Data General

# 6060, 6061, 6067 DG/DISC STORAGE SUBSYSTEMS

PRODUCT BRIEF

## FEATURES

- Economical storage of from 50 to 760 million bytes of data
- 806K-byte per second data transfer rate
- Moving-head drives feature high-performance 3330/3330-II type technology
- Track-to-track head positioning in 6 milliseconds
- Advanced controller and adapter features
- High reliability and maintenance features
- Operator-oriented controls and indicators
- Supported by Data General's Advanced Operating System (AOS) and Real-time Disc Operating System (RDOS)
- For use on Data General NOVA®, ECLIPSE®, and Commercial System CS/40 and CS/60 computers
- Optional dual-porting from a second Data General computer.
- Drives of 50-, 96-, and 190-megabyte capacity can be intermixed in up-to-four-drive subsystems
- Connects to NOVA or ECLIPSE data channel or ECLIPSE Burst Multiplexor Channel
- Designed and manufactured by Data General

## DESCRIPTION

Data General's Model 6060, 6061, and 6067 DG/Disc Storage Subsystems offer economical high-capacity, high-performance moving-head disc storage for data-base-oriented and/or system device applications. They utilize established 3330-type (6060) and 3330-11-type (6061, 6067) technology in conjunction with advanced controller/adapter features.

The basic subsystem includes a controller and adapter for up to four disc storage units, one disc storage unit, a disc pack, and necessary cabling. A basic Model 6060 subsystem includes a 96-megabyte disc drive; a basic Model 6061 includes a 190-megabyte disc drive; and a basic Model 6067 includes a 50-megabyte disc drive. Users can expand each subsystem with up to three additional 96-megabyte (6060-A), 190-megabyte (6061-A), or 50-megabyte (6067-A) drives in any mix. Additional units include disc packs and cabling. The entire subsystems are designed and manufactured by Data General.

## HIGH-PERFORMANCE DISC DRIVES

The DG/Disc Storage Units have a maximum capacity of 95,956,992 bytes (6060); 190,279,680 bytes (6061); or 50,075,600 bytes (6067). Data recording density (innermost track) is 4040 bits per inch. Track density is 192 per inch (6060) or 370 per inch (6061, 6067). There are either 19 (6060, 6061) or 5 (6067) data recording surfaces.

The drives feature high-performance access and data transfer. Track-to-track head seek positioning typically requires only 6 milliseconds; average head positioning time is 35 milliseconds; and maximum positioning time is 60 milliseconds. At 3600 RPM disc rotational speed, rotational latency averages 8.3 milliseconds and data transfer proceeds at a rate of 806,000 bytes per second. Overall average seek access time (average seek plus rotational latency) is 43.3 milliseconds.

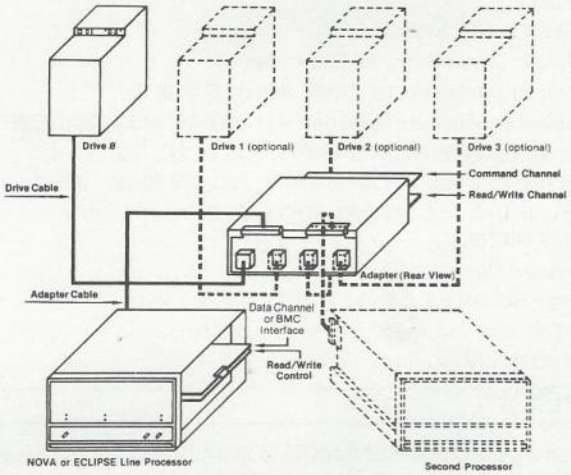
## ADVANCED CONTROLLER/ADAPTER FEATURES

DG/Disc Storage Subsystem performance is greatly enhanced by extended controller and adapter features. The two-board controller resides in the central processing unit or associated expansion chassis. The adapter resides in a separate rack-mounted enclosure.

Unique features, such as independent command and read-write channels and RESERVE and TRESPASS capabilities, let users establish efficient data transfer. Privileged file structures are permitted in multiple shared-disc environments.

An error correcting feature ensures data transfer integrity. The Error Correcting Code (ECC) polynomial is appended to the data in every sector. When data is read back, the ECC bits are evaluated by hardware registers in the adapter. In this manner hardware can detect a burst error of up to 32 bits and software can correct an error of up to 11 consecutive bits in a 512-byte sector. Longer bit transfer errors can be similarly detected.

There are two controller versions: one for attachment to a standard NOVA or ECLIPSE data channel and another for use with the 10-megabyte-per-second Burst Multiplexor Channel (BMC). The BMC is standard on ECLIPSE M/600 computers and optional on ECLIPSE C/350 and S/250 computers. The Dual-Port Option is also available to RDOS systems in both data channel and BMC versions. The data channel, BMC controller and Dual-Port Option versions are otherwise functionally identical.




## RELIABILITY AND MAINTENANCE FEATURES

DG/Disc Storage Subsystems are highly reliable and lend themselves to easy maintenance. They use proven 3330- and 3330-11-type technology, and add features such as position offsets from track centerline to allow recovery of marginal data. The subsystem design further promotes easy maintenance for high up-time applications. Sixteen disc unit status bits are available to aid diagnosis of drive malfunctions. Debugging is further enhanced by the addition of optical fault indicators within the disc unit itself. Maintenance procedures are oriented toward isolation of malfunctions within modular printed circuit boards, and subsequent board replacement.

## OPERATION

DG/Disc Storage Subsystem controls and indicators are designed for data-system applications. Operator controls include DC Power On/Off, Drive Start/Stop, and Write Enable/Disable. Convenient status indicators (LED's) include DC Power On, DC Power Check, Drive Ready and Write Enabled.

Also, when AC power is restored following a loss of power, the disc drives will automatically return to the state set by the controls. The switches can also be used to provide software system initialization using any drive in a subsystem.

## DUAL-PORT OPTION

Dual-porting is an integral design feature of the DG/Disc Storage Subsystems. Dual porting allows Data General computers to share disc access in a coordinated fashion. The subsystem adapter allows efficient and flexible programming of data transfers. A standard hardware and software dual-port configuration is supported by Data General's Real-time Disc Operating System. This configuration includes a Model 4020 Interprocessor Bus linking the two Data General computers.

Dual-porting can be ordered initially or added after the disc and first computer are in use, because dual-porting is implemented simply by adding the Dual-Port Option to a second computer. This option consists of a disc controller and dual-porting cabling assemblies. Dual-porting can span two standard data channels, two Burst Multiplexor Channels, or one channel of each type.

## SOFTWARE SUPPORT

DG/Disc Storage Subsystems are supported by Data General's Interactive COBOL systems software on CS/40 and CS/60 small business systems and by two Data General operating systems. Data General's multiprogramming Advanced Operating System (AOS) for ECLIPSE computers provides simultaneous control of timesharing, multiple batch job streams and real-time environments. Data General's Real-time Disc Operating System (RDOS) for ECLIPSE and NOVA computers provides multiterminal or batch capabilities in single- or dual-operation modes.

Both AOS and RDOS support FORTRAN IV, the globally/locally-optimizing FORTRAN 5, and extended BASIC as well as RJE80 (2780/3780) and HASP II emulation software on NOVA or ECLIPSE computers. AOS and RDOS support high-level ANSI '74 COBOL, INFOS® — an advanced data-base-oriented file management system — and Data General's Idea (Interactive data entry/access) software on commercial ECLIPSE computers. RDOS also supports Business BASIC on NOVA or ECLIPSE computers. AOS also supports Data General's ANSI-compatible PL/I, a powerful structured application development language. DG/L, Data General's structured high-level systems programming language, is available on all ECLIPSE systems. Programs written in DG/L will execute on microNOVA™, NOVA, and ECLIPSE computers.

## DISC STORAGE SYSTEM SPECIFICATIONS

### GENERAL

**Capacity**

**Per Sector:** 512 bytes

**Per Track:** 24 sectors; 12,288 bytes

**Recording Surfaces:** 19 (6060, 6061); 5 (6067)

**Cylinders** (tracks per surface): 411 (6060); 815 (6061, 6067)

**Sectors per Cylinder:** 120 (6067); 456 (6060, 6061)

**Bytes per Cylinder:** 61,440 (6067); 233,472 (6060, 6061)

**Bytes per Unit:** 50,073,600 (6067); 95,956,992 (6060); 190,279,680 (6061)

**Rotational Speed:** 3600 RPM

**Average Rotational Latency:** 8.33 milliseconds

**Data Transfer Rate:** 806,000 bytes per second

**Head Positioning (Seek) Time**

**Track-to-track:** 6 milliseconds

**Average:** 35 milliseconds

**Maximum:** 60 milliseconds

**Average Access Time (Average Seek plus Average Rotational Latency):** 43.3 milliseconds.

**Track Density:** 192 (6060) or 370 (6061, 6070) tracks per inch.

**AC Voltages** (See Table below)

**Recording Density:** 4040 bits per inch.

**Disc Pack Type**

Data General Model 1143 Disc Pack. (50 MB)
Data General Model 1122 Disc Pack. (96 MB)
Data General Model 1123 Disc Pack. (190 MB)

**Start and Stop Time:** 40 sec. to operating speed; 30 sec. to stop.

**AC Power Requirements**

**Voltage Tolerance:** +10%, -15%..

**Frequency Tolerance:** ±1 Hertz.

**Phases:** Single (Adapter and 6067); Three (6060 and 6061).

**Drive Start-Up Current U.S. Voltage at +10%:** 30 Amperes per phase for 12 seconds (6060, 6061); 40 Amperes for 20 seconds (6067).

**Drive Running Current when Accessing; U.S. Voltage (nominal):** 5.0 Amperes per phase (6060, 6061); 14 Amperes (6067).

**Adapter Power:** 1.8 Amperes at 100 Volts; 1.5 Amperes at 120 Volts; 0.8 Amperes at 220 Volts; 0.75 Amperes at 240 volts.

| Typical of | 6060, 6061 | 6067 and/or Adapter |
|---|---|---|
| U.S.A. | 208/120 VAC; 60Hz; 3Ø Wye | 120 VAC; 60 Hz; 1Ø |
| Japan | 200 VAC; 50 Hz; 30 Delta | 100 VAC; 50 Hz; 1Ø |
| Continental Europe | 380/220 VAC; 50 Hz; 3Ø Wye | (does not apply) |
| Australia/United Kingdom | 415/240 VAC; 50Hz; 3Ø Wye | 240 VAC; 50 Hz; 1Ø |
| Continental Europe | 220 VAC; 50 Hz; 3Ø Delta | 220 VAC; 50 Hz; 1Ø |

**Controller or Model 6062 Dual-Port Option**

Mounts in computer chassis using two I/O slots. Data Channel or Burst Multiplexor Channel (specify) connection.

Draws 6.3 Amperes at +5 Volts DC (either controller type).

**Maximum Allowable Data Channel Latency:** 19.8 microseconds.

**Adapter**

7-inch chassis; rack-mounting

**Cabling and Ground Braid**

Disc drive to AC power, supplied at 5 ft. (1.5 meters) standard length.

Disc drive to adapter, supplied at 30 ft. (9.1 meters) standard length.

Adapter to CPU controller, supplied at 10 ft. (3 meters) standard length.

**Upgrades**

- 96 to 190-megabyte drives
- Data Channel to BMC controller or Dual-Port Option.

### MECHANICAL

All drives have identical external appearance and are free-standing in supplied cabinets.

**Dimensions (Drive):** 45" (114.3cm)H; 24" (61.0cm)W; 34-7/8" (88.6cm)D

**Maximum Weight of Drive (with Disc pack):** 575 lbs. (261.4 kg.)

**Dimensions (Adapter):** 6½" (16.5cm)H; 18-9/16" (48.1cm)W; 22-7/8" (58.1cm)D

**Weight of Adapter:** 30 lbs. (13.6kg.)

### ENVIRONMENTAL

**Drive Temperature Range:** 50°F to 90°F (10°C to 32°C); operating.

**Temperature Gradient:** 15°F (8.3°C) per hour, maximum (does not apply to Adapter); drive and media must be same temperature for proper operation.

**Relative Humidity Range (Operating):** 20% to 80% noncondensing.

**Altitude:** To 6,000 feet (1829 meters); operating

**Drive Heat Dissipation:** 6140 BTU/hour (1800 Watts) nominal, based on current used while accessing.

**Maximum Adapter Operating Temperature:** to 131°F (55°C).

**Maximum Adapter Heat Dissipation:** 614 BTU/hour (180 Watts).

## SALES AND SERVICE

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