

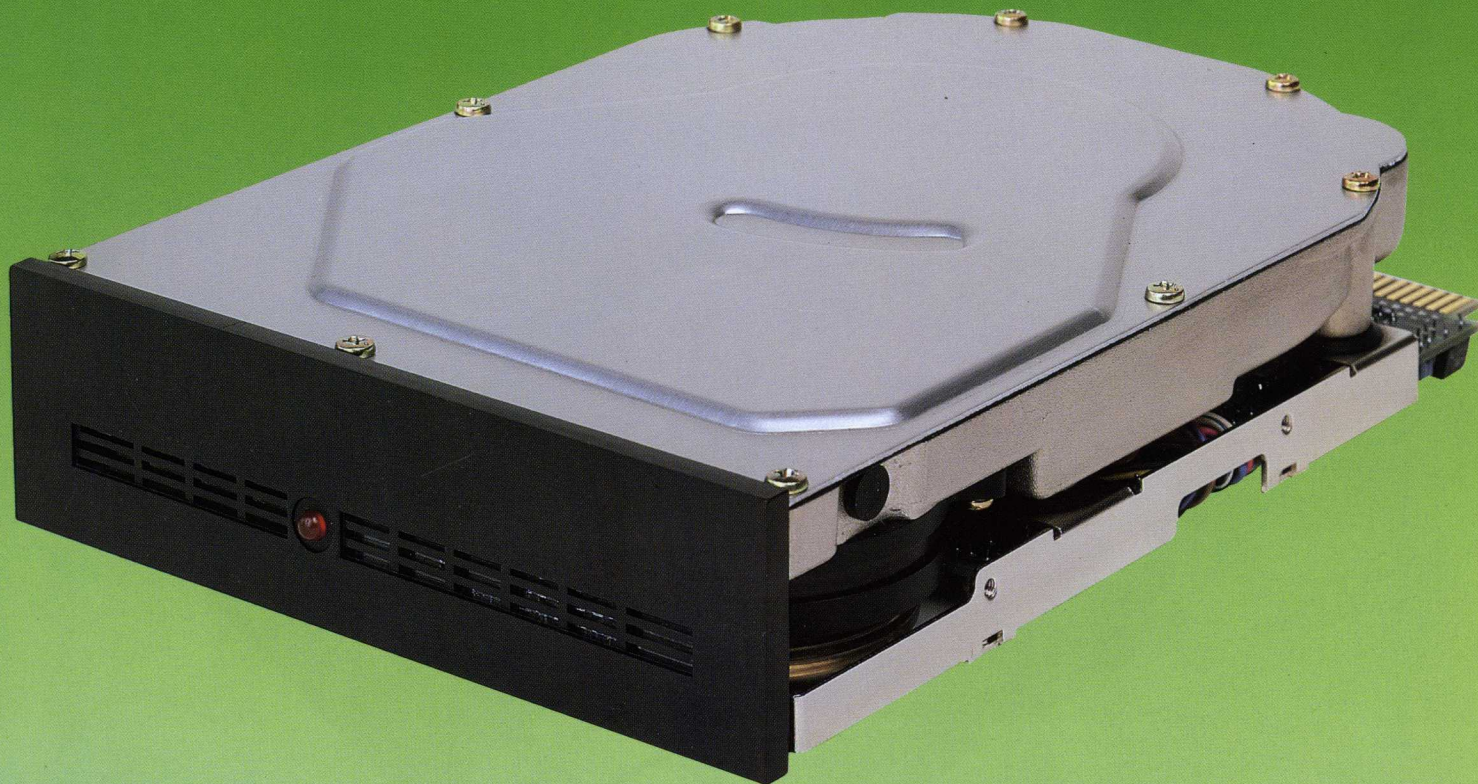
OEM MICRODISK DRIVES

APR

1984

# M2230AT/BT M2233AT/BT

*Half-high 5¼-inch Winchester-type fixed disk drives with 6.6- and 13.33-megabyte storage capacities.*



M2233BT





Fujitsu has made its 5¼-inch Winchester-type disk drives thinner and lightweight. The M2230AT/BT and M2233AT/BT each have only half the height of conventional models. Their unformatted capacities are 6.6 megabytes (M2230AT/BT) and 13.33 megabytes (M2233AT/BT). The type AT models have the Seagate ST506/412 interface, and the type B models have the SA4000 interface. Each model's disk enclosure is completely sealed, integrating one or two disks, two or four Whitney-type contact start/stop heads, a rotary stepper actuator, and a DC spindle motor. These thinner and lighter disk drives fit into a wide variety of small office automation systems, such as personal computers, word processors, and terminal systems.

### Compact, lightweight

The M2230AT/BT and M2233AT/BT each have the same physical size as the industry standard half-high minifloppy disk drive. They can be mounted horizontally or vertically. Each model weighs only 1.5 kg (3 lb), and consumes mere 30 watts. Noise and vibration have also been greatly reduced. These features make the drives the ideal choice for small, desk-top office systems.

### High performance

The M2230AT/BT and M2233AT/BT combine compactness and high performance. The average positioning time, including the settling time, is 95 milliseconds, and the data transfer rate is 625 kilobytes per second. The start time is less than 20 seconds, and a dynamic brake reduces the stop time to less than 15 seconds.



M2233BT



## Microprocessor controlled

With the M2230AT/BT and M2233AT/BT, the stepping motor is controlled by a microprocessor. As a result, the drives' seek control circuit is greatly simplified, further increasing the reliability.

## Reliable, maintenance free

The completely sealed disk enclosure contains a breathing filter and recirculation filter to provide a contamination-free environment. Whitney-type contact start/stop heads eliminate moving parts for head loading and unloading. The Head IC prevents read errors caused by external electrical noise, and the LSI drive logic further enhances the drives' reliability. No wonder then that the mean-time-between-failure (MTBF) of these drives is more than 10,000 power-on hours. Also, no preventive maintenance is required, and mean-time-to-repair (MTTR) is less than 30 minutes.

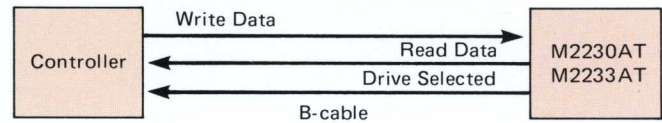
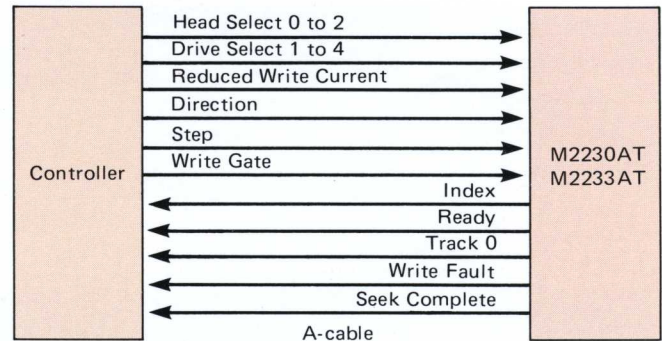
## Seagate and SA4000 interfaces

The type AT models have the Seagate ST506/412 interface, an internationally used modified floppy interface for 5¼-inch disks. The type BT models are provided with the SA4000 interface, a widely used modified floppy interface for 8- and 14-inch disks. The type BT models include Variable Frequency Oscillator (VFO) and Modified Frequency Modulation (MFM) circuits, making the job of designing controllers much easier. The type BT models also offer an optional control board for a bidirectional data bus interface and a simplified host interface. Since the control board is the same size as the main printed circuit board, it can be mounted over the main board, making system design an easy one.

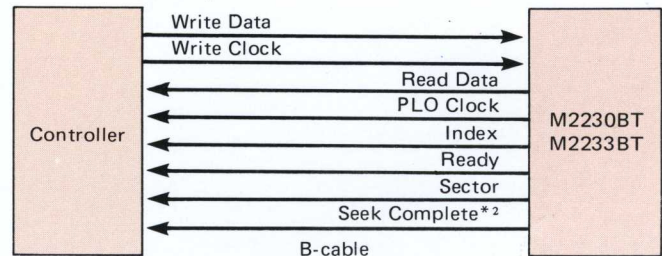
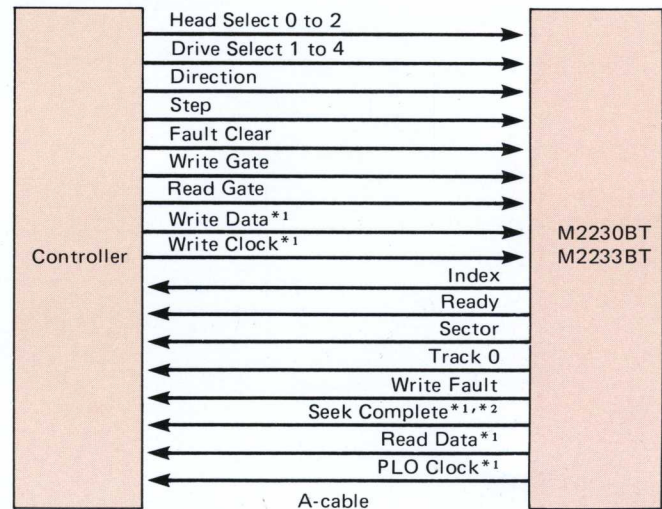
## Internationally compatible

These 5¼-inch disk drives use low-voltage DC power of +12V and +5V, permitting international applications and freedom from the effects of power line fluctuations.

### Seagate ST506/412 interface



### SA4000 interface



\*1. Signal lines are connected by turning on the corresponding switches on the printed circuit boards.

\*2. Settling time may be included or omitted by setting relevant switches on the printed circuit boards.



## FUNCTIONAL SPECIFICATIONS

		M2230AT	M2233AT	M2230BT	M2233BT
Storage capacity	Unformatted	6.66 megabytes	13.33 megabytes	6.66 megabytes	13.33 megabytes
	Formatted	5.24 megabytes	10.48 megabytes	5.24 megabytes	10.48 megabytes
Disks (5¼-inch)		1	2	1	2
Heads (read/write)		2	4	2	4
Track capacity	Unformatted	10,416 bytes			
	Formatted	8,192 bytes (32 sectors)			
Tracks per cylinder		2	4	2	4
Cylinders		320			
Sectors		32		16 or 32	
Positioning time (including settling time)	Track-to-track	18 milliseconds			
	Average	95 milliseconds			
	Maximum	245 milliseconds (320 cylinders)			
Average latency time		8.3 milliseconds			
Rotational speed		3,600 rotations/minute			
Recording density		10,200 bits/inch			
Track density		300 tracks/inch			
Data transfer rate		625 kilobytes/second			
Recording code		MFM (Modified Frequency Modulation)			
Interface code		MFM (Modified Frequency Modulation)		NRZ (Non-Return-to-Zero)	
Interface		Modified Floppy (Seagate ST506/412 interface)		Modified Floppy (SA4000 interface) Option: control board	
Start time		Less than 20 seconds			
Stop time		Less than 15 seconds			

## RELIABILITY SPECIFICATIONS

		M2230AT/BT, M2233AT/BT
Mean-time-between-failures (MTBF)		More than 10,000 power-on hours
Mean-time-to-repair (MTTR)		Less than 30 minutes
Component life		5 years
Error rates	Recoverable errors	10 per 10 <sup>11</sup> bits read
	Unrecoverable errors	10 per 10 <sup>13</sup> bits read
	Seek errors	10 per 10 <sup>7</sup> seeks

Specifications are subject to change without notice.  
For the latest information, contact your local  
Fujitsu representative.

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## PHYSICAL SPECIFICATIONS

		M2230AT M2233AT	M2230BT M2233BT
Power requirements		12 VDC±10%, 1.8 A (max. 4.0 A) 5 VDC±5%, 1 A	12 VDC±10%, 1.8 A (max. 4.0 A) 5 VDC±5%, 1.6 A
Dimensions	Height	41 mm (1.6 in)	
	Width	146 mm (5.7 in)	
	Depth	203 mm (8.0 in)	
Weight		1.5 kg (3 lb)	
Ambient temperature	Operating	5°C to 45°C ( 41°F to 113°F)	
	Not operating	-40°C to 60°C (-40°F to 140°F)	
	Gradient	Less than 15°C (27°F)/hour	
Relative humidity	Operating	20% to 80% (non condensing)	
	Not operating	5% to 95% (non condensing)	
Vibration and shock resistance	Operating	Max. 0.2 G (3 Hz to 60 Hz) Shock: max. 2 G (max. 10 ms)	
	Not operating	Max. 0.4 G (3 Hz to 60 Hz) Shock: max. 3 G (max. 10 ms)	
	In storage or transport	Shock: max. 5 G (max. 30 ms)	
Altitude	Operating	3,000 m (10,000 ft)	
	Not operating	12,000 m (40,000 ft)	

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