TB-303 | SERVICE NOTES

First Edition

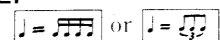## SPECIFICATIONS ERRATA & SUPPLEMENT is attached at the end of the page.

PATTERN MEMORY CAPACITY
64: 8 (PATTERN) x 2 (PATT. SECTION) x 4 (PATT. GROUP I, II, III, IV)
Contents: Pitch, Value, Accent, Slide

MINIMUM STEP

STEPs/measure
♩=♪♪♪ → 1 to 16 steps (2, 3 or 4 meter)
♩=♪♪ → 1 to 15 steps (2, 3, 4 or 5 meter)

Scale
3 octaves (PATTERN) w/TRANSPOSE
4 octaves (TRACK) w/Key shift

TRACK MEMORY CAPACITY
64 measures/TRACK Total 256 measures (64 x 7 TRACKs)
Contents: Pattern Order, TRANSPOSE, D.C. ✗
TUNING Control: approx. ±700 cents (perfect fifth)
TEMPO Control: (♩ = 40 to 300)

CONNECTIONS
Output: Impedance 10kΩ
Headphone: Impedance 8Ω to 30Ω
Gate Out: OFF: 0V; ON: +12V
CV Out: +1V to +5V (1 volt/oct)
SYNC In: DIN connector
MIX In: Impedance 100kΩ
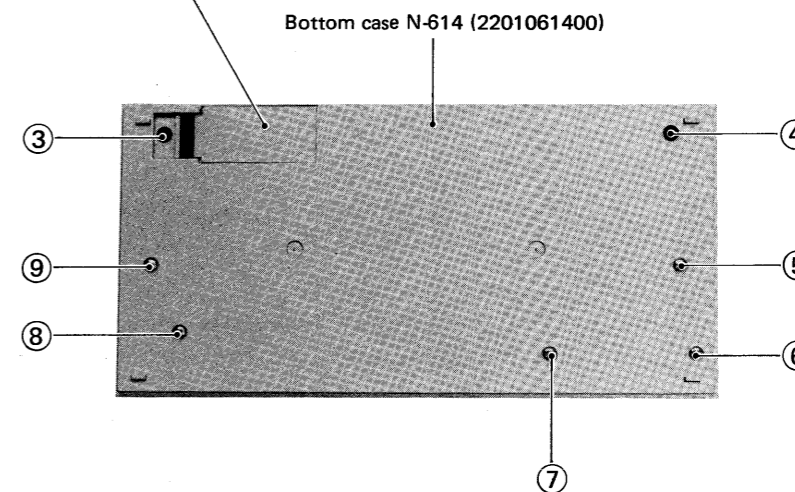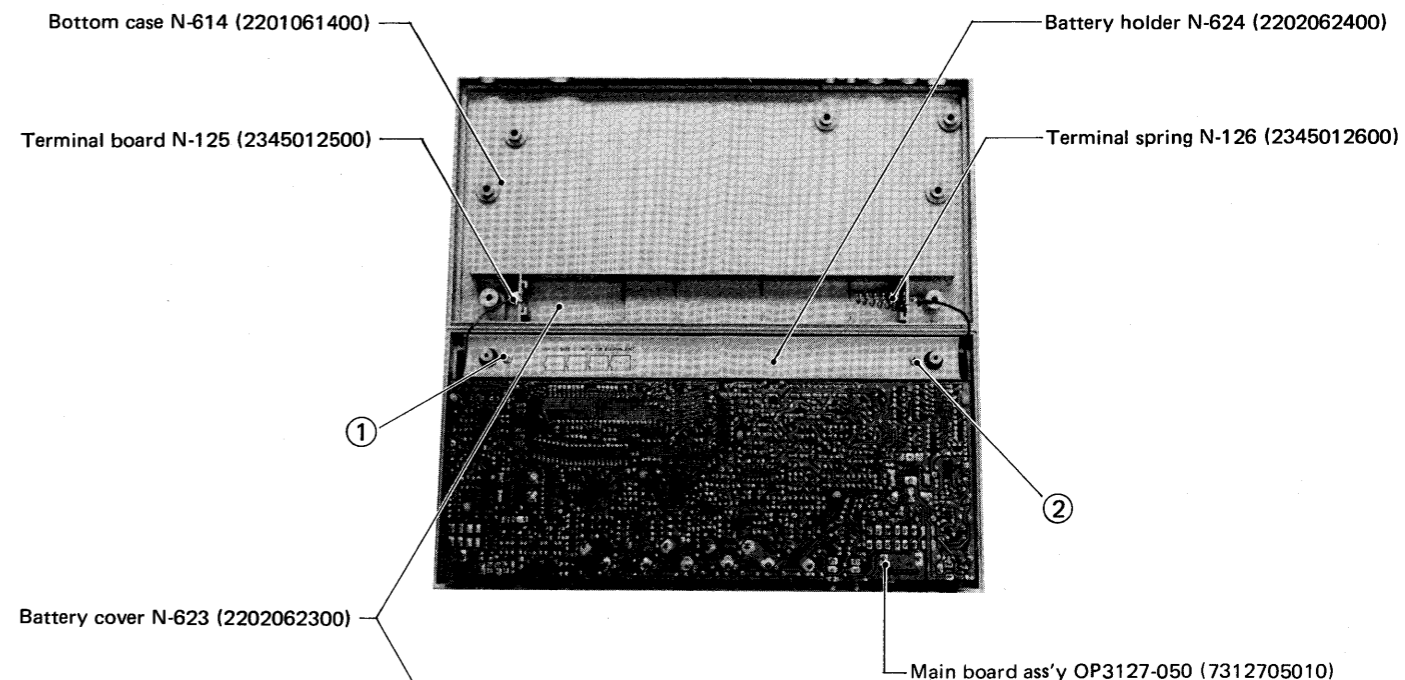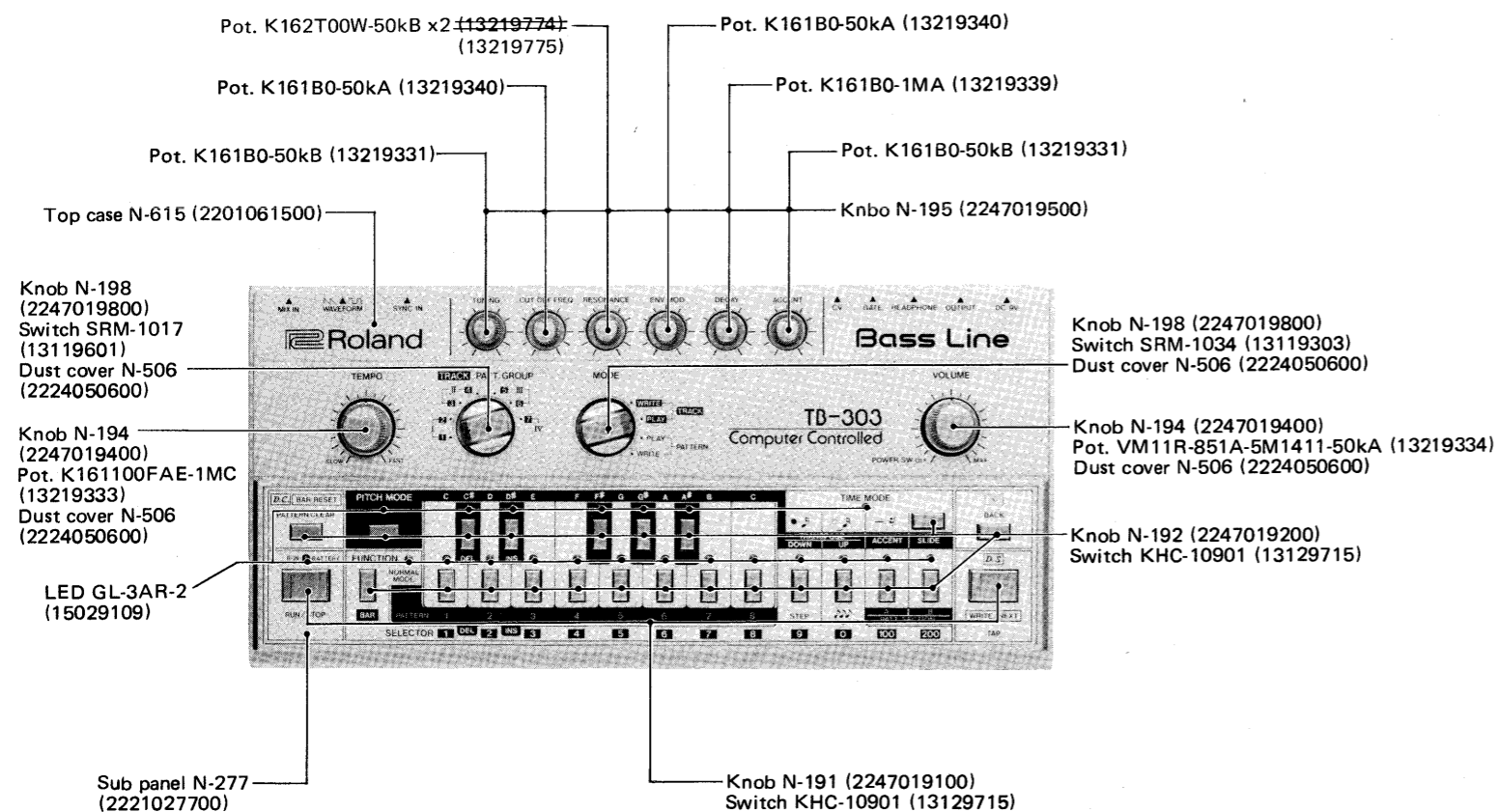Gain: Unity

POWER
6V: 1.5V battery x 4
9V: AC adaptor
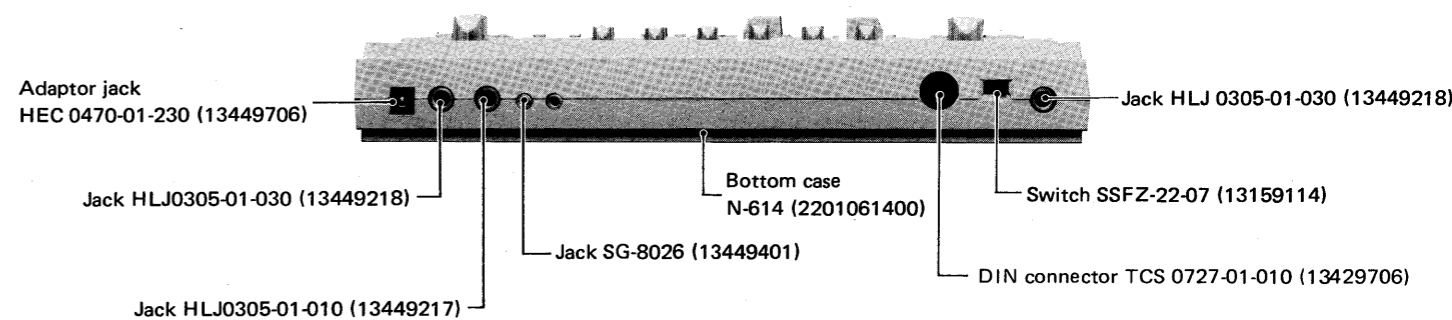80mA to 120mA

Dimensions: 300(W) x 146(D) x 55(H) mm
Weight: 1.0 kg

READ "PRELIMINARY DIAGNOSIS" ON PAGE 7
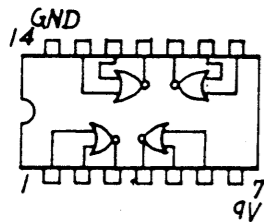BEFORE STARTING TROUBLESHOOTING

Bottom case N-614 (2201061400)
Terminal board N-125 (2345012500)
Battery cover N-623 (2202062300)
Battery holder N-624 (2202062400)
Terminal spring N-126 (2345012600)
Main board ass'y OP3127-050 (7312705010)

① ②

Bottom case N-614 (2201061400)

③ ④ ⑨ ⑤ ⑧ ⑥ ⑦

SCREWS ①—④ 3 x 10mm B₁, Fe, Cr, Binding, Self tapping
SCREWS ⑤—⑨ 3 x 18mm B₁, Fe, Ni, Binding, Self tapping

BOTTOM CASE REMOVAL SCREWS: ③—⑨

Pot. K162T00W-50kB x2 (13219774) (13219775)
Pot. K161B0-50kA (13219340)
Pot. K161B0-50kA (13219340)
Pot. K161B0-1MA (13219339)
Pot. K161B0-50kB (13219331)
Pot. K161B0-50kB (13219331)
Knbo N-195 (2247019500)
Top case N-615 (2201061500)

Knob N-198 (2247019800)
Switch SRM-1017 (13119601)
Dust cover N-506 (2224050600)

Knob N-194 (2247019400)
Pot. K161100FAE-1MC (13219333)
Dust cover N-506 (2224050600)

LED GL-3AR-2 (15029109)

Knob N-198 (2247019800)
Switch SRM-1034 (13119303)
Dust cover N-506 (2224050600)

Knob N-194 (2247019400)
Pot. VM11R-851A-5M1411-50kA (13219334)
Dust cover N-506 (2224050600)

Knob N-192 (2247019200)
Switch KHC-10901 (13129715)

Sub panel N-277 (2221027700)

Knob N-191 (2247019100)
Switch KHC-10901 (13129715)

Roland   Bass Line
TB-303
Computer Controlled

Adaptor jack HEC 0470-01-230 (13449706)
Jack HLJ0305-01-030 (13449218)
Jack SG-8026 (13449401)
Jack HLJ0305-01-010 (13449217)
Bottom case N-614 (2201061400)
Jack HLJ 0305-01-030 (13449218)
Switch SSFZ-22-07 (13159114)
DIN connector TCS 0727-01-010 (13429706)

MC14001BCP
Quad 2-Input NOR Gate

BA662

HD14584B
Hex Schmitt Trigger

μPD650C
(Top View)

CL₁	1	42	CL₀
PC₀	2	41	Vss(0V)
PC₁	3	40	PB₃
PC₂	4	39	PB₂
PC₃	5	38	PB₁
INT	6	37	PB₀
RES	7	36	PA₃
PD₀	8	35	PA₂
PD₁	9	34	PA₁
PD₂	10	33	PA₀
PD₃	11	32	PI₂
PE₀	12	31	PI₁
PE₁	13	30	PI₀
PE₂	14	29	PH₃
PE₃	15	28	PH₂
PF₀	16	27	PH₁
PF₁	17	26	PH₀
PF₂	18	25	PG₃
PF₃	19	24	PG₂
TEST	20	23	PG₁
(+5V)Vcc	21	22	PG₀
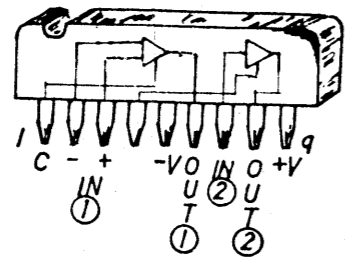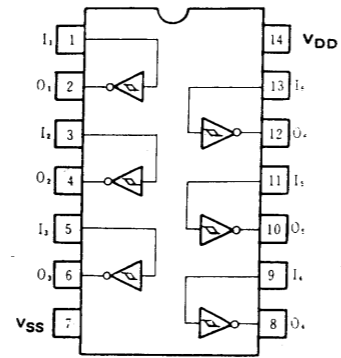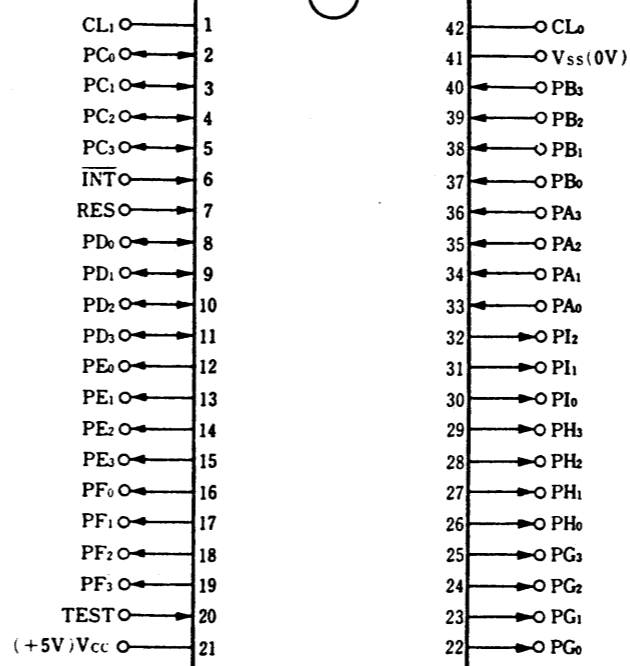
μPD650C—085 FUNCTIONAL DESCRIPTION

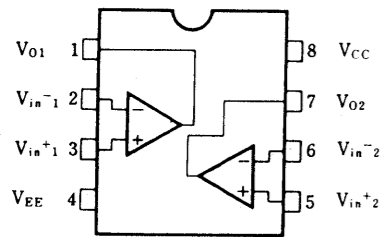|		No.	
PH (Port H)	0	26	
	1	27	Scanning signal outputs to switches
	2	28	Switching signal outputs to STATUS BUFFER & GATE
	3	29	
PA (Port A)	0	33	
	1	34	Switch scanning signal inputs
	2	35	STATUS (TEMPO CLOCK. START/STOP. TAP) inputs
	3	36	
PB (Port B)	0	37	
	1	38	Inputs from switch board switches
	2	39	
	3	40	
PG (Port G)	0	22	
	1	23	Drive signals to switch board LEDs
	2	24	
	3	25	
PE (Port E)	0	12	
	1	13	
	2	14	
	3	15	
PD (Port D)	0	8	MEMORY ADDRESS
	1	9	
	2	10	
	3	11	
PF (Port F)	0	16	PITCH DATA
	1	17	
	2	18	
	3	19	
PC (Port C)	0	2	
	1	3	Data Inputs/Outputs
	2	4	
	3	5	
PI (Port I)	0	30	Memory WE
	1	31	Pitch data latch strobe
	2	32	Gate signal

MC14050B
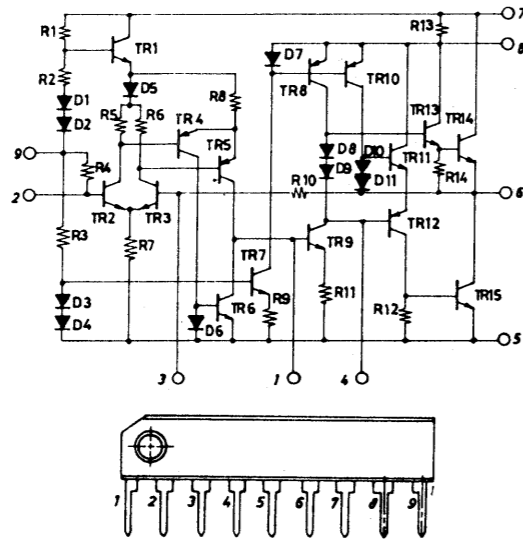### HEX BUFFERS

NC = Pin 13, 16
Vss = Pin 8
Vcc = Pin 1

LA4140

AN6562

V₀₁	1	8	Vcc
Vin⁻1	2	7	V₀₂
Vin⁺1	3	6	Vin⁻2
VEE	4	5	Vin⁺2

MC14174B
HEX TYPE D FLIP-FLOP

		INPUTS		OUTPUT
	Clock	Data	Reset	Q
	⤒	0	1	0
	⤒	1	1	1
	⤓	X	1	Q	No Change
	X	X	0	0

X = Don't Care

V_DD = Pin 16
V_SS = Pin 8

MC14013B
DUAL TYPE D FLIP-FLOP

BLOCK DIAGRAM

TRUTH TABLE

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

X = Don't Care
† = Level Change

V_DD = Pin 14
V_SS = Pin 7
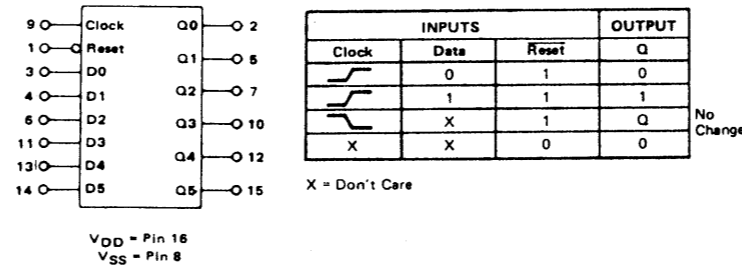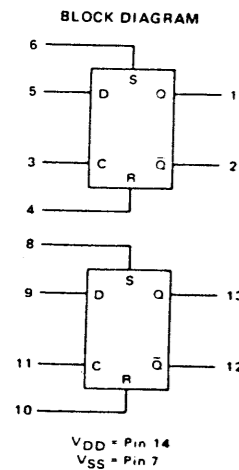
MC14556B
DUAL BINARY TO 1-OF-4 DECODER/DEMULTIPLEXER

TRUTH TABLE

INPUTS			OUTPUTS MC14555B				OUTPUTS MC14556B			
ENABLE	SELECT									
Ē	B	A	Q3	Q2	Q1	Q0	Q̄3	Q̄2	Q̄1	Q̄0
0	0	0	0	0	0	1	1	1	1	0
0	0	1	0	0	1	0	1	1	0	1
0	1	0	0	1	0	0	1	0	1	1
0	1	1	1	0	0	0	0	1	1	1
1	X	X	0	0	0	0	1	1	1	1

X = Don't Care

V_DD = Pin 16
V_SS = Pin 8
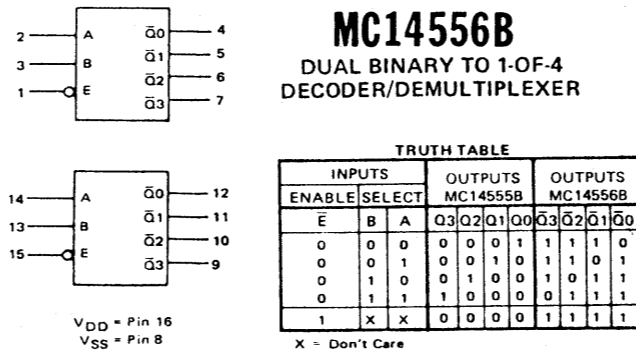
MC14066B
QUAD ANALOG SWITCH QUAD MULTIPLEXER
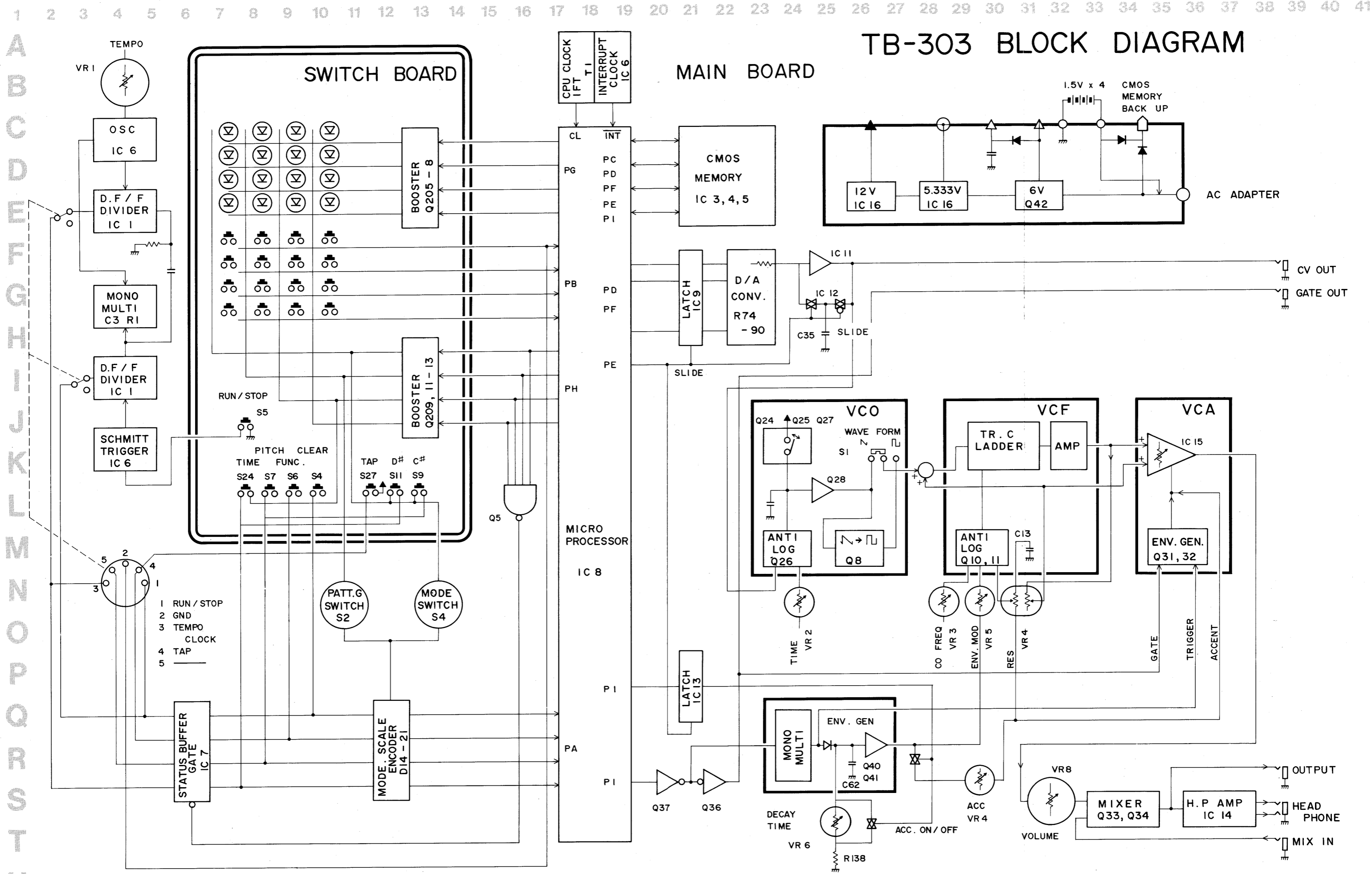
BLOCK DIAGRAM

V_DD = Pin 14
V_SS = Pin 7

LOGIC DIAGRAM AND TRUTH TABLE
(1/4 OF DEVICE SHOWN)

Control	Switch
0	OFF
1	ON

Logic Diagram Restrictions
Vss ≤ Vin ≤ VDD
Vss ≤ Vout ≤ VDD

Vcontrol	Vin to Vout Resistance
Vss	>10⁹ Ohms typ
VDD	3 × 10² Ohms typ

TB-303 BLOCK DIAGRAM

MAIN BOARD
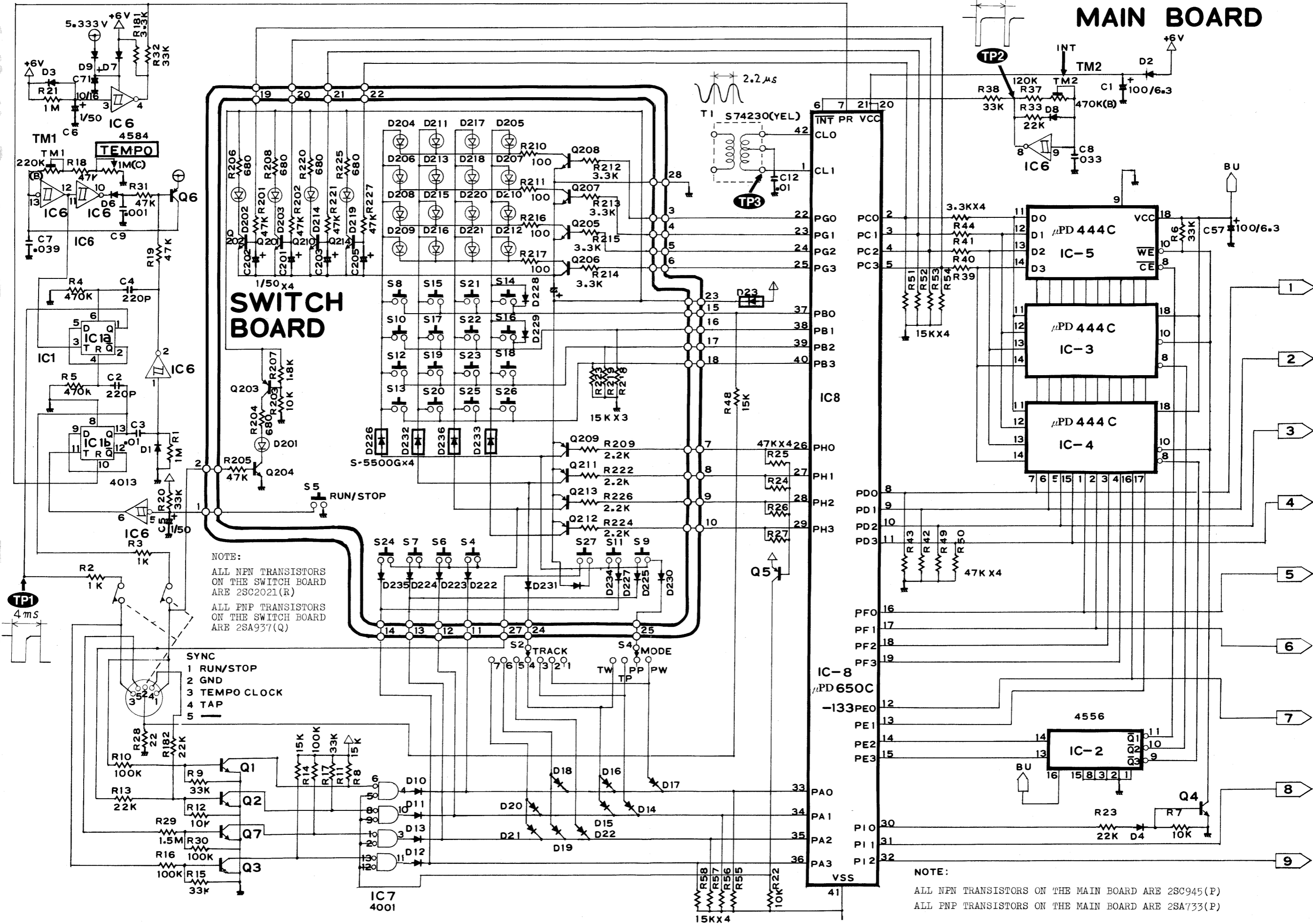
SWITCH BOARD

NOTE:
ALL NPN TRANSISTORS
ON THE SWITCH BOARD
ARE 2SC2021(R)

ALL PNP TRANSISTORS
ON THE SWITCH BOARD
ARE 2SA937(Q)

SYNC
1 RUN/STOP
2 GND
3 TEMPO CLOCK
4 TAP
5

IC8
IC-8
μPD650C
-133

IC7
4001

IC-5   μPD 444C
IC-3   μPD 444C
IC-4   μPD 444C

IC-2
4556

NOTE:
ALL NPN TRANSISTORS ON THE MAIN BOARD ARE 2SC945(P)
ALL PNP TRANSISTORS ON THE MAIN BOARD ARE 2SA733(P)

This page is a full-page electronic schematic diagram for the Roland TB-303 Main Board, dated Feb.19, 1982.
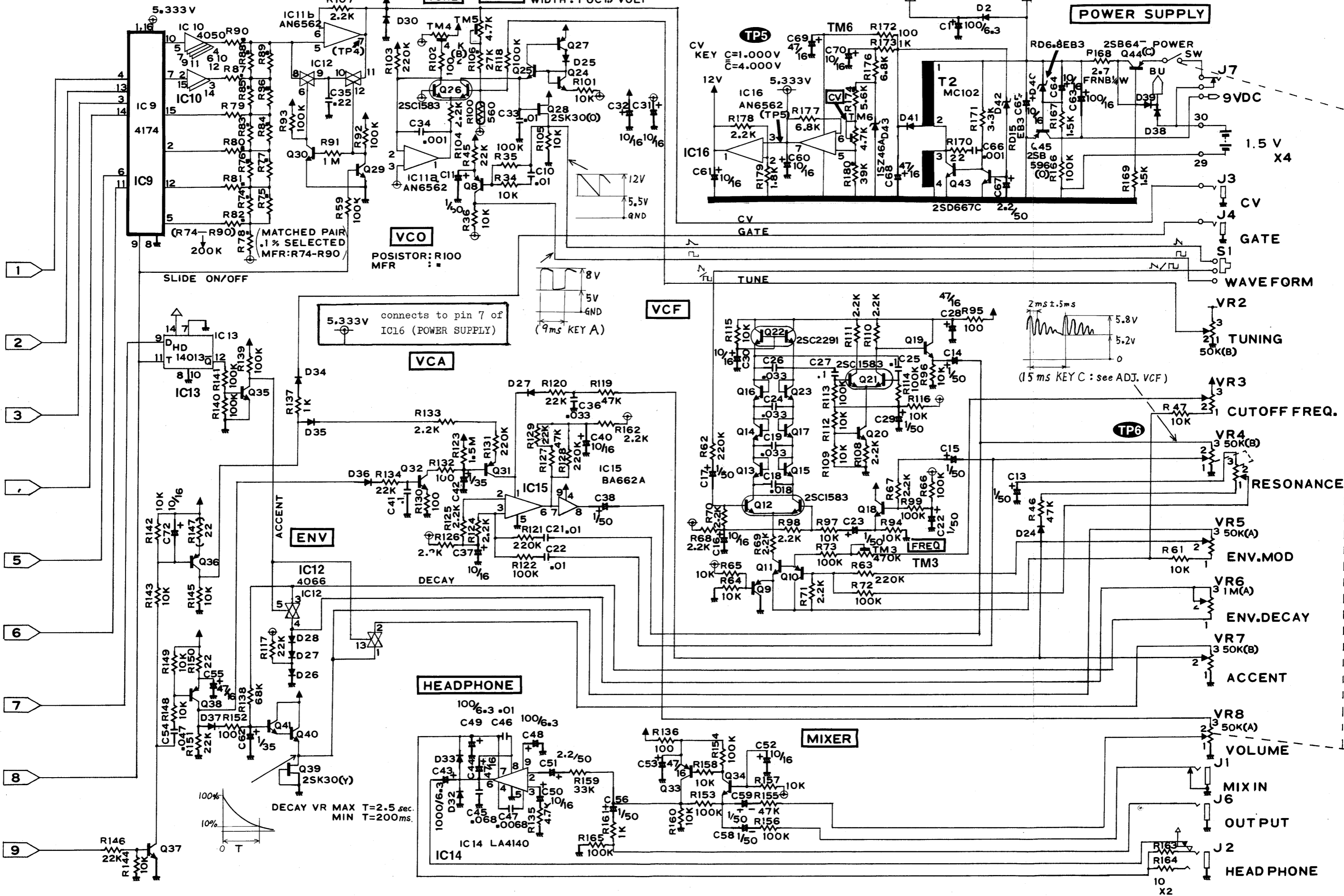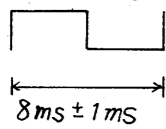
ADJUSTMENT

Adjustments should be done from the component side.
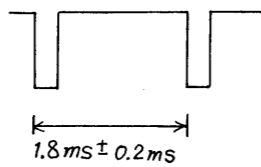Use digital voltmeter or oscilloscope, as appropriate.

TEMPO
Check point: TP1
Turn TEMPO full clockwise.
Adjust TM1 for:

$8\,ms \pm 1\,ms$

INT CLOCK
Check point: TP2
Adjust TM2 for:

$1.8\,ms \pm 0.2\,ms$

CAUTION:
The following adjustments will be done in PATTERN WRITE mode.
If existing rhythm patterns need to be restored, locate a PATTERN that contains no rhythms or the easiest ones to copy and write it down.
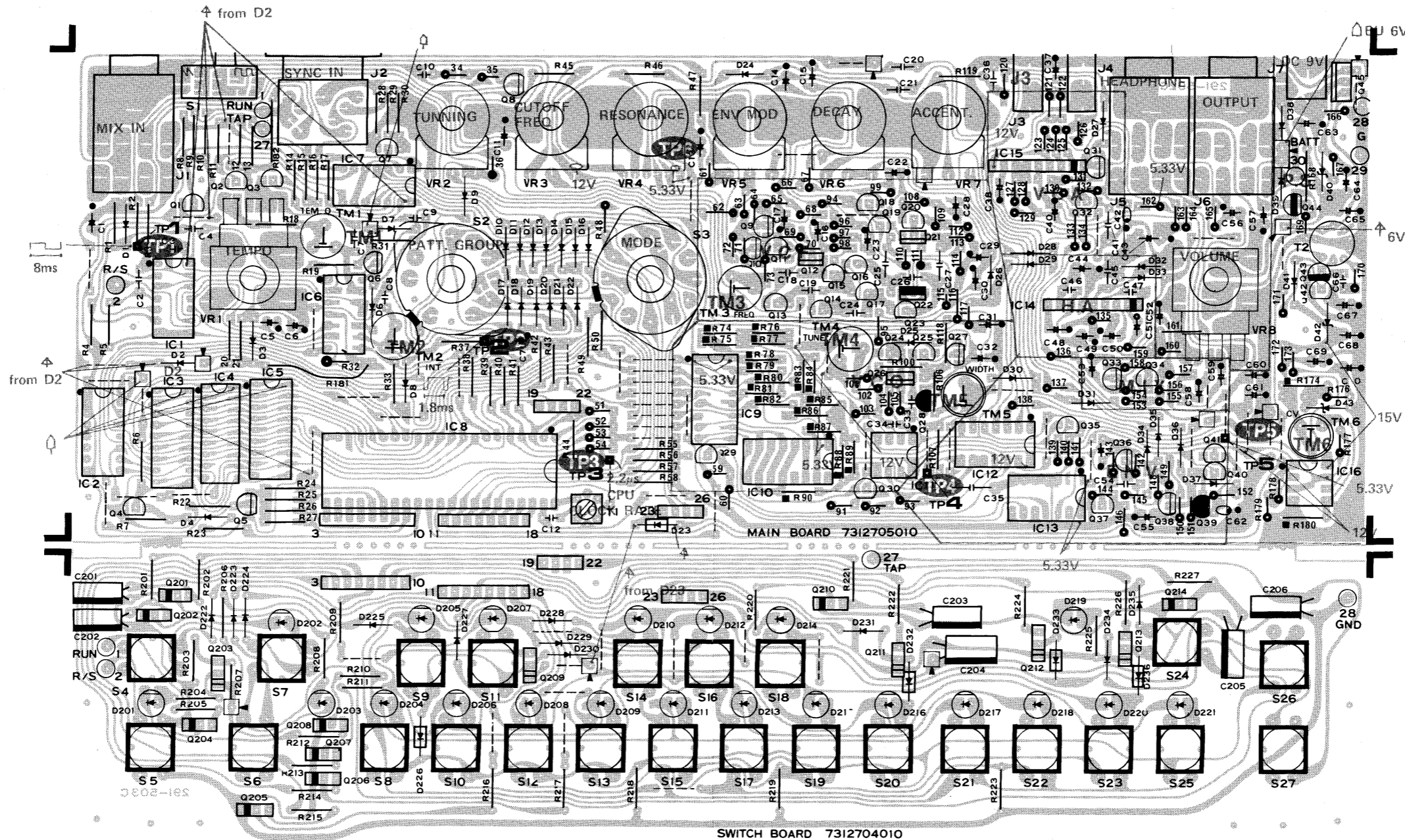
CV
Check point: CV out jack
With PITCH mode, press low C key and note the reading — CVL.
Press high C key, adjust TM6 for CVL+ $1.000V \pm 3mV$ — CVM.
While holding down TRANSPOSE UP, press high C key, confirm that the reading is CVM+$1.000 \pm 3mV$.

View from component side
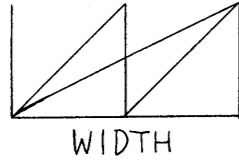
MAIN BOARD
OP3127-050
(7312705010)
(pcb 291-502C)

SWITCH BOARD
OP3127-040
(7312704010)
(pcb 291-503C)

6

VCO

Check point: Q28 source or S1 WAVE-
FORM terminal.
Set TUNE in its middle position.
With PITCH mode. While tapping CL and
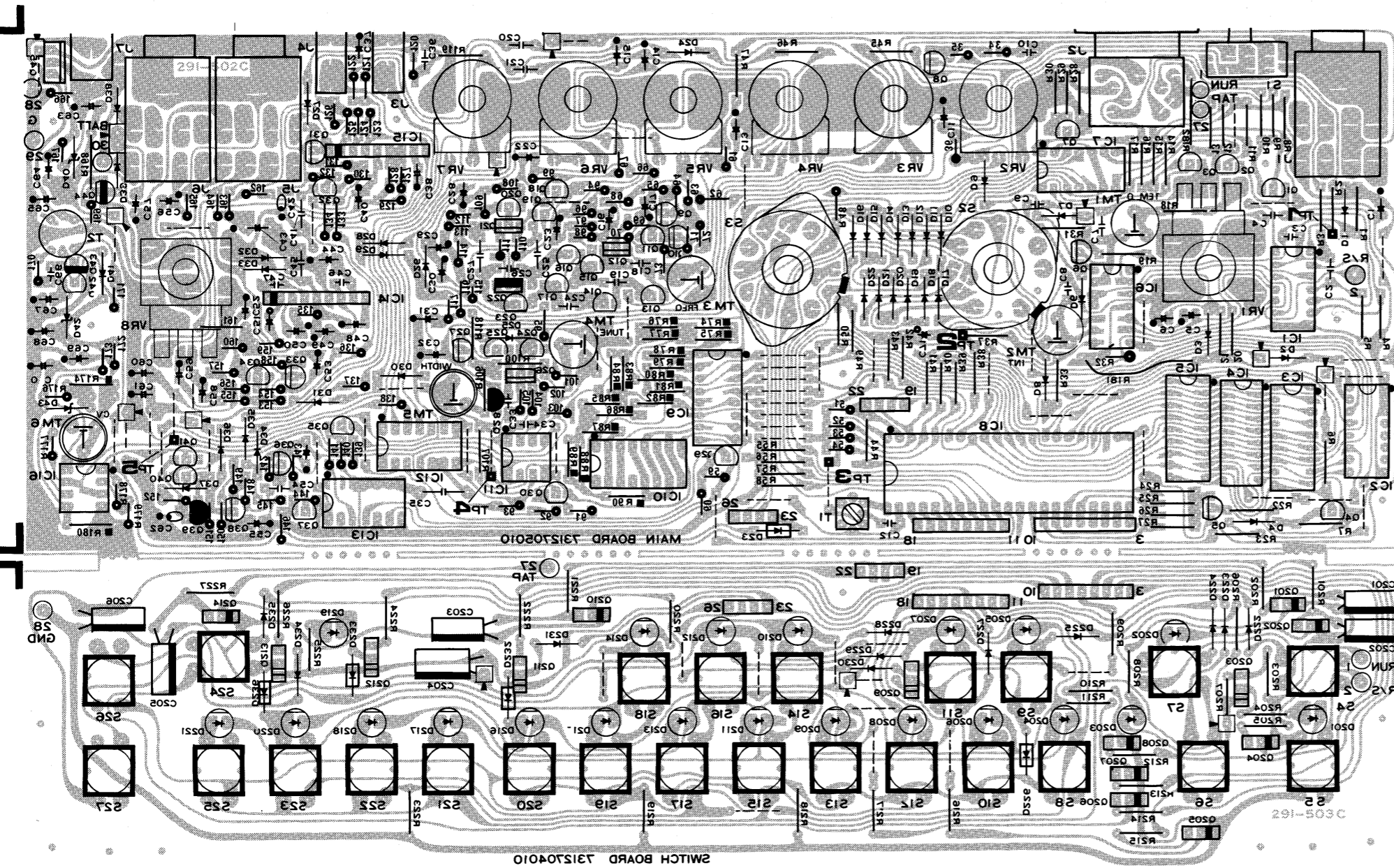CH keys alternately, adjust TM5 WIDTH
for 2:1 waveforms:

WIDTH

Press A key and adjust TM4 for 110Hz.
Confirm 4:1±0.5% with CL and CH +
TRANSPOSE UP.

VCF

Check point: TP6
Panel settings:
CUTOFF FREQ : center
WAVEFORM : SAWTHOOTH
RES   : Full clockwise
ENV MOD,
DECAY, ACC : Full counterclockwise

Afdjust TM3 for:

2ms ± 0.5ms
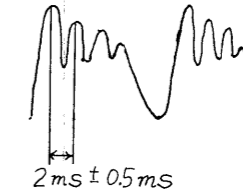
View from foil side

PRELIMINARY DIAGNOSIS

BATTERY

First check the DC voltage.
Most users are not so familiar with battery operated equipment as to
suspect aged dry cells in the malfunctioning (silent) TB-303 when LEDs
other than RUN/BATTERY are lit up.

MISOPERATION

The versatile TB-303 inevitably needs to be manipulated according to
what is instructed in the TB-303 Owner's manual.
Symptoms listed below are likely to be found (by the user) in a unit
which will be returned for servicing, as an evidence of defect.
Confirm the operation following to the steps described in the manual —
on the page(s) referenced.

* Patterns (especially note value) are not reproduced as they should be.
   " 4 TO WRITE YOUR OWN BASS LINE"   PP. 49-64

* Incorrect PATTERN selection
   "IMPORTANT NOTES"   P. 3

* The LED above the selected PATTERN switch does not flush
   " ② Setting the STEP number"   P. 53
   "b. WRITING A BASS PATTERN IN 3/4"   PP. 55-57

* TRACK fails to store data being written into it.

* Phrases do not repeat in order in TRACK PLAY mode.
   "SELECTING THE TRACK"   PP. 23-32
   "B. TO WRITE YOUR OWN BASS LINE"   PP. 64-68

* Melody does not run at the beginning of the 1st measure in TRACK
   PLAY mode.
   " 4 LET'S PLAY THE TRACK"   PP. 31-32

2SC536F
2SA733P
2SC2021R
2SA937Q

7

VCF ENVELOPE MODULATION

In the conventional VCF configuration, envelope modulation voltages applied to modulation control voltage input of VCF rise from a fixed potential to their values regardless of shape and amount of envelope and fall back to the same potential. Fig. 1. In this setup, an attempt to deepen envelope modulation is increment of control voltage in one direction, only to open up filter. Resultants are; higher the control voltage input, longer the period of time cutoff point travels through higher frequency range in which significant aural sound characteristic changes do not occur, whereas notes are brightened.

To compensate for the limitation this impose, there is a gimmick in the TB-303 VCF circuit. The Q9 has a key role in this arrangement. See Fig. 2. It developes bias for Q10 and Q11 to set initial cutoff point at the center of frequency range. Within the range even a small amount of voltage change can create a appreciable modulation.
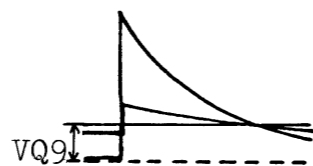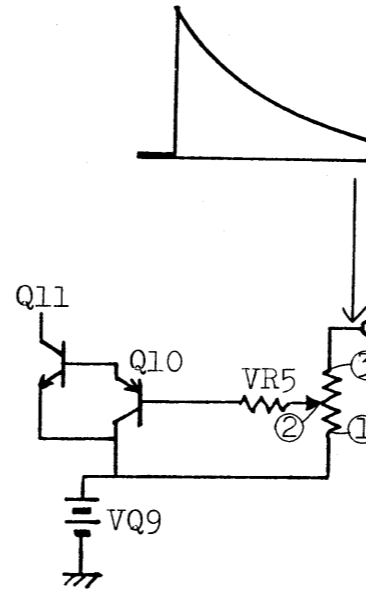

Fig. 1

Fig. 3

Fig. 2

Rotating wiper ② of VR5 closer to terminal ③ increases ENV MOD voltage being fed to base of Q10 while changing the bias which in turn lowers VCF cutoff frequency. See Fig. 3. This is equal to turning CUTOFF knob counterclockwise and, since Q10 and Q11 in combination convert control voltage to the current in anti-log fashion, the cutoff point stays in an effective frequency range for the most portion of envelope sweeping duration.

PARTS LIST

PANEL

2201061500	Top case	N615	top
2201061400	Bottom case	N-614	bottom
2202062300	Battery cover	N-623	
2202062400	Battery holder	N-624	
2221027700	Sub panel	N-277	

SOCKET

13429706	DIN connector	TCS0737-01-010	Sync
13449218	Jack	HLJ0305-01-030	MONO
13449217	Jack	HLJ0305-01-010	STEREO
13449401	Jack	SG8026	MINI
13449706	Adaptor jack	HEC0470-01-230	AC adaptor

TRANSFORMER COIL

12449217	IFT coil	S74230 (yellow)	CPU clock
12449507		MC102C	DC-DC converter

SWITCH

13119601	SRM1017	rotary	TRACK, INSTRUMENT
13119303	SRM1034	rotary	MODE
13129715	KHC10901	push	All switches on the switch board
13159114	SSFZ-22-07	slide	SYNC in/out

SEMICONDUCTOR

LSI

15179126	μPCD650C-133	CMOS CPU
15179305	μPD444C	CMOS RAM

IC

15159101H0	HD14001BP	Quad 2-input NOR gate
15159105	HD14013BP or MN4013B	Dual type D flip-flop
15129128	HD14050BP	Hex buffers

15159115	HD14066BP	Quad analog switch Quad multiplexer
15159133	HD14174BP	Hex type D flip-flop
15159308	HD14556BP	Dual binary to 1-of-4 Decoder/Demultiplexer
15189138	AN6562	Dual op amp
15229802	BA662(A)	Vari-conductance amp
15159303H0	HD14584B	Hex Schmitt trigger
15199509	LA4140	AF Power amp

TRANSISTOR

15119105	2SA733(P)	
15119602	2SB647(C)	
15119806	2SB596(O)	
15129602	2SD667(C)	
15129121	2SC2021(R)	
15129130	2SC1583(F)	Dual Tr
15129131	2SC2291(F)	Dual Tr

FET

15139101	2SK30TM(Y)	
15139102	2SK30TM(O)	

LED

15029109	GL3AR2

DIODE

15019120	1S2473	Si diode
15019209	S-5500G	
15019122	1S-188FM	Ge diode
15019655	RD6.8EB-3 or 15019656 RD6.8EB2-T	
15019653	RD15EB-3	
15019126	1SS-133	Si diode
15019630	158-46A	

POTENTIOMETER

13219333	K161100FAE-IMC	tempo
13219334	VM11R851A-5M1411-50KA	master vol. & power switch
13219331	K161B0-50KB	TUNING, ACCENT
13219340	K161B0-50kA	CUT OFF FREQ, ENV MOD
13219339	K161B0-1MA	DECAY
13219774	K162T00W-50kB x 2	RESONANCE
13299116	H1051A016-47kB	trimmer
13299119	H1051A021-220kB	trimmer
13299122	H1051A023-470kB	trimmer
13299543	H1021A011-4.7kB	trimmer

RESISTOR

12559708	FRNB 2.7Ω	Fuse resistor

CIRCUIT BOARD ASSEMBLY

7312705010	MAIN BOARD	OP3127-050	(PCB 291 502C)
7312704010	SWITCH BOARD	OP3127-040	(PCB 291 503C)

KNOB

2247019400	Knob	N-194	master VR & TEMPO
2247019500	Knob	N-195	instrument level
2247019100	Knob	N-191	RUN/STOP, TAP
2247019200	Knob	N-192	step number
2247019800	Knob	N-198	rotary switch

OTHERS

1299503	PCB Holder	LCBS-12NS	
2219028700	Holder	N-287	Potentiometer for master vol. & tempo
2343097600	Flat cable		8-core
2343097700	Flat cable		4-core
2345012500	Terminal board		Battery + side
2345012600	Terminal spring		Battery − side
2224011500	Dust cover	N-115	slide switch
2224050600	Dust cover	N-506	master vol., tempo, rotary switch

1、 ＊ ＊ ＊ ＊ ＊ ＊ ＊ ＊ （ page 1 ）

Pot. K162T00W-50kB x2 (13219774)
(13219775)
Pot. K161B0-50kA (13219340)
Pot. K161B0-50kB (13219331)
Top case N-615 (2201061500)

Pot. K161B0-50kA (13219340)
Pot. K161B0-1MA (13219339)
Pot. K161B0-50kB (13219331)
Knbo N-195 (2247019500)

Knob N-198
(2247019800)
Switch SRM-1017
(13119601)
Dust cover N-506
(2224050600)

Knob N-198 (2247019800)
Switch SRM-1034 (13119303)
Dust cover N-506 (2224050600)

Roland   Bass Line
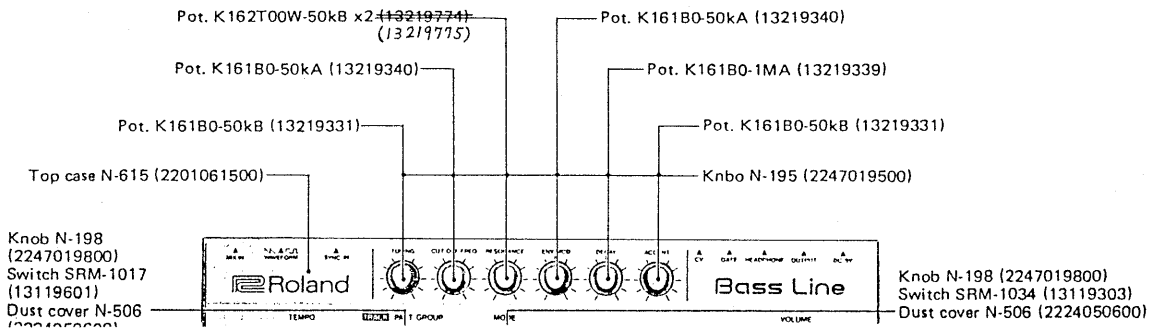
2、 CIRCUIT DIAGRAM （ page 5 ）

IN BOARD
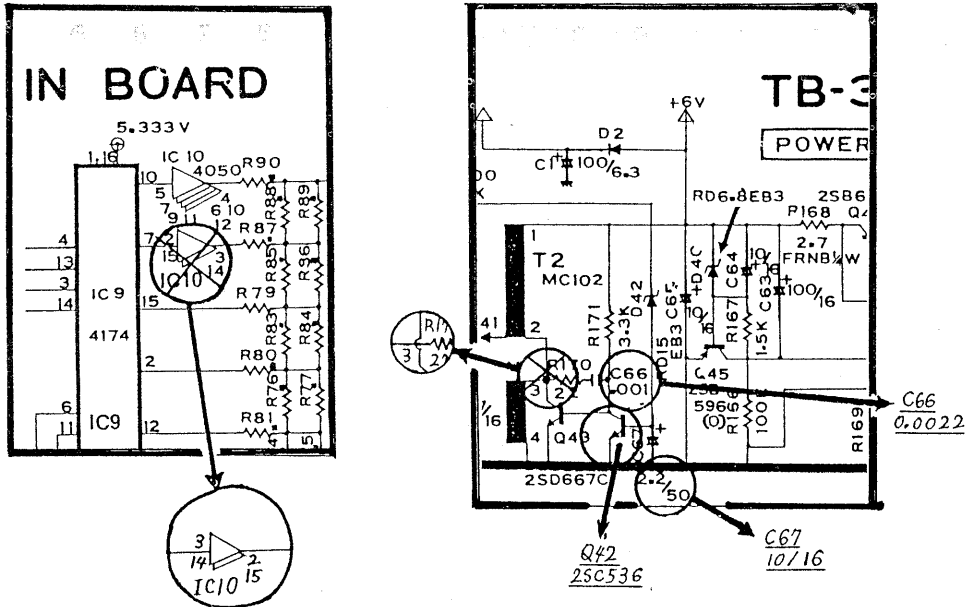
3、 PARTS LIST （ page 8 ）

* PANEL   2221027700   Sub panel N-277
                       2221027701

* POTENTIOMETER   13219774   K162T00W-50KBx2
                       13219775
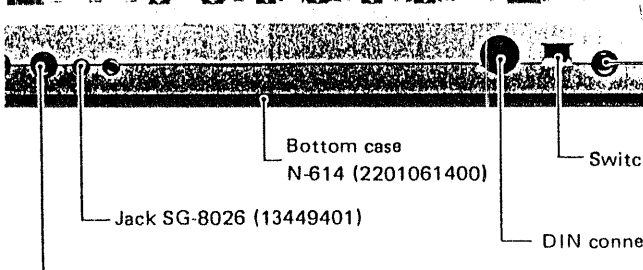
*TRANSISTOR

```
15119105   2SA733(P)
15119602   2SB647(C)
15119806   2SB596(O)
15129602   2SD667(C)
15129121   2SC2021(R)
15129130   2SC1583(F)  Dual Tr
15129131   2SC2291(F)  Dual Tr
```

```
15119105   2SA733(P)
15119602   2SB647(C)
15119806   2SB596(O)
15129602   2SD667(C)
15129121   2SC2021(R)  ( or 15129608  2SD637(R) )
15129130   2SC1583(F)  Dual Tr
15129131   2SC2291(F)  Dual Tr
15129102   2SC536(F)
15119121   2SA937(Q)   ( or 15119607  2SB642(R) )
```

Page	WRONG 誤 →	CORRECT 正
1	* DIN CONNECTOR TCS0727-01-010 (~~13429706~~) →	DIN CONNECTOR TCS0727-01-010 (13429609)
8	* PARTS LIST/パーツリスト SOCKET - - - - - - - - - - - - - - - - - - ~~13429706~~ DIN CONNECTOR → ~~TCS073701-010~~ SYNC	13429609 DIN CONNECTOR TCS0727-01-010 SYNC

(page 1)

Jack HLJ 0305-01-030 (13449218)

Bottom case
N-614 (2201061400)

Switch SSFZ-22-07 (13159114)

Jack SG-8026 (13449401)

DIN connector TCS 0727-01-010 (13429~~700~~)
609

PARTS LIST

(page 8)

PANEL

2201061500	Top case	N615	top
2201061400	Bottom case	N-614	bottom
2202062300	Battery cover	N-623	
2202062400	Battery holder	N-624	
2221027700	Sub panel	N-277	

SOCKET **609** **0727**

13429~~700~~	DIN connector	TCS~~0737~~-01-010	Sync
13449218	Jack	HLJ0305-01-030	MONO
13449217	Jack	HLJ0305-01-010	STEREO
13449401	Jack	SG8026	MINI
13449706	Adaptor jack	HEC0470-01-230	AC adaptor

* Please amend all existing
  service notes as above.
* 該当サービスノートを上記のように
  修正して下さい。