KMA-202F-12R

User's Manual

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INTRODUCTION

The KMA-202F-12R motherboard is compatible with the PC/AT. This means that virtually all the software that is available for the PC/AT can also be run on a system you build around the KMA-202F-12R motherboard.

Moreover, the same keyboard commands used on a PC/AT can also be used on the motherboard. For example, the same <Ctrl> <Alt> <Del> combination of keystrokes that is used for the software reset on the PC/AT may also be used on your KMA-202F-12R based system.

For this reason, the KMA-202F-12R motherboard is the ideal choice for anyone seeking affordable AT-style power.

The clear, well-illustrated instructions in this manual ensure that even if you are a newcomer to the computer world, you will have your system installed and running with the minimum of effort.

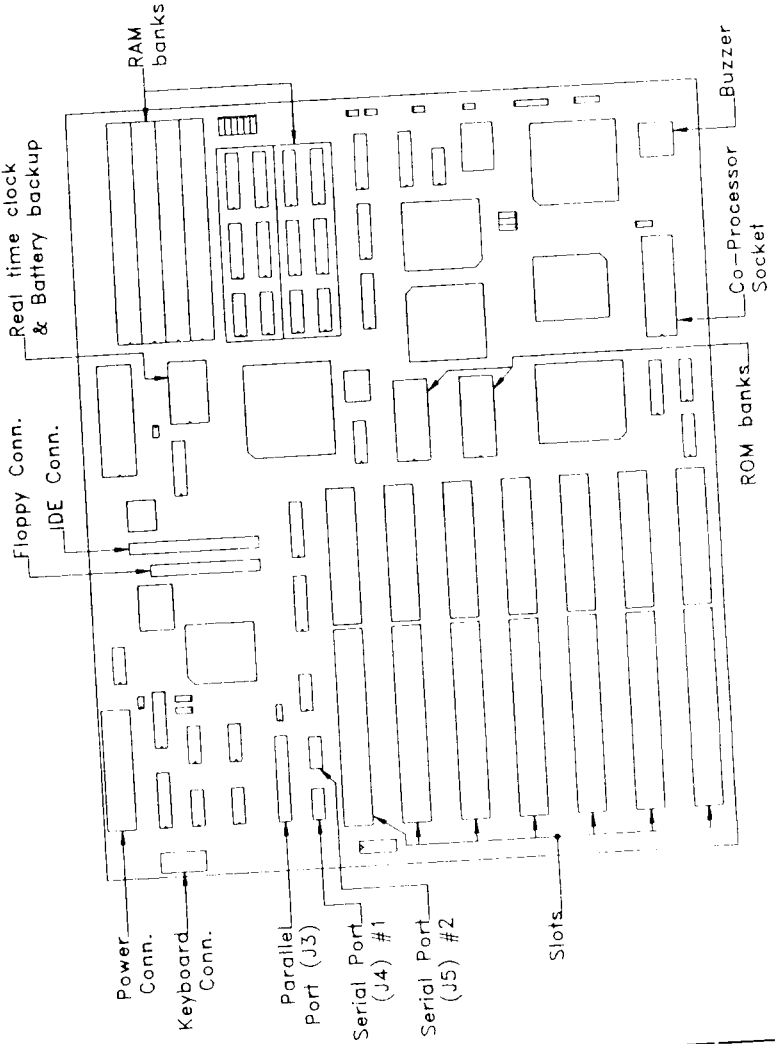
FEATURES

- 80286-12 microprocessor (optional 80287 coprocessor).
- Use of Winbond PC/AT compatible chip set.
- Switchable between 6MHz Normal mode and 12MHz Turbo mode by either a software switch or a hardware switch.
- 6MHz I/O operation to keep compatibility with all existing add-on cards.
- 6MHz Normal mode compatible with IBM PC/AT and 12MHz Turbo mode faster than IBM/AT.
- Two serial ports and one parallel port onboard.
- Onboard battery backup for CMOS configuration table and real-time clock.
- RAM subsystem of 512KB, 1MB, 2MB or 4MB
- RAM configurations of 640/384KB
- 7 expansion slots
- Sixteen-level interrupt
- Three-channel timer for music and time.
- Seven-channel DMA for disk and special I/O
- Four-layer motherboard

- Speed test by Landmark Speed Test Program rev. 0.99 for zero-wait state = 15.5MHz
- Floppy disk control on board
- IDE on board

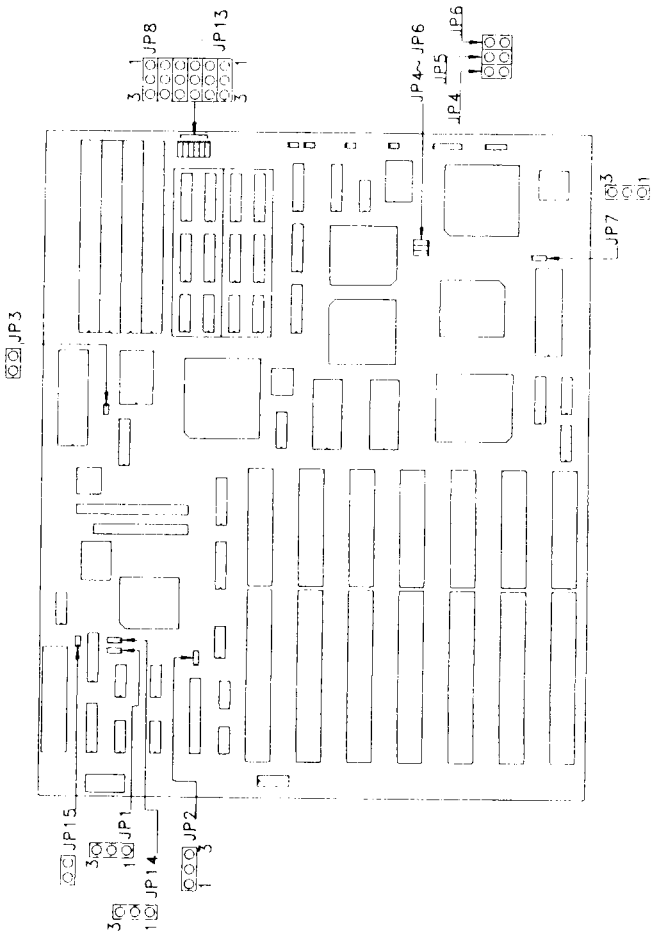
BOARD LAYOUT

The illustration below will familiarize you with the layout of the KMA-202F-12R motherboard and its onboard parts:



INSTALLATION

During the course of this section references will be made to jumper settings used to configure the various functions of the KMA-202F-12R mainboard. The following diagram shows the locations of all the jumpers that may need to be set.



RAM Installation

Three jumpers, JP4, JP5 and JP6 are used to configure RAM size on the motherboard. The two RAM banks can be made to contain from 512KB, up to 1MB by means of setting jumper JP4, JP5 and JP6.

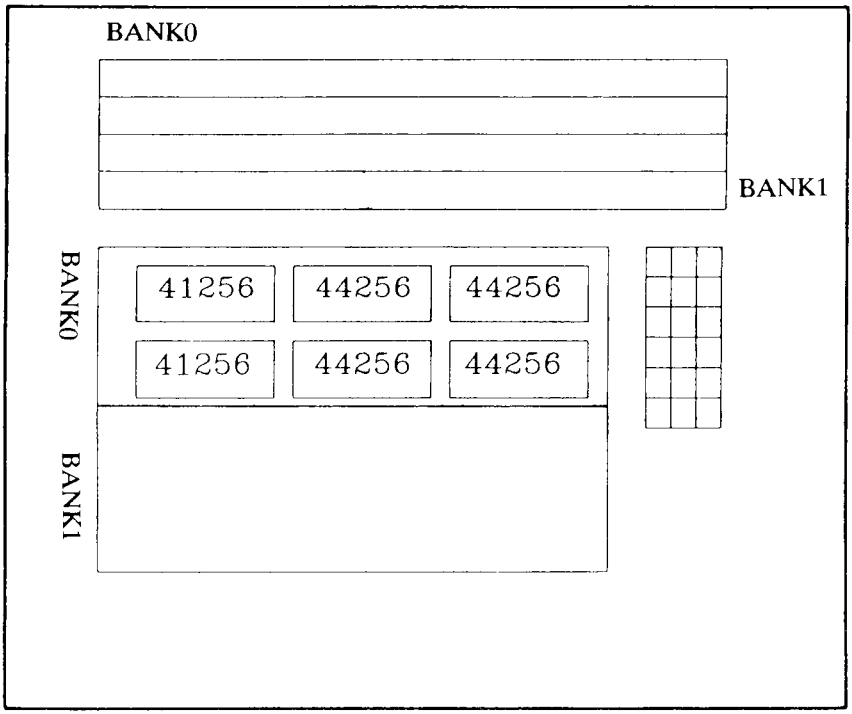
For the location of JP4, JP5 and JP6 refer to the illustration on Page 5.

To select the proper settings of the jumpers for the RAM size that you want, refer to the table below:

JP4	JP5	JP6	Base RAM	EXT. or EMS RAM	Shadow
0	0	0	512K	0	x
0	0	1	640K	384K	x
0	1	0	640K	0	x
0	1	1	640K	256K	128K
1	0	0	640K	1408K	x
1	0	1	640K	3456K	x
1	1	0	640K	1280K	128K
1	1	1	640K	3328K	128K

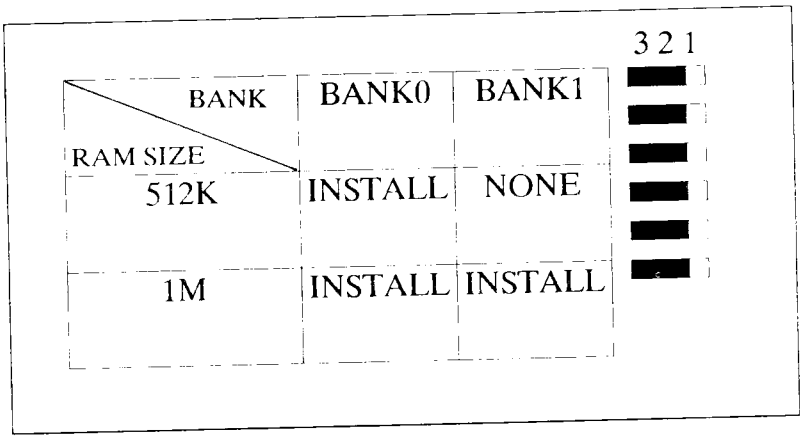
RAM Subsystem

The KMA-202F-12R support different DRAM subsystem as following:



DIP-DRAM

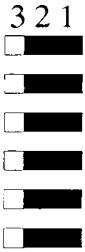
JP8-JP13 should jump over pin 2, 3



SIMM Module

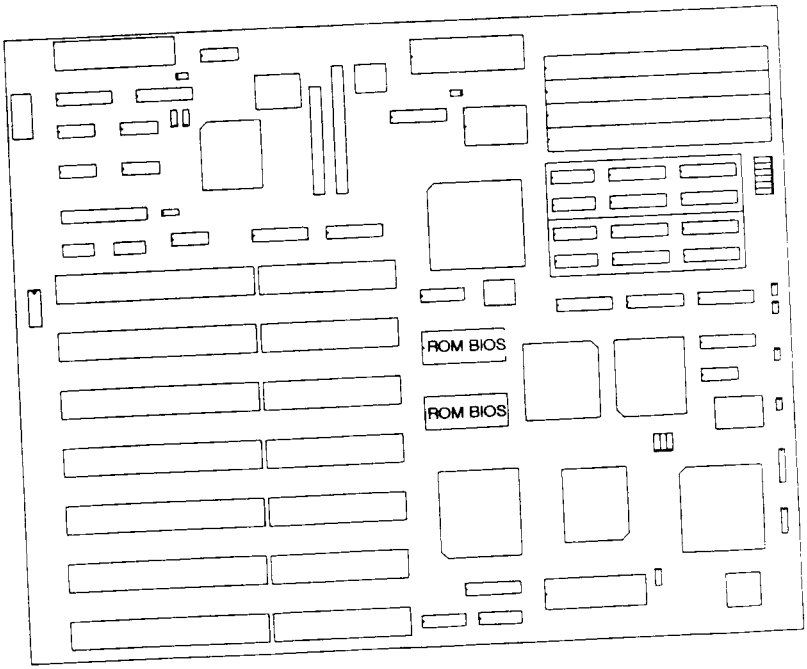
JP8-JP13 should jump over pin 1, 2

BANK / ROM SIZE	BANK0	BANK1
512K	256K * 9	NONE
1M	256K * 9	256K * 9
2M	1M * 9	NONE
4M	1M * 9	1M * 9



ROM Installation

Two 27256 can be installed for the ROM of this system. ROM
BIOS location refers to the illustration below:



Serial/Parallel Port Settings

There are two serial ports and one parallel port on the KMA-202F-12R motherboard. Before actually using these ports, you should set the jumpers JP1 and JP2 correctly. Refer to the illustrations on pages 3 & 4 to find the port connectors and these jumpers.

The following tables indicate the proper settings of these jumpers:

Parallel port (J3) jumper settings

J3	JP1	ADDR.
LPT1	(2, 3)	378
LPT2	Default (1, 2)	278

Serial port 1 (J4) is always enable, encode addr. is 3F8.
Serial port 2 (J5) jumper setting

J5	JP2	ADDR.
COM2	(1, 2) Default	2F8
Disable	(2, 3)	NONE

COMMUNICATIONS

To use a communication line with a modem you must ensur
the asynchronous communications parameters (baud rat
parity, data bits and stop bits) are properly set. This is don
using MS-DOS's MODE command, or GWBASICA's OPE
command. Consult the appropriate manual for details. Th
KMA-202F-12R serial ports are fully compatible with th
parameter ranges specified by the OPEN or MODE com
mands.

RS-232 connectors for serial/parallel ports

To connect a serial device to the serial port #1, it is necessary to use the nine-wire ribbon cable with the ten-pin rectangular connector on one end and the male 25-pin connector on the other. The female connector should be plugged into on the KMA-202F-12R, the male connector should be mounted in an empty expansion slot opening at the rear of the case. It can then be connected to an external serial device via a cable.

Display Adapter Settings

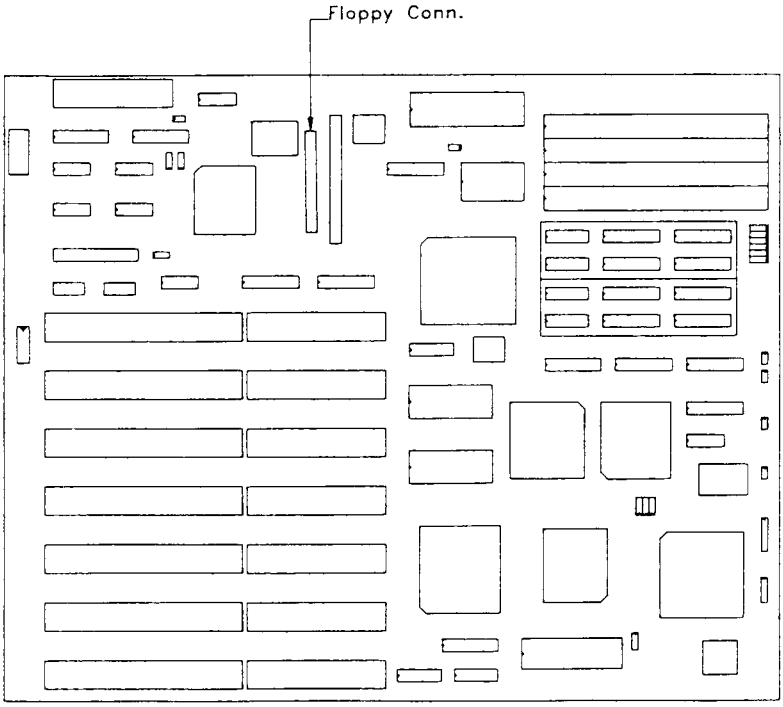
Jumper JP3 is used to select the display adapter. To find jumper JP3 on the motherboard refer to the illustration on page 5.

To configure the motherboard for the bype of display adpater you want, set jumper JP3 according to the table below:

	Jumper Setting
Primary display attached to monochrome display	JP3  OPEN
Primary display attached to color graphics monitor adapter	JP3  SHORT

Floppy Disk Drive Controller

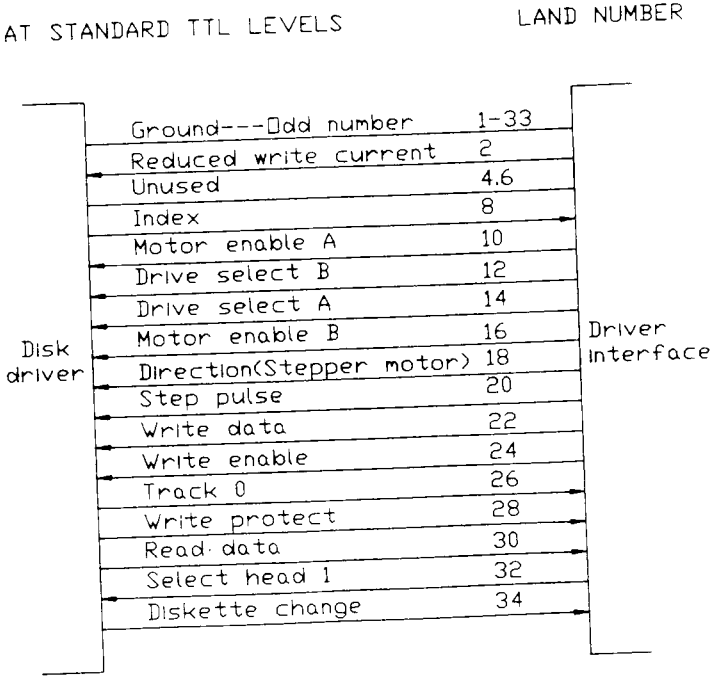
A ribbon cable included with your KMA-202F-12R can be used to connect up to two disk drives to the floppy disk drive controller on the board, each one can be a 360K, 720K, 1.2M or 1.44M floppy disk drive. You can use the JP14, to disable the onboard floppy disk controller. The ribbon cable should be connected to pin connector J13. To locate pin connector J13 and JP14. Please refer to the illustration next page:



JP14	Floppy disk connect
(1, 2) Default	ENABLE
2, 3	DISABLE

Note: the red line on the ribbon cable will be connected to pin 1 on the connector. You should attach the end of the cable that has one connector to the mainbaord and the other end with two connectors to the two disk drives. The inner connector attaches to drive "B" and the one on the end to drive "A".

The pinout for the floppy disk controller port is given in the following fingure



IDE AT Bus Hard Disk Drive Interface

Connector J14 is used to connect a IDE AT bus hard disk drive (HDD) to your KMA-202F-12R, please refer to the figure below for the location of J14.

To enable the IDE AT bus HDD interface on board, please set the JP15 to shourt. If you have a AT hard disk drive with adapter already. You should disable the IDE interface on board by open the JP15 before you install your hard disk adapter to KMA-202F-12R.

Panel Indicators and Switches

How you attach the mainboard to the case of your system unit is largely up to you. This is because the KMA-202F-12R Turbo mainboard can be used in a variety of 80286 type system unit cases.

Your system unit will have all the indicators and switches shown below and preferably even a reset switch, a Turbo hardwares switch and a Turbo LED. If not, you can either install a new panel display or omit some of these items from your system. Your computer dealer offers an accessory which allows you to add the two switches and the LED to your system.

The cables leading from this control panel will be connected to the appropriate pin connectors on the mainboard. Before you attach the mainboard to the case, you should connect these cables to the mainboard.

The pinouts for the keylock pin connector, J26 are given in the following table. Refer to it to connect the keylock cable to the pin connector.

Pin	Assignments
1	LED power
2	Not used
3	Ground
4	Keyboard inhibit
5	Ground

Note that pin 2 is not used and therefore the corresponding socket in the cable connector has no wire lead. The wire for pin 1 can thus easily be identified and the cable connector oriented correctly.

Functions of Panel Indicators and Switches

Now that you have connected the panel indicators and switches, you should understand something about their functions:

Keylock: The keylock is used to enable or disable the keyboard. By disabling the keyboard, the user ensures that anyone who

does not have a key will be unable to use the computer. Unlocking the keylock enables the keyboard. the keylock connecotr is located at J26, as previously noted.

Power LED: The power LED indicates whether the power is on.

Hardware reset: The reset switch restarts the computer from the RAM test stage. If you encounter any problems while using unfamiliar software, you can always restart from the beginning by pressing the restart button. The reset connector is jumper J24.

Turbo LED: The turbo LED indicates operation in Turbo mode. The Turbo LED connector is jumper J23.

Trubo switch: the turbo switch changes operation mode between Turbo and Normal. The turbo switch connector is jumper J25.

Speaker: The speaker connector is located at J27.

The pinouts for the various switch and indicator connectors are given on the following page.

Turbo LED jumper J23 pinouts

Pin	Function
1	Select pin
2	VCC

Speaker jumper J27 pinouts

Pin	Function
1	Data out
2	5 VDC
3	Ground
4	5 VDC

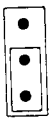
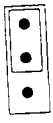
Trubo switch jumper J25 pinouts

Pin	Function
2	Select pin
1	Ground

Math Coprocessor Installation

The math coprocessor located at U47 is optional. When a 80287 coprocessor is installed the BIOS will check its presence automatically. Setting any switch to indicate its presence is unnecessary.

However choosing the appropriate jumper setting JP7 for 80287 is essential:

JP7	Mode
	12MHz Turbo Mode
	6MHz Normal Mode

If you install a coprocessor, be certain that it is the correct one for the clock speed in which you intend to do your processing. consult the vendor from whom you purchase the chip if you are in doubt as to which one to choose.

Power supply

The final step is to attach the power supply cable to the main-board at connector J1. Looking from the top of the case, on the left side of the power supply are some cables. Find the 12-pin plastic connector (the four-pin connectors are for the disk drives and hard disks). The pinout description is on the next page.

The pinouts for the two connectors at J1 are as follows:

Pin	Assignments	Connector
1	Power good	PS8
2	+5 VDC	
3	+12 VDC	
4	-12 VDC	
5	Ground	
6	Ground	
1	Ground	PS9
2	Ground	
3	-5 VDC	
4	+5 VDC	
5	+5 VDC	
6	+5 VDC	

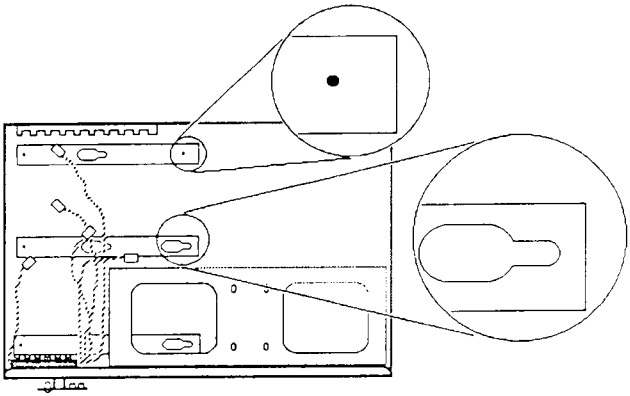
Choosing A Power supply

The power supply provides a "power-good" signal to indicate proper operation of the power supply. The power-good signal is a TTL-compatible high level for normal operation or a low level for fault conditions. If the power-good signal works well, then the system will function properly. Otherwise, the data setting in CMOS RAM will be lost. The following list gives you some guidelines for choosing the right power supply:

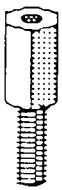
- The power-good signal should have a turn-on delay of at least 200ms, but not longer than 500ms when the power is on (This means that the power-good signal goes to a high level later than +5V).
- The power-good signal goes to a low level at least 100ms before +5V falls below the regulation limits when the power is off.

Fastening Motherboard to Case

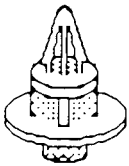
Open the case of your system unit. If it is an empty cas
should look something like the illustration below:



Notice the two types of fastening points circled. The slots
be used with plastic connectors inserted into the motherb
or brass female connectors. Brass female connectors wi
srecwed into the holes in the case. The plastic and brass
nectors are pictured below:



Brass
connector

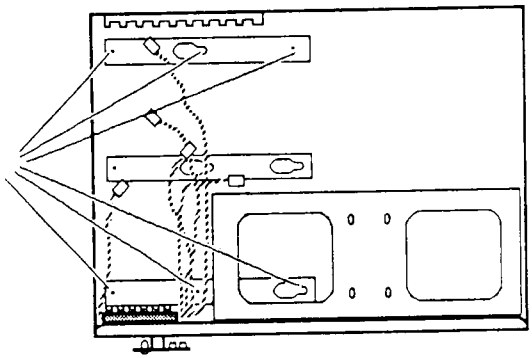


Plastic
connector

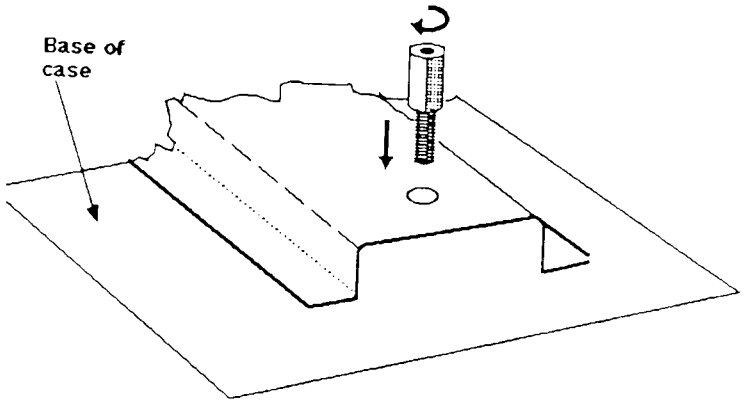
It is recommended that you first attach the female brass connectors to the case to make installation easier. These brass connectors should be screwed into the case at six points, which will ground the motherboard and thereby minimize radio and TV interference.

The six points where you should screw in the brass connectors to the case are pictured below

Fasten these points with brass connectors



Screw the brass connectors into the case as shown below:

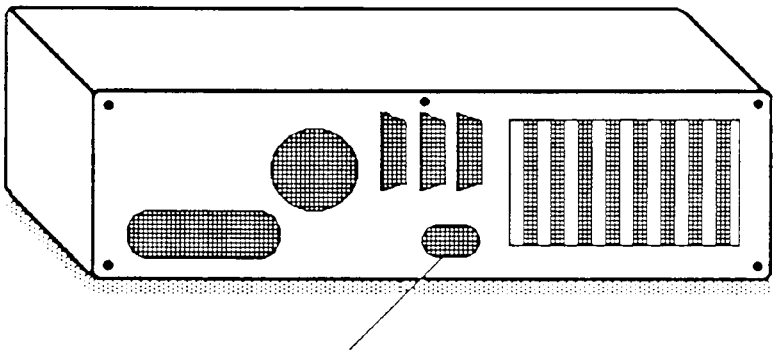


If you wish, insert the plastic connectors into the holes on
motherboard which will be located above the slot-type conn
tors in your case. The pointed ends of the plastic connect
should be on the top side of the motherboard. Note that us
the plastic connecots is optional, but you should use the br
connectors in order to ground the motherboard to your cas

If you have used the plastic connectors in the motherboa
slide them into the slots in the case. Next, fasten the moth
board to the brass connectors with screws. Otherwise, sim
place the motherboard over the brass connectors in the c
and screw the motherboard snugly down to them.

Keyboard Connector

Having fastened the motherboard to the case, it only remains to attach the keyboard. The keyboard connector is located at the back of your system unit. Refer to the illustration below:



Location of keyboard connector from back panel

The pin assignments for keyboard connector J2 are as follo

Pin	Assignments
1	Keyboard clock
2	Keyboard data
3	spare
4	Ground
5	+5 VDC

You have now finished configuring and connecting the ma
board.

OPERATION

The main advantage of the KMA-202F-12R 12MHz zero-wait mini-80286 Turbo mainboard over ordinary PC/AT mainboards is its dual clock system. This innovation makes it possible for your computer to operate at either of two clock speeds 6MHz or 12MHz. In the 12MHz Turbo mode, your computer will operate up to 195% faster than a conventional 80286-based computer

Mode	DRAM Used	Test Value
6 MHz/0 wait	80ns	7.7
12 MHz/0 wait	80ns	15.5

To select the Normal/Turbo options, refer to the following instructions:

Obtaining 12MHz Turbo Mode

This mainboard supports both a software switch and
hardware switch for changes between Normal and Turb
modes.

Setting Default Operation Mode

The Turbo hardware switch, jumper J25 (shown on page 5
gives you the choice of running the KMA-202F-12R in eith
Normal or Turbo mode when the power is on. For defau
operation:

- In Trubo mode ...Place a jumper over J25
- In Normal mode....Take the jumper off J25

Hardware Switch

If you have a hardware switch on your panel, connect it
jumper J25. More information on this is given in the panel
dicators and switches section.

Push the hardware switch on to enter Turbo mode and push it off to enter Normal mode.

Hardware switch off

Hardware switch on

Using the hardware switch means that the only indication of the mode your computer is in will be the Turbo LED. It will turn on in the Turbo mode and turn off in the Normal mode. The cursor will always have the same appearence.

Software Switch

Before using the software switch, pay attention to whether default operation is in Normal or Turbo mode. If it is in Normal mode, do the following: press and hold down the control < Ctrl > and alternate < Alt > keys on the keyboard while you press the plus < + > key. The Turbo LED on your panel, if you have installed one, will light. For more information on the Turbo LED, refer to the panel indicators and switches section. Now the computer is in Turbo mode.

To return to Normal mode, press the < Ctrl > < Alt > < - > you used to enter Turbo mode. When you enter Normal mode, the Turbo LED will turn off.

If default operation is in Turbo mode, that means you alrea
place a jumper over J25 then your system will always runni
at Turbo speed. .

Alternate Use of Both Switches

Both the hardware and the software switches may be used
ternatively, the hardware switch has 1st priority to set syst
into Turbo mode. And software switch only has function wh
hardware switch is setting to Normal mode. When using bo
switches alternatively, the Turbo LED will be the only accura
indicator of the actual mode: the LED will be on in Turbo mo
and off in Normal mode.

Turbo LED and Hardware Switch

Most 80286-type computer cases do not have a Turbo LED
a Trubo hardware switch. However, both of these items a
very useful as you probably can already see. Therefore, it
highly recommended that you install both in your system if y
do not already have them.

For more information, refer to the panel indicators a
switches section.

TECHNICAL INFORMATION

Microprocessor

The 80286 is a high-performance microprocessor with a 16-bit external data path, up to 16 megabytes of directly addressable physical memory and up to one gigabyte of virtual memory space. The operation speed of the 80286 chip is 6MHz in Normal mode and 12MHz in Turbo mode.

The 80286 operates in two modes: protected virtual address and real address.

Virtual address mode

The virtual address mode provides a 1-gigabyte virtual address space mapped onto a 16 megabyte physical address space. Virtual address space is large than physical address space and the use of a virtual address that does not map to a physical address location will cause a restartable interrupt.

This mode uses 32-bit pointers that consist of a 16-bit selector and offset components. The selector specifies an index into a memory-resident table and the 24-bit base address of the desired segment is obtained from the memory table. A 16-bit offset is added to the segment base address to form the physi-

cal address. The microprocessor automatically references the tables whenever a segment register is loaded with a selector. Instructions that load a segment register will refer to the memory-based tables without additional program support. The memory-based tables contain 8-byte values called descriptors.

Real Address Mode

In this mode, physical memory is a contiguous array of up to 1 megabyte. The selector portion of the pointer is interpreted as the upper 16 bits of a 20-bit address and the remaining 4 bits are set to zero. This mode of operation is compatible with the 8088 and the 8086.

Segments in this mode are 64KB in size and may be read, written or executed. An interrupt may occur if data operands or instructions attempt to wrap around the end of a segment. In this mode, the information contained in the segment does not use the full 64KB and the unused end of the segment may be overlayed by another segment to reduce physical memory requirements.

System Timers

The system has three programmable timer/counters. These are channels 0 through 2 defined as follows:

Channel 0	System Timer
GATE 0	Tied on.
CLK IN 0	1.190MHz OSC.
CLK OUT 0	8259A IRQ 0.

Channel 1	Refresh Request Generator
GATE 1	Tied on.
CLK IN 1	1.190MHz OSC.
CLK OUT 1	Request Refresh Cycle.

NOTE: Channel 1 is programmed to generate a 15-microsecond period signal.

Channel 2	Tone Generation for Speaker
GATE 2	Controlled by bit 0 of port hex 61 PPI bit.
CLK IN 2	1.190MHz OSC.
CLK OUT 2	Used to drive the speaker.

The 8254-2 timer/counter is treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters; the fourth is a control register for mode programming.

System Interrupts

Sexteen levels of system interrupts are provided by the 80286 NMI and two 8259A interrupt Controller chips. The following shows the interrupt-level assignments in decreasing priority:

Level	Function
Microprocessor NMI	Parity or I/O channel check
Interrupt controllers	
CTRL 1 CTRL2	
IRQ0	Timer output 0
IRQ1	Keyboard (Output buffer full)
IRQ2	Interrupt from CTRL 2
IRQ8	Realtime clock interrupt
IRQ9	Software redirected to INT 0AH (IRQ2)
IRQ10	Reserved
IRQ11	Reserved
IRQ12	Reserved
IRQ13	Coprocessor
IRQ14	Fixed disk controller
IRQ15	Reserved
IRQ3	Serial port 2
IRQ4	Serial port 1
IRQ5	Parallel port 2
IRQ 6	Diskette controller
IRQ7	Parallel port 1

ROM Subsystem

The ROM subsystem has a 32K by 16-bit arrangement consisting of two 32K by 8-bit ROM/EPROM modules. The odd and even address codes reside in separate modules. The top of the first megabyte and the bottom of the last megabyte address space is assigned to ROM (hex 0F0000 and hex FF0000). Parity checking is not done on ROM.

Direct Memory Access

Eight DMA channels are supported by the system. Two INTEL 8237-5 DMA controller chips (four channels in each chip) are used. DMA channels are assigned as follows:

CTRL 1	CTRL 2
Ch 0 -- Spare	Ch 4 -- Cascade for CTRL1
Ch 1 -- SDLC	Ch 5 -- Spare
Ch 2 -- Diskette	Ch 6 -- Spare
Ch 3 -- Spare	Ch 7 -- Spare

DMA Channels

Channels 0 through 3 are contained in DMA controller 1. Transfers of 8-bit data, 8-bit I/O adapters and 8-bit or 16-bit system memory are supported by these channels. Each of these

channels will transfer data in 64KB blocks throughout the 16-megabyte system address space.

Channels 4 thuough 7 are contained in DMA controller 2. To cascade channels 0 through 3 to the microprocessor, use channel 4. Transfers of 16-bit data between 16-bit adapters and 16-bit system memroy are supported by channels 5, 6 and 7. DMA channels 5 thuough 7 will transfer data in 128KB blocks throughout the 16-megabyte system address space. These channels will not transfer data on odd-byte boundaries.

The addresses for the page register are as follows:

Page Register	I/O Hex Address
DMA channel 0	0087
DMA channel 1	0083
DMA channel 2	0081
DMA channel 3	0082
DMA channel 5	008B
DMA channel 6	0089
DMA channel 7	008A
Refresh	008F

Address generation for the DMA channels is as follows:

For DMA channels 3 through 0

Source	DMA Page Registers	8237A-5
Address	A23-A16	A15-A0

NOTE: To generate the addressing signal "byte high enable" (BHE), invert address line AO.

For DMA channels 7 through 5

Source	DMA Page Registers	8237A-5
Address	A23-A17	A16-A1

NOTE: The BHE and AO addressing signals are forced to a logic 0. DMA channel addresses do not increase or decrease through page boundaries (64KB for channels 0 through 3 and 128KB for channels 5 through 7).

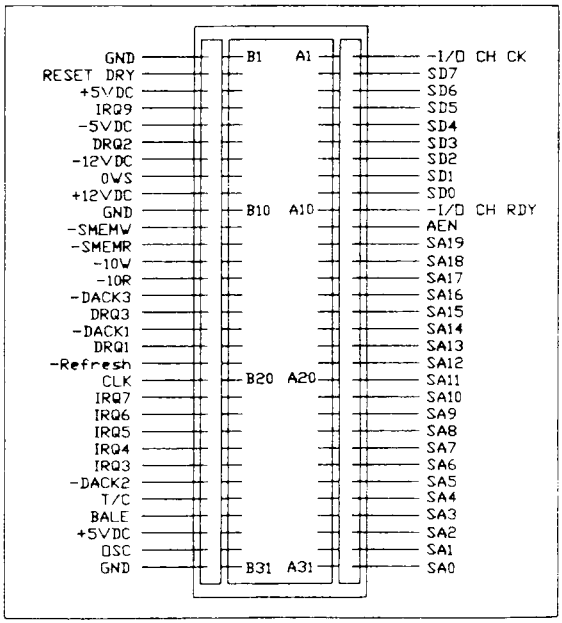
I/O Channel Slots

The I/O channel supports:

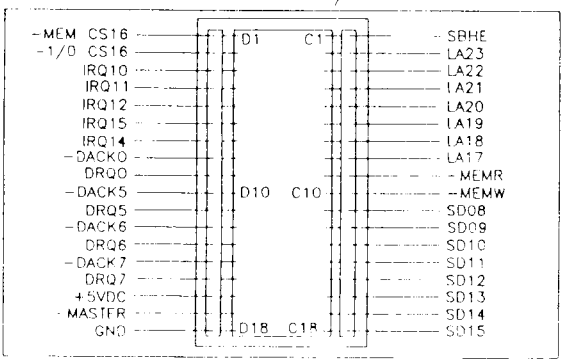
- Refresh of system memory from channel, microprocessors.
- Selection of data accesses (either 8 bit or 16 bit)
- Interrupts
- 24-bit memory addresses (16MB)
- I/O wait-state generation
- I/O address space hex 100 to hex 3FF
- Open-bus structure (allowing multiple microprocessors to share the system's resources, including memory).
- DMA channels

Numbering of the I/O slots is as follows

J1-J8 I/O channels



J10-J14 and J16 I/O channels



Math coprocessor

The math coprocessor funtions as an I/O device through I/O port addresses hex 0F8, 0FA and 0FC. The microprocessor sends OP codes and operands to I/O ports. The microprocessor also receives and stores results through the same I/O ports. The "busy" signal sent by the coprocessor forces the microprocessor to wait until the coprocessor is finished executing.

The following describes the math coprocessor controls:

0F0: The latched math coprocessor busy signal can be cleared with an 8-bit "Out" command to port F0. The coprocessor will latch "busy" if it asserts its error signal. Data output should be zero.

0F1: The math coprocessor will reset if an 8-bit "Out" command is sent to port F1. Again, the data output should be zero.

EMS Support

1. The EMS 4.0 driver is loaded by the CONFIG.SYS at booting time.
2. The EMS 4.0 driver command line has to be like the following:

DEVICE = WINEMM.SYS /Iy /Mz

or

DEVICE = WINEMM.SYS -Iy -Mz

where
I - page register address y: 0 - F (by hexidecimal)

y = *0 --> 208h/209h, 4208h/4209h, 208h/8209h, C208h/C209h
1 --> 218h/219h, 4218h/4219h, 8218h/8219h,C218h/C219h
2 --> 228h/229h, 4228h/4229h, 8228h/8229h, C228h/C229h
3 --> 238h/239h, 4238h/4239h, 8238h/8239h, C238h/C239h
4 --> 248h/249h, 4248h/4249h, 8248h/8249h, C248h/C249h
5 --> 258h/259h, 4258h/4259h, 8258h/8259h, C258h/C259h
6 --> 268h/269h, 4268h/4269h, 8268h/8269h, C268h/C269h
7 --> 278h/279h, 4278h/4279h, 8278h/8279h, C278h/C279h
8 --> 288h/289h, 4288h/4289h, 8288h/8289h, C288h/C289h
9 --> 298h/299h, 4298h/4299h, 8298h/8299h, C298h/C299h
a --> 2A8h/2A9h, 42A8h/42A9h, 82A8h/82A9h, C2A8h/C2A9h
b --> 2B8h/2B9h, 42B8h/42B9h, 82B8h/82B9h, C2B8h/C2B9h
c --> 2C8h/2C9h, 42C8h/42C9h, 82C8h/82C9h, C2C8h/C2C9h
d --> 2D8h/2D9h, 42D8h/42D9h, 82D8h/82D9h, C2D8h/C2D9h
e --> 2E8h/2E9h, 42E8h/42E9h, 82E8h/82E9h, C2E8h/C2E9h
f --> 2F8h/2F9h, 42F8h/42F9h, 82F8h/82F9h, C2F8h/C2F9h

M - base memory address z : 0 - 8 (by decimal)

z = 00 --> C000h, C400h, C800h, CC00h
01 --> C400h, C800h, CC00h, D000h
02 --> C800h, CC00h, D000h, D400h
03 --> CC00h, D000h, D400h, D800h
*04 --> D000h, D400h, D800h, DC00h
05 --> D400h, D800h, DC00h, E000h
06 --> D800h, DC00h, E000h, E400h
07 --> DC00h, E000h, E400h, E800h
08 --> E000h, E400h, E800h, EC00h

The command line parameters can be in either upper or lower case.

If the base memory address conflicts with the SYSTEM ROM address, it must be changed another value.

The parameter with "*" is default