

Chapter 2: Installation

Quick Installation Table

This chapter explains how to successfully install the mainboard into a computer case and build a working system. The installation procedure is as follows:

Quick Jumper Setting Reference	Provides a quick reference for the jumper settings on this mainboard.
Before you Begin	Provides advice on choosing a case, avoiding static electricity damage, and setting jumpers.
Preparing the Mainboard	Provides a guide to the mainboard and I/O port locations, full details on the jumper settings, and advice on installing the mainboard in the system case.
Install Other Hardware	Provides guidance on installing essential hardware: processor, memory, hard disk drive, CD-ROM, floppy disk drive, and expansion cards.
Make the External Connections	Provides advice on using the external I/O ports to install peripheral devices such as a keyboard, a monitor, a mouse, a printer, loudspeakers, and so on.

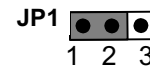
Quick Jumper Setting Reference

If you are familiar with most of the material in this chapter, you can begin preparing the mainboard for installation by using this quick reference to begin setting the jumpers. A detailed description of the jumper setting appears later in this chapter.

JP1: Clear CMOS memory jumper

Use this 3-pin jumper to clear all the current data stored in the CMOS memory.

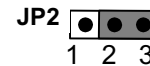
Function	Jumper Cap
Normal operation	Short pins 1-2
Clear CMOS	Short pins 2-3



JP2: Keyboard power on jumper

Use this 3-pin jumper to enable keyboard power on with hot keys or password.

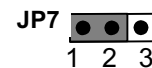
Function	Jumper Cap
Disable keyboard power on	Short pins 1-2
Enable keyboard power on	Short pins 2-3



JP7: Suspend-to-RAM jumper

Use this 3-pin jumper to enable the Suspend-to-RAM function.

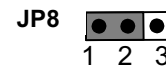
Function	Jumper Cap
Enable Suspend-to-RAM	Short pins 1-2
Disable Suspend-to-RAM	Short pins 2-3



JP8: Flash BIOS jumper

Use this 3-pin jumper to enable or disable Flash BIOS protection. If enabled, the existing BIOS cannot be flashed with another version.

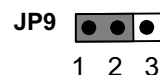
Function	Jumper Cap
Enable Flash BIOS	Short pins 1-2
Disable Flash BIOS	Short pins 2-3



JP9: Set System Bus Frequency to 100 MHz

Use this 3-pin jumper to set the system bus frequency. In the normal setting, the system automatically selects the correct frequency according to the kind of processor installed. In the Force 100 MHz setting, the system uses a 100 MHz system bus even if the processor is designed to operate with a 66 MHz bus.

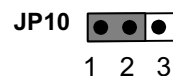
Function	Jumper Cap
Normal operation	Short pins 1-2
Force 100 MHz	Short pins 2-3



JP10: Set System Bus Frequency to 133 MHz

Use this 3-pin jumper to set the system bus frequency. In the normal setting, the system automatically selects the correct frequency according to the kind of processor installed. In the Force 133 MHz setting, the system uses a 133 MHz system bus even if the processor is designed to operate with a 100 MHz bus.

Function	Jumper Cap
Normal operation	Short pins 1-2
Force 133 MHz	Short pins 2-3

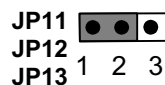


Note: When both JP9 and JP10 have the 2-3 pins shorted, the board is set to force a 66 MHz FSB processor to run on a 133 MHz system bus.

JP11, JP12, JP13: Select Celeron or Joshua Processor for Socket-370

Use these 3-pin jumper sets to select the processor type you are using in the PGA370 processor socket.

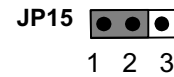
Function	Jumper Cap
Intel Celeron	Short pins 1-2
Cyrix Joshua	Short pins 2-3



JP15: Automatic (BIOS) or Manual configuration

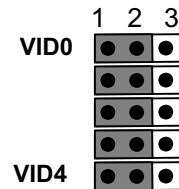
Use this 3-pin jumper to automatically (BIOS) or manually set the CPU core voltage and system bus multiplier ratio. When set to manual configuration, use the VID and BF jumpers to define proper configuration. It is recommended that you set this jumper to automatic configuration.

Function	Jumper Cap
Automatic configuration	Short pins 1-2
Manual configuration	Short pins 2-3



VID: Set CPU core voltage jumpers

Use this 3 x 5-pin jumper set to manually set the CPU core voltage. See later in this chapter for information on the core voltage setting required for the processor that you have installed.



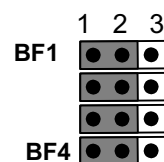
Volt.	Pin Settings				
	VID0	VID1	VID2	VID3	VID4
Auto*	1-2	1-2	1-2	1-2	1-2
2.05V	2-3	2-3	2-3	2-3	2-3
2.00V	All open	2-3	2-3	2-3	2-3
1.95V	2-3	All open	2-3	2-3	2-3
1.90V	All open	All open	2-3	2-3	2-3
1.85V	2-3	2-3	All open	2-3	2-3
1.80V	All open	2-3	All open	2-3	2-3
1.75V	2-3	All open	All open	2-3	2-3
1.70V	All open	All open	All open	2-3	2-3
1.65V	2-3	2-3	2-3	All open	2-3
1.60V	All open	2-3	2-3	All open	2-3
1.55V	2-3	All open	2-3	All open	2-3
1.50V	All open	All open	2-3	All open	2-3
1.45V	2-3	2-3	All open	All open	2-3
1.40V	All open	2-3	All open	All open	2-3
1.35V	2-3	All open	All open	All open	2-3
1.30V	All open	All open	All open	All open	2-3
3.5V	2-3	2-3	2-3	2-3	All open
3.4V	All open	2-3	2-3	2-3	All open
3.3V	2-3	All open	2-3	2-3	All open
3.2V	All open	All open	2-3	2-3	All open
3.1V	2-3	2-3	All open	2-3	All open
3.0V	All open	2-3	All open	2-3	All open
2.9V	2-3	All open	All open	2-3	All open

Volt.	Pin Settings				
	VID0	VID1	VID2	VID3	VID4
2.8V	All open	All open	All open	2-3	All open
2.7V	2-3	2-3	2-3	All open	All open
2.6V	All open	2-3	2-3	All open	All open
2.5V	2-3	All open	2-3	All open	All open
2.4V	All open	All open	2-3	All open	All open
2.3V	2-3	2-3	All open	All open	All open
2.2V	All open	2-3	All open	All open	All open
2.1V	2-3	All open	All open	All open	All open

*Auto: When all 1-2 pins are shorted, the core voltage will automatically be determined.

BF: Set system bus multiplier ratio jumpers

Use this 3 x 4-pin jumper set to manually set the system bus multiplier ratio. See later in this chapter for information on the system bus multiplier ratio setting required for the processor that you have installed.



Ratio	Pin Settings			
	BF1	BF2	BF3	BF4
Auto*	1-2	1-2	1-2	1-2
2	2-3	2-3	2-3	2-3
4	2-3	All open	2-3	2-3
3	2-3	2-3	All open	2-3
5	2-3	All open	All open	2-3
2.5	2-3	2-3	2-3	All open
4.5	2-3	All open	2-3	All open
3.5	2-3	2-3	All open	All open
5.5	2-3	All open	All open	All open
6	All open	2-3	2-3	2-3
8	All open	All open	2-3	2-3
7	All open	2-3	All open	2-3
Res.	All open	All open	All open	2-3
6.5	All open	2-3	2-3	All open
1.5	All open	All open	2-3	2-3
7.5	All open	2-3	All open	All open
2	All open	All open	All open	All open

*Auto: When all 1-2 pins are shorted, the system bus multiplier ratio will automatically be determined.

Before You Begin

Before you begin to install your P6VAP-A+ mainboard, take some precautions to ensure that you avoid the possibility of damage to the product from static electricity. Ensure too that you are installing the mainboard into a suitable case.

Static Electricity

In adverse conditions, static electricity can accumulate and discharge through the integrated circuits and silicon chips on this product. These circuits and chips are sensitive and can be permanently damaged by static discharge.

- ◆ If possible wear a grounding wrist strap clipped to a safely grounded device during the installation.
- ◆ If you don't have a wrist strap, discharge any static by touching the metal case of a safely grounded device before beginning the installation.
- ◆ Leave all components inside their static-proof bags until they are required for the installation procedure.
- ◆ Handle all circuit boards and electronic components carefully. Hold boards by the edges only. Do not flex or stress circuit boards.

Choosing a Case

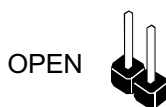
This is a full-sized ATX mainboard that measures 304mm x 200mm (11.9" x 7.8"). It has 6 expansion slots. The mainboard will fit most ATX cases that are designed for full-sized ATX mainboards. With a full set of expansion slots and support for 4 IDE devices, you might like to choose a case that has a robust power supply unit that delivers at least 250 watts.

Some features on the mainboard are implemented by cabling connectors on the board to indicators and switches on the system case. Ensure that your case supports all the features required. The P6VAP-A+ mainboard can support one or two floppy diskette drives and four enhanced IDE drives. Ensure that your case has sufficient power and space for all the drives that you intend to install.

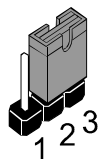
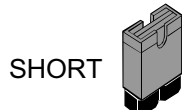
The mainboard has a set of I/O ports on the rear edge. Ensure that your case has an I/O template that supports the I/O ports and expansion slots.

How to Set Jumpers

A jumper consists of two or more pins mounted on the mainboard. Some jumpers might be arranged in a series with each pair of pins numbered differently. Jumpers are used to change the electronic circuits on the mainboard. When a jumper cap is placed on two jumper pins, the pins are **SHORT**. If the jumper cap is removed (or placed on just a single pin) the pins are **OPEN**.

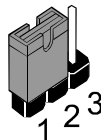


This illustration shows a 2-pin jumper. When the jumper cap is placed on both pins, the jumper is **SHORT**. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is **OPEN**.



This illustration shows a 3-pin jumper. The jumper cap is placed on pins 2 and 3, so this jumper setting is **SHORT PINS 2-3**.

This illustration shows the same 3-pin jumper. The jumper cap is placed on pins 1 and 2, so this jumper setting is **SHORT PINS 1-2**.

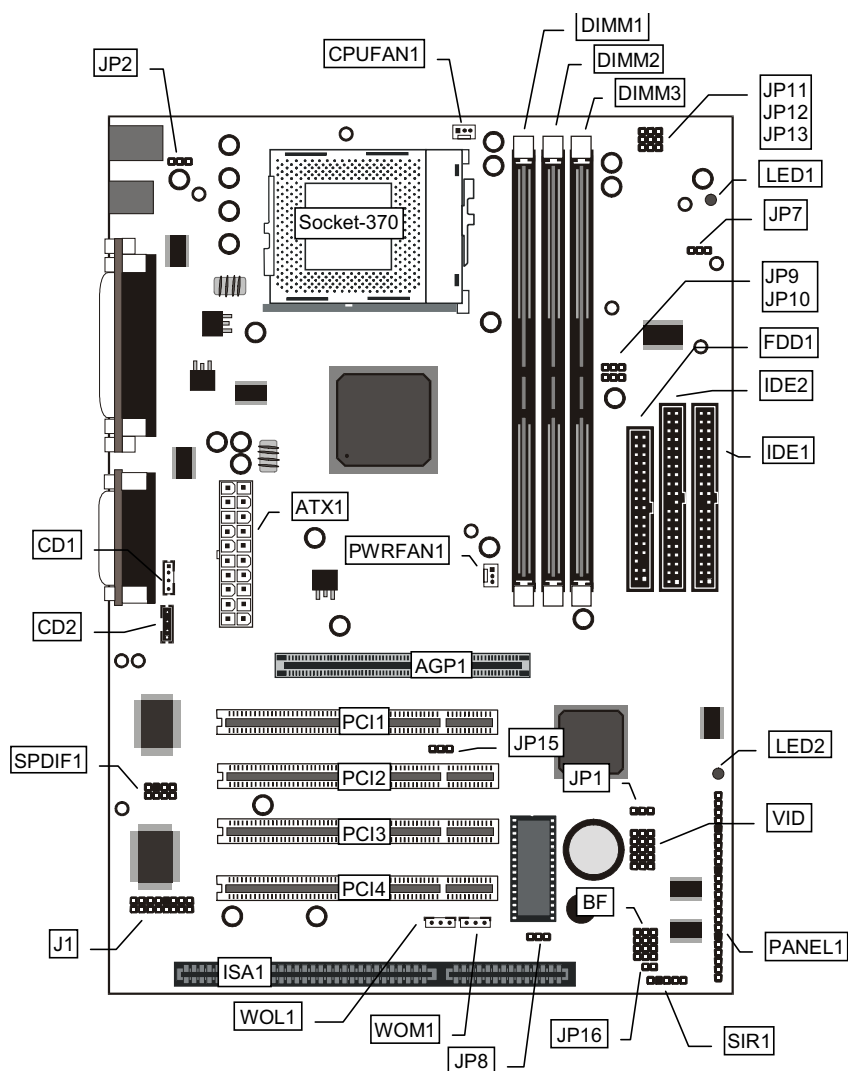


In this manual, all the jumper illustrations clearly show the pin numbers. When you are setting the jumpers, make sure that the jumper caps are placed on the correct pins to select the function or feature that you want to enable or disable.

Preparing the Mainboard

Mainboard Guide

Use the following illustration and key to identify the components on your mainboard.



Key to Mainboard Components

Component	Description
SOCKET-370	Socket for Intel FC-PGA Celeron or Cyrix Joshua processor
DIMM1, 2, 3	Slots for 168-pin memory modules
IDE1, 2	Primary and secondary IDE channels
FDD1	Connector for floppy disk drives
AGP1	Slot for AGP graphics adapter
PCI 1, 2, 3, 4	3 x 32-bit PCI expansion slot
ISA1	8/16-bit ISA expansion slot
ATX1	Connector for ATX power supply
CPUFAN1	Power connector for CPU cooling fan
PWRFAN1	Power connector for case cooling fan
SIR1	Connector for optional IR port
PANEL1	Panel connector for switches and indicators
CD1	Audio connector for optional CD-ROM drive
CD2	Auxiliary audio connector for optional CD-ROM drive
SPDIF1	In/Out connector for 24-bit digital audio
WOL1	Wake up connector for network adapter
WOM1	Wake up connector for fax/modem card
JP1	Clear CMOS memory jumper
JP2	Keyboard power on jumper
JP7	Enable Suspend-to-RAM jumper
JP8	Enable Flash BIOS jumper
JP9	Set system bus frequency jumper (100MHz)
JP10	Set system bus frequency jumper (133MHz)
JP11	
JP12	Set CPU type for Socket-370 jumper.
JP13	
JP15	Automatic (BIOS)/manual CPU core voltage and multiplier ratio configuration jumper
JP16	Connector for two-color LED
J1	Connector for fax/modem adapter card
VID	Set CPU core voltage jumpers
BF	Set CPU multiplier ratio jumpers
LED1*	Onboard 3VSB LED for SDRAM
LED2**	Onboard Power LED

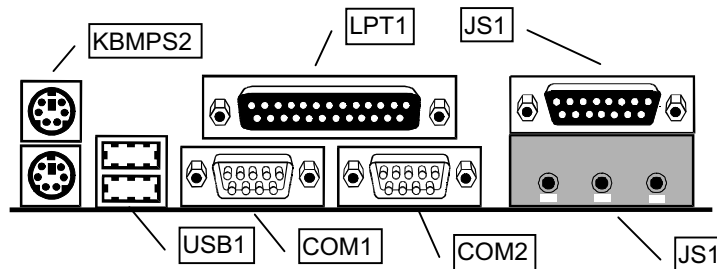
***LED1**

This red indicator turns on if your system is suspended to RAM. In a suspend to RAM, the system turns off most of the power-consuming components except for the 3.3V required to refresh the memory. If LED1 is turned on, it warns you that the computer is still active and you should not carry out any work on the mainboard.

****LED2**

This green indicator turns on whenever the system is turned on. It warns you that the system is active and you should not carry out any work on the mainboard.

I/O Ports Side View

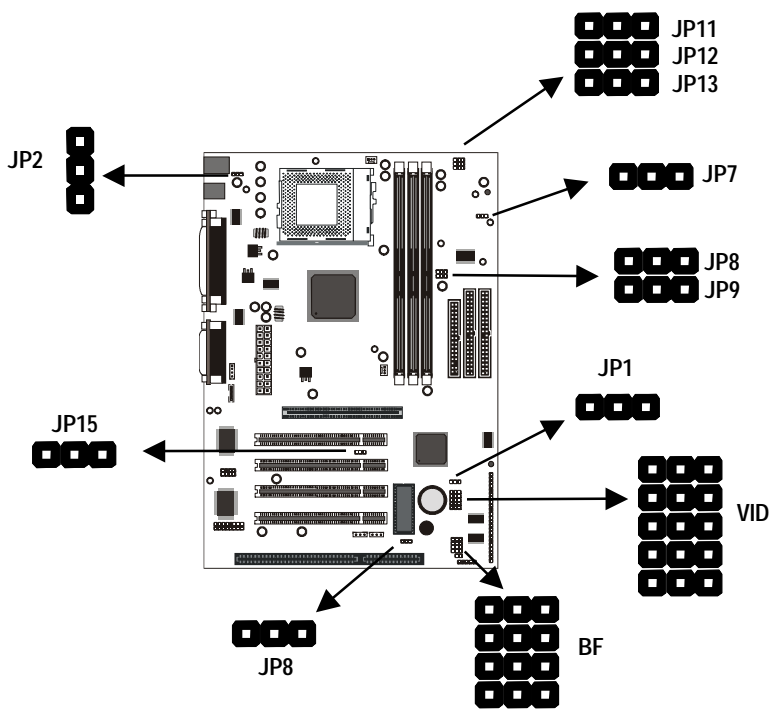


Key to I/O Ports

Component	Description
KBMPS2	PS/2 port for pointing device (upper port) PS/2 port for keyboard (lower port)
LPT1	External parallel port
JS1 (Upper)	External game/MIDI port
JS1 (Lower)	Audio jacks for (left to right) line out, line in, microphone
COM2	External serial port 2/4
COM1	External serial port 1/3
USB1	Two stacked Universal Serial Bus ports

Check the Jumper Settings

Check all the mainboard jumpers to ensure that the board is configured correctly.



JP1: Clear CMOS Memory Jumper

This jumper lets you erase the system setup settings that are stored in CMOS memory. You might need to erase this data if incorrect settings are preventing your system from operating. To clear the CMOS memory, turn off the system, disconnect the power cable from the mainboard, and short the appropriate pins for a few seconds.

JP1

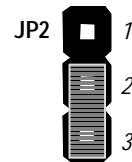
1 2 3

Function	Jumper Cap
Normal Operation	Short pins 1-2
Clear CMOS	Short pins 2-3

JP2: Keyboard Power On Jumper

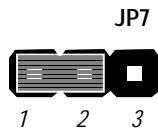
This jumper lets you use a typed-in password as a power switch to turn your system on. If you enable this property, you need to define the password or the hot keys using the setup utility. See Chapter 3 for more information.

Function	Jumper Cap
Disable keyboard power on	Short pins 1-2
Enable keyboard power on	Short pins 2-3



JP7: Suspend-to-RAM Jumper

Use this 3-pin jumper to enable the Suspend-to-RAM feature. In a Suspend-to-RAM condition, the contents of the system's memory is held intact, while practically all other components are turned off completely or slowed down to reduce power consumption.

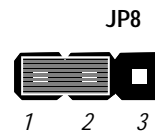


Function	Jumper Cap
Enable Suspend-to-RAM	Short pins 1-2
Disable Suspend-to-RAM	Short pins 2-3

JP8: Flash BIOS jumper

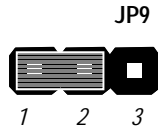
Use this 3-pin jumper to enable or disable Flash BIOS protection. If enabled, the existing BIOS cannot be flashed with another version.

Function	Jumper Cap
Enable Flash BIOS	Short pins 1-2
Disable Flash BIOS	Short pins 2-3



JP9: Set System Bus Frequency to 100MHz

Use this 3-pin jumper to set the system bus frequency. In the normal setting, the system automatically selects the correct frequency according to the kind of processor installed. In the Force 100 MHz setting, the system uses a 100 MHz system bus even if the processor is designed to operate with a 66 MHz bus.

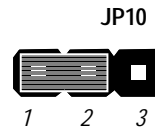


Function	Jumper Cap
Normal Operation	Short pins 1-2
Force 100 MHz	Short pins 2-3

JP10: Set System Bus Frequency to 133MHz

Use this 3-pin jumper to set the system bus frequency. In the normal setting, the system automatically selects the correct frequency according to the kind of processor installed. In the Force 133 MHz setting, the system uses a 133 MHz system bus even if the processor is designed to operate with a 100 MHz bus.

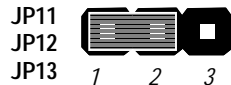
Function	Jumper Cap
Normal Operation	Short pins 1-2
Force 133 MHz	Short pins 2-3



Note: When both JP9 and JP10 have the 2-3 pins shorted, the board is set to force a 66 MHz FSB processor to run on a 133 MHz system bus.

JP11, JP12 and JP13: Select Celeron or Joshua Processor for Socket-370

Use these 3-pin jumper sets to select the processor type you are using in the PGA370 processor socket. If pins 1-2 are shorted, the Socket-370 is set for use with the Intel Celeron processor. If pins 2-3 are shorted, the Socket-370 is set for use with the Cyrix Joshua processor.

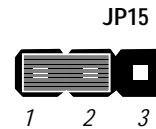


Function	Jumper Cap
Intel Celeron	Short pins 1-2
Cyrix Joshua	Short pins 2-3

JP15: Automatic (BIOS) or Manual configuration

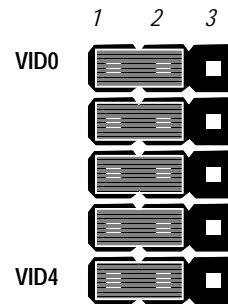
Use this 3-pin jumper to automatically (BIOS) or manually set the CPU core voltage and system bus multiplier ratio. When set to manual configuration, use the VID and BF jumpers to define proper configuration. It is recommended that you set this jumper to automatic configuration.

Function	Jumper Cap
Automatic configuration	Short pins 1-2
Manual configuration	Short pins 2-3



VID: Set CPU core voltage jumpers

Use this 3 x 5-pin jumper set to manually set the CPU core voltage. Check the documentation that comes with the processor that you want to use, to check the required voltage settings.

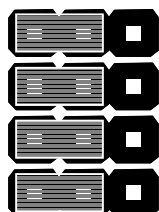


Volt.	Pin Settings				
	VID0	VID1	VID2	VID3	VID4
Auto*	1-2	1-2	1-2	1-2	1-2
2.05V	2-3	2-3	2-3	2-3	2-3
2.00V	All open	2-3	2-3	2-3	2-3
1.95V	2-3	All open	2-3	2-3	2-3
1.90V	All open	All open	2-3	2-3	2-3
1.85V	2-3	2-3	All open	2-3	2-3
1.80V	All open	2-3	All open	2-3	2-3
1.75V	2-3	All open	All open	2-3	2-3
1.70V	All open	All open	All open	2-3	2-3
1.65V	2-3	2-3	2-3	All open	2-3
1.60V	All open	2-3	2-3	All open	2-3
1.55V	2-3	All open	2-3	All open	2-3
1.50V	All open	All open	2-3	All open	2-3
1.45V	2-3	2-3	All open	All open	2-3
1.40V	All open	2-3	All open	All open	2-3
1.35V	2-3	All open	All open	All open	2-3
1.30V	All open	All open	All open	All open	2-3
3.5V	2-3	2-3	2-3	2-3	All open
3.4V	All open	2-3	2-3	2-3	All open
3.3V	2-3	All open	2-3	2-3	All open
3.2V	All open	All open	2-3	2-3	All open

Volt.	Pin Settings				
	VID0	VID1	VID2	VID3	VID4
3.1V	2-3	2-3	All open	2-3	All open
3.0V	All open	2-3	All open	2-3	All open
2.9V	2-3	All open	All open	2-3	All open
2.8V	All open	All open	All open	2-3	All open
2.7V	2-3	2-3	2-3	All open	All open
2.6V	All open	2-3	2-3	All open	All open
2.5V	2-3	All open	2-3	All open	All open
2.4V	All open	All open	2-3	All open	All open
2.3V	2-3	2-3	All open	All open	All open
2.2V	All open	2-3	All open	All open	All open
2.1V	2-3	All open	All open	All open	All open

*Auto: When all 1-2 pins are shorted, the core voltage will automatically be determined.

BF: Set system bus multiplier ratio jumpers



Use this 3 x 4-pin jumper set to manually set the system bus multiplier ratio. The CPU clock speed is configured by the product of the system bus frequency times the multiplier. For example, if you have a system bus speed of 100 MHz and a multiplier of 4, the CPU clock speed will be $100 \times 4 = 400$ MHz.

Ratio	Pin Settings			
	BF1	BF2	BF3	BF4
Auto*	1-2	1-2	1-2	1-2
2	2-3	2-3	2-3	2-3
4	2-3	All open	2-3	2-3
3	2-3	2-3	All open	2-3
5	2-3	All open	All open	2-3
2.5	2-3	2-3	2-3	All open
4.5	2-3	All open	2-3	All open
3.5	2-3	2-3	All open	All open
5.5	2-3	All open	All open	All open
6	All open	2-3	2-3	2-3
8	All open	All open	2-3	2-3
7	All open	2-3	All open	2-3
Res.	All open	All open	All open	2-3
6.5	All open	2-3	2-3	All open
1.5	All open	All open	2-3	2-3

Ratio	Pin Settings			
	BF1	BF2	BF3	BF4
7.5	All open	2-3	All open	All open
2	All open	All open	All open	All open

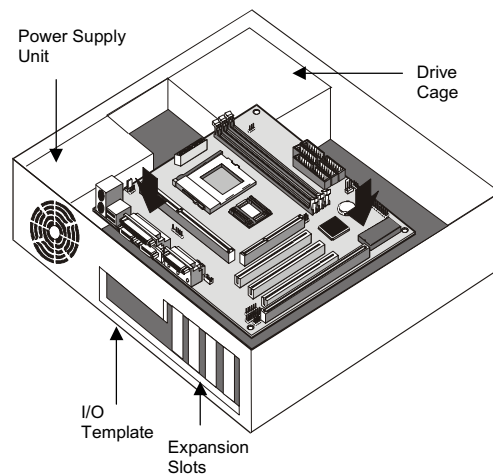
*Auto: When all 1-2 pins are shorted, the system bus multiplier ratio will automatically be determined.

Install the Mainboard in the Case

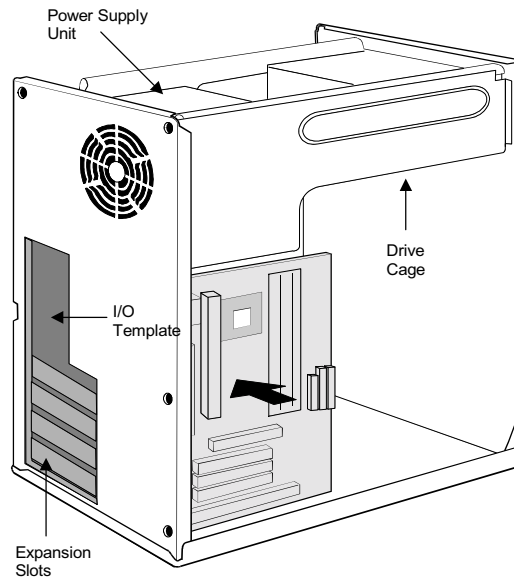
The mainboard is drilled with a series of holes. Most system cases have mounting brackets installed in the case which correspond to the holes in the mainboard. You can secure the mainboard in the system case by placing the mainboard over the mounting brackets and driving screws through the mainboard into the mounting brackets.

Note: Do not overtighten the screws as this can stress the mainboard.

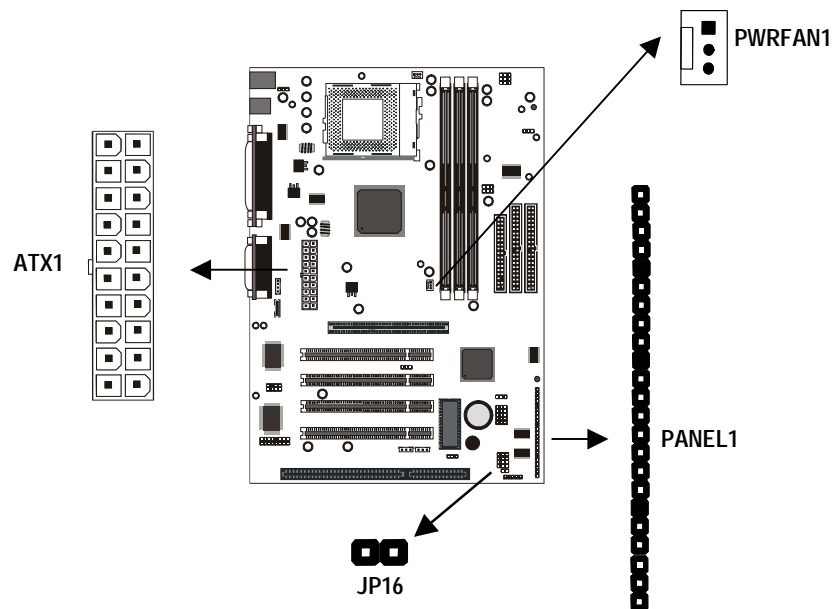
The illustration below shows the mainboard installing in a standard desktop case.



The illustration below shows the mainboard installing into a tower-type case.



Connecting Power, Chassis Fan, and Panel



After you have installed the mainboard into the system case, connect the power cable from the case power supply unit to the mainboard power connector ATX1. Connect the chassis (if your case has them) to the 12V power supply connector PWRFAN1 on the mainboard. Then connect the case switches and indicators to the PANEL1 and JP16 connector on the mainboard.

Power Connector

Locate the power cable from the case power supply unit and plug it into the ATX1 power connector.

Chassis Fan

If your case has a cooling fan installed, plug the cable from the fan into the mainboard fan power supply PWRFAN1.

Green LED Connector

If your case has a dual color indicator lamp for the ACPI Green suspend mode, connect the cable from the indicator to the JP16 dual color LED connector.

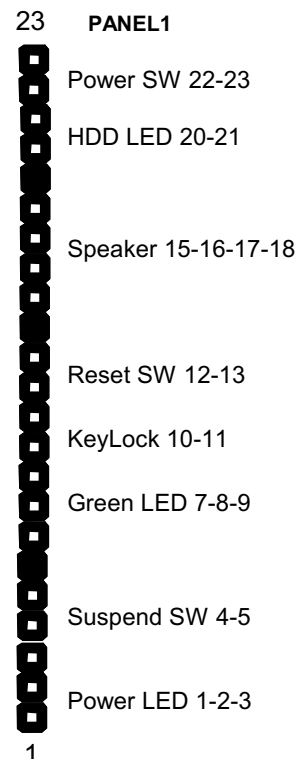
Panel Connector

The mainboard PANEL1 connector has a standard set of switch and indicator connectors that are commonly found on ATX system cases. Use the illustration below to make the correct connections to the case switches and indicators.

Function	Pins
Power Indicator	1+, 2+, 3
Suspend Switch	4, 5
Green LED*	7+, 8+, 9
Keylock	10, 11
Reset Switch	12, 13
Speaker	15+, 16, 17, 18
HDD Indicator	20+, 21
Power Switch	22+, 23

***Green LED**

“Green LED” can support two kinds of LED: When using Single-color LED, connect to pins 7 and 8. When using Dual-color LED, connect to pins 8 and 9.



Install Other Hardware

Start installing the essential hardware required to get your system started.

Install the Processor

This mainboard has a Socket-370 processor socket. To choose a processor, you need to consider the performance requirements of the system and also the price of the processor. Performance is based on the processor design, the clock speed and system bus frequency of the processor, and the quantity of internal cache memory and external cache memory. Higher clock speeds and larger amounts of cache memory deliver greater performance.

About Socket-370 Processors

The socket-370 supports PGA Intel Celeron and Cyrix Joshua processors, and FC-PGA Intel Coppermine processors.

Intel Celeron

PGA stands for Plastic Pin Grid Array. This is a description of the square plastic package that the processor is embedded in. The PGA Celeron is identical to the SEPP Celeron, except for the external packaging. PGA Celerons run at clock speeds from 300 MHz through to 533 MHz. All the current PGA Celerons operate over a 66 MHz system bus. The PGA Celeron is less expensive than a SEPP Celeron with the same clock speed.

Cyrix Joshua

The new Cyrix Joshua processor also fits into the Socket-370. The Joshua will include a 256K on-chip L2 cache, which runs at full processor speed. It is the first non-Intel chip to plug into the same socket as a Celeron. Cyrix Joshua processors run over a 100 or 133 MHz system bus.

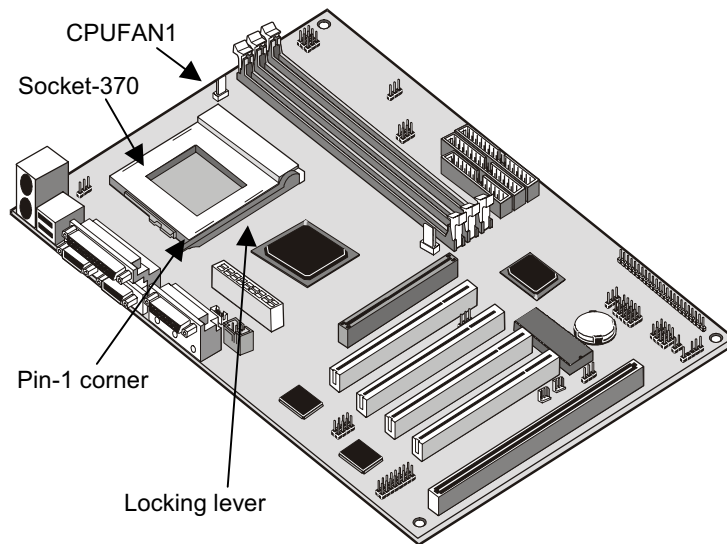
Intel Coppermine

The Intel Coppermine processor runs over a 66, 100 or 133 MHz system bus. The FC-PGA Coppermine ships with clock speeds running from 500 MHz through to 750 MHz.

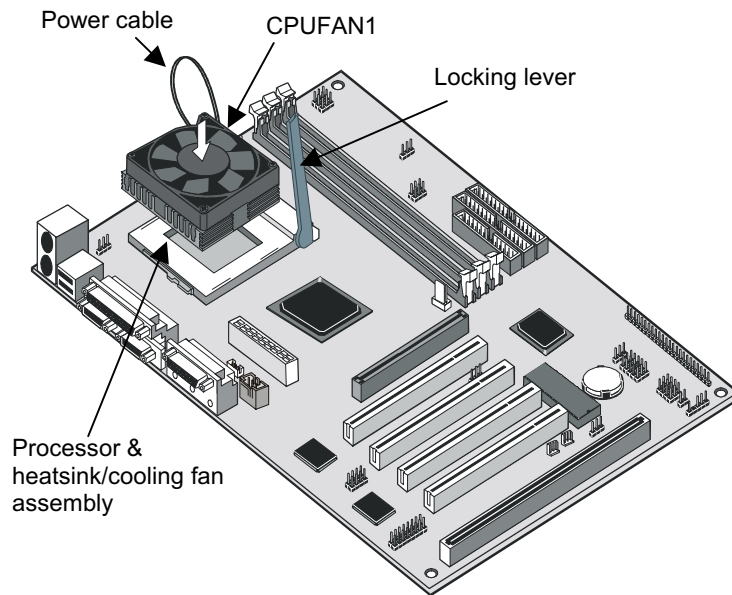
Installing a Socket-370 Processor

If you have decided to install the mainboard with a FC-PGA Celeron processor, follow the steps below.

Locate the Socket-370 and CPUFAN1



1. On the mainboard, locate the socket-370 and CPUFAN1.
2. On the socket-370, pull the locking lever away from the socket to unhook it and then raise the locking lever to the upright position.
3. Identify the pin-1 corner on the socket-370 and the pin-1 corner on the processor. The socket pin-1 corner is adjacent to the handle of the locking lever. The processor pin-1 corner is beveled.
4. Matching the pin-1 corners, drop the processor into the socket. No force is required and the processor should seat into the socket easily.
5. Swing the locking lever down and hook it under the latch on the edge of the socket. This locks the processor in place.
6. Locate the power cable on the heatsink/cooling fan assembly that is attached to the top of the processor.
7. Plug the power cable into the CPUFAN1 power supply on the mainboard.



The mainboard must be configured to deliver the correct clock speed and the correct system bus for the kind of processor that you have installed. You can do this by either using the system setup utility, or manually, by setting the correct jumper settings on the board.

The first time you start the system, immediately enter the setup system and make the appropriate settings. Usually, you should automatically configure the CPU by using the BIOS Features page of the setup utility. See Chapter 3 for more information.

However, you have the possibility to manually set the system bus speed, multiplier ratio, and CPU voltage. Remember that the CPU clock speed is configured by the product of the system bus frequency times the multiplier. For example, if you have a system bus speed of 100 MHz and a multiplier of 4, the CPU clock speed will be $100 \times 4 = 400$ MHz.

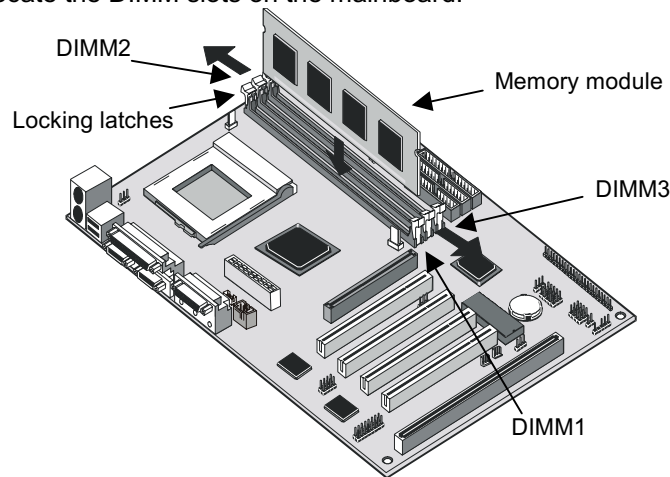
Note: When using the Cyrix Joshua processor, make sure to adjust jumpers JP11, JP12 and JP13 to the proper settings.

Install the Memory Modules

For this mainboard, you must use 168-pin 3.3V non-buffered Dual In-line Memory Modules (DIMMs). The memory chips must be standard or registered SDRAM (Synchronous Dynamic Random Access Memory). The memory bus can run at 100 MHz or 133 MHz. If your processor operates over a 133 MHz system bus, you must install PC-133 memory that also operates over a 133 MHz bus. If your processor operates over a 100 MHz system bus, you must install PC-100 memory that also operates over a 100 MHz bus.

You must install at least one memory module. You can install the module in any one of the three DIMM slots. Each module may be installed with up to 256 MB of memory so the maximum capacity is 768 MB. The mainboard supports memory chips that have EC (Error Correction) or ECC (Error Correction Code).

1. Locate the DIMM slots on the mainboard.



2. The DIMM slots are keyed with notches and the DIMMs are keyed with cut-outs so that they can only be installed correctly. Check that the cut-outs on the module edge connector match the notches in the slot.
3. Push the latches on each side of the DIMM slot down.
4. Install the DIMM module into the slot and press it carefully but firmly down so that it seats correctly. The latches at either side of the slot will be levered upwards and latch on to the edges of the DIMM when it is installed correctly.

Install a Hard Disk Drive and CD-ROM

This section describes how to install IDE devices such as a hard disk drive and a CD-ROM drive.

Note: *Ribbon cable connectors are usually keyed so that they can only be installed correctly on the device connector. If the connector is not keyed make sure that you match the pin-1 side of the cable connector with the pin-1 side of the device connector. Each connector has the pin-1 side clearly marked. The pin-1 side of each ribbon cable is always marked with a red stripe on the cable.*

About IDE Devices.

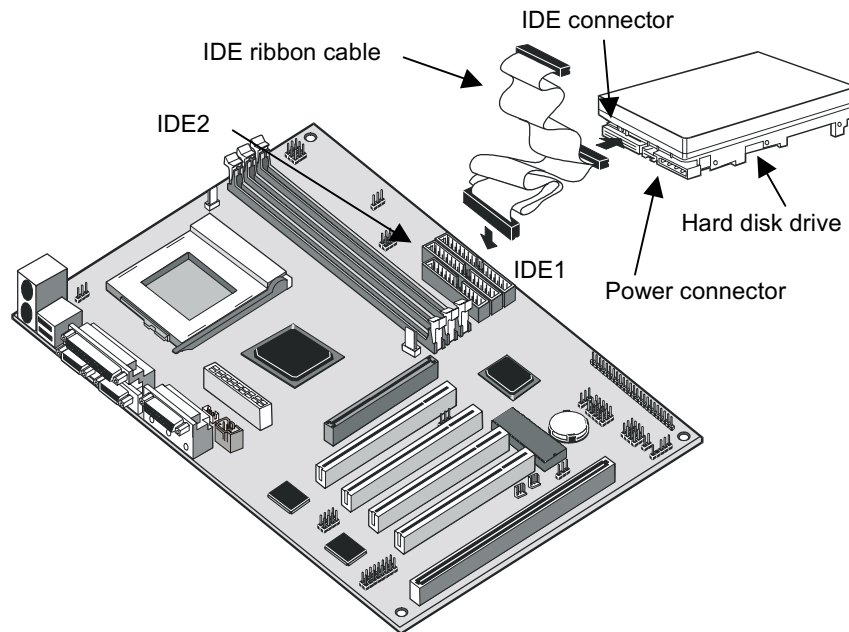
Your mainboard has a primary IDE channel interface (IDE1) and a secondary IDE interface (IDE2). The mainboard ships with one IDE ribbon cable which supports one or two IDE devices. All IDE devices have jumpers or switches which can be used to set the IDE device as MASTER or SLAVE.

If you install two IDE devices on one cable, you must make sure that one device is set to MASTER and the other device is set to SLAVE. The documentation of your IDE device explains how to do this.

If you want to install more than two IDE devices, obtain a second IDE cable and you can add two more devices to the secondary IDE channel. If there are two devices on the cable, make one MASTER and one SLAVE.

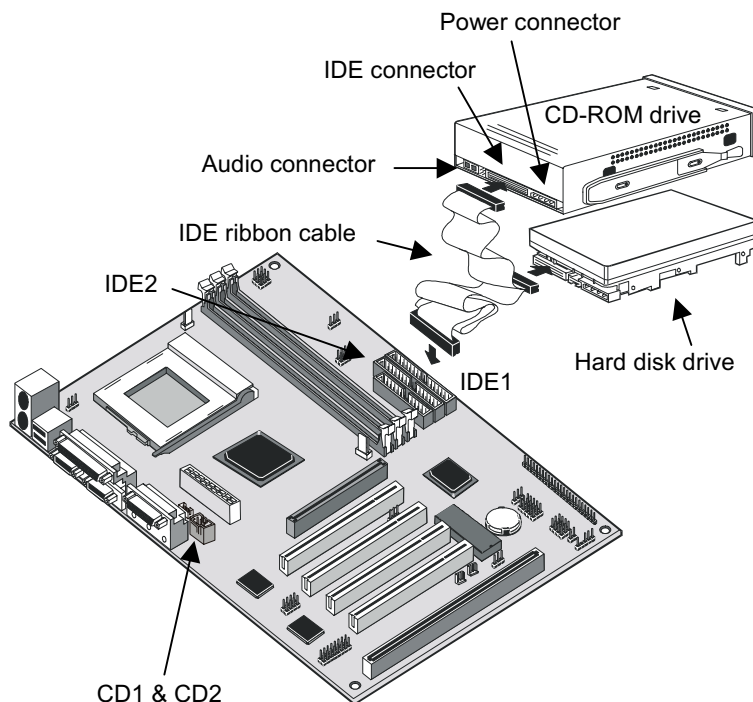
Installing a Hard Disk Drive

1. Install the hard disk drive into the drive cage in your system case.
2. Plug the IDE cable into the primary IDE channel on the mainboard IDE1.
3. Plug one of the connectors on the IDE cable into the IDE connector on the back edge of the hard disk drive. It doesn't matter which connector on the cable that you use. Make sure that you have the pin-1 side of the cable matched with the pin-1 side of the connector.
4. Plug a power cable from the case power supply unit into the power connector on the back edge of the hard disk drive.
5. When you first start up your system, go immediately to the setup utility and use the IDE Hard Disk Auto Detect feature to configure the IDE devices that you have installed. See Chapter three for more information.



Installing a CD-ROM Drive

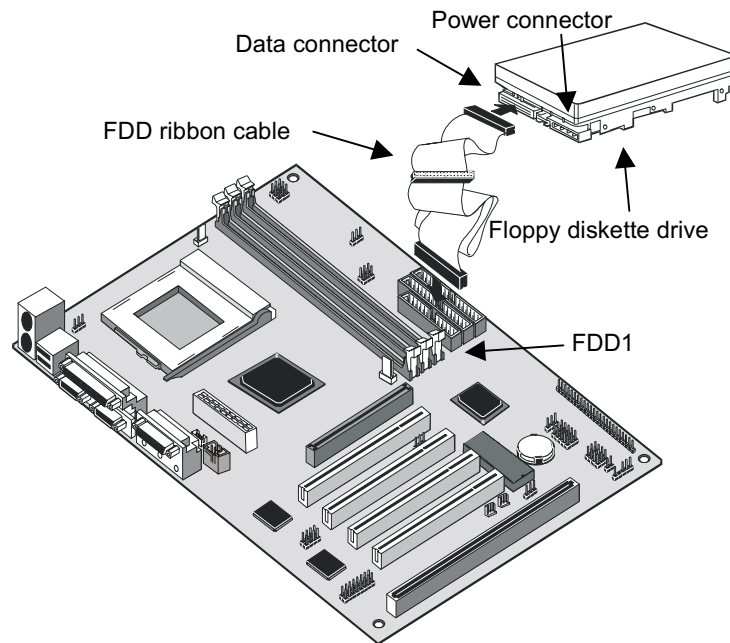
1. Install the CD-ROM drive into the drive cage in your system case.
2. Plug the IDE cable into the primary IDE channel on the mainboard IDE1.
3. Plug one of the connectors on the IDE cable into the IDE connector on the back edge of the CD-ROM drive. It doesn't matter which connector on the cable that you use. Make sure that you have the pin-1 side of the cable matched with the pin-1 side of the connector.
4. Plug a power cable from the case power supply unit into the power connector on the back edge of the CD-ROM drive.
5. Use the audio cable provided with the CD-ROM drive to connect the audio connector on the rear edge of the CD-ROM drive to the one of the two CD connectors on the motherboard.
6. When you first start up your system, go immediately to the setup utility and use the IDE Hard Disk Auto Detect feature to configure the IDE devices that you have installed. See Chapter three for more information.



Installing a Floppy Diskette Drive

The mainboard has a floppy diskette drive interface and it ships with a diskette drive ribbon cable that supports one or two floppy diskette drives. You can install a 5.25" drive or a 3.5" drive with various capacities. The floppy diskette drive cable has one type of connector for a 5.25" drive and another type of connector for a 3.5" drive.

1. Install the floppy diskette drive into the drive cage in your system case.
2. Plug the diskette drive cable into the diskette drive interface on the mainboard FDD1.
3. Plug one of the connectors on the diskette drive cable into the data connector on the back edge of the floppy diskette drive. Make sure that you have the pin-1 side of the cable matched with the pin-1 side of the connector.
4. Plug a power cable from the case power supply unit into the power connector on the back edge of the diskette drive.



5. When you first start up your system, go immediately to the setup utility and use the Standard page to configure the floppy diskette drives that you have installed. See Chapter three for more information.

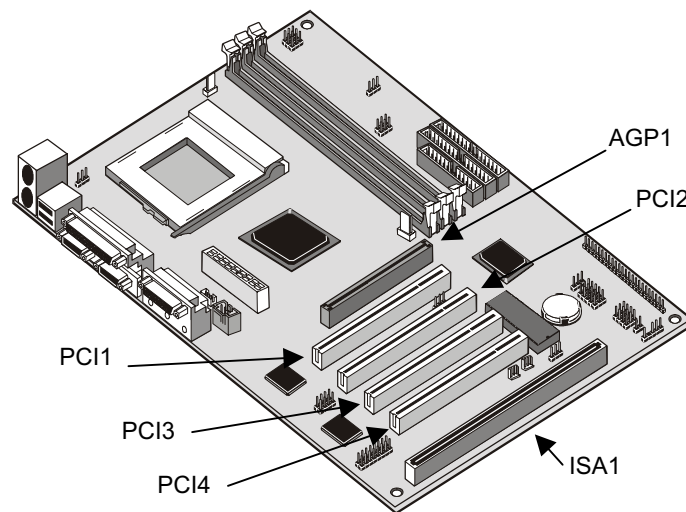
Using the Expansion Slots

This mainboard has several expansion slots. You can install add-in cards into these slots to add new features to your system. In order to get your system started, you must install an add-in graphics adapter. The mainboard has three kinds of expansion slots.

AGP Slot: The AGP slot can be used to install a graphics adapter that has the AGP (Accelerated Graphics Port) interface.

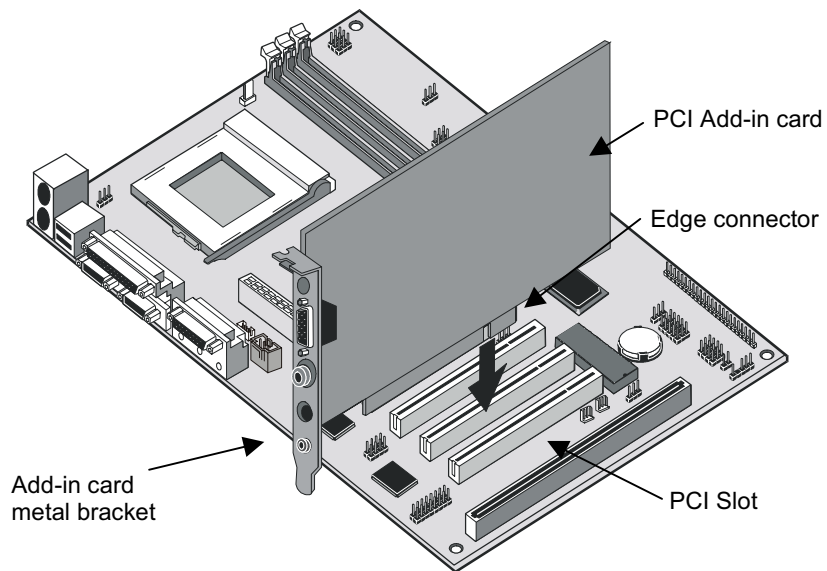
PCI Slots: The PCI slots can be used to install add-in cards that have the 32-bit PCI (Peripheral Components Interconnect) interface.

ISA Slot: The ISA slot can be used to install add-in cards that have the legacy 8/16-bit ISA (Industry Standard Architecture) interface.



1. Before installing an expansion card, check the documentation for the card carefully. If the card is not Plug and Play, you may have to manually configure the card before installation.
2. Select which expansion slot you are going to use for your add-in card.
3. In the system case, remove the blanking plate from the slot in the system case that corresponds to the expansion slot that you are going to use.

4. Position the edge connector of the add-in card over the expansion slot. Position the metal bracket of the card in the empty slot in the system case.
5. Install the edge connector of the add-in card into the expansion slot. Press down quite firmly so that you are sure that the edge connector is correctly seated in the slot.
6. Secure the metal bracket of the card in the empty slot in the system case with a screw.
7. For some add-in cards, for example graphics adapters and network adapters, you have to install drivers and software before you can begin using the add-in card.



Add-in Card Options

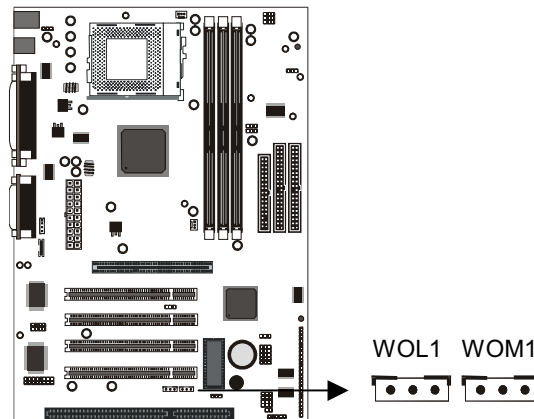
The mainboard has some features that can be used by some types of add-in cards.

WOL1: Wake on LAN

If you have installed a network adapter (LAN adapter), you can use the cable provided with the card to plug into the WOL1 connector on the mainboard. This is the Wake On LAN feature. When your system is in a power-saving mode, any traffic through the network will automatically resume the system. You must enable this item using the Power Management page of the setup utility. See Chapter three for more information.

WOM1: Wake on Modem

If you have installed a fax/modem add-in card, you can use the cable provided with the card to plug into the WOM1 connector on the mainboard. This is the Wake On Modem feature. When your system is in a power-saving mode, an incoming call will automatically resume the system. You must enable this item using the Power Management page of the setup utility. See Chapter three for more information.



Install Options and Extension Brackets

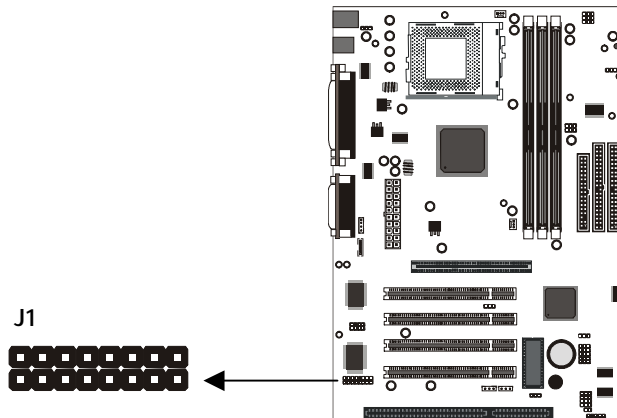
This mainboard has a number of special connectors that allow you to add optional features to your system. You can install any of the following items:

- ◆ Fax/modem card option
- ◆ Infrared port
- ◆ 24-bit digital audio extension bracket (SPDIF)

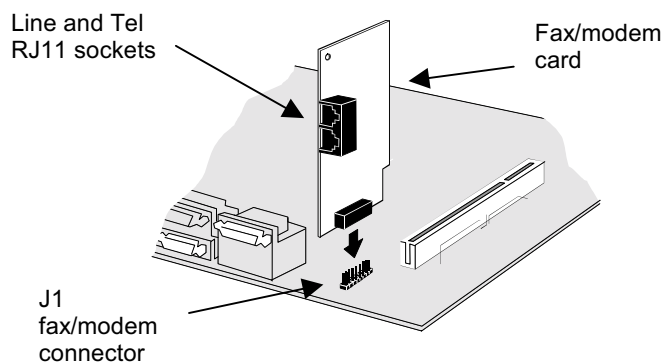
Fax/modem Card

You must install the fax/modem card in order to use the built-in fax/modem. The fax/modem card is an optional item supplied with this mainboard.

1. Locate the J1 fax/modem connector on the mainboard.



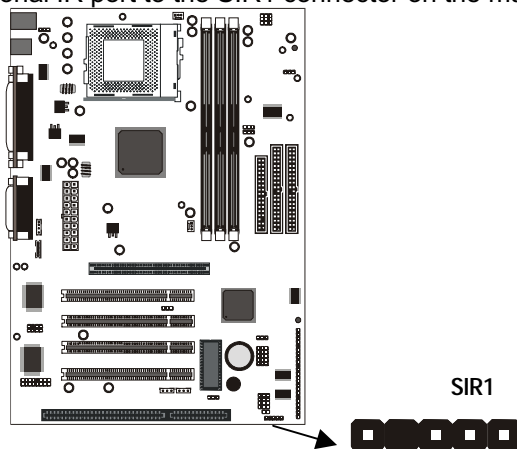
2. Remove the expansion slot blanking plate from the system chassis that is adjacent to the fax/modem connector.
3. Install the fax/modem card on to the J1 connector as shown below. The RJ11 Line and Telephone sockets on the bracket are positioned in the expansion slot with the removed blanking plate.



Infrared Port

This option can be purchased from third-party vendors.

1. If you are installing an optional serial infrared port, connect the cable from the optional IR port to the SIR1 connector on the mainboard.



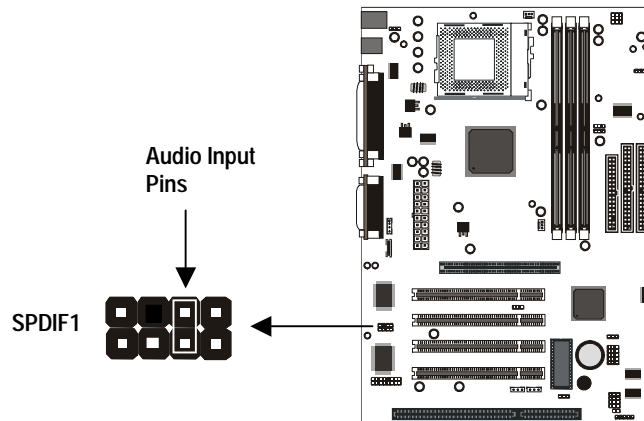
2. After you have connected the cable, secure the optional IR port to the appropriate place on your system case.

Note: An IR port may use some of the resources required by a second serial port or a fax/modem card. If you have more than one of these items installed, you may not be able to use them at the same time. You can use the *Peripherals* page of the setup utility to switch resources between an IR port and a second serial port. See Chapter 3 for more information.

Digital Audio Extension Bracket

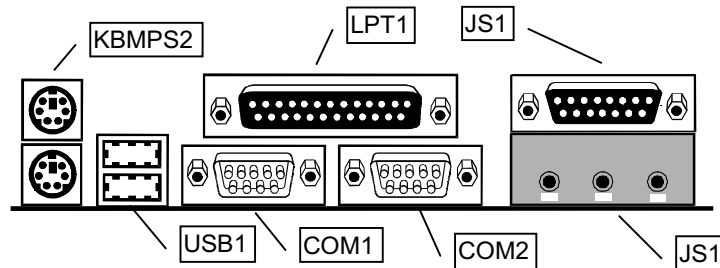
You can purchase an optional 24-bit digital audio extension bracket from a third-party vendor. You can use the audio RCA jacks to connect to digital audio devices. If your CD-ROM/DVD drive has digital audio output, you can connect it to the input pins of the SPDIF connector.

On the mainboard, locate the digital audio connector SPDIF1. Connect the cable from the digital audio extension bracket to SPDIF1. If you have digital audio output from your CD-ROM/DVD drive, connect it to the marked audio input pins.



Make the External Connections

After you have installed the mainboard, make the connections to the external ports.



1. KBMPS2 is a stack of two PS/2 mini-DIN ports. The upper port can be used by a PS/2 mouse or pointing device. The lower port can be used by a PS/2 keyboard.
2. LPT1 is a parallel port that can be used by printers or other parallel communications devices. The system identifies the parallel port as LPT1.
3. The upper 15-pin port JS1 is a game/MIDI port. You can use this port to connect a joystick or a MIDI device to your system.
4. The lower part of JS1 is three audio jacks. The left side jack is for a stereo line out signal. The middle jack is for a stereo line in signal. The right side jack is for a microphone.
5. COM2 is a serial port that can be used by serial devices such as a mouse, a fax/modem and so on. This serial port is identified by the system as COM2/4.
6. COM1 is a serial port that can be used by serial devices such as a mouse, a fax/modem and so on. This serial port is identified by the system as COM1/3.
7. USB1 is a stack of two Universal Serial Bus ports. Use these ports to connect to USB devices.

External Connector Color Coding

To help identify the external connectors, many connectors now use standard colors as shown in the table below.

Connector	Color
Analog VGA	Blue
Audio line in	Light blue
Audio line out	Lime
Digital monitor / flat panel	White
IEEE 1394	Grey
Microphone	Pink
MIDI/Game	Gold
Parallel	Burgundy
PS/2 compatible keyboard	Purple
PS/2 compatible mouse	Green
Serial	Teal or Turquoise
Speaker out / subwoofer	Orange
Right-to-left speaker	Brown
USB	Black
Video out	Yellow
SCSI, network, telephone, modem, and so on	None