



				+-2
		Resistor	+-+	XX
		Termination		XX
		Pack		XX
			+-+	XX
				XX J1
				XX
				XX Power
				XX J3
+-----+				

## Jumpers

SEAGATE ST213/ST225/ST225R/ST238R/ST250R PRODUCT MANUAL 36025-003

### Jumper setting

-----

x = Factory setting

#### JP7 Drive select Configuration Jumper block

```

+-----+-----+-----+-----+
|Drive Select | 9-10 |11-12 |13-14 |15-16 |
+-----+-----+-----+-----+
|Drive 4      |CLOSED|OPEN  |OPEN  |OPEN  |
|Drive 3      |OPEN  |CLOSED|OPEN  |OPEN  |
|Drive 2      |OPEN  |OPEN  |CLOSED|OPEN  |
|Drive 1      |OPEN  |OPEN  |OPEN  |CLOSED|
+-----+-----+-----+-----+

```

The Drive Select line enables the controller to select and address the drive. Control cable interface options may use either a daisy-chain or radial configuration.

#### JP7 Manufacturing test

-----

x     7- 8    OPEN    Do not install a jumper on the Manufacturing Test jumper on the user configuration jumper block. This is a test function and used during the manufacturing process and is not recommended for field use. When the pins are shorted, the stepper motor will continuously seek between Track 0 and the maximum cylinder and will ignore control signals via the interface.

#### JP7 Write Fault

-----

x 5- 6 OPEN The Write Fault signal may be internally latched. It may be enabled by shorting pins 5-6 at J7. This latch may be cleared when Drive Select goes false (if selected). The standard configuration, with the shorting block removed, causes Write Fault to go false when Write Gate goes false. Not required for standard operation.

JP7 Recovery Mode

-----

x 3- 4 CLOSE Recovery Mode is a read/write head microstepping option on the ST225R and ST250R. It is enabled by shorting pins 3-4 at J7. THE ST225R AND ST250R ARE SHIPPED WITH THIS OPTION ENABLED.

Recovery Mode is initiated when the controller asserts the Recovery Mode line true at the interface. This changes the step line to a microstep function after 100 nsec. A step pulse will now cause Seek Complete to go false 100 nsec. after the drive receives the pulse. The drive then microsteps off-track using the optimum algorithm, allowing time for the read/write heads to settle and then takes the Seek Complete line true.

The controller may then read data. If data is not read correctly, the controller may issue an additional step pulse. Up to 2 microstep algorithms may be accessed before the sequence is repeated.

When data is read correctly, the controller exits Recovery Mode by taking the Recovery Mode line false at the interface. The drive will then return the heads to the nominal position by taking Seek Complete false, allowing time for the heads to settle, and resasserting Seek Complete.

JP7 Radial/Daisy-Chain Mode

-----

x 1- 2 OPEN Daisy-Chain-Configuration  
A Daisy-Chain configuration allows connection of a maximum of two drives on a common control cable. A separate data cable is required for each drive. The last drive in the chain (physically farthest from the controller) requires termination. All other drives should not be terminated. The maximum permitted cable length from the controller to the last drive is 10ft (0.31m).

1- 2 CLOSE Radial Configuration  
To configure the drive radially, install a jumper

on pins 1 and 2 of the user configuration jumper block. If you configure the drive radially, leave the resistor terminator packs installed on all drives. Each radially connected drive has its own control and data cable. Drives in this configuration always remain selected.

### J3 DC Power and pin connector assignments

```

-----
+-----+ pin 1 +12 VDC
| 1 2 3 4 | pin 2 +12 VDC Gnd
+-----+ pin 3 + 5 VDC Gnd
          pin 4 + 5 VDC

```

## Install

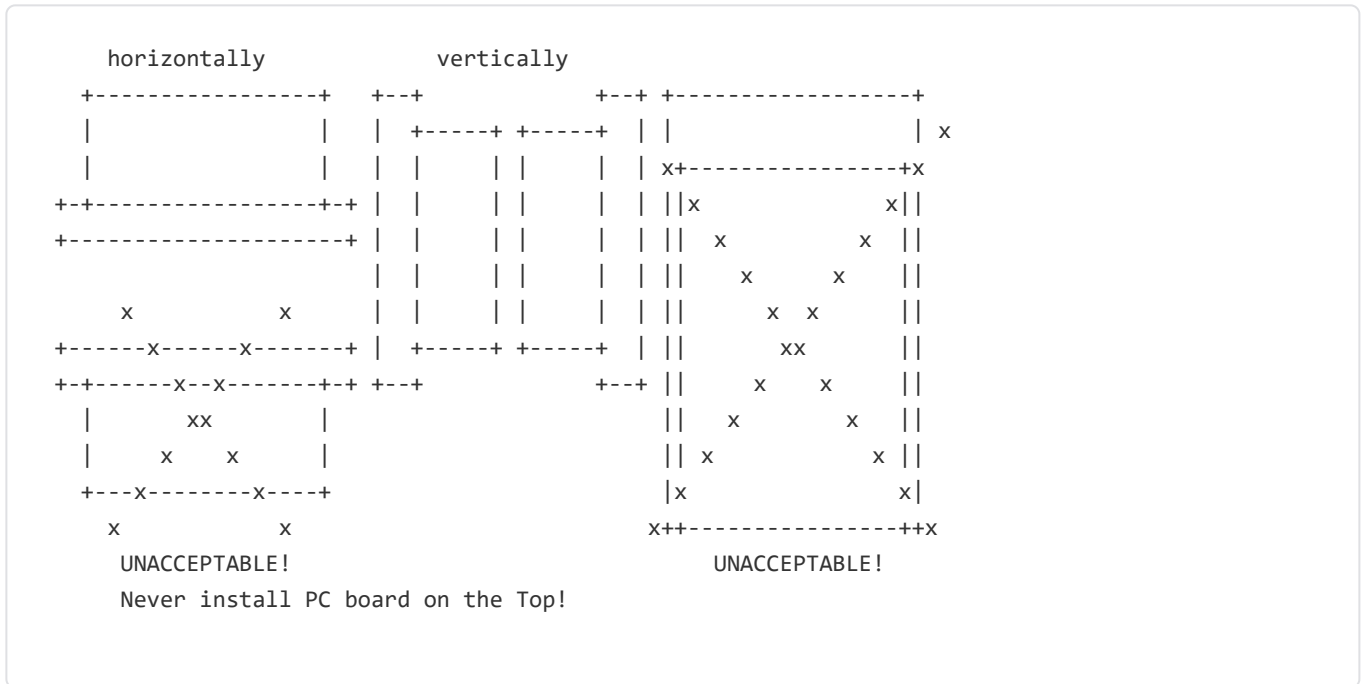
SEAGATE ST213/ST225/ST225R/ST238R/ST250R PRODUCT MANUAL 36025-003

### Notes on installation

=====

### Drive mounting

-----



The drive may be mounted horizontally with the PC board down or on either side. Mounting vertically on either end is a prohibited orientation.

The drive should not be tilted front or back, in any position, by more than 5°. For optimum performance, the drive should be formatted

in the same position as it will be mounted in the host system.

The mounting screws must not exceed inside the mounting feet more than 3.2 mm, measured from the outside surface of the foot.

#### Interface and Recording Method

-----

The ST213 and ST225 are designed for operation with the ST412 interface with MFM encoding at 5.0 Mbits/sec. data transfer rate. Operation of a MFM drive with a RLL controller is not approved by SEAGATE and will void the drive warranty.

The ST225R, ST238R and ST250R are designed for operation with the ST412 interface with Run Length Limited (2,7) encoding at 7.5 Mbits/sec. data transfer rate.

#### Radial/Daisy-Chain Mode

-----

The Drive Select line enables the controller to select and address the drive. Control cable interface options may use either a Daisy-Chain or Radial configuration.

Drives can be configured in either a daisy-chain or radial mode.

The resistor pack must remain installed on the last drive in a chain.

The resistor pack must remain installed on all radially-selected drives.

#### Shock and vibrations

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All shock and vibration specifications assume that the drive is mounted in an approved orientation with the input levels at the drive mounting screws.

#### Read/Write Head Park Zone

-----

##### ST213/ST225/ST238R

The read/write heads may be parked by issuing a seek to any cylinder between 615-670

##### ST225R/ST250R

The read/write heads may be parked by issuing a seek to any cylinder

between 667-670

At power-on the drive will recalibrate to Track 0. If the heads are parked while power is still applied, any step pulse will cause the unit to recalibrate to Track 0.

#### FCC Verification

-----

These drives are devices which are intended to be contained solely within a personal computer or similar enclosure and not attached to an external device. As such, they are considered to be subassemblies even when individually marketed to the customer. As a subassembly, no Federal Communications Commission certification of the device is required.

#### DC Power Requirements

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Power may be applied or removed in any sequence without loss of data or damage the drive.

#### Input Noise

-----

Maximum permitted input noise ripple: 100 mV (peak-to-peak)  
Maximum permitted input noise: 20 MHz.  
Ripple measured at the host system power supply across an equivalent 8 resistive load on the +12 V line and an equivalent 3 load on the +5 V line.

#### DC-Unsafe

-----

A DC-unsafe condition is defined as DC voltage input to the drive outside the specified tolerances. This condition will cause a micro-processor reset.

This will prohibit writing, but will not directly cause a Write Fault

#### Handling and Static-Discharge Precautions

-----

After unpacking, and prior to system integration, the drive may be exposed to potential handling and ESD hazard. Do not touch the drive connectors or board components or without observing static-discharge preferred. Handle the drive by the frame only. Always rest the drive on a padded surface until it is mounted in the host system.

## Auto-Truncation

-----

The drive will enter the auto-truncation mode if the controller issues an excessive number of step pulses, which would place the read/write heads outward beyond Track 0 or inward beyond the maximum data cylinder.

With auto-truncation active, the drive will ignore additional pulses, take control of the actuator, and recalibrate the heads to Track 0.

Caution: If the controller is still issuing slow-step pulses after the drive issues Seek Complete from auto-truncation mode, the drive will either reenter auto-truncation mode with Direction In true.

## Precompensation

-----

For optimum performance, precompensation is recommended for the ST213 and ST225 on tracks 300 through 614. Twelve nsec. is recommended for both early and late bits.

Some controllers provide a default precompensation setting from cylinder 128 to 256. The ST213 and ST225 will perform satisfactorily at these settings.

# Features

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## Media Defects

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A media defect is a read error when the data, which has been correctly written, cannot be recovered within 16 retries.

A printout will be provided with each drive shipped listing the location of any defect by head, cylinder, sector and byte. The defect map will specify the number of bytes from index. For MFM this will be based on 1.6 sec./byte. RLL encoding is based on 1.056 sec./byte.

Some drives will have the defect map fixed to the drive top cover.

ST213 There will be no more than 11 defects total per drive. Cylinders 0, 1, 2 and 3 will be free of defects.

ST225 There will be no more than 21 defects total per drive.

ST225R Cylinders 0, 1, 2 and 3 will be free of defects.

ST238R There will be no more than 33 defects total per drive.  
Cylinders 0, 1, and 2 will be free of defects.

ST250R There will be no more than 42 defects total per drive.  
Cylinders 0, 1, and 2 will be free of defects.

### Access Time Definition and Timing

Access time is defined as the time from leading edge of the last step pulse received to Seek Complete (including setting). The step pulse period must be 5-200 sec.

		ST213		
		ST225	ST225R	
		ST238R	ST250R	
Track-to-Track	msec.	20	20	
	Average msec. typ.	65	70	
	Average msec. max.	150	165	
Latency	msec. avg.	8.33	10	

### Bit Jitter

Bit jitter reduction determines the relationship between the leading edge of read data and the center of the data window.

The data separator must provide at least -40dB of bit jitter reduction at 2F with an offset of less than 1.5 nsec. shift from the center of the data window.

### UL/CSA Listing

The drive family is listed in accordance with UL 478 and CSA C22.2 (0-M1982), and meets all applicable sections of IEC 380 and VDE 0806/08.81, as tested by TUV-Rheinland, North America.

### Reliability



MTBF 100,000 Power-on hours

PM: Not required

MTTR: 30 Minutes

Service life: 5 Years

## General

### SEAGATE SUPPORT SERVICES

Seagate Technology

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#### Technical Support Services

If you need assistance installing your drive, consult your dealer.

Dealers are familiar with their unique system configurations and can help you with system conflicts and other technical issues. If you need additional assistance with your Seagate(r) drive or other Seagate products, use one of the Seagate technical support services listed below.

#### SeaFONE at 1-800-SEAGATE (1-800-732-4283)

Seagate's 800 number allows toll-free access to automated self-help services, providing answers to commonly asked questions, troubleshooting tips and specifications for disc drives and tape drives. This service is available 24 hours daily and requires a touch-tone phone. If you need to speak to a technical support engineer, dial this number and listen to the options for technical support. (International callers can also reach this automated self-help service by dialing 408-456-4496).

#### Seagate Technology online services

Using a modem, you can obtain troubleshooting tips, free utility programs, drive specifications and jumper settings for Seagate's entire product line. You can also download software for installing and analyzing your drive.

#### SeaNET

You can obtain technical information on Seagate drives, Seagate software and much more over the Internet from Seagate's World Wide Web home page (<http://www.seagate.com>) or Seagate's ftp server (<ftp://ftp.seagate.com>).

You may also send E-mail with your questions to [DiscSupport@Seagate.com](mailto:DiscSupport@Seagate.com) or [TapeSupport@Seagate.com](mailto:TapeSupport@Seagate.com).

## SeaBOARD

SeaBOARD is a computer bulletin board system (BBS) that contains information about Seagate's disc and tape drive products and is available 24 hours daily. 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.

### BBS Location Modem number

United States Disc: 408-434-1080; Tape: 408-456-4415

England 44-1628-478011

France 33 1-48 25 35 95

Germany 49-89-140-9331

Singapore 65-292-6973

Thailand 662-531-8111

Australia 61-2-9756-2359

Taiwan 886-2-719-6075

### Seagate CompuServe forum

Online technical support for Seagate products is available on CompuServe. To access our technical support forum, type go seagate. This forum provides information similar to that found on SeaBOARD. In addition, you can type questions or browse through previous questions and answers on the forum messages.

### Seagate Technology FAX services

#### SeaFAX

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.

#### Location Telephone number

United States 1-800-SEAGATE or 408-456-4496

England 44-1628-894084

Australia 61-2-9756-5170

### Seagate technical support FAX

You can FAX questions or comments to technical support specialists 24 hours daily. Responses are sent during business hours.

#### Location FAX number

United States 408-944-9120

England 44-1628-890660

France 33 1-46 04 42 50

Germany 49-89-1430-5100

Australia 61-2-9725-4052

Singapore 65-293-4722

Hong Kong 852-2368 7173

Taiwan 886-2-715-2923

Korea 82-2-556-7294/4251

### Seagate technical support

You can talk to a technical support specialist during business hours

Monday through Friday for one-on-one technical help. Before calling, note your system configuration and drive model number (STxxxx). There are several technical support phone numbers available for various Seagate products.

Location	Telephone number
United States	Please dial 1-800-SEAGATE for the specific product telephone number. (6:00 A.M. to 11:15 A.M., 12:30 P.M. to 5:00 P.M., Pacific time, M-F)
England	44-1628-894083 (10:00 A.M. to 1:00 P.M., 2:00 P.M. to 5:00 P.M., M-F)
France	33 1-41 86 10 86 (9:30 A.M. to 12:30 P.M., 2:00 P.M. to 5:00 P.M., M-F)
Germany	Disc: 49-89-140-9332; (9:30 A.M. to 12:30 P.M., 2:00 P.M. to 4:00 P.M., M-F) Tape: 49-89-140-9333
Australia	61-2-9725-3366 (9:00 A.M. to 5:00 P.M., M-F)
Singapore	65-290-3998 (9:00 A.M. to 12:00 P.M., 2:00 P.M. to 5:00 P.M., M-F)
Hong Kong	852-2368 9918
Taiwan	886-2-514-2237
Korea	82-2-556-8241

### SeaTDD 408-944-9121

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 6:00 A.M. to 11:15 A.M. and 12:30 P.M. to 5:00 P.M. (Pacific time) Monday through Friday.

### Customer Service Centers

Seagate direct OEM, Distribution, System Integrator and Retail customers should contact your Seagate Service Representative for warranty information. Other customers contact your place of purchase. Seagate offers comprehensive customer support for all Seagate drives. Seagate customer service centers are the only facilities authorized to service Seagate drives. These services are available worldwide.

Location Telephone number FAX number

United States 1-800-468-3472; 405-949-6740

Other Americas

(Canada & Brazil) 405-949-6706; 405-949-6738

Mexico 525-546-6965; 525-546-4888

Europe, Middle

East & Africa 31-2065-43300; 31-2065-34320

Asia Pacific &

Australia 65-485-3595; 65-485-4980

Japan 81-3-5462-2904; 81-3-3462-2979

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