# *Universal* Installation Handbook

NOT FOR RESALE

Seagate

## TECHNICAL SUPPORT

For further support information, contact your dealer, distributor or system integrator.

## WARRANTY INFORMATION

The terms of your warranty are determined by your dealer, distributor or systems integrator.


Seagate Publication: 36042-001, Rev. D
920 Disc Drive, Scotts Valley, CA 95066-4544, USA

# *SECTION 1:*
## PRODUCT INFORMATION

This document supports the Seagate hard disc drives specified below.

## ST412 INTERFACE DRIVES USING MFM ENCODING AT 5.0 MEGABITS/SEC.

| Product Information | ST125 | ST138 | ST225 | ST251 | ST251-1 |
|---|---|---|---|---|---|
| Formatted Capacity (Megabytes): | 21 | 32 | 21 | 42 | 42 |
| Read/Write Heads: | 4 | 6 | 4 | 6 | 6 |
| Data Cylinders: | 615 | 615 | 615 | 820 | 820 |
| Step Pulse Range ($\mu$sec.) | 3-200 | 3-200 | 5-200 | 3-200 | 3-200 |
| Access Time (msec.): | 28 | 28 | 65 | 40 | 28 |
| Write Precompensation (cyl.): | N/A | N/A | 300-614 | N/A | N/A |
| Reduced Write Current (cyl.): | N/A | N/A | N/A | N/A | N/A |
| Power (Watts): | 10 | 10 | 14.8 | 11 | 12 |

| Product Information | ST4038 | ST4051 | ST4053 | ST4096 |
|---|---|---|---|---|
| Formatted Capacity (Megabytes): | 31 | 42 | 44 | 80 |
| Read/Write Heads: | 5 | 5 | 5 | 9 |
| Data Cylinders: | 733 | 977 | 1,024 | 1,024 |
| Step Pulse Range ($\mu$sec.): | 10-70 | 10-70 | 3-70 | 3-70 |
| Access Time (msec.): | 40 | 40 | 28 | 28 |
| Write Precompensation (cyl.): | 300-732 | N/A | N/A | N/A |
| Reduced Write Current (cyl.): | N/A | N/A | N/A | N/A |
| Power (Watts): | 25.5 | 25.5 | 23 | 25.5 |

# *SECTION 2:*
# ST412 INTERFACE DRIVE CONFIGURATION

## MFM CONTROLLER SELECTION

The hard disc controller you use will affect the performance of the drive. To achieve full performance with an MFM drive, you must use an MFM controller which operates the ST412/MFM interface at 5.0 megabits/sec.

Operation of an MFM drive at data rates other than 5.0 megabits/sec. or operation of an MFM drive with an RLL controller is not approved by Seagate and will void your warranty.

## RLL CONTROLLER SELECTION

To achieve full performance with a Run Length Limited (RLL) drive you must use an RLL (2,7) controller which operates the ST412/RLL interface at 7.5 megabits/sec.

**Only Seagate drives with an *R* appended to the product number are designed and certified for use with a Run Length Limited (RLL 2,7) controller. Note: early ST238, RLL drives did not have the *R* suffix.**

Operation of an RLL drive at data rates other than 7.5 megabits/sec. or operation of an RLL drive with an MFM controller is not approved by Seagate and will void your warranty.

## WRITE PRECOMPENSATION

For optimum performance, provide write precompensation on only the ST412/MFM drives listed below. **Drives not listed do not require precompensation.**

| | |
|---|---|
| ST213, ST225: | Cyl. 300 to 614 |
| ST4038: | Cyl. 300 to 732 |

## RESISTOR TERMINATION PACKS

If you are installing a single drive, the resistor pack must remain installed. If you are installing multiple hard disc drives, remove the resistor termination pack from all drives not connected to the last connector on a J1 cable.

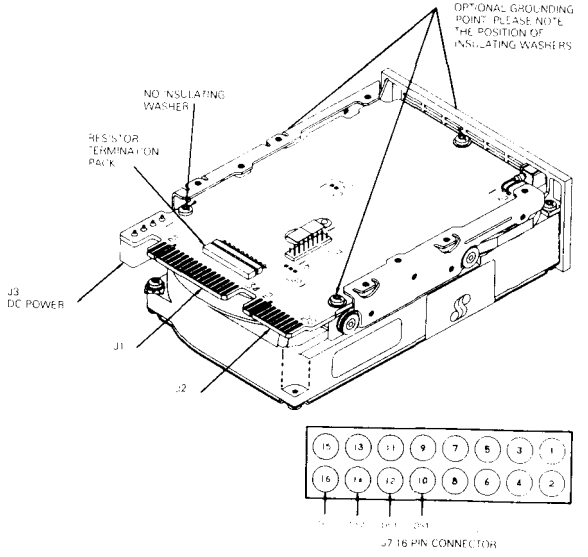
When reinstalling a resistor pack, note that pin-1 on the pack is denoted by a dot or numeral one. A square pad on the disc drive board indicates pin-1 at the socket. Refer to Figures 1, 2 and 3.

## READ/WRITE HEAD AUTO-PARK

All Seagate disc drives, with the exception of the ST213, ST225, ST225N and ST238R products, have an automatic read/write head parking function at power-off. This feature does not require operator intervention.

Some versions of DOS support a parking command for the products listed above. Refer to the system documentation. Third-party software is also available for this task. Contact your dealer, distributor or systems integrator.

***FIGURE 1: MFM/RLL, 3.5 Inch Interface Connectors***



# *SECTION 3:*
# SCSI INTERFACE DRIVE CONFIGURATION

Seagate intelligent drives, designated by an *N* appended to the product number, i.e., ST251N, have an onboard controller that supports the SCSI interface as defined in the ANSI X3T9.2/82-2 document.

## SCSI INTERFACE CABLE CONNECTION

System connection is via a 50-pin, SCSI connector. Pin-1 is noted in Figures 4 and 5 below. Strain relief is recommended at the cable.

## SCSI ADDRESS SELECTION

The SCSI address jumpers are located adjacent to the 50-pin, SCSI interface connector. Refer to Figures 4 and 5 below.

## OPTIONAL PARITY BIT ENABLE

Some system buses require parity bit checking. Consult the system documentation for the specific requirements.

Most drives have an additional two jumper pins to enable parity. They are located with the SCSI address jumper pins. To enable parity, short the *P-jumper* pins. To disable parity, remove the *P-jumper.* Refer to Figures 4 and 5 below.

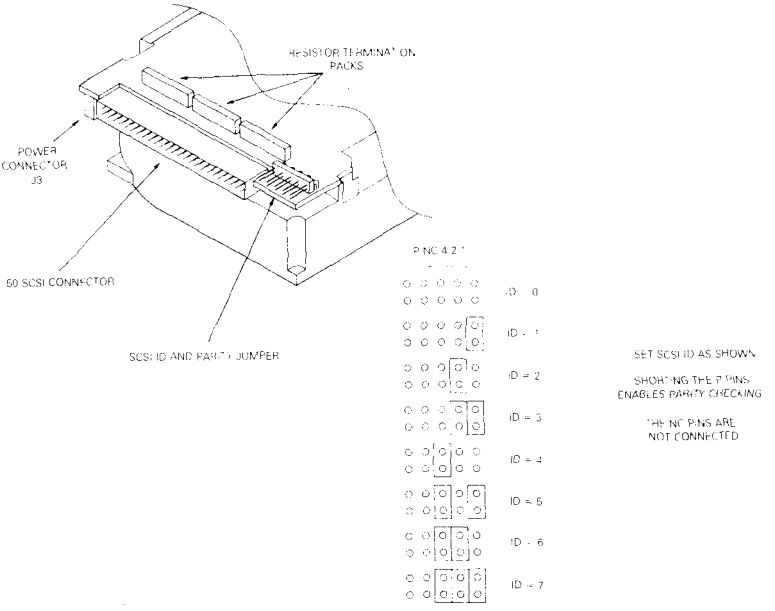
**Note:** Earlier versions of the ST225N may not have these jumper pins, and this option is unavailable.

## RESISTOR TERMINATION PACKS

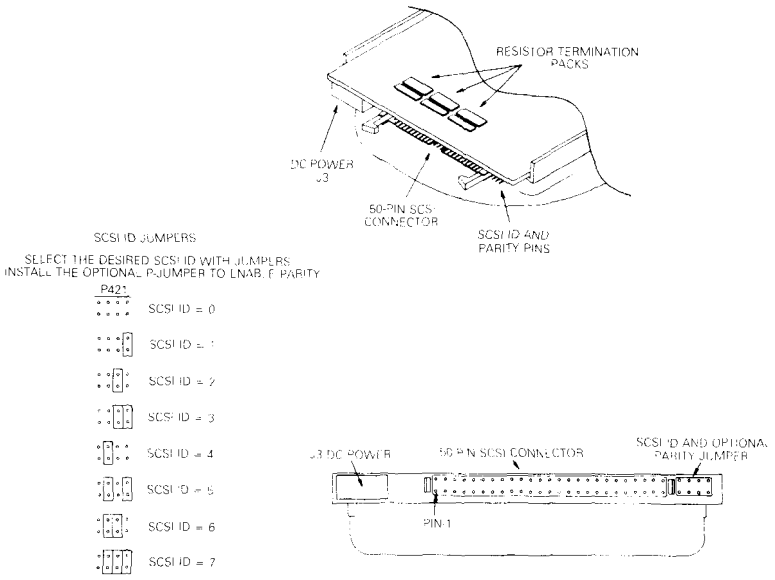
If you are installing a single drive, the resistor termination packs must remain installed. When installing resistor packs, note that pin-1 is designated by a dot or numeral one on the pack. A square pad on the board indicates pin-1 at the resistor pack socket.

If you are installing two or more drives, **remove the resistor packs on all but the last drive in the chain.** Refer to Figures 4 and 5 below.

## FIGURE 4: 3.5" SCSI Interface Connectors




## FIGURE 5: 5.25" SCSI Interface Connectors



1. Verify that all connections between the drive and the controller are correctly installed. Some cables have a contrasting-color stripe indicating pin-1. The even-numbered pins are on the same side of the board as the resistor termination pack(s) Pin 2 is labeled on the circuit board edge-connectors.

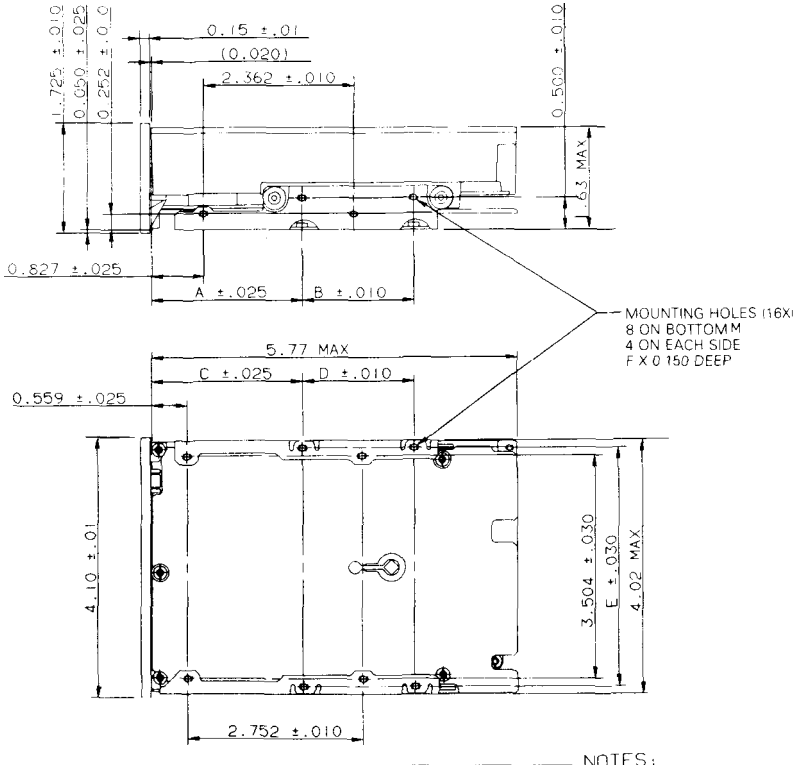
2. Connect the drive DC power connector (J3).

3. Verify correct cabling, jumper and resistor-pack configuration.

4. You are now ready to secure the drive into position and replace the system cover.

5. Continue to the primary format operations.

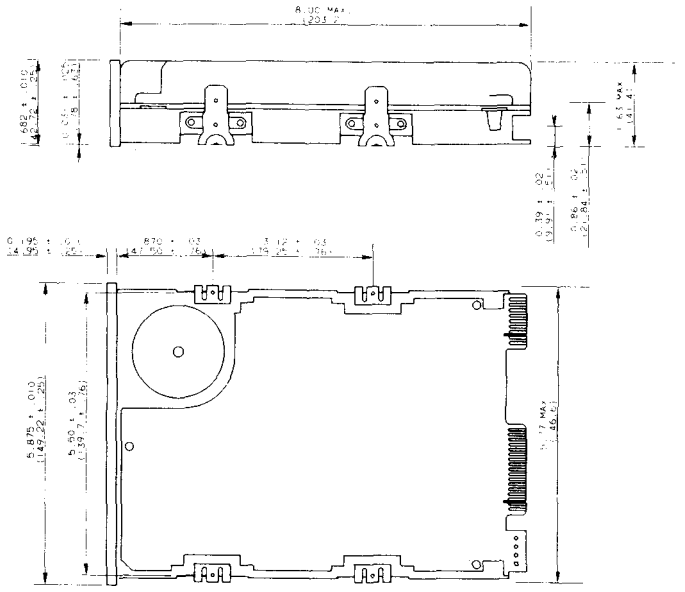
***FIGURE 6: 3.5 Inch Drive Mounting Dimensions***



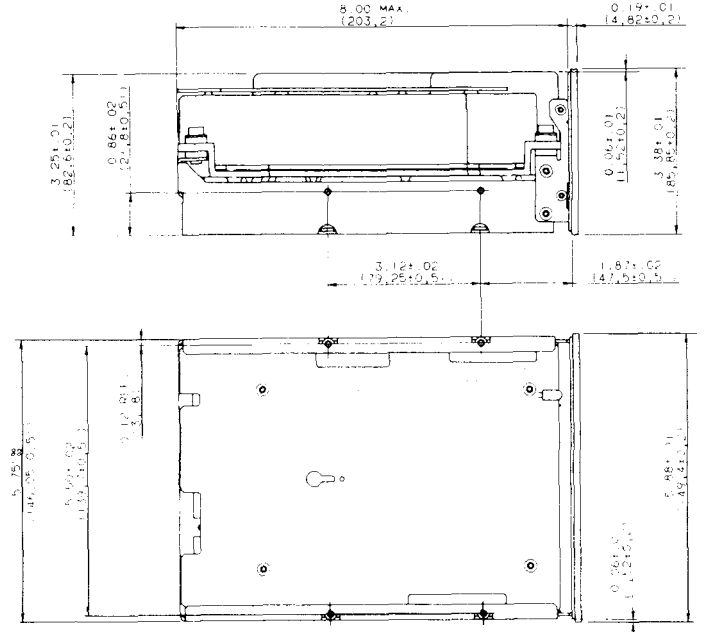

| TABULATION | | | | | | |
|---|---|---|---|---|---|---|
| THREAD TYPE | A | B | C | D | E | F |
| ENGLISH | 2.375 | 1.750 | 2.375 | 1.750 | 3.750 | 6-32 UNC-2B |
| METRIC | 2.433 | 1.752 | 2.433 | 1.752 | 3.752 | M4 X 0.7-6H |

NOTES:
1. ALL DIMENSIONS, INCLUDING TABULATION, ARE IN INCHES.

## FIGURE 7: Half-Height Drive Mounting Dimensions



## FIGURE 8: Full-Height Drive Mounting Dimensions



# *SECTION 5:*
# DRIVE FORMATTING

The MFM/RLL drive format routine is detailed below.

If you are installing a Seagate disc drive with a Seagate controller/Host Adaptor, refer to the installation guide that was shipped with the controller/Host Adaptor for formatting instructions.

## ST412 INTERFACE MFM AND RLL DRIVE FORMATTING

The formatting operation has three different stages, which must be completed before the drive may be used:

- A low-level (or primary) format to establish communications between the controller and the drive.
- Partitioning the drive into one or more logical drives.
- A high-level format to install the operating system on the drive.

**Caution:** you must use the same version of DOS throughout the formatting process.

Drives with greater than 32 formatted megabytes require device driver software for formatting. Seagate ships partitioning software to overcome the DOS limitation of 32 megabytes. The software is shipped only with drives that format to greater than 32 megabytes. This software executes all three steps in the formatting process.

The low-level format may be completed using the DEBUG program found on the DOS system or supplemental diskette with the *Advanced Diagnostics* program, available from IBM.

You may be asked by the DEBUG or diagnostic program to enter the following parameters (see your controller or software manual):

1. Number of cylinders (see Section 1: Product Information)
2. Number of heads