



GSI Model 2C

Dual-Channel Enhanced IDE Adapter

Installation Guide

**BEFORE CALLING GSI TECHNICAL SUPPORT,
PLEASE READ SECTION 2 & 3 OF THIS
MANUAL COMPLETELY!**

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This manual applies to issue 4 (and later) of the Model 2C adapter and BIOS v5.03 and later.

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1.0 PRODUCT OVERVIEW

The Model 2C EIDE adapter supports the direct connection of up to 4 EIDE drives on 2 separate IDE channels. Each channel has its own IDE connector marked **Channel X** and **Channel Y**.

The Model 2C's two channels are fully configurable. If a system has only one IDE channel installed, the Model 2C's channels can be set as the second and third channels in the system. If the system has two channels, the Model 2C can be set to add two more — supporting a total of eight (8) EIDE drives in the system!

New & Expanded EIDE Technology

The EIDE interface was developed to overcome capacity barriers (504MB, 2.1GB, etc.) and to allow for the connection of up to four drives (which most PCI motherboards now support). The Model 2C EIDE adapter allows for the connection of an additional 4 EIDE drives in PCI systems (for a total system support of up to 8 EIDE drives) and provides onboard BIOS support (BiosManager™) for higher-capacity hard drives.

The BiosManager™ BIOS controls EIDE drives attached to the GSI adapter and controls EIDE drives **attached to other IDE connectors**, including the motherboard. This added BIOS support overcomes the most common PC BIOS limitations.

Some PC systems have BIOS limitations for hard drive capacities. Many 386 and 486 systems do not support drives larger than 504MB and the BIOS on some "Pentium-class" systems do not support drives larger than 2.1GB (which is unrelated to the 2.1GB partition size maximum of DOS or FAT16, but a system BIOS problem).

The GSI Model 2C Bigabyte™ technology uses built-in hardware and firmware control to allow these hard drives to be easily installed into any system — including these problematic systems.

Features:

- ❖ Two EIDE channels (Channel X & Channel Y support up to four EIDE devices)
- ❖ Onboard **Flash** BiosManager™ upgrades existing IDE adapters to EIDE!
- ❖ Special Bigabyte™ support for EIDE drives with more than 4095 cylinders!
- ❖ **Flash** BIOS means **no DRIVERS or system CMOS SUPPORT REQUIRED!**
- ❖ Intelligent BiosManager™ "Auto-Senses" drive parameters
- ❖ Supports large EIDE drive sizes above 528MB
- ❖ Compatible with EIDE (or ATAPI-compliant) CD-ROM drives
- ❖ BiosManager™ "Auto-Prep" feature optionally prepares new drives
- ❖ Co-resides with other disk drive adapters
- ❖ IDE Channel X can be configured as the First, Second, Third or Fourth IDE Channel
- ❖ IDE Channel Y can be configured as the Second, Third or Fourth IDE Channel
- ❖ Both Model 2C Channels can be disabled (the Model 2C becomes a BIOS-only adapter)

Before installing the GSI Model 2C, please read the following Pre-Installation Considerations. Section 3.0 is a quick installation section that should have the product up and running in most systems in a **Flash!**

Thank you for buying an American-made GSI adapter.

2.0 PRE-INSTALLATION CONSIDERATIONS

There are a few pre-installation considerations that need to be addressed **before** installing your GSI adapter. Please read carefully.

2.1 DISK MANAGER, EZ-DRIVE & MAX-BLAST SOFTWARE

Many of the new EIDE hard drives are shipped with proprietary software drivers that provide translation of the drive's parameters for systems that do not support LBA (Logical Block Addressing). This includes Disk Manager, EZ-Drive and Max-Blast software drivers.

These drivers put a non-DOS format on the drive and are incompatible with EIDE adapters. If you are installing a new EIDE hard drive on the Model 2C, ****DO NOT USE THESE DRIVERS****.

If you have an EIDE hard drive *previously* formatted with this type of software, **you must remove the software before installing the GSI Model 2C**. Some of these newer software drivers have an un-install utility. Check with the manufacturer of the software for the removal process.

To remove the software in most cases, the following steps must be taken:

**Warning: The following procedures will result in data loss.
Back up all data from the hard drive before proceeding.**

- 1.) Back up all data from the hard drive.
- 2.) Create a DOS Boot Diskette (not a Win95 recovery disk). If you are unsure how to create this diskette, refer to your DOS documentation. Make sure that only the DOS FDISK and FORMAT utilities are on the diskette. Do not have any CONFIG.SYS or AUTOEXEC.BAT files on this diskette. Put the diskette in the A: floppy drive and re-boot.
- 3.) Type the following at the DOS prompt: "FDISK<space>/mbr"
- 4.) Re-boot the system after you see the DOS prompt again.
- 5.) Use the DOS FDISK utility and delete all partitions (both DOS and non-DOS partitions) only on the hard drive you are formatting. If you have more than one hard drive on the system, it may be wise to disconnect any other hard drives while you are "cleaning" this hard drive. This will ensure you only format the drive that has the proprietary drivers.

This should remove the drive partitioning software and clean the drive completely. The drive is now ready to be used with the GSI Model 2C.

2.2 IMPORTANT PCI SYSTEM IRQ INFORMATION

If you have a PCI system, be aware that the Model 2C, which installs into an ISA slot in your PC, is factory default set to IRQ 11 & IRQ 10. Since many PCI systems reserve IRQ's for Plug-n-Play PCI adapters, you must reserve the IRQs for the Model 2C in the system BIOS setup.

In many systems, you can enter the system setup by pressing the "DELeTe" key during the boot-up process. You can then go to the PCI configuration setup section of the BIOS that relates to IRQ assignments. Look for a listing of IRQs that the PCI bus can automatically use and reserve IRQ 11 and IRQ 10 for ISA or "Legacy ISA" adapters (or the appropriate IRQ if you have changed the Model 2C settings). Remember that if you change the default jumper settings, make sure to change the Windows®95 resource settings for the Model 2C to reflect this change.

2.3 DOES YOUR SYSTEM HAVE AN INTEGRATED IDE INTERFACE?

Many systems have IDE connectors (channels) built-in to the motherboard. Each IDE channel supports up to two IDE (or EIDE) drives - one as master and one as slave. Each IDE channel requires the use of an IRQ (interrupt request) and no two IDE channels can use the same IRQ.

If your system has an integrated IDE channel, you must make sure the GSI Model 2C does not conflict with it. Following are the industry standard channel selections:

Channel	IRQ	I/O Address	Note
1	14	1F0-3F0	Primary IDE channel - system boots from the drive set as master on this channel
2	15	170-370	Secondary IDE channel, if IRQ 15 is used by another device, optional IRQ 12 can be used
3	11	1E8-3E8	Third IDE channel, if IRQ 11 is used by another device, optional IRQ 12 can be used
4	10	168-368	Fourth IDE channel, if IRQ 10 is used by another device, optional IRQ 12 can be used

Note: IRQ 12 can only be used by one channel at a time.

Channels 3 and 4 are the factory default for the Model 2C and should work with most systems, including systems with are two channels on the motherboard.

As an added feature, the GSI Model 2C BiosManager™ will **enhance** any **existing** IDE channels. This allows older IDE adapters to support EIDE drives and increase the performance of hard drives. During the boot-up process, in the GSI banner, a message will show what drives are attached to the GSI Model 2C and the configuration of the adapter's channels.

2.4 MODEL 2C FACTORY DEFAULT JUMPER SETTINGS

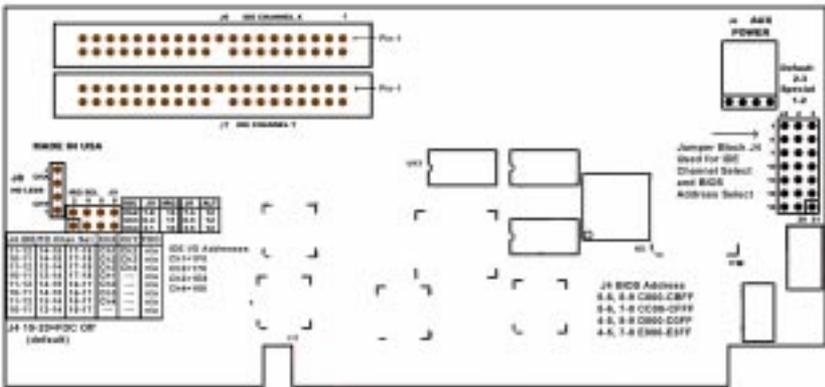
The Model 2C channels are factory set to Channel 3 (using IRQ 11) and Channel 4 (IRQ 10). This is the optimum configuration for a PCI system and will work fine in a single-channel system.

During the boot-up process, a GSI banner will appear on screen showing what drives are attached and the configuration of the adapter's channels.

The following are the factory default jumper settings for the Model 2C:

Jumper block J4			
Description	Jumper ON Pins	Channel X	Channel X
Channel Settings	11-12, 13-14, 17-18	Channel 3	Channel 4
BIOS Address	5-6, 8-9	C800-C8FF	

Jumper block J9		
Description	Jumper ON Pins	Default Setting
Alternate IRQ	1-3, 4-6, 7-8	Ch. 3: IRQ 11, Ch. 4: IRQ 10



(Adapter Layout)

Write down the GSI Model 2C Serial Number!

Please take the time now to write down the Model 2C **serial number**, please write it down on page xx as it is **required for technical support**.

3.0 INSTALLING THE GSI MODEL 2C

This section of the manual should allow you to quickly install the GSI Model 2C in your computer. Should you have problems or questions regarding an INSTALLATION step, please read the reference sections carefully.

3.1 PHYSICAL INSTALLATION

(1) Model2C jumper configuration

Before installation of the Model 2C, determine if there are any adapters currently installed in the system which could conflict with the Model 2C's factory default settings (as shown in section 2). Conflicts occur when there are duplicate I/O addresses or identical IRQ settings. Check for IRQ, I/O address and BIOS address conflicts. If there are any conflicts, reconfigure the Model 2C or the conflicting adapter. In most cases the Model 2C's default settings will work fine.

(2) Preparing computer for installation

CAUTION! Turn off the power to the computer, as well as any attached peripherals. Let disk drives stop before working on the computer. All electronic equipment is sensitive to **static electricity** at levels far below those that humans notice. To protect the system, touch the metal case parts *before* touching the electronics.

(3) Check the jumpers on the (E)IDE drives

The IDE drive jumper settings should be kept at the factory default setting when you have only one drive on the Model 2C. If there are two (E)IDE drives connected to the same cable, you must set one as the Master and the other as the Slave.



Note: Master/Slave jumper settings are for drives that share a cable. If you have another IDE adapter in the system that has only one hard drive on it and the Model 2C (running in secondary mode) has only one drive attached to it, both drives should be set as Standalone (or Master if there is no standalone option). Master or Slave can be at *either* cable position. For more information, see D.2.

(4) Attach the IDE ribbon cable (40-pin non-twisted cable)

Identify the IDE ribbon cable (40-pins and no twist) and connect the cable to the appropriate IDE connector on the Model 2C. For Channel X, connect the cable to connector **J6**, for Channel Y connect to **J7**. Note that the **colored** edge (usually red) on the cable indicates the **PIN-1** side. The IDE ribbon cable must be properly aligned (PIN-1 to PIN-1) in order for the drive(s) to work.

(5) Make sure the power cable(s) is attached to the IDE drive(s)

(6) Verify Model2C configuration

Recheck the Model 2C configuration. Make sure that there are no conflicts and that the IDE cable(s) is connected correctly. If you haven't written down the Model 2C **serial number**, please write it down as it is **required for technical support**.

(7) Install the Model 2C into the computer

Install the Model 2C into any open 16-bit ISA bus slot. Make sure that the adapter is seated well and then power on the system.

3.2 SYSTEM CMOS SETUP & MODEL 2C BIOS AUTO-INSTALL

(1) System CMOS or BIOS Setup

Do not select a CMOS drive type for drives attached to the Model 2C. Select 'None' or 'Not Installed'. Refer to your system documentation for information on changing the system CMOS setup.

(2) Windows®95 **IMPORTANT** System BIOS Setup

If you are using Windows®95, select drive 'Type 1' in the system CMOS for **any** hard drive attached to Channel 1 (either the Model 2C's channel 1 or another IDE adapter). Even though 'Type 1' in the system CMOS may be a 10MB drive, it is the correct setting for the Model 2C EIDE adapter.

(3) Advanced CMOS Setup – BIOS Shadowing

Many systems offer shadowing of an adapter's BIOS, like the GSI Model 2C's. A *shadowed* BIOS is executed from a high-speed RAM copy of the BIOS, and may enhance performance. Shadowing of the Model 2C BIOS should be ON for normal operation, but OFF when first installing the Model 2C adapter or whenever reconfiguring hard drive setup.

(4) Complete the boot-up sequence

Upon boot-up the Model 2C's BIOS will auto-install all attached IDE drives, reading their parameters and saving them in the adapter's configuration memory. If you do not see the Model 2C banner, or the system does not function properly, please read the troubleshooting section of this manual. GSI Banner example:

```
GSI BIOS MANAGER (tm) v5.03 at C800-CDFD      Serial #A12345 (c)1992-97 GSI
on Model 2C EIDE 2-Channel 4-Drive Adapter - Model 2C Channels: - - 3 4
+ Hard Drive Support and ATAPI Detection for OFFboard Channels: 1 2 - -
```

Ch#	Drive	Volume	ParType	Drive
M/S	Type (MB)	(MB) Name	FileSys	Model Name
1 M	Hard 2441	2012 WD32500LIL0	Pri/F16	WDC AC32500
3 M	* ATAPI *			
4 M	Hard 514	503 MaxtorTest	Pri/F32	Maxtor 7540 A

```
Exit GSI BIOS . . .
```

The GSI Banner shows where drives are connected (Ch#), what they are jumpered as ('M'aster or 'S'lave) and if they are ATAPI drives. It also shows hard drive capacities, volume names and partition information. Note: the GSI serial number **appears** in the GSI Banner. **The GSI Banner is a useful tool for identifying ATA/IDE drives installed.**

(5) For NEW hard drives

The Model 2C offers to Auto-Prep (FDISK and/or FORMAT) each new (E)IDE hard drive for you. This is a quick and easy way to install new hard drives. This utility will automatically FDISK the hard drive, creating a single (FAT16) partition using the full capacity of the drive (up to the DOS limit of 2.1GB). Auto-Prep will also DOS-format the drive, but not make it bootable. If you wish to define your own partitions, just select NO to Auto-Prep and proceed with the partitioning process defined by your operating system software manuals. You may also use the DOS FDISK to create extended partitions beyond 2.1GB, if your hard drive has the capacity.

(6) Install DOS, if needed, using the DOS install procedure.

(7) For hard drives already formatted & CD-ROM drives

Do not attempt to use the Model 2C with an IDE hard drive previously formatted using a proprietary disk preparation software. If the hard drive was formatted using this type of software, please go back to the Pre-Installation Considerations section 2.1 and remove the non-DOS preparation software before using that drive with the Model 2C.

For hard drives not formatted using preparation software and for Enhanced IDE (or ATAPI) CD-ROM drives, the Model 2C will simply “auto-sense” the drives and show the information on screen during the boot process. No options are given. The Model 2C banner will appear during the boot process with configuration details. For DOS systems, remember that EIDE CD-ROMs are initialized via a device driver in the CONFIG.SYS file. Make sure the device driver has the correct I/O address and IRQ for the Model 2C channel that you have connected the CD-ROM drive to.

3.3 WINDOWS®95 CONFIGURATION

Channel 1 and Channel 2 Operation

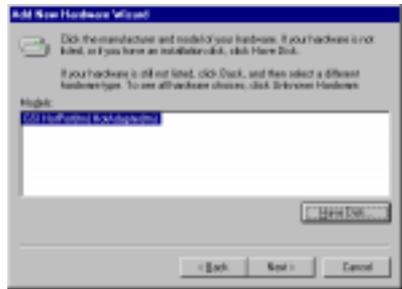
Drives connected to the system or Model 2C’s Channel 1 or Channel 2 should be automatically identified by Windows®95 and run in 32-bit file mode. If any drive(s) connected to these channels is running in MS-DOS Compatibility Mode, simply run the Add New Hardware Wizard (in the Control Panel) and the Model 2C will automatically identify these drives and configure the Standard IDE/ESDI driver.

Channel 3 and Channel 4 Operation

The Windows®95 Standard IDE/ESDI sometimes identifies these channels properly via the Add New Hardware Wizard search, but not always. If these channels are not identified, the drives attached will run in MS-DOS compatibility mode. To ensure these drives are running in 32-bit mode you need an information (.INF) file to point the standard Windows®95 IDE driver to these channels. One is available (GSIEIDE.INF) on our Web site (<http://www.gsi-inc.com>) or you can create the file (see Appendix F).

Once you have the .INF file on a floppy disk, you are ready to proceed. Startup Windows®95 and put the floppy disk with the .INF file in Drive A:.. Go to the Control Panel and run the Add New Hardware Wizard. Do **not** have the Wizard attempt to detect the new hardware. When asked “Do you want Windows to search for your new hardware?”, click on the “No” button and then click on Next.

Select “Hard disk controllers” as the type of new hardware you want to install and then click Next. A list of manufacturers and products will appear, click on Have Disk. This will bring up a box that asks you to insert the manufacturer’s disk in Drive A:/, select OK and a dialog box will appear:



Click on the GSI Enhanced IDE Controller and select Next. A warning dialog box of possible I/O conflicts *may* appear, just click Next and then click Finish.

You will be prompted to re-boot— do not reboot yet! If you are going to use both Model 2C channels (Channel X and Channel Y), then repeat the previous step for the second channel.

After running the Add New Hardware Wizard for a second time and again selecting the GSI Enhanced IDE Controller information, **you will be prompted to re-boot— do not re-boot yet as we need to confirm the I/O address settings as follows:**

After loading the .INF file, confirm the I/O settings as follows:

- 1) Right mouse-click on the My Computer icon and select Properties.
- 2) Click on Device Manager and select the Hard disk controllers. If the GSI Enhanced IDE Controller does not appear, go to the Control Panel and run the Add New Hardware Wizard again as described in the previous step.
- 3) Select the GSI Enhanced IDE Controller and click on Properties (if there are two, then this process needs to be done for both).
- 4) In the Properties dialog, click on the Resources tab. Channel 3 (Basic configuration 2) is the default setting of the Model 2C. This uses the Input/Output Range of 01E8-01EF, 03EE-03EE and Interrupt Request (IRQ) 11.



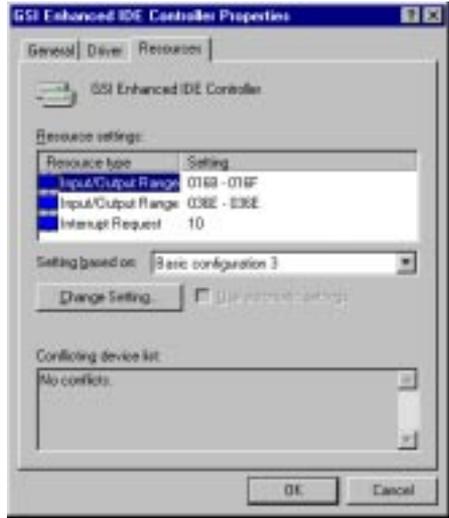
 **Note:** If this setting does not appear, click on “Use automatic settings” to disable automatic configuration and then click on the “Change Setting” button to make the proper changes. You should have no conflicting devices. If you do have conflicting devices for IRQ 11, you can use IRQ 12 — but also **remember to set the jumper on the Model 2C to IRQ 12 also!**



Remember: if you have installed for both of the Model 2C IDE channels, then confirm the resource settings for the second Model 2C channel as well. The default resource settings for Channel 4 should be the Input/Output Range of 0168-016F, 036E-036E and Interrupt Request (IRQ) 10.

Your system should now be configured for optimal performance. If you chose to change the settings of the Model 2C, make sure to use those settings instead of the ones shown in step 4.

You can now reboot the system.



When you reboot you may want to confirm that the Model 2C is running properly. Right mouse-click on the My Computer icon and select Properties. Check the hard disk controllers in the Device Manager for a yellow (!) next to the GSI Enhanced IDE Controller. If there is not a yellow (!), then the Windows®95 driver has installed properly. If not configured properly, please review this section again for any errors.

3.4 CHECK FOR PROPER DRIVE OPERATION

(1) Test each drive for proper operation

Once you have confirmed proper operation of the drive(s), you may now turn BIOS shadowing back on. For more on BIOS shadowing, see Appendix C.



Note: Take a moment to write down the Serial Number of the GSI adapter in the space provided in the back of this manual. Please write down the GSI serial number from the GSI Banner (which shows on screen during the boot process). Boot up the system and press the 'Pause' key to hold the GSI Banner on screen. The GSI serial number is **required for technical support** and product registration. The GSI serial number is not the same as the part number "PN 1533-2C-xx-x" found on a label or #1537-22-xx-x, which is silk-screened on the actual printed circuit board. You can register your product on the Internet at <http://www.gsi-inc.com>.

Your Model 2C adapter should now be up and running. The following appendices provide more detailed information and there is a Basic Troubleshooting Section [Appendix G], should you encounter installation difficulties.

APPENDIX A – PHYSICAL INSTALLATION

A.1 HARDDRIVE INSTALLATION

A.1.1 Setting the EIDE Drive Mode Jumpers

EIDE (Enhanced IDE or standard IDE) drives usually have one or two jumpers to set the drive to operate as either *Standalone*, *Master*, or *Slave* (for more detailed information, see Appendix D.2). Set these jumpers appropriately, as per the drive manufacturers' instructions. If you use drives from two different manufacturers, you run a greater risk that the drives will not work together. For Master/Slave problems, contact the drive manufacturers' Technical Support Dept. for help.

A.1.2 Hard Drive Cable Attachment

Use a standard straight 40-pin IDE data cable for connection of one or two (E)IDE drives. Remember to observe Pin-1 markings.

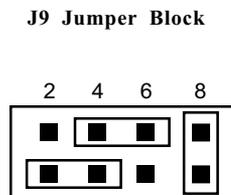
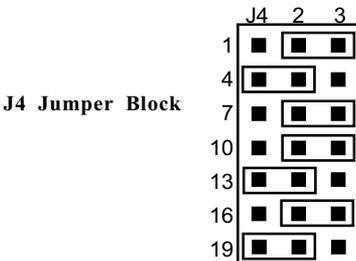
A.2 MODEL 2C JUMPER SETTINGS

A.2.1 Channel Configuration Jumpers - Adapter Operation

Jumper blocks J4 and J9 are used to configure the Model 2C's two IDE channels. The Model 2C's channels are named Channel X (connector closest to the top edge of the adapter) and Channel Y (connector just below Channel X). These two channels can be configured using jumpers as follows:

Model 2C Configuration Options						
Config. Option	Channel X		Channel Y		J4 Jumper Block Jumper Pins	J9 Jumpers Jumper Pins
	Ch.	IRQ (I/O)	Ch.	IRQ (I/O)		
1	1	14 (1F0-3F0)	2	15 (170-370)	11-12, 14-15, 17-18	7-8
2	2	15 (170-370)	-	(none)	10-11, 13-14, 17-18	7-8
3	2	12 (170-370)	-	(none)	10-11, 13-14, 17-18	7-5
4	2	15 (170-370)	3	11 (1E8-3E8)	10-11, 14-15, 17-18	4-6, 7-8
5	2	15 (170-370)	3	12 (1E8-3E8)	10-11, 14-15, 17-18	5-6, 7-8
6	3	11 (1E8-3E8)	-	(none)	10-11, 14-15, 16-17	4-6
7	3	12 (1E8-3E8)	-	(none)	10-11, 14-15, 16-17	5-6
8	3	11 (1E8-3E8)	4	10 (168-368)	11-12, 13-14, 17-18	1-3, 4-6
9	3	11 (1E8-3E8)	4	12 (168-368)	11-12, 13-14, 17-18	3-5, 4-6
10	3	12 (168-368)	4	10 (168-368)	11-12, 13-14, 16-17	1-3, 5-6
11	4	10 (168-368)	-	(none)	11-12, 13-14, 16-17	1-3
12	4	12 (168-368)	-	(none)	11-12, 13-14, 16-17	3-5
13	-	-	-	(none)	10-11, 13-14, 16-17	none

In the above chart, if a Jumper setting is 2-3, that means that the jumper should be on pins 2 and 3 of that jumper block. Factory default settings are shown above in **bold** and below:



A.2.2 Setting the GSI BIOS Address

Jumper block J4 is also used to set the BIOS address of the Model 2C. There are four BIOS address options on the Model 2C. You can confirm the **actual** current GSI-BIOS address by reading it from the GSI BIOS banner, on-screen at boot-up time (see Installation Section 3.2 for example).

Changing the GSI BIOS address usually has no effect **unless** another adapter (e.g. SCSI or sound card) is using the same memory address and conflicting with the Model 2C's BIOS. Some VGA adapters cause conflicts at all CXXX and DXXX addresses. In such a case, trying the **E000** GSI BIOS address may escape this conflict. Following are settings for the BIOS address of the Model 2C's *flash* BIOS:

BIOS Address	Put Jumper on J4 Pins:
C800-CBFF (default)	5-6, 8-9
CC00-CFFF	5-6, 7-8
D000-D3FF	4-5, 8-9
E000-E3FF	4-5, 7-8

A.2.3 Model 2C Special "Bigabyte™" Option

You may experience system lock-up or other odd problems with hard drives that have more than 4095 cylinders. Although many PC's shipped since 1995 have EIDE support in the system BIOS, those systems do not support drives with more than 4095 cylinders properly. The GSI Model 2C has a special jumper option on jumper block J4 that provides a much needed solution for integration of these very large hard drives. The default setting is ON and has the jumper on pins 2-3 of J4. To disable Bigabyte™ support, jumper pins 1-2 of J4.

Some of these larger hard drives come with special software (Disk Manager, etc.) and may have extra jumpers on the drives. Do not use the extra jumpers and must not use any non-DOS partitioning software with the Model 2C. Please see section 2.1 for more information.

A.2.4 Inserting the Model 2C

Choose an open slot in the computer's motherboard and remove the rear-panel blanking plate in line with the slot, saving the screw to anchor the adapter in place. Gently but firmly press the GSI Model 2C into the slot, fastening it into place with the retaining screw. The case **hard-drive LED** (which lights during disk activity) wire-pair goes on **J8**, with the **colored** LED wire going to either positive (+) end pin. Note that there is a (+) for both the Channel X (CHX) and Channel Y (CHY).

Connector **J5** is a 4-pin power connector like the one found on most 3.5" floppy drives. You can use it to supply 12V and 5V power to your drives. However, if your power supply has an unused power connector, it is safer to connect your drive to that because a few hard drives, mostly the older full-height drives, exceed the 12V/5V power feed limit of the motherboard and/or the GSI Model 2C.

Caution! The 12V and 5V loads attached to the Model 2C **J5** power connector **must not exceed**:

5V LIMIT —	2.0 Amps maximum (= 10 Watts)
12V LIMIT —	1.5 Amps maximum (= 18 Watts)

Exceeding either maximum, *even for a moment*, may **seriously damage** the motherboard or Model 2C. This power connector is protected by self resetting fuses. These fuses will protect against slight overloads.

APPENDIX B — SYSTEM CMOS/BIOS SETUP

B.1 SYSTEM CMOS SETUP — EIDE, IDE, ATA & ATAPI DRIVES

B.1.1 Windows®95

If you are using Windows®95 you must set the hard drive(s) on channel 1 to drive 'Type 1' in the system CMOS, even if this channel is not on the Model 2C. See B.1.2 on how to do this.

B.1.2 Model 2C Channel X set as Channel 1

If using Windows®95 or in some systems, a drive type must be declared in the system's CMOS setup memory. The reason for this is to allow the system and/or Windows®95 to know that at least one hard drive exists. Because the actual drive parameters will be determined by the Model 2C, the actual drive size declared in the system's CMOS does not have to be the actual size of the drive. In practice, it has been found that the more reliable operation is achieved if the drive is declared as a 10MB drive. In most systems drive Type 1 or 23 are 10MB drive definitions.

If your system CMOS does not have a drive Type 1 or the Type 1 in that BIOS is not a 10MB hard drive, you can use the user-definable (usually Type 47) and enter the parameters: 306 for cylinders, 4 for heads and 17 for sectors. If your system does not have a user-definable, Type 23 is usually a 10MB hard drive and usually works.

B.1.3 Model 2C Channel X Configured Other than Channel 1

Do **not** declare drives attached to the Model 2C in the System CMOS Setup. Select 'None' or 'Not Installed' — except for systems running Windows®95, as noted above.

B.1.4 CMOS Setup — System BUS Speed

Some motherboard CMOS Setup procedures allow the modification of the system bus speed. All GSI products are designed to operate at the full ISA-specified bus speed of 8.33MHz. Users are advised that running a motherboard at speeds other than this ISA-specified speed may cause detected or undetected loss of data.

B.2 GSIMODEL2C FLASH BIOS OPERATION

The Model 2C remembers the hard drive configuration in *Flash* memory. If you install a brand new adapter or move the adapter to a different type of system, the Model 2C's BIOS will automatically update it's configuration. For hard drives not formatted using partitioning software and for Enhanced IDE (or ATAPI) CD-ROM drives, the Model 2C will simply "auto-sense" the drives and show you the information on screen during the boot process. No options are given. The Model 2C banner will appear during the boot process with configuration details.

Do not attempt to use the Model 2C with an IDE hard drive previously formatted using a special disk partitioning software. If the hard drive was formatted using this type of software, please go back to the Pre-Installation Considerations section 2.1 and remove the proprietary software from the hard drive before using it with the Model 2C.

APPENDIX C – SYSTEM & SOFTWARE USAGE

C.1 USING MEMORY MANAGERS SOFTWARE

If you are installing the Model 2C in a Windows®95 or Windows®NT, please ignore this Section (C.1). Shadowing or excluding the Model 2C BIOS only applies to DOS or Windows®3.xx systems.

Using memory management software to shadow or exclude the Model 2C BIOS address region may increase performance. Many 386, 486 and 586/Pentium System Setups offer *shadowing* of an adapter's BIOS in the Advanced System Setup options.

Shadowing can also be done using a memory manager software utility. You may shadow the Model 2C BIOS using **either** of these methods once the installation has been completed.

Please note that if you are shadowing the Model 2C BIOS address with the memory manager, you do not need to exclude it as well. However, if your CMOS is handling the shadowing, **you must exclude** the Model 2C BIOS range from the memory manager.

C.1.1 Shadowing the Model 2C BIOS

To ENABLE shadowing of the Model 2C BIOS with the DOS (version 6 or later) EMM386.EXE memory manager, make sure the following line is in your CONFIG.SYS (where *AddressRange* is the Model 2C BIOS's 8kB address range, e.g., C800-C9FF):

device = EMM386.EXE ROM=*AddressRange*

There are similar ways to configure other memory management software programs. Please consult the documentation for the software you intend to use.

System BIOSs for most 486 and some 386 systems allow you to turn ON shadowing (in the C, D, and E pages of memory) in 16kB, 32kB, or 64kB blocks. Any of these block sizes will totally contain the Model 2C **8kB** BIOS.

Note your Model 2C BIOS Start Address as shown in boot time Banner and request shadowing, in your Advanced CMOS System Setup, as follows:

Model 2C BIOS Address In System Setup Shadowing, Choose:			
	If 16kB Block	If 32kB Block	If 64kB Block
C800-CBFF	C800-CBFF	C800-CFFF	C000-CFFF
CC00-CFFF	CC00-CFFF	C800-CFFF	C000-CFFF
D000-D3FF	D000-D3FF	D000-D7FF	D000-DFFF
E000-E3FF	E000-E3FF	E000-E7FF	E000-EFFF

C.1.2 Excluding the Model 2C BIOS

If you use memory manager software, such as DOS' EMM386 or QEMM, you may experience odd problems if you do not exclude the Model 2C BIOS address. Try **excluding** the memory region of the Model 2C BIOS from the memory manager's optimization process. **For Example:** In the CONFIG.SYS file add the **exclude** option for a Model 2C whose BIOS is at the **C800** address:

Memory Manager	Exclusion Statement
DOS' EMM386	Device = X:\DOS\EMM386.SYS X=C800-C9FF

If this exclusion statement does not work for your memory manager, check the software's documentation on how to exclude a memory region and follow those instructions. If you are using a different Model 2C BIOS address (confirm BIOS address from Model 2C Banner), the following table shows which regions should be excluded accordingly:

Model 2C BIOS Address	Exclude Region
C800	C800-C9FF
CC00	CC00-CDFF
D000	D000-D1FF
E000	E000-E1FF

C.2 DOS AND WINDOWS® 3.X COMPATIBILITY

Normal DOS software usage rules apply to systems using the GSI Model 2C adapter. No special drivers are required. The GSI Model 2C is compatible with Windows® 3.x, with the only exception being 32-bit Disk Access. This option is only available for Channel 1. If the drive is larger than 504MB, you must replace the Windows® driver (WDCTRL.386) with the one supplied by the drive manufacturer. Windows® 3.11 does not support 32-bit disk access for any channel other than channel 1.

Also be aware that DOS FAT16 has a partition limit of 2GB per partition. You must keep the partition sizes under 2GB as a result of this DOS limitation. This is **not** a limitation of the GSI Model 2C, but rather a limitation of the DOS FAT16 system.

If you have a drive larger than 2GB, you will still be able to use the full capacity of the drive, but not in a single partition. Use the DOS FDISK utility to create multiple partitions on the drive.

C.3 MICROSOFT WINDOWS NT 4.0

At the time of this printing, the Model 2C has been tested with Windows NT 4.0 and works fine with no software modifications required.

C.4 MICROSOFT WINDOWS® 95

The Model 2C is compatible with Windows® 95, see **Section 3.3** for more information on installation and configuration.

C.5 NOVELLNETWORKS

C.5.1 Installing a Novell Partition (NetWare 3.11 or later)

To prepare an (E)IDE hard drive for a Novell Partition on the Model 2C's Channel 1 (Channel X, selected as Channel 1), do the following:

- 1) Run System CMOS Setup and declare the Novell hard drive as Drive Type 1 in CMOS
- 2) On reboot confirm that the GSI BIOS Setup screen for the Novell hard drive has the proper information in it. Specifically, check that:
 - a) No odd characters appear in the hard drive descriptive text (if they do, there are hard drive read errors.)
 - b) Native parameters match the drive-manufacturer's data sheet (do not continue if they do not match)
 - c) Correct partition information appears (Partition Found or Not Found)
- 3) Partition Status: If necessary, use the DOS' FDISK to delete partitions or create a DOS partition. If you delete all partitions, turn your PC power OFF, wait five seconds then power ON. On reboot, the Model 2C will see that the Native Parameters are set up for the Novell drive. If you create a DOS partition, run DOS' FORMAT (for FORMAT parameters see DOS manual) to format the partition.



Note: DO NOT USE THE NOVELL COMPSURF OPTION!

- 4) Run Novell's SERVER.EXE task and:
 - a) Issue LOAD IDE.DSK /L (see note below concerning IDE.DSK versions) Set CH1 I/O Address and IRQ to 1F0 and E (=14), (for CH2 : 170 and F (=15), etc.)
 - b) Issue LOAD INSTALL.NLM to run the Novell Install and then:
 - 1.) Do not choose the FORMAT Option (IDE drives come factory formatted)
 - 2.) Create a Novell Partition. Check that Novell reports a cylinder found consistent with the hard drive's default Native Parameters.
 - 3.) Run Novell's Surface Test on each Novell Partition.

To use the Model 2C with Novell 3.xx, you must have NetWare 3.11 or later. You can call the Novell BBS (or contact your Novell office) to get the current version of Novell's IDE.DSK. Make sure the version of that driver is June 1994 or later.

C.5.2 Model 2C Channels #2, 3, and 4

When using the Model 2C's Channels #2, 3, and/or 4, do the following:

- 1) Novell 4.0 — Use the Novell IDE Driver which you received with the Novell 4.0 kit.
- 2) Novell 3.11 — Get the IDE Driver from Novell's BBS and use it with Novell 4.0
- 3) Novell 3.0 — Contact Novell about their network operating system upgrade options.

APPENDIX D — (E)IDE: SETUP & OPERATION

D.1 (E)IDE DRIVE CABLES

Most IDE drive cables can connect two (E)IDE hard drives (or hard drive plus ATAPI drive), one at the End Position and one at the Center. The IDE (ATA) Interface Specification specifies a **maximum** cable length of **18"**, **this length must not be exceeded**. GSI ships the Model 2C in bulk packaging without an IDE cable and in retail kits with an IDE cable.

D.2 (E)IDE MASTER, SLAVE, AND STANDALONE JUMPERS

(E)IDE hard drives, (E)IDE (ATAPI) CD-ROM drives *and IDE tape drives* usually have jumpers (shunts) to allow operation in one of three modes: Standalone, Master or Slave. These settings relate only to drive operation on a single channel. A situation may arise where you are using two channels, each running only a single drive. In that scenario, both drives would be set in Master or Standalone operation — as they are the only drive on each channel!

Standalone

This mode is for running only one hard drive **on a Model 2C channel**. Many hard drives come factory default in this mode. If your hard drive does not have a Standalone mode, it can be set to Master.

Master

The Master mode can be used for two situations. If you have only one hard drive (or other IDE device) attached to the Model 2C, it can be set as Master **or** Standalone. If you are running two drives **on a Model 2C channel**, one should be set as Master and the other as Slave. The Master or Standalone drive has a *Drive address of 0*.

Slave

When you are running two (E)IDE drives together, **ON THE SAME CHANNEL**, one must be set as Master and the other as Slave. This mode is usually the factory default setting for EIDE (ATAPI) CD-ROM drives and EIDE tape backup drives. The Slave drive has a *Drive address of 1*.

Note: In setting the Standalone, Master & Slave jumpers for IDE hard drives (and IDE CD-ROM and tape drives), ignore all other drives that are attached to any other adapter (even IDE) in the system. These settings relate to drives that SHARE THE SAME CABLE.



Some (E)IDE drives *may* not work as master (or slave) with drives from other manufacturers — sometimes even with other drive models from the *same* manufacturer! Consult drive makers about such problems.

D.3 IDE CABLE SELECT (CSEL) OPTION

Most IDE drives have a Cable Select (CSEL) jumper option, in addition to the Master, Standalone and Slave jumpers. This option enables the drive address to be selected by the position on a cable select cable.

If your Model 2C was supplied with a GSI CSEL Cable (part #: 1548-CS-XX-X), you can use this cable to take advantage of Cable Select. When using this CSEL cable, the drive attached to the end of the cable is Drive 0 (Master) and the drive attached to the middle connector is Drive 1 (Slave). If the cable was not supplied, contact GSI for information on where to obtain a GSI CSEL cable.

D.4 MODEL 2C'S BIOS SUPPORT FOR HARD DRIVES

For any IDE hard drive being installed on a Model 2C, two cases should be distinguished:

D.4.1 Partition Exists

If the hard drive has a **valid partition** (has already been prepared for use), the Model 2C will **analyze** this existing partition and **will support it**, by setting up proper parameters for the drive.

If you were only able to use part of the drive's capacity before using the Model 2C and would like to now use the full capacity, **you must back up your data, delete the existing partitions and reboot**. This will enable the Model 2C's Auto-Prep utility that will allow the full capacity to be used.

D.4.2 No Partition Exists

If the hard drive is **not yet prepared** with a partition, the Model 2C will use the hard drive's IDE Identify Drive response information to read the hard drive's parameters. In so doing, the Model 2C should be making use of 100% of the hard drive's capacity — if the hard drive's firmware issues a *correct* Identify Drive report.



Note 1: If you want to **remove** existing partitions on a hard drive, use DOS' **FDISK** to delete them.

D.5 MODEL 2C IDENTIFY DRIVES SUPPORT

D.5.1 Model 2C's Auto-Sense Feature

The ANSI Standard for IDE drives provides an optional-to-manufacturer (and usually implemented) Identify Drive Command, which allows GSI Intelligent adapters to interrogate the drive as to the Heads, Cylinders, and Sector counts (as well as other technical parameters). The Model 2C BIOS uses the IDE Identify Drive command to *Auto-Sense* the size of IDE drives. The Model 2C uses the *recommended* mode for operating your hard drive(s). This is the drive's *Native Mode* (or default Translation Mode) because it usually gives maximum performance and storage capacity. The BIOS detects drives that have existing partitions and configures the drive to match the existing partitions.

D.5.2 (E)IDE Hard Drives Not Formatted to Full Capacity

The Model 2C uses existing partition information on a formatted drive to establish the drive's operational parameters. If a user is connecting the Model 2C to a drive which has been set up using CMOS parameters that **do not use the whole drive's capacity**, it is recommended that the user back up the drive data to other media (e.g., tape or floppies) and reformat the drive to run in its Native Mode.

However, the user may have a drive which contains valuable data and therefore may wish to use the drive in its present configuration. In the case *where the full capacity of the drive is not being used*, the Model 2C will use the partition information placed on the drive by the old adapter. Data saving **cannot be guaranteed** but the user may want to take advantage of this capability.

D.6 INTEGRATING (E)IDE ATAPI CD-ROM AND TAPE DRIVES

An EIDE or ATAPI CD-ROM and/or tape backup drive can be operated on the Model 2C in either Slave Mode (where there is also a hard drive in *Master Mode* on the Model 2C) or in Standalone Mode (where there is no other IDE drive on the Model 2C). In either case, the ATAPI CD-ROM or tape drive should **not** be declared in the System CMOS Setup procedure. Follow the drive manufacturer's installation and user manual information.

APPENDIX E — SYSTEM INTEGRATION TOPICS

E.1 CO-EXISTING WITH A SCSI OR ESDI ADAPTER

The Model 2C has been designed to be able to co-exist with SCSI or ESDI adapters. Unfortunately, many older SCSI and ESDI adapter BIOSs were not designed to co-exist. That is, they have been written on the assumption that there would never be any **other drive adapter** with a BIOS co-residing in the system with them. If you do **not** even see a GSI Banner at boot time, and **if** you have situated the GSI BIOS at a *lower address* than the SCSI/ESDI BIOS, try putting the **GSI BIOS** at a **higher address** — or vice versa.



Note: Some SCSI adapters use an installable device driver when they see that two other hard drives are already known to the system. *Removable* SCSI hard drives, like the QUANTUM PASSPORT XL, can co-exist with a Model 2C— as long as the removable drive is **not** used as the Boot Drive.

E.2 THE MODEL 2C IN AN EISA BUS MOTHERBOARD

EISA bus motherboards have a built-in system configuration protocol that is intended to provide automatic setup of add-on adapters. This automated procedure deals with the add-on adapters one at a time, working its way from one side of the computer to the other. The sequence in which two add-on adapters get scanned for EISA bus setup *may* affect proper adapter operation for one or both adapters. Try interchanging slot positions of the Model 2C and other adapters that have a BIOS on them.

E.3 PRODUCT SPECIFICATIONS

The GSI Model 2C Enhanced IDE Adapter uses the Part #: 1533-2C-xx-x, where xx-x is the adapter revision number. It is distributed in bulk (where GSI supplies the adapter and manual) and in retail (the Model 2C, IDE data cable and manual in a GSI box).

Adapter Dimensions:

2.80" x 5.96" - Industry Standard Architecture (ISA) 16-bit adapter

Bus Slot Requirements:

16-bit ISA — conforming to IEEE-P996-ISA specifications

Power Consumption:

5 watts (Model 2C itself, without J5 drive-power load considered —
See Section A.2.4)

IDE Drive Compatibility:

Supports IDE drives conforming to ANSI specification X3T9.2-791D

Western Digital (WD) Enhanced IDE Guidelines:

Supports Enhanced Drive Parameter Table (EDPT) to handle drives up to 7.9GB in capacity

IDE Drive Connector Definition:

Channel X: 40-pin industry standard IDE drive connector, PIN-1 towards bracket
Channel Y: 40-pin industry standard IDE drive connector, PIN-1 towards bracket

APPENDIX F – WINDOWS®95 INF FILE

F.1 CONTENTS OF WINDOWS®95 INF FILE

If you do not have internet access to visit the GSI Web site and need to create the Windows®95 .INF file to allow the Windows®95 Standard IDE driver to see drives on Channel 3 and Channel 4, you can create the file easily. Simply create a file (you can use notepad) named GSIEIDE.INF and type in the following text:

```
; EIDE WIN95 INF
[Version]
Signature="$WINDOWS 95$"
InfVersion=0.9
Class=hdc
Provider=%GSI%

[Manufacturer]
"%GSI%"=GSI

[GSI]
%GSIEIDE.DeviceDesc%=GSIEIDE, *GSIEIDE

[GSIEIDE]
LogConfig=GSI1, GSI2, GSI3, GSI4
AddReg=GSIEIDE_AddReg

[GSI1]
ConfigPriority=HARDWIRED
IOConfig=1f0-1f7(3ff::)
IOConfig=3f6-3f6(3ff::)
IRQConfig=14

[GSI2]
ConfigPriority=HARDWIRED
IOConfig=170-177(3ff::)
IOConfig=376-376(3ff::)
IRQConfig=15

[GSI3]
ConfigPriority=HARDWIRED
IOConfig=1e8-1ef(3ff::)
IOConfig=3ee-3ee(3ff::)
IRQConfig=11,12

[GSI4]
ConfigPriority=HARDWIRED
IOConfig=168-16f(3ff::)
IOConfig=36e-36e(3ff::)
IRQConfig=10,12

[GSIEIDE_AddReg]
HKR,,DriverDesc,, "ESDI Port Driver"
HKR,,DevLoader,, *IOS
HKR,,PortDriver,, ESDI_506.pdr

[Strings]
GSI="GSI Technology"
GSIEIDE.DeviceDesc="GSI Enhanced IDE Controller"
```

APPENDIX G — BASIC TROUBLESHOOTING

The following are some basic troubleshooting tips you should read if experiencing problems with your installation. Each problem is followed by some suggestions and then points to a [section] for more information.

G.1 GSI Banner is Not Seen On The Screen During Bootup:

- Does the hard drive have more than 4095 cylinders? [A.2.3]
- Is there a *second* BIOS at the same address as the GSI BIOS? [A.2.2]
- System BIOS *may* not be looking for the GSI-BIOS at **E000** address. [A.2.2]
- Is there a **SCSI/ESDI** adapter with BIOS at *higher* address than GSI BIOS? Re-jumper to put GSI BIOS at the higher address. [A.2.2, E.1]
- Another card using C000-DFFF memory (LAN, multimedia, scanner, etc.)? Try removing it to establish exactly where the conflict is occurring.
- Do you have a “Plug-N-Play” CMOS? Try disabling PnP option in CMOS [2.2]



If the above has been tried and you still see no GSI banner upon boot, contact GSI Tech Support (714-261-9744).

G.2 Not getting 32-bit File/Disk Access in Windows 3.xx:

- Review Appendix C.2
- Check to make sure you have the latest Windows 3.x 32-bit Disk Access driver from the hard drive manufacturer.
- Is there an ATAPI CD-ROM on the same channel? Call the drive manufacturer for the updated 32-bit disk access driver. Note that some drives will simply not allow 32-bit access with a CD-ROM as a slave.

G.3 Only able to access 504MB of a high-capacity EIDE hard drive:

- Make sure the system CMOS is set properly. [3.2]
- Is Disk Manager, EZ-Drive or Max-Blast on drive? [2.1]
- Is there already a partition on the drive? [D.3]
- Does the drive have more than 4095 cylinders? [A.2.3]

G.4 Hard Drive(s) Not Found by GSI Model 2C

- Check that cables are properly connected.
- Is the drive jumpered correctly? If drive should be set to standalone, but is set to master or slave, it may not be seen by GSI BIOS. [D.2]

G.5 Hard Drive Read/Write Operations Appear to be Faulty

- *Garbled* data reported at top of GSI Banner Setup screen... VGA or drive adapter interfering? Remove that adapter or substitute another one. [A.2.2]
- Check system BUS speed. See B.1.3

APPENDIX G — BASIC TROUBLESHOOTING

G.6 IDE HARD DRIVE PERFORMANCE NOT INCREASED

- Does your IDE hard drive support read/write multiple? Ask manufacturer.
- Are you shadowing the GSI BIOS? [C.1]
- Did you remember to exclude the GSI BIOS Address range with your memory manager? [C.1]

G.7 CHANGES TO MODEL 2C BIOS NOT SAVING

- Did you remember to turn OFF shadowing of GSI BIOS while making changes?
- Did you remember to exclude the GSI BIOS Address range with your memory manager? [C.1]

G.8 Message: 'SYSTEM ERROR — Turn off SHADOWING during installation'

- If shadowing of GSI BIOS region is already OFF, *another adapter* is interfering with write/verify to the GSI *Flash* BIOS chip. Remove/substitute cards.

G.9 'Hard Drive Controller Error' Message Just after Memory Test

- Is another adapter using the same IRQ or I/O address as the Model 2C? [2.2]
- Power cable or ribbon cable not attached to HD? [3.1]
- User selected CMOS HD Type *exceeds* the hard drive's actual capacity? [E.1.3]
- Check hard drive's Standalone/Master/Slave *jumpers* vs. maker's tech info. [E.1]
- Ribbon cable Pin-1 orientation wrong? [A.1.2]
- The hard drive may need more time before first command. Enable 'Floppy Seek at Boot' and 'Test Memory beyond 1MB' options, if available, in System Setup.
- Hard drive says 'Ready' but returns an error when System BIOS issues first hard drive command. Check for firmware correction from hard drive OEM.



Note: The HDD Controller Failure message can appear if there is a timing problem involved in a Master/Slave drive relationship. Try running one of the drives as a standalone (disconnecting the other drive) to ascertain if that is the problem. If it is, contact the hard drive manufacturer for possible drive firmware correction.

G.10 Problem with Maxtor 1.2GB HD (71626AP)

- Contact Maxtor technical support at 1-800-2MAXTOR.

INSTALLATION NOTES

If, after reading this manual, you are still having problems you may contact GSI at the following numbers:

Internet Support:

www.gsi-inc.com

Fax

714-757-1778

If you still need to contact Technical Support, our hours are Monday through Friday 8am to 5pm Pacific Standard Time.

714-261-9744

Before calling Technical Support you need to have the following information:

GSISERIAL NUMBER:

(no technical support provided without the serial number)

- Type of processor
- System memory
- System configuration
- Error messages received

GSI manufactures other disk controller products including:

The **GSI Model 12** -- An 8-bit high-speed floppy-tape accelerator adapter capable of supporting data transfer rates up to 2Mb per second. Perfect accelerator for QIC-3010 and QIC-3020 tape backup drives or for adding more floppy drives to any system.

The **GSI Model 18** -- Enhanced IDE for ISA Systems. Supports two EIDE drives & increases data throughput up to 80%. Allows EIDE hard drives to co-exist with MFM, RLL, SCSI, ESDI and other IDE hard drives.

The **GSI Model 21** -- A 16-bit Combo IDE / Floppy & Tape accelerator board. **Increases IDE** throughput up to **80%**. Supports two IDE, four floppy (including 2.88MB) and one floppy-tape drive. **Doubles** the speed of 250MB (QIC-80) tape backup units to 7MB per minute.

The **GSI Model 32** -- This 16-bit high-speed, multi-port disk accelerator board has all of the features of the GSI Model 21, plus two high-speed 16550 UART serial ports and one bi-directional parallel port!

The **GSI Model 4C** -- The GSI Model 4C Disk Accelerator supports EIGHT IDE hard drives on FOUR separate channels. Perfect for Novell duplexing or mirroring!

GSI

Irvine, CA

(714) 261-7949 Sales

(714) 757-1778 Fax

(714) 261-9744 Technical Support



All GSI products are designed,
manufactured and tested in the U.S.A.