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80286 CPU Mother Board User's Operation Manual

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1. Introduction

M209 is a 80286 CPU mother board. It is designed with the most advanced ASIC technology to increase reliability and capability. **M209** is fully compatible with the IBM PC/AT.

2. Features of M209 Mother Board

- 1) 80286 CPU
- 2) On board memory size: 4M bytes maximum
- 3) On board use both D-TYPE RAM socket & MODULE RAM socket
- 4) Zero wait state page mode
- 5) LIM EMS 4.0 support over entire 16M bytes
- 6) Shadow RAM support in 16K bytes increments
- 7) socket for 80287 co-processor
- 8) Hardware and Software speed switching
- 9) OS/2 optimization
- 10) Six 16-bits and one 8-bits slots for AT expansion bus
- 11) Dimension for baby AT size
- 12) Special features:
 - Keyboard typematic rate
 - Power on password
 - Hard disk boot sector virus protection

3. M209 Configuration

3.1 Display Adaptor Select

JP2 is used to select color or monochrome display adaptor.

Pin	Description
1-2	Monochrome
2-3*	Color

*:Default Setting

3.2 Connector Description

M209 mother board provides the following connectors for control panel ,key-board and power supply:

- Turbo LED Connector
- Power Supply Connector
- Turbo Switch Connector
- Speaker Connector
- Reset Switch Connector
- Keyboard Connector
- Auxilliary Keyboard Connector
- Key Lock & Power LED Connector
- 7 Segment Display Control
- External Battery Connector

a) Turbo LED Connector (*JP11*)

The Turbo LED indicates operation in Turbo mode when it is lit. The Turbo LED connector is located at *JP11* on the mother board. The pinout of the connector is as follows:

Pin	Description
1	LED Anode
2	LED Cathode

b) Power Supply Connector (J1)

The power supply connector *J1* is a single plastic connector. Insert the plugs from the power supply onto this connector. The pin assignments of this connector are as follows:

<u>Pin</u>	<u>Description</u>
1	Power Good
2	NC
3	+ 12 V
4	- 12 V
5	Ground
6	Ground
7	Ground
8	Ground
9	- 5V
10	+ 5 V
11	+ 5 V
12	+ 5 V

c) Turbo Switch (JP13)

The system speed can be switched between turbo mode and normal mode. The connector for the switch is located at *JP13* on the mother board. The Turbo mode is on while the turbo switch is open. When it is close, the system is in normal mode.

The pinout and the switch setting of the Turbo Switch are shown below:

<u>Pin</u>	<u>Description</u>
1	Ground
2	Turbo

d) Speaker Connection (JP16)

A speaker should be connected to this connector. The pinout is shown below:

<u>Pin</u>	<u>Description</u>
1	Speaker –
2	Speaker +

e) Reset Switch Connector (JP14)

With a switch connected to JP14, the computer will operate normally while the switch is open. If you press and then release the switch, it will cause the system to reset. The switch setting and pinout are as follows:

<u>Pin</u>	<u>Description</u>
1	Reset In
2	Ground

Note:1-2 Close Reset System

f) Keyboard Connector (J2)

The Keyboard connector is located at J2. The pinout of J2 is as follows:

<u>Pin</u>	<u>Description</u>
1	Keyboard Clock
2	Keyboard Data
3	Spare
4	Ground
5	+ 5 V

g) Auxiliary Keyboard Connector (JP1)

This connector is used for those keyboard connector which is mounted at the front panel of the chassis. The pinout is as follows:

Pin	Description
1	Keyboard Clock
2	Keyboard Data
3	Spare
4	Ground
5	+ 5 V

h) Key Lock & Power LED Connector (JP3)

The key lock connector is located at JP3 on the mother board. The keyboard is locked when the pins 4 and 5 are shorted. The power LED is also connected to this connector and will light up while the power is switched on.

Pin	Description
1	LED Anode
2	Polarization Pin
3	LED Cathode
4	Key Lock
5	Ground

i) 7 Segment Display Control (JP12)

Some of the computer chassis have 7-segment display to show the system speed. It needs only one control signal to toggle the display between turbo and normal speed.

Pin	Description
1	Control Signal
2	+ 5 V
3	Ground

j) External Battery Connector (JP4)

If you want to use external battery, insert the plugs from the battery onto this connector. The assignments of this connector are as follows:

Pin	Description
1	External Battery Vdc (+6V DC)
2	NC
3	NC
4	Ground

4. Installation of Co-processor

Inside **M209** there is a 40 pin socket for the 80287 co-processor. Please refer to the layout of **M209** to locate the position to plug in the co-processor. The clock rate of the co-processor can be set to the same of the CPU.

<u>CPU clock</u>	<u>Clock frequency for 80287</u>	<u>Co-processor</u>
20 MHz *2	$20 \text{ MHz} * 2/3 = 13.33 \text{ MHz}$	80287-16
16 MHz *2	$16 \text{ MHz} * 2/3 = 10.67 \text{ MHz}$	80287-12
12 MHz *2	$12 \text{ MHz} * 2/3 = 8 \text{ MHz}$	80287-8

5. Installation of DRAM

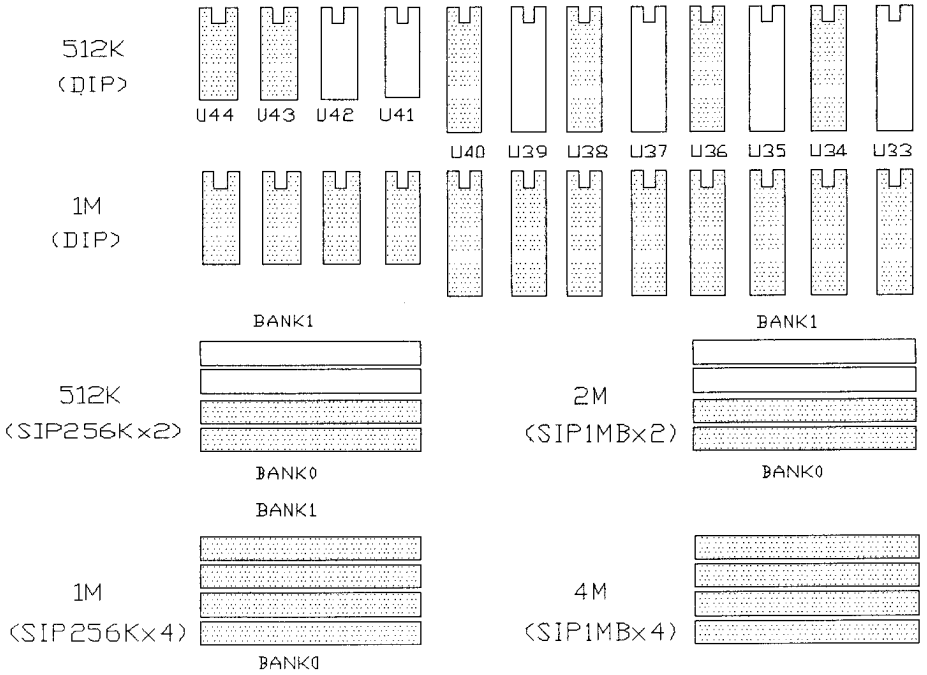
M209 uses either *44256 DRAM DIP type chips* or *256KB/1MB DRAM SIP module* as system memory. System memory can be configure to be 512KB, 1MB, 2MB or 4MB maximum, relative setting is showing you below for your configuration. Take care to this step before you choice the memory size.

<u>Size</u>	<u>DRAM Type</u>
512KB	DIP/44256*4, DIP/41256*2
1MB	DIP/44256*8, DIP/41256*4
1MB	SIP/256K*4
2MB	SIP/1MB*2
4MB	SIP/1MB*4

All of these DRAM installation must start from *BANK0*. Corresponding 41256 DRAM chips are used if parity check is enabled when *DIP type 44256 DRAM* is been selected. Related location of RAM chips or RAM modules will show in Appendix D.

A correct and careful action is necessary when chips or modules are inserting to their socket.

<u>System Speed</u>	<u>Recommended DRAM Speed</u>
20 MHz	80ns
16 MHz	80ns
12 MHz	100ns



6. M209 CMOS Setup Function

The setup function is used to configure the system. It is activated by pressing **DEL** key when a message:

"Press if you want to run *SETUP Utility*"

is shown on the screen during boot-up. The **SETUP** menu is shown below:

ADVANCED SYSTEM UTILITY VERSION 2.32 COPYRIGHT©1991 PCCHIPS INC.

DATE (M/D/Y)	01/01/80				
TIME (H:M:S)	12:00:00				
FLOPPY DRIVE A	1.2M				
FLOPPY DRIVE B	NONE				
HARD DISK 1	17	CYLS	HEADS	PRECOMP	LZONE
HARD DISK 2	NONE	977	5	300	977 17 40MB
VIDEO DISPLAY	EGA / VGA				
SYSTEM SPEED	NO CHANGE				
PARITY	ENABLED				
SPECIAL FEATURE	DISABLED				
BASE MEMORY	640 KB				
EXTENDED MEMORY	1024 KB				
EMS MEMORY	DISABLE	PAGE FRAME: E000H	I/O PORT: 02E8H		
SCRATCH RAM	(1)	C0 C4 C8 CC D0 D4 D8 DC E0 E4 E8 EC F0 F4 F8 FC			
SHADOW RAM	SEGMENT	X X X X X X X X X X X X X X ON ON ON ON			

The date format is United States: -
 Month / Day / Year
 Please use pgUp/PgDn to change
 the value, or just enter the
 decimal number from 0 to 9.

ESC = ABORT, ↑ ↓ ← → = SELECT, PGUP/PGDN = MODIFY, F10 = SAVE & EXIT

User should use 4 arrow keys to select item. The content of the items can be changed by pressing PgUp/PgDn keys and may be modified by using the BACKSPACE key and entering numbers directly. The small window inside the SETUP menu contains the information about the selected item. User is recommended to read through the information before changing the content.

M209 provides 3 special features which are shown on the window. They can be obtained by pressing PgUp/PgDn key at the item "**Special Feature**". They are Keyboard Typematic Rate, Power On Password & Hard Disk Boot Sector Virus Protection. The features, including Shadow RAM will be described in section 7.

Note: The system setup of M209 is kept in the Real Time Clock chip. When the power is turned off, the date & time is maintained by a battery back-up. User is recommended to turn on the power for an hour a week so as to keep the battery working.

7. Special Features of M209

M209 provides 4 special features to increase capability. The features can be utilized when the system memory on board is at least 1 MByte. They are described in the following sections.

7.1 Keyboard Typematic Rate

When user presses down a key, it takes a little while to get repeated character. The feature of Keyboard Typematic Rate can shorten the time taken and increase the character's repeating rate by choosing the FAST mode in SETUP menu.

7.2 Power On Password

Power On Password is provided to secure the system from illegal access by other people. The feature can be enabled through the SETUP menu. Once it is enabled, it is necessary to type in password whenever the system power is turned on.

Note: If user forgets the password, you should turn off the power, short the JP10 by putting metal across pin 1 & 2 and then move away. When you turn on the power again, no password is requested, but a message of "CMOS battery state low" is shown on the screen. User can ignore the message.

7.3 Hard Disk Boot Sector Virus Protection

M209 provides this feature to protect system from being infected by computer virus. If the feature is enabled through the SETUP menu, the system will be immune from the viruses that affect the hard disk partition table and boot sector.

Note: During a new hard disk initialization, do not enable this feature since write operation to hard disk partition table and boot sector are inhibited. However, don't hesitate to enable this feature for your hard disk which is being used.

7.4 Shadow RAM

The function of the Shadow RAM is to load the content of system BIOS, video BIOS, etc. to the system memory so as to speed up the processing.

The segments of BIOS to be downloaded to Shadow RAM are selected through the SETUP menu during booting up system. In the SETUP menu, segments from F0 to FC are the location of system BIOS. To speed up the processing, it is recommended to select ON.

8. Selection of Operating Speed

The operating speed can be controlled through hardware switch and software control. The hardware switch has been described in section 3.2-c, i.e. Turbo mode is chosen when JP13 is open whereas normal, is closed.

For the software control, which is a built-in function of **M209**, you can select the mode either through SETUP menu or pressing 3 specified keys on the keyboard simultaneously which is described as follows:

<u>Action</u>	<u>Operating speed</u>
Press 'Ctrl', 'Alt', '+' simultaneously	Turbo
Press 'Ctrl', 'Alt', '-' simultaneously	Normal

Note that if NO CHANGE is selected in the SETUP menu, the operating speed will depend on the hardware switch during power up.

However, user can alter the speed by pressing the special keys or switching the hardware switch as desired.

9. Utility Programs

The programs are provided in the Utility Diskette to increase your utilization power of the M209 mother board. The programs are used when the system installs at least 1MB bytes memory. For the installation procedure, please refer to the README.DOC file in the diskette by typing:

```
A: > TYPE README.DOC ↵
```

You can Use these utilities to utilize your operation.

This README.DOC file contains the most update information about the utility diskette shown below.

EMS driver
Hard Disk Cache
RAM Disk
Print Spooler

Please read the following for description on the utilities and the installation method.

9.1 Utilities installation

With the INSTALL.EXE the utilities can be installed to your hard disk or a floppy disk provided that they must be bootable. After installation, the utilities will be available whenever you boot up the system using the installed disk. The installation program can be used for modification after first time installation.

To do first time installtion :

1.1 Place this diskette into drive A

1.2 Type A:

1.3 Type INSTALL

1.4 Follow the instructions shown, and select the source drive, boot drive, target drive, target path and the size of RAM Disk, Hard Disk Cache and Print Spooler.

1.5 Press F10 to save and modify the CONFIG.SYS and AUTOEXEC.BAT.

1.6 Restart the system using the installed disk.

9.2 EMS Driver Installation

EMS.SYS is a LIM 4.0 compatible EMS Driver. This driver is applicable with at least 1M bytes on board memory installed and EMS feature (in the BIOS setup menu) must be enabled.

To install DEMS :

2.1 Execute the installation program called INSTALL.EXE which can be found in this diskette.

2.2 Or follow the procedures below.

A . Copy the DEMS.SYS file from this disk to the root directory of the disk using in starting up the computer.

B . Then add the following line into the CONFIG.SYS file.

DEVICE = DEMS.SYS

C . Reboot the system

A sign-on message from the DEMS.SYS should be seen as follow:

```
Expanded Memory Manager Version 4.26
Copyright (C) 1990 PC Chips INC.
Total Page : XXXX (YYYYY KB)
Page from : ZZZZ
I/O Address : PPP
```

9.3 Files in the UTILITY diskette

SCLEAR.COM	(for clearing the Print Spooler)
README.DOC	(This document)
INSTALL.EXE	(for installation and setup)
README.EXE	(for viewing this document)
DEMS.SYS	(Driver for expanded memory)
EMMDISK.SYS	(RAM Disk)
CACHE.SYS	(Hard Disk Cache)
SPOOLER.SYS	(Print Spooler)

*note: This UTILITY disk will be updated without notice.

Appendix A

Summary of Jumpers & Connectors

A-1 Jumpers:

<u>Jumper</u>	<u>Connection</u>	<u>Description</u>
JP2 Video Display Adaptor	1-2 *2-3	Monochrome Color
JP10 RTC & CMOS Reset	1-2	Short: Clear Password
JP5 80287 Clock Select	1-2 *2-3	Oscillator 1 Used as Input Clock CPU Clock Used as Input Clock

*Default settings.

A-2 Connectors:

Connector	Pinout	Function
JP1 External-Keyboard Connector	1: Keyboard Clock 2: Keyboard Data 3: Spare 4: GND 5: +5 V	
JP3 Keyboard Lock & Power LED	1: LED Anode 2: Polarization Pin 3: LED Cathode 4: Key Lock 5: GND	
JP4 External Battery Connector	1: BAT + 2,3: NC 4: BAT -	
JP11 Turbo LED	1: LED Anode 2: LED Cathode	
JP12 7-Seg-Display Connector	1: Control Signal 2: +5V 3: GND	
JP13 Turbo Switch	1: GND 2: Turbo	Short: Turbo Open: Normal
JP14 Reset Switch	1: Reset In 2: GND	Short: Reset Open: Normal
JP16 Speaker Connector	1: Speaker - 2: Speaker +	

A-3 I/O Channel Slot:

Signal Name	I/O	Slot
GROUND	GND	B1
RESET DRV	O	B2
+ 5V	Power	B3
IRQ9	I	B4
- 5V	Power	B5
DRQ2	I	B6
- 12V	Power	B7
OWS -	I	B8
+ 12V	Power	B9
GROUND	GND	B10
SMEMW -	O	B11
SMEMR -	O	B12
IOW -	I/O	B13
IOR -	I/O	B14
DACK3 -	O	B15
DRQ3	I	B16
DACK1 -	O	B17
DRQ1	I	B18
REFRESH -	I/O	B19
CLK	O	B20
IRQ7	I	B21
IRQ6	I	B22
IRQ5	I	B23
IRQ4	I	B24
IRQ3	I	B25
DACK2 -	O	B26
T/C	O	B27
BALE	O	B28
+ 5V	Power	B29
OSC	O	B30
GROUND	GND	B31

A-4 I/O Channel Slot:

Signal Name	I/O	Slot
I/O CH CK -	I	A1
SD7	I/O	A2
SD6	I/O	A3
SD5	I/O	A4
SD4	I/O	A5
SD3	I/O	A6
SD2	I/O	A7
SD1	I/O	A8
SD0	I/O	A9
I/O CH RDY	I	A10
AEN	O	A11
SA19	I/O	A12
SA18	I/O	A13
SA17	I/O	A14
SA16	I/O	A15
SA15	I/O	A16
SA14	I/O	A17
SA13	I/O	A18
SA12	I/O	A19
SA11	I/O	A20
SA10	I/O	A21
SA9	I/O	A22
SA8	I/O	A23
SA7	I/O	A24
SA6	I/O	A25
SA5	I/O	A26
SA4	I/O	A27
SA3	I/O	A28
SA2	I/O	A29
SA1	I/O	A30
SA0	I/O	A31

A-5 I/O Channel Slot:

<u>Signal Name</u>	<u>I/O</u>	<u>Slot</u>
MEM CS16 —	I	D1
I/O CS16 —	I	D2
IRQ10	I	D3
IRQ11	I	D4
IRQ12	I	D5
IRQ15	I	D6
IRQ14	I	D7
DACK0 —	O	D8
DRQ0	I	D9
DACK5 —	O	D10
DRQ5	I	D11
DACK6 —	O	D12
DRQ6	I	D13
DACK7 —	O	D14
DRQ7	I	D15
+ 5V	Power	D16
MASTER —	I	D17
GROUND	GND	D18

A-6 I/O Channel Slot:

Signal Name	I/O	Slot
SBHE	I/O	C1
LA23	I/O	C2
LA22	I/O	C3
LA21	I/O	C4
LA20	I/O	C5
LA19	I/O	C6
LA18	I/O	C7
LA17	I/O	C8
MEMR —	I/O	C9
MEMW —	I/O	C10
SD8	I/O	C11
SD9	I/O	C12
SD10	I/O	C13
SD11	I/O	C14
SD12	I/O	C15
SD13	I/O	C16
SD14	I/O	C17
SD15	I/O	C18

Appendix B

General Trouble-shooting

Symptom 1 : No video display and no power light after power up.

Cause 1 : Power cord is not connected.

Solution : Check power cord if it is properly connected.

Cause 2 : Power supply does not work.

Solution : Replace power supply with new one.

Symptom 2 : No video display.

Cause : Video connector is not connected.

Solution : Connect the video connector to display adapter.

Symptom 3 : A message of "Keyboard error" is shown on the screen.

Cause 1 : Keyboard is not connected.

Solution : Connect keyboard properly.

Cause 2 : Keyboard is locked.

Solution : Unlock the keylock.

Symptom 4 : A message of "CMOS battery state low" is shown on the screen.

Cause 1 : JP10 has been shorted.

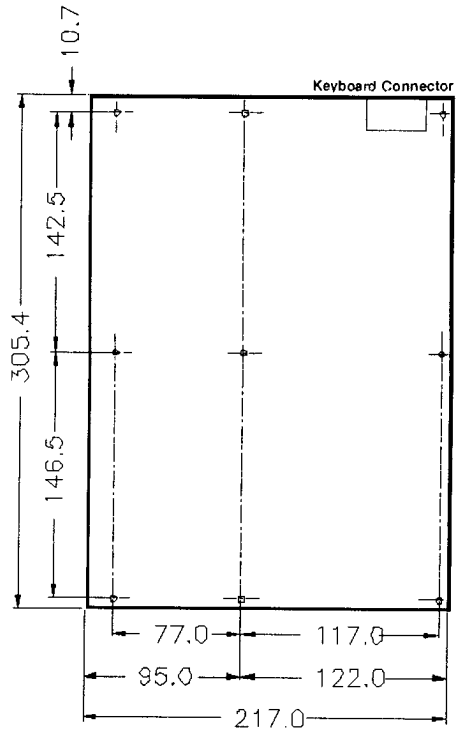
Solution : Ignore the message since it does not affect the normal operation.

Cause 2 : The battery has not enough power, this would come up with another message of "CMOS system options not set".

Solution : Configure the system again through SETUP menu, and leave the power on for few hours to charge up the battery.

Appendix C

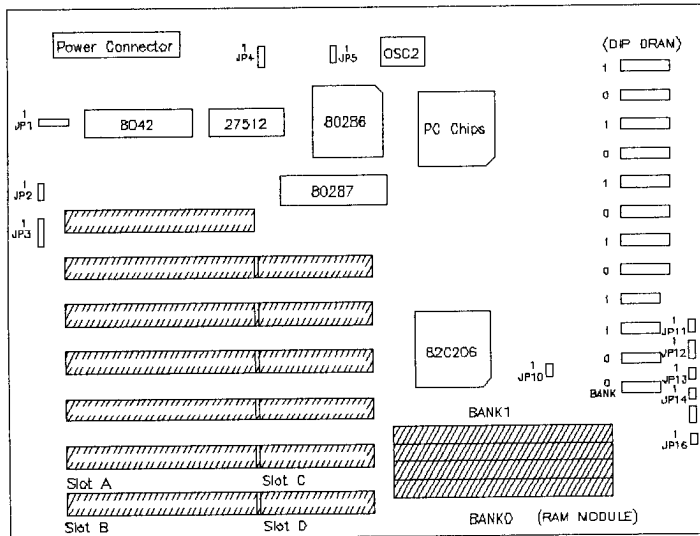
Dimension of M209 Mother Board

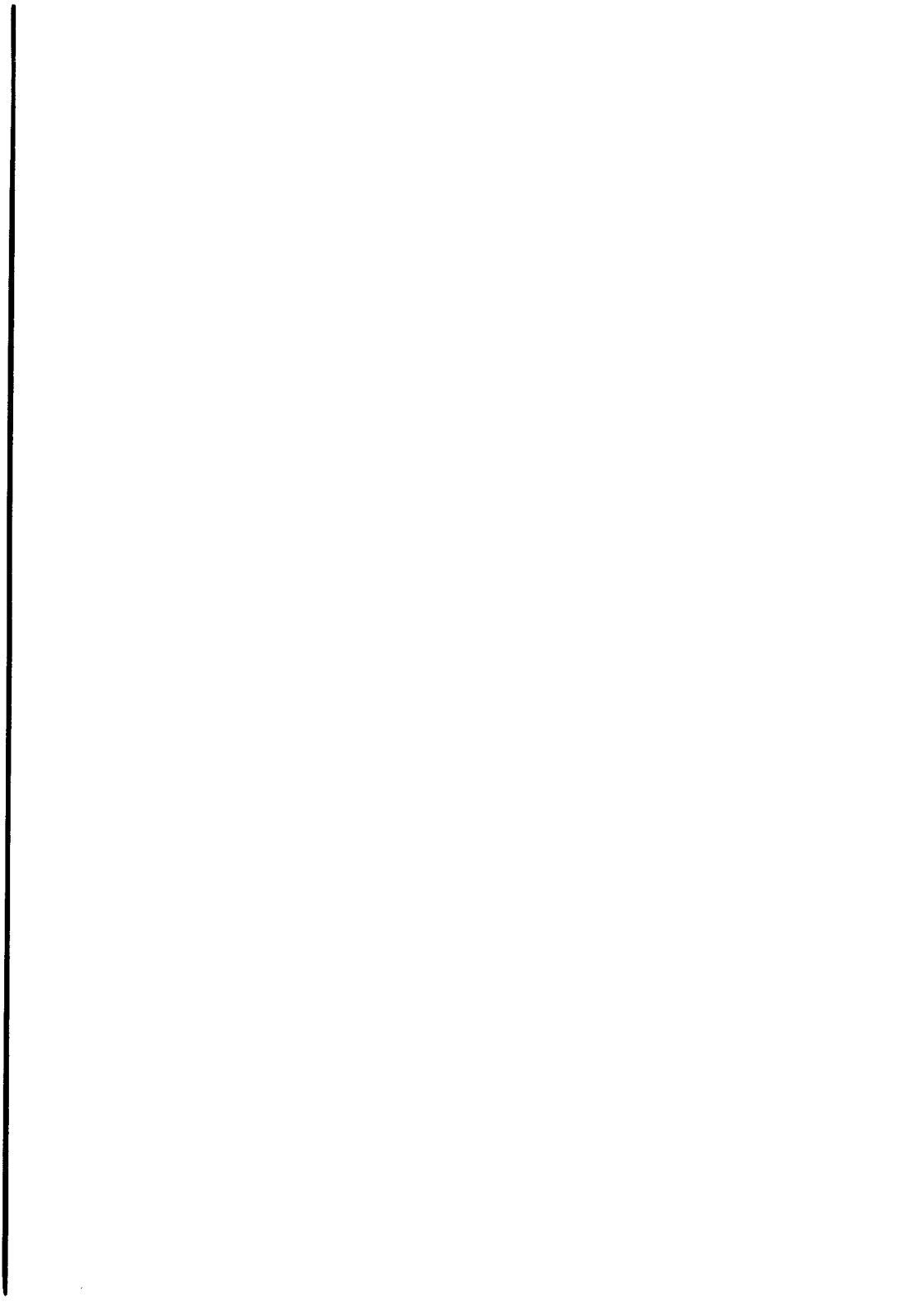


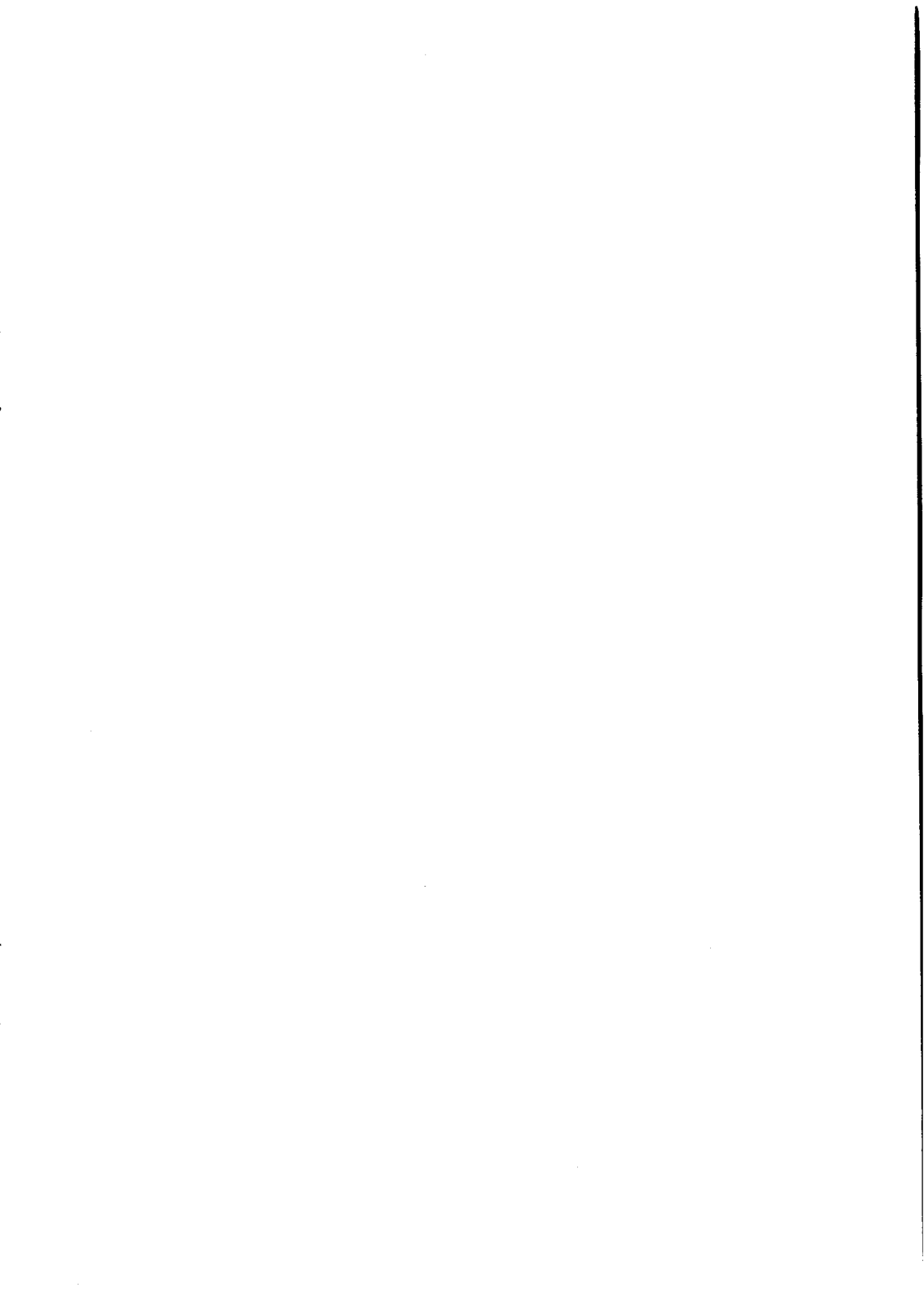
Note: All dimensions are in mm.

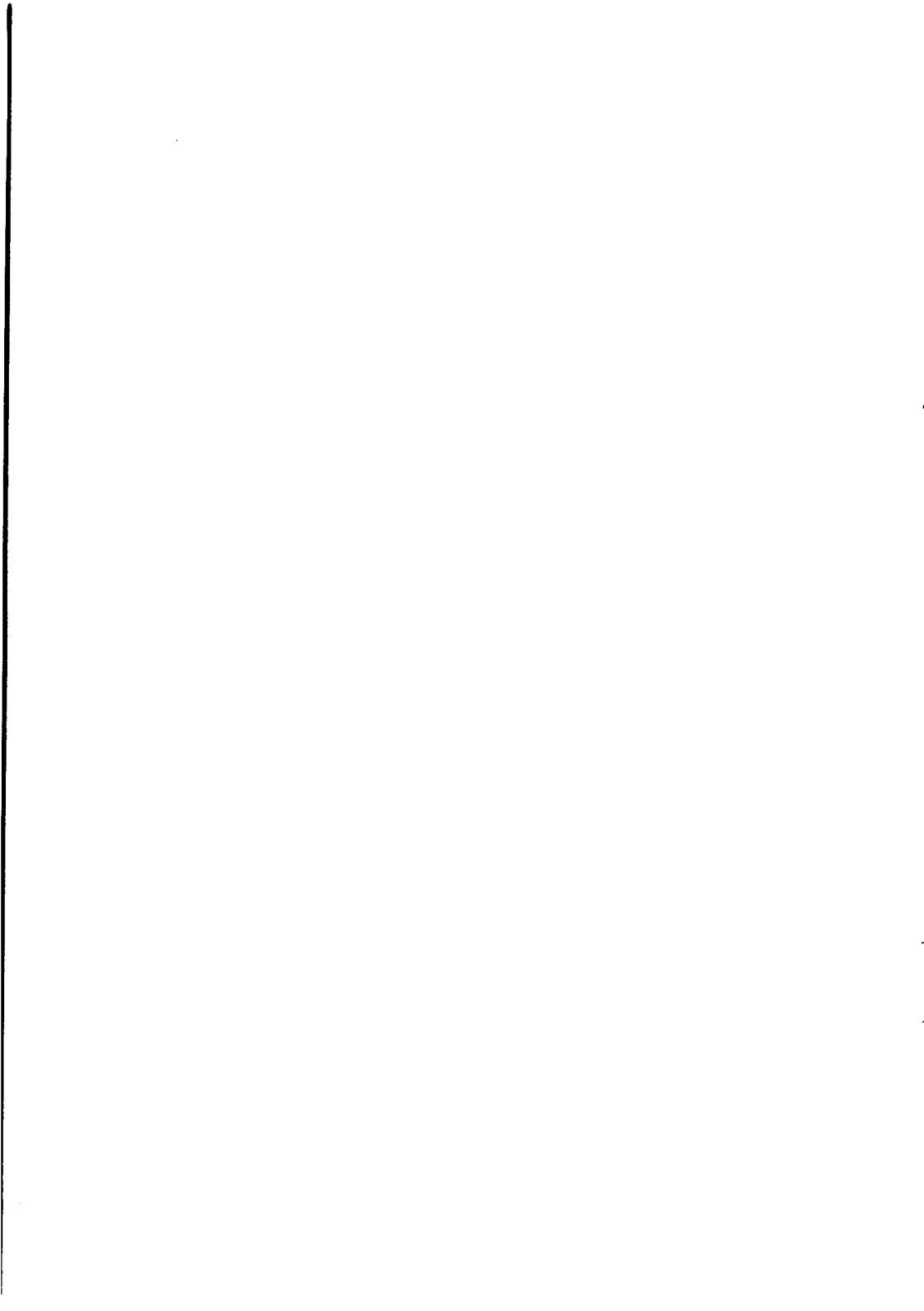
Appendix D

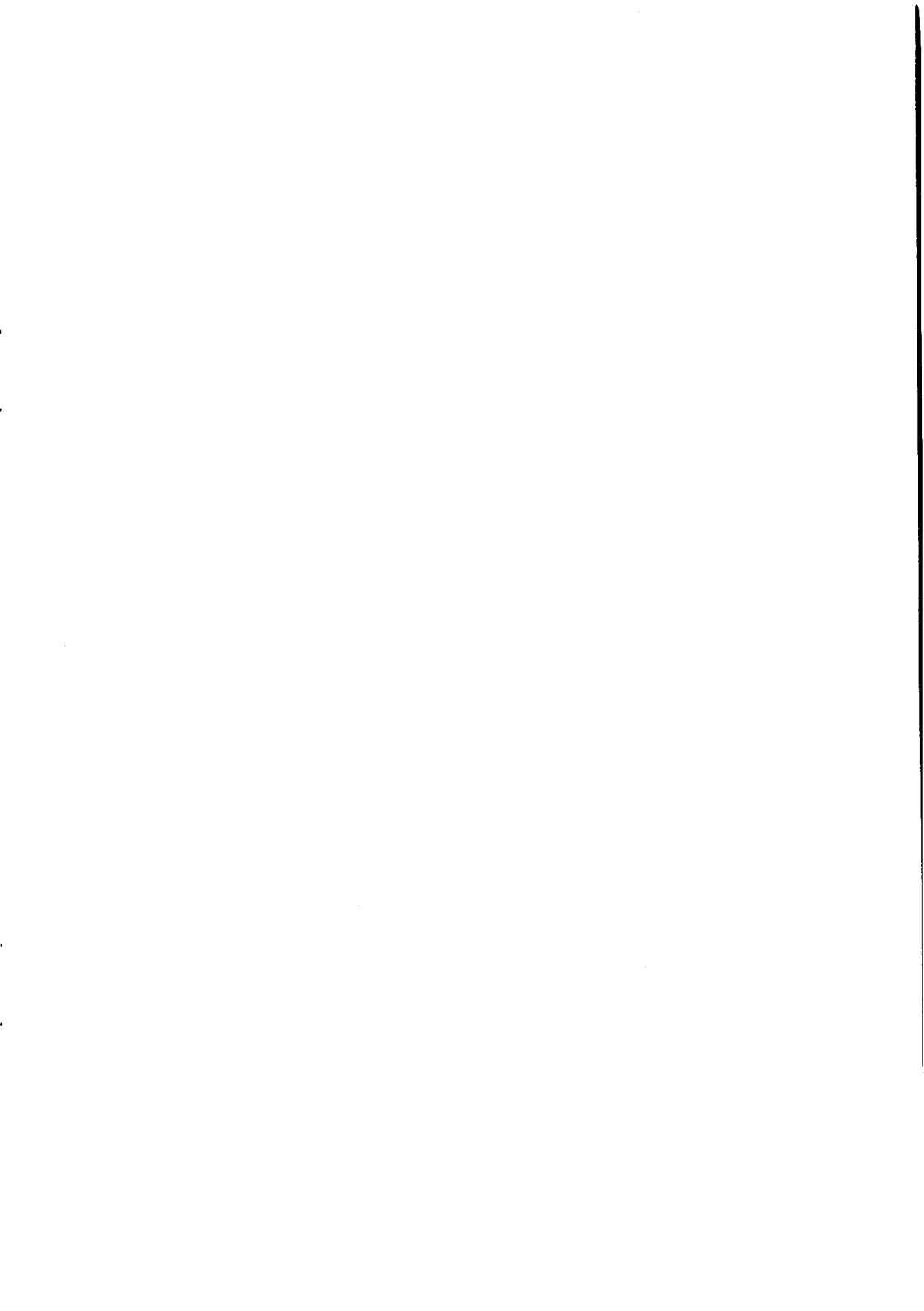
Layout of M209 Mother Board











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