MASTER
M

SERVICE MANUAL
& PARTS LIST

ELECTRONIC KEYBOARD

HT-6000

SEPT. 1987

HT-6000

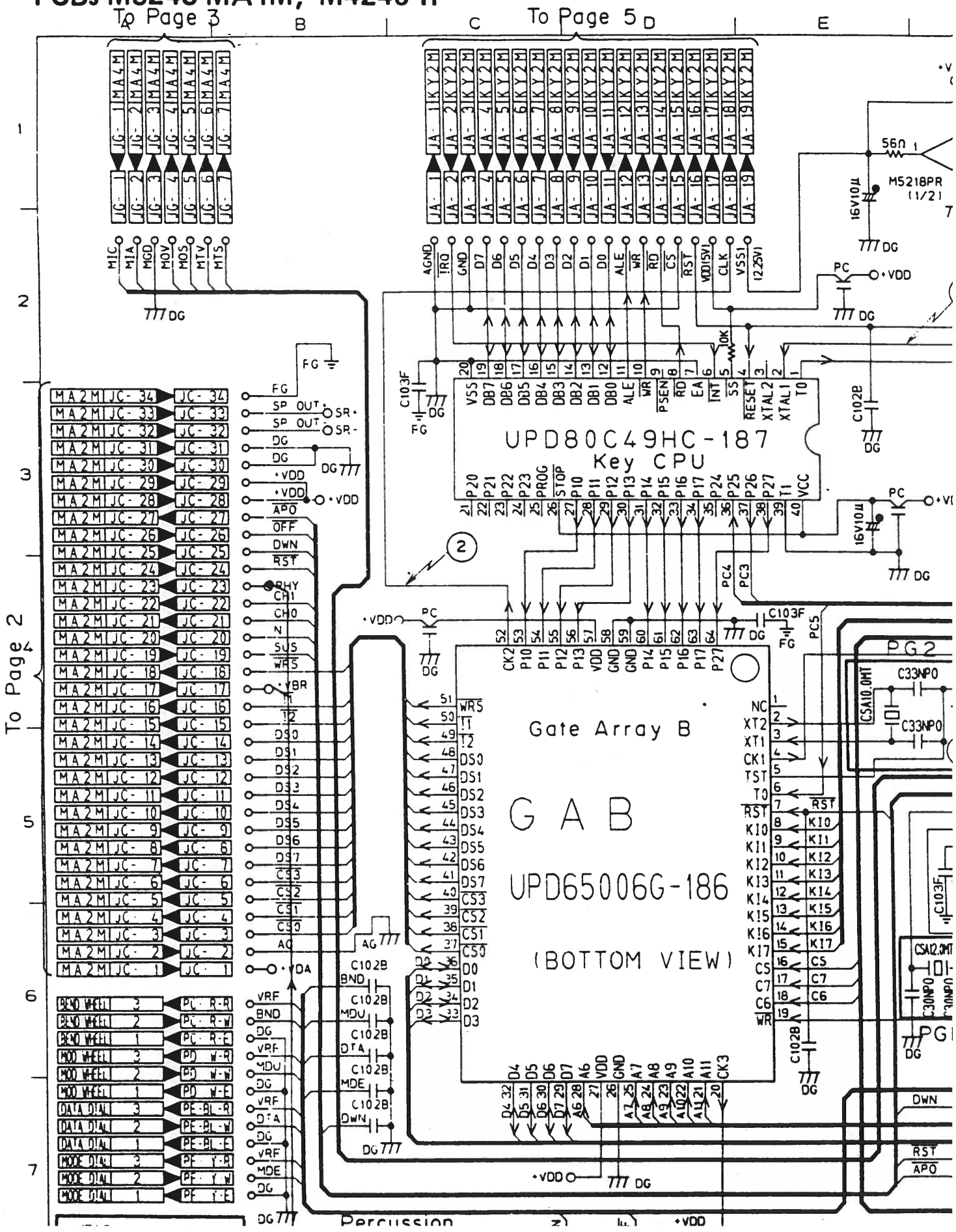
CASIO

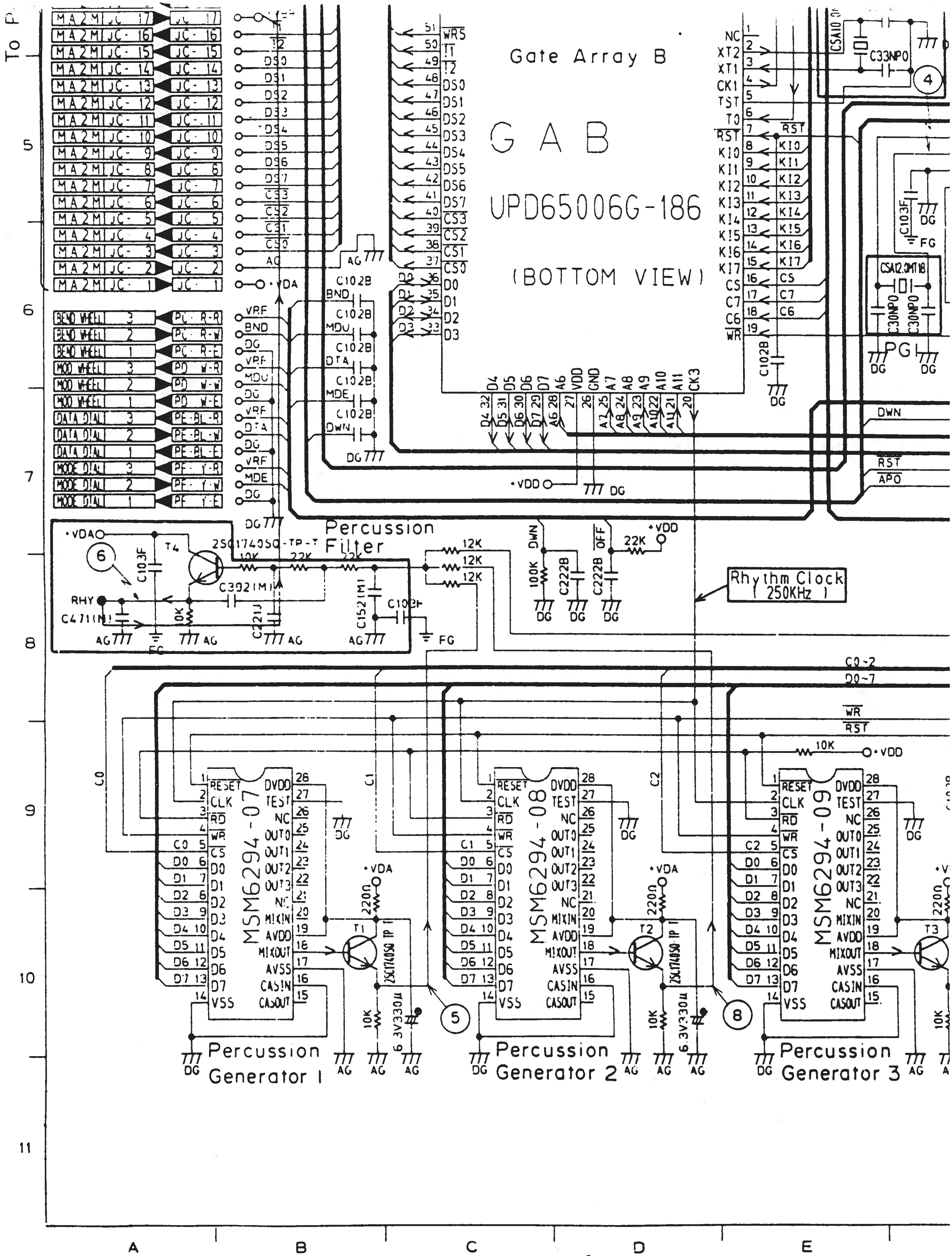
80
ALL

CONTENTS

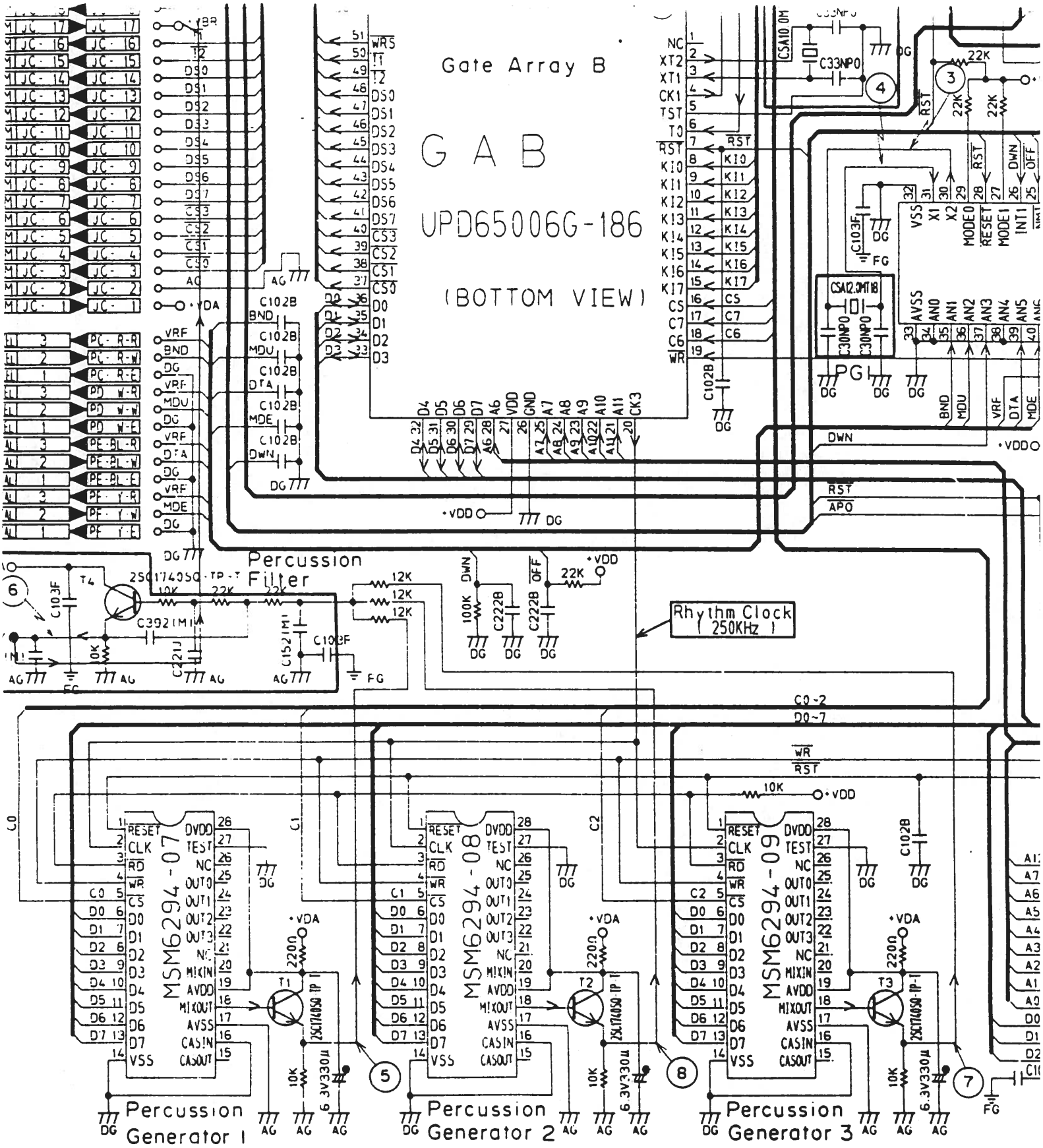
SCHEMATIC DIAGRAM

PCBs M5245-MA1M, M4240-IF

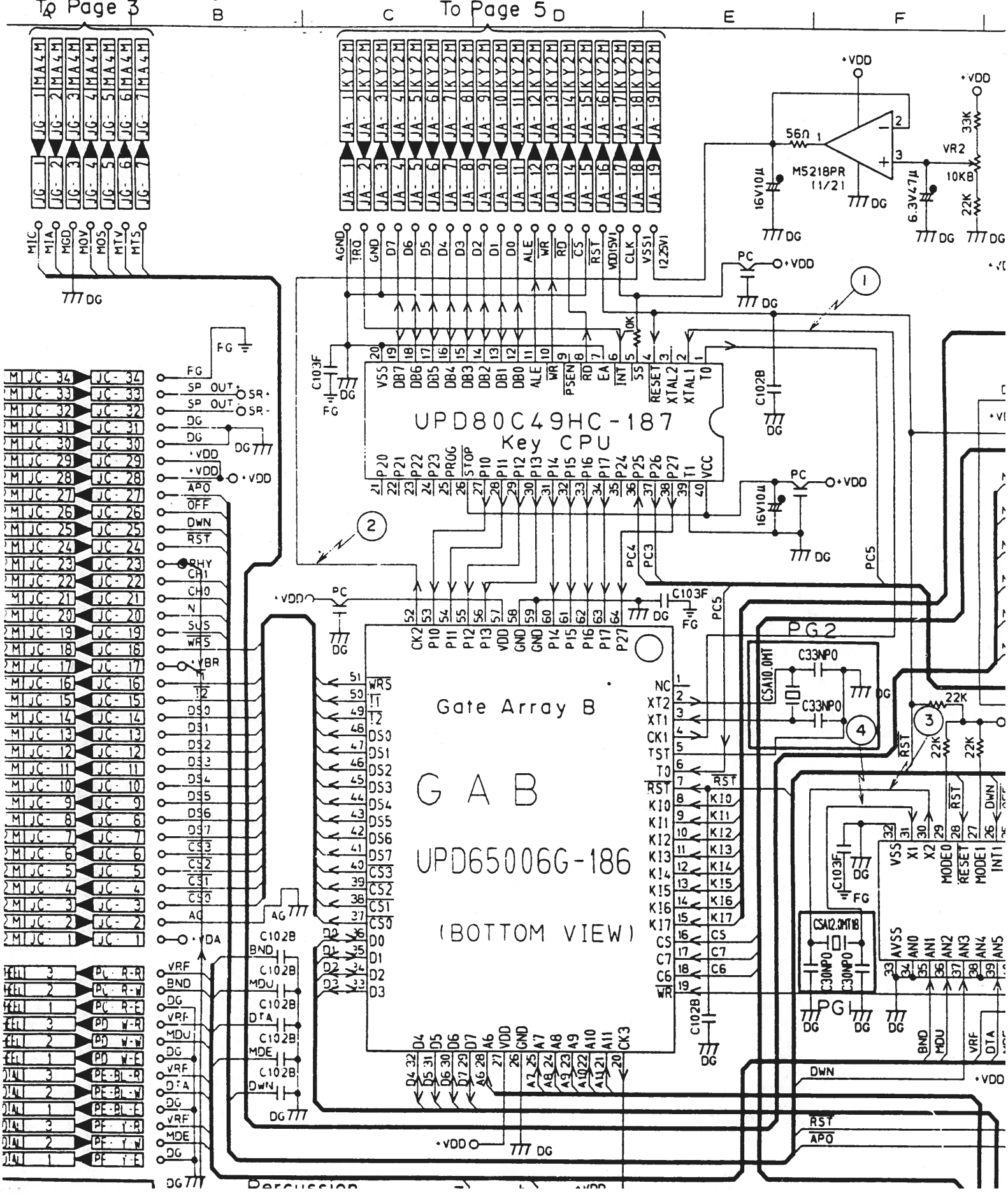


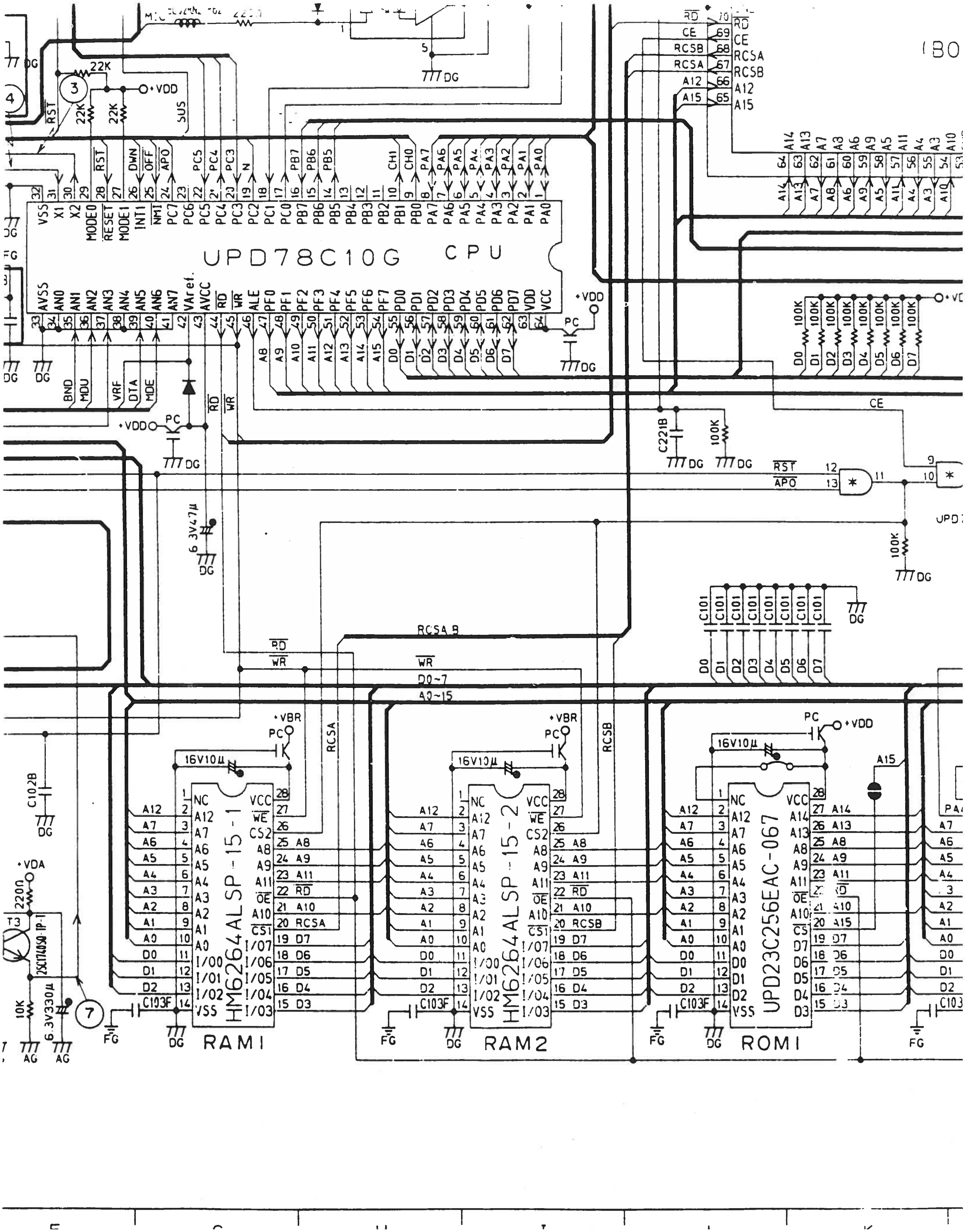


Gate Array B
GAB
UPD65006G-186
(BOTTOM VIEW)
Percussion Filter
2SC1740SQ-TP-T
Rhythm Clock
(250KHz)
RHY
MSM6294-07
MSM6294-08
MSM6294-09
Percussion Generator 1
Percussion Generator 2
Percussion Generator 3
CSA12.0MT18
PG1
BEND WHEEL
MOD WHEEL
DATA DIAL
MODE DIAL
C0~2
D0~7
WR
RST
APO
DWN
A
B
C
D
E
5
6
7
8
9
10
11


Gate Array B
G A B
UPD65006G-186
(BOTTOM VIEW)
Percussion Filter
Rhythm Clock 250KHz
MSM6294-07
MSM6294-08
MSM6294-09
Percussion Generator 1
Percussion Generator 2
Percussion Generator 3
C0-2
D0-7
WR
RST
•VDD
•VDA
DG
AG
FG

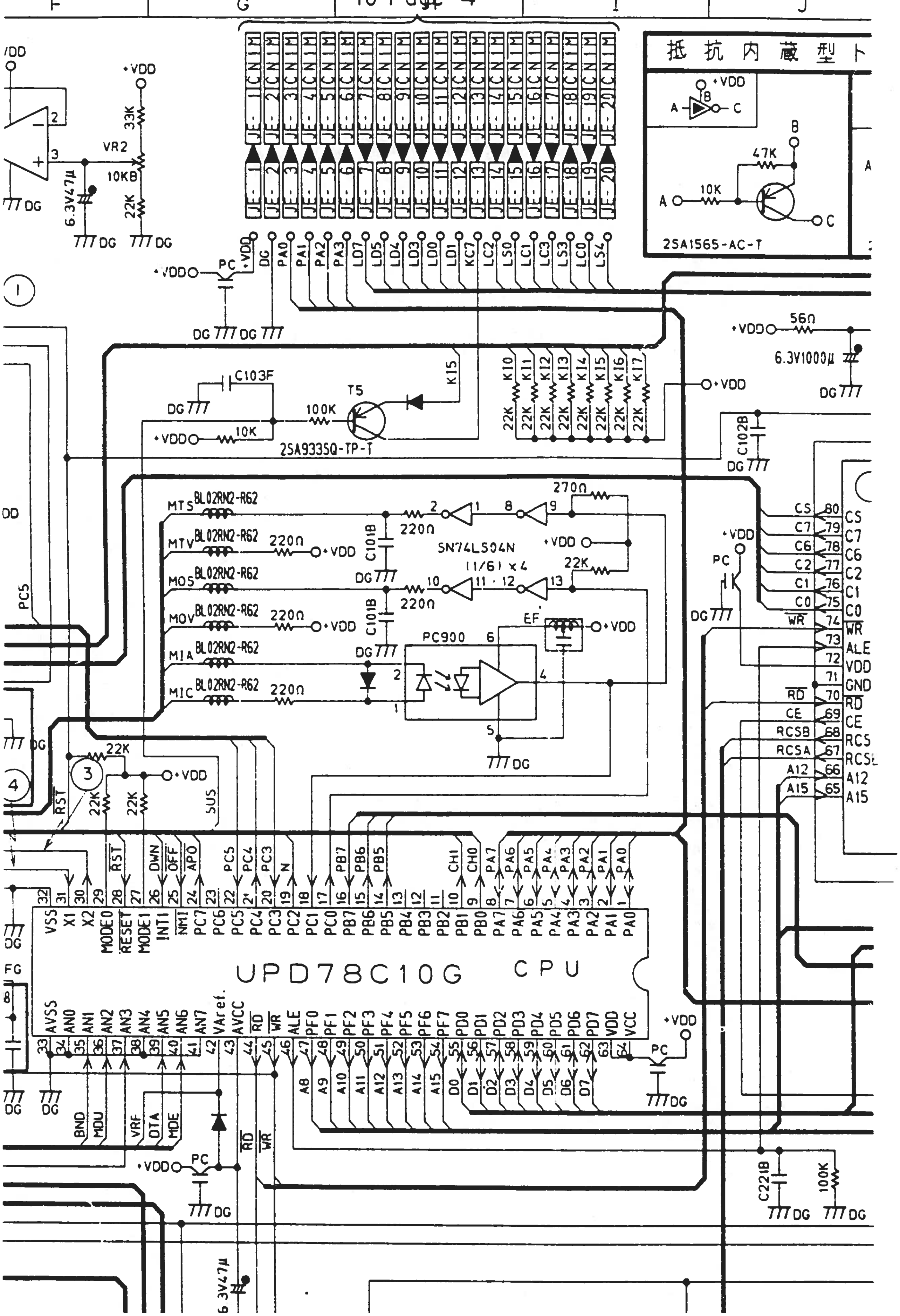
TIC DIAGRAM
ls M5245-MA1M, M4240-IF

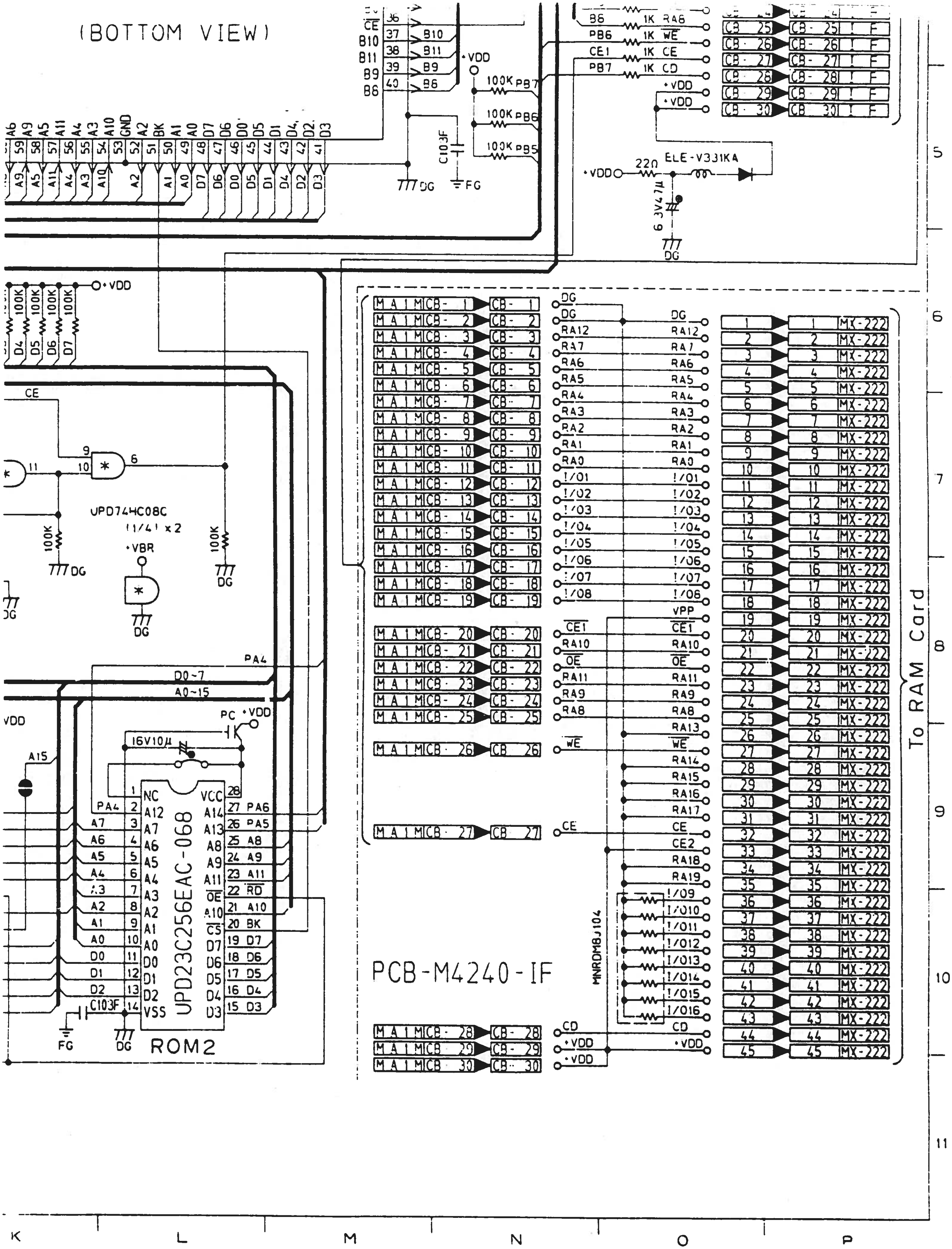


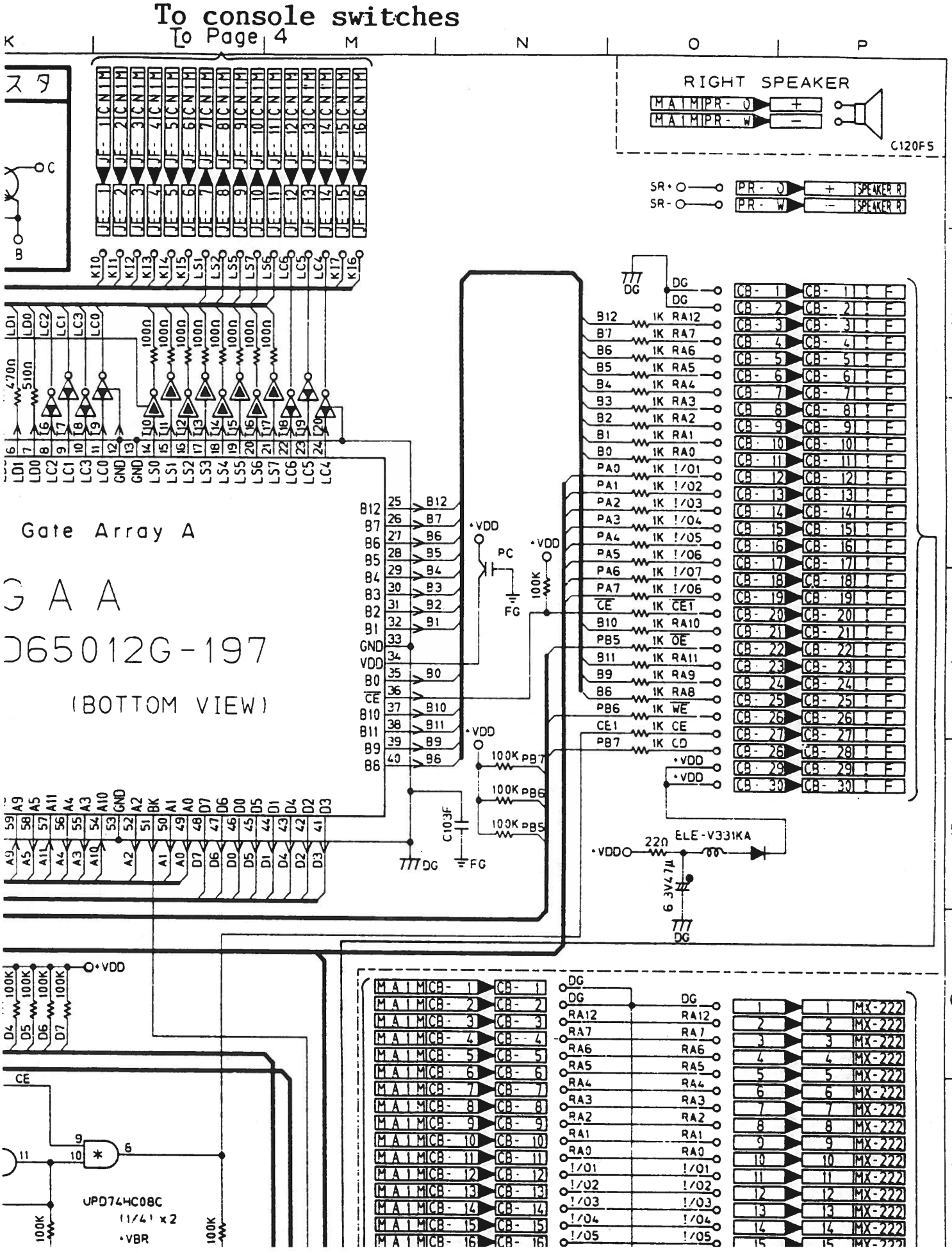

UPD78C10G CPU
VSS X1 X2 MODE0 RESET MODE1 INT1 NMI PC7 PC6 PC5 PC4 PC3 PC2 PC1 PC0 PB7 PB6 PB5 PB4 PB3 PB2 PB1 PB0 PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0
AVSS AN0 AN1 AN2 AN3 AN4 AN5 AN6 AN7 VAref AVCC RD WR ALE PF0 PF1 PF2 PF3 PF4 PF5 PF6 PF7 PD0 PD1 PD2 PD3 PD4 PD5 PD6 PD7 VDD VCC
RST DWN OFF APO SUS CH1 CH0
BND MDU VRF DTA MDE
+VDD
22K
DG
FG
AG
C221B
100K
RST
APO
CE
RCSA
RCSB
RCSA.B
RD
WR
D0~7
A0~15
C101
C102B
6.3V47μ
+VBR
PC
16V10μ
C103F
HM6264ALSP-15-1
HM6264ALSP-15-2
UPD23C256EAC-067
NC A12 A7 A6 A5 A4 A3 A2 A1 A0 I/O0 I/O1 I/O2 VSS I/O3 I/O4 I/O5 I/O6 I/O7 CS1 A10 OE A11 A9 A8 CS2 WE VCC
RAM1
RAM2
ROM1
+VDA
220Ω
T3
2SC1740SQ-TP-1
10K
6.3V330μ
(BO

To Console Switches

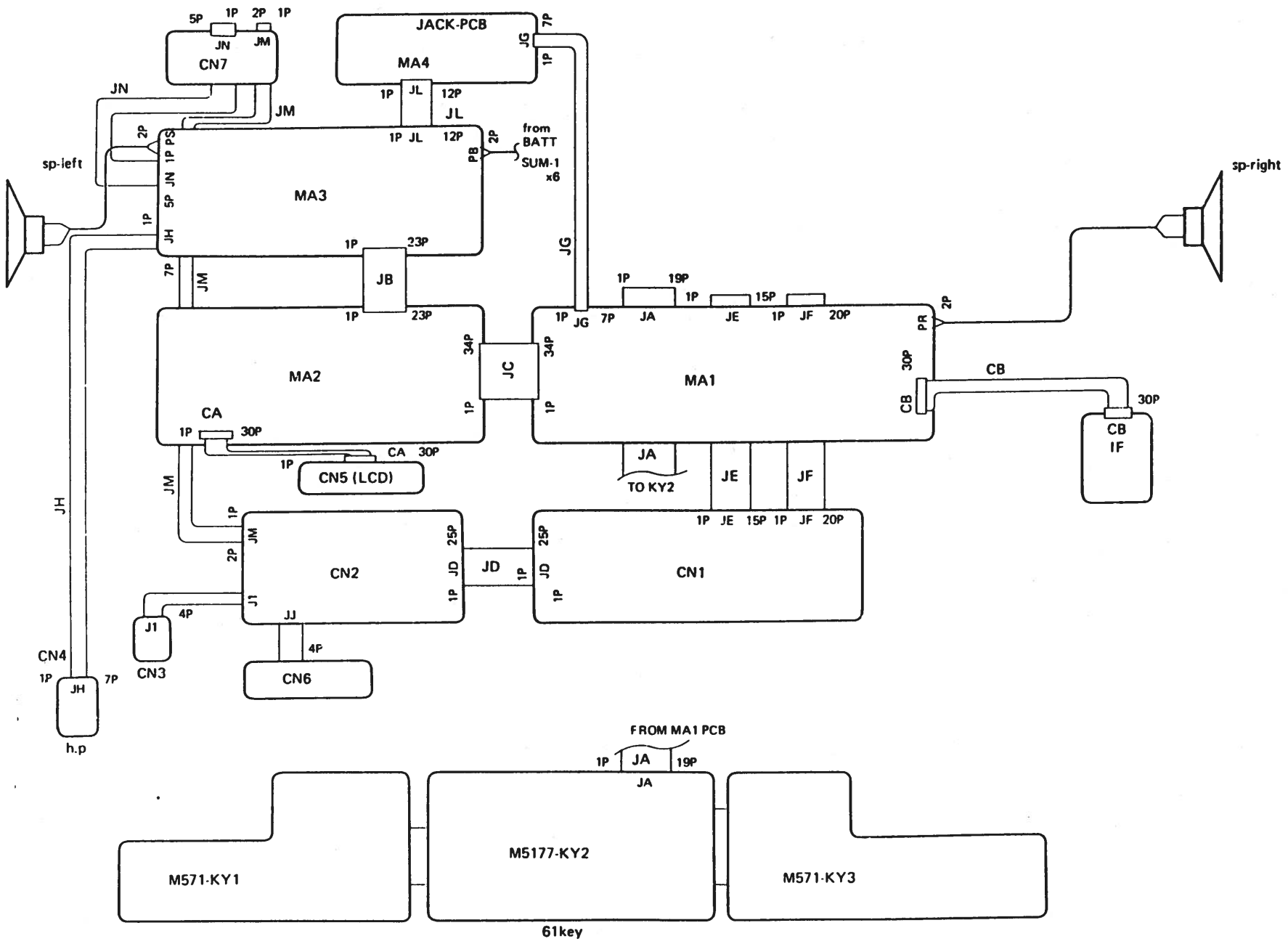
To Page 4


F
G
H
I
J
抵抗内蔵型ト
2SA1565-AC-T
47K
10K
VR2
10KB
33K
22K
6.3V47μ
PC
C103F
100K
T5
2SA933SQ-TP-T
K15
K10
K11
K12
K13
K14
K16
K17
56Ω
6.3V1000μ
C102B
BL02RN2-R62
MTS
MTV
MOS
MOV
MIA
MIC
220Ω
270Ω
C101B
SN74LS04N
(1/6) x 4
PC900
EF
RST
SUS
DWN
OFF
APO
CH1
CH0
UPD78C10G
CPU
VSS
X1
X2
MODE0
RESET
MODE1
INT1
NMI
AVSS
AVCC
VAref
ALE
BND
MDU
VRF
DTA
MDE
C221B
100K
CS
C7
C6
C2
C1
C0
WR
VDD
GND
RD
CE
RCSB
RCSA
A12
A15
FG


(BOTTOM VIEW)
UPD74HC08C
(1/4) x 2
UPD23C256EAC-068
ROM2
ELE-V331KA
MNRDM8J104
PCB-M4240-IF
To RAM Card
K
L
M
N
O
P
5
6
7
8
9
10
11

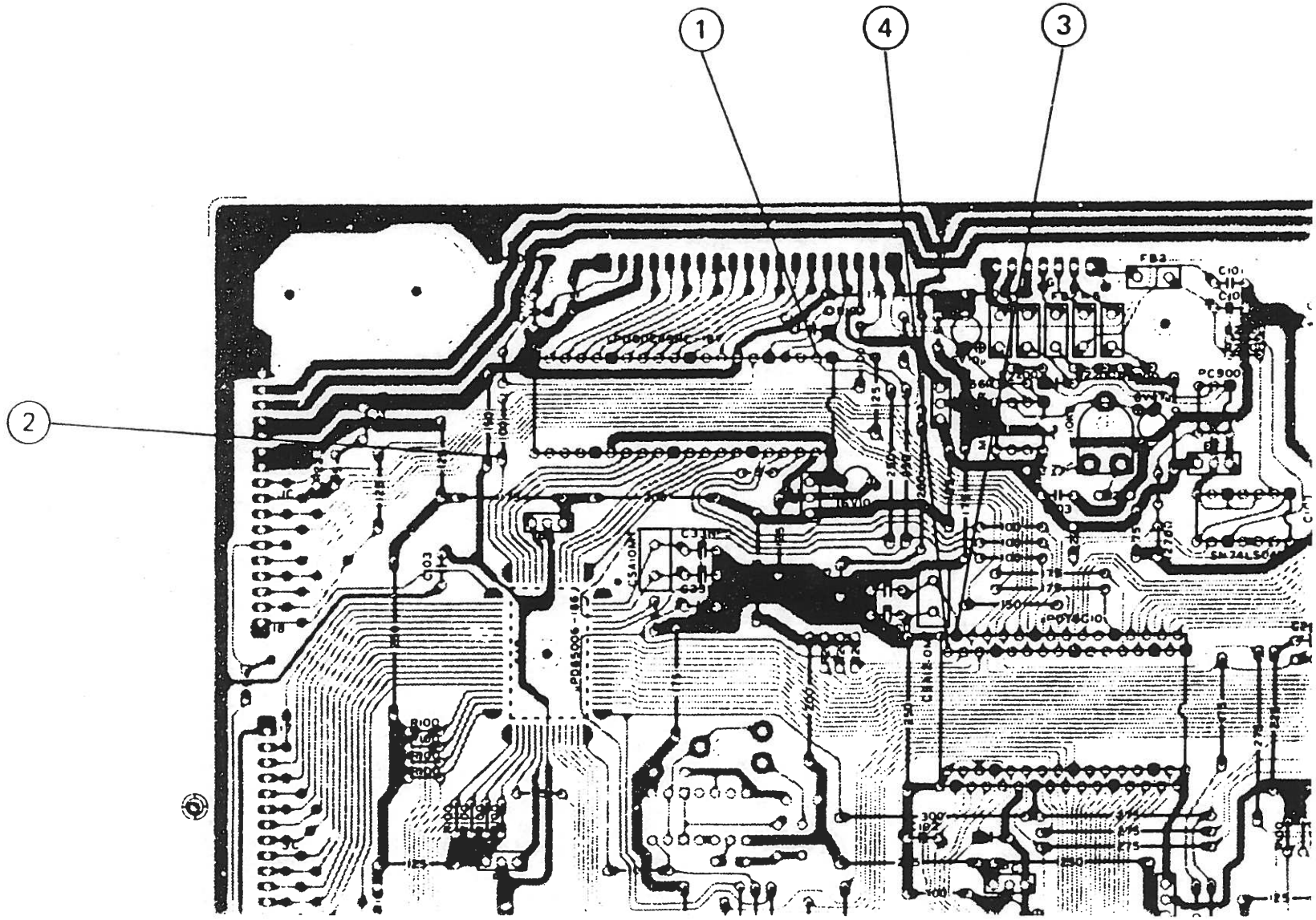

To console switches
To Page 4
K
M
N
O
P
RIGHT SPEAKER
C120F5
Gate Array A
G A A
D65012G-197
(BOTTOM VIEW)
UPD74HC08C
11/41 x2
•VDD
DG
FG
PC
100K
1K RA12
1K RA7
1K RA6
1K RA5
1K RA4
1K RA3
1K RA2
1K RA1
1K RA0
1K !/01
1K !/02
1K !/03
1K !/04
1K !/05
1K !/06
1K !/07
1K !/06
1K CE1
1K RA10
1K OE
1K RA11
1K RA9
1K RA8
1K WE
1K CE
1K CD
C103F
220
ELE-V331KA
6.3V47μ

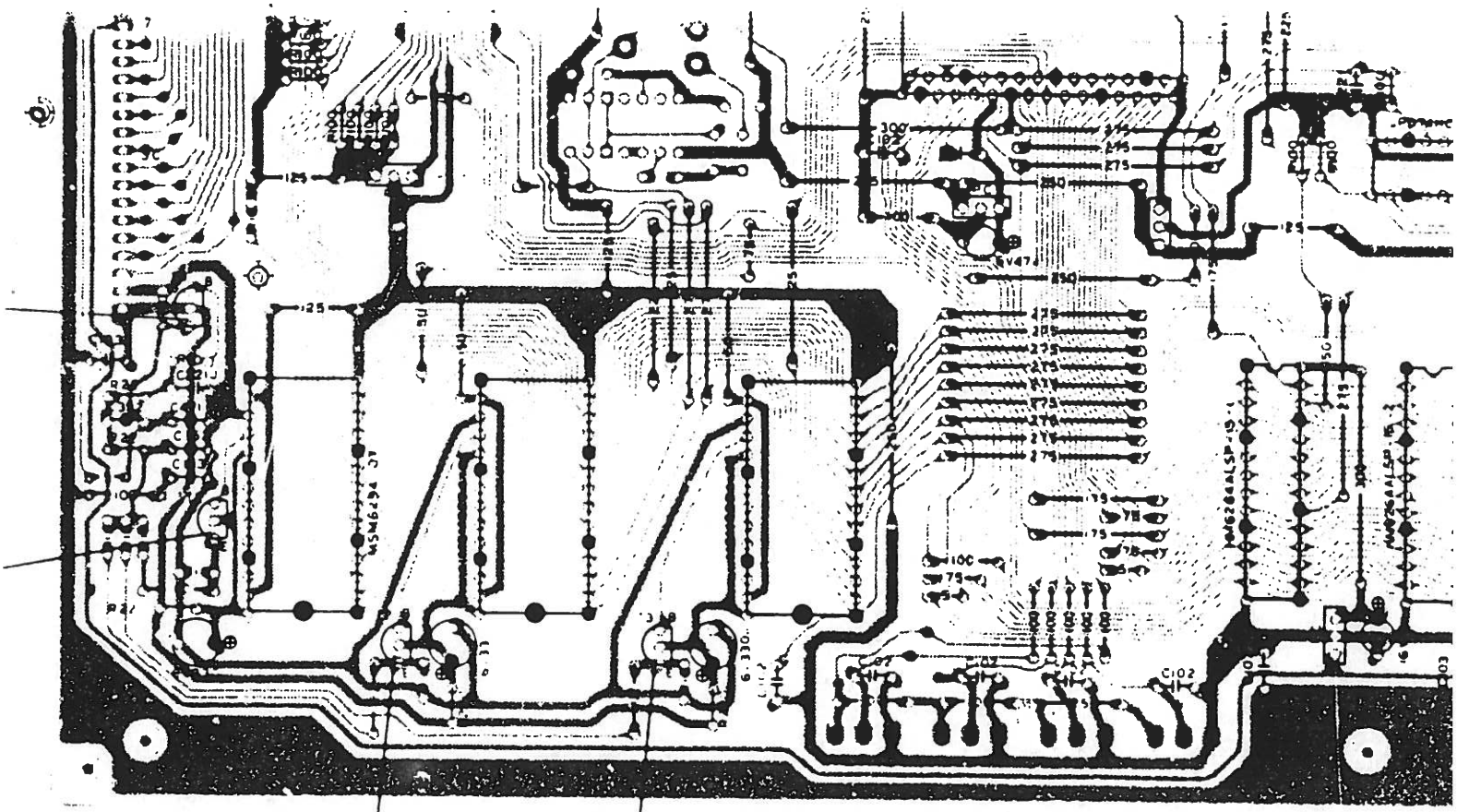
WIRING DIAGRAM



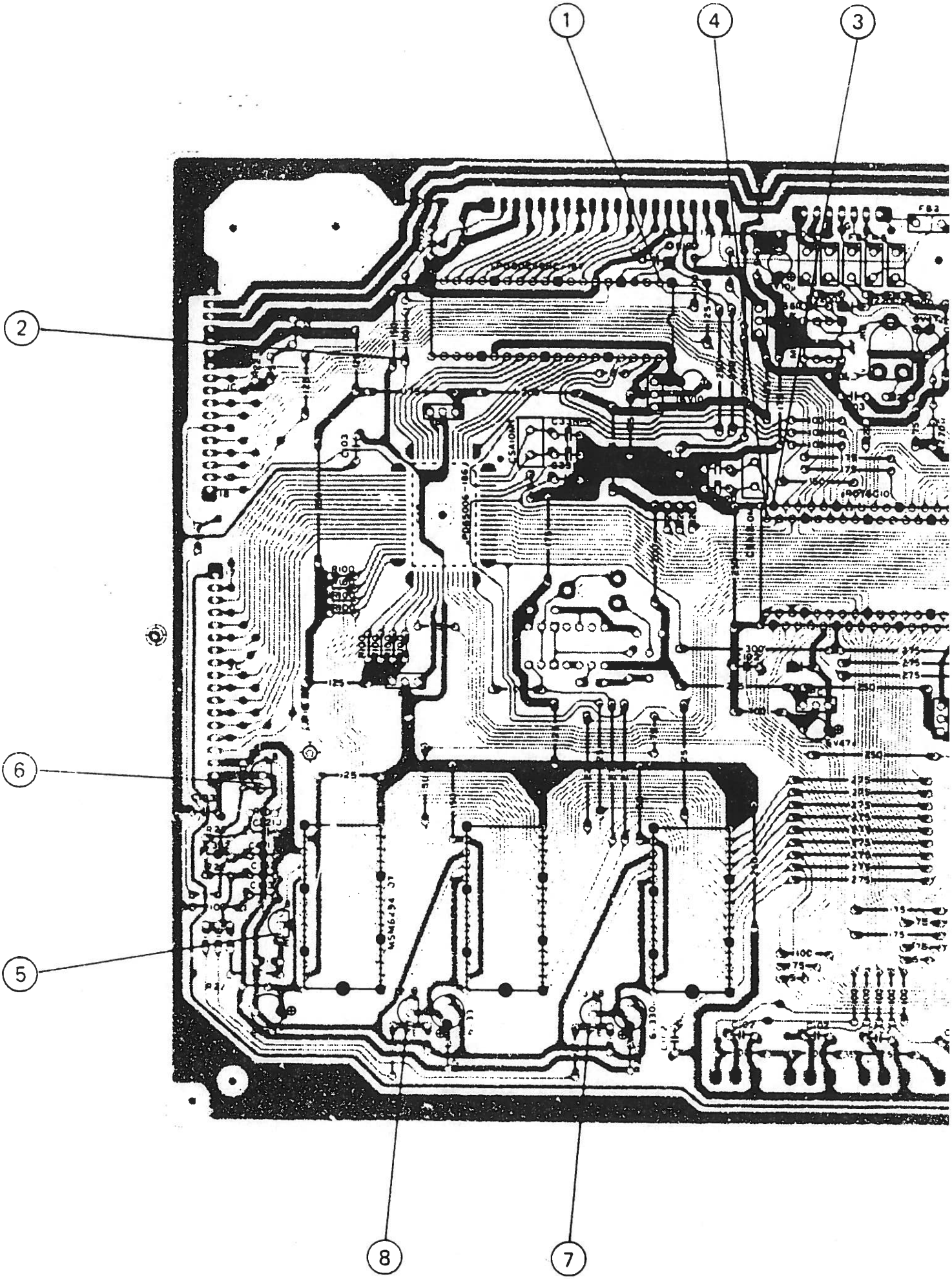
PCB VIEW

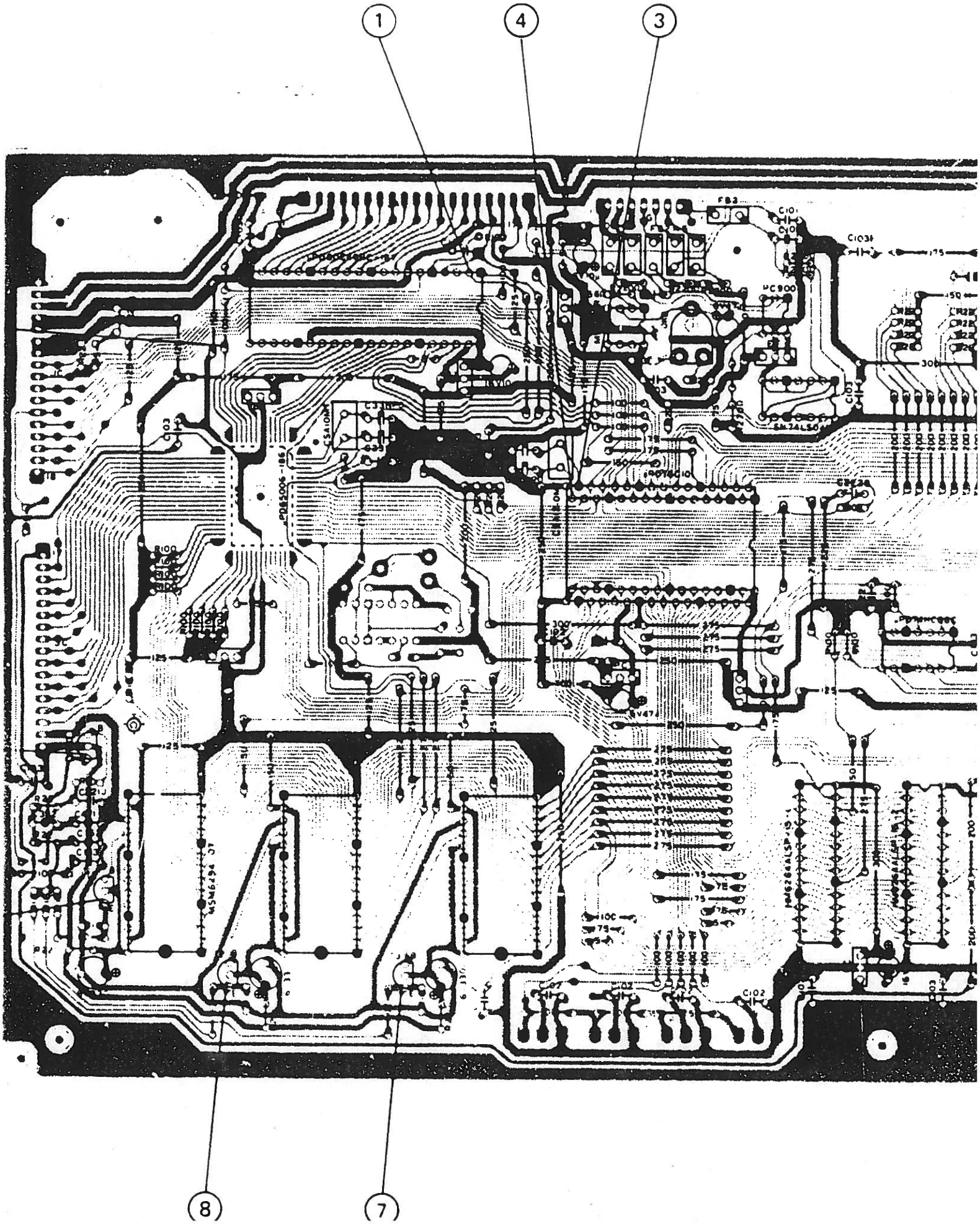
PCB M5245-MA1M

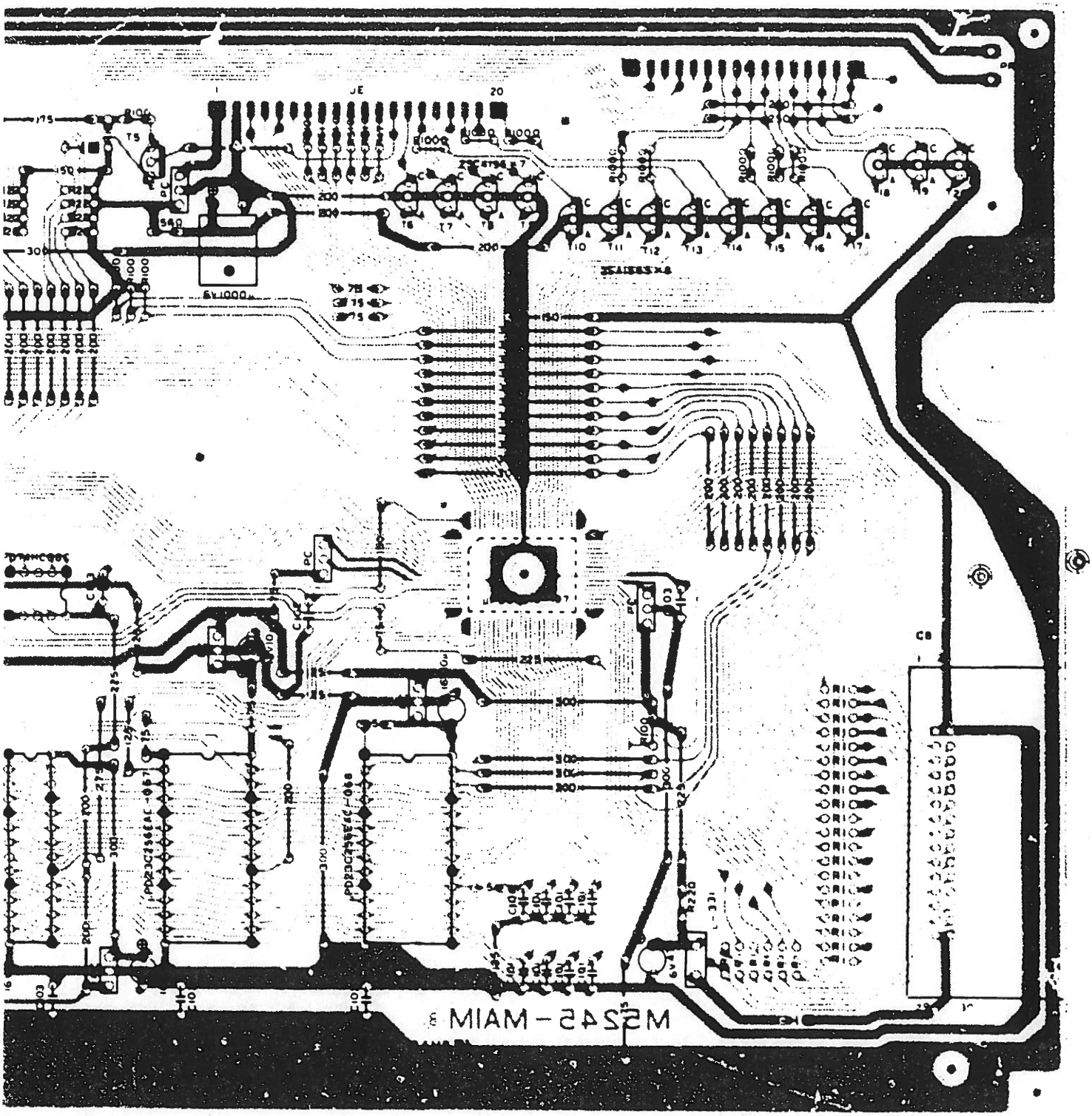




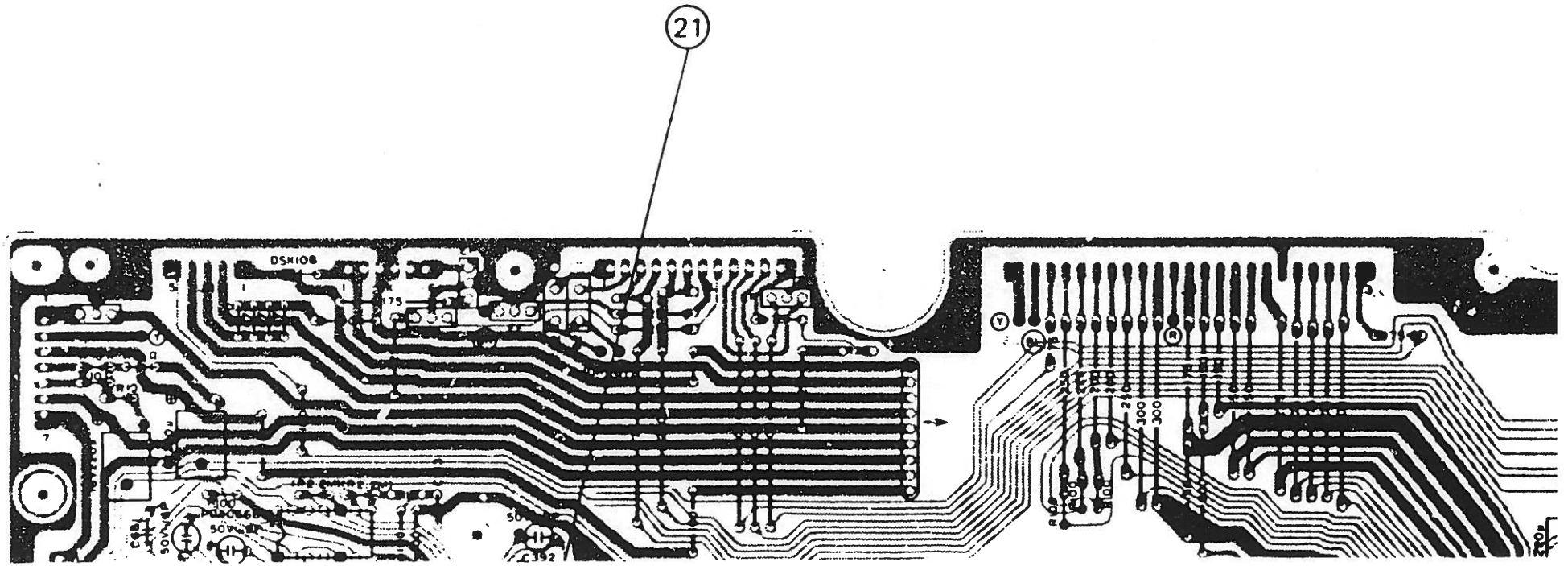
B1

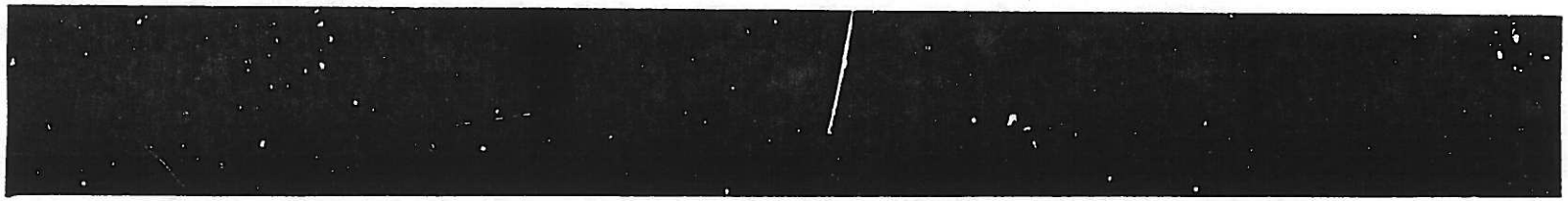

1
4
3
2
6
5
8
7


1
4
3
8
7

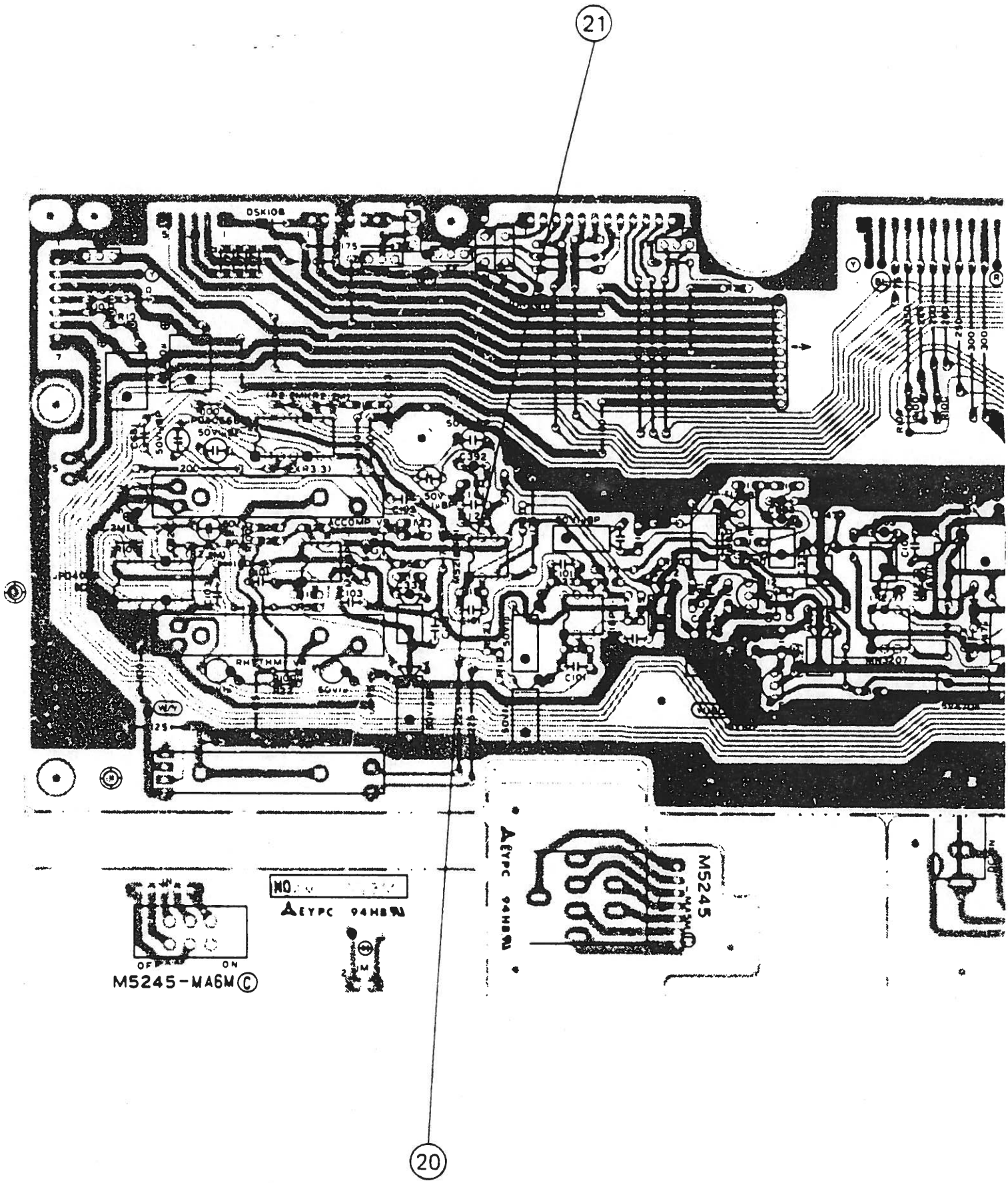

MS245 - MAIN 3

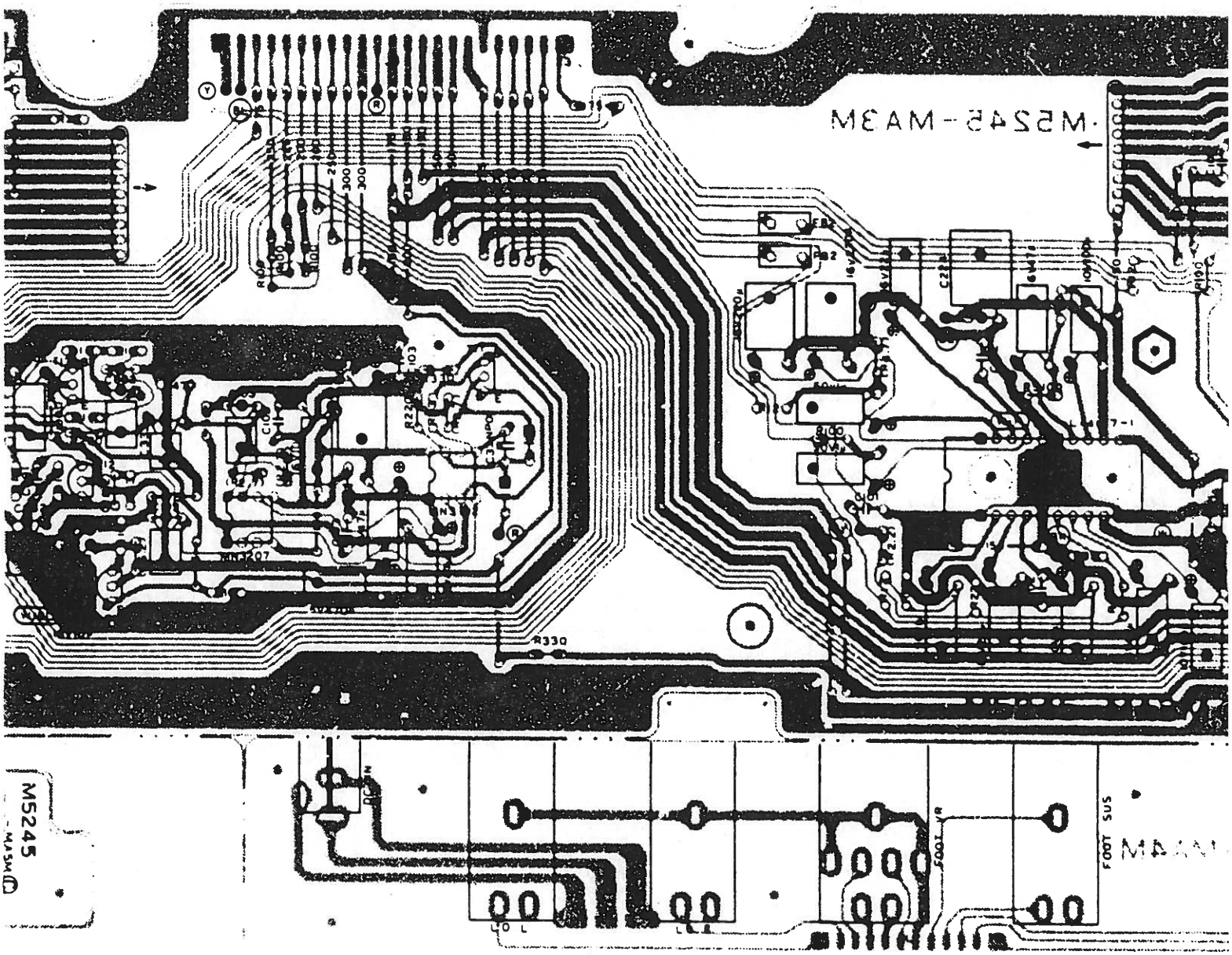
PCBs M5245-MA3M, MA4M, MA5M, MA6M

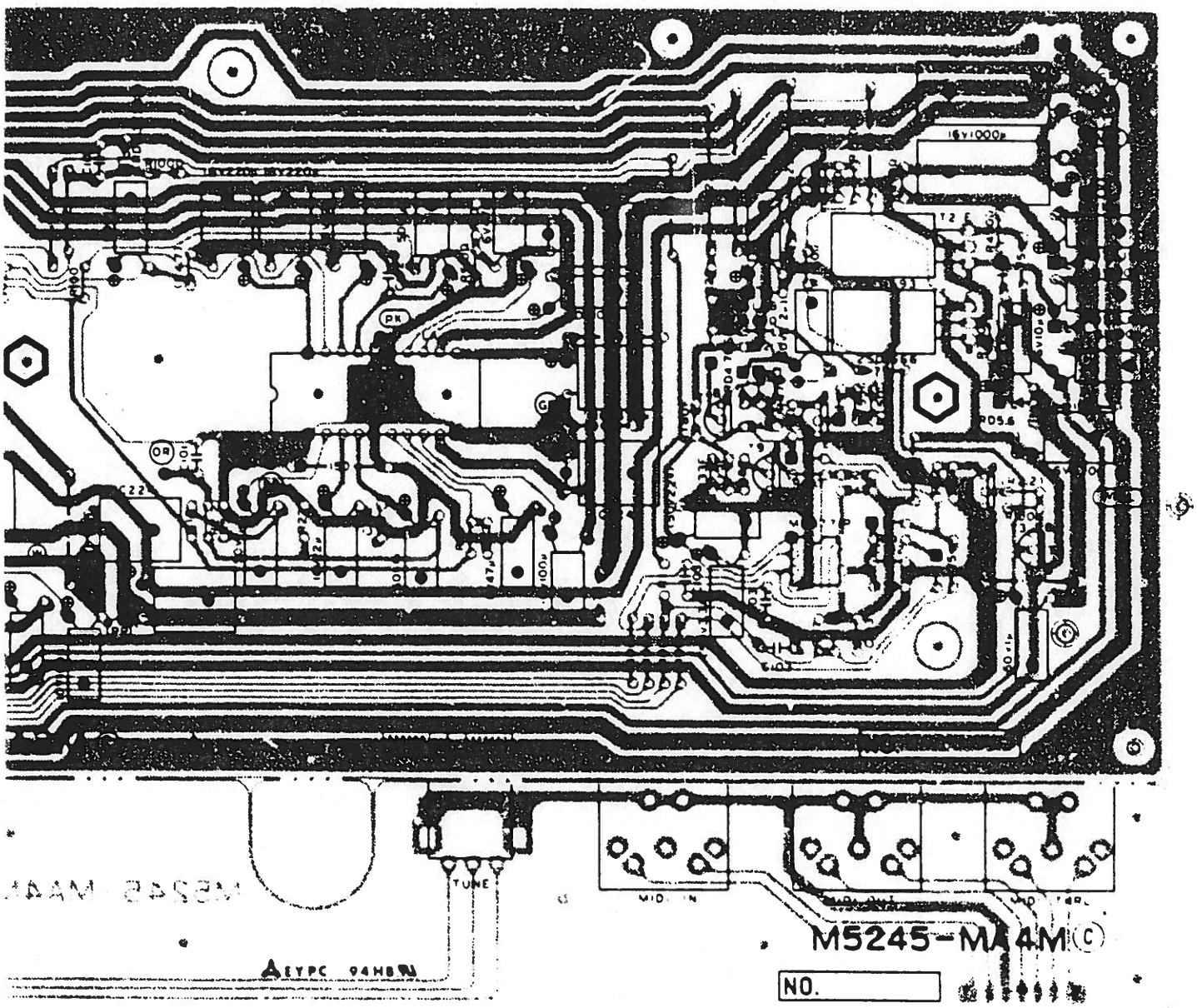


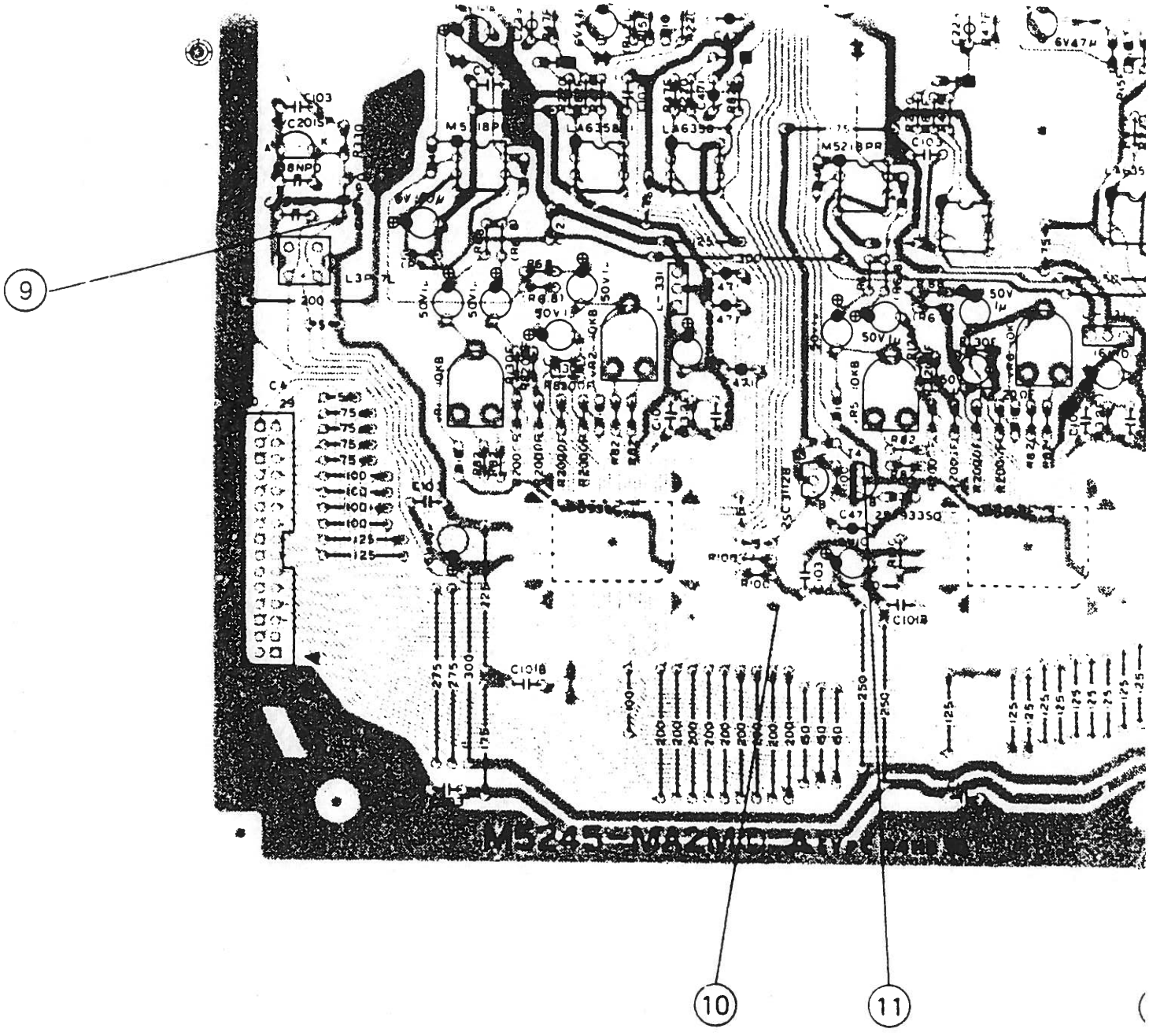


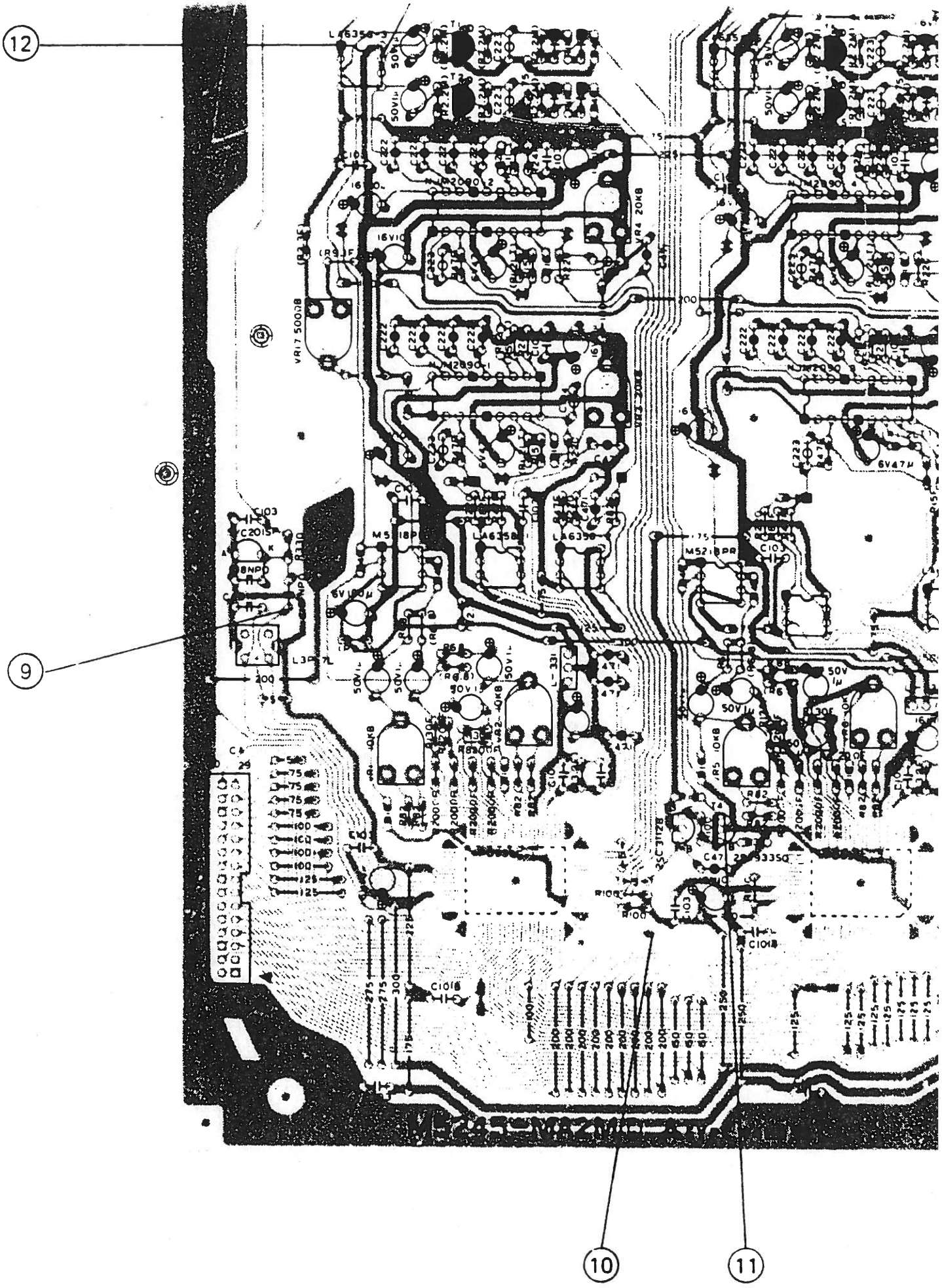
Pin No.	Terminal Name	In/Out	Function
12~19	DB0 ~ DB7	In/Out	Data bus (D0 ~ D7) between MSM6200.
20	Vss		Ground (0V) source.
26	VDD		+5V source.
27~34	P10 ~ P17	Out	Data bus (D0 ~ D7) between CPU.
36	P25 (CNT49)	In	Control signal input from CPU.
37	P26 (INT49)	Out	Interrupt signal output to CPU.
38	P27 (WR49)	Out	Timing pulse output for data read/write.

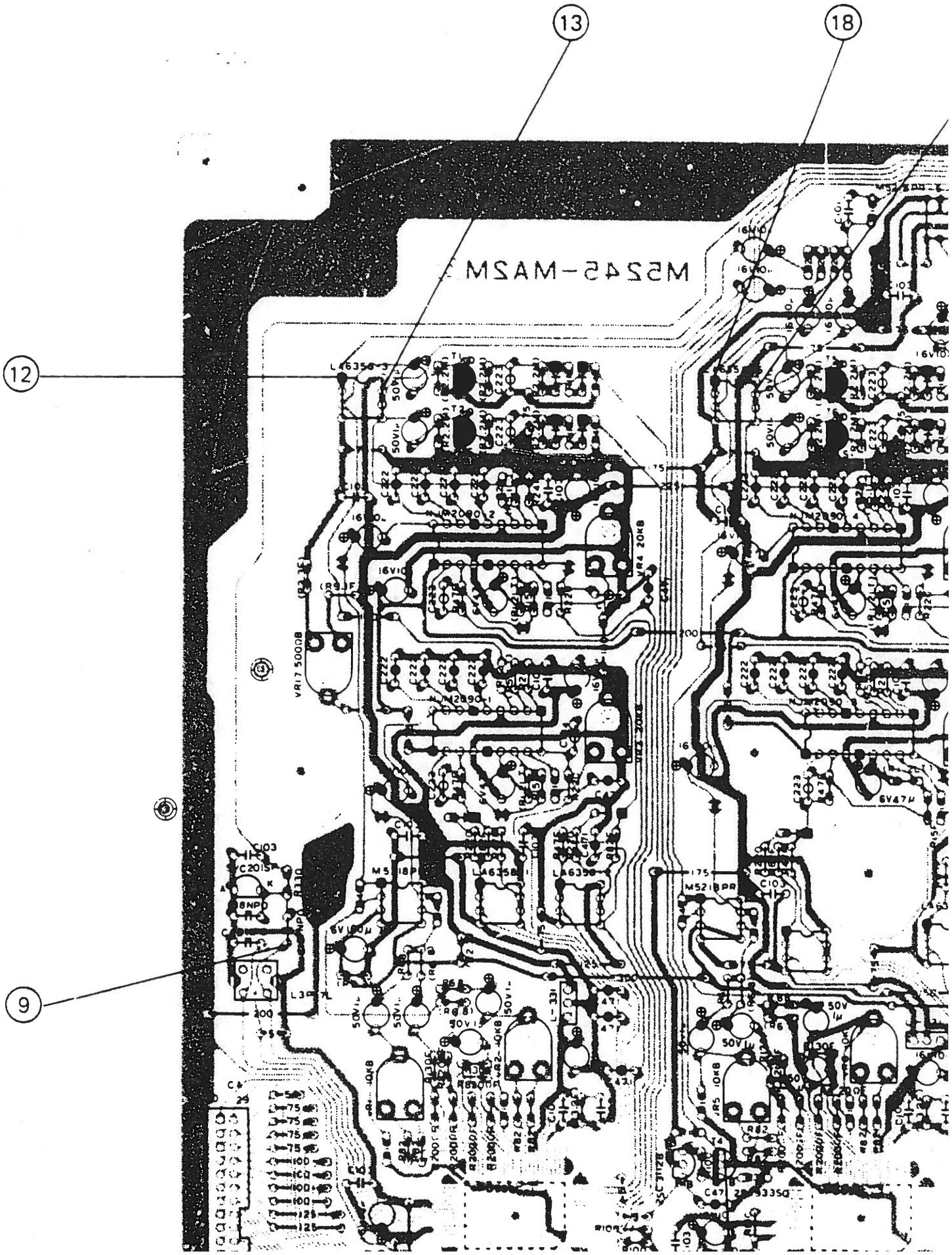

21
20
M5245-MA6M
M5245

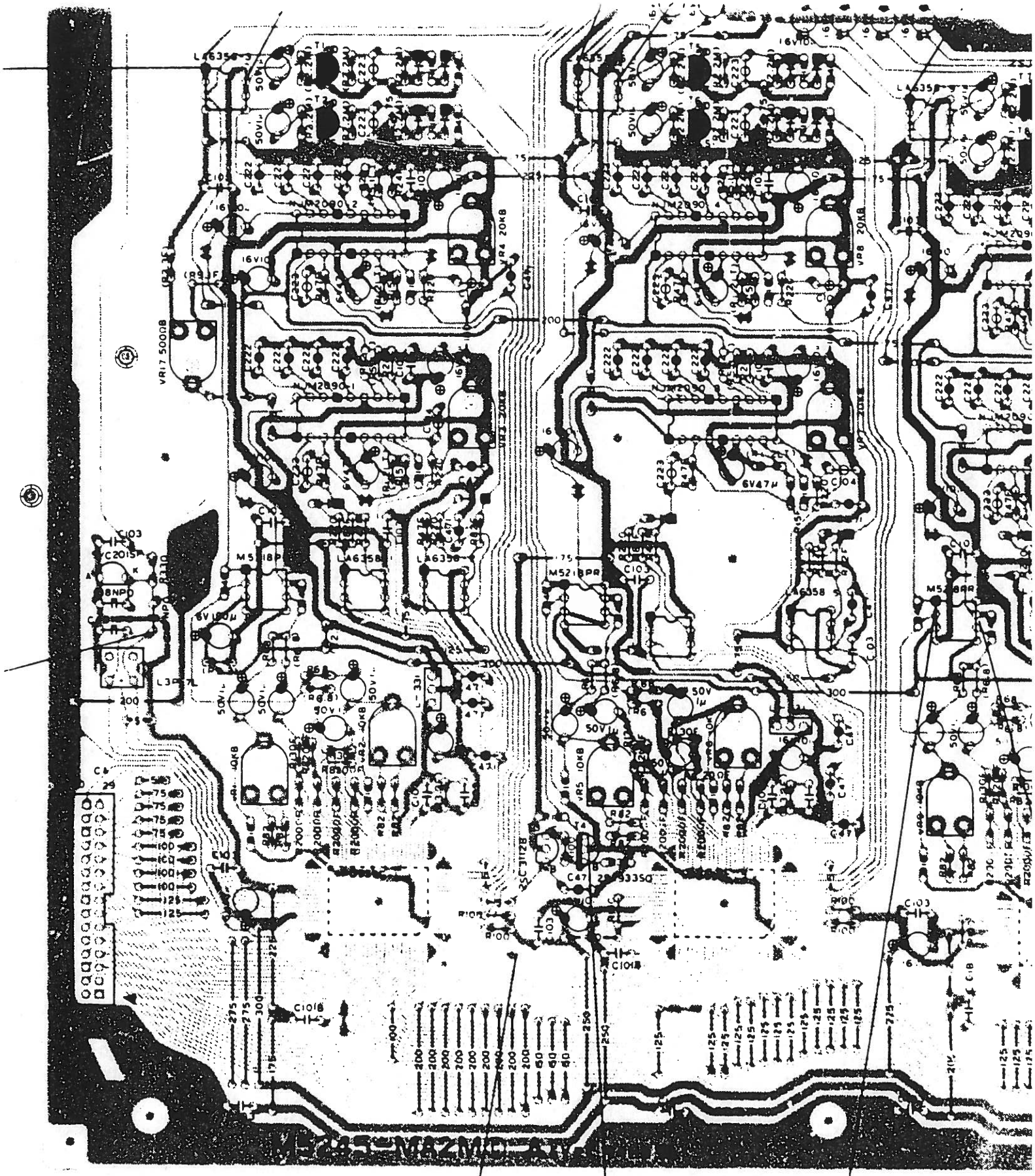

M5245 - MASM

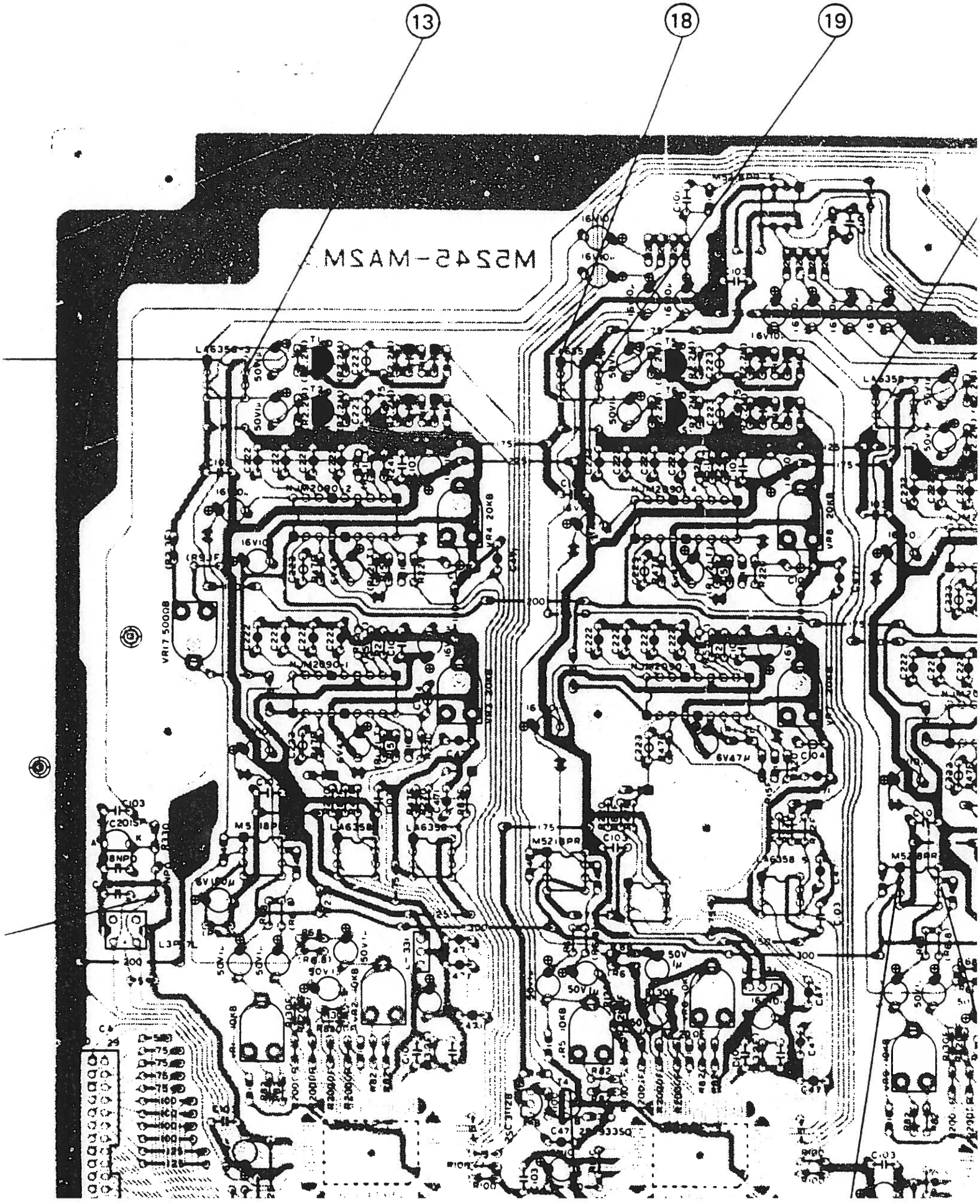

TUNE
MID IN
M5245-M4M
NO.

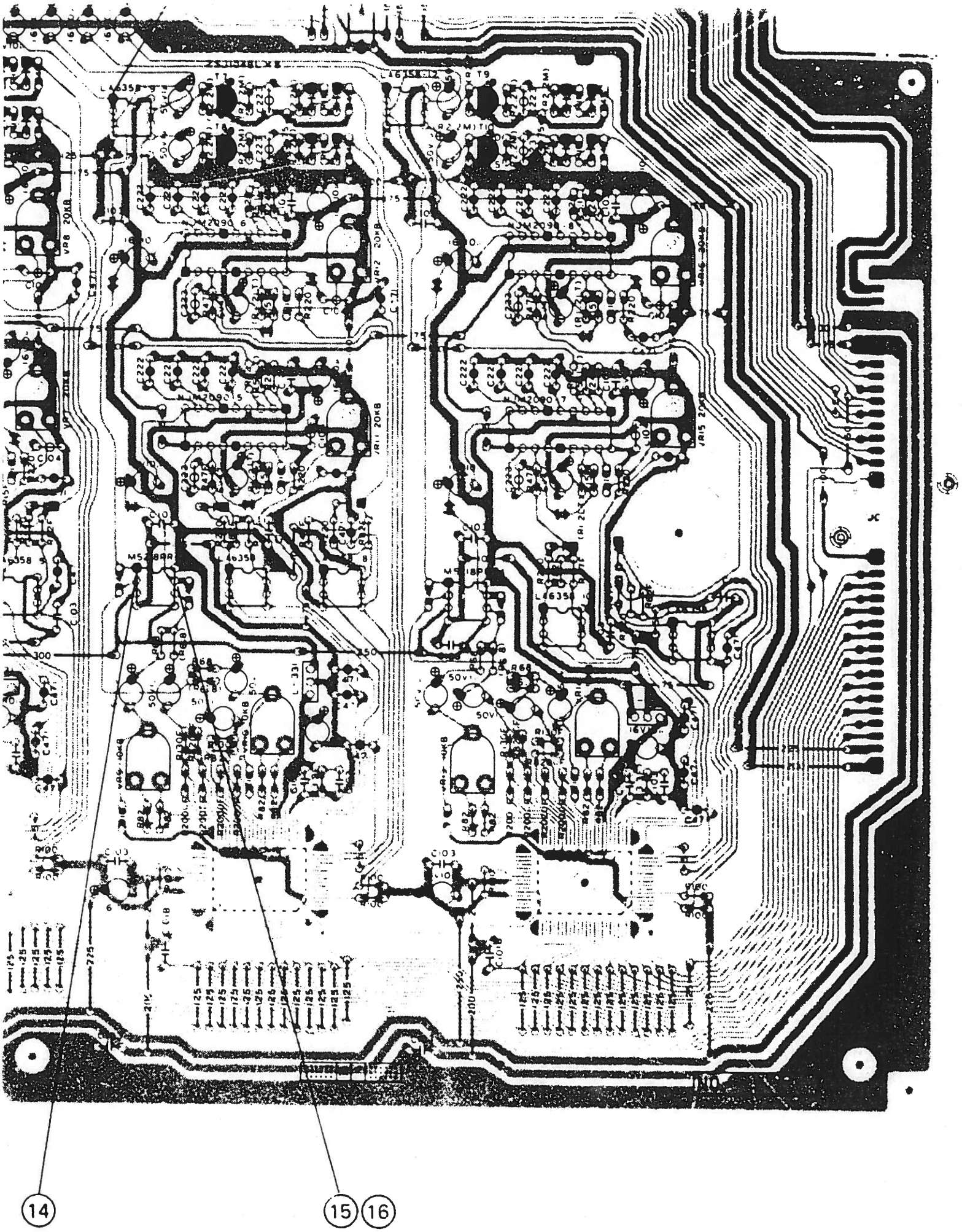

9
10
11


12
9
10
11


13
18
12
9

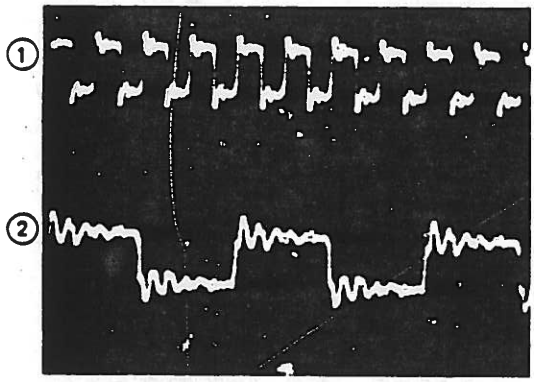

10
11
14


13
18
19


14
15
16

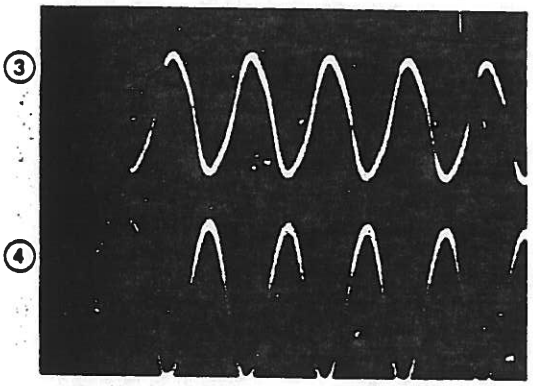
19
17

MAJOR WAVEFORMS



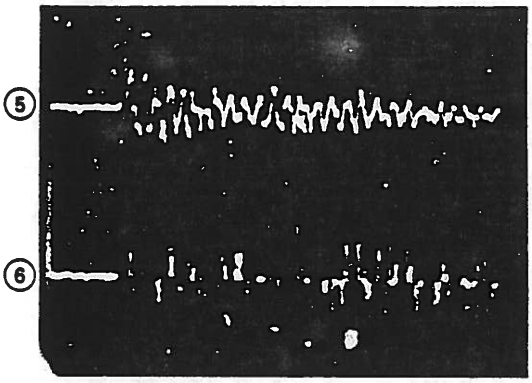
(1) Key CPU clock pulse
μPD8049HC-0187 pin 2
0.5V/Div., 0.1ms/Div.

(2) Key Controller clock pulse
μPD8049HC-187 pin 52
0.5V/Div., 0.1ms/Div.



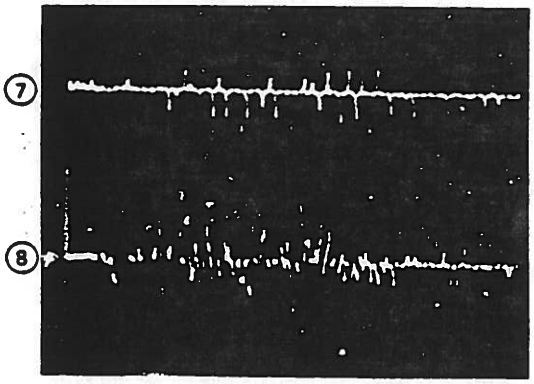
(3) CPU clock pulse
μPD78C10G pin 30
0.2V/Div., 0.05μs/Div.

(4) CPU clock pulse
μPD78C10G pin 31
0.2V/Div., 0.05μs/Div.



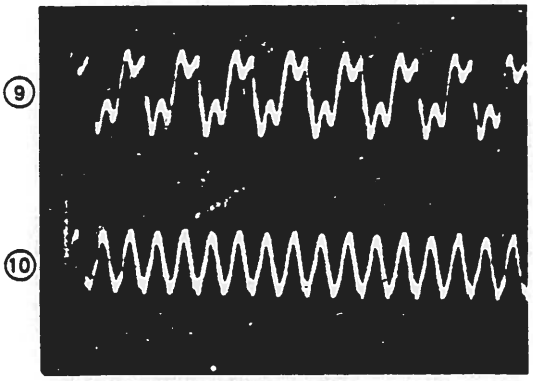
(5) Percussion signal
T1 emitter
20mV/Div., 20ms/Div.

(6) Percussion signal
T4 emitter
20mV/Div., 20ms/Div.
Rhythm: Rock 1
Tempo: Medium



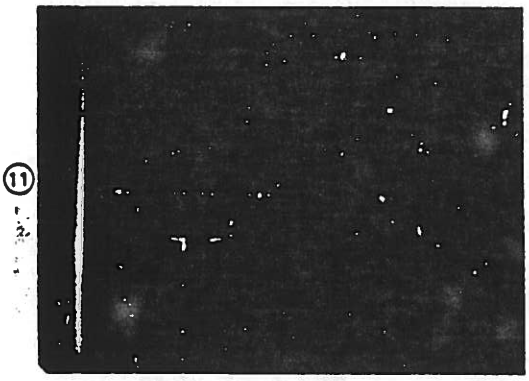
(7) Percussion signal
T3 emitter
50mV/Div., 10ms/Div.

(8) Percussion signal
T2 emitter
50mV/Div., 10ms/Div.
Rhythm: Samba
Tempo: Medium

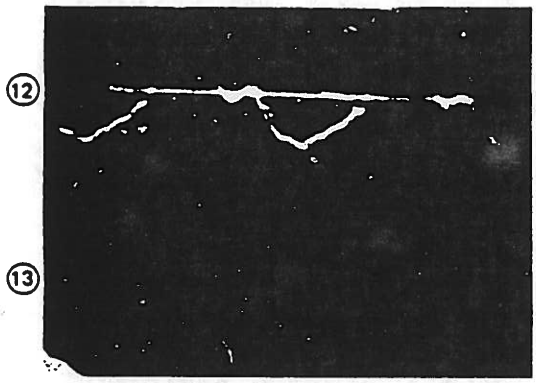


⑨ Music LSI clock pulse (Out)
μPD935G-1 pin 30
0.5V/Div., 0.1μs/Div.

⑩ Music LSI clock pulse (In)
μPD935G-1 pin 32
0.5V/Div., 0.1μs/Div.
PCB: M5245-MA2M

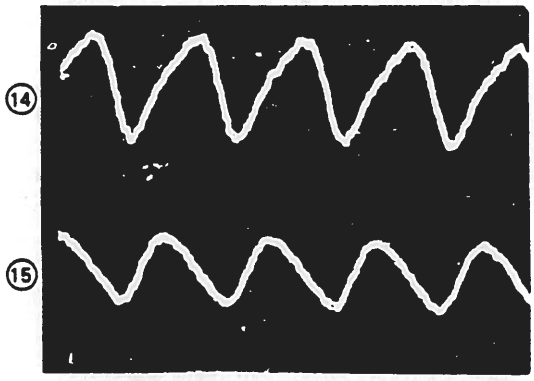


⑪ LFO signal
T4 emitter
10mV/Div., 20ms/Div.
PCB: M5245-MA2M



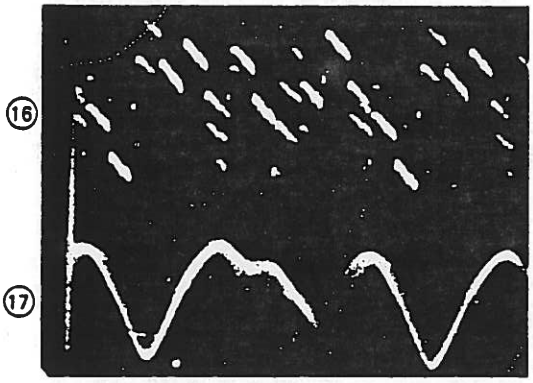
⑫ Bass signal
LA6358-3 pin 1
20mV/Div., 2ms/Div.
Tone: Synth. Ens

⑬ Obbligato signal
LA6358-3 pin 7
10mV/Div., 2ms/Div.
Tone Jazz Organ
Chord: A
PCB: M5245-MA2M



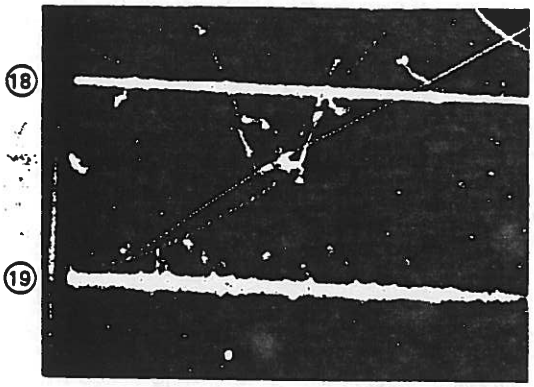
⑭ Upper tone signal
M5218PR-3 pin 1
5mV/Div., 1ms/Div.

⑮ Upper tone signal
M5218PR-3 pin 7
5mV/Div., 1ms/Div.
Tone: Flute
Key: A5
PCB: M5245-MA2M



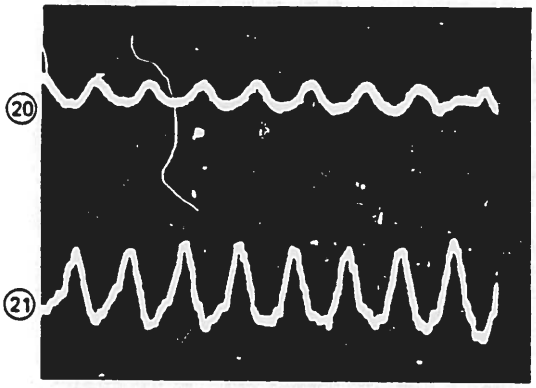
⑯ Unfiltered Upper tone
M5218PR-3 pin 7
20mV/Div., 0.5ms/Div.

⑰ Filterd Upper tone
LA6358-9 pin 1
10mV/Div., 0.5ms/Div.
Tone: Jazz Organ
Key: A5
PCB: M5245-MA2M



⑱ Chord signal
LA6358-6 pin 1
5mV/Div., 0.5ms/Div.

⑲ Chord signal
LA6358-6 pin 7
5mV/Div., 0.5mV/Div.
Tone: Jazz Organ
Chord: A
PCB: M5245-MA2M



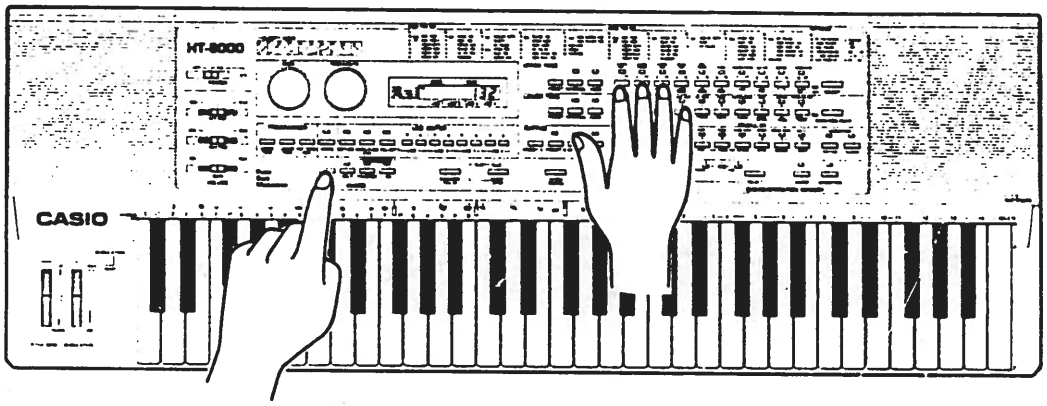
⑳ Stereo Chorus Circuit input
M5218PR-1 pin 1
5mV/Div., 2ms/Div.

㉑ Stereo Chorus Circuit output
M5218PR-1 pin 7
5mV/Div., 2ms/Div.
Tone : Flute
Key : A5
PCB : M5245-MA3M

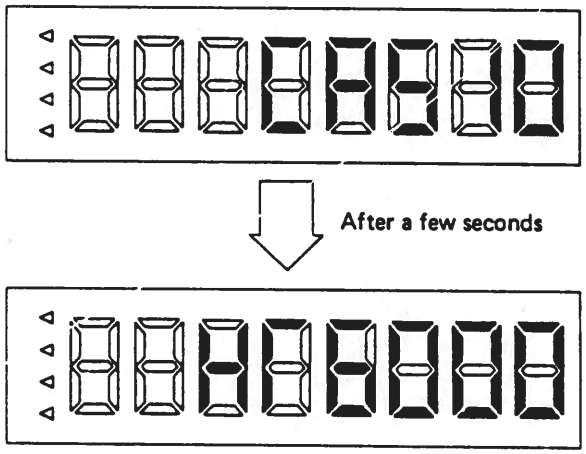
SELF DIAGNOSTIC PROGRAM/ADJUSTMENT

The HT-6000 is equipped with self diagnostic program which checks RAMs, LCD, and APO (Auto Power Off) functions.
Also, the program enables the HT-6000 to be set in VCF adjustment mode.

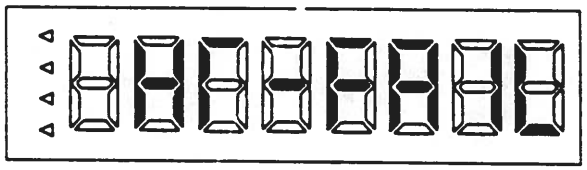
1. To execute the self diagnostic program, press Upper Tone 1 ~ 3 switches simultaneously and then press CHORD "OFF" switch.



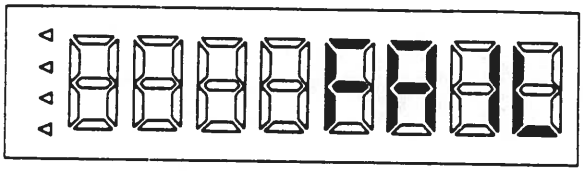
2. The display shows;



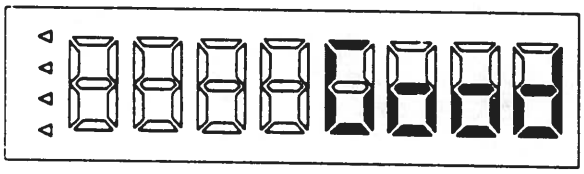
3. After then, if address lines are not proper, it indicates;



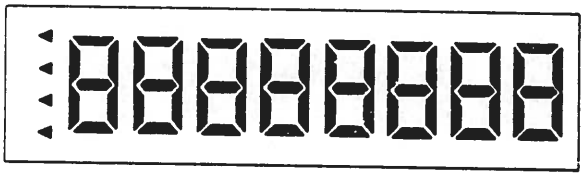
4. When the RAMs are improper, the LCD shows;



5. When the address bus line and RAMs are properly functioning, display indicates;

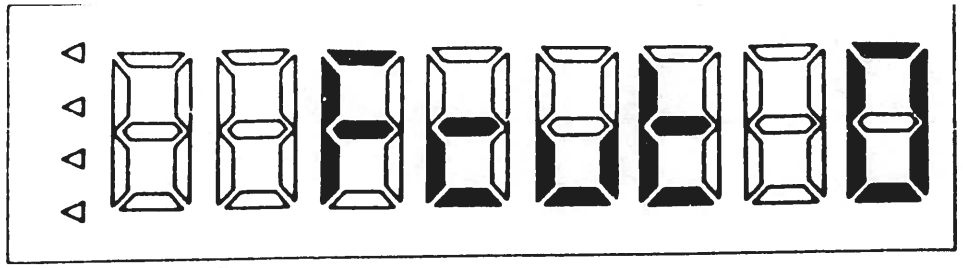


6. LCD then display all the segments.



Each segment will be displayed one by one.

7. After then CPU automatically shuts the power off by signal APO.

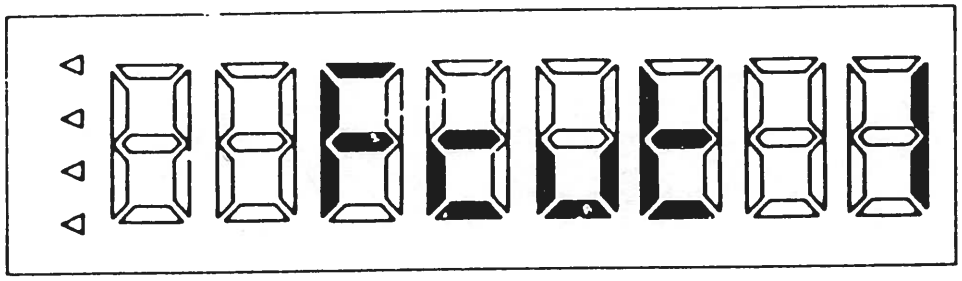


2. Adjust variable resistor VR17 on PCB M5245-MA2M so that the voltage of VCF 1 (NJM-2090-1) pin 3 (checkpoint (A1)) is 2.00V ± 2mV.

3. Make sure that pin 3 voltages of VCF 2 (NJM-2090-2) ~ VCF 8 (NJM-2090-8) are within 2.00V ± 15mV.

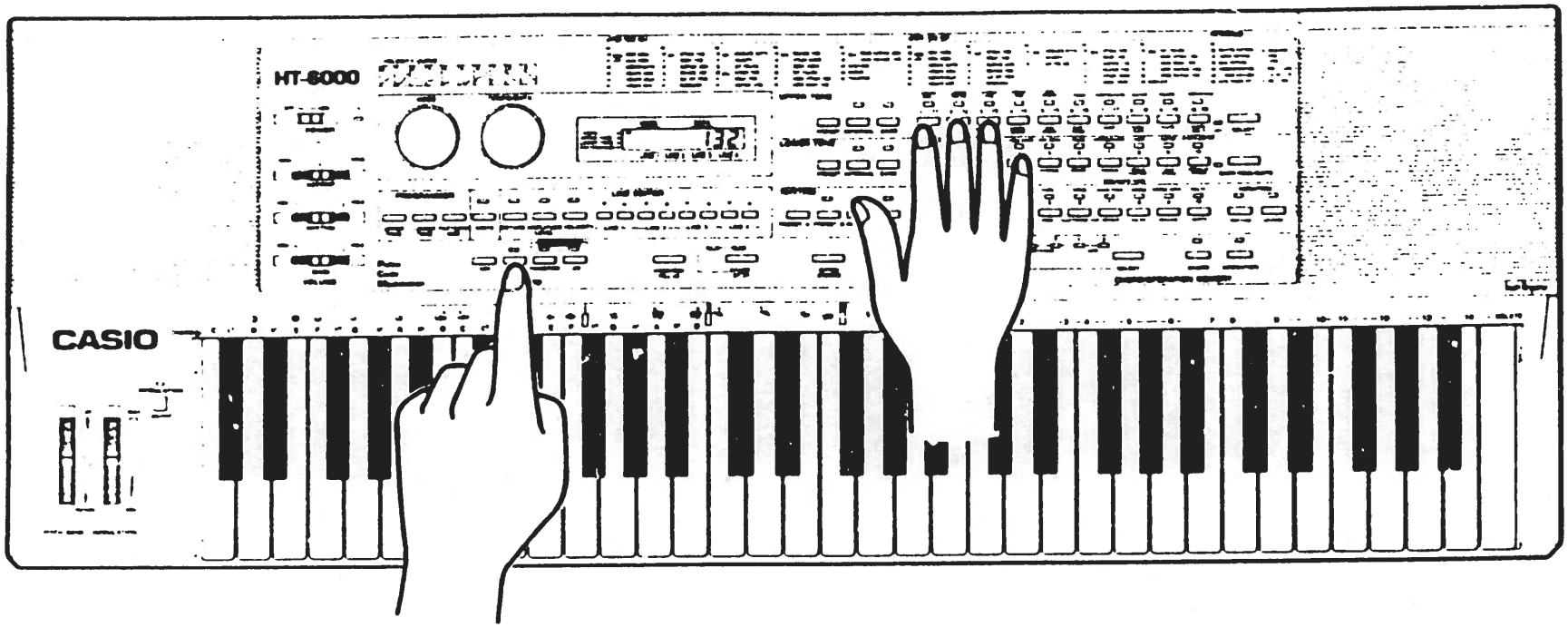
VCF Cutoff Frequency Adjustment

1. Sequentially from VCF bias voltage adjustment, press CHORD "ON" button.
   Display then indicates;



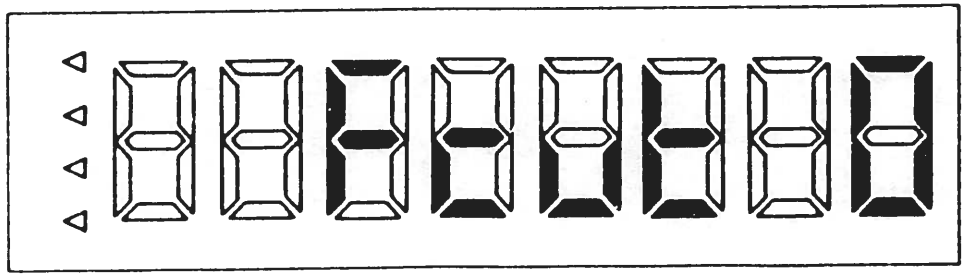
VCF Adjustments

To execute VCF Adjustment mode program, press Upper Tone 1, 2, 3 switches simultaneously and then press "SPLIT" button.



VCF Bias Voltage Adjustment

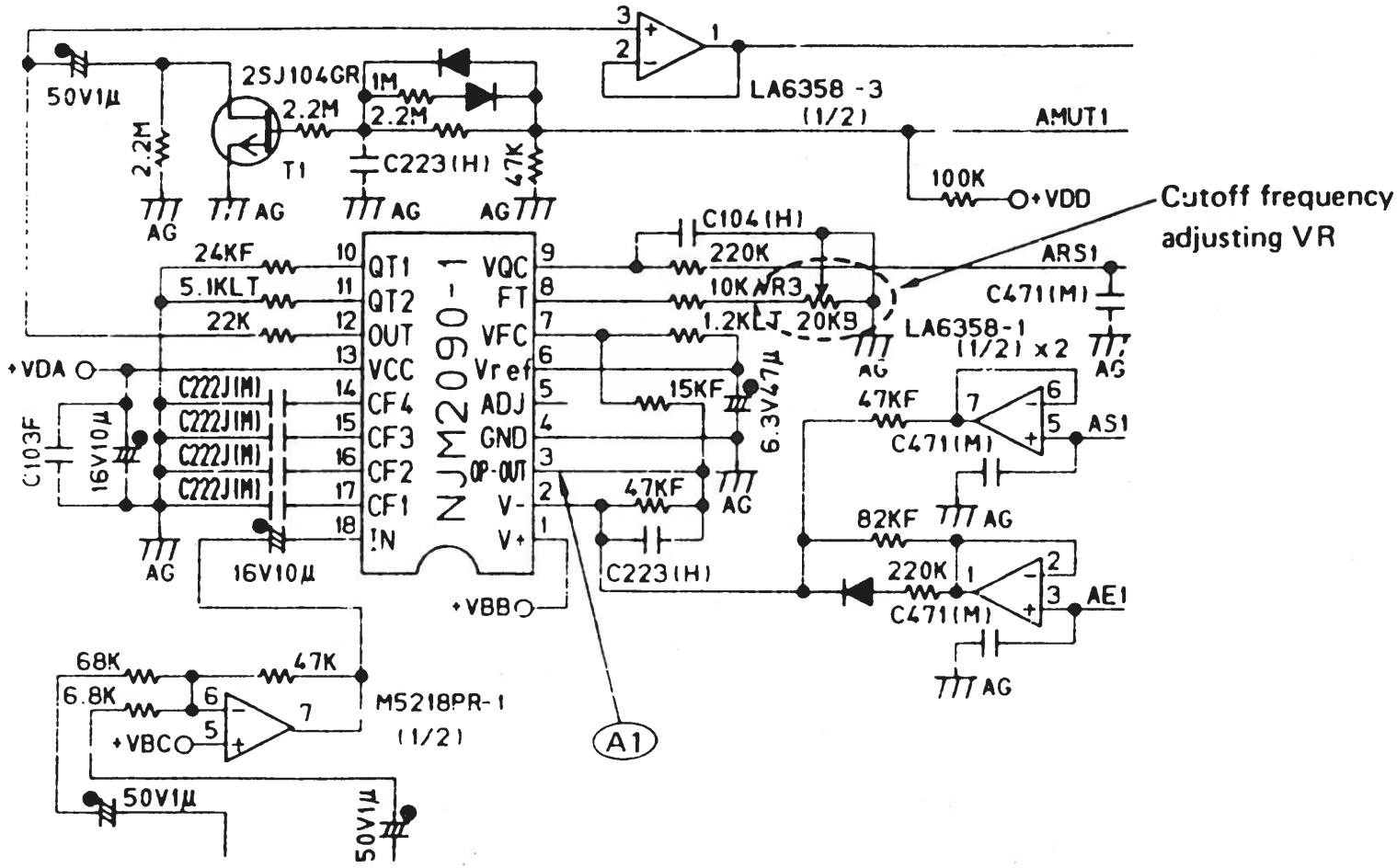
1. By the above operation, the display shows;



2. Adjust variable resistor VR17 on PCB M5245 MA2M so that the voltage of VCF 1 (NJM-2090-1)

6. Observing VCF's pin 12 waveform, turn cutoff frequency adjustment VRs (VR3, VR4, VR7, VR8, VR11, VR12, VR15, and VR16) so that the peak to peak voltage of the waveform is 1/4 of the formerly checked voltage in the above procedure 3.

7. Perform the above procedures 1 ~ 6 for all the VCFs.

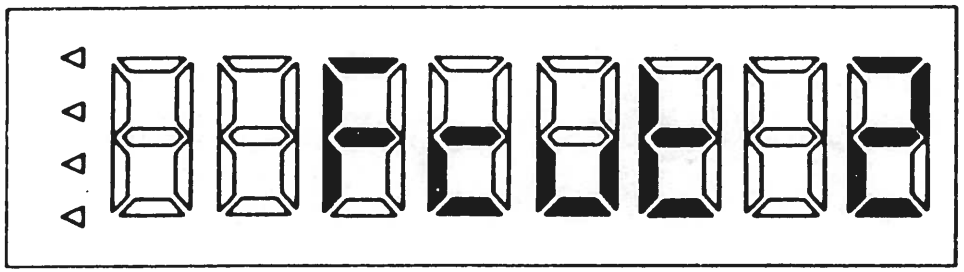


2. Music LSIs then provide the following voltages and waveform to corresponding VCF pins.

OP OUT (pin 3)	DC 0.5 ~ 0.6V
VQC (pin 9)	DC 0.5 ~ 0.6V
IN (pin 18)	640 Hz 0.46 ~ 0.52 Vrms sine wave

3. Connecting an oscilloscope to pin 12 of a VCF (NJM-2090), check the peak to peak to peak voltage of the waveform.

4. Press CHORD "FINGERED" button.
   The LCD indicates;



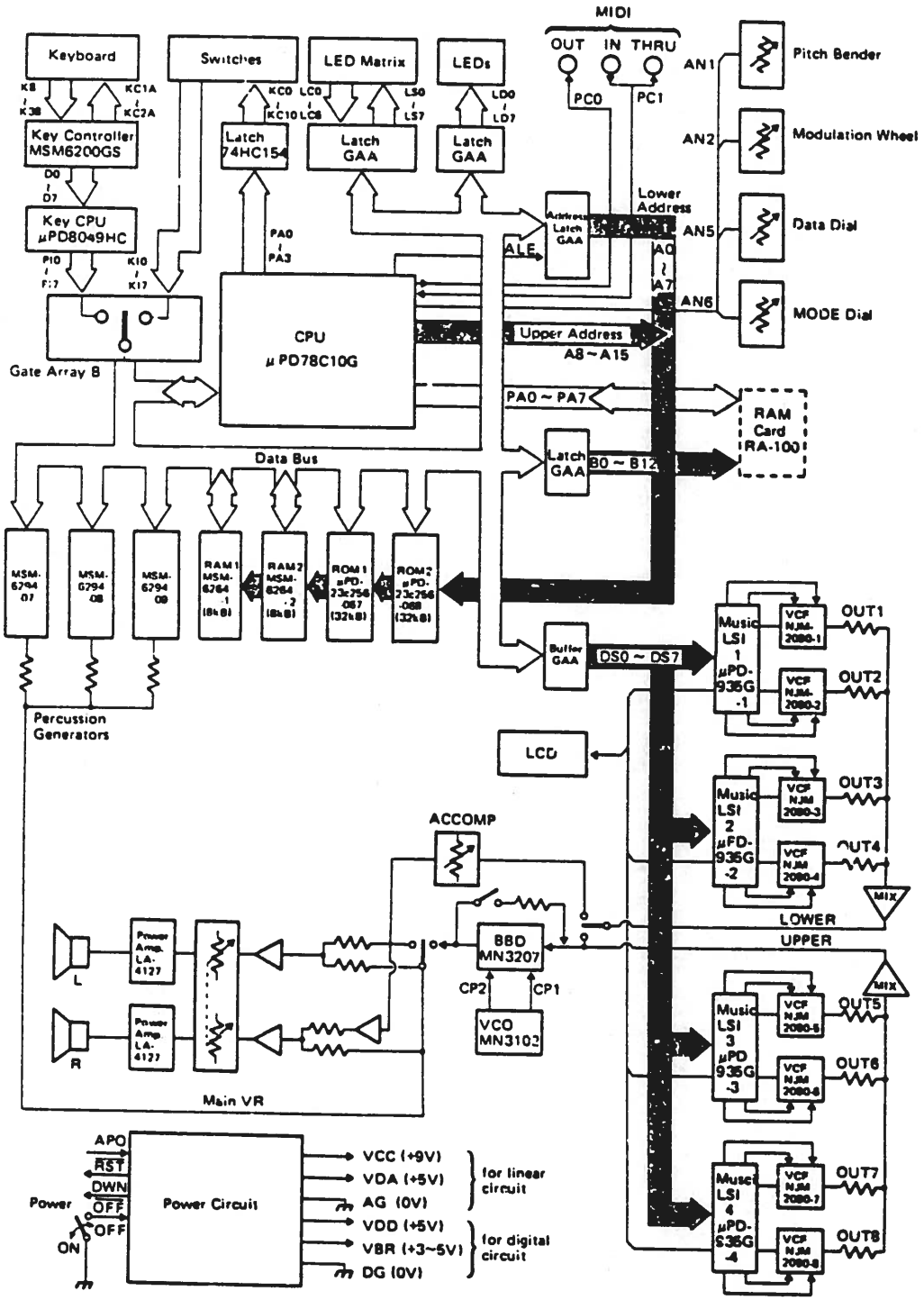
5. Music LSIs provide the following voltages and waveform to corresponding VCF pins.

OP OUT (pin 3)	DC 2V
VQC (pin 9)	DC 0.5 ~ 0.6V
IN (pin 18)	640 Hz 0.46 ~ 0.52 Vrms since wave

6. Observing VCF's pin 12 waveform, turn cutoff frequency adjustment VRs (VR3, VR4, VR7, VR8, VR11, VR12, VR15, and VR16) so that the peak to peak voltage of the waveform is 1/4 of the formerly checked voltage in the above procedure 3.

7. Perform the above procedures 1 ~ 6 for all the VCFs.

BLOCK DIAGRAM

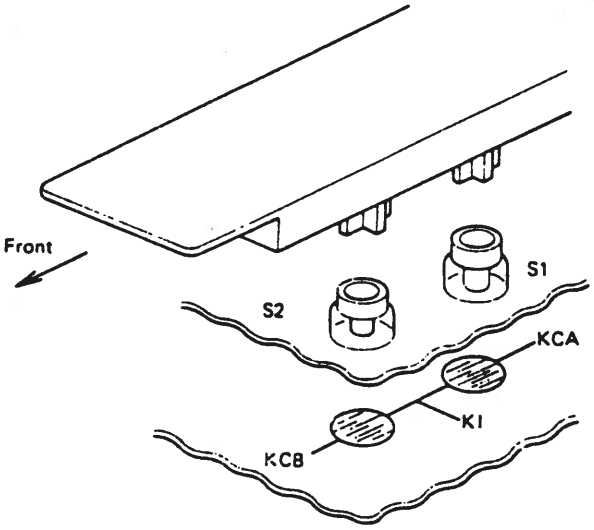


B14

KEYBAORD

Key Touch Speed Detection

Each key has two key contact switches S1 and S2.



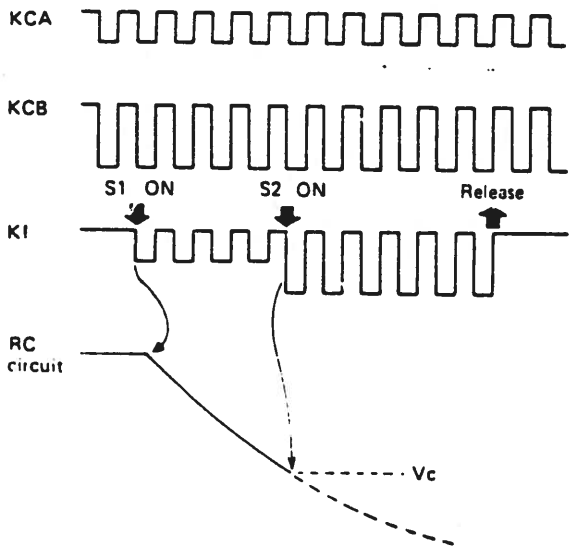
When a key is hit, S1 turns on first, then S2.

The interval time between turning on of S1 and S2 varies according to the touch speed of the key.

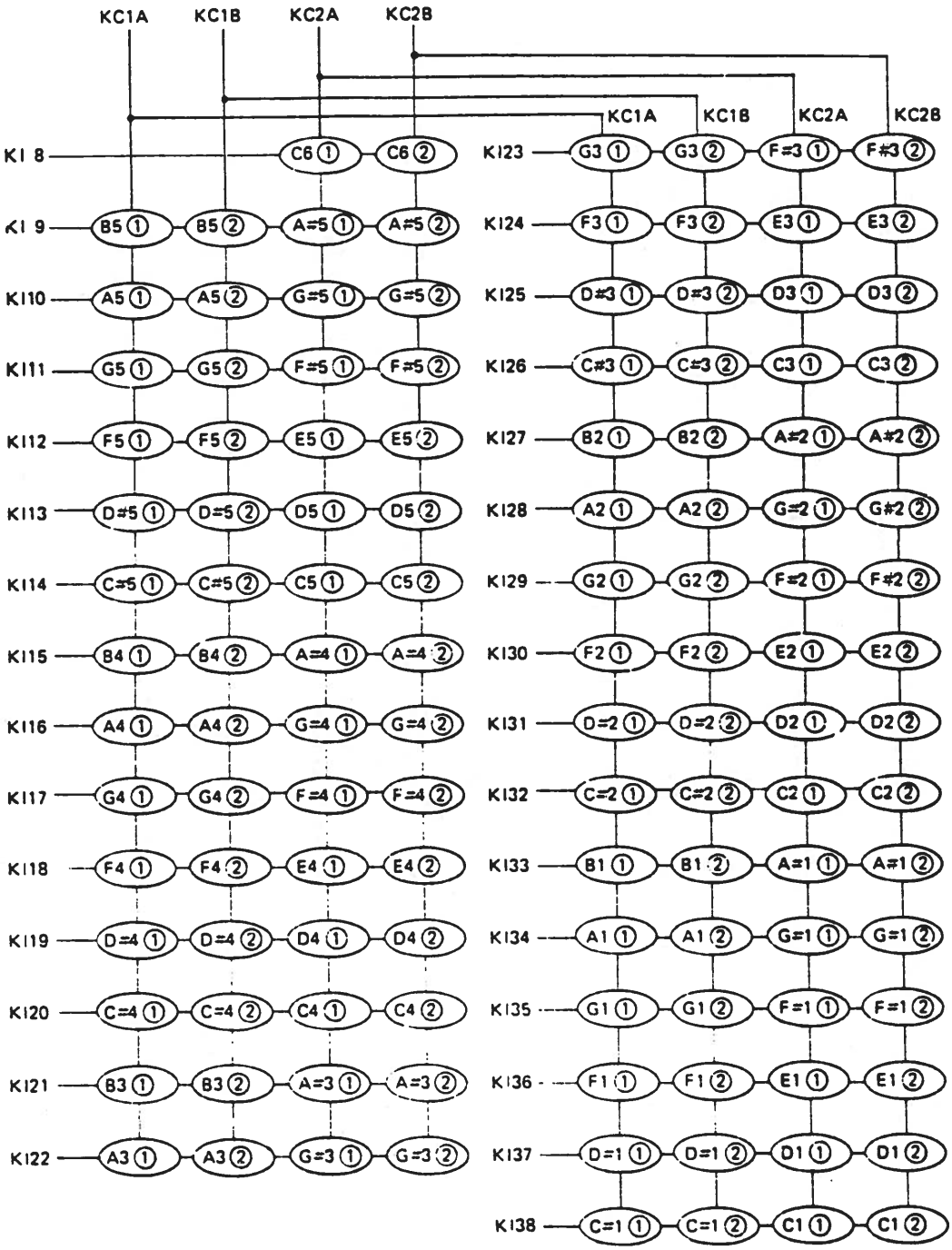
LSI MSM 6200 detects the time interval and determines the key touch speed.

Some RC (resistor and capacitor) integrating circuits are connected to the MSM6200 and when switch S1 turns on, the RC circuit starts to discharge. The discharging stops when S2 turns on.

The MSM 6200 also contains an ADC (Analog to Digital Converter) and changes the voltage Vc of the RC circuits into a 5-bit digital signal which is sent to the CPU as key entry and hitting speed data.



Key Matrix


KC1A
KC1B
KC2A
KC2B
KI 8
KI 9
KI10
KI11
KI12
KI13
KI14
KI15
KI16
KI17
KI18
KI19
KI20
KI21
KI22
C6 ① C6 ②
B5 ① B5 ② A#5 ① A#5 ②
A5 ① A5 ② G#5 ① G#5 ②
G5 ① G5 ② F#5 ① F#5 ②
F5 ① F5 ② E5 ① E5 ②
D#5 ① D#5 ② D5 ① D5 ②
C#5 ① C#5 ② C5 ① C5 ②
B4 ① B4 ② A#4 ① A#4 ②
A4 ① A4 ② G#4 ① G#4 ②
G4 ① G4 ② F#4 ① F#4 ②
F4 ① F4 ② E4 ① E4 ②
D#4 ① D#4 ② D4 ① D4 ②
C#4 ① C#4 ② C4 ① C4 ②
B3 ① B3 ② A#3 ① A#3 ②
A3 ① A3 ② G#3 ① G#3 ②
KC1A
KC1B
KC2A
KC2B
KI23
KI24
KI25
KI26
KI27
KI28
KI29
KI30
KI31
KI32
KI33
KI34
KI35
KI36
KI37
KI38
G3 ① G3 ② F#3 ① F#3 ②
F3 ① F3 ② E3 ① E3 ②
D#3 ① D#3 ② D3 ① D3 ②
C#3 ① C#3 ② C3 ① C3 ②
B2 ① B2 ② A#2 ① A#2 ②
A2 ① A2 ② G#2 ① G#2 ②
G2 ① G2 ② F#2 ① F#2 ②
F2 ① F2 ② E2 ① E2 ②
D#2 ① D#2 ② D2 ① D2 ②
C#2 ① C#2 ② C2 ① C2 ②
B1 ① B1 ② A#1 ① A#1 ②
A1 ① A1 ② G#1 ① G#1 ②
G1 ① G1 ② F#1 ① F#1 ②
F1 ① F1 ② E1 ① E1 ②
D#1 ① D#1 ② D1 ① D1 ②
C#1 ① C#1 ② C1 ① C1 ②

Pin Functions of Key Touch Control LSI (MSM6200)

Pin No.	Terminal Name	In/Out	Function
1 ~ 6	IR6 ~ IC8	In/Out	External RC discharging circuit inputs and outputs.
10	REF		Reference voltage (+5V).
11	AG		Analog ground.
20	O1	Out	Interrupt request signal output. When Low, MSM6200 interrupts the Key CPU.
25~28 29~32	O2 ~ O5 IO1 ~ IO4	Out In/Out	Upper 4-bit data bus. Lower 4-bit data bus. O2 O3 O4 O5 IO1 IO2 IO3 IO4 MSB LSB
34	I 2	In	ALE (Address Latch Enable) signal input. When HGIH, address in MSM6200 is assigned.
35	I 3	In	$\overline{WR}$ signal input. When LOW, data or address can be written in MSM6200.
36	I 4	In	$\overline{RD}$ signal input When Low, Key CPU reads data from MSM6200.
37	I 5	In	$\overline{CS}$ (chip select) signal input. When Low, communications between the Key CPU and MSM6200 is possible.
39	I 10	In	Reset signal input. Low active At power on, receives a reset signal to initialize MSM6200's internal circuits.
40	VDD		+5 volt source.
43	PGI	In	Clock pulse (2.47 MHz) input.
45	VSS2		Ground (0 volt) source.
46	VSS1		+2.25 volt source.
47~50	KC2B~KC1A	Out	Key common signal outputs.
58~88	K8 ~ K38	In	Key input terminals.
91~100	IR1 ~ IC5	In/Out	External CR circuits inputs and outputs.

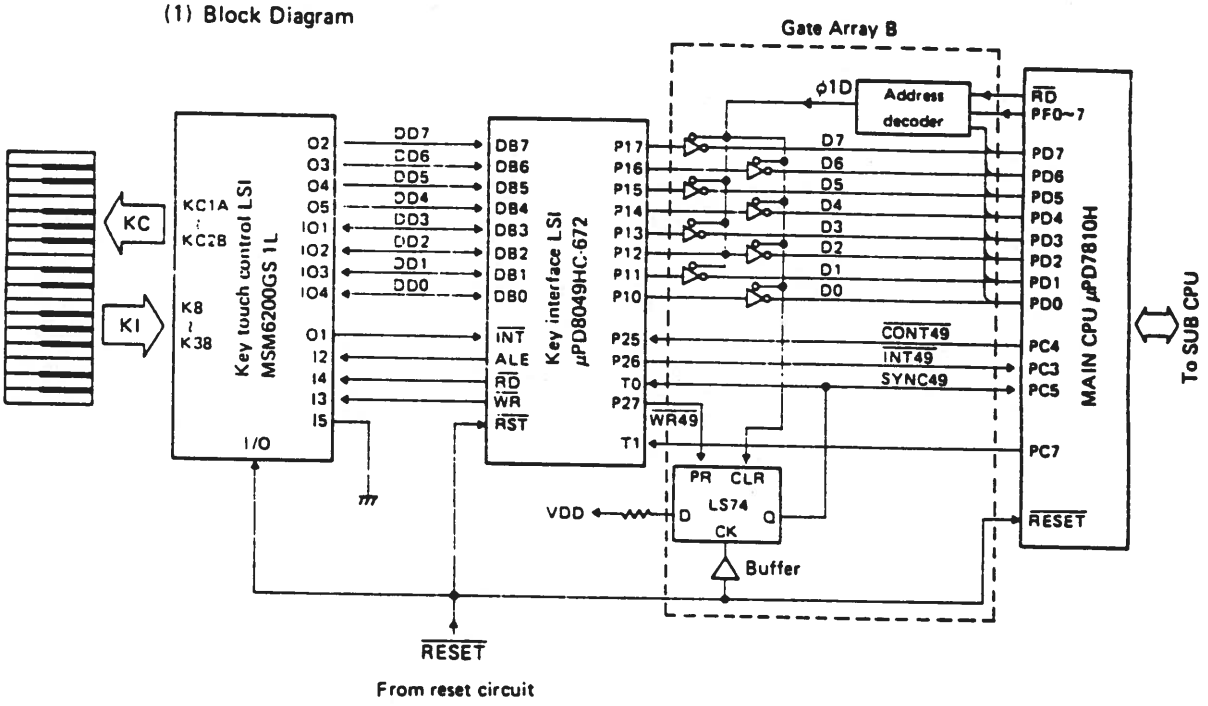
Pin Functions of Key CPU (μPD8049HC)

Pin No.	Terminal Name	In/Out	Function
1	T0	In	Clock pulse input for data read/write.
2	XTAL1	In	8.96 MH clock pulse input.
4	$\overline{RESET}$	In	At power ON, the terminal stays LOW level for a while in order to initialize internal circuits.
6	$\overline{INT}$	In	Interrupt signal input from MSM6200.
8	$\overline{RD}$	Out	Read signal output. Key interface LSI reads data from MSM6200 when terminal is LOW.
10	$\overline{WR}$	Out	Write signal output. Key CPU writes data or address in MSM6200 when terminal is Low.
11	ALE	Out	ALE (Address Latch Enable) signal output. Address in MSM6200 is assigned when High level.

Pin No.	Terminal Name	In/Out	Function
12~19	DB0 ~ DB7	In/Out	Data bus (D0 ~ D7) between MSM6200.
20	Vss		Ground (0V) source.
26	VDD		+5V source.
27~34	P10 ~ P17	Out	Data bus (D0 ~ D7) between CPU.
36	P25 (CNT49)	In	Control signal input from CPU.
37	P26 (INT49)	Out	Interrupt signal output to CPU.
38	P27 (WR49)	Out	Timing pulse output for data read/write.
39	T1 ($\overline{TST}$)	In	Test signal input. Key CPU does selfcheck of internal RAM/ROM at Low.
40	VCC		+5V source.

Key Touch Data Communication

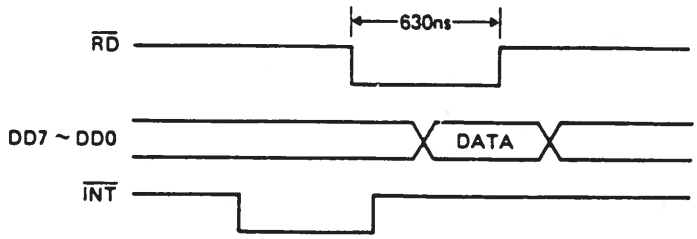
(1) Block Diagram



Key touch control LSI fetches the data of key entry and key touch speed from keybord, then the data are transmitted to Main CPU via Key CPU which is a buffer.
The Key CPU LSI quicken the data communication between the Key touch control LSI and the CPU.

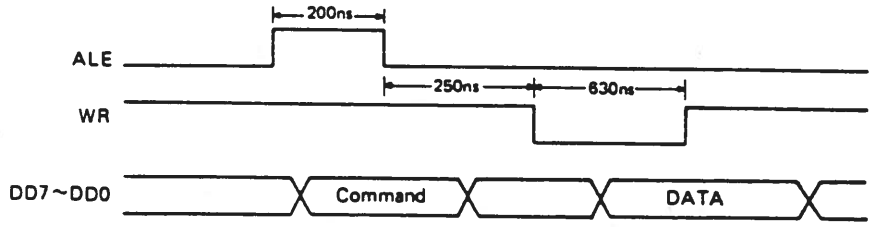
(2) Timing chart from MSM6200 to μPD8049HC

For sending mainly key entry and initial touch data.



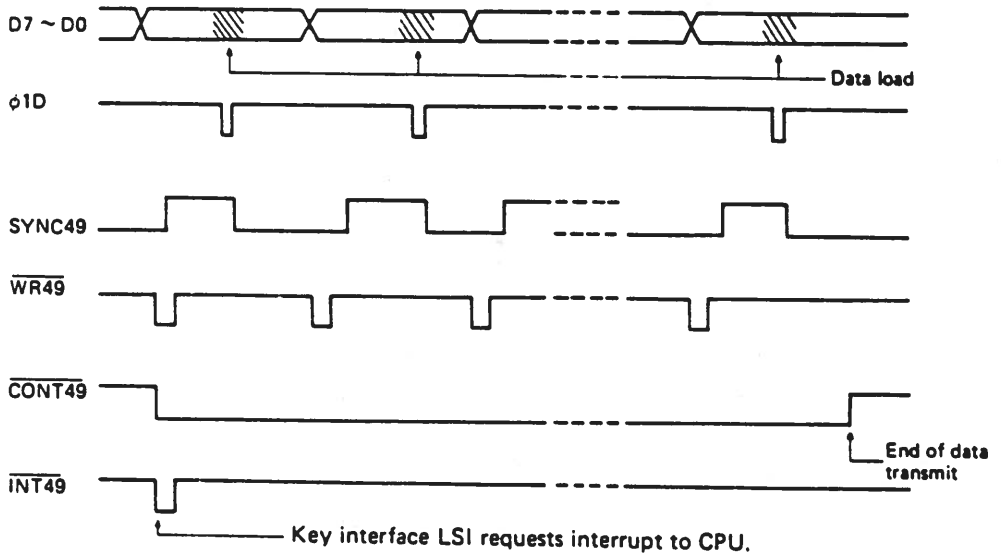
(3) Timing chart from μPD8049HC to MSM6200

For sending mainly request command of key entry and key touch speed data.



(4) Timing chart from μPD8049HC to MSM6200

For transmitting mainly key entry and key touch speed data in this process.



SWITCH MATRIX

Receiving signals PA0 ~ PA3 from CPU, decoder TC74HC154 provides scan signals to the switches.

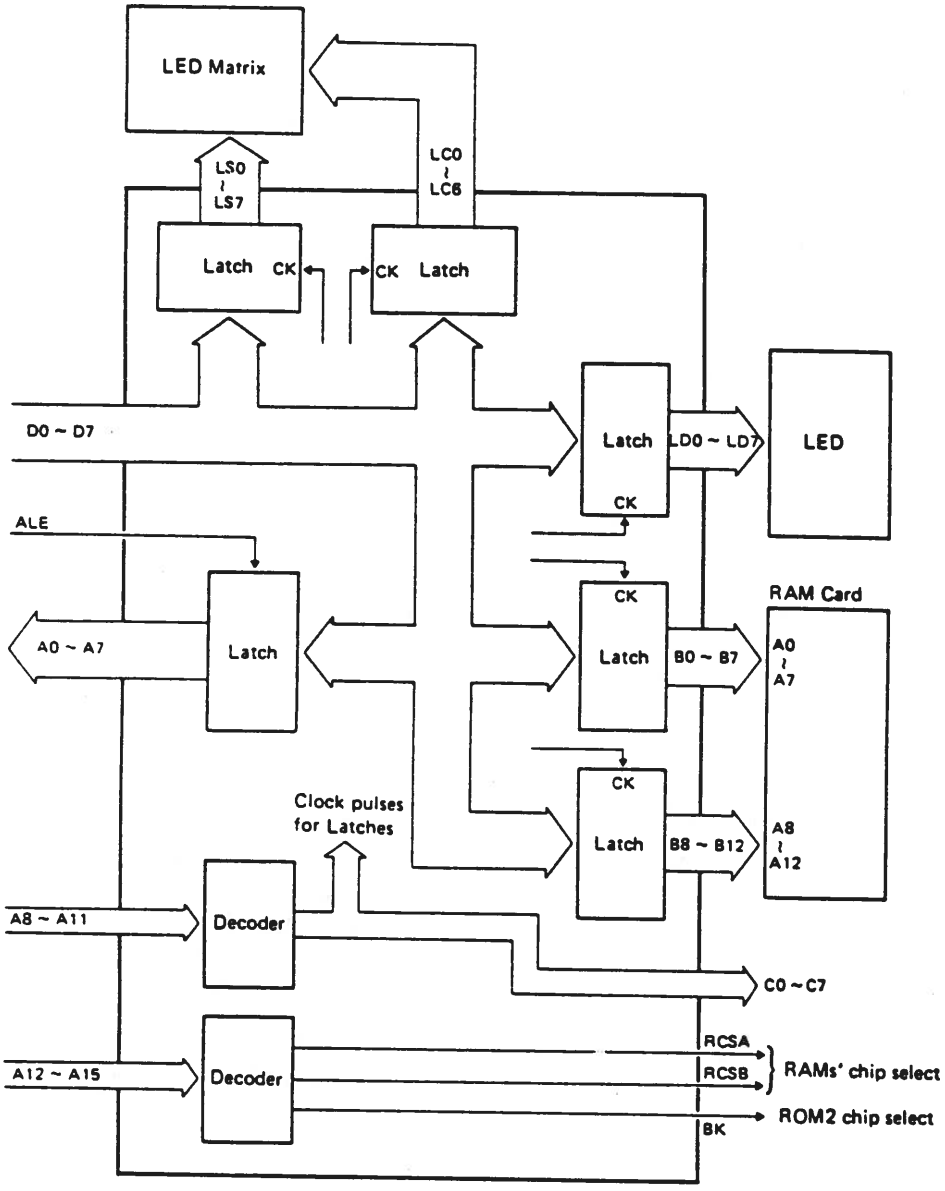
	KI0	KI1	KI2	KI3	KI4	KI5	KI6	KI7
KC0	UPPER SYNTH. ENS.	UPPER COSMIC DANCE	UPPER STRING ENS.	UPPER BRASS ENS.	UPPER PIPE ORGAN		LINE 1	LINE 1
KC1	UPPER PIANO	UPPER HARPSI-CHORD	UPPER GUITAR	UPPER TRUMPET	UPPER VIBRA-PHONE	UPPER TONE SELECT	LINE 2	LINE 2
KC2	LOWER SYNTH. ENS.	LOWER BRASS ENS.	LOWER SYNTH. BRASS	LOWER COSMIC DANCE	LOWER JAZZ ORGAN	LOWER BASS/ OBBLI.	LINE 3	LINE 3
KC3	LOWER PIANO	LOWER HARPSI-CHORD	LOWER HARP	LOWER GUITAR	LOWER SYNTH. GUITAR	ACCOMP. VARIA-TION		
KC4	ROCK	8 BEAT	16 BEAT	DISCO	POPS	RHYTHM VARIA-TION	LINE 4	LINE 4
KC5	SWING	SLOW ROCK	SAMBA	BOSSA NOVA	WALTZ	RHYTHM PRESET A		DETUNE
KC6	LOWER PRESET	LOWER INTER-NAL	LOWER CARD			RHYTHM PRESET B	VELOCITY	AMPLITUDE LEVEL
KC7	UPPER PRESET	UPPER INTER-NAL	UPPER CARD	AUTO HARMO-NIZE			UPPER EDIT	LOWER EDIT
KC8	RHYTHM INTER-NAL	RHYTHM CARD					PATTERN /MIDI	WRITE
KC9			INTRO/ ENDING	CHORD MEM. RECORD/ DELETE	OP. MEM. RECORD	CHORD/ OP. MEM. SELECT	SYNCHRO FILL-IN	START/ STOP
KC10					NORMAL	SPLIT	FING'D	CASIO CHORD

CPU (μPD78C10G) PIN FUNCTIONS

Pin No.	Terminal	Signal	In/Out	Pin Function	
1 ~ 4	PA0 ~ PA3	PA0 ~ PA3	In/Out ~ In/Out	From these signals, switch scan signals KC0 ~ KC10 are generated.	Data bus for RAM Card
5 ~ 7	PA4 ~ PA6	PA4 ~ PA6	In/Out ~ In/Out	Address signals (A12 ~ A14) for ROM 2	
8	PA7	PA7	In/Out		
9	PB0	CH0	Out	Stereo chorus ON/OFF control signal. High – Stereo chorus ON Low – Stereo chorus OFF	
10	PB1	CH1	Out	Stereo chorus depth control signal. High – Deep Low – Shallow	
14	PB5	$\overline{OE}$	Out	RAM Card's output enable signal. When Low, data can be output from RAM Card.	
15	PB6	$\overline{WE}$	Out	RAM Card's write enable signal. When Low, data can be written in RAM Card.	
16	PB7	CD	In	RAM Card detection signal. CPU descriminates that a RAM Card is inserted when it receives Low level from this terminal.	
17	PC0	MOS	Out	MIDI data output	
18	PC1	–	In	MIDI data input	
19	PC2	N	Out	Melody/Accomp changeover signal. Depends on the voltage level of this terminal, outputs of Music LSIs 1 and 2 go either to melody or accomp. circuits. High – Melody Low – Accompaniment	
20	PC3	PC3	In	Interrupt from Key CPU.	
21	PC4	PC4	Out	Control signal to Key CPU.	
22	PC5	PC5	In	Receives High level signal when Key CPU requests to send data to CPU.	
24	PC7	APO	Out	APO (Auto Power Off) control signal. Falls to Low level at APO.	
25	$\overline{NMI}$	$\overline{OFF}$	In	The terminal receives Low when the power switch is turned off. CPU then performs the power off transaction.	

26	INT1	DWN	In	When the power source or VDD (+5V) is too low, the terminal receives High level. CPU then provides APO signal to shut the voltages off.
28	$\overline{\text{RESET}}$	$\overline{\text{RST}}$	In	When the power switch is turned on, the terminal receives Low level signal for approximately 100 milliseconds during which CPU's built-in circuits are reset.
30, 31	X2, X1	–	In/Out	12 MHz clock pulse input/output
32	VSS	–	–	Ground source
33	AVSS	–	–	Ground source for the built-in ADCs (Analog to Digital Converters)
35	AN1	BND	In	Voltage level from the pitch bender is transformed into digital data in a built-in ADC.
36	AN2	MDU	In	Modulation wheel input. Voltage level from the modulation wheel is converted into digital data in a built-in ADC.
37	AN3	DWN	In	Voltage down detection signal input. When the power voltage is too low, the terminal detects it and CPU flushes the pilot lamp.
39	AN5	DTA	In	Data dial input. Voltage level form Data dial is converted into digital data in a built-in ADC.
40	AN6	MDE	In	Mode dial input. Voltage level from Mode dial is digitized in a built-in ADC.
42	VAref	–	–	Refer voltage (+5V) for built-in ADCs
43	AVCC	–	–	+5V source for built-in ADCs
44	$\overline{\text{RD}}$	$\overline{\text{RD}}$	Out	Read Signal. Low when CPU reads data from ROMs, RAMs, and Gate Array A.
45	$\overline{\text{WR}}$	$\overline{\text{WR}}$	Out	Write signal. Low when CPU writes data in RAMs, Percussion Generators, and Gate Array A.
46	ALE	ALE	Out	Address Latch Enable. At the rising edge of this signal, data bus (D0 ~ D7) become lower address signals (A0 ~ A7).
47~54	PF0~PF7	A8~A15	Out	Upper address bus for ROMs, RAMs, Gate Array A, and Gate Array B.
55~62	PD0~PD7	D0~D7	In/Out	Data bus

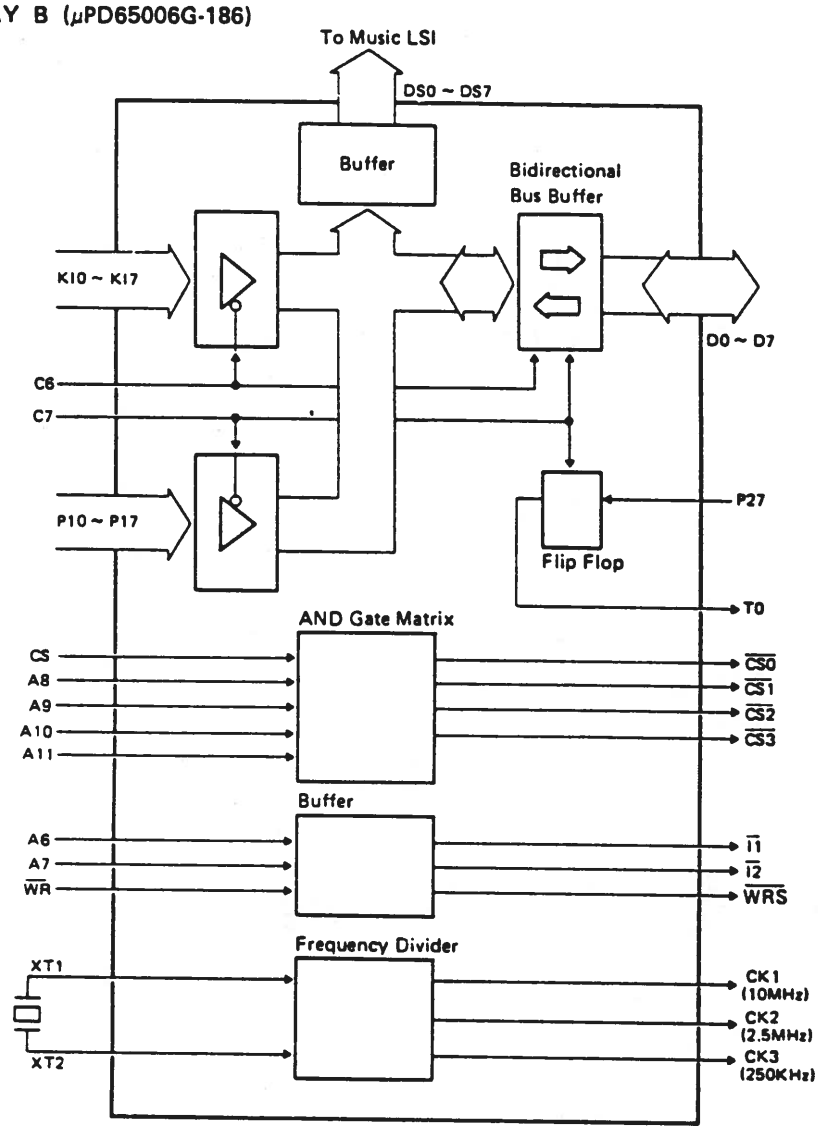
GATE ARRAY A (μPD65012G-197)



Signals functions

LS0 ~ LS7, LC0 ~ LC6	–	LED drive signals
LD0 ~ LD7	–	LED drive signals
B0 ~ B12	–	RAM Card's address bus
A0 ~ A7	–	Lower address bus
C0 ~ C2	–	Percussion Generators' chip select
C6, C7	–	Gate Array B's data selector control signals
RCSA, RCSB	–	RAMs' chip select

GATE ARRAY B (μPD65006G-186)

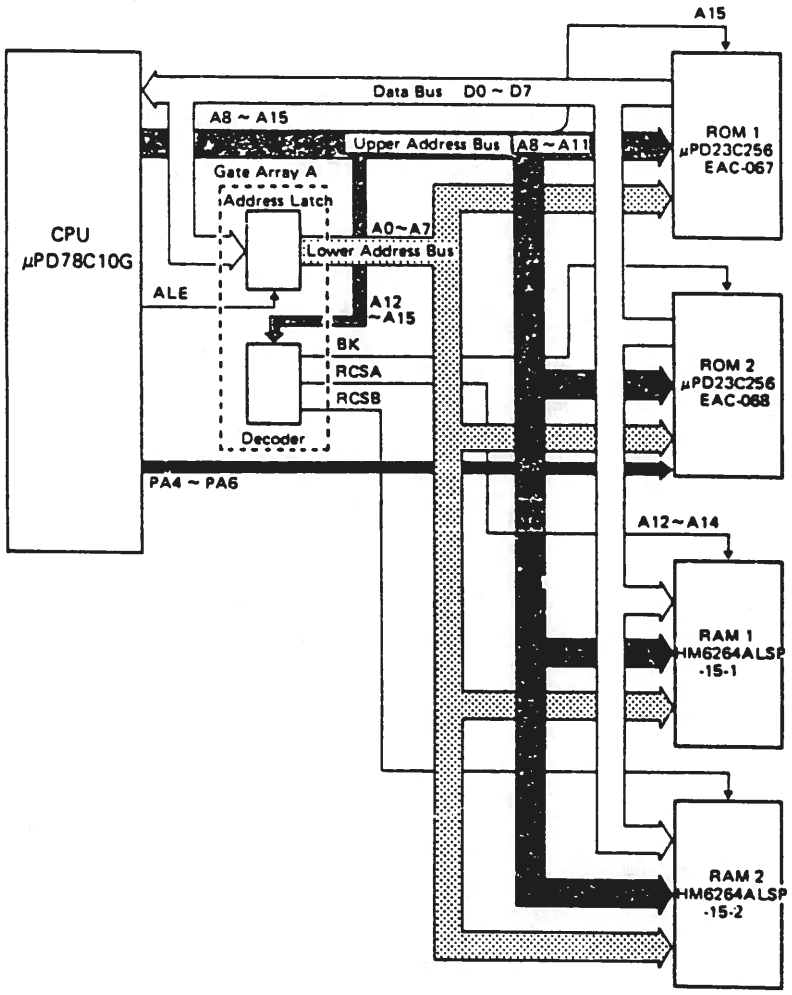


Signals functions

KI0 ~ KI7	–	Switch input signals
P10 ~ P17	–	Data input from Key CPU
D0 ~ D7	–	Data bus
T0	–	Becomes High when Key CPU sends data to CPU
CS0	–	Music LSI 1's chip select signal
CS1	–	Music LSI 2's chip select signal
CS2	–	Music LSI 3's chip select signal
CS3	–	Music LSI 4's chip select signal
$\overline{I1}$, $\overline{I2}$	–	Music LSIs' data/command descrimination signal
$\overline{WRS}$	–	Write signal for Music LSIs
CK1	–	Clock pulse for Key CPU
CK2	–	Clock pulse for Key Controller MSM6200
CK3	–	Clock pulse for Percussion Generators

C10

ROMs & RAMs ACCESS



Chip select signals BK (ROM 2 chip selection), RCSA (RAM 1 chip selection), and RCSB (RAM 2 chip selection) are generated from signals A12 ~ A15 in Gate Array A's built-in decoder.
ROM 1 is selected from the CPU directly by signal A15.
Address Latch in Gate Array A turns the contents of data bus into lower address bus when signal ALE rises to High level.

ROM/RAM Contents

ROM 1 – System's work area
ROM 2 – Preset voices and preset rhythm pattern data area
RAM 1 – System's work area
RAM 2 – User's voice and rhythm pattern area for the internal memory

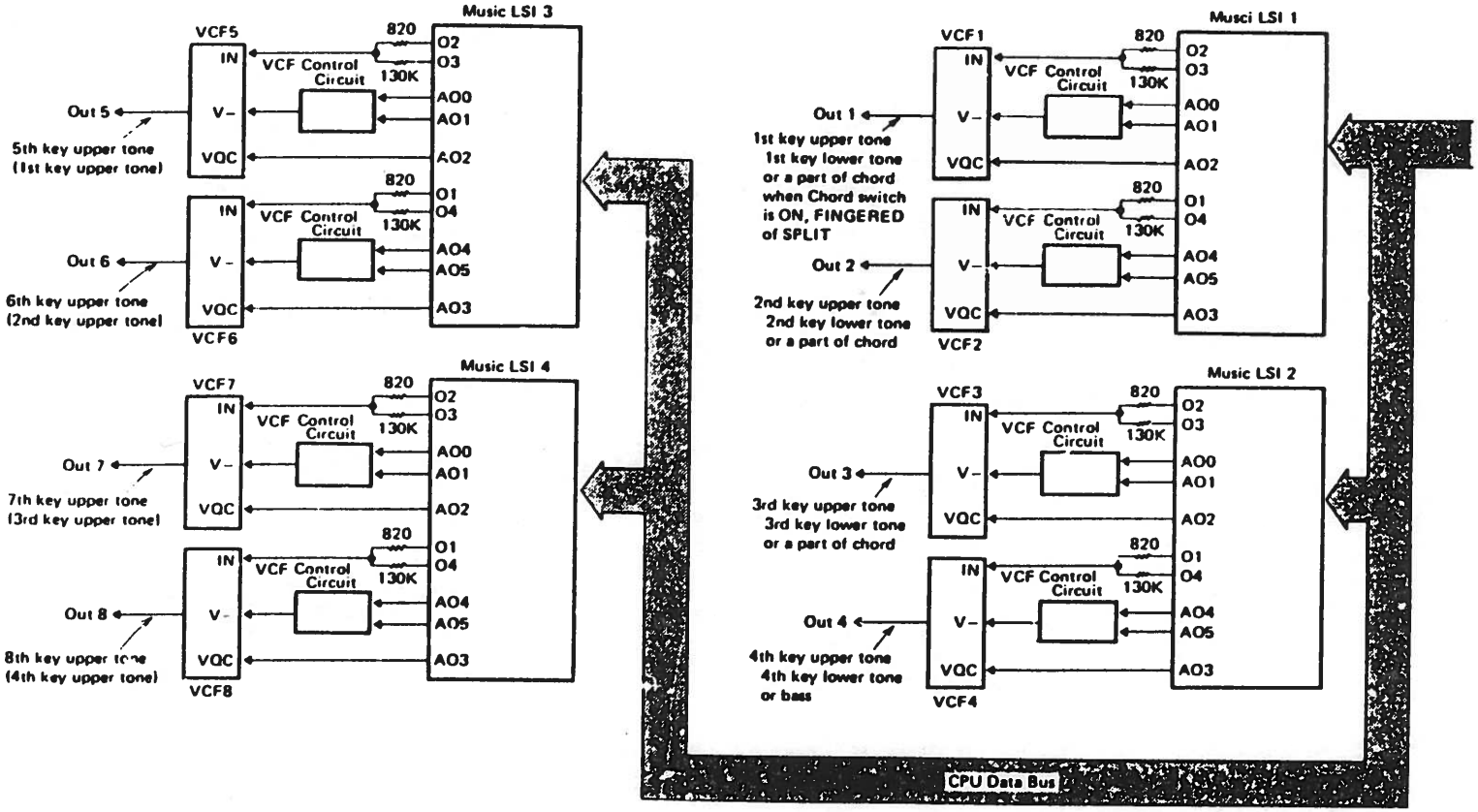
MUSCI LSIs

HT-6000 is equipped with four Music LSIs.

A Music LSI is able to output two sounds and, as each output sound is 4-note polyphonic, it provides the sounds of Line 1 ~ Line 4 which is programmed in Tone Edit and Line Edit modes.

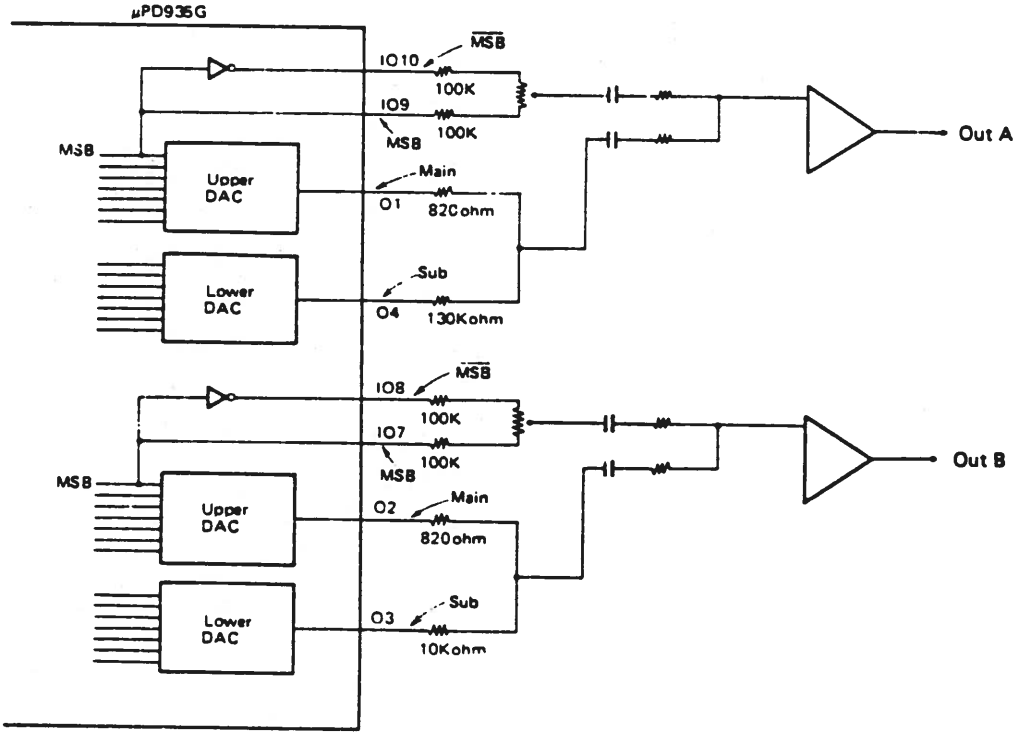
When CHORD switch is OFF, the keyboard emanates 8-note polyphonic melody. At this time, each output provides single sound in order of key depression.

When CHORD switch is FINGERED, ON, or SPLIT, the keyboard emanates 4-note melody and 4-note accompaniment or lower tone. In this case, OUT 5 ~ OUT 8 provides melody sound whereas OUT1 ~ OUT4 output accompaniment or lower tone.

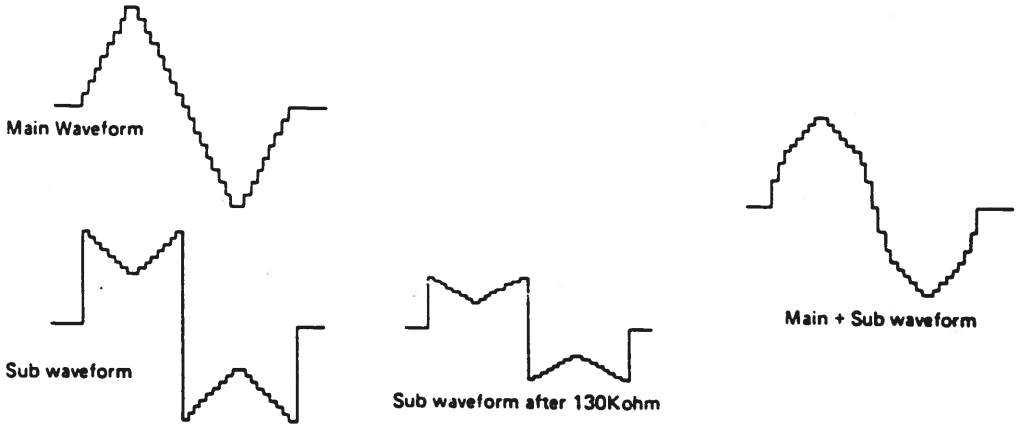


MUSCI LSI (μPD935G)

Containing four 7-bit DACs (Digital to Analog Converters), a Music LSI provides two sound outputs.



Each sound is generated by mixture of main and sub waveforms.
Upper DAC provides main waveform while Lower DAC generates supplemental waveform and, these waveforms are mixed in the ratio of 1 : 158 as they pass through 820 ohm and 130Kohm resistors.



In order to obtain proper envelope curve, MSB (Most Significant Bit) or inverted MSB signal is added to the waveform.

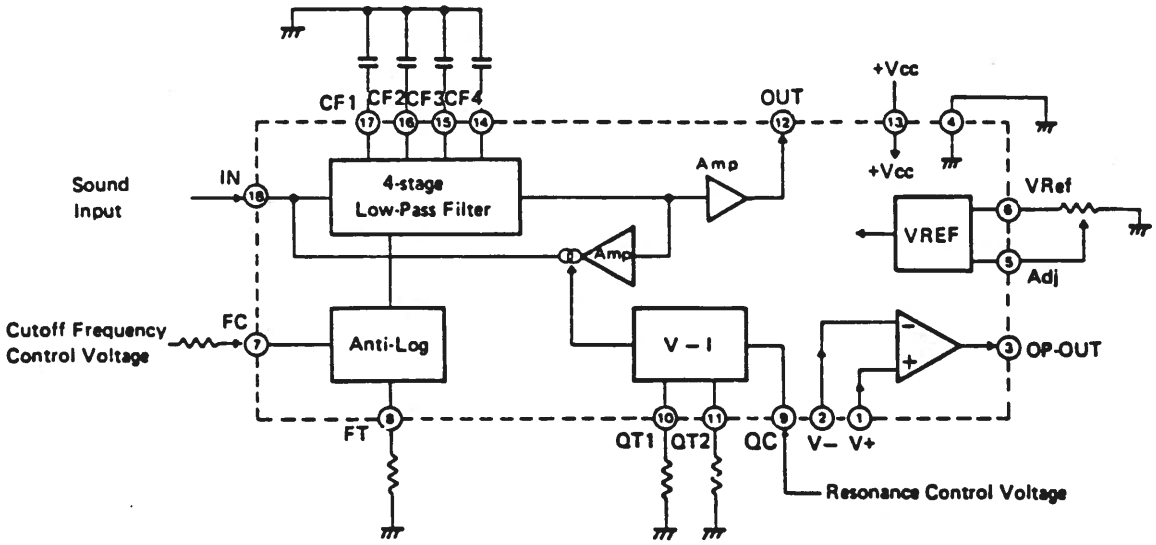
MUSIC LSI (μPD935G) PIN FUNCTIONS

Pin No.	Terminal	Signal	In/Out	Function
1	$\overline{WR}$	$\overline{WR}$	In	At the rising edge of this signal, Music LSI receives data or command from the CPU.
2	$\overline{I1}$	$\overline{I1}$	In	When Low, Music LSI descriminates data bus input as a command.
3	$\overline{I2}$	$\overline{I2}$	In	When Low, Music LSI descriminates data bus input as a datum.
4	$\overline{CS}$	C0 ~ C2	In	Chip enable terminal. When Low the LSI is able to communicate with CPU.
5~12	D0 ~ D7	D0 ~ D7	In	Data bus
14~28	SA4~CMZ BA4~BB1	AA4-Z	Out	LCD drive signals
29	VDD	+VDD	-	+5V source
30	CLK	CLK	In/Out	Depends on the voltage level of terminal I3 (pin 34), this terminal functions as input or output of clock pulse. When terminal I3 is Low, this terminal outputs a half frequency of the clock pulse whereas this terminal becomes clock pulse input when I3 is High.
31, 32	PG2, PG1	–	In/Out	19 MHz clock pulse input/output
33	GND	–	–	Ground (0V) source
34	I3	–	In	CLK (pin 30) In/Out determination terminal. When this terminal is High, pin 30 outputs a half frequency of the clock pulse whereas pin 30 becomes clock pulse input when this terminal is High.
42, 43	IO7, IO8	–	Out	Bit compensation signals for output A
46	O3	–	Out	Sub waveform for output A
48	O2	–	Out	Main waveform for output A
50	O1	–	Out	Main waveform for output B
52	O4	–	Out	Sub waveform for output B
55, 56	IO9~IO10	–	Out	Bit compensation signals for output B
63	AO0	AE1, BE1, CE1, DE1	Out	VCF envelope control voltage output. In accordance with voltage level of this terminal, VCF envelope of output A is varied.

C14

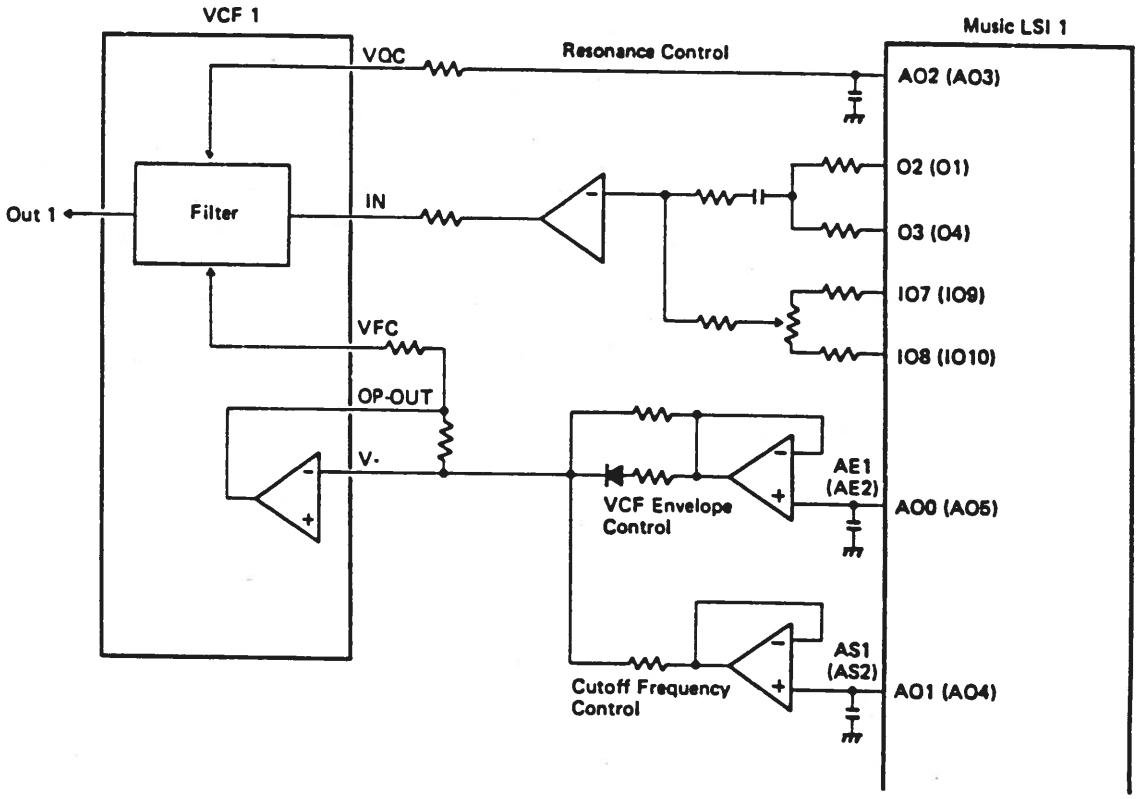
64	AO1	AS1, BS1, CS1, DS1	In/Out	Cutoff frequency voltage output. In accordance with the voltage level of this terminal, cutoff frequency of output A is varied.
65	AO2	ARS1, BRS1, CRS1, DRS1	Out	Resonance control voltage output. The voltage output from this terminal controls resonance value of output A.
66	AO3	ARS2, BRS2, CRS2, DRS2	Out	Resonance control voltage output. The voltage output from this terminal controls resonance value of output B.
67	AO4	AS2, BS2, CS2, DS2	Out	Cutoff frequency control voltage output. In accordance with the voltage level of this terminal, cutoff frequency of output B is varied.
68	AO5	AE2, BE2, CE2, DE2	Out	VCF envelope control voltage output. In accordance with voltage level of this terminal, VCF envelope of output B is varied.
70	AO7	LF0	Out	Low frequency triangle waveform output. According to the frequency of this signal, stereo chorus speed is determined. Only Music LSI 1 provides this signal.
75	MUT	AMUT2, BMUT2 CMUT2, DMUT2	Out	Output B mute signal. When this terminal is Low, output B sound is muted.
77	BAS	AMUT1, BMUT1 CMUT1, DMUT1	Out	Output A mute signal. When this terminal is Low, output A sound is muted.

VCF (NJM2090)

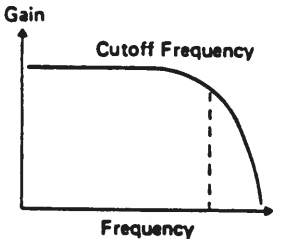


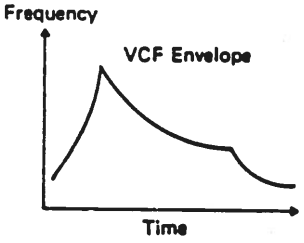
NJM2090 is a VCF (Voltage Controlled Filter) which contains 4-stage low-pass filter.
Cutoff frequency of the filter is determined by the voltage level of pin 7 (FC). When the voltage is small, cutoff frequency is high and the cutoff frequency reduces if voltage of pin 7 increases. Resonance of the filter varies by the voltage level of pin 9 (QC). The resonance effect is in direct proportion to the voltage level of pin 9, namely, higher the pin 9 voltage, the more effective the resonance.

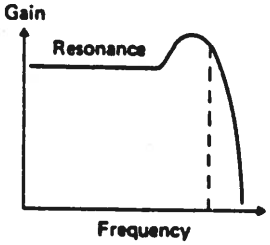
VCF CONTROL CIRCUIT



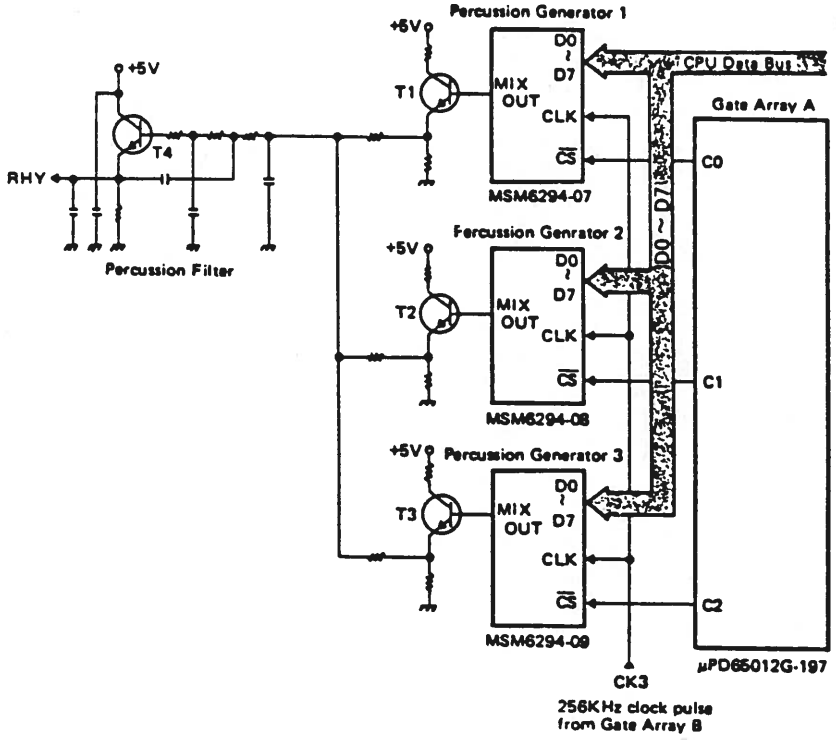
In accordance with preset or programmed VCF values (Mode 10 ~ 18), corresponding voltages are provided from terminals AO0 (AO5), AO1 (AO4), and AO2 (AO3) which control VCF envelope, cutoff frequency, and resonance.







PERCUSSION GENERATOR

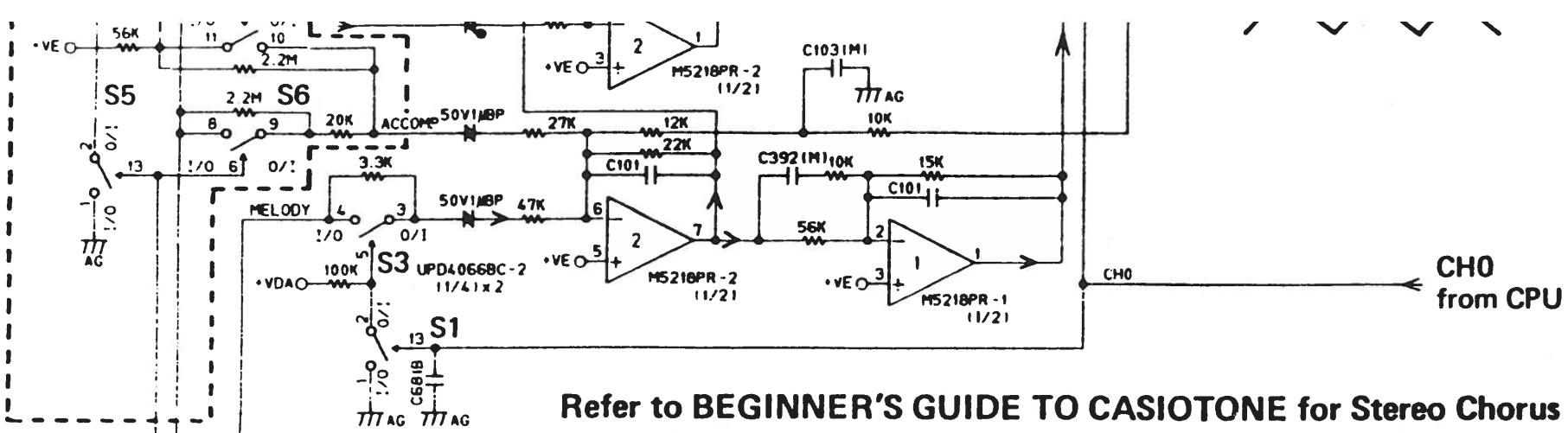


Percussion Generator consists of DACs and ROM which stores PCM (Pulse Coded Modulation) percussion sounds data.

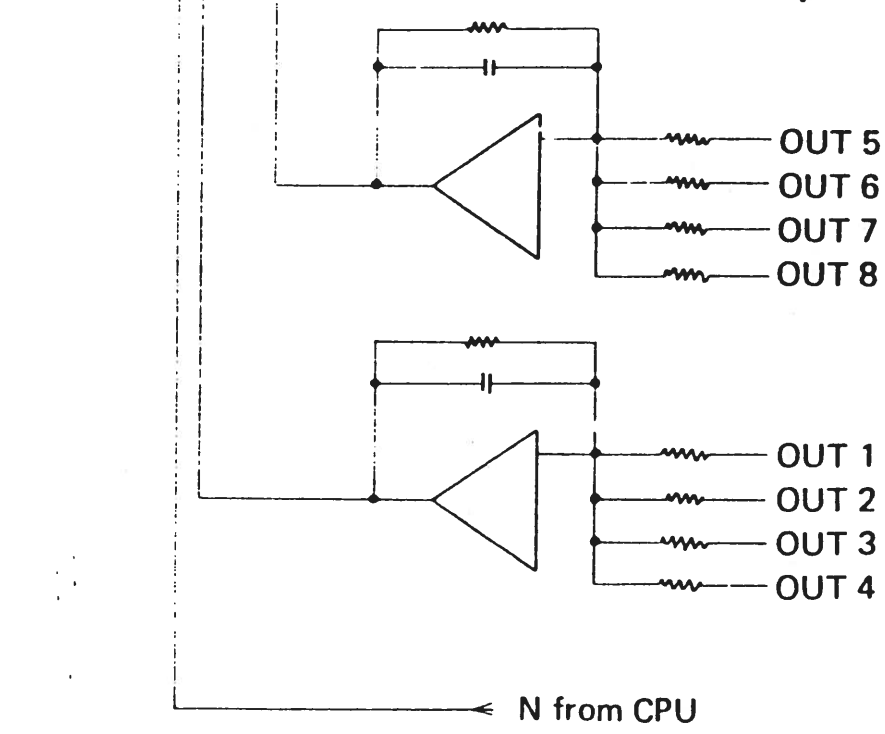
By CPU data bus, a percussion data output from the ROM and converted into an analog waveform. Chip select signals C0 ~ C2 are provided from Gate Array (A) and, 256KHz clock pulse is generated in Gate Array (B).

The following table indicates the percussion sounds stored in each Percussion Generator.

Percussion Generator 1 MSM6294-07	Bass Drum, Gate Snare, Snare Drum, High Synth Tom, Low Synth Tom, Rim Shot, High Timbal, Low Timbal
Percussion Generator 2 MSM6294-08	Closed High Hat, Open High Hat, Cymbal, High Conga, Low Conga, High A Gogo, Low A Gogo, Cow Bell
Percussion Generator 3 MSM6294-09	Timpani, Orchestra Hit



Refer to BEGINNER'S GUIDE TO CASIOTONE for Stereo Chorus Circuit operations.



Melody/Chord Changeover Circuit

In accordance with CHORD switch status, Music LSIs outputs OUT 1 ~ OUT 4 become either melody or accompaniment.

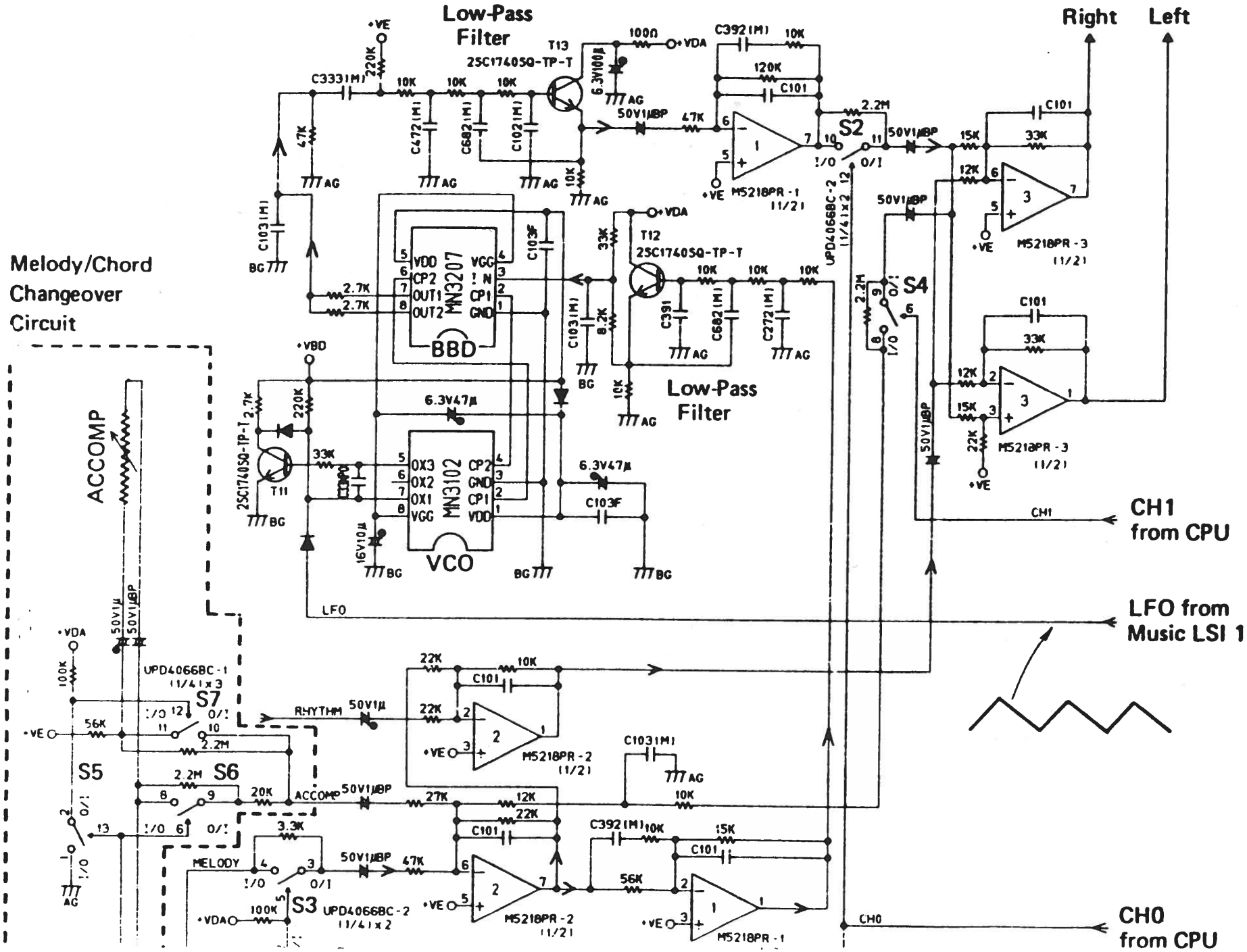
When CHORD switch is OFF, CPU raises signal "N" causing switches S5, S6, and S7 off, on, and off respectively. OUT 1 ~ OUT 4 sounds enter pin 6 of op amp 2.

When CHORD is ON or FINGERED, OUT 1 ~ OUT 4 become chord or lower tone.

At this time, signal "N" stays Low turning switches S5, S6, and S7 on, off, and on respectively.

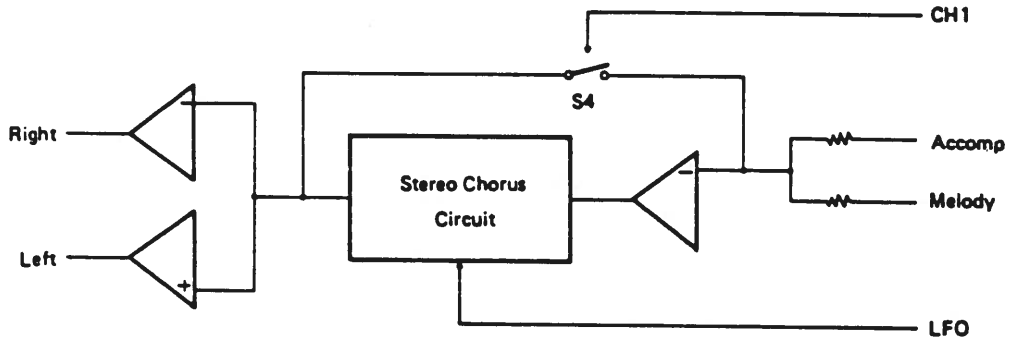
OUT 1 ~ OUT 4 sounds enter pin 6 of op amp 2 via ACCOMP volume control.

MELODY/CHORD CHANGEOVER CIRCUIT & STEREO CHORUS CIRCUIT

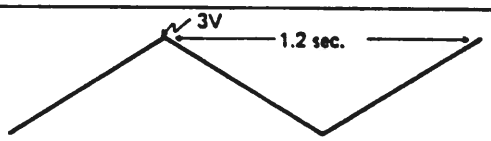
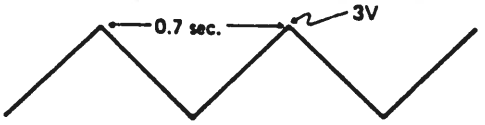


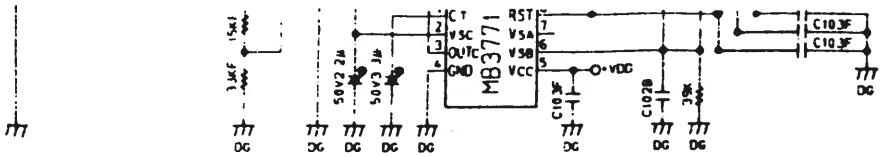
Signal CH0 is provided from the CPU. When DATA value in MODE 50 is "0", the signal falls to LOW causing switches S1, S2, and S3 to turn off, off and on respectively for sending melody signal to the Mixer directly and cutting the BBD output.
When DATA value is 1, 2 or 3, signal CH0 rises turning switches S1, S2 and S3 on, on and off respectively. Melody signal is sent to the right and left channels mixers via Stereo Chorus Circuit.

Signal CH1 controls the stereo depth. When MODE 50's DATA value is "2", signal CH1 turns switch S4 ON. Stereo Chorus Circuit output signal is fed-back to the BBD again to deepen the stereo effect.

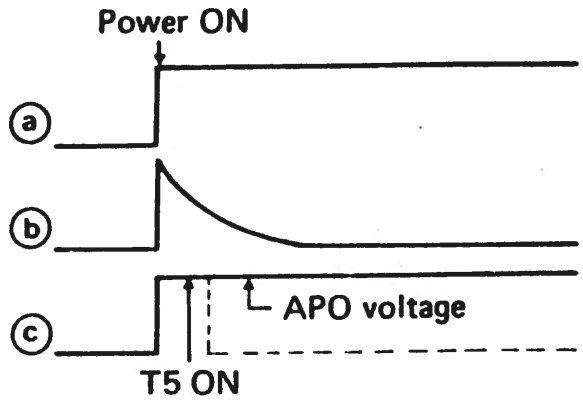


Chorus speed is controlled by triangle waveform LFO from Music LSI 1's built-in DAC.

MODE 60 DATA Value	LFO Waveform (Checkpoint: T7 Emitter on PCB MA1M)
0	
1	
2	
3	

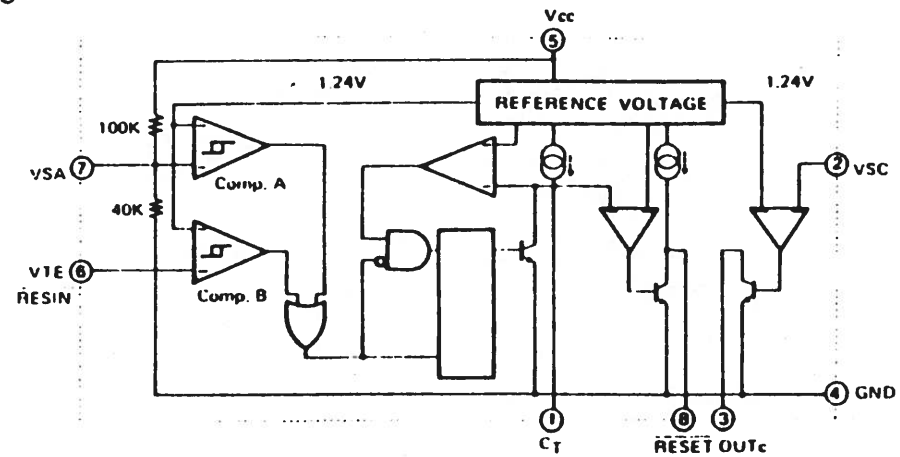


transistors T8 and T4 are turned off to shut all the voltages except +VBR down.



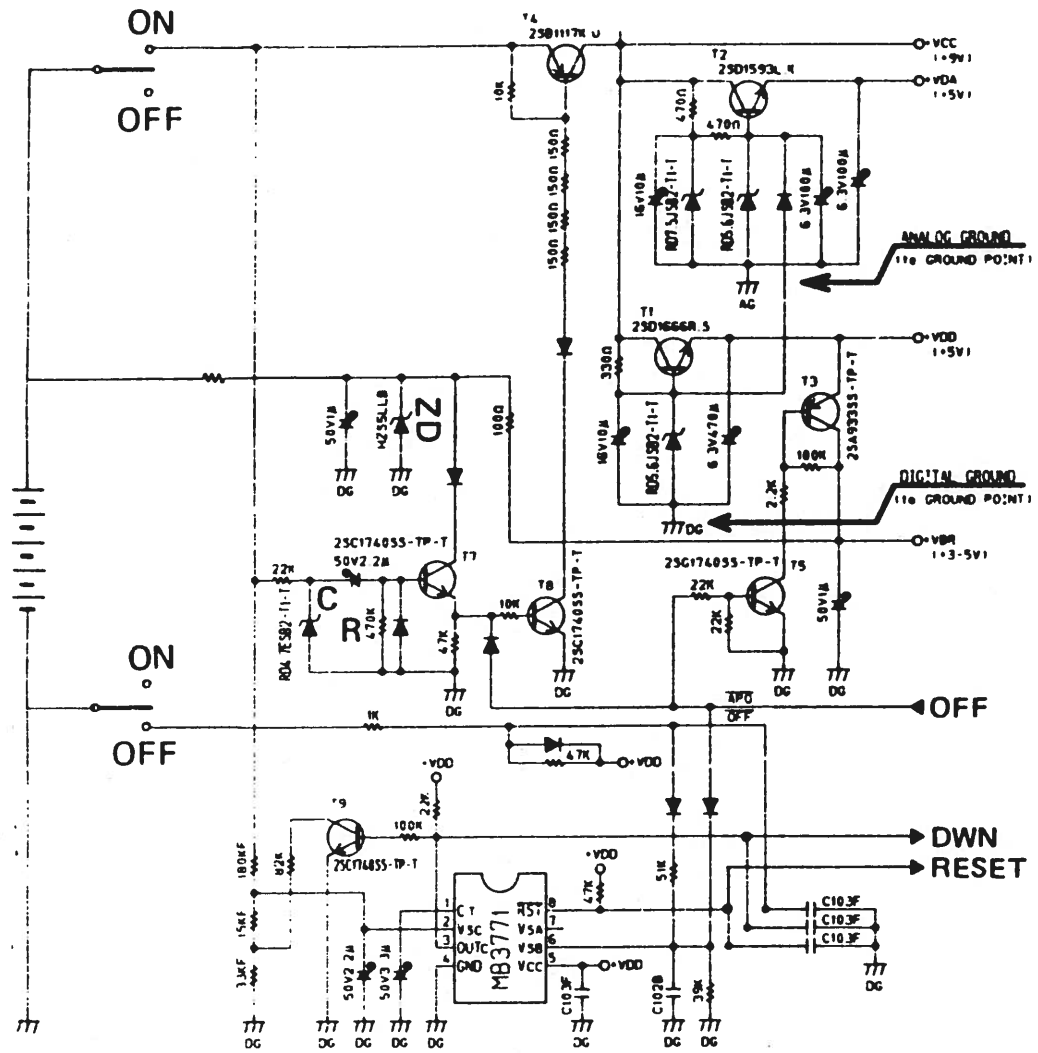
Forming a differential circuit, capacitor C and resistor R turn T5 on for a moment to turn T7 on compulsorily at the first stage of the Power ON.

IC MB3771 generates RESET signal and observes the voltage level of the power source.
When the power switch is turned on, MB3771 outputs a LOW level signal from pin 8 to initialize the LSI's internal circuits.
Containing a comparator, MB3771 also observes the battery voltage from pin 2 and if the battery voltage becomes less than six volts, the IC falls pin 3 LOW informing the CPU of the power down. Receiving DWN signal, CPU then flashes the pilot lamp and outputs signal APO six minutes after then to shut the voltages down.



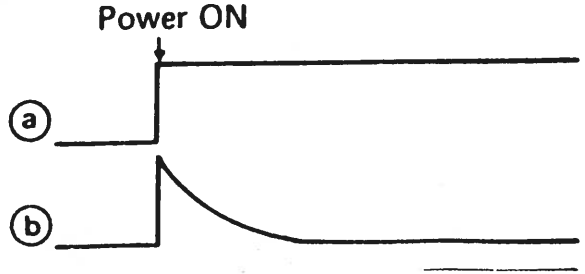
MB3771 Block Diagram

POWER CIRCUIT



Normally, signal APO from the CPU stays HIGH level turning transistors T8 and T4 on. T4 provides +VCC (+9V) to Power Amplifier. +VCC is also sent to transistors T2 and T1 to make +VDA (+5V for the linear circuits) and +VDD (+5V for the digital circuits).
+VBR (RAM's back up voltage) is generated from +VDD via transistor T3 at Power ON and Zener diode ZD provides the voltage at Power OFF.

After six minutes from the last operation of the keyboard, the CPU falls signal APO (Auto Power Off), transistors T8 and T4 are turned off to shut all the voltages except +VBR down.



Forming a differential circuit, capacitor C and resistor R turn

TROUBLESHOOTING

Trouble	Faulty Block	Checkpoint
No Power	Power Circuit	Refer to page 3 for check-points' voltage levels.
	MB3771 on PCB MA3M	
	Transistor T4 on PCB MA3M	
	CPU	Make sure that μPD78C10's pin 24 is High during Power ON.
No sound at all	CPU (μPD78C10)	
	ROMs (μPD23C256EAC-067, 068)	
	RAMs (HM6264ALSP-15)	
	Gate Array (A)	
	Oscillator 1	Waveform ③, ④
	Power Circuit	Check the voltages +VCC (+9V), +VDD (+5V), and +VDA (+5V).
One of the speakers does not sound	Opamp M5218BR-3 on PCB MA3M	Pins 1 and 7 of the opamp
	Power Amp LA4127	Pin 4 of Power Amp
	Speaker	
Sometimes No Filter Effect	One of the VCFs (NJM2090)	Waveforms ⑫, ⑬, ⑰ ~ ⑲
	VCF Control Circuit	Pins 1 and 7 of LA6358-1, 2, 4, 5, 7, 8, 10, 11
	Music LSIs (μPD935G)	Voltage levels of Music LSIs' pins 63, 64, 67 and 68
Sometimes No Sound Hitting a key repeatedly, sometimes No Sound Emanates	Music LSIs (μPD935G)	Waveforms of Music LSIs' pins 46, 48, 50, 52
	VCFs (NJM2090)	Waveforms of pin 12
No percussions	Percussion Generator 1 (MSM6294-07) or Percussion Generator 2 (MSM6294-08) or Percussion Generator 3 (MSM6294-09)	Waveforms of T1 ~ T3 emitters.
	Percussion Filter	Waveform of T4 emitter
	Gate Array (B)	Pin 20 waveofrm
	RHYTHM volume VR	
	CPU (μPD78C10)	

LCD does not indicate properly	Music LSIs 1 and 2	
	LCD	
	Heat seal	
No key entry at all	Key Controller (MSM6200)	
	Key CPU (μPD80C49HC-187)	
	Gate Array (B)	
No switch entry at all	Gate Array (B)	
	Decoder (TC74HC154P) on PCB M5245-CN1M	
	CPU (μPD78C10)	Signals from pins 1 ~ 4
Certain keys or switches do not function	Open circuit of KC, KI or SI lines	
	Dirty contacts	
No RAM Card Access	RAM Card	
	Gate Array (A)	
	RAM Card connector	
	CPU (μPD78C10)	
	ROMs (μPD23C256EAC-067, 068)	
	RAMs (HM6264ALSP-15)	

Prices and Specifications subject to change without notice

HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	1) M5245-MA1M PCB ASS'Y						
	2010 1568	LSI	μPD78C10G	1		BA	A
	2010 1589	LSI	μPD4364CX12L, 15L (μPD6364CX12L, 15L)	2		AL	A
☆	2010 3570	LSI	μPD80C49HC-187	1		AW	A
☆	2010 3577	LSI	MSM6294-07	1		AU	A
☆	2010 3584	LSI	MSM6294-08	1		AU	A
☆	2010 3591	LSI	MSM6294-09	1		AU	A
☆	2010 3619	LSI	μPD65006-186	1		AN	A
☆	2010 3626	LSI	μPD65012-197	1		AU	A
☆	2010 3899	LSI	μPD27C256C-M245P (μPD27C256EAC-067)	1		BA	A
☆	2010 3906	LSI	μPD27C256C-M245D (μPD27C256EAC-068)	1		BA	A
☆	21004677	MOS IC	TC74HC08P	1		AD	A
	2110 3756	Bipolar IC	SN74LS04N	1		AF	A
	2120 1146	Monolithic IC	M5218PR	1		AE	A
	2400 5062	Photo coupler	PC900	1		AH	A
	2520 1442	Ceramic oscillator	CSA10.0MT	1		AE	A
	2590 0140	Ceramic oscillator	CSA12.0MT18	1		AE	A
	2760 2177	Semi fixed resistor	V8K4-11B10K	1		AB	B
	2804 5824	Electrolytic capacitor	6.3RE2-1000	1		N/A	C
☆	2845 0588	Three polarity capacitor	EXC-ECT223MBC	13		N/A	C
	22009010	Transistor	2SA933-SQ-TP-T	1		AD	A
	22209035	Transistor	2SC1740SQ-TP-T	4		AD	A
	2250 0126	Digital transistor	2SA1565-AC-T	8		AD	A
	2252 0203	Digital transistor	2SC4195-AC-T	7		AD	A
	23002086	Diode	1SS254T-77-T	4		AA	C
	2606 0413	Carbon film resistor	R-20-510-J-T24-T	5		N/A	C
	2617 0028	Carbon film resistor	R-20-100-J-T24-T	8			C
	2617 0036	Carbon film resistor	R-20-220-J-T24-T	8			C
	2617 0052	Carbon film resistor	R-20-1K-J-T24-T	26			C
	2617 0095	Carbon film resistor	R-20-10K-J-T24-T	8			C
	2617 0109	Carbon film resistor	R-20-33K-J-T24-T	1			C
	2617 0141	Carbon film resistor	R-20-100K-J-T24-T	17			C
	2617 0231	Carbon film resistor	R-20-270-J-T24-T	1			C
	2617 0246	Carbon film resistor	R-20-12K-J-T24-T	3			C
	2617 0249	Carbon film resistor	R-20-470-J-T24-T	1			C

Note: ☆ – New parts
Q'ty – Quantity used per unit

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	2617 0273	Carbon film resistor	R-20-22-J-T24-T	1		N/A	C
	2617 0297	Carbon film resistor	R-20-22K-J-T24-T	16		↓	C
	2617 0335	Carbon film resistor	R-20-56-J-T24-T	2			C
	2805 5102	Electrolytic capacitor	SME6.3VB-330(M)-T	3			C
	2805 6541	Electrolytic capacitor	SME6.3VB-47(M)-T	3			C
	2805 6681	Electrolytic capacitor	SME16VB-10 (M)-T	6			C
	2818 0365	Ceramic capacitor	RT-HE50TKYB102K-T	9			C
	2818 0390	Ceramic capacitor	RT-HE40TKYB221K-T	1			C
	2818 0403	Ceramic capacitor	RT-HE60TKYB222K-T	2			C
	2818 0446	Ceramic capacitor	RT-HE40TKYB101K-T	10			C
	2818 2082	Ceramic capacitor	RT-HE70TKYF103Z-T	12			C
	2818 3208	Ceramic capacitor	RT-HE50TKCH330J-T	2			C
	2818 3283	Ceramic capacitor	RT-HE50TKCH300J-T	2			C
	2818 3488	Ceramic capacitor	RT-HE70TKSL221J-T	1			C
	2830 6321	Mylar capacitor	AMZV-152K50-T	1			C
	2830 6347	Mylar capacitor	AMZV-392K50-T	1		↓	C
☆	3841 0287	Conductor	ELE-V331KA-T	1		AC	C
	3020 2147	Ferrite beads	BL02RN2-R62	6		AB	C
	3025 0203	EMI filter	EXC-EMT222DC	1		AB	C
	3501 0651	PCB connector	3440-50K2SCSC	1		AH	X
		2) M5245-MA2M PCB ASS'Y					
	2010 1575	LSI	μPD935G	4		BH	A
	2114 0189	Monolithic IC	NJM2090D	8		AP	A
	2120 1146	Monolithic IC	M5218PR (LA6462D)	5		AE	A
	2120 6211	OP amp	LA6358	12		AE	A
	22009010	Transistor	2SA933-SQ-TP-T	1		AD	A
	2252 0168	Transistor	2SC3112B-TPE2-T	1		AD	A
	2254 0070	FET	2SJ104BL, GR-TPE2-T (2SJ45K.L-T)	8		AD	A
	23002086	Diode	1SS254T-77-T	25		AA	A
	2390 0112	Variable capacitor	SVC201SPA	1		AD	B
	2760 2177	Semi-fixed resistor	V8K4-11B10K	8		AB	B
	2760 2185	Semi-fixed resistor	V8K4-11B500	1		AB	B
	2760 2215	Semi-fixed resistor	V8K4-11B20K	8		AB	B
	2775 0119	Thermal resistor	ERS-B30J512	8		—	C
	2605 0028	Metal film resistor	CRB20FX24K-T24-T	8		N/A	C
	2605 0210	Metal film resistor	CRB20FX-9.1K-T24-T	1		↓	C

Note: ☆ – New parts
Q'ty – Quantity used per unit

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	2605 0217	Metal film resistor	CRB20FX-200-T24-T	16		N/A	C
	2605 0224	Metal film resistor	CR820FX-15K-T24-T	8			C
	2605 0238	Metal film resistor	CRB20FX-47K-T24-T	16			C
	2605 0245	Metal film resistor	CRB20FX-82K-T24-T	8			C
	2605 0252	Metal film resistor	CRB20FX-3.3K-T24-T	5			C
	2617 0079	Carbon film resistor	R-20-3.3K-J-T24-T	1			C
	2617 0095	Carbon film resistor	R-20-10K-J-T24-T	19			C
	2617 0109	Carbon film resistor	R-20-33K-J-T24-T	1			C
	2617 0117	Carbon film resistor	R-20-47K-J-T24-T	16			C
	2617 0125	Carbon film resistor	R-20-68K-T24-T	8			C
	2617 0133	Carbon film resistor	R-20-82K-J-T24-T	16			C
	2617 0141	Carbon film resistor	R-20-100K-J-T24-T	12			C
	2617 0168	Carbon film resistor	R-20-220K-J-T24-T	16			C
	2617 0176	Carbon film resistor	R-20-1M-J-T24-T	8			C
	2617 0214	Carbon film resistor	R-20-2.7K-J-T24-T	1			C
	2617 0297	Carbon film resistor	R-20-22K-J-T24-T	16			C
	2617 0327	Carbon film resistor	R-20-2.2M-J-T24-T	24			C
	2617 0408	Carbon film resistor	R-20-6.8K-J-T24-T	8			C
	2617 0491	Carbon film resistor	R-20-330K-J-T24-T	1			C
	2700 7490	Metal film resistor	CRB20FX820-T24-T	8			C
	2700 7503	Metal film resistor	CRB20FX130K-T24-T	8			C
	2775 0112	Thermal resistor	ERS-A33J122-T	8			C
	2805 6541	Electrolytic capacitor	SME6.3VB-47(M)-T	8			C
	2805 6681	Electrolytic capacitor	SME16VB-10(M)-T	34			C
	2805 6699	Electrolytic capacitor	SME50VB-1(M)-T	24			C
	2813 0161	Ceramic capacitor	RT-HE60TKCH430J-T	1			C
	2813 0294	Semi conductive capacitor	RT-C60TKYR223K-T	16			C
	2813 0560	Semi conductive capacitor	DD408SR104K16-T	8			C
	2818 0446	Ceramic capacitor	RT-HE40TKYB101K-T	4			C
	2818 0486	Ceramic capacitor	RT-HE80TKCH121J-T	1			C
	2818 2082	Ceramic capacitor	RT-HE70TKYF103Z-T	39			C
	2818 3194	Ceramic capacitor	RT-HE40TKCH180J-T	1			C
	2819 0557	Ceramic capacitor	RT-HE50TKSL101K-T	2			C
	2830 6312	Mylar capacitor	AMZV-471K50-T	25			C
	2831 0287	Mylar capacitor	AMZV-222J50-T	32			C
☆	3841 0287	Inductor	ELE-V331KA-T	4		AC	C
☆	3501 1568	PC8 connector	7630-60K2FL	1		AH	X
☆	3841 0238	Coil	L3P-7L	1		AD	B

Note: ☆ – New parts
Q'ty – Quantity used per unit

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	3) M5245-MA3M PCB ASS'Y						
	2100 7552	C-MOS IC	MN3102	1		AF	A
	2100 7561	BBD	MN3207	1		AO	A
	21003549	C-MOS IC	TC4066BP	2		AF	A
	2114 0070	Monolithic IC	LA4127	2		AI	A
	2114 0140	Monolithic IC	MB3771P	1		AG	A
	2120 1146	Monolithic IC	M5218PR	3		AE	A
	22305237	Transistor	2SD1866R, S	1		AE	A
☆	2253 0168	Transistor	2SD1593L, K	1		AD	A
☆	2280 0042	Transistor	2SB1117-(K, U)	1		AD	A
	22209035	Transistor	2SC1740SQ-TP-T	4		AD	A
	23002086	Transistor	2SA933SS-TP-T	1		AD	A
	22209035	Transistor	2SC1740SS-TP-T	4		AD	A
	23002086	Diode	1SS254T-77-T	11		AA	C
	23103681	Zener diode	RD4.3ESB2-T1-T	1		AA	B
	23103273	Zener diode	RD5.6JSB2-T1-T	2		AA	B
	23103231	Zener diode	RD4.7ESB2-T1-T	1		AA	B
☆	23102498	Zener diode	RD7.5ESB2-T1-T	1		AB	B
☆	2360 0644	Zener diode	HZS5BLLTD-T	1		AC	B
☆	2390 0371	Diode	DSK10B-BT-T	1		AB	C
	2605 0175	Metal film resistor	CRB20FX33K-T24-T	1		N/A	C
	2605 0224	Metal film resistor	CRB20FX-15K-T24-T	1			C
	2605 0259	Metal film resistor	CRB20FX-180K-T24-T	1			C
	2606 0406	Carbon film resistor	R-20-51K-J-T24-T	1			C
	2606 0413	Carbon film resistor	R-20-510-J-T24-T	2			C
	2617 0028	Carbon film resistor	R-20-100-J-T24-T	6			C
	2617 0052	Carbon film resistor	R-20-1K-J-T24-T	1			C
	2617 0061	Carbon film resistor	R-20-2.2K-J-T24-T	3			C
	2617 0079	Carbon film resistor	R-20-3.3K-J-T24-T	1			C
	2617 0087	Carbon film resistor	R-20-4.7K-J-T24-T	2			C
	2617 0095	Carbon film resistor	R-20-10K-J-T24-T	17			C
	2617 0109	Carbon film resistor	R-20-33K-J-T24-T	6			C
	2617 0117	Carbon film resistor	R-20-47K-J-T24-T	10			C
	2617 0133	Carbon film resistor	R-20-82K-J-T24-T	1			C
	2617 0141	Carbon film resistor	R-20-100K-J-T24-T	6			C
	2617 0168	Carbon film resistor	R-20-220K-J-T24-T	2			C
	2617 0203	Carbon film resistor	R-20-470K-J-T24-T	1			C
	2617 0206	Carbon film resistor	R-20-39K-J-T24-T	1			C

Note: ☆ – New parts
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HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	2617 0214	Carbon film resistor	R-20-2.7K-J-T24-T	3		N/A	C
	2617 0220	Carbon film resistor	R-20-150-J-T24-T	4			C
	2617 0246	Carbon film resistor	R-20-12K-T24-T	8			C
	2617 0249	Carbon film resistor	R-20-470-J-T24-T	2			C
	2617 0262	Carbon film resistor	R-20-120K-J-T24-T	1			C
	2617 0265	Carbon film resistor	R-20-10-J-T24-T	4			C
	2617 0289	Carbon film resistor	R-20-15K-J-T24-T	3			C
	2617 0297	Carbon film resistor	R-20-22K-J-T24-T	15			C
	2617 0301	Carbon film resistor	R-20-56K-J-T24-T	4			C
	2617 0327	Carbon film resistor	R-20-2.2M-J-T24-T	4			C
	2617 0386	Carbon film resistor	R-20-330-J-T24-T	1			C
	2617 0459	Carbon film resistor	R-20-27K-J-T24-T	1			C
	2617 0505	Carbon film resistor	R-20-33K-J-T24-T	1			C
☆	2617 0818	Carbon film resistor	R-20-20K-J-T24-T	1			C
	2617 0877	Carbon film resistor	R-20-8.2K-J-T24-T	1			C
	2617 0893	Carbon film resistor	R-20-47-J-T24-T	4			C
	2617 0931	Carbon film resistor	R-20-6.2K-J-T24-T	1			C
	2800 9056	Electrolytic capacitor	50RE2-3R3-T14-T	1			C
	2805 6699	Electrolytic capacitor	SME50VB-1(M)-T	3			C
☆	2805 8210	Electrolytic capacitor	SME50VB-1(M)Y-T	12			C
☆	2805 8217	Electrolytic capacitor	SME50VB-2R2(M)Y-T	2			C
☆	2805 8224	Electrolytic capacitor	SME16VB-10(M)Y-T	4			C
☆	2805 8231	Electrolytic capacitor	SME16VB-22(M)Y-T	4			C
☆	2805 8238	Electrolytic capacitor	SME6.3VB-47(M)Y-T	6			C
☆	2805 8245	Electrolytic capacitor	SME6.3VB100(M)Y-T	3			C
☆	2805 8252	Electrolytic capacitor	SME10VB-100(M)Y-T	4			C
☆	2805 8259	Electrolytic capacitor	SME16BV-220(M)-T	6			C
☆	2805 8266	Electrolytic capacitor	SME6.3VB-470(M)Y-T	2			C
☆	2805 8273	Electrolytic capacitor	SME50VB-1MBP-T	5			C
☆	2805 8280	Electrolytic capacitor	SME50VB-1MBPY-T	2			C
	2813 0567	Ceramic capacitor	RT-HE80TKSL391J-T	1			C
	2818 0365	Ceramic capacitor	RT-HE50TKYB102K-T	5			C
	2818 0497	Ceramic capacitor	RT-HE40TKYB681K-T	3			C
	2818 2082	Ceramic capacitor	RT-HE70TKYF103Z-T	13			C
	2818 3208	Ceramic capacitor	RT-HE50TKCH330J-T	1			C
	2819 0557	Ceramic capacitor	RT-HE50TKSL101K-T	8			C
	2830 6237	Mylar capacitor	AMZV-102K50-T	1			C
	2830 6245	Mylar capacitor	AMZV-272K50-T	1			C
	2830 6261	Mylar capacitor	AMZV-103K50-T	3			C

Note: ☆ – New parts
Q'ty – Quantity used per unit
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HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	2830 6296	Mylar capacitor	AMZV-332K50-T	1		N/A	C
	2830 6347	Mylar capacitor	AMZV-392K50-T	1			C
	2830 6355	Mylar capacitor	AMZV-472K50-T	1			C
	2830 6398	Mylar capacitor	AMZV-333K50-T	1			C
	2830 6452	Mylar capacitor	AMZV-682K-50-T	2			C
	2830 6606	Mylar capacitor	AMZV-224K50-T	4			C
60	2765 0266	Slide VR Accomp/Rhythm	S3018-10KB-L25	2		AF	B
☆ 61	2765 0511	Slide VR Main	S3018-10KBX2-L25	1		AH	B
	2804 9722	Electrolytic capacitor	16RE2-1000	2		N/A	C
	2805 2201	Electrolytic capacitor	16RE2-470	2			C
	3020 2147	Ferrite beads	BL02RN2-R62	4		AB	C
	3025 0203	EMI filter	EXC-EMT222DC	5		AB	C
☆	3725 1092	PC joiner M24LB	JSF50-23-85M	1		AD	C
☆				1			X
	4) M5245-MA4M PCB ASS'Y						
62	2765 0294	VR Pitch Control	K121K0Z1A-100KB	1		AD	B
63	35123245	DC jack AC Adaptor	HEC2305-01-030	1		AC	B
64	3512 4381	DIN connector MIDI Jack	YKE31-0037	3		AC	B
65	3612 0665	Phone jack Ft.Volume	YKB21-5006	1		AE	B
66	3612 0789	Jack Line Out/Sustain	YKB21-5010	3		AD	B
				1			X
	5) M5245-MA5M PCB ASS'Y						
67	3612 0665	Phone jack Headphone	YKB21-5006	1		AE	B
				1			X
	6) M5245-MA6M PCB ASS'Y						
	2370 0042	LED Power Indicator	LN866RPT-(TA)	1		AC	B
68	34203784	Slide switch Power Sw.	SSE-22FP	1		AD	B
	7) M5245-CN1M PCB ASS'Y						
	2100 5053	MOS IC	TC74HC154P	1		AG	A
	23010097	Diode	1S2473-T-77-T	49		AA	C
	2320 9802	LED	LN366GPT-(TA)	4		AC	B
	2370 0042	LED	LN866RPT-(TA)	44		AC	B
	2614 0234	Carbon film resistor(P)	R-25-1KJ-T24-T	4		N/A	C

Note: ☆ – New parts
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HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
	2845 0588	Three polarity capacitor	EXC-ECT223MBC	1		N/A	C
	3410 1728	Tact switch	EVQ-QS205K	49		AB	B
	3725 1015	PC joiner M245E	JSF50-20-130M	1		AE	C
	3725 1022	PC joiner M245F	JSF50-16-130M	1		AD	C
	8) M5245-CN2M PCB ASS'Y						
	23002086	Diode	1SS254T-77-T	22		AA	C
	2320 9802	LED	LN366GPT-(TA)	1		AC	B
	2370 0042	LED	LN866RPT-(TA)	8		AC	B
	3410 1728	Tact switch	EVQ-QS205K	21		AB	B
	3725 1029	PC joiner	JSF00-26-35	1		AD	C
	9) M5149-CN3 PCB ASS'Y						
	23700042	LED Mod. on/off	LN866RPT	1		AC	B
	10) M5149-CN6 PCB ASS'Y						
	2370 0035	LED I,II,III	LN851RPP.WE	3		AC	B
	11) M4240-IF PCB ASS'Y						
69	3501 0861	30P connector 149A	7930-30P-36-M149	1		AN	X
	3501 0896	Card connector	JC20-C45PA-LT2-A2	1		AQ	C
	43076890	Blank PCB M4240-IF	M43166A-1	1		AH	X
	12) UPPER CASE ASS'Y						
1	2765 0329	VR Mode, Tempo/data	K161100M5C-50KB	2		AF	B
2	6908 9480	Fill in button 240	M32435-4	2		AC	C
3	6908 9510	Fill in button 240	M32435-5	1		AC	C
4	6908 9570	Rhythm button	M4498-17	1		AC	C
5	6908 9580	Slide knob 71	M31359-14	1		AC	C
6	6908 9590	Slide VR knob 71	M31358-2	3		AC	C
7	6909 0000	Key top	M32436-5	8		AC	C
8	6909 0030	Entry dial	M32437-1	2		AE	C
9	6910 1860	Fill in contact rubber 31	M4675-1	1		AB	B
10	6913 4381	Upper case sub ass'y	M210025A°1	1		BQ	C

Note: ☆ – New parts
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HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
11	6913 4390	Key top set 245	M310101*1	1		—	C
12	6913 4400	Fill in button 240	M32435-6	1			C
13	6913 4410	Fill in button 240	M32435-8	2			C
14	6913 4420	Fill in button 240	M32435-7	1			C
15	6913 4430	Key top	M32436-6	1			C
16	6913 4440	Key top	M32436-7	1			C
17	3831 0189	Speaker	C120F5	2		AZ	B
54	6913 4570	Display Window	M310021-1	1		AQ	C
		13) LCD UNIT					
18	6913 4460	LCD Holder	M310022-1	1		AD	C
19	3335 1071	LCD	CA143-TS	1		AD	A
20	35011197	30P connector 245A	7930-30P-48-M246	1		AD	X
21	6913 4491	Heat seal 245	M410073A-1	1		AF	A
		14) BENDER ASS'Y					
22	2770 6843	VR	VM10W520A-50KB	1		AH	B
23	6904 0420	Bender spring	M41737-1	1		AB	X
24	6904 6110	Bender knob 153	M31620-1	1		AD	C
25	6904 6120	Bender chassis 153	M42128-1	1		—	X
26	6911 5250	Bender chassis B	M41946-1	1		—	X
		15) MODULATION ASS'Y					
27	2770 6843	VR	VM10W520A-50KB	1		AH	B
28	6904 6110	Bender knob 153	M31620-1	1		AD	C
29	6904 6120	Bender chassis 153	M42128-1	1		—	X
30	6911 5250	Bender chassis B	M41946-1	1		—	X
		16) KEYBOARD ASS'Y					
31	6903 7710	White key CF	M31269-1	10		AF	C
32	6903 7720	White key BE	M31271-1	10		AF	C
33	6903 7730	White key D	M31270-1	5		AF	C
34	6903 7740	White key G	M31272-1	5		AF	C
35	6903 7750	White key A	M31273-1	5		AF	C
36	6903 7760	White key S	M31274-1	1		AF	C
37	6903 7770	Black key	M31275-1	25		AF	C
38	6905 6941	Key stopper	M31986A-1	1		—	X
39	69037660	Contact rubber E	M31276A-1	4		AF	B

Note: ☆ — New parts
Q'ty — Quantity used per unit
• — Minimum order and supply quantity

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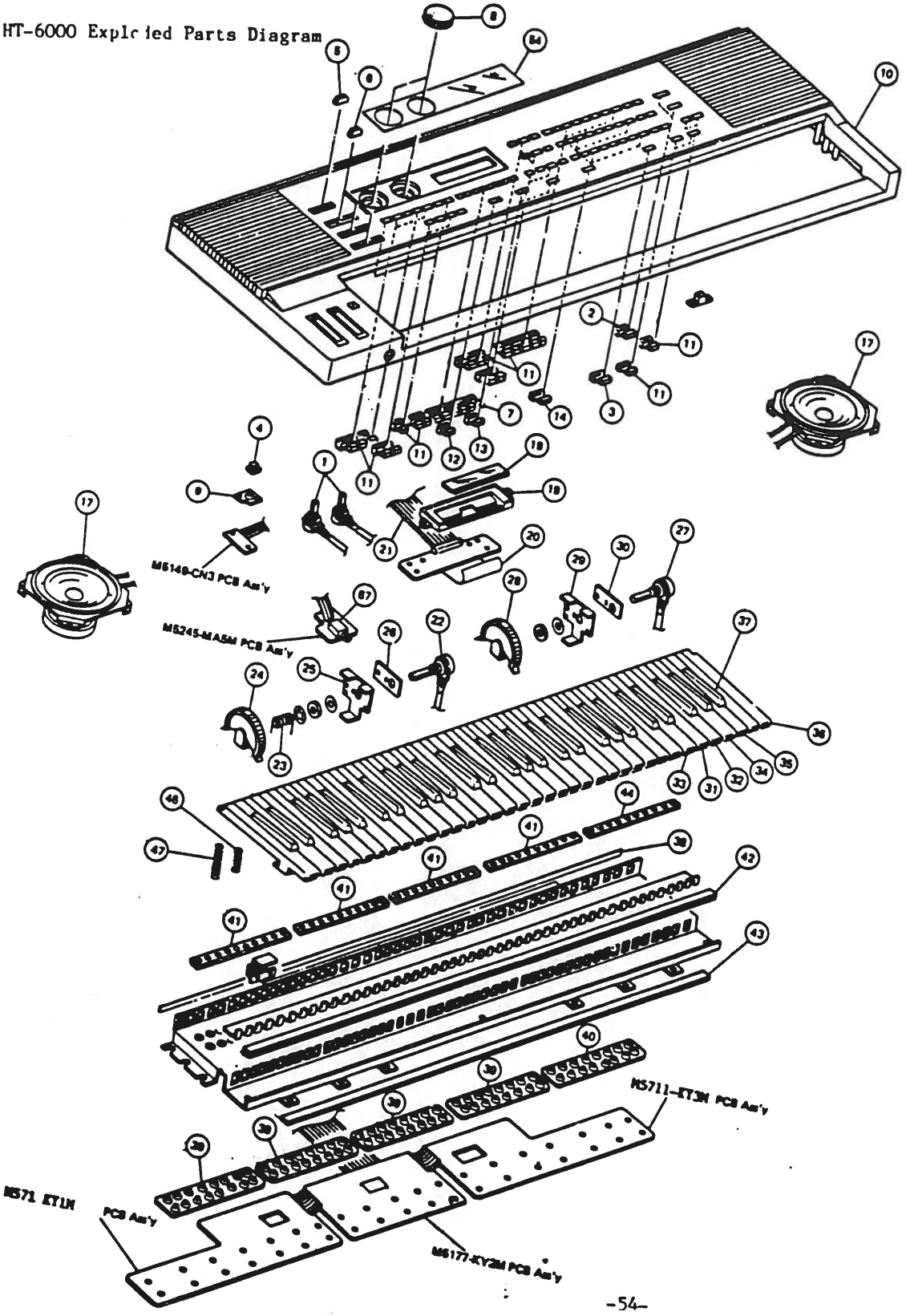
HT-6000 Parts List

Item	Code No.	Part Name	Specification	Q'ty		Price Code	Rank
40	69037670	Contact rubber F	M31277A-1	1		AF	B
41	6903 7680	KB guide A	M31317-1	4		--	X
42	6903 7690	Stopper (Upper)	M41694-1	5			X
43	6903 7700	Stopper (Lower)	M41693-1	1			X
44	6903 7890	KB guide B	M31318-1	1			X
☆45	6913 6480	KB chassis	M210011-1	1		↓	X
46	6903 7780	KB spring (for black key)	M41630-1	25		AA	C
47	6903 9880	KB spring (for white key)	M41632-2	36		AA	C
		17) LOWER CASE ASS'Y					
48	69060422	Battery cover sub ass'y	M31520G*5	1		AF	C
49	6913 4376	Lower case sub ass'y	M210026F*1	1		BJ	C
50	6903 2150	Battery spring B	M41330-1	1		AB	C
51	6902 6140	Battery spring 90	M41226-1	1		AB	C
52	6905 3280	Battery blind 152	M31490-2	1		--	C
53	6902 3900	Rubber foot	M41109-1	5		—	C
		18) OTHERS					
	69082120	Note stand 145	M32254A-1	1		--	X
	6913 4350	Dust cover	M310105-1	1		--	X
		M5177 Keyboard PCB Assy.					
	20040815	LSI	MSM6200GS-IL	1		BE	B
	23010097	Diode	1S2473	94		AA	C
	23002086	Diode	1S254T	28		AA	C
	37210041	PC Joiner	PCJ-JVU-16-22	2		AB	C
	37209936	PC Joiner	PCJ-UV-19-210	1		AG	C
	43072420	Blank PCB M571-KY1M	M2822A-1	1		AQ	C
	43074290	Blank PCB M5177-KY2M	M21246-1	1		AN	C
	43072440	Blank PCB M571-KY3M	M2823-1	1		AQ	C

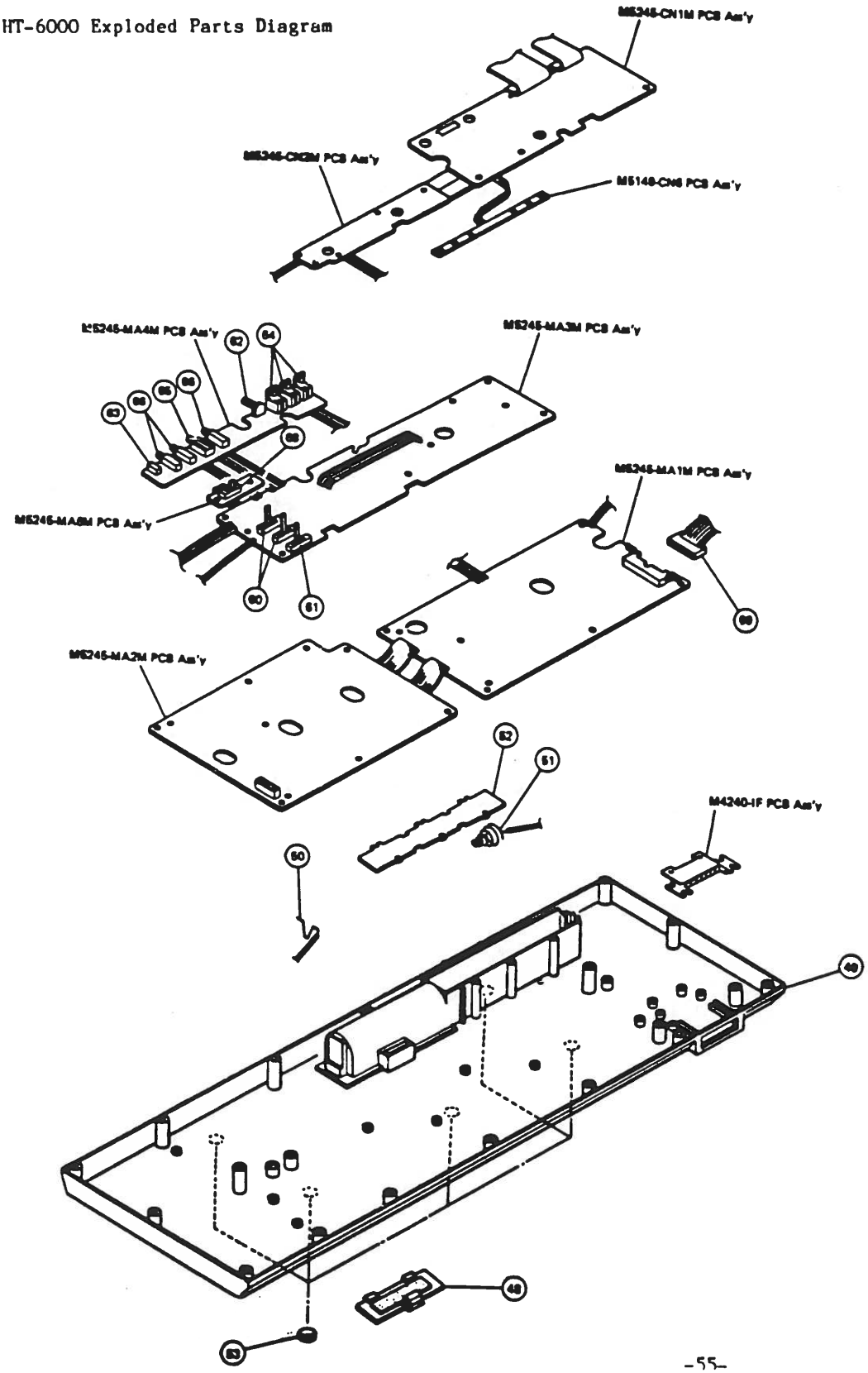
Q'ty- Quantity used per unit

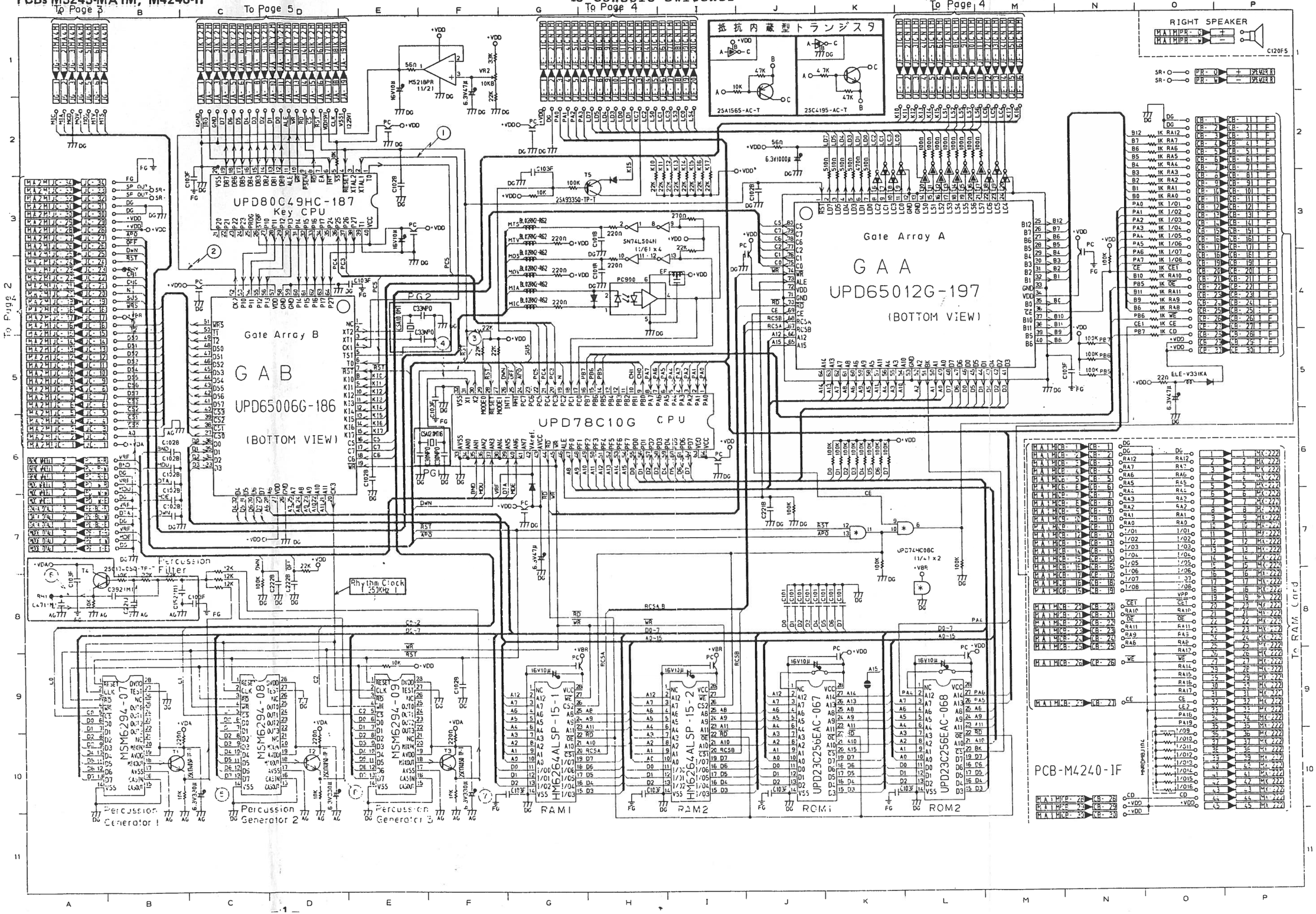
Rank A: Essential
B: Stock Recommended
C: Others
X: No Stock Recommended

HT-6000 Explc ied Parts Diagram



HT-6000 Exploded Parts Diagram




To Console Switches
To console switches
To Page 3
To Page 5
To Page 4
To Page 4
To Page 2
RIGHT SPEAKER
抵抗内蔵型トランジスタ
UPD80C49HC-187
Key CPU
Gate Array A
G A A
UPD65012G-197
(BOTTOM VIEW)
Gate Array B
G A B
UPD65006G-186
(BOTTOM VIEW)
UPD78C10G CPU
Percussion Filter
Rhythm Clock 1 250KHz 1
Percussion Generator 1
Percussion Generator 2
Percussion Generator 3
MSM6294-07
MSM6294-08
MSM6294-09
HM6264ALSP-15-1
RAM1
HM6264ALSP-15-2
RAM2
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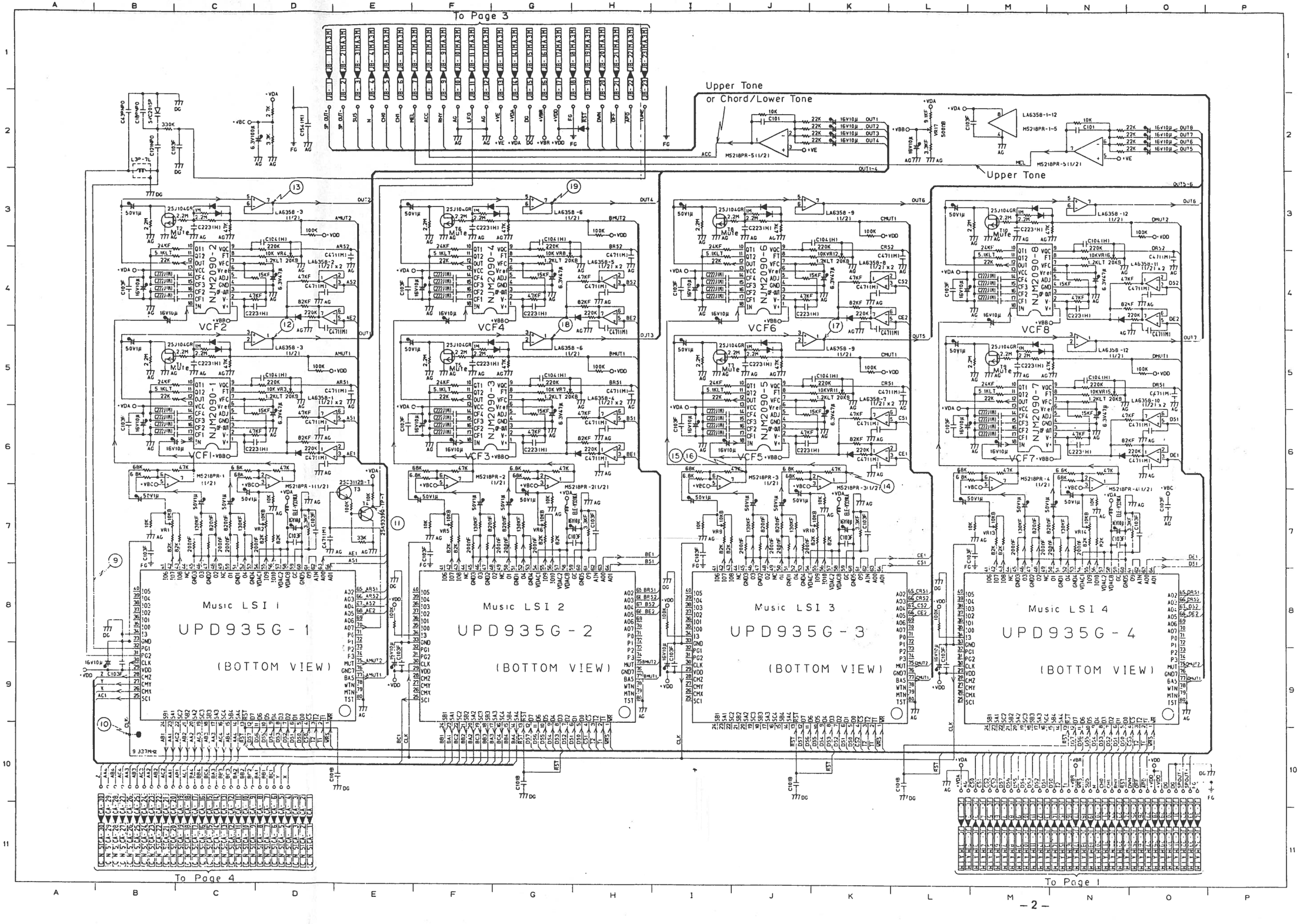
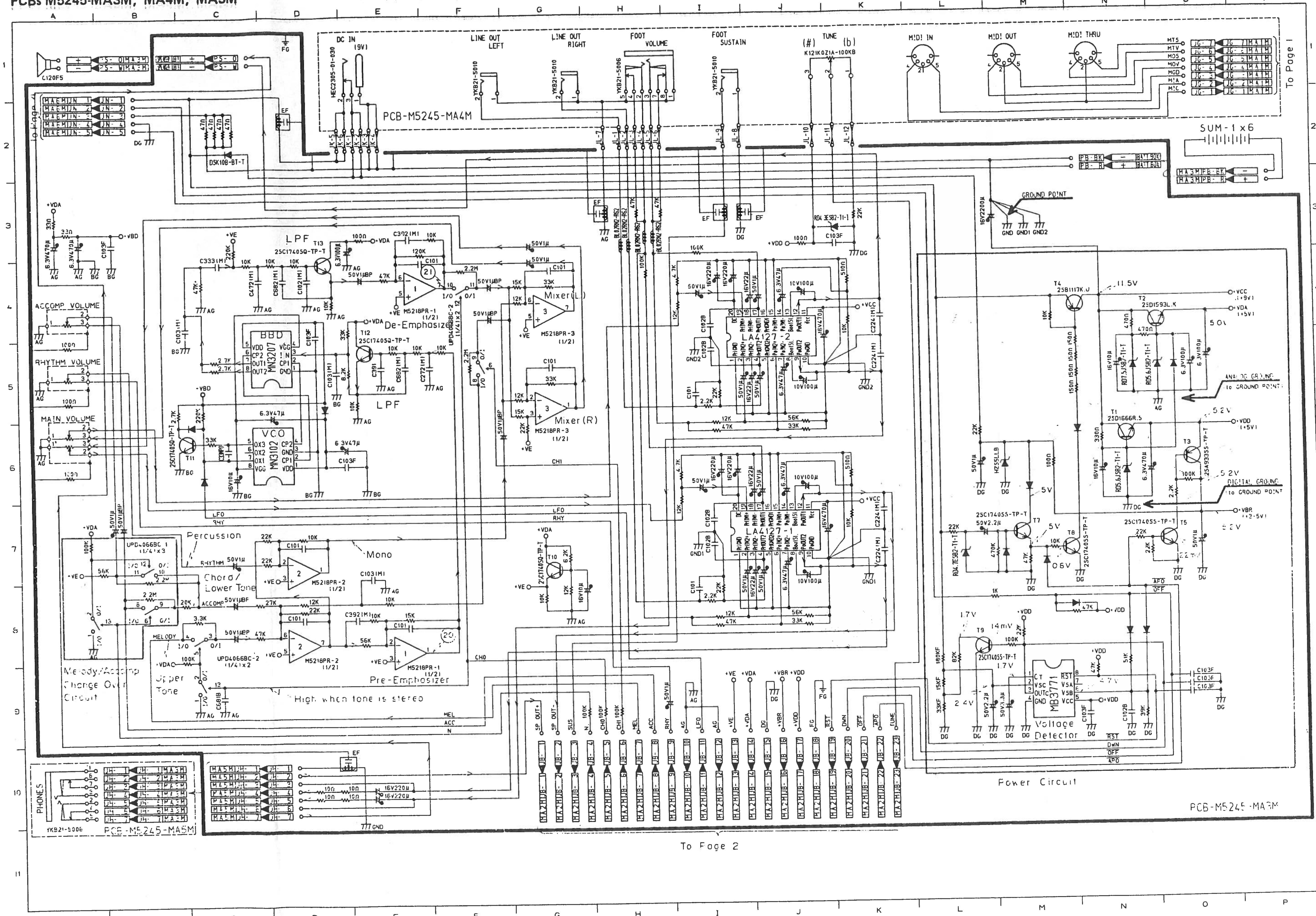
ROM1
UPD23C256EAC-068
ROM2
PCB-M4240-IF
To RAM Card


To Page 3
Upper Tone
or Chord/Lower Tone
Upper Tone
VCF1
VCF2
VCF3
VCF4
VCF5
VCF6
VCF7
VCF8
Music LSI 1
UPD935G-1
(BOTTOM VIEW)
Music LSI 2
UPD935G-2
(BOTTOM VIEW)
Music LSI 3
UPD935G-3
(BOTTOM VIEW)
Music LSI 4
UPD935G-4
(BOTTOM VIEW)
To Page 4
To Page 1


DC IN (9V)
LINE OUT LEFT
LINE OUT RIGHT
FOOT VOLUME
FOOT SUSTAIN
TUNE
MIDI IN
MIDI OUT
MIDI THRU
To Page 1
PCB-M5245-MA4M
SUM-1x6
GROUND POINT
LPF
BBD
MN3207
VCO
MN3102
De-Emphasize
Mixer(L)
Mixer(R)
ACCOMP VOLUME
RHYTHM VOLUME
MAIN VOLUME
LA4127-2
Percussion
Mono
Chord/Lower Tone
Melody/Accomp Change Over Circuit
Upper Tone
Pre-Emphasizer
High when tone is stereo
ANALOG GROUND to GROUND POINT
DIGITAL GROUND to GROUND POINT
Voltage Detector
MB3771
Power Circuit
PHONES
PCB-M5245-MA5M
PCB-M5245-MA3M
To Page 2

PCB-M5245-CN1M

PCB-M5245-MA6M

PCB-M5245-CN5

PCB-M5245-CN2M

PCB-M5149-CN3

PCB-M5149-CN6

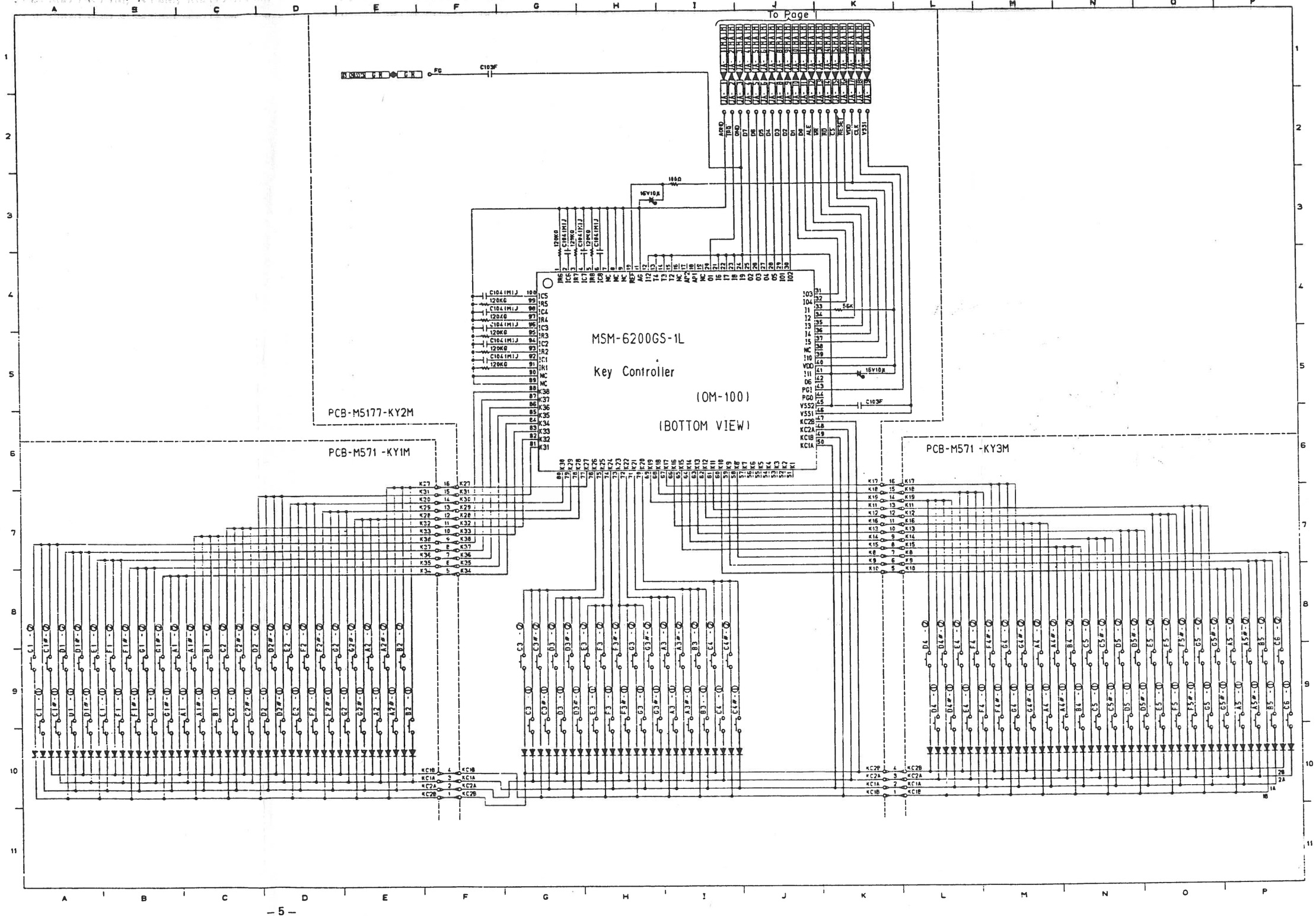
TC74HC154P

DG777

To Page 1

To Page 2

To Page 3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MSM-6200GS-1L
Key Controller
(OM-100)
(BOTTOM VIEW)
PCB-M5177-KY2M
PCB-M571 -KY1M
PCB-M571 -KY3M

PCB VIEW

PCB M5245-MA1M