



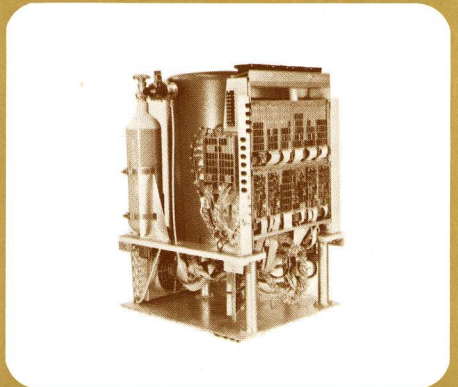
HEAD PER TRACK DISC MEMORY PRODUCTS



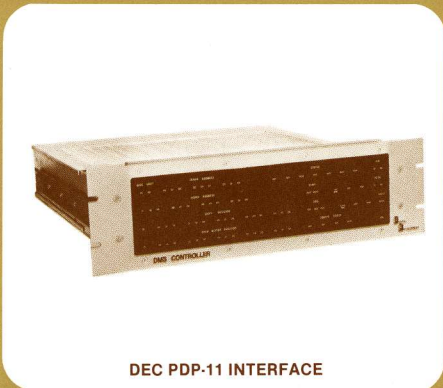
6000X SERIES



7310 SERIES



7600 SERIES

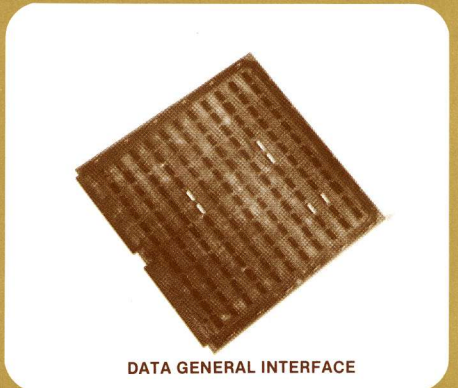


DEC PDP-11 INTERFACE

DMS-11 CONTROLLER

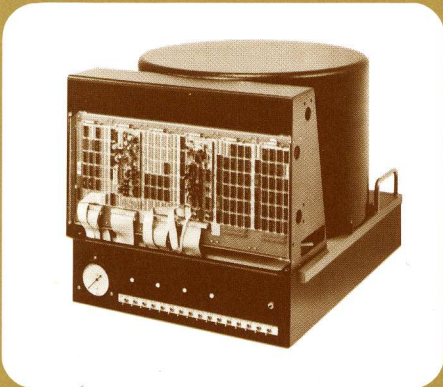


PX-73 DISC EXERCISER

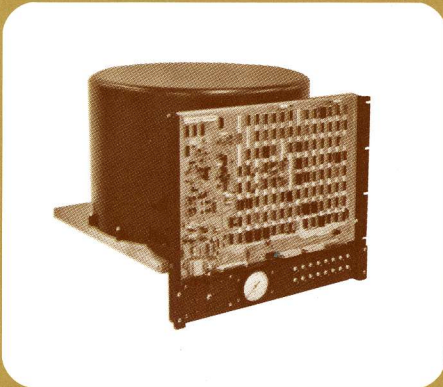


DATA GENERAL INTERFACE

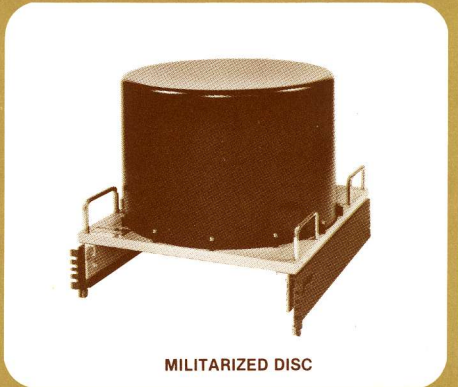
DMS-16 CONTROLLER



A7310/9100 SERIES



SYSTEMS 60 AND 90



MILITARIZED DISC

M6000 SERIES

DIGITAL DEVELOPMENT CORPORATION

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GENERAL

Digital Development Corporation was founded in 1959 at San Diego, California, with the objective of providing the industrial and scientific computer market a fast access, rugged and reliable auxiliary mass storage device. The company's first offering was a fixed head, oxide coated drum. The philosophy behind the product design was to emphasize exceptionally long life, low maintenance requirements and environmental stability which were achieved through the use of sealing techniques.

DDC, recognizing the need for larger capacity memory devices with improved recording densities and volumetric efficiency, began a program of research and development to improve the technology while retaining the original design goals that had already been established. This program of research and development culminated with the introduction, in 1965, of a modular head per track disc memory device, designated the DDC 7300 Series. The 7300 Series incorporated a then unique flying write/read head which allowed DDC to obtain the desired recording density of 35,000 bits per track and average access time of 8.5 milliseconds while maintaining the reliability identified with DDC. Its acceptance in the marketplace led to the establishment of the industry standard for reliability and performance.

In 1971 we introduced a high density disc memory employing a new and sophisticated recording technique. The memory device, designated the DDC 7310 Series, utilizes the same field proven mechanical subassemblies of the 7300 Series while providing for more than twice the recording density (75,000 bits per track) of the 7300 Series. Also in 1971, DDC introduced the 6000 Series, employing the same major mechanical subassemblies and recording technique of the 7310 Series. The 6000 Series provides the same performance as the other DDC disc memories while taking advantage of certain manufacturing economies to reduce costs.

Anticipating the future in mass storage requirements, DDC has combined its engineering and manufacturing talents and has developed a high capacity disc memory, the DDC 7600 Series, with a reduced average access time of 5 milliseconds. The 7600 Series is mechanically identical to the 7310 Series with the addition of an internal cooling system to extract the heat generated at 6000 rpm operation.

Realizing that customer usage of mass storage devices has led to increased storage requirements, DDC introduced the A7310/9100 Series Disc Memory Units. These disc memories, while using the same field proven mechanical and electronic technologies of their predecessors, offer the customer from 50 to 100% capacity increases with a corresponding 25 to 50% cost reduction.

Recognizing the increasing level of sophistication among the users of computer equipment, DDC

has launched a series of disc memory systems designed to interface to the most popular computer main frames. Called DMS Series, the product line combines our established disc memory devices and a line of controllers specifically developed for the targeted computer system. The complete package provides hardware and software transparency to the host computer. The end result provides the market with the most reliable disc memory system available and at a significant cost savings.

In early 1975 DDC introduced two new disc memories; the Systems 60 and 90, a low-cost disc series; and the M6000 Series, a militarized version of our existing product line.

SYSTEM APPLICATIONS

Digital Development Corporation head per track disc memories are in use in a wide variety of industrial and military applications. Typical of the types of applications are process control, message switching, time sharing, memory swapping, data channel buffering, type setting, and scientific research. DDC's fixed-head-per-track disc memories can be used throughout the total spectrum of applications where equipment must be in continuous operation and deliver the high performance demanded.

DDC devices are operating in installations ranging from controlled computer room environments to the rigors of shipboard and vehicular mounting. Over 60% of the head-per-track disc memories and drum memories delivered to date are in process control or mobile installations where high reliability and limited maintenance is of prime importance. DDC systems are installed in critical industries such as petroleum cracking plants, chemical plants, food processing plants, power stations, steel mills, automotive assembly plants, etc.; some under the most hostile of environments. Standard DDC memories are operating in a number of van mounted installations used in remote area oil exploration. DDC has delivered numerous systems to the U.S. Navy and Coast Guard, through sub and prime contracts, for installation aboard ships. The inherent ruggedization of DDC's standard products is providing the same performance standards to industries whose requirements are no less demanding but whose operational requirements are far less critical. Data processing, communications, point-of-sale and laboratory instrumentation applications make up the balance of the types of DDC disc memory installations that have earned the confidence of their users.

DISC MEMORY UNITS

Digital Development Corporation disc memory units are characterized by:

- High Reliability — MTBF's based on actual field performance ranging from 9,000 hours (1024 track units) to 15,000 hours (64 track units).

TABLE OF DISC MEMOR

SERIES		6000X	MILITARIZED DMU M6000		7310
MODELS		6200X	M6200	M6300	7311 7312
SPEED (ROTATIONAL)		3600RPM	3600RPM	1800RPM	3600RPM
TRACKS	MIN	64	64	64	64 64
	MAX	128	256	256	256 512
	INCREMENTS	64	64	64	64 64
	MAX SPARES	na	4	4	4 4
BITS PER TRACK (MAX)		72,000	75,000	150,000	75,000
CAPACITY	MIN	4.6	4.8	4.8	4.8 4.8
	MAX	9.2	19.2	38.4	19.2 38.4
	INCREMENTS	4.6	4.8	4.8	4.8 4.8
AVERAGE ACCESS TIME MILLISECONDS		8.5	8.5	17.0	8.5
DATA TRANSFER RATE M BITS PER SERIAL SECOND MAX		4.1	4.4	4.4	4.4 4.4
HUMIDITY	OPERATING	5-95%	0-100%	0-100%	5-95%
ALTITUDE	NON-OPERATING	15,000	35,000	35,000	10,000
		50,000	50,000	50,000	25,000
SHOCK AND VIBRATION OPERATING/NON-OPERATING		5 G's	15 G's MIL-E-5400K CURVE III	15 G's MIL-E-5400K CURVE III	5 G's 5 G's
TEMPERATURE	OPERATING	0° to 50° C	-20° to 50° C	-20° to 50° C	0° to 50° C
	NON-OPERATING	-40° to +70° C	-40° to +70° C	-40° to +70° C	-40° to +70° C

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UNIT PARAMETERS

	7600	A7310			9100			SYSTEMS 60 & 90	
	7613	A7311	A7312	A7313	9111	9112	9113	60	90
	6000RPM	3600RPM			1800RPM			3600RPM	1800RPM
	64 1024 64 32	64 256 64 8	64 512 64 16	64 1024 64 32	64 256 64 8	64 512 64 16	64 1024 64 32	64 256 64 2	64 256 64 2
	75,000	105,000			150,000			150,000	150,000
	4.8 76.8 4.8	6.7 26.8 6.7	6.7 53.6 6.7	6.7 107.2 6.7	9.6 38.4 9.6	9.6 76.8 9.6	9.6 153.6 9.6	9.6 38.4 9.6	9.6 38.4 9.6
	5.2	8.5			17.0			8.5	17.0
	7.2	6.2	6.2	6.2	4.4	4.4	4.4	8.8	4.4
	5-95% 10,000 25,000	5-95% 10,000 25,000			5-95% 10,000 25,000			5-95% 15,000 25,000	5-95% 15,000 25,000
	2 G's	5 G's	5 G's	2 G's	5 G's	5 G's	2 G's	5 G's	5 G's
	0° to 50° C -40° to +70° C	0° to 50° C -40° to +70° C	0° to 40° C	0° to 50° C -40° to +70° C	0° to 40° C	0° to +50° C -40° to +70° C	0° to +50° C -40° to +70° C		

- Low Maintenance — Only scheduled maintenance throughout the design life is the routine (6-9 months) replacement of the helium supply cylinder.
- Long Life — 10 year minimum design life.
- Rugged construction — 5g's (up to 512 tracks) and 2g's (1024 track) shock and vibration.
- Sealed Enclosure/Controlled Gas Environment — The controlled atmosphere protects the rotating assembly from dust, moisture, corrosive gasses, and other contaminants; and as a result, DDC has never experienced a field bearing failure.
- Non-Contact Adjustment Free Recording Heads — Heads never contact the recording surface. In a nonoperational mode, heads are mechanically restrained 0.003 inches from the recording surface. When actuated, heads are pneumatically actuated to the flying position. Fail safe control removes pneumatic pressure from the heads when fault condition exists.
- Modular Design — Major subassemblies are field repairable and replaceable without adjustment. All modules of a like part number are completely interchangeable.
- Field expandability — Systems are incrementally field expandable.
- Complete Write/Read/Selection/Timing Electronics — Systems include all electronics necessary for writing, reading, and track selection. The system provides all necessary timing and control signals at TTL levels to allow for easy interface to a controller.
- Format Flexibility — Data formats are defined by the customer.

The performance characteristics of disc memory products are summarized in the adjacent table.

DISC MEMORY SYSTEMS

Digital Development Corporation's disc memory products are offered as prime components of a variety of systems sold by many computer manufacturers and systems houses. To make available these very same products to a broader range of users, DDC has developed a series of disc memory systems which interface to the most popular computer hardware. At present, two systems are available, both using DDC's off-the-shelf disc memory units. Which disc memory used is predicated on planned word capacity, expansion requirements and physical constraints.

For the Digital Equipment Corporation PDP-11 users, DDC offers its DMS-11 Disc Memory. This system is characterized by:

- Direct replacement for DEC RF/RS-11 and RC-11/RF-64 memory systems
- Direct interface to DEC PDP-11 UNIBUS
- Hardware and software transparent
- Up to four disc memories on a single controller
- From 64K to 2M word capacities with standard software

- Up to 16M word capacity with special software
- Sector and word oriented models

For the Data General Corporation Nova 800, Nova 1200, and Supernova users, DDC offers the DMS-16 Disc Memory. The system is characterized by:

- Direct replacement for DGC 4019 controller and Novadisc
- Plug compatible controller on 15" X 15" board utilizing available computer slot
- Hardware and software transparent
- Optional multidisc control
- From 64K to 2M word capacities with standard software
- Up to 16M word capacity with special software

The Systems 60 and 90 head-per-track memories are self-contained, complete with electronics for reading, writing, track selection and timing generation. Data capacities range from 9.6 to 38.4 million bits of storage. The System 60 has an average access time of 8.5 milliseconds while the System 90 has a 17 millisecond average access time. The capacity and format can be tailored to the needs of each application.

Unit modularity yields a very low MTTR. The unit is designed for mounting on slides in a standard 19" rack and extend for service.

MILITARIZED DISC

The M6000 Series Disc Memory Systems are designed to operate in accordance with performance characteristics, standards and environmental requirements applicable to military installations; such as mobile, shipboard and airborne. The Systems are interface compatible with NTDS fast interface requirements, and CPU's such as the AN/UYK-19 and AN/UYK-20, with data capacities ranging from 4.8 to 38.4 million bits. The M6000 Series consists of two models; The M6200 (3600 rpm) and the M6300 (1800 rpm).

Future plans call for additional models of the DMS Series. In so doing, DDC can provide the broadest spectrum of computer users the same confidence in its disc products that has been the providence of a discerning group of computer and systems customers.

PX 73 PORTABLE MEMORY EXERCISER

The PX 73 was designed for field testing of DDC Disc Memory Units. The unit incorporates the circuitry necessary to interface with all current DDC Memories. The exerciser provides all the necessary signals to stridently test fixed head disc memories.

The exerciser is capable of providing up to 8 channels of parallel write data and comparing the resultant memory system read data for data errors. The exerciser provides twelve address lines capable of sequentially addressing all or part of 4096 data tracks.

MAJOR FUNCTIONS:

- Addressing: The exerciser can incrementally address up to 8K tracks.
- Data Generation: The exerciser generates up to 8 channels of formatted data. The data generator may be programmed to generate fixed, variable or pseudo-random data patterns of 16 or 32 bits in length, or the respective track addresses.
- Error Detection: The exerciser simultaneously checks up to 8 data channels for data errors.
- Controls/Indicators: Controls and indicators are provided for setting up such variable memory system parameters as preamble length and polarity, read delay and the read recovery interval following track switching or writing, bit clock density per track, sector marks, or any repetitive timing signal per track.

WARRANTY

All DDC products carry a one year parts and labor warranty. Any failure to meet specified performance criteria will be expeditiously repaired on site at no charge to the customer. Spare parts carry a 90 day after shipment warranty. Subsequent to the initial warranty period, products and spare parts which have been repaired on an out of warranty basis are warranted for a period of 90 days after such repair.

FACILITIES

The DDC facility, in which the Company's operations are presently housed, is a modern, air-conditioned structure. DDC presently occupies 70,000 square feet of the building including a 6000 square foot controlled atmosphere clean room. The construction of the building provides maximum usable volume, and adaptability of internal arrangement.

FOR FURTHER INFORMATION CONTACT YOUR LOCAL SALES REPRESENTATIVE OR DDC DIRECTLY



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