

FabiATech Corporation

IPC Solution

Website: <http://www.fabiatech.com>

Email: support@fabiatech.com

FX5401 Embedded Computers

Small System User's Manual

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If your board requires servicing, contact the dealer from whom you purchased the product for service information. You can help assure efficient servicing of your product by following these guidelines:

- ❑ A list of your name, address, telephone, facsimile number, or email address where you may be reached during the day
- ❑ Description of you peripheral attachments
- ❑ Description of your software (operating system, version, application software, etc.) and BIOS configuration
- ❑ Description of the symptoms (Extract wording any message)

For updated BIOS, drivers, manuals, or product information, please visit us at www.fabiatech.com

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Chapter 1 Introducing the FX5401 System

Overview

The FX5401 is a 1U embedded system with 3.5" low-power Pentium CPU module inside. This user's manual provides information on the physical features, installation, and BIOS setup of the FX5401.

Built to unleash the total potential of the Pentium Processor, Able to support 300 MHz CPUs, this system supports dual 10/100M interface network port, audio, 1 So-DIMM socket for up to 256MB PC-100 SDRAM, and a 4MB PCI-VGA controller.

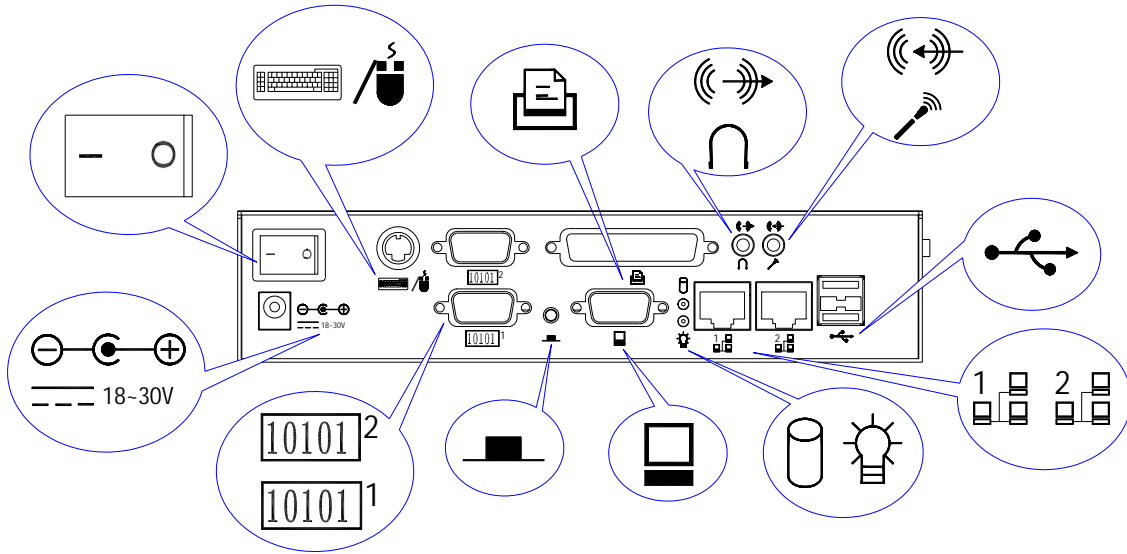
Each FX5401 has two ports for I/O communications. Two RS-232C ports are available.

The Fx5401 is perfect for POS and POI applications, Internet Router, VPN Gateway, fire wall, Mail Server, WBT, Thin Client and small Embedded Control. The unit is only 200mm(L) X 130mm(W) X 44mm (H), offering unparalleled performance in a very small footprint.

Series Comparison Table

Model	FX5401
Processor	GX1-300Mhz
Chipset	CS5530A
1So-DIMM(Max. SDRAM)	128MB Standard 256MB/512MB (Option)
CRT VGA	Yes
Watchdog Timer	Yes
Multi I/O	Two RS232
Enhanced IDE or CF	One
USB	Two
Audio	Line-In/Out
RJ45 Ethernet (10/100Mbps)	Dual
Dimensions (Unit: mm)	200(L) x 130(W) X 44(H)

Layout



Specifications

❑ ***Processor Board –***

FB2530 inside, 300 MHz low-power Pentium CPU with 128MB SDRAM.

❑ ***I/O Outlets –***

Dual 100M / 10M Ethernet with RJ-45 ports.

One parallel port with DB25 port.

Two Serials RS-232 with DB9 ports.

PS/2 compatible keyboard and mouse interface.

Audio function supports Line-In, Line -Out and MIC-In connector.

Two USB ports.

One Line-In and One Line-Out ear-jet connectors.

One DC-In plug connector

One Push bottom reset switch.

One power LED and hard disk/ Compact n Flash access LED.

❑ ***Storage Bay-***

One Compact Flash slot with plug-in aperture and cover, one 44-pin DiskOnModule space. One 2.5" hard disk space with HDD clamp holder.

❑ ***Power requirement –***

+24V with 25% tolerance, 0.8A minimum.

❑ ***Dimensions (1U height)-***

130.0mm(D) x 200.0mm(W) x 44.2mm(H)

Packing List

Upon receiving the package, verify the following things. Should any of the mentioned happens, contact us for immediate service.

- Unpack and inspect the FX5401 package for possible damage that may occur during the delivery process.
- Verify the accessories in the package according to the packing list and see if there is anything missing or incorrect package is included.
- If the cable(s) you use to install the FX5401 is not supplied from us, please make sure the specification of the cable(s) is compatible with the FX5401 system.

Note: after you install the FX5401, it is recommended that you keep the diskette or CD that contains drivers and document files, and keep the document copies, or unused cables in the carton for future use.

The following lists the accessories that may be included in your FX5401 package. Some accessories are optional items that are only shipped upon order.

- One FX5401 embedded system.
- One AC to DC24V power adapter and 1 AC power code.
- One 2.5" HDD clamp holder accessory pack.
- One Y-type (3-terminal) PS/2 keyboard plus mouse port adapter cable. (Optional)
- L-type universal fixers and 6 screws.
- 6 stamp pads for this enclosure.
- One compact disc includes software utility.

Chapter 2 Hardware Installation

This chapter introduces the system connectors & jumper settings, and guides you to apply them for field application.

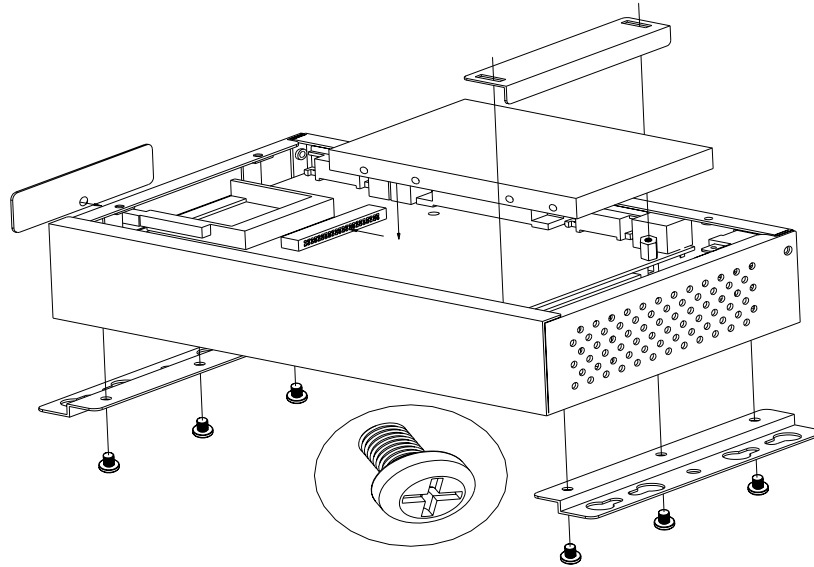
Before Installation

Before you install the system, make sure you follow the following descriptions.

1. Before removing the cover, shut down the operation System and disconnect power switch to off and unplug AC-to DC Adapter cable.
2. Install or unplug any connector, Compact Flash, and hard disk be sure that the power is disconnected or power switch to off from the system. If not, this may damage the system.
3. The ESD (Electricity Static Discharge) may be created from human body that touches the board. It may do damage to the board circuit.

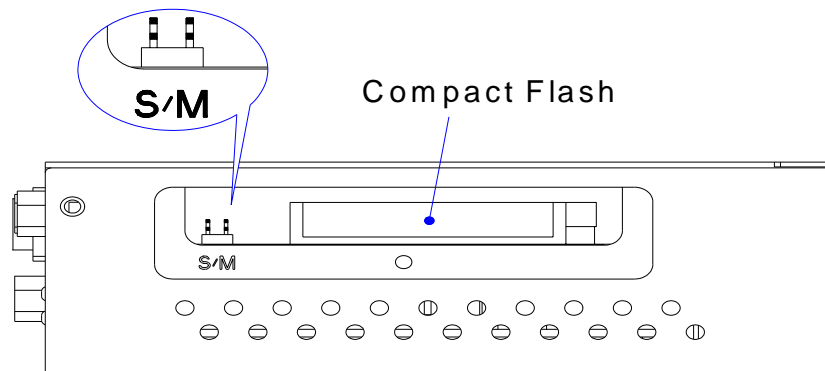
□ **Removing Covers –Installing HDD or Compact Flash**

If you are installing hardware option, you can remove the top cover or left side cover. The following figure will guide you how to install 2.5" HDD inside the FX5401 and how to install the FX5401 fixers.

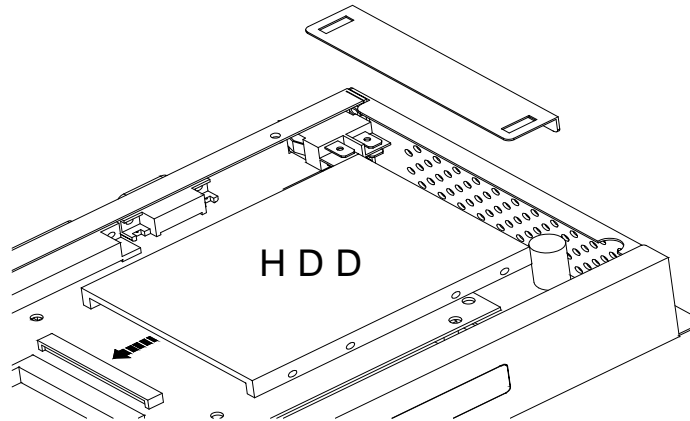


Note: Tighten the screws when handling the hard disk and Compact Flash modules.

If you are only installing Compact Flash modules, you don't need to remove top cover. The following figure will guide you select JP (open or close) are all use to select Master or Slave device on IDE.



If you are installing hard disk, you need to remove top cover. The following figure will guide inserting the hard disk before you must verify the pin behind the pivot end of the hard disk in the IDE2.

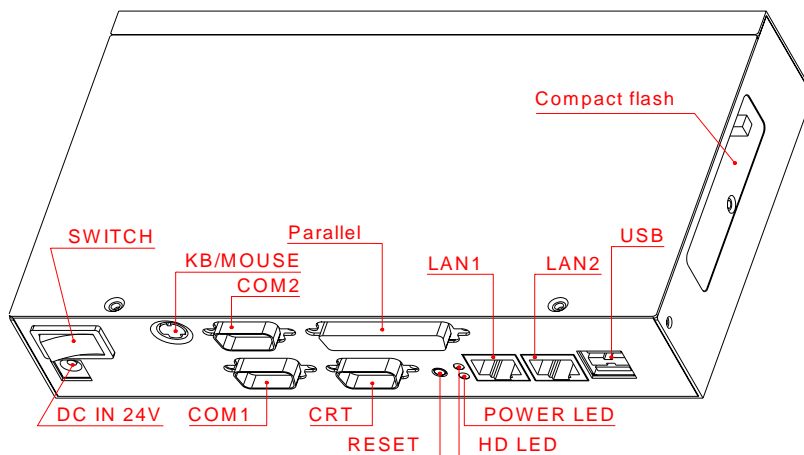


Note: Use caution when handling the hard disk to prevent damage to IDE2 connector as you insert hard disk. Gently slide the hard disk into the IDE2 and stop when you feel resistance.

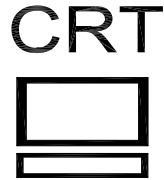
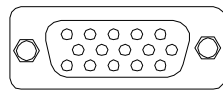
□ Connecting the Monitor, Keyboard, Mouse

To connector the peripheral control devices and monitor to the FX5401, refer to the following procedure.

Connector the monitor, keyboard and mouse to the FX5401 using the connections provided on the rear of the chassis. See following figure and rear pictures.

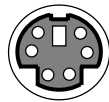


1. A VGA connector is provided for CRT display



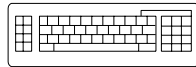
DB15	Signal
1	Red
2	Green
3	Blue
13	Hsync
14	Vsync
12	DDC Data
15	DDC Clock
5 & 10	Digital Ground
6,7,8	Analog Ground
Others	Not Used

2. The connector use the included adapter cable you can attach standard PS/2 type keyboard and mouse. Standard PS/2 keyboard can be plugged into this connector without any adapter cable. If PS/2 keyboard and mouse will be used simultaneously, a Y-type (3-terminal) adapter cable is needed.



KB

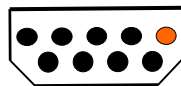
MOUSE



Pin 1	Mouse Data
Pin 2	Keyboard Data
Pin 3	Ground
Pin 4	VCC
Pin 5	Mouse Clock
Pin 6	Keyboard Clock

□ **Connecting the COM ports and Parallel Port**

The DB9 (COM1/2) is standard serials port connector. The following tables show the signal connections of these connectors.

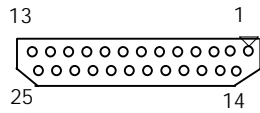


COM

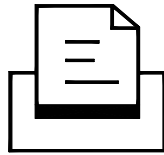
10101

DB-9	RS-232 Signal
1	-DCD2
6	-DSR2
2	RXD2
7	-RTS2
3	-TXD2
8	-CTS2
4	-DTR2
9	-RI2
5	Ground
Case	Case Ground

The printer is standard DB25 connector.



PRINT

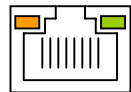


DB-25	Description	DB-25	Description
1	-STROBE	14	-AUTO FORM FEED
2	DATA 0	15	-ERROR
3	DATA 1	16	-INITIALIZE
4	DATA 2	17	-PRINTER SELECT IN
5	DATA 3	18	Ground
6	DATA 4	19	Ground
7	DATA 5	20	Ground
8	DATA 6	21	Ground
9	DATA 7	22	Ground
10	ACKNOWLEDGE	23	Ground
11	BUSY	24	Ground
12	PAPER	25	Ground
13	PRINTER SELECT	--	No Used

□ **Connecting the LAN ports and USB Ports**

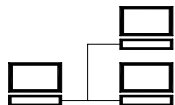
The RJ45 connector with 2 LED's for LAN. The left side LED (orange) indicates data is being accessed and the right side LED (green) indicates on-line status. (On indicates on-line and off indicates off-line)

RJ45 connector



1 8
(Front View)

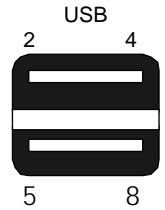
LAN



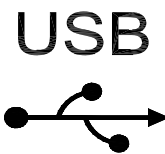
The following lists the pin assignment of RJ45.

LAN1/LAN2	Signal	LAN1/LAN2	Signal
1	TPTX+	5	FBG1
2	TPTX -	6	TPRX -
3	TPRX+	7	FBG2
4	FBG1	8	FBG2

The Fx5401 supports a dual port USB connector. Any USB device can be attached to USB ports with plug-and-play supported. The up side port is USB #1 and the down side port is USB #2

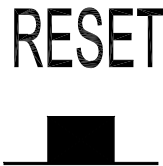


USB#1/#2	Signal	USB#1/#2	Signal
Pin 1	USBV0	Pin5	USBV1
Pin 2	USBD0-	Pin6	USBD1-
Pin 3	USBD0+	Pin7	USBD1+
Pin 4	USBG0	Pin8	USBG1



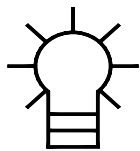
□ **System Reset header and Power /HDD LED**

The Fx5401 has a push bottom switcher for system reset; Push and release the bottom will cause hardware reset of FX5401 and restart system booting.



The Power, Watchdog and HDD LED has two distinctive status: Off for inactive operation and blinking light for activity.

POWER



HD



Front View

Hard Disk Access LED (Red)
Power LED (Green) &
Watchdog LED

□ **Connecting the DC Power Jack and Power Switch**

Power is supplied through an external AC/DC power adapter. Check the technical specification section for information about AC/DC power input voltage.



DC +24V, 25% tolerance

0.8A minimum

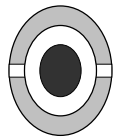
Since the switch does include a power switch, plugging its power adapter into a power outlet then switch power to on (1), when you final installed system hardware device.



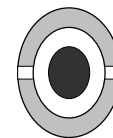
1 : Power On

O: Power Off

□ **Connecting the Audio Microphone In/ Speak Out**

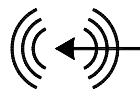


Line - In (Left Side)



Line - Out (Right Side)

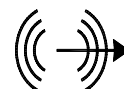
LINE IN



MIC



LINE OUT



SPK OUT



Chapter 3 BIOS Setup

This chapter describes the BIOS setup.

Overview

BIOS are a program located on a Flash memory chip on a circuit board. It is used to initialize and set up the I/O peripherals and interface cards of the system, which includes time, date, hard disk drive, the ISA bus and connected devices such as the video display, diskette drive, and the keyboard. This program will not be lost when you turn off the system.

The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

The BIOS default values ensure that the system will function at its normal capability. In the worst situation the user may have corrupted the original settings set by the manufacturer.

All the changes you make will be saved in the system RAM and will not be lost after power-off.

When you start the system, the BIOS will perform a self-diagnostics test called Power On Self Test (POST) for all the attached devices, accessories, and the system. Press the [Del] key to enter the BIOS Setup program, and then the main menu will show on the screen.

Note: Change the parameters when you fully understand their functions and subsequence.

ROM PCI/ISA BIOS (2A434FJD)
CMOS SETUP UTILITY
AWARD SOFTWARE, INC.

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

BIOS Functions

On the menu, you can perform the following functions

1. Standard CMOS Setup-
2. BIOS Features Setup
3. Chipset Features Setup
4. Advanced Chipset Setup
5. Power Management Setup
6. PNP/PCI Configuration
7. Load BIOS Defaults
8. Load Setup Default
9. Integrated Peripherals Setup
10. User Password
11. IDE Auto Detect
12. Save & Exit Setup
13. Exit Without Saving

Keyboard Convention

On the BIOS, the following keys can be used to operate and manage the menu:

Item	Function
ESC	To exit the current menu or message
Page Up/Page Down	To select a parameter
F10	Save and exit
F2	To change the color of the menu display. F2 is to go forward and F3 is to go backward.
UP/Down Arrow Keys	To go upward or downward to the desired item

Standard CMOS Setup

This section describes basic system hardware configuration, system clock setup and error handling. If the CPU board is already installed in a working system, you will not need to select this option anymore.

```

ROM PCI/ISA BIOS (2A434FJA)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

```

Date (mm:dd:yy) : Fri, Jan 4 2002									
Time (hh:mm:ss) : 16 : 4 : 52									
HARD DISKS		TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE
Primary Master	:	0	0	0	0	0	0	0	AUTO
Primary Slave	:	0	0	0	0	0	0	0	AUTO
Drive A : 1.44M, 3.5 in.									
Drive B : None									
Video : EGA/UGA									
Halt On : No Errors									
ESC : Quit			↑ ↓ + + : Select Item			PU/PD/+/- : Modify			
F1 : Help			(Shift)F2 : Change Color						

Date & Time Setup

Highlight the <Date> field and then press the [Page Up] / [Page Down] or [+]/[-] keys to set the current date. Follow the month, day and year format.

Highlight the <Time> field and then press the [Page Up] / [Page Down] or [+]/[-] keys to set the current date. Follow the hour, minute and second format.

The user can bypass the date and time prompts by creating an AUTOEXEC.BAT file. For information on how to create this file, please refer to the MS-DOS manual.

Floppy Setup

The <Standard CMOS Setup> option records the types of floppy disk drives installed in the system.

To enter the configuration value for a particular drive, highlight its corresponding field and then select the drive type using the left-or right-arrow key.

Hard Disk Setup

The BIOS supports various types for user settings, The BIOS supports <Pri Master>, <Pri Slave>, so the user can install up to two hard disks. For the master and slave

jumpers, please refer to the hard disk's installation descriptions and the hard disk jumper settings.

You can select <AUTO> under the <TYPE> and <MODE> fields. This will enable auto detection of your IDE drives during boot up. This will allow you to change your hard drives (with the power off) and then power on without having to reconfigure your hard drive type. If you use older hard disk drives, which do not support this feature, then you must configure the hard disk drive in the standard method as described above by the <USER> option.

Video

This option selects the type of adapter used for the primary system monitor that must match your video display card and monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

You have two ways to boot up the system:

When VGA set as primary and monochrome set as secondary, the selection of the video type is "VGA Mode".

When monochrome set as primary and VGA set as secondary, the selection of the video type is "Monochrome Mode".

Error Halt

This option determines whether the computer will stop if an error is detected during power up.

No errors	The system boot will not be stopped for any error that may be detected.
All errors	Whenever the BIOS detect a non-fatal error the system will be stopped and you will be prompted.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

Memory

This option is display-only which is determined by POST (Power On Self Test) of the BIOS.

Base Memory

The POST of the BIOS will determine the amount of base (or conventional) memory

installed in the system. The value of the base memory is typically 512K for systems with 512K memories installed on the motherboard, or 640K for systems with 640K or more memory installed on the motherboard.

Extended Memory

The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.

Other Memory

This refers to the memory located in the 640K to 1024K-address space. This is memory that can be used for different applications. DOS uses this area to load device drivers to keep as much base memory free for application programs. Most use for this area is Shadow RAM.

Total Memory

System total memory is the sum of basic memory, extended memory, and other memory.

BIOS Features Setup

This section describes the configuration entries that allow you to improve your system performance, or let you set up some system features according to your preference. Some entries here are required by the CPU board's design to remain in their default settings.

ROM PCI/ISA BIOS (2A434FJA)			
BIOS FEATURES SETUP			
AWARD SOFTWARE, INC.			
Virus Warning	: Disabled	Video BIOS Shadow	: Enabled
CPU Internal Cache	: Enabled	C8000-CBFFF Shadow	: Disabled
Quick Power On Self Test	: Enabled	CC000-CFFFF Shadow	: Disabled
Boot Sequence	: C,A,SCSI	D0000-D3FFF Shadow	: Disabled
Swap Floppy Drive	: Disabled	D4000-D7FFF Shadow	: Disabled
Boot Up Floppy Seek	: Enabled	D8000-DBFFF Shadow	: Disabled
Boot Up NumLock Status	: On	DC000-DFFFF Shadow	: Disabled
Gate A20 Option	: Fast		
Typematic Rate Setting	: Disabled		
Typematic Rate (Chars/Sec)	: 6		
Typematic Delay (Msec)	: 250		
Security Option	: Setup		
PCI/VGA Palette Snoop	: Disabled		
OS Select For DRAM > 64MB	: Non-OS2		
Report No FDD For WIN 95	: No		
		ESC : Quit	↑↓↓+ : Select Item
		F1 : Help	PU/PD/+/- : Modify
		F5 : Old Values (Shift)	F2 : Color
		F6 : Load BIOS Defaults	
		F7 : Load Setup Defaults	

Virus Warning

This option may flash on the screen. During and after the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and the following error message will appear, in the mean time, you can run an anti-virus program to locate the problem.

Available Options: Disabled, Enabled

Default setting: Disable

CPU Internal Cache

This functions speeds up memory access. The FB2510 GXM Cyrix CPU has an internal cache.

Available options: Disabled, Enabled

Default setting: Enabled

Quick Power On Self Test

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

Available options: Disabled, Enabled

Default setting: Enable

Boot Sequence

This field specifies which device the system looks first upon power on. The item has different boot sequence options of three drives each. In addition to the traditional driver A and C, options include IDE hard drivers D, E and F, plus a SCSI hard driver and CD-ROM drive, USB CD-ROM and USB-HDD.

Available options: C, CDROM, A, SCSI, USB-FDD, USB-HDD, USB-CDROM, Disabled, Enabled

Default setting: C, CDROM, A

Swap Floppy Drive

The field reverses the drive letter assignments of your floppy disk drives in the Swap A, B setting, otherwise leave on the default setting of **Disabled** (No Swap). This works separately from the BIOS Features floppy disk swap feature. It is functionally the same as physically interchanging the connectors of the floppy disk drives. When the function's setting is **<Enabled>**, the BIOS swapped floppy drive assignments so that Drive A becomes Drive B, and Drive B becomes Drive A under DOS.

Available options: Disabled, Enabled

Default setting: Disabled

Boot Up Floppy Seek

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K types are 40 tracks while 720K, 1.2M and 1.44M are all 80 tracks.

Enabled	BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS cannot tell from 720K, 1.2M or 1.44M drive type, as they are all 80 tracks.
Disabled	BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

Boot Up Numlock status

This field is used to activate the Num Lock function upon system boot. If the setting is on, after a boot, the Num Lock light is lit, and user can use the number key.

Available options: On, Off

Default setting: On

Gate A20 Option

This item is chosen as <Normal>, the A20 signal is controlled by keyboard controller or chipset hardware. The selection is "Fast" Port 92 or a chipset specific method controls means the A20 signal

Available options: Normal, Fast

Default setting: Normal

Typematic rate Setting

This function specifies the keystroke repeat rate when a key is pressed and held down.

Available options: Disable, Enable

Default setting: Disable

Typematic Rate (Chars/Sec)

Typematic Rate sets the rate at which characters on the screen repeat when a key is pressed and held down.

Available options: 6, 8, 10, 12, 15, 20, 24, or 30 characters per second

Default setting: 6

Typematic Delay (Msec)

The number selected indicates the time period between two identical characters appearing on screen.

Available options: 250, 500, 750 and 1000

Default setting: 250

Security Option

This field enables password checking every time the computer is powered on or every time the BIOS Setup is executed. If ***Always*** is chosen, a user password prompt appears every time and the BIOS Setup Program executes and the computer is turned on. If ***Setup*** is chosen, the password prompt appears if the BIOS executed.

Available options: Setup, Always

Default setting: Setup

PCI/VGA Palette Snoop

This option must be set to Enabled if any ISA adapter card installed in the computer requires VGA palette snooping.

Available options: Enable, Disable

Default setting: Disable

OS Select for DRAM > 64MB

This segment is specifically created for OS/2 when DRAM is large than 64MB,if you operating system is OS/2 and DRAM used is large 64MB, You have to select "OS/2" OTHERWISE (under non -OS/2), default is NON OS/2.

Available options: Non-OS/2, OS/2

Default setting: Non-OS/2

Report No FDD for Win95

This option allows Windows 95 to share IRQ6 (assigned to a floppy disk drive) with other peripherals in case the driver does not exist.

Available options: Enable, Disable

Default setting: Disable

Video, 16k Shadow C000 - DC00, 16k shadow

These fields control the location of the contents of the 16KB of ROM beginning at the specified memory location. If no adapter ROM is using the named ROM area, this area is made available to the local bus. The settings are:

1. **Disabled:** The video ROM is not copied to RAM. The contents of the video ROM cannot be read from or written to cache memory.
2. **Enabled:** The contents of C000h - CFFFF are written to the same address in system memory (RAM) for faster execution.

Available options: Disabled, Enabled,

Default setting: Disable (Video shadow is Enable)

Chipset Features Setup

This section describes the configuration of the board's chipset features.

```

ROM PCI/ISA BIOS (2A434F19)
CHIPSET FEATURES SETUP
AWARD SOFTWARE, INC.

SDRAM CAS latency Time : 3 T
SDRAM Clock Ratio Div By : 3

16-bit I/O Recovery (CLK): 5
8-bit I/O Recovery (CLK): 5

USB Controller : Enabled
USB Legacy Support : Disabled

Video Memory Size : 1.5 M
Display status : CRT
Flat Panel Resolution : 640x480

ESC : Quit      ↑↓←→ : Select Item
F1 : Help      PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults
    
```

SDRAM CAS AUTO Latency Time

This field specifies the latency for the Synchronous DRAM system memory signals.

Available Options: 3T, 2T

Default setting: 3 T

SDRAM Clock Ration Div by

When 100 MHz external frequency runs the system, the system will run at 3 cycle clocks. When 66 MHz runs the system, the system will run at 4 cycle clocks. Selecting Auto, the system will be auto adaptive depending on the SDRAM clock that is installed.

Available Options: 4T, 3T

Default setting: 3 T

8bit I/O Recovery Time

The recovery time is the length of time, measured in CPU clocks, which the system will delay after achieving an input/output request. This delay takes place to wait for the I/O to complete the request. This field specifies the recovery time for 8bit I/O.

Available Options: Disabled, 1 –8 Sysclk

Default setting: 5 Sysclk

16Bit I/O Recovery Time

This field specifies the recovery time for 16Bit I/O.

Available Options: Disabled, 1 –8 Sysclk

Default setting: 5 Sysclk

USB Controller

Select Enabled if a USB device is installed to the system. If Disabled are selected, the system will not be able to use a USB device.

Available Options: Disabled, Enabled

Default setting: Enabled

USB Legacy Support

Select Enabled if you system contains a USB controller and you have USB keyboard and mouse. If Disabled are selected, the system will not be able to use a USB device under DOS.

Available Options: Disabled, Enabled

Default setting: Disable

Video Memory

This field specifies which VGA display memory. You can select either Video memory on the VGA. The setting share onboard memory.

Available Options: 1.5MB, 2.5MB, and 4MB

Default setting: 1.5MB

Display state

This field specifies which VGA display will be used when the system is boot. You can select either the LCD or the CRT booting on the VGA.

Available Options: Both, LCD, and CRT

Default setting: CRT

Flat Panel Resolution

When use the LCD the field specifies which select display resolution for different TFT LCD display type.

Available Options: 640x480, 800x600 and 1024x768

Default setting: 640X480

Power Management

ROM PCI/ISA BIOS (2A434FJ9)			
POWER MANAGEMENT SETUP			
AWARD SOFTWARE, INC.			
Power Management	: Disabled	IRQ1 (KeyBoard)	: ON
** PM Timers **		IRQ3 (COM 2)	: OFF
Doze Mode	: Disabled	IRQ4 (COM 1)	: OFF
Standby Mode	: Disabled	IRQ5 (LPT 2)	: OFF
HDD Power Down	: Disabled	IRQ6 (Floppy Disk)	: OFF
MODEM Use IRQ	: NA	IRQ7 (LPT 1)	: OFF
Throttle Duty Cycle	: 33.3 %	IRQ9 (IRQ2 Redir)	: OFF
		IRQ10 (Reserved)	: OFF
		IRQ11 (Reserved)	: OFF
		IRQ12 (PS/2 Mouse)	: OFF
		IRQ13 (Coprocessor)	: OFF
		IRQ14 (Hard Disk)	: OFF
		IRQ15 (Reserved)	: 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

The field determines how much power consumption is needed for the system after selecting the below items.

Doze Mode

This field defines the continuous idle time before the system enters Doze Mode.

Standby Mode

This field defines the continuous idle time before the system enters Standby Mode. If any item defined is enabled & active Standby timer will be reloaded.

HDD Power Down

This field specifies the power conserving state that the hard disk drive enters after the specified period of hard drive inactivity has expired.

Available Options: Disabled, Standby, Suspend

Default setting: Disabled

Modem Use IRQ

This field specifies the IRQ of the modem.

IRQ

These options enable event monitoring. When the computer is in a power saving mode, activity on the named interrupt request line is monitored by BIOS. When any activity occurs, the computer enters Full On mode.

PCI/Plug and Play

ROM PCI/ISA BIOS (2A434F19)
 PNP/PCI CONFIGURATION
 AWARD SOFTWARE, INC.

PNP OS Installed : No Resources Controlled By : Manual Reset Configuration Data : Disabled IRQ-3 assigned to : Legacy ISA IRQ-4 assigned to : Legacy ISA IRQ-5 assigned to : PCI/ISA PnP IRQ-7 assigned to : PCI/ISA PnP IRQ-9 assigned to : PCI/ISA PnP IRQ-10 assigned to : Legacy ISA IRQ-11 assigned to : Legacy ISA IRQ-12 assigned to : PCI/ISA PnP IRQ-14 assigned to : PCI/ISA PnP IRQ-15 assigned to : PCI/ISA PnP DMA-0 assigned to : PCI/ISA PnP DMA-1 assigned to : PCI/ISA PnP DMA-3 assigned to : PCI/ISA PnP DMA-5 assigned to : PCI/ISA PnP DMA-6 assigned to : PCI/ISA PnP DMA-7 assigned to : PCI/ISA PnP	PCI IRQ Activated By : Level Used MEM base addr : N/A ESC : Quit ↑↓←→ : Select Item F1 : Help PU/PD/+/- : Modify F5 : Old Values (Shift)F2 : Color F6 : Load BIOS Defaults F7 : Load Setup Defaults
---	---

PNP O/S Installed

Set to Yes to inform BIOS that the operating system can handle Plug and Play (PnP) devices.

Available Options: Yes, No

Default setting: No

Resources Controlled By: Auto, Manual

If you select Auto, all the interrupt request (IRQ), DMA assignment, and Used DMA fields disappear, as the BIOS automatically assigns them. The default value is "Manual".

Available Options: Auto, Manual

Default setting: Manual

Reset Configuration Data: Enable, Disable

If you select Enable 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 operation operating system cannot boot.

Available Options: Enable, Disable

Default setting: Disable

IRQ-n/DMA-n Assigned: PCI/ISA PnP, Legacy ISA

The resources are controlled manually.

1. Legacy ISA Devices compliant with the original PC AT bus specification, requiring a specific interrupt/DMA (such as IRQ4, IRQ3 for serial port 1 and 2).
2. PCI/ISA PnP Devices compliant with Plug and play standard, whether designed for PCI or ISA bus.

Use MEM base addr. : Resources Controlled By: Auto, Manual

Select a base address for the memory area used by any peripheral that requires high memory.

Available Options: N/A, C800, CC00, D000, D400, D800 and DC00

Default setting: N/A

Peripheral Setup

This section describes the function of peripheral features.

**ROM PCI/ISA BIOS (2A434FJA)
INTEGRATED PERIPHERALS
AWARD SOFTWARE, INC.**

IDE HDD Block Mode	: Enabled	Build in CPU Audio	: Enabled
Primary IDE Channel	: Enabled	Audio I/O Base Address	: 220H
Master Drive PIO Mode	: Auto	MPU-401 I/O Base Address	: 330H
Slave Drive PIO Mode	: Auto	Audio IRQ Select	: IRQ 5
IDE Primary Master UDMA	: Auto	Audio Low DMA Select	: DMA 1
IDE Primary Slave UDMA	: Auto	Audio High DMA Select	: DMA 5
Onboard FDC Controller	: Enabled		
Onboard Serial Port 1	: 3F8/IRQ4		
Onboard Serial Port 2	:		
UART Mode Select	:		
Onboard Parallel Port	:		
Parallel Port Mode	:		
ECP Mode Use DMA	: 3		

IDE HDD Block Mode

This option allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

IDE PIO

IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship, which is determined by the cabling configuration used to attach them to the controller. Your system supports one IDE controller – a primary and a secondary – so you have the ability to install up to four separate hard disks.

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to affect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by them. This is simpler and more efficient (and faster). Your system supports five modes, numbered from 0 to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode.

OnBoard FDC

This field enables the floppy drive controller on the FX5401.

Available Options: Auto, Disabled, Enabled

Default setting: Auto

OnBoard Serial Port 1

These fields select the I/O port address for each Serial port.

Available Options: Disabled, 3F8H/IRQ4, 2F8H/IRQ3, 3E8H/IRQ4, 2E8H/IRQ3

Default setting: 3F8H/IRQ4

OnBoard Serial Port 2

These fields select the I/O port address for each Serial port.

Available Options: Disabled, 3F8H/IRQ4, 2F8H/IRQ3, 3E8H/IRQ4, 2E8H/IRQ3

Default setting: 2F8H/IRQ3

UART Mode Select

The second serial port offers these infrared interface modes.

Available Options: Normal, IrDA, and ASKIR

Default setting: Normal

OnBoard Parallel Port 1

This field selects the I/O port address for parallel port.

Available Options: Disabled, 378H/IRQ7, 278H/IRQ5, 3BCH/IRQ7

Default setting: 378H/IRQ7

Parallel Port Mode

This field specifies the parallel port mode. ECP and EPP are both bi-directional data transfer schemes that adhere to the IEEE P1284 specifications.

Available Options: Printer, EPP1.7+SPP, EPP1.7+ ECP, EPP1.9, EPP, and ECP

Default setting: Printer

ECP Mode Use DMA

This field is read-only and cannot be configured.

Available Options: 0, 1, and 3

Default setting: ECP for DMA3

Build In CPU Audio

This field specifies the internal Audio Control.

Available Options: Disable, Enable

Default setting: Enable

Audio Base I/O Address

These fields select the I/O port address for Audio.

Available Options: 220H, 240H, 260H and 280H

Default setting: 220H

Audio IRQ Select

This field specifies the IRQ for the Audio.

Available Options: Disable, 5,7 and 10

Default setting: 5

Audio Low DMA Select

This field specifies the DMA for internal Audio Control.

Available Options: Disable, 0, 1 and 3

Default setting: 1

Audio High DMA Select

This field specifies the DMA for internal Audio Control.

Available Options: Disable, 5, 6 and 7

Default setting: 5

Password Setup

There are two security passwords: Supervisor and User. Supervisor is a privileged person that can change the User password from the BIOS.

According to the default setting, both access passwords are not set up and are only valid after you set the password from the BIOS.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.
2. Type the desired password (up to 8 character length) when you see the message, "Enter New Supervisor Password."
3. Then you can go on to set a user password (up to 8 character length) if required. Note that you cannot configure the User password until the Supervisor password is set up.
4. Enter Advanced CMOS Setup screen and point to the Password Checkup field.
5. Select Always or Setup.
 - ✧ **Always:** a visitor who attempts to enter BIOS or operating system will be prompted for password.
 - ✧ **Setup:** a visitor who attempts to the operating system will be prompted for user password. You can enter either User password or Supervisor password.
6. Point to **Save Settings and Exit** and press Enter.
7. Press Y when you see the message, "Save Current Settings and Exit (Y/N)?"

Note: it is suggested that you write down the password in a safe place to avoid that password may be forgotten or missing.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.
2. Press Enter instead of entering any character when you see the message, "Enter New Supervisor Password."
3. Thus you can disable the password.

Chapter 4 Software Installation

The enclosed diskette includes FX5401 VGA, AUDIO driver and LAN driver. To install and configure you FX5401 system, you need to perform the following steps.

Installation WIN 95/98

- 1 Copy completely Window 98 and required drivers to the Hard drive execute this step on the normal PC, not on the FX5401 system.
- 2 Install the Hard drive to the FX5401 system.
- 3 Execute the installation procedure of Win98 Setup.
- 4 The rest steps please follow the Win 98 installation guide
- 5 The method of driver installation, please refer to the contents of installed drive

VGA Drivers

WIN98/WIN95 Driver

- 1 To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA>NS5530>WIN98. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to a 1.44" diskette.
- 2 Execute CYRIXM-1.exe file.
- 3 The screen shows the SETUP type. Press any key to enter the main menu.
- 4 As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

- 5 In the WINDOWS98/ME, you can find the <DISPLAYL> icon located in the

{CONTROL PANEL} group.

- 6 Adjust the <Resolution> and <Color>.

LAN Utility & Driver

- 1 To install the LAN utility OR driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8139C. If your system is not equipped with a CD ROM device, copy the LAN VGA driver from the CD ROM to a 1.44" diskette.
- 2 Execute install.exe file.

Note: In the LAN directory, a HELPME.EXE file is included to provide installation information

Audio Drivers

WIN 95/98 Driver

- 1 To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>AUDIO>NS5530>WIN98. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to a 1.44" diskette.
- 2 Execute CYRIXM~1.EXE file.
- 3 The screen shows the SETUP type. Press any key to enter the main menu.
- 4 As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

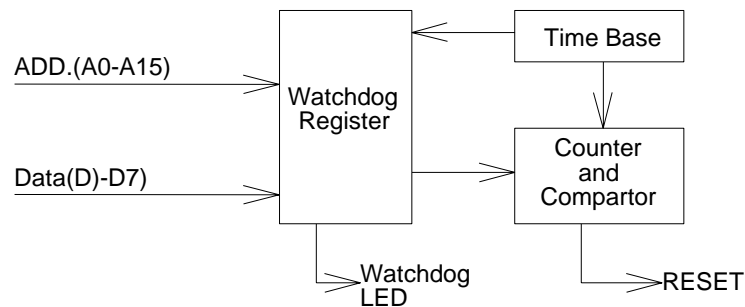
No, I will restart my computer later.

System must be restart then complete the installation.

Watchdog Timer

This section describes how to use the Watchdog Timer, including disabled, enabled, and trigger functions.

The FX5401 is equipped with a programmable time-out period watchdog timer. You can use your own program to enable the watchdog timer. Once you have enabled the watchdog timer, the program should trigger the I/O every time before the timer times out. If your program fails to trigger or disable this timer before it times out, e.g. because of a system hang-up, it will generate a reset signal to reset the system. The time-out period can be programmed to be set from 1 to 255 seconds or minutes.



The CD-ROM includes a Watch Dog demo file. In the file, there are 3 execution programs written in different forms. The sub-directories of the file are:

1. WATCHDOG/ASSEMBLE: Library and Test Program written in Assembly Language
2. WATCHDOG/TURBOC: Library and Test Program written in Turbo C++

The WATCHDOG includes a demonstration program established for users who would like to configure the Watchdog timer by themselves.

Note: In the WATCHDOG directory, README.TXT file is included to provide demo program information.

Watchdog Timer Setting

The watchdog timer is a circuit that may be used from your program software to detect system crashes or hang-ups. LED1 on this CPU board is the watchdog timer indicator, which is located at the upper-left corner above the USB connector. Whenever the watchdog timer is enabled, the LED will blink to indicate that the timer is counting. The watchdog timer is automatically disabled after reset.

Once you have enabled the watchdog timer, your program must trigger the watchdog timer every time before it times out. After you trigger the watchdog timer, it will be set to non-zero value to watchdog counter and start to count down again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system.

The factor of the watchdog timer time-out constant is approximately 1 seconds. The period for the watchdog timer time-out is between 1 to FF timer factors.

If you want to reset your system when watchdog times out, the following table listed the relation of timer factors between time-out periods.

Time Factor	Time-Out Period (Seconds)	Time-Out Period (Minutes)
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
"	"	"
"	"	"
"	"	"
FF	FF	FF

Watchdog Timer Enabled

To enable the watchdog timer, you have to output a byte of timer factor to the watchdog. The following is a Turbo C++ program, which demonstrates how to enable the watchdog timer and set the time-out period at 6 seconds.

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
char WD_TIME=0x6;

InitWD(equWdUnitS);
printf ("Enable watchdog");
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

Watchdog Timer Trigger

After you enable the watchdog timer, your program must write the same factor as enabling to the watchdog register at least once every time-out period to its previous setting. You can change the time-out period by writing another timer factor to the watchdog register at any time, and you must trigger the watchdog before the new time-out period in the next trigger. Below is a Turbo C++ program, which demonstrates how to trigger the watchdog timer:

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
char WD_TIME=0x6;

InitWD(equWdUnitS);
printf ("Enable watchdog");
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

Watchdog Timer Disabled

To disable the watchdog timer, simply write a 00H to the watchdog register.

```
#include "stdio.H"
#include "WDLIB.H"

main()
{
  InitWD(equWdUnitS);
  printf ("Disable Watch Dog");
  //Disable watch dog
  DisWD(WD_TIME);
}
```

Chapter5 Error Coding

This section outlines the errors that may occur when you operate the system, and also gives you the suggestions on solving the problems.

Topic include:

- Trouble Shooting for Post Beep & Error Messages

Trouble Shooting for Post Beep and Error Messages

The following information informs the Post Beep & error messages. Please adjust your systems according to the messages below. Make sure all the components and connectors are in proper position and firmly attached. If the errors still exist, please contact with your distributor for maintenance.

POST BEEP

Currently there are two kinds of beep codes in BIOS setup.

- One indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by three short beeps.
- The other indicates that an error has occurred in your DRAM. This beep code consists of a constant single long beep.

CMOS BATTERY FAILURE

When the CMOS battery is out of work or has run out, the user has to replace it with a new battery.

CMOS CHECKSUM ERROR

This error informs that the CMOS has corrupted. When the battery runs weak, this situation might happen. Please check the battery and change a new one when necessary.

DISK BOOT FAILURE

When you can't find the boot device, insert a system disk into Drive A and press < Enter >. Make sure both the controller and cables are all in proper positions, and also make sure the disk is formatted. Then reboot the system.

DISKETTE DRIVES OR TYPES MISMATCH ERROR

When the diskette drive type is different from CMOS, please run setup or configure the drive again.

ERROR ENCOUNTERED INITIALIZING HARD DRIVE

When you can't initialize the hard drive, ensure the following things:

1. The adapter is installed correctly
2. All cables are correctly and firmly attached
3. The correct hard drive type is selected in BIOS Setup

ERROR INITIALIZING HARD DISK CONTROLLER

When this error occurs, ensure the following things:

1. The cord is exactly installed in the bus.
2. The correct hard drive type is selected in BIOS Setup
3. Whether all of the jumpers are set correctly in the hard drive

FLOPPY DISK CONTROLLER ERROR OR NO CONTROLLER PRESENT

When you cannot find or initialize the floppy drive controller, please ensure the controller is in proper BIOS Setup. If there is no floppy drive installed, ensure the Diskette Drive selection in Setup is set to NONE.

KEYBOARD ERROR OR NO KEYBOARD PRESENT

When this situation happens, please check keyboard attachment and no keys being pressed during the boot. If you are purposely configuring the system without a keyboard, set the error halt condition in BIOS Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot procedure.

MEMORY ADDRESS ERROR

When the memory address indicates error. You can use this location along with the memory map for your system to find and replace the bad memory chips.

MEMORY SIZE HAS CHANGED

Memory has been added or removed since last boot. In EISA mode, use Configuration Utility to re-configure the memory configuration. In ISA mode enter BIOS Setup and enter the new memory size in the memory fields.

MEMORY VERIFYING ERROR

It indicates an error verifying a value is already written to memory. Use the location along with your system's memory map to locate the bad chip.

OFFENDING ADDRESS MISSING

This message is used in connection with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

REBOOT ERROR

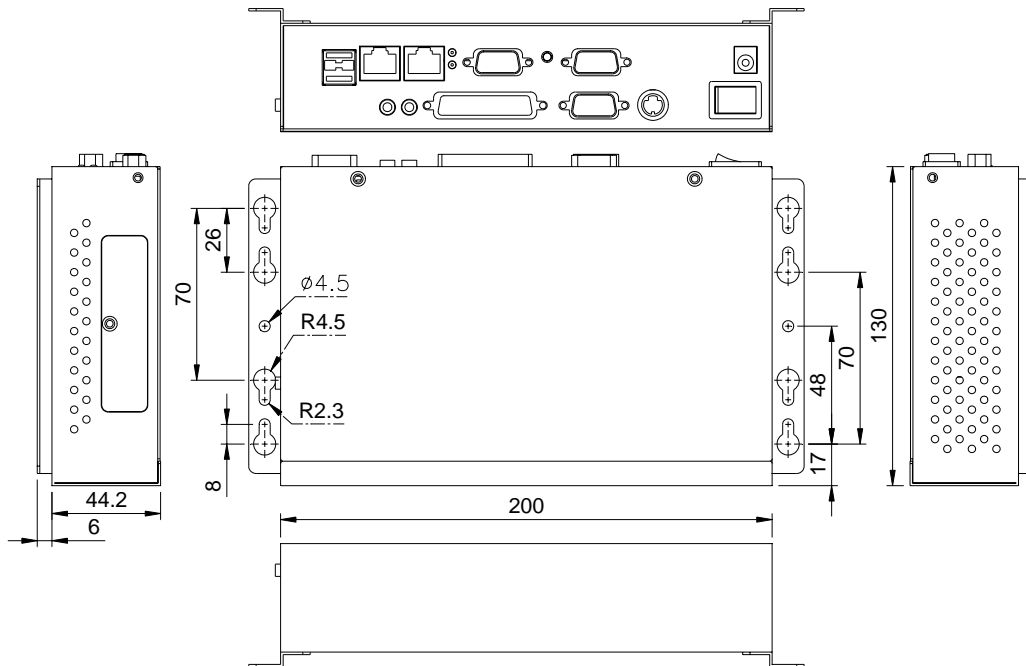
When this error occurs that requires you to reboot. Press any key and the system will reboot.

SYSTEM HALTED

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

Appendix

Dimension



Technical Reference

Physical and Environmental

DC Inputs: 24V/0.8A Minimal

Temperature: Operating 0°C ~ 45°C

Relative humidity 5 % to 95 % non-condensing

DC-AC adapter

Input AC Voltage Range: 100V~240V/1A, 50Hz ~60Hz

Output DC Voltage: 24V/1.25A Maximal

Real-Time Clock and Non-Volatile RAM

The FX5401 contains a real-time clock compartment that maintains the date and time in addition to storing configuration information about the computer system. It contains 14 bytes of clock and control registers and 114 bytes of general purpose RAM. Because of the use of CMOS technology, it consumes very little power and can be maintained for long periods of time using an internal Lithium battery. The contents of each byte in the CMOS RAM are listed below:

Address	Description
00	Seconds
01	Second alarm
02	Minutes
03	Minute alarm
04	Hours
05	Hour alarm
06	Day of week
07	Date of month
08	Month
09	Year
0A	Status register A
0B	Status register B
0C	Status register C

Address	Description
0D	Status register D
0E	Diagnostic status byte
0F	Shutdown status byte
10	Diskette drive type byte, drive A and B
11	Fixed disk type byte, drive C
12	Fixed disk type byte, drive D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	Low actual expansion memory byte
31	High actual expansion memory byte
32	Date century byte
33	Information flags (set during power on)
34-7F	Reserved for system BIOS

CMOS RAM Map

Register	Description
00h -10h	Standard AT-compatible RTC and Status and Status Register data definitions
11h – 13h	Varies
14h	Equipment Bits 7-6 Number of Floppy Drives 00 1 Drive 01 2 Drives Bits 5-4 Monitor Type 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bits 3 Display Enabled 0 Disabled 1 Enabled Bit 2 Keyboard Enabled 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bit 1 Math Coprocessor Installed 0 Absent 1 Present Bit 0 Floppy Drive Installed 0 Disabled 1 Enabled
15h	Base Memory (in 1KB increments), Low Byte
16h	Base Memory (in 1KB increments), High Byte
17h	IBM-compatible memory (in 1KB increments), Low Byte
18h	IBM-compatible memory (in 1KB increments), High Byte (max 15 MB)
19h-2Dh	Varies
2Eh	Standard CMOS RAM checksum, high byte
2Fh	Standard CMOS RAM checksum, low byte
30h	IBM-compatible Extended Memory, Low Byte (POST) in KB
31h	IBM-compatible Extended Memory, High Byte (POST) in KB
32h	Century Byte
33h	Reserved. Do not use
34h	Reserved. Do not use
35h	Low byte of extended memory (POST) in 64 KB
36h	High byte of extended memory (POST) in 64 KB
37h-3Dh	Varies
3Eh	Extended CMOS Checksum, Low Byte (including 34h-3Dh)
3Fh	Extended CMOS Checksum, High Byte (including 34h-3Dh)

I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses, which also becomes the identity of the device. There is a total of 1K-port address space available. The following table lists the I/O port addresses used on the Industrial CPU Card.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 071h	Real Time Clock, NMI
078h - 07Bh	TTL I/O
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
2E8h - 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3E8h - 3EFh	Serial Port #3(COM3)
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

Interrupt Request Lines (IRQ)

There are a total of 15 IRQ lines available on the Industrial CPU Card. Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on the Industrial CPU Card.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	AUDIO
IRQ6	Floppy Disk Controller
IRQ7	Parallel Port #1
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	LAN #1
IRQ11	LAN #2
IRQ12	PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE
IRQ15	USB

DMA Channel Map

The equivalent of two 8237A DMA controllers are implemented in the FX5401 board. Each controller is a four-channel DMA device that will generate the memory addresses and control signals necessary to transfer information directly between a peripheral device and memory. This allows high speed information transfer with less CPU intervention. The two DMA controllers are internally cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1) and three channels for transfers to 16-bit peripherals (DMA2). DMA2 channel 0 provides the cascade interconnection between the two DMA devices, thereby maintaining IBM PC/AT compatibility.

The following is the system information of DMA channels:

DMA Controller 1	DMA Controller 2
Channel 0: Spare	Channel 4: Cascade for controller 1
Channel 1: Reserved for IBM SDLC	Channel 5: Spare
Channel 2: Diskette adapter	Channel 6: Spare
Channel 3: Spare	Channel 7: Spare

Serial Ports

The ACEs (Asynchronous Communication Elements ACE1 to ACE2) are used to convert parallel data to a serial format on the transmit side and convert serial data to parallel on the receiver side. The serial format, in order of transmission and reception, is a start bit, followed by five to eight data bits, a parity bit (if programmed) and one, one and half (five-bit format only) or two stop bits. The ACEs are capable of handling divisors of 1 to 65535, and produce a 16x clock for driving the internal transmitter logic.

Provisions are also included to use this 16x clock to drive the receiver logic. Also included in the ACE is a completed MODEM control capability, and a processor interrupt system that may be software tailored to the computing time required to handle the communications link.

The following table is a summary of each ACE accessible register

DLAB	Port Address	Register
0	Base + 0	Receiver buffer (read)
		Transmitter holding register (write)
0	Base + 1	Interrupt enable
X	Base + 2	Interrupt identification (read only)
X	Base + 3	Line control
X	Base + 4	MODEM control
X	Base + 5	Line status
X	Base + 6	MODEM status
X	Base + 7	Scratched register
1	Base + 0	Divisor latch (least significant byte)
1	Base + 1	Divisor latch (most significant byte)

Receiver Buffer Register (RBR)

Bit 0-7: Received data byte (Read Only)

Transmitter Holding Register (THR)

Bit 0-7: Transmitter holding data byte (Write Only)

Interrupt Enable Register (IER)

Bit 0: Enable Received Data Available Interrupt (ERBFI)

Bit 1: Enable Transmitter Holding Empty Interrupt (ETBEI)

Bit 2: Enable Receiver Line Status Interrupt (ELSI)

Bit 3: Enable MODEM Status Interrupt (EDSSI)

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Interrupt Identification Register (IIR)

Bit 0: "0" if Interrupt Pending

Bit 1: Interrupt ID Bit 0

Bit 2: Interrupt ID Bit 1

Bit 3: Must be 0

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Line Control Register (LCR)

Bit 0: Word Length Select Bit 0 (WLS0)

Bit 1: Word Length Select Bit 1 (WLS1)

WLS1	WLS0	Word Length
0	0	5 Bits
0	1	6 Bits
1	0	7 Bits
1	1	8 Bits

Bit 2: Number of Stop Bit (STB)

Bit 3: Parity Enable (PEN)

Bit 4: Even Parity Select (EPS)

Bit 5: Stick Parity

Bit 6: Set Break

Bit 7: Divisor Latch Access Bit (DLAB)

MODEM Control Register (MCR)

Bit 0: Data Terminal Ready (DTR)

Bit 1: Request to Send (RTS)

Bit 2: Out 1 (OUT 1)

Bit 3: Out 2 (OUT 2)

Bit 4: Loop

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Line Status Register (LSR)

Bit 0: Data Ready (DR)

Bit 1: Overrun Error (OR)

Bit 2: Parity Error (PE)

Bit 3: Framing Error (FE)

Bit 4: Break Interrupt (BI)

Bit 5: Transmitter Holding Register Empty (THRE)

Bit 6: Transmitter Shift Register Empty (TSRE)

Bit 7: Must be 0

MODEM Status Register (MSR)

Bit 0: Delta Clear to Send (DCTS)

Bit 1: Delta Data Set Ready (DDSR)

Bit 2: Training Edge Ring Indicator (TERI)

Bit 3: Delta Receive Line Signal Detect (DSLSD)

Bit 4: Clear to Send (CTS)

Bit 5: Data Set Ready (DSR)

Bit 6: Ring Indicator (RI)

Bit 7: Received Line Signal Detect (RSLD)

Divisor Latch (LS, MS)

	LS	MS
Bit 0:	Bit 0	Bit 8
Bit 1:	Bit 1	Bit 9
Bit 2:	Bit 2	Bit 10
Bit 3:	Bit 3	Bit 11
Bit 4:	Bit 4	Bit 12
Bit 5:	Bit 5	Bit 13
Bit 6:	Bit 6	Bit 14
Bit 7:	Bit 7	Bit 15

Desired Baud Rate	Divisor Used to Generate 16x Clock
300	384
600	192
1200	96
1800	64
2400	48
3600	32
4800	24
9600	12
14400	8
19200	6
28800	4
38400	3
57600	2
115200	1

Parallel Ports

Register Address

Port Address	Read/Write	Register
Base + 0	Write	Output data
Base + 0	Read	Input data
Base + 1	Read	Printer status buffer
Base + 2	Write	Printer control latch

Printer Interface Logic

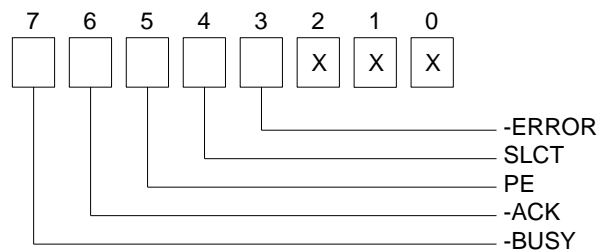
The parallel portion of the SMC37C669 makes the attachment of various devices that accept eight bits of parallel data at standard TTL level.

Data Swapper

The system microprocessor can read the contents of the printer's Data Latch through the Data Swapper by reading the Data Swapper address

Printer Status Buffer

The system microprocessor can read the printer status by reading the address of the Printer Status Buffer. The bit definitions are described below:

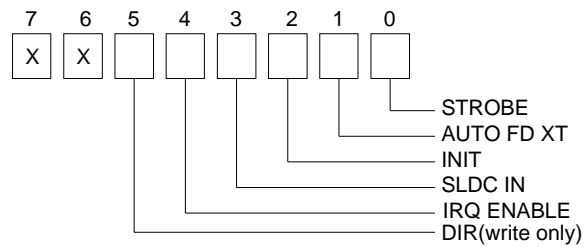


NOTE: X represents not used.

- Bit 7: This signal may become active during data entry, when the printer is off-line during printing, or when the print head is changing position or in an error state. When Bit 7 is active, the printer is busy and cannot accept data.
- Bit 6: This bit represents the current state of the printer's ACK signal. A 0 means the printer has received the character and is ready to accept another. Normally, this signal will be active for approximately 5 microseconds before receiving a BUSY message stops.
- Bit 5: A 1 means the printer has detected the end of the paper.
- Bit 4: A 1 means the printer is selected.
- Bit 3: A 0 means the printer has encountered an error condition.

Printer Control Latch & Printer Control Swapper

The system microprocessor can read the contents of the printer control latch by reading the address of printer control swapper. Bit definitions are as follows:



NOTE: X represents not used.

- Bit 5: Direction control bit. When logic 1, the output buffers in the parallel port are disabled allowing data driven from external sources to be read; when logic 0 they work as a printer port. This bit is write-only.

- Bit 4: A 1 in this position allows an interrupt to occur when ACK changes from low state to high state.

- Bit 3: A 1 in this bit position selects the printer.

- Bit 2: A 0 starts the printer (50 microseconds pulse, minimum).

- Bit 1: A 1 causes the printer to line-feed after a line is printed.

- Bit 0: A 0.5 microsecond minimum highly active pulse clocks data into the printer. Valid data must be present for a minimum of 0.5 microseconds before and after the strobe pulse.