



## **GSI Model 21**

# **Intelligent IDE / Four Floppy Host Adapter**

## **Installation Instructions**

### Technical Support:

**Should you encounter any difficulties installing a GSI Model 21 controller, please contact the place you purchased it from for technical support. GSI directly supports its Authorized Distributors only. Thank you.**

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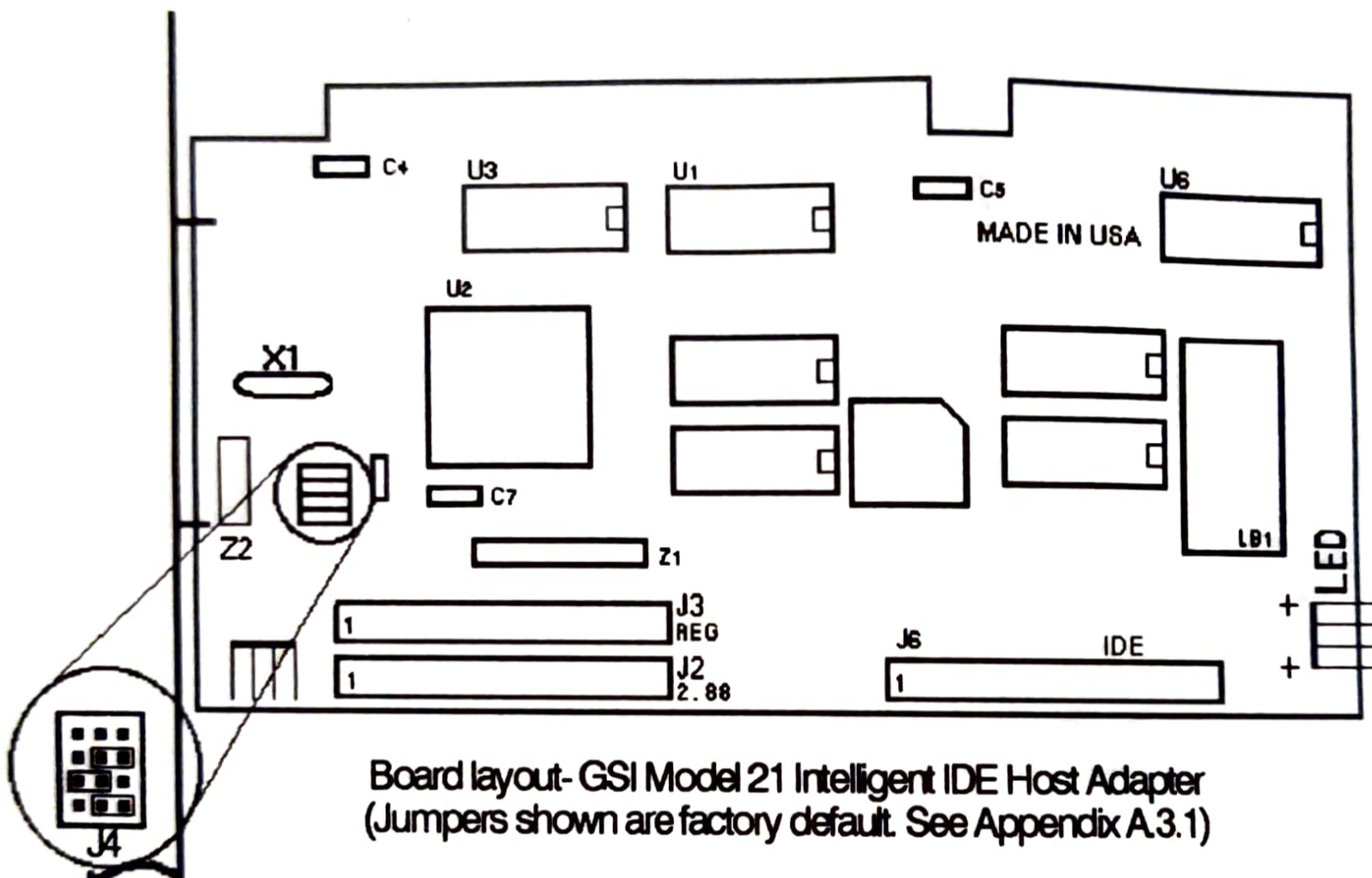
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**This manual is applicable to all revisions of the Model 21 controller and BIOS versions 2.XX.**

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# GSI Model 21 User Manual

## 1.0 PRODUCT OVERVIEW

The GSI Model 21 Intelligent IDE Host Adapter is intended for use as the primary Hard-Drive/Floppy-Drive Controller in any IBM/AT-compatible computer with an available 16-bit AT-compatible bus slot. GSI Intelligent IDE Host Adapters use a *Flash* BIOS to ease installation and maximize the performance of IDE hard drives. The Model 21 Host Adapter provides hardware and BIOS-software control for 2 IDE (AT-bus) hard drives and up to four floppy drives (any mix of 2.88MB/1.44MB/720kB/1.2MB/360kB regular/hi-speed).

This controller's 8kB *Flash* BIOS / CONFIGURATION MEMORY allows it to provide Intelligent Hard and Floppy Drive support with features such as:

### Intelligent IDE Hard-Drive support:

- \* Model 21 *Flash* BIOS provides better IDE translation resulting in higher performance
- \* It asks the hard drive to report its native internal heads, cylinders and sectors mode and automatically sets up and formats for Native-Mode efficiency.
- \* When cylinders > 1024, it calculates a properly aligned emulation mode to let the system use the entire large IDE hard drive efficiently
- \* It detects and analyzes existing emulation-mode partitions and advises the user to try to prevent loss of valuable data

### Intelligent Floppy-Drive support:

- \* The Model 21 supports any mix of up to a total of four floppy drives per system
- \* It allows the user to re-assign (from the keyboard) any floppy drive as the A: Boot Drive (or as any other available floppy drive letter)
- \* It allows booting from any type of diskette, including 2.88MB diskettes
- \* Supports the QIC-80, 1Mb/sec tape transfer rate, eliminating expensive high speed tape controllers

## 2.0 QUICK INSTALLATION REFERENCE (for details see Appendices)

### 2.1 PHYSICAL INSTALLATION

- o With power OFF open the computer case (See precautions in Appendix A)
- o Check jumpers on floppy and hard drives - (See Appendix D.3)
- o Install floppy and hard drive(s)
- o Attach all drive cables from floppy drives and IDE hard drives to proper connectors on GSI controller - (See Appendix A.1)
- o Check jumpers on GSI Model 21 controller - (See Appendix A.3.1)
- o Install GSI Model 21 controller card in motherboard 16-bit slot
- o Power ON

### 2.2 MOTHERBOARD/CONTROLLER SETUP

- o Motherboard CMOS- On most motherboards select NO FLOPPY DRIVES and declare the hard drive as TYPE 1 (See Appendix B.1.1)
- o Be sure to turn OFF shadowing of GSI BIOS during installation
- o Run GSI-BIOS HD/Floppy SETUP by pressing INSERT key at REBOOT
- o If desired, FDISK and DOS-format the hard drive and install DOS
- o Test hard drive for proper operation of Wr/Rd/Compare/CHKDSK
- o Test each floppy drive: Format/Wr/Rd/Compare/CHKDSK on all diskette types

## APPENDIX A - PHYSICAL INSTALLATION

**General Precautions:** Always switch OFF the computer and allow disk drives to stop before working on the computer. The case cover must be removed 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!

Do **not** use pre-2.88 pin-header to card-edge adapters on 2.88 ED drives! Doing so causes the drive to report the wrong diskette type to the controller. Use cables with pin-header connectors, which are designed to plug directly into 3.5" drives.

#### A.1.2 Setting the Drive-Select Jumpers on the Floppy Drives

All floppy disk drives should be set to Drive Select 1 (DS1 of DS0 thru DS3), the normal factory setting for PC usage with standard twisted cables.

#### A.1.3 Floppy Cable Attachment

It is usually easier to attach cables 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 controller 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) For 2.88MB drives or additional Regular drives.

Each drive must be connected to the appropriate cable type. If drives have to be mixed (ie. 2.88MB and regular) on the same cable, the 2.88MB must be declared as a Type 7. (See Appendix E)

Be careful to connect the Pin-1 color-striped side of the cable to the Pin-1 side of its header (Read the card markings) and of the floppy drive (The slot in 5.25" floppy-drive edge connectors is toward the Pin-1 side).

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

#### A.1.4 Floppy Drive Letter Assignment

Floppy drive letters (A: B: etc.) are (re-)assignable by the user by dialog with the GSI SETUP Utility. At (re-)boot of the system, the user is prompted to press the INSERT key if he wants to do Hard Drive or Floppy Drive Setup.

### A.2 HARD DRIVE INSTALLATION

#### A.2.1 Setting the Hard Drive Jumpers

IDE (AT-bus) hard drives usually have more than one jumper (shunt) to set the drive to operate as either "Standalone" (the only IDE drive), "Master" (of a Master/Slave pair) or "Slave" (of a Master/Slave pair.) Set these jumpers appropriately, per the drive manufacturer's instructions. If you use drives from two different manufacturers, you may have to contact the manufacturers' technical support services for help.

#### A.2.2 Hard-Drive Cable Attachment

Use a standard straight 40-pin cable for connection of one or two IDE drives. Observe Pin-1 markings, as with floppy drives. Model 21's shipped in GSI VAR Packs (Part#1533-21-Vx-x) include a cable for 2 IDE hard drives, Part#1548-02-01-9.

**ADDENDUM TO GSI MODEL 21 Manual  
For Part#1533-21-06-8**

Use the following jumper settings for the GSI Model 21 Intelligent IDE Host Adapter in addition to the settings shown on page 3.

**A.3 CONTROLLER INSTALLATION**

A.3.1 Setting the Controller's BIOS-Address Jumpers

Jumper block J4 allows the installer to choose any of four addresses for the BIOS. The user should confirm the actual current GSI BIOS address by reading it from the GSI-BIOS Banner, on-screen at boot-time.

Model 21s with Part#1533-21-06-8 (shown on the product label on the card) and later:

<u>BIOS HEX ADDRESS</u>	<u>Put Shunts On J4 Rows</u>	<u>J4 Pin Layout</u>
CC00-CDFF	7-8 and 10-11	1 2 3 (1,2,3,4 not used)
D400-D5FF (default)	7-8 and 11-12	4 <span style="border: 1px solid black; padding: 0 2px;">5</span> <span style="border: 1px solid black; padding: 0 2px;">6</span>
DC00-DDFF	8-9 and 10-11	<span style="border: 1px solid black; padding: 0 2px;">7</span> <span style="border: 1px solid black; padding: 0 2px;">8</span> 9
E000-E1FF	8-9 and 11-12	10 <span style="border: 1px solid black; padding: 0 2px;">11</span> <span style="border: 1px solid black; padding: 0 2px;">12</span>

Jumpers 5 and 6 are for manufacturer use only. Leave these jumpered.

## A.3 CONTROLLER INSTALLATION

### A.3.1 Setting the Controller's BIOS-Address Jumpers

Jumper block J4 allows the installer to choose any of four addresses for the BIOS. The user should confirm the actual current GSI BIOS address by reading it from the GSI-BIOS Banner, on-screen at boot-time.

Model 21s with Part#1533-21-05-0 (shown on the product label on the card) and later:

<u>BIOS HEX ADDRESS</u>	<u>Put Shunts On J4 Rows</u>	<u>J4 Pin Layout</u>
CC00-CDFF	7-8 and 10-11	1 2 3 (1,2,3,4 not used)
<b>D400-D5FF (default)</b>	<b>7-8 and 11-12</b>	4 <del>5-6</del>
DC00-DDFF	8-9 and 10-11	<del>7-8</del> 9
E400-E5FF	8-9 and 11-12	10 <del>11-12</del>

Model 21s with Part#1533-21-04-3 (shown on the product label on the card) and earlier:

<u>BIOS HEX ADDRESS</u>	<u>Put Shunts On J4 Rows</u>	<u>J4 Pin Layout</u>
C800-C9FF	1-2 and 4-5	J4
E000-E1FF*	1-2 and 5-6	1 <del>2-3</del>
D800-D9FF	2-3 and 4-5	4 <del>5-6</del>
<b>DC00-DDFF (default)</b>	<b>2-3 and 5-6</b>	7 8 9 (7,8,9 not used)

\*On Model 21 Part#1533-21-03-6 and earlier, read 'D000-D1FF'.

### 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 HD-LED wire-pair goes on J8, with the colored LED wire going to either positive (+) pin.

## APPENDIX B - SYSTEM SETUP PROCEDURE

### B.1 MOTHERBOARD CMOS SETUP -- DRIVE-CONFIGURATION DATA

#### B.1.1 CMOS Setup on the System Motherboard -- Floppy Drives

Run the motherboard-BIOS Setup procedure (per motherboard manual) to set the CMOS configuration memory. The CMOS memory on the motherboard should be set to reflect either no floppy drives or **only** the types of drives attached on the REG (Regular) cable header on the primary controller. (**Note:** Some motherboard BIOSs insist on having a floppy disk drive selected in the CMOS. In this case, for all drives other than 360kB, declare a 1.2MB drive installed.)

#### B.1.2 CMOS Setup on the System Motherboard -- Hard Drives

Run the Motherboard BIOS Setup procedure, per motherboard manual. Declare the IDE drive(s) as Type 1, to declare the presence of hard drive(s) supported by an intelligent controller. (See also Appendix F, and IDE mode tutorial)

It is possible to declare the drive(s) as some other hard drive Type (e.g. to match pre-existing partitions), although it will not normally affect the Model 21's handling of the drive. An exception exists for certain drives which are not strictly IDE-compliant and which erroneously report back the Type 1 heads and sectors parameters as if they were factory-default native-mode values. For such drives, if a user-definable hard drive Type (e.g. AMI's Type 47) is available, define heads, cylinders and sectors values per hard drive maker's guidance.

#### B.1.3 CMOS Setup on the System Motherboard -- Shadowing the GSI BIOS

Shadowing of the GSI BIOS should be OFF during GSI Setup. Shadowing is recommended for normal operation and is necessary for some 80486 systems.

### B.2 GSI CONTROLLER SETUP -- FOR HARD DRIVES & FLOPPY DRIVES

The GSI 1533-21 remembers the hard/floppy drive configuration in *Flash* memory. If you install a brand new card, you will be forced to run GSI Setup.



### B.2.1 GSI-BIOS Controller Setup -- Hard Drives

To run the GSI-BIOS Hard-Drive Setup Utility, do the following:

- 1) Ctrl-Alt-Del to reboot
- 2) Watch for the GSI Banner to appear, including 'Press INSERT to change configuration.' and then press the INSERT key (either INSERT key)
- 3) Select H to enter GSI Hard Drive Setup

If the hard drive is new (or has no partitions), the drive will be set up in **Native Mode**. If one or more partitions exist, the hard drive will be setup in **CMOS** or **GSI-Emulation Mode** (Note: Multiple partitions must be consistent in heads and sectors). In either case, the partition heads, cylinders and sectors will be reported on-screen. (See Appendix F also.)

### B.2.1 GSI-BIOS Controller Setup -- Floppy Drives

To run the GSI-BIOS Setup Utility for Floppy Drives, reboot and press INSERT, (when prompted), and select "F" to enter Floppy Drive Setup. You will be shown the Current Drive Settings, if any. If you want to make changes, you will be asked, in turn, to select which drive you want as A:, B:, 3:, and 4:, with New Choices shown alongside Current Settings. (For each drive selection, the Setup Utility lights the LED on the next available drive and asks whether this is your choice for Drive X:.) Entering "N" lights the LED on the next available drive; "Y" accepts the lighted drive as X: and advances to the "Enter Drive Type for X:" dialog. Answering 'N' repeatedly should light the Floppy Drive LEDs, one at a time, in succession, in cyclic fashion. (See also Appendix G.2)

### B.2.2 Floppy Drive Letter Assignments by DOS

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 as follows:

- 1) Under DOS 5.0 -- the next two letters after the hard-drive letter(s)
- 2) Under DOS 3.30 or 4.01 or DRDOS 6.0 -- Drives C: and D:

### B.2.3 Floppy Drive Types Accommodated

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

<u>Type (x)</u>	<u>Floppy Type Description</u>	<u>Type(x)</u>	<u>Floppy Type Description</u>
0	Absent		
	REGULAR-SPEED (300/360 RPM)		HIGH-SPEED (600/720 RPM)
1	5.25" 360kB		(as used by commercial duplicators)
2	5.25" 1.2MB	11	5.25" 360kB
3	3.5" 720kB	12	5.25" 1.2MB
4	3.5" 1.44MB	13	3.5" 720kB
5	3.5" 2.88MB EHD-H	14	3.5" 1.44MB
6	3.5" 2.88MB EHD-L		
7	3.5" 2.88MB EHD-N		

## **APPENDIX C - USAGE GUIDELINES**

Normal DOS and software usage rules apply to systems employing the GSI Model 21 controller. Considerable effort has been made to ensure compatibility with the most commonly used operating systems: MSDOS 5.0, MSDOS 3.30, MSDOS 4.01 and DRDOS 6.0. Common DOS commands like Chkdsk, Copy, Xcopy, Diskcopy and Format should work straightforwardly. **Only** DOS 5.0 and DRDOS 6.0 properly support Format of a 2.88MB diskette.

### **C.1 FORMATTING DISKETTES IN A 2.88MB DRIVE WITH DOS FORMAT**

#### C.1.1 Formatting in a 2.88MB drive under DOS 5.0

For GSI BIOS-Type 5 2.88MB floppy drives (see D.2), type:

FORMAT A: (or other drive letter) for all diskette types

For GSI BIOS-Type 7 2.88MB floppy drives (see D.2), type:

FORMAT A: for 2.88MB diskettes  
 FORMAT A: /f:1.44 (or /f:720 as appropriate)

**C.1.1 Formatting in a 2.88MB drive under DRDOS 6.0**

For all 2.88MB drives, type:

FORMAT A: /f:2.88 (or /f:1.44 or /f:720 as appropriate)

**C.2 WINDOWS 3.1**

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

DMABUFFERSIZE=18 (or higher)

\* Windows 3.0 will work with the GSI controller, but because Windows 3.0 does not fully support 2.88MB drives, only "low density" and "high density", 1.44MB disks will not work with it.

**C.3 OS/2**

The GSI Model 21 is compatible with OS/2 v2.0, subject to OS/2's limitation of three floppy drives maximum. However, because OS/2 does not use BIOS calls when doing floppy drive-letter transactions, it is not possible to use GSI's floppy drive-letter remapping under OS/2. Consequently, you should plan your floppy drive-letter assignments and cable-connect the drives accordingly -- A: at the end of the REG cable, B: at the center of the REG cable, and 3: at the end of the 2.88 cable.

**C.4 NOVELL INSTALLATIONS**

Let the GSI Hard Drive Setup use your drive in native mode and declare the drive as Type 1 to the Motherboard Setup. NetWare 2.x and 3.x will then "plug-n-play". Do not chose the format option under Compsurf.

**APPENDIX D - 2.88 FLOPPY DRIVES AND DISKETTES**

**D.1 2.88MB DISKETTES AND DRIVES -- BASIC FACTS**

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

- 2.88MB drives are totally read/write/format compatible with 720kB and 1.44MB 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 hole (like the HD hole, but just behind it)
- 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 and 2.88MB)
- 2.88MB drives have a dual hole-sensor and report the diskette type to the floppy controller
- The GSI Model 21 tells DOS 5.0 and Windows 3.1 what the current diskette type is
- 2.88MB drives are often shipped new with IBM PS/2-type jumpering; you must use 2.88-drive jumpering as in section D.3 of this manual.

**D.2 TABLE OF 2.88MB DRIVES, BY MANUFACTURER**

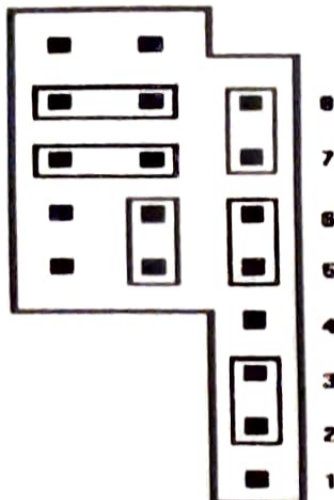
2.88MB Floppy Drive OEM	Model	Use GSI-Setup Drive Type#	2.88MB Floppy Drive OEM	Model	Use GSI-Setup Drive Type#
Chinon	FZ-358	5	Sony	MP-F40W-15	7
Citizen	OSDF	5	TEAC	FD-235J-363x	5
Epson	SMD-1060	5	TEAC	FD-235J-365x	5
Mitsubishi	MF356C-752VG	7	Toshiba	PD211	7
Mitsumi	D352T2	5	Y-E Data	YD-742	5

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

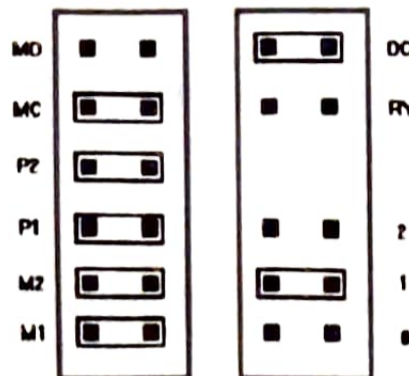
### D.3 2.88MB FLOPPY DRIVE JUMPER INFORMATION

For 2.88MB drives with jumper blocks shown below, their jumpers must be set as shown to ensure proper PC/AT-compatible operation with GSI controllers. This information is included here for installers' convenience. Check carefully that model names match your drive's model name exactly.

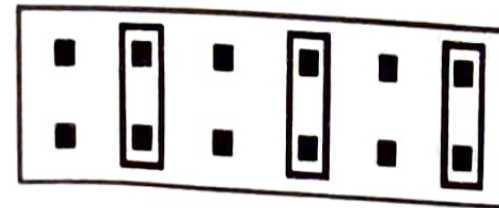
Epson Model SMD-1060:



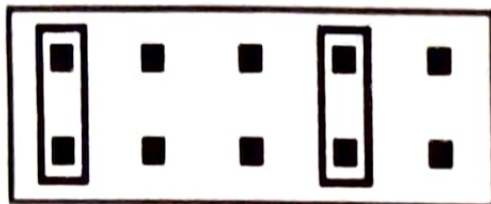
Y-E Data Model YD-742:



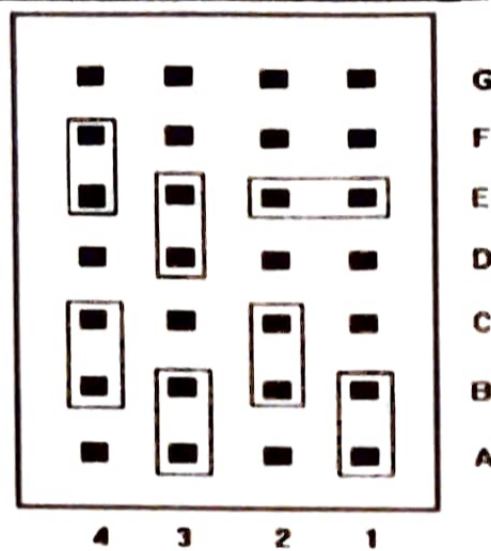
Mitsumi Model D352T2:



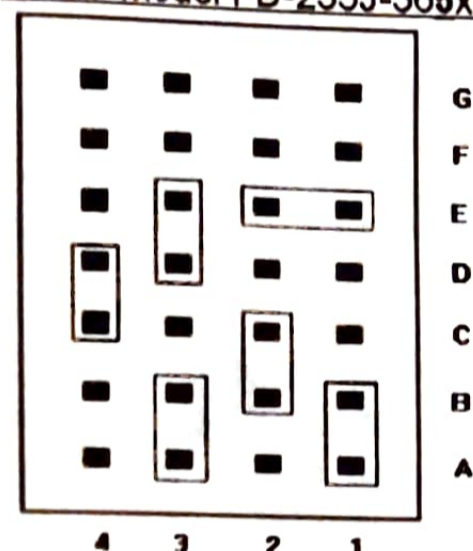
Sony Model MP-F40W-15:



TEAC Model FD-235J-363x:



TEAC Model FD-235J-365x:



## APPENDIX E - FLOPPY DRIVE-MIX POSSIBILITIES

### Floppy Drive-Mix Possibilities with the Model 21 IDE/4-Floppy Controller

The GSI Model 21 IDE/4-Floppy Controller can accommodate almost any mix of four floppy drives. What restrictions there are relate mostly to 2.88MB drives. If you are trying to use a smart 2.88MB drive, one which reports to the floppy controller what type of diskette is currently in the drive, you should observe the following rules:

- 1) Do **not** use an old-style pre-2.88MB adapter with **all** odd pins grounded to connect the 2.88MB drive to its cable
- 2) Do **not** connect any other type of drive (Tape, 360kB, 720kB, 1.2MB, 1.44MB, or non-reporting 2.88MB drive) on the same cable as the 2.88MB drive

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 the GSI Setup process. When the diskette is changed, the first floppy process will take a bit longer than usual. This is because the controller must do special tests to determine the type of diskette which is currently loaded.

## APPENDIX F – IDE HARD DRIVE OPERATING MODES

### F.1 IDE Hard Drive Operating Modes – Some Background Information

**F.1.1 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) as it gives optimum performance and maximum storage capacity. If a new drive (or drive without any partitions on it) is installed with a GSI Model 21, the drive will automatically be set in Native Mode. The ANSI Standard for IDE hard drives provides an optional-to-manufacturer (and usually implemented)

Identify Drive Command, which allows smart controllers to interrogate the drive as to its heads and cylinders count (as well as other technical parameters). The Model 21 uses this feature to provide Native Mode operation.

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 motherboard CMOS, a Drive Type that corresponds to the drive's parameters (see manufacturer's documentation) and the drive **must** have an **existing formatted partition**. If you wish to change the partition size on one of these drives, use DOS FDISK. **DO NOT REBOOT** between removing the old partitions and declaring the new partitions. Drives of this older type **must** already have a valid partition on them to operate.

**F.1.2 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 used in CMOS Emulation Mode (see above), it is recommended that he back up the drive data to other media (e.g., tape or floppies) and re-format 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 majority of the cases, 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 well want to take advantage of this capability.

#### **F.2 Large IDE Hard Drives with More Than 1024 Cylinders**

Some IDE hard drives have more than 1024 cylinders. (For example, a 211MB Seagate ST1239A has 1272 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 1533-21 is connected to such a drive, it automatically uses a setup strategy to handle this problem effortlessly for the installer.

## **APPENDIX G - OTHER SYSTEM INTEGRATION TOPICS**

### **G.1 INTEGRATING TAPE UNITS**

Floppy-interface tape units can be operated by the GSI Model 21. In fact, the Model 21 will operate QIC-80 tape units at the fastest transfer rate, saving you the cost of a separate dedicated high-speed tape controller. If the tape unit operates in a 'Transparent Mode' (most can), where it does not tie up a Drive Select as a floppy drive does, four floppy drives plus a tape unit may be operated on a Model 21 under DOS and Windows. Unfortunately, *many* tape drives when used in Transparent Mode **avoid interference with only those floppy drives with which they share a cable**. Fortunately, a Tape Select/Deselect switch can be connected in place of the Transparent Mode jumper, causing the tape unit to 'disappear' when switch-deselected. Alternatively, a non-transparent drive-select mode option may be offered by the tape unit manufacturer.

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

For two-in-one floppy drives (e.g. TEAC or Cannon 5.25" ½-height 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 **does not use a Drive Select**.
- Treat the 1.2M and 1.44M drive sections as if separate drives: i.e., identify the 1.2M section as a GSI-BIOS Type 2 and the 1.44M as a GSI-BIOS Type 4.
- You must put diskettes in the TEAC Combo drive during GSI-BIOS Setup.

### **G.3 GSI INTERRUPT, DMA CHANNEL AND I/O ADDRESS USAGE**

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

Drive	IRQ	DMA	I/O Address
Hard Drive	14	none	1F0-1F7
Floppy Drive	6	2	3F0-3F7



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U.S.A.

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