DATA SHEET

DSD 480

- 2 MEGABYTES OF ON-LINE DISKETTE STORAGE FOR YOUR DEC® LSI-11 OR PDP®-11 COMPUTER
- DOUBLE-SIDED, DOUBLE-DENSITY OPERATION
- DEC RX02 HARDWARE AND SOFTWARE COMPATIBILITY
- SUPPORTS ALL DEC AND IBM DISKETTE FORMATS
- EXCLUSIVE HYPERDIAGNOSTICS—BUILT-IN INTELLIGENCE

DATA SYSTEMS DESIGN

® Registered Trademark of Digital Equipment Corporation

DOUBLE CAPA
SUPERIOR PER

FULL COMPATIBILITY WITH DEC HARDWARE, SOFTWARE AND MEDIA.

HARDWARE COMPATIBILITY

Standard interfaces are available for all DEC LSI-11 and PDP-11 computers, including those with extended memory. The DSD 480 can be used either as an RX01 for downward software compatibility or as an RX02 for increased storage capacity and data throughput.

SOFTWARE COMPATIBILITY

The DSD 480 can be used with all operating systems, user-written applications programs and diagnostics that support the RX02. The DSD 480 has been carefully designed for compatibility with all aspects of the RX02, including undocumented features. This insures successful operation with all future software releases.

MEDIA COMPATIBILITY

The DSD 480, like the RX02, uses industry standard IBM 3740 formatted diskettes, and DEC double-density formatted diskettes. Users may interchange data and programs with any DEC RX01 or RX02 flexible disk system. In addition, the DSD 480 write-precompensates data, improving the read margins in high density magnetic recording.

DMA OR PROGRAMMED I/O

The DSD 480 may be configured for either DMA (direct memory access) data transfer for RX02 software compatibility, or programmed I/O data transfer for RX01 software compatibility.

ADDED CAPABILITIES

2 MEGABYTE CAPACITY

The DSD 480 can read and write on double-sided, double-density diskettes for a formatted capacity of one megabyte per diskette, or two megabytes of on-line capacity. Since no current DEC product provides this feature, a patch to the RT-11 system monitor is required to activate double-sided support. A DSD command file automatically configures a standard-distribution RT-11 monitor so single- and double-sided operations are fully transparent to DEC software. RSX-11 device handlers already support double-sided operation. The practical design of the DSD 480 insures compatibility with future DEC double-sided flexible disk systems.

IBM FORMAT COMPATIBILITY

In addition to the DEC single- and double-density formats, the DSD 480 will read and write in all IBM diskette formats — both single- and double-density, single- and double-sided. DSD 480 users are able to conveniently exchange programs and data between DEC and IBM-compatible systems.

The IBM 2D 256 byte-per-sector format is fully transparent to DEC software after implementing the double-sided monitor patch. All other IBM formats are fully implemented in DSD 480 hardware but require a user-modified software handler.

DEC AND IBM DISKETTE FORMATS

FORMAT	SUPPORTED BY DSD 480	SUPPORTED BY RX02	COMMENTS
SINGLE-SIDED DISKETTE			
Single-Density			
DEC (IBM 3740) (128 byte)	YES	YES	DEC-compatible
IBM 1 (256 or 512 byte)	YES	NO	Modified handler required
Double-Density			
DEC (256 byte)	YES	YES	DEC-compatible
DOUBLE-SIDED DISKETTE			
Single-Density			
DEC (IBM 3740) (128 byte)	YES	NO	RT-11 monitor patch supplied
IBM 2 (128 byte)	YES	NO	RT-11 monitor patch supplied
IBM 2 (256 or 512 byte)	YES	NO	Modified handler required
Double-Density			
DEC (256 byte)	YES	NO	RT-11 monitor patch supplied
IBM 2D (256 byte)	YES	NO	RT-11 monitor patch supplied
IBM 2D (512 or 1024 byte)	YES	NO	Modified handler required

BUILT-IN BOOTSTRAP

A 512-byte hardware bootstrap is built into the DSD 480 LSI-11 and PDP-11 interfaces, eliminating the need to purchase an expensive extra board. The bootstrap routine recognizes the diskette density and format. It automatically loads system software from either single- or double-sided diskettes, executes a sequence of diagnostics to confirm proper operation of the controller and interface, and performs a complete read and write verification of the host system's main memory.

DISKETTE FORMATTING

The DSD 480 allows single track or complete diskette formatting independent of the computer. Any DEC or IBM format may be selected. The user can recover magnetically damaged diskettes and may select the physical sector sequence and the software sector interleave pattern to optimize computer system throughput.

OPTIMIZED PERFORMANCE

The average access time of the DSD 480 is 34% faster than the DEC RX02. Fill- and-empty buffer operations are 20% faster, allowing the DSD 480 to use standard 2-way interleaving in many circumstances where an RX02 is too slow. This achieves up to 13 times faster system throughput.

WRITE PROTECTION

Diskettes may be protected to insure that valuable data will not be accidentally lost due to inadvertent overwrite.

DRIVE POWER DOWN OPTION

Interrupts the AC power to the floppy drive motors when neither drive has been accessed for more than ten minutes. The AC power is restored with the next access. This option reduces motor, spindle bearing and media wear. It also reduces internal chassis temperature and power usage. A must for applications with infrequent drive access. The option is available for an extra charge.

BUILT-IN INTELLIGENCE

The DSD 480 controller module is a high speed microcomputer. It contains both a microprocessor and a bi-polar, bit-slice processor for high data transfer rates and accurate adherence to diskette format standards.

AUTOMATIC SELF-TESTS

Each time the DSD 480 is turned on or initialized, a series of microprogrammed self-tests are automatically performed to verify proper functioning of the controller and drive hardware. These tests do not delay system initiation and are transparent to the user during system power-up sequence.

HYPERDIAGNOSTICS

If a computer system problem occurs, the DSD 480's controller contains DSD's exclusive HyperDiagnostics™, a library of microprogrammed routines which

ACITY
RFORMANCE

perform self-tests independent of the computer. By verifying proper operation of the DSD 480, the user can easily isolate computer system failures. These powerful tools are switch-selectable to perform and monitor the following operations:

- simplified acceptance tests requiring no special equipment or computers.
- drive-independent controller self-tests.
- off-line diskette formatting.
- extensive drive maintenance routines and composite system exercisers.
- simplified disk drive alignment and adjustment procedures.

Nine LED indicators on the controller module display the status of DSD 480 system and HyperDiagnostic operation. Sub-system faults are easily isolated to allow for quick servicing.

DIAGNOSTIC DISKETTE

Every DSD 480 is shipped with a diagnostic di[illegible]te containing additional programs fo[illegible]ailed exercising and status reporting of the disk system. These programs are executed by the host computer, and are operated from a console terminal.

WRITE CURRENT REDUCTION

The DSD 480 utilizes Write Current Reduction when it is writing to inner tracks of the diskette. This is done to reduce data bit shift and intra track splatter on the inside high number diskette tracks. These inside tracks have a much higher bit density than the outside tracks, because of the smaller physical size of the inside tracks. By reducing the Write Current, we can improve data recovery when the diskette is read. This makes for better data integrity and reliability.

RELIABILITY

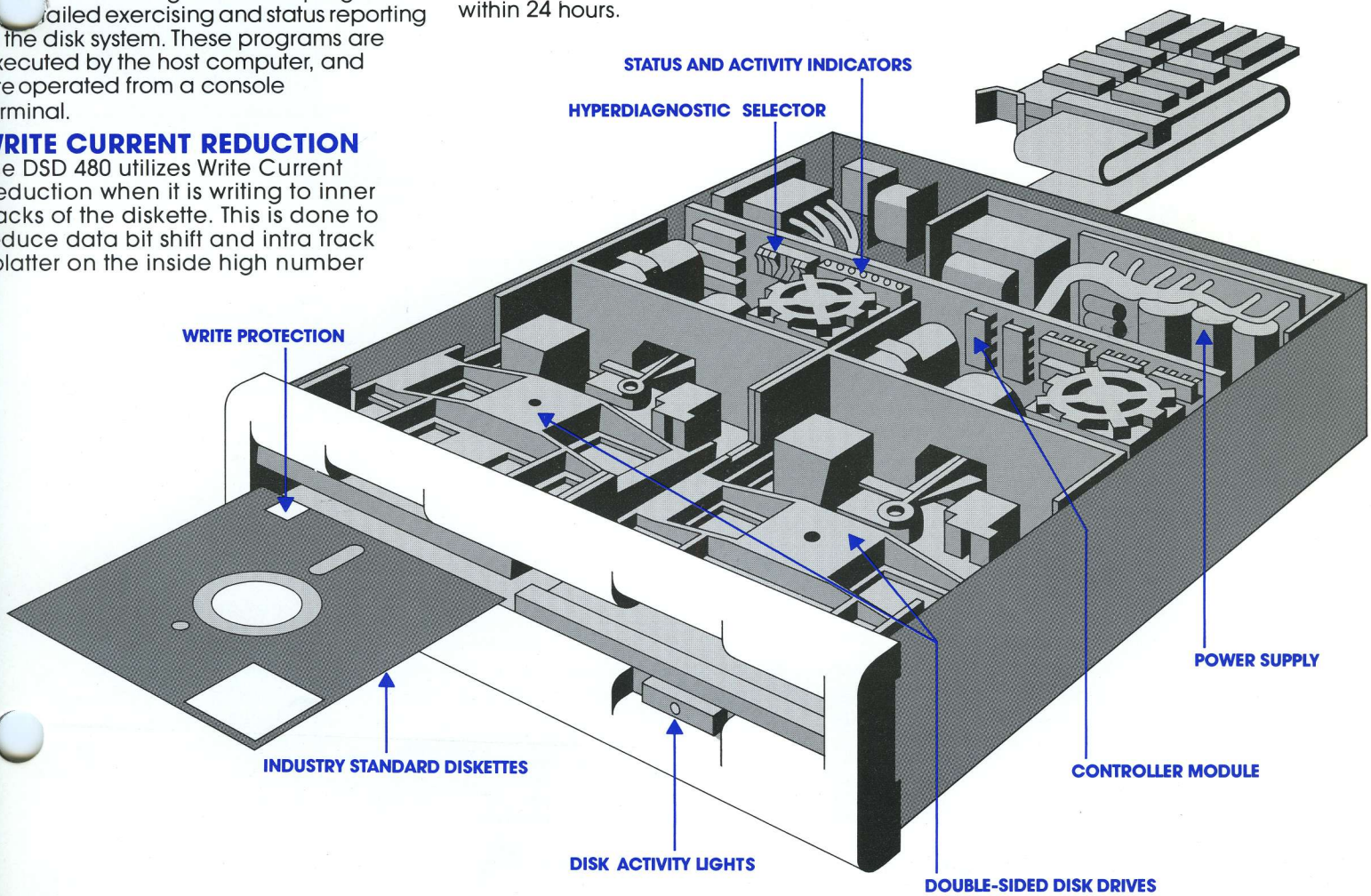
The DSD 480 is manufactured with field-proven disk drives and pretested sub-system modules to insure trouble-free operation. Complete systems are thoroughly exercised and subjected to stringent quality assurance standards.

WARRANTY AND SERVICE

Each DSD 480 is protected by a 90-day warranty. In the event of a malfunction, a phone call to Data Systems Design will dispatch the appropriate replacement module to domestic U.S. customers—usually within 24 hours.

COMPACT MODULAR DESIGN

The DSD 480 is a compact, low-profile unit, featuring attractive and rugged construction. The 5¼-inch chassis occupies only half the rack space of a DEC RX02. It can be mounted in a standard 19-inch RETMA rack, or used as a tabletop unit. Keyed connectors on all cables insure mistake-proof installation and removal of major assemblies.



SPECIFICATIONS

DSD 480

FORMATS

	DOUBLE-DENSITY		SINGLE-DENSITY
Capacity (Bytes Formatted)	DEC	IBM 2D-256	IBM 3740 (DEC)
Single-Sided Diskette	512,512	NA	256,256
Double-Sided Diskette	1,025,024	985,088	512,512
Tracks per Surface	77	74 (+2 spares)	77
Sectors per Track	26	26	26
Bytes per Sector	256	256*	128
Recording Format	DEC RX02	IBM 2D	IBM 3740
Recording Technique	DEC-modified MFM	MFM	Double Frequency

*(128 bytes per sector on track 0 side 0)

Diskettes: Accepts DEC- or IBM-compatible, soft-sectored diskettes.
Note: The DSD 480 will also support IBM 1 and IBM 2 (256 or 512 bytes/sector) and IBM 2D (512 or 1024 bytes/sector) formats. The user must provide a modified software handler for this capability.

SPEEDS

Diskette to Controller		Diskette Rotation:	360 rpm ± 2%
Double-Density:	62.5 KBytes/Sec	Head Step Rate:	3 ms track-to-track
Single-Density:	31.25 KBytes/Sec	Head Load Time:	35 ms
Controller to CPU:	27 μsec/word plus DMA overhead	Average Access Time:	174 ms
		Max Access Time:	410 ms

Real throughput: 20 KBytes/sec within a track (2-way interleave) — 18 KBytes/sec across entire diskette (2-way interleave, 7 sector skew track-to-track)

INTERFACE CHARACTERISTICS

	LSI-11 (Q-Bus)	PDP-11 (Unibus®)
Backplane Requirement	1 half-quad Q-Bus slot	1 quad SPC slot
Standard Device Addresses	777170-777172	777170-777172
Hardware Bootstrap Addresses		
Primary	773000	771000
Alternates	766000	766000
	771000	773000
	775000	775000
Interrupt Vectors		
Standard	264	264
Alternates	000-774	000-774
Power Consumption (+5 volts)		
Nominal	1.44 amp	1.30 amp
Maximum	2.00 amp	1.70 amp
Heat Dissipation (BTU/hr)		
Nominal	24	24
Maximum	40	40

CHASSIS CHARACTERISTICS

Power Consumption (max.)	170 watts idle, 300 watts busy
Domestic input voltage	100 VAC or 120 VAC RMS ± 10%
International input voltage	220 VAC or 240 VAC RMS ± 10%
Input frequencies	60 Hz (± 1 Hz)
	50 Hz (± 1 Hz)
Heat Dissipation (BTU/hr)	
Nominal	468 idle 681 busy
Maximum	846 idle 1125 busy

ENVIRONMENT

U.L. Listing EDP equipment, UL 478 standard

Operating temperatures
- Interface: 0°C to 50°C (32°F to 122°F)
- Chassis: 0°C to 40°C (32°F to 104°F)
- Diskettes: 10°C to 51°C (50°F to 125°F)

Non-operating temperatures
- Interface and Chassis: −40°C to 66°C (−40°F to 151°F)

Humidity
- Interface and Chassis: 10% to 95% (non-condensating)

Sizes	
Chassis:	5.25"h x 17.6"w x 21.0"d (13.3 cm x 44.7 cm x 53.3 cm)
Shipping Carton:	10.5"h x 24.0"w x 33.5"d (26.7cm x 61.0cm x 85.1cm)
Quad PDP-11 interface:	9.0"h x 10.5"w x 0.5"d (22.86 cm x 26.67 cm x 1.27 cm)
Dual-wide LSI-11 interface:	9.0"h x 5.2"w x 0.5"d (22.86 cm x 13.21 cm x 1.27 cm)
Weight	
Chassis:	50 pounds (27 kg)
System, packaged for shipping:	74 pounds (38 kg)

® Registered Trademark of Digital Equipment Corporation.

Orders for the DSD 480 can be placed through your local sales representative or directly with Data Systems Design.

WESTERN REGION SALES
Data Systems Design, Inc.
2560 Mission College Blvd.
Suite 108
Santa Clara, CA 95050
(408) 727-3163

CENTRAL REGION SALES
Data Systems Design, Inc.
5050 Quorum Drive
Suite 339
Dallas, TX 75240
(214) 980-4884

EASTERN REGION SALES
Data Systems Design, Inc.
51 Morgan Drive
Norwood, MA 02062
(617) 769-7620
TWX: 710-336-0120

CORPORATE HEADQUARTERS
Data Systems Design, Inc.
2241 Lundy Avenue
San Jose, CA 95131
(408) 946-5800
TWX: 910-338-0249

INTERNATIONAL SALES: Australia 03/544 3444; Belgium and Luxembourg 02/7209038; Canada 416/625 1907; Denmark 02/63 22 33; Finland 90/88 50 11; France 03/411 5454; Hong Kong and Peoples Republic of China 03/696231; Israel 52-52444; Italy 02/4047648; Japan, Osaka 06/323 1707, Tokyo 03/345 1411; Netherlands 02977-22456; New Zealand 04/693 008; Norway 02/78 94 60; Singapore, Malaysia, and Indonesia 2241077; Spain 01/433 2412; Sweden 08/38 03 70; Switzerland 01/741 41 11; United Kingdom 7073/34774; West Germany and Austria 089/1204-0; Yugoslavia 61/263 261