GSI Model 2C

Dual-Channel
Enhanced IDE Adapter

Installation Guide

PLEASE READ THE FOLLOWING:

BEFORE CALLING GSI TECHNICAL SUPPORT, PLEASE READ THE INSTALLATION SECTION OF THIS MANUAL (PAGES 5-7) COMPLETELY AND HAVE ALL INFORMATION ON PAGE 20 READY!

Doc. #: 1539-2C-01-3

This manual applies to all revisions of the Model 2C adapter and BIOS version 4.10 and later.

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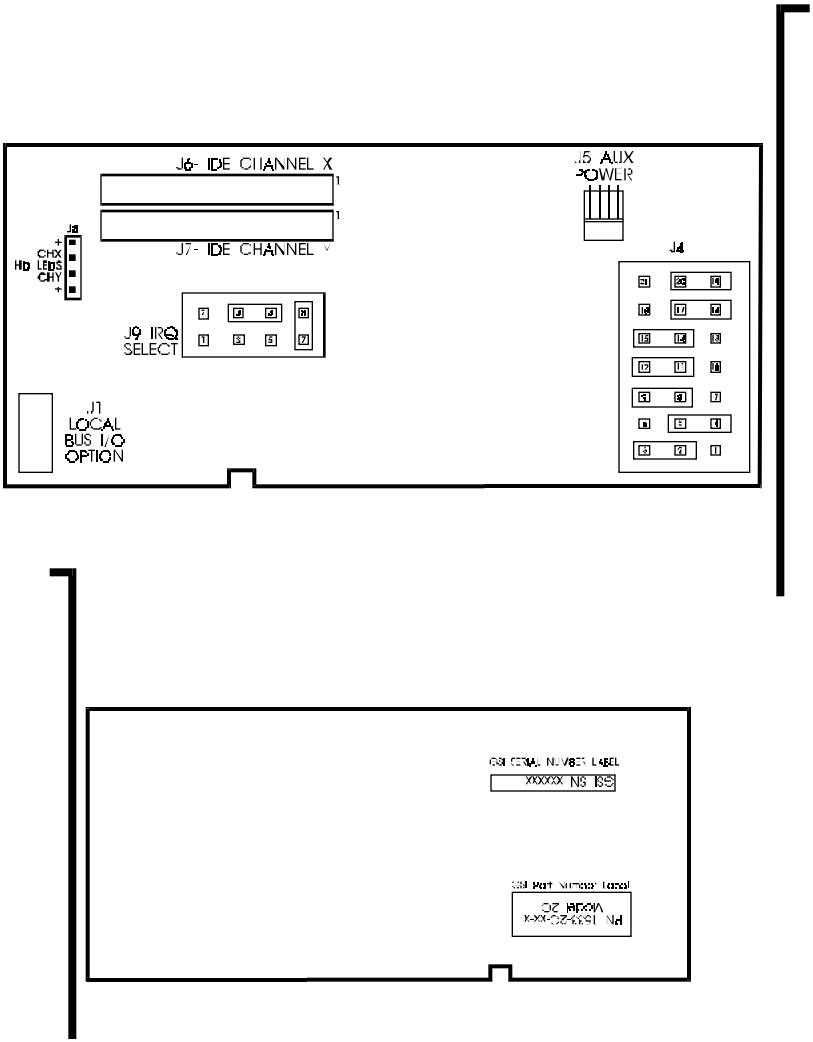


Notice

Please write down the GSI serial number from the back, or non-component, side of the GSI adapter. The serial number is located on a long bar-code label, comprised of six digits (GSI SN XXXXXX) and 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 another label or #1539-22-xx-x, which is silk-screened on the actual printed circuit board. Remember to register your product using the enclosed product registration card and the GSI serial number.

Do not remove the GSI Model 2C from the pink anti-static bag until time of installation. This will protect the adapter from static electricity generated by handling the adapter without proper protection.

1.0 PRODUCT OVERVIEW

The Model 2C supports up to four (4) EIDE drives on two (2) separate IDE channels (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 Innovative Bigabyte™ Technology

The EIDE interface was developed to overcome the 504MB capacity (or 1024 cylinder) problem, yet another new capacity barrier has hit a large percentage of the industry, the 2.5GB barrier. This is unrelated to the 2.1GB partition size maximum of DOS, but a real problem that affects, by some estimates, 45-50% of the installed PCs.

The problem stems from the BIOS in those systems attempting to "auto-detect" the hard disk drive parameters. Once the system's BIOS finds the drive parameters it can then calculate the capacity and boot the system. New 2.5GB and larger hard drives have more than 4095 cylinders and these "problem" systems crash detecting a cylinder count this high. The GSI Model 2C Adapter's 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 Accelerated EIDE channels (four EIDE devices)
- Onboard ***Flash*** BIOS upgrades existing IDE adapters to EIDE!
- Special Bigabyte™ support for EIDE drives with more than 4095 cylinders!
- Increases EIDE data transfer rates up to 80%!
- Upgradable to 32-bit using a GSI VESA Extender Module
- Onboard ***Flash*** BIOS means **NO DRIVERS REQUIRED!**
- No system CMOS or BIOS support required
- Onboard ***Flash*** BIOS requires ***no conventional memory***
- Intelligent EIDE interface *"Auto-Senses"* drive parameters
- Supports large EIDE drive sizes above 528MB
- Compatible with EIDE (or ATAPI-compliant) CD-ROM drives
- *"Auto-Prep"* feature optionally prepares new drives
- Co-resides with other disk drive adapters
- IDE Channel X can be configured as:
  - Primary Channel (IRQ 14); or
  - Secondary Channel (IRQ 15 or IRQ 12); or
  - Third Channel (IRQ 11 or IRQ 12)
- IDE Channel Y can be configured as:
  - Secondary Channel (IRQ 15 or IRQ 12); or
  - Third Channel (IRQ 11 or IRQ 12); or
  - Fourth Channel (IRQ 10 or IRQ 12)
- IDE Channel Y can be disabled
- ***Flash*** BIOS provides easy upgrade path

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 on 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 DOES THE SYSTEM HAVE AN INTEGRATED IDE INTERFACE?

Many systems have IDE adapters or also referred to as "channels" built-in to the motherboard. Each IDE channel supports up to two IDE (or EIDE) drives - one as a master and one as a 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 adapter, you must make sure the existing adapter(s) and the GSI Model 2C do not conflict with each other. 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 unavailable, optional IRQ 12 can be used
3	11	1E8-3E8	Third IDE channel, if IRQ 11 is unavailable, optional IRQ 12 can be used
4	10	168-368	Fourth IDE channel, if IRQ 10 is unavailable, optional IRQ 12 can be used

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

For systems that have an IDE adapter integrated on the motherboard, the Model 2C will co-reside with them by using alternate channels. If the motherboard has only one channel integrated, the Model 2C can be configured to provide a second and third channel (factory default). If there are two channels on the motherboard, the Model 2C can be configured to provide a third and fourth channel. The GSI Model 2C's channels are factory set to channel 2 and channel 3. For channel 2, channel 3 and channel 4, an optional IRQ 12 selection is available should you encounter conflicts with any other adapters.

As an added feature, the onboard ***Flash*** BIOS on the GSI Model 2C will enhance any existing IDE channels. This will allow 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 shows what drives are attached to the GSI Model 2C and the configuration of the adapter's channels.

2.3 MODEL 2C FACTORY DEFAULT JUMPER SETTINGS

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

Jumper block J4 **Description**	**Jumpers**	**Default Setting**
Factory Jumper	JP2-3	Factory Set **(Do not change)**
Channel Y Enable	JP4-5	Enabled
I/O Address Select	JP8-9, 11-12	Channel 2, Channel 3
BIOS Address	JP13-14, 16-17	C800-C8FF

Jumper block J9 **Description**	**Jumpers**	**Default Setting**
IRQ Select	JP7-8, 4-6	IRQ 15, IRQ 11

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) Model 2C 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 2.3). Conflicts occur when there are duplicate I/O addresses or identical IRQ settings. Check for IRQ, port 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 your 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 your system, take care to 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 GSI Model 2C, 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.

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

Identify the IDE ribbon cable (2" wide, 40-pins and no twist) and connect the cable from **J6** on the Model 2C to the (E)IDE Drives. 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) If necessary, carefully install the drive(s) into the computer case

(7) Verify Model 2C configuration

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

(8) 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

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).

(3) Advanced CMOS Setup – BIOS Shadowing

Many 386, 486 and 586 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.

The GSI Banner will be similar to the following example:

```
GSI Model 2C Adapter – with GSI BIOS v4.10 at E000-E1FF   (c)1992-96 GSI
Intelligent EIDE 2-Channel (4-Drive) Adapter set to Ch3+4 GSI Ser#A12345

On C MAS Drv  Total  Volume   Volume     Volume
2C h SLV Type DrvSiz  Size  Name/Label  Type /FAT Drive responds as .  .
== = === ==== ====== ====== =========== ========= ======================
–  1 MAS Hard 1549MB 1547MB NO NAME     PRI-fat16 WDC AC31600
2C 3 MAS Hard  519MB  518MB             PRI-fat16 Quantum Fireball 540

   Exit GSI BIOS . . .
```

The example GSI Banner shows that the first hard drive is on another adapter configured as channel 1. The second hard drive is on one channel of the Model 2C, which is configured as channel 3. Note that the GSI serial number **does** appear in the GSI Banner.

(5) For NEW hard drives

The Model 2C will offer to Auto-Prep (FDISK and/or FORMAT) each new (E)IDE hard drive for you. This is a very quick and easy way to install new hard drives. This utility will automatically FDISK the hard drive, creating a single 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 manuals. You may also use the DOS FDISK to create extended partitions beyond 2.1GB, if your hard drive has the capacity.

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

(6) 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 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 non-DOS partitioning software before using that drive with the Model 2C.

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 shows 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.

If you put an Enhanced IDE CD-ROM drive on a channel - without a hard drive - you may experience an added delay during the boot-up process. This is a result of the Model 2C BIOS trying to identify the CD-ROM (using the Identify Drive command) and not receiving a quick reply (like a hard drive). This may result in a timeout (usually 10 seconds) before the Model 2C will finish installing. Also, 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. Refer to Section 2.2 for Model 2C channel information.

3.3 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 section B.3.

Note: Take a moment here to write down the Serial Number of the GSI adapter on your product registration card. Please remember to send in this registration card to GSI. GSI cannot register your product without the Serial Number!!

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 HARD DRIVE 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* (the only EIDE drive on one cable), *Master* (of a Master/Slave pair on one cable) or *Slave* (of a Master/Slave pair on one cable). 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 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

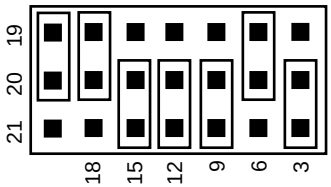
A.2.1 Channel Configuration Jumpers - Adapter Operation

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:

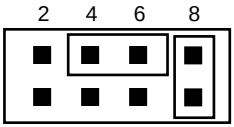
Channel X & Channel Y Possible Configurations					
Ch. X	**Ch. Y**	**IRQ's (X,Y)**	**I/O Addresses**	**J4 Jumpers**	**J9 Jumpers**
1	2	14, 15	1F0-3F0, 170-370	2-3, 4-5, 7-8, 11-12	7-8
2	disabled	15, none	170-370, none	2-3, 5-6, 8-9, 11-12	7-8
2	disabled	12, none	170-370, none	2-3, 5-6, 8-9, 11-12	5-7
2	**3**	**15, 11**	**170-370, 1E8-3E8**	**2-3, 4-5, 8-9, 11-12**	**7-8, 4-6**
2	3	15, 12	170-370, 1E8-3E8	2-3, 4-5, 8-9, 11-12	7-8, 5-6
3	disabled	11, none	1E8-3E8, none	2-3, 5-6, 7-8, 10-11	4-6
3	disabled	12, none	1E8-3E8, none	2-3, 5-6, 7-8, 10-11	5-6
3	4	11, 10	1E8-3E8, 168-368	2-3, 4-5, 7-8, 10-11	4-6, 1-3
3	4	11, 12	1E8-3E8, 168-368	2-3, 4-5, 7-8, 10-11	4-6, 3-5

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:

J4 Jumper Block



J9 Jumper Block



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 and 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 3.2 for example).

Changing the GSI BIOS address will usually have 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	13-14, 16-17
CC00-CFFF	14-15, 16-17
D000-D3FF	13-14, 17-18
E000-E3FF	14-15, 17-18

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 has the jumper on pins 19-20 of J4. For the GSI Bigabyte™ support, jumper pins 20-21 of J4.

Some of these larger hard drives come with special software (Disk Manager, etc.) and may have extra jumpers on the drives. You do not need to 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** 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 (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 SETUP PROCEDURE

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

In some systems or if using Windows®95, 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 can work.

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 GSI MODEL 2C 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.

B.3 SHADOWING THE GSI BIOS - VERY IMPORTANT

Shadowing the GSI BIOS address region may increase performance. Most 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 GSI BIOS using **either** of these methods.

B.3.1 Using Memory Management Software

To ENABLE shadowing of the GSI BIOS with the DOS (version 6 or later) EMM386.EXE memory manager, make sure the following line is in your CONFIG.SYS:

```
device = EMM386.EXE ROM=AddressRange
```

where *AddressRange* is the GSI BIOS's 8kB address range (e.g., CC00-CDFF).

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's **8kB** BIOS.

Note your GSI BIOS Start Address as shown in your GSI Bootup Banner and request shadowing, in your Advanced CMOS System Setup, as follows:

GSI BIOS Address (HEX)	In System Setup Shadowing, Choose: If 16kB Block	If 32kB Block	If 64kB Block
C800-C9FF	C800-CBFF	C800-CFFF	C000-CFFF
CC00-CDFF	CC00-CFFF	C800-CFFF	C000-CFFF
D000-D1FF	D000-D3FF	D000-D7FF	D000-DFFF
E000-E1FF	E000-E3FF	E000-E7FF	E000-EFFF

Please note that if you are shadowing the GSI 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 GSI BIOS range from the memory manager.

C.1 USING MEMORY MANAGER SOFTWARE

If you use memory manager software, such as DOS' EMM386, QEMM, 386MAX, or Netroom, you may experience odd problems if you do not exclude the GSI-BIOS address. Try **excluding** the memory region of the **GSI BIOS** from the memory manager's optimization process.

Example:
In the CONFIG.SYS file add the **exclude** option for a Model 2C whose BIOS is at the **CC00** address:

Memory Manager	**Exclusion Statement**
DOS' EMM386	`Device = X:\DOS\EMM386.SYS X=CC00-CDFF`
QEMM	`Device = X:\QEMM\QEMM.SYS X=CC00-CDFF`
386MAX	`Device = X:\386MAX\386MAX.SYS exclude=CC00-CFFF`

If the above 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 GSI BIOS address (confirm BIOS address from GSI Banner), the following table shows which regions should be excluded accordingly:

GSI 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 card. 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 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 FAT 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® 95

At the time of this printing, the Model 2C has been tested with Windows® 95. One limitation is that Windows® 95 does not support 32-bit file operations on Channel 3 or Channel 4. If your system shows that the hard drives attached to Channel 1 or Channel 2 of the Model 2C are running in MS-DOS Compatibility Mode, go to the Control Panel and run the Add New Hardware Wizard. This has been known to find the GSI adapter's first two channels and use the STANDARD IDE/ ESDI HARD DISK CONTROLLER driver to provide 32-bit file support.

C.4 NOVELL NETWORKS

C.4.1 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 of 1994 or later.

C.4.2 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 as with Novell 4.0
3) Novell 3.0 — Contact Novell about their network operating system upgrade options.

APPENDIX D — (E)IDE DRIVES: 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 (CAM-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 packs with an IDE data 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.

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.

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 MODEL 2C'S BIOS SUPPORT FOR HARD DRIVES

For any IDE hard drive which you are installing on a Model 2C, two cases should be distinguished:

D.3.1 Partition Exists

If your 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 capactity 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.3.2 No Partition Exists

If your 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 **abandon** existing partitions on your hard drive, use DOS' **FDISK** to delete them.

Note 2: If the Model 2C's Channel X is selected as Channel 1 choice of Drive Type, in System Setup, declares a drive capacity that *exceeds* the actual hard drive capacity, the drive will usually declare an error — reported as 'HD *controller* failure" — when the System BIOS first tries to initialize it — *before* the GSI BIOS is even made active.

D.4 MODEL 2C IDENTIFY DRIVE SUPPORT

D.4.1 Model 2C's *Auto-Sense* Feature

The Model 2C BIOS uses the IDE Identify Drive command to *Auto-Sense* (E)IDE drives. This allows the Model 2C to *Auto-Sense* virtually any IDE hard drive which has already been in use with DOS and has **DOS-standard** partitions (like those created using DOS' FDISK utitlity). This ability is useful for when there is no User Definable Drive Type option (like AMI Type 47), when the drive parameters are unknown or for installing high-capacity (E)IDE drives that exceed the system BIOS' capability.

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 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).

D.4.2 (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 HD'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.5 INTEGRATING (E)IDE ATAPI CD-ROM AND TAPE DRIVES

An (E)IDE 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. Both the Mountain and the Summit IDE (non-ATAPI, but compatible) tape drives are shipped set up for Slave Mode but they also provide jumpers which allow setup for Standalone Mode. Follow the drive manufacturer's installation and user manual information.

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 SCSI and ESDI adapter BIOSs are *ill-behaved*. 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 Accelerator 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, manual and registration card) and in retail (the Model 2C, IDE data cable, manual and registration card 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 8.4GB 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 — VESA LOCAL BUS OPTION

F.1 VESA LOCAL BUS EXTENDER MODULE(S)

The GSI Model 2C Enhanced IDE adapter can be upgraded to support the VESA local bus. GSI has two VESA Extender Modules available to convert the GSI ISA Enhanced IDE adapters. One VESA Extender (GSI Part #: 1645-V1-xx-x) supports only a single IDE channel (or two drives). The other VESA Extender (GSI Part #: 1645-V2-xx-x) supports two channels (or four drives) — provided your system has two channels.

The two channel VESA Extender is the perfect add-on to the GSI Model 2C, allowing up to four EIDE hard drives to run at full Mode 4 performance on the VESA local bus.

GSI Model 2C's can be upgraded with the VESA Extender Module. The GSI Model 2C has a Local Bus I/O Option header that directly connects to the VESA Extender Module.

F.2 VESA EXTENDER MODULE FEATURES

The GSI 1645-V1 and 1645-V2 VESA Extender Modules eliminate the ISA-bus performance limitation by providing full PIO Mode 3 and PIO Mode 4 data transfers. The GSI VESA Modules simply extend any GSI ISA Accelerator adapter to the VESA local bus. Using the VESA local bus with new Enhanced IDE and Fast ATA (or Fast ATA-2) hard drives, the GSI VESA Modules can allow these drives to achieve their maximum data transfer rates. Using an advanced engineering process the GSI VESA Modules have the unique ability to Mix & Match various Modes of drives without performance loss! GSI VESA Modules can run Mode 4 drives on the same cable as Mode 1 drives while maximizing the performance of each!

GSI 1645-V1 VESA Extender Module Features:

- 32-bit VESA Compliant with new Enhanced IDE and Fast ATA(2) standards
- Provides full PIO **Mode 3** (11.1MB/s) & **Mode 4** (16.6MB/s) performance with I/O Channel Ready
- Simply extends any GSI ISA Accelerator Adapter to the VESA Localbus
- Supports DMA Multiword Modes 1 & 2
- **Mix & Match** older Mode 0,1 or 2 drives with new Mode 3 or 4 drives on the same cable — with no performance loss!
- Onboard ***Flash*** BIOS provides quick, easy installation, but takes NO memory addressing!
- **No device drivers required** for any operating system or software (totally transparent to the O/S!)
- Compatible with DOS, Windows® 3.x, Windows® for Workgroups, Windows NT™, OS/2 and Novell
- Designed, manufactured & tested in the U.S.A.

GSI 1645-V2 VESA Extender Module Features:

- Same high performance and easy installation features as 1645-V1 VESA Module
- Supports four (4) IDE drives on two (2) IDE channels

For more information on the GSI VESA Extender Modules, contact GSI at (714) 261-7949.

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 references an **Appendix** for more reading. Below, SW=software, HD=hard drive, FD=floppy drive & TD=tape drive

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

- Does the drive have more than 4095 cylinders? See A.2.3
- Is there a *second* BIOS at the same address as the GSI BIOS? **A.2**
- System BIOS *may* not be looking for the GSI-BIOS at **E000** address. **A.2**
- Ill-behaved **SCSI**/ESDI adapter with BIOS at *higher* address than GSI BIOS? Rejumper to put GSI BIOS at the higher address. **A.2, E.1**
- Another card using C000-DFFF memory (LAN, multimedia, scanner, etc.)? Try removing it to establish exactly where the conflict is occuring.
- Do you have a "Plug-N-Play" CMOS? Try disabling PnP option in CMOS.

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:

- Review Appendix C.
- Check to make sure you have the latest Windows 3.x 32-bit Disk Access driver from the drive manufacturer.
- Is there an ATAPI CD-ROM on the same channel? Call the drive manufacturer for the updated 32-bit disk access driver. Not 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, See 3.2
- Is Disk Manager, EZ-Drive or Max-Blast on drive?, See 2.1
- Is there already a partition on the drive? See D.3
- Does the drive have more than 4095 cylinders? See 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. See D.2

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

- *Garbled* data reported at top of GSI HD Setup screen... VGA or drive adapter interfering? Remove that adapter or substitute another one. **A.2**
- Check system BUS speed. See B.1.3

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? **B.3**
- 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?
- If you changed partitions using FDISK, did you remember to to rerun the GSI BIOS-setup to allow the Model 2C to adapt to the change?
- 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 HD's Standalone/Master/Slave *jumpers* vs. maker's tech info. **E.1**
- Ribbon cable Pin 1 orientation wrong? **A.2.2**
- HD may need more time before first command. Enable 'Floppy Seek at Boot' and 'Test Memory beyond 1MB' options, if available, in System Setup.
- HD says 'Ready' but returns an error when System BIOS issues first HD command. Get HD firmware correction from 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 indeed the problem. If it is, contact the HD 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

During installation, you should take down the following information. This information will be useful should you need to contact technical support. GSI's Authorized Distributors can provide you technical support, or you can contact GSI Technical Support at (714) 261-9744 or by fax (714) 757-1778. When calling either Technical support department, MAKE SURE TO HAVE THE FOLLOWING INFORMATION READILY AVAILABLE.

SUPPLIER INFORMATION

Date of Purchase: _____ Invoice #: _____

Product Purchased From: _____

Seller's Tech Support Phone #: _____

GSI PRODUCT INFORMATION

GSI Model 2C Part #: 1533-2C-___-__ GSI Model 2C Serial #: _____ 

GSI Model 2C BIOS Version : _____

GSI BIOS Address Used: _____

OTHER INFORMATION

System Information: _____

Disk Drive Information: _____

Other Cards in System: _____

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!

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

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