RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference with radio and television reception.

If this equipment does cause interference to radio or TV reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* Reorient the receiving antenna.

* Relocate the computer away from the receiver.

* Move the computer away from the receiver.

* Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

* Ensure that card slot covers are in place when no card is installed.

* Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.

* If peripherals are used with this system, it is suggested to use shielded, grounded cables, with in- line filters if necessary.

If necessary, the user should consult the dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

NOTE

1. When you see an error message appear on the screen after turning the power on, leave the system switched on for one or two hours to recharge the battery. You can then enter the system configuration.

2. Leave your system switched on for 10 to 15 hours to completely recharge the battery.

3. If you had left the system switched off for more than one month, follow step 2, above.

CONTENTS

SECTION 1 GENERAL FEATURES

The Fox-286 system board is high performance system board that represents a significant technological advance over the original 80286 designs. It offers an increased power and flexibility architecture by supporting 80286 processor speeds up to 12 MHz(*). This manual is designed to provide the basic information necessary for the end user to understand the Fox-286 system board.

The Fox-286 system board is designed for the most advanced computer-based applications for today and in the future. The Fox-286 system provides a highly integrated approach to implement a very flexible system based on the PC/AT and the 80286 CPU. Key features of the board are summarized below:

1.1 PROCESSOR AND SYSTEM

* *16 bit 80286 CPU*

* *Optional 80287 numeric coprocessor*

* *6/12 MHz system speed hardware/software switchable*

* *1/0 wait state hardware selectable*

* *On board battery backup for CMOS configuration table and real-time clock*

* *On board power good test circuit*

***(*) Note** : Fox-286 is available in two models :*

- *Fox 286-16 and*
- *Fox 286-12*

Specifications are the same for the two models except that FOX 286-16 operates much faster, up to 16MHz at turbo mode and 8MHz at normal mode.

1.2 MEMORY SUBSYSTEM

* ***Memory Capacity:***

1MB using 256K X 4 DRAM chips

* ***Memory Configuration:***

256KB/0KB
512KB/0KB
640KB/0KB
640KB/384KB

* Parity bit can either be enabled or disabled

* ***ROM Capacity:***

256K EPROM BIOS space for custom BIOS applications

1.3 I/O SUBSYSTEM

* *Eight expansion slots*

- 4 with a 36- and a 62-pin card-edge socket
- 2 with only the 62-pin card-edge socket

* *Additional Features*

** Hardware control support

- Keylock
- Reset
- Turbo LED
- Power LED
- Speaker
- Wait State
- External Battery

** System support function:

- 7-Channel Direct Memory Access
- 16-level interrupt
- Three programmable timers
- System clock

SECTION 2 INTRODUCTION

The design of cost effective IBM PC/AT compatible Microcomputer requires taking advantage of every possible advanced technology. Cost effectiveness usually can be achieved in utilizing the least expensive parts available and the lowest counts of the required parts. The Fox-286 is designed with top performance and flexibility in mind, it is a fully PC/AT compatible system board implemented with the high integration G2 AT chip set which supports the 80286 CPU at clock speeds up to 12 MHz zero wait state performance.

One main advantage of this design includes the dual clock system. This innovation make it possible for your computer to operate at either of two clock speeds: 6 MHz or 12 MHz. In the 12 MHz zero wait-state mode, your computer will operate much faster than a conventional 80286-based computer.

The board also features zero wait-state DRAM accesses in a design which supports one MByte of DRAMs on the system board. This allows higher system performance relative to older PC-AT designs. And by selection of switch setting, you can configure the RAM for the one-wait/zero-wait option. This flexibility in configuration allows you to select an ideal cost/performance combination.

It also provides on-board powergood source. The on- board power good generator provides a 'power-good' signal to indicate proper operation of the power supply. It allows you to used XT grade power supply which does not provide the circuitry to generate the power good signal. The Fox-286 system is hardware and software compatible with associated PC-AT products. This means that virtually all the hardware and software that is available for the PC/AT can also be run on a system you build around the Fox-286 system board.

The Fox-286 is fully software compatible with the IBM PC-AT design. The Fox-286 is designed such that software is completely portable between the PC-AT to the Fox-286. Note that "real-time" types of software programs could be the exception, as the higher operating speed of

the Fox-286 could cause execution or human interface problems.

The Fox-286 supports MS-DOS Version 2.0 and above, Xenix and all PC/AT application programs. Users can run applications designed for the PC/AT on the Fox- 286 without any modification. Multi-tasking and multi-user capabilities are fully functional on the Fox- 286 system board.

In addition, the Fox-286 provides standard expansion bus connectors so that add-on cards developed for the PC-AT will interface correctly.

The Fox-286 features high performance, low power consumption, low board space requirements, reliability and low cost.

For these reasons, the Fox-286 is the ideal choice for a person seeking affordable, well designed AT-style power.

SECTION 3 SYSTEM BOARD SWITCH SETTING

The switches on the system board are shown in the figure below and on the following pages. These settings are used to specify the system board memory size and zero or one wait state operation.

Warning: *Before you change any switch settings, make a note of how the switches are presently set.*

Switch	**Function**
1	Zero/One Wait State Function

2 Reserved

3,4 RAM Size Selection

3.1 SYSTEM BOARD SWITCH BLOCK LOCATION

The following figure shows where the switch block is on the system board.

Note: *The switch settings below are for example only.*

Change the switch settings by using the tip of a pen to gently pushing the switches into the correct position.

3.2 RAM CONFIGURATION AND INSTALLATION

The Fox-286 supports *44256K* DIPs for 1MB on-board memory configuration. Switch 1 selects zero-wait state or one-wait state operation. Switch 3 & 4 are set to reflect the total amount of memory in your system. The Fox-286 system board provides four 20-pins DIP

sockets (for 44256 DRAMs) and four 38-pins dual sockets (for either 44256 or 4464 DRAMs) for 1 MB or 640 KB memory configuration.

Memory can be installed/split as follows:

44256K DIPs :

256KB/0KB	(512KB installed)
512KB/0KB	(512KB installed)
640KB/0KB	(640KB installed)
640KB/384KB	(1MB installed)

Utilizing 44256K DIPs

System Memory	Switch Setting	RAM Location/Type
256KB		**U3,U4,U8,U9 -44256** **U2,U7(parity) -41256**
512KB		**U3,U4,U8,U9 -44256** **U2,U7(parity) -41256**
640KB		**U3,U4,U8,U9 -44256** **U2,U7(parity) -41256** **U13,U14,U18,U19-4464** **U12,U17(parity)-4164**
640KB/384KB		**U3,U4,U8,U9 -44256** **U13,U14,U18,U19-44256** **U2,U7,U12,U17-41256** **(parity)**

U2, U7, U12 and U17 are the parity bits used for data checking. In normal situations, those bits are not needed. Hence, the user can left those sockets blank and thus allowing you to minimize the system cost.

(For more detail, please refer to the section on parity)

3.3 ONE-WAIT/ZERO-WAIT STATE SWITCH SETTING

What is Zero Wait State?

In a high performance PC/AT system based on the 80286 microprocessor running at its maximum bus transfer speed, only two system clock cycles would be required for any given byte (8-bit) or word (16-bit) transfer. The problem is that most subsystems cannot keep up with this pace, especially at system speeds exceeding 8 MHz. This implies the need for wait states during some accesses. Which means that the 80286 microprocessor has to wait in a do nothing loop until memory can respond to its needs for data. For this reason, the processor has to insert wait states. This is when the wait state comes in.

But the secret to high performance is to eliminate the wait states during the most frequent operations. The system board DRAM accesses are the most important target for no wait state performance. By far the most common memory or I/O cycle performed by the 80286 in an AT is a memory access to the DRAM on the system motherboard. These are important because most PC/AT applications spend over 90% of their time executing these types of cycles. Streamlining these cycles is the best way to achieve high performance in a PC/AT compatible system.

To achieve a true zero-wait state in the Fox-286 system board, it has been designed such that memory subsystem is fast enough to respond to the CPU data, and thus memory bus cycle can be completed in just 2 cycles, eliminating the needs for wait states. This is what we refer to as zero wait state cycle.
Switch 1 is used to select the zero-wait state or one- wait state operation. Refer to the following figure for location of Switch 1 and the proper setting:

Zero-wait State

One-wait State

SECTION 4 SYSTEM BOARD JUMPER SELECTION

The mainboard jumpers allow the user to select the desired system configuration. The tables below shows the function and the default settings of these jumpers. Details of these jumpers will be discussed in the following sections.

Jumper	***Function***
JP1	*DRAM speed selector*

JP2 *BIOS ROM chip selection*

JP3 *Display adapter selection*

JP4 *Parity enable/disable*

Default Settings

JP1 *Pin 2,3 short*

JP2 *Pin 2,3 short (256K ROM BIOS)*

JP3 *Open (Monochrome)*

JP4 *Pin 2,3 short (Parity check enable)*

4.1 DRAM SPEED SELECTOR

The jumper JP1 allows the user to be able to use DRAM from different sources available in the market. This option is included in order to render superior tolerance to the wide range of DRAM's specifications. This will ensure the highest degree of compatibility performance with those various DRAMs' timing requirements.

The default setting for JP1 is pin 2,3 shorted. This setting should satisfy most DRAMs' timing requirements. In case system memory is not behaving reliably, try to alter JP1 setting to pin 1,2 to solve such problem.

Refer to the figure below for the default setting.

4.2 ROM CONFIGURATION AND INSTALLATION

The Fox-286 contains sockets for two BIOS EPROMs that can either be 27128 or 27256. Setting of jumper JP2 determines the ROM size and the type of ROM being used in the system board. Installation of the chips is explained in the table below. No matter what BIOS is used, the low-byte chip should be inserted in socket U20 and the high-byte chip should be inserted in socket U21.

JP2 Setting	***Type of BIOS***	***ROM chip installation U20***	***U21***
1-2	***64KB size***	***27256***	***27256***
2-3	***32KB size***	***27128***	***27128***

4.3 DISPLAY ADAPTER SETTINGS

The Fox-286 system can work with various display units if provided with a suitable display adapter. Jumper JP3 is used to signal the system what type of display adapter is installed. If

you want to use two monitors (a color monitor and a high-resolution monochrome monitor, for example), set the adapter type to the monitor you want to use when the system boots. Refer to the figure below for the location of jumper JP3 and the appropriate setting:

JP3 Setting	***Adapter Type***
ON	*Color Graphics Adapter or Enhanced Graphics Adapter*
OFF	*Monochrome Adapter*

4.4 PARITY ENABLE/DISABLE

What is Parity?

Parity is a method for detecting errors in data communications. The parity bit is added at the end of a data word. The value of this bit is a function of the rest of the data word. There are several ways that the parity bit can be calculated.

"Even parity" means that the parity bit is set so that the sum of all the bits in the data word (including the parity bit) is even.

"Odd parity" is similar; the parity bit is set so that the sum of all the data bits in a word, including the parity bit, is an odd number.

"No parity" means that no parity bit is added to the end of a data word.

For the Fox-286 System board, Memory Data Parity Check can either be enabled or disabled by altering the setting of jumper JP4.

When installing DIP type RAM chips; *U2, U7, U12 and U17* are the DRAM chips for the parity bit. If data parity check is not desired, the sockets for U2, U7, U12 and U17 can be left blank; thus enabling the user to minimize the number of RAM chips installed for the system.

For 1MB memory configuration, 41256 RAM chips are used for parity bits.
For 640KB memory configuration, 41256 RAM chips are used for BANK 0 parity bits (U2 and U7); 4164 RAM chips are used for BANK 1 parity bits (U12 and U17).

Refer to the figure below for the location of jumper JP4, parity bits and the appropriate setting:

JP4 Setting	**Parity Check**
1-2	Disable

2-3	Enable

SECTION 5 SYSTEM BOARD CONNECTOR

This section describes with details of the hardware features in the system board. You may find the information in this section useful. Under typical conditions, these connectors will have to connected to the indicators and switches of the system unit.

Connector	**Function**
P1	Speaker connector
P2	Hardware reset connector
P3	Turbo LED connector
P4	Turbo switch connector
P5	Power LED and Ext-Lock connector
P6,P7	Power supply connector
P8	External battery connector
KB1	Keyboard connector

Pin assignments are as follows:

5.1 P1 - Speaker Connector

The speaker connector is a 4-pin, keyed, Berg strip. The pin assignments follow.

Pin	Assignments
1	Data out
2	+5 Vdc
3	Ground

4	+5 Vdc

5.2 P2 - Hardware Reset Connector

A reset will restarts the computer from the RAM test stage. If you encounter any problems while using unfamiliar software, you can always restart from the beginning by pressing the restart button.

Pin	Assignments
1	Selection pin
2	Ground

5.3 P3 - Turbo LED Connector

The turbo LED indicates operation in Turbo mode (12MHz). This is a 2-pin keyed, Berg strip (0.1") male pin connector.

Pin	Assignments
1	+5Vdc
2	LED signal

5.4 P4 - Turbo Switch Connector

The operating speed of the system board can be selected by the turbo switch setting. A speed switchover circuit ensures a smooth switchover between operating speeds, even during system operation. Also software selection via keyboard is allowed if appropriate BIOS is used.

Hardware Select Mode:

The turbo switch changes operation mode between 12MHz and 6MHz. This setting determines the speed at which the processor runs after booting. If you have a hardware switch on your case panel, connect it to jumper P4. You then can push the hardware switch to enter either Normal

mode or Turbo mode. The pin assignments are as follows:

Pin	Assignments
1	Select pin
2	Ground

Software Select Mode:

In addition to setting the processor clock speed by front-panel switch (Turbo switch), you can also change processor speed 'on-the-fly' via keyboard command. The FOX-286 has speed switching circuitry allowing it to change speed during operation, even while you are running a program.

The system is default to run in high speed, but the operating mode can also be changed. You can toggle the operating speed between turbo mode and normal mode by pressing the following keystrokes simultaneously:

[Ctrl], [Alt], [+]
or [Ctrl], [Alt], [-]

The turbo LED light will light up to show whether your computer is now running in turbo mode or normal mode. When the Turbo LED is turned on, the system is in Turbo mode (12 MHz). If the Turbo LED is off, the system is in Normal mode (6 MHz).

5.5 P5 - Power LED And Ext-Lock Connector

The power LED indicates whether the power is on. The keylock is used to enable or disable the keyboard. By disabling the keyboard, the user ensures that anyone who does not have a key will be unable to use the computer. Unlocking the keylock enables the keyboard.

The power LED and keylock connector is a 5-pin Berg strip. Its pin assignments are as follow:

Pin	Assignments
1	LED Power
2	Key
3	Ground
4	Keyboard inhibit

	5	Ground

5.6 P6, P7 - Power Supply Connector

Pin		Assignments
P6:	1	Ground
2		Ground
3		-5 Vdc
4		+5 Vdc
5		+5 Vdc
6		+5 Vdc
P7:	1	Power good
2		+5 Vdc
3		+12 Vdc
4		-12 Vdc
5		Ground
6		Ground

5.7 P8 - External Battery Connector

This is for connecting four size "AA" batteries instead of the on-board battery to the CMOS RAM. This feature provides the same function as the on-board batteries.

Pin	Assignments
1	6 Vdc
2	N/C
3	Ground

4	**Ground**

5.8 KB1 (DIN Connector) - Keyboard Connector

The keyboard connector is a five-pin DIN 90-degree printed circuit board (PCB) mounting. The pin assignments are as follows:

Pin	Assignments
1	**Keyboard clock**
2	**Keyboard data**
3	**Spare**
4	**Ground**
5	**+5 Vdc**

5.9 80287 Numeric Processor Installation

If you use certain applications or programming languages, you may want to install a math co-processor to enhance the performance of your system. Be ware, however, that your application program must be specifically designed to take advantage of the math co- processor to benefit from its presence in the system.

The 80287 Numeric Processor operates in conjunction with the 80286 CPU and will enhance the system's math capabilities. To install the 80287, simply insert the LSI chip into the empty socket (U30) below the power connector.

Important

Each pin on this LSI has a unique function. The 80287 should therefore be inserted into the socket in the correct direction. If it is inserted incorrectly, the LSI or the computer may be damaged. Install the LSI correctly by referring to the illustration. Care should be taken not to bend and damage any of the pins. When inserting the LSI into the socket, apply force evenly over the LSI body.

SECTION 6 SYSTEM OPERATION

6.1 SYSTEM BIOS

All microcomputer systems use a Basic Input Output System. This is software that has been permanently recorded in a ROM (Read Only Memory) chip and functions as the basic point of communication between the system board and the rest of the computer.

The BIOS provides an operational interface to the system and relieve the programmer from worrying about the characteristics of hardware devices. Thus, hardware modifications and enhancements become transparent to user's programs, access to BIOS is through the program interrupts of the 80286 microprocessor. Each BIOS entry point is available through its own interrupt.

6.2 POWER UP

Upon your turning on the power of your FOX-286 system, the system will go through a self-test routine which checks all of its internal devices. Complete testings will be carried out on the CPU, base 640K RAM, extended RAM, ROM, system board, CMOS memory, video controllers, parallel and serial subsystems, floppy and fixed disk subsystems and the keyboard.

When the self-test is completed, the system will search for the DOS (disk operating system) system file in drive A. If no system diskette is put in drive A, it will check the fixed disk (if installed).

6.3 FIRST TIME STARTUP

If it is the first time that the computer is started up, you will need to configure the system by telling the SETUP program what hardware configuration your system contains.

6.4 CONFIGURING YOUR SYSTEM

The AMI BIOS, in addition to the BIOS program itself, contains a setup program that is called up everytime the system boots up. This is called the SETUP. The SETUP program lets you specify your system's configuration of diskette drives, hard disk drives, video display, memory, and date and time. The AMI BIOS provides a one-screen interactive equipment and machine configuration setup. The SETUP can be run after the system has been turned on and the memory test is finished or has been escaped. The SETUP program is built-in, you do not need a diskette to use it.

If your FOX-286 is already installed in a working system, you will not need to use the SETUP program unless the configuration already recorded in the on- board CMOS RAM is lost or a

change is made in your system hardware configuration. If the information is lost due to loss of battery power, you will need to reenter the configuration. If the configuration is altered, the changes must be recorded.

6.4.1 Memory Test Bypass

After the system is powered on or after a reset, the BIOS performs diagnostics of the system and displays the size of the memory being tested.

Note that you can bypass the memory test by pressing the **<ESC>** key. This option would be useful when the memory on the system is quite large. You may hit the **<ESC>** key when the message following message appears on the screen:

Press <ESC> Key to bypass MEMORY test

6.4.2 Running Setup

Follow the instructions as they come up on the screen to complete the procedure. The initial prompt on the screen tells you to press the **<DEL>** key if you want to use the setup program. It is displayed briefly just after the RAM test is run when you first turn on the system. If it disappears before you have a chance to respond turn the system off and on again or reset the system and the message will reappear. The initial screen prompt will be similar to:

Press <DEL> key if you want to run SETUP or DIAGS.

Hit **<DEL>** key to get into the Setup Mode. (Note that **<DEL>** key will get you into the setup mode, only when the above message is displayed on the screen.)
Upon your pressing of the **<DEL>** key, the following message will appear on the screen :

EXIT FOR BOOT
RUN CMOS SETUP
RUN DIAGNOSTICS

Use <Up> and **<Down>** keys to highlight the selected item. Highlight **RUNCMOSSETUP** for the SETUP program and press the **<Return>** key to enter this option.
In a moment, the following SETUP menu will appear :
Once you have entered the SETUP menu, enter the date, time, the primary display type, the floppy drive installed and the hard disk drive type (if installed). See **Appendix1** for a printed list of hard disk drive types. The SETUP program will automatically determines your computer's memory configuration and displays it on the SETUP menu.

Use the **<Up>, <Down> , <Left>, <Right>,** and **Return** keys to move between options. The field shown in reverse video is the current field, which is the one the user may changes. Then use **<PgUp>** and **<PgDn>** keys to select the correct values.

After you have entered the correct values to all of the SETUP options, you may now exit the SETUP program. To do so, press **<ESC>** key to exit. The following message will then appear :

Write data into CMOS and exit (Y/N)?

Press **Y** to update the data and exit the SETUP program.

The computer now performs a cold boot (equivalent to turning the power off and back on again), performs the memory test, and then tries to boot from the disk drive. If your hard disk has not yet been initialized, be sure that you have a bootable DOS diskette in the A drive.

6.5 RUNNING AMI BIOS DIAGNOSTICS

Following the above procedures until the following display is shown on the screen :

EXIT FOR BOOT
RUN CMOS SETUP
RUN DIAGNOSTICS

Use the <Up> & **<Down>** to move the highlight bar to select **"RUN DIAGNOSTICS"** and then press **<Enter>**. The following screen will then appear :
The AMI Utilities includes services for the hard disk, floppy, keyboard, video and miscellaneous. It provides an easy to operate screen-menu allowing inexperienced users to operate the program. Simply press
<Left> or **<Right>** and **<Up>** or **<Down>** keys to move the highlight bar the option desired.

SECTION 7 TECHNICAL INFORMATION

This section provides the technical materials about the FOX-286 system board. The information in this section is for reference, and is intended for advanced readers who needs to understand the basic design and operation of the FOX-286 system.

7.1 GC101/GC102 AT CHIP SET

The GC101 Peripheral Controller is the heart of the three chip system and forms most of the control circuits and "glue" logic of the AT architecture in a single CMOS VLSI chip.

The GC101 performs CPU and peripheral support functions including the following:

* All Peripheral Devices and Refresh Counters

* All mega functions

  -82284 Clock Generator

  -82288 Bus Controller

  -8254 Timer

  -8259 Interrupt Controller (2)

  -8237 DMA Controller

The GC102 may be configured as either an Address Buffer or Data Buffer by strapping one pin high or low. This chip replaces address buffer, data transceivers, memory drivers, parity generators and supporting circuitry.

GC102 Data Buffer provides:

* Buffers and latches data for the CPU expansion bus and memory

* Parity bit generation and checking

* Slew rate controlled outputs

GC102 Address Buffer provides:

* Address buffering for expansion bus, local I/O bus and DRAM address bus.

* 10 bit DRAM address bus

7.2 FOX-286 SYSTEM BLOCK DIAGRAM

7.3 MICROPROCESSOR

The 80286 is a high-performance microprocessor with a 16-bit external data path, up to 16 megabytes of directly addressable physical memory and up to one gigabyte of virtual memory space. The operating speed of the 80286 chip is 8 MHz in Normal mode and 16 MHz in Turbo mode.

The 80286 operates in two modes: protected virtual address and real address.

Virtual address mode

The virtual address mode provides a 1-gigabyte virtual address space mapped onto a 16 megabyte physical address space. Virtual address space is larger than physical address space, and the use of a virtual address that does not map to a physical address location will cause a restartable interrupt.

This mode uses 32-bit pointers that consist of a 16-bit selector and offset components. The selector specifies an index into a memory-resident table, and the 24 bit base address of the desired segment is obtained from the memory table. A 16-bit offset is added to the segment base address to form the physical address. The microprocessor automatically references the tables whenever a segment register is loaded with a selector. Instructions that load a segment register will refer to the memory-based tables without additional program support. The memory-based tables contain 8-byte values called descriptors.

Real address mode

In this mode, physical memory is a contiguous array of up to 1 megabyte. The selector portion of the pointer is interpreted as the upper 16 bits of a 20-bit address, and the remaining 4 bits are set to zero. This mode of operation is compatible with the 8088 and 8086.

Segments in this mode are 64KB in size and may be read, written or executed. An interrupt may occur if data operands or instructions attempt to wrap around the end of a segment. In this mode, the information contained in the segment does not use the full 64KB, and the unused end of the segment may be overlay by another segment to reduce physical memory requirements.

7.4 SYSTEM MEMORY MAP

7.5 I/O ADDRESS MAP

I/O Address Map on System Board

I/O address hex 000 to 0FF are reserved for the system board I/O.

I/O Address Map on the I/O slots

I/O address hex 100 to 3FF are available on the I/O channel.

7.6 SYSTEM TIMERS

The system has three programmable timer/ counters controlled by the timer/counter from the GC101 chip set and are defined as channels 0 through 2 :

Note: Channel 1 is programmed to generate a 15-micro- second period signal.

The 8254 Timer/Counter is treated by system programs as an arrangement of four programmable external I/O ports. Three are treated as counters, the fourth is a control register for mode programming.

7.7 SYSTEM INTERRUPTS

Sixteen levels of system interrupts are provided by the 80286 NMI and two 8259 Interrupt Controller within the GC101 chip set. The following shows the interrupt- level assignments in decreasing priority.

7.8 DIRECT MEMORY ACCESS (DMA)

The system supports seven DMA channels. Two DMA Controller are included in the GC101, with four channels for each chip. The DMA channels are assigned as follows:

The following shows the addresses for the page register.

7.9 REAL TIME CLOCK AND CMOS RAM

The CMOS RAM Chip (146818) contains the real-time clock and 64 bytes of CMOS RAM, it keeps configuration information when power is off. Upon you turn the system power on, CMOS will load the recorded configuration into the system so that the system can function in the right track with the equipped components. However, if you haven't configured the CMOS, or the battery which supports the power to the CMOS is weaken, you need to redefine the necessary parameters whenever the system is booting up.

The program of the CMOS setting will be loaded into the system automatically from the sub-system named BIOS. The following table shows the CMOS RAM addresses.

CMOS RAM Address Map

* These bytes are not included in the checksum calculation and are not part of the configuration record.

Real-time Clock Information

The following table describes real-time clock bytes and specifies their addresses.

Note: The setup program initializes registers A, B, C, and D when the time and date are set. Also Interrupt 1A is the BIOS's interface to read/set the time and date. It initializes the status bytes the same as the setup program.

7.10 MATH COPROCESSOR

The 80287 Math Coprocessor enables the FOX-286 system to perform high-speed arithmetic, logarithmic functions, and trigonometric operations with extreme accuracy.

The coprocessor works in parallel with the microprocessor. The parallel operation decrease operating time by allowing the coprocessor to do mathematical calculations while the microprocessor continues to do other functions.

The Mathematics Coprocessor, 80287 is treated as an I/O device through I/O port address hex 0F8, 0FA and 0FC. The microprocessor sends OP codes and operands through these I/O ports. The microprocessor also receives and stores results through the same I/O ports. The "BUSY" signal generated by the coprocessor signifies to the microprocessor to wait until the coprocessor has finished executing.

The following describe the mathematics coprocessor control ports:

0F0 The latched Mathematics Coprocessor busy signal can be cleared with an 8- bit, Out command, to port F0. The coprocessor will latch "BUSY", if it asserts its error signal. Data output should be zero.

0F1 The Mathematics Coprocessor will reset to real address mode which is in the 8087 compatible if an 8-bit Out command is sent to port F1. Again, the data output should be zero.

7.11 SYSTEM EXPANSION BUS

The FOX-286 provides drive for up to eight XT- compatible cards (six of which can be AT-compatible with the second connector)

The I/O channel supports:

* I/O address space from hex 100 to hex 3FF
* Selection of data access (either 8 or 16 bit)
* 24 bit memory addresses (16MB)
* Interrupts
* DMA channels
* Refresh of system memory from channel microprocessors

There are eight 62-pin (JA1-JA8) and six 36-pin (JB1- JB6) edge connector sockets for I/O channel adapter cards. In two positions, the 36-pin connector is not present. These positions can support only 62-pin I/O bus adapters.
The following figure shows the pin numbering for I/O channel connectors JA1 to JA8.
The following figure shows the pin numbering for I/O channel connectors JB1-JB6.
The following table summarize pin assignments for the I/O channel connectors.

I/O Channel (A-Side, JA1-JA8)

I/O Channel (B-Side, JA1-JA8)
I/O Channel (C-Side JB1-JB6)
I/O Channel (D-Side JB1-JB6)
APPENDIX

Hard Disk Drives supported by AMI BIOS

Type	Cylinders	Head	Write Precomp	Landing Zone	Capacity
1	306	4	128	305	10MB
2	615	4	300	615	21MB
3	615	6	300	615	31MB
4	940	8	512	940	64MB
5	940	6	512	940	48MB
6	615	4	None	615	21MB
7	462	8	256	511	31MB
8	733	5	None	733	31MB
9	900	15	None	901	115MB
10	820	3	None	820	21MB
11	855	5	None	855	36MB
12	855	7	None	855	51MB
13	306	8	128	319	21MB
14	733	7	None	733	44MB
15	Reserved				
16	612	4	All	663	21MB
17	997	5	300	997	42MB
18	997	7	None	997	58MB
19	1024	7	512	1023	61MB
20	733	5	300	977	31MB
21	733	7	300	732	42MB
22	733	5	300	733	31MB
23	306	4	All	336	10MB
24	925	7	All	925	56MB
25	925	9	None	925	72MB
26	754	7	754	754	46MB
27	754	11	None	754	72MB
28	699	7	256	699	46MB
29	923	10	None	823	71MB
30	918	7	918	918	55MB
31	1024	111	None	1024	98MB
32	1024	15	None	1024	133MB
33	1024	5	1024	1024	44MB
34	612	2	128	612	10MB
35	1024	9	None	1024	80MB
36	1024	8	512	1024	71MB

37	**615**	**8**	**128**	**615**	**42MB**
38	**987**	**3**	**987**	**987**	**25MB**
39	**987**	**7**	**987**	**987**	**60MB**
40	**820**	**6**	**820**	**820**	**42MB**
41	**977**	**5**	**977**	**977**	**42MB**
42	**981**	**5**	**981**	**981**	**42MB**
43	**830**	**7**	**512**	**830**	**50MB**
44	**830**	**10**	**None**	**830**	**72MB**
45	**917**	**15**	**None**	**918**	**115MB**
46	**1224**	**15**	**None**	**1223**	**152MB**

47 USER TYPE

FOX-286 SYSTEM BOARD LAYOUT

SUMMARY OF SYSTEM BOARD SETTINGS

Switch 1	**Function**
ON	Zero wait state
OFF	One wait state

Switch Setting

3	4	Memory configuration

Using 44256K DIPs :

ON		ON	256KB / 0KB
OFF	ON		512KB / 0KB
ON		OFF	640KB / 0KB
OFF		OFF	640KB / 384KB

Jumper	**Pin**	**Function**
JP1	2,3	DRAM speed selector
(default)		
JP2	1,2	256K ROM BIOS
2,3		128K ROM BIOS
JP3	short	CGA / EGA / VGA
open		Monochrome
JP4	1,2	Parity bit disable
2,3		Parity bit enable

Connector	**Function**
P1	Speaker connector
P2	Hardware reset connector
P3	Turbo LED connector
P4	Turbo switch connector

P5	Power LED & Ext-Lock connector
P6, P7	Power supply connector
P8	External battery connector
KB1	Keyboard connector