



Models 514 and 519

5.25 Inch Winchester Disk Drives

With ST-412 Interface

SECTION 2 FUNCTIONAL SPECIFICATIONS

2.1 Introduction. This section sets forth the functional specifications for PRIAM 514/519 Disk Drives. Table 2-1 lists electrical and physical specifications, and Table 2-2 outlines both operating and non-operating environmental specifications.

Table 2-1. 514/519 Functional Specifications

Performance:	<u>514</u>	<u>519</u>
Number of Disks	6	8
Capacity (Mbytes, Unformatted):	140.2	191.2
Bytes per Track	10,416	10,416
Number of Data Heads	11	15
Bytes per Cylinder	114,576	156,240
Number of Data Cylinders	1224	1224
Positioning Times (msecs):		
Single Track	5	5
Average (1/3 Stroke)	20	20
Maximum	45	45
Average Rotational Latency (msec)	8.3	8.3
Track Density (TPI)	1070	1070
Data Transfer Rate (Mbits/sec)	5.0	5.0
Recording Characteristics:		
Maximum Density (BPI)	10,924	10,924
Maximum Flux Density (FCI)	10,924	10,924
Recording Code	MFM	MFM
Controlled Start/Stop Time (sec):		
Typical	20	20
Maximum	30	30
Nominal RPM ($\pm 0.1\%$)	3600	3600
Electrical Requirements (also see paragraph 2-3):		
Power Consumption (+5 and +12 volts):		
Peak (Start up)	64 Watts	
Peak (Seeking)	57 Watts	
Average	35 Watts	
Idle	29 Watts	

Table 2-1. 514/519 Functional Specifications (Cont.)

Electrical Requirements (Cont.)		
Power Parameters:	+12 VDC	+5 VDC
Tolerance	±5%	±5%
(±10% allowable on 12V start up only)		
Maximum Amps, Peak (5 sec)	4.5	2.0
Maximum Amps, RMS (Seeking)	4.0	1.7
Average Amps, RMS (Seeking)	2.2	1.7
Idle Amps, RMS	1.7	1.7
Ripple, Peak-Peak	120 mV max	120 mV max
at VDC, Minimum	11.52	4.87
Load Regulation, Static	5%	5%
Load Regulation, Dynamic:		
Peak Transient Voltage	0.8 volts max	--
Transient Response Time	20 microV-sec min	--
RMS Voltage	250 mV RMS max	--
(Above power specifications are measured at drive connector J3.)		
Physical Characteristics:		
(Outline drawings of the disk drives are shown in Figure 2-1.)		
Weight	Both: Less than 7.0 lbs. (3.18 kg.)	
Length	8.00 +0.00/-0.04 in. (20.32 +0.00/-0.10 cm)	
Width	5.75 +0.00/-0.02 in. (14.61 +0.00/-0.05 cm)	
Depth	3.25 ±0.01 in. (8.26 ±0.03 cm)	
Required Mounting Orientation:		
Horizontal	Spindle Impeller Down	
Vertical	Power Connector J3 Up with Matrix PCBA Down (preferred, but either vertical orientation is acceptable) and Positioner Motion Horizontal within 5 degrees	

SECTION 6 INTERFACE: PHYSICAL CHARACTERISTICS

6.1 **Introduction.** This section presents a physical description of the ST-412 Interface and customer options available with it.

6.2 **Cable Connections.** The ST-412 interface provides four connections for cabling between the disk drive and the host controller. They are as follows:

J1	Control Signals (Multiplexed)
J2	Read/Write Signals (Radial)
J3	DC Power Input
J14	Frame Ground

Refer to Figure 6-1 for connector locations on the Interface PCB, and refer to Table 6-1 for connector pin call-outs.

6.2.1 **The J1/P1 Connector: Control Signals.** Connection with J1 is through a 34-pin edge connector. The dimensions for this connector are shown in Figure 6-2. The pins are numbered 1 through 34 with the even pins located on the component side of the PCB. Pin 2 is located on the end of the PCB connector closest to the DC Power connector J5/P5 and is labeled. The recommended mating connector for P1 is AMP ribbon connector P/N 88373-3 or Molex 15-35-1341. All odd pins are ground. A key slot is placed between pins 4 and 6.

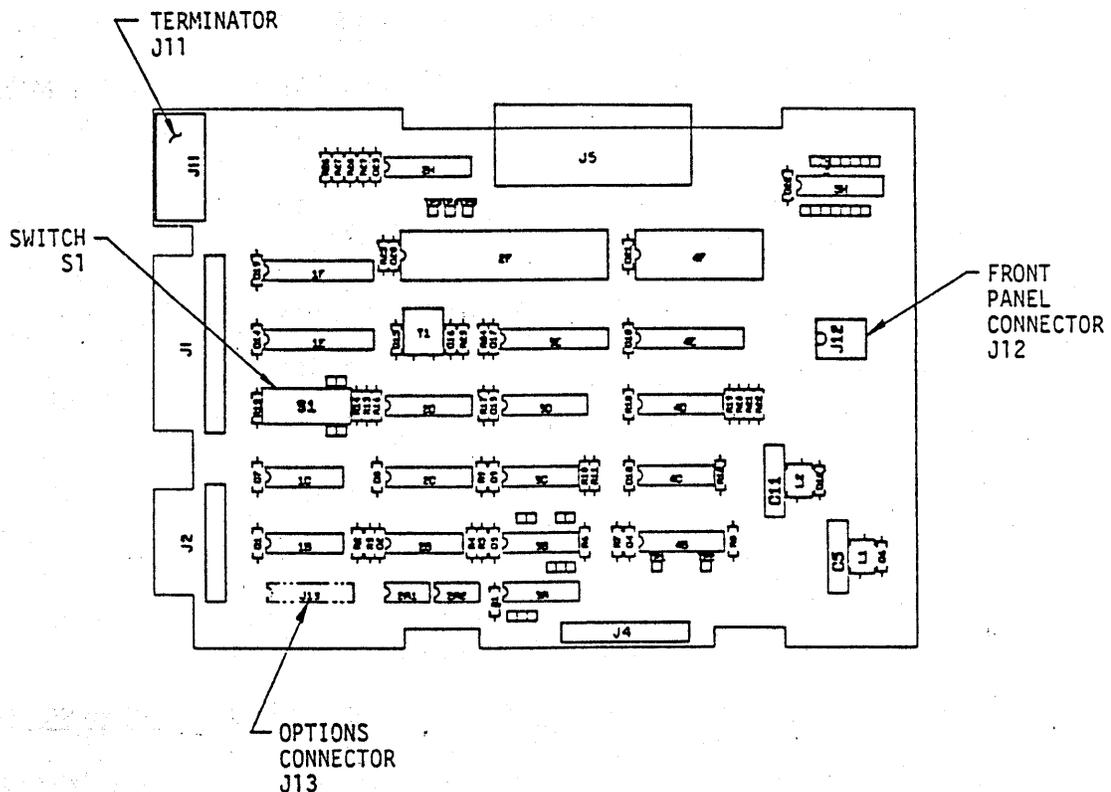


Figure 6-1. Interface PCBA Connector Locations

Table 6-1. Connector Pin Call-Outs

CONTROL SIGNALS - J1/P1

<u>CONTROL SIGNAL NAME</u>	<u>GROUND</u>	<u>SIGNAL PIN</u>	<u>TRANSMISSION</u>
-HEAD SELECT 8	1	2	TO DRIVE
-HEAD SELECT 4	3	4	TO DRIVE
-WRITE GATE	5	6	TO DRIVE
-SEEK COMPLETE	7	8	TO CONTRLR
-TRACK 0	9	10	TO CONTRLR
-WRITE FAULT	11	12	TO CONTRLR
-HEAD SELECT 1	13	14	TO DRIVE
RESERVED (To J2 Pin7)	15	16	--
-HEAD SELECT 2	17	18	TO DRIVE
-INDEX	19	20	TO CONTRLR
-READY	21	22	TO CONTRLR
-STEP	23	24	TO DRIVE
-DRIVE 1 SELECT	25	26	TO DRIVE
-DRIVE 2 SELECT	27	28	TO DRIVE
-DRIVE 3 SELECT	29	30	TO DRIVE
-DRIVE 4 SELECT	31	32	TO DRIVE
-DIRECTION IN	33	34	TO DRIVE

DATA SIGNALS - J2/P2

<u>DATA SIGNAL NAME</u>	<u>GROUND</u>	<u>SIGNAL PIN</u>	<u>TRANSMISSION</u>
-DRIVE SELECTED	2	1	TO CONTRLR
RESERVED	4	3	--
RESERVED	6	5	--
RESERVED (To J1 Pin 16)	8	7	--
RESERVED		9	--
RESERVED		10	--
GROUND	11,12		--
+MFM WRITE DATA		13	TO DRIVE
-MFM WRITE DATA		14	TO DRIVE
GROUND	15,16		--
+MFM READ DATA		17	TO CONTRLR
-MFM READ DATA		18	TO CONTRLR
GROUND	19,20		--

DC POWER - J3/P3

	<u>VOLTAGE</u>	<u>GROUND</u>	<u>TRANSMISSION</u>
+12 Volts DC	1	2	TO DRIVE
+5 Volts DC	4	3	TO DRIVE

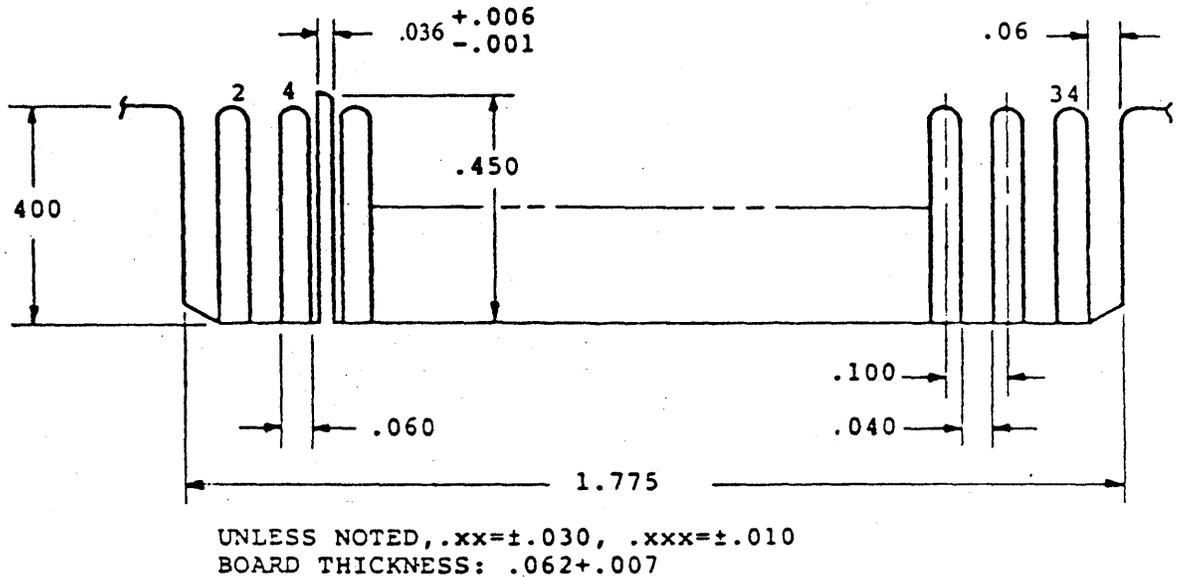


Figure 6-2. J1 Connector

6.2.2 The J2/P2 Connector: Data Signals. Connection with J2 is through a 20-pin edge connector. The dimensions for the connector are shown in Figure 6-3. The pins are numbered 1 through 20 with the even pins located on the component side of the PCB. The recommended mating connector for P2 is AMP ribbon connector P/N 88373-6, or Molex P/N 15-35-1201. A key slot is placed between pins 4 and 6.

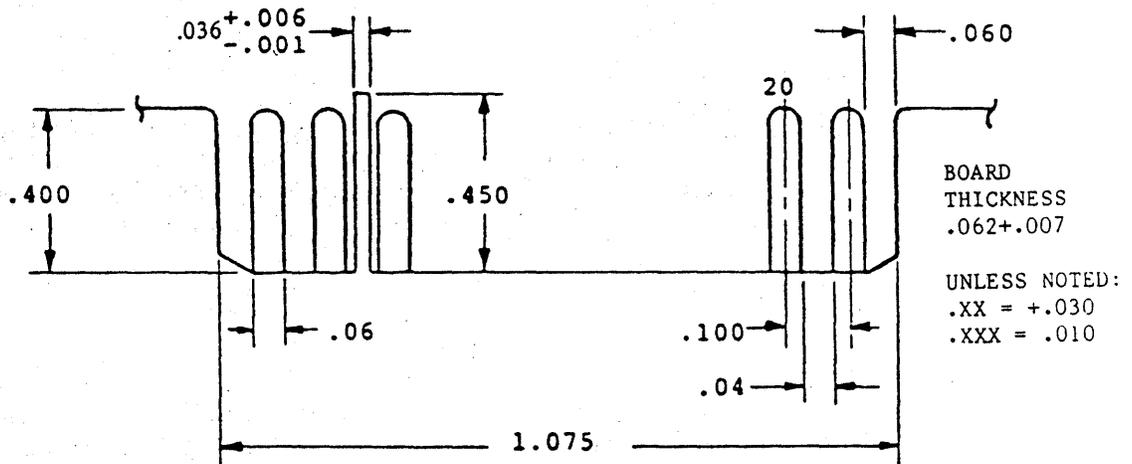


Figure 6-3. J2 Connector

6.2.3 The J3/P3 Connector: DC Power. The drive dc power connector is a 4-pin AMP Mate-N-Lok connector (AMP P/N 350211-1), mounted on the component side of the Servo PCBA. The recommended mating connector is AMP P/N 1-480424-0, utilizing AMP pins P/N 61314-4 (Strip) or P/N 60617-4 (Loose Piece). J3 pins are numbered as shown in Figure 6-4.

PIN 1 +12V DC $\pm 5\%$ AT 4.5A MAX.
 ($\pm 10\%$ AT POWER UP)
 PIN 2 +12V RETURN
 PIN 3 +5V RETURN
 PIN 4 +5V DC $\pm 5\%$ AT 2.0A MAX

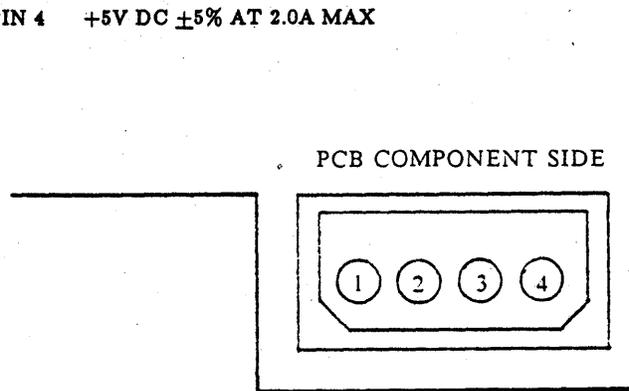


Figure 6-4. J3 Connector

6.2.4 **The J14/P14 Connector: Frame Ground.** Fasten AMP P/N 61761-2. The recommended mating connector is AMP 62187-1. If used, the hole in J14 will accommodate a wire size of 18 AWG maximum.

6.3 Customer Options.

6.3.1 **Switch Selectable Options.** Two optional features implemented via the drive select/option select dipswitch S1 are available for customer reconfiguration of drive functions. (See Table 6-2.) They are the Radial/Daisy Chain option and the PRIAM Unique Mode.

Radial/Daisy Chain Option. Switch S1-5 changes the drive select protocol. When S1-5 is OFF the drive interface is set for normal daisy chain operation. Switching S1-5 ON facilitates radial operation by forcing permanent drive selection regardless of the address chosen by drive select switches S1-1 through S1-4.

PRIAM Unique Mode. Switch S1-6 selects recovery options from WRITE FAULT, and SERVO FAULT (loss of READY) conditions. The following protocol is established when PRIAM Unique is selected (closing S1-6):

- When dc power is applied to the drive, sequencing up is no longer automatic. The drive will remain stopped with SEEK COMPLETE true and READY false.
- Any motion command will cause the drive to sequence up.
- SERVO FAULT and WRITE FAULT will both be reset when any motion command is received. Removal of dc power is not required to reset SERVO FAULT (loss of READY). Simple de-selection of the drive will clear WRITE FAULT but not SERVO FAULT.

- The drive will not conceal seek faults by attempting three automatic retries. It will instead immediately post SEEK COMPLETE or NOT READY status.
- When a forward illegal cylinder address greater than maximum is received, a sequence down will be executed.
- As in the normal ST-412 mode of operation, when a reverse illegal cylinder address less than zero is received, a fast restore to Cylinder 0 will be performed.

6.3.2 Sequence Up/Down. In the normal ST-412 mode of operation the drive will sequence up as soon as power is applied. However, the user may connect J13-12 with a jumper to an unused line of the J2 connector (such as J2-3) to provide a sequence up/down capability. The drive will spin down when the line is low, and it will spin up when the line is high. This line can be used to spin down the drive even in the PRIAM Unique Mode.

6.3.3 Write Protect. Grounding J13-9 with a jumper to J13-8 will inhibit writing and protect all previously written data by causing WRITE FAULT if WRITE GATE is activated. (See Figure 6-5.) J13 has sockets flush with the PCB on 0.1 in. centers and 0.3 in. spacing to accept low profile (<.20 in. high) DIP jumpers or wire jumpers.

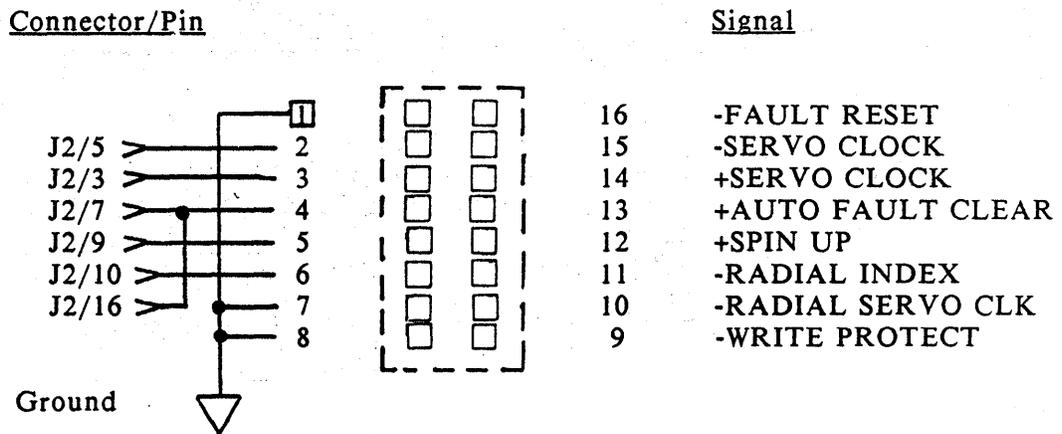


Figure 6-5. J13 Option Settings

6.3.4 Interface Options. With the addition of jumpers to the appropriate locations of J13, any of the following non-multiplexed signals may be sent to the controller on any of the reserved lines of the J2 connector.

+5V (as a reference only)
 GROUND
 INDEX
 SEEK COMPLETE
 10 MHz SERVO CLOCK

6.3.5 **Front Panel Indicator.** The front panel indicator is a green LED that illuminates when the drive is selected. It is connected via internal cable to front panel connector J12 (see Figure 6-6).

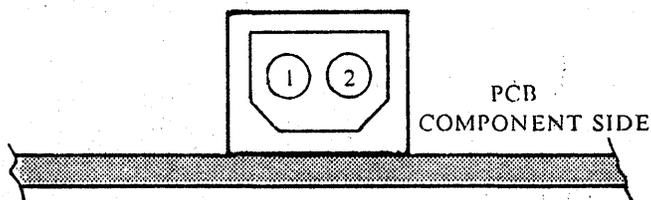


Figure 6-6. J12 Front Panel Indicator Connector

6.3.6 **Auto Write Fault Clear.** The automatic clear, WRITE FAULT, in the normal ST-412 mode of operation can be inhibited by grounding J13-13 with a jumper. If this is done, WRITE FAULT can be cleared by de-selecting the drive, or by a momentary TTL low on the fault reset line J13-16, or by powering down the drive.

Table 6-2. S1 Switch Settings

POSITION 1	DRIVE SELECT 1	ON
POSITION 2	DRIVE SELECT 2	ON
POSITION 3	DRIVE SELECT 3	ON
POSITION 4	DRIVE SELECT 4	ON
POSITION 5	RADIAL CONFIGURATION	ON
POSITION 6	PRIAM UNIQUE	ON
POSITION 7	UNUSED	--
POSITION 8	UNUSED	--