Series 8000 Cartridge Disc Drive Systems
Models 8100/5 and 8200/5

GENERAL DESCRIPTION

Series 8000 Disc Drive Systems offer two cartridge disc drives designed to surpass the stringent requirements of today's computer systems. Both drive units provide speed, high storage capacity, excellent reliability, compact modular construction, and versatility of interfacing to any digital computer.

Model 8200/5 is a dual-disc drive which utilizes one fixed disc and an IBM 5440 top loading disc cartridge. Storage capacity of the 8200/5 is 50 million bits at a density of 100 tracks per inch on the recording surfaces. Model 8100/5, the single disc drive, is identical but uses only the removable disc cartridge to provide 25 million bits of storage.

The choice of disc configurations permits tailoring of storage capacity to the requirements of each system. In addition to unlimited off-line storage in the form of removable cartridges, up to four Microdata Disc Drives can be daisychained on a single device cable, allowing up to 20 million bytes of on-line storage by a single controller.

STANDARD FEATURES

- Single- and dual-disc drives
- IBM 5440 removable disc cartridges
- 25 or 50 million bit storage capacity
- Compact packaging - just 8.75 inches high including power supply
- Modular electronics and fewer moving parts for high reliability
- Voice coil positioning system with optical position scale and velocity transducer
- Positive positioning - accurate to twice the actual track density
- 10 milliseconds track-to-track positioning
- Automatic drive belt tension adjustment
- Three-micron air filtration for maximum data integrity
- Integral power supply
- 1500 or 2400 rpm disc rotation
- Daisychain operation - up to four drives per controller
- Write protection, one for fixed disc and one for removable disc cartridges
- 5000 hour MTBF
- Low data error rate (less than 1 in 10^{12})
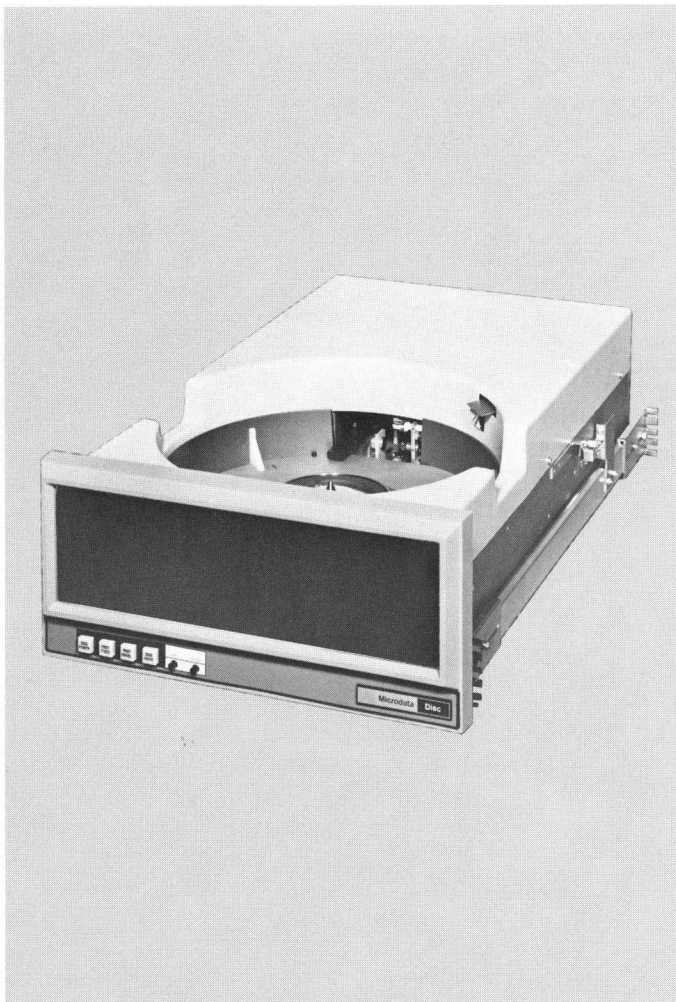
ACCESS TIMES

Access times of the Microdata Disc Drive Systems are faster than any comparable unit. A new head positioning system provides conservatively rated track-to-track access times of 10 milliseconds, 35 milliseconds for a random move, and 60-milliseconds maximum (203 tracks).

The standard 1500 rpm disc rotation speed accepts and supplies data at 1.562 MHz, with 40 milliseconds average rotational latency. An optional 2400 rpm disc speed is available for giving a 2.5 MHz data transfer rate. Average rotation latency with this option is reduced to 25 milliseconds.

RELIABILITY

Data

Error free data during read and write operations (less than 1 bit in 10^{12} bits transferred) is assured by the reliability of the entire data electronics section and by the accuracy of the Microdata Disc head positioning system. The high efficiency voice coil and new optical position system have been designed to achieve positive positioning accuracy of 200 tracks per inch, twice the actual track density of the disc.

The quality and reliability of recorded information is further ensured by the positive air filtration cooling system. An air filter removes microscopic particles that could damage the disc and head surfaces or cause loss of data.

Mechanical

Simplicity of design with fewer moving parts in the drive mechanics has resulted in the most reliable disc drive in its class. Mean time between failure (MTBF) of 5000 hours is a reality. All mechanical parts are precision machined for smooth operation under all loads and conditions.

The head positioning voice coil is highly efficient to reduce heat built-up in the unit. Built with high precision machining of high carbon steel, the Microdata Disc Drive System delivers top performance with minimum power. The three-micron air filter on the cooling air intake removes dirt and dust that could cause wear and damage to the critical moving parts.

Improper belt tension is a major cause of premature wear of the drive belt and disc spindle bearings, and proper tension is normally a matter of judgement by the technician. In the Microdata Disc Drive, an automatic belt tension adjustment eliminates a judgement adjustment.

Circuit

Circuit wiring and wire harnesses have been virtually eliminated in the Microdata Disc Drives. All disc electronics are contained on four printed circuit boards that plug into a printed circuit backplane. This not only increases the basic circuit reliability, but also significantly reduces trouble-shooting and maintenance repair time. Any circuit problem can be corrected in less than one hour, and in most cases the drive is returned to operation in minutes.
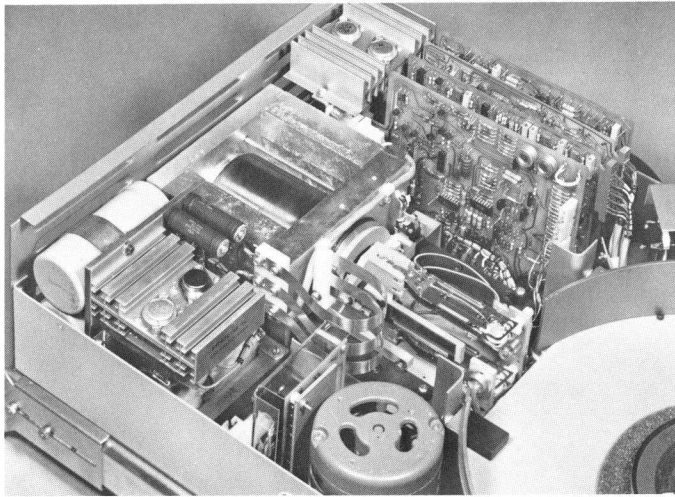
INTERFACE

The interface contains complete control, data, timing, and status functions for disc operation. An additional output line provides dc voltage for signal termination in the user's controller. The interface allows up to four disc drives to be operated by a single common controller. The optional daisy-chain connector permits the device cable to be routed from one disc drive to the next.

The interface is configured to provide a high degree of flexibility in the design of disc controllers. All lines use negative-true logic compatible with both DTL and TTL circuitry.

Input Lines
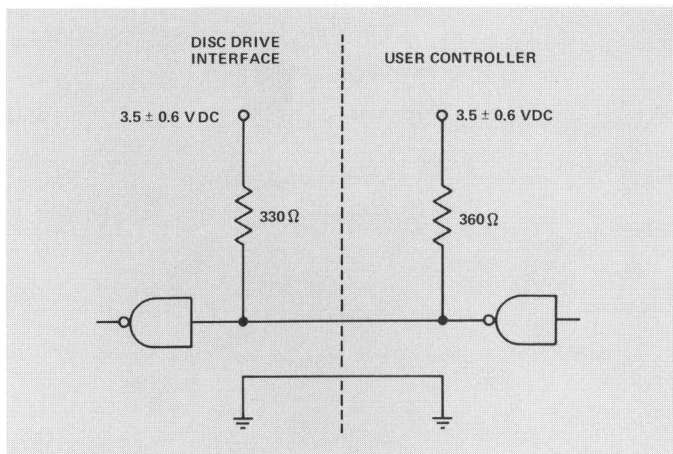
Circuit	Quantity
Drive Select	4
Write Mode Enable	1
Read Mode Enable	1
Erase Mode Enable	1
Disc (Platter) Select	1
Head Select	1
Write Data	1
Track Address	8
Restore to Track Zero	1
Track Address Strobe	1
File Unload Interlock	1

Output Lines
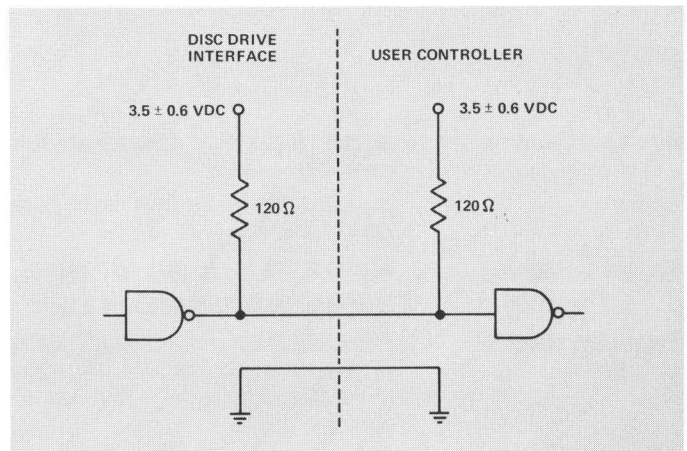
Circuit	Quantity
Read Data	1
Read Clock	1
Sector Pulse	1
Sector Index Pulse	1
Sector Address	5
File Ready	1
Seek Complete	1
Illegal Track Address	1
Unit Malfunction	1
Termination Voltage	1

PACKAGING

Microdata Disc Drives feature compact packaging for more storage in a given amount of rack space. The drive unit is 8.75 inches high by 28 inches deep and is designed for mounting in a standard 19-inch (RETMA) equipment rack. The disc power supply can be contained within the drive, or a rack-mounted external supply capable of powering two drives can be used. Slide mounting allows the drive unit to be withdrawn to the front of the rack for loading and removal of the disc cartridge.

OPTIONS

- **I/O Cables** - Microdata compatible cables are available for connecting the disc drive to the user's controller and for connecting disc drives together via the daisychain connectors. The cables are 2.5-inch-wide flat ribbon cables with 64 26-gauge conductors. Cables are available in 2.5-foot and 8-foot lengths with connectors on one or both ends.

- **External Power Supply** - Microdata Disc Drives can be ordered without the standard integral power supply. Optional external, rack-mounted supply accommodates two drive units.

- **1500 or 2400 Rpm Disc Speed** - Selection of disc speed provides a choice of data rates and rotation latency times.

- **Choice of Sector Format** - Disc sector rings are available for 16- and 24-sector formats.

- **Disc Exerciser** - Portable, briefcase exerciser provides complete checkout and testing of Microdata Disc Drives

SPECIFICATIONS

Disc Configuration	Model 8100/5 - One removable cartridge
	Model 8200/5 - One removable cartridge and one fixed disc
Storage Capacity	Model 8100/5 - 25,000,000 bits
	Model 8200/5 - 50,000,000 bits
Recording Medium	Removable cartridge is IBM 5440 or equivalent; all discs are 14 inches in diameter, oxide-coated aluminum substrate.
Cylinders Per Surface	203
Track Spacing	100 Tracks per inch
Disc Rotation Speed	1500 RPM ± 2% or 2400 rpm ± 2%
Data Rate	1.562 MHz @ 1500 rpm; 2.5 MHz @ 2400 rpm
Positioning Time (including settle)	10 milliseconds track to track 35 milliseconds average 60 milliseconds maximum
Rotation Latency (including settle)	40 milliseconds (maximum) @ 1500 rpm 25 milliseconds (maximum) @ 2400 rpm
Head Positioning System	High efficiency voice coil (linear motor) with optical position scale and velocity transducer.
Mean Time Between Failure (MTBF)	Greater than 5000 hours
Mean Time to Repair (MTTR)	Less than one hour
Recoverable Error Rate	Less than 1 bit in 10^{10} bits transferred
Non-Recoverable Error Rate	Less than 1 bit in 10^{12} bits transferred
Air Filteration	3 micron
DC Power	Internal dc power supply; optional external power supply accommodates two disc drives.
Disc Drive Dimensions	19 inches wide, 8.75 inches high, 28 inches deep
External Power Supply Dimensions	19 inches wide, 8.75 inches high, 28.25 inches deep
Weight	120 pounds
Ac Power	115 Vac ± 10% @ 1.5A (average) or 220 Vac ± 10% @ 0.8A; 59.5 to 60.5 Hz or 49.5 to 50.5 Hz.
Operating Environment	55° to 105°F, 10 to 80% relative humidity without condensation.