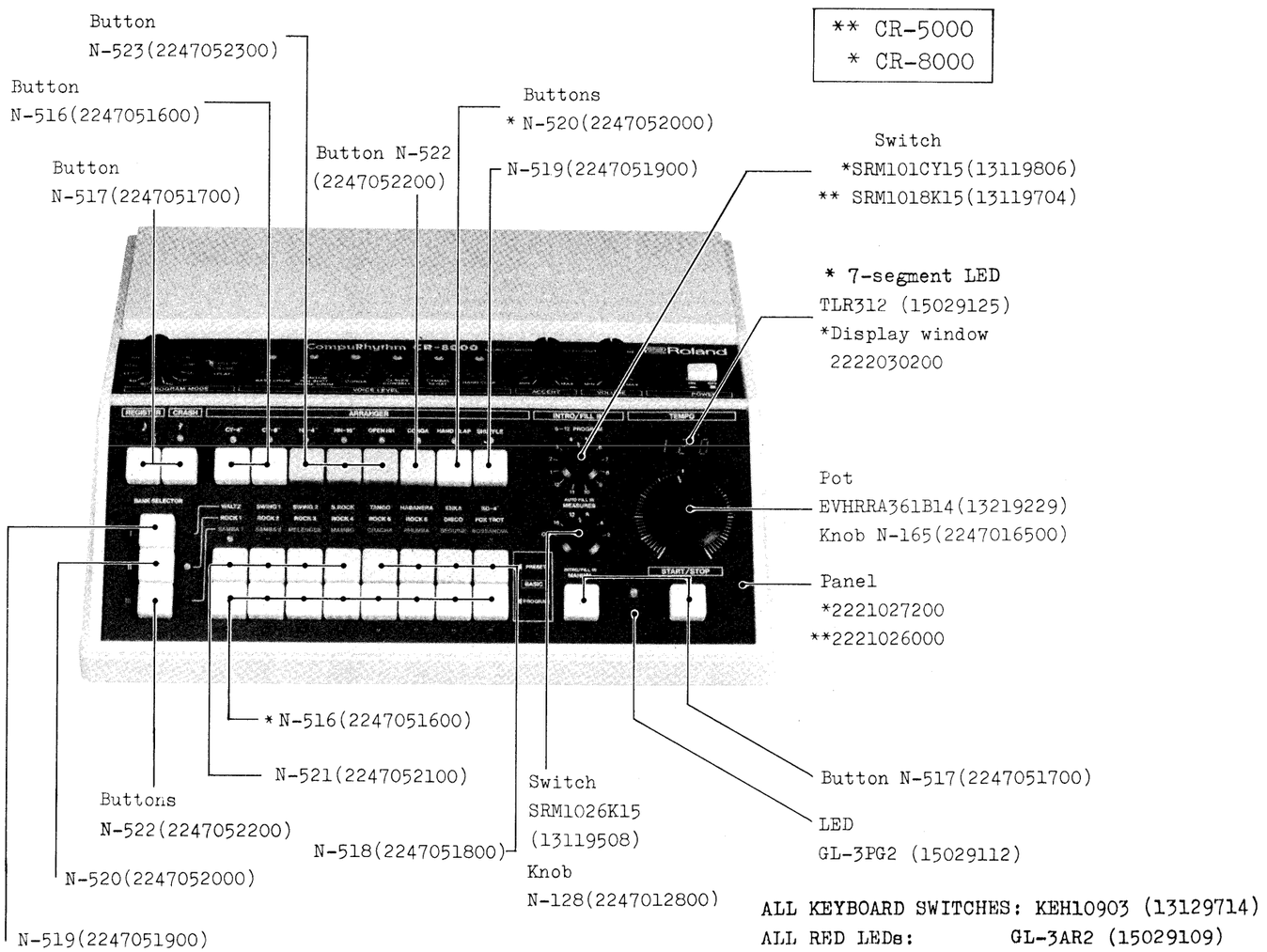
CR-5000/8000 SERVICE NOTES

SPECIFICATIONS

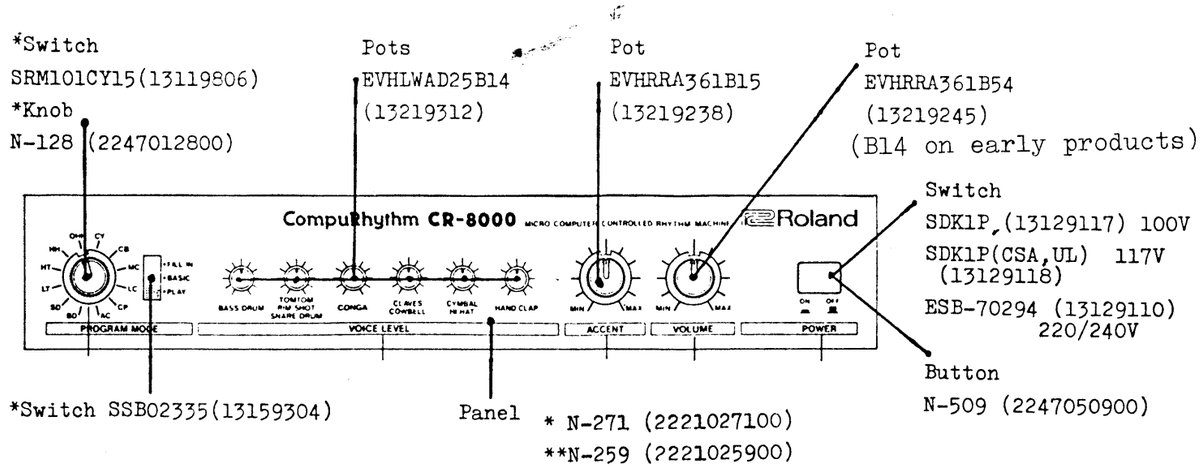
First Edition

Second Printing (July 12, 1983 E2)

OUTPUT IMPEDANCE	Less than 6KΩ or less than 25KΩ (Serial No. CR5000 091100–, CR8000 090900–)
TRIGGER OUT	Level: +5 positive edge Width: 44ms (typ) @ TEMPO min./12ms (typ) @ TEMPO max.
OUTPUT (max.) ..... (into 100KΩ)	4V p-p @ VOICE LEVEL max./VOLUME max./ACCENT min. (16V p-p @ ACCENT max.)
(CR8000)	2.5V p-p @ VOICE LEVEL mid./VOLUME mid./ACCENT mid.
SYNC IN	+15V (max.)
SYNC OUT	+15V (Tempo clock – 6.7ms-71ms)
POWER CONSUMPTION ...	CR5000: 10W, CR8000: 12W
DIMENSIONS	331(W) x 278(D) x 108(H)mm
WEIGHT	3.7kg
NOISE ..... (load 100kΩ)	0.3mV rms (–68dB) (0dB = 0.775V) (DIN 45405 wtd)

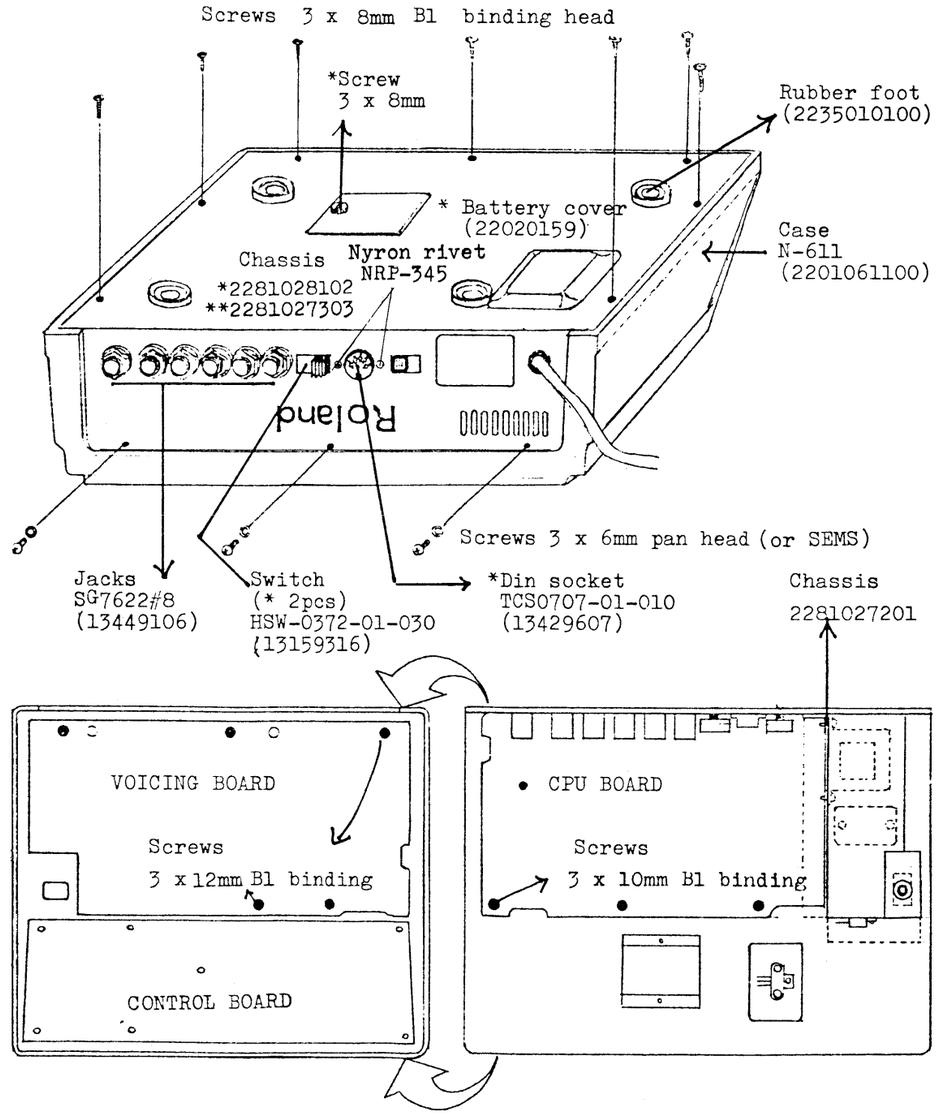


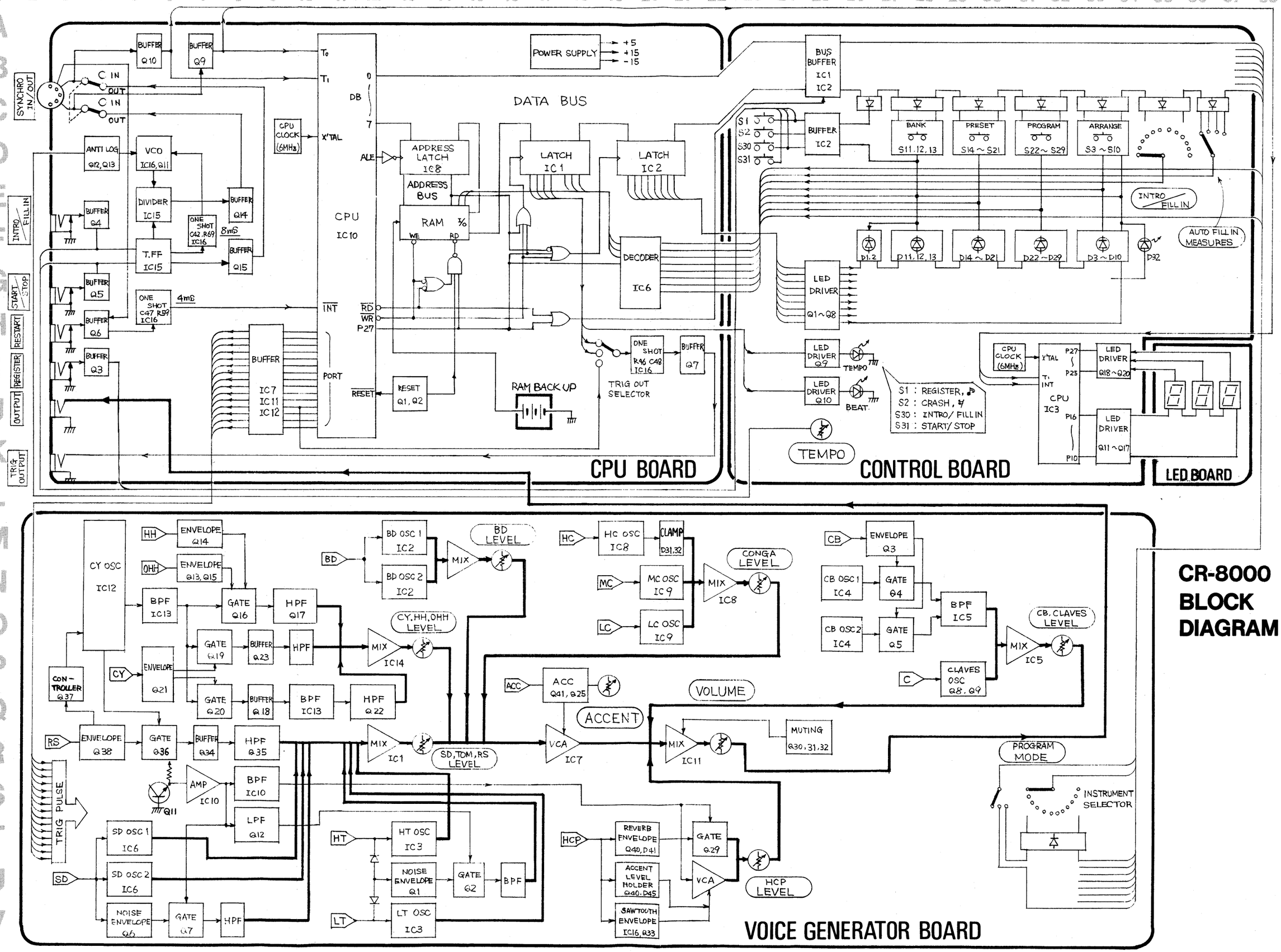
ALL KEYBOARD SWITCHES: KEH10903 (13129714)
ALL RED LEDs: GL-3AR2 (15029109)



DISASSEMBLY

Remove ten (10) screws indicated below.





CR-8000 BLOCK DIAGRAM

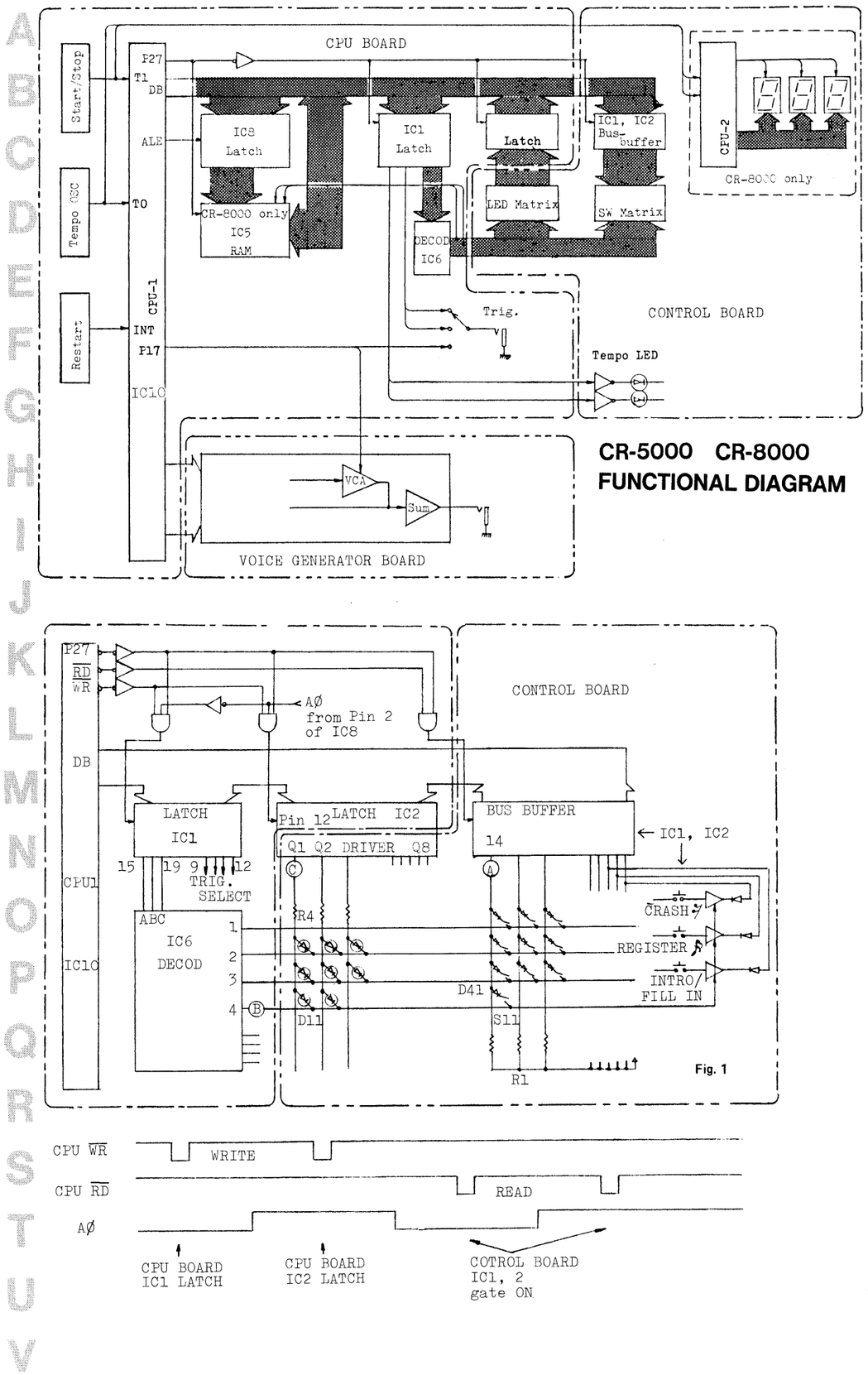


Fig. 1

CR-5000 CR-8000 FUNCTIONAL DIAGRAM

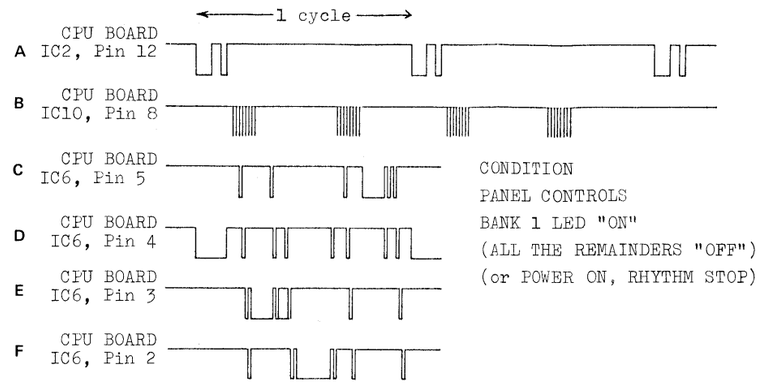


Fig. 2

CIRCUIT DESCRIPTION

SWITCH SCANNING

CPU holds one of switch matrix rows low through LATCH IC1 and DECODER IC6.
Exp. When S11 closes while pin 4 of IC6 (B in Fig. 1) is held low, pin 14 of BUFFER IC1 (A in Fig. 1) which is pulled up via R1, becomes low. This low is read by CPU through data bus.
CPU continues this sequence for the remaining 7 matrix rows (Ⓑ, Fig.2).
Once rhythm starts, time interval between switch scanning varies to Tempo Clock rate.

LED DINAMIC SCANNING

To light LED that is on, CPU selects matrix row and column where the LED is connected diagonally.
In the above example D11 has been on, CPU fires LED driver Q1 through LATCH IC2 in sympathy with low at B in Fig. 1 (Ⓐ and Ⓓ in Fig. 2.)

Lengths of lows and intervals between lows in Fig. 2 also vary greatly with controls setting and rhythm tempo.

VOICE TRIGGER SIGNAL

CPU delivers trigger signals (negative going) to individual VOICE Generators.
Trigger signal goes negative at the falling edge of tempo clock and stays low until the next falling edge of the tempo clock. That is,width of trigger signal is equal to period of one clock signal. The maximum trigger signal rate is $\frac{24 \text{ clocks}}{4}$:(♪).

EXT TRIGGER Derived from LATCH IC1 on CPU board. They are also negative going and the pulse width is equal to that of tempo clock.

RESTART

CPU reads INT terminal (not in use for interrupt application) every 3ms and , when INT is high, resets internal counter to revert to onset of a measure.
If monostable (1/6IC6, C47 and R59) output is high for a period shorter than 3ms or longer than 6ms, CPU may miss it or read twice at INT terminal; resultant is non return to the starting point of a two measure succession or quick double return.

VOICE GENERATORS

Most voice generators are designed based on a fashion similar to those detailed in the circuit description on the TR-808 Service Notes which is expected to be referenced to as necessary. Exceptions are Cymbal and Rim Shot. Below brief comments on individual voices.

BD

The circuit consists of two bridged-T networks.

SD

Also has two bridged-T filters for drum sound, in addition, noise generator for snare sound.

LT. HT:

Bridged-T networks in these stage include two diodes in their RC constant loop. The diode changes conducting rate in proportion to sound amplitude passing through the network, changing filter characteristic, thus shifts filter response curve (frequency) along sound contour. Pink noise is combined with this output to simulate reverbration.

LC. MC. HC

Also based on Bridged-T. HC output is clamped on D31 and D32 to have multiple harmonics to emphasis highs.

HH. OHH. CY

The combined square waves from Shmitt triggers IC2 are gated at choppers with the contour shaped by respective envelop generator outputs.

RS

Among six Schmitt triggers, two are used which are reset by an RS trig fed through Q37. The first rising edge of two outputs are synchronized to each other to eliminate unsavory sound at the very first of RS note.

CB

Two oscillator outputs of different frequency are summed at BPF after gated at choppers.

HCP

HCP sound is accomplished by modulating white noise with sawthooth waves derived from IC6.

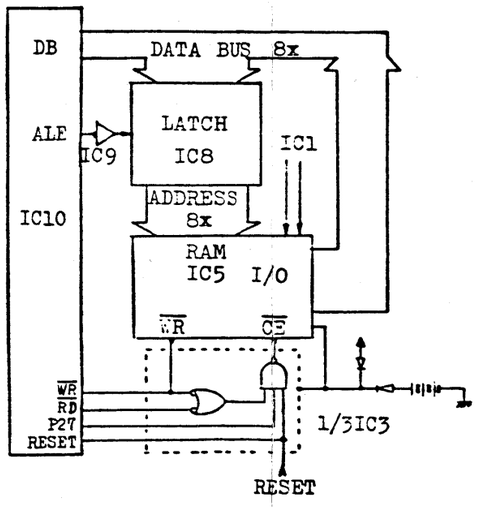
ACCENT

Sounds passing through VCA IC7 are accentuated simaltenously when an accent pulse is applied to Q41 with its amplitude determined by VR8 setting.

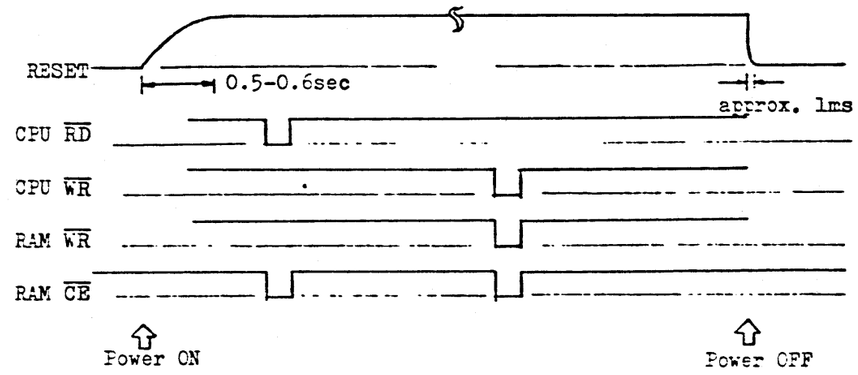
C (CLAVES)

The circuit is designed based on conventional R-C phase oscillator.

RAM
CR-8000 only



NOTES:
P27 - high during RAM accessing
$\overline{CE}$ - high during power off

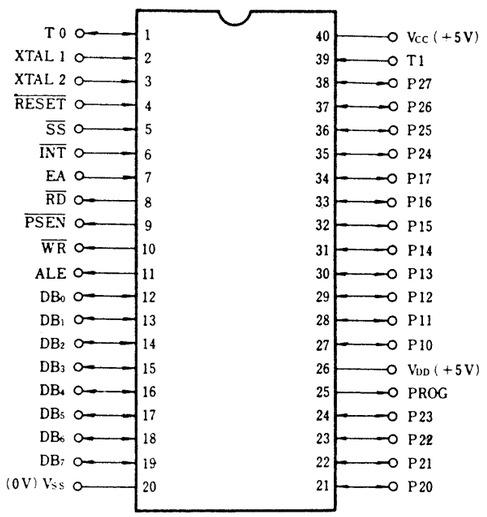


Storage for programmed rhythm patterns are provided for the CR-8000. The memories are maintained by backup batteries (three 1.5V dry cells).
The ten address bits are required to access to a memory location on 1024 words by 4 bit RAM uPD444; 8 bits are latched into IC8 by ALE and 2 bits into IC1 (also used for switch scanning).

μPD8049C/μPD8048C

SINGLE COMPONENT 8-BIT MICROCOMPUTER

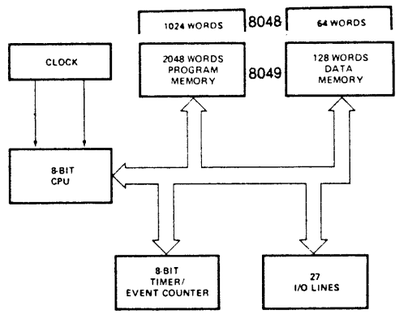
(Top View)



8049
2K × 8 ROM
128 × 8 RAM

8048
1K × 8 ROM/EPROM
64 × 8 RAM

BLOCK DIAGRAM



μPD8049C

PIN NAME	PIN NO.	FUNCTION
TØ	1	TEMPO CLOCK IN
T1	39	START/STOP SIGNAL IN
INT	6	RESTART SIGNAL IN
DATA BUS	12-19	SWITCH SCANNING OUT/IN LEDs LIGHT OUT TEMPO LED, TRIG OUT MEMORY READ/WRITE (CR-8000 only)
PORT 1		TRIGGER OUT FOR VOICE GENERATOR
P10	27	CYMBAL
P11	28	HI TOM
P12	29	OPEN HI-HAT
P13	30	LOW TOM
P14	31	HI-HAT
P15	32	SNARE DRUM
P16	33	BASS DRUM
P17	34	ACCENT
PORT 2		TRIGGER OUT FOR VOICE GENERATOR
P20	21	HI CONGA
P21	22	MIDDLE CONGA
P22	23	LOW CONGA
P23	24	COWBELL
P24	35	CLAVES
P25	36	RIM SHOT
P26	37	HAND CLAP
P27	38	I/O SELECT (SWITCH, LED BLOCK or RAM BLOCK)

uPD8049C-159
uPD8049C-232 (improved version)

The following program bug is eliminated in the -232 version.

Condition
SHUFFLE ON with alternate rhythm patterns selected.
INTRO/FILL IN is pushed after the termination of first measure pattern.

When INTRO/FILL IN part ends, CPU delivers rhythm pattern data for the first measure but replaces the first step data only with the one for the second measure.
This is perceptive in RHUMBA, BEGUINE or BOSSANOVA.

μPD8048C CR-8000 only

PIN NAME	PIN NO.	FUNCTION
TØ	1	NO APPLICATION (KEPT LOW)
T1	39	TEMPO CLOCK IN
INT	6	START/STOP SIGNAL IN
DATA BUS	12	KEPT HIGH
	13	KEPT LOW
	14	KEPT LOW
	15	KEPT LOW
	16-19	NO CONNECTION
PORT 1		
P10	27	7-SEGMENT LED LIGHT SIGNAL OUTPUTS
P11	28	
P12	29	
P13	30	
P14	31	
P15	32	
P16	33	
P17	34	NO CONNECTION
PORT 2		
P20-P23	21-24	NO CONNECTION
P24	35	(NOT IN USE)
P25	36	7-SEGMENT LED CONTROL SIGNAL OUTPUT
P26	37	
P27	38	

for Internal program initialization

TEMPO DISPLAY (CR-8000 only)

uPD8048C IC3 on Control Brd counts Tempo Clocks derived from Q9 on CPU Brd whenever power is being fed to the CR-8000.
Since 24 tempo clocks are made equal to one ♩, actual tempo displayed is

$$\frac{\text{clocks per minute}}{24}.$$

CPU performs an equivalent eq. in a short period and drives Q18-Q20 on Control Brd in synchronous with drive signals for 7 segments of display LEDs.
Upon rhythm running INT of CPU IC3 goes and stays negative with which CPU's internal count gate is disabled, then re-started at the first falling edge of the next tempo clock. This count break allows CPU to skip transitional tempo clock that is reset by a start signal.
If INT remains high after rhythm running, tempo display varies temporarily.

	F1	F2	F3
100 V	jumper		
117 V			
220v,240v	CEE T1A	CEE T400mA	CEE T400mA
240v 3P	CEE T1A	CEE T400mA	CEE T400mA

REFER TO CR-5000 CKT DIA FOR AC WIRINGS.

Sec. Wirings Ratings(DC): ±23V @120mA, 10V @700mA

CONTROL BOARD

1. START/STOP
2. GND
3. TEMPO CLOCK
4. NC
5. NC

SYNC. IN/OUT — SW2: SYNCHRO IN/OUT

JK4 INTRO/FILL IN
JK2 START/STOP
JK3 RESTART
JK5 REGISTER
JK1 OUTPUT
JK6 TRIGGER OUT PUT

IC 10 μPD 8049C -159 or -232 see p.5

PR1 : ERS-C33G561

X1 : FCR-6

R41 : RM8-273K

R52, R53: RM8-273K

R40 ; RM8-472K

V.G. BOARD

CPU BOARD GL3125-060

CONTROL BOARD

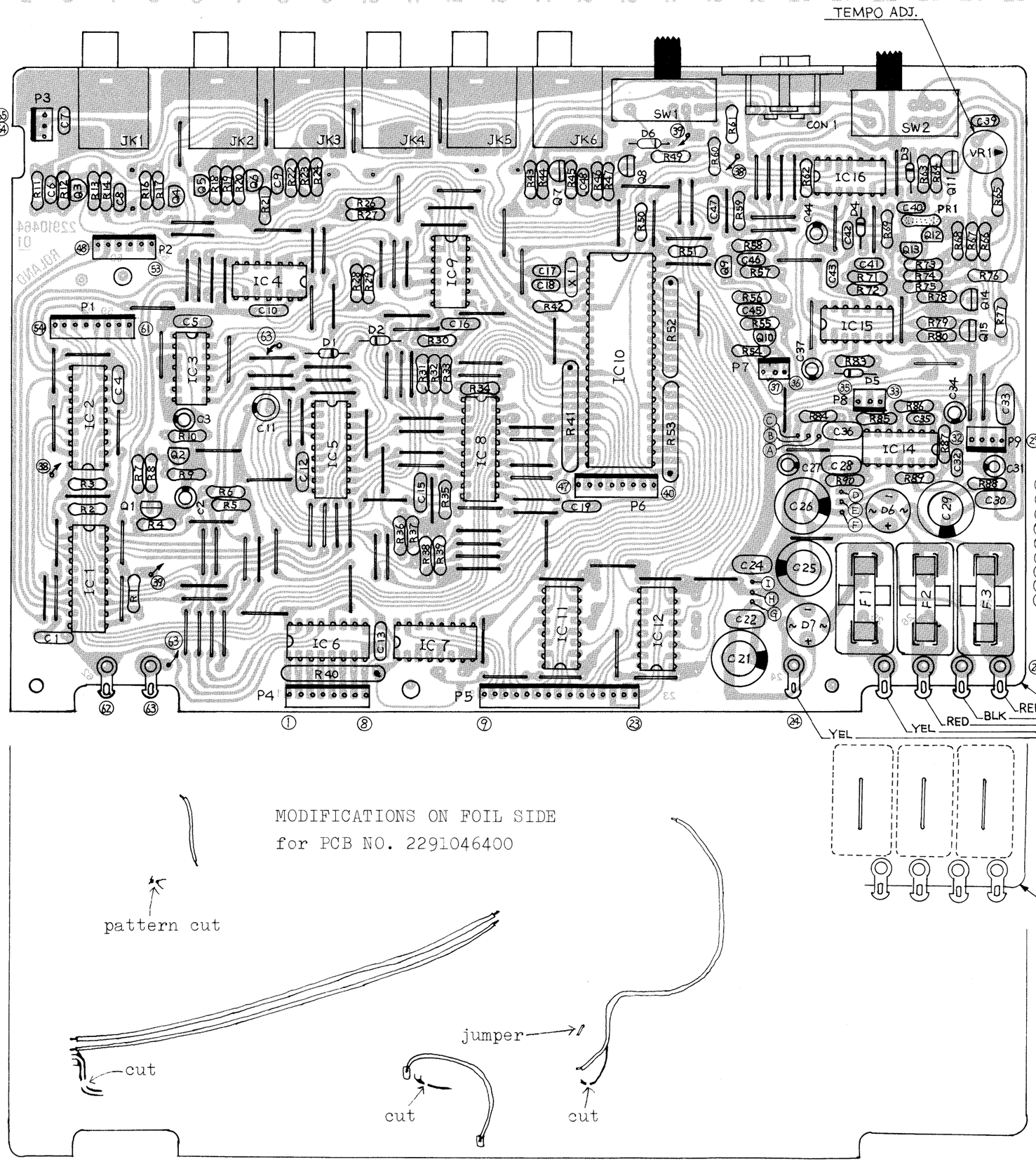
later products 15V p-p w/ slight modifications → 44mS (TEMPO MIN) 12mS (TEMPO MAX)

IC 1,2,8 ; DM74LS273	IC16 ; HD14584BP	Q 1,7,8,11,14,15 ; 2SA733(P)
IC 3,4 ; HD14023BP		Q 2~6,9,10,12,13 ; 2SC945(P)
IC 7,11,12 ; HD14050BP		Q 16 ; 2SB596(O)
IC 9 ; 74LS04P		Q 17 ; 2SD880(Y)
IC 15 ; HD14013BP		

CR-8000 CPU

CR-8000
CPU BOARD

GL3125-060
(731250600)
(pcb 2291046401)



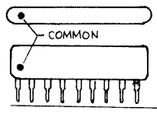
2SC 945 P

2SA 733 P

DS442 or 1S2473 1S1588

Posistor ERS-C33G561

Ceramic Resonator



Resistor Array
R40, R41 R52 R53

0.1μF Ceramic

0.1μF Mylar

CHANGES IN COMPONENTS

Ensure trigger outputs at IC1 when low V_{OH}

LS273 is used.

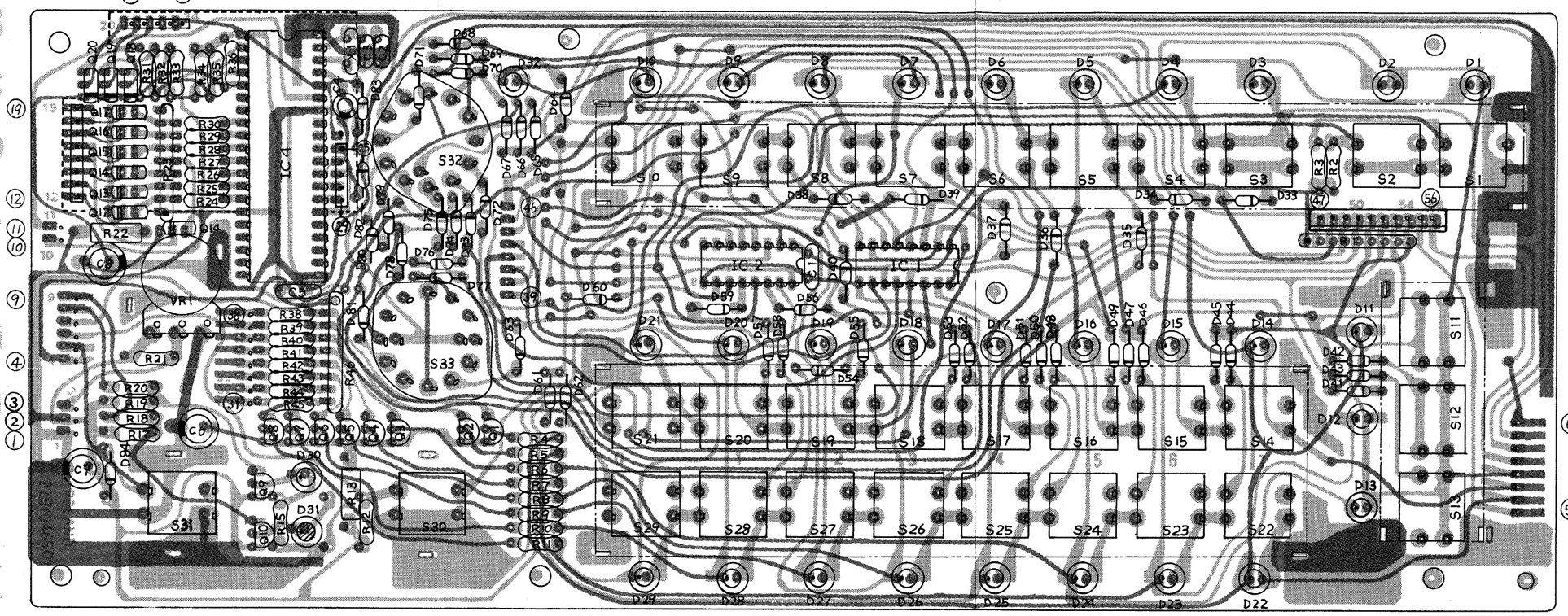
R47	47k to 10k
R48	47k to D6
R1	10k to 27k
R61	10k to 27k
R60	10k to 27k

MODIFICATIONS ON FOIL SIDE
for PCB NO. 2291046400

CONTROL BOARD GL3125-090 (7312509008) (pcb 2291046501)

Serial Number 142650 and higher

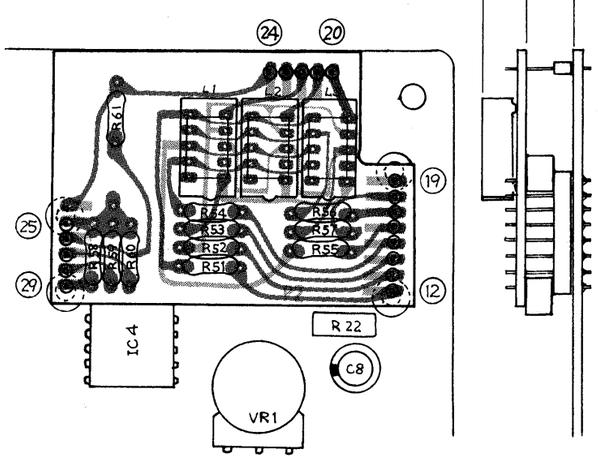
(Viewed from the rear)



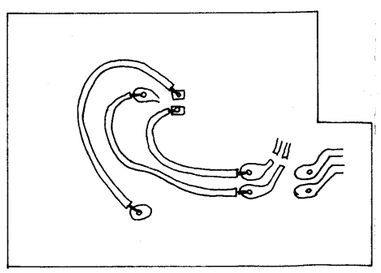
Refoer to p.16 for pcb 2291046500: surface mounting jumper wire.

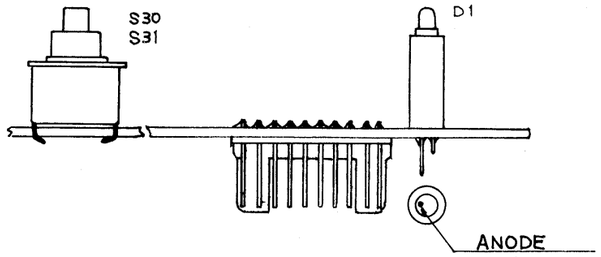
CR-8000

LED BOARD (7312511001) (pcb 2291046600)

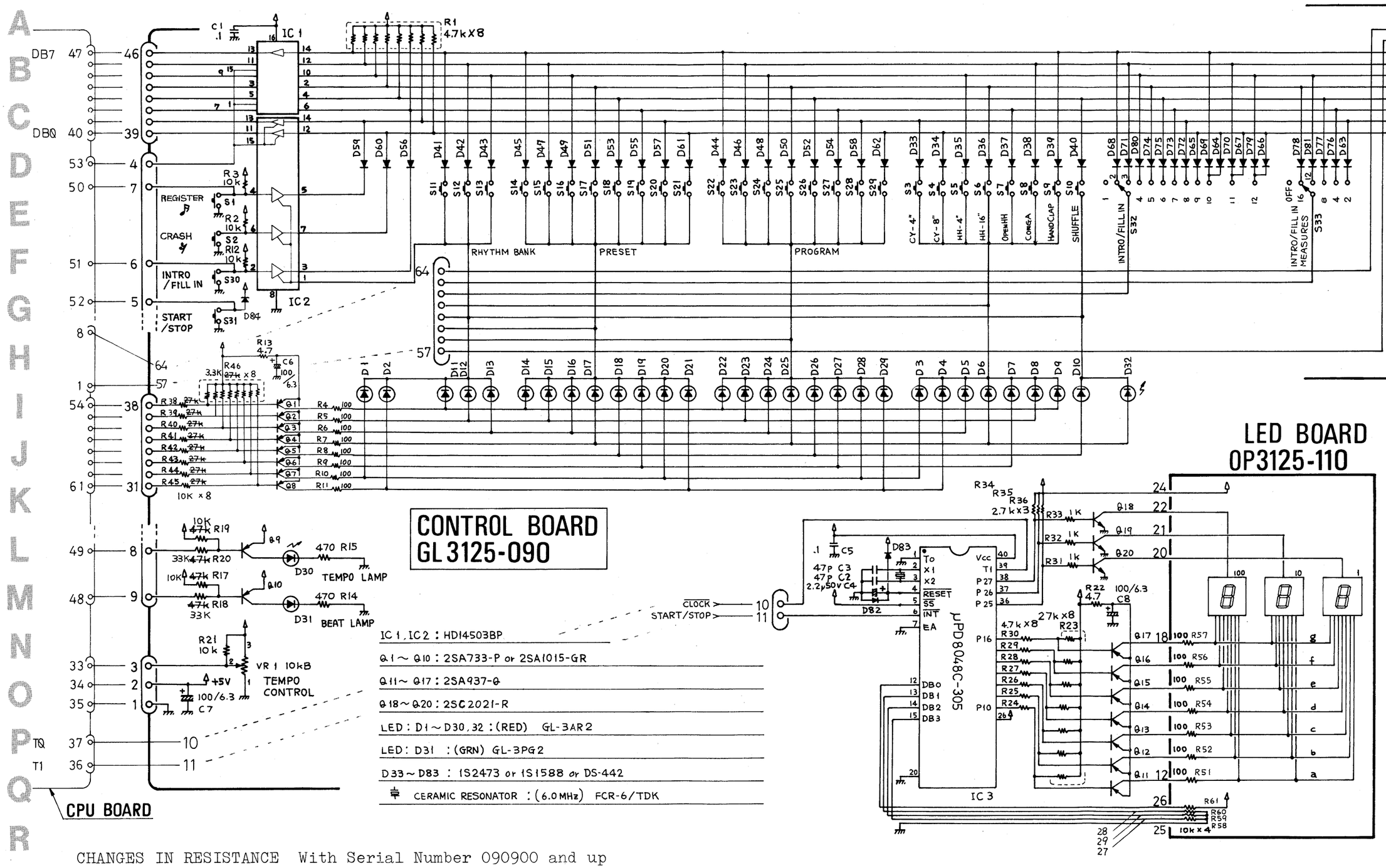


LED BOARD
on early products
pcb 2291046600
↑
without underscore
Pattern cuts, Jumpers





: DS442 or 1S1588, 1S2473	
: 2SA733P or 2SA1015GR	
: 2SA937Q	
: 2SC2021R	
X1 : CERAMIC RESONATOR (6.0MHz)	FCR-6
: LED GL-3PR2 (RED)	
: LED GL-3PG2 (GRN)	



IC 1, IC 2 : HD14503BP

Q 1 ~ Q 10 : 2SA733-P or 2SA1015-GR

Q 11 ~ Q 17 : 2SA937-Q

Q 18 ~ Q 20 : 2SC2021-R

LED : D1 ~ D30, 32 : (RED) GL-3AR2

LED : D31 : (GRN) GL-3PG2

D 33 ~ D 83 : 1S2473 or 1S1588 or DS-442

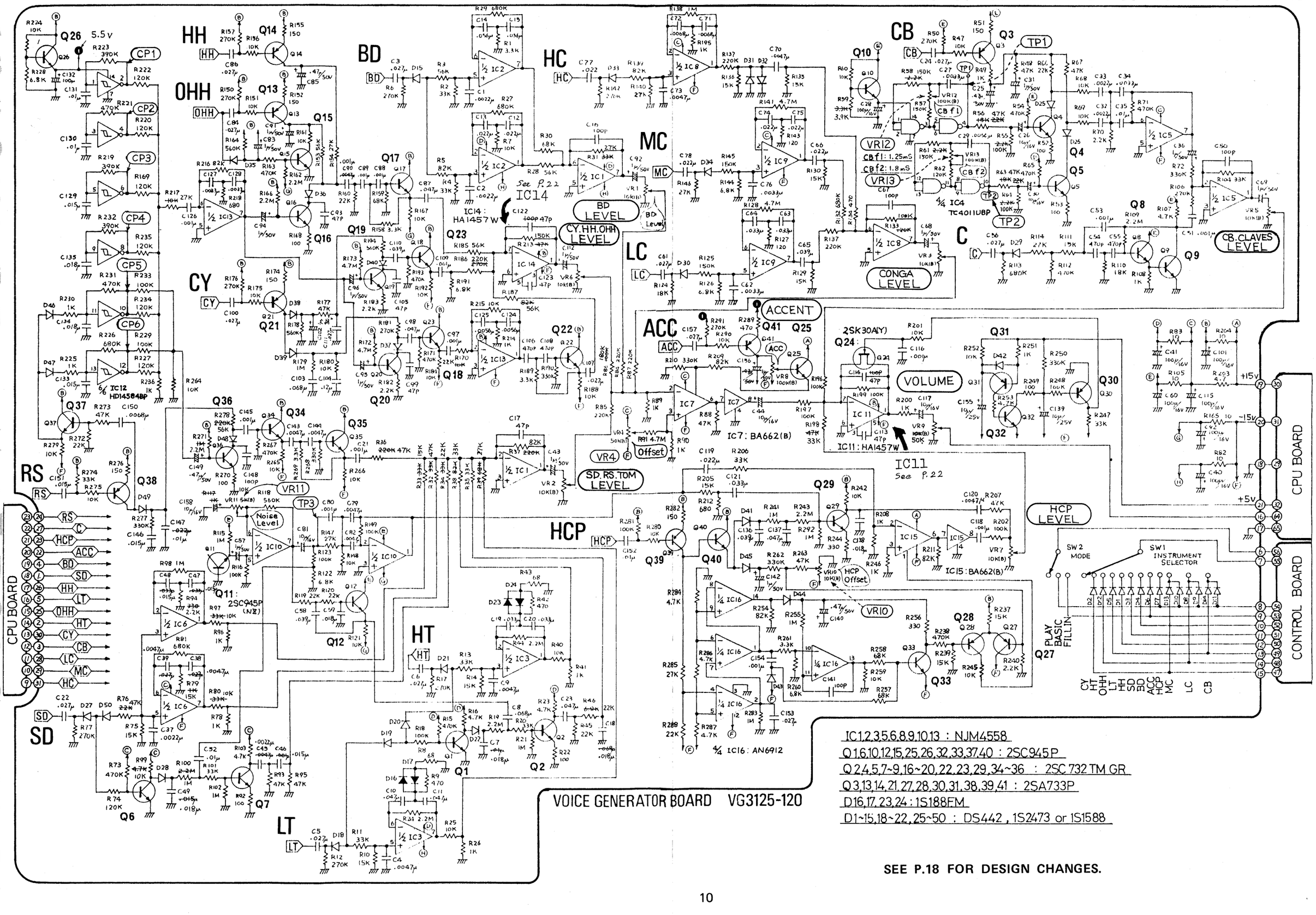
CERAMIC RESONATOR : (6.0 MHz) FCR-6/TDK

CHANGES IN RESISTANCE With Serial Number 090900 and up

The changes eliminates possible dim lighting of LEDs due to insufficient H level output at IC1 or IC2 on CPU board:

R38-R45: 27k to 10k R17, R19: 47k to 10k R18, R20: 47k to 33k
Resistor Array R46: 27k to 3.3k

CR-8000 CONTROL



IC1,2,3,5,6,8,9,10,13 : NJM4558
Q1,6,10,12,15,25,26,32,33,37,40 : 2SC945P
Q2,4,5,7~9,16~20,22,23,29,34~36 : 2SC732TM GR
Q3,13,14,21,27,28,30,31,38,39,41 : 2SA733P
D16,17,23,24 : 1S188FM
D1~15,18~22,25~50 : DS442, 1S2473 or 1S1588

SEE P.18 FOR DESIGN CHANGES.

early PCB: R117 1kΩ
S/N 101300-: C158

VR11 TP-3
NOISE LEVEL

VR12 TP-1
CB FREQ

VR13 TP-2
CB FREQ

View from foil side

- 2SC945-P
- 2SC732TM-GR
- 2SA733-P
- 2SC945-P(NZ)
- 2SK30A-Y
- DS442, 1S2473 or 1S1588
- 1S188FM

BRN ①
GRN ⑤

VR10
HCP OFFSET

ORN ㉑
BLK ⑱ ⑰ ⑯

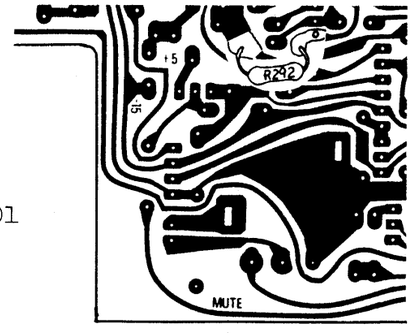
VR9 VR8 VR7 VR6 VR5 VR3 VR2 VR1

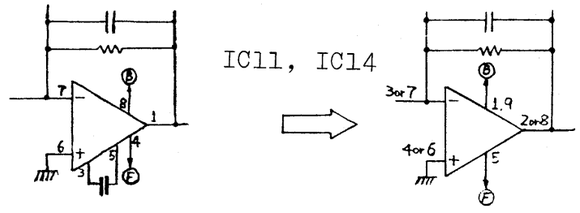
VR4 OFFSET

BLK BRN
⑮ ⑥

CR-8000
VOICING BOARD
VG3125-120
(7312512007)
(pcb 2291046302)

surface
mounting
on PCB
2291046301





HA1457W (8 pins) or NJM4558S (9 pins) (See p. 22 for detail.)

CHANGES IN COMPONENTS

with S/N 090900
VR9 from 10k to 50k
Eliminates whizz sound upon power off.

with S/N 101300
R198(HCP) 47k to 33k

with S/N 111700
R55,56,58,61,63,64 resistances are increased to limit currents into IC4. This modification is mandatory when replacing defective IC4.

ALSO SEE CR-5000 VG BRD LAYOUT FOR OTHER MODIFICATIONS.

ADJUSTMENTS

CPU BOARD

RAM BACK UP BATTERIES (CR-8000 only)
Power switch must be turned OFF.
Connect 100 ohms across pins 18 (Vcc) and 9 (GND) of RAM IC5 or shunt meter (scope or voltmeter) inputs with 100 ohms. Confirm approx. 4V at pin 18.

TEMPO CLOCK

Allow at least 10 minutes for circuit thermal stabilization.

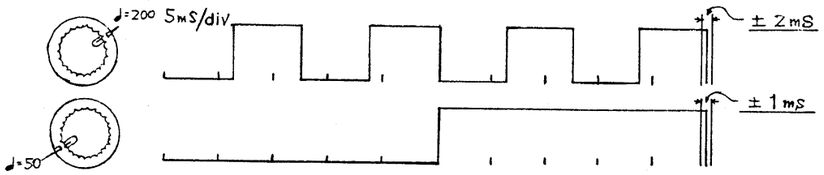
CR-5000

Connect scope to pin 1 of CPU (TP-1). Set scope time base to 5ms/div.
With TEMPO set at 200 adjust VR1 for 12.5ms/cycle (50ms/4 cycles).
Reset TEMPO to 50 and confirm that 1 cycle is 50m±1ms. If exceeds this limit, readjust VR1 for 1ms at the sacrifice of ±2ms error at TEMPO 200.

CR-8000

Turning TEMPO across its travel, confirm TEMPO DISPLAY; factory set ranges from 33±2 to 375±5%. Adjust VR1 as required.

NOTE: $\text{TEMPO} = \dfrac{2500}{\text{period of one tempo clock cycle (ms)}}$



VOICE BOARD

NOISE

Connect scope (1V/div, time base relatively slow) to TP-3.
Adjust VR11 for 2V p-p when measured at rather dense peaks.

CB

Connect scope to TP-1. Adjust VR12 for 1.25ms/cycle.
Connect scope to TP-2. Adjust VR13 for 1.8ms/cycle.

CY

See table right. Probing CP1-CP6 of oscillators IC6, confirm frequency ratios between adjacent two; they should be in 1.1-1.4 steps. Note that two oscillators generating on too close frequency will sound beating cymbal which can be eliminated by tailoring R and C listing on the table.

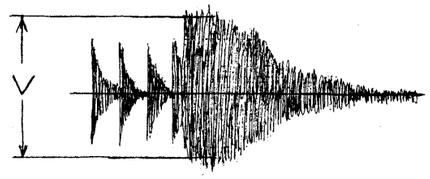
OFFSET

Controls set up - All VOICE LEVELs: FCCW; VOLUME, ACCENT: MAX; RYTHM: DISCO
Start the ryhthm. Monitoring through OUTPUT jack (scope or amp), adjust VR4 for minimum thump.

HCP (CR-8000 only)

Controls set up - HCP VOICE LEVEL: FCW; VOLUME: MAX; ARRANGER: HAND CLAP
Connect scope V IN to OUTPUT jack and H (EXT) to HCP trig terminal 23.
Adjust VR10 for the below:

Serial number up to 101299 1V p-p
Serial number 101300 and up 2V p-p



		CHECK POINT	FREQUENCY (mS)(Hz) MIN	TYP	MAX	AMPLITUDE (V_{P-P}) MIN	TYP	MAX	DECAY TIME (mS) MIN	TYP	MAX	VOICE LEVEL CONTROL AT HOT TERMINAL: AMPLITUDE (V_{P-P}) MIN	TYP	MAX	DECAY TIME (mS) MIN	TYP	MAX	OUTPUT JACK AMPLITUDE (V_{P-P})
BD	H	IC2 PIN1	13.2 (76)	11.4 (88)	9.7 (103)	6.8	7.6	8.4	30	40	50	6.7	8.0	9.6	77	96	115	1.2
	L	IC2 PIN7	20.2 (50)	17.5 (57)	15.0 (67)	11.9	13.2	14.5	90	100	110							
SD	H	IC6 PIN1	3.5 (286)	3.0 (333)	2.5 (400)	4.7	5.6	6.5	8	10	12	10.8	13.0	15.6	58	72	86	1.7
	L	IC6 PIN7	5.1 (196)	4.4 (227)	3.8 (266)	16.8	20.0	23.2	28	34	40							
LT		IC3 PIN7	10.9 (91.7)	9.4 (106)	8.0 (124)	24	27	28				7.0	8.8	10.6	160	200	240	1.3
HT		IC3 PIN1	7.6 (132)	6.6 (152)	5.6 (177)	24	27	28				4.6	6.0	7.4	120	150	180	1.0
LC		IC9 PIN7	5.8 (172)	5.0 (200)	4.3 (234)	24	27	28				6.4	8.0	9.6	136	170	200	1.3
MC		IC9 PIN1	3.9 (256)	3.4 (294)	2.9 (343)	24	27	28				2.2	2.8	3.4	80	100	120	0.4
HC		IC8 PIN1	1.67 (599)	1.45 (690)	1.24 (807)	24	27	28				3.4	4.3	5.1	12	15	18	0.6
CB		TP1,VR12 TP2,VR13		1.25 (800) 1.80 (555)								1.1	1.3	1.6	29	36	43	1.3
C		Q9 COLLECTOR	0.49(2.01K)	0.43(2.33K)	0.37 (2.72K)							1.3	1.6	1.9	11	14	17	1.5
HCP		VR10										0.4	0.6	0.8	72	90	108	2.0

	CHECK POINT	R (KΩ)	C (μF)	FREQUENCY (mS)(Hz) MIN	TYP	MAX	RS	18.4	23	27.6	24	30	36	2.6
RS CY HH OHH	CP 1	R233 390	C131 0.01	1.58 (631)	1.26 (794)		CY	6.3	7.6	9.1	300	380	450	1.2
	CP 2	R221 470	C130 0.01		1.54 (649)		HH	5.8	7.0	8.4	59	74	89	1.1
	CP 3	R219 390	C129 0.015		1.91 (524)		OHH	5.8	7.0	8.4	240	300	360	1.1
	CP 4	R232 390	C135 0.018		2.25 (444)									
	CP 5	R231 470	C134 0.018		2.72 (368)									
	CP 6	R226 680	C133 0.015	4.20 (238)	3.53 (283)									

CR-5000 S/N with 101400 -
CR-8000 S/N with 101300 -

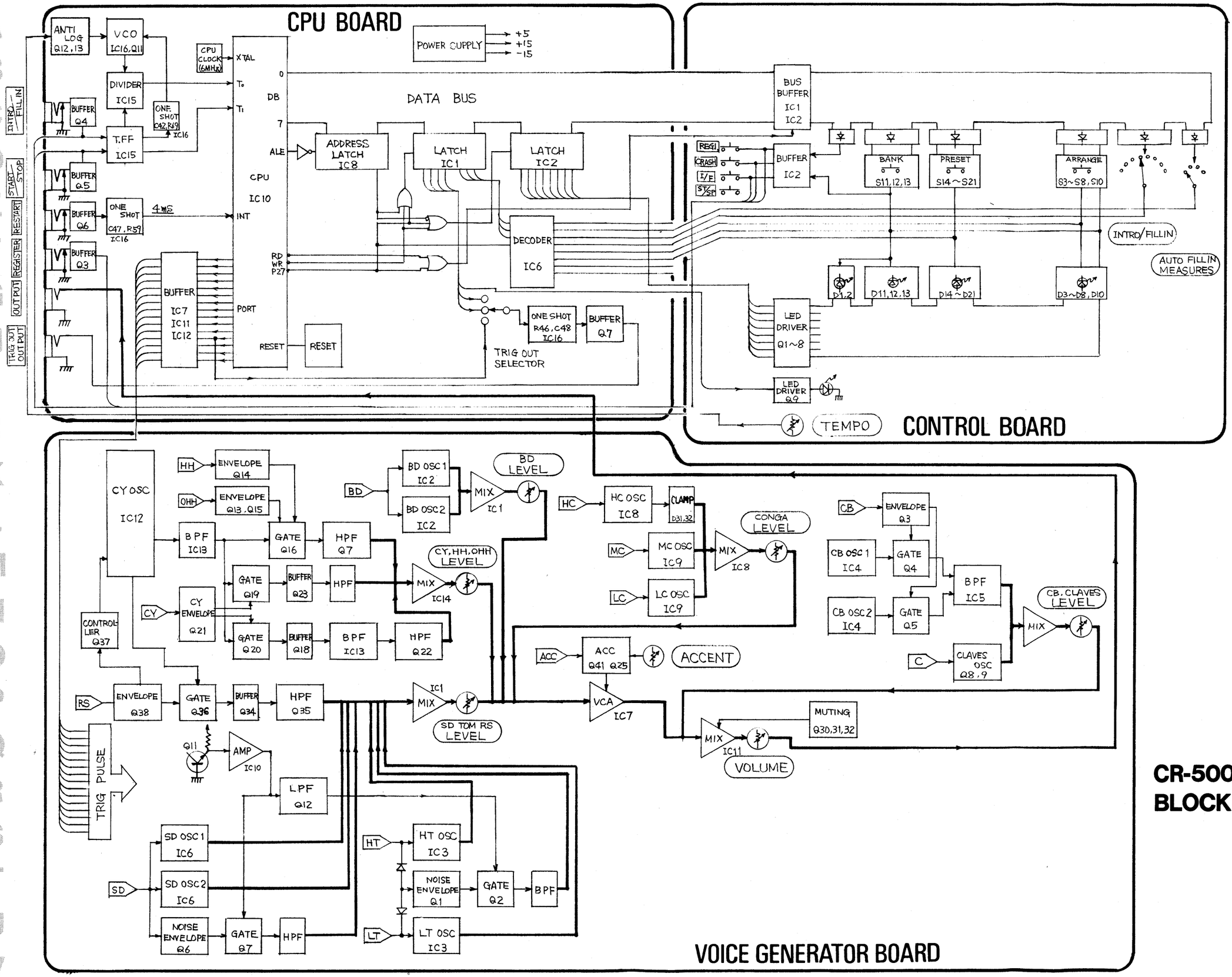
Ref. set up
VOICE LEVEL, VOLUME: MAX
ACCENT : MIN
(@ MAX, add 12dB to each: four times MIN.)

		CHECK POINT	FREQUENCY (mS)(Hz) MIN	TYP	MAX	AMPLITUDE (V_{P-P}) MIN	TYP	MAX	DECAY TIME (mS) MIN	TYP	MAX	VOICE LEVEL CONTROL AT HOT TERMINAL: AMPLITUDE (V_{P-P}) MIN	TYP	MAX	DECAY TIME (mS) MIN	TYP	MAX	OUTPUT JACK AMPLITUDE (V_{P-P})
BD	H	IC2 PIN1	13.2 (76)	11.4 (88)	9.7 (103)	6.8	7.6	8.4	30	40	50	7.2	9.0	10.8	77	96	115	1.5
	L	IC2 PIN7	20.2 (50)	17.5 (57)	15.0 (67)	11.9	13.2	14.5	90	100	110							
SD	H	IC6 PIN1	4.4 (227)	3.8 (263)	3.2 (308)	24	27	28	54	64	74	9.6	12.0	14.4	58	72	86	1.7
	L	IC6 PIN7	5.1 (196)	4.4 (227)	3.8 (266)				30	40	50							
LT		IC3 PIN7	10.9 (91.7)	9.4 (106)	8.0 (124)							7.2	9.0	10.8	160	200	240	1.5
HT		IC3 PIN1	7.6 (132)	6.6 (152)	5.6 (177)							5.6	7.0	8.4	120	150	180	1.0
LC		IC9 PIN7	5.8 (172)	5.0 (200)	4.3 (234)							6.4	8.0	9.6	136	170	200	1.3
MC		IC9 PIN1	3.9 (256)	3.4 (294)	2.9 (343)							2.4	3.0	3.6	80	100	120	0.5
HC		IC8 PIN1	1.67 (599)	1.45 (690)	1.24 (807)							3.4	4.3	5.1	12	15	18	0.6
CB		TP1,VR12 TP2,VR13		1.25 (800) 1.80 (555)								1.1	1.3	1.6	29	36	43	1.3
C		Q9 COLLECTOR	0.49(2.01K)	0.43(2.33K)	0.37 (2.72K)							1.3	1.6	1.9	11	14	17	1.5
HCP		VR10										0.4	0.6	0.8	72	90	108	1.0

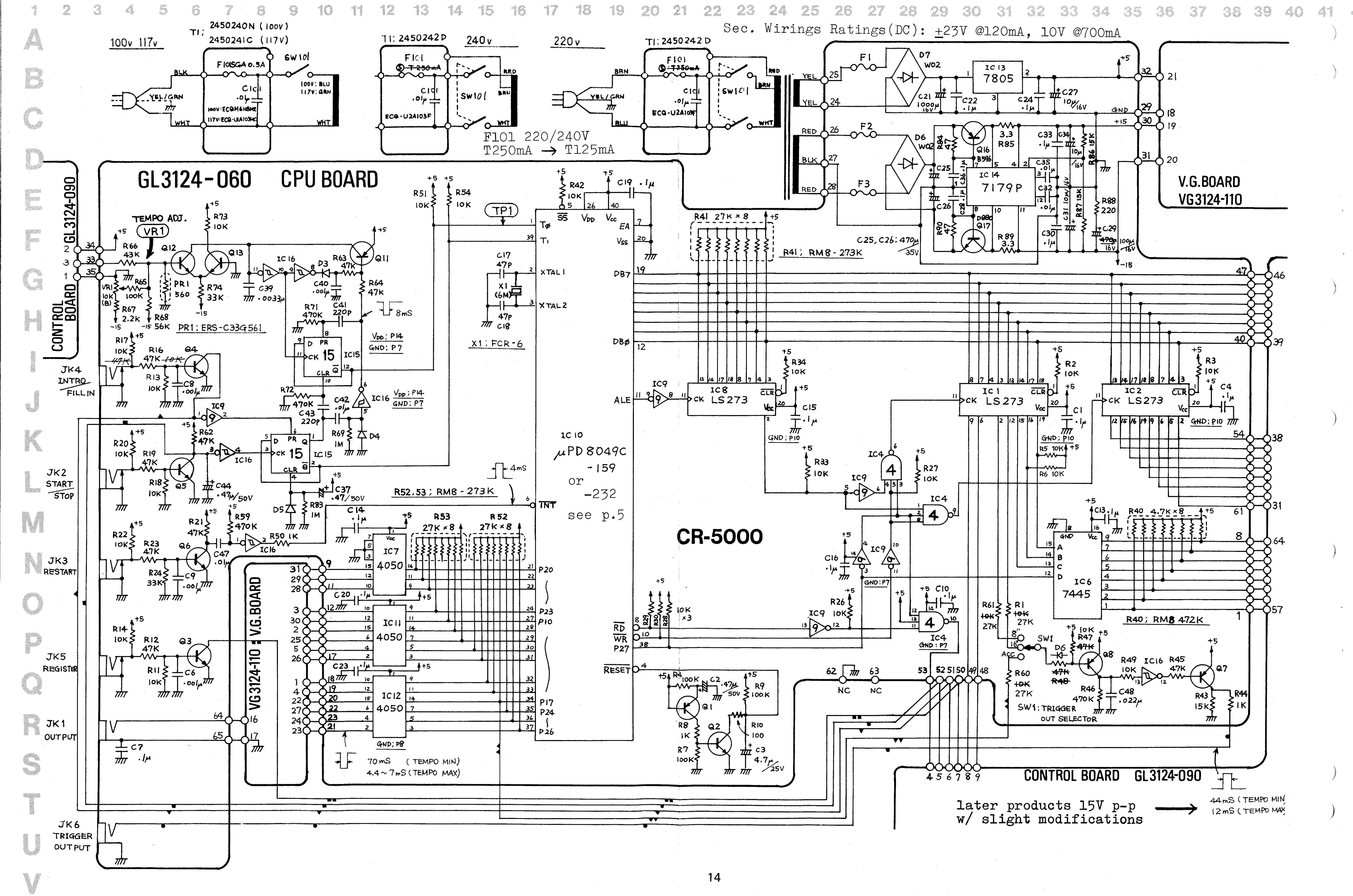
CR-5000 S/N up to 101399
CR-8000 S/N up to 101299

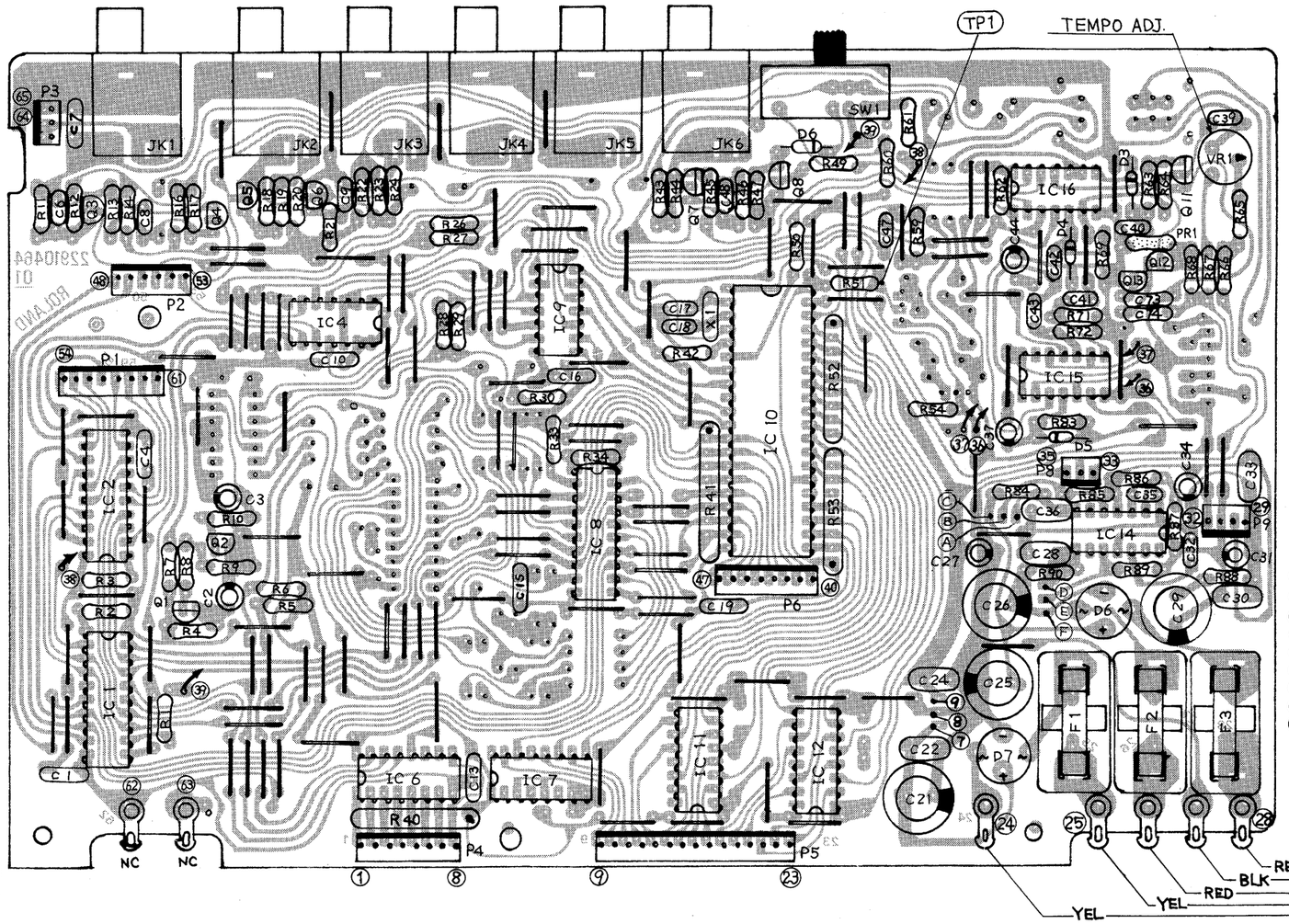
See table above for RS, CY, HH and OHH frequencies.

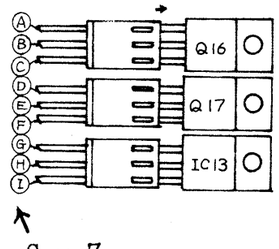
RS	10	13	16	24	30	36	1.5
CY	2.5	3.5	4.5	300	380	450	1.0
HH	3.0	4.0	5.0	59	74	89	1.0
OHH	3.0	4.0	5.0	240	300	360	1.0



CR-5000 BLOCK DIAGRAM


Sec. Wirings Ratings(DC): ±23V @120mA, 10V @700mA
100v 117v
T1: 2450240N (100v)
2450241C (117v)
T1: 2450242D
240v
220v
T1: 2450242D
F101 220/240V
T250mA → T125mA
GL3124-060 CPU BOARD
GL3124-090
CONTROL BOARD
TEMPO ADJ.
VR1
PR1: ERS-C33G561
JK4 INTRO FILL IN
JK2 START STOP
JK3 RESTART
JK5 REGISTER
JK1 OUTPUT
JK6 TRIGGER OUTPUT
TP1
X1: FCR-6
IC10
μPD8049C
-159
or
-232
see p.5
CR-5000
R52.53; RM8-273K
R41; RM8-273K
R40; RM8 472K
IC13 7805
IC14 7179P
V.G.BOARD
VG3124-110
VG3124-110 V.G.BOARD
IC7 4050
IC11 4050
IC12 4050
IC8 LS273
IC1 LS273
IC2 LS273
IC6 7445
SW1: TRIGGER OUT SELECTOR
CONTROL BOARD GL3124-090
70mS (TEMPO MIN)
4.4~7mS (TEMPO MAX)
later products 15V p-p
w/ slight modifications
44mS (TEMPO MIN)
12mS (TEMPO MAX)





2SC 945 P

2SA 733 P

DS442 or 1S2473 1S1588

Posistor ERS-C33G561

Ceramic Resonator

Resistor Array
R40, R41, R52, R53

0.1μF Ceramic

0.1μF Mylar

CR-5000
CPU BOARD
GL-3124-060
(7312406008)
(pcb 2291046401)

CHANGES IN COMPONENTS

Ensure trigger outputs at IC1 when low V_{OH}

LS273 is used.

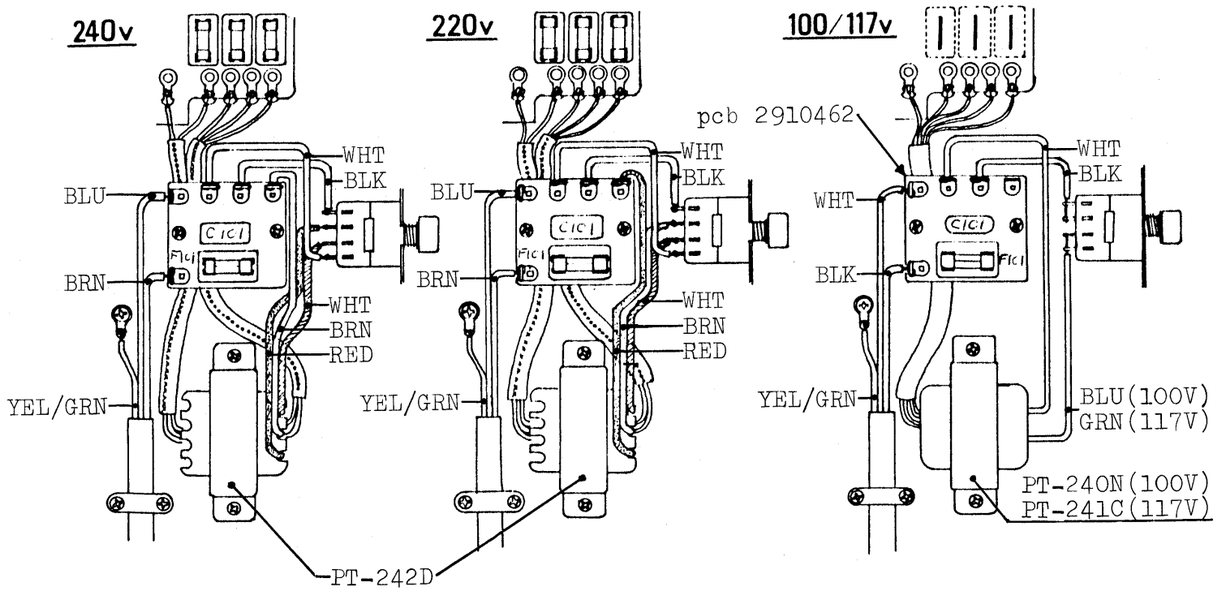
R47 47k to 10k
R48 47k to D6
R1 10k to 27k
R61 10k to 27k
R60 10k to 27k

Prevents possible oscillation at final amp upon power off.

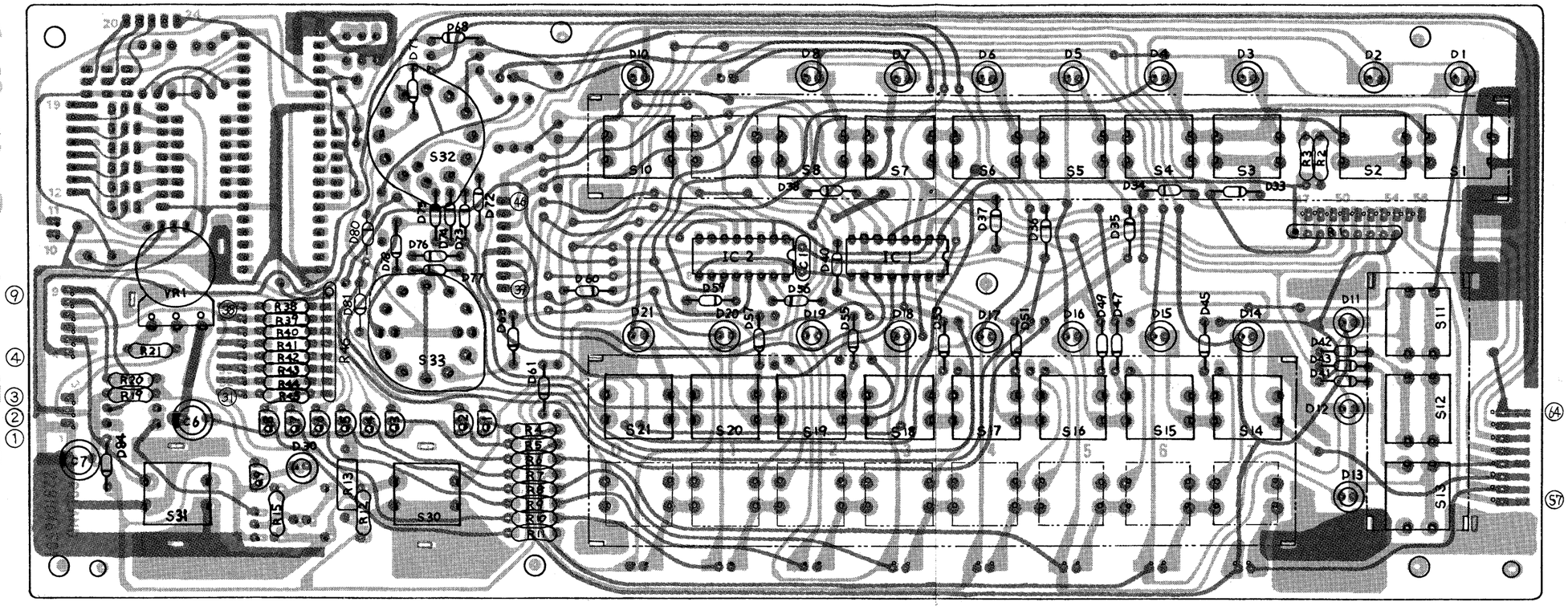
C29: 470uF to 100uF

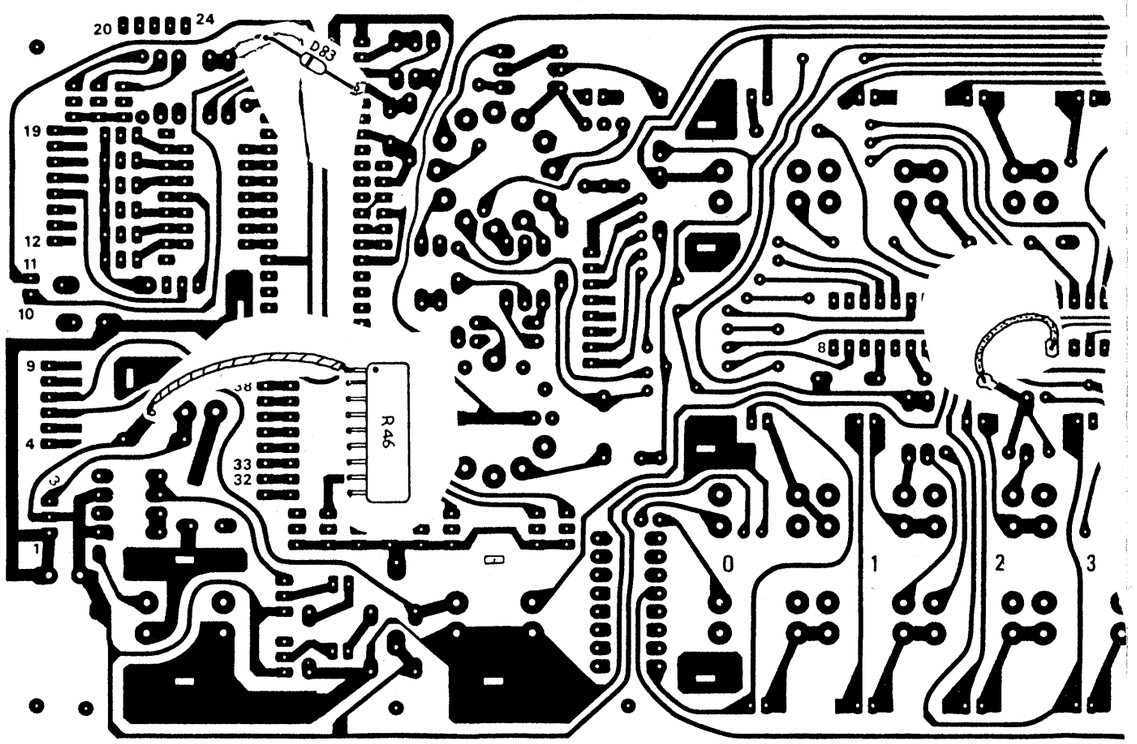
SOME MODIFICATIONS
FOR PCB 2291046400
AT FOIL SIDE
SEE CR-8000 LAYOUT

	F1	F2	F3
100V	jumper	jumper	jumper
117V	jumper	jumper	jumper
220V, 240V	CEE T1A	CEE T400mA	CEE T400mA
240V 3P	CEE T1A	CEE T400mA	CEE T400mA



IC1,2,8 ; DM74LS273	IC9 ; HD74LS04P	Q1,7,8,11 ; 2SA733(P)
IC4 ; HD14023BP	D3~5 ; DS442 or 1S2473 1S1588	Q2~6,12,13 ; 2SC945(P)
IC6 ; HD7445	IC13 ; μA7805UC	Q16 ; 2SB596(O)
IC7,11,12 ; HD14050BP	IC14 ; TA7179P	Q17 ; 2SD880(Y)
IC15 ; HD14013BP	IC16 ; HD14584BP	





CR-5000
CONTROL BOARD
GL3124-090
(7312409010)
(pcb 2291046501)

with serial number 152650

(Viewed from the rear)

: DS442 or 1S1588, 1S2473

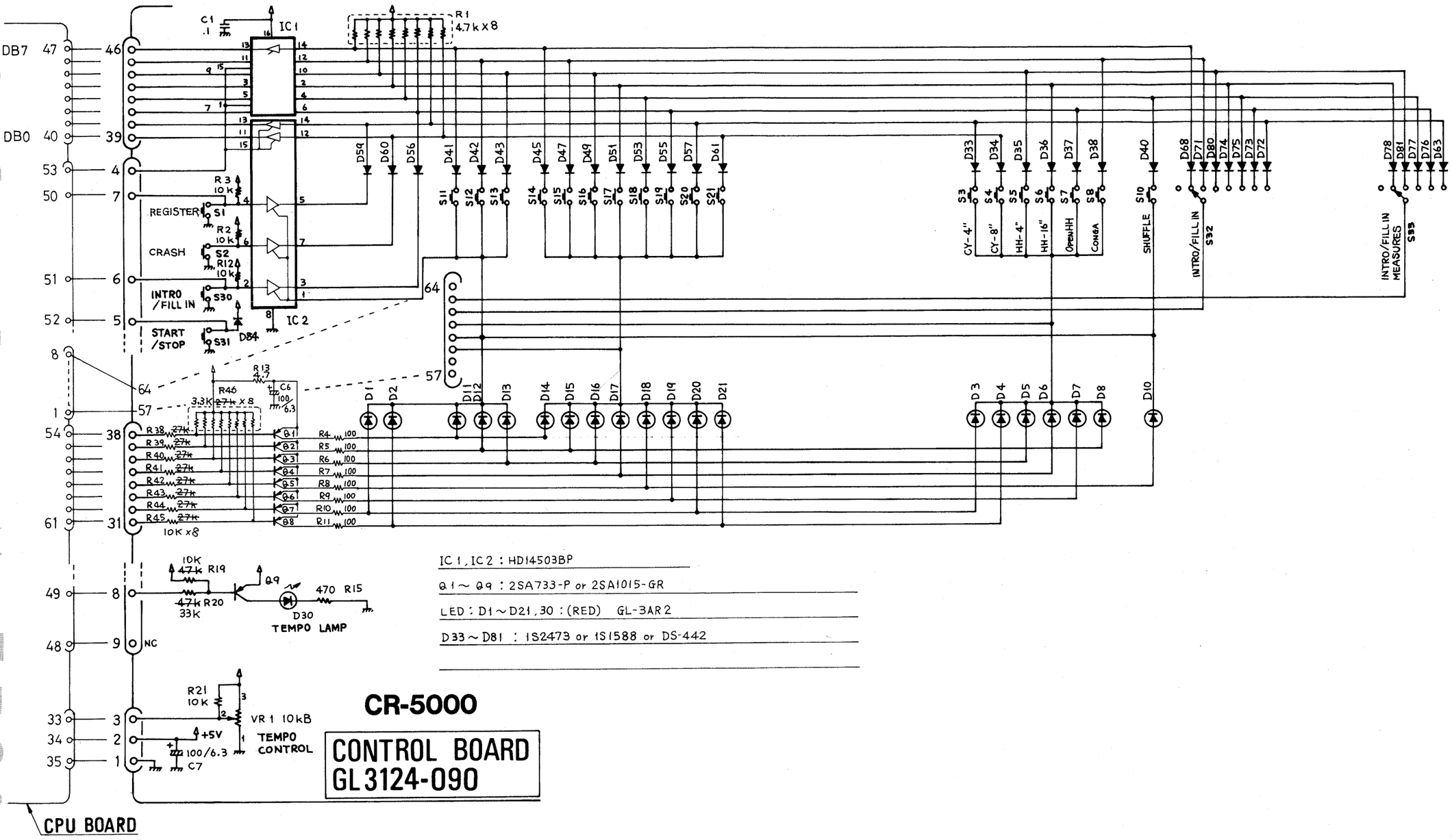
: 2SA733P or 2SA1015-GR

: LED GL-3PR2 (RED)

(pcb 2291046500)

surface mounting

D83 - CR-8000 only



IC 1, IC 2 : HD14503BP

Q 1 ~ Q 9 : 2SA733-P or 2SA1015-GR

LED : D1 ~ D21, 30 : (RED) GL-3AR2

D33 ~ D81 : 1S2473 or 1S1588 or DS-442

CR-5000

CONTROL BOARD GL3124-090

CHANGES IN RESISTANCE With Serial Number 091100 and up

The changes eliminates possible dim lighting of LEDs due to insufficient H level output at IC1 or IC2 on CPU board:

R38-R45: 27k to 10k R19: 47k to 10k R20: 47k to 33k
Resistor Array R46: 27k to 3.3k

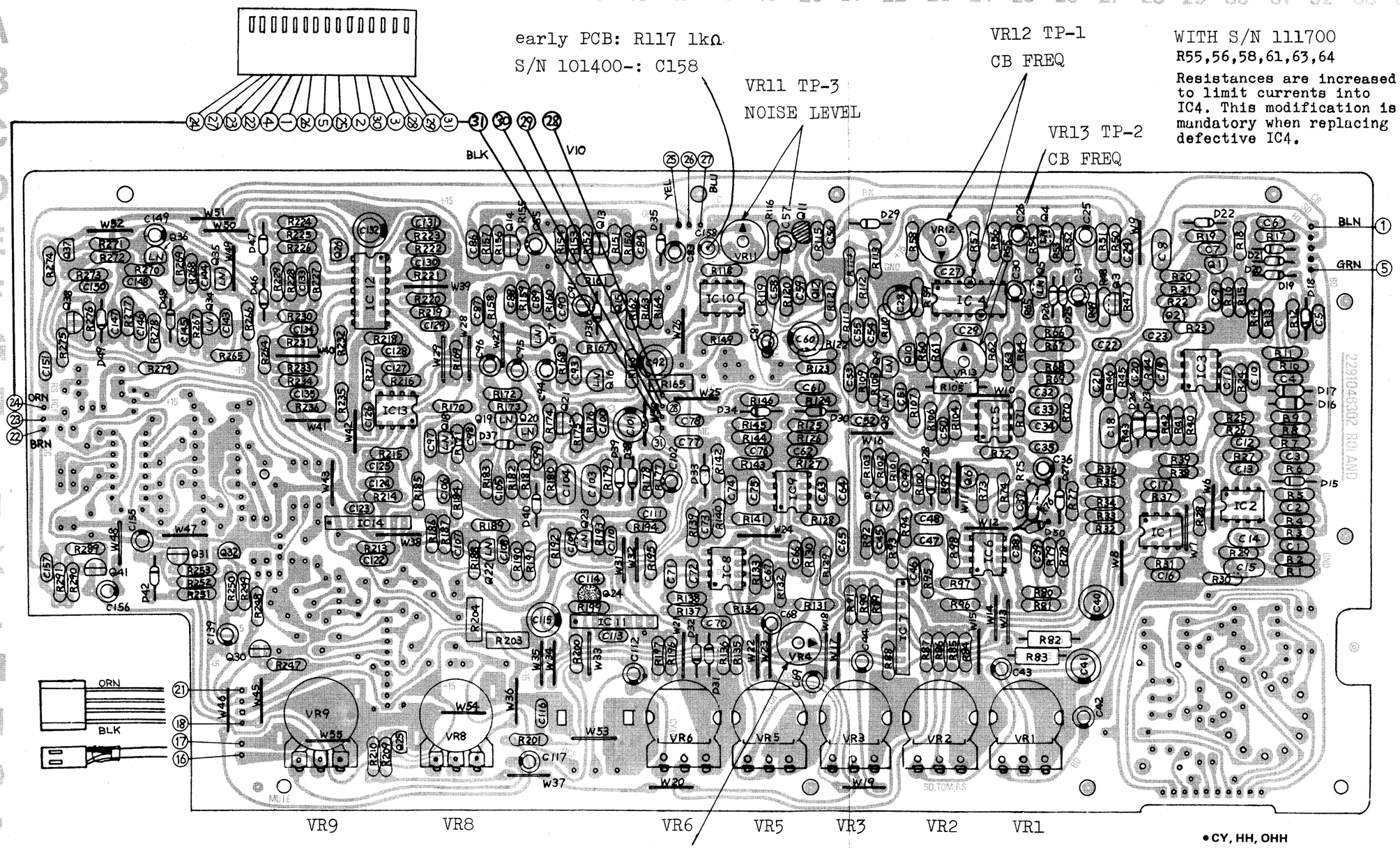
early PCB: R117 1kΩ.
S/N 101400-: C158

VR11 TP-3
NOISE LEVEL

VR12 TP-1
CB FREQ

VR13 TP-2
CB FREQ

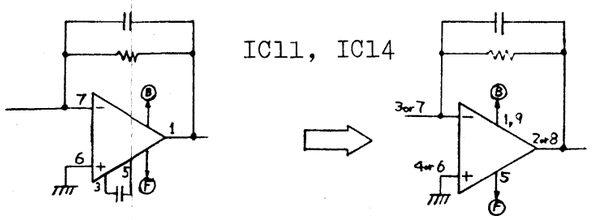
WITH S/N 111700
R55,56,58,61,63,64
Resistances are increased to limit currents into IC4. This modification is mandatory when replacing defective IC4.



2SC945-P
2SC732TM-GR
2SA733-P
2SC945-P(NZ)
2SK30A-Y
DS442, 1S2473 or 1S1588
1S188FM

VR9
with S/N 091100
From 10k to 50k

IC11, IC14



HA1457W(8-pin) or NJM4558S (9-pin)
See p. 22 for detail.

CR-5000
VOICING BOARD
VG3124-110 (7312411009)
(pcb 2291046302)

View from foil side

CHANGES IN COMPONENT WITH SERIAL NUMBERS:

CR-5000 101400
CR-8000 101300

• SD

R94	330	→	2.2k
R97	33k	→	10k
R79	1k	→	15k
R80	33k	→	10k
R76	22k	→	47k
R99	4.7k	→	10k
R33	33k	→	15k
R32	33k	→	47k
R34	33k	→	22k
R100	2.2M	→	1M
C48, 47	.033μF	→	.015μF
C39, C38	.027μF	→	.0047μF
C49	.015μF	→	.018μF
C45	.0047μF	→	.0022μF
C46	.001μF	→	.015μF

• NOISE

VR11	5k(B)	→	10k(B)
R117	1k	→	open
C158	0	→	10μF/16

• TOM TOM

R46	6.8k	→	22k
R38	82k	→	33k
R39	68k	→	27k
R37	220k	→	82k
C18	.068μF	→	.018μF
C7	.01μF	→	.018μF

• CONGA

R133	120k	→	100k

• CB

R59	3.3k	→	3.9k
R56	18k	→	22k
R63	18k	→	22k

• OUTPUT

C114	100pF	→	47pF

• ACC

C156	0.47μF	→	1μF

• CY, HH, OHH

R217	10k	→	27k
R170	10k	→	22k
R187	82k	→	56k
R186	270k	→	220k
R213	47k	→	150k
R86	100k	→	180k
C90	.0047μF	→	.001μF
C122	100pF	→	47pF

• RS

R271	1M	→	2.2M
R278	220k	→	56k
R36	220k	→	47k
C147	.002μF	→	.01μF

• BD

R31	33k	→	27k

R55,56,58,61,63,64
Resistances are increased to limit currents into IC4.
This modification is mandatory when replacing defective IC4.

CR-5000
VOICE GENERATOR BOARD
VG 3124-110

IC7 : BA662(B)

IC11

Q24 : 2SK30A(Y)

Q11 : 2SC945 P(NB)

NOISE GENERATOR

LEFT

When ½IC10 bias current is high, it heavily DC biases output waveform, narrowing headroom. (Flatened one peak at relarively small input signal.)

RIGHT

Decoupling capacitor makes DC gain of the IC unity.

IC1,2,3,5,6,8,9,10,13 : NJM4558DP
IC11,14 : HA1457W or NJM4558S
Q1,6,10,12,15,25,26,32,37 : 2SC945P
Q24,5,7,8,9,16~20,22,23,34~36 : 2SC732TM GR
Q3,13,14,21,30,31,38,41 : 2SA733P
D16,17,23,24 : 1S188FM
D15,18~22,25~40,42,46~50 : DS442, 1S2473 or 1S1588

PARTS LIST

* CR-8000 ** CR-5000

2201061100	Case N-611
*2281028102	Chassis(bottom plate) N-281
*22020159	Battery cover
*12199525	Battery holder
*2219024802	Holder
*2226031000	Cushion
**2281027302	Chassis(bottom plate) N-273
2235010100	Rubber foot
2281027201	Chassis N-272 power trans.
*2221027100	Panel(upper) N-271
**2221025900	Panel(upper) N-259
*2221027200	Panel(lower) N-272
**2221026000	Panel(lower) N-260
*2222030200	Escutcheon(LED window)N-302

KNOB. BUTTON

2247012800	Knob N-128 rotary small
2247016500	Knob N-165 rotary large
2247050900	Button N-509 wht p.sw.
2247051600	Button N-516
2247051700	Button N-517
2247051800	Button N-518
2247051900	Button N-519
2247052000	Button N-520
2247052100	Button N-521
2247052200	Button N-522
2247052300	Button N-523

POWER TRANSFORMER

22450240N1	PT-N-240N	100V
22450241C1	PT-N-241C	117V
22450242D0	PT-N-242D	220/240V

POTENTIOMETER

13219229	EVHRRA361B14 TEMPO, VOLUME on early units
13219312	EVHLWAD25B14 Voice level
13219238	EVHRRA361B15 ACCENT
13219245	EVHRRA361B54 VOLUME not on eary products
13299106	EVTR4AA00B53 5kB trim
13299101	EVTR4AA00B14 10kB trim
13299107	EVTR4AA00B54 50kB trim
13299102	EVTR4AA00B15 100kB trim

SWITCH

13129117	SDK1P power 100V
13129118	SDK1P w/CSA UL 117V
13129110	ESB-70294 220/240V
13159316	HSW-0372-01-030 slide TRIG OUT select. SYNC IN/OUT
13129714	KEH10903 RHYTHM SELECT
13119508	SRM1026K15 FILL IN MEASURE
*13119806	SRM101CY15 FILIN SELT.INSTMNT
*13159304	SSB02335 PROGRAM MODE
**13119704	SRM1018K15 FILL IN SELECT

PCB

*7312506009	CPU (pcb 2291046401)
**7312406008	CPU (pcb 2291046401)
*7312509008	CONTROL (pcb 2291046500)
**7312409010	CONTROL (pcb 2291046500)
*7312512007	VOICING (pcb 2291046302)
**7312411009	VOICING (pcb 2291046302)
*7312511001	LED (pcb 2291046600)
2291046200	FUSE

JACK. SOCKET

13449106	SG7622#8
*13429607	DIN socket TCS0707-01-010

FUSE

12559104	SGA 0.500	100/117V
12559505	CEE T125mA(s)	220/240V
12559510	T400mA CEE(s) ±15V	220/240V
12559513	CEE T1A(s) +5V	220/240V
12199519	Fuse clip TF-758	

RESISTOR ARRAY

13910107	RM8-332K	3.3K x 8
13910101	RM8-472K	4.7K x 8
13910102	RM8-273K	27K x 8

SEMICONDUCTORS

IC

1517911700	μPD8049C-159	CPU
or		(See Page 5 for difference.)
1517913000	μPD8049C-323	
*15179118	μPD8048C-305	CPU display
15159105H0	HD14013BP	
15159126H0	HD14023BP	
15159128H0	HD14050BP	
15159303H0	HD14584BP	
15169304H0	HD74LS04P	
15169325C0	DM74LS273N	octal D FF
15169115H0	HD7445	BCD-TO-DECIMAL DEC
*15179305	μPD444C	RAM
15199110T0	TA7179P	±15V regulator1519
15199106F0	μA7805UC	+5V regulator
15159306HC	HD14503BP	
15159103T0	TC4011UBP	
15189103	NJM4558DP	
*15189113	AN6912	
15189502	HA1457W	(pin incompatible, see p. 22)
or		
15189135	NJM4558S	
15229803	BA662B	VCA

TRANSISTOR

15119105	2SA733P
15129108	2SC945-P
15129108A	2SC945-P(NZ) noise
15129104	2SC732TM-GR
*15119121	2SA937-Q
*15129121	2SC2021-R
15139101	2SK30ATM-Y
15119806	2SB596-0 or Y
15129816	2SD880-0 or Y

LED

15029109	GL-3AR2 red
*15029112	GL-3PG2 green BEAT
*15029125	TLR312 DISPLAY

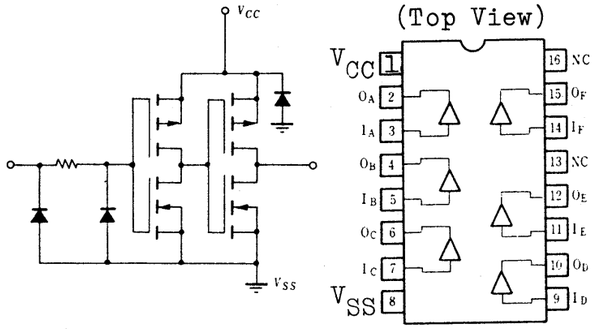
Diode

15019107	DS442 or 1S1588 or 1S2473
15019122	1S188FM
15019236	W02 bridge rectifier

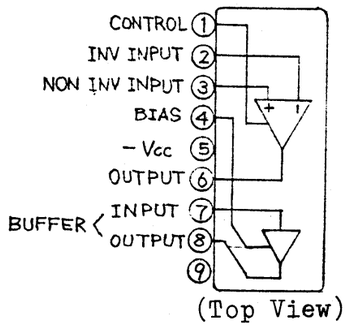
12389708	FCR-6 (6.0MHz) ceramic resonator
15229909	ERS-C33G561 560 ohm posistor

HD14050B

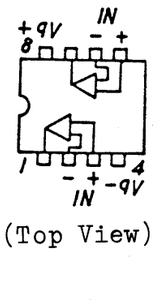
Hex Buffers



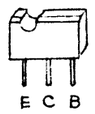
BA662



μPC4558C



2SA937
2SC2021



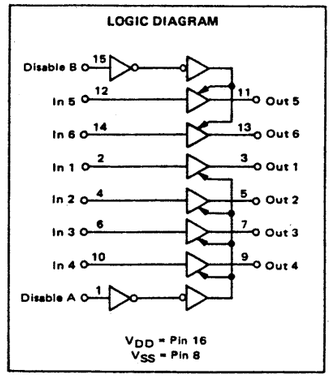
MC14503B

HEX NON-INVERTING 3-STATE BUFFER

TRUTH TABLE

In_n	Appropriate Disable Input	Out_n
0	0	0
1	0	1
X	1	High Impedance

X = Don't Care



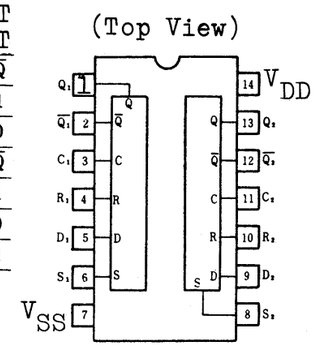
MAXIMUM RATINGS (Voltages referenced to V_{SS}, Pin 8)

Rating	Symbol	Value	Unit
DC Supply Voltage	V_{DD}	–0.5 to +18	Vdc
Input Voltage, All Inputs	V_{in}	–0.5 to V_{DD} + 0.5	Vdc
DC Current Drain per Input Pin	I	10	mAdc
DC Current Drain per Output Pin	I	25	mAdc
Operating Temperature Range – AL Device	T_A	–55 to +125	°C
CL/CP Device		–40 to +85	
Storage Temperature Range	T_{stg}	–65 to +150	°C

HD14013B

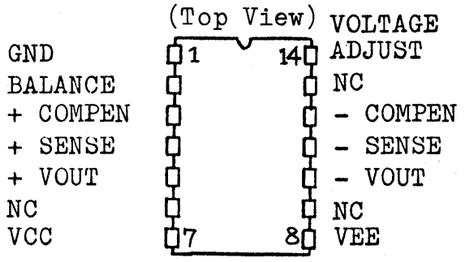
Dual Type D Flip Flop

INPUT				OUTPUT	
Clock*	Data	Reset	Set	Q	$\overline{Q}$
↑	0	0	0	0	1
↑	1	0	0	1	0
↓	×	0	0	Q	$\overline{Q}$
×	×	1	0	0	1
×	×	0	1	1	0
×	×	1	1	1	1



TA7179P

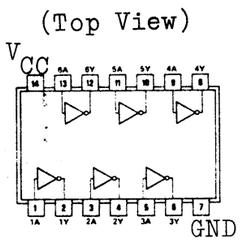
DUAL ±15V TRACKING RAGULATOR



Reg.IN = 5mV(typ)(VIN=18-30V)
Reg.OUT= 5mV(typ)(IOUT=0-50mA)
Ripple rejection ratio = 75dB
Output current = 100mA (max)

74LS04

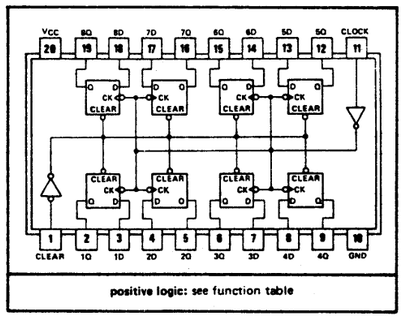
HEX INVERTER



N74LS273

OCTAL D-TYPE FLIP-FLOP WITH CLEAR

(Top View)



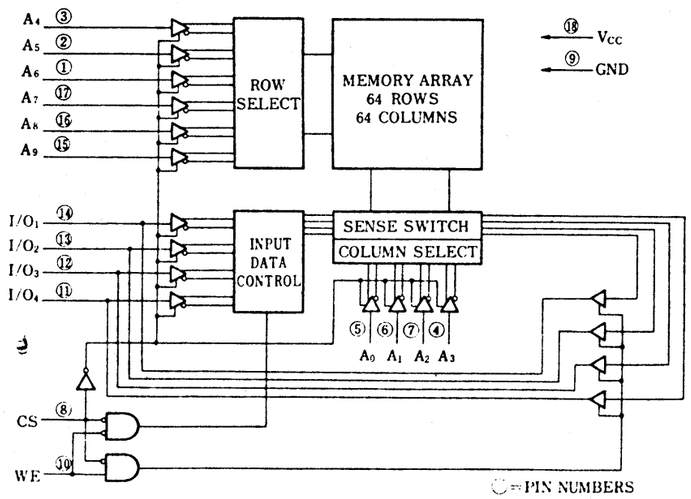
FUNCTION TABLE
(EACH FLIP-FLOP)

INPUTS			OUTPUT
CLEAR	CLOCK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q_0

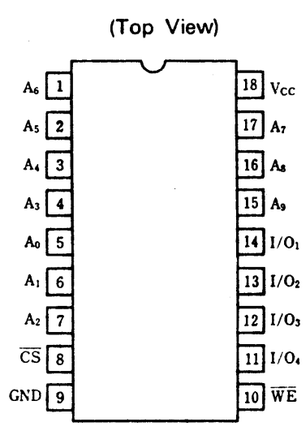
HM4334P-4

μPD444C

4096 BIT STATIC CMOS RAM



(Top View)

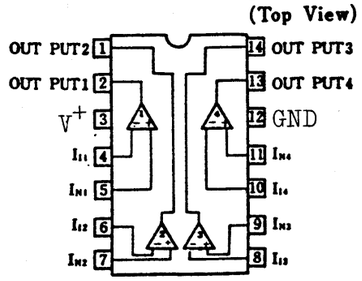


μPC177C, AN6912

Quad Comparator

Connection Diagram

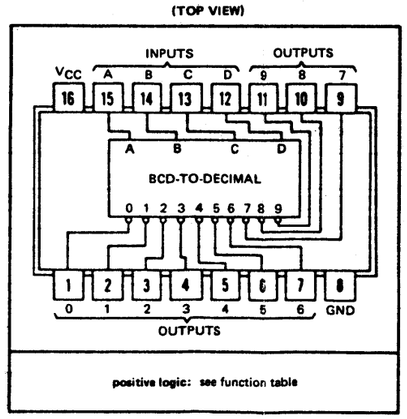
(Top View)



N7445

BCD-TO-DECIMAL DECODERS/DRIVERS

(TOP VIEW)

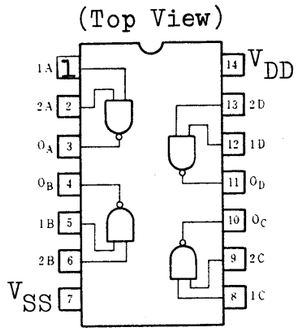


FUNCTION TABLE

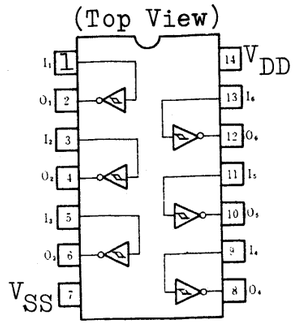
NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = high level (off), L = low level (on)

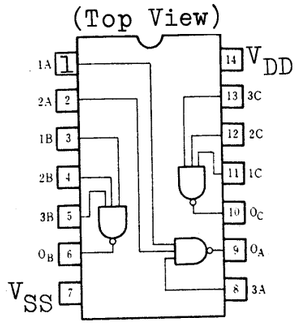
HD14011B
Quadruple 2-input NAND Gate



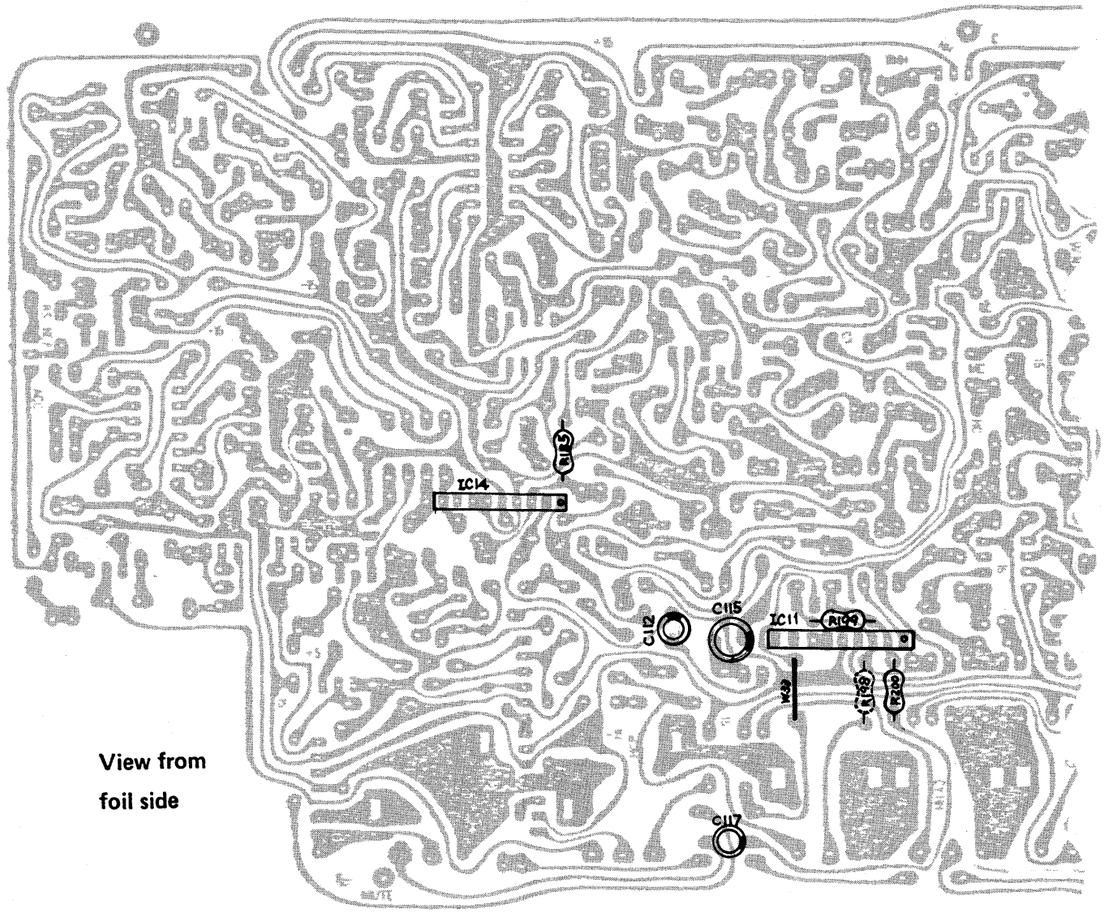
HD14584B
Hex Schmitt Trigger



HD14023B
Triple 3-input NAND Gate



VOICING BOARD CHANGES



View from foil side

CHANGING OPERATIONAL AMPLIFIERS

On CR-5000/8000 VG Boards as well as in other Roland products, the IC NJM4558S replaces HA1457W which is discontinued at the semiconductor manufacturer.

Incompatible pin arrangement leads to minor PCB re-layout as shown below, which is due to put into practical production.

Serial Numbers with which the change is effective on the CR-5000/8000 are not fixed as of the date this edition is closed.

NOTE: Although two OP AMPs are contained in new IC, one is left redundant in this application.