MICROPOLIS 1660 DISK DRIVE
SPECIFICATIONS

Unformatted Capacity:	Model Number 1664-7
Total Mbytes	389.3
Disk Platters	4
Read/Write Heads	7
Cylinders	1780
Bytes per track	31,832

Formatted Capacity

Total Mbytes	344.4
Bytes per Sector	512
Sectors per Track	54

PC Drive Types.

If you are using third-party installation software or an board BIOS on the controller, follow the instructions included with the software or controller. Otherwise, examine the entries in your drive table and find the type that most resembles the head and cylinder parameters of the drive without exceeding these parameters.

Performance Specifications

Seek Time (including settling time)	Track-to-Track	4 msec
	Average	14 msec
	Maximum	30 msec
Avg Rotational Latency		8.33 msec
Rotational Speed		3600 rpm +/- 0.5%
Data Transfer Rate		15 Mbits/sec
MTBF		150,000 hours
Positioner		Fully balanced rotary voice coil
Parking		Automatic park and lock

General Functional Specifications

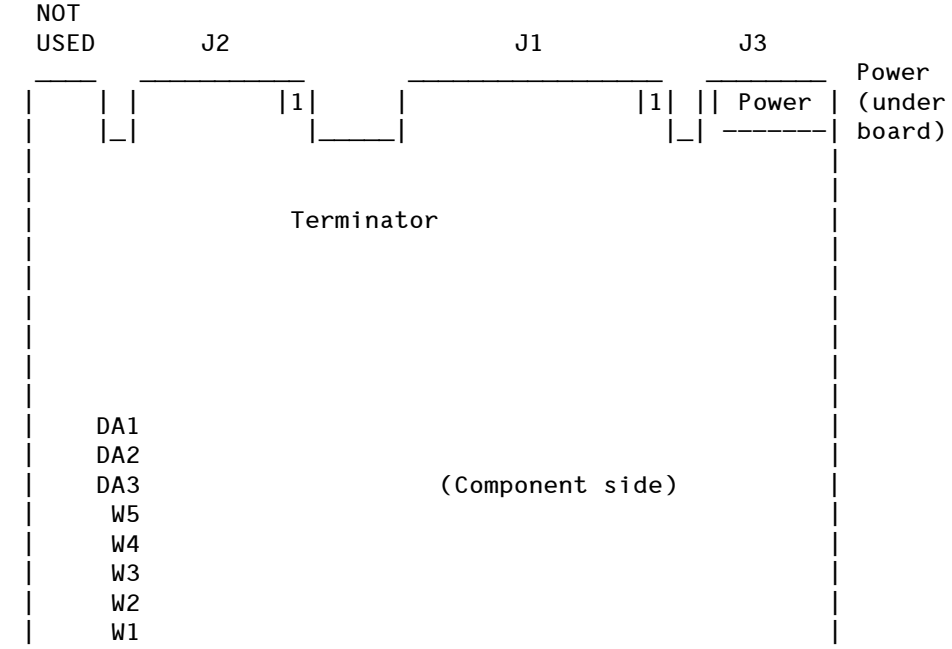
Interface	ESDI
Sectoring (see W1 description, below)	Hard or Soft
Write Precompensation Start Cylinder	1780 *
Reduced Write Current Start Cylinder	1780 *
Landing Zone	1780
Mounting Plane	Any orientation

* These are effectively turned off by specifying a non-existent cylinder. Some systems accomplish this by using a value of "-1"

Power Requirements

+12V +/-5%	0.9A Avg
	(2.0A max. during start-up)
+5V +/-5%	0.7A avg
Power dissipation, typical	14 Watts

Drive Addressing and Interface Termination



RN1 Interface Terminator
The Interface Terminator factory installed at RN1 will provide proper termination for the interface lines. When daisy-chaining multiple drives, leave the terminator installed only in the last physical drive on the daisy chain; remove the terminator from each of the other drives. In most PC/AT installations, the C: drive is actually at the end of the cable and should retain the terminator.

DA1, DA2, DA3 Drive Address Jumpers
The drive address jumpers are identified as DA1, DA2 and DA3. Address selection is binary, as shown in the table below. The ESDI controller's documentation will specify the drive address to use.

Drive Address	Select Jumpers DA3	DA2	DA1
1	out	out	in
2	out	in	out
3	out	in	in
4	in	out	out
5	in	out	in
6	in	in	out
7	in	in	in

"Drive address 0" (no jumper at DA1, DA2, or DA3) is a "deselect" (i.e., no drive selected). Drives are factory configured as Drive Address 1. For many multiple drive installations, each drive must have a unique address. An exception is that for every drive in a PC/AT installation, verify that the only Drive Address is at DA2; move the jumper if necessary (the special twisted interface cable that is generally used takes care of assigning a unique address to each drive). PC/AT controller can typically support a maximum of two drives.

W5 Selects the Spindle Control Option.
W5 selects the spindle a control option. If W5 is installed, the drive waits for a Start Spindle command(after power is applied) to start the spindle motor. If W5 is not installed (the factory default configuration),the drive automatically starts the spindle motor at power-on. W5 is not installed for PC/AT applications.

W1 Selects the Sectoring Mode.

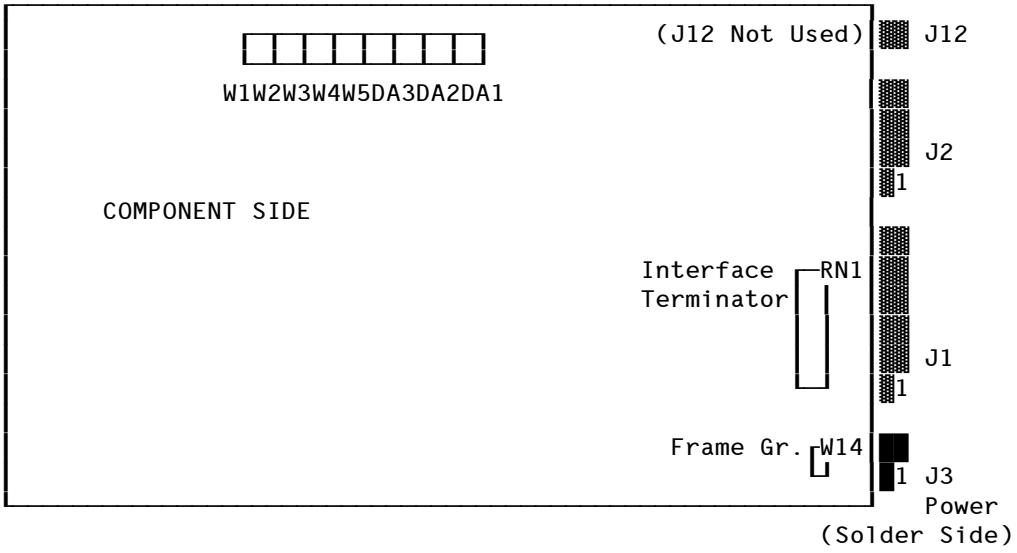
If W1 is installed, the drive operates in the soft-sectored mode. If W1 is not installed (the factory default configuration), the drive operates in the hard-sector mode. W1 is not installed for most PC/AT in applications.

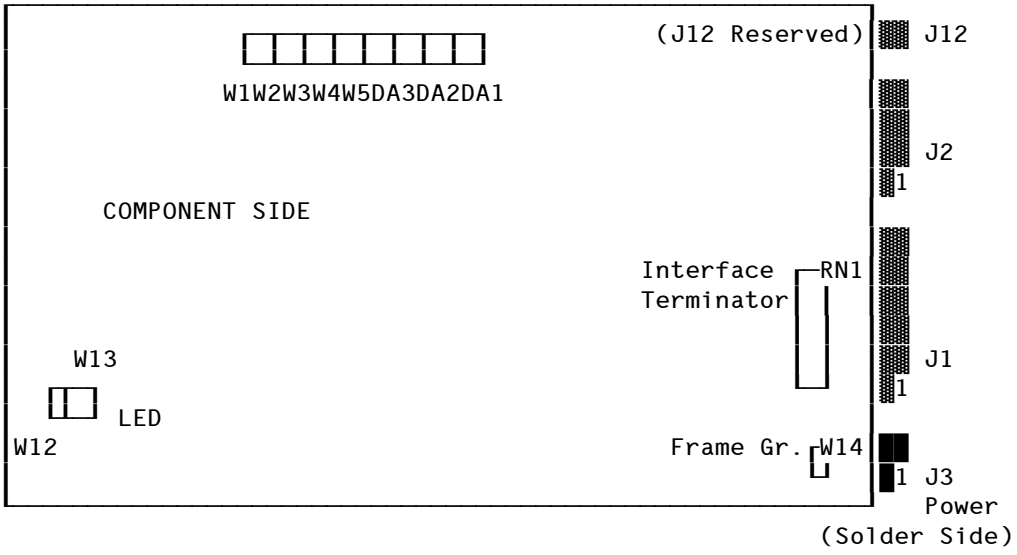
W2, W3, W4 Sector Size and Number Options
The number of bytes per sector may be specified using the Set Bytes Per Sector command or by selecting a default sector configuration with jumpers W2, W3, and W4 as follows:

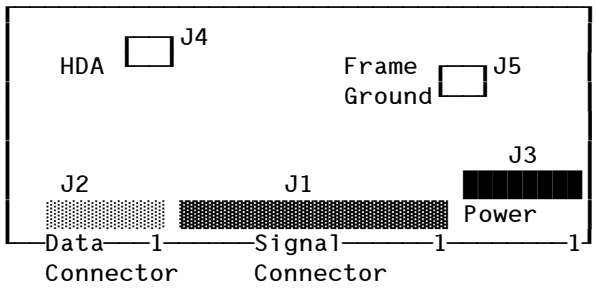
Jumpers			Sectors	Bytes/Sector	
W4	W3	W2	Per Track	Formatted	Unformatted
out	out	out	53	512	588
* out	out	in	54	512	576
out	in	out	28	1024	1116
out	in	in	14	2048	2232
in	out	out	7	4096	4464
RESERVED					
in	in	out	97	256	321
in	in	in	1	31,248	31,248

* This is the default (factory installed) configuration and is recommended for PC/AT applications

Part No. 106602-xx-x







Jumper Setting

■ = Jumper set at factory

Drive Select DA3/DA2/DA1

Drive Address	Select Jumpers DA3	DA2	DA1
■ 1	OPEN	OPEN	CLOSED
2	OPEN	CLOSED	OPEN
3	OPEN	CLOSED	CLOSED
4	CLOSED	OPEN	OPEN
5	CLOSED	OPEN	CLOSED
6	CLOSED	CLOSED	OPEN
7	CLOSED	CLOSED	CLOSED

Drive Address 0 is used as a "deselect" (i.e., no drive is selected).

The three Drive Select interface lines are decoded to select the correspondingly addressed drive to the host controller/formatter. In multiple—drive systems, each drive must have its own unique address.

Terminator Pack RN1 provides proper termination for the interface lines. When daisy—chaining the 1660 drives, the terminator is installed only in the last drive on the daisy chain.

W1 Hard— or Soft—sectored mode

CLOSED The drive is configured to operate in the SOFT SECTOR mode. Address mark generation and detection are enabled, and the Sector/Address Mark Found interface signal is used to report address mark found. Sector size is selected by the host controller.

■ OPEN The drive is configured to operate in the HARD SECTOR mode. The Sector/Address Mark Found interface signal is used to transmit sector pulses to the host controller.

Sector pulses are derived from the servo disk. The number of sector pulses generated is equal to:

$$\text{INT}\left[\frac{31{,}248}{n}\right]$$

Where 31,248 = byte clock derived from servo disk
INT = integer part of
n = the number of unformatted bytes/sector (82 minimum)

W2/W3/W4 Hard Sector Configuration

Sectors	Bytes/Sector		Jumpers		
	Formatted	Unformatted	W4	W3	W2
53	512	588	OPEN	OPEN	OPEN
■ 54	512	576	OPEN	OPEN	CLOSED
28	1024	1116	OPEN	CLOSED	OPEN
14	2048	2232	OPEN	CLOSED	CLOSED
7	4096	4464	CLOSED	OPEN	OPEN
–	Reserved		CLOSED	OPEN	CLOSED
97	256	321	CLOSED	CLOSED	OPEN
1	31248	31248	CLOSED	CLOSED	CLOSED

The number of bytes/sector may be specified using the Set Bytes Per Sector command or by selecting a sector configuration with option jumpers W2, W3, and W4.

Note that the factory default sector configuration is 54 sectors (W2 installed, W3 and W4 not installed).

Other combinations of sector numbers and bytes per sector are available; contact Micropolis Product Support for details.

W5 Spindle Control Option

CLOSED The drive must wait for a Start Spindle command to start the spindle motor.

■ OPEN The drive automatically starts the spindle motor at power–on. (Factory default configuration)

W12/W13 LED (for 1664–7)

A jumper is installed at W12 or W13 to select the color of the LED.

When a jumper is installed at W12, the red LED is selected.

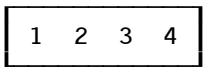
When a jumper is installed at W13 (the factory default configuration), the green LED is selected.

W14 Frame Ground Option

CLOSED Frame ground is connected to logic ground.

■ OPEN Frame ground is not connected to logic ground

J3 DC Power and pin connector assignments

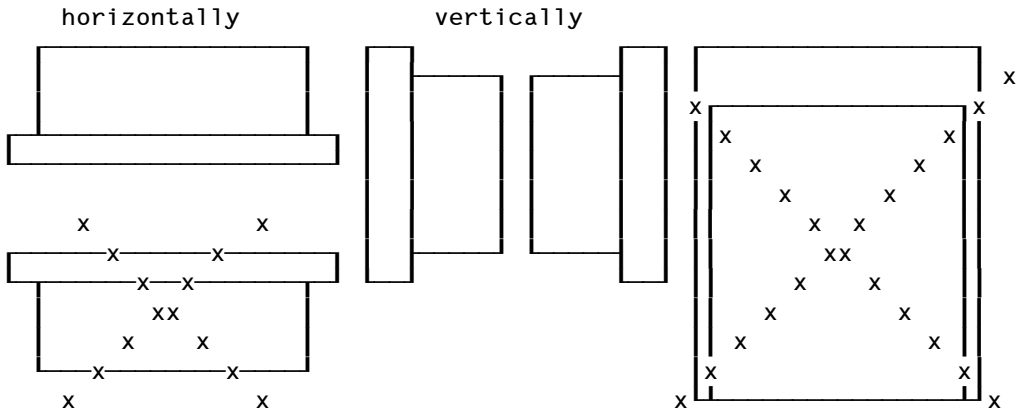


pin 1 +12 V
pin 2 +12 V Return
pin 3 + 5 V Return
pin 4 + 5 V

J12 RESERVED!

Notes on installation

Drive mounting



Dimensions and Mounting

The 1660 Series uses industry-standard mounting for 5¼-inch half-height Winchester disk drives.

Recommended orientation is vertical on either side, or horizontal with the Device Electronics board down; other mounting orientations may be used provided the ambient air temperature around the drive is kept at or below 50°C (122°F).

Inasmuch as the drive frame acts as a heat sink to dissipate heat from the unit, the enclosure and mounting structure should be designed to allow natural convection of heat around the HDA and frame. If the enclosure is small and/or natural air flow is restricted, a fan may be required. In any case, no point on the HDA assembly should exceed 62°C (143°F).

Mounting Screws

4 per side 6-32 UNC-2B x 0.10 deep (thru hole).
4 on bottom 6-32 UNC-2B x 0.22 deep

Caution: To avoid restricting HDA sway space, the mounting screws must not penetrate the outer surface of the side mounting holes more than .10 (+.00, -.03) inch or the bottom mounting holes by more than .20 (+.00, -.03) inch. Torque applied to the screws must not exceed 8 in-lbs.

Control Signal Connector J1

J1 is a 34-pin board-edge connector. The signals on this connector control the drive and transfer drive status to the host controller.

Recommended Cable: 3M Scotchflex 3365/34 or equivalent.
Mating connector: AMP 88373-3 (key slot between pins 4 and 6).

J2 Data Tranfer Connector

J2 is a 20-pin board-edge connector. The signal on this connector contain read or write data.

Recommended Cable: 3M Scotchflex 3365/20.
Mating Connector: AMP 88373-6 (key slot between pins 4 and 6).

J3 DC Power Connector

J3 is a 4-pin, keyed, AMP MATE-N-LOCK connector. This connector supplies DC power (+5V and +12V) to the drive.

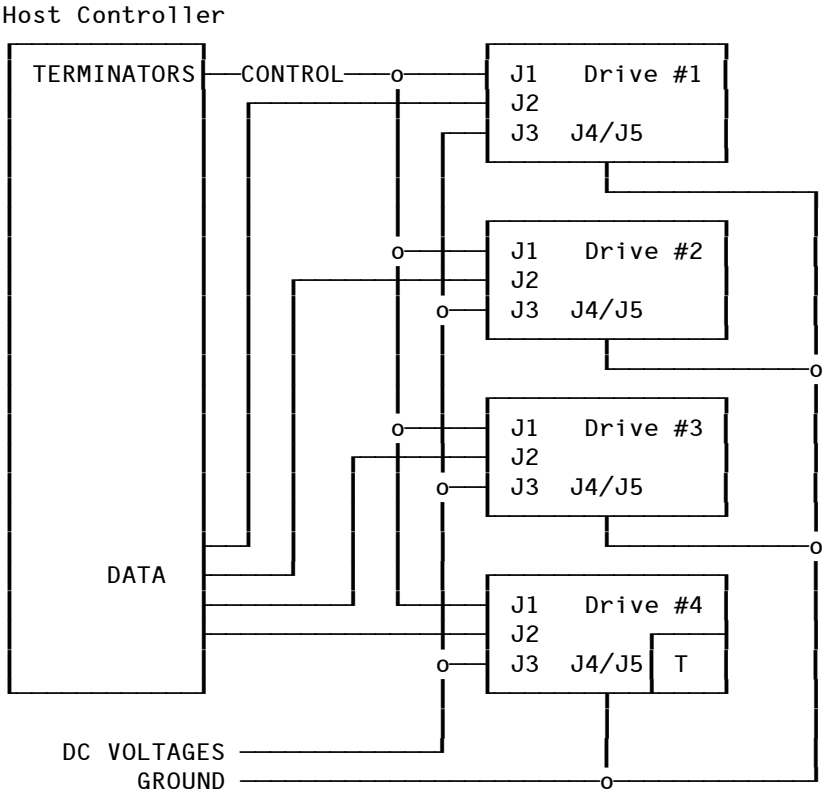
Mating Connector: AMP 1-480424-0
Pins: AMP 350078-4
Suggested Wire Size: 18 AWG

Ground Connectors J4 and J5

3/16-inch spade lugs J4 and J5 are provided for grounding. System characteristics determine the proper ground connection.

Mating connector: AMP 60972-2 or equivalent.

Daisy-chaining the 1660 Drive



T = TERMINATORS

Interface Terminator RN1 is installed ONLY in the last physical drive in the control chain.

Connectors J4 and J5 are provided for grounding; system characteristics determine the proper ground connection.

Up to seven disk drives may be connected to a single host controller/formatter. The control signal at J1 are transmitted via the standard, daisy-chain interconnection.

The data signals at J2 are transmitted via radially connected data-transfer lines.

Interface Electrical Characteristics

Connector J1
The Control Signals control the drive and transfer drive status to the host controller. The signals are low-true at the interface, high-true into drivers and out of receivers, and have the following logic levels.

Driver: 7438 or equivalent
Receiver: 74LS14 or equivalent

True = 0.0 VDC to 0.40 VDC @ I = -48 milliamps (maximum)
False = 2.5 VDC to 5.25 VDC @ I = +250 microamps (open collector)

Interface Cable Length 10 feet (3 meters) maximum

Connector J2
All interface data transfer signals are differential in nature. One TTL control signal and four TTL status signal are also provided at Connector J2. The signals are high true into drivers and out of receivers and have the EIA RS-422 levels shown.

Driver: AMD 26LS31 or equivalent
Receiver: AMD 26LS32 or equivalent

High = +2V
Low = +0.5V

Adjustments and Maintenance

The 1660 disk drives requires no adjustments or periodic maintenance; additionally, no mechanical adjustments are required to prepare a system for handling or shipment.

Field-Replacable Components

The concept of repair by replacement of complete functional components is utilized in the 1660 Series, resulting in an MTTR of less than 15 minutes.

Interface

The 1660 disk drives are pin- and function-compatible with the Serial mode of the Enhanced Small Device Interface (ESDI) for 5 1/4-inch Winchester disk drives. In the Serial mode, interface signals (control, data, and status) are transmitted serially via handshaking request/acknowledge signals.

Media Defects

Media defects are physical characteristics of the media which result in repetitive read error when a functional drive is operated within specified operating conditions.

At the time of manufacture, a media test system evaluates every drive and identifies each media defect location. The defects are logged on a label affixed to the drive. The defective areas are identified by head address (HD), cylinder address (CYL), and number of Bytes From Index (BFI). A printed listing of the defects is also shipped with each drive.

In addition to listing the defects on the label and the printout, the defects are also mapped on the drive. The defect list is written for each data surface. The list

is written on the corresponding surface in Sector 0 at three cylinder locations:

1) The maximum cylinder (1779).

2) The maximum cylinder minus 8 (1771).

3) A special cylinder accessed as "Cylinder 4095" (FFFh).

Note: The cylinder at the address of 4095 is a drive-unique location. This is in compliance with the industry-standard ESDI specification. Do not attempt to write to Cylinder 4095.

Micropolis specifies that all 1660 drives shall have no more than one defect per megabyte of unformatted capacity. Additionally, Cylinder 0 and the cylinder at 4095 shall be defect-free at the time of shipment.

Seek Time

		1660
Track-to-Track	msec. typ.	4
Average	msec. typ.	14
	msec. max	30
One-Third Stroke	msec. max.	15
Latency	msec. avg.	8.33
Nominal	msec. max.	16.67