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The **GSI Model 18** -- A 16-bit primary/secondary hard disk accelerator board. Increases IDE throughput up to 80%. Allows IDE hard drives to co-exist with MFM, RLL, SCSI, ESDI and other IDE hard drives. Also supports duplexing and mirroring of IDE hard drives in Novell networks.

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

The **GSI Model CD** -- A 16-bit ATAPI IDE CD-ROM and Tape Backup adapter board. This low-cost, secondary controller is fully ATAPI and MPC compliant. Perfect for adding ATAPI-only drives. Not intended for use with hard drives as the GSI Model 18 is better suited for that application.

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GSIMODEL21

GSI MODEL 21 IDE, ISA 16BIT  
BIOS CONTROLLER, M/F, TAPE

59289  
5A712



GSIMODEL21

## GSI Model 21

### ENHANCED IDE, FLOPPY & QIC-80 TAPE DRIVE ACCELERATOR BOARD

## Installation Manual



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This manual applies to all revisions of the Model 21 controller and BIOS version 3.05 and later.

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## Model 21 Manual Overview

The following section summaries will help you identify the sections you need to read. For best results, however, we recommend that you read the entire manual before installing and using your GSI Model 21.

### Conventions Used

This section explains both text and graphics usage in this manual.

### Product Overview

Explains the features and functions of the GSI Model 21 Intelligent IDEa™ Accelerator Board.

### Quick Installation Reference

This section is intended to provide a quick reference for installation and using the GSI Model 21.

### Appendices

The Appendices in this manual further explain items quickly referenced in the Quick Installation Reference.

### Appendix G - Basic Troubleshooting

This important section provides basic troubleshooting should you experience difficulties during the installation process.

### Installation Notes

During installation, you should take down specific notes regarding the GSI Model 21 and your system. These notes will help should you need to troubleshoot your installation.

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## Conventions Used

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This section explains both text and graphics usage in this manual.

### Bold Type

**Bold Type** usually indicates a section heading. If bold type is used outside a heading, it is used to highlight a term of importance.

### Courier Type

**Courier Type** is used to show responses from the computer, or commands to the computer.

### <Bracketed Items>

Keys on the keyboard are enclosed in "brackets", e.g., <Del> represents the Delete key, <A> represents the capital letter "A", etc. Combination keystrokes run together without spaces, i.e., <Ctrl><Alt><Del>.

### Graphics

A few graphics are used to call attention to items:



Indicates a special note on a related subject.

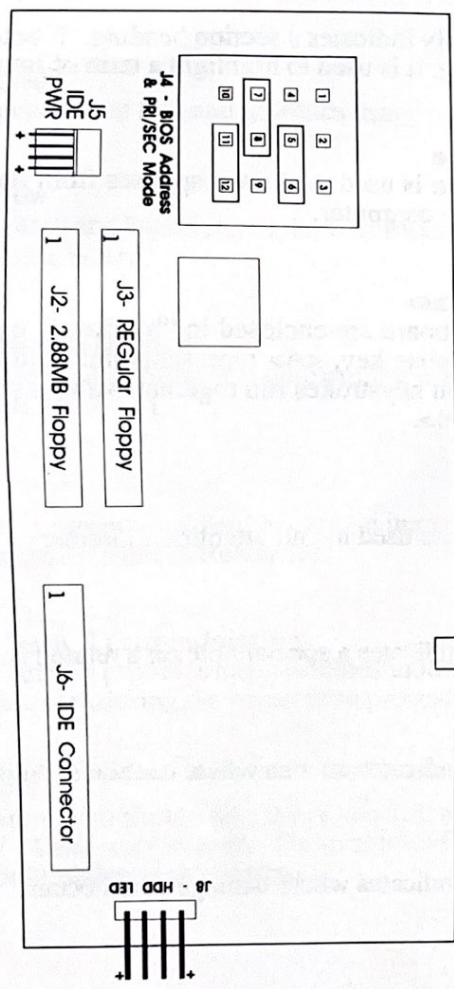


Indicates an area where caution should be used.



Indicates where damage could occur.

Board layout - GSI Model 21  
 (J4 Jumper Block is shown enlarged. Jumpers shown are factory default. See Appendix A.3.1)



## 1.0 PRODUCT OVERVIEW

The GSI Model 21 *Intelligent IDE<sup>™</sup> Accelerator Board* is a high performance intelligent controller for use in IBM AT-compatible PCs. It supports IDE hard drives, floppy drives, and IDE or floppy-interface tape drives. The Model 21 uses a state-of-the-art 8kB *Flash BIOS* to make installation quick and easy, while also *accelerating* IDE hard drive throughput.

The Model 21 is a 16-bit ISA-bus controller and will work only in a 16-bit ISA motherboard slot. For extreme flexibility in *co-existing* with other controllers (for example, a SCSI, an ESDI, an MFM/RLL, or another IDE), this board can be re-jumpered for *secondary* I/O-address operation.

The Model 21 Accelerator Board can control as many as seven drives:

- Two IDE drives (any IDE hard drives up to 8.4GB or IDE tape drives)
- Four floppy drives (including 2.88MB)
- Plus a floppy-based tape backup drive

### Intelligent IDE Hard Drive and IDE Tape Drive Support

- **Acceleration:** Provides 10-80% data transfer rate acceleration for most IDE hard drives, compared to standard passive IDE adapters
- **"Auto-Senses" IDE Drive Size:** Lets you use 100% of any IDE hard drive
- **Auto-Install:** Automatically detects, analyzes, and sets up any partitions which it finds already set up on your IDE drive
- **Huge-Drive Support:** Handles high-capacity IDE drives, allowing a single DOS partition (drive letter) for capacities up to 8.4GB
- **Compatibility:** DOS, Windows 3.x, Novell NetWare 3.x/4.x, & OS/2 2.x
- **IDE-Tape Support:** Supports an IDE-interface tape drive (QIC-80/40 type) — either as Slave to an IDE hard drive or by itself

### Intelligent Floppy Drive and Floppy-Interface Tape Drive Support

- Supports any mix of up to four floppy drives (system limit)
- Doubles the speed of 250MB QIC-80 tape drives, transferring data at 1 Megabit per second — twice the standard floppy-interface tape speed.
- Allows the user to assign floppy drive letters from the keyboard, selecting any floppy drive as A: (the Boot Drive), or as B:, or 3:, or 4:. (DOS & Windows environments only)
- Boots from any type of 3.5"/5.25" diskette, including 2.88MB diskettes
- Allows DOS 6.x/5.0 to media-sense the diskette type in 2.88MB drives, eliminating the need for DOS-FORMAT /f:xxx switches!

## 2.0 QUICK INSTALLATION REFERENCE

This section of the manual should allow you to quickly install the GSI Model 21 in your computer. Each step has, if needed, a bracketed [ ] reference to other sections in this manual that discuss that particular step in more detail. Should you have problems or questions regarding a QUICK INSTALL step, please read carefully the reference sections.

### 2.1 PHYSICAL INSTALLATION

- (1) With power OFF, open the computer case.



**CAUTION!** 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.

- (2) **Check the jumpers on the IDE devices** [E.1.2]  
Each IDE hard drive's (or IDE tape drive's) Master/Slave jumpers should be kept at the factory-default *Single* (also called *Standalone* or *Single/Master*) setting if that IDE device will be the **only** one on the IDE cable. If there are **two** IDE drives connected to the Model 21 (sharing the IDE cable), you must jumper one as *Master* and the other as *Slave*. Master or Slave can be at *either* cable position.
- (3) **Attach the IDE ribbon cable (wider, 40-pin non-twisted cable)** [A.2.2]  
Connect the ribbon cable from **J6** to the IDE Hard/Tape Drives. Note that the **colored** band found on one edge of the IDE ribbon cable indicates the **Pin 1** edge.
- (4) **Check the floppy drive and floppy-based tape drive jumpers** [D.3, F.1]  
Leave these jumpers at factory settings, except for 2.88MB floppies. See D.3
- (5) **Attach floppy ribbon cables (narrower, 34-pin twisted cables)** [A.1.3, E.1.1]  
Connect the ribbon cables from **J3/J2** to the floppy and tape drives. Note that the **colored** band found on one edge of each floppy cable indicates the **Pin 1** edge.
- (6) **Check the Model 21's GSI BIOS Address Jumpers** [A.3.1]  
In most cases skip this step, as the factory BIOS Address setting should work fine.
- (7) **Check the Model 21's Primary/Secondary Mode Jumper** [A.3.1]  
Try factory-default Primary (PRI) Mode. For SEC Mode, see A.3.1.
- (8) **Install the Model 21 into a 16-bit ISA bus slot and Power ON** [A.3.2]

### 2.2 SYSTEM CMOS SETUP

- (1) **Hard Drives – Select "Type 1" for GSI Auto-Install (PRI Mode)** [B.1.2]
  - a) **Primary Mode (default):** Select Type 1 for each hard drive on the Model 21. There is no system CMOS setting for tape drives, either IDE or floppy-interface.
  - b) **Secondary Mode** (see Step 7 above): Do **not** declare drives attached to the Model 21 in CMOS when running in secondary mode.

## 2.0 QUICK INSTALLATION REFERENCE (cont.)

- (2) **Floppy Drives – Select "None" or "Not Installed"** [B.1]



**Note:** In *rare* cases, you must declare PRI Mode floppy drives. Read B.1

- (3) **Tape Drives – Do nothing! (Not declared during setup)** [E.5, F.1]

- (4) **Advanced CMOS Setup – Turn OFF BIOS shadowing** [B.3]

Many 386 or faster PCs have *Advanced System CMOS Setup* procedures that offer shadowing of an adapter BIOS' memory region, like the Model 21's. A *shadowed* BIOS is executed from a high-speed RAM copy of the BIOS, usually enhancing performance. Shadowing of the GSI BIOS address area should be **OFF** until you complete your installation, but **ON** for normal operation. The Model 21 will ask you to **temporarily "Turn OFF shadowing!"** if it cannot write to the *Flash* BIOS chip when it needs to. Section B.3 discusses various methods of providing *shadowed* execution of your BIOS.

### 2.3 GSI MODEL 21 FLOPPY & HARD DRIVE SETUP

- (1) **Reboot your system and watch for the GSI Banner** [B.2]  
The GSI Boot-Time Banner should appear on-screen after your system BIOS's boot-time banner. For AMI BIOS, look for it just beneath the AMI Configuration Report. If your Model 21 has never been installed in a PC since factory test, look for "Configuration not set up. Press any key..." on your display. Press any key.
- (2) **Run GSI Floppy Setup, saving your desired configuration** [B.2.2]  
Your floppy configuration entries will be saved to the GSI Model 21's *Flash* BIOS. Verify, on reboot, that the GSI Banner properly reports your hard drive and floppy drive configuration, for those drives that are *connected to the Model 21*. If not, reboot your system and press <INSERT> when prompted, to re-enter the GSI BIOS setup.

### 2.4 CHECK FOR PROPER DRIVE OPERATION

- (1) **Test each hard, floppy and/or tape drive for proper operation**  
Issue the **VERIFY ON** DOS command before starting these tests. To verify proper hard drive operation, run many DOS SCANDISKS or run Norton Disk Doctor (Continuous Mode).

Your Model 21 controller 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

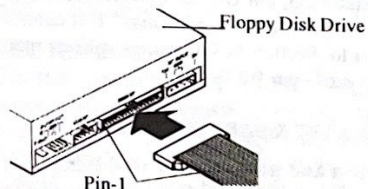


**General Precautions:** Turn system power **OFF** and let disk drives **stop** before working on the computer. Remove the case cover to gain access to the connectors (slots) on the computer's main board (motherboard). All electronic equipment is sensitive to *static electricity* at levels below those that humans notice. Take care to **touch the metal case parts before** touching the electronics.

### A.1 FLOPPY DRIVE INSTALLATION

#### A.1.1 CAUTION! AVOID CERTAIN CABLE-TO-DRIVE ADAPTERS! — FOR 2.88MB

Do **not** use **pre-2.88MB** pin-header to card-edge **adapters** on **2.88MB** drives! Doing so makes the drive report the wrong diskette type to the controller. Use cables with **pin-header connectors**, which are designed to plug **directly** into 3.5" drives as shown below: (See also Appendix D.4.)



#### A.1.2 SETTING THE DRIVE-SELECT JUMPERS ON THE FLOPPY DRIVES

All floppy drives should be set to **Drive Select 1 (DS1)** of DS0-DS3, the normal factory setting for drives intended for use in PCs, with standard two-drive *twisted* cables.



**Note:** For *combo* 1.2/1.44 two-in-one FDs, a possible exception to this rule, see App. F.2.

#### A.1.3 FLOPPY CABLE ATTACHMENT

It is usually easier to attach cables to the Model 21 **before** inserting the controller into the computer. Regular and ED (2.88MB) drives require separate but identical cables due to a slight difference in their interface. Two cable attachment headers are provided on the GSI Model 21 for the 2.88 and REGular (standard *twisted* PC-type 2-drive) cables:

- J3 (REG)** For 5.25" 1.2MB/360kB and 3.5" 720kB/1.44MB drives.  
**J2 (2.88 / REG2)** For 2.88MB drives or **additional Regular** drives.

Connect each floppy drive to J3 or J2 as indicated above. Be careful to connect the **Pin-1** color-marked side of the **cable** to the Pin-1 side of its **header** (Read the card markings) and of the floppy **drive**. The *slot-cut* in 5.25" floppy-drive edge connectors is toward the Pin-1 side.

When putting only one floppy drive on a cable, it is PC-standard usage to put it on the *end* connector, although the Model 21 will work normally with it at the center. If the system will be running OS/2 or UNIX operating systems, see App. C.5. If a 2.88MB and a non-2.88MB (floppy or tape) drive must **share** a cable, the 2.88MB **must** be declared as a GSI Type 7 (See D.4).



**Note:** Model 21's shipped in GSI VAR Packs (Part #1533-21-Vx-x) include one general purpose floppy cable, Part #1117-04-01-0. This cable connects two floppy drives, one at the End Position and one at the Center, and offers a *choice* of 3.5" or 5.25" connector at each position. For four floppy drives a second floppy cable is required.

## ADDENDUM

For GSI Model 21 Manual (1539-21-11-1)  
 For GSI Model 21 (Part#1533-21-09-1)

Use the following jumper settings for the GSI Model 21 Enhanced IDE Accelerator Board in addition to the settings shown on page 5.

### A.3 CONTROLLER INSTALLATION

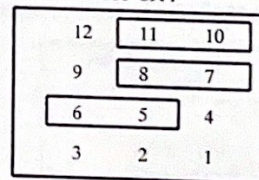
#### A.3.1 Setting the Model 21's BIOS-Address and Operation Mode Jumpers

To change the Model 21's BIOS address or mode of operation (primary or secondary), simply use the jumpers on Jumper Block J4.

For Model 21's with Part #1533-21-09-1 or later (for Part #, see the product label on the card):

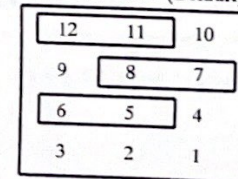
Mode of Operation	Jumper Pins	Selects
Primary Mode (Factory Default)	5 and 6	IRQ14, I/O Address 1F0-1F7
Secondary Mode	4 and 5	IRQ15, I/O Address 170-177

BIOS ADDRESS  
C800-C9FF



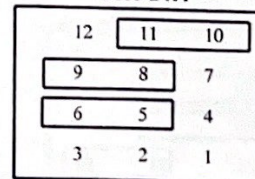
J4

BIOS ADDRESS  
CC00-CDFF (Default)



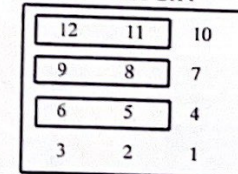
J4

BIOS ADDRESS  
D000-D1FF



J4

BIOS ADDRESS  
E000-E1FF



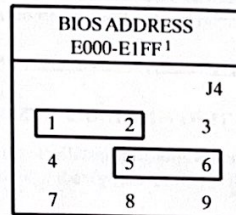
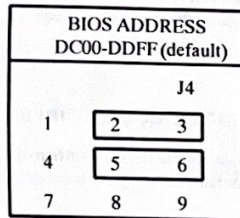
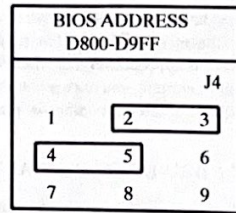
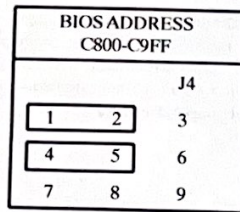
J4



**Note:** Pins 1, 2, & 3 are not used.

### A.3 CONTROLLER INSTALLATION (cont.)

For Model 21 with Part #1533-21-04-3 or earlier (for Part #, see the product label on the card):



#### Notes:

Pins 7, 8 & 9 are not used.



The E000 address is provided to allow compatibility with the few badly engineered VGA cards which interfere with 8-bit read/write operations throughout the entire C and D memory pages. (Unfortunately, many non-AMI system BIOSs do not search for a controller BIOS at E000.)

<sup>1</sup> For Model 21 Part #1533-21-03-6 and earlier, this selects BIOS Address 'D000-D1FF'.

Model 21's with Part #1533-21-04-3 and earlier **do not support** secondary mode.

### A.3.2 INSERTING THE CONTROLLER

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 card in place. Gently but firmly press the GSI Model 21 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.

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 21.

**Caution!** The 12V and 5V loads attached to the Model 21 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** motherboard or Model 21.

## APPENDIX B — SYSTEM SETUP PROCEDURE

### B.1 MOTHERBOARD CMOS SETUP — DRIVE CONFIGURATION

#### B.1.1 SYSTEM CMOS SETUP — FLOPPY DRIVES

Run the System CMOS Setup procedure, per the system manual, to set the CMOS configuration memory. The CMOS should be set to *No Floppy Drives* for any floppy drive attached to the Model 21.

**Primary Mode Only** — If you have a PC which *insists* on seeing at least one floppy declared in CMOS (a few proprietary brands do), declare **only** floppy drives attached to the J1-REG (Regular) cable. (The system BIOS will *not* find floppy drives attached to the J2-2.88 header.) If any floppy drive is of a type not offered as a CMOS choice, declare it as a *1.2MB Drive*.

#### B.1.2 SYSTEM CMOS SETUP — HARD DRIVES

##### B.1.2.1 Model 21 Operating in Primary Mode

Run the System CMOS Setup procedure, per the system manual. You **must** declare the hard drives attached to the Model 21 in the System CMOS Setup, or else the Model 21 will not take any notice of them. Your choice of CMOS Setup Hard Drive Type *may* affect the proper operation of a hard drive. In general, Hard Drive Type usage is as follows:

- 1) CMOS Type 1 asks the Model 21 to perform **automatic** drive-parameter (#Heads, #Cylinders, and #Sectors) initialization from data *reported to the Model 21 by the drive*. Choose System CMOS Drive Type 1 for most IDE hard drives.
- 2) **Any other** CMOS Drive Type asks the Model 21 to accept the #Heads, #Cylinders, and #Sectors parameters as a **manual override** — useful when the automatic Type 1 mode proves unsatisfactory.



**Note:** A few IDE hard drives *violate* industry standard IDE specifications and **cannot** be used as Type 1. If a partition or **partitions already exist** (i.e., the hard drive has been in use or has already been prepared for use), the Model 21 will set up drive parameters consistent with the partition(s), so that the drive can be used and existing files can be read. The GSI Hard Drive Setup screen will tell you *whether* partitions already exist on a hard drive and whether they are *consistent* with the drive's Native parameters or System CMOS parameters. For more details, see Appendix E.

##### B.1.2.1 Model 21 Operating in Secondary Mode

Do **not** declare IDE hard drives attached to the Model 21 in the System CMOS Setup.

#### B.1.3 CMOS SETUP ON THE SYSTEM MOTHERBOARD — SHADOWING THE GSI BIOS

Shadowing of the GSI BIOS address region should be **OFF during GSI Setup**. Shadowing is **recommended** for normal operation and is *necessary* for a few 486 systems. See Appendix B.3.

#### 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 CONTROLLER SETUP—FORWARD & FLOPPY DRIVES

The Model 21 remembers the hard and floppy drive configuration in *Flash* memory. If you install a brand new card or move a card to a different type of system, you will be asked to (re-)run GSI Setup.

To run the GSI BIOS Setup Utility, do the following:

- 1) <Ctrl><Alt><Del> to reboot
- 2) Watch for the GSI Banner (See A.3.1) to appear, including 'Press INSERT to change configuration' and then press the <INSERT> key (either <INSERT> key)



**Note:** Press the <SPACE> bar to bypass the 4 second wait and boot faster

### B.2.1 GSI MODEL 21 FLASH BIOS SETUP — FLOPPY DRIVES

GSI Setup begins with the Floppy Drive Setup screen. You will be shown the Current Drive Settings, if any. If you want to make changes (this question is skipped if you haven't saved a previous setup or if the board is new), enter <Y>. You are then asked, in turn, to select drive letters as follows:

"Choose Drive A: Is the drive with the light ON your choice?"  
Answering <Y><ENTER> chooses this floppy drive as drive A: and brings the request:

"Enter type for Drive A:"

Select a GSI Drive Type using the table on-screen (and for 2.88MB floppies, the table in section D.2).

For each floppy drive letter selection, the Setup Utility lights the LED on the next drive still unassigned until all floppy drives are configured. Answering <N><ENTER> advances the LED-ON indication to the next available drive.



**Note:** Answering <N><ENTER> repeatedly should light all floppy LEDs, one at a time, in succession, in cyclic fashion; if not, see Appendix G. (For TEAC Combo drives, see F.2)

After you have assigned all floppy drives, you are asked: "Want to save?". Enter <Y><ENTER> to save your configuration to the GSI Model 21 *Flash* BIOS.

### B.2.2 GSI MODEL 21 FLASH BIOS SETUP — HARD DRIVES

After you save your Floppy Setup (or if you answer <N> to "Do you want to change..?"), you will be shown a non-interactive Hard Drive Setup screen for the first hard drive on the Model 21. This screen should show information from the hard drive (Model, Serial Number, Firmware revision and any other information received from the drive from the IDENTIFY DRIVE command the Model 21 has issued). Also displayed is whether or not any partitions were found on the drive (and if so, what type) and whether Emulation Mode (See E.2.2) has been chosen by the Model 21. If a setting in the system's CMOS (other than Type 1) disagrees with the partition information shown (head, cylinder and sector numbers), the Model 21 will caution you that the two do not match. If a second drive is attached, you will be prompted to "Press a key to continue", which moves on to the next drive. If there is only one drive attached, this prompt is "Press a key to reboot", which ends Hard Drive Setup and reboots the system, saving the hard drive setup information.

### B.2.3 DRIVE LETTER ASSIGNMENTS — FOR FLOPPY DRIVES AND HARD DRIVES

On floppy-only systems, the 3rd and 4th floppy drives will be C: and D:. On systems with hard drives, the 3rd and 4th floppy drives will get drive letters assigned by DOS as follows:

- 1) Under MSDOS/PCDOS 6.x/5.x — the last two letters, after all other drive letter(s)
- 2) Under DOS 3.30 or 4.01 or DRDOS 6.0/5.0 — Drives C: and D:



**Note:** GSI Floppy Setup refers to the 3rd and 4th FDs as "3:" and "4:" respectively.

## B.3 SHADOWING THE GSI BIOS - VERY IMPORTANT

Shadowing the GSI BIOS address region is a **must** for performance, affecting both hard and floppy drives. Most 386 or 486 System Setups offer *shadowing* of controller card BIOSs like GSI's in their 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. The primary difference between the two methods is that memory manager software-shadowing allows you to rerun GSI BIOS Setup whenever you want, without worrying about going back into your system's CMOS and disabling, then re-enabling, shadowing each time.

To ENABLE shadowing of the GSI BIOS with DOS 6.x's 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., D400-D5FF).

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 21'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
D400-D5FF	D400-D7FF	D000-D7FF	D000-DFFF
D800-D9FF	D800-DBFF	D800-DFFF	D000-DFFF
DC00-DDFF	DC00-DFFF	D800-DFFF	D000-DFFF
E000-E1FF	E000-E3FF	E000-E7FF	E000-EFFF
E400-E5FF	E400-E7FF	E000-E7FF	E000-EFFF

See Section A.3.1 for details of the Model 21's J4 jumper block settings vs. GSI BIOS address.

## B.4 FLOPPY DRIVE TYPES SUPPORTED — GSI-SETUP DRIVE TYPES

The Model 21 accommodates all 3.5"/5.25" floppy drive types which have been *de facto* standards in the IBM-compatible marketplace, even the 600/720 RPM drives not usually found except in commercial floppy duplicating equipment. GSI Drive Types shown in the GSI BIOS Setup screen are:

Standard 300/360 RPM Drives		Hi-Speed 600/720 RPM Drives	
GSI Type #	Floppy Type Description	GSI Type #	Floppy Type Description
1	5.25" 360kB	11	5.25" 360kB
2	5.25" 1.2MB	12	5.25" 1.2MB
3	3.5" 720kB	13	3.5" 720kB
4	3.5" 1.44MB	14	3.5" 1.44MB
5 <sup>1</sup>	3.5" 2.88MB ED-H	NO DRIVE OR DRIVE UNAVAILABLE 0 Absent/Unavailable	
6 <sup>1</sup>	3.5" 2.88MB ED-L		
7 <sup>1</sup>	3.5" 2.88MB ED-N		



**Note:** Drive Types 1-7 are for normal, industry standard, floppy drives. Drive Types 11-14 are for the High Speed 600/720 RPM floppy drives used primarily by diskette duplicators.

**Note:** GSI BIOS Drive Types 5 and 6 accommodate most of the 2.88MB drive variants which have been produced to this time. GSI BIOS Type 7 is provided to deal with any case where the drive's media type reporting should be ignored. See D.2 for a list of recommended GSI BIOS Drive Types for 2.88MB floppy drives by make and model.



## APPENDIX C — SYSTEM & SOFTWARE USAGE GUIDELINES

### C.1 FORMATTING DISKS IN A 2.88MB DRIVE USING DOS FORMAT

Use the DOS FORMAT command to format 3.5" diskettes in the 2.88MB drive. See the following table, which describes the necessary switch settings for FORMAT for each diskette type, 2.88MB floppy drive Type (as determined by the GSI BIOS Setup) and operating system:

Diskette Capacity	Operating System	GSI SETUP Type 5 or 6 Floppy Disk Drive	GSI SETUP Type 7 Floppy Disk Drive
2.88MB	DOS 6.x/5.0	FORMAT A:	FORMAT A:
	DOS 3.30/4.01	FORMAT A: /t:80 /n:36	FORMAT A: /t:80 /n:36
	DRDOS 6.0	FORMAT A: /f:2.88	FORMAT A: /f:2.88
1.44MB	DOS 6.x/5.0	FORMAT A:	FORMAT A: /f:1.44
	DOS 3.30/4.01	FORMAT A: /t:80 /n:18	FORMAT A: /t:80 /n:18
	DRDOS 6.0	FORMAT A: /f:1.44	FORMAT A: /f:1.44
720kB	DOS 6.x/5.0	FORMAT A:	FORMAT A: /f:720
	DOS 3.30/4.01	FORMAT A: /t:80 /n:9	FORMAT A: /t:80 /n:9
	DRDOS 6.0	FORMAT A: /f:720	FORMAT A: /f:720

\*When using the FORMAT command, substitute the appropriate drive designation for "A:".



**Important Note:** DOS 6.x/5.0 FORMAT finds out from the GSI Model 21 which type of diskette is in the drive waiting to be formatted. Therefore a whole mixed stack of 3.5" diskettes of any type (720/1.44/2.88) can be DOS-FORMATTED **without returning to the DOS prompt every time that you change diskette types**. Just say <Y> when DOS asks: 'Format another?'

### C.2 USING MEMORY MANAGER SOFTWARE

If you use memory manager software, such as QEMM, 386MAX, or Netroom, you may experience faulty handling of some diskette types — for example, a 720kB disk in a 1.44MB drive. Try **excluding** the memory region of the GSI BIOS from the memory manager's optimization process.

#### Example:

If using QEMM (or 386MAX or Netroom), in the CONFIG.SYS file add the **exclude** option for a Model 21 whose BIOS is at the DC00 address:

```
Device = C:\QEMM\QEMM.SYS exclude=DC00-DDFF
```

For 386MAX & Netroom, do similarly.

### C.2 USING MEMORY MANAGER SOFTWARE (cont.)

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	GSI BIOS Address	Exclude Region
C800	C800-C9FF	DC00	DC00-DDFF
CC00	CC00-CDFF	E000	E000-E1FF
D400	D400-D5FF	E400	E400-E5FF
D800	D800-D9FF		

If you use *both* 2.88MB disks and DOS 5.0's extended-memory driver EMM386.EXE, add the switch **D=18** to the CONFIG.SYS line, as follows:

```
device=EMM386.EXE D=18
```



**Note:** Memory managers cause 386, 486 & Pentiums to run in **Virtual Mode**, which can s-l-o-w hard and floppy I/O.

### C.3 DOS, DRDOS, AND DOS-BASED APPLICATIONS SOFTWARE

Normal DOS software usage rules apply to systems using the GSI Model 21 card. Considerable effort has been made to ensure compatibility with the most commonly used DOSs: MSDOS/PCDOS 6.x/5.0/3.30/4.01 and DRDOS 6.0. (See Sections B.2.2 and C.1 if using a DOS versions other than DOS 6.x/5.0.) Common DOS commands like Chkdisk, Copy, Xcopy, Diskcopy and Format should work fine.

Properly programmed DOS applications should be expected to run normally with all floppy drive and diskette types. You may find that a *few* maintenance utilities, tape-backup programs, or copy-protected diskettes (especially older ones) make *unwarranted assumptions* about drive letter assignments or about total system FD count (which *may be 3 or 4*, instead of the usual 2).

### C.4 OPERATING WITH THREE OR FOUR FLOPPY DRIVES

Unfortunately, some commercial software products, even very well known ones, have not been thoroughly tested for proper operation with more than two floppy drives. For this reason, GSI advises caution when running drive related *maintenance* or *setup* software with more than two floppy drives known to the system (that is, declared in GSI Floppy Setup). Such products include: DOS' FDISK; defragmentation software; compression software; file manager utilities; hard drive support installable device drivers; SCSI installation and maintenance software.

A typical problem is that some of a program's attempts to read or write on a hard drive will incorrectly reference a floppy drive instead. Watch drive LEDs to spot clearly incorrect references, such as a floppy LED coming ON when FDISK is run from a hard drive. Please report any such findings to the software publisher and also to GSI, via your vendor's Tech Support Dept.

#### C.4.1 OPERATING WITH FLOPPY DRIVES RE-MAPPED VIA GSI FLOPPY SETUP

You may also experience faulty operation with a few commercial software products if you are using GSI's floppy drive-letter remapping feature. A few commercial programs *bypass* BIOS calls and talk *directly* to the floppy controller hardware. Such products include *some*: floppy diskette duplicating utilities; software package installation shells and some system hardware/software configuration checkers.

##### C.4.1.1 Workaround

You can avoid this software deficiency by redoing your GSI Floppy Setup process (see B.2.1) and always accepting the floppy drive offered to you with LED ON — as Drive A:, then B:, etc.

#### C.4.3 SOME SOFTWARE MAY NOT YET SUPPORT 2.88MB FLOPPY DRIVES

Although they have been around since 1990, you may occasionally encounter commercial software which does not support 2.88MB floppy drives. If you are unfortunate enough to have been inconvenienced by this problem, voice your complaints to the appropriate software Tech Support Depts.

#### C.4.4 TAPE BACKUP SOFTWARE USE FOR SECONDARY MODE

Your system configuration may dictate use of the Model 21 in Secondary-Address Mode (see A.3.2). A few well-known backup software programs do not bother to check whether there is a tape unit attached to a floppy controller operating at the Secondary (alternate) I/O Address. If you are having problems in this configuration, check with the backup software's Tech Support.

#### C.4.5 BACKUP SOFTWARE MAY CAUSE ERRORS IN FLOPPY OPERATIONS

A few cases have been reported where well known backup software utilities have modified BIOS workspace parameters and caused errors in floppy operations. You may experience unexpected floppy errors after using your backup software. Experiment to see whether your error disappears after rebooting and re-trying your floppy operations. If so, contact your backup software company's Tech Support Dept., report the error, and request their latest software version.

### C.5 NOVELL NETWORKS

#### C.5.1 INSTALLING A NOVELL PARTITION (NETWARE 3.XX & 4.XX)

To prepare an IDE hard drive for a Novell Partition, do the following:

- 1) Run System CMOS Setup and declare the Novell hard drive as Drive Type 1 in CMOS (For *Secondary Mode*, do not declare a Drive Type in CMOS for drives attached to the Model 21)
- 2) On reboot, press <INSERT> to enter GSI Setup. Confirm that the GSI Hard Drive 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-maker's data sheet (do not continue if they don't)
  - 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, then ON. On reboot, press <INSERT> to run GSI Setup again, so that 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.
- 4) Run Novell's SERVER.EXE task and:
  - a) Issue LOAD IDE.DSK/L (see note below concerning IDE.DSK versions)  
Set I/O Address and IRQ to 1F0 and E (=14), or for Secondary Mode: 170 and F (=15).
  - 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 21 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.

#### C.5.2 NOVELL NETWARE 2.15

For NetWare 2.15, do the following:

- 1) Declare *Hard Drive Type 1* in System CMOS Setup
- 2) Operate the Model 21 in **Primary Mode only**.
- 3) Use the Novell standard hard-disk driver (not the more modern IDE.DSK)
- 4) Drives over 528MB are not supported in this version of Novell NetWare.

### C.6 WINDOWS 3.1 AND WINDOWS APPLICATIONS SOFTWARE

The GSI Model 21 is compatible with Windows 3.1 in all Windows modes and for all floppy services. You should check your Windows SYSTEM.INI file, [386enh] section, to see that you have the following line:

**DMABUFFERSIZE=18** (or higher)

Properly programmed Windows applications should be expected to work normally with all floppy drive and diskette types.



**Note:** Windows 3.0 will work with the Model 21, but Windows 3.0 does not fully support 2.88MB drives — only "low density" and "high density". You cannot specify "1.44MB disk in 2.88MB drive".

#### C.6.1 WINDOWS 32-BIT DISK ACCESS MODE (ALSO KNOWN AS FASTDISK)

In order to run in 32-Bit Disk Access Mode, WINDOWS must be dealing with IDE hardware (IDE controller plus IDE Hard Drive) which is 100% compatible with the historic WD1003 IBM/AT hard drive controller. The GSI Model 21, when used with IDE drives conforming to the ANSI ATA (IDE) standard, is fully WD-1003 compatible.

##### C.6.1.1 High-Capacity IDE Hard Drives

The Microsoft Windows 3.1 32 bit access mode driver is not written to accommodate large IDE drives. Trying to force the driver to accept drives larger than 528MB or having more than 1024 cylinders will result in **data corruption or data loss!**

#### C.7 OS/2 2.1 & 2.0

The GSI Model 21 is compatible with OS/2 Versions 2.1 & 2.0. However, GSI's *floppy drive letter remapping* feature is **not** available under OS/2. Further, OS/2 will want to see FDs added in the order shown in the table below. **If you skip** a floppy cable position, OS/2 will **ignore** all later-lettered floppies! If, due to this limitation, you must put a *normally* GSI BIOS Type 5 (or Type 6) **2.88MB** drive on the **REG** cable, remember to declare it as a **Type 7** in GSI Floppy Setup. Consequently, plan your FD letter assignments and cable-connect the drives accordingly:

Drive	Cable/Header	Position on Cable
A:	J3 (REG):	END
B:	J3 (REG):	CENTER
3:	J2 (2.88):	END
4:	J2 (2.88):	CENTER

When GSI Setup asks, for each drive letter,

"Choose Drive X: . Is the drive with the light ON your choice?"  
answer '<Y> <ENTER>'.

As shipped, OS/2.0 is limited to **three** floppy drives. However, an updated IBM1FLPY.ADD driver is available through IBM OS/2 Technical Support to provide support for **four** floppy drives.

### C.8 MICROSOFT WINDOWS NT

The Model 21 is compatible with Windows NT, but there are considerations. The floppy drive letter remapping feature is not available; therefore, floppy drive installation is the same as with OS/2.2.x (see above, C.7). The other significant limitation of Windows NT is high-capacity IDE support. At the time of this printing, the Windows NT driver did not support IDE partitions greater than 528MB or IDE drives with more than 1024 cylinders.

## APPENDIX D — 2.88 FLOPPY DRIVES AND DISKETTES

### D.1 2.88MB DISKETTE AND DRIVE BASICS

Some basic facts you should know about 2.88MB diskettes and drives are the following:

- 2.88MB drives are fully read/write/format compatible with 720/1.44 diskettes
- 2.88MB diskettes are marked 'ED' and have a barium ferrite (not iron oxide) coating
- 2.88MB disks do **not** have the HD (1.44MB) jacket hole but **do** have an ED (2.88MB) hole (like the HD hole, but just *behind* the HD hole position)
- 2.88MB disks must be used with a 2.88MB format (Note: all 3.5" disks **must** be formatted **per jacket holes** — 720kB/1.44MB/2.88MB) — (standard PC usage)
- 2.88MB diskettes have 36 sectors, whereas 1.44s have 18 and 720s have 9
- 2.88MB drives have a dual hole sensor and they report diskette type to the Model 21
- The GSI Model 21 tells DOS 6.x/5.0 and Windows 3.1 what the current diskette type is
- 2.88MB drives often come with IBM *PS/2-mode* jumpering. For desired PC/XT/AT/386/486 standard operation, you **must** use jumpering as shown in Section D.3 of this manual.

### D.2 TABLE OF 2.88MB FLOPPY DRIVES, BY MANUFACTURER

2.88MB Floppy Drive Make	Model #	Use GSI Setup Drive Type #	2.88MB Floppy Drive Make	Model #	Use GSI Setup Drive Type #
Chinon	FZ-358	5	Sony	MP-F40W-15	6 <sup>1</sup>
Citizen	OSDF	5	TEAC	FD-235J-363n <sup>2</sup>	5
Epson	SMD-1060	5	TEAC	FD-235J-365n <sup>2</sup>	5
Mitsubishi	MF356C-752	6 <sup>1</sup>	Toshiba	ND3571	7
Mitsumi	D352T2	5	Y-E Data	YD-742	5
Panasonic	JU-259AP	7	Alps	DRF823	7



<sup>1</sup> Note: Use Type 7 for Model 21 with Part #1533-21-04-3 or **earlier** (for Part #, see the product label on the card)



<sup>2</sup> Note: n in the TEAC Model #s is a bezel color digit.

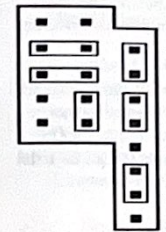
Using two 2.88MB floppy drives which have different GSI BIOS Drive Types is **not** recommended. If you must do this, you may need to assign both drives the GSI BIOS Drive **Type 7** during GSI setup sequence.

The make and model information provided above is for the convenience of installers. Check with drive manufacturers for current accuracy.

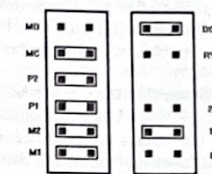
### D.3 2.88MB FLOPPY DRIVE JUMPER INFORMATION

For 2.88MB drives with jumper blocks shown below, you **must** set the jumpers as shown, to ensure proper PC/XT/AT/386/486-compatible operation. This information is included here for installers' convenience. Check carefully that your drive's model name matches *exactly*, because some manufacturers make *special* 2.88MB drive models for *non-standard proprietary* PCs.

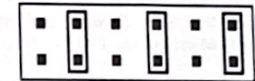
Epson Model SMD-1060



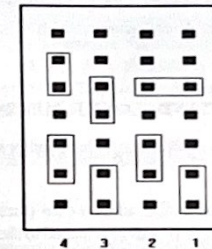
Y-E Data Model YD-742



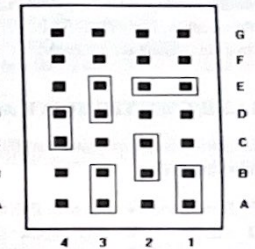
Mitsumi Model D352T2



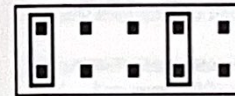
TEAC Model FD-235J-363n



TEAC Model FD-235J-365n



Sony Model MP-F40W-15



### D.4 FLOPPY DRIVE MIX POSSIBILITIES

The Model 21 floppy interface can accommodate **any** mix of up to four 5.25"/3.5" floppy drives. What restrictions there are relate mostly to 2.88MB drives. If you have a **smart** 2.88MB GSI BIOS Type-5/6 drive (one which reports to the FDC what type of diskette is currently in the drive) and you want **automatic** disk-type reporting to DOS & WINDOWS, you should observe the following rules:

- 1) Do **not** use an old style pre-2.88MB adapter (that is, one with all odd pins grounded — normally used with 720kB/1.44MB floppy drives) to connect the 2.88MB drive to its cable
- 2) Do **not** connect any other type of drive (i.e., Tape, 360kB/720kB/1.2MB/1.44MB, or **non-reporting** 2.88 drive) on the same cable as a Type-5/6 media-reporting 2.88 drive
- 3) If you are installing three or four 2.88MB FDs, declare "Type 7" for those on the REG cable

When you break either of these rules, the 2.88MB drive will **always** report that it contains either: a '720kB diskette' or 'no diskette'. If you must break **either** of these two rules, you should declare your media reporting drive as a **non-reporting Type-7** drive during GSI Floppy Setup. In this case, some floppy processes may take *slightly* longer than usual, because the controller must perform special tests to determine the type of diskette which is currently loaded.

## APPENDIX E — IDE HARD DRIVES & IDE TAPE DRIVES: SETUP & OPERATION

### E.1 IDE HARD DRIVE SETUP

#### E.1 IDE HARD DRIVES — A DEFINITION

IDE hard drives are an evolutionary outgrowth of the older ST506 class MFM and RLL drives. Most of the electronic functions of the MFM & RLL controllers have been miniaturized and incorporated on the drive's own circuit board. Today's IDE adapter simply performs the necessary signal buffering to extend motherboard AT bus signals onto a flexible cable and to the hard drive.



**Note:** A **primary address** IDE adapter (like the GSI Model 21 in Primary Mode) plus IDE drive is an **alternative** to the older MFM or RLL controller plus drive. The two cannot be used together in the same system. However, a **secondary address** IDE card (like the GSI Model 21 in Secondary Mode) can be used to add an IDE hard drive so that it can **co-exist** with an MFM or RLL hard drive.

#### E.1.1 IDE DRIVE CABLES

Model 21s shipped in GSI VAR Packs (Part #1533-21-Vx-x) include one 40-conductor standard IDE ribbon cable, Part #1548-02-01-9. This cable can connect two IDE hard devices, one at the End Position and one at the Center.

#### E.1.2 IDE MASTER, SLAVE, AND STANDALONE JUMPERS

IDE hard drives, tape drives and IDE CD-ROMs usually have jumpers to allow operation in the following modes:

- Standalone → the only IDE drive on its IDE adapter card (factory default setting for HDs)
- Master → with another IDE drive (= *slave*) attached to the same IDE adapter card
- Slave → with another IDE drive (= *master*) attached to the same IDE adapter card (factory default setting for IDE *tape* drives)

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



**Note:** In setting the Standalone/Master/Slave jumpers for IDE hard drives (and IDE tape & CD-ROM drives), **ignore** all other drives that are attached to any **other controller** (even IDE) in the system.

#### E.1.3 SYSTEM CMOS SETTING FOR IDE HARD DRIVES

When the Model 21 is operating in Primary Mode, hard drives must be declared in CMOS. Do **not** declare IDE Tape and CD-ROM drives in the system CMOS. Also, when operating in Secondary Mode, you do **not** declare hard drives in the system CMOS. For each IDE *hard drive*, two cases will be discussed here:

- 1) Partition exists (maybe more than one)
- 2) No partition exists

##### E.1.3.1 Partition Exists

If your IDE hard drive has a **valid partition** (has already been prepared for use), the Model 21 will **analyze** this existing partition, and **will support it**, by setting up proper Heads, Cylinders, and Sectors-per-Track description parameters for the drive. In some cases this will make more space available for a new partition.

#### E.1.3 SYSTEM CMOS SETTING FOR IDE DRIVES (CONT.)

##### E.1.3.2 No Partition Exists

If your hard drive is not yet prepared with a partition, the Hard Drive Type which you choose in your System CMOS Setup routine controls the Model 21's hard drive parameter treatment, as follows:

- a) **Type 1** — The Model 21 automatically sets up the hard drive's parameters, based on the drive's *Identify Drive* report, such that DOS' FDISK will create a Native Mode partition. The '**Type 1**' designation is standard PC usage to indicate presence of a *smart* controller.
- b) **Any other CMOS HD Type** — The Model 21 treats your System CMOS hard drive parameters (Heads, Cylinders, and Sectors-per-Track) as **manual override** values to be used **regardless** of the parameters reported in the HD's Identify Drive report. This feature allows:
  - 1) choice of an old style partition, compatible with some standard system BIOS HDD type
  - 2) coping with a HD which *lies* about its Heads/Cylinders/Sectors parameters. (Some do!)



**Note:** If you want to **abandon** existing partitions on your hard drive, use DOS' **FDISK** to delete them. **REMEMBER** that each time you change the IDE hard drive's partitions, using **FDISK**, you **must** re-run the GSI BIOS Setup to allow the Model 21 to adapt to the change. (If your choice of Hard Drive Type, in System Setup, declares a drive capacity that *exceeds* the actual drive's capacity, the hard 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.)

### E.2 IDE HD OPERATING MODES — BACKGROUND INFORMATION

#### E.2.1 NATIVE MODE

The recommended mode for operating your hard drive(s) with the Model 21 is the drive manufacturer's *Native Mode* (or default Translation Mode) because it usually gives optimum performance and maximum storage capacity. The ANSI Standard for IDE hard drives provides an optional to manufacturer (and usually implemented) Identify Drive Command, which allows *Intelligent* controllers to interrogate the drive as to its Heads, Cylinders, and Sectors counts (as well as other technical parameters). The Model 21 uses this feature to provide Native Mode operation, *if* you specify CMOS Type 1 for a drive which is *not yet prepared*.

*Some* older IDE drives (particularly 20MB and 40MB drives) do **not** conform to this standard. For these drives to operate on a Model 21, you **must** declare, in the System CMOS Setup, a Drive Type that corresponds to the drive's parameters (see hard drive manufacturer's documentation).

#### E.2.2 GSI EMULATION MODE

The Model 21 uses existing partition information on a formatted drive to establish the drive's operational parameters. If a user is connecting the Model 21 to a drive which has been set up using CMOS parameters that **do not use the whole HD's capacity**, it is recommended that he 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 above case *where the full capacity of the drive is not being used*, the Model 21 will use the partition information placed on the drive by the old controller. Data saving **cannot be guaranteed** but the user may want to take advantage of this capability.

### E.3 LARGE IDE HARD DRIVES WITH MORE THAN 1024 CYLINDERS

Some IDE hard drives have more than 1024 cylinders. Historically, drives with more than 1024 cylinders have caused setup headaches because system BIOS calls do not provide for cylinder counts greater than 1024. When the GSI Model 21 is connected to such a drive, it automatically uses a setup strategy to handle this problem effortlessly for the installer.

### E.4 HIGH-CAPACITY IDE HARD DRIVES — FROM 504MB UP TO 8GB

Some IDE hard drives have *very* large capacities, exceeding the **DOS limit of 504MB**. The GSI Model 21 provides BIOS-level support for IDE hard drives up to **8 GB's** in capacity! The high-capacity hard drive is treated as one drive volume and will be assigned *one drive letter* by DOS. No device drivers are needed. It is transparent to the user that there is anything unusual about his GigaByte-plus hard drive.



**Note:** You should be extremely cautious about using hard drive maintenance software, such as a hard drive *defragmenter* program, on an IDE drive >504MB. You might end up with an **unrecoverable** hard drive, because of unwarranted assumptions made by the utility software. Consult with the software company's Tech Support Dept. before using such products.

### E.5 INTEGRATING IDE TAPE AND CD-ROM DRIVES

An IDE tape drive or CD-ROM drive can be operated on the Model 21 in either:

- 1) Slave Mode, where there is also a hard drive in *Master Mode* on the Model 21, or
- 2) Standalone Mode, where there is no other IDE drive on the Model 21

In either case, the tape drive or CD-ROM is **not** declared in the System CMOS Setup procedure. Both the Mountain and the Summit IDE tape drives have jumpers which allow Standalone Mode usage.

## APPENDIX F — OTHER SYSTEM INTEGRATION TOPICS

### F.1 INTEGRATING FLOPPY-INTERFACE QIC-80/QIC-40 TAPE UNITS

The GSI Model 21 can control **one** QIC-80 or QIC-40 tape unit — along with up to four floppy drives. In fact, the Model 21 operates 250MB (QIC-80) tape units at their faster, *double-speed*, transfer rate (1 Mbit/sec), saving you the cost of a separate high speed tape-only controller.

For tape unit installation, follow the tape drive maker's user manual **if and only if:** 1) you have, at most, two floppy drives **and** 2) you install **all** floppy and tape drives on the **same cable**.



**Note:** If you have any **2.88MB** drives on this cable, you must declare them as GSI BIOS **Type 7**, not 5 or 6, in the GSI Setup, per Appendix D.4. For all other cases, read the rest of this section.

#### F.1.1 WHICH FLOPPY-CABLE POSITION TO USE FOR TAPE UNIT

Connect your QIC-80 or QIC-40 tape unit at the **Center** position of the **J3, REG**, floppy cable.

#### F.1.2 BACKGROUND ON FLOPPY INTERFACE TAPE UNITS

Floppy interface QIC-80 and QIC-40 tape units are designed to operate on the *same cable* as one or two floppy drives. To do this, the tape units use various techniques to **sense** the presence of the floppy drives. If the tape unit receives a command sequence but sees that a **floppy drive is currently selected** (by checking the cable's Drive Select signals), the tape unit then **ignores** the commands. Otherwise, the tape unit decides that they are tape commands and processes them. This mode of operation is often called 'Transparent Mode'.

Most tape units are factory set to operate in this mode, although most of them can be jumpered to use a Drive Select signal, just as floppy drives do. However, do not presume that all tape units' Transparent Modes will work with a two-cable, four-floppy controller. Many will not, for they will interfere with any floppy drives which **do not share a cable** with them. The Colorado Jumbo tape units, which do not provide a Drive Select Mode, appear to work fine with up to four floppy drives coexisting with them.

#### F.1.3 CASE 1: THE TAPE UNIT SHARES A CABLE WITH ALL OF THE FLOPPY DRIVES (2 FLOPPY DRIVES MAXIMUM)

When the tape unit can share a cable with **all** of the floppy drives (by definition, **one or two** FDs), connection of a tape unit is straightforward. This is essentially like using a standard 2-floppy-only controller. In this case you can use the typical manufacturer supplied add-on tape drive cable and can operate the tape unit in Transparent Mode. (This cable provides a connector which is the equivalent of a **second** Center-Position connector on the basic floppy cable. In fact, if, after installing your floppy drives, you still have a spare Center-Position connector available on your floppy cable, you can attach the tape unit to that spare connector and not even use the add-on tape unit cable.)

#### F.1.4 CASE 2: BOTH J2 AND J3 CABLES ARE IN USE & A TAPE UNIT IS PRESENT

When both of the Model 21 floppy cable headers (J3/REG and J2/2.88) are used to connect floppy drives and a tape drive, by definition there is **at least one** floppy drive which is **not** on the same cable as the tape drive. As discussed in F.1.1, *some* tape units are factory set to a Transparent Mode which will not work properly in this environment. Operate these tape units in Drive Select Mode (You will then be able to use a maximum of three floppy drives.) See F.5 for floppy drive select usage.

## E.2 COMBINATION (TWO-IN-ONE) FLOPPY DRIVES

For two-in-one floppy drives (for example, TEAC Combo or Canon 5.25" 1/2-ht 1.2MB+1.44MB), follow these guidelines:

- A combo drive **cannot share** its floppy cable with any other floppy drive, but can with a tape unit if the tape unit is operating in **Transparent Mode** (where no Drive Select signal is used)
- Treat the 1.2MB and 1.44MB drive sections **as if they were two separate floppy drives**: that is, identify the 1.2MB section as a GSI Setup 'Type 2' and the 1.44MB as a 'Type 4'



**Note:** For the TEAC Combo disk drive, you **must put diskettes in** to see its LEDs light during GSI Setup.

## E.3 THE MODEL 21 CO-EXISTING WITH A SCSI OR ESDI CONTROLLER

The Model 21 has been designed to be able to co-exist with SCSI or ESDI controllers. Unfortunately, many SCSI and ESDI controller BIOSs are *ill-behaved*. That is, they have been written on the assumption that there would never be any **other drive controller** 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. (See Section A.3.1)



**Note:** Some SCSI controllers 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 21 with GSI BIOS v2.05 or later — as long as the removable drive is **not** used as the Boot Drive.

## E.4 THE MODEL 21 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 cards. This automated procedure deals with the add-on cards one at a time, working its way from one side of the computer to the other. The sequence in which two add-on cards get scanned for EISA bus setup *may* affect proper card operation for one or both cards. Try interchanging slot positions of the Model 21 and other cards with BIOS.

## E.5 MODEL 21 DRIVE-SELECT USAGE FOR FLOPPY DRIVES

As seen from the Model 21's floppy controller chip connections, the Drive-Select to cable-position correspondence is as follows:

Drive Select	GSI Connector	Cable Position
DS0	J3 - Regular Header	End Position
DS1	J3 - Regular Header	Center Position
DS2	J2 - 2.88 Header	End Position
DS3	J2 - 2.88 Header	Center Position

During Floppy Setup, the Model 21 searches for drive presence in the order DS0, DS1, DS2, DS3.



**Note:** Because the Model 21 uses standard PC **twisted** cables, jumper **all floppy drives** as '**DS1**' for **any** cable position — except for TEAC Combo drives (Consult TEAC Tech Support).

## E.6 MODEL 21 INTERRUPT, DMA, AND I/O ADDRESS USAGE

Interrupt, DMA Channel and I/O Control/Status Port Addresses used by the GSI Model 21 are as follows:

### PRIMARY MODE OPERATION:

HARD DRIVES			FLOPPY DRIVES		
IRQ	DMA	I/O Addresses	IRQ	DMA	I/O Addresses
14	none	1F0-1F7 (& 3F6-3F7)	6	2	3F0-3F7

### SECONDARY MODE OPERATION:

HARD DRIVES			FLOPPY DRIVES		
IRQ	DMA	I/O Addresses	IRQ	DMA	I/O Addresses
15	none	170-177 (& 376-377)	6	2	370-377

These are absolutely standard usages for PCs and should pose no incompatibility issues.

## E.7 PRODUCT SPECIFICATIONS

The GSI Model 21 Intelligent IDE Accelerator Board uses the Part #: 1533-21-xx-x, where xx-x is the board revision number. It is distributed two ways: in bulk (where GSI supplies the board, manual and registration card) and in VAR packs (1533-21-Vx-x) where GSI supplies one floppy disk drive cable, one IDE hard drive cable, manual and product registration card.

### Board Dimensions:

2.80" x 5.96"

### Bus Slot Requirements:

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

### Power Consumption:

5 watts (Model 21 itself, without J5 drive-power load considered — See Section A.2.2)

### IDE Drive Compatibility:

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

### Floppy Drive Connector Definition:

REG (J3): 34-pin industry standard floppy drive connector  
2.88 (J2): 34-pin industry standard floppy drive connector — **Except:**  
Pins 17 & 27 (for GSI BIOS Drive Type 6 2.88MB drive)  
Pins 29 & 33 (for GSI BIOS Drive Type 5 2.88MB drive)  
are used for diskette-type media-sense signals.

## APPENDIX G—BASIC TROUBLESHOOTING — SYMPTOMS AND CURES

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:

- Is there a *second* BIOS at the same address as the GSI BIOS? **A.3.1**
- System BIOS *may* not be looking for the GSI BIOS at **E000** address. **A.3.1**
- Ill-behaved VGA card in **16-bit** BIOS mode? (Try it in an *8-bit slot*. If this works, configure VGA card to 8-bit BIOS operation.) **A.3.1**
- Ill-behaved SCSI/ESDI adapter with BIOS at *higher* address than GSI BIOS? Rejumper to put GSI BIOS at the higher address. **F.3**
- Another card using C000-DFFF memory (LAN, multimedia, scanner, etc.)? Try removing it to establish exactly where the conflict is occurring.

### G.2 FLOPPY DRIVE-SELECT AND/OR LED INDICATOR PROBLEMS

- Are **all** FDs set to **DS1** (by jumpers or switches on the drive)? **A.1.2/F.2**
- Do TEAC *Combo* 1.2/1.44 Drive *LEDs* not turn ON during GSI Setup? Put diskettes in the *Combo*. Call TEAC for *Combo* jumpers. **F.2**
- GSI Floppy Setup not seeing all of the floppy drives. **B.2.2**
- Are cables the wrong type or faulty? Were cables put on with the Pin-1 orientation backwards (drive LED staying permanently ON)? **A.1.3**
- Do you have two drives at the *same* position (Center/End) on the *same* cable? **A.1.3**
- Are all floppy drive and tape drive *power* cables connected? **2.1**
- Are some of the floppy drives not seen properly by OS/2? **C.5**
- Is DOS DIR or a SW Install process unable to see disk change (DC)? 'DC' signal jumpering wrong on FD or cable-to-FD card-edge adapter?

### G.3 VARIOUS DOS ERROR MESSAGES DURING FLOPPY USE

- Diskette may be faulty and unusable or need reformatting. Replace or reformat diskette.
- Have you assigned an incorrect GSI Drive Type number in GSI FD Setup? Rerun GSI Setup, correcting Drive Type designation. **B.4/D.2**
- Is Memory Manager software in use without the required **exclude** of GSI-BIOS area? **C.2**
- Getting a Format or read/write error from a 3.5" diskette whose format (**720kB** or **1.44MB** or **2.88MB**) *disagrees with diskette jacket holes*? **D.1**
- Error using copy-protected, diagnostic, configuration checking or other type of utility or special software? **C.3**
- FD error due to QIC-80/40 tape unit on the *other* floppy cable? **F.1.4**
- Has ill-behaved tape backup software altered FD parameters? **E.1.4**

## APPENDIX G—BASIC TROUBLESHOOTING — SYMPTOMS AND CURES (cont.)

### G.4 2.88MB FLOPPY DRIVE/DISK ERRORS

- Are 2.88MB drive's jumpers set **exactly** per Section D.3?
- Was the wrong GSI Drive Type declared in GSI Floppy Setup? **B.4/D.2**
- Card-edge adapter on 2.88MB FD? Is there a non-2.88MB FD on the 2.88MB cable, defeating the 2.88's diskette type reporting? **A.1.1/D.4**
- Does DOS FORMAT say "Unable to write Boot Record" — due to **unshadowed** GSI BIOS? Occasionally seen in 486 systems? **B.3**
- WIN3.x error: No 'DMABUFFERSIZE = 18' in SYSTEM.INI? **C.4**
- DOS error: No EMM386 **d=18** switch in CONFIG.SYS? **C.2**
- 2.88MB diskette bad blocks or *lost data*, from 720/1.44-type diskettes formatted as 2.88MB? **D.1**
- Did a 2.88MB disk formatted by DOS **3.30/4.01** go bad after working OK for a while? Reformat the diskette using DOS 5.0 or 6.x.

### G.5 S-L-O-W DISKETTE OPERATION

- Did you forget to turn *shadowing* of GSI BIOS back ON after installation? **B.3**
- Memory Mgr. SW putting PC in Virtual Mode, with its extra CPU burden? **C.2**

### G.6 MESSAGE: 'SYSTEM ERROR—TURN OFF SHADOWING DURING INSTALLATION'

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

### G.7 'HARD DRIVE CONTROLLER ERROR' MESSAGE JUST AFTER MEMORY TEST

- Power cable or ribbon cable not attached to HD? **2.1**
- 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.

**APPENDIX G — BASIC TROUBLESHOOTING —  
SYMPTOMS AND CURES (cont.)**

**G.8 HARD DRIVE(S) NOT FOUND BY GSI MODEL 21**

- Check that HD(s) have been declared in System CMOS Setup. **B.1.2**

**G.9 HARD DRIVE READ/WRITE OPERATIONS APPEAR TO BE FAULTY**

- *Garbled* data reported at top of GSI HD Setup screen... VGA or drive controller interfering? Remove that controller or substitute another one. **A.3.1**

**G.10 IDE HARD DRIVE PERFORMANCE NOT INCREASED**

- Does your IDE hard drive support read/write multiple? Ask the manufacturer.
- Are you shadowing the GSI BIOS? **B.3**
- Did you remember to exclude the GSI BIOS Address range with your memory manager? **C.2**

**G.11 QIC-80 TAPE BACKUP SPEED NOT INCREASED**

- Does your backup software support 1Megabit per second transfers? Ask the software manufacturer.
- Are you shadowing the GSI BIOS? **B.3**
- Did you remember to exclude the GSI BIOS Address range with your memory manager? **C.2**

**G.12 CHANGES TO MODEL 21 BIOS NOT SAVING**

- Did you remember to turn OFF shadowing of GSI BIOS while making changes?
- If you changed the partitions using FDISK, did you remember to rerun the GSI BIOS-setup to allow the Model 21 to adapt to the change?
- Did you remember to exclude the GSI BIOS Address range with your memory manager? **C.2**

**INSTALLATION NOTES**

During installation, you should take down the following information. This information will be useful should you need to contact your supplier for technical support. GSI supports its customers through its Authorized Distributors.

**SUPPLIER INFORMATION**

Date of Purchase: \_\_\_\_\_ Invoice #: \_\_\_\_\_

Product Purchased From: \_\_\_\_\_

Seller's Tech Support Phone #: \_\_\_\_\_

**GSI PRODUCT INFORMATION**

GSI Model 21 Serial #: \_\_\_\_\_

GSI Model 21 BIOS Version : \_\_\_\_\_

GSI BIOS Address Used: \_\_\_\_\_

**OTHER INFORMATION**

System Information: \_\_\_\_\_

Disk Drive Information: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Other Controller Cards: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_