

PRIAM DISKOS 3350/6650/15450  
WINCHESTER DISC DRIVE  
PRODUCT SPECIFICATION

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## I. INTRODUCTION

### A. General Description

PRIAM's DISKOS 14-inch disc drives use advanced Winchester and microprocessor technologies to provide users with low-cost disc drives having high capacity, fast access, and long-term reliability. A linear motor voice coil positioner with track following servo enables the DISKOS drives to position Winchester type heads quickly and precisely. These low force heads assure high data reliability. An advanced Winchester technology disc is driven by a brushless DC motor; the head positioner coil, carriage, heads, and disc are enclosed in a sealed, contamination-resistant chamber to assure high reliability.

In the DISKOS 3350 and DISKOS 6650, one disc is used. In the DISKOS 15450, two discs are included in the head/disc assembly.

Two heads are used with each disc surface, and a full head area on the disc is dedicated to servo information for track following, seeking, and write timing. Thus, the Winchester disc drive technology introduced in large and expensive disc systems is applied to a low cost drive designed for small system use.

A microprocessor controls positioning during track seeks, provides interface control and monitors drive operation. For example, it controls the power up sequencing and a self-test program checks drive performance during each power up sequence. Any malfunction detected by these tests will prevent the drive from becoming ready, reducing the chance of loss of data or damage to the drive.

All members of the PRIAM 14-inch disc family have the same dimensions and fit standard racks; their light weight and small overall size permit use with smaller systems. Cables connect directly to the drive circuit boards to reduce connector costs and make custom system integration easy.

Two integral interfaces are offered. The PRIAM Interface simplifies controller design by keeping handshaking protocols to a minimum. The SMD-compatible interface allows connection to controllers designed for CDC Storage Module Drives.

## B. Design Advantages

Design and performance advantages of the PRIAM 14-inch disc drive family are included in the following summary:

1. Advanced Winchester technology discs and heads for high data density and lowest cost per megabyte.
2. Linear voice coil positioners assure:
  - a. Fast access to data.
  - b. Mechanical simplicity and precise positioning.
  - c. Potential for expanded capacity with same basic disc drive mechanism.
  - d. High reliability head carriage with compensation for long-term wear.
3. Track-following head positioning servo assures:
  - a. High data reliability through exact locating of heads on data tracks.
  - b. Accurate tracking of data by heads, regardless of effects of temperature.
  - c. Short start time, without need for protracted warm-up.
4. Brushless DC spindle motor improves reliability by:
  - a. Accelerating and braking the disc quickly, extending disc and head life and improving data reliability.
  - b. Elimination of belts, pulleys, relays, switches, starting capacitors, and mechanical brakes normally associated with AC motors in Winchester disc drives.
  - c. Elimination of brushes so that brush wear and noise problems do not occur.
5. Reserved area on disc surface for head landing and takeoff protects data integrity.
6. Small physical size, only 7" X 17" X 20", complies with trend toward ever-smaller systems.
7. Light weight permits easier installation and service, with smaller, less expensive cabinets.
8. Microprocessor-controlled self-test protects data and the drive, aids in troubleshooting.

9. Proprietary closed air system with positive pressure and continuous filtration of air assures long-term data reliability by preventing entry of contaminants into head/disc chamber.
10. DC operation permits flexibility of prime power source and ease of battery backup. Optional universal power supply makes international shipment easy.
11. VFO/data separator included in basic disc drive electronics.

C. Product Options and Accessories

PRIAM's 14-inch disc drives have the following standard options:

1. PRIAM's optional power supply allows drives to operate from 100, 120, 220, and 240 VAC, 50 or 60 HZ, AC power. The optional power supply is delivered mounted within the drive frame; no extra space or interconnection is required.
2. Optional slides allow easy access to drives mounted in standard racks and cabinets.
3. The SMART Interface is an additional PCBA that attaches to the PRIAM Interface main PCBA. It may also be installed separately at the user's option. The SMART Interface provides byte-oriented data, as well as a byte-oriented command structure, enabling attachment of DISKOS drives to the typical microprocessor I/O bus with a simple host adapter. Details of this interface are available in the SMART Interface Specification 300059.
4. The SMD Adapter is an additional PCBA that attaches to the main PCBA. It may also be installed separately at the user's option. The SMD Adapter converts the PRIAM Interface to an SMD-compatible interface. Details of this interface are available in the SMD Interface Specification 300058.

The DISKOS 14-inch products can be ordered with the following accessories:

1. Terminators are available for I/O signal lines to minimize reflections and ensure maximum data integrity. One terminator is required for a single drive, or for the base drive of any number of daisy-chained drives up to four.
2. I/O cables can be provided to connect the user's controller to the PRIAM drive and daisy-chained drives to one another. Cables come in 6 and 15 foot lengths.

D. Reference Documentation

The following reference documents further define the DISKOS 14-inch products.

1. PRIAM Interface Specification - 300057
2. SMD Interface Specification - 300058
3. SMART Interface Specification - 300059
4. Filtered Power Supply Specification - 300040

II. OPERATING SPECIFICATIONS\*

Operating specifications for the DISKOS 14-inch product family are shown below:

	<u>DISKOS 3350</u>	<u>DISKOS 6650</u>	<u>DISKOS 15450</u>
A. Number of discs	1	1	2
B. Capacity (Mbytes, unformatted)	33.9	67.9	158.5
Bytes per Track	20,160	20,160	20,160
Number of Data Heads	3	3	7
Bytes per Cylinder	60,480	60,480	141,120
Number of Cylinders	561	1,121	1,121
C. Seek Times (msecs)			
Single Track typ(max)	8(10)	8(10)	8(10)
Average .. typ(max)	45(48)	45(48)	45(48)
Maximum typ(max)	85(88)	85(88)	75(85)
D. Average Rotational Latency (msec)	9.7	9.7	9.7
E. Track Density (tracks per inch)	480	960	960
F. Data Transfer Rate (MB/sec)	1.04	1.04	1.04
G. Recording Characteristics:			
Maximum Density (BPI)	6,430	6,430	6,430
Recording Code	MFM	MFM	MFM
H. Controlled Start/Stop Time (sec)	30	30	50

\*Specifications in this document are subject to change without notice.

III. PHYSICAL CHARACTERISTICS

Outline drawings of the DISKOS 14-inch products are provided in Figure 1.

Weights of PRIAM 14-inch disc drives are shown below:

	<u>3350</u>	<u>6650</u>	<u>15450</u>
Basic disc drive (lbs.)	34	34	TBD
Power Supply Option (lbs.)	18	18	18
Slide Option (lbs.)	6	6	6

The recommended mounting orientations are horizontally, with PCB up for cooling, or vertically, with the power supply side of rack frame down and positioner motion horizontal. The exact locations of the drives' mounting fasteners are shown in Figure 1.

IV. ENVIRONMENTAL LIMITS

All PRIAM 14-inch disc drives operate reliably within the following limits:

- A. Operating Temperature                    10 to 40° C  
Humidity (without condensation)        20 to 80% R.H.  
Altitude                                        -1000 to 7000 feet
  
- B. Non-Operating Temperature            -40 to 60° C  
Humidity (without condensation)        5 to 95% R.H.  
Altitude                                        -1000 to 40000 feet

V. POWER REQUIREMENTS

A. DC Power

All PRIAM 14-inch disc drives require power from four DC voltages: +24, +5, -5, and -12 volts. DC power is supplied via a 6-pin connector (AMP 1-480270-0 socket and 6 AMP PINS 60619-1, or equivalent). Details of power requirements are available in PRIAM Power Supply Specification 300040. The following summarizes some of the power parameters:

<u>VOLTAGE</u>	<u>PIN NUMBER</u>	<u>CURRENT (AMPS)</u>		<u>RIPPLE (MV P-P MAX)</u>
		<u>MAXIMUM</u>	<u>TYPICAL</u>	
+24 $\pm$ 1.2 volts	2	7.0 (while starting)	--	48 (*100)
		--	5.5 (seeking)	
		--	4.0 (not seeking)	
+ 5 $\pm$ 0.25 volts (w/ adapters)	5	6.0	4.5	10 (*50)
(w/o adapters)		4.0	1.5	
- 5 $\pm$ 0.25 volts	3	2.0	1.0	10 (*50)
-12 $\pm$ 0.6 volts	4	0.7	0.5	24 (*50)
GND	1	8.7	--	--
24 volt return	6	7.0	--	--

\* Allowed for power systems with  $\pm$  3% tolerance including line and load regulation and ripple frequency components under 1 MHZ. Ripple frequency components greater than 1 MHZ must be less than 5 MV, P-P.

B. AC Power (Optional)

PRIAM's optional power supply provides all of the specified DC requirements. The power supply requires a maximum of 425 watts at 47-63 HZ and one of the following voltages:

- 100 VAC  $\pm$  10%
- 120 VAC  $\pm$  10%
- 220 VAC  $\pm$  10%
- 240 VAC  $\pm$  10%

The power consumption drops to 350 watts max following startup.

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VI. RELIABILITY

A. Seek Errors

Seek errors occur when the data heads are not correctly positioned over the data track commanded at the interface. When this condition is internally detected by the disc drive, a seek error status is posted and the heads are automatically restored to cylinder 0.

The seek error rate, which is comprised of all seek errors, internally and externally detected (failure to verify a known good ID field, for example), is less than one in  $10^6$  seeks.

B. Data Errors

Data errors are detected using CRC or ECC circuits, or a byte by byte software comparison. A data error that is not repeated in 10 successive read operations is considered a soft error. The soft error rate for PRIAM 14-inch drives is less than one error in  $10^{10}$  bits read.

A data error that repeats one or more times in 10 successive read operations is considered a hard error. The hard error rate (excluding disc defects) for PRIAM 14-inch drives is less than one error in  $10^{13}$  bits read.

C. Defects

Defects are hard errors found in the disc during disc drive manufacture. All such defects are identified by PRIAM for the user's information when disc drives are delivered. A defect is less than 2 bytes long. Any track containing more than 3 defects is considered "bad" by PRIAM. Each bad track is considered one defect for purposes of the specification. The maximum number of defects and bad tracks for each of the DISKOS 14-inch products is shown below.

	<u>3350</u>	<u>6650</u>	<u>15450</u>
Defects (max.)	40	100	230
Bad Tracks (max.)	15	40	90

D. MTBF

PRIAM 14-inch disc drives expected mean time between failures is greater than 8000 hours.

E. MTTR

The mean time to repair DISKOS 14-inch drives is less than one-half hour.

F. Preventive Maintenance

No preventive maintenance is required.

PRIAM 14-INCH DISC DRIVE OUTLINE AND MOUNTING

FIGURE 1

