JUKI-750E
DX4-100 MHz with Ethernet SBC Version 3.0

User Manual Version 3.0
November 19, 2003

Support

For any questions regarding the content of this manual or related, email us at: support@iei.com.tw.

Table of Contents

Chapter 1 Introduction

Thank you for choosing JUKI-750E DX4-100 with Ethernet Single Board Computer. JUKI-750E is a standalone board with PC/104 connector, equipped with two COM ports and advanced high-performance multi-mode I/O and Ethernet function, designed for the system manufacturers, integrators, or VARs to provide quality and reliable performance.

An advanced high performance super I/O function is supported by the Maple chipset. The on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT and XT architecture's, as well as EPP and ECP.

The LCD/CRT controller is TOPRO TP6508 which can provide LCD and CRT display at the same time. The LCD interface connector is a 44-pin 2.0mm pitch type.

The most outstanding feature in JUKI-750E is built-in PC/104 expansion bus. Based on the PC/104 bus, you can easily install over thousands of PC/104 modules from hundreds vendors in the world. JUKI-750E has external power connector that can be connected to power supply directly. It is very suitable for your standalone applications. Also, it provides four COM Ports: three RS232C, one RS-232C or RS-422/485 Port, for industrial field site application.

1.1 Specifications

JUKI-750E DX4-100 with LCD/CRT & Ethernet Single Board Computer provides the following specification:

- **System**

  - **CPU:** ACC Maple, includes DX4-100 CPU
  - **DMA channels:** 7
  - **Interrupt levels:** 15
  - **Real-time clock/calendar:** DS12887/BQ3287 or equivalent chip and quartz oscillator, 128B CMOS memory, powered by lithium battery for over 10 years of data retention.

- **Memory**

  - **RAM memory:** 1MB to 64MB
  - **Shadow RAM memory:** System BIOS: 0F0000h ~ 0FFFFFh

- **LCD/CRT Interface**

  - **Chipset:** TP6508
  - **Resolution:** Supports up to 800 x 600 resolution for STN and TFT LCD Flat Panel. Supports 1024x768 256 colors for CRT display.
  - **Display Memory:** 1MB on board.

- **Ethernet Interface**

  - **Chipset:** Realtek RTL-8019 chipset
  - **Type:** 10MBps 16-bit Ethernet, Novell NE2000 compatible.

- **Input/Output**

- **IDE hard disk drive interface:** Supports up to two IDE hard disk drives. Can be disabled by BIOS Setup.
- **Floppy disk drive interface:** Supports two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives. Can be disabled by BIOS Setup.
- **Two high-speed Series ports:** NS16C550 compatible UARTs with send/receive 16-byte FIFOs, data rates are independently programmable from 115.2K baud down to 50 baud. Modem control circuitry.
- **Multi-mode Parallel Port:**
  i. **Standard mode -** IBM PC/XT, PC/AT, PS/2 compatible bi-directional parallel port.
  ii. **Enhanced mode -** Enhanced parallel port (EPP) compatible with IEEE 1284 specification.
  iii. **High-speed mode -** Microsoft and Hewlett Packard extended capabilities port (ECP), compatible with IEEE 1248 specification.

- **Industrial features**

- **Watchdog timer:** Software programmable time period can be set from 1 to 255 seconds. Reset is generated when CPU does not periodically trigger the timer.
- **PC/104 expansion bus:** A 64-pin and 40-pin, industrial embedded-PC bus standard.
- **External power connector:** 8-pin male connector (Molex 6410 series compatible)
- **Keyboard connector:** A 5-pin header on board and 6-pin mini-DIN keyboard connector is located on the mounting bracket.

- **General**

- **Power Consumption:** +5V @ 1.65A (DX4-100MHz, 32MB RAM)
- **Operating Temperature:** 0° ~ 55 °C
- **Humidity:** 5% ~ 95%, non-condense
- **Dimension:** 180mm(W) x 122mm (L), standard AT form factor

1.2 Package Contents

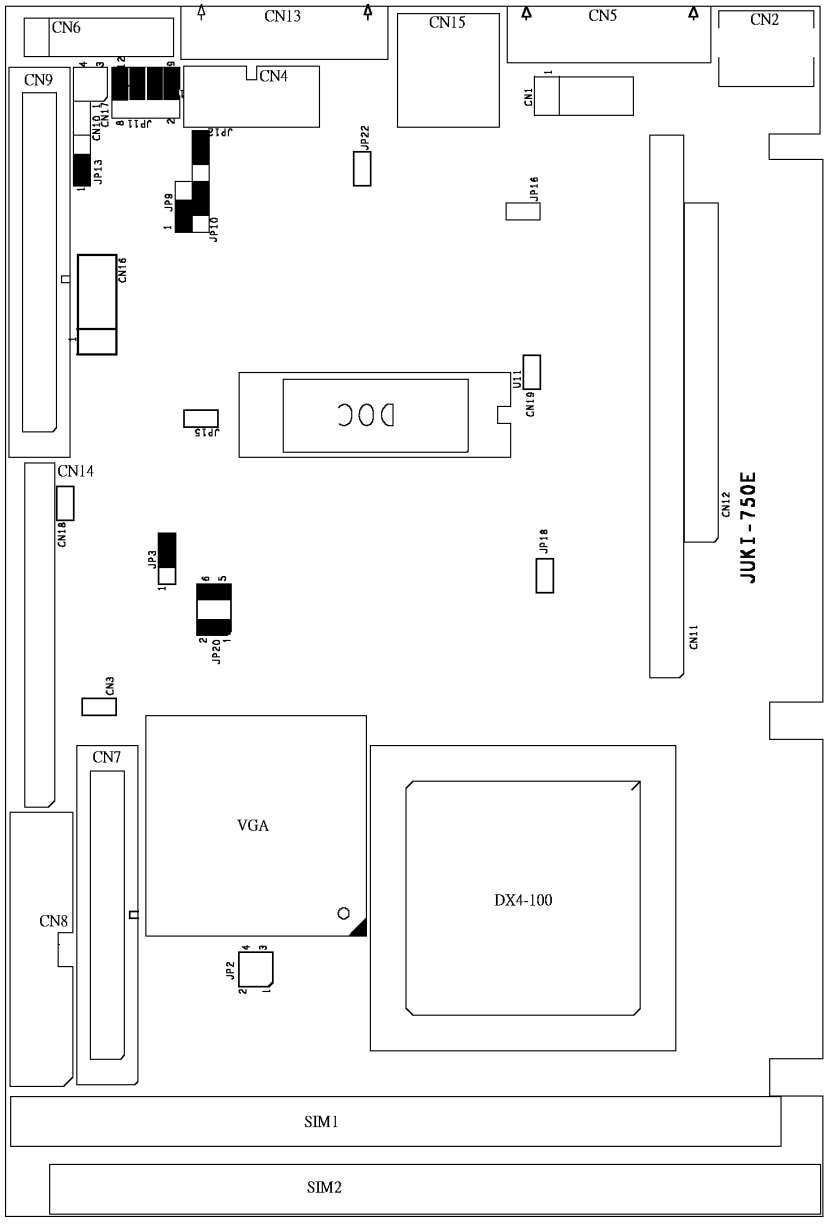
JUKI-750E package includes the following items:

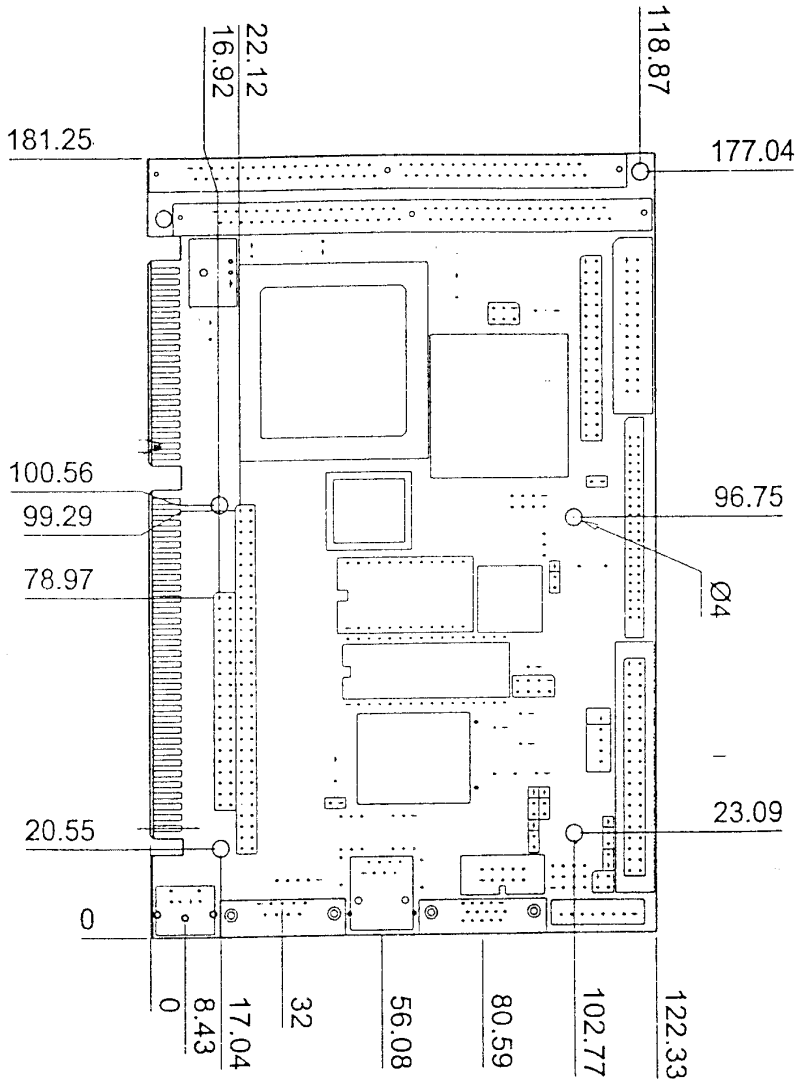
- JUKI-750E DX4-100 with LCD/CRT & Ethernet single board computer
- RS-232/printer cable
- FDD/HDD cable
- 6-pin mini-din to 5-pin din keyboard/mouse adapter cable
- User manual

Chapter 2 Installation

This chapter describes how to install the JUKI-750E. At first, the layout of JUKI-750E is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for the JUKI-750E's configuration, such as CPU type selection, system clock setting, and interrupt IRQ setting for serial ports and parallel port, are also included.

2.1 JUKI-750E Layout




22.12
16.92
118.87
181.25
177.04
100.56
99.29
96.75
78.97
Ø4
20.55
23.09
0
0
8.43
17.04
32
56.08
80.59
102.77
122.33

2.2 CPU Setting for JUKI-750E

The system clock is generated by the ICS650, and the different CPU clock frequency can be selected by JP2 and shown as following table:

- **JP2: CPU Speed Setting**

JP2	1-2	3-4
75MHz	CLOSE	CLOSE
100MHz	OPEN	OPEN

2.3 Watchdog Timer

Watchdog Timer is enabled by reading port 543H. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again. The Watchdog Timer is disabled by reading port 943H.

- **JP3: Watchdog Timer Type Selector**

JP3	Description
2-3	RESET
1-2	RESERVED

2.4 DiskOnChip™ Flash Disk

DiskOnChip™ Flash Disk Chip (DOC) is produced by M-Systems. The DOC (MD-2200-xMB) is a 32-pin DIP package. DOC is 100% compatible to hard disk and DOS. No extra software utility is needed. It is “plug and play”, easy and reliable to use. Currently DOC is available in 2MB to 72MB capacity.

- **JP20: DiskOnChip™ Memory Address Setting**

Address	1-2	3-4	5-6
CE000	OPEN	CLOSE	CLOSE
D6000	CLOSE	OPEN	CLOSE
DE000	OPEN	OPEN	CLOSE

2.5 COM2 RI Pin Setting

COM2 (CN4) can supply +5V or +12V power to the serial devices via RI pin (Pin 9) of the COM port connector. The maximum current is 1A with fuse protection for the total two connector’s 5V/12V output. If the output is set to 12V, customers have to make sure to have 12V to supply to the board.

- **JP12/JP13: COM2 (CN4), Pin 9**
  RI signal or 5V/12V output selection

Function	JP12	JP13
RI Signal	2-3	1-2
5V	1-2	2-3

12V	1-2	1-2

2.6 COM2 RS-232, RS-422 or RS-485 Setting

The COM2 (CN4) can be set to RS-232 or RS-422/485 for industrial field site application.

- **JP9/JP10/JP11: COM2 (CN4) RS-232/422/485 setting**

COM2 Function	JP9	JP10	JP11
RS-232	1-2	2-3	3-10 5-11 7-12
RS-422	2-3	1-2	3-4 5-6 7-8
RS-485	1-2	1-2	3-4 5-6 7-8

2.7 Free IRQ3 and IRQ4 Setting

To free IRQ3, IRQ4 for other application, disable the COM2 (for IRQ3) or disable the COM1 (for IRQ4) by BIOS setting. And also have to close the jumper JP15 to free IRQ3 and close the jumper JP16 to free IRQ4.

- **JP15: Free IRQ3 setting**

OFF	Enable COM2
ON	Disable COM2

- **JP16: Free IRQ4 setting**

OFF	Enable COM1
ON	Disable COM1

2.8 Clear CMOS Setup

If you forget the CMOS password, you can clear or reset it by closing the JP18. After JP18 is closed, turn on the power for about 3 seconds then turn it off and open the JP18. Now, the password has been cleared from your CMOS.

- **JP18: Clear CMOS**

OFF	NORMAL
ON	CLEAR

2.9 Realtek8019AS Setting

Realtek8019AS can be set to PNP MODE or JUMPERLESS MODE.

- **JP22: Realtek8019AS setting**

OFF	PNP mode
ON	JUMPERLESS mode

Chapter 3 Connection

This chapter describes how to connect peripherals, switches and indicators to the JUKI-750E board. You can access most of the connectors from the top of the board while it is installed in the chassis.

3.1 Floppy Disk Drive Connector

JUKI-750E board comes equipped with a 34-pin daisy-chain driver connector cable. The detailed pin assignment of the connector is specified in the following table:

- **CN7: FDC Connector**

PIN	Description	PIN	Description
1	GROUND	2	REDUCE WRITE CURRENT#
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	GROUND	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	GROUND	34	DISK CHANGE#

3.2 IDE Disk Drive Connector

You can attach two IDE (Integrated Device Electronics) hard disk drives to the JUKI-750E internal controller. The board comes equipped with a 40-pin flat-cable connector. The detailed pin assignment of the connector is specified as following table:

- **CN9: IDE Interface Connector**

PIN	Description	PIN	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. JUKI-750E includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN8. The detailed pin assignment of the connector is specified as following table:

- **CN8: Parallel Port Connector**

PIN	Description	PIN	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	IOW#	24	GROUND

25	GROUND		

3.4 Serial Ports

JUKI-750E offers two high-speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports let you connect to serial devices or a communication network. One DB-9 connector and thee 10-pin headers are provides by the JUKI-750E. The detailed pin assignment of the connectors are specified as following tables:

- **COM1 (CN5): Serial Port Connector**

PIN	Description
1	DATA CARRIER DETECT (DCD)
2	RECEIVE DATA (RXD)
3	TRANSMIT DATA (TXD)
4	DATA TERMINAL READY (DTR)
5	GROUND (GND)
6	DATA SET READY (DSR)
7	REQUEST TO SEND (RTS)
8	CLEAR TO SEND (CTS)
9	RING INDICATOR (RI)

- **COM2 (CN4): 2x5-pin header at RS-232 mode**

PIN	Description	PIN	Description
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GND	10	N/C

- **COM2 (CN4): 2x5-pin header at RS-422/485 mode**

PIN	Description	PIN	Description
1	TX-	6	RX+
2	TX+	7	RX-
3		8	
4		9	
5		10	

3.5 Keyboard / Mouse Connector

JUKI-750E provides two keyboard connectors. Two 5-pin header connectors CN16, CN1 supports passive backplane applications. Another one is a 6-pin Mini-DIN connector CN2 on the board-mounting bracket for single board computer applications.

- **CN16: 5-pin Header Keyboard Connector**

PIN	Description
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	N/C
4	GROUND
5	+5V

- **CN1: 5-pin Header Mouse Connector**

PIN	Description
1	MOUSE DATA
2	N/C
3	GROUND
4	+5V
5	MOUSE CLOCK

- **CN2: 6-pin Mini-DIN Keyboard / Mouse Connector**

PIN	CN15 keyboard
1	KEYBOARD DATA
2	MOUSE DATA
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	MOUSE CLOCK

3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board. These features are completely optional install them if you need them. The detailed pin assignment of the connectors is specified as following table:

- **CN3: Reset Button**

PIN	Description
1	External Reset
2	Ground

- **CN10: IDE LED Connector**

PIN	Description
1	HDD ACTIVE#

2	+5V

3.7 External Power Connector

JUKI-750E has an on-board external power connector CN6. You can connect power directly to the CPU board for some single-board-computer (without passive backplane) application.

- **CN6: External Power Connector**

PIN	Description
1	+5V
2	+12V
3	-12V
4	GROUND
5	GROUND
6	-5V
7	+12V
8	+5V

- **CN19: LED Power Connector**

PIN	Description
1	+5V LED
2	GND

3.8 External Speaker

JUKI-750E has its own buzzer, you also can connect to the external speaker through the connector CN18:

- **CN18: Speaker**

PIN	Description
1	SPEAKER SIGNAL
2	+5V

3.9 PC/104 Connection Bus

JUKI-750E PC/104 expansion bus let you attach any kind of PC/104 modules. The PC/104 bus has already become the industrial embedded PC bus standard, so you can easily install over thousands of PC/104 modules from hundreds of vendors in the world. There are two PC/104 connectors on this board: PC/104-64 and PC/104-40.

- **CN12: PC/104-40 Connector**

PIN	Description	PIN	Description
21	GND	1	GND
22	SBHE#	2	MCS16#
23	LA23	3	IOCS16#
24	LA22	4	IRQ10
25	LA21	5	IRQ11
26	LA20	6	IRQ12
27	LA19	7	IRQ15
28	LA18	8	IRQ14
29	AL17	9	DACK0#
30	MEMR#	10	DRQ0
31	MEMW#	11	DACK5#
32	SD8	12	DRQ5
33	SD9	13	DACK6#
34	SD10	14	DRQ6
35	SD11	15	DACK7#
36	SD12	16	DRQ7
37	SD13	17	VCC
38	SD14	18	MASTER#
39	SD15	19	GND
40	GND	20	GND

- **CN11: PC/104-64 Connector**

PIN	Description	PIN	Description
1	IOCHCK#	33	GND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS
9	SD0	41	+12V
10	IOCHRDY	42	GND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#
14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	N/C
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

3.10 VGA/LCD Interface Connector

JUKI-750E provides a 2x22-pin connector for the LCD flat panel interface and a DB15 VGA connector.

- **CN13: 15-pin Female Connector**

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

- **CN14: LCD Interface Connector**

PIN	Description	PIN	Description
1	+12V	2	+12V
3	GND	4	GND
5	+5V	6	+5V
7	FPVEE	8	GND
9	P0	10	P1
11	P2	12	P3
13	P4	14	P5
15	P6	16	P7
17	P8	18	P9
19	P10	20	P11
21	P12	22	P13
23	P14	24	P15
25	P16	26	P17
27	P18	28	P19
29	P20	30	P21
31	P22	32	P23
33	GND	34	GND
35	SHFCLK	36	FLM
37	M	38	LP
39	GND	40	ENABLK
41	GND	42	N/C
43	+5V	44	5V

3.11 LAN RJ45 Connector

ROCKY-750E has a built-in RJ45 LAN connector for 10Mbps Ethernet (NE-2000 compatible) operation.

- **CN15: LAN RJ45 Connector**

1	TX+	5	NC
2	TX-	6	RX-
3	RX+	7	NC
4	NC	8	NC

- **CN17: LED Connector (4-pin header) for LAN**

1	LED Link	2	+5V
3	LED RX	4	+5V

Chapter 4 AMI BIOS Setup

JUKI-750E uses AMI BIOS for system configuration, and the AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1 Getting Started

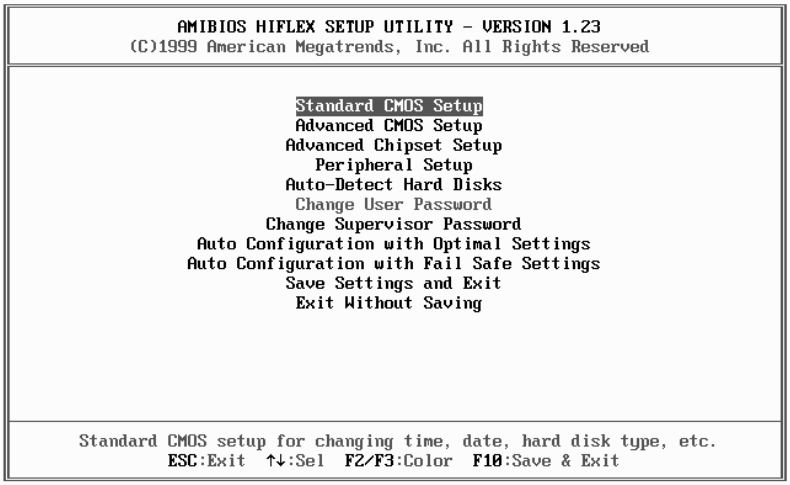
When you turn on the power, BIOS will enter the Power-On-Self-Test routines. These routines will be executed for system test and initialization and system configuration verification.

Note: for your convenience, a diskette containing files for updating the BIOS is included with the following content:

FLASH634.COM: flash utility to update BIOS

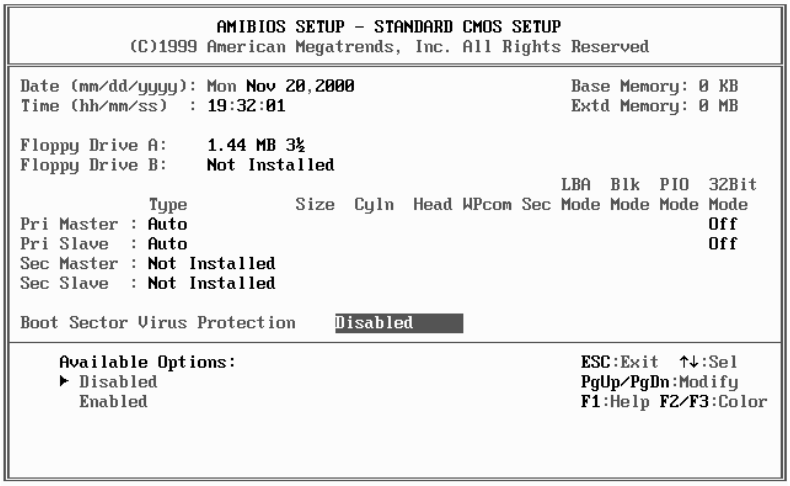
After the POST routines are completed, the following message appears:
" Hit DEL if you want to run SETUP"

To access AMI BIOS SETUP UTILITY, press <Del> key. The following screen will be displayed at this time:



4.2 Standard CMOS Setup

The standard CMOS Setup is used for basic hardware system configuration. The main function is for Date/Time setting and Floppy/Hard Disk setting. Please refer to the following screen for this setup.



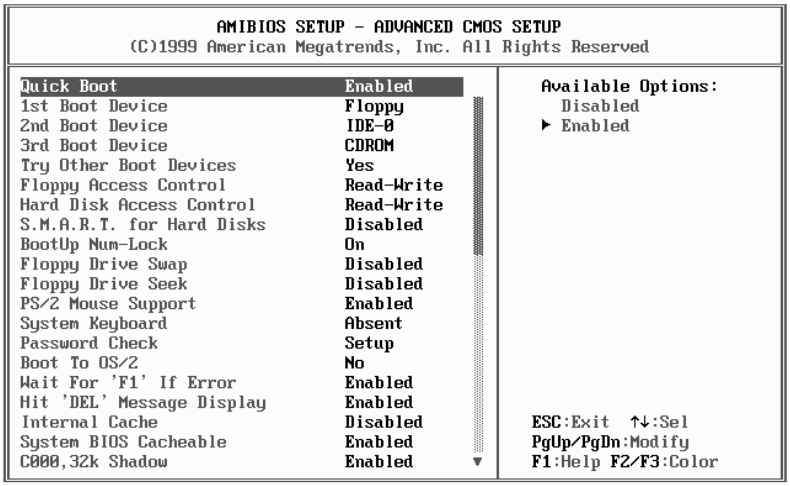
To set the Date, for example, press either the arrow or <Enter> button on your keyboard to select one of the fields (Months, Date or Year) then press either <PgUp> or <PgDn> to set it to the current Months, Date and Year. Do the same steps for Time setting.

For IDE hard disk drive setup, check the following possible setup procedure:

1. Use the Auto-Detect Hard Disk option in the main menu; the computer will automatically detect the HDD specifications.
2. Manually enter the specifications by yourself by selecting the Type of your HDD.

4.3 Advanced CMOS Setup

The following screen will be displayed if you select Advanced CMOS Setup:



You can change the value of each option by using <PgUp> and <PgDn> key. The available values are shown on the right screen.

Quick Boot > *Enabled*: To enable BIOS to boot quickly when you turn on your computer. The BIOS will only check the first 1MB of the system memory.

Quick Boot > *Disabled:* BIOS will test all system memory when it boots up. It will spend about 40 seconds until it receives a Ready signal from the HDD. It will also wait for you to press the <Del> key or not.

1st, 2nd, 3rd Boot Device > To define the device type for booting after the routines check up completes. If the 1st Boot Device fails, the BIOS will attempt to boot from the 2nd or the 3rd device.

Try Other Boot Devices > BIOS will try to boot from any other available device in the system if the 1st, 2nd and 3rd device fails to boot.

Floppy Access Control > To define the read/write access which is set when booting from a floppy drive.

Hard Disk Access Control > To define the read/write access which is set when booting from a HDD.

S.M.A.R.T. for Hard Disks > To allow BIOS to use the **S**ystem **Ma**nagement and **R**eporting **T**echnologies protocol for reporting server system information on a network.

BootUp Num-Lock > To turn on/off the Num-Lock option on an enhanced keyboard when you boot. If you turn it off, the arrow keys on the numeric keypad can be used just as the other set of arrow keys on the keyboard and vice versa.

PS/2 Mouse Support > To testify whether or not a PS/2 mouse is supported.

System Keyboard > To testify whether or not a keyboard is attached to the computer.

Primary Display > To define the type of display monitor of the system. The Absent option is for network file servers.

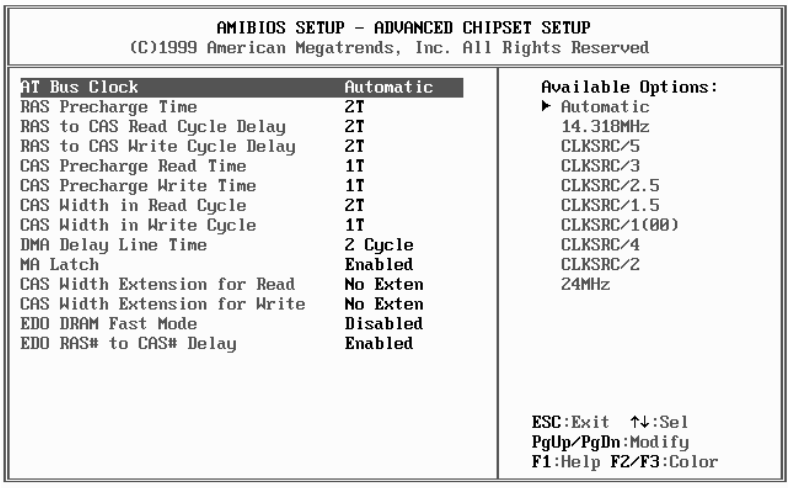
Password Check > To define if a password is necessary or not for access to the system.

Boot to OS/2 > If you run the OS/2 operating system, this option must be set to yes.

System BIOS Cacheable > To define whether or not the memory segments FOOOH can be read from or written to cache memory. Setting it Enabled will give faster execution in your system.

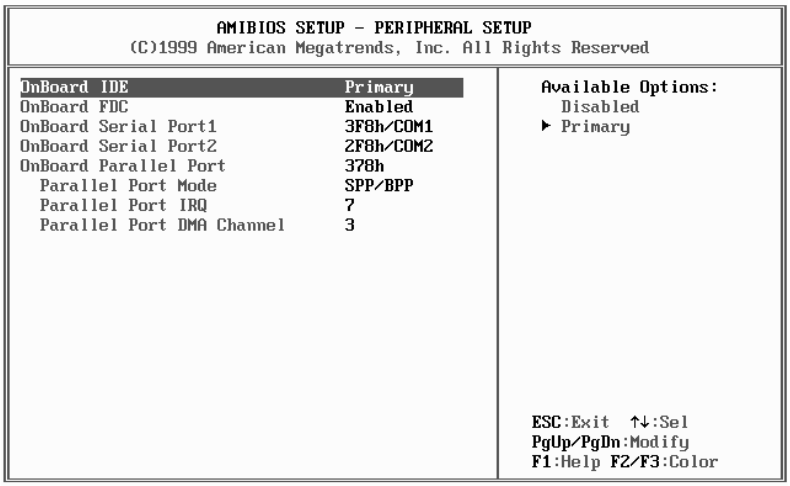
XXXX, 16k Shadow > ROM Shadow is a technique in which BIOS code is copied from slower ROM to faster RAM. If you enable it then the BIOS will be executed form the RAM. Each option allows 16KB segment to be shadowed to the RAM.

4.4 Advanced Chipset Setup



Note: Do not change any value on this page unless you understand well the impact of every value to your system.

4.5 Peripheral Setup



When you enter the Peripheral Setup, the following items are available for setting:

- On-board IDE: to define the on-board Integrated Drive Electronics controller channel(s) to be used. Available options are: Primary, Secondary and Disabled.

- On-board FDC: The floppy disk drive controller can be Enabled or Disabled by this item. When you do not need floppy disk, the FDD controller can be disabled.

- Serial Port 1: The options are Disabled, 3F8, 2F8, 3E8, and 2E8. You can set the I/O address of the serial port 1 or disable it.

- Serial Port 2: The options are Disable, 3F8, 2F8, 3E8, 2E8. You can set the I/O address of the serial port 2 or disable it.

- OnBoard Parallel Port: The options are Auto, Disable, 3BC, and 378. You can set the I/O address of the parallel port or disable it.

- Parallel Port Mode: JUKI-750E provides EPP, ECP, ECP/EPP,and SPP/BPP Mode. EPP passes the parallel port to be used with devices which stick to the EPP specification. The existing parallel port signals will be used by EPP to provide asymmetric bi-directional data transfer driven by the host devices. ECP passes the parallel port to be used with devices which stick to the ECP specification.

- Parallel Port IRQ: To define the Interrupt Request (IRQ) which is used by the parallel port.

- Parallel Port DMA Channel: To set the DMA Channel used by the parallel port.

4.6 Auto-Detect Hard Disk

This option detects the parameters of an IDE hard disk drive (HDD sector, cylinder, head, etc) automatically and will put the parameters into the Standard CMOS Setup screen. Up to 4 IDE drives can be detected and the parameters will be listed in the box. Press <Y> if you accept these parameters. Press <N> to skip the next IDE drives.

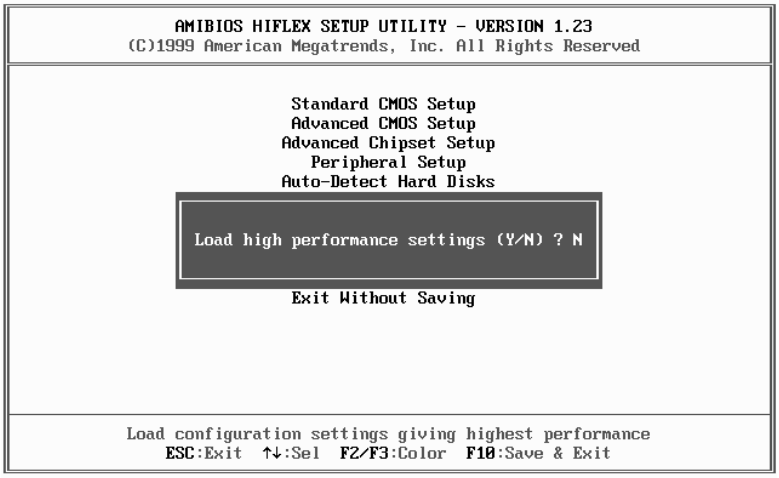
Note: If your IDE HDD was formatted in previous older system, incorrect parameters may be detected. In this case, you need to enter the correct parameters manually or low-level format the disk.

4.7 Change Supervisor Password

This option sets a password that is used to protect your system and Setup Utility. Supervisor Password has higher priority than User Password. Once you setup the password, the system will always ask you to key-in password every time you enter the BIOS SETUP. If you enter the BIOS SETUP with Supervisor Password, you can choose every setup/option on the main menu but with User Password, you can only choose three setup/options (USER PASSWORD, SAVE SETTING AND EXIT and EXIT WITHOUT SAVING). To disable these passwords, enter the BIOS SETUP room with Supervisor Password and then just press the <Enter> key instead of entering a new password when the 'Enter Password' prompt pops up. N.B.: if you forget the password, do the Clear/Reset CMOS procedure (see Part 2.8 the CPU Setting for JUKI-750E >> Clear CMOS SETUP)

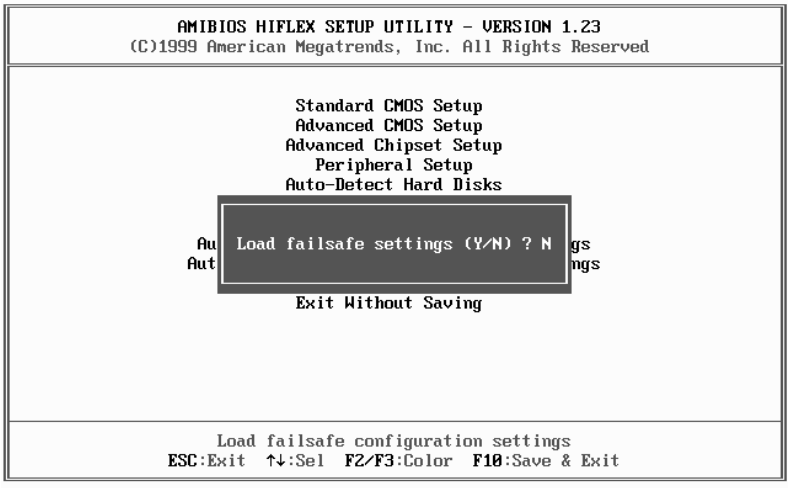
4.8 Auto Configuration with Optimal Settings

This option lets you load the *optimal* default settings. These settings are *best-case values* which will provide the best performance. Whenever your CMOS RAM is damaged, these optimal settings will be loaded automatically.



4.9 Auto Configuration with Fail Safe Settings

This option lets you load the Fail Safe default settings when something happens to your computer so that it cannot boot normally. These settings are not the most optimal settings but are the most stable settings.

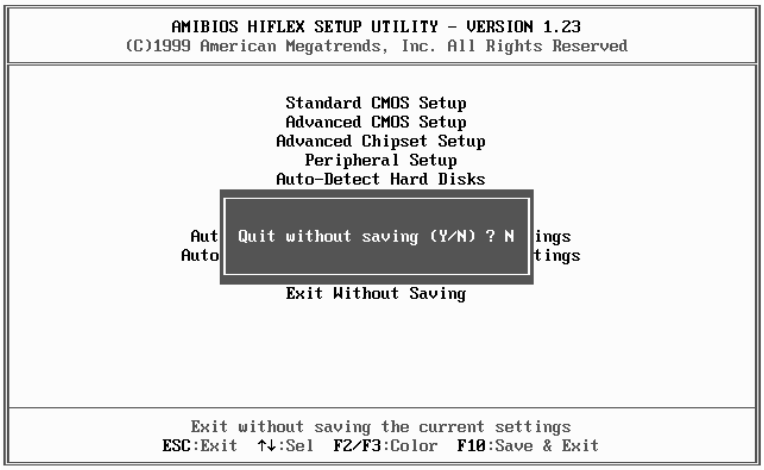


4.10 Save Settings and Exit

Select this option when you finish setting all the parameters and want to save them into the CMOS. Just simply press <Enter> key and all the configuration changes will be saved.

4.11 Exit Without Saving

Select this option if you want to exit the Setup without saving the changes that you made. Just simply press <Enter> key and you will exit the BIOS SETUP without saving the changes.



Appendix A Watchdog Timer

Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, hardware on the board will perform a hardware reset (cold boot) to bring the system back to a known state.

Watchdog Timer is controlled by three I/O ports.

543	Write	Set Watchdog Time period
543 (hex)	Read	Enable the refresh the Watchdog Timer.
943 (hex)	Read	Disable the Watchdog Timer.

To enable the Watchdog Timer, user has to define Timer before enable the Watch-dog Timer function. The output data is a value of time interval and the range of the value is from 01 (hex) to FF (hex) and time interval 1 sec to 255 sec.

Data	Time Interval
01	1 sec
02	2 sec
03	3 sec
04	4 sec
.	.
.	.
.	.
FF	255 sec

This will enable and activate the countdown timer which will eventually time out and reset the CPU to ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 943H and 543H. This must be done within the time out period that is selected by software, please refer to the example program.

A tolerance of at least 5% must be maintained to avoid unknown routines within 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 543H must be read within 7 seconds.

Note: when exiting a program it is necessary to disable the Watch-Dog Timer, otherwise the system will reset.

Example program:

```
TIMER_PORT   =  543H
TIMER_START  =  543H
TIMER_STOP   =  943H
;
; INITIAL TIME PERIOD COUNTER
;

      MOV   DX, TIME_PORT
      OUT    AL, 8 ; 8 SECONDS
;
```

```
; ADD YOUR APPLICATION HERE
;
      MOV   DX, TIMER_START
      IN       AL, DX.       ; START COUNTER
;
; ADD YOUR APPLICATION HERE
;
W_LOOP:
      MOV    DX,TIMER_STOP
      IN       AL,DX
      MOV   DX, TIMER_START
      IN       AL, DX.       ; RESTART COUNTER
;
; ADD YOUR APPLICATION HERE
;
      CMP      EXIT_AP, 0
      JNE      W_LOOP
       MOV    DX, TIMER_STOP
       IN        AL, DX
;
; EXIT AP
```

Appendix B Panel Support List

The JUKI-750E supports a wide range of flat panels. The different flat panel will need different LCD drive BIOS. The default setting is for Color DSTN flat panel. The available BIOS for different panels are in the following list. Please note all the BIOS files already included the system BIOS and LCD drive BIOS, re-program the BIOS flash chip with the file, and then power on again.

15MLCD.ROM – BIOS for MONO DSTN 640x480
For example: HOSIDEN HLM6667
HITACHI LMG5160XUFC
CASIO MD650TS00-01
OPTREX DMF_50260NFU-FW-8

15DSTN.ROM – BIOS for Color DSTN 640x480
For example: SANYO LCM-5331-22NTK
SHARP LM64C35P

15TFTS1.ROM – BIOS for TFT 640x480-SYNC (16-bit)

15TFTS2.ROM – BIOS for TFT 640x480-SYNC (18/24-bit)
For example: HITACHI TX26D60/TX24D55
TOSHIBA LTM09C015A
SHARP LQ10D321

15TFTLP1.ROM – BIOS for TFT 640x480-LP(16-bit)

15TFTLP2.ROM – BIOS for TFT 640x480-LP(16/24-bit)
For example: TOSHIBA LTM09C015A18

15TFT861.ROM – BIOS for TFT 800x600-SYNC(16-bit)/
15TFT862.ROM – BIOS for TFT 800x600-SYNC(18/24-bit)
For example: NEC NL8060AC26-05
NEC NL8060AC26-04
NEC NL8060BC31-02

15EL.ROM – BIOS for EL 640x480
For example: PLANAR EL640.480-A

15PLASMA.ROM – BIOS for PLASMA 640x480
For example: PANASONIC S817

How to update BIOS yourself?

1. Use EPROM Programmer setting the right Flash type and then write the file into the Flash.
   To use this method, you should carefully take the Flash chip out of socket and then put it back after finish the programming.
   Usually the flash type is: ATMEL AT29C010A

   Or,

2. There also have a utility (FLASH462.COM) and directly re-program the BIOS under DOS.
   For example:

   C:>FLASH462 15MLCD.ROM

Appendix C I/O Information

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 (non-maskable interrupt) 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
443	Watchdog timer enable
843 or 043	Watchdog timer disable

1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-C7FFF	VGA BIOS
C8000 – EFFFF	Free for customer application
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

IRQ Mapping Chart

IRQ0	System Timer	IRQ8	RTC Clock
IRQ1	Keyboard	IRQ9	Unused
IRQ2	Cascade to IRQ Controller	IRQ10	Unused
IRQ3	COM2/COM4	IRQ11	Unused
IRQ4	COM1/COM3	IRQ12	PS/2 mouse
IRQ5	Unused	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Unused

DMA Channel Assignments

DMA Channel	Function
0	Available
1	Available
2	Floppy Disk
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available