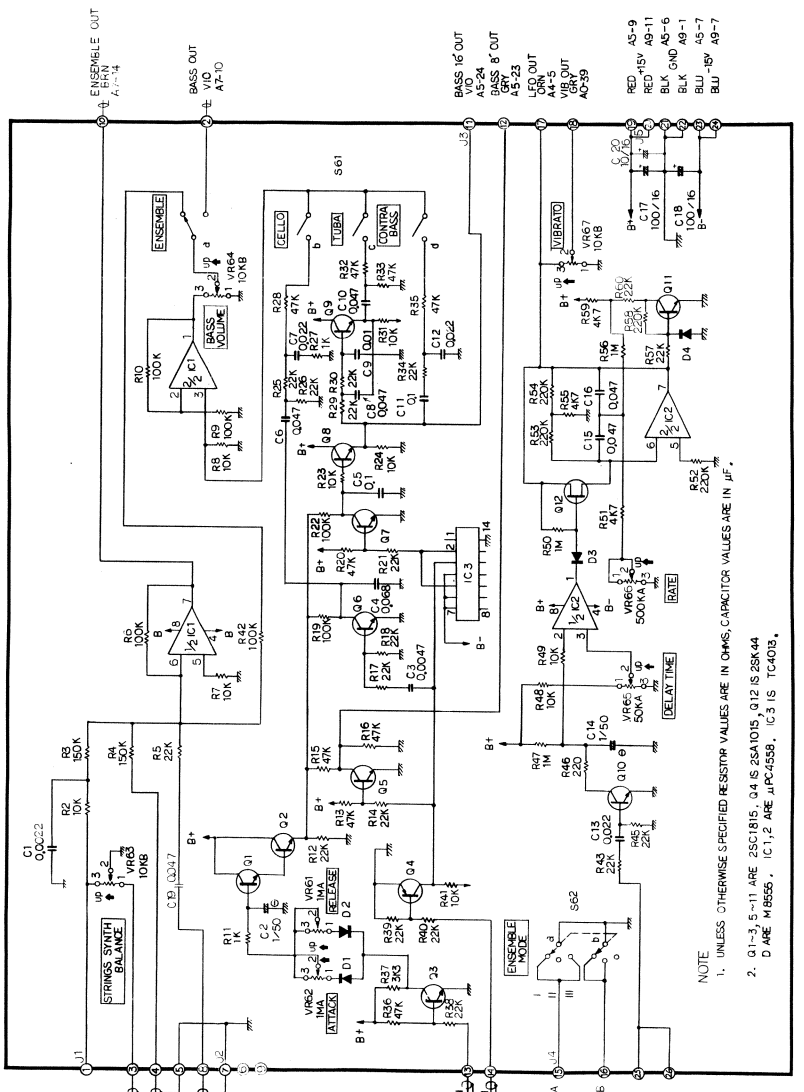
1. Turn VR-1 fullclockwise.
2. Adjust VR-2 for 17KHz. (Fig. A)
3. While depressing a key, adjust VR-1 for Fig. B. (Change Time Sweep Range if neccessary).



While tapping a key, turn VR-3 until click pulse just disappears. Make final adjustment with oscilloscope in most sensitive.

BASS VOICING & LFO





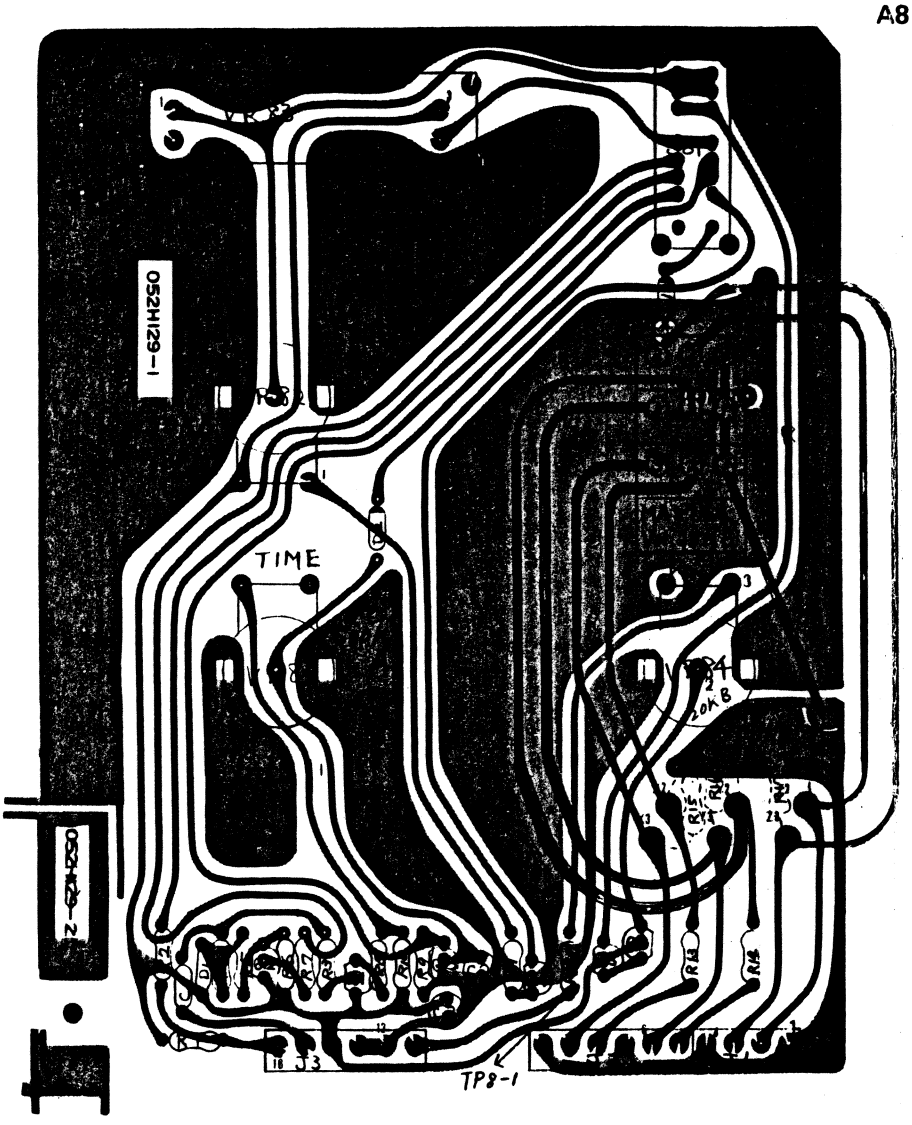
A8

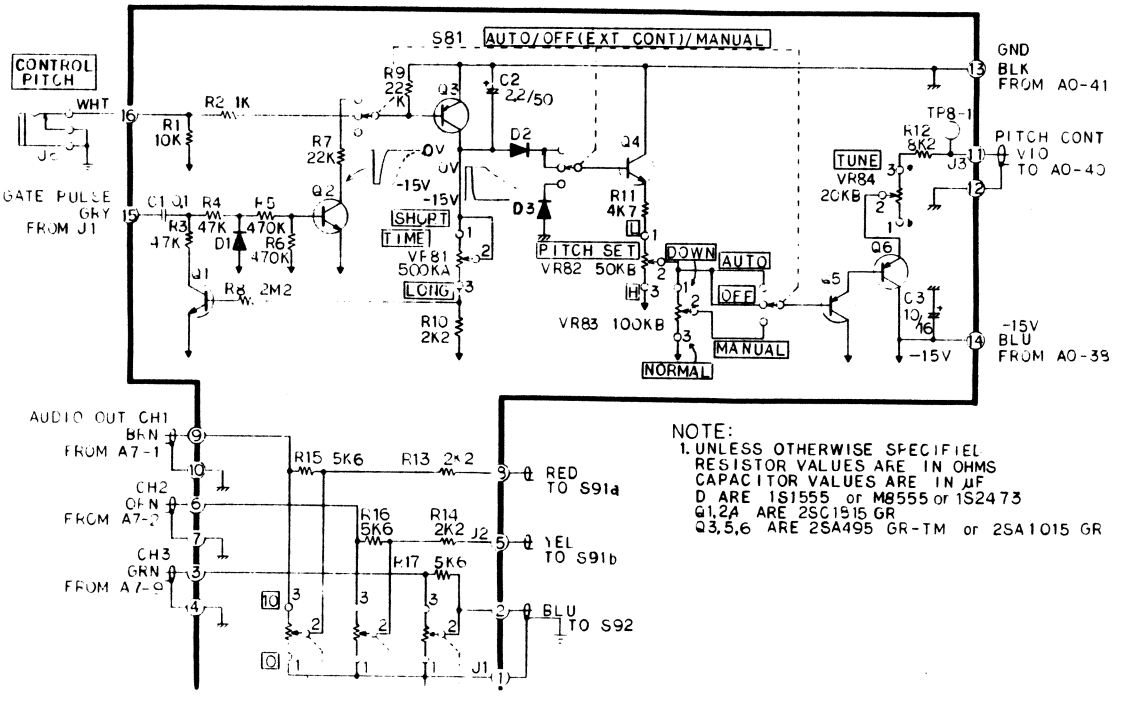
PITCH SHIFT
OPH-29 (149H029)

S_{81} : SLE643-15P
J_1 : 2373-04A
J_2 : 2373-06A
J_3 : 2373-06A

Serial No. 740300
and higher

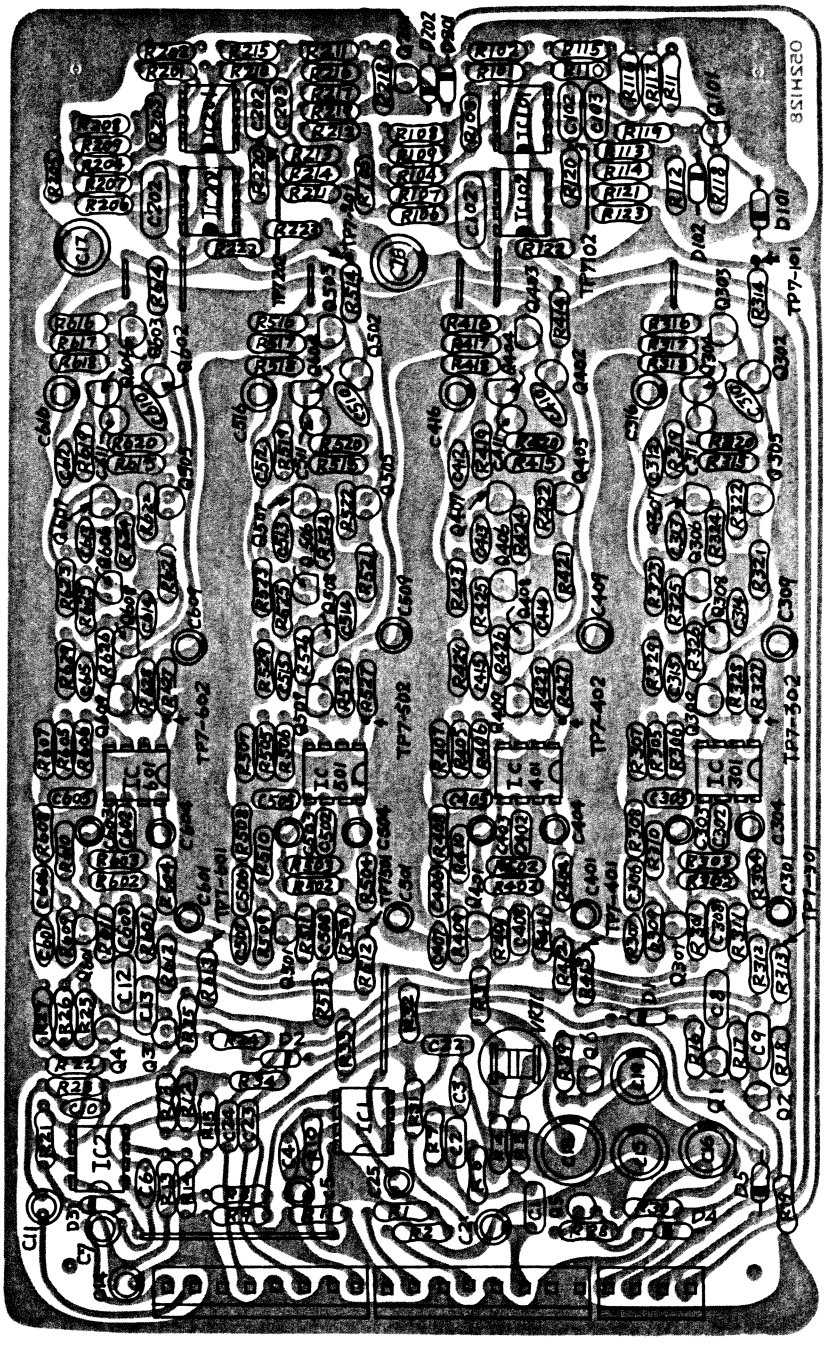
VR85 10KB
R15, R16, R17 } delete





NOTE:
1. UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF
D ARE 1S1555 or M8555 or 1S2473
Q1,2,4 ARE 2SC1915 GR
Q3,5,6 ARE 2SA495 GR-TM or 2SA1015 GR

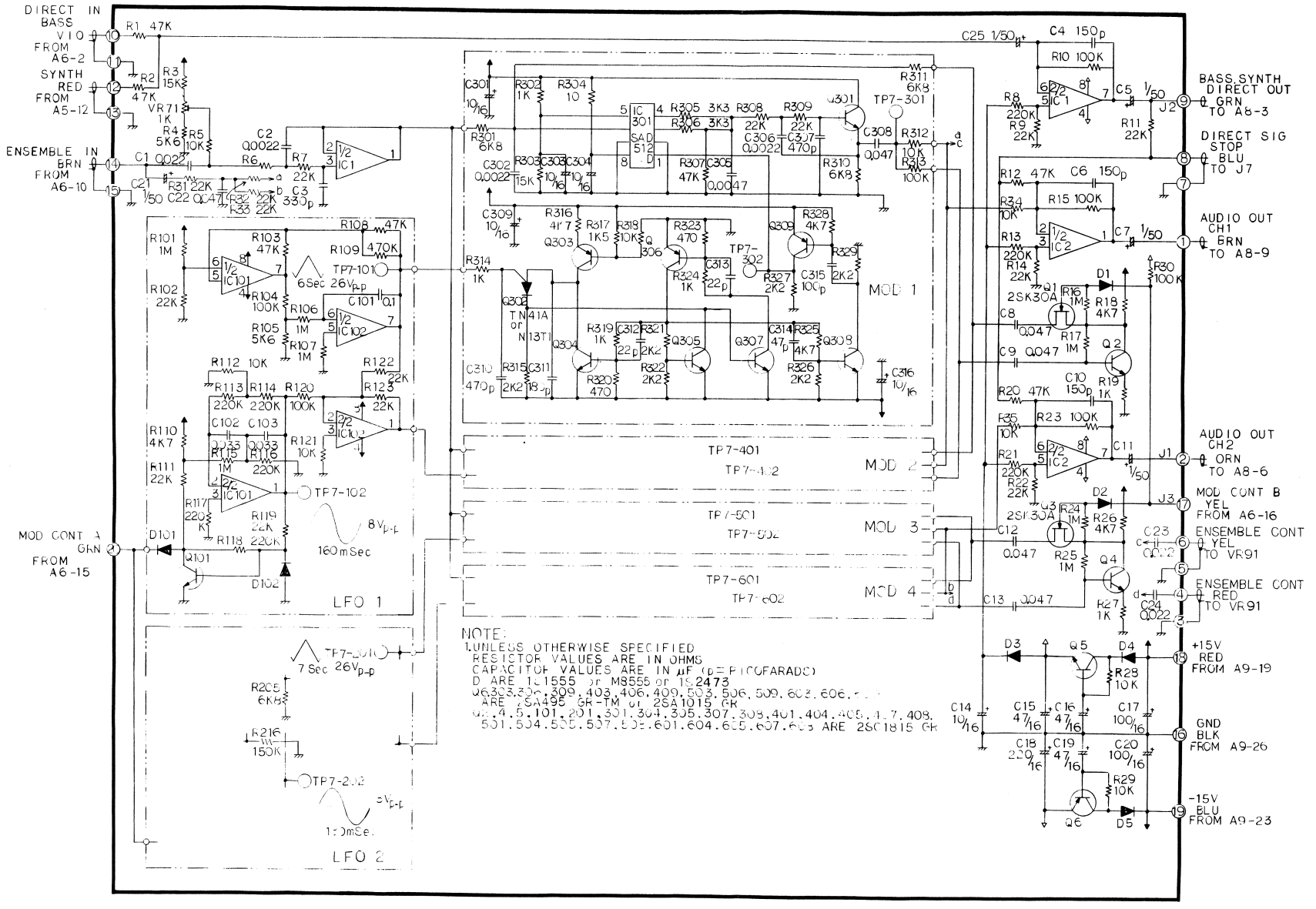
ENSEMBLE MODULATOR ETH-7 (151H007)



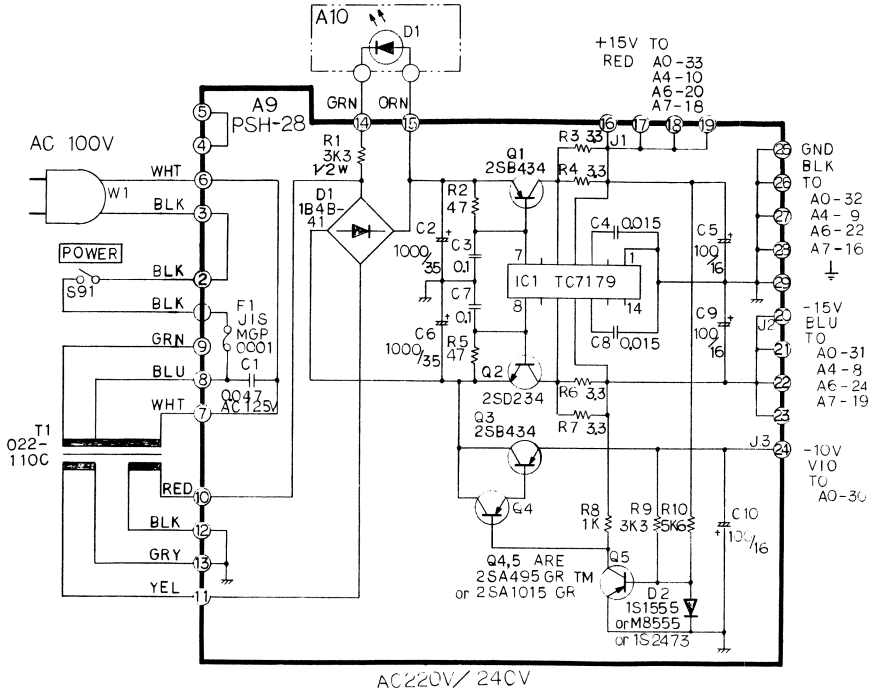
MODULATOR BIAS ADJUSTMENT

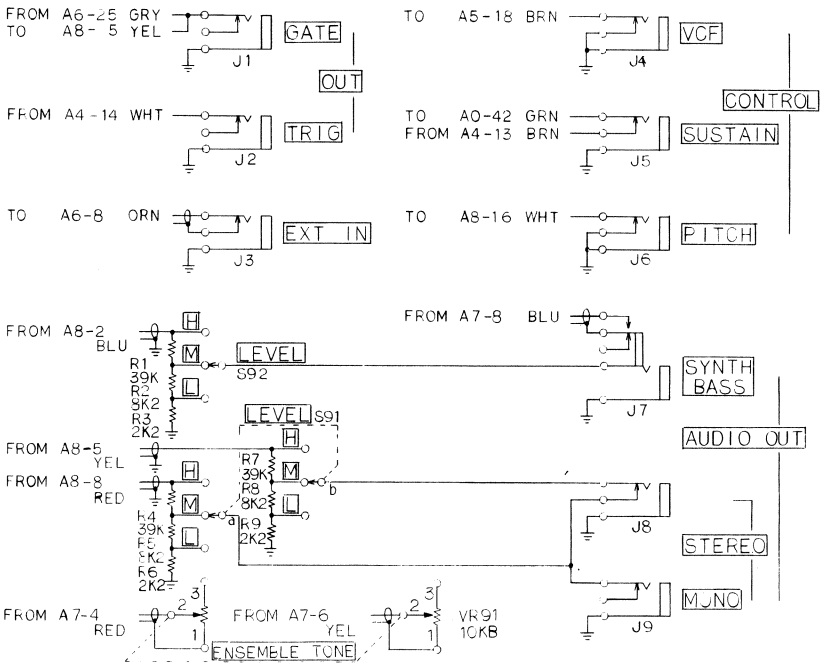
Feed a signal (1kHz, sine, –20dB) into EXT. IN jack on the rear panel.
Connect an oscilloscope to MONO jack.
Set ENSEMBLE changeover switch at I.
Increase the input level until the output is slightly distorted.
Adjust VR-71 so that positive half and negative are symetrical.

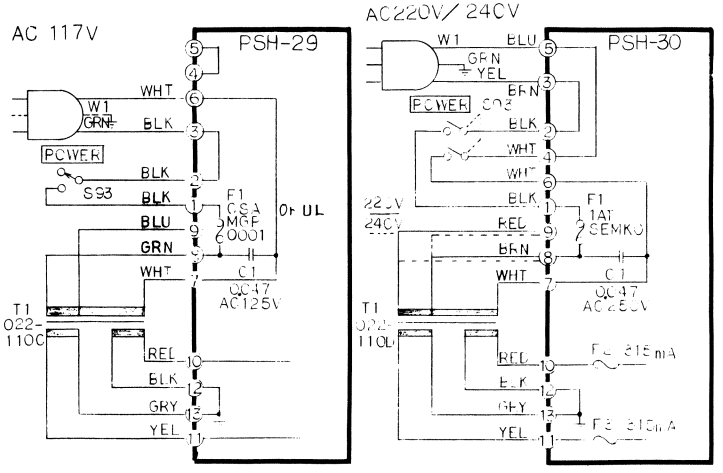
For easier check on individual channel, connect the scope at the points:
TP7-301, -401, -501 and -601.

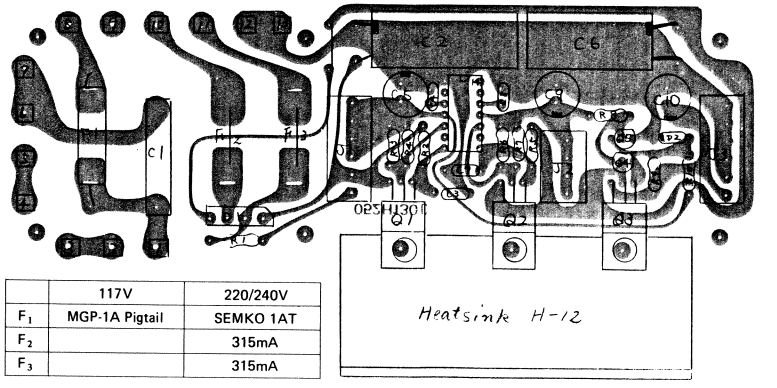

DIRECT IN BASS VIO FROM A6-2
SYNTH RED FROM A5-12
ENSEMBLE IN BRN FROM A6-10
MOD CONT A GRN FROM A6-15
BASS SYNTH DIRECT OUT GRN TO A8-3
DIRECT SIG STOP BLU TO J7
AUDIO OUT CH1 BRN TO A8-9
AUDIO OUT CH2 ORN TO A8-6
MOD CONT B YEL FROM A6-16
ENSEMBLE CONT YEL TO VR91
ENSEMBLE CONT RED TO VR91
+15V RED FROM A9-19
GND BLK FROM A9-26
-15V BLU FROM A9-23
MOD 1
MOD 2
MOD 3
MOD 4
LFO 1
LFO 2
NOTE:
1.UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN μF (p=PICOFARADS)

PSH-28C (146H028C) 100V **PSH-29C** (146H029C) 117V **PSH-30C** (146H030C) 220/240V





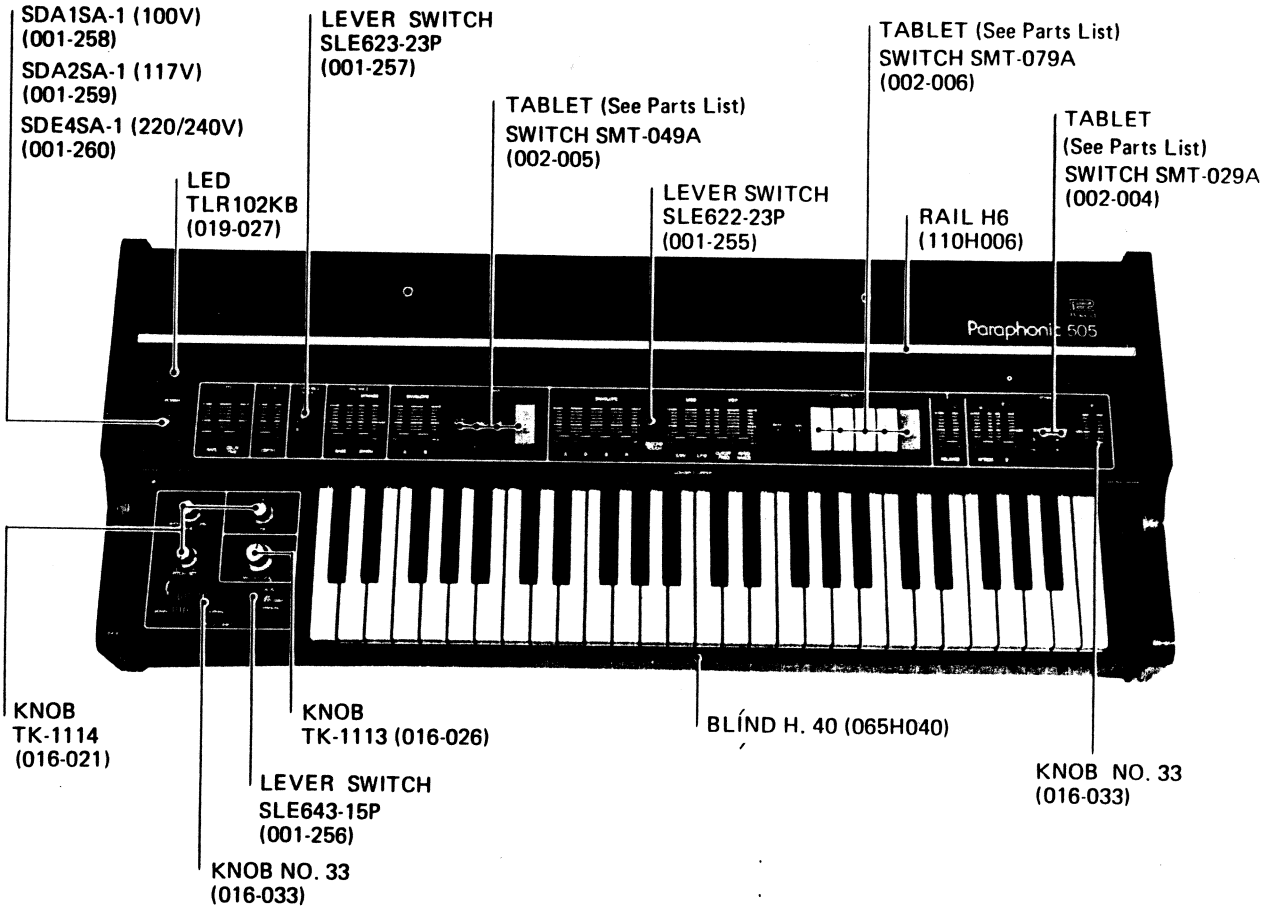


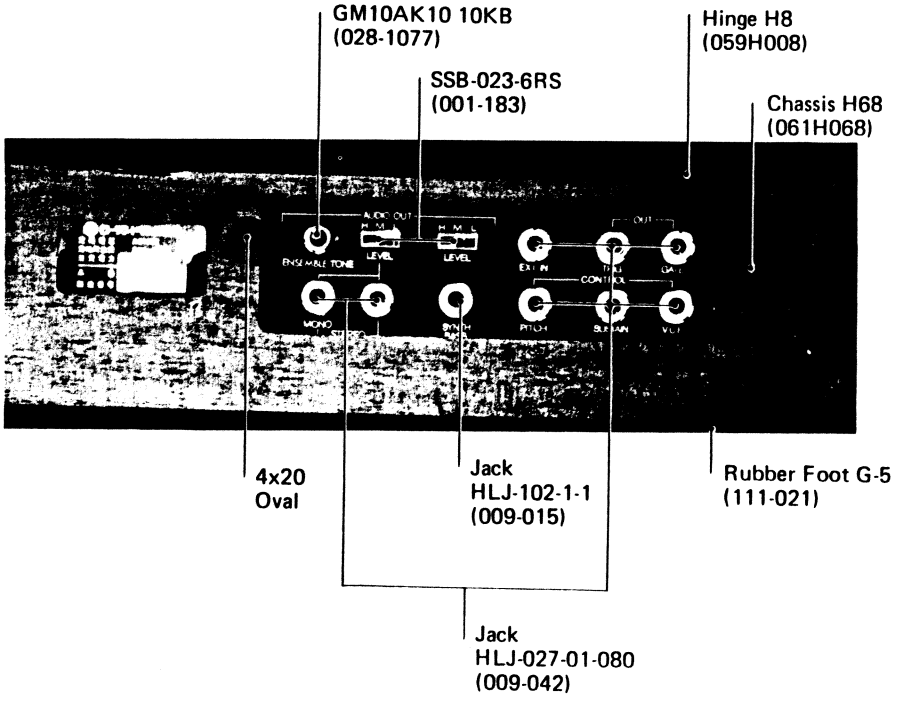


	117V	220/240V
F_1	MGP-1A Pigtail	SEMKO 1AT
F_2		315mA
F_3		315mA

PARTS LAYOUT

POWER SWITCH





PARTS LIST

081H170	Cabinet H170
059H008	Hinge H8
111-021	Rubber Foot G-5
081H171	Side Block H171 left
081H172	Side Block H172 right
072H041	Panel H41 upper
068-018	Bushing No. 18 music rack
110H006	Rail H6 music rack
004-010	Keyboard SK-192A
065H040	Blind H40
016-026	Knob TK-1113 large
016-021	Knob TK-1114 small
016-033	Knob No. 33 Slide
009-015	Jack HLJ-102-1-1
009-042	Jack HLJ-027-01-080 Bass Synth
022-110C	Power Transformer No. 110C 100/117V
022-110D	Power Transformer No. 110D 220/240V
022-129	Coil RC-855 osc 180μH
008-041	Fuse MGP0001 1A pigtailed w/CSA or UL marking 117V
008-066	Fuse SEMKO 1A midget prim. 220/240V
008-061	Fuse SEMKO 315mA midget sec. 220/240V

PCB ASSY

149H028	OPH-28	(052H122)	
147H009	GTH-9	(052H123)	
147H010	GTH-10	(052H123)	
147H011	GTH-11	(052H124)	
151H007	ETH-7	(052H128)	
155H001A	ARH-1A	(052H125A)	
153H002A	VCFH-2A	(052H126A)	
158H002A	LFOH-2A	(052H127A)	
149H029A	OPH-29	(052H129)	
146H028C	PSH-28C	(052H130C)	100V
146H029C	PSH-29C	(052H130C)	117V
146H030C	PSH-30C	(052H130C)	220/240V

ICs

020-156	AY30214	
020-051	TC4001P	
020-158	TC4042P	
020-090	TC4051P	
020-157	TC4532P	
020-076	TC4024P	
020-041	TC4013P	
020-161	TA7179P	
020-064	uPC4558C	
020-096	BA662	
020-160	BA662-A	
020-162	SAD512	BBD

TRANSISTORS

017-131	TN41A	PUT
017-064	2SA495TM-GR	
017-022	2SB434-O	
017-010	2SD234-O	
017-130	2SC381-R	
017-129	2SC752G-O	
017-106	2SC1815-GR	
017-016	2SK30A-GR	FET

DIODES

018-086	SVC303	varicap
018-014	1S2473	
018-081	1B4B41	bridge
019-027	TLR102KB	LED

POTENTIOMETERS

028-1077	GM10AK10B14	w/click
028-1068	JM40AK35B14	4-ganged
028-1058	VM60ZK30B24	20KB
028-1059	VM60ZK30B54	16ϕ pc terminal
028-1054	VM60ZK30A55	500KA
029-459	LFE3RC20B14	slide ENV (from A curve to B)
029-461	LFE3RC20B54	50KB
029-462	LFE3RC20B15	100KB
029-449	LFE3RC20A54	50KA
029-453	LFE3RC20A16	1MA
029-472	LFE3RC16B15L	100KB
030-465	SR19R	10K Trimmer
030-459	SR19R	1K
030-469	SR19R	47K

SWITCHES

001-183	SSB0236RS	slide 2-pole 3-pos.
001-255	SLE622-23P	lever 2-pole 2-pos.
001-256	SLE643-15P	lever 4-pole 3-pos.
001-257	SLE623-23P	lever 2-pole 3-pos.
001-258	SDA 1S A1	power 100V seesaw
001-260	SDE 4S A1	power 220/240V
001-259	SDA 2S A1	power 117V
002-004	SMT029A	tablet STRINGS
002-005	SMT049A	tablet BASS
002-006	SMT079A	tablet SYNTH
003-010	Tablet	green
003-011	Tablet	maroon
003-012	Tablet	white
003-013	Tablet	gray

OTHERS

048H012	Heatsink H12
064H200	PCB holder DLC BS-6N PSH
068-029	Collar Bush NA-305 PCB
068-034	Collar Bush NB-300 PCB
035-145	Capacitor ECQS5500J 50pF styrol
035-158	Capacitor ECQS1181JZ 180pF Styrol
045-005	Resistor array RM-6 334J 330K x6

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