

**JUKI – 3711P/3712**  
**Pentium® III, Celeron™, VIA Cyrix® III with**  
**Ethernet, VGA/LCD**  
**Ver 1.x**

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## Introduction

Welcome to the JUKI-3711P/3712 Pentium® III, Celeron Single Board Computer. The JUKI-3711P/3712 board is a PCISA/ISA form factor board, which comes equipped with high performance Pentium® III, Celeron™, VIA Cyrix® III Processor and advanced high performance multi-mode I/O, designed for the system manufacturers, integrators, or VARs that want to provide all the performance, reliability, and quality at a reasonable price.

In addition, the JUKI-3711P/3712 provides C&T MI69K VGA chip. The VGA which provides up to 1280x1024 resolution. The VGA memory is share main memory.

An advanced high performance super AT I/O chip – Winbond W83977TF-AW is used in the JUKI-3711P/3712 board. Both on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT architecture's.

JUKI-3711P/3712 uses Intel 82559ER Fast Ethernet Multifunction PCI Controller as LAN controller. The 82559ER is a fully integrated 10BASE-T/100BASE-TX LAN solution with high performance networking functions and low power features.

JUKI-3711P/3712 uses the advanced VIA Chipset, 82C693A/82C596B.

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## 1.1 Specifications :

- **CPU:** Celeron™ 300- 566Mhz or above Processor  
Pentium® III (FCPGA) 450 - 866Mhz or above Processor  
VIA Crix® III 466Mhz or above Processor
- **FSB:** 66/100/133MHz
- **Bus:** PCISA Bus, compatible to Jump PISA Ver. 1.07 (JUKI-3711P)  
ISA Bus (JUKI-3712)
- **DMA channels :** 7
- **Interrupt levels :** 15
- **Chipset :** VIA 82C693A/82C596B
- **RAM memory :** Single 168-pin DIMM sockets support SDRAM module. The max memory is up to 256MB.
- **Ultra ATA66 IDE Interface :** Two PCI Enhance IDE hard drives.  
The south bridge supports Ultra ATA66 IDE interface.
- **Floppy disk drive interface :** Single 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drive.
- **Two high speed Serial ports :** NS16C550 compatible UARTs, with one RS232/RS422/RS485 multifunction serial port.  
RS485 provides the function of auto-direction.
- **Bi-directional Parallel Port:** compatible with ECP and EPP
- **Hardware Monitoring:** W83L784R to monitor power supply voltage and fan speed status.
- **IrDA port :** Support Serial Infrared(SIR) and Amplitude Shift Keyed IR(ASKIR) interface.
- **USB port :** Support two USB ports for future expansion. USB 1.1.
- **WatchDog Timer :** can be set by 1,2,3... 255 seconds period. Reset or NMI was generated when CPU did not periodically trigger the timer. Your program use hex 843 and 443 to control the watch-dog and generate a system reset.

- **E<sup>2</sup>Key Function** : Nonvolatile memory for data backup and security.
- **VGA Controller** : C&T Mini 69000 VGA controller, 2M memory .  
Screen Resolution : up to 1280x1024 in 8-bit Color. Supports CRT & LCD interface
- **Intel 82559ER Fast Ethernet LAN PCI Controller** : IEEE 802.3u Auto-Negotiation support for 10BASE-T/100BASE-TX standard. Fast back-to-back transmission support with minimum interframe spacing. Connected to your LAN through RJ45 connector.
- **CompactFlash Disk**: 100% compatible with IDE hard disk
- **Keyboard Connector**
- **Mouse** : PS/2 Mouse Port on-board.
- **Power Consumption** : +5V/3.5A (PIII 500, 64M DRAM, running WINSTONE on NT4.0)
- **Operating Temperature** : 0° ~ 60°C ( CPU needs Cooler)

---

## 1.2 What You Have

In addition to this *User's Manual*, the JUKI-3711P/3712 package includes the following items:

- JUKI-3711P/3712 Celeron™, Pentium® III Single Board Computer
- RS-232(Top), RS422/485(Bottom) Cable x 1
- Printer Cable x 1
- FDD Cable x 1
- IDE HDD DMA66 Cable x1
- 6-pin Mini-Din to 5-pin Din Keyboard & PS2 Mouse Adapter Cable x 1
- CD-ROM Driver x1

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

# 2

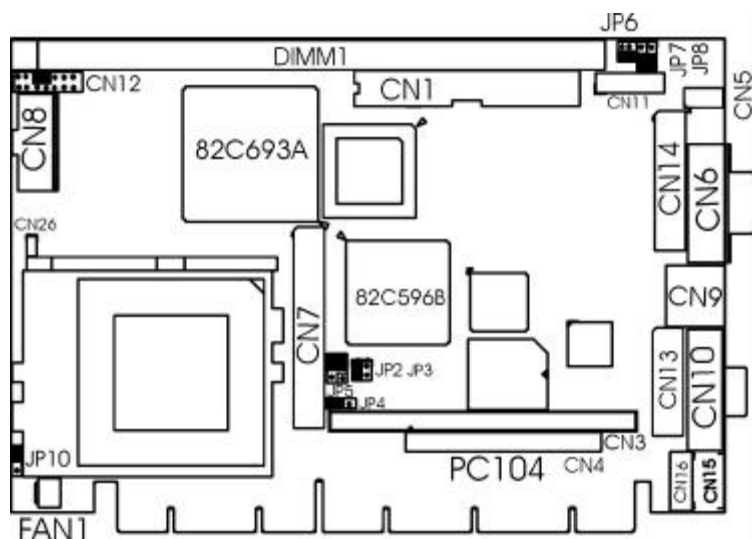
## Installation

This chapter describes how to install the JUKI-3711P/3712. At first, the layout of JUKI-3711P/3712 is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for the JUKI-3711P/3712's configuration, such as CPU type selection, system clock setting, and watch dog timer, are also included.

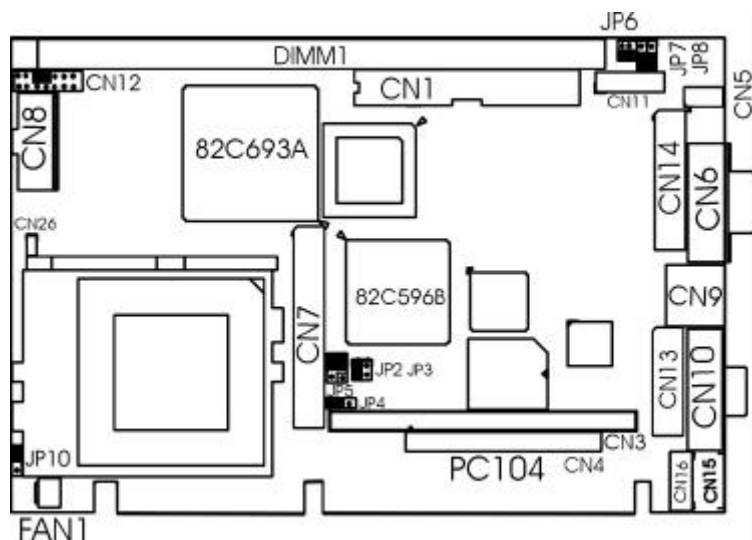


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## 2.1 JUKI-3711P's Layout



## JUKI-3712's Layout



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## 2.2 CompactFlash Disk Master/Slave Mode

This jumper is used to select CompactFlash Disk device mode.  
The CompactFlash used IDE channel 2.

- **JP2 : CompactFlash Disk Mode Setup**

JP2	DESCRIPTION
SHORT	Master
OPEN	Slave

---

## 2.3 Clear CMOS Setup

If want to clear the CMOS Setup(for example forgot the password you should clear the setup and then set the password again.),you should close the JP3 about 3 seconds, then open again. Set back to normal operation mode.

- **JP3 : Clear CMOS Setup**

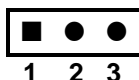
JP3	DESCRIPTION
OPEN	Keep CMOS Setup (Normal Operation)
SHORT	Clear CMOS Setup

---

## 2.4 Inverter Power Select

This jumper is for LCD inverter power voltage setting.

- **JP4 : Inverter VCC**

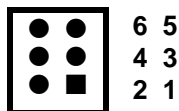


JP4	DESCRIPTION
1-2	+12V
2-3	+5V

---

## 2.5 LCD Panel Shift Clock/Panel VCC Select

This jumper is for the setting of LCD panel shift clock mode and Panel power voltage.



- **JP5 : LCD Panel Shift Clock**

JP5	DESCRIPTION
3-5	Normal
1-3	Invert

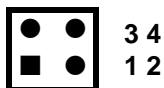
- **JP5 : Panel VCC**

JP5	DESCRIPTION
4-6	+3.3V
2-4	+5V

---

## 2.6 Serial Port B(COM2) Mode select

This jumper is for the setting of serial port B(COM2) operation mode.



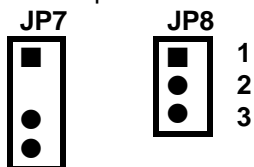
- **JP6 : Serial Port B(COM2)**

JP6	DESCRIPTION
1-2	RS-232
3-4	RS-422/485

---

## 2.7 Serial Port B -- RI or External Power Select

These jumpers are used to set the "RI" pin of COM2 as ring signal or external power.



### • JP7, JP8 : RI mode select

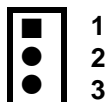
JP7	JP8	DESCRIPTION
X	2-3	RS-232 RI
1-2	1-2	+5V
2-3	1-2	+12V

X: dont care

---

## 2.8 CPU Fan Power Voltage Select

This jumper is for the setting of CPU Fan power voltage. If your CPU card dont use backplane, you can connect power to CN8. You must choose jumper 2-3 or use external power for CPU Fan.



### • JP10 : CPU Fan Power Voltage

JP10	DESCRIPTION
1-2	+12V
2-3	+5V

# 3

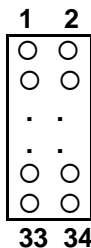
## Connection

This chapter describes how to connect peripherals, switches and indicators to the JUKI-3711P/3712 board.

### 3.1 Floppy Disk Drive Connector

JUKI-3711P/3712 board equipped with a 34-pin daisy-chain driver connector cable.

#### • CN14 : FDC CONNECTOR



PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE A#
11	GROUND	12	DRIVE SELECT B#
13	GROUND	14	DRIVE SELECT A#
15	GROUND	16	MOTOR ENABLE B#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	WRITE GATE#

25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	N/C	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	N/C	34	DISK CHANGE#

### 3.2 PCI IDE Disk Drive Connector

You can attach two IDE( Integrated Device Electronics) hard disk drives to the JUKI-3711P/3712 IDE controller. This connector supports ATA-66 hard disk ribbon cable.

• **CN1 : IDE Interface Connector**

**2 4 6 ... 36 38 40**



**1 3 5 ... 35 37 39**

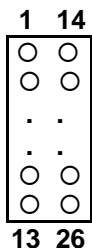
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	N/C	28	BALE -- DEFAULT
29	N/C	30	GROUND -- DEFAULT
31	INTERRUPT	32	IOCS16# -- DEFAULT
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

---

### 3.3 Parallel Port

This port is usually connected to a printer. The JUKI-3711P/3712 includes an on-board parallel port, accessed through a 26-pin flat-cable to connector CN13.

• **CN13 : Parallel Port Connector**



PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE
17	PRINTER SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	GROUND
25	GROUND	26	NC

---

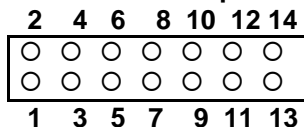
### 3.4 Serial Ports

The JUKI-3711P/3712 offers two high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO. COM2 also provides multifunctions as RS422 (full-duplex) or RS485 (half-duplex). The RS485 can automatically change its direction depending on the data flow. So you can take the advantage of normal serial port programming without special care for its direction control.

**CN10** : COM1 (external DB-9 connector)

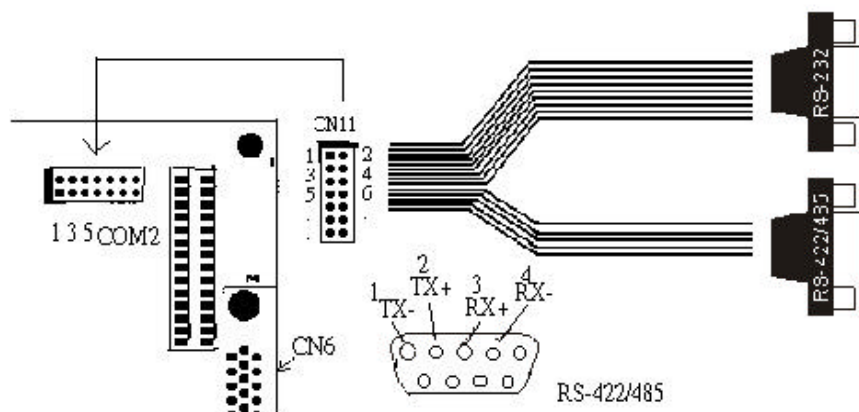
**CN11** : COM2

• **CN11 : Serial Port 14-pin Connector**



CN10	CN11	DESCRIPTION
1	1	DATA CARRIER DETECT (DCD, RS232)
2	3	RECEIVE DATA (RXD, RS232)
3	5	TRANSMIT DATA (TXD, RS232)
4	7	DATA TERMINAL READY (DTR, RS232)
5	9	GROUND (GND, RS232)
6	2	DATA SET READY (DSR, RS232)
7	4	REQUEST TO SEND (RTS, RS232)
8	6	CLEAR TO SEND (CTS, RS232)
9	8	RING INDICATOR (RI, RS232)
	10	N/C
	11	TX+ (RS422/RS485)
	12	TX- (RS422/RS485)
	13	RX+ (RS422)
	14	RX- (RS422)





#### Cable for COM2:

Notes : If you want to use the RS485 mode, just connect to pin1 and pin2.If you want to use the RS422 mode, then connect to pin 1~4.

## 3.5 Keyboard Connector

The JUKI-3711P/3712 provides 6-pin Min-DIN keyboard/mouse connector.

#### • CN15 : 6-pin Mini-DIN Keyboard/Mouse Connector

PIN NO.	DESCRIPTION
1	KEYBOARD DATA
2	MOUSE DATA
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	MOUSE CLOCK

• **CN16 : 5-pin External Keyboard Connector**



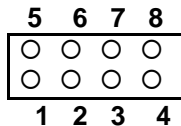
PIN NO.	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	NC
4	GROUND
5	+5V

---

### 3.6 USB Port Connector

The JUKI-3711P/3712 built-in two USB ports for the future new I/O bus expansion. It complies with USB 1.1.

**CN5 : USB 0,1**



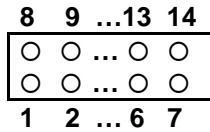
1	VCC	5	GROUND
2	DATA-	6	DATA +
3	DATA+	7	DATA -
4	GROUND	8	VCC

---

### 3.7 External Switch, Indicator and IrDA

There are several external switches and indicators for monitoring and controlling your CPU board. All the functions are in the CN12 connector.

### CN12 Pin Assignment and Functions :



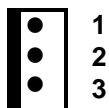
FUNCTION		PIN NO.	DESCRIPTION
SPEAKER		8	SPK SIGNAL
		11	VCC
BUZZER		10	JUMPER
		11	
RESET		6	POWER GOOD
		7	GROUND
HDD LED		14	LED
		13	VCC
IrDA		1	VCC
		2	NC
		3	IRRX
		4	GND
		5	IRTX

---

## 3.8 Fan Connector

The JUKI-3711P/3712 provides CPU cooling fan connector, chassis fan connector. These connectors can supply 12V/500mA to the cooling fan. In the connector there have a "rotation" pin . The rotation pin is to get the fan's rotation signal to system. So the system BIOS could recognize the fan speed. Please note only specified fan offers the rotation signal.

• **FAN1 : CPU Fan Connector**



PIN NO.	DESCRIPTION
1	Ground
2	12V
3	Rotation Signal

---

### 3.9 LAN RJ45 Connector

JUKI-3711P/3712 is equipped with a built-in 10/100Mbps Ethernet Controller. You can connect it to your LAN through RJ45 LAN connector. The pin assignments are as following:

• **CN9 : LAN RJ45 Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TX+	7.	N/C
2	TX-	8.	N/C
3.	RX+	9.	Speed +
4.	N/C	10.	Speed -
5	N/C	11.	Active +
6.	RX-	12.	Active -

---

### 3.10 VGA Connector

The pin assignments are as following

• **CN6 : 15-pin Connector**

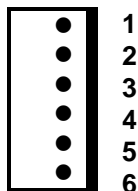
1	RED	2	GREEN
3	BLUE	4	NC
5	GROUND	6	GROUND
7	GROUND	8	GROUND
9	NC	10	GROUND
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

---

### 3.11 Power Connector

The pin assignments are as following

#### **CN8 : Power Connector**



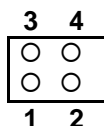
PIN NO.	DESCRIPTION
1	GROUND
2	GROUND
3	NC
4	+5V
5	+5V
6	+5V

---

### 3.12 LAN LED Connector

The pin assignments are as following

#### **CN27 : LAN LED**

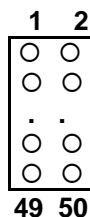


LAN LED					
+	-	Description	LED ON	LED OFF	LED Flashing
2	1	Speed	100Mbps	10Mbps	NA
4	3	Link/Active	Link Ok	Link Fail	Sending or Receiving

### 3.13 CD Connector

JUKI-3711P/3712 board equipped with a 50-pin connector.

• **CN14 : LCD CONNECTOR**



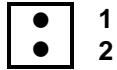
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	N/C	2	P33
3	P34	4	P31
5	P35	6	P32
7	P30	8	P28
9	P29	10	P27
11	P25	12	P26
13	P24	14	P21
15	P23	16	P22
17	P16	18	P20
19	P17	20	P18
21	P19	22	P14
23	P13	24	P12
25	P15	26	P11
27	P7	28	P10
29	Panel-VCC	30	Panel-VCC
31	P9	32	P8
33	P4	34	P6
35	P3	36	P5
37	P2	38	P1
39	M	40	P0
41	Shift Clock	42	Enable Backlight
43	FPVDD	44	FLM
45	Enable VEE	46	LP
47	GND	48	GND
49	Inverter VCC	50	Inverter VCC

---

### 3.14 Power LED Connector

The pin assignments are as following

#### CN26 : Power LED Connector



PIN NO.	DESCRIPTION
1	LED +
2	LED -

# 4

## BIOS Setup

---

### 4.1 Introduction

This chapter discusses Award™ Setup program built into the ROM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in battery-backed CMOS RAM so that it retains the Setup information while the power is off.

---

### 4.2 Starting Setup

The BIOS is immediately activated when you turn on the computer. While the BIOS is in control, the Setup program can be activated in one of two ways:

1. By pressing <Del> immediately after switching the system on, or
2. by pressing the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to...

PRESS F1 TO CONTINUE, DEL TO ENTER SETUP



---

## 4.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Key	Function
Up Arrow	Move to the previous item
Down Arrow	Move to the next item
Left Arrow	Move to the item on the left (menu bar)
Right Arrow	Move to the item on the right (menu bar)
Esc	Main Menu: Quit without saving changes Submenus: Exit Current page to the next higher level menu
Move Enter	Move to the item you desired
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu - - Exit current page and return to Main Menu
F1 key	General help on Setup navigation keys
F5 key	Load previous values from CMOS
F6 key	Load the fail-safe defaults from BIOS default table
F7 key	Load the optimized defaults
F10 key	Save all the CMOS changes and exit

---

## 4.4 Main Menu

Once you enter the AwardBIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and two exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

ROM PCI/ISA BIOS (2A6LGI99)

CMOS SETUP UTILITY

AWARD SOFTWARE, INC.

STANDARD CMOS SETUP BIOS FEATURE SETUP CHIPSET FEATURE SETUP POWER MANAGEMENT SETUP PNP/PCI CONFIGURATION LOAD BIOS DEFAULTS LOAD SETUP DEFAULTS	INTEGRATED PERIPHERALS SUPERVISOR PASSWORD USER PASSWORD IDE HDD AUTO DETECTION SAVE & EXIT SETUP EXIT WITHOUT SAVING
Esc : Quit	↑ ↓ ← → : Select Item
F10 : Save & Exit Setup	(Shift)F2 : Change Color

Note that a brief description of each highlighted selection appears at the bottom of the screen.

## **Setup Items**

The main menu includes the following main setup categories.

---

### ***STANDARD CMOS SETUP***

Use this menu for basic system configuration. See Section 4.5 for the details.

---

### ***BIOS FEATURES SETUP***

Use this menu to set the Advanced Features available on your system. See Section 4.6 for the details.

---

### ***CHIPSET FEATURES SETUP***

Use this menu to change the values in the chipset registers and optimize your system's performance. See section 4.7 for the details.

---

### ***INTEGRATED PERIPHERALS***

Use this menu to specify your settings for integrated peripherals. See section 4.8 for the details.

---

### ***IDE HDD AUTO DETECTION***

Use this menu to specify your settings for integrated peripherals. See section 4 for the details.

---

### ***POWER MANAGEMENT SETUP***

Use this menu to specify your settings for power management. See section 4.9 for the details.

---

### ***PNP / PCI CONFIGURATION***

This entry appears if your system supports PnP / PCI. See section 4.10 for the details.

---

### ***LOAD BIOS DEFAULTS***

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate. See section 8 for the details.

---

### ***LOAD SETUP DEFAULTS***

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. While Award has designed the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs. See section 8 for the details.

---

### ***SUPERVISOR / USER PASSWORD***

Use this menu to set User and Supervisor Passwords. See section 9 for the details.

---

### ***SAVE & EXIT SETUP***

Save CMOS value changes to CMOS and exit setup. See section 10 for the details.

---

### ***EXIT WITHOUT SAVE***

Abandon all CMOS value changes and exit setup. See section 10 for the details.

## 4.5 STANDARD CMOS SETUP

The items in Standard CMOS Setup Menu are divided into 10 categories. Each category includes no, one or more than one setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

```
ROM PCI/ISA BIOS [2A61G199]
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.
```

Date (mm:dd:yy) : Wed, Jul 19 2000									
Time (hh:mm:ss) : 22 : 49 : 45									
HARD DISKS	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE	
Primary Master	: Auto	0	0	0	0	0	0	0	Auto
Primary Slave	: Auto	0	0	0	0	0	0	0	Auto
Secondary Master	: Auto	0	0	0	0	0	0	0	Auto
Secondary Slave	: Auto	0	0	0	0	0	0	0	Auto
Drive A : 1.44M, 3.5 in.									
Drive B : None									
LCD&CRT : Both									
Halt On : All Errors									
ESC : Quit									
F1 : Help									
↑ ↓ → ← : Select Item									
{Shift}F2 : Change Color									
F4/PD/+/- : Modify									

Figure 1: The Standard CMOS Setup

## Standard CMOS Setup Selections

Item	Options	Description
Date	MM DD YYYY	Set the system date.
Time	HH : MM : SS	Set the system time
IDE Primary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
IDE Primary Slave	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
IDE Secondary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
IDE Secondary Slave	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
Drive A Drive B	None 360K, 5.25 in 1.2M, 5.25 in 720K, 3.5 in 1.44M, 3.5 in 2.88M, 3.5 in	Select the type of floppy disk drive installed in your system
LCD & CRT	Both LCD CRT	Select the default display device
Halt On	All Errors No Errors All, but Keyboard All, but Diskette All, but Disk/Key	Select the situation in which you want the BIOS to stop the POST process and notify you

**Table 2 Standard CMOS Setup Selections**

## 4.6 BIOS FEATURES SETUP

This section allows you to configure your system for basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

ROM PCI/ISA BIOS (2A6LG199) BIOS FEATURES SETUP AWARD SOFTWARE, INC.			
Virus Warning	: Disabled	Video BIOS Shadow	: Enabled
CPU Internal Cache	: Enabled	C8000-CBFFF Shadow	: Disabled
External Cache	: Enabled	CC000-CFFFF Shadow	: Disabled
CPU L2 Cache ECC Checking	: Enabled	D0000-D3FFF Shadow	: Disabled
Quick Power On Self Test	: Disabled	D4000-D7FFF Shadow	: Disabled
Boot Sequence	: A,C,SCSI	D8000-DBFFF Shadow	: Disabled
Swap Floppy Drive	: Disabled	DC000-DFFFF Shadow	: Disabled
Boot Up Floppy Seek	: Enabled	LCD Panel Type	: 640x480 18B-TFT
Boot Up NumLock Status	: On		
IDE HDD Block Mode	: Enabled		
Gate A20 Option	: Fast		
Memory Parity/ECC Check	: Disabled		
TypeMatic Rate Setting	: Disabled		
TypeMatic Rate (Chars/Sec)	: 6		
TypeMatic Delay (Msec)	: 250		
Security Option	: Setup	ESC : Quit	F4 : Select Item
PCI/VGA Palette Snoop	: Disabled	F1 : Help	F5/F6/+/- : Modify
OS Select For EMM > 64MB	: Non-OS2	F5 : Old Values (Shift)F2	: Color
		F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	

### Virus Warning

Allows you to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area, BIOS will show a warning message on screen and alarm beep.

Enabled	Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.
Disabled	No warning message will appear when anything attempts to access the boot sector or hard disk partition table.

---

### **CPU Internal Cache/External Cache**

These two categories speed up memory access. However, it depends on CPU/chipset design.

Enabled	Enable cache
Disabled	Disable cache

---

### **CPU L2 Cache ECC Checking**

This item allows you to enable/disable CPU L2 Cache ECC checking. The choice: Enabled, Disabled.

---

### **Quick Power On Self Test**

This category speeds up Power On Self Test (POST) after you power up the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.

Enabled	Enable quick POST
Disabled	Normal POST

---

### **Boot Sequence**

The BIOS attempts to load the operating system from the devices in the sequence selected in these items.

The Choice: Floppy, LS/ZIP, HDD, SCSI, CDROM, Disabled.

---

### **Swap Floppy Drive**

If the system has two floppy drives, you can swap the logical drive name assignments.

The choice: Enabled/Disabled.

---

### **Boot Up Floppy Seek**

Seeks disk drives during boot up. Disabling speeds boot up.

The choice: Enabled/Disabled.

---

### **Boot Up Numlock Status**

Select power on state for NumLock.

The choice: On/Off.



---

### **IDE HDD Block Mode**

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If your IDE hard drive supports block mode (most new drives do), select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.

The choice: Enabled, Disabled

---

### **Gate A20 Option**

Select if chipset or keyboard controller should control GateA20.

Normal	A pin in the keyboard controller controls GateA20
Fast	Lets chipset control GateA20

---

### **Memory Parity/ECC Check**

Select if chipset or keyboard controller should control GateA20.

Normal	A pin in the keyboard controller controls GateA20
Fast	Lets chipset control GateA20

---

### **Typematic Rate Setting**

Key strokes repeat at a rate determined by the keyboard controller. When enabled, the typematic rate and typematic delay can be selected.

The choice: Enabled/Disabled.

---

### **Typematic Rate (Chars/Sec)**

Sets the number of times a second to repeat a key stroke when you hold the key down.

The choice: 6, 8, 10, 12, 15, 20, 24, 30.

---

### **Typematic Delay (Msec)**

Sets the delay time after the key is held down before it begins to repeat the keystroke.

The choice: 250, 500, 750, 1000.

---

### **Security Option**

Select whether the password is required every time the system boots or only when you enter setup.

System	The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.
Setup	The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

Note: To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.

---

### **PCI/VGA Palette Snoop**

Leave this field at *Disabled*.

Choices are Enabled, Disabled.

---

### **OS Select For DRAM > 64MB**

Select the operating system that is running with greater than 64MB of RAM on the system.

The choice: Non-OS2, OS2.

---

### **Video BIOS Shadow**

Key strokes repeat at a rate determined by the keyboard controller. When enabled, the typematic rate and typematic delay can be selected. The choice: Enabled/Disabled.

---

### **C8000-CBFFF Shadow / DC000-DFFFF Shadow**

These categories determine whether option ROMs will be copied to RAM. An example of such option ROM would be support of on-board SCSI.

Enabled	Optional shadow is enabled
Disabled	Optional shadow is disabled

---

### **LCD Panel Type**

This setting is to select the type of LCD used with JUKI-3711P/3712. User can select appropriate setting according to his LCD. But not all the same type of LCD could be support. You could try it first and if it does not work, the VGA BIOS have to be modified to fit the LCD.

1024 x 768 DSTN
640 x 480 MONO
640 x 480 DSTN
800 x 600 DSTN
640 x 480 12 BIT TFT
640 x 480 18 BIT TFT
1024 x 768 TFT
800 x 600 TFT

---

## 4.7 CHIPSET FEATURES SETUP

ROM PCI/ISA BIOS (2A6LG199) CHIPSET FEATURES SETUP AWARD SOFTWARE, INC.	
Bank 0/1 DRAM Timing : <b>SDRAM 8/10ns</b>	Auto Detect DIMM/PCI Clk : Disabled
SDRAM Cycle Length : 3	Spread Spectrum Modulated: Disabled
DRAM Clock : Host CLK	CPU Host Clock : 66
System BIOS Cacheable : Disabled	CPU Die Temperature :
Video RAM Cacheable : Disabled	CPU FAN Speed :
OnChip USB : Disabled	Vcore : +3.3V :
	+ 5 V :
	ESC : Quit           ↑↓←→ : Select Item
	F1 : Help           PU/PD/+/- : Modify
	F5 : Old Values (Shift)F2 : Color
	F6 : Load BIOS Defaults
	F7 : Load Setup Defaults

This section allows you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It also coordinates communications between the conventional ISA bus and the PCI bus. It must be stated that these items should never need to be altered. The default settings have been chosen because they provide the best operating conditions for your system.

---

### ***Bank 0/1 DRAM Timing***

The first chipset settings deal with CPU access to dynamic random access memory (DRAM). The default timings have been carefully chosen and should only be altered if data is being lost. Such a scenario might well occur if your system had mixed speed DRAM chips installed so that greater delays may be required to preserve the integrity of the data held in the slower memory chips.

The Choice: SDRAM 8/10ns, Normal, Medium, Fast, Turbo.

---

***SDRAM Cycle Length***

Select the number of SCLKs for an access cycle.

The Choice: 2, 3.

---

***DRAM Clock***

Selecting HOST Clk is DRAM Clock equal CPU HOST Clock. If you choice HOST-33, DRAM Clock equal CPU Host Clock-33MHz.

The Choice: HOST Clk, HOST-33.

---

***System BIOS Cacheable***

Selecting *Enabled* allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

The choice: Enabled, Disabled.

---

***Video BIOS Cacheable***

Select Enabled allows caching of the video BIOS , resulting in better system performance. However, if any program writes to this memory area, a system error may result.

The Choice: Enabled, Disabled.]

---

***OnChip USB***

Select *Enabled* if your system contains a Universal Serial Bus (USB) controller and you have USB peripherals.

The choice: Enabled, Disabled.

---

***USB Keyboard Support***

Select *Enabled* if your system contains a Universal Serial Bus (USB) controller and you have a USB keyboard.

The choice: Enabled, Disabled.

---

***Auto Detect DIMM/PCI Clk***

This item allows you to enable/disable auto detect DIMM/PCI Clock.

The choice: Enabled, Disabled.

---

---

### ***Spread Spectrum Modulated***

This item allows you to enable/disable the spread spectrum modulate.  
The choice: Enabled, Disabled.

---

## **4.8 INTEGRATED PERIPHERALS**

```
ROM PCI/ISA BIOS (2A61G199)
INTEGRATED PERIPHERALS
AWARD SOFTWARE, INC.
```

OnChip IDE Channel0 : <b>Enabled</b> OnChip IDE Channel1 : Enabled IDE Prefetch Mode : Enabled Primary Master PIO: Auto Primary Slave PIO: Auto Secondary Master PIO: Auto Secondary Slave PIO: Auto Primary Master UDMA: Auto Primary Slave UDMA: Auto Secondary MasterUDMA: Auto Secondary Slave UDMA: Auto Init Display First : PCI Slot  KBC input clock : 8 MHz Onboard FDC Controller: Enabled Onboard Serial Port 1 : 3F8/IRQ4 Onboard Serial Port 2 : 2F8/IRQ3 UART Mode Select : Normal	Onboard Parallel Port : 378/IRQ7 Parallel Port Mode : SPP       ESC : Quit           ↑↓←→ : Select Item F1 : Help           PU/PD/+/- : Modify F5 : Old Values   (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults
---	---

---

### ***OnChip IDE Channel 0/1***

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Select *Enabled* to activate each channel separately.

The choice: Enabled, Disabled.

---

### ***IDE Primary/Secondary Master/Slave PIO***

The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device.

The choice: Auto, Mode 0, Mode 1, Mode 2, Mode 3, Mode 4.

---

### ***IDE Primary/Secondary Master/Slave UDMA***

Ultra DMA/33/66 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and your system software both support Ultra DMA/33/66, select Auto to enable BIOS support.

The Choice: Auto, Disabled.

---

### ***Init Display First***

This item allows you to decide to active whether PCI Slot or on-chip VGA first

The choice: PCI Slot, Onboard , AGP

---

### ***KBC input clock***

This item is keyboard controller input clock option.

The choice: 6, 8 ,12, 16 MHz .

---

### ***Onboard FDC Controller***

Select Enabled if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install and-in FDC or the system has no floppy drive, select Disabled in this field.

The choice: Enabled, Disabled.

---

### ***Onboard Serial Port 1/Port 2***

Select an address and corresponding interrupt for the first and second serial ports.

The choice: 3F8/IRQ4, 2E8/IRQ3, 3E8/IRQ4, 2F8/IRQ3, Disabled, Auto.

---

### ***UART Mode Select***

Select a operation mode.

The choice: IrDA, ASKIR, Normal.

---

### ***UART2 Duplex Mode***

Select a UART2 speed mode.

The choice: Full, Half.

---

***RxD , TxD Active***

Select a RxD, TxD active level.

The choice: Hi,Hi, Hi,Lo, Lo,Hi, Lo,Lo

---

***Onboard Parallel Port***

Select an address and corresponding interrupt for the parallel port.

The Choice: 3BC/IRQ7, 378/IRQ7, 278/IRQ5, Disabled.

---

***Parallel Port Mode***

Select parallel port Mode.

The Choice: SPP, EPP, ECP, ECP+EPP.

---

***ECP Mode Use DMA***

Select a ECP mode used DMA channel.

The choice: 1, 3.

---

***EPP Mode Select***

Select a EPP mode.

The choice: EPP1.7, EPP1.9.



---

## 4.9 POWER MANAGEMENT SETUP

The Power Management Setup allows you to configure your system to most effectively save energy while operating in a manner consistent with your own style of computer use.

```
ROM PCI/ISA BIOS (2A6L9199)
POWER MANAGEMENT SETUP
AWARD SOFTWARE, INC.
```

Power Management : User Define	Primary INTR : OFF
PM Control by APM : Yes	
Video Off After : Suspend	
Video Off Method : v/HSYNC+Blank	
MODEM Use IRQ : 3	
HDD Power Down : Disable	
Doze Mode : Disable	
Suspend Mode : Disable	
** PM Events **	
VGA : OFF	
LPT & COM : LPT/COM	
HDD & FDD : ON	
DMA/master : OFF	
ESC : Quit            ↑↓←→ : Select Item	
F1 : Help            PU/PD/+/- : Modify	
F5 : Old Values    (Shift)F2 : Color	
F6 : Load BIOS Defaults	
F7 : Load Setup Defaults	

---

### POWER MANAGEMENT

This category allows you to select the type (or degree) of power saving and is directly related to the following modes:

1. HDD Power Down
2. Doze Mode
3. Suspend Mode

There are four selections for Power Management, three of which have fixed mode settings.

Disable (default)	No power management. Disables all four modes
Min. Power Saving	Minimum power management. Doze Mode = 1 hr. Standby Mode = 1 hr., Suspend Mode = 1 hr., and HDD Power Down = 15 min.
Max. Power Saving	Maximum power management -- <b>ONLY AVAILABLE FOR SL CPU's</b> . Doze Mode = 1 min., Standby Mode = 1 min., Suspend Mode = 1 min., and HDD Power Down = 1 min.
User Defined	Allows you to set each mode individually. When not disabled, each of the ranges are from 1 min. to 1 hr. except for HDD Power Down which ranges from 1 min. to 15 min. and disable.

---

### ***Video Off After***

This determines the manner in which the monitor is blanked.  
The choice: Yes, No.

---

### ***Video Off Method***

This determines the manner in which the monitor is blanked.

V/H SYNC+Blank	This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

---

### ***MODEM Use IRQ***

This determines the IRQ in which the MODEM can use.  
The choice: 3, 4, 5, 7, 9, 10, 11, NA.

---

### ***HDD Power Down***

When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.  
The choice: Enabled, Disabled.

---

### ***Doze Mode***

When enabled and after the set time of system inactivity, the CPU clock will run at slower speed while all other devices still operate at full speed.

---

### ***Suspend Mode***

When enabled and after the set time of system inactivity, all devices except the CPU will be shut off.

The choice: Enabled, Disabled.

### **PM Events**

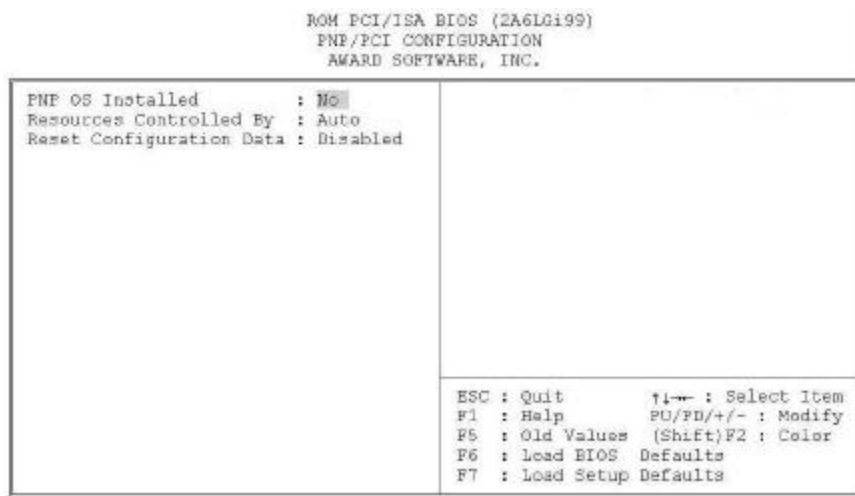
PM events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything which occurs to a device which is configured as *Enabled*, even when the system is in a power down mode.

**Primary IDE 0, Primary IDE 1**  
**Secondary IDE 0, Secondary IDE 1**  
**FDD, COM, LPT Port**  
**PCI PIRQ[A-D] #**

---

## 4.10 PNP/PCI CONFIGURATION SETUP

This section describes configuring the PCI bus system. PCI, or **P**ersonal **C**omputer **I**nterconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.



---

### ***PNP OS Installed***

This item allows you to determine install PnP OS or not.  
The choice: Yes, No.

---

### ***Resource controlled by***

The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows®95. If you set this field to "manual" choose specific resources by going into each of the sub menu that follows this field (a sub menu is preceded by a "➤").  
The choice: Auto(ESCD), Manual.

---

### ***Reset Configuration Data***

Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system can not boot.

The choice: Enabled, Disabled .

---

### ***IRQ Resources***

When resources are controlled manually, assign each system interrupt a type, depending on the type of device using the interrupt.

---

#### ***IRQ3/4/5/7/9/10/11/12/14/15 assigned to***

This item allows you to determine the IRQ assigned to the ISA bus and is not available to any PCI slot. Legacy ISA for devices compliant with the original PC AT bus specification, PCI/ISA PnP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.

The Choice: *Legacy ISA* and *PCI/ISA PnP*.

---

### ***DMA Resource***

When resources are controlled manually, assign each system DMA channel a type, depending on the type of device using the DM channel.

---

#### ***DMA 0/1/3/5/6/7 assigned to***

Legacy ISA for devices compliant with the original PC AT bus specification, PCI/ISA PnP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.

Choices are *Legacy ISA* and *PCI/ISA PnP*.

---

## 4.11 Defaults Menu

Selecting “Defaults” from the main menu shows you two options which are described below

### **LOAD BIOS SETUP DEFAULTS**

When you press <Enter> on this item you get a confirmation dialog box with a message similar to:

LOAD BIOS DEFAULTS (Y/N) ? **N**

Pressing Y'loads the BIOS default values for the most stable, minimal - performance system operations.

### **LOAD SETUP DEFAULTS**

When you press <Enter> on this item you get a confirmation dialog box with a message similar to:

LOAD SETUP DEFAULTS (Y/N) ? **N**

Pressing Y'loads the default values that are factory settings for optimal performance system operations.

---

## 4.12 IDE HDD auto detection

This option will automatically checks the correct hard disk type.

---

## 4.13 Supervisor/User Password Setting

You can set either supervisor or user password, or both of them. The differences between are:

### **supervisor password :**

can enter and change the options of the setup menus.

### **user password :**

just can only enter but do not have the right to change the options of the setup menus. When you select this function, the following message will appear at the center of the screen to assist you in creating a password.

### **ENTER PASSWORD:**

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

### **PASSWORD DISABLED.**

When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option (see Section 3). If the Security option is set to password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

---

## 4.14 Exit Selecting

### Save & Exit Setup

Pressing <Enter> on this item asks for confirmation:

**Save to CMOS and EXIT (Y/N)?** **Y**

Pressing "Y" stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

### Exit Without Saving

Pressing <Enter> on this item asks for confirmation:

**Quit without saving (Y/N)?** **Y**

This allows you to exit Setup without storing in CMOS any change. The previous selections remain in effect. This exits the Setup utility and restarts your computer.



# Appendix A. Watch-Dog Timer

The WatchDog Timer is a device to ensure that standalone systems can always recover from abnormal conditions that cause the system to crash. These conditions may result from an external EMI or a software bug. When the system stops working, hardware on the board will perform hardware reset (cold boot) to bring the system back to a known state. Three I/O ports control the operation of WatchDog Timer.

443 (hex)	Write	Set WatchDog Time period
443 (hex)	Read	Enable the refresh the WatchDog Timer.
043/843 (hex)	Read	Disable the WatchDog Timer.

Prior to enable the WatchDog Timer, user has to set the time-out period. The resolution of the timer is 1 second and the range of the timer is from 1 sec to 255 sec. You need to send the time-out value to the I/O port – 443H, and then enable it by reading data from the same I/O port – 443H. This will activate the timer that will eventually time out and reset the CPU board. To ensure that this reset condition wont occur, the WatchDog Timer must be periodically refreshed by reading the same I/O port 443H. This must be done within the time-out period that is set by the software, please refer to the example program. Finally, we have to disable the WatchDog timer by reading the I/O port -- 843H or 043H. Otherwise the system could reset unconditionally.

*A tolerance of at least 5% must be maintained to avoid unknown routines in the operating system (DOS), such as disk I/O that can be very time-consuming. Therefore if the time-out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.*

**Example assembly program:**

```
TIMER_PORT = 443H
TIMER_START = 443H
TIMER_STOP = 843H
::Initial Timer Counter
MOV DX, TIMER_PORT
MOV AL, 8 ::8 seconds
OUT DX, AL
MOV DX, TIMER_START
IN AL, DX ::Start counter
```

```
W_LOOP:
MOV DX, TIMER_STOP
IN AL, DX
MOV DX, TIMER_START
IN AL, DX ::Restart counter
::Add Your Appliaction Here
CMP EXIT_AP, 0
JNE W_LOOP
MOV DX, TIMER_STOP
IN AL, DX
::Exit AP
```

## Appendix B. E<sup>2</sup> Key™ Function

The JUKI-3711P/3712 provides an outstanding E<sup>2</sup>KEY™ function for system integrator. Based on the E<sup>2</sup>KEY™, you can free to store the ID Code, Password or Critical Data in the 1Kbit EEPROM. Because the EEPROM is nonvolatile memory, you don't have to worry for losing very important data.

Basically the E<sup>2</sup>KEY™ is based on a 1Kbit EEPROM which is configured to 64 words (from 0 to 63). You could access (read or write) each word at any time.

When you start to use the E<sup>2</sup>KEY™ you should have the utility in the package. The software utility will include four files as follows,

**README.DOC**  
**E2KEY.OBJ**  
**EKEYDEMO.C**  
**EKEYDEMO.EXE.**

The E2KEY.OBJ provides two library functions for user to integrate their application with E<sup>2</sup>KEY™ function. These library (**read\_e2key** and **write\_e2key**) are written and compiled in C language. Please check the following statement, then you will know how to implement it easily.

**unsigned int read\_e2key(unsigned int address)**

/\* This function will return the E<sup>2</sup>KEY™'s data at address. The address range is from 0 to 63. Return data is one word, 16 bits

**\*/void write\_e2key(unsigned int address, unsigned data)**

/\* This function will write the given data to E<sup>2</sup>KEY™ at certain address. The address range is from 0 to 63. The data value is from 0 to 0xffff. \*/

To easily start to use the function, please refer to the included EKEYDEMO.C code at first.

# Appendix C. Address Mapping

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## IO Address Map

I/O address Range	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller #1, Master
040-05F	8254 timer
060-06F	8042 (Keyboard Controller)
070-07F	Real time Clock, NMI Mask
080-09F	DMA Page Register
0A0-0BF	Interrupt Controller #2
0C0-0DF	DMA Controller #2
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F2	Core logic programming configuration
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2 (LPT3)
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1 (LPT2)
3B0-3BF	Monochrome Display and Printer Adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/Graphics Monitor Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1

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## 1<sup>st</sup> MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-C7FFF	VGA BIOS
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

\*Default setting

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## IRQ Mapping Table

IRQ0	System Timer	IRQ8	RTC clock
IRQ1	Keyboard	IRQ9	Available
IRQ2	Cascade to IRQ Controller	IRQ10	Available
IRQ3	COM2	IRQ11	Available
IRQ4	COM1	IRQ12	PS2 mouse
IRQ5	Available	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Secondary IDE

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## DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Floppy disk ( 8-bit transfer )
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available