

MOLECULAR

DD 1600 Dual Disc Drive



Electronic accounting and data processing require large files to be stored in such a way that they can be read and amended at high speeds without endangering the security of the information. The DD 1600 gives MOLECULAR the ability to store up to 6.4 megabytes (3.2 million words), or about ten million characters.

The unit comprises two rapidly rotating magnetic discs, one fixed and one exchangeable. Data can be written to and read from them via Molecular and, in addition, any record can be amended. The average time for the completion of any one of these operations is less than one-twentieth of a second. Both programs and data can be stored on the DD 1600 which can act as an extension to MOLECULAR's central store.

Technical Details

Disc organisation

1 sector = 128 words
1 track = 16 sectors
1 cylinder = 2 tracks
1 disc = 406 cylinders

Access times

Average access time 35 milliseconds
Average latency 12.5 milliseconds
Sector read/write 1.5 milliseconds

Disc speed

2,400 revolutions a minute

Dimensions

Width 18.5 inches (470mm)
Depth 30 inches (760mm)
Height 34 inches (860mm)

Operating conditions

Normal office environment without false floor or ceiling as defined in the Molecular Site Preparation Manual.

Power consumption

700 VA

Ambient temperature

15° - 32° Centigrade

Voltage

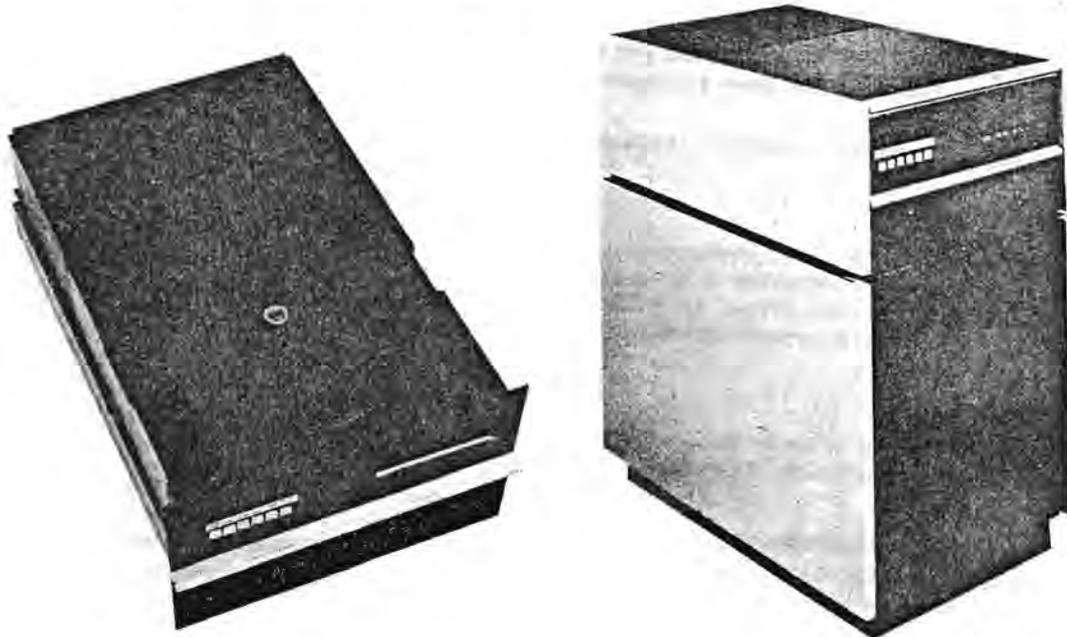
240± 10% 50 Hz single phase
110/120V 60 Hz single phase optional



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CONTROL DATA 9427H DOUBLE-DENSITY CARTRIDGE DISK DRIVE DESIGNED FOR ORIGINAL EQUIPMENT MANUFACTURERS



CONTROL DATA 9427H Cartridge Disk Drive is a medium capacity, random-access storage device which records and reads information on a cartridge disk. The basic 9427H unit consists of a rack-mountable deck assembly which includes a spindle and drive motor, head-positioning mechanism, logic chassis, power supply and air-filtration system. The read/recovery circuit will operate with or without missing clock patterns such as those found in variable sector formats. The unit features absolute (direct) addressing to position heads to desired track.

The CDC® 9427H uses the CDC 9848 Cartridge Disk or equivalent (IBM 5440). A single disk within the cartridge stores information on two oxide-coated surfaces. Head positioning is performed by a closed-loop, proportional-servo system. The carriage is driven by a voice-coil linear actuator, which provides rapid data accessing.

The basic 9427H has a capacity of 50×10^6 bits. Storage capabilities can be doubled by adding an optional fixed disk. This disk provides the same facilities as the cartridge, except that it is non-removable.

Special Features:

- 12 MB standard, optional 6 MB and 3 MB capacities unformatted
- Under 35 ms random access time
- Independent blower motor
- Rack or cabinet mount options
- Self contained, integral, universal 50/60 H, 100-250 VAC power supply.
- Extremely cool operation (less than 5° F temp. rise in the cartridge area)
- Wide voltage tolerance (-15% +10%) allows operation during power brown-outs

OPERATOR CONTROL PANEL

Start	Ready	Active	Fault Reset	Write Protect Upper	Write Protect Lower
Alternate Action Switch	Indicator	Indicator	Momentary Switch	Alternate Action Switch	Alternate Action Switch

Start Switch—When depressed, energizes the spindle drive motor and initiates the First Seek sequence provided the cartridge disk is in place, the cartridge hold downs are closed and the appropriate voltages are present.

Start Indicator—Lights when the spindle is rotating and remains lit after the Start Switch is de-energized until the spindle has stopped. The indicator also is lit when the Start Switch is in the "on" position, even if a condition exists which prevents the First Seek sequence.

Fault Reset Switch—Pressing the switch clears the Fault flip-flop in the logic chassis and extinguishes the Fault Indicator on the operator panel, providing the fault condition is no longer present. Faults which are potentially damaging to heads or media result in automatic head retraction and stopping of the spindle, and can only be cleared by stopping and re-starting the spindle with the Start switch.

Fault Reset Indicator—Lights when one or more operational faults occurs.

Write Protect Upper Switch—When depressed, prevents Write and Erase operations, thus protecting data on the cartridge disk.

Write Protect Upper Indicator—Lights when cartridge data are protected either by the controller via I/O signals or by the operator via the Write Protect Switch.

Write Protect Lower Switch—When depressed, prevents Write and Erase operations, thus protecting data on the fixed disk.

Write Protect Lower Indicator—Lights when fixed disk data are protected either by the controller via I/O signals or by the operator via the Write Protect Switch.

Ready Indicator—Lights when unit is up to speed and the heads are loaded and a first seek has been successfully completed.

Active Indicator—Lights when unit is seeking, reading or writing.

INTERFACE DATA

The 9427H interface provides flexibility in the design of new controllers, yet remains compatible with existing controllers for CDC Cartridge Disk Drives. All interface signals are defined true when at ground potential, and false when at +4 volts (nominal).

INPUT SIGNAL LINES

Cylinder Address Bits—Consist of nine lines carrying the cylinder address to the drive when the CA strobe is valid (true).

Return to Zero Seek—A 1 microsecond pulse which causes the heads to recalibrate to cylinder position 000. Optionally, this line can be a level used in conjunction with CA strobe.

Head Select—One line is used to select the cartridge or fixed disk, and another line selects the upper or lower Read/Write head of the selected disk. Optionally, either or both head select lines can be converted.

Write Data Clock—One line carries the double frequency clock and data information signals to the drive.

Write Gate—When true, the Write Gate enables a write current to pass through the write coils of the selected head.

Erase Gate—When true, the Erase Gate enables an erase current to pass through the erase coils of the selected head.

Read Gate—When true, the Read Gate enables the recorded transitions on a pack to be sensed when the head is selected. The Read Gate is also used to gate separated data and separated clock pulses to be transmitted to the controller.

Unit Select—Four lines (one per unit) are used to select a unit to be accessed. The lines must remain active during any command from the controller, except when monitoring Interrupts. Optionally, the unit may be continually selected for star configuration.

Write Protect or Track Offset—This dual mode-line is enabled by a switch in the interface panel. When in the Write Protect mode, actuating this line inhibits writing and erasing. When in the Track Offset mode, activating this line causes heads to move cyclically ± 800 micro inches from nominal position at a 2 Hz rate.

200 TPI Status—When true, the line indicates that unit is operating in a 200 TPI mode.

Stop Override—If the unit of interest has been started by the operator and the stop-override option has been selected, then Unit Select will maintain 9427H in a selected on-line condition until the Unit Select falls, even if the front panel start switch is reversed to an "off" position.

OUTPUT SIGNAL LINES

All output lines are gated by unit select with the exception of the interrupt lines.

On Cylinder—When true, the line indicates that the heads have been moved to the desired location indicated by the contents of the Cylinder Address Register. At the On Cylinder time, the carriage has positioned the heads at the nominal track location and is ready for a new command sequence. Optionally the On Cylinder can also be present when a Seek Error has occurred.

Read Data—The separated Read Data is transmitted on this line, and is valid only when Read Gate is "on." Pulse width is optionally either 100 ns or 200 ns.

Read Clock—The separated clock is transmitted to the controller using Read Clock line. This line is also only true when Read Gate is true. Pulse width is optionally either 100 ns or 200 ns.

Index—This line carries the selected index from the cartridge if a cartridge head is selected or from fixed disk if a fixed disk head is selected (providing fixed disk is installed). Indices are detected by two separate transducers and only one line driver is used. Options allow its timing to coincide with the sector 0 pulse or to occur in the middle of the last sector.

Sector—The gated sector is from the cartridge if a cartridge head is selected and is from the fixed disk if a fixed-disk head is selected. Pulse width for both Sector and Index is nominally 50 microseconds.

Seek Error—The situation occurs when heads have failed to move to the specified cylinder address within 500 ms of CA strobe. An RTZS command sent to the unit indicating a Seek Error will clear the Seek Error condition and restore the actuator to cylinder 000.

Fault—The Fault condition is true if any of the following conditions exist: multiple head selection; Read and Write Gate enabled at the same time; Read and Erase Gate enabled at the same time; Erase current and no Write Gate; Write current and no Erase Gate; Read, Write or Erase Gates are "on," but On Cylinder is not true; departure of power supply voltages from specified values; or if the fixed disk heads are selected when no fixed disk is installed. All fault conditions except the last two are latched and are resettable by the Fault Reset switch or by RTZS.

Write Protected—When Write Protected, raising of internal Write Enable is totally inhibited. The condition is true if Write Protect line from the controller is true or if the applicable operator control panel Write Protect switch is "on."

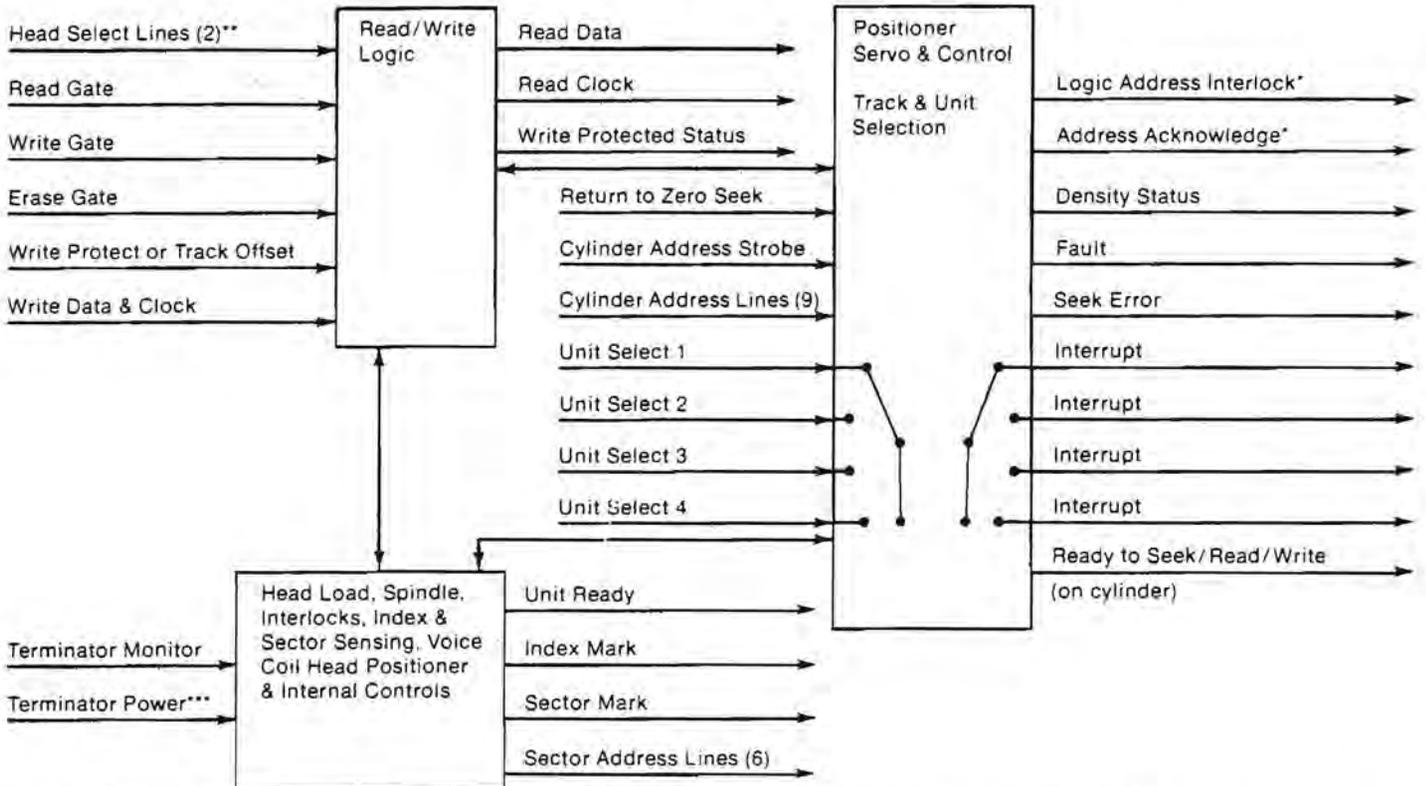
Unit Ready—Condition is true if cartridge is in place, disks are up to speed, heads are loaded and the unit has been selected by a controller.

Interrupt 1, 2, 3 and 4—These lines are unique to each disk drive and therefore not gated by the unit select line. Interrupt (attention), when true, indicates that either the previously initiated seek has been completed and the heads are On Cylinder, or 500 ms have elapsed since the start of the Seek and On Cylinder did not rise. Interrupt is reset by either Read or Write Gate, or by another seek

command. The Seek Error line is made true by any failure to complete a Seek. It may be reset only by an RTZS command.

Sector Address—Six lines carry the address of the sector currently under the Read/Write heads. They are gated for the unit and disk which is selected.

9427H Simplified Functional Block Diagram



*With the optional availability of Logical Address Interlock and Address Acknowledge interface lines using a Winchester connector, the 9427H is compatible with the Diablo 40 Series Cartridge Disk Drive. Address Interlock is not available on the ELCO connector.
 Switches are provided to invert each of these signals to allow compatibility with any head and disk numbering scheme. *Terminator power is supplied by the 9427H on Winchester and 3M connector options. With ELCO or AMP connections, it is optionally supplied by either the controller or the 9427H.

SPECIFICATIONS

Track Density	200 TPI or 100 TPI
Accessing Time	
Maximum access time	60 ms
Maximum track to track access time	7 ms
Average access time	35 ms
Spindle Speed	2400 rpm (1500 rpm optional) ($\pm 2\%$ with $\pm 1/2$ Hz and $+10\%$ - 15% mains tolerances)
Latency Time	12.5 mx (at 2400 rpm) (20 ms at 1500 rpm)
Recording Mode	Double frequency
Density (nominal)	1530 bpi (outer track) 2200 bpi (inner track)
Bit rate (nominal)	2.50 MHz (1.56 MHz at 1500 rpm)
Tracks per cylinder	4 (2 if fixed disk removed)
Cylinders per unit	406 (numbered 0 through 405)

Sectors	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20, 24, 25, 28, 29, 30, 32, 36, 40, 48, 50, 56, 60, 64, 72 hard or missing-clock soft sectoring
Units per controller I/O channel	4 maximum, in daisy-chain configuration
Data Capacity	
Bits per track	62,500 nominal
Bits per cylinder	250,000 nominal (125,000 without fixed disk option)
Bits per unit	100,000,000 nominal (50,000,000 without fixed disk option)
Cartridge Disk	
Disk per cartridge	1
Useable recording surfaces per disk cartridge	2
Disk surface diameter	14 inches
Recording diameters	Track 405 (inner), 9.077 inches Track 0 (outer), 13.127 inches nominal

Disk surface coating Magnetic oxide
 Read/Write Heads CDC self-loading, straddle
 erase standard; pre-erase
 available)

Physical (Rack-Mounted Unit)

Height 10.31 inch (panel)
 (Mounts on 10½-inch centers
 in relay rack)
 Width 19 inch
 Depth 28.25 inch behind recessed
 panel
 28.63 inch (behind panel)
 Flat panel (fits 30-inch deep
 relay rack)
 Weight 135 pounds (rack version)

Physical (Cabinet Mounted Unit)

Height 34 inches
 Width 18½ inches (18½ inches bot-
 tom)
 Depth 29¾ inches
 Weight 235 pounds

Air Filter 0.3 Micron 99%

Electrical

Input power source
 60 Hz units 100-250 volts a.c. in 10-volt
 increments (+10%, -15%),
 59-60.5 Hz, single phase
 50 Hz units 100-250 volts a.c. in 10-volt
 increments (+10%, -15%),
 49-50.5 Hz, single phase

Current -

The following chart holds true
 at 50/60 Hz and nominal line
 voltage with accessor doing
 worst-case (maximum power)
 repeat seeks.

VOLTS	100	110	120	130	140	150	160	170
AMPS	5.2	4.7	4.3	4.0	3.7	3.4	3.2	3.0
VOLTS	180	190	200	210	220	230	240	250
AMPS	2.9	2.7	2.6	2.5	2.4	2.3	2.2	2.1

Power factor: .8

Surge current during spindle
 start is twice the above values
 and lasts 5 seconds

Input/Output Connections

Two connectors on the I/O
 panel at the rear of the unit. A
 terminator is required if the
 unit is the last (or only) unit
 connected to the controller.
 The terminator consists of
 DIP-packaged resistor net-
 works which plug into the I/O
 P.I.B. and can be removed.

Environmental
 (Operating)

Temperature: 60°F to 90°F
 Humidity: 10% to 80% (No
 condensation)
 Altitude: Zero to 7500 feet
 (Specifications are available
 for operating at extended
 environmental limits.)

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