

OEM MINIDISK DRIVES

# M2351A/AF

*10.5-inch (268 mm) Winchester-type fixed-disk drives with 474 megabyte capacity and 18 millisecond average positioning time*



M2351A

**FUJITSU**

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The M2351A and M2351AF minidisk drives are 10.5-inch (268 mm) Winchester-type fixed-disk drives each offering a large storage capacity of 474 megabytes, superlative performance and high reliability. They are suitable for both online and large-scale data base applications.

The M2351A adopts moving heads only, while the M2351AF has moving heads plus fixed heads (for accessing 1.69 megabytes) for improved throughput. The M2351A and M2351AF each consist mainly of a disk enclosure, four printed circuit boards and a DC power supply unit. The disk enclosure is completely sealed and integrates six disks, Winchester-type contact start/stop heads, a rotary actuator, DC spindle motor and IC read preamplifiers.

## **Very large storage capacity**

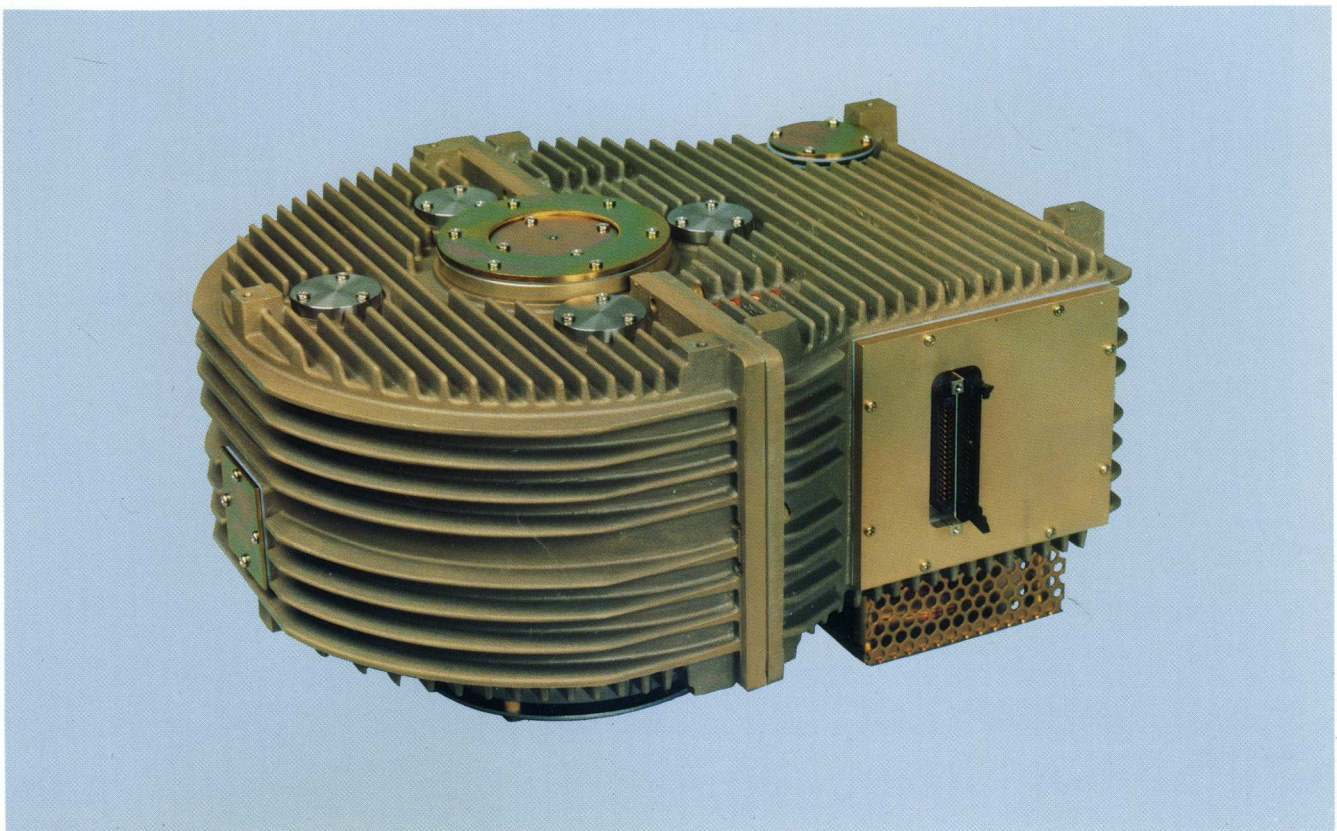
The M2351A and M2351AF each have 842 cylinders with 28,160 byte unformatted track capacity, and their servo-controlled track-following system assures accurate head positioning on extremely high-density tracks of 880 tracks per inch, thus realizing an unparalleled large storage capacity—474 megabytes on six minidisks.

## **Superb performance**

The adoption of an advanced rotary actuator and a direct-drive DC spindle motor of 3,961 rotations per minute, as well as two heads per surface, allows for exceedingly high performance: 18 millisecond average positioning time (5 milliseconds for track-to-track, 35 milliseconds maximum), 7.58 millisecond average latency time, and 1.859 megabyte-per-second data transfer rate. With the M2351AF, 60 fixed heads allow for faster access to 1.69 megabytes.

## **Enhanced reliability**

The completely sealed disk enclosure shuts off air flow from the outside to provide a contamination-free environment for the low-flying heads. Winchester-type contact start/stop heads eliminate moving parts for head loading and unloading. A read preamplifier on each head arm assembly called the head IC amplifies small read signals to increase the reliability of read data. Printed circuit boards incorporate advanced LSI semiconductors. With these sophisticated features, the M2351A and M2351AF assure a mean-time-between-failure (MTBF) of 10,000 power-on hours.



*M2351A/AF disk enclosure*

**Compact, economical**

Despite their large capacity and superb performance, the M2351A and M2351AF each can be mounted in a standard 19-inch rack, thus saving installation space. Stand-alone models are also available. With the adoption of smaller disks and a rotary actuator, the M2351A/AF's power consumption is substantially reduced to less than 0.62KVA, thus contributing to energy saving.

**Dual channel option**

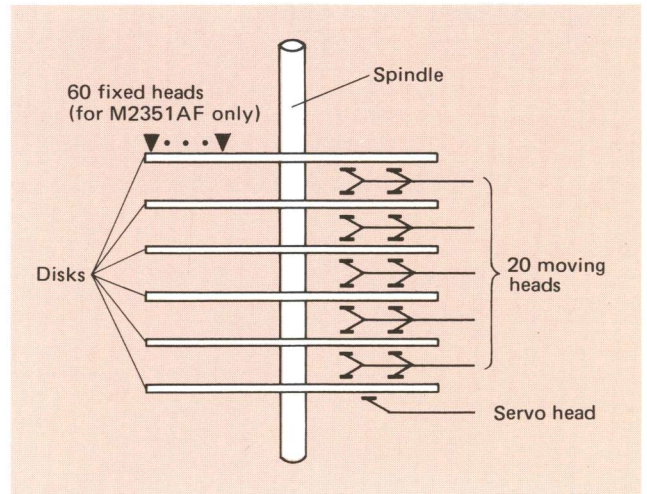
The M2351A and M2351AF each can be accessed from two channels when a dual channel option is provided, permitting two controllers to share the same data file.

**Modified SMD interface**

The industry standard Storage Module Drive (SMD) interface has been modified to support the M2351A/AF's increased track capacity and to facilitate maintenance.

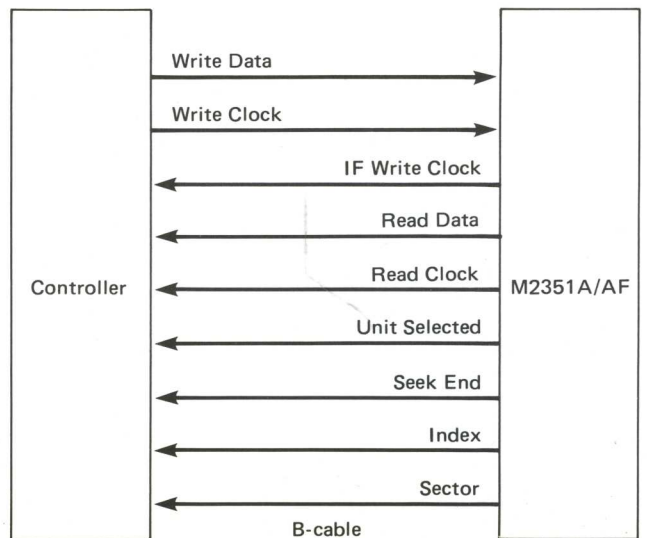
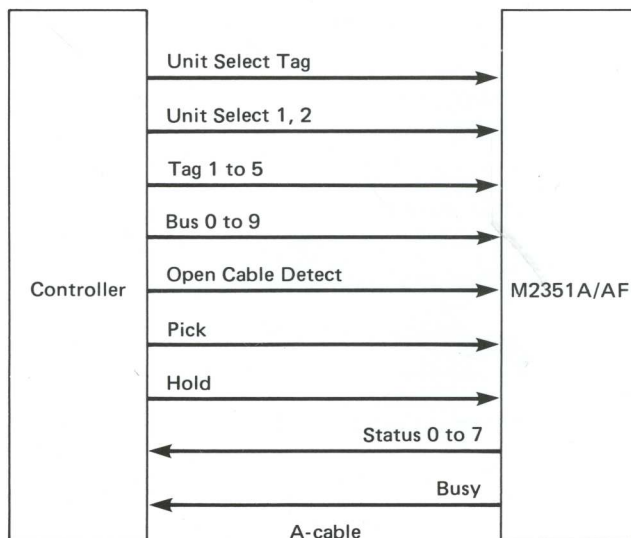
**Maintenance-free**

Thanks to the completely sealed disk enclosure as well as the belt-eliminating built-in DC spindle motor and other highly reliable printed circuit boards, the M2351A and M2351AF require substantially reduced maintenance. Even if errors occur, the error information is provided both via light-emitting diodes on a printed circuit board and via interface signals, for improved serviceability. The compact disk enclosure can be easily replaced by a customer engineer, and mean-time-to-repair (MTTR) is less than 30 minutes.



*M2351A/AF head-disk structure*

**Modified SMD interface**



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## FUNCTIONAL SPECIFICATIONS

		M2351A	M2351AF
Storage capacity (unformatted)	Moving heads	474,214,400 bytes	
	Fixed heads	—	1,689,600 bytes
Disks		6	
Heads	Moving	20 (2 per surface)	
	Servo	1	
	Fixed	—	60
Bytes per track		28,160	
Tracks per cylinder	Moving heads	20	
	Fixed heads	—	20
Cylinders	Moving heads	842	
	Fixed heads	—	3
Positioning time	Track-to-track	5 milliseconds	
	Average	18 milliseconds	
	Maximum	35 milliseconds	
Average latency		7.58 milliseconds	
Rotational speed		3,961 rotations/minute±2%	
Recording density		12,790 bits/inch	
Track density		880 tracks/inch	
Data transfer rate		1.859 megabytes/second	
Recording code		MFM (Modified Frequency Modulation)	
Interface code		NRZ (Non Return to Zero)	
Interface		Modified SMD (Modified Storage Module Drive)	
Head positioning method		Servo-controlled track-following	
Start time		30 seconds	
Stop time		15 seconds	

## RELIABILITY SPECIFICATIONS

		M2351A/AF
Mean-time-between-failures (MTBF)		More than 10,000 power-on hours
Mean-time-to-repair (MTTR)		Less than 30 minutes
Components life		5 years
Error rates	Recoverable errors	10 per 10 <sup>11</sup> bits read
	Unrecoverable errors	10 per 10 <sup>14</sup> bits read
	Seek errors	10 per 10 <sup>8</sup> seeks

## PHYSICAL SPECIFICATIONS

		M2351A/AF
Dimensions and weight	Height	264mm (10.4 inches)
	Width	482mm (19.0 inches)
	Depth	700mm (27.6 inches)
	Weight*	60kg (132 lb)
Power requirements		100VAC±10%, 50Hz±2Hz, 5.7A or 60Hz±2Hz, 5.4A 120VAC±10%, 60Hz±2Hz, 4.6A 220VAC±10%, 50Hz±2Hz, 2.9A 240VAC±10%, 50Hz±2Hz, 2.6A
Ambient temperature	Operating	10 to 40°C (18 to 104°F), less than 10°C (18°F)/hour
	Non-operating	-40 to 60°C (-40 to 140°F), less than 20°C (36°F)/hour
Relative humidity	Operating	20 to 80% (non-condensation)
	Non-operating	5 to 95% (non-condensation)
Vibration	Operating	0.2G (5 to 50Hz), 1G (50 to 500Hz) shock: 2G (max. 10ms)
	Non-operating	0.2G (10 to 500Hz), shock: 3G (max. 10ms)
	In storage or during transportation	3G, shock: 5G (max. 30ms)
Altitude	Operating	3,000m (10,000 feet)
	Non-operating	12,000m (40,000 feet)

\* When mounted in a 19-inch rack, the rack is required to have at least 610mm (24 inches) depth.

Specifications are subject to change without notice. For the latest information, contact your local Fujitsu representative.  
Second edition, February 1982

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OL1006-824S3