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Digital Equipment Corporation

ENGINEERING SPECIFICATION

Date: Feb 12, 1998

Title: PCXRA-AY 6.4GB UDMA IDE Interface 3 1/2" Disk Drive

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE
A	Release to ECO Control		D. Pham	2/12/98	B. McLane	2/12/98

ECO History:

* Document Initial Released 2/12/1998 at rev A
  To release the Western Digital Ultra DMA/33 Caviar AC36400 (akaTucson) CCC:C2 drive
  2.1GB/Platter, 5400rpm, MR head
  Digital p/n PCXRA-AY rev. A01

Engineer	Approved	Size	Code	Number	Rev
Dat Pham	**B. McLane**	**K**	**SP**	**PCXRA-AY-DBT**	**A**
		Sheet 1 of 1			

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Title: PCXRA-AY 6.4GB UDMA IDE Interface 3 1/2" Disk Drive

General Description:
This specification defines the detailed requirements of a 3 1/2 inch, 6.4 gigabyte (formatted) disk drive with an Integrated Drive Electronics (IDE) Interface. This disk drive, which is a low cost, random-access, rotating memory device stores data in fixed-length blocks on rigid media disks. The storage medium contained within the drive is in a fixed, non-operator-removable configuration

Applicable Documents (per latest revision on date of order):

International Organization For Standardization Standards:

ISO DIS 7779	Acoustics: Measurement of Noise Emitted from Computer Business Equipment - Second draft proposal June, 1982
ISO 9000	Quality Management and Quality Assurance

Federal Communications Commission:

FCC Part 15, Subpart B for class B equipment in an enclosure

Underwriter's Laboratories, Inc.

UL-STD-1950	Safety of information Technology Equipment with sub clauses 1-7 Applicable Appendix and Supplement B.

Canadian Standards Association:

CSA-STD-C22.2	No. 950 Safety of Information Technology Equipment including Electrical Business Equipment.

International Electrotechnical Commission:

EN-60950(IEC 950)	Safety of Telecommunications Apparatus including Information Processing Equipment

C.I.S.P.R.22 Class B

Title: PCXRA-AY 6.4GB UDMA IDE Interface 3 1/2" Disk Drive

The Council of European Communities:

89/366/EEC	C E Mark

SFF Committee:

SFF-8035i	Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.)

Western Digital Corporation:

79-860030-003	Caviar AC36400 Technical Reference Manual

2.0 Drive Requirements:
This drive will comply to the product description in the supplier's product manual, for the Western Digital Caviar AC36400 and this specification.

2.1 Drive Performance:
The following parameters are the minimum requirements to meet this product specification.

A. Formatted Capacity:

Per Drive (megabytes)	6,448.6
Per Block (bytes)	512
Blocks per Drive(User)	12,594,960
Interleave	1:1

B. Transfer Rate:

To/From Media (Max)	16.375 Mbyte/sec
To/From Buffer (Max)	16.6 Mbyte/sec PIO Mode 4
To/From Buffer (Max)	16.6 Mbyte/sec Multiword DMA Mode 2
To/From Buffer (Max)	33.3 Mbyte/sec Ultra DMA/33
Buffer Size	256 Kbyte

C. Seek Time: (all times are nominal)

Track to Track (msec)	2.0 msec
Typical Average (msec)	9.5 Read
Typical Average (msec)	11.5 Write
Typical full stroke (msec)	19 msec

D. All times are for nominal power and environmental conditions. Average seek time is determined by dividing the total time required to seek between all possible pairs of track addresses in the forward and reverse direction, by the total number of these possible seeks.

Average Rotational Latency	5.5 msec
Rotational Speed (± 0.5%)	5400 RPM
Start Time typical:	11 Sec
Stop Time typical:	6 Sec

2.2 Drive Logical Parameters:

Cylinders	13328
Heads	15
Sectors	63
Blocks per Drive	12,594,960

3.0 Physical Specifications:

3.1 Mechanical Dimensions (See Figure 1):

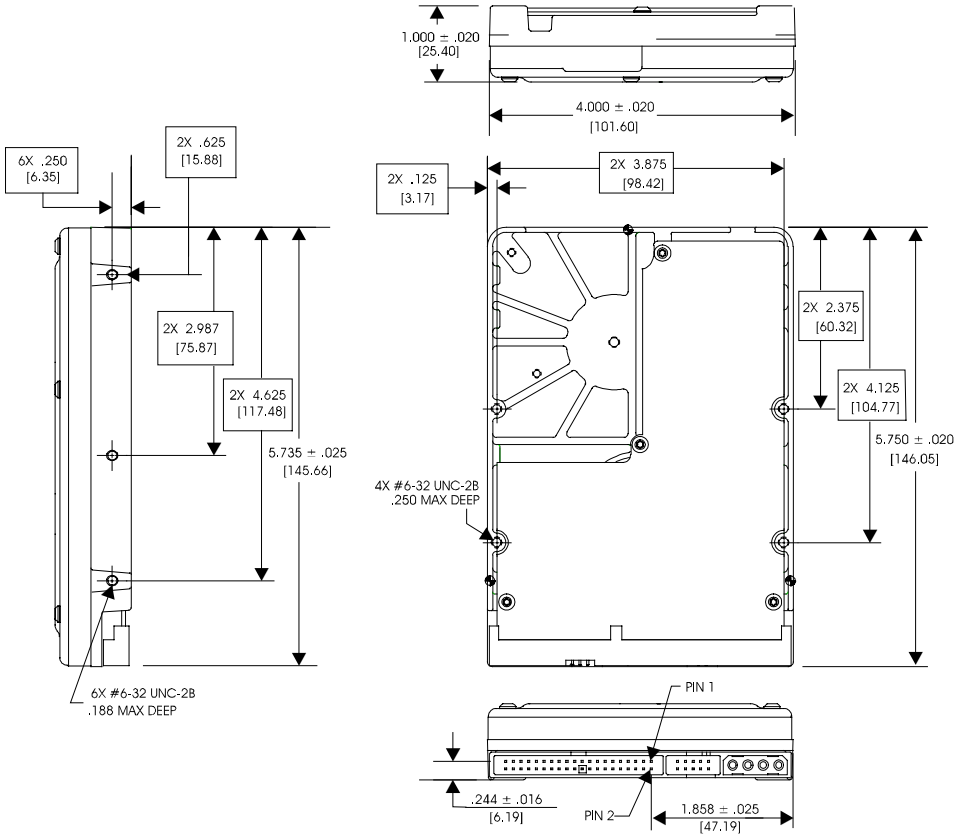
	Metric	English
Height	25.4 mm ± 0.51 mm	1.0 inch ± 0.02 inch
Width	101.6 mm ± 0.51 mm	4.0 inches ± 0.02 inch
Depth	146.05 mm ± 0.51 mm	5.75 inches ± 0.02 inch
Weight	0.5 kg ± 0.05 kg	1.1 pounds ± 0.11 pound

3.2 Drive Mounting:

The mounting holes allow the drive to be mounted in any orientation. For mounting, #6-32 x 1/4 UNC screws are recommended. Mounting screw torque should not exceed 8 inch-pounds

NOTE: Caution should taken to ensure that the mounting screws do not damage the drive PCBA

Figure 1: Typical Drive Mounting Dimensions



4.0 Power Requirements:

Supply Voltage Requirement: The voltages required to operate the drive are +5VDC ±5%, and +12VDC ±8% measured at the interface side of the power connector referenced to it's associated return ground. Maximum power supply ripple allowed: 100 mV(+5V) 200 mV(+12V) peak to peak, 0-20 MHz.

4.1 Drive Current Requirements: All values are typical except Spin-up Mode.

Mode	12V +/- 8%	5VDC +/- 5%	Power
R/W Mode	215 ma	550 ma	5.3 W
Seek Mode	510 ma	500 ma	8.6 W
Idle Mode	215 ma	550 ma	5.3 W
Standby	45 ma	190 ma	1.5 W
Spin-up Mode(Max)	1800 ma	550 ma	24.4 W
Sleep	45 ma	96 ma	1.02 W

5.0 Acoustics: at Idle 40 dBa Max @ 1 meter

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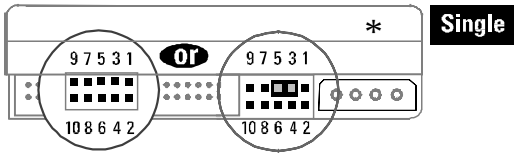
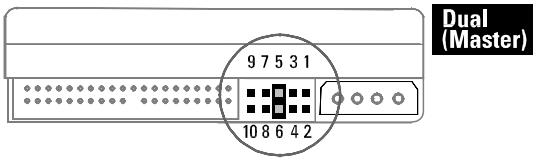
6.0 Jumper Configuration:

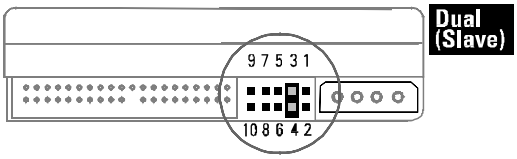
1 If the drive you are installing is the only drive in your system, use one of these settings.



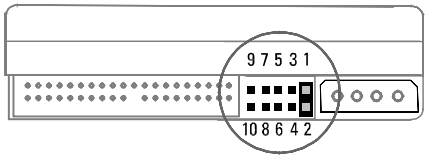
2 If the drive you are installing will be the boot drive (first drive) in a two drive system, use this setting.



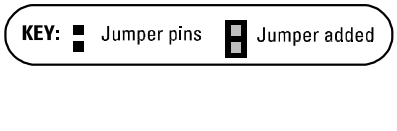
3 If the drive you are installing will be the second drive in a two drive system, use this setting.

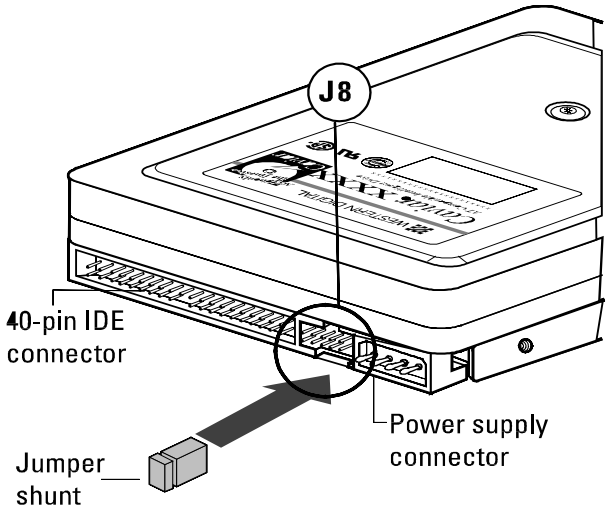


4 Cable Select (CSEL) option. Infrequently used by some system manufacturers. A special cable is required.



* *Factory storage placement. In this position, the jumper has no affect on hard drive operation.*





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Dat Pham	**B. McLane**	**K**	**SP**	**PCXRA-AY-DBT**	**A**
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7.0 AT Interface connector pin assignments:

7.1 In the following table:
- indicates active low signal.
Direction(Dir) is with respect to the drive.
IN indicates input to the drive.
OUT indicates output from the drive.
I/O indicates the signal is bi-directional
Reserved pins/ground do not have direction
PDIAG- and DASP- are used for communication between the Master and Slave drives.

Pin	Signal	Dir	Pin	Signal	Dir
1	RESET-	IN	2	Ground	-
3	Data Bit 7	I/O	4	Data Bit 8	I/O
5	Data Bit 6	I/O	6	Data Bit 9	I/O
7	Data Bit 5	I/O	8	Data Bit 10	I/O
9	Data Bit 4	I/O	10	Data Bit 11	I/O
11	Data Bit 3	I/O	12	Data Bit 12	I/O
13	Data Bit 2	I/O	14	Data Bit 13	I/O
15	Data Bit 1	I/O	16	Data Bit 14	I/O
17	Data Bit 0	I/O	18	Data Bit 15	I/O
19	Ground	-	20	Key	No Pin
21	DMARQ	OUT	22	Ground	-
23	DIOW- STOP	IN	24	Ground	-
25	DIOR- HDMARDY- DMA ready on data in bursts HSTROBE Data strobe on data out bursts	IN	26	Ground	-
27	IORDY DDMARDY- DMA ready on data out bursts DSTROBE Data strobe on data in bursts	OUT	28	CSEL	-
29	DACK1-	IN	30	Ground	-
31	INTRQ	OUT	32	Reserved	-
33	DA1	IN	34	PDIAG-	I/O
35	DA0	IN	36	DA2	IN
37	CS1FX-	IN	38	CS3FX-	IN
39	DASP-	I/O	40	Ground	-

7.2 Interface Connectors:
The recommended connectors and their numbers are shown below:

7.3 40-Pin Connector	3M 3417-7000 or equivalent
Strain Relief	3M 3448-2040 or equivalent
Flat Cable(Stranded 28 AWG)	3M 3365-40 or equivalent
Flat Cable(Stranded 28 AWG)	3M 3517-40 (shielded) or equivalent

Note: The Maximum cable length is 45.7 cm(18 in), to key the IDE mating connector you must plug the hole at pin 20.

7.4 DC Power Connector:

4-pin power connector	AMP P/N 84069-1 or equivalent
Loose-piece contacts	AMP P/N 61173-4 or equivalent
Strip contacts	AMP P/N 350078-4 or equivalent
3-pin connector	Molex P/N 39-00-0033 or equivalent
Strip contacts	Molex P/N 39-00-0023 or equivalent
Loose-piece contacts	Molex P/N 39-00-00341 or equivalent

8.0 Reliability:

8.1 MTBF:

The disk drive shall demonstrate 350,000 hours MTBF as measured by the Ongoing Reliability Test and schedule defined in Exhibit "C" of the Basic Order Agreement.

9.0 Drive Ship Configuration The following drive parameters will be set at the factory prior to shipment.

9.1 Jumper Configuration
Spare jumper across J8 pins 3 and 5

9.2 Set Features Configuration.

Number of Read Segments	Set to 1
Write Auto-Reallocation	Enabled
Read Auto-Reallocation	Enabled
Read Cache	Enabled
Write Cache	Enabled