

**GA-486QS  
USER'S  
MANUAL**

# GA-486QS USER'S MANUAL

33/25MHz CACHE 486DX/SX

2ND EDITION

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## INTRODUCTION

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### INTRODUCTION

Welcome to using the GA-486QS motherboard. The motherboard is a 80486DX/SX CACHE PC/AT compatible system with ISA bus, and has been designed to be the fastest ISA PC/AT system. there are new features allow you to operate the system with just the performance you want.

This manual also explains how to install the motherboard for operation, and how to set up your CMOS CONFIGURATION with BIOS SETUP program.

## KEY FEATURE

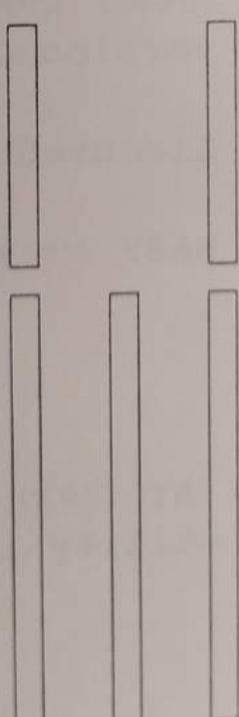
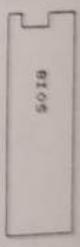
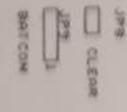
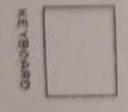
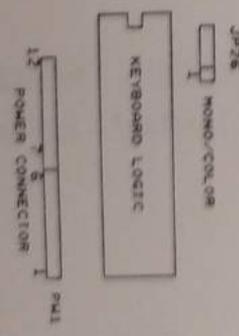
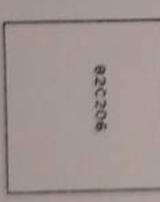
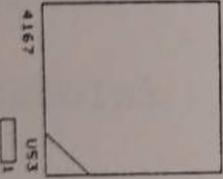
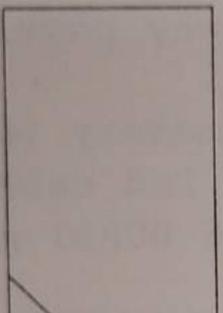
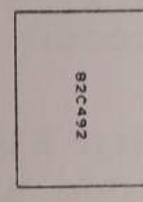
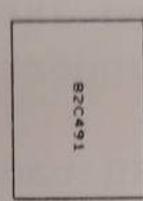
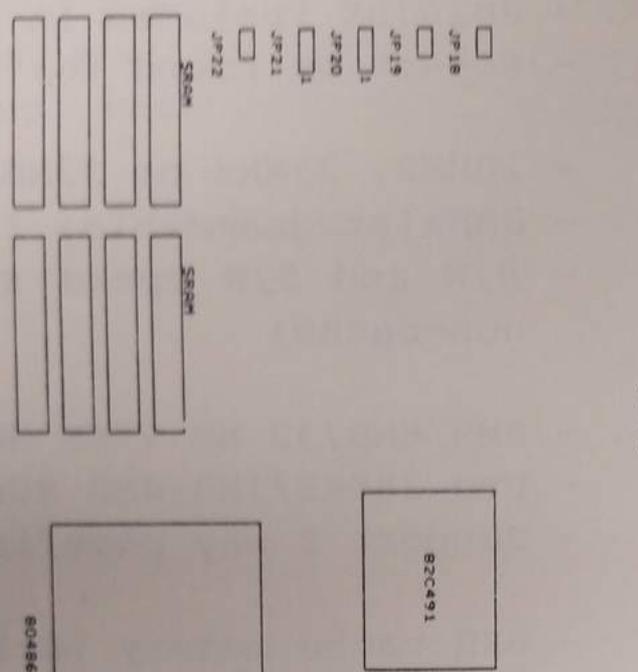
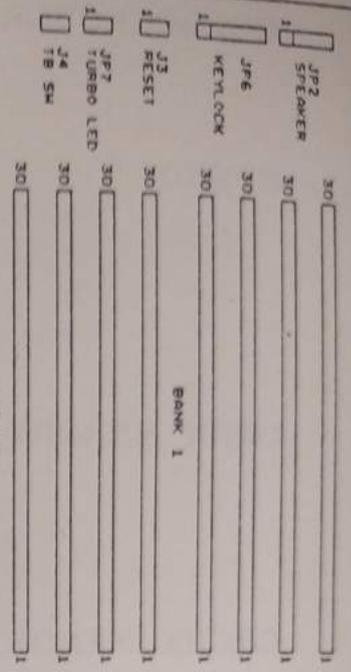
## HARDWARE

- CPU - 80486DX or 80486SX
- COPROCESSOR - 80387DX included in 80486DX  
- Socket on board for weitek 4167
- SPEED - 20MHz, 25MHz or 33MHz system speed  
- 8MHz(programmable) I/O BUS speed  
- H/W and S/W speed switchable function (cache or non-cache)
- DRAM MEMORY - 2MB/8MB/32 MB SIMM MODULE socket on board  
- Use 256KB/1MB/4MB 80nS SIMM MODULE DRAM  
- Support 2 way page/interleave DRAM access mode
- CACHE MEMORY - 8KB cache memory included in 80486DX/SX  
- 64KB/256KB 2nd cache memory on board  
- Support 486 BURST mode on 2nd cache memory access
- SHADOW RAM - Main BIOS shadow function programmable  
- Video BIOS shadow function programmable
- REMAP DRAM - 256KB DRAM relocatable (Available in chipset version C)
- BIOS - Licensed AMI or MR BIOS
- DIMENSION - BABY AT size

## SOFTWARE

- BIOS - AT CMOS SETUP, ADVANCED SETUP and HARD DISK utility included in main BIOS

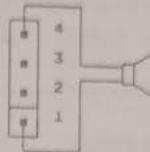




CONNECTORS PINOUT

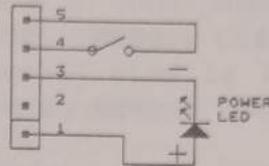
JP2 SPEAKER CONNECTOR:

- 1 - DATA
- 2 - NC
- 3 - GND
- 4 - VCC (+5V)



JP6 POWER LED & KEYLOCK CONNECTOR:

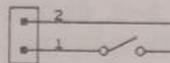
- 1 - LED ANODE (+)
- 2 - NC
- 3 - LED CATHODE (-)
- 4 - KEYLOCK
- 5 - GND



J3 RESET CONNECTOR:

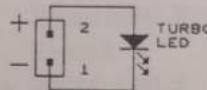
- 1 - GND
- 2 - RESET

\*Close PIN 1-2 to RESET SYSTEM



JP7 TURBO LED CONNECTOR:

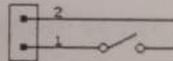
- 1 - GND (-)
- 2 - LED ANODE (+)



J4 TURBO SWITCH CONNECTOR:

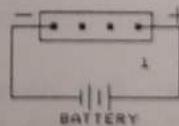
- 1 - GND
- 2 - TURBO

\*Close PIN 1-2 to SLOW SPEED (non-cache)



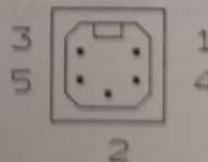
JP9 EXTERNAL BATTERY CONNECTOR:

- 1 - BATTERY ANODE (+)
- 2 - NC
- 3 - GND
- 4 - BATTERY CATHODE (-)



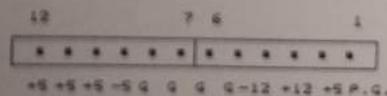
KB1 KEYBOARD CONNECTOR:

- 1 - KEY CLOCK
- 2 - KEY DATA
- 3 - NC
- 4 - VCC (+5V)
- 5 - GND



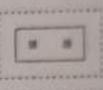
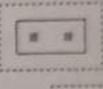
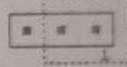
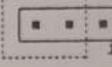
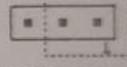
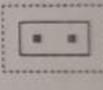
PW1 PPOWER CONNECTOR:

- 1 - POWER GOOD SIGNAL
- 2,10,11,12 - VCC (+5V)
- 3 - (+12V)
- 4 - (-12V)
- 5,6,7,8 - GND
- 9 - (-5V)



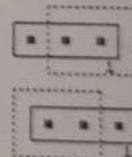
JUMPERS SETUP

SRAM SIZE SETUP JUMPERS:

JP NO.	64KB	256KB	64KB	256KB
JP18	OPEN	CLOSE		
JP19	OPEN	CLOSE		
JP20	2-3 CLOSE	1-2 CLOSE		
JP21	2-3 CLOSE	1-2 CLOSE		
JP22	OPEN	CLOSE		

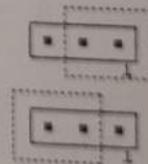
CPU TYPE SETUP JUMPER:

JP31 - PIN 1-2 Close for 80486DX installed  
 PIN 2-3 Close for 80486SX installed



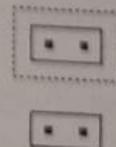
DISPLAY TYPE SETUP JUMPER:

JP26 - PIN 1-2 Close for COLOR  
 - PIN 2-3 Close for MONO



CMOS POWER SUPPLY JUMPER:

JP8 - "Close" for normal operation  
 "Open" for not supplying power to CMOS  
 (Open this jumper few minutes to clear CMOS values.)



**DRAM MEMORY INSTALLATION**

**TYPE & SPEED** - The motherboard can use 256KB, 1MB or 4MB type SIMM MODULE DRAM, and the DRAM speed is 70nS or 80nS.

**TOTAL MEMORY** - The DRAM memory system on motherboard consists of bank 0 and bank 1. The DRAM of bank 0 must be installed first, then bank 1. Each bank consist of 4 pcs. SIMM MODULE DRAM, because this is a 32 bit system. The total memoey size is 1 - 32MB, and various DRAM type configuration in following TABLE are available :

BANK 0 TYPE	BANK 1 TYPE	INTERLEAVE MODE	TOTAL MEMORY
256KB	NONE	PAGE ONLY	1MB
256KB	256KB	2-WAY	2MB
1MB	NONE	PAGE ONLY	4MB
1MB	1MB	2-WAY	8MB
4MB	NONE	PAGE ONLY	16MB
4MB	4MB	2-WAY	32MB

## HARDWARE INSTALLATION

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### CACHE MEMORY INSTALLATION

**TYPE & SPEED** - The cache memory system consist of two parts, one is TAG SRAM, the other is DATA SRAM. The TAG SRAM type used in this motherboard is 16Kx4-20nS(2 pcs.), and the DATA SRAM type is 8Kx8-25nS or 32Kx8-25nS(8 pcs.).

**TOTAL MEMORY** - The motherboard can be installed 64KB or 256KB cache memory when you use 8Kx8 or 32Kx8 type DATA SRAM separately. Please refer to the following table When you install the cache memory:

SRAM TYPE	JP 18/19/22	JP 20/21	TOTAL MEMORY
8Kx8	OPEN	2-3 CLOSE	64KB
32Kx8	CLOSE	1-2 CLOSE	256KB

\*NOTE: IF THERE ARE NOT JUMPERS ON POSITION JP 18-22, THE CACHE SIZE IS FIXED TO 256KB.

PROCESSOR INSTALLATION

SYSTEM SPEED - The system speed is depended on the OSC. frequency. You can change the osc. component on U33 position from 40MHz to 66.67MHz for 20MHz to 33MHz system.

CPU TYPE - The motherboard can use 80486DX or 80486SX cpu. You can use 80486DX-25 or 80486DX-33 for 25MHz or 33MHz separately, also you can use 80486SX-20 for 20MHz or 25MHz system. The jumper JP31 must be set up properly to match the cpu type, please refer to following table:

CPU TYPE	JP31	OSC. FREQ.
80486DX-25	1-2 CLOSE	50MHz
80486DX-33	1-2 CLOSE	66.67MHz
80486SX-20	2-3 CLOSE	40MHz
*80486SX-20	2-3 CLOSE	50MHz

\*NOTE: FOR BETTER PERFORMANCE, YOU CAN USE 80486SX-20 IN 25MHz SYSTEM, BECAUSE 80486SX-20 IS MODIFIED FROM 80486DX-25.

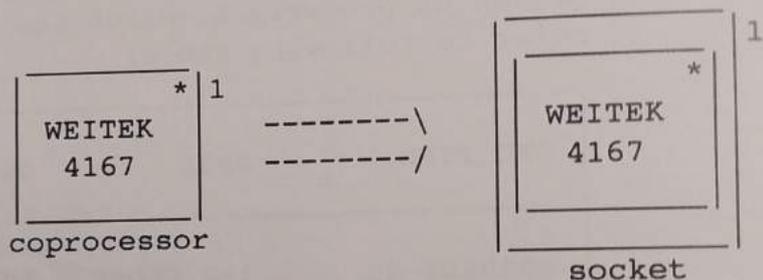
## HARDWARE INSTALLATION

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### COPROCESSOR INSTALLATION

**TYPE & SPEED** - There is a 144 pin PGA socket on board, you can add a numeric coprocessor WEITEK-4167 to this socket. The speed of coprocessor must match the system speed.

**INSTALLATION** - WHEN YOU INSTALL THE COPROCESSOR ON SOCKET, PLEASE NOTICE THE PIN 1 OF COPROCESSOR IS IN THE SAME CONNER WITH THE PIN 1 OF SOCKET!



## SOFTWARE SETUP

## BIOS SETUP

## OVERVIEW

- The AMI BIOS SETUP program is used to configure the system. These system options are stored in the CMOS. If the CMOS is good, the system is configured with the values stored in the CMOS. If the CMOS is bad, the system is configured with default values stored in the ROM BIOS. There are two sets of default values stored in the ROM BIOS - the BIOS SETUP default values and the POWER-ON default values. The BIOS SETUP default values are the ones supposed to give the optimum performance for the system. They are the best case of default values. The POWER-ON default values are the ones for the stable values for the system. They are the worst case of default values.

## START SETUP

- After POWER-ON and booting the system, the user is given a message for entering SETUP program. Normally, you can press "DEL" or "ESC" key to enter SETUP program. The following options will be shown on the screen:

```

BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITYS
(C) 1990 American Megatrends Inc., All Rights Reserved

```

```

STANDARD CMOS SETUP
  ADVANCED CMOS SETUP
  ADVANCED CHIPSET SETUP
  AUTO CONFIGURATION WITH BIOS DEFAULTS
  AUTO CONFIGURATION WITH POWER-ON DEFAULTS
  HARD DISK UTILITY
  WRITE TO CMOS AND EXIT
  DO NOT WRITE TO CMOS AND EXIT

```

Standard CMOS Setup for changing Time, Date, Disk Type, etc.

```

_____| ESC:Exit | -|-:Sel  F2/F3:Color  F10:Save & Exit | ____

```

STANDARD SETUP - Select "STANDARD CMOS SETUP" and press "ENTER" KEY; the following warning message will be shown on the screen:

**BIOS SETUP PROGRAM - WARNING INFORMATION**  
(C) 1990 American Megatrends Inc., All Rights Reserved

Improper Use of Setup may Cause Problems !!

If System Hangs, Reboot System and Pressing "ESC" key

Do any of the following After Entering Setup

- (i) Alter Options to make System Work
- (ii) Load BIOS Setup Defaults
- (iii) Load Power-On Defaults

Hit "ESC" to Stop now, Any other Key to Continue

Press "ENTER" key again; the user will be given the following STANDARD CMOS SETUP options:

**BIOS SETUP PROGRAM - STANDARD CMOS SETUP**  
 (C) 1990 American Megatrends Inc., All Rights Reserved

Date(mn/date/year):Sun, Nov 11 1990      Base memory:640KB  
 Time(hour/min/sec):13:54:42              Ext. memory:3072KB  
 Daylight saving :Disable    Cylin Head Wpcom LZone sect Size  
 Hard disk C: type :Not Installed  
 Hard disk D: type :Not Installed  
 Floppy drive A: :Not Installed  
 Floppy Drive B: :Not Installed  
 Primary display :Monochrome  
 Keyboard :Installed

Month : Jan, Feb .....Dec
Date : 01, 02, 03.....31
Year : 1901, 1902.....2099

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1
2	3	4	5	6	7	8

ESC:Exit | -| -:Sel F2/F3:Color PU/PD:Modify

These options are used to configure system. Use "UP/DOWN/LEFT/RIGHT ARROW" key to move the cursor and "PAGE UP/PAGE DOWN" key to modify these options.

- \*Date: Month, Date and Year.
- \*Time: Hour, Minute and Second.
- \*Daylight Saving: Disable or Enable.
- \*Hard Disk C: and D: The user can choose the "STANDARD TYPE" from 1 - 46 or "USER TYPE" 47 which the user can enter the hard disk parameters.
- \*Floppy drive A: and B: 360KB 5 1/4", 1.2KB 5 1/4", 720KB 3 1/2", 1.44Mb 3 1/2" or Not Installed.
- \*Primary Display: Monochrome, Color 40x25, VGA/PGA/EGA, Color 80x25, Not Installed.
- \*Keyboard: Installed or Not Installed.

After setting the STANDARD CMOS SETUP, the user can press "ESC" key to enter main options.

ADVANCED SETUP - Select "ADVANCED CMOS SETUP", and press "ENTER" key to enter ADVANCED SETUP options. The user is still given a warning message; press "ENTER" again. The following options will be shown on the screen:

BIOS SETUP PROGRAM - ADVANCED CMOS SETUP	
(C) 1990 American Megatrends Inc., All Rights Reserved	
Weitek Processor	: Absent
System Boot Up Sequence	: A:, C:
External Cache Memory	: Enable
Internal Cache Memory	: Enable
Fast Gate A20 Options	: Enable
Turbo Switch Function	: Enable
Shadow Ram Options	: Both

---

ESC:Exit | - | -:Sel (Ctrl)PU/PD:Modify F1:Help F2/F3:Color |  
 F5:Old Value F6:BIOS Setup Defaults F7:Power-on Defaults |

If the ADVANCED SETUP is first time be used or the POWER-ON DEFAULT values have been loaded, the user must press "F6" & "Y" to load BIOS DEFAULT values. Otherwise the system may not work with it's maximum performance.

- \*Weitek Processor: Set Present when weitek processor is installed; otherwise set Absent.
- \*System Boot Up Sequence: "A:, C:" for Floppy drive A: booting first or "C:, A:" for Hard Disk drive C: booting first.
- \*External Cache Memory: Enable or Disable on board 2nd cache Memory.
- \*Internal Cache Memory: Enable or Disable CPU internal 8KB cache memory.
- \*Fast Gate A20 options: Enable for higher performance when EXTENSION DRAM ( > 1MB ) is used. Disable for using some program which must be run in fully compatible PC/AT mode.
- \*Shadow Ram Option: " Main " for main BIOS shadow; "Video" for video BIOS shadow; "Both" for main & video BIOS shadow; "Disable" for none shadow.

After setting the ADVANCED CMOS SETUP, the user can press "ESC" key to enter main options.

CHIPSET SETUP - Select "ADVANCED CHIPSET SETUP" in main option and press "enter" key to enter CHIPSET SETUP options. The user is still given a warning message, press "ENTER" key again. The following options will be shown on the screen:

BIOS SETUP PROGRAM - ADVANCE CHIPSET SETUP	
(C) 1990 American Megatrends Inc., All Rights Reserved	
BUS Clock Selection	: CLKIN/4
256KB Memory Relocation	: DISABLE
DRAM Write Wait State	: 0 W/S
Non-Cacheable Block-3 Base	: 0 KB
Non-Cacheable Block-3 Size	: Disable

---

ESC:Exit | - | -:Sel (Ctrl)PU/PD:Modify F1:Help F2/F3:Coior |  
 F5:Old Value F6:BIOS Setup Defaults F7:Power-on Defaults |

If the CHIPSET SETUP is first time be used or the POWER-ON DEFAULT values have been loaded, the user must press "F6" & "Y" to load BIOS DEFAULT values. Otherwise the system may not work with it's maximum performance.

\*Bus Clock Selection: CLKIN/3 for 20MHz or 25MHz system speed, CLOCK/4 for 33MHz system speed. If there is any problem about slow I/O device, the user can use CLOCKIN/4 or CLOCKIN/5 for 25MHz or 33MHz operation.

\*256KB Memory Relocation: Enable or Disable. The relocation (REMAP) function is only available with new version chipset.(REV. C)

\*Dram Write Wait State: 0 W/S for maximum performance, 1 W/S or 2 W/S for slower speed DRAM. ( Some brands 80nS DRAM may need to use 1 W/S.)

\*Non-Cacheable Block-3: The user can set up a non-cache block from one starting addresss to another ending address in total memory map. The starting address is the BASE address, the block SIZE is the ending address minus the starting address. The BIOS is always set up 640KB - 1MB (384Kb) block to non-cacheable.

After setting the CHIPSET CMOS SETUP, the user can press "ESC" key to enter main options.

**AUTO CONFIGURATION** - The user can use AUTO CONFIGURATION function to load the BIOS DEFAULT or POWER-ON values. The BIOS DEFAULT values support the best performance, so the user can load the BIOS DEFAULT values instead of setting up the ADVANCED CMOS & ADVANCED CHIPSET SETUP.

The POWER-ON DEFAULT values support stable values but low performance values for system, so the user don't load the POWER-ON DEFAULT values except some troubles appear.

**END SETUP** - After setting up the total CMOS SETUP, the user can use "HARD DISK UTILITY" or end the setup process by selecting "WRITE TO CMOS AND EXIT" and press "ENTER" & "y" keys. If the user is just checking the setup values or there are any wrong setup values, the user can select "DO NOT WRITE TO CMOS AND EXIT" and press "ENTER" & "Y" keys to end the BIOS SETUP program.

#### KEYBOARD SETTING FUNCTION

"CNTL-ALT-DEL" - Pressing these keys simultaneously will cause system to WARM START (SOFT RESET).

"CNTL-ALT-(+)" - Pressing these keys simultaneously will change the system speed to high speed. (TURBO, ALL CACHE MEMORY ENABLE)

"CNTL-ALT-(-)" - Pressing these keys simultaneously will change the system speed to low speed. (NORMAL, DISABLE CACHE MEMORY)

AT TECHNICAL INFORMATION

I/O BUS CONNECTOR PIN OUT

62 PIN SLOT PIN OUT:

GND	B01	*	*	A01	-I/O CH CHK
RESET	B02	*	*	A02	SD07
+5V	B03	*	*	A03	SD06
IRQ9	B04	*	*	A04	SD05
-5V	B05	*	*	A05	SD04
DRQ2	B06	*	*	A06	SD03
-12V	B07	*	*	A07	SD02
-OWS	B08	*	*	A08	SD01
+12V	B09	*	*	A09	SD00
GND	B10	*	*	A10	-I/O CH RDY
-SMEMW	B11	*	*	A11	AEN
-SMEMR	B12	*	*	A12	SA19
-IOW	B13	*	*	A13	SA18
-IOR	B14	*	*	A14	SA17
-DACK3	B15	*	*	A15	SA16
-DRQ3	B16	*	*	A16	SA15
-DACK1	B17	*	*	A17	SA14
-DRQ1	B18	*	*	A18	SA13
-REFRESH	B19	*	*	A19	SA12
BCLK	B20	*	*	A20	SA11
IRQ7	B21	*	*	A21	SA10
IRQ6	B22	*	*	A22	SA09
IRQ5	B23	*	*	A23	SA08
IRQ4	B24	*	*	A24	SA07
IRQ3	B25	*	*	A25	SA06
-DACK2	B26	*	*	A26	SA05
T/C	B27	*	*	A27	SA04
BALE	B28	*	*	A28	SA03
+5V	B29	*	*	A29	SA02
OSC	B30	*	*	A30	SA01
GND	B31	*	*	A31	SA00

AT TECHNICAL INFORMATION

36 PIN SLOT PIN OUT :

-MEMCS16	D01	*	*	C01	SBHE
-I/OCS16	D02	*	*	C02	LA23
IRQ10	D03	*	*	C03	LA22
IRQ11	D04	*	*	C04	LA21
IRQ12	D05	*	*	C05	LA20
IRQ15	D06	*	*	C06	LA19
IRQ14	D07	*	*	C07	LA18
-DACK0	D08	*	*	C08	LA17
DRQ0	D09	*	*	C09	-MEMR
-DACK5	D10	*	*	C10	-MEMW
DRQ5	D11	*	*	C11	SD08
-DACK6	D12	*	*	C12	SD09
DRQ6	D13	*	*	C13	SD10
-DACK7	D14	*	*	C14	SD11
DRQ7	D15	*	*	C15	SD12
+5V	D16	*	*	C16	SD13
-MASTER	D17	*	*	C17	SD14
GND	D18	*	*	C18	SD15

## I/O &amp; MEMORY MAP

MEMORY MAP : [0000000-009FFFF] System memory used by DOS and application program.  
[00A0000-00BFFFF] Display buffer memory for VGA /EGA/CGA/MONOCROME adapter.  
[00C0000-00DFFFF] Reserved for I/O device BIOS ROM or RAM buffer.  
[00E0000-00EFFFF] Reserved for BASIC ROM.  
[00F0000-00FFFFFF] System BIOS ROM.  
[0100000-1FFFFFF] System extension memory.

I/O MAP : [000-01F] DMA controller.(MASTER)  
[020-021] INTERRUPT controller.(MASTER)  
[022-023] CHIPSET control registers I/O ports.  
[040-05F] TIMER control registers.  
[060-06F] KEYBOARD interface controller.(8042)  
[070-07F] RTC ports & CMOS I/O ports.  
[080-09F] DMA register.  
[0A0-0BF] INTERRUPT controller.(SLAVE)  
[0C0-0DF] DMA controller.(SLAVE)  
[0F0-0FF] MATH COPROCESSOR  
[1F0-1F8] HARD DISK controller.  
[278-27F] PARALLEL port-2.  
[2B0-2DF] GRAPHICS adapter controller.  
[2F8-2FF] SERIAL port-2.  
[360-36F] NETWORK ports.  
[378-37F] PARALLEL port-1  
[3B0-3BF] MONOCROME & PRINTER adapter.  
[3C0-3CF] EGA adapter.  
[3D0-3DF] CGA adapter.  
[3F0-3F7] FLOPPY DISK controller.  
[3F8-3FF] SERIAL port-1.

AT TECHNICAL INFORMATION

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TIMER & DMA CHANNELS MAP

TIMER MAP : TIMER Channel-0 System timer to interrupt controller  
TIMER Channel-1 DRAM REFRESH request  
TIMER Channel-2 SPEAKER tone generator

DMA CHANNELS : DMA Channel-0 Available  
DMA Channel-1 IBM SDLC  
DMA Channel-2 FLOPPY DISK adapter  
DMA Channel-3 Available  
DMA Channel-4 Cascade for DMA controller 1  
DMA Channel-5 Available  
DMA Channel-6 Available  
DMA Channel-7 Available

INTERRUPT MAP

NMI : Parity check error

IRQ (H/W) : 0 System TIMER interrupt from TIMER-0  
1 KEYBOARD output buffer full  
2 Cascade for IRQ 8-15  
3 SERIAL port 2  
4 SERIAL port 1  
5 PARALLEL port 2  
6 FLOPPY DISK adapter  
7 PARALLEL port 1  
8 RTC clock  
9 Available  
10 Available  
11 Available  
12 Available  
13 MATH coprocessor  
14 HARD DISK adapter  
15 Available

RTC & CMOS RAM MAP

RTC & CMOS	:	00	Seconds
		01	Second alarm
		02	Minutes
		03	Minutes alarm
		04	Hours
		05	Hours alarm
		06	Day of week
		07	Day of month
		08	Month
		09	Year
		0A	Status register A
		0B	Status register B
		0C	Status register C
		0D	Status register D
		0E	Diagnostic status byte
		0F	Shutdown byte
		10	FLOPPY DISK drive type byte
		11	Reserve
		12	HARD DISK type byte
		13	Reserve
		14	Equipment byte
		15	Base memory low byte
		16	Base memory high byte
		17	Extension memory low byte
		18	Extension memory high byte
		19-2d	Reserve
		2E-2F	2-byte CMOS RAM checksum
		30	Reserved for extension memory low byte
		31	Reserved for extension memory high byte
		32	DATE CENTURY byte
		33	INFORMATION FLAG
		34-3F	Reserve
		40-7f	Reserved for CHIPSET SETTING DATA