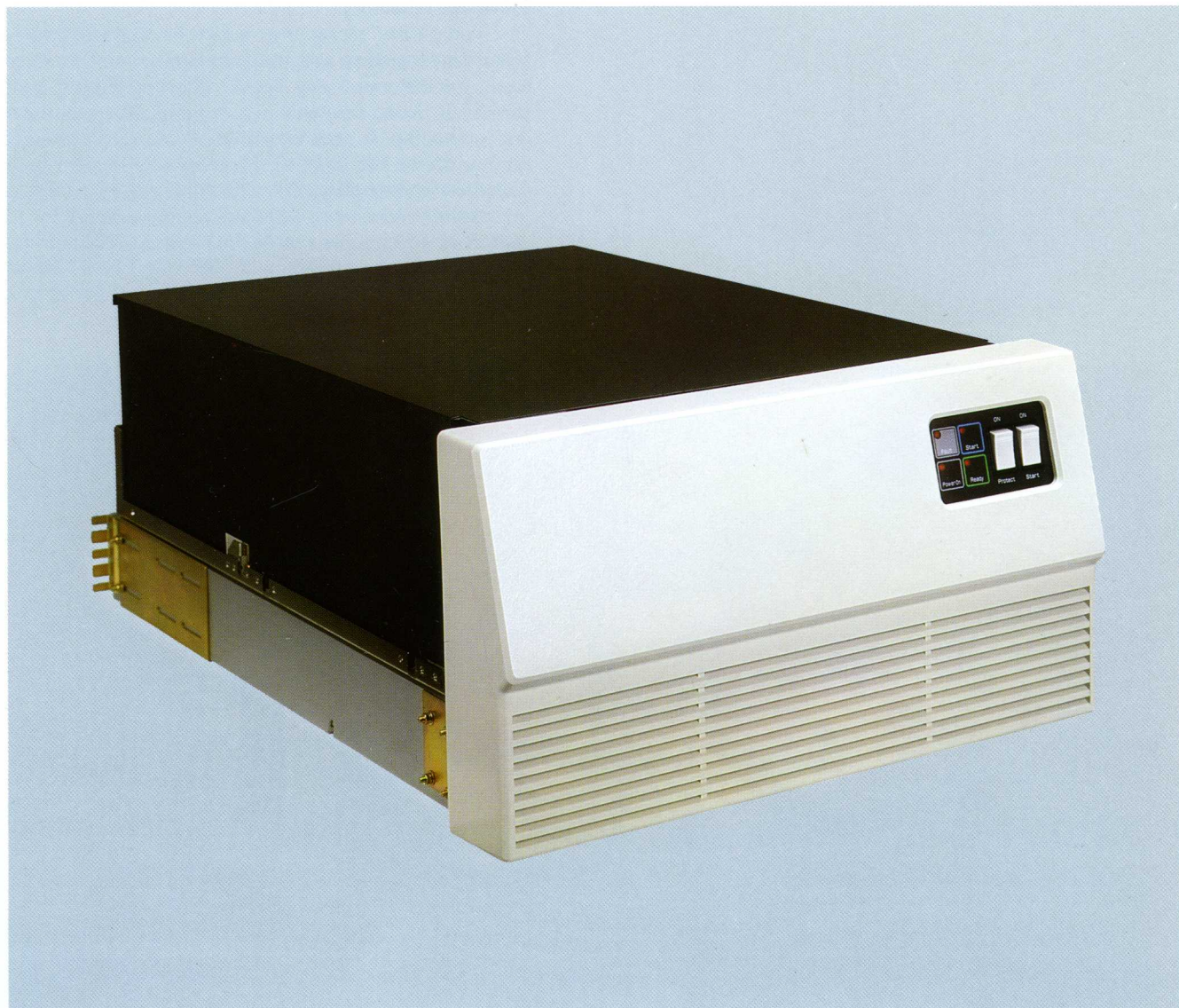


OEM MINIDISK DRIVES

M2351A/AF

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

APR 1984



M2351A



OEM MINIDISK DRIVES

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

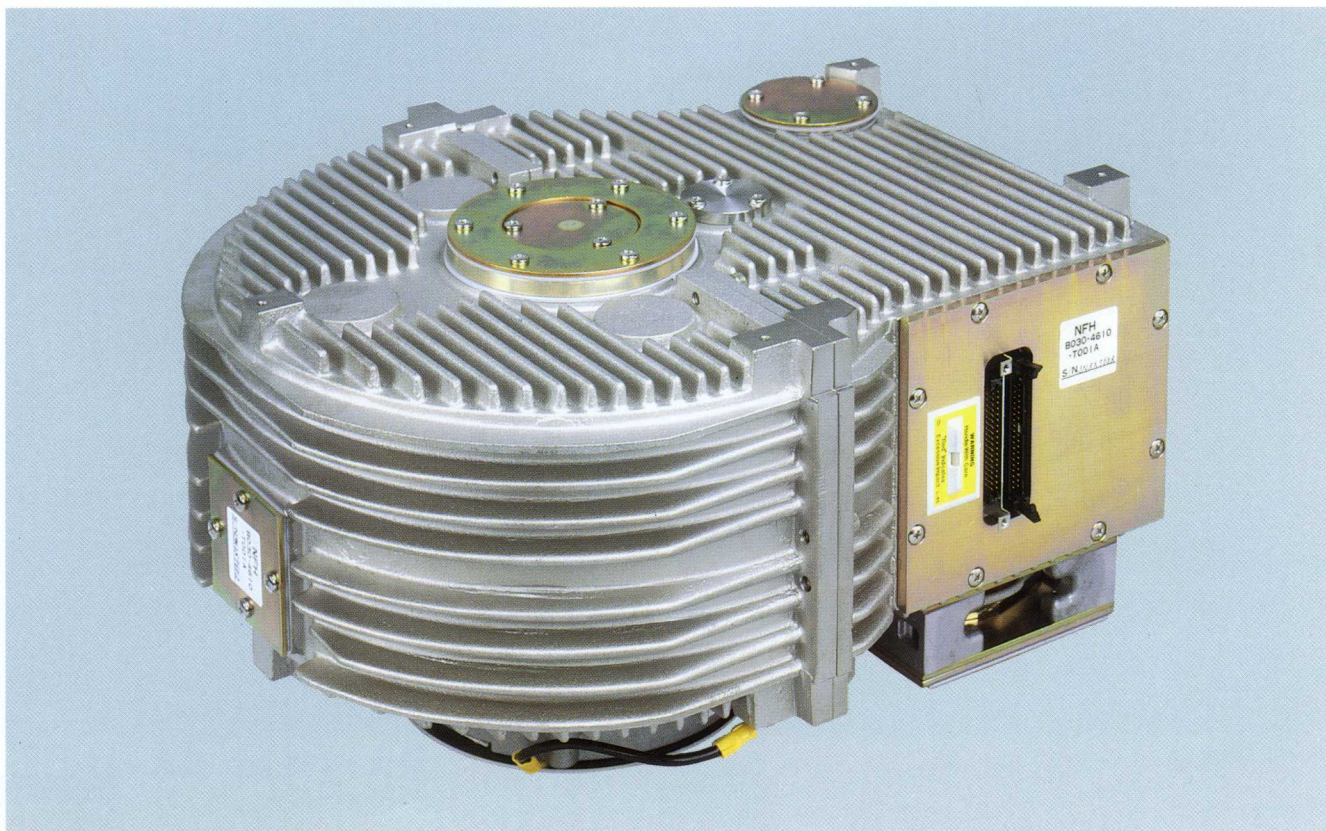
The M2351A and M2351AF each have 842 cylinders with 28,160 byte unformatted track capacity, and their servo-controlled track-following system assures accurate head positioning on extremely high-density tracks of 880 tracks per inch, thus realizing an unparalleled large storage capacity—474 megabytes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

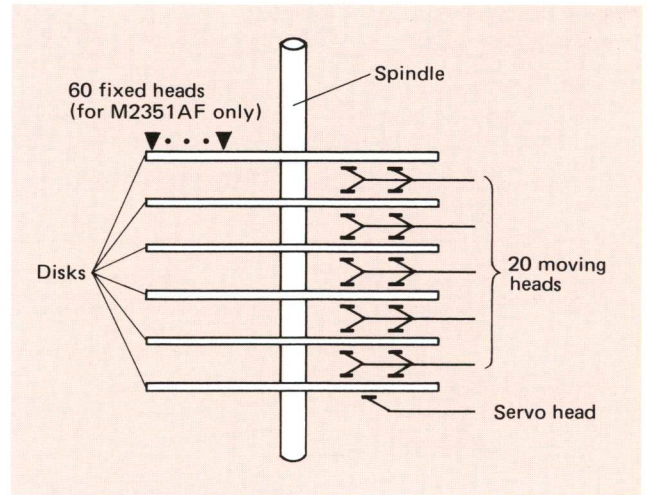
The M2351A and M2351AF each can be accessed from two channels when a dual channel option is provided, permitting two controllers to share the same data file.

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.

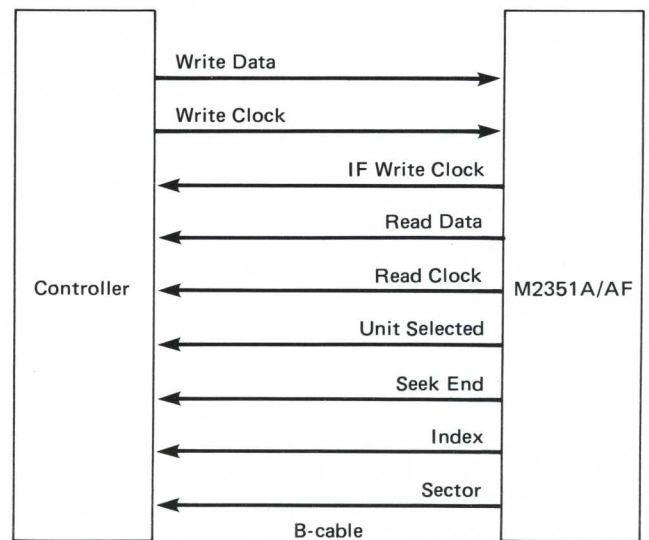
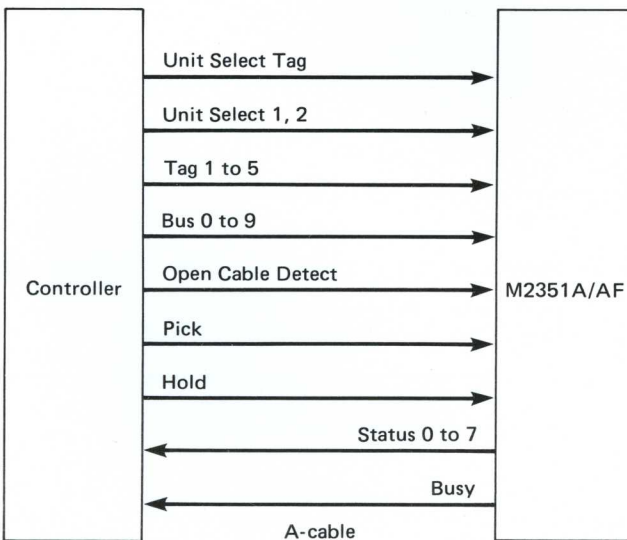
Maintenance-free

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



OEM MINIDISK DRIVES

FUNCTIONAL SPECIFICATIONS

| | | M2351A | M2351AF |
|--------------------------------|----------------|---|----------------|
| Storage capacity (unformatted) | Moving heads | 474.21 megabytes | |
| | Fixed heads | — | 1.69 megabytes |
| 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 ¹¹ bits read |
| | Unrecoverable errors | 10 per 10 ¹⁴ bits read |
| | Seek errors | 10 per 10 ⁸ seeks |

PHYSICAL SPECIFICATIONS

| | | M2351A/AF |
|-----------------------|-------------------------|--|
| Dimensions and weight | Height | 264mm (10.4 in) |
| | Width | 482mm (19.0 in) |
| | Depth | 700mm (27.6 in) |
| | 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°C to 40°C (18°F to 104°F), less than 10°C (18°F)/hour |
| | Not operating | -40°C to 60°C (-40°F to 140°F), less than 20°C (36°F)/hour |
| Relative humidity | Operating | 20% to 80% (non condensing) |
| | Not operating | 5% to 95% (non condensing) |
| Vibration | Operating | 0.2G (5 to 50Hz), 1G (50 to 500Hz), shock: 2G (max. 10ms) |
| | Not operating | 0.2G (10 to 500Hz), shock: 3G (max. 10ms) |
| | In storage or transport | 3G, shock: 5G (max. 30ms) |
| Altitude | Operating | 3,000m (10,000 ft) |
| | Not operating | 12,000m (40,000 ft) |

* 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.
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