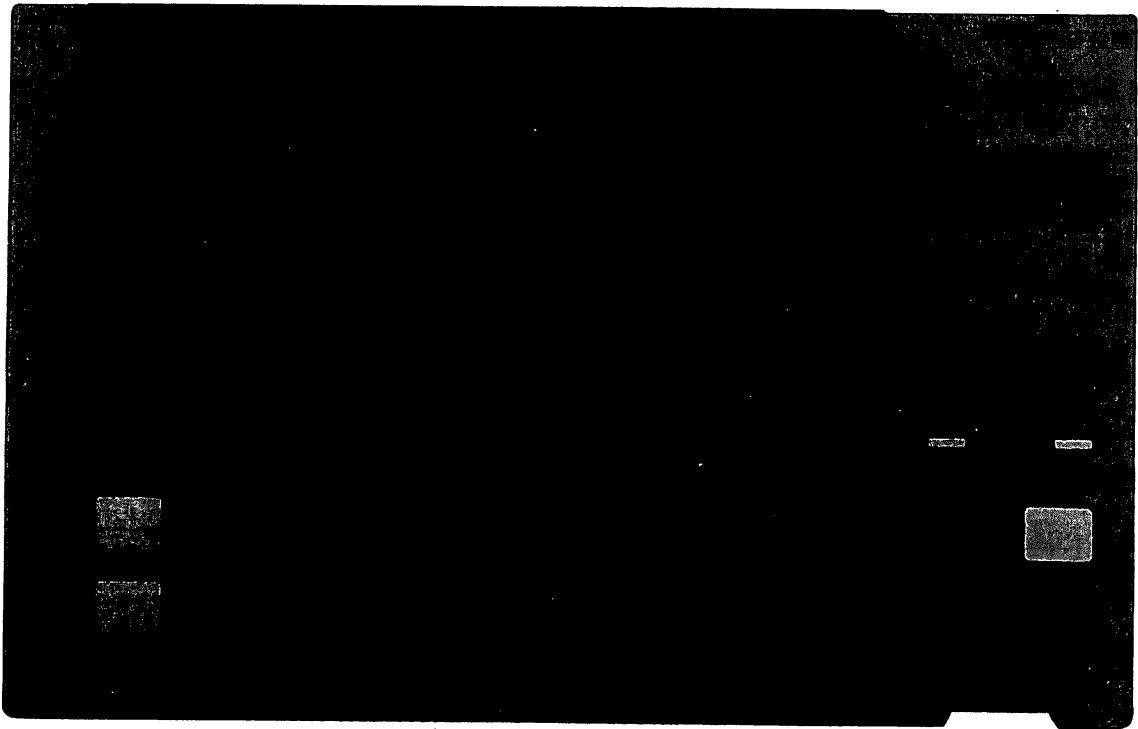


DDD-1

DYNAMIC DIGITAL DRUMS SERVICE MANUAL



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KORG®

1. TECHNICAL SPECIFICATIONS

1 MEMORY CAPACITY

BUILT IN RAM	: 64 Kbit × 2 (BATTERY BACKUPED)
RAM CARD	: 64 Kbit × 2 (BATTERY BACKUPED)
PATTERN No.	: 100
NOTE No.	: 4,458 (MAX Note No. IN A BAR; 249)
SONG No.	: 10
PART No. PER SONG	: MAX 255
SONG BAR	: MAX 9,999
INSTRUMENT SETTING	: 6

2 MEMORY PARAMETER

PATTERN DATA

1. PATTERN No.	: 00 ~ 99
2. NAME	: 8 CHARACTORS
3. BEAT	: 1/4 ~ 8/4, 1/8 ~ 16/8, 1/16 ~ 32/16, 1/32 ~ 64/32
4. BAR	: 1 ~ 99
5. FLAM TIME	: 0 ~ 9 × 10msec
6. SWING VALUE	: 0 ~ 9 (50% ~ 88%)

PATTERN SEQUENCE DATA

1. INSTRUMENT NUMBER	: A ~ N (14)
2. LOCATION	: ♩/24 RESOLUTION
3. DYNAMICS	: 0 ~ 15
4. TUNE	: -12 ~ +12 (25 steps)
5. DECAY	: 0 ~ 15
6. FLAM ON	: ON/OFF

SONG DATA

1. SONG NUMBER	: 0 ~ 9
2. NAME	: 8 CHARACTORS
3. INST SETTING NUMBER	: 0 ~ 5
4. INITIAL TEMPO	: 40 ~ 250 BPM

SONG SEQUENCE DATA

1. PATTERN/SONG No.	: PTN 00 ~ 99/SONG 0 ~ 9
2. PART NUMBER	: MAX 255 PARTS
3. REPEAT	: REPEAT TIMES 1 ~ 99
4. TEMPO CHANGE	: -99 ~ +99 BPM

INSTRUMENT SETTING DATA

1. SETTING NUMBER	: 0 ~ 5
2. TOUCH SENSE	: 0 ~ 9
3. TOTAL TUNE	: 0 ~ 127 (ABOUT 9.4 CENTS STEP)
4. TOTAL DECAY	: 0 ~ 15
5. OUTPUT LEVEL	: 0 ~ 15
6. OUTPUT ASSIGN	: STEREO L3 ~ R3, MULTI OUT 1 ~ 6
7. INST ASSIGN A ~ N	: INST NUMBER
8. ASSIGN MODE A ~ N	: MONO/POLY/EXCLUSIVE

SYSTEM SETTING DATA

1. METRONOME	: ON/OFF
2. METRONOME BEAT	: 1/4 ~ 1/32
3. AUDIO INPUT TRIG ASSIGN	: A ~ N
4. TRIG OUTPUT ASSIGN	: A ~ N
5. CLOCK	: INTERNAL/MIDI/TAPE
	: AVAILABLE/UNAVAILABLE (WRITE)
6. MIDI RECOGNITION	: OMNI MODE (ON/OFF)
	: MIDI CH (1 ~ 16)
	: SEQ TUNE VOLUME (72 ~ 96)
	: SEQ DECAY (9 ~ 24)
	: NOTE NUMBER (25 ~ 71)
7. MIDI TRANSMISSION	: AVAILABLE/UNAVAILABLE (NOTE)
	: MIDI CH (A ~ N ; 1 ~ 16)
8. SAMPLING SET	: CAN BE DIVIDED BLOCK 1, BLOCK 2
	: SAMPLING CLOCK (0 ~ 127)
	: SAMPLING TRIG (AUTO/MANUAL)

3 EXTERNAL MEMORY

RAM CARD

MEMORY CAPACITY : 128 Kbit SRAM, BATTERY BACK UPED
 ACCESS TIME : SAVE; LESS THAN 3 sec
 : LOAD; LESS THAN, 2 sec
 : VERIFY; LESS THAN 2 sec

MIDI

ACCESS TIME : LESS THAN 19 sec

TAPE

ACCESS TIME : LESS THAN 82 sec
 (ABOUT 2,000 BPS)

CONTROLLER

SLIDER : VOLUME (SIGNAL OUTPUT)
 : DATA (PARAMETER EDIT)
 : AUDIO INPUT LEVEL

KEY

: START	: FLAM
: STOP/RESET	: TOUCH SENSITIVE INST KEY × 14 (A~N)
: REC/ENTER	: MODE SELECTION KEY × 6 (1~6)
: TAP TEMPO	: FUNCTION SELECTION KEY × 8 (f1~f8)
: ROLL	: CURSOR KEY × 2 (◀ ▶)
	: TEN KEY × 10 (0~9)
	: + 1/YES KEY
	: - 1/NO KEY

SWITCH

: POWER SW
 : DIP SW (TAPE I/O LEVEL, TRIG OUTPUT POLARITY, MEMORY PROTECT)

DISPLAY

LCD DISPLAY : 5×7 DOT MATRIX, 16 CHARACTER × 2 LINES
 LCD DISPLAY WITH BACK ILLUMINATION

LED INDICATOR : × 10
 (RUN, REC, MODE × 6, PEAK, TRIG)

INPUT/OUTPUT

JACK	INPEDANCE	LEVEL
STEREO OUTPUT R/MONO	1 KΩ	2,3 Vp-p (TOM 1)
R or L	2 KΩ	3,7Vp-p (TOM 1)
MULTI OUTPUT 1~6	100Ω	4,6Vp-p (TOM 1)
SAMPLING OUTPUT		
METRONOME OUTPUT	100Ω	5,7Vp-p AT STRONG BEAT
TAPE OUTPUT (DATA)	2,2KΩ/4,7KΩ	1,7Vp-p/17mVp-p
TRIG OUTPUT	1KΩ	+5V GND/GND +5V
HEADPHONES OUTPUT	51Ω	8,0Vp-p
AUDIO INPUT	10KΩ	0,37Vp-p Vol MAX, PEAK LED ON
TAPE INPUT		HIGH (DIP SW ON)
		LOW (DIP SW OFF)
FOOT SW INPUT	START/STOP 10KΩ	+5V GND
	TAP TEMPO 10KΩ	+5V GND

TAPE SYNC \downarrow = 24, "1" = 320μS, "0" = 640 μS

REMAINING NOISE LEVEL

OUT R : LESS THAN -76dBm
 OUT L : LESS THAN -76dBm
 MULTI 1~6 : LESS THAN -73dBm
 METRO : LESS THAN -68dBm

ALLOWABLE CLICK NOISE AT POWER ON/OFF

OUT L, R : WITHIN 5,5Vp-p
 MULTI 1~6 : WITHIN 7,0Vp-p

POWER SUPPLY

AC LOCAL VOLTAGE 50/60 Hz, 5w
 BUILT IN RAM BACKUPED BATTERY ; LITHIC BATTERY

DIMENSION 411 (W) × 263 (D) × 65 (H) mm

WEIGHT 3,2Kg

2. MIDI IMPLEMENTATION

1. TRANSMITTED DATA

1. CHANNEL MESSAGE

STATUS	SECOND	THIRD	DESCRIPTION
1 0 0 0 n n n n	0 k k k k k k k	0 0 0 0 0 0 0 0	Note Off (NOTE1) k k k k k k k = 25~71
1 0 0 1 n n n n	0 k k k k k k k	0 v v v v v v v	Note On (NOTE1) k k k k k k k = 25~71 v v v v v v v = 1~127

★ nnnn = 0 ~ 15: Channel Numbers set to individual keys via MIDI Transmit Function.

NOTE

- Note OFF transmitted immediately after Note transmission.

2. SYSTEM MESSAGES

STATUS	SECOND	THIRD	DESCRIPTION
1 1 1 1 0 0 0 0	0 1 0 0 0 0 1 0	0 x x x x x x x	Exclusive Messages(NOTE 1)
1 1 1 1 0 1 1 1	_____	_____	EOX (NOTE 1)
1 1 1 1 0 0 1 0 1 1 1 1 0 0 1 1	0 l l l l l l l l 0 s s s s s s s s	0 h h h h h h h h _____	Song Position Pointer(NOTE2) Song Select (NOTE 3)
1 1 1 1 1 0 0 0 1 1 1 1 1 0 1 0 1 1 1 1 1 0 1 1 1 1 1 1 1 1 0 0	_____ _____ _____ _____	_____ _____ _____ _____	Timing Clock (NOTE 4) Start Continue Stop

NOTES

- Transmitted when set to MIDI in Data Transfer Mode.
- Transmitted when measure is selected with Song Select Function set to STOP (However, transmission is impossible when 0111 1111 0111 1111.)
- Transmitted when SONG is selected with Song Select Function set to STOP.
- Transmitted when Clock is not set to MIDI (not transmitted when set to STOP).

3. SYSTEM EXCLUSIVE MESSAGES

① SEQUENCE DATA

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
{ 0 0 0 1 0 0 1 0	DDD-I ID 12H } (NOTE 1)
{ 0 0 0 0 0 1 1 1	
0 1 0 0 1 0 0 0	SEQUENCE DATA 48H
0 d d d d d d d	DATA
⋮	Data up to 56 bytes *57 bytes for the first block only
0 d d d d d d d	
1 1 1 1 0 1 1 1	EOX

NOTE

1. DDD-1 is transmitted when SQD-1 receives DATA DUMP REQUEST during SAVE operation while set to the MIDI Function in the Data Transfer Mode.

② DATA END BLOCK

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42 H
0 0 1 1 0 0 0 0	FORMAT ID 30 H
{ 0 0 0 1 0 0 1 0	DDD-I ID 12 H } (NOTE 1)
{ 0 0 0 0 0 1 0 0	
0 1 0 0 1 1 1 1	DATA END BLOCK 4FH
1 1 1 1 0 1 1 1	EOX

NOTE

1. DDD-1 is transmitted when SQD-1 receives DATA DUMP REQUEST during SAVE operation while set to the MIDI Function in the Data Transfer Mode.

③ DEVICE ID

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
0 0 0 1 0 0 1 0	DDD-I ID 12H
1 1 1 1 0 1 1 1	EOX

2. RECOGNIZED RECEIVE DATA

1. CHANNEL MESSAGES

STATUS	SECOND	THIRD	DESCRIPTION
1 0 0 0 n n n n	0 k k k k k k k k	0 x x x x x x x	Note Off(NOTE 1)
1 0 0 1 n n n n	0 k k k k k k k k	0 0 0 0 0 0 0 0	Note Off(NOTE 1)
1 0 0 1 n n n n	0 k k k k k k k k	0 v v v v v v v v	Note On (NOTE 2) v v v v v v v v = 1 ~ 127
1 1 0 0 n n n n	0 p p p p p p p p	—————	Program Change(NOTE 3)
1 0 1 1 n n n n	0 1 1 1 1 1 0 0	0 x x x x x x x	Omni Mode Off
1 0 1 1 n n n n	0 1 1 1 1 1 0 1	0 x x x x x x x	Omni Mode On

★ nnnn = 0 ~ 15: Channel Numbers set via the MIDI Receive Function at OMNI MODE ON, all messages received regardless of setting. At OMNI MODE OFF, only set Channel Message is received. However, Channel Mode Messages receive set Channel Messages regardless of OMNI ON/OFF status.

NOTES

1. Recognized Note OFF Note Numbers

k k k k k k k k = 9 ~ 24(SEQ DECAY)

k k k k k k k k = 72 ~ 96(SEQ TUNE)

★ kkk kkkk = 25 ~ 71 is ignored.

2. Recognized Note ON Note Numbers

k k k k k k k k = 9 ~ 24(SEQ DECAY)

k k k k k k k k = 25 ~ 71(INST KEY)

k k k k k k k k = 72 ~ 96(SEQ TUNE)

3. When a Program Change Message is received in the INST SETTING mode, Instrument settings may be altered.

★ Program change Numbers outside of the range are ignored. Program change Numbers outside of the p p p p p p p p = 0 ~ 5 range are ignored.

2. SYSTEM MESSAGES

STATUS	SECOND	THIRD	DESCRIPTION
1 1 1 1 0 0 0 0	0 1 0 0 0 0 1 0	0 x x x x x x x	Exclusive Messages(NOTE 1)
1 1 1 1 0 1 1 1	—————	—————	EOX (NOTE 1)
1 1 1 1 0 0 1 0	0 l l l l l l l l	0 h h h h h h h h	Song Position Pointer(NOTE 2)
1 1 1 1 0 0 1 1	0 s s s s s s s s	—————	Song Select (NOTE 2)
1 1 1 1 1 0 0 0	—————	—————	Timing Clock (NOTE 3)
1 1 1 1 1 0 1 0	—————	—————	Start
1 1 1 1 1 0 1 1	—————	—————	Continue
1 1 1 1 1 1 0 0	—————	—————	Stop

NOTES

1. Recognized when Data Transfer Mode is set to MIDI.

2. Recognized only when Song Select Function is set to STOP. Song Numbers outside the sss ssss = 0 ~ 9 range are ignored.

3. Recognized when Clock is set to MIDI.

3. SYSTEM EXCLUSIVE MESSAGES

1] DATA DUMP REQUEST

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
0 0 0 1 0 0 1 0	DDD-1 ID 12H
0 0 0 1 0 0 0 0	DATA DUMP REQUEST 10H
1 1 1 1 0 1 1 1	EOX

2] SEQUENCE DATA

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
0 0 0 1 0 0 1 0	DDD-1 ID 12H
0 0 0 0 0 1 0 0	SQD-1 ID 07H
0 1 0 0 1 0 0 0	SEQUENCE DATA 48H
0 d d d d d d d	DATA } Data up to 56 bytes
⋮	
0 d d d d d d d	DATA } * First block is 57 bytes.
1 1 1 1 0 1 1 1	EOX

NOTE

1. DDD-1 is transmitted when SQD-1 receives SEQ DATA during LOAD operation while set to the MIDI Function in the Data transfer Mode.

3] DATA END BLOCK

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
0 0 0 1 0 0 1 0	DDD-1 ID 12H
0 0 0 0 0 1 0 0	SQD-1 ID 07H
0 1 0 0 1 1 1 1	DATA END BLOCK 4FH
1 1 1 1 0 1 1 1	EOX

NOTES


2. DDD-1 is transmitted when SQD-1 receives SEQ DATA during LOAD operation while set to the MIDI Function in the Data transfer Mode.

4) DATA DUMP ERROR

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 0 0 0 0	FORMAT ID 30H
0 0 0 1 0 0 1 0	DDD-1 ID 12H
0 0 1 0 0 0 0 0	DATA DUMP ERROR 20H
1 1 1 1 0 1 1 1	EOX

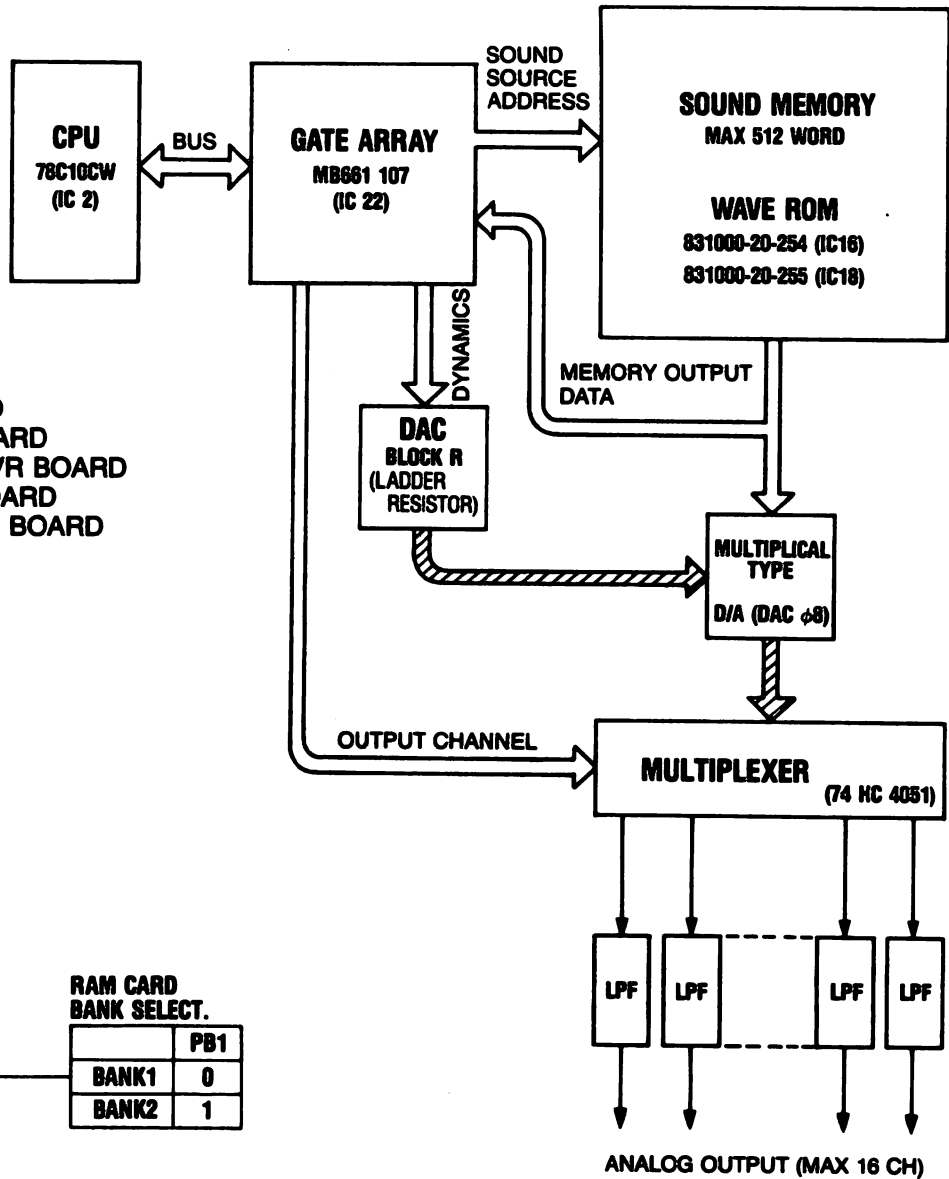
5) DEVICE ID REQUEST

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	EXCLUSIVE STATUS
0 1 0 0 0 0 1 0	KORG ID 42H
0 1 0 0 0 0 0 0	FORMAT ID 40H
1 1 1 1 0 1 1 1	EOX



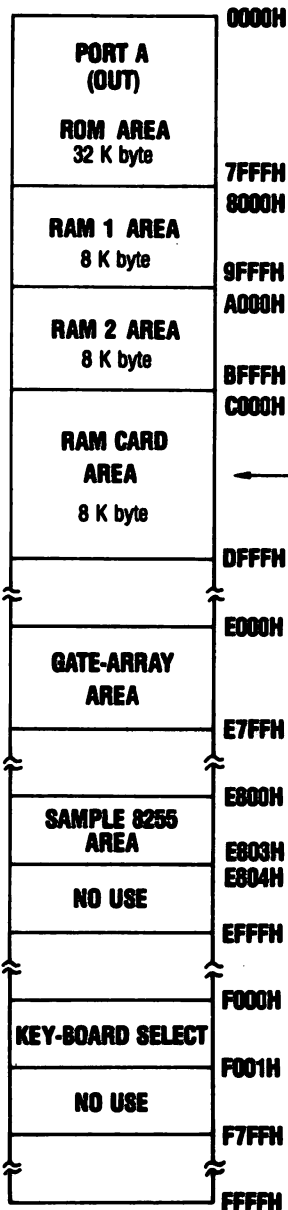
3. SYSTEM EXPLANATION

1. Basic construction of the SYSTEM is as follows. For each circuitry, refer to circuit explanation on Page 27.



2. ORGANIZATION OF P.C. BOARD

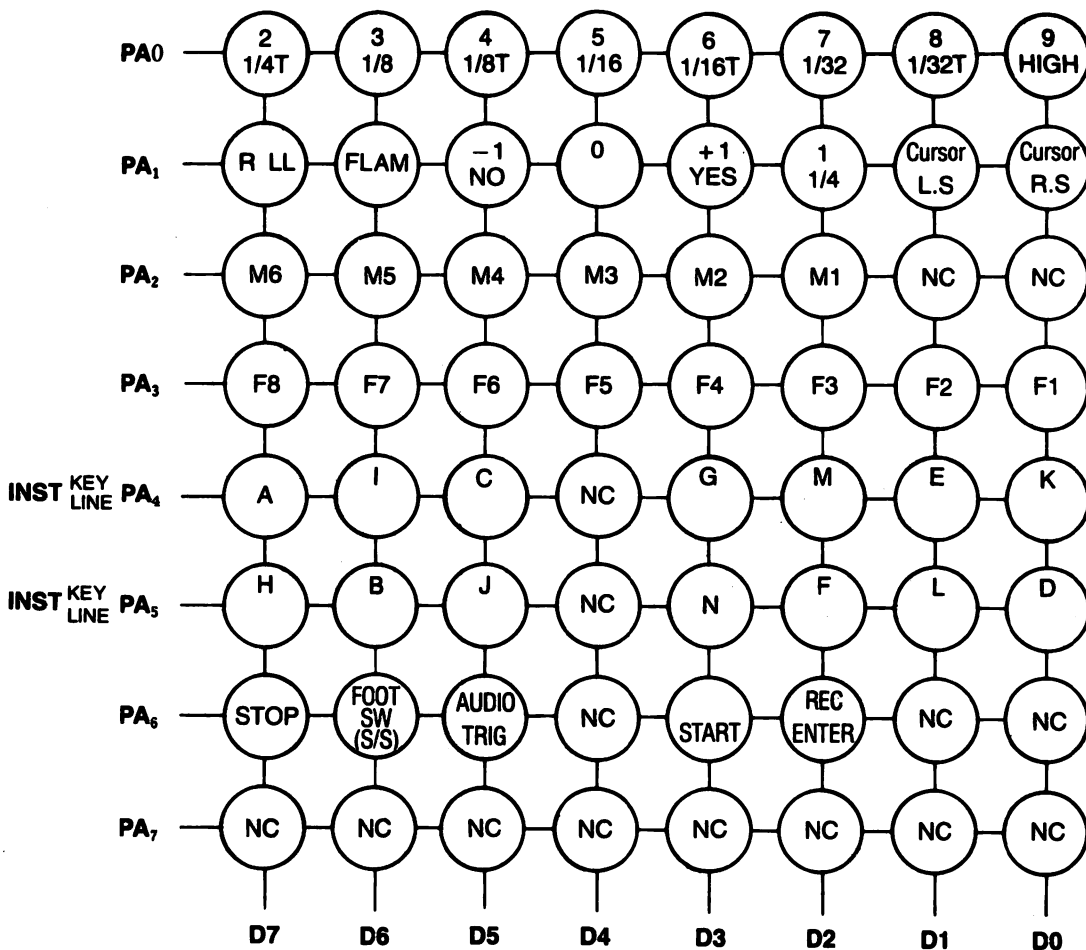
- KLM-6019MAIN BOARD
- KLM-6020TAPE I/O BOARD
- KLM-6021PANNEL SW BOARD
- KLM-6022PANNEL SLIDE VR BOARD
- KLM-6023PANNEL LED BOARD
- KLM-6007POWER SUPPLY BOARD



RAM CARD BANK SELECT.

	PB1
BANK1	0
BANK2	1

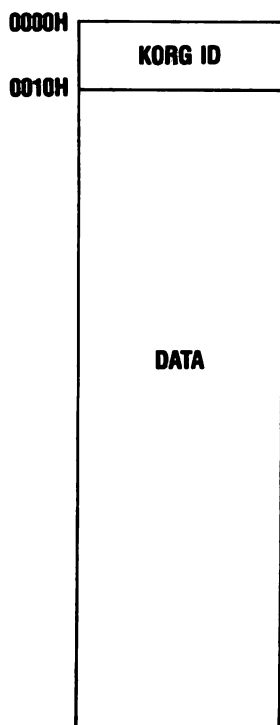
4. KEY MATRIX



5. ROM/RAM CARD FORMAT.

■ X-507 RAM CARD FORMAT

address

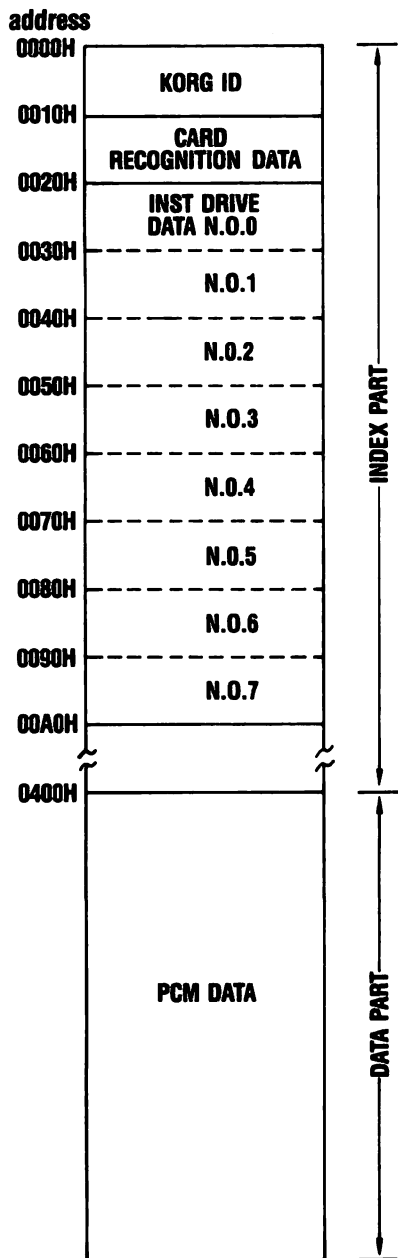


★ DATA in a RAM CARD is roughly divided into the KORG ID PART and the DATA PART.

★ KORG ID PART:
KORG ID stands for KORG'S RAM CARD and whose data is used for DDD-1.
And the DATA names which are christened by manipulation on the panel will be stored. Refer to the next page.

★ DATA PART:
DATA of patterns, songs, settings which are recorded in a main frame of DDD-1 are stored in this part.

VOICE ROM CARD FORMAT



★ Data in a ROM card is roughly divided into the INDEX PART and the DATA PART.

★ INDEX PART consists of:
 KORG ID — KORG's Rom Card which is used for DDD-1.
 CARD RECOGNITION DATA — The Data to discern the card from the others.
 INST DRIVE DATA — The Data for making sounds.

★ DATA PART means PCM DATA.

5. SYSTEM RESET

The DDD-1 boasts many functions like INST ASSIGN and etc., it is sometimes turned into us for repair services although nothing is wrong with it.

● As a basic checking method, there is SYSTEM RESET

Hold down **+1 YES** and **-1 NO** and turn the power switch ON

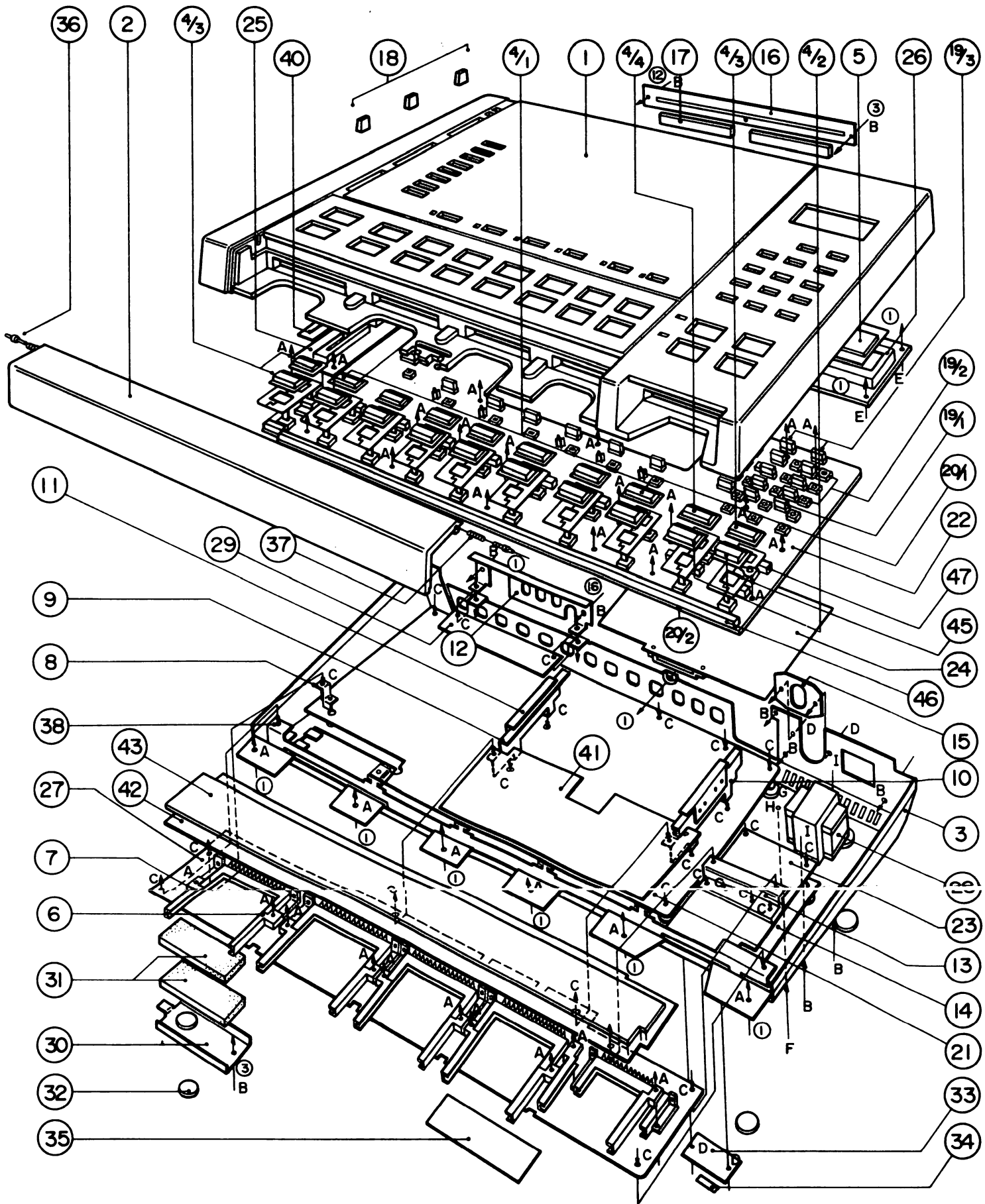
DISPLAY

```

KORG  DDD-1
SYSTEM RESET !!
  
```

When you run the SYSTEM RESET, keys on the panel will be automatically set at their original positions in accordance with the assigned sounds on the panel.

4. STRUCTURAL DIAGRAM

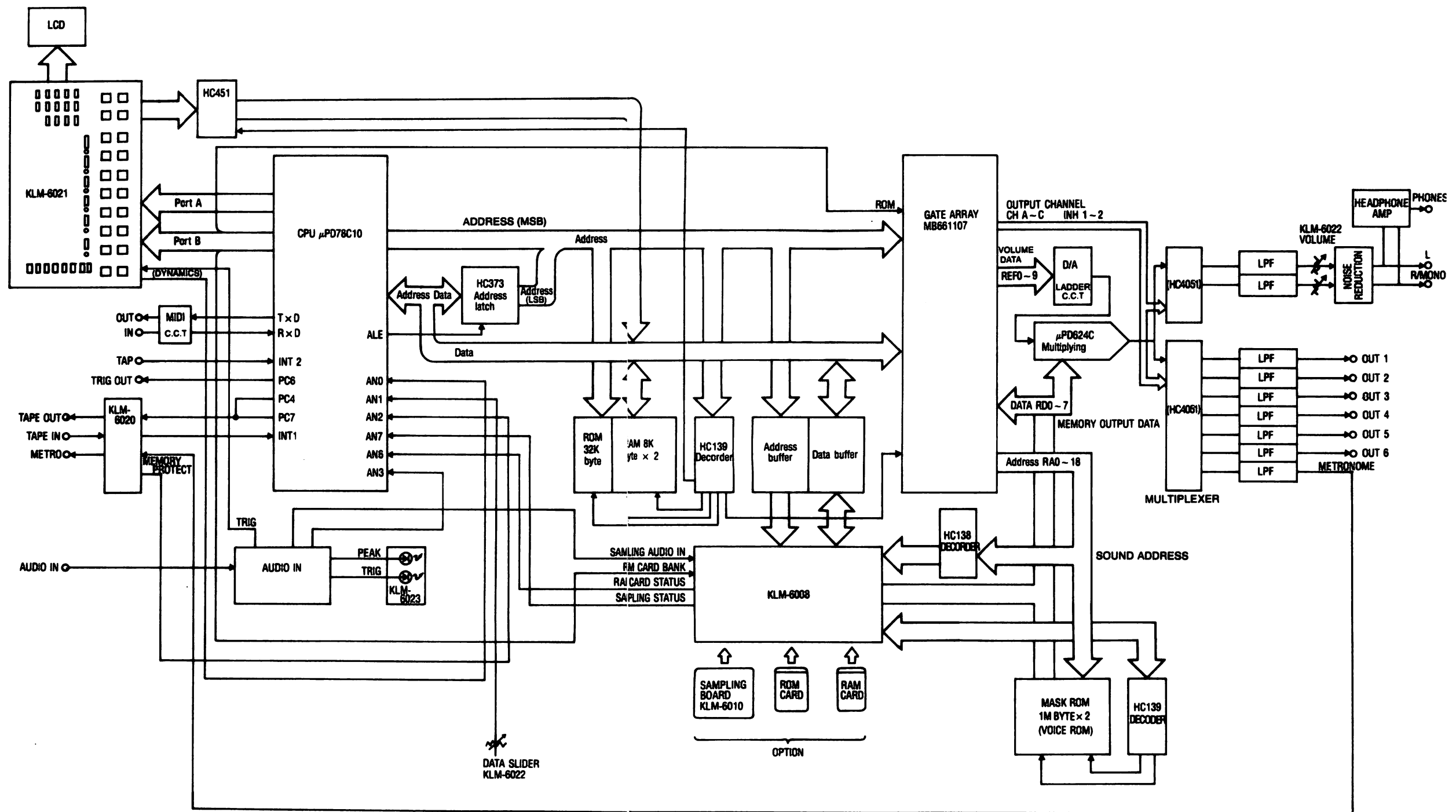


PART NO.	PART NAME	PART CODE
1	UPPER CASE	64622600
2	ROM CARD COVER	64622700
3	LOWER CASE	64077900
4/1	TACT SW. KNOB GRAY	62016800
4/2	TACT SW. KNOB BLUE GREEN	62017000
4/3	TACT SW. KNOB IVORY	62016900
4/4	TACT SW. KNOB RED	62016700
5	LCD COVER	63003300
6	CARD RAIL L	64622601
7	CARD RAIL R	64622600
8	METAL FITTING OF PCB SUPPORT	64078700
9	P.C. BOARD RAIL L	64079601
10	P.C. BOARD RAIL R	64079600
11		
12	MINI PHONE JACK PLATE	64076100
13	HEAT SINK	56003700
14	SHIELDING SHEET	63003600
15	AC CORD FIXING PLATE	64078200
16	SUPPORTING PLATE OF SAMPLING BOARD	64078000
17	BOARD CUSHION	55010100
18	SLIDE VR KNOB NO. 3	62017300

19/1	PUSH SW. KNOB IVORY	62012401
19/2	PUSH SW. KNOB GRAY	62014400
19/3	PUSH SW. KNOB BLUE GREEN	62017400
20/1	LED SPACER TYPE X No. 6	57504700
20/2	LED SPACER TYPE X No. 7	57504900
21	P.C. BOARD KLM-6019	34360190
22	P.C. BOARD KLM-6021	34360210
23	P.C. BOARD KLM-6007	34360070
24	P.C. BOARD KLM-6010	
25	P.C. BOARD KLM-6022	
26		
27	LCD	31300400
28	P.C. BOARD KLM-6008	34360080
29	POWER TRANSFORMER	
30	P.C. BOARD KLM-6020	
31	BATTERY COVER	64078300
32	BATTERY CUSHION	55010100
33	RUBBER FEET	50006700
34	NAME PLATE	
35	SERIAL NO. SEAL	56569999
36	SERVICEMAN CAUTION	58023700
37	ROM CARD COVER FIX PIN	64078600
38	SPRING	

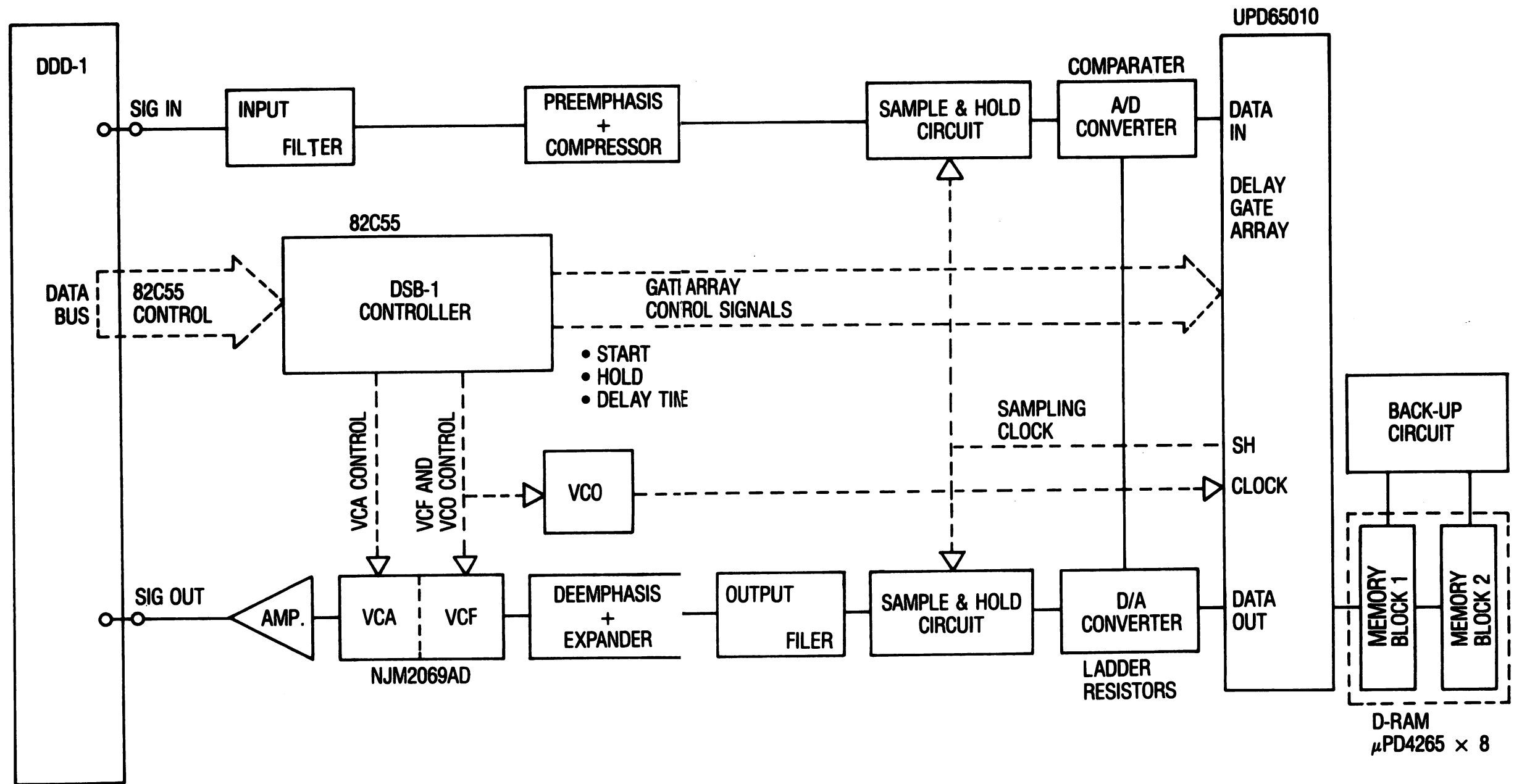
38	P.C. BOARD KLM-6023	
39	SLIDE VR MASK	55008300
40	SHIELDING SHEET	58024800
41	PANEL BOARD SUPPORT PLATE	64623000
42	PANEL BOARD CUSHION	50010500
43	TACT SW. KNOB SUPPORT PLATE A	63003900
44	TACT SW. KNOB SUPPORT PLATE B	63004000
45	PANEL BOARD CUSHION A	50010600
46	PANEL BOARD CUSHION B	50010700
47		

PART NO.	SCREWS, NUT & WASHER	Q'TY
A	PLAX BZMC 3x8	40
B	FEB BZMC 3x8	9
C	FEB ZMC 3x8	21
D	TP2GB BZMC 3x8	4
E	PLAX BZMC 2x6	4
F	FEB ZMC 4x8	1
G	FHN ZMC 4	1
H	TWU ZMC 4	1
I	FHN ZMC 3	2
J	PLAX B BZMC 3x8	6

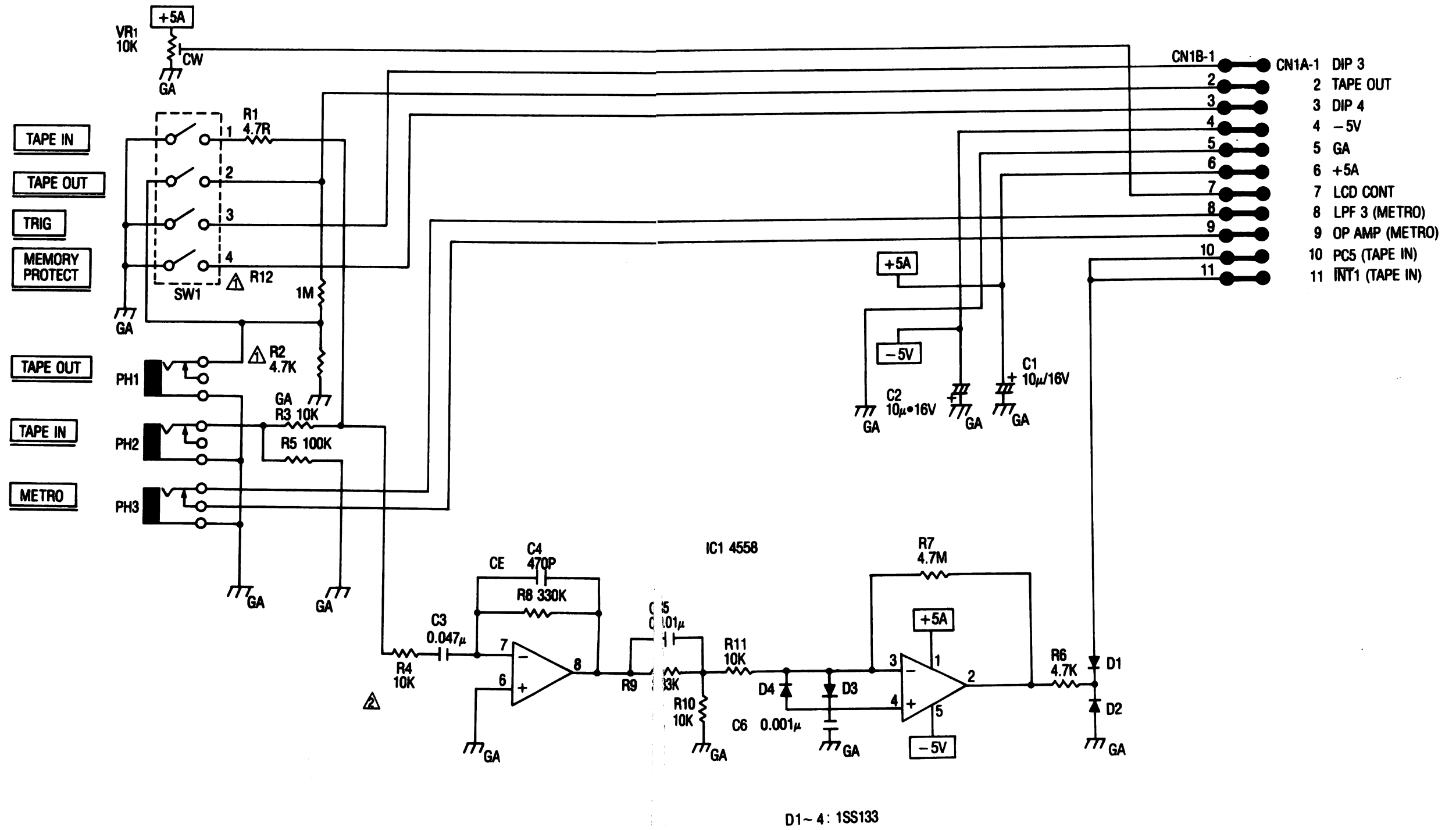


5. BLOCK DIAGRAM

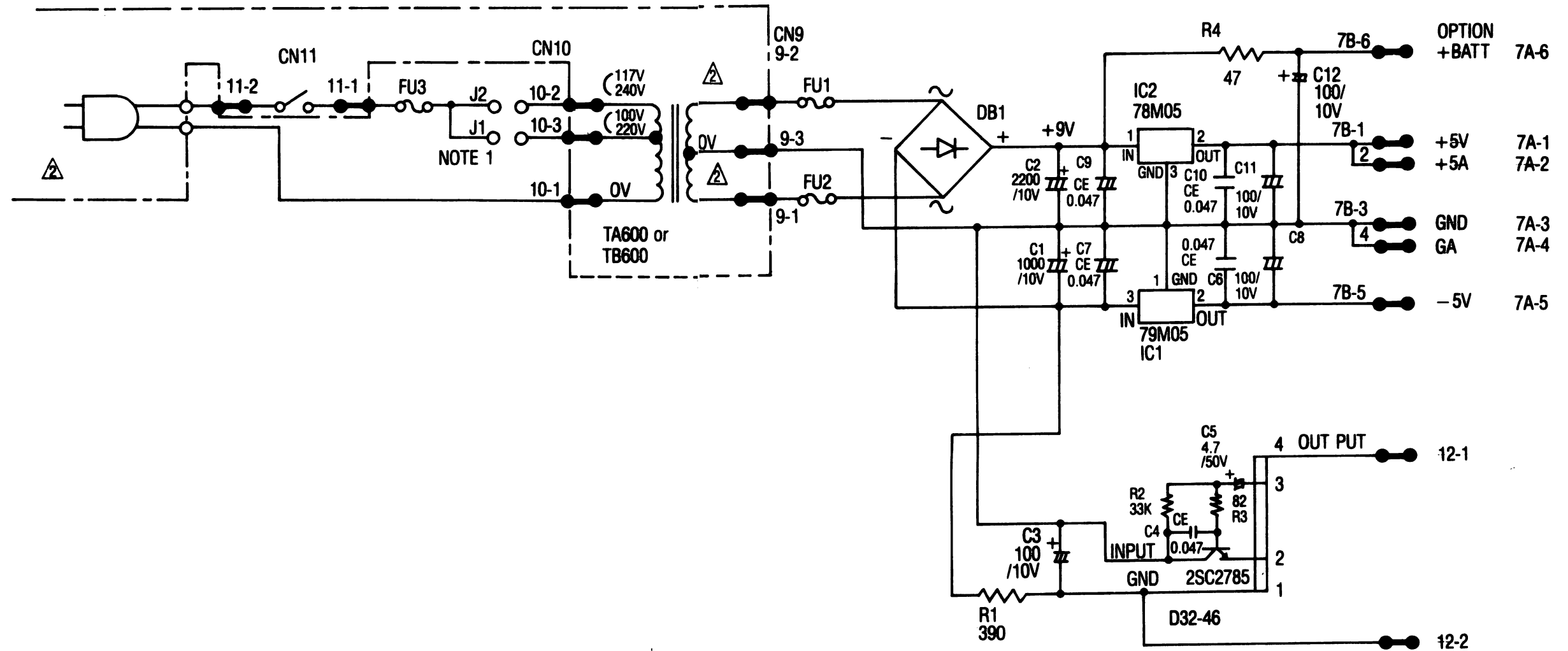
<DSB-1 BLOCK DIAGRAM>



KLM-6020

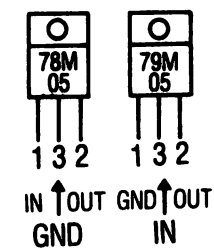


6. CIRCUIT DIAGRAM

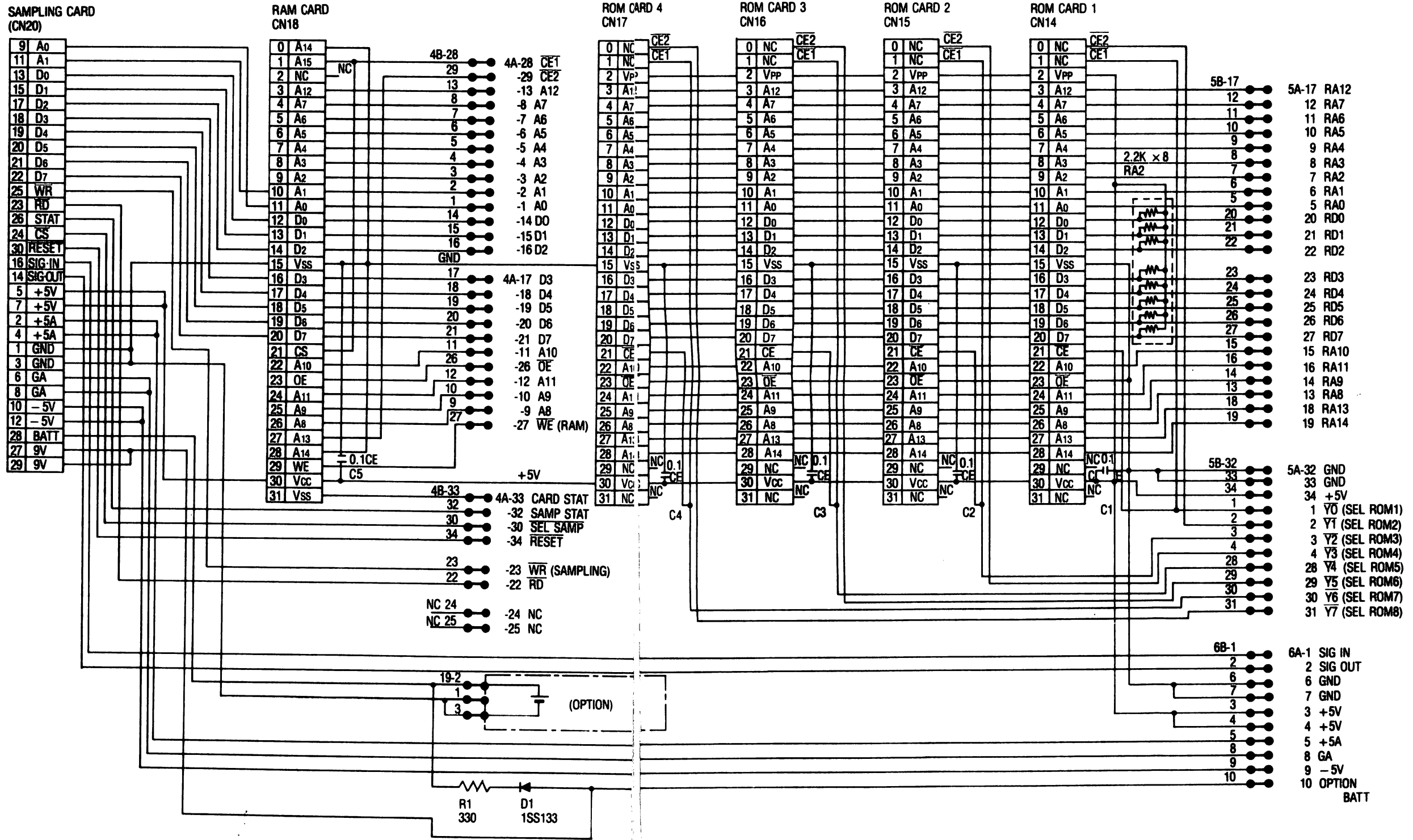


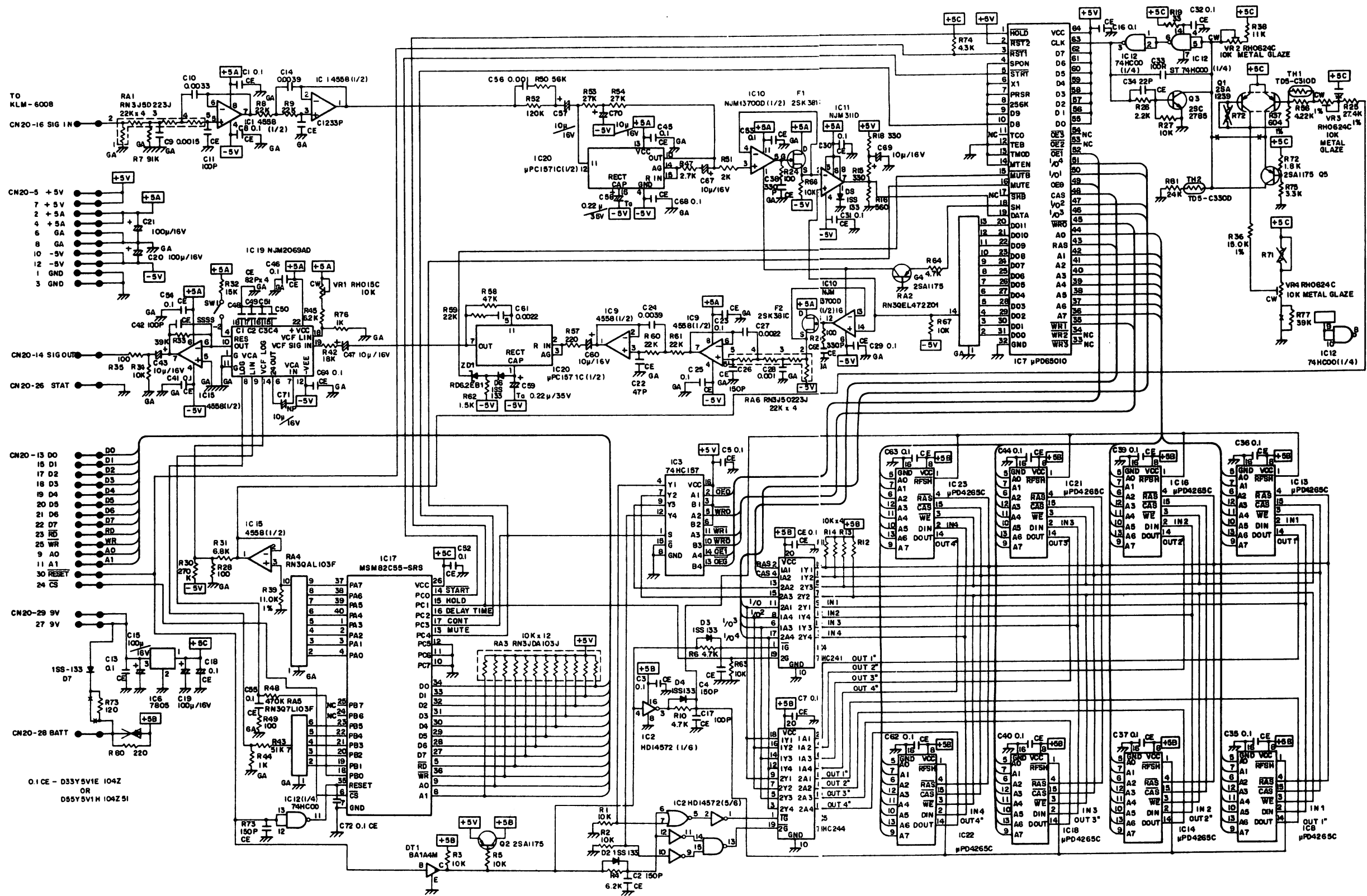
NOTE 1

LOCAL VOLTAGE	FUSE F3	JUMPER WIRE (Ω)
100V	250V 500mA	J2 NOT MOUNTED
117V	250V 500mA	J1 NOT MOUNTED
220V	250V T500mA	J2 NOT MOUNTED
240V	250V T500mA	J1 NOT MOUNTED

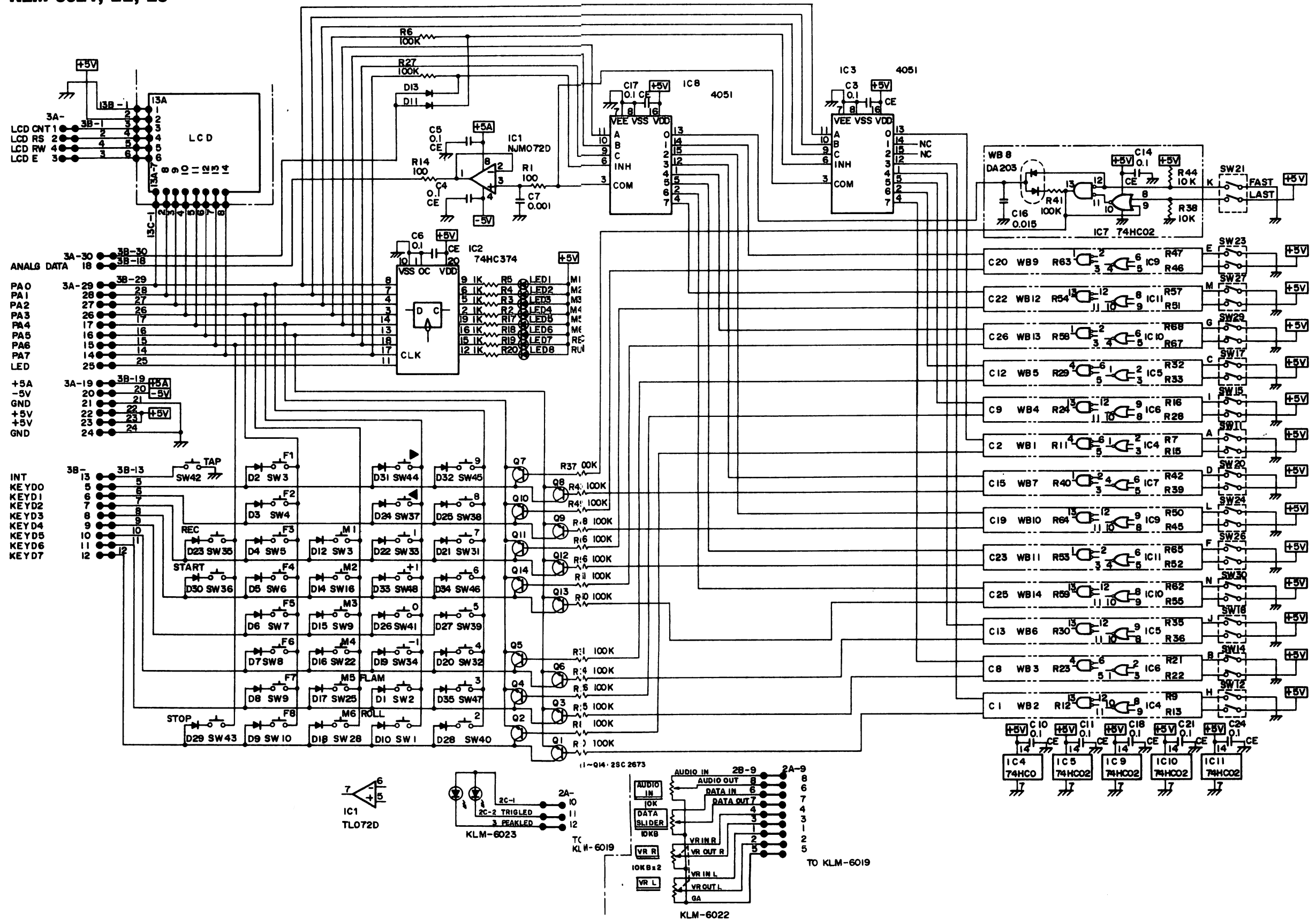


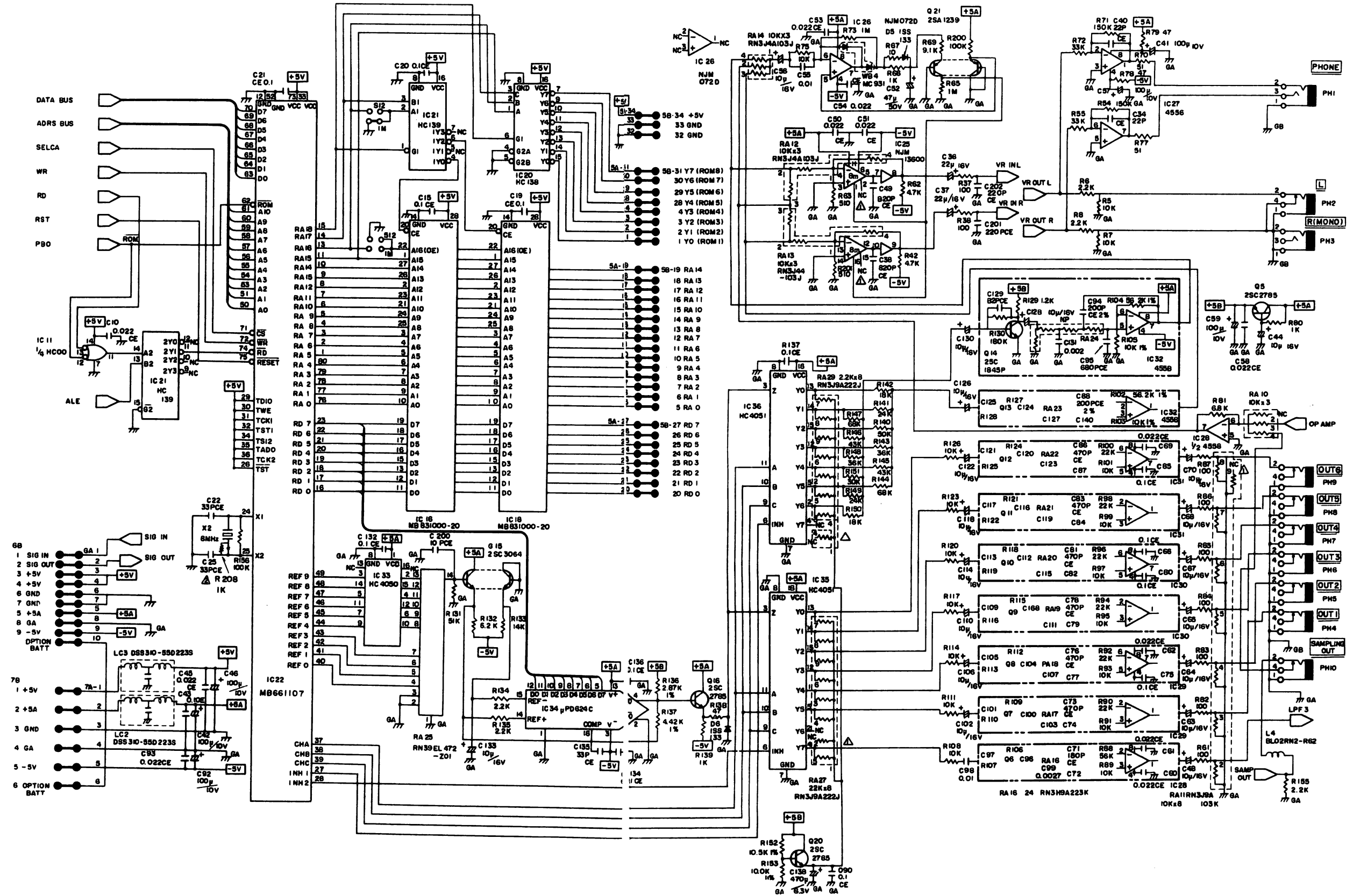
KLM-6008



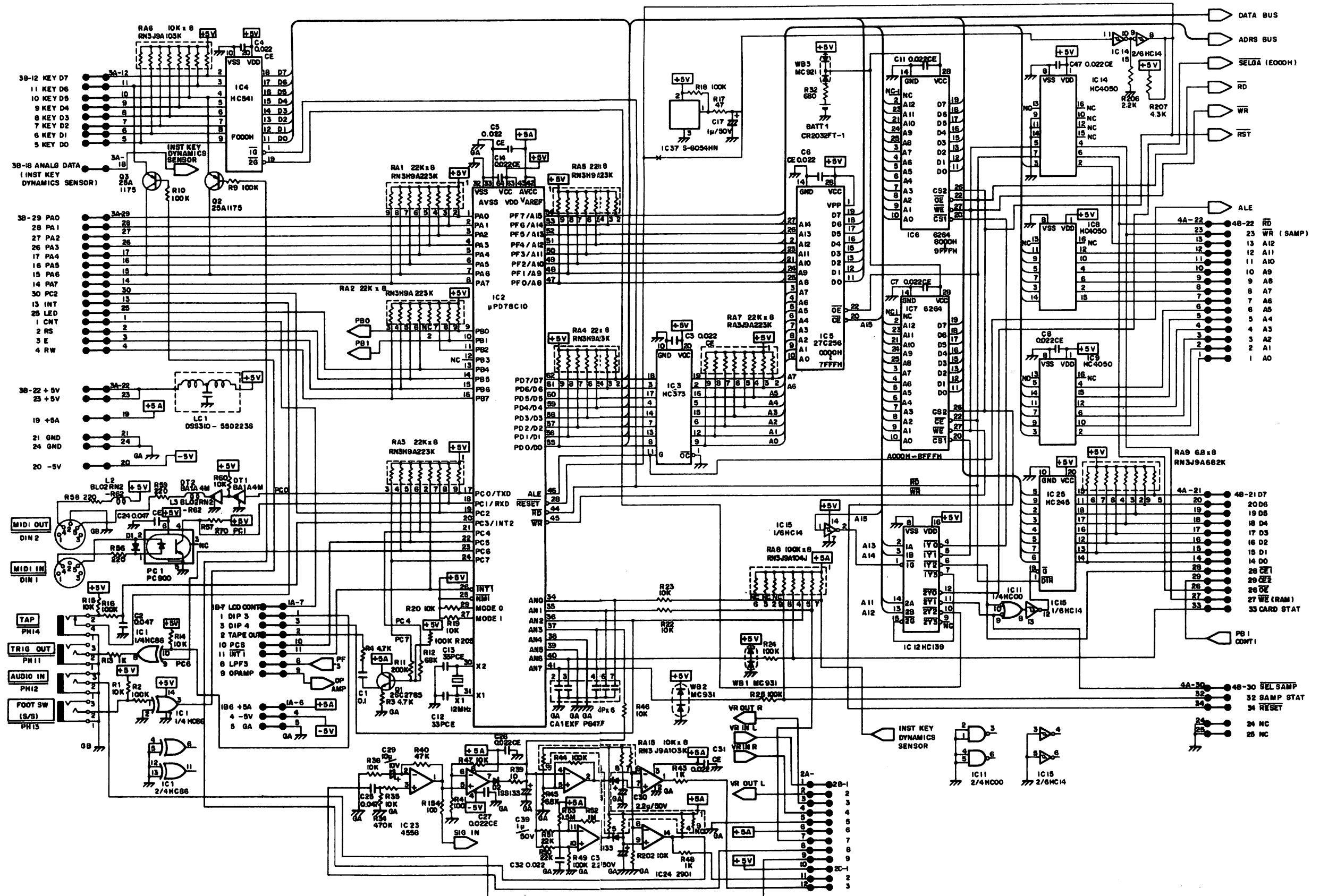


KLM-6021, 22, 23



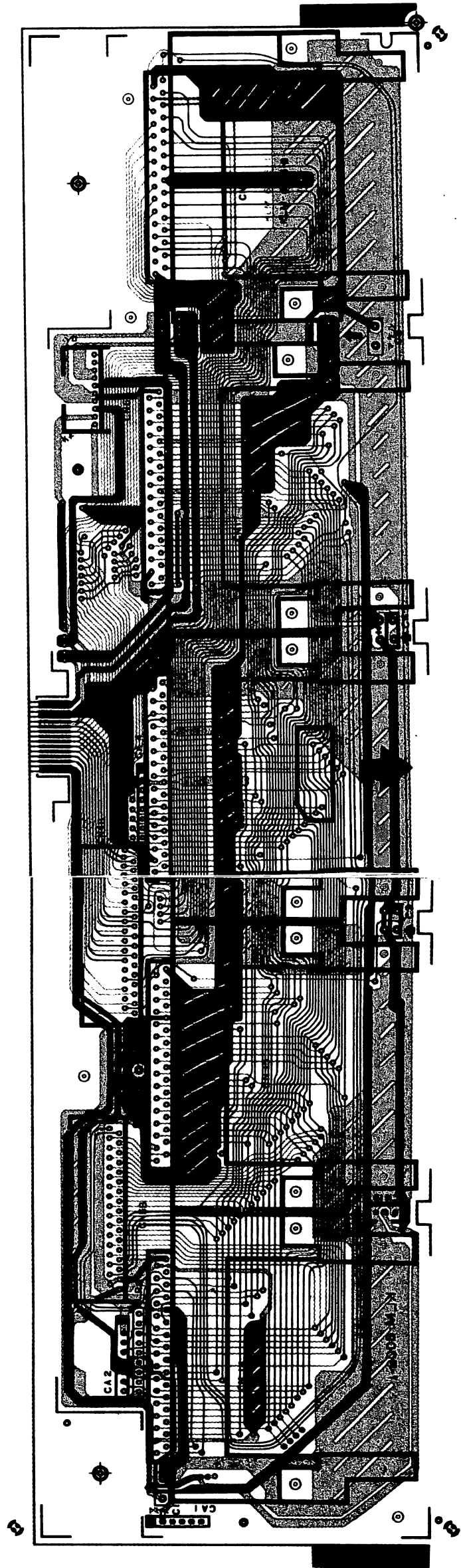


KLM-6019-1

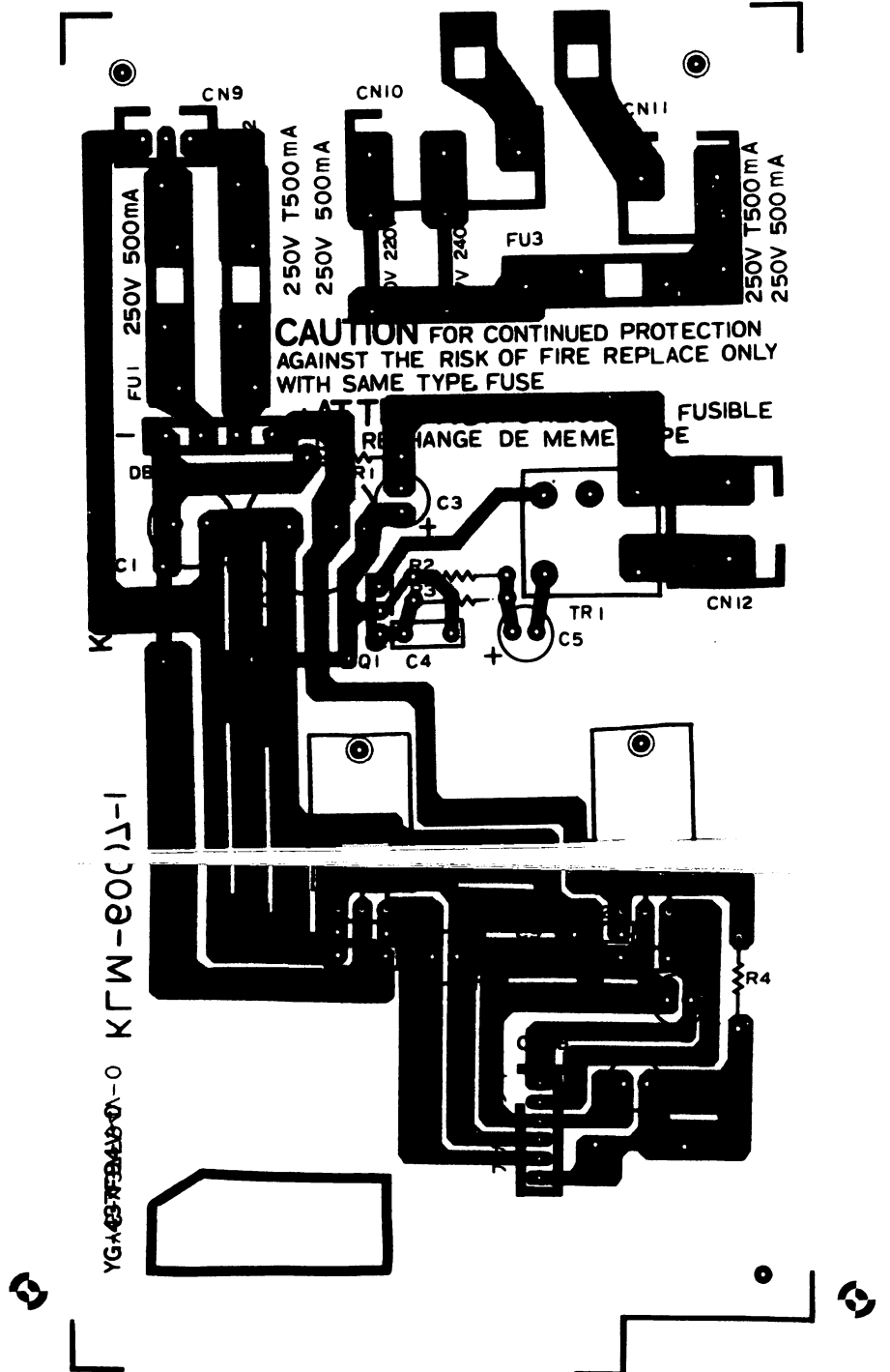


7. P.C. BOARD

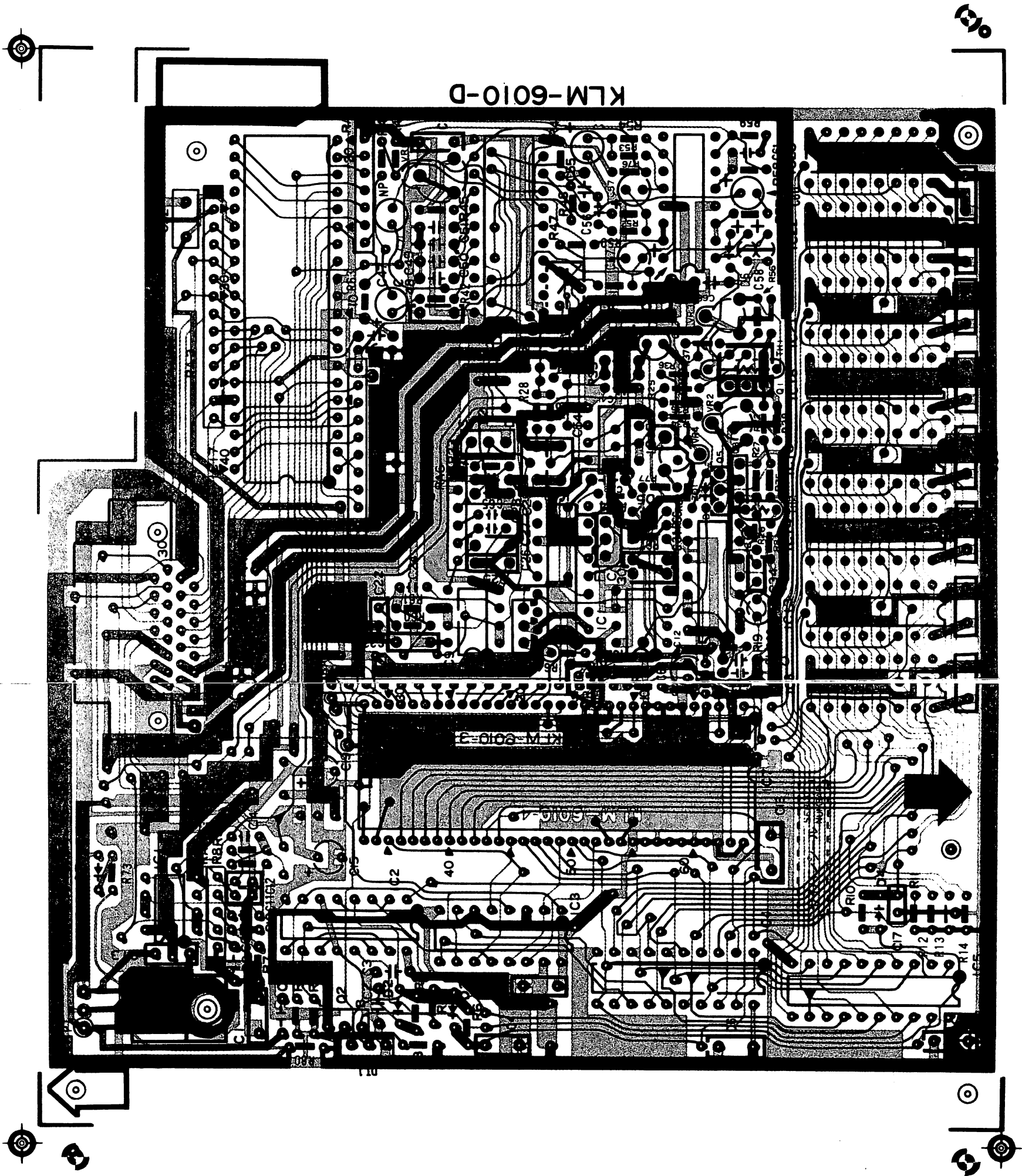
KLM-6008

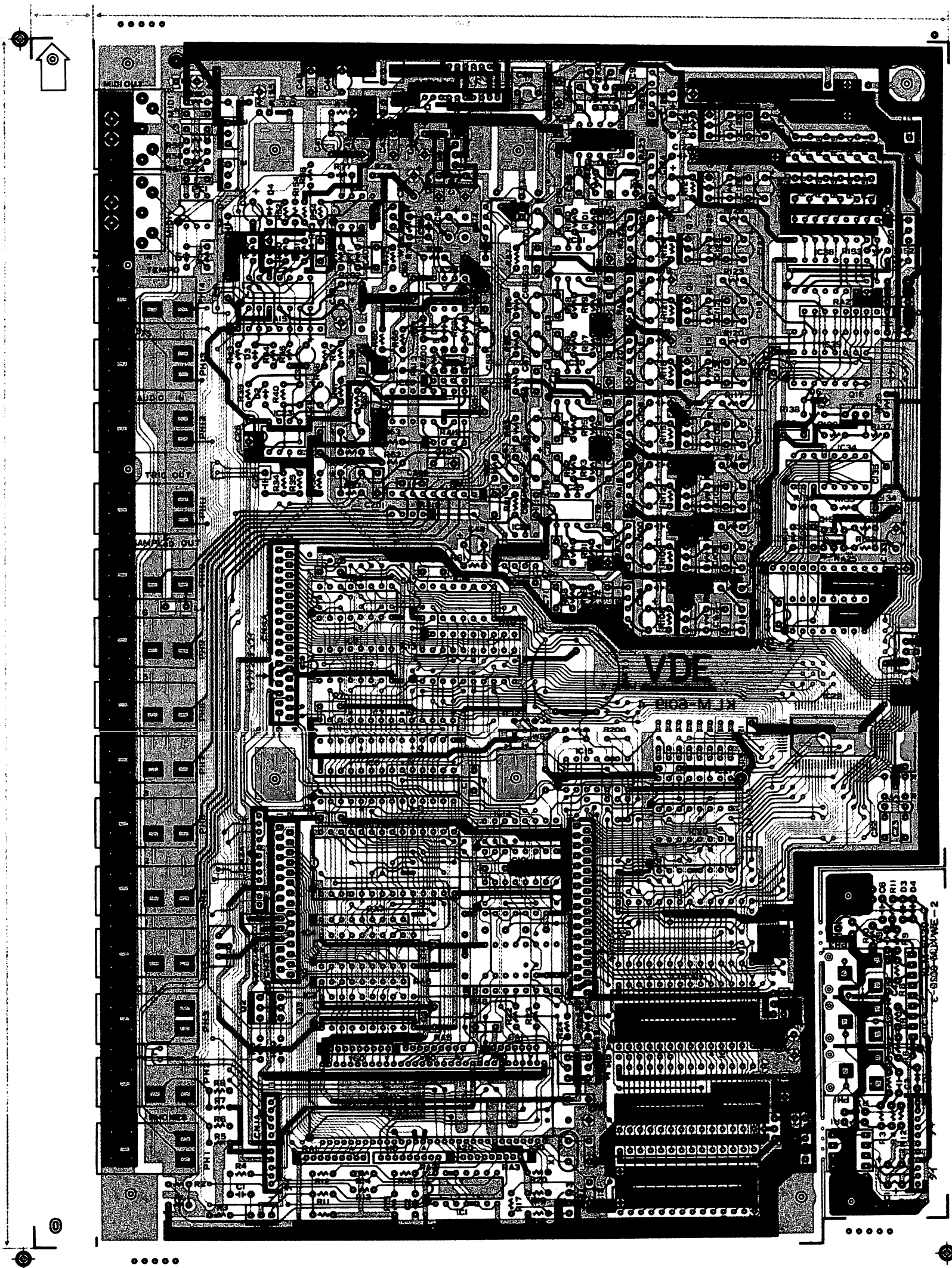


KLM-6007



KLM-6010 (DSB-1)





8. MAIN ERROR MESSAGES

```
MEMORY FULL !!  
P01-01 : *PTN-01*
```

Pattern Memory becomes FULL during Real Time Recording (See pg. 52)

```
BAR MEMORY FULL!  
P01-01 : *PTN-01*
```

249 notes are already in one Bar in Real Time recording (See pg. 52)

```
MEMORY FULL !!  
P01-01 : S008/008
```

Pattern Memory becomes FULL during Step Recording (See pg. 58)

```
BAR MEMORY FULL!  
P01-01 : S008/008
```

249 notes already in one Bar in Step Recording (See pg. 58)

```
MEMORY SHORTAGE!
```

COPY or APPEND impossible due to memory shortage (See pg. 70)

```
CREATE1 *SONG-1*  
PART011!! Error
```

Position set for REPEAT is incorrect (See pg. 76)

```
RAM CARD SAVE  
Error End.
```

SAVE not performed correctly with RAM Card (See pg. 113)

```
RAM CARD VERIFY  
Error End.
```

VERIFY not performed correctly with RAM (See pg. 114)

```
TAPE VERIFY  
Error End.
```

VERIFY not performed correctly with Cassette Tape (See pg. 122)

```
TAPE LOAD  
Error End.
```

LOAD not performed correctly with Cassette Tape (See pg. 125)

```
ROM CARD CECK  
Card1: Error.
```

An inappropriate ROM Card is set in unit (See pg. 130)

9. MAIN CIRCUIT EXPLANATION

1. KLM-6019 circuit board CPU section (Circuit Diagram 1)

■ CPU

In the DDD-1, the μ PD-78C10 1-chip microprocessor is used to perform various types of control.

The CPU operates in accordance with a 12 MHz ceramic oscillator. In addition, since the CPU is a multiplex address/data bus, the lower 8 bits of the address are latched by IC3 (HC373).

Port A and port B are output ports. Most of the output is output to circuit board KLM-6021 (panel).

■ Memory

IC5 (27C256) is a 32 K byte ROM (program ROM). IC6 and IC7 (MB8464A) are 8K byte RAMs. The two together have a total capacity of 16K bytes. The RAMs are backed up by a lithium battery (BATT1) during POWER OFF.

■ KEY data input

IC4 (HC541) is used as a port for reading in key data, mainly from circuit board KLM-6021 (panel).

■ MIDI

In output of MIDI OUT, CPU TxD (port PC0) MIDI out signal is buffered by DT1 and DT2 (BA1A4M).

MIDI IN is isolated by photo coupler PC1 (PC900) and input into RxD (port PC1) of the CPU.

■ TAP, TRIG OUT, FOOT SW

a TAP

The tap tempo is input to INT2 (port PC3) of the CPU.

b TRIG OUT

The TRIG OUT signal is produced at port 6 of the CPU. The polarity is switched by a dip switch (SW1 or SW3); then it is output from the TRIG OUT jack.

c FOOT SW

FOOT SW on/off signal is buffered by IC1 (HC86) then entered into the key sw matrix by Q3 (2SA1175).

■ TAPE OUT

The resultant of the signals at CPU ports PC4 and PC7 passes through Q1 (2SC2785) and is output from the circuit board KLM-6020 TAPE OUT jack.

■ AUDIO IN

The signal input from the jack (PH12) passes through the KLM-6023 AUDIO IN potentiometer and then enters the AUDIO IN circuit.

In the AUDIO IN circuit it is first amplified by the first stage IC23 (4558) and then fed to the sampling board. Then it is half wave rectified by the second stage IC23 (4558) and input as a dynamic value to the CPU analogue port AN3.

The circuit board KLM-6023 PEAK LED is lit by the comparator circuit formed by IC24 (2901).

After the signal passes through the TRIG detection circuit formed by IC24 (2901), part of it is input to the key matrix by transistor Q2 (2SA1175), and the remainder lights the circuit board KLM-6023 TRIG LED.

■ Reset circuit

POWER ON or OFF is detected by the reset IC, IC37 (S-8054HN). A reset signal is formed, passes through IC15 (HC14) and input to the CPU, GATE ARRAY, RAM and sampling board.

■ RAM card, sampling board, buffer and status

Since the RAM card and sampling board are connected directly by the CPU bus, a buffer is provided for the connection for the sake of safety. IC14, IC8 and IC9 (HC4050) form the address bus buffer, while IC25 (HC245) acts as a two-way buffer for the data bus. In addition, the RAM card status signal (CARD STAT) becomes LOW when the card is plugged in and is input to CPU analogue port AN6. The sampling board status signal becomes LOW when the board is plugged in and is input to CPU analogue port AN7.

■ Decoder

Addresses A11 to A15 are decoded by IC12 (HC138), and the RAM, RAM card, GATE ARRAY, sampling board and KEY input port (IC4) select signals are formed.

2. Circuit board KLM-6019, GATE ARRAY section (Circuit Diagram 2)

■ GATE ARRAY

The GATE ARRAY (IC22 MB661107) is connected directly to the CPU bus, and controls the rhythm sound source data in the voice ROM and ROM card under CPU supervision.

■ Sound source ROMs

The sound source ROMs are mask ROMs. Two, each with 1M bit capacity, are used. They are connected to the GATE ARRAY sound source address data bus, and accessed by the GATE ARRAY. In addition, this bus is connected to the circuit board KLM-6008 ROM card, and accesses sound source data.

■ Decoder

IC21 (HC139) decodes the signals from sound source addresses RA17 and RA18, and inputs them to sound source ROM chip enable. IC20 (HC138) decodes the signals from sound source addresses RA15 to RA18 and forms the ROM card (circuit board KLM-6008) select signal.

■ D/A

GATE ARRAY sound volume data (REF 0 to 9) are D/A converted by ladder-type resistor RA25 (IC33-HC4050 causes only the data from REF 4 to 9 to pass through a buffer).

IC34 (μ PC624C) multiplies the D/A converted sound volume data by the sound source data (RD 0 to 7) and D/A convert the result.

■ Multiplexer

IC36 (HC4051) takes the signal D/A converted by IC34 (μ PD624C) and output it at the L, R fixed level determined by the GATE ARRAY channel output (CH A to C). In addition, IC35 (HC4051) outputs to MULTI OUT 1 to 6 and the metronome as determined by the channel output (CH A to C).

■ LPF

Multiplexer output (L, R/MONO, OUT 1 to 6, metronome) is fed to an LPF which removes the 25.64 KHz sampling clock signal and outputs the result.

■ Noise reduction

The signal is double half wave rectified by IC26 (NJM072D). Then the sound volume values are converted into DC voltage values, and current output is performed by the pair transistor Q21 (2SA1239). IC25 (NJM13600) operates as an LPF whose frequency range expands from the low region to the high region depending on the magnitude of the volume that is input.

■ Headphone amplifier

Headphone can be driven by IC27 (NJM4556).

■ Bias circuit

After the power is turned ON, this circuit prevents a clicking sound when the No.1 sound of the GATE ARRAY is emitted, and applies a bias voltage to the multiplexer output.

3. PANEL SECTION

■ LCD

The LCD module displays characters under control of CPU ports PA 0 to 7 and PB 4 to 7.

■ Analogue demultiplexer

This consists of IC3 and IC8 (4051), and sends the dynamic value of instruction KEY A to N determined by port A to the CPU. IC1 (NJM 072) is used to hold a fixed time from the time the dynamic value is input until the CPU comes to reading.

■ MODE, REC, RUN LED

Port A data are latched by IC2 (HC374) and light the corresponding LED.

■ KEY matrix

Key scanning is done for ports PA 0 to 6, and data for the key that is pressed are read into the CPU. In addition, Q1 to Q14 come ON when the corresponding instruction KEY is pressed, forming an alternative to an electrical switch.

■ Instruction keys

Each instruction key employs a switch with a 2 contact structure. A dynamic value is produced from the time difference between the 2 contacts, by the 74HC02 circuit. That dynamic value is input into IC3 and IC8 (4051). At the same time, the information that the key was pressed passes through transistor Q1 to Q14 and is output into the key matrix.

KLM-6021

- The TAPE OUT (PH1) output level can be varied using switch 1 — 2.
- The metronome sound is output at METRO (PH3). If a jack is not plugged in here, the output goes to L, R/MONO and PHONES.
- The polarity of the TRIG output can be changed by switch 1-3.

- Switch 1-4 is the memory protect switch.
- The LCD contrast can be adjusted by VR1 (10K).
- The signal input by TAPE IN (PH2) is converted to the level set by switch 1-1; then it is converted into a waveform that the CPU can read by the circuitry of IC1 (4558).

KLM-6022 (VOL circuit board)

- Potentiometers VR L and R determine jack outputs L and R/MONO, and the PHONE sound volume.
- The power supply voltage is voltage-divided by the DATA SLIDER, and the resulting value is input to

CPU analogue port AN1.

- AUDIO IN can vary the volume of the AUDIO IN input.

KLM-6023 (LED circuit board)

The PEAK LED and TRIG LED light according to the AUDIO IN status.

KLM-6007

KLM-6007 is the power supply circuit board. The output voltages are as given below.

a IC2 (78M05).....	+ 5V ± 5%
b IC1 (79M05).....	- 5V ± 5%
c OPTION BATT	+ 9V ± 10%
d Power supply for use.....	AC100V (effective value) ± 10%

KLM-6008

Circuit board KLM-6008 is a circuit board for only the wiring of the ROM card, RAM card and sampling board. It consists of a CPU bus and GATE ARRAY bus.

DSB-1: Description of Circuit Board (1)

DSB-1 has one gate array (μ PD65010) on circuit board KLM-6010. It is controlled by data from DDD-1 and performs sampling. It can be easily understood by considering that it has only the sampling function of other devices which have an identical gate array.

< Explanations of Individual circuits >

1. INPUT FILTER

The input signal from DDD-1 (voice signal input) is filtered by the $f_c = 19\text{kHz}$ 5th-order Chebyshev low-pass filter to prevent sampling block and beats from occurring.

2. PRE-EMPHASIS + COMPRESSOR

The signal which has passed through the input filter is pre-emphasized by the RC of C56 and R50; then dynamic range is compressed by the compressor circuit formed by the compounder IC (1/2 IC20; μ PC1571C).

3. SAMPLE & HOLD CIRCUIT: input side

The sample and hold circuit which digitizes the input signal consists of an 13700 (1/2 IC10) and FET (F1); the 13700 (transconductance amplifier) is used as a high-speed analogue switch. Also, the control signal which controls that switch operation is automatically produced by the gate array (IC7) and output from pin 18 "SH" of the gate array. This frequency is called the "sampling clock".

4. A/D CONVERTER

The circuitry which performs A/D conversion of a signal that has been sampled and held is incorporated into the interior of the gate array, but the high-speed converter (IC11) and the sequential comparison data output D/A circuit are attached to the outside. This converter performs sequential comparison A/D conversion.

5. GATE ARRAY

Gate array exclusively used for delay: NEC μ PD65010.

6. D/A CONVERTER

The effect signal that has been processed by the gate array (IC7) is output as 12-bit digital data to DO11 to DO0 (pin 20 to pin 31). These data are converted to analogue data by the R-2R ladder-type resistor (BLOCK R). This signal is used as the output side sample & hold circuit input signal and as sequential comparison data for the gate array input side A/D conversion comparator.

7. SAMPLE & HOLD CIRCUIT: output side

The effect signal (digital data) from the gate array is sampled and held by a 13700 (1/2 IC10) and FET (F2), similar to the way the D/A converted signal (analogue data) is sampled and held on the input side (explained above).

8. OUTPUT FILTER

This is a 5th-order Chebyshev low-pass filter ($f_c = 16\text{kHz}$) to remove the sampling clock component.

9. DE-EMPHASIS + EXPANDER

The dynamic range, which was compressed on the input side, is restored to its original condition by the expander circuit formed by the compounder IC (1/2 IC20; μ PC1571C). In addition, by sending the gate array (IC7) mute signal (pin 15: MUTB) to the circuit formed by ZD, R62 and D6, the expander circuit is forcibly shut off so that unnecessary signals are not passed on. The signal which has been restored to its original condition is de-emphasized by the RC of C61 and R59.

10. VCF-VCA + AMP. (output amplifier)

The de-emphasized signal is input to the VCF inside IC19 (NJM2069) and high-cut; fc, at this time is controlled by the analogue data formed by D/A converting the control signal from DDD-1 through PA0 to PA7 of IC17 (82C55). The range of variation is 9 kHz to 40 kHz. In addition, in the VCA inside the same IC the output level from IC19 is controlled by analogue data formed by D/A conversion of the DDD-1 control signal that has passed through PB0 to PB5 of IC17. SW1 and VR1 which are attached to IC19 are used to adjust the fc of the built-in VCF. For the detailed adjustment method refer to the calibration and specifications manual. The signal output from IC19 passes through the output amplifier formed by IC15, and then is output to SIG OUT of DDD-1.

11. VCO: CLOCK CIRCUIT

This circuit performs clock control of the gate array (IC7). This control varies the timing inside the gate array, changing the time for reading data from memory and the frequency of the sampling clock that is output. As a result, the frequency (tune) of the DSB-1 output signal can be varied.

The circuit is an oscillator consisting of the pair transistor Q1, 74HC00 (IC/2) and transistor Q3. By applying a linear control voltage to the pair transistor, the oscillator is varied exponentially. Since the musical scale varies exponentially, by control of this circuit musical intervals can be added to the output signal. The linear control voltage for the pair transistor is analogue data formed by D/A conversion of the DDD-1 control signal output through PA0 to PA7 of IC17 (82C55). The oscillator output frequency varies within the range of 740 kHz to 3.2 MHz. This range can be adjusted by VR2, 3 and 4.

12. D-RAM

IC8, IC13, IC14, IC16, IC18, IC21, IC22 and IC24 are 64 K bit dynamic CMOS RAMs; specifically, they are μ PD4265 which are capable of being backed up by batteries. There are 4 bits worth of I/O ports for the memory but this memory has only 1 bit of I/O, so there are 4 totaling 64k words. Consequently, this circuit which uses 8 has 4 bits \times 64k words \times 2 blocks = 128k words. 126 bits (3 words) are used for 1 sampling, which makes 43690 words/12 bits. When the sampling frequency is taken to be 23.1 kHz, the maximum delay time of 1891 msec is obtained. Of the 2 blocks, BLOCK 1 uses IC13 as the LSB and also has IC16, IC21 and IC23 in that order, while BLOCK 2 uses IC8 as the LSB and has IC14, IC18 and IC22 in that order.

13. BLOCK CHANGE & GATE CIRCUIT

As was discussed in section 12, the memory is divided into 2 blocks. The control signal from DDD-1 is output to PC3 of IC17 (82C55) and controls IC3 (74HC157) which is used for BLOCK selection, selecting either BLOCK 1 or BLOCK 2. If the output from PC3 of IC17 is "L", reading from and writing into BLOCK 1 can be done by OE0 or WE0. Also if "H" is output to PC2 of IC17 (which is normally "L"), making PC3 "L", reading from and writing into BLOCK 1 can

be done by OE0 or WE0, and continuous (128k words) reading from and writing into BLOCK 2 can be done by OE1 or WE1. (PC2 "H" and PC3 "H" are prohibited by the software. The gate circuit consists of the three-state buffer consisting of 74HC241 (IC4) and 74HC244 (IC5), plus HD14572 (IC2). IC4 opens the gate to either the BLOCK 1 or BLOCK 2 read-out path as selected by IC 3. The BLOCK read-out path gates are constantly alternated while the power to DDD-1 is ON. Both gates are never open at once, but when the power to DDD-1 is OFF both are closed. The IC5 gate, due to the way it is coordinated with IC4, is always closed when the power to DDD-1 is OFF or when read-out from memory is in progress.

14. BATTERY (battery back-up circuit)

When the power to DDD-1 is ON, DSB-1 is operated by the power supply voltage supplied from DDD-1. When the power is OFF, only the memory and peripheral circuits are operated by the voltage from the battery, so that the contents of memory are preserved. Switching between the two modes is done by transistor Q2.

15. VOLTAGE REGULATOR (stabilized power supply circuit)

Inside DSB-1 a stable voltage is produced and supplied by IC6 (7805) so that the circuits related to VCO will not be affected by fluctuations in the DDD-1 power supply voltage.

16. DSB-1 CONTROLLER: 82C55

The DDD-1 data bus writes control data directly into D0 to D7 of IC17 (82C55). These data are output to PORT A through PORT C, and control DSB-1. (However, data are read into the data bus side only in PC4).

< 82C55 PORT settings >

Port	IN/OUT	Port No.	Name of output section	Functions
Port A	OUT	PA0 PA7	IC19 VCF + VCO	The signal passes through an external ladder-type resistor (RA4) used for D/A conversion, and voltage is produced, varying in 256 steps.
Port B	OUT	PB0 PB5	IC19 VCA	The signal passes through an external ladder-type resistor (RA5) used for D/A conversion, and voltage is produced, varying in 33 steps.
Port C	OUT	PC0	IC7 START	"L" is output in order to start input or output with respect to the gate array.
		PC1	IC7 HOLD	Holds and releases the hold on the sampling sound. On "H" the sound is held; on "L" the hold is released. While recording is in progress, "L" is output; at other times "H" is output.
		PC2	IC7 D8	Memory is switched between 128k words and 64k words. When "H" is output it is 128k words; when "L" is output it is 64k words.
		PC3	IC3 SELECT	Selects BLOCK 1 or BLOCK 2 of memory. "L" selects BLOCK 1; "H" selects BLOCK 2. Both BLOCK 1 and BLOCK 2 can be selected in only one case, when PC2 is "H" and PC3 is "L".
	IN	PC4	IC7 MUTE	The IC7 MUTE signal is read in; when it is recognized the system switches out of recording mode.

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
CARBON RESISTORS				
10413247	S1/4JYTP 47 OHM	KLM-6007		1
10413282	S1/4JY 82 OHM			1
10413310	S1/4JYTP 100 OHM	KLM-6021		2
10413339	S1/4JYTP 390 OHM	KLM-6007		1
10413410	S1/4JYTP 1K	KLM-6021		8
10413510	S1/4JYTP 10K			28
10413533	S1/4JYTP 33K	KLM-6007		1
10413610	S1/4JYTP 100K	KLM-6021		30
10416000	1/6JTP 0 OHM	KLM-6007		4
		KLM-6019		2
		KLM-6021		5
10416210	1/6JTP 10 OHM	KLM-6019		2
10416247	1/6JTP 47 OHM			4
10416251	1/6JY 51 OHM			2
10416310	1/6JTP 100 OHM			10
10416322	1/6JTP 220 OHM			3
10416327	1/6JTP 270 OHM			1
10416333	1/6JTP 330 OHM	KLM-6008		1
10416351	1/6JTP 510 OHM	KLM-6019		2
10416368	1/6JTP 680 OHM			1
10416410	1/6JTP 1.0K			7
10416412	1/6JTP 1.2K			9
10416422	1/6JTP 2.2K			6
10416443	1/6JTP 4.3K			1
10416447	1/6JTP 4.7K			7
10416462	1/6JTP 6.2K			1
10416468	1/6JTP 6.8K			2
10416491	1/6JTP 9.1K			1
10416510	1/6JTP 10K			35
10416515	1/6JTP 15K			1
10416518	1/6JTP 18K			2
10416522	1/6JTP 22K			8
10416524	1/6JTP 24K			2
10416530	1/6JTP 30K			2
10416533	1/6JTP 33K			3
10416536	1/6JTP 36K			2
10416543	1/6JTP 43K			2
10416547	1/6JTP 47K			1
10416551	1/6JTP 51K			1
10416556	1/6JTP 56K			1
10416568	1/6JTP 68K			3
10416610	1/6JTP 100K			13
10416615	1/6JTP 150K			2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
10416618	1/6JTP 180K	KLM-6019		9
10416620	1/6JTP 200K			1
10416633	1/6JTP 330K			1
10416647	1/6JTP 470K			1
10416710	1/6JTP 1.0M			4
10416715	1/6JTP 1.5M			1
10416747	1/6JY 4.7M			1
SOLID RESISTORS				
11013822	1/4KY 22M	KLM-6021		1
METAL FILM RESISTORS				
12514287	1/6 2.87K	KLM-6019		1
12514442	1/6 4.42K			1
12515100	1/8TP 10.0K			3
12515105	1/6 10.5K			1
12515562	1/6 56.2K			2
BLOCK RESISTORS				
13807002	RNBQEL001A	KLM-6019		1
13809001	RN3J9A103K 10K			3
13809002	RN3J9A223K 22K			1
13809003	RN3J9A682K 6.8K			1
13809004	RN3H9A223K 22K			5
13814001	RN3J4A103J 10K			4
13815001	RN3J5D223J 22K			9
13819002	RN3J9A222J 2.2K	KLM-6008		1
		KLM-6019		2
13819003	RN3J9A104J 100K			1
MYLAR CAPACITORS				
20023410	50V 0.001UF	KLM-6021		1
20023515	50V 0.015UF			14
20402410	50V 0.001UF	KLM-6019		1
20402412	50V 0.0012UF			8
20402427	50V 0.0027UF			1
20402510	50V 0.01UF			3
20402522	50V 0.022UF			1
20402547	50V 0.047UF			3
20402610	50V 0.1UF			1
CERAMIC CAPACITORS				
21452100	50V 10PF TP	KLM-6019		1
21452220	50V 22PF TP			2
21452330	50V 33PF TP			3
21452820	50V 82PF TP			9
21453100	50V 100PF TP			2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
21453180	50V 180PF TP	KLM-6019		1
21453220	50V 220PF TP			2
21453470	50V 470PF TP			7
21453680	50V 680PF TP			9
21453820	50V 820PF TP			2
21455220	50V 0.022UF			25
21455470	50V 0.047UFTP	KLM-6007		5
21512610	TPD33Y5V1E104ZL-W	KLM-6008		5
		KLM-6019		16
21612610	D33Y5V1E104Z51	KLM-6021		11
EMI FILTER				
21950100	DSS310-55D223S	KLM-6019		4
ELECTROLYTIC CAPACITORS				
23504410	10V 1000UF	KLM-6007		1
23504422	10V 2200UF			1
25401347	6.3V 470UF	KLM-6019		1
25402310	10V 100UF	KLM-6007		4
		KLM-6019		4
25403222	16V 22UF			2
25408110	50V 1UF			1
25408122	50V 2.2UF			2
25406147	50V 4.7UF	KLM-6007		1
		KLM-6019		1
25442310	10V 100UF			2
25443210	16V 10UF			30
25446110	50V 1UF			1
BLOCK CAPACITORS				
24815347	50V 470PF x 6	KLM-6019		1
PPC				
26401320	100V 200PF G	KLM-6019		2
TR				
30001800	2SA 1239	KLM-6019		1
30203400	2SC2673 FREE (P.Q.R)	KLM-6021		14
30400050	2SA1175	KLM-6019		2
30420070	2SC2785	KLM-6007		1
		KLM-6019		4
30420100	BA1A4M			2
30420130	2SC1845P T			9
PAIR TR				
30203300	2SC3064	KLM-6019		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
DIODE				
31001900	DA-203	KLM-6021		14
31400100	1S1555	KLM-6021		35
31401300	1SS-133	KLM-6008		1
		KLM-6019		10
BRIDGE DIODE				
31010100	1B4B41	KLM-6007		1
LED				
31203600	SLP-178C	KLM-6021		3
31203700	SLP-278C			1
31205400	SLP-175B			6
LCD				
31300400	16x2 EDM-CC162333B	LCD ASSY		1
DOUBLE DIODE				
31500100	MC931	KLM-6019		3
31500200	MC921			1
IC				
32001067	74HC00C	KLM-6019		1
32001071	74HC (40H) 138C			1
32001073	74HC (40H) 373C			1
32001083	74HC374C	KLM-6021		1
32001094	74HC139C	KLM-6019		2
32001112	UPC624C			1
32001113	UPD78C10CW			1
32003075	TC74HC541P			1
32003076	TC74HC4050P			4
32003077	TC74HC4051P			2
32003102	TC74HC02P	KLM-6021		7
32003175	TC74HC245P	KLM-6019		1
32003186	TC74HC86P			1
32004017	HD-14051 BP	KLM-6021		2
32004100	74HC14P	KLM-6019		1
32009001	NJM-4558D-V			6
32009002	NJM-4556 D			1
32009005	NJM-4558 S			1
32009009	NJM-072D			1
		KLM-6021		1
32009014	NJM-2901 N	KLM-6019		1
32009017	NJM-13600D-A			1
32009032	NJM-78M05A	KLM-6007		1
32009054	NJM79M05			1
32012019	MBM27C256-25	KLM-6019		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
32012021	MB8464-10LLP	KLM-6019		2
32012030	MB831000-20-254			1
32012031	MB831000-20-255			1
32023005	S-8054HN			1
GATE ARRAY				
32012022	MB861107	KLM-6019		1
PHOTO COUPLER				
33000900	PC-900	KLM-6019		1
CERAMIC OSCILLATOR				
33502500	PRT-12.0RM	KLM-6019		1
33502700	PRT-8.0RMO			1
SEMI FIXED VRs				
35005310	RH0652C 10K	KLM-6019		1
SLIDE VRs				
38507000	RS20111A6 10KB DATA ENTRY	KLM-6021		1
38507100	RS30111A6 10KB			1
38507200	RS30112A6 10KB x2			1
POWER SW				
37508000	SDDJI			1
DIP SW				
37508700	KSPA04	KLM-6019		1
PUSH SW				
37508800	SKCLKC	KLM-6021		20
TACT SW				
37508900	SKHHBV			28
POWER TRANSFORMER				
40010200	TA-600		117 US	1
			100JP	1
			117EX	1
			117CN	1
40010300	TB-600		220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			220 WG	1
			220FR	1
			240UK	1
			220 SC	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
COIL				
40202200	36640	KLM-6007	220 WG	2
40202300	BLO2RN2-R62	KLM-6019		1
40202300				3
INVERTER				
40202400	NEL-D32-46	KLM-6007		1
PHONE JACK				
45404300	YKB21-5012	KLM-6019		9
45404400	YKB21-5010			5
45404500	YKB21-5029			3
DIN JACK				
45405400	YKF51-5008	KLM-6019		2
FUSE				
46411701	250V 0.5A UL		117 US	1
			100JP	1
			117EX	1
			117CN	1
46461701	250V T500MA		117 US	2
			220 GE	3
			220 SE	3
			240 AF	3
			240 AU	3
			240 GE	3
			220 WG	3
			100 JP	2
46461701	250V T500MA		117EX	2
			220FR	3
			240UK	3
			117CN	2
			220 SC	3
CONNECTOR				
47111400	TOP S25-014	LCD ASSY		1
47160300	B3B-EH	KLM-6007		1
		KLM-6008		1
47170600	B6B-PH	KLM-6019		1
47171200	B12B-PH			1
47190200	TOP 5096-02C	KLM-6007		2
47190300	TOP 5096-03C			1
47271000	S10B-PH	KLM-6008		1
47271100	S11B-PH	KLM-6019		1
47404708	CARD FIT CF-130A	KLM-6021		1
47404709	CARD FIT CF-134A	KLM-6008		2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
47404710	CARD FIT CF-030	KLM-6019		1
47404711	CARD FIT CF-034			2
BC CONNECTOR				
47409900	L-32	KLM-6008		5
HARNES				
47506013	HNS-6013	KLM-6019		1
47506014	HNS-6014	KLM-6021		1
47506015	HNS-6015	KLM-6007		1
47506016	HNS-6016	KLM-6019		1
47506017	HNS-6017	KLM-6021		1
47506018	HNS-6018			1
47506019	HNS-6019	LCD ASSY		1
IC SOCKET				
48001282	28P DICA-28CTI	KLM-6019		1
RUBBER FEET				
50008200				1
50008700				4
PANEL BOARD CUSHION				
50010500	X-507			1
50010600	A			1
50010700	B			14
FUSE HOLDER				
51502300	S-N5057 #01	KLM-6007		6
LITHIC BATTERY				
52001300	CR2032-FT			1
BUSHING				
54000300	SR-4K-4		117 US	1
			100JP	2
			117EX	1
54000400	SR-5P-4		240 AU	1
54000500	SR-6W-1		220 GE	1
			220 SE	1
			240 AF	1
			240 GE	1
			220 WG	1
			220FR	1
			240UK	1
			220 SC	1
54000501	SR-6N3-4		117CN	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
WIRE BAND				
54007200	PLT-1M			4
ISOLATING WASHER				
54007300	B-1725K	KLM-6007		2
CORD BAND				
54007600	NO.113 BLACK			1
SPIRAL CLIP				
54008600	CS-8			1
JUMPER CORD				
54520150	SMCD30 × 200BD × 10(2)			1
54520160	SMCD34 × 100BD × 10(2)			1
54520170	SMCD34 × 60BD × 10(2)			1
SLIDE VRs MASK				
55008300				1
BOARD CUSHION				
55010000				2
BATTERY CUSHION				
55010100				2
HEAT SINK				
56003700		KLM-6007		1
RADIATION SHEET				
56500300	BFG-30	KLM-6007		1
LED SPACER				
57504300	TYPE X NO.7 L = 6.8	KLM-6021		6
57504700	TYPE X L = 9.1			4
GND SEAL				
58001900			220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			220 WG	1
			220FR	1
			240UK	1
			220 SC	1
WIRING CAUTION				
58004000	LARGE NO1		240UK	1
SERVICEMAN CAUTION				
58023700				1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
SHIELDING SEET				
58024800				1
63003500				1
AC CORD				
60000102	KE-1044B PVC. 75		100JP	1
60000201	SPT-2 18AWG SU428-58		117 US	1
60000301	CLASS1 (SU429-58)		117EX	1
			220 GE	1
			240 GE	1
			220 WG	1
			240UK	1
			220 SC	1
60000401	SAA (SU428-58) 3X.75		240 AU	1
60000501	BS PLUG (SU431A-58)		240 AF	1
60000901	SEV (SU430-58)		220 SE	1
60001301	KP-4819D GTCE-3.75		220FR	1
60002000	SJT (SU338-56) 18/3MM		117CN	1
PUSH SW. KONB				
62012401	B-2 IVORY			2
62014400	B-4 GRAY			24
TACT SW. KNOB				
62016700	RED			1
62016800	GRAY			14
62016900	IVORY			3
62017000	BLUEGREEN			2
TACT SW. KNOB SUPPORT PLATE				
63003900	PLATE A			8
63004000	PLATE B			2
SLIDE VRs KNOB				
62017300	B NO.3			3
PUSH KNOB				
62017400	B-7 BLUEGREEN			2
LCD COVER				
63003300				1
LOWER CASE				
64077900			117 US	1
			220 GE	1
			220 SE	1
			240 AF	1
			240UK	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
64077900			240 GE	1
			100 JP	1
			117EX	1
			220FR	1
			240UK	1
			117CN	1
			220 SC	1
64077910			220 WG	1
SUPPORTING PLATES OF SAMPLING BOARD				
64078000				1
MINI PHONE JACK PLATE				
64078100			117 US	1
			220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			100JP	1
			117EX	1
			220FR	1
			240UK	1
			117CN	1
			220 SC	1
			220 WG	1
64078110				
AC CORD FIXING PLATE				
64078200	PLATE NO.1		117 US	1
			220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			220 WG	1
			100JP	1
			117EX	1
			220FR	1
			240UK	1
64078201	PLATE NO.2		117CN	1
BATTERY COVER				
64078300				1
ROM CARD COVER FIX PIN				
64078600	BSBM			2

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
METAL FITTING OF PCB SUPPORT				
64078700				1
P.C. BOARD RAIL				
64079600	R			1
64079601	L			1
SPRING				
64402700				2
64403000			220 WG	4
UPPER CASE				
64622500			117 US	1
			220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			100JP	1
			117EX	1
			220FR	1
			240UK	1
			117CN	1
			220 SC	1
64622510			220 WG	1
CARD RAIL				
64622600	R	KLM-6008		5
64622601	L			5
ROM CARD COVER				
64622700				1
PANEL BOARD SUPPORT PLATE				
64623000				1
LUG				
67201600	4PHY N3		220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			220 WG	1
			220FR	1
			240UK	1
			220 SC	1
SERIAL NO. SEAL				
68599999				1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
GUARANTEE SEAL				
68602500			100JP	1
NAME PLATE				
68602800			117 US	1
			220 GE	1
			220 SE	1
			240 AF	1
			240 AU	1
			240 GE	1
			220 WG	1
			117EX	1
			220FR	1
			240UK	1
			117CN	1
			220 SC	1
68603000			100JP	1
SCREW				
70530308	FE B ZMC 3x8	KLM-6007		21
70560308	FE B BZMC 3x8			2
70560408	FE B BZMC 4x8			9
72560308	TP2G B BZMC 3x8			1
74530206	PLAX B ZMC 2x6			4
74530308	PLAX B ZMC 3x8			4
74530308	PLAX B ZMC 3x8			40
74560308	PLAX B BZMC 3x8			6
NUT				
77030300	FHN ZMC 3			2
77130300	HN1 ZMC 3	KLM-6007		2
WASHER				
78430400	TWU ZMC 4			1

DSB-1 PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY	
CARBON RESISTORS					
10016447	1/8JY 4.7K	KLM-6010		1	
10416233	1/8JY 33 OHM			1	
10416310	1/8JTP 100 OHM			5	
10416312	1/8JY 120 OHM			1	
10416322	1/8JTP 220 OHM			2	
10416333	1/8JTP 330 OHM			2	
10416356	1/8JTP 560 OHM			1	
10416410	1/8JTP 1.0K			2	
10416415	1/8JTP 1.5K			1	
10416418	1/8JTP 1.8K			1	
10416420	1/8JTP 2.0K			1	
10416422	1/8JTP 2.2K			1	
10416427	1/8JTP 2.7K			1	
10416433	1/8JTP 3.3K			1	
10416443	1/8JTP 4.3K			1	
10416447	1/8JTP 4.7K			2	
10416462	1/8JTP 6.2K			2	
10416468	1/8JTP 6.8K			1	
10416510	1/8JTP 10K			13	
10416511	1/8JTP 11K			1	
10416515	1/8JTP 15K			1	
10416518	1/8JTP 18K			1	
10416522	1/8JTP 22K			5	
10416524	1/8JTP 24K			1	
10416527	1/8JTP 27K			2	
10416539	1/8JTP 39K			2	
10416547	1/8JTP 47K			1	
10416551	1/8JTP 51K			1	
10416556	1/8JTP 56K			1	
10416591	1/8JTP 91K		KLM-6010		1
10416612	1/8JTP 120K				1
10416627	1/8JTP 270K				1
10416647	1/8JTP 470K				1
METAL FILM RESISTORS					
12513604	1/6 604 OHM			1	
12514442	1/6 4.42K			1	
12515110	1/6 11.0K			1	
12515150	1/6 15.0K			1	
12515274	1/6 27.4K			1	
BLOCK RESISTORS					
13807002	RNBQEL001A			1	

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
13807008	RN3Q7L103F			1
13807009	RN3QAL103F			1
13811001	RN3JDA103J 10K			1
13815001	RN3J5D223J 22K			2
THERMISTORS				
18032510	TD5-C310D			1
18032530	TD5-C330D			1
MYLAR CAPACITORS				
20023410	50V 0.001UF			2
20023415	50V 0.0015UF			1
20023422	50V 0.0022UF			2
20023433	50V 0.0033UF			1
20023439	50V 0.0039UF			2
STYROL CAPACITOR				
20502310	50V GT 100PF			1
CERAMIC CAPACITORS				
21352221	50V 22PF			1
21352331	50V 33PF			1
21352471	50V 47PF			1
21353101	50V 100PF			3
21452820	50V 82PF			4
21453151	50V 150PF TP			4
21453330	50V 330PF TP			2
21512610	TPD33Y5V1E104ZL-W	KLM-6010		33
TANTALUM CAPACITOR				
22013022	35V 0.22UFK			2
ELECTROLYTIC CAPACITORS				
23707210	16V 10UF			7
23707310	16V 100UF			4
24507210	A16V 10UF			1
TR				
30001800	2SA 1239			1
30400050	2SA1175			3
30420070	2SC2785			1
30420100	BA1A4M			1
FET				
30460021	2SK381-34-C			2
DIODE				
31401300	1SS-133			6

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
ZENER DIODE				
31420400	RD-6.2EB-TN-B1			1
IC				
32001034	UPC-1571 C			1
32001085	UPD65010CW-113			1
32001125	UPD4265C			8
32003100	74HC(40H)00P			1
32003145	TC74HC157P			1
32003169	TC74HC241P			1
32003173	TC74HC244P			1
32004116	HD14572UBP			1
32008022	MSM82C55RS			1
32009001	NJM-4558D-V			3
32009011	NJM-7805 A			1
32009012	NJM-311D			1
32009026	NJM-13700-D			1
32009036	NJM2069A-D			1
P.C. BOARD				
34360100	KLM-6010			1
SEMI FIXED VRs				
35002310	VR RH0615C 10K			1
35012310	VR RH0624C 10KB			3
SLIDE SW				
37306200	SSSS212A	KLM-6010		1
EDGE CONNECTOR				
47410000	FCN-225J030-G/			1
BATTERY				
52001600	4N-270AA			1
SHIELDING PLATE				
63003800				1
SCREWS				
70530210	FE B ZMC 2 x 10	KLM-6010		2
70530308	FE B ZMC 3 x 6			4
NUT				
77130200	HN1 ZMC2	KLM-6010		2
77130300	HN1 ZMC 3			4
NYLON WASHER				
79030408	4 x 8 x 1.5			4

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