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*ST9190 Family:*  
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***ST9140AG***  
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***ST9190AG***  
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***AT Interface Drives***  
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*Installation Guide*  
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***Read before you begin...***

**Application.** Your drive is designed for IBM AT and compatible personal computers, particularly laptop and notebook models.

**Warning.** Turn off the computer before you open the case, touch any internal components or install the drive.

**Note.** Special training or tools may be needed to service laptop and notebook computers. Opening the case may void your warranty. Review the terms and conditions of your warranty before opening the case.

**Static discharge.** Observe the following precautions:

- Keep the drive in its static-shielded bag until you are ready to complete the installation. Do not attach any cables to the drive while it is in its static-shielded bag.
- Handle the drive by its edges or frame.
- Do not touch the I/O connector pins or the circuit board.
- Before handling any components, put on a grounded wrist strap, or ground yourself frequently by touching the metal chassis of a computer that is plugged into a grounded outlet.
- Use antistatic padding on all work surfaces.
- Avoid static-inducing carpeted areas.

**Drive handling.** The drive is extremely fragile—handle it with care. Do not attach labels to any part of the drive.

**Inspection.** Once you are familiar with the handling precautions listed above, inspect the drive. If it appears to be damaged, call your distributor or dealer immediately.

**Warranty.** See your authorized Seagate® distributor or dealer.

**Maintenance and repair.** Seagate drives do not require maintenance. The head/disc assembly is sealed; if you break the seal, you void the warranty. Seagate customer service centers are the only facilities authorized to repair Seagate drives. Seagate does not sanction any third-party repair facilities.

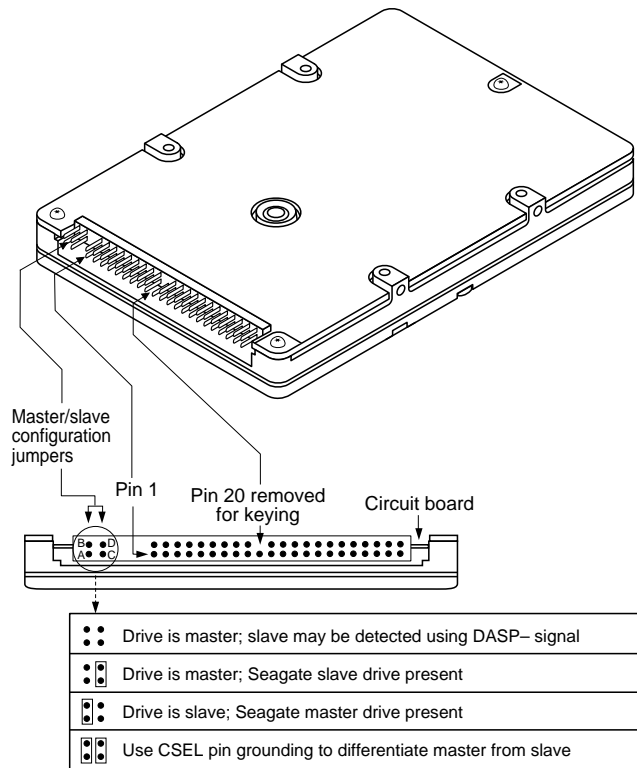
**Shipping.** Keep your original box and packing materials for transporting or shipping your drive. The box has a *Seagate Approved Package* label. Shipping a drive in an unapproved container voids the warranty. Call your authorized Seagate distributor to purchase additional boxes.

### Configuring the drive

**Put on a grounded wrist strap.** If you are grounding yourself to the chassis of the computer, plug the power cord into a grounded outlet. Wear a grounded wrist strap throughout the installation procedure.

**Install master/slave jumpers.** In a two-drive system, you need to designate one drive as the master, or drive 0, and the other drive as the slave, or drive 1. In a one-drive system, configure the drive as a master. To configure the drive as a master or slave, install the master/slave jumpers as shown in Figure 1.

As an alternative to configuring the drive as a master or slave using jumper settings, you can use a specialized daisy-chain cable that grounds pin 28 (CSEL) on only one of its two drive connectors. In this case, a drive becomes a master if it is attached to the grounded CSEL connector; otherwise it becomes a slave. To configure an ST9190 family drive for master/slave selection using cabling, install both master/slave jumpers. In choosing this approach, you should be aware that the drive consumes less power with fewer jumpers installed.



**Figure 1. ATA interface cable connector and master/slave configuration jumpers**

## Attaching cables

This drive is designed for a host computer that supplies interface signals and +5V power through a single 44-pin connector and cable. If your computer has a fixed connector that attaches directly to the drive, skip ahead to the following section, "Mounting the drive." Otherwise, perform the following steps:

- 1. Turn off the computer.** In some notebook and laptop computers, you may need to remove the battery.
- 2. Put on a grounded wrist strap.**
- 3. Connect the 44-pin interface/power cable.** Connect the 44-pin interface/power cable. Match pin 1 of the interface cable to pin 1 of the interface connector on the drive and on the computer. Pin 1 is usually denoted by a stripe along one edge of the ribbon cable. The location of pin 1 on the drive interface connector is shown in Figure 1 on page 3. The cable should be no longer than 18 inches.

**Caution.** The printed circuit cables used in some laptop computers are delicate. Be careful not to tear them.

## Mounting the drive

You can mount the drive in any orientation using the four side mounting screws or the four bottom mounting screws. Be careful not to crimp or strain the connector cable. If you plug the drive directly into a fixed connector, be careful not to bend the drive connector pins.

**Caution.** To avoid damaging the drive:

- Allow a minimum clearance of 0.030 inches (0.762 mm) around the entire perimeter of the drive for heat dissipation.

- Use M3X0.5 *metric* mounting screws *only*.
- Do not insert mounting screws more than 0.150 inches into the screw holes.
- Do *not* overtighten the screws (maximum torque: 3 inch-lb).

This drive is designed according to the industry-standard MCC mounting specifications and must be used with MCC-compatible connectors and mounting hardware in fixed-mounting applications. If the mounting screws in your computer do not line up with the screw holes on the drive, your computer may not be MCC compatible.

## Configuring system BIOS

Before your computer can recognize a new drive, you must enter basic information about the drive into the computer's BIOS. Specifically, you need to know the number of cylinders, heads, and sectors, and the overall capacity of the drive you are installing. It is not necessary to understand these terms to set up the system BIOS. The table below lists these specifications for the ST9190 family drives.

<b>Drive Specification</b>	<b>ST9190AG</b>	<b>ST9140AG</b>
No. cylinders	873	980
No. read/write heads	16	15
No. sectors per track	24	17
Total No. sectors	335,232	249,900
Bytes per sector	512	512
Capacity (Mbytes)		
BIOS calculated	163.6	121.9
Usable	171.6	127.9

To determine which drive types your BIOS supports, read your computer documentation or run your system setup program. Alternatively, you can run the FINDTYPE.EXE utility program, available from Seagate Technical Support services (on the SeaBOARD BBS).

The methods used to configure system BIOS vary from computer to computer. In some computers you can run a setup program from the DOS prompt. In other computers, you must initiate BIOS setup by pressing certain keys while the computer is booting up. See your system documentation.

Within the setup program, there are three possible ways that you can specify your drive type:

- Match your drive specifications (from the table on page 5) with those of a drive type listed in the setup program.
- Specify a custom or user-defined drive type in the setup program, then manually enter your drive specifications (from the table on page 5).
- Select a drive type having specifications lower than those required for your drive, and allow your drive to mimic the drive type selected.

When you enter drive specifications for a custom or user-defined drive type, the BIOS should display a drive capacity equal to that listed as BIOS calculated capacity in the table on page 5. This value is slightly lower than the usable drive capacity.

In a few situations, none of the drive types specified in your BIOS setup program will match your drive, and the setup program will not provide an opportunity to specify a custom drive type. In this case, choose the third option described above—allowing your ST9190 family drive to mimic one of the BIOS-supported drive



types. During the BIOS setup process, simply select a drive type with a capacity that is *less than or equal to* the drive's BIOS calculated capacity listed in the table on page 5. This drive type should have no more than 16 read/write heads or 63 sectors per track. In addition, the total number of sectors for that drive type (listed in the setup program) should not exceed the number of cylinders times the number of read/write heads times the number of sectors per track. In other words, *total sectors per drive*  $\leq$   $(No. cylinders) \times (No. read/write heads) \times (No. sectors per track)$ .

**BIOS compatibility notes**

The ST9190 family drives conform to ATA interface specifications. For a detailed description of the ATA commands implemented by these drives, see the *Seagate ST9190 Family Product Manual* and the *Seagate ATA Interface Reference Manual*. The host system BIOS must provide support for the ATA interface command set. Several key compatibility issues are discussed below.

In accordance with ATA specifications, the BIOS must reset any emulation/translation parameters after a hard reset is received from the host.

In some configurations, the ST9190 family ATA interface drives may supply up to 16 bytes of error correction code (ECC) with the Read Long and Write Long commands. Depending on the drive type, your system BIOS may look for 4 bytes of ECC. If your system BIOS expects 4 bytes of ECC and the drive supplies a different number of bytes, some drive diagnostic programs may fail, typically resulting in time-out errors. Consult your computer documentation or call your computer dealer or manufacturer for information on configuring your computer to receive more than 4 bytes of ECC.

**Note.** Some older drive diagnostic programs may incorrectly report an ECC detection failure when analyzing an ST9190 family drive. This occurs because the drive hardware corrects the data automatically, avoiding the error rather than reporting it. Such a report does not indicate a drive malfunction.

### **Formatting and partitioning the drive**

**Caution.** Formatting or partitioning a drive that contains data destroys that data. Make sure all data has been safely backed up before repartitioning or reformatting a drive. Seagate Technology assumes no liability for lost data.

#### **Low-level formatting**

Seagate AT Interface drives are low-level formatted at the factory and do not require additional low-level formatting prior to use.

#### **Partitioning**

A single disc drive can be subdivided into partitions that behave as separate drives (labeled C, D, E, etc.). Versions of DOS prior to Version 4.0 are not able to access more than 32 Mbytes of disc space as a single drive. Therefore, drives having a capacity of over 32 Mbytes *must* be divided into several smaller partitions for use with these older versions of DOS. Seagate does not recommend using ST9190 family drives with DOS versions prior to Version 3.3.

To partition a drive, you must first boot the computer using a floppy disk that contains system files. Partition the drive using the DOS FDISK utility program (described in your DOS manual). If you are partitioning a drive that will be used to boot the computer, make sure that the primary DOS partition is marked active.

### High-level formatting

After you partition the drive, use the DOS FORMAT command (or equivalent utility program) to high-level format each of the drive partitions. This process verifies the information written by the low-level format and creates file allocation tables (used to catalog and access files). Consult your DOS manual for FORMAT command options. During formatting, you must copy DOS system files to one disc partition (generally the "C" drive), so that the computer can boot off of that drive. After high-level formatting a drive, you can verify the usable drive capacity using the DOS CHKDSK utility program.

### Installation troubleshooting

Before calling Seagate Technical Support, please read and consider all the possibilities discussed below. The suggestions presented here will resolve the vast majority of installation problems.

**General Troubleshooting Techniques.** The following troubleshooting techniques address the most common drive installation problems. Methods for resolving specific problems are provided on subsequent pages.

**Warning.** Always turn off the computer before changing jumpers or touching any internal components.

- **Verify hardware compatibility.** Check the documentation for the drive and host adapter to confirm that these components are appropriately matched for each other and to your system.
- **Verify your hardware configuration.** Refer to the drive and controller installation guides to make sure all jumper settings suit your host computer's requirements.

- **Check all cables.** Make sure all cables are securely connected. Printed circuit and ribbon cables are both quite fragile. Make sure they are not crimped or damaged in any way. Having extra cables on hand for troubleshooting saves time and frustration. Most ribbon cables have a stripe down one side to designate the pin 1 location. Make sure pin 1 on the interface cable connector is connected to pin 1 on the drive interface connector and pin 1 on the host connector. Refer to Figure 1 on page 3 for the location of pin 1 on the drive interface connector.
- **Check all cards.** Check to see that all cards are secured in their expansion slots on the motherboard. Make sure that full size (16-bit) cards are not plugged into half-size (8-bit) slots. After the cards are permanently installed and the system is running properly, use mounting screws to secure the cards in place.
- **Check the power supply specifications.** The output of your power supply may not be sufficient to meet the power requirements of the new devices you have installed. If you are not sure whether the power supply meets the system requirements, consult your computer dealer or distributor.
- **Use the same version of DOS throughout your system.** The same version of DOS must be used throughout all phases of building and configuring your system.
- **Verify the BIOS drive type.** The BIOS drive type you specified during system setup must approximate, but not exceed, the specifications and maximum drive capacity of the disc drive. Refer to the BIOS configuration section of this manual to double check your drive specifications against those specified in your system BIOS.

- **Check for viruses.** Before installing any new software, use a virus checking program to scan the installation diskettes for viruses. Symptoms of viruses can include intermittent system lock-ups, reboots and drive errors.

**Specific Troubleshooting Techniques.** Methods for resolving specific drive installation problems are listed on the following pages. These methods incorporate many of the general troubleshooting techniques described in the previous section.

**The screen goes blank when you power up the computer.**

- Make sure the monitor is plugged in and turned on.
- Check all cards. Make sure the video card is seated in its slot and secured with mounting screws.
- Check all cables. Make sure the video card cables (if any) are securely attached.
- Power down the computer and remove the drive host adapter. If the screen comes on after you reboot, the host adapter may be incompatible or defective. If so, see your dealer.

**At startup, the computer does not recognize the presence of the drive.**

- Check all cables.
- Check jumper settings on all drives.
- Check the power supply specifications.
- Reboot the computer and make sure the drive spins up. If your drive is very quiet, it may be difficult to hear it spin up—check the drive activity LED, if your computer has one. If the drive does not spin up, check the drive cables again.
- Verify the BIOS drive type.

- Try a warm boot. Press CTRL, ALT, and DELETE at the same time to reboot the computer without turning off the power. If a warm boot causes a previously unrecognized drive to become recognized, there may be a timing problem, in which the drive fails to become ready before the host completes its power-on self-test.

One possible solution is to slow the processor speed of your computer during startup. If your computer has a turbo switch, turn it off before powering-on the computer. If your computer does not have a turbo switch, you may be able to use keyboard commands to slow the processor speed. After the computer is up and running, return your processor speed to fast. (See your computer manual for details.) Another solution is to simply warm-boot your computer after every power-on.

- Check for I/O address conflicts. To isolate the conflict, first verify that the drive and host adapter are compatible with your system by disconnecting all of the other peripherals (except the video card). Then install the drive and host adapter. Next, install the other peripherals, one at a time, until the conflict reappears. After you have isolated the source of the address conflicts, you can resolve the conflict by changing the I/O address of the peripheral that appears to cause the conflict.

**The dealer partitioned and high-level formatted the drive for you in the store. Later, you installed the drive and it does not work.**

- Reboot the computer and make sure the drive spins up.
- Check all cables.
- Check the power supply specifications.
- Use the same version of DOS throughout your system. Check with your dealer to make sure the DOS version the dealer used

to partition and high-level format the drive is the same as the version you have installed on your computer.

- Verify the BIOS drive type. You must use the same BIOS drive type or translation geometry to install the drive that the dealer used to partition and high-level format it.
- Check for memory conflicts.
- Check for viruses.

**During FDISK, the computer hangs or fails to create or save the partition record.**

- Check all cables.
- The FDISK program on your DOS utilities diskette may be corrupted. Try a backup DOS diskette.
- Make the partitions smaller.
- Use another drive type or translation geometry. Sometimes the host BIOS does not accept a particular translation geometry even though that geometry is listed as an option during system setup.
- Change the interrupt jumper setting on the host adapter.
- Check for media defects at the beginning of the drive (where the partition record is stored). Use a third-party surface hard-disc scan utility.

**During FDISK, the error message, "No Fixed Disk Present," appears.**

- Check all cables.
- Check the power supply specifications.
- Reboot the computer and make sure the drive spins up.
- Verify the BIOS drive type.

- Check for I/O address conflicts.

**During high-level formatting, the drive keeps finding hard errors and reporting the following message. “Attempting to recover allocation units. . .”**

- This is normal with DOS Version 4.0 or later. The drive will format normally. However, after formatting the drive, you may want to run a third-party surface-scan program to check for bad sectors.

**During high-level formatting, the drive does not format to full usable capacity.**

- Check to make sure that you entered the correct drive type or translation geometry in the BIOS setup program (for example, you should not specify more than 1,024 cylinders). If this is the case, you must run the setup program again, then partition and high-level format the drive again.

**Note.** Your drive’s formatted capacity is limited to the capacity of the BIOS geometry you selected. If your BIOS does not offer a geometry that takes advantage of the full capacity of the drive, and a user-defined drive type is not available, use a third-party partitioning utility.

- Run FDISK again and make the partitions smaller.

**At startup, the DOS messages, “Disk Boot Failure,” “Non-System Disk,” or “No ROM Basic - SYSTEM HALTED,” appear.**

- Check all cables.
- Check to make sure that the same version of DOS is in use throughout your system.
- Reinstall the DOS system files using the DOS SYS utility.



- Make sure the primary partition is active in FDISK.
- Check for viruses.

**During operation, the system error message, “Drive not Ready,” appears.**

- Check all cables. For each ribbon cable, verify that pin 1 of the cable is matched to pin 1 of the connector. Pin 1 is usually denoted by a stripe on the side of the ribbon cable.
- Check the power supply specifications.
- Reboot the computer and make sure the drive spins up.

### **Technical support services**

Always consult your computer dealer first for technical support. Dealers are generally more familiar with unique system configurations.

Technical support is available for all Seagate products by calling the SeaFAX™, Seagate Technical Support FAX, SeaFONE™, SeaBOARD™ and SeaTDD™ services.

#### **SeaFAX. 408/438-2620**

You can use a touch-tone telephone to access Seagate's automated FAX system to receive technical support information by return FAX. This service is available 24 hours daily.

#### **Seagate Technical Support FAX. 408/438-8137**

You can FAX questions or comments to technical support specialists 24 hours daily. Responses are sent between 8:00 A.M. and 5:00 P.M. (Pacific time), Monday through Friday.

#### **SeaFONE. 408/438-8222**

You can talk to a technical support specialist between 8:00 A.M. and 5:00 P.M. (Pacific time), Monday through Friday.

SeaFONE provides recorded technical information on selected Seagate products while you are on hold. You can access the recordings 24 hours daily. Before calling, note your computer configuration and drive model number (STxxxx).

**SeaBOARD**

Using a modem, you can:

- Access documentation, drive specifications and jumper settings for Seagate's entire product line.
- Download software for installing and analyzing your drive.
- Request a return phone call from the technical support staff.

SeaBOARD is available 24 hours daily. It supports communications up to 9,600 baud. Set your communications software to eight data bits, no parity, and one stop bit (8-N-1). SeaBOARD phone numbers are listed in the following table.

<b>Location</b>	<b>Modem number</b>
United States	408-438-8771
Canada	416-856-5581
England	44-62-847-8011
France	33-1-40 67 10 34
Germany	49-89-140-9331
Singapore	65-292-6973
Australia	61-2-756-2359
Korea	82-2-556-7294

**SeaTDD. 408/438-5382**

Using a telecommunications device for the deaf (TDD), you can send questions or comments 24 hours daily and exchange

messages with a technical support specialist between 8:00 A.M. and 5:00 P.M. (Pacific time), Monday through Friday.



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