```
                    MICROPOLIS 1650 DISK DRIVE
                         SPECIFICATIONS

                            Model Number
Unformatted Capacity:    1653-4    1653-5    1654-6    1654-7

  Total Mbytes           104.0     130.0     156.1     182.1
  Disk Platters             3         3         4         4
  Read/Write Heads          4         5         6         7
  Cylinders          ---------------- 1249 ------------------
  Bytes per track    -------------- 20,832 ------------------


Formatted Capacity

  Total Mbytes           92.0      115.0     138.0     161.0
  Bytes per Sector   ----------------- 512 ------------------
  Sectors per Track  ----------------- 36  ------------------
```

PC Drive Types.

  If you are using third-party installation software or on 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        16 msec
                                          Maximum        37 msec
  Avg Rotational Latency                                8.33 msec
  Rotational Speed                            3600 rpm +/- 0.5%
  Data Transfer Rate                            10 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                 1249 *
  Reduced Write Current Start Cylinder                 1249 *
  Landing Zone                                         1249
  Mounting Plane                            Any orientation
```
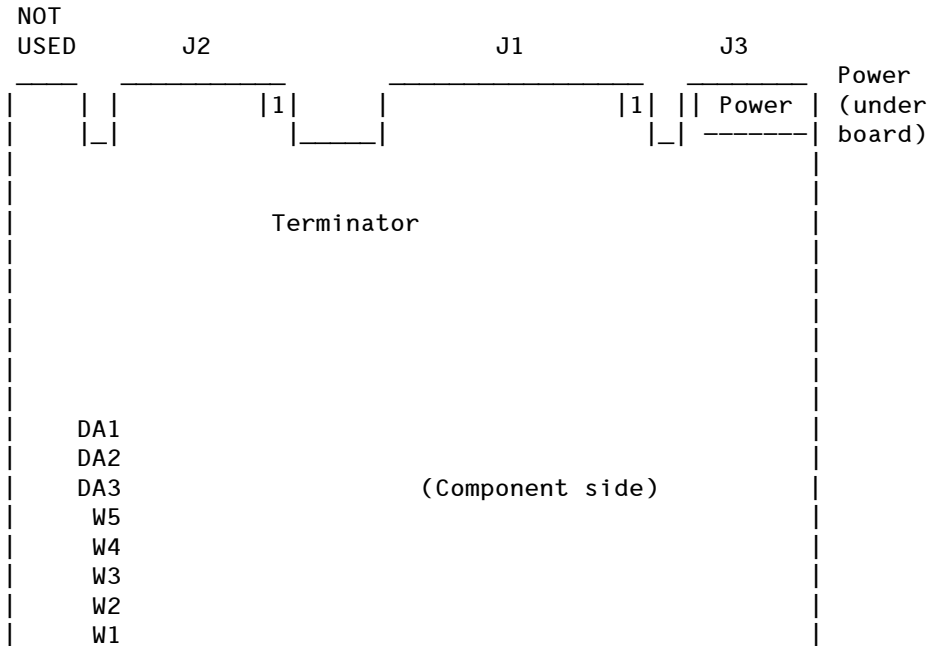
  * These are effectively turned off by specifying a non-existent cylinder. Some
    systems accomplish this by using a value of "-1"

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

```
    NOT
    USED         J2                      J1            J3
   ____   _____              _____   _____   Power
  |    | |        |1|    |       |1| || Power |  (under
  |    |_|        |_____|        |_|  |_| -------| board)
  |                                              |
  |                                              |
  |                    Terminator                |
  |                                              |
  |                                              |
  |                                              |
  |                                              |
  |                                              |
  |                                              |
  |     DA1                                      |
  |     DA2                                      |
  |     DA3            (Component side)          |
  |     W5                                       |
  |     W4                                       |
  |     W3                                       |
  |     W2                                       |
  |     W1                                       |
```

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 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 Option
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	35	512	595
* out	out	in	36	512	578
out	in	out	19	1024	1096
out	in	in	9	2048	2314
in	out	out	5	4096	4166
in	out	in	32	512	651
in	in	out	64	256	325
in	in	in	1	20,832	20,832

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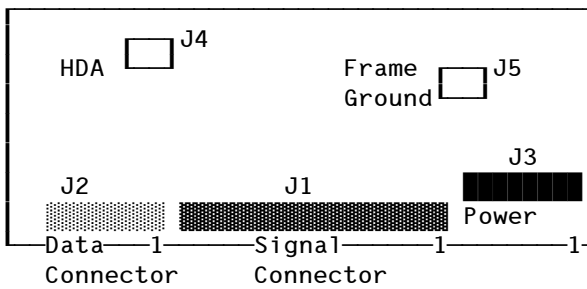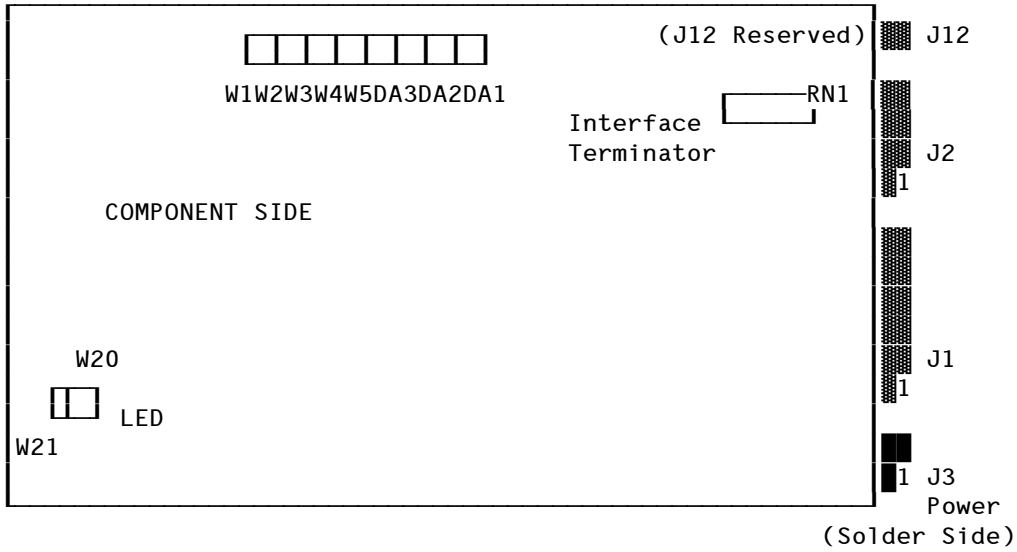
Jumper Setting

* = 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 Adress lines are decoded to select the correspondingly addressed drive. 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 1654-7 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 signal is used to transmit sector pulses to the host controller. (Factory default configuration)

Sector pulses are derived from the servo disk. The number of sector pulses generated equals:

$$\mathrm{INT}\left[\frac{20{,}832}{n}\right]$$

Where 20,832 = 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
35	512	595	OPEN	OPEN	OPEN
* 36	512	578	OPEN	OPEN	CLOSED
19	1024	1096	OPEN	CLOSED	OPEN
9	2048	2314	OPEN	CLOSED	CLOSED
5	4096	4166	CLOSED	OPEN	OPEN
32	512	651	CLOSED	OPEN	CLOSED
64	256	325	CLOSED	CLOSED	OPEN
1	20832	20832	CLOSED	CLOSED	CLOSED

* Factory default configuration

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

Note that the factory default sector configuration is 36 sectors (W2 installed, W3 and W4 not installed).

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)

<u>W20/W21 LED Color Option</u>

A jumper is installed at W20 or W21 to select the color of the LED.

When a jumper is installed at W20, the red LED is selected.

When a jumper is installed at W21 (the factory default configuration), the green LED is selected.
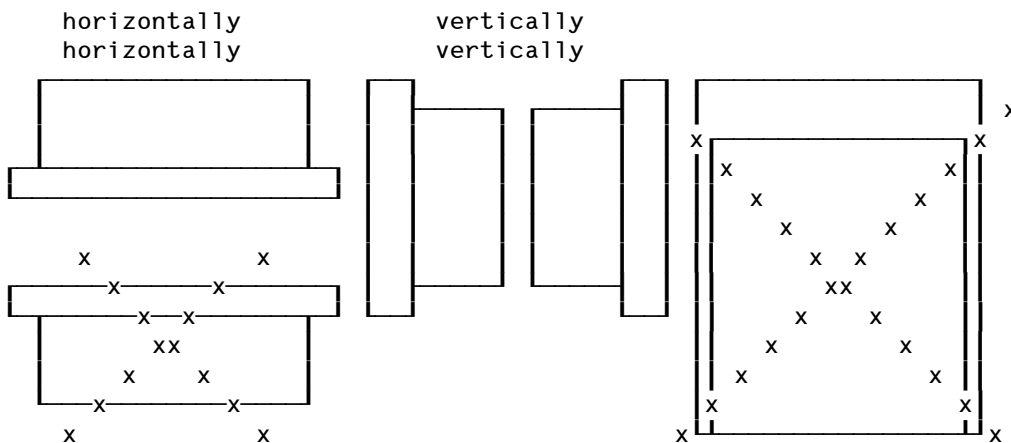

<u>J3   DC Power and pin connector assignments</u>

```
 ┌─────────────┐      pin 1     +12 V
 │ 1   2   3   4 │    pin 2     +12 V Return
 │             │      pin 3     + 5 V Return
 └─────────────┘      pin 4     + 5 V
```

J12 RESERVED!

Notes on installation

<u>Drive mounting</u>

<u>Dimensions and Mounting</u>

The 1654-7 series uses industry-standard mounting for 5 ¼-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 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 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.
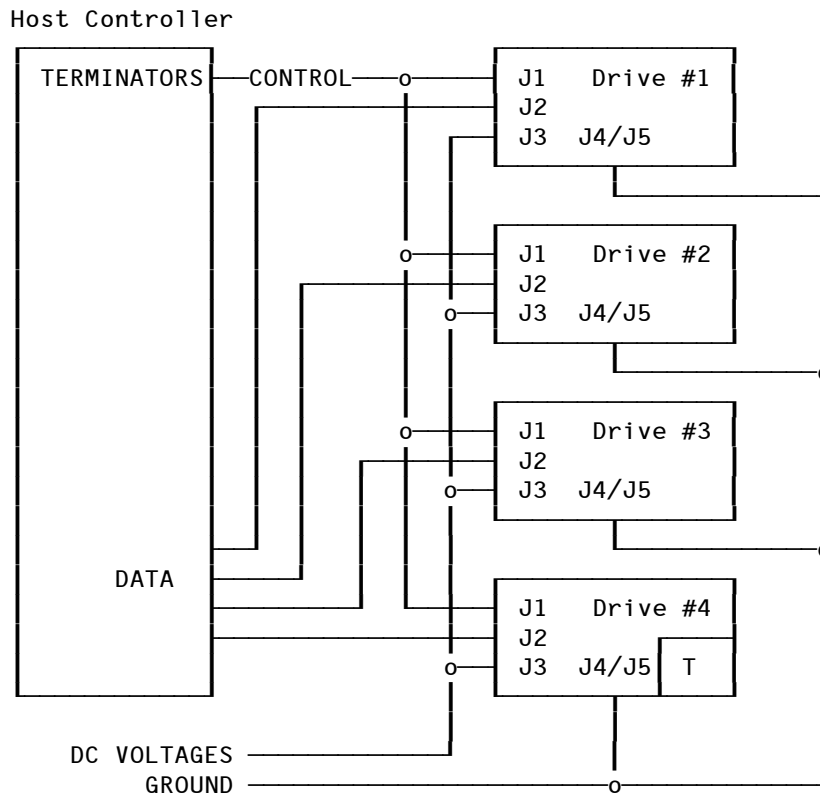
Mating Connector: AMP 1-480424-0
           Pins: AMP 350078-4
Suggested Wire Size: 18 AWG

Ground Connectors J4 and J5

3/16-inch spade lugs J4 and J5 are provided for grounding.

Mating connector: AMP 60972-2 or equivalent.

Daisy-chaining the 1654-7 Drive

Host Controller

```
              Host Controller
 ┌─────────────┬──────────────┐  ┌────────────────────────┐
 │ TERMINATORS │──CONTROL──o───┼──│ J1    Drive #1         │
 │             │              │  │ J2                     │
 │             │              │  │ J3   J4/J5             │
 │             │              │  └────────────────────────┘
 │             │         o────┼──│ J1    Drive #2         │
 │             │              │  │ J2                     │
 │             │         o────┼──│ J3   J4/J5             │
 │             │              │  └────────────────────────┘
 │             │         o────┼──│ J1    Drive #3         │
 │             │              │  │ J2                     │
 │             │         o────┼──│ J3   J4/J5             │
 │    DATA     │              │  └────────────────────────┘
 │             │         o────┼──│ J1    Drive #4         │
 │             │              │  │ J2                     │
 │             │         o────┼──│ J3   J4/J5    │ T │    │
 └─────────────┴──────────────┘  └────────────────────────┘
 DC VOLTAGES ────────
    GROUND ───────────────────o
```


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.