

A brief description of the mainboard is given below:

- 486DX/DX2/SX microprocessor
- Optional upgrade socket for 487SX-16/20/25 or OverDrive™-20/25 MHz
- Symphony chipset designed to support 486DX-25/33/50, 486DX2-50/66, 486SX-16/20/25, 487SX-16/20/25 or OverDrive™-20/25 MHz operation
- Secondary cache implemented to support burst bus operation for maximum system performance
- Write-through 64KB/256KB secondary cache (both read and write cycles are cached)
- 1/2/4/5/8/16/17/20/32MB DRAM onboard
- Decoupled refresh operation for maximum performance
- Shadow RAM for system BIOS and video ROM
- Standard AT (ISA) bus support
- Seven-channel DMA
- 16-level interrupt
- Three programmable timers
- DALLAS DS1287 real-time clock and CMOS configuration RAM
- Keyboard and speaker attachments
- 27512 (64KB) ROM subsystem
- System speed switchable by a hardware switch or a keyboard
- DTK/AMI BIOS support
- Four-layer board

- System-performance benchmarks of the 486DX-50MHz :

Byte Benchmarks V. 2.1

Size of secondary cache	64KB	256KB
CPU test	11.52	11.56
FPU test	49.10	49.11

Landmark CPU Speed Test V. 2.00

Size of secondary cache	64KB	256KB
CPU	167.20	167.20
FPU	426.21	426.21

Power Meter V. 1.7

Size of secondary cache	64KB	256KB
MIPS	21.9	21.9
Whetstones	5072.7K	5072.7K

Note:

The above system-performance benchmark value is only for your reference.

The motherboard supports not only the 486DX-25/33/50 processor but also the 486DX2 (P24)-50/66, the 486SX-16/20/25, the 487SX-16/20/25 and the OverDrive™ (P23T)-20/25.

The 486DX/DX2/SX should be installed into the processor socket (U29). The 487SX or the OverDrive™ should be inserted into the upgrade socket (U31).

Note: OverDrive™ is the official product name for the P23T processor and 486DX2 is that for the P24 processor.

For the Processor Socket

The 486DX

The 486DX CPU offers the highest performance for DOS, OS/2, Windows and UNIX System V/386 applications. It is 100% binary compatible with the 386 CPU. One million transistors integrate cache memory, floating point hardware and memory management on the chip while retaining binary compatibility with previous members of the '86 architectural family. Frequently used instructions execute in one cycle resulting in RISC performance levels. An 8-Kbyte unified code and data cache combined with a 160 Mbyte/Sec burst bus at 50 MHz ensure high system throughput even with inexpensive DRAMs.

The 486DX CPU contains an on-chip floating point unit. This floating point unit functions exactly the same as the 387 math coprocessor software and will run this software without any modification.

The 486DX2

The 486DX2 (P24) microprocessor is a fully compatible member of the 486 family with 50/66 MHz core speed using 25/33 MHz bus clocks. The 486DX2 is driven by what can be called a 1/2 x clock, as opposed to the 1x clock in the 486DX and the 2x clock in the 386 microprocessors. This speedup includes the internal cache memory, the floating point unit, the instruction decode unit, the ALU and everything except the bus interface.

The 486SX

The 486SX microprocessor provides a new low-cost entry point to powerful 486 desktop computing. The 486SX microprocessor integrates the same RISC-technology, one-clock-per-instruction integer core, on-chip cache memory, and memory management unit as the 486DX microprocessor; however, the 486SX does not have an internal math coprocessor.

For the Upgrade Socket

The 487SX

The 487SX math coprocessor not only supports CPU functions, but also contains a math coprocessor. The 487SX coprocessor provides optional math upgrade capability for the 486SX microprocessor to increase floating point performance. More than 2100 software packages have been designed to use coprocessors.

The OverDrive™ (P23T)

The OverDrive™ (P23T) upgrade processor is designed to operate in the upgrade socket of both 486DX CPU and 486SX CPU based systems. When installed in either a 486DX CPU or a 486SX CPU based system, the OverDrive™ upgrade processor increases both integer and floating point performance of the system equal to the 486DX2 microprocessor.

erDrive™ will have the heat sink attached to lead PGA package. It is 100% pin compatible 487SX math coprocessor.

motherboard incorporates Symphony's chipset (82C461 and 82C362) to reduce the on-chip count and shrink the board to baby-AT size. The motherboard supports not only the 486DX-33 processor but also the 486DX2-50/66, the 486/20/25, the 487SX-16/20/25 or the OverDrive-20/25.

To save board space, an 8-bit EPROM is provided on the motherboard. This is different from the traditional 16-bit EPROM. Since access to DRAM is faster than to EPROM, it is desirable to store BIOS code through DRAM. The Symphony motherboard supports faster access shadow RAM.

The advanced DRAM controller allows for one to two banks of on-board DRAMs in configurations of up to 16MB. Each bank may be independently comprised of 1MB and 4MB DRAMs.

Page and page-interleave operations are also supported. Performance is further enhanced through the use of a decoupled-refresh mechanism which allows for uncoupled DRAM and AT bus refresh without putting the CPU on hold.

Drivers and buffers for driving the AT buses are included in the chipset. It also supports 256KB address relocation and flexible cache memory subsystems with 64KB or 256KB caches.

Secondary Cache Memory Subsystem

The processor has an 8KB internal cache. The 64KB/256KB external cache is called a secondary cache. The cache controller supports direct and write-through cache systems including two cache SRAMs.

Main Memory Subsystem

System memory may be a combination of 1MB and 4MB SIM modules in configurations of 1, 2, 3, or 4 modules for a total of 32MB.

With so many memory configurations, setup is designed with maximum ease of use in mind. Configuration settings detected and set by the BIOS automatically.

In the IBM PC/AT, conventional memory extends from 0 to 640KB. This is the system area, and is available for use by application programs. Physical memory address space from 640KB to 1024KB is reserved for the system.

The shadow RAM feature must be enabled by the BIOS in order to enhance system performance. Shadowed memory in the range 0f A0000h to 0f D0000h and D0000h to EFFFFh may be relocated to a higher address of memory. Thus, 256KB of memory may be shadowed.

Configuration

This chapter will guide you through the physical installation of the mainboard.

Restrictions

Before installing the mainboard, we strongly recommend that you abide by the following restrictions:

- 27512 EPROM (BIOS) with 200ns access time
- DRAM with 80ns access time
- Cache SRAM with 20ns access time
- TAG SRAM with 20ns access time

If you select CPUs of various speeds, refer to the following table for different restrictions.

CPU	OSC	DRAM	SRAM
50MHz	50MHz	80ns	20ns
33MHz	66MHz	80ns	25ns
25MHz	50MHz	100ns	25ns
20MHz	40MHz	120ns	35ns
16MHz	32MHz	120ns	35ns

Note: CPU-486DX/486DX2/486SX/487SX/OverDrive

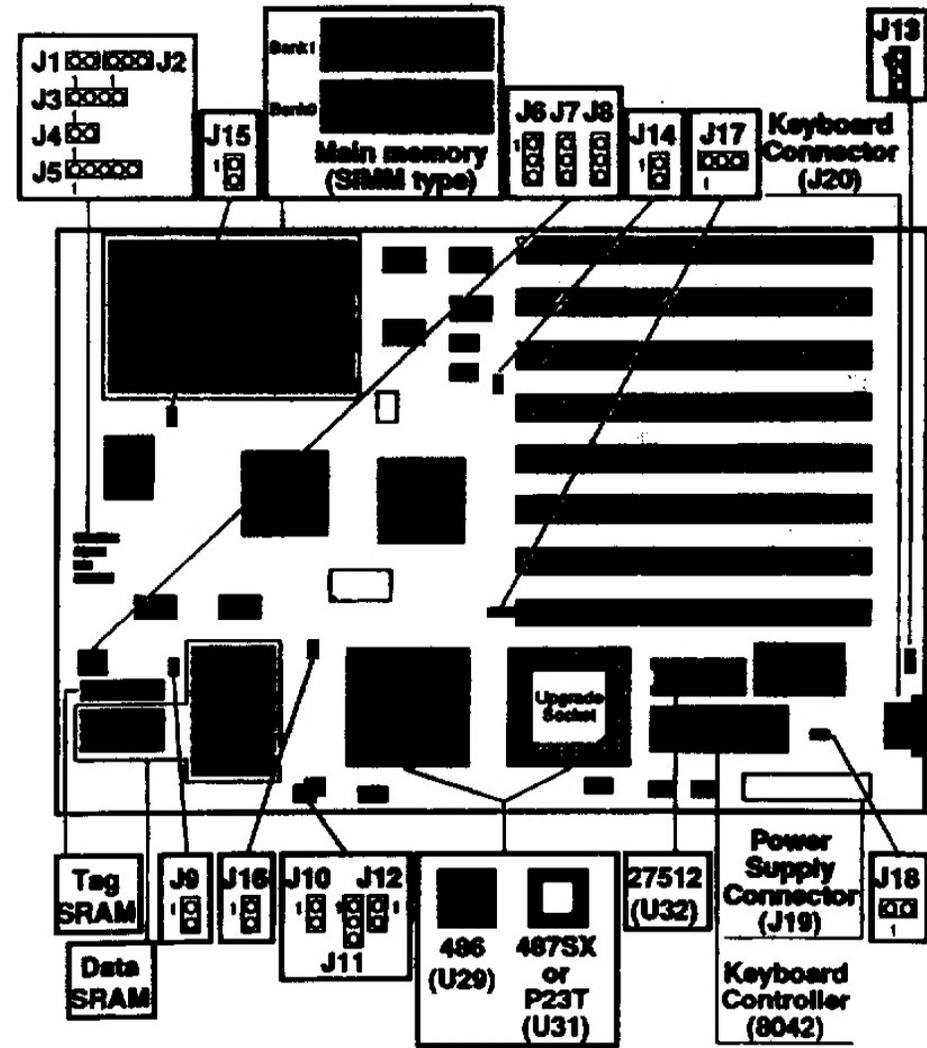
Packing the Mainboard

When you unpack and handle the board and other system components, all materials should be placed on an anti-static mat. You are advised to wear a grounded anti-static wristband. Inside the carton, the mainboard is packed in an anti-static bag and sandwiched between sheets of sponge. Take out the mainboard and place it on the grounded surface described above with the component side up.

The mainboard for damage. Components mounted in sockets should be pressed down to ensure that they are properly seated. If any evidence of damage to the mainboard is apparent, do not turn on the power if the board is already installed or attempt to continue installation without obtaining authorized technical assistance.

Board Layout

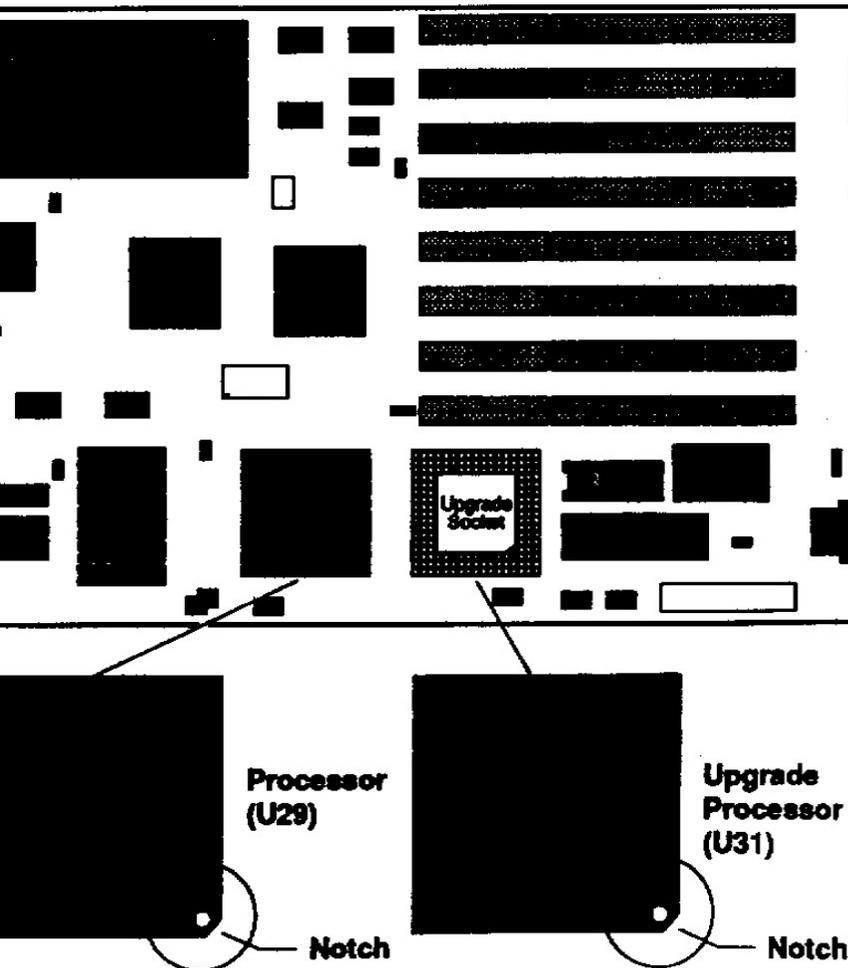
The figure below will familiarize you with the layout of the mainboard. The location of the main memory is particularly noteworthy. The various configurations of the main memory may be a little complicated but are not difficult to figure out.



CPU and Math Coprocessor Installation

The mainboard supports the 486DX /486DX2/486SX/487SX/OverDrive™ series. The 486DX /486DX2/486SX processor chip should be inserted into the processor socket (U29), with the notch as shown on this page.

The optional 487SX/OverDrive™ chip should be inserted into the upgrade socket (U31), with the notch on the package oriented in the same direction as the corresponding notch on the socket. The position of the upgrade socket is shown below.



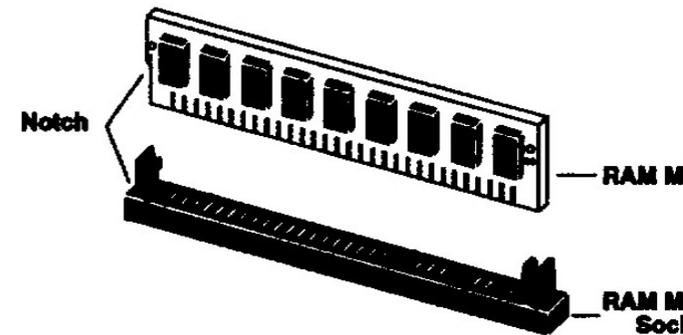
ROM Installation

To install the ROM chip, refer to the illustration on page 9 for the location of the DIP socket (U32).

DRAM Installation

The mainboard has one kind of SIMM socket. The socket of the RAM module is a 30-pin single-in-line

Remember that when inserting RAM modules, you must make sure the notched or dotted end of the RAM module is lined up with the notched end of the socket. Gently push the RAM module into the socket. See the following figure.



Two banks of main memory are on the mainboard, BANKs 0 and 1. Refer to the figure on page 9 for the location of these banks. Each bank accommodates the 32-bit wide data bus. BANK 0 must be installed first.

To select the proper setting for the RAM size that you want, refer to the table on the next page for different onboard memory (DRAM) configurations.

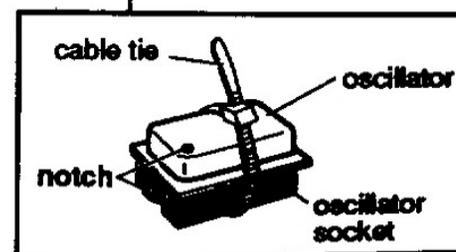
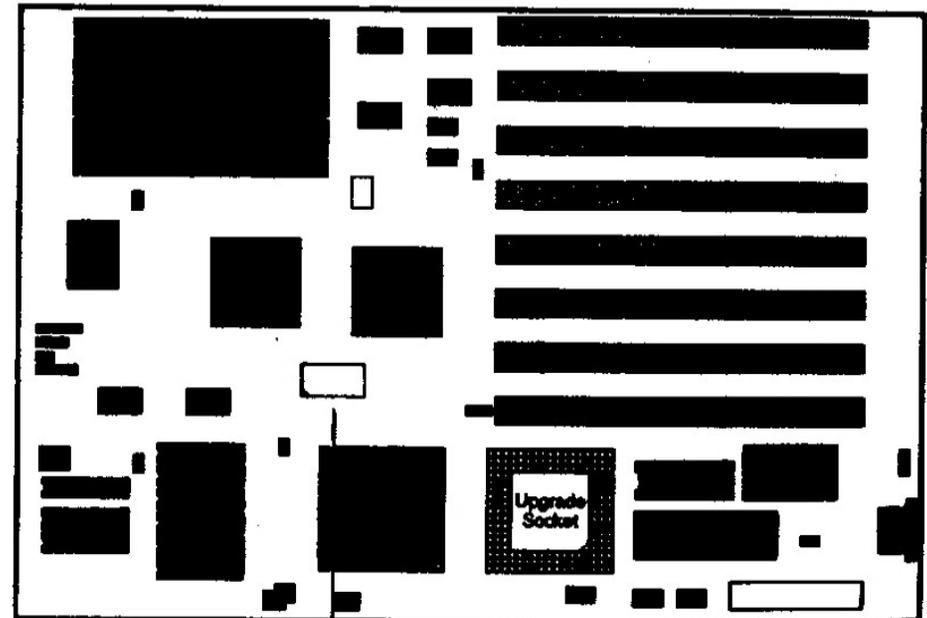
OSC1 Installation

RAM SIZE	Onboard	
	BANK 0	BANK 1
1MB	(256Kbit x 9) x 4 RAM Module	None
2MB	(256Kbit x 9) x 4 RAM Module	(256Kbit x 9) x 4 RAM Module
4MB	(1Mbit x 9) x 4 RAM Module	None
5MB	(256Kbit x 9) x 4 RAM Module	(1Mbit x 9) x 4 RAM Module
5MB	(1Mbit x 9) x 4 RAM Module	(256Kbit x 9) x 4 RAM Module
8MB	(1Mbit x 9) x 4 RAM Module	(1Mbit x 9) x 4 RAM Module
16MB	(4Mbit x 9) x 4 RAM Module	None
17MB	(256Kbit x 9) x 4 RAM Module	(4Mbit x 9) x 4 RAM Module
17MB	(4Mbit x 9) x 4 RAM Module	(256Kbit x 9) x 4 RAM Module
20MB	(1Mbit x 9) x 4 RAM Module	(4Mbit x 9) x 4 RAM Module
20MB	(4Mbit x 9) x 4 RAM Module	(1Mbit x 9) x 4 RAM Module
32MB	(4Mbit x 9) x 4 RAM Module	(4Mbit x 9) x 4 RAM Module

Oscillator socket OSC1 is reserved for 32/40/50/66/50 MHz oscillators when 16/20/25/33/50 MHz CPUs are installed.

If you want to change the CPU speed to 16/20/25/33/50 MHz, you have to install a 32/40/50/66/50 MHz oscillator in oscillator socket OSC1. The oscillator should be inserted into the socket with the notch on the package oriented in the same direction as the corresponding notch on the socket.

Finally, use a cable tie to fasten the oscillator. Refer to the figure below.

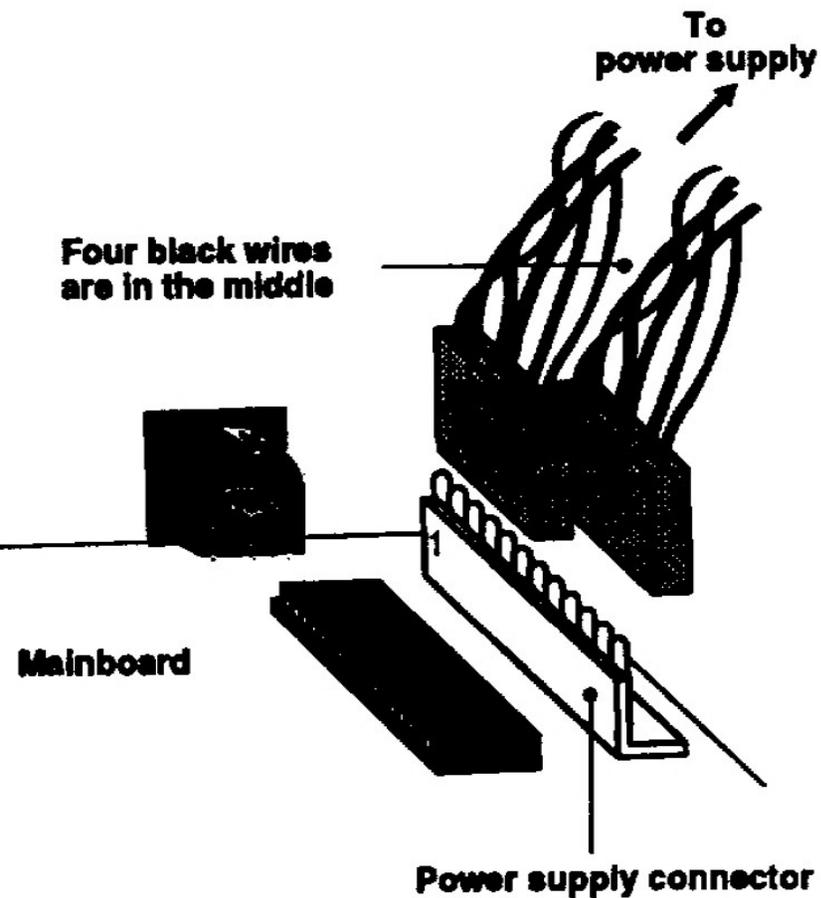


on to Power Supply

you are installing the mainboard yourself, the final step is attaching the power supply cable to the mainboard at connector J19, which is located in the upper right quadrant of the board.

There are some cables on the power supply. Be sure the four black wires from the power supply are located in the middle of the power connector.

Refer to the following figure. Pin 1 is shown in the picture for your convenience.



The pinouts for the connector J19 are

Pin	Assignment
1	Power Good
2	+5 VDC
3	+12 VDC
4	-12 VDC
5	Ground
6	Ground
7	Ground
8	Ground
9	-5 VDC
10	+5 VDC
11	+5 VDC
12	+5 VDC

Connectors and Jumpers

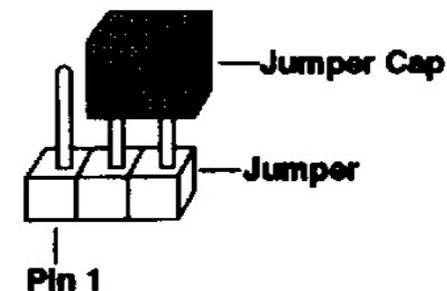
See the illustration on page 9 for the location of each of the jumpers and connectors. Most of the jumpers are preset at the factory.

Connectors and Jumpers

A variety of connections can be made from the mainboard to a control panel on the front of your system.

A jumper is a kind of switch which uses a plastic cap with a metal interior to connect (short) two pins. If a jumper needs to be left open, you should save the cap for future use by covering only one pin of the jumper. This has no effect on the function of the board while it keeps the cap handy. The illustration below shows the side and top views of a three-pin jumper in which pins two and three are shorted.

Side View



Top View



With the mainboard oriented in the direction shown in the illustration above, the pins of each jumper are numbered from left to right in ascending order.

The following sections describe the functions or the settings of the connectors and jumpers on your main-

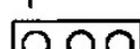
Reset Connector (J1)

This connector links the reset switch on the control panel. If you encounter any problems with unfamiliar software, you can always start the system beginning by pressing the reset button. This ensures that any data which have not been saved will not be lost.

Jumper J1	Function
	Reset
	Default

Turbo Connector (J2)

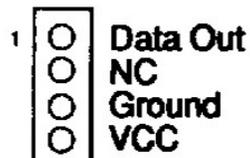
This connector switches the system between Normal and Turbo speeds.

Jumper J2	Hardware Mode
	Normal Speed (AT compatible)
	Turbo Speed

Note that Turbo and Normal modes can be selected with a software switch invoked from the control panel, as shown below:

Speaker Connector (J3)

This connector uses only two lines (data out and ground) for the speaker in the chassis. The pin assignments are:



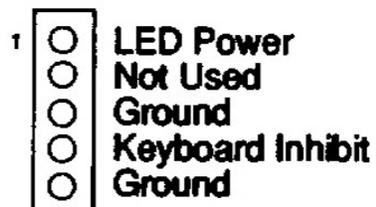
Turbo LED Connector (J4)

This connector is used to enable the Turbo LED. A Turbo LED indicates operation in Turbo mode.



Keyboard Lock/Power LED (J5)

This connector links the keyswitch to your control panel and also supplies the signal for the power LED. The pin assignments are listed below:



Cache Memory Size Selection (J6~J8)

This jumper selects the various cache size configurations.

Jumper J6 - J8	Cache RAM Type
	64KB cache memory with nine 20ns 8K x 8 bit SRAM chips (default)
	256KB cache memory with nine 20ns 32K x 8 bit SRAM chips

The cache configurations are listed below:

64KB: 64KB cache (with eight 8K X 8 bit data SRAM chips, one 8K X 8 bit tag SRAM chip)

256KB: 256KB cache (with eight 32K X 8 bit data SRAM chips, one 32K X 8 bit tag SRAM chip)

Refer to the figure below for the location of data and tag SRAM.

Cache Size	Data SRAM	Tag SRAM
64KB	8K x 8bit x 8	8K x 8bit
256KB	32K x 8bit x 8	32K x 8bit

Cache Write-Hit Wait State Selection (J9)

Jumper J9 is used to select cache write-hit wait states. Refer to the following table.

Jumper J9	Function
	zero wait state cache write hit (default)
	one wait state cache write hit

CPU Type Selection (J10~ J12)

The following table shows the jumper setting for CPU type selection.

CPU Select	Jumpers		
	J10	J11	J12
486DX			
486DX2			
486SX			

Note:
The 487SX/OverDrive™ upgrade processor installed into the upgrade socket ignores jumpers J10 ~ J12.

Video Selection (J13)

Jumper J13 is used to select a color or a monochrome display adapter. Refer to the figure below.

Jumper J13	Video Selection
	monochrome display adapter (default)
	color display adapter

CPU Speed Selection (J14 ~ J18)

Jumpers J14 ~ J18 are used to select CPU speed. Refer to the following table.

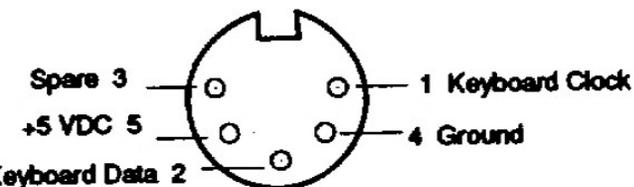
CPU Speed Selection	Jumpers				
	J14	J15	J16	J17	J18
16/20/25/33MHz					
486DX-50 (SRAM=20ns)					
486DX-50 (SRAM=15ns)					
486DX2-50					

Power Supply Connector (J19)

This connector is provided for the power supply. It is important that this connector be correctly connected; otherwise the mainboard may be damaged. Information on selecting your power supply may be found in the Introduction to Power Supply section.

Keyboard Connector (J20)

This connector may be located at the back of your system unit. Any AT-compatible keyboard with a 5-pin connector may be used. The pin assignments for keyboard connector J20 are as follows:



System Options

CPU Type

The mainboard supports not only the 486DX processor but also the 486DX2, the 486SX, 487SX/OverDrive™. The default jumper settings are for the 486DX/DX2 processor. If you want to change to the 486SX, you must change the settings of jumpers J10 ~ J12. However, the 487SX/OverDrive™ upgrade processor installed into the upgrade socket ignores the settings of jumpers J10 ~ J12.

CPU Speed

If you want to change the CPU speed to 16/20/25/33/50 MHz, you have to change jumpers J14 ~ J18 and install a 32/40/50/66/50 MHz oscillator in oscillator socket OSC1.

Memory Size

The mainboard supports a combination of 256KB, 1MB and 4MB SIM modules in configurations of up to 32MB of on-board memory. The possible memory configurations are 1MB, 2MB, 4MB, 5MB, 8MB, 16MB, 17MB, 20MB and 32MB.

Cache Size

The mainboard supports a direct-mapped, write-through secondary cache system with data size of either 64KB or 256KB. The default setting is 64KB cache (with nine 8K x 8bit SRAMs). If you want to change the cache size to 256KB (with nine 32K x 8bit SRAMs) for top performance, you must change the settings of jumpers J6~J8.

Changing Operation Speed

Software Switch

When pins 2 and 3 of jumper J2 are shorted, operation speed may be toggled between Turbo and Normal (AT compatible) speed by holding down the control <Ctrl> and alternate <Alt> keys on the keyboard while pressing the minus <-> key (on the numeric keypad).

The Turbo LED on the front panel, if you have one, will light to indicate Turbo mode.

Hardware Switch

When pins 1 and 2 of jumper J2 are connected by the switch on the control panel, push the hardware switch OFF to enter Turbo mode and push it ON to enter Normal mode. The Turbo LED will light in the Turbo mode.

BIOS Utility and Setup

This chapter will acquaint you with the DTK BIOS of your motherboard. If you are an AMI BIOS or another BIOS user, skip this chapter and refer to its respective BIOS manual.

The BIOS is composed of two portions:

- system BIOS
- setup program

System BIOS

System BIOS is fully IBM BIOS compatible. In addition, many special functions are provided. If you want to use them, you should enable them in the setup program.

IBM BIOS Compatibility

POST

POST (Power-on Self Test) checks all components and devices in the system when you boot the system. If any error is found, system BIOS will display a warning message. If no error is found, it will start to boot the OS (operating system).

Device Driver

System BIOS provides device drivers for standard devices such as fixed disks, a video display, a keyboard, a printer and RS-232.

Special Functions

Several special functions supported by ROM BIOS are as follows:

- Software turbo/normal switch
- Four different floppy disk drives
- Two user-defined hard disk types
- System password
- Three system utilities—a calculator, a timer and a hard disk park
- Symphony chipset support

The following is an introduction to these special functions:

Software Turbo/Normal Switch

When pins 2 and 3 of jumper J2 on the mainboard are shorted, the operation speed may be toggled between Turbo and Normal by holding down the <Ctrl> ,<Alt> and <-> (on the numeric keypad) keys at the same time.

The Turbo LED on the front panel, if you have one, will light to indicate Turbo mode.

Four Different Floppy Disk Drives

System BIOS supports four types of floppy disk drives — 360K, 720K, 1.2M and 1.44M. You can set your floppy disk drive type through the setup program.

Two User-defined Hard Disk Types — Type 48 and Type 49

The system BIOS provides broad support for special hard disks that may not be on the list of 47 hard disk types. If you want to set up a hard disk which is not listed, the first step is to enter the ROM setup program to set correct specifications (e.g., cylinders, heads, and sectors/tracks). Next, select hard disk type 48 or 49. When the system is rebooted, the hard disk in your system should work.

Password

The password check utility executes before booting the setup program is run. This function provides thorough protection for your system. You may create a password through the setup program to deny unauthorized users access to the computer. When a password is set, the computer allows a user three chances to key in the password.

If you have a short memory, you had better keep a record of the password in a safe place. Keeping it in a DOS-formatted diskette is one solution. BIOS will save the password in a DOS-formatted diskette if you like.

Three System Utilities

These system utilities — a calculator, a timer and a hard disk park program — are in your system BIOS. These utilities are enabled by the setup program.

Note:

- If a timer is enabled, current time will be displayed in the upper right corner of the screen.
- To use a calculator, press the <Ctrl> ,<Alt> and <5> (on the numeric keypad) keys. To exit the calculator, press <Esc>.
- You must disable these utilities before you run any diagnostic software.
- These utilities can be used in the text-display mode only.
- When these utilities are enabled, base memory will be reduced by 7KB.

Symphony Chipset Configuration

System BIOS will program the Symphony chipset according to the instructions you gave in the setup program.

Program

The system setup program included in your BIOS is used to set up your system hardware.

Entering the Setup Program

There are three ways to enter the setup program:

Pressing <F1> to Enter the Setup Program

You will need to press <F1> to enter the setup program when:

- your computer is turned on for the first time
- the non-rechargeable battery is dead
- the hardware configuration is changed
- the hardware configuration is malfunctioning

If the battery for the CMOS ROM chip is dead or the system configuration does not match your actual hardware configuration, you will have to reconfigure your system. The computer will give you this screen message:

```
Press the F1 key to enter the
setup program or press any other
key to continue
```

Under the above conditions, pressing <F1> will automatically start the setup program.

Using the DOS DEBUG Command to Enter the Setup Program

Under any conditions within DOS, you can use the DOS DEBUG command as follows:

```
A> DEBUG <Enter>
-g=f000:ff60 <Enter>
```

This command will start the setup program.

Pressing <Esc> to Enter the Setup Program

If you want to set up special functions provided by BIOS or reconfigure your system, you will need to enter the setup program. After starting your computer, press the <Esc> key immediately. Before the setup program appears, the following message will appear on the screen:

```
SETUP utility will be starting
```

When the system self test is completed, the setup program will take over.

Once you have entered the setup program, you will see the following initial screen:

```
ROM SETUP PROGRAM VERSION 2.0
(C) COPYRIGHT DATATECH ENTERPRISES CO., LTD 1990.
ALL RIGHTS RESERVED.
```

1. SETUP UTILITY PREPARATION.

2. PREFORMAT HARD DISK.
3. SET UP BUILT-IN UTILITY.
4. SET UP PASSWORD.
5. SET UP USER-DEFINED HARD DISK TYPE.
6. SET UP SHADOW RAM.
9. QUIT SETUP PROGRAM.

```
CHOOSE ITEM NUMBER : [1]
```

Running the Setup Program

Setting Up System Standard Configuration

If you choose item 1 from the initial screen, You can set the following:

- date and time
- coprocessor
- base memory
- extended memory
- diskette drive
- fixed disk type
- display card

Preformatting Hard Disk

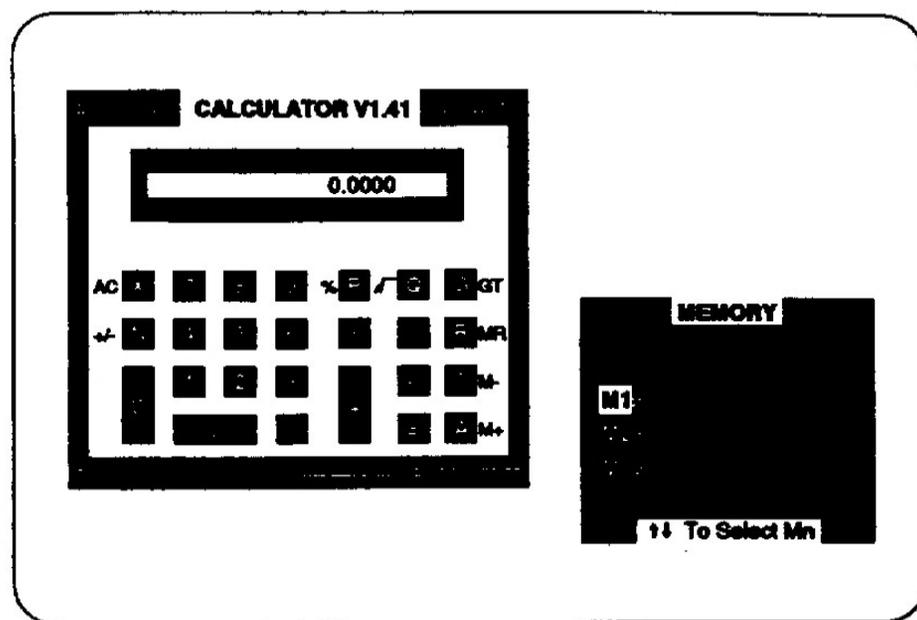
If you want to preformat your hard disk(s), choose item 2. Before starting your computer, make sure to set the correct parameters. Consult your computer dealers if you are in doubt as to which rate to choose.

Setting Up Build-in Utility

If you choose item 3, you may enable or disable system utilities.

- The timer has two basic functions:
 1. Current time can be turned off, set to display on the hour, or set to display constantly.
 2. An alarm may be set for each hour, half hour, or turned off.
- If a calculator is enabled, you may press <Ctrl> <Alt> <5> (on the numeric keypad) in the text mode to start the calculator.

This calculator runs only in the 80-column text mode. It is a 12-digit and 4-decimal business calculator. After you start the calculator, the screen will appear as follows:



This calculator is virtually the same as most business calculators. The following table shows its key functions.

Keys	Function
0 - 9	number keys
+ - * /	basic operators
P	"%" (percent)
Q	"√" (square root)
R	"MR" (memory recall)
S	"M-" (the value in memory minus the displayed one)
A	"M+" (adds the displayed value to value in memory)
X	"AC" (all clear) will clear the displayed and memory values.
C	will clear the displayed value
G	equal to "GT" (grand total)
N	"+/-" (sign change) will toggle sign of the number

- If you press <Ctrl> <Alt> <5> (on the numeric keypad) and select HDISK PARK, the HDISK PARK utility can park your hard disk. Do this before moving your computer to prevent data loss or damage to your hard disk.

Password Setup

Selecting item 4 in the setup menu will start the system password setup. You can key in a password with a maximum of seven alphanumeric units. The password may be kept in a DOS-formatted diskette with a specially processed file called PASSWORD.KEY. When a password is set, the user is given three chances to key in the password after the system has been booted up. If the correct password is not given during the three tries, the system will not function. The system will ask you to insert the "key" diskette (if you have one) on which your password is saved. If you disable the password function, the setup program will clear the previous password.

User-defined Hard Disk Type

If none of the drive types (1-47) match the fixed disk drive specification, you should select item 5 to configure a user-defined hard disk. You should key in the specifications of your hard disk (e.g., cylinders, heads and sectors/tracks). When you have finished keying in these numbers, the user-defined option will be set and defined as type 48 or 49.

Symphony Chipset Configuration

Your system is designed for the Symphony chipset. You may select item 6 in the setup menu to configure the Symphony chipset. Four items can be selected:

- IO recovery time
- Decoupled refresh
- Shadow RAM
- 0KB or 256KB relocation

IO Recovery Time: The system provides four types of IO recovery time — 0, 4, 8 and 12 SYSCLK.

The IO recovery time function provides optional IO speed to match with various IO devices. It benefits some slow IO add-on cards. For more flexibility, we recommend that you select 12 SYSCLK.

Decoupled Refresh: The system provides two types of refresh cycles — conventional refresh and decoupled refresh.

In conventional refresh cycles, the type in the IBM PC/AT, the DRAMs on both the local DRAM bus and the AT bus are refreshed at the same time while the CPU is held idle during the entire refresh period.

Decoupled refresh performs local DRAM refresh operations separately from the AT bus; therefore, the overhead of bus arbitration and HOLD/HLDA handshaking is eliminated. As soon as the local refresh cycle is completed, the CPU will proceed with succeeding local bus cycles without waiting for the slow action of the AT bus refresh. However, DMA or AT bus cycles are deferred until the AT bus refresh cycle is complete.

Shadow RAM: Your system provides a feature called shadow RAM. It allows BIOS code to be executed from local DRAMs resident at the same physical address as the BIOS EPROM. Shadow RAM configuration is dependent on 0KB or 256KB relocation. When the system relocation is set to be 0KB, F0000-FFFFF is set as shadow RAM enabled (the default BIOS setting). C0000-CFFFF, D0000-DFFFF and E0000-EFFFF may all be selected as shadow RAM enabled or disabled.

But when the system relocation is set to be 256KB, F0000-FFFFF is set as shadow RAM enabled. D0000-DFFFF and E0000-EFFFF are set as shadow RAM disabled. Only C0000-CFFFF may be selected as shadow RAM enabled or disabled.

0KB or 256KB Relocation: When 0KB relocation is selected, shadow RAM options are as follows:

C0000 - C3FFF selectable

C4000 - C7FFF selectable

C8000 - CBFFF selectable

CC000 - CFFFF selectable

D0000 - D3FFF selectable

D4000 - D7FFF selectable

D8000 - DBFFF selectable

DC000 - DFFFF selectable

E0000 - EFFFF selectable

F0000 - FFFFF default enabled

When 256KB relocation is selected, shadow RAM options are as follows:

C0000 - C3FFF selectable

C4000 - C7FFF selectable

C8000 - CBFFF selectable

CC000 - CFFFF selectable

D0000 - D3FFF default disabled

D4000 - D7FFF default disabled

D8000 - DBFFF default disabled

DC000 - DFFFF default disabled

E0000 - EFFFF default disabled

F0000 - FFFFF default enabled

System BIOS Error Messages

The following lists the various BIOS error messages:

ROM BIOS Checksum Error

– Indicates an invalid ROM BIOS failure.

8254 Error

– Indicates an 8254 timer controller failure.

8237 Error

– Indicates an 8237 DMA controller failure.

74612 Error

– Indicates a 74612 page register failure.

8259 Error

– Indicates an 8259 interrupt controller failure.

8742 Error

– Indicates an 8742 controller failure.

Check Battery

– Indicates a system backup battery disconnection or power loss.

RTC Checksum Error

– Indicates that the system configuration is not available.

Refresh Indicator Error

– Indicates that the system memory refresh does not work.

Base 64K Memory Error

– Indicates that the system's first 64K of memory does not work.

FDC Error User Check

– Indicates that the floppy diskette controller does not work.

FDD Seek Failure

- Indicates a failure of the floppy diskette drive "seek" operation.

Keyboard Error User Check

- Indicates the disconnection of the keyboard from the system or a keyboard device failure.

Parity Error but Segment not Found, Press any Key to Continue

- Indicates that the NMI circuit has detected a RAM parity error.

System Memory Mismatch, Run SETUP

- Indicates a mismatch of memory size in the CMOS RAM as well as onboard. You need to run the setup program.

Display Card Mismatch, Run SETUP

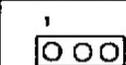
- Indicates a mismatch of a recorded type in the CMOS RAM as well as onboard. You need to run the setup program.

Appendix A

Quick Reference for Jumper Settings

J1 — Reset Connector

J2 — Turbo Connector

Jumper J2	Hardware Method
	Normal Speed (AT compatible speed)
	Turbo Speed

Jumper J2	Software Method
	Speed Toggled by Pressing <Ctrl>, <Alt> and <-> keys

J3 — Speaker Connector

J4 — Turbo LED Connector

J5 — Keylock Connector

J6 ~J8 — Cache Memory Size Selection

Jumper J6 - J8	Cache RAM Type
	64KB cache memory with nine 20ns 8K x 8 bit SRAM chips (default)
	256KB cache memory with nine 20ns 32K x 8 bit SRAM chips

J9 — Cache Write-Hit Wait State Selection

Jumper J9	Function
	zero wait state cache write hit (default)
	one wait state cache write hit

J10~J12 — CPU Type Selection

CPU Select	Jumpers		
	J10	J11	J12
486DX			
486DX2			
486SX			

J13 — Video Selection

Jumper J13	Video Selection
	monochrome display adapter (default)
	color display adapter

J14 ~ J18 — CPU Speed Selection

CPU Speed Selection	Jumpers				
	J14	J15	J16	J17	J18
16/20/25/33MHz					
486DX-50 (SRAM=20ns)					
486DX-50 (SRAM=15ns)					
486DX2-50					

J19 — Power Connector

J20 — Keyboard Connector

Appendix B

Factory Default Settings

Because of large numbers of jumpers and options on the mainboard, it is best to start with the factory default settings and make experimental modifications from that point. The following shows the default settings for the 486DX-33/486DX-50/486DX2-50 mainboard.

For the 486DX-33 Mainboard

If your mainboard is installed a 486DX-33 processor, refer to the following table for the default settings.

Jumper	Short	Function
J6		64K cache memory
J7		
J8		
J9		zero wait state cache write hit
J10		486DX/DX2 selection
J11		
J12		
J13		monochrome display adapter
J14		for 486DX-33 CPU
J15		
J16		
J17		
J18		

the 486DX-50 Mainboard

If your mainboard is installed a 486DX-50 processor, refer to the following table for the default settings.

Short	Function
	64K cache memory
	
	
	zero wait state cache write hit
	486DX/DX2 selection
	
	
	monochrome display adapter
	for 486DX-50 CPU
	
	
	
	

For the 486DX2-50 Mainboard

If your mainboard is installed a 486DX2-50 processor, refer to the following table for the default settings.

Jumper	Short	Function
J6		64K cache memory
J7		
J8		
J9		zero wait state cache write hit
J10		486DX/DX2 selection
J11		
J12		
J13		monochrome display adapter
J14		for 486DX2-50 CPU
J15		
J16		
J17		
J18		

