
ST01, ST02
SCSI Host Adapter
Installation Guide

Seagate

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Introduction:

This handbook may be used for ST01/02 Host Adapter installation or with Seagate's SCSI Paired Program. Paired Program means that the drive and Host Adapter/Controller are matched to optimize system throughput. And, installation software is already loaded on the drive.

Seagate SCSI drives are recognized by an "N" after the drive model number, e.g., ST1096N.

The ST01 and ST02 Host Adapters provide an 8-bit SCSI interface for the IBM PC XT AT (and all 100% compatible systems) and up to seven SCSI devices. Installation of more than two hard disc drives requires device driver software, which is not provided by Seagate.

The ST02 additionally supports up to two 3.5-inch or 5.25-inch floppy diskette drives.

Seagate SCSI Host Adapters require only a single bus connector and may be installed in a standard IBM PC short or long slot.

Before You Begin...

This guide may be used for ST01/02 SCSI Host Adapter installation; both Paired and non-Paired applications. In either application, ST01/ST02 setup is identical.

All Paired Program drives are shipped already formatted with a small DOS partition. A program to install the drive, called INSTALLR is contained in that partition. You must supply the DOS system. Seagate Paired Program drives are easily recognized by a "PR" label on the top cover.

Paired Program drives with formatted capacities greater than 32 megabytes are shipped with partitioning software, referred to as Disk Manager.

Before Beginning The Installation: Inspect the drive, Host Adapter, cables, mounting hardware and accessories, documentation and packaging. If any item is incorrect, missing or appears damaged, contact your Distributor/Dealer.

Shipping: Improper handling during transit/shipping accounts for many "installation" problems. When transporting or shipping a drive, controller or system, please ensure that they are correctly packed in the original container and shipped via an approved carrier.

Repair centers may refuse receipt of components improperly packaged or obviously damaged in transit. Consult your Distributor/Dealer for approved packing materials and carriers.

Care and Handling: Do not handle a drive/Host Adapter without observing static-discharge precautions. A grounded wrist-strap is preferred; if unavailable, ground yourself frequently by touching the metal chassis of the system before handling any components. Do not unpack the drive/Host Adapter until you are ready to complete the installation.

Seagate disc drives do not require any preventive maintenance. The head/disc assembly is sealed and does not contain any user serviceable components. Do not tamper with the sealed top cover; doing so will void your warranty.

I. SCSI Drive and Host Adapter Compatibility

The ST01/ST02 Host Adapters support Seagate SCSI interface hard drives. Early versions of the ST01 have an 8K ROM and no auxiliary drive power connector. The 16K version of the ST01 has an auxiliary drive power connector and is designated as ROM Version 2.0 or higher.

The ST02 supports up to two 3.5-inch or 5.25-inch floppy diskette drives.

Table 1: ST02 Diskette Support

Diskette	Capacity	Transfer Rate
5.25-inch	360 KBytes	250 Kbits/sec
5.25-inch	1.2 MBytes	300/500 Kbits/sec
3.5-inch	720 KBytes	250 Kbits/sec
3.5-inch	1.44 MBytes	300/500 Kbits/sec

Diskette support in IBM PC-compatible systems depends upon the operating system used and the BIOS installed on the system board. The user may have to upgrade either the BIOS or operating system in order to obtain the desired diskette support.

Table 2 outlines the operating system requirements for the various diskette drive types.

Table 2: PC/MS-DOS Support for Diskette Drives

DOS Version	360 KByte	1.2 MByte	720 KByte	1.44 MByte
PC/MS-DOS 2.1	X			
PC/MS-DOS 3.0	X	X		
PC/MS-DOS 3.1	X	X		
PC/MS-DOS 3.2	X	X	X	
PC/MS-DOS 3.3	X	X	X	X

IBM offers drive support starting at PC-DOS 3.2 for the 720 KByte diskette and at version 3.3 for the 1.44 MByte drive. The DRIVER.BIN module is installed via the CONFIG.SYS module at boot time.

Microsoft offers driver support starting at MS-DOS 3.2 for the 720 KByte drive through use of the DRIVPARM and DRIVER.SYS programs.

MS-DOS 3.3 supports both the 720 KByte and 1.44 MByte drives using the DRIVER.SYS program.

The MS-DOS DRIVER.SYS and DRIVPARM modules are installed via the CONFIG.SYS file at boot time.

In addition to the requirement that the operating system support a particular diskette drive, the ROM BIOS installed on the system board must also provide compatibility.

Table 3 indicates the diskette drives supported by the ROM BIOS installed in the most common IBM systems.

PC compatibles that do not use an original IBM BIOS should consult the Operations Manual supplied with their system to determine the diskette drive support offered.

Table 3: IBM ROM BIOS Support for Diskette Drives

IBM System	360 KByte	1.2 MByte	720 KByte	1.44 MByte
PC, PC XT	X			
PC XT 286	X	X	X	
PC AT (6 MHz)	X	X		
PC AT (8 MHz)	X	X	X	
PS/2 Model 30	X	X	X	
PS/2 Model 50/60/80	X	X	X	X

Note: The ST02 Host Adapter does not contain any ROM BIOS extensions for diskette drive support.

II. ST01/ST02 and SCSI Drive Configuration

Before attempting any installation read through these instructions. Verify that the system is powered-down.

1. Remove the top cover from the system. Retain the screws.
2. SCSI Address/Parity Jumpers and Resistor Packs:

Set the SCSI ID jumper on the hard disc drive. The Host Adapter recognizes devices by their SCSI ID number. If the drive has parity jumpers, they must remain shorted.

* If you are installing one drive, the ID number is 0 (no jumper).

* A second physical drive must be set as ID number 1.

* Drive Resistor Termination Packs:

If you are installing two drives, remove the resistor termination packs from the first drive (the drive nearest the Host Adapter on the cable).

3. Remove the Host Adapter from the protective covering. Observe static-discharge precautions and do not touch the board components or connectors.

4. Host Adapter Configuration Jumpers:

* Starting BIOS Address, ST01 and ST02:

C800H is the 16K BIOS Address (default). For the 8K BIOS, the default Address is CA00H. If there is a board already installed at the default Address in the system, use the jumpers to change to another Address. Refer to Figures 1-3 and Tables 4-5.

* Zero-Wait-State (0WS), ST01 and ST02:

A 2-pin jumper is provided to enable the 0WS logic for PC ATs and compatibles that implement the 0WS control line on the PC bus. The default configuration disables the use of this line.

Optimum performance will be achieved, on PC AT compatibles that correctly implement this signal, by enabling this line. Refer to Figures 1-3 and Table 6. Please consult your system manual or contact your dealer for more information.

* Interrupt Selection, ST01 and ST02:

A 3-pin jumper is provided in order to select interrupts. Interrupts should be disabled (by removing the jumper) for PC/MS-DOS operating in PC XT AT environments. This is the default configuration. Refer to Figures 1-3 and Table 7.

* Diskette Drive Selection, ST02 Only:

The ST02 supports all four of the standard PC diskette drive types. A jumper is provided (JP5) to restrict diskette support PC XT functionality; that is, only 360 KByte and 720 KByte. The default setting (jumper on) will support all types. Refer to Figure 3 and Table 8.

* Register Emulation, ST02 Only:

Many personal computers that are compatible with the IBM PC AT check at boot time to verify that an AT-compatible diskette/hard drive controller is present. If not, then an XT-compatible diskette controller is assumed and only 360 KByte diskette drives are supported.

A jumper is provided to enable emulation of this register (01F4H). Refer to Figure 3 and Table 9.

The default is to enable emulation. In PC and PC XT environments, it is not used and may be safely left installed. It should be used in PC AT compatible systems; removing the jumper may prevent use of 1.2 MByte and other (non-360 KByte) format diskette drives.

Emulation should be disabled if the system already has a hard disc controller installed.

5. Connect the hard drive (and diskette drive to the ST02) cables to the Host Adapter. You may find it easier to attach the cables before you install the Host Adapter in the system. Pin-1 on the Host Adapter always corresponds to pin-1 at the drive connector. Note that some cables have a colored stripe to indicate pin-1.

6. Install the drive in the left drive-bay, if possible, as the power supply may obstruct the cable.
7. For ease of installation attach the cable to the drive before you slide it completely back into position.
8. Connect the drive DC power line.
9. Verify that all connections are correct and replace the system cover. Go on to Parts IV and V/VI for the required formatting.

Figure 1: ST01 Host Adapter, 8K ROM Version

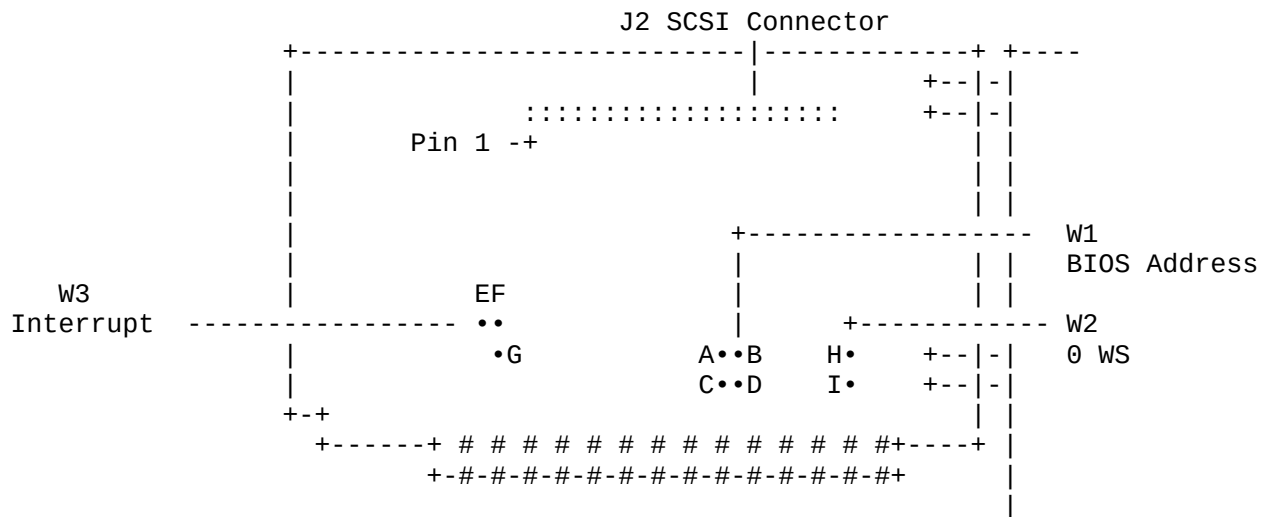
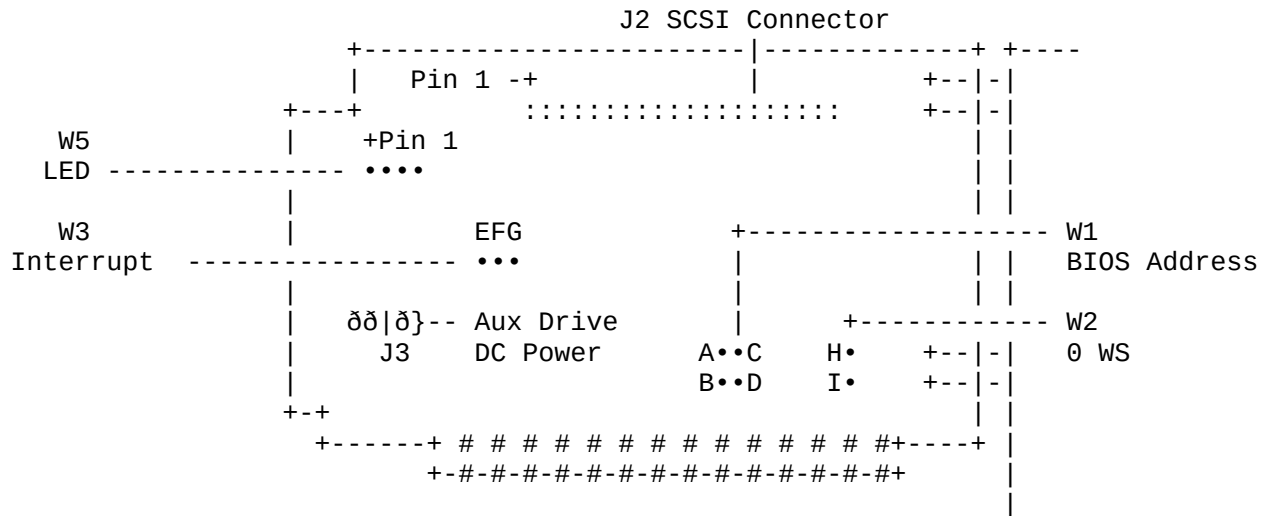


Figure 2: ST01 Host Adapter, 16K ROM Version



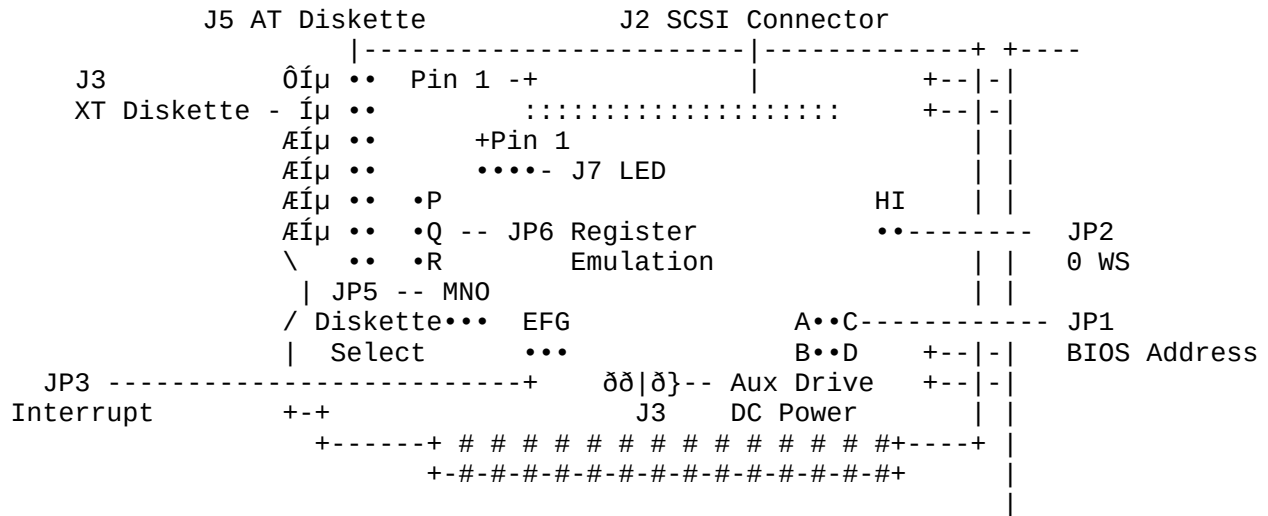
* Auxiliary Drive Power Connector:

A 5-pin DC power connector is provided for systems that lack DC power cables. It may also be used for Drive-on-a-Card installations. Contact your dealer for more information.

* LED Connector:

A 4-pin header is provided for the drive front bezel LED connector used in IBM PC AT and compatible systems. Pins 1 and 4 are logic ground. Pins 2 and 3 provide +5 VDC when the SCSI channel is active.

Figure 3: ST02 Host Adapter



* Auxiliary Drive Power Connector:

A 5-pin DC power connector is provided for systems that lack DC power cables. It may also be used for Drive-on-a-Card installations. Contact your dealer for more information.

* LED Connector:

A 4-pin header is provided for the drive front bezel LED connector used in IBM PC AT and compatible systems. Pins 1 and 4 are logic ground. Pins 2 and 3 provide +5 VDC when the SCSI channel is active.

Table 4: ST01 8K BIOS Memory Address (W1)

Configuration	Address
No jumpers installed	CA00H (Default)
Pins A-B Shorted	C800H
Pins C-D Shorted	CE00H
Pins A-B and C-D Shorted	DE00H

Note: The 8K BIOS version of the ST01 is easily recognized. It doesn't have a notch in the upper left corner of the card.

Table 5: ST01/ST02, 16K BIOS Memory Address (JP1)

Configuration	Address
No jumpers installed	C800H (Default)
Pins A-B Shorted	Invalid
Pins C-D Shorted	CC00H
Pins A-B and C-D Shorted	DC00H

Table 6: Zero-Wait-State Enable, ST01 and ST02 (W2 or JP2)

Configuration	0WS State
No jumpers installed	0WSDisable(Default)
Pins H-I Shorted	0WS Enable

Table 7: Interrupt Enable, ST01 (W3) and ST02 (JP3)

Configuration	IRQ State
No jumpers installed	Interrupts Disabled (Default)
Pins E-F Shorted	IRQ3 Enable
Pins F-G Shorted	IRQ5 Enable

Table 8: Diskette Drive Type Selection, ST02 Only (JP5)

Configuration	Diskette Type Selected
Pins M-N Shorted	360/720 KByte Only
Pins N-O Shorted	360/720 KByte & 1.2/1.44 MByte (Default)

Table 9: Register 01F4h Emulation, ST02 Only (JP6)

Configuration	Diskette Type Selected
Pins Q-R Shorted	Enabled for PC XT 286 and PC AT (Default)
Pins P-Q Shorted	Disabled for PC XT

Refer to page 7 for additional information on Register 01F4h emulation.

III. ST02 Diskette Drive Configuration

The ST02 has two 34-pin connectors for diskette drive support. J3 is provided as an edge-connector for use with PC and PC XT compatible diskette drive cables. J5 is a 34-pin header for use with PC AT compatible diskette drive cables. Contact your dealer for cables.

1. PC Setup Jumpers: There are several jumpers located on the diskette drive that must be correctly set to perform in the PC environment. Each manufacturer may label these jumpers differently. Refer to the diskette drive manual supplied with your system to determine correct jumper position.
2. Diskette Drive Select Jumpers: This header has four positions. They are labeled DS0-3 or DS1-4 depending on the drive vintage. For PC applications only, DS1 (older drives) or DS2 (newer drives) are used because the drive interconnecting cable has lines switched to accommodate a common jumper setting.
3. Diskette Terminator Jumper: This jumper is used to activate terminating resistors for 7 of the 11 drive interface input lines. The lines are defined by drive type and manufacturer. In PC applications Drive A has the terminating resistor jumper active. Drive B has no terminating jumper.

IV. Notes Before Formatting the Drive

The installation procedure will "low-level" format new physical blocks, create DOS-compatible partitions, root directories and file allocation tables for the entire drive. The procedure is identical for IBM XT and AT systems, except where indicated.

All Seagate Paired Program drives are shipped with a small DOS partition containing INSTALLR.EXE, PARK.COM, and README.1ST (a printable supplement to this installation guide). README.1ST contains the latest information for the drive being installed. It can be accessed by the DOS commands: TYPE, COPY, and PRINT.

- * If your drive has less than 32 formatted MBytes, you will need one DOS-bootable diskette that has the boot files from the version of DOS that you plan to use on your Seagate drive. This diskette should also contain the FORMAT program provided with DOS, and sufficient space (approximately 5 KBytes) to save the installation programs from the hard drive. The diskette must not be write-protected.
- * If your drive has more than 32 formatted MBytes, you will need two diskettes; one DOS-bootable with the version of DOS you plan to use. The second diskette must have at least 320 KBytes available to save the installation and Disk Manager programs. The diskettes must not be write-protected.
- * Important Note for PC AT Installations:

If you are installing your drive in a PC AT or 100% compatible, and a hard drive is not presently attached or operational, the hard drive count in CMOS will already be set to zero, or no hard drives installed.

If a standard hard drive is already attached and operating, it will be the first drive and the Seagate Paired Program Drive will be Drive 2. It is not necessary to change the CMOS hard drive count when installing Seagate Paired Program drives.

Note to Installers and/or second drive installations: DOS assigns a logical identifier (C, D, E...) to each partition that it recognizes during the boot load. It assigns these letters to the first partition on each physical drive in sequential order. Therefore, if you have a single drive with three partitions, they will be assigned C, D, and E.

V. Installation: Drives Less Than 32 MBytes

IMPORTANT. This Section is for Paired Program installations only. Read Section IV before formatting. The entire software installation routine is menu-driven and takes from ten to thirty minutes, depending on drive size. For specific DOS questions, refer to the DOS manual supplied with your system.

After the format is completed, the read/write heads will be parked. At the next power-up, the system will boot from the hard disc.

Read/Write Head Park Program: A PARK program is pre-loaded on all Paired Program drives. The ST225N requires use of this program to park the heads before your drive/system is transported. All other Seagate SCSI drives automatically park the heads at power-down.

For optimum performance, format the drive installed in your system in the same orientation in which it will be used.

1. Software Installation: START HERE

Place a DOS-bootable diskette (to boot simply means to start the system) in Drive A and switch the power on.

2. After the boot process is complete, begin the installation by typing:

C:INSTALLR C

Pre#: Enter (Return)

If the drive and Host Adapter are correctly installed you will see the following display:

Seagate Disc Formatting Utility, VX.X

If you are installing a second drive, type:

D:INSTALLR D ENTER

3. Your screen should look like this:

A>C:INSTALLR C

or, A>D:INSTALLR D

After pressing ENTER (Return), you will see a screen and follow the screen prompts.

VI. Installation: Drives Greater Than 32 MBytes

IMPORTANT. This Section is for Paired Program installations only. Read Section IV before formatting. The entire software installation routine is menu-driven and takes from ten to thirty minutes, depending on drive size. Help is available by pre#ing the F1 key. For specific DOS questions, refer to the DOS manual supplied with your system.

At the beginning of the installation, you will be instructed (after the boot) to remove the DOS diskette and insert a blank formatted diskette to make a backup copy of the Disk Manager software.

After the format is completed, the read/write heads will be parked. At the next power-up, the system will boot from the hard disc.

For optimum performance, format the drive installed in your system in the same orientation in which it will be used.

1. Software Installation: START HERE

Place a DOS-bootable diskette (to boot simply means to start the system) in Drive A and switch the power on.

2. After the boot proce# is complete, begin the installation by typing:

A>C:INSTALLR C ENTER

If the drive and Host Adapter are correctly installed you will see the following display:

Seagate Disc Formatting Utility, VX.X

If you are installing a second drive, type:

A>D:INSTALLR D ENTER

3. Follow the screen prompts.

If you are installing a drive with Disk Manager software, and you already have a hard disc in your system, you must copy the DMDRVR.SYS and CONFIG.SYS files from the Disk Manager diskette to the existing (first, or boot) drive.

If you already have a CONFIG.SYS file on the boot drive, update the file to include the following line:

```
DEVICE=DMDRVR.BIN
```

Refer to your DOS manual for instructions on editing the CONFIG.SYS file.

VII. Troubleshooting Your Installation

If you have a problem getting the initial screen, or later getting the system to boot:

- * Check the cabling between the Host Adapter and drive. Pin-1 on the Adapter always corresponds to Pin-1 at the drive connector. Most cables have a contrasting color on the cable to indicate Pin-1.
- * Check the power cable to the drive. Can you hear it spinning up?
- * Verify correct hard drive SCSI ID selection.
- * Verify correct BIOS Address for the Host Adapter. See Tables 4-5. If you have more than one board that uses BIOS ROM space, each must be configured to a different memory Address. Addressing multiple boards at the same memory location can cause problems of a seemingly indeterminate nature.
- * If you experience problems accessing your DOS partition after installation, refer to the .REF files provided with the Disk Manager software (drives over 32 formatted MBytes).

For system or DOS help, contact your computer system manufacturer.

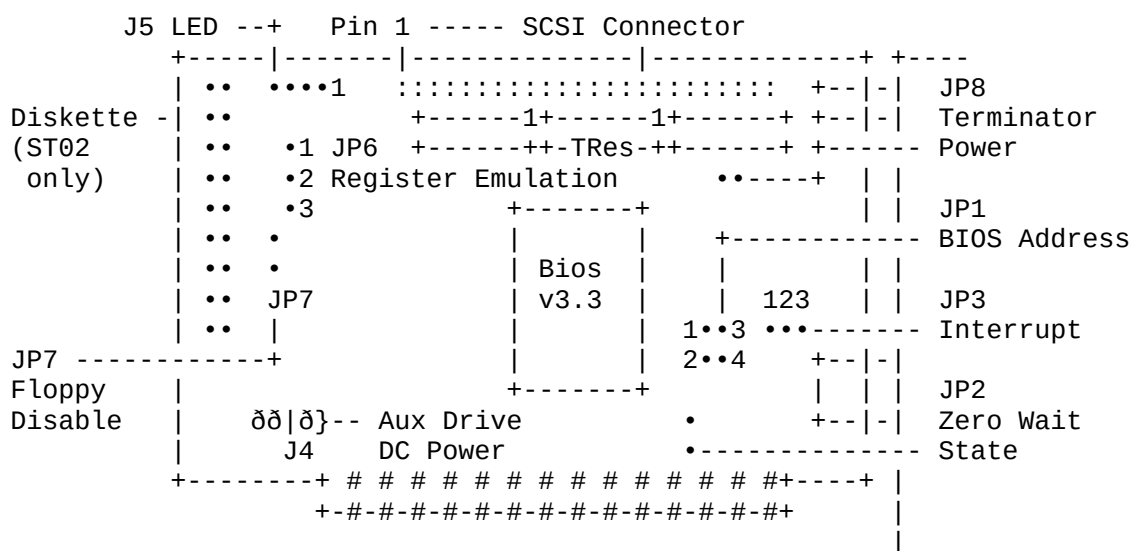
For additional installation help, contact your authorized Seagate Distributor/Dealer.

endum from the Seagate Tech Support BBS: The ST01/02 has a newer
ard layout that can be identified by the ROM BIOS chip with a
ersion number 3.3 sticker.

Like previous versions of the ST01/02, this release will support drives with more than 1024 cylinders and the ability to disable the floppy controller portion on the ST02. This provides compatibility with the Swift and Wren families of Seagate disc drives. Please note that there is no possibility of ROM upgrades to older versions of the ST01/02 SCSI host adapter.

ST01/ST02 SCSI Host Adapter, 16K ROM Version 3.3

(Some configurations have a DB25 external SCSI connector on the clamp.)



Imper Definitions:

JP1 - Bios Address Selection

Pins		BIOS
1-2	3-4	Address
Open	Open	C8000h
Short	Open	CA000h (invalid)
Open	Short	CC000h
Short	Short	CD000h

JP2 - Zero Wait State

	Open	=	Disable	
	Short	=	Enable	

JP3 - Interrupt

	No Jumper	=	Int. Disable	
	1-2 Shorted	=	IRQ 3	
	2-3 Shorted	=	IRQ 5	

JP4 - Drive Power Connector

JP6 - H. D. Emulation Register

	2-3 Shorted	=	Disable	
	1-2 Shorted	=	Enable	

(1F2, 1F4 AT System only)

JP7 - Floppy Enable/Disable

	Open	=	Enable	
	Shorted	=	Disable	

(ST-02 only)

JP8 - Terminator Power

	Open	=	Disable	
	Shorted	=	Enable	

(If enabled, the ST01/02 will supply terminator power to remote device)

J5 - External LED Connector