Microscience International Corporation

SPECIFICATION APPROVAL SHEET

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S00005	
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TITLE:

KISMET 20MB HALF-HEIGHT DRIVE SPECIFICATION

HH-725

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1.0 INTRODUCTION

1.1 General Description:

The Winchester 5 1/4 inch disk drive is a random access storage device with plated media fixed storage. The total storage capacity formatted is 20 megabytes. (32 sectors per track, 256 bytes per sector.)

1.2 Product Approvals:

The disk drive by design must be able to meet the following compliances; RFI and EMI (under FCC docket 20780/FCC 80-148 part 15), UL, CSA, and VDE.

2.0 FEATURES

- Industry standard 5 1/4 inch half-height enclosure
- Lightweight, total weight 3.40 pounds
- 5.0 Megabit-per-second data transfer rate
- Buffered seek mode
- Power is less than 11 watts
- Rugged thin film media
- Precision PLL controlled brushless DC spindle motor
- Stainless steel band-stepper actuator/stepper motor head positioning system with linear actuator
- Closed-loop servo-positioning with stepper motor in microstepping mode
- Microprocessor performs constant drive checks during operation
- Inner and outer guardbands
- Extensive on-board diagnostics
- Industry standard packaging and connections (see attached figure for exact positioning).
- Six point carriage suspension
- SHIPPING ZONE

2.0 FEATURES continued

- o Can be mounted in any position
- o Shock mounted HDA on four corners
- o Drive select and Termination switch configured same as HH-612

3.0 SPECIFICATION SUMMARY

3.1 Physical Specifications:

Environmental limits (Operating)	
Ambient temperature	40 to 122 degrees F (5 to 50 degrees C)
Gradient	54 degrees F/hr. (30 degrees C/hr.)
Relative humidity	8 to 80% non-condensing
Wet bulb, maximum	78 degrees F, non-condensing (25.5 degrees C)
Altitude	0 to 20,000 ft.
Vibration *	5-60 hz., .006 in. p-p 60-500 hz., .35g peak
Shock *	10g, 11 msec.

Acoustic, operating in a horizontal position, measured 34 in. from drive.

A scale	46dB
B scale	48dB
C scale	54dB

Environmental (non-operating)	
Ambient temperature	-40 to 140 degree F (-40 to 60 degree C)
Relative humidity	8 to 80%, non-condensing (25.5 degrees C)
VIBRATION *	5-30 hz., .04 in. p-p 30-500 hz., 2 g peak
SHOCK *	40 g, 11 mesc
ALTITUDE	40,000 FT

* NO MECHANICAL DAMAGE WILL OCCUR WITHIN THESE LIMITS

3.1 Physical Specifications continued

Power Requirements:

DC voltage	+12 volts +/- 5% @ .6 amp typical 1.5 amps starting 1.8 amps maximum +5 volts +/- 5% @ .7 amps typical .9 amps maximum
Power dissipation	11 watts
AC voltage	not required
line regulation	+/- 0.1% maximum for 10% change
load regulation	+/- 0.2% for 50% load change
output ripple and noise	100 mv p-p maximum, 3 mv RMS maximum
overall stability	+/- 3% (including temperature and long term drift)

3.2 Mechanical Dimensions:

Height	1.625 inches
Width	5.75 inches
Depth	8.00 inches
Weight	4.00 lbs

3.3 Reliability Specifications:

MTBF	14,000 power on hours
MTTR	20 minutes
PM	not required
Component life	5 years
Media Defects	
Single byte	10 per head
Multiple bytes	5 per head
Max single, multiple	7 per head
Error free Cylinder	track 0

Media defect reporting

An error map sticker shall be attached to each drive. The numbers shall be in decimal and show, Head, Cylinder and byte location.

3.4 Specifications:

Capacity Unformatted	
per drive	25.52 Mbytes
per surface	6.38 Mbytes
per track	10416 bytes
Capacity Formatted	
per drive	20.0 Mbytes
per surface	5.0 Mbytes
per track	8192 bytes
per sector	256 bytes
sectors per track	32
Data Transfer Rate	5.0 Mbits/sec.
Average latency	8.45 msec
Access time	
Track to Track (w/settling)	35 msec
Average (w/settling)	105 msec
Maximum (w/settling)	240 msec
Interface	ST 506/412

3.5 Physical Specification:

Rotational speed	3550 rpm +/- .1%
Recording density	9680 bpi
Areal	6.27 X 10^6 bits/sq. inch
Flux density	9680 fci
Track density	648 tpi
Cylinders per head	612
Cylinders per surface	612
Platters	2
Heads	4
Window margins	consistent with HH-612 (see attached chart)

4.0 FUNCTIONAL OPERATIONS:

4.1 Power Up Sequencing:

DC power +12 V and +5 V may be supplies in any order. When the spindle speed reaches 100%, the heads will automatically recalibrate to track zero. Upon a successful recalibrate, track zero, ready and seek complete status signales will be true. The unit will not perform any read/write or seek functions until ready is true.

4.2 Drive Selection:

Drive selection occurs when one of the drive select lines are activated. Only the drive selected will respond to the input signals, and only that drives output signals are then gated to the controller interface. Drive termination networks shall be 330/220.

4.3 Track Accessing:

This control signal activates the Read/Write head actuator to step inward or outward to reach a desired track. The direction of motion is determined by the Direction In line.

Head motion or step is initiated at the logical one to logical zero transition or at the leading edge of this signal pulse. The read/write heads will seek at the rate of the incoming step pulses under normal step access.

The step pulse period is 3 u sec minimum, for any number steps, within the specified range of the drive.

Seek complete shall become false within 500 n sec. after the leading edge of the first step pulse.

Ramp step is active when the step pulses are between 10 micro sec. and 200 micro sec. apart, and a minimum of fifteen (15) steps. The microprocessor will buffer all step pulses until, 200 micro sec. min of time expires since the last pulse. Access time is measured from the last 200 micro sec. pulse until seek complete.

See attached figures for both normal mode and Ramp mode step access.

4.4 Direction In:

The direction of read/write head motion is determined by the state of the signal when the step line is pulsed. Logical zero or true sets the actuator motion forward or toward spindle. No change in direction can be made until seek complete is true.

4.5 Seek Complete:

This line is true (logical zero) whenever the read/write heads are settled on track. Reading or writing is prohibited by the drive when seek complete is false.

4.6 Track Zero:

This signal indicates (true or logical zero) when the read/write heads are positioned over the outermost track, track zero.

4.7 Faults:

All faults conditions will be set and latches, internally by the drive and will be indicated by the green LED's flashing signal.

4.8 Servo Positioning:

Employs closed loop servo-positioning of the heads, a unique method which provides a high level of accuracy and reliability under varying operating conditions. Servo information is written in the servo gaps between data tracks in such a way that the head positioned on the data track is reading servo information from two adjacent servo gaps on both sides of the data track.

The servo tracks are pre-recorded before the index pulse. The time for servo gap is 200 microseconds. During servo gap, only the servo head is selected by microprocessor in read-only-mode.

4.9 Guardbands:

The guardbands located at the inner and outer peripheries of the platters are each seven tracks in width and are written with the same servo pattern.

4.10 Heads and Media:

The media consists of a single 130 mm-diameter aluminum disk plated on both sides with thin film media. This coating formulation, along with the 3370 head technology, permits high reliability even under extensive start/stop operations.

4.11 Diagnostics:

The microprocessor checks the operational state of the disk upon power up and during normal operation. The results are reported to the user via the front panel LEDs, in a four bit binary code.

5.0 THEORY OF OPERATION:

5.1 Introduction

The following sections detail the basic operating theory for the major KISMET series disk drive functions. This includes interfacing requirements, operation of the various drive functions, data encoding and recovery methods, and controller recommendations. Figure 5-1 is a functional diagram of the KISMET series Disk Drive.

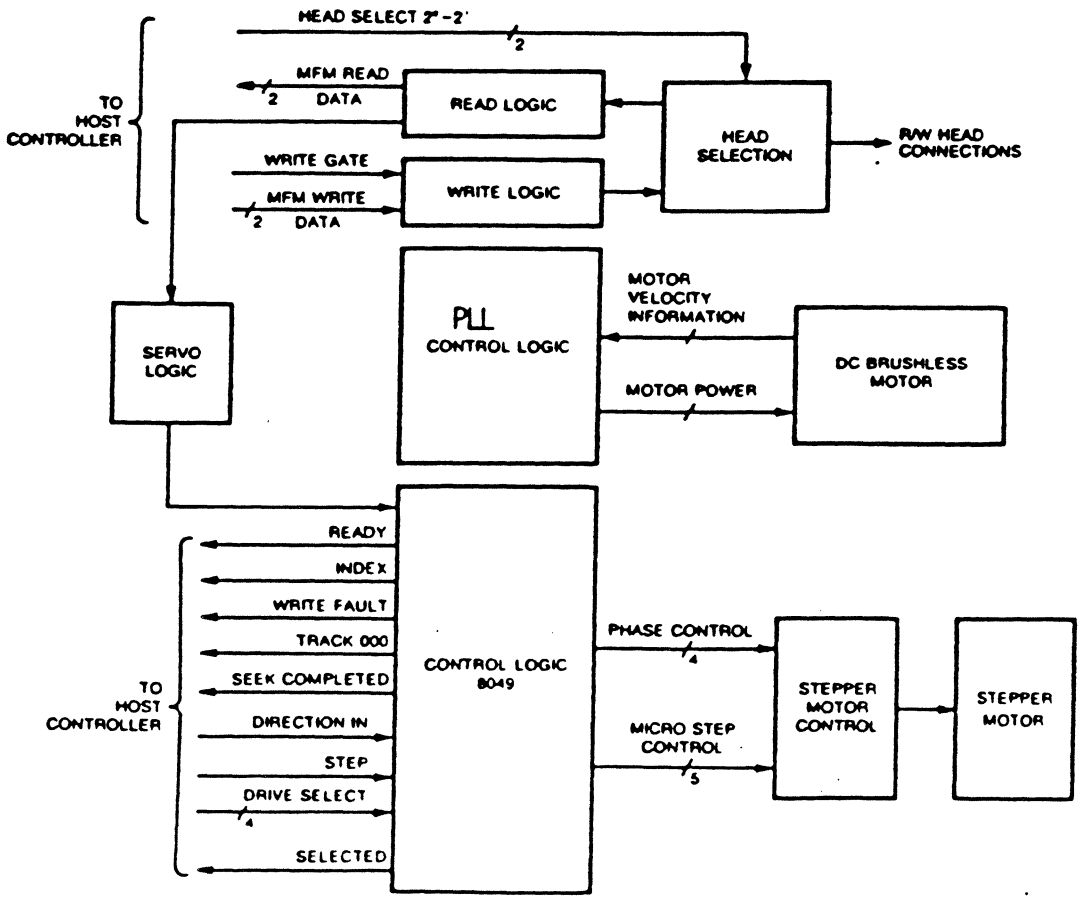


Figure 5-1 - Functional Block Diagram

5.2 Power-Up Sequencing

DC power +12 V and +5 V may be supplied in any order. When the spindle speed reaches 100% (phase locked), the heads will automatically recalibrate to track 100. Upon a successful recalibrate, Track 000, Ready and Seek Complete status signals will be true. The unit will not perform any Read/Write or Seek functions until Ready is true. Figure 5-2 illustrates power-up timing.

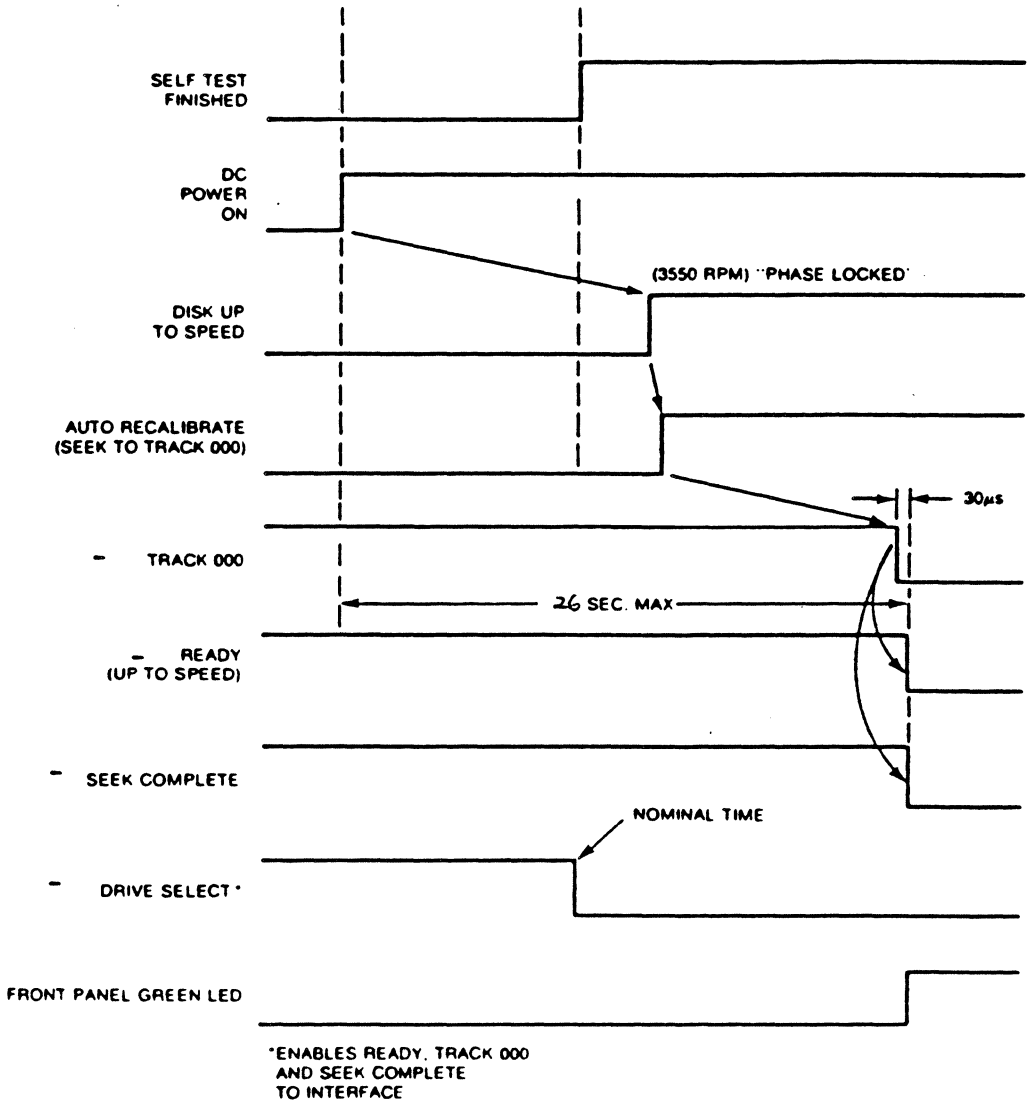


Figure 5-2 - Power Up Timing Chart

5.3 Interfacing Requirements

The subsections below discuss all data, control and status signals used by the KISMET.

The KISMET series disk drive utilized an ST506/412 interface. A two cable system (J1/P1 control and status cable, J2/P2 data cable) relays control information, drive status, and data transfer to a host controller.

5.4 Control/Status Cable (J1/P1)

A 34-pin flat-ribbon cable relays all control signals to the drive (Seek, Read, Write, etc.) as well as returning drive status (Ready, Seek Complete, etc.) to the host control system. Drive selection also enables all output status to the host system. Figure 5-3 illustrates the recommended circuits and line termination for the Control/Status Cable.

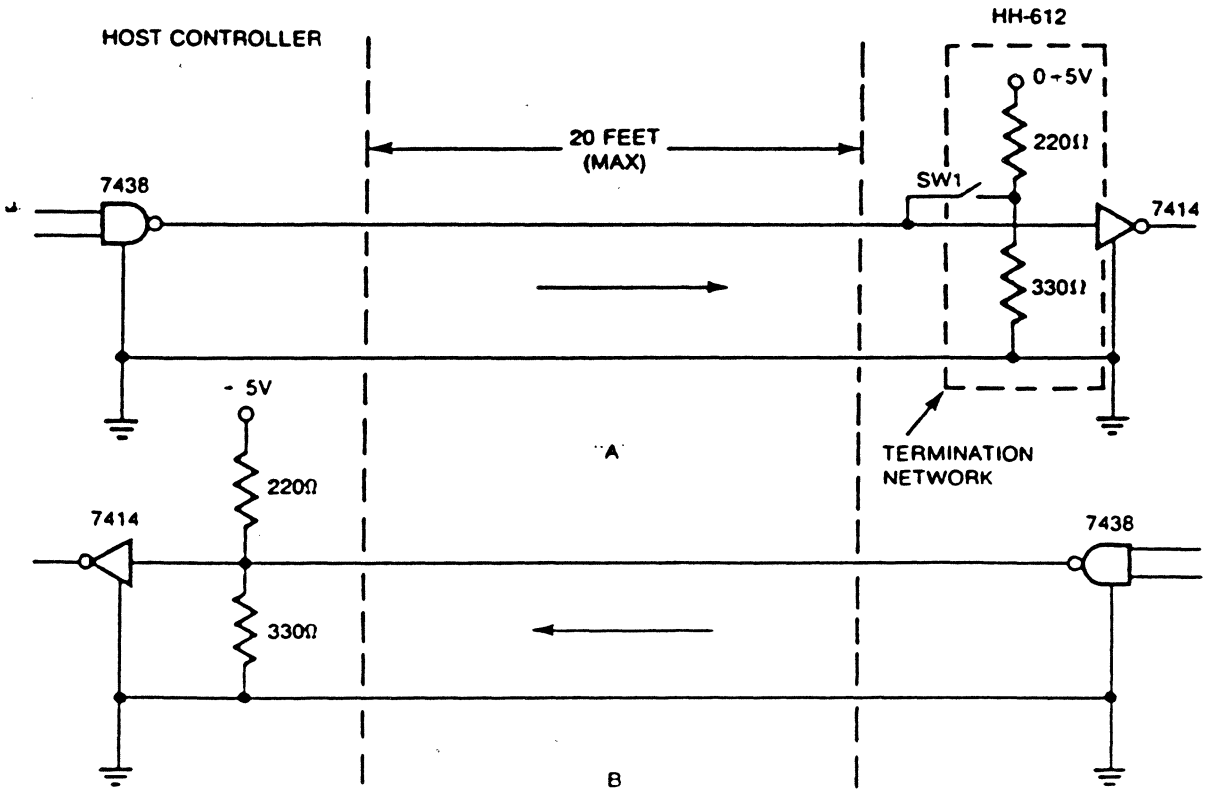


Figure 5-3 - Control/Status - Driver/Receiver Circuits

5.4.1 Write Gate (Control)

This signal to the drive determines the direction of data transfer of the disk subsystem. Activated (logical zero), this signal enables data to be written on the disk (information on the write data lines). The inactive state (logical one) enables disk data to transfer to the host controller on the read data lines.

This line must be inactive to enable step pulse(s) to activate the band-positioning actuator.

Writing data to the KISMET is accomplished by the following procedure:

(1) Drive selection (multidrive systems)

(2) Drive ready true

(3) Selecting required cylinder (track and head)

(4) Verify no write fault exists

(5) Activating write gate and transferring data on the write data lines.

Reading data from the KISMET is accomplished by:

(1) Write gate line deactivated

(2) Drive selection (multidrive systems)

(3) Drive ready true

(4) Selecting required cylinder (track and head)

5.4.2 Head Select 2^0 and 2^1 (Control)
These two lines provide for the selection of one of the four KISMET Read/Write heads. Heads are addressed as 0 through 3 with Head Select Line 2^0 being the least significant bit. Table 5-1 on the next page lists the signals used to select any available head.

During servo gap Head 3 is automatically selected in Read mode. After servo gap, drive restores selected head.

Table 5-1 - Head Selection

Head Select Lines		Head Selected
2^1	2^0 (LSB)	
0	0	0
0	1	1
1	0	2
1	1	3

The Input/Output line logical states are defined as:

TRUE: 0.0VDC to 0.4VDC @I = -40mA (max)

FALSE: 2.5VDC to 5.25VDC @I = +250uA (open)

5.4.3 Step (Control)

This control signal activates the Read/Write head actuator to step inward or outward to reach a desired track. The direction of motion is determined by the Direction In line.

Head motion or step is initiated at the logical one to logical zero transition or at the leading edge of this signal pulse. The Read/Write heads will seek st the rate of the incoming step pulses under normal step access.

Figure 5-4 on the next page illustrates timing constraints for normal step mode.

Ramped Seek Mode offers seek times for optimum performance. Figure 5-5 on the next page illustrates timing constraints for ramped seek mode.

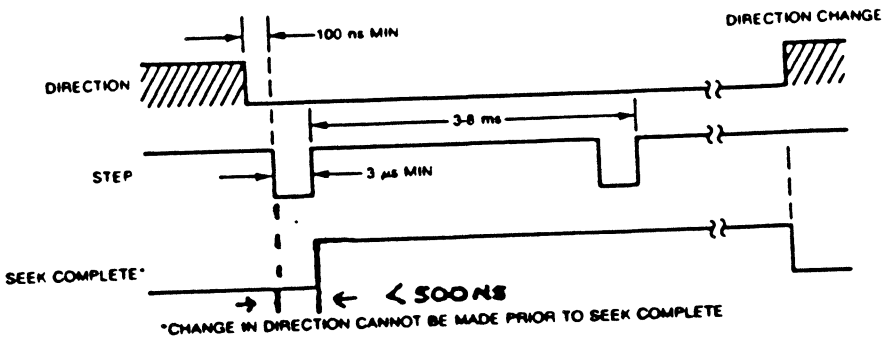


Figure 5-4 - Normal Step Mode Timing

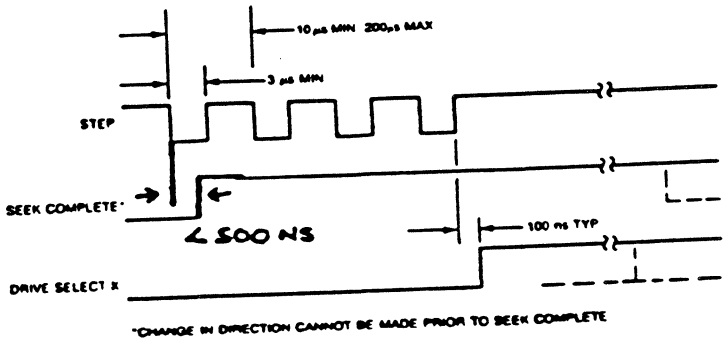


Figure 5-5 - Ramped Step Mode Timing

Read Write head positioning (seek) is accomplished by:

(1) Write Gate inactive

(2) Drive selection (multiple drive system)

(3) Drive Ready and Seek Complete true

(4) Setting the Direction In signal

(5) Pulsing the step line

NOTE: Seek action is a 1-to-1 ratio with the step pulses, one cylinder seek per each pulse fed.

5.4.4 Direction In (Control)

The direction of Read/Write head motion is determined by the state if this signal when the step line is pulsed. Logical zero or true sets the actuator motion forward or toward spindle. This line must remain stable for 100ns prior to step time. No change in direction can be made until Seek complete is true. (See Figure 5-4.)

5.4.5 Drive Select - 1, 2, 3 or 4 (Control)

These four lines provide individual drive selection in multiple drive configurations. A switch set located on the electronics PCB determines which select line (1-4) will activate that drive. (Refer to Section 3 for details of switch settings.) Only the drive selected in a multiple drive system will enable its input and output lines to the host controller.

5.4.6 Seek Complete (Status)

This line is true (logical zero) whenever the Read/Write heads are settled on track. Reading or writing is prohibited by the drive when Seek Complete is false (logical one).

Seek Complete will be false under the following conditions:

(1) < 500 uS (typical) after the leading edge of a step pulse or series of step pulses.

(2) A Recalibration Sequence (return to zero) is initiated by drive logic (power-on and heads are not located over cylinder zero).

5.4.7 Track 000 (Status)

This signal indicates (true or logical zero) when the Read/Write heads are positioned over the outermost track, Track 000.

5.4.8 Write Fault (Status)

This signal indicates (true or logical zero) when a fault condition exists in the drive that will cause imporper writing or data destruction on the disk. Writing is inhibited in the drive until the condition is corrected.

The conditions that can cause a write fault are:

(1) Write Gate and Drive Selected but no Write Current sensed.

(2) Multiple heads selected.

(3) No head selected.

(4) Write gate present but no Transition of MFM Write Data line.

5.4.9 Index (Status)

This signal, occurring once every revolution, indicates the beginning of the data track. Only the transition from logical one (normal) to logical zero is valid. See Figure 5-6 for index timing.

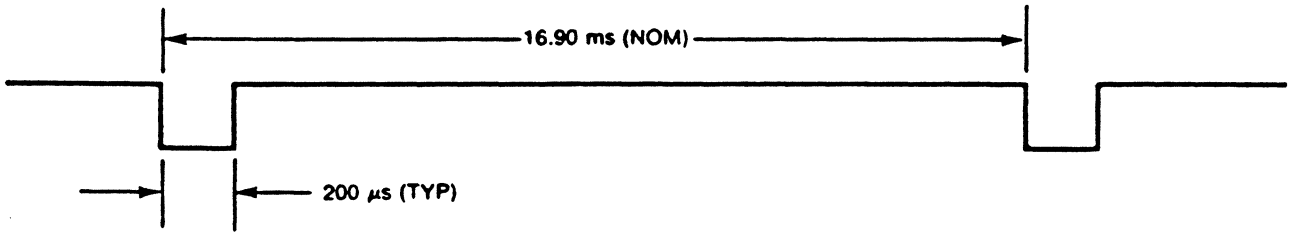


Figure 5-6 - Index Timing

5.4.10 Ready (Status)

When true (logical zero), this signal indicates the drive is up to speed. Together with Seek Complete, this indicates that the drive is ready to Seek, Read or Write and all I/O signals are valid. Write and Seek commands are prohibited when Ready is false.

Typical time for Ready to go true after Power-On is 18 seconds.

5.5 Data Cable (J2/P2)

A 20-pin flat ribbon cable carries all read and write data between the HH-612 and host controller. One drive status line is present to indicate Drive Selected. All lines associated with the transfer of data between the drive and host controller are differential in nature. Two pairs of balanced signal lines are used; MFM Write Data nad MFM Read Data. Figure 5-7 illustrates the Driver/Receiver circuit used in the KISMET series.

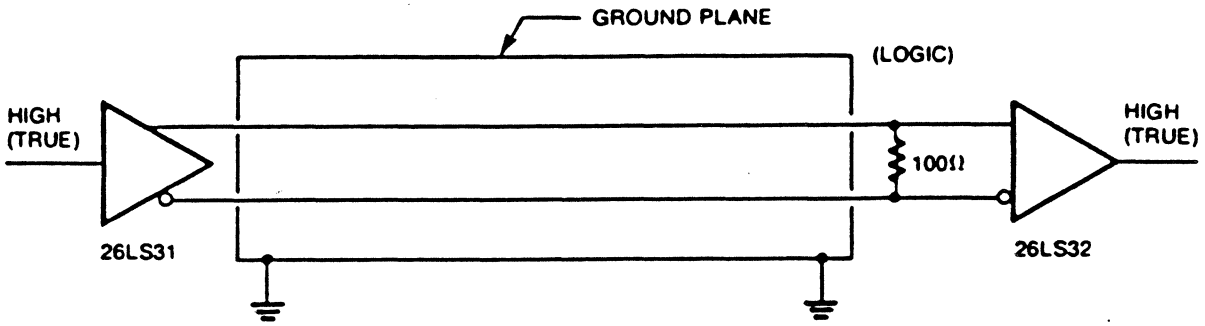


Figure 5-7 - Differential Driver/Receiver Circuits

5.5.1 MFM Write Data

This differential pair (+ and -) carries information from a host controller to be written on the disk. A transition of the positive (+) line going more positive than the negative (-) line will cause a flux reversal on a track provided Write Gate is active. The host controller should disable the write drivers during a read operation.

Figure 5-8 on the next page illustrates related timing for MFM data and standardized (NRZ) data as required at the interface. Note where the MFM transitions occur in relation to the NRZ data within a bit cell.

Presence of MFM Write Data line transition is required during the Write Operation, otherwise the drive will produce Write Fault signal.

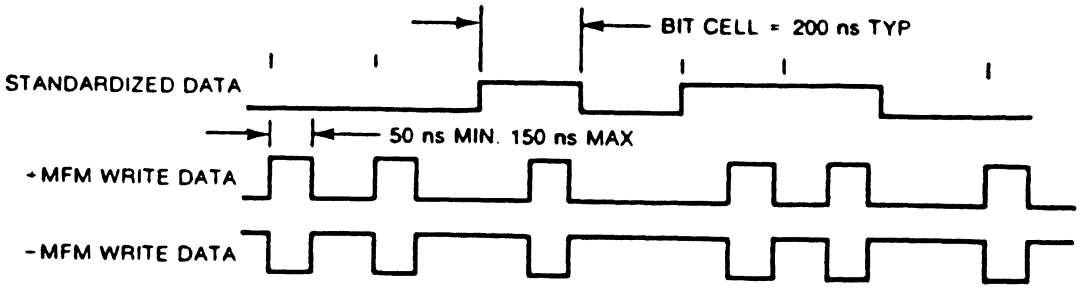


Figure 5-8 - MFM Write Data Timing

5.5.2 MFM Read Data

The data recovered by reading a pre-recorded track on the disk are transmitted to the host system using this differential pair (+ and -). A transition of the positive (+) line going more positive than the negative (-) line represents a flux reversal on the track under the selected head.

Read Gate is enabled when Write Gate in inactive (false).

Figure 5-9 on the next page illustrates related timing for MFM data and standardized NRZ data required at the interface. Note where the MFM transitions occur in relation to the NRZ data within a bit cell.

During servo gap (the last 200 microseconds before index), there is no transition on the MFM Read Data line.

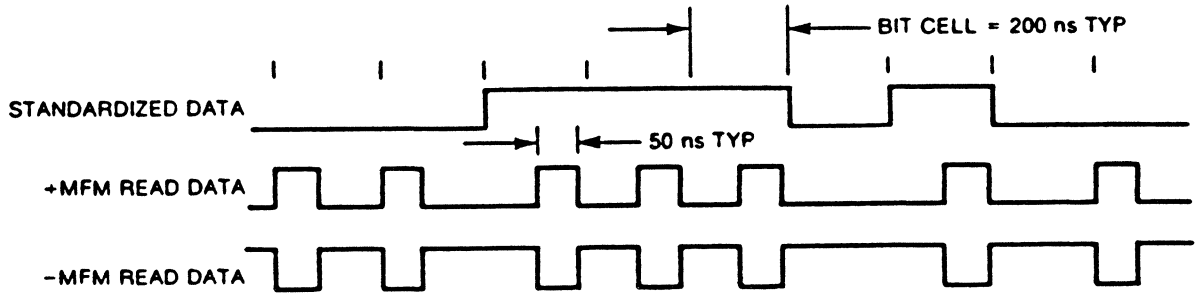


Figure 5-9 - MFM Read Data Timing

5.5.3 Drive Selected (Status)

This return status indicates (true or logical zero) that this unit has been selected by the host controller.

This status signal also illuminates the red front panel LED if the unit is selected.

The Drive Selected line is driven by a TTL open collector, identical to the status drivers of the Control/Status cable. Refer to Figure 5-3 for circuit recommendations.

5.6 General Timing Considerations

Figure 5-10 below illustrates the general sequence of events (with required timing restrictions) for Seek and Read/Write operation of the KISMET. This timing diagram represents a six-track seek (0-5), a Read, then a Write operation.

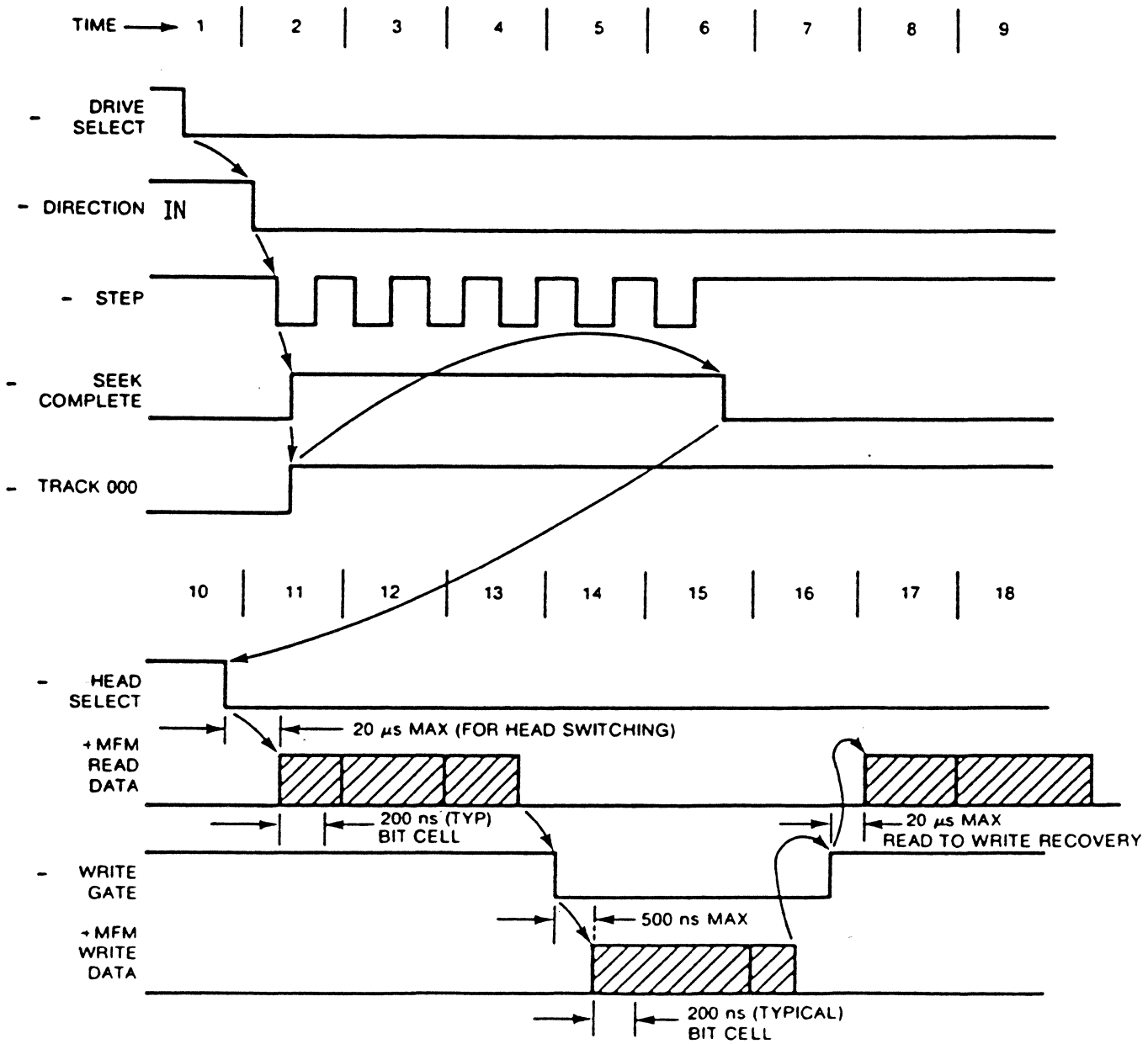


Figure 5-10 - General Timing Considerations

5.7 Read/Write and Control Functions

This subsection covers Read/Write and control electronics and mechanics.

5.7.1 Microprocessors Control

All drive electronics are contained on one printed circuit card. Internal drive functions are directed by one microprocessor that recognizes status and generates the necessary control information. This design provides increased versatility in interface control and future enhancements.

General functions that fall under the control of the microprocessor are:

(1) Self test during Power Up and Diagnostic during normal operation

(2) Write enabling

(3) Write fault detection

(4) Servo-position control

(5) Read/Write head positioning

- (a) Stepper Motor Control
- (b) Ramped Seek Mode
- (c) Track 000 Detect

(6) Interface control designations and status production

Primary power (+5 and +12 VDC) is connected directly to this PCB via the J3 connector and relayed to various other drive functions.

5.7.2 Servo-Positioning

The KISMET employs closed-loop servo-positioning of the heads, a unique method which provides a high level of accuracy and reliability under varying operating conditions. Servo information is written in the servo gaps between data tracks in such a way that the head positioned on the data track is reading servo information from two adjacent servo gaps on both sides of the data track. The inner head is used exclusively to read the servo and guardband information. Figure 5-11 illustrates this technique.

Servo gaps are pre-recorded before index pulse. The time for servo gap is 200 microseconds. During servo gap, only the servo head is selected by the microprocessor in read-only mode to prevent accidental overwriting of the servo pattern. Tri-bit servo is used, with three phase sampling. A constant offset is used.

The guard bands located at the inner and outer peripheries of the platters are each seven tracks in width and are written with the same servo pattern. This effectively prevents wallcrashing.

As a result of servo-positioning the head is always located at the center of the track regardless of thermal expansion of mechanical parts, hysteresis of the stepper motor and positioning system, or long term mechanical wear. These factors all contribute to long term reliability of the drive.

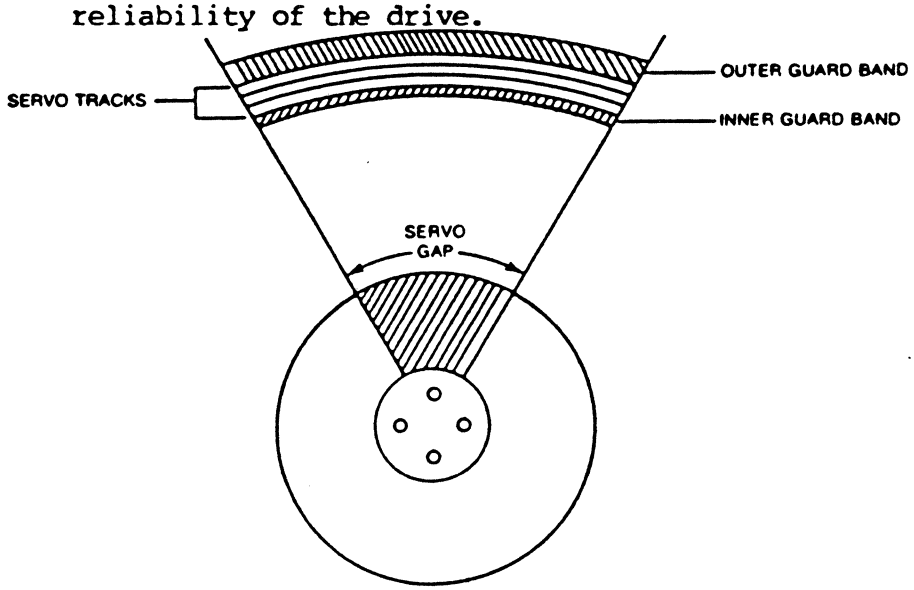


Figure 5-11 - Servo -Positioning Diagram

5.7.3 Drive Mechanics

The media is directly driven by a brushless DC motor that is mounted externally from the sealed Head/Disk assembly, thus providing thermal isolation. The motor and spindle are balanced dynamically to minimize vibration levels.

A microprocessor-determined pulse sequence fed to the DC motor controls drive speed. This frequency is crystal controlled and provides exceptionally stable transfer rates.

A cast alloy rigid base plate supports all critical alignment components and is insulated from the mounting structure by rubber shock mounts.

5.7.4 Positions Mechanics

The Read/Write heads are mounted on a precisely balanced, ball-bearing-supported actuator assembly. A highly polished stainless steel band connects the actuator to a thermally isolated stepper motor. Figure 5-12 illustrates the actuator subassembly.

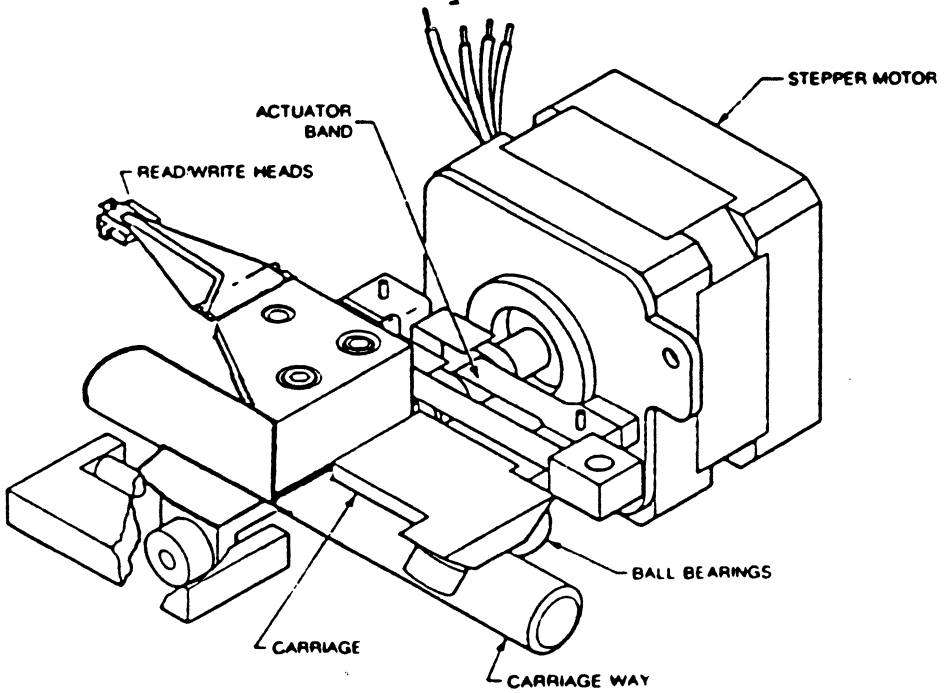


Figure 5-12 - Actuator Breakdown

5.7.5 Read/Write Heads and Media

The KISMET heads are mounted on the actuator for precise alignment and optimum seek performance (See Figure 5-12).

5.7.5 Read/Write Heads and Media continued

The media consists of a single 130mm-diameter aluminum disk plated on both sides with thin film media. This coating formulation, along with the 3370 head technology, permits high reliability even under extensive start/stop operations.

Data are written on the coated disk by passing a current through the Read/Write head, which generates a flux field across the head gap. This magnetizes the particles directly beneath the head with an orientation (polarity) related to the direction of the current flow through the head.

Data recovery involves detecting the presence of flux transitions beneath a selected Read/Write head. Magnetized particles that pass beneath the head gap generate a current flow in the head circuit. Direction of current is determined by polarity of this magnetic field.

5.7.6 Media Defects

Any defects on the media surface will be identified in the factory. This information is included with each drive at time of shipment. The defect information will indicate the head number, cylinder number, and the number of bytes offset from index for each defect. The maximum number of defects per head is five single defects or two multiple defects. Track 000 is certified to be defect-free for each head.

Single defects are no longer than two (2) bytes in length. Multiple defects are no longer than four (4) bytes in length but will be counted as two single defects.

5.7.7 Air Filtration System

The sealed Head/Disk assembly is assembled in Class 100 environments to provide the increased reliability inherent in Winchester product lines. The KISMET contains an internal absolute filter mounted into the base plate to provide constant internal air filtration. This design significantly increases reliability by reducing particle counts relative to internal head/disk interaction in the minimum amount of time from the start operation.

A second filter, located on the Head/Disk assembly top cover, permits constant ambient internal pressure equalizaion without contamination. Figure 5-13 diagrams the internal air flow.

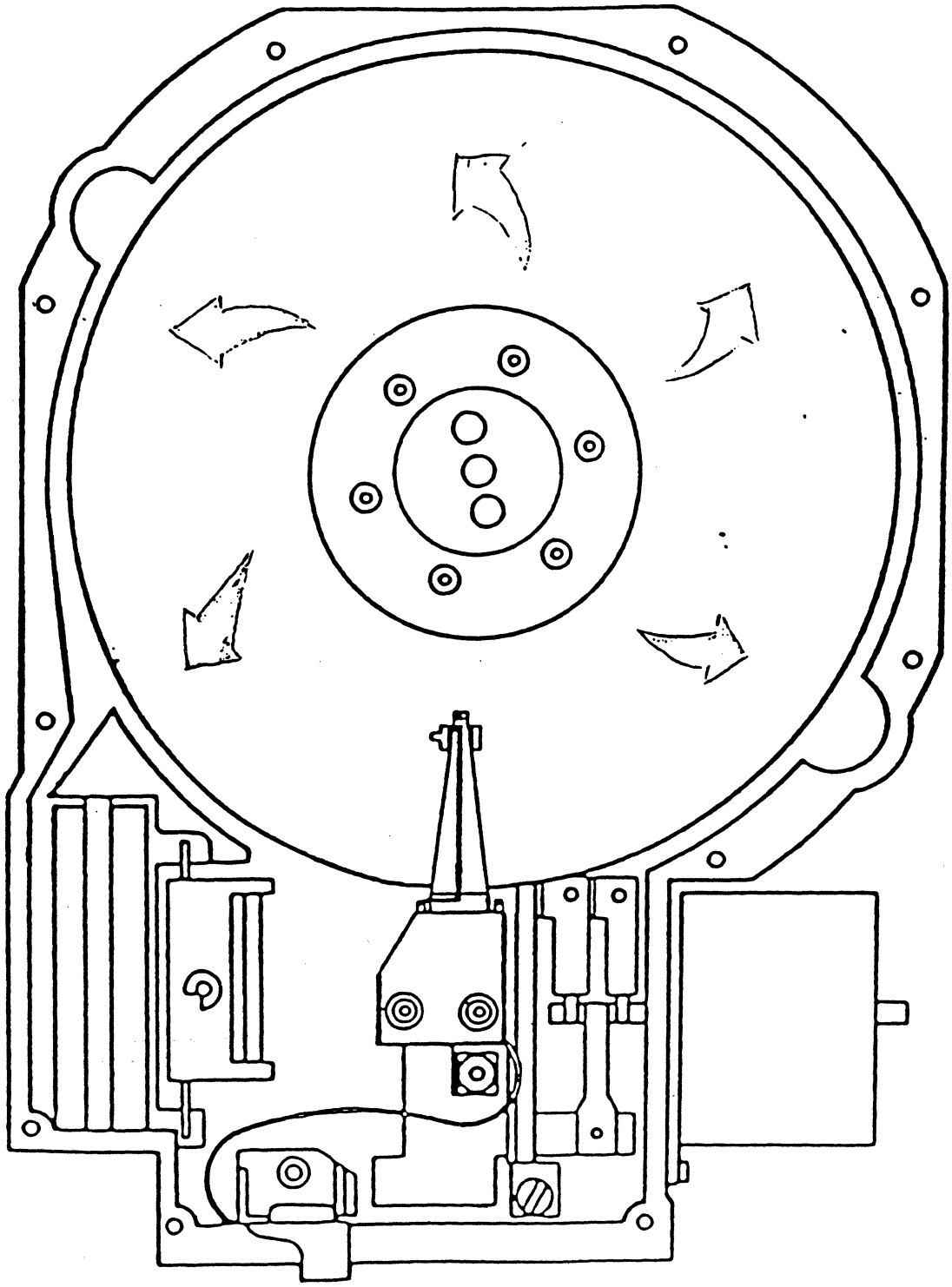


Figure 5-13 - Air Flow

5.8 External Indicators

The two LEDs on the front panel of the disk drive illuminate during operation. The red LED indicates that the drive is currently selected.

When the drive is operational, the green LED can be in any one of four states, as given in the table below. This LED is used to flash error messages should certain fault conditions occur on the drive. A four bit binary code is used, with the most significant bit first. Tables 5-2 and 5-3 list the most common error codes.

Table 5-2 - Green LED Conditions

GREEN LED INDICATOR	
Indication	Meaning
ON	Drive is ready.
OFF	Drive is not ready.
Continuous Uniform Blinking	Occurs for five (5) seconds after successful completion of power on reset, indicating that servo is operating correctly. The drive is now ready.
Non-uniform Blinking	Error or fault conditions (see below).

Table 5-3 - GREEN LED ERROR CODES

GREEN LED ERROR CODES (Long Flash = 1, Short Flash = 0)		
CODE	NUMBER	ERROR OR FAULT INDICATOR
0010	2	Recalibration fails 1 (Outer guard band in place of inner guard band.)
0011	3	Recalibration fails 2 (Guard band always present).
0100	4	Recalibration fails 3 (Guard band not detected).
0101	5	Speed check fails.
0110	6	Seek attempt when writing.
1000	8	Microprocessor self test fails 1 (Timer error).
1001	9	Microprocessor self test fails 2 (Port 1 error).
1010	10	Microprocessor self test fails 3 (Port 2 error).
1011	11	Guardband detected when running automatic test.

6.0 INSTALLATION AND CHECKOUT

6.1 The KISMET can be mounted in many configurations. When mounting, consideration must be given to heat dissipation, stability and serviceability.

Side brackets with tapped holes are provided and permit base or side mounting.

The drive may be oriented on any axis. When installing into an enclosrue, at least 0.1 inch clearance must be maintained around the entire drive to allow vibration isolation, and to prevnet obstruction of the breather filter on the top of the drive.

Special mounting brackets can be adapted to withstand extremely harsh environments.

Figures 6-1 and 6-2 illustrate all measurements to take into consideration for mounting. The mounting frame requires 6-32 machine screws for securing to chassis.

For information about custom or specialized mounting, contact Microscience International Corporation.

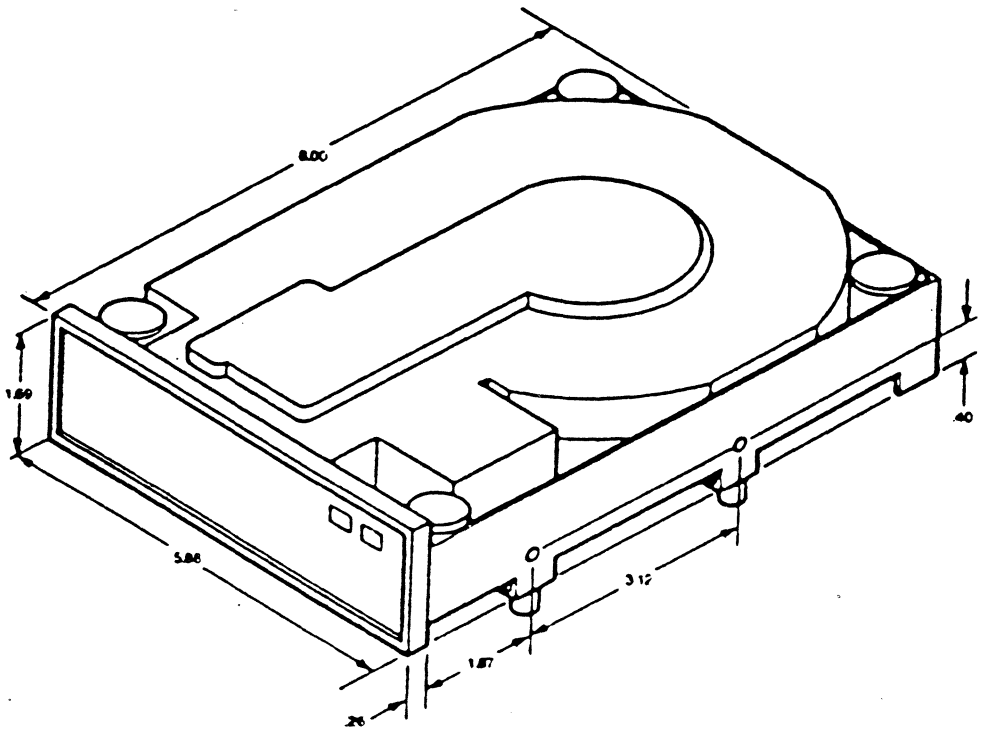


Figure 6-1 - Physical Dimensions

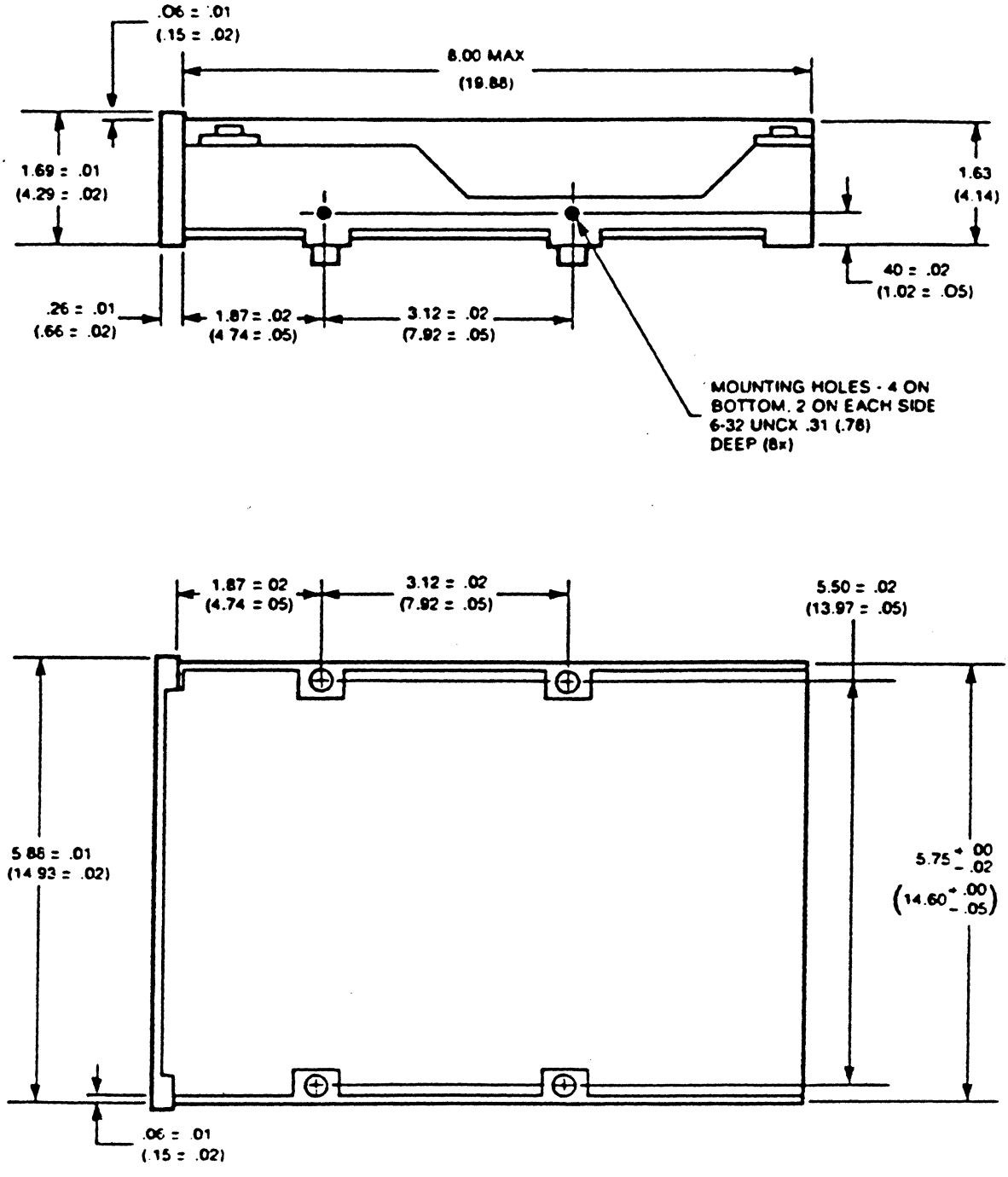


Figure 6-2 - Mounting Dimensions

6.2 Connecting

Figure 6-3 shows the locations of the DC power connector, J3; the control signal conector, J1; and the data signal connector, J2. For recommended connectors refer to Table 6-1.

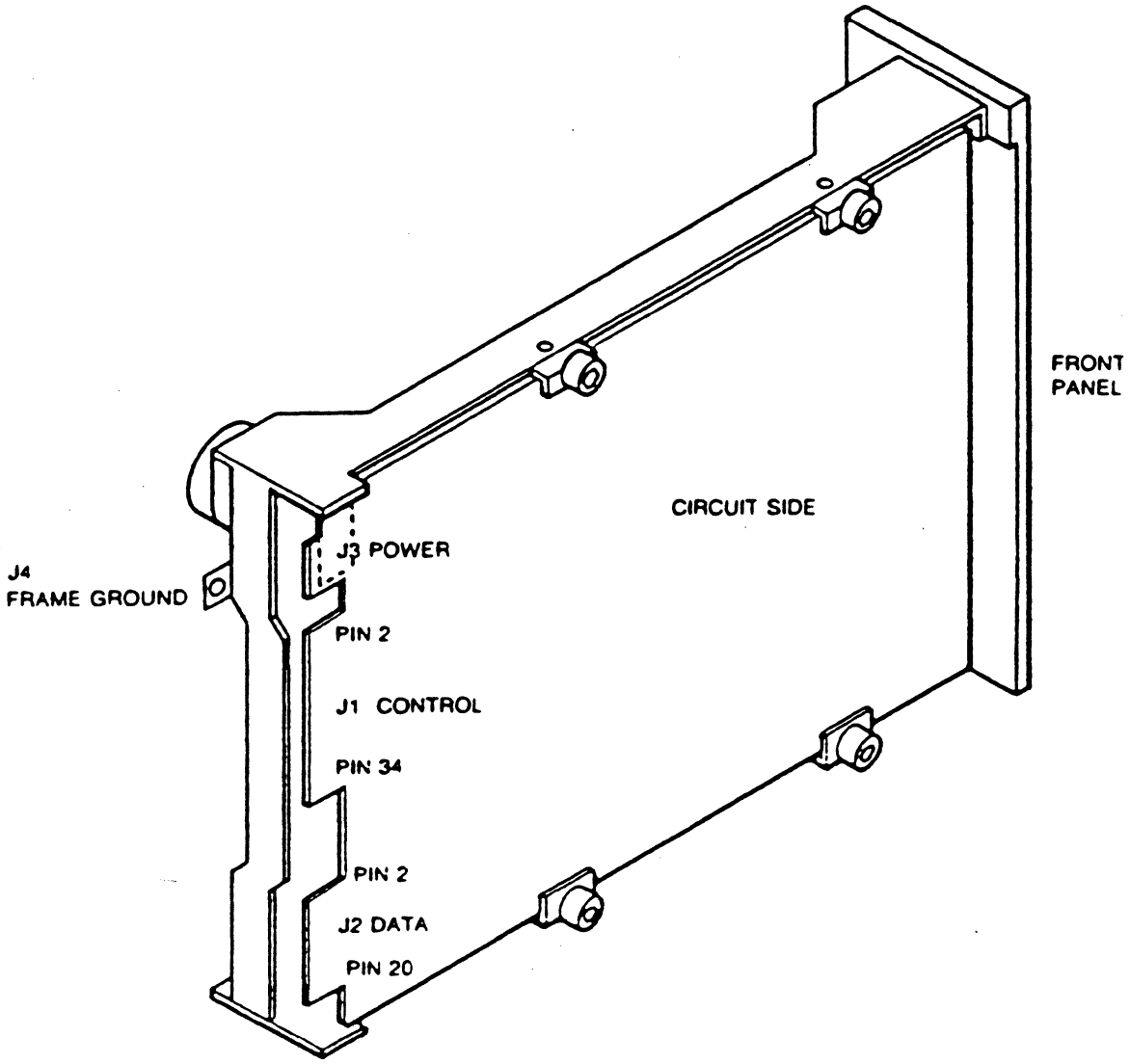


Figure 6-3 - Connector Locations

6.2.1 Power Connections

The KISMET requires only DC power for operation. For power specifications, refer to Table 6-2. DC power is fed to the unit via connector J3/P3, a 4-pin AMP mate-n-lock connector, part number 641737-1, mounted on the back side of the electronics PCB. The mating connector (plug) required is AMP part number 1-480424-0 with 4 AMP pins, part number 350078-4. (Refer to Figure 6-3.)

Table 6-1 - Recommended Connectors

Location	Type	Part No.
J1	AMP Ribbon Connector	88373-3
J2	AMP Ribbon Connector	88373-6
J3	AMP Connector Plug	1-480424-0
Frame Ground	AMP Connector	6-972-1

Table 6-2 - Power Specifications

PIN ASSIGNMENTS - J3/P2 CONNECTOR				
P2 Pin	DC Voltage	Tolerance	Current	Max Ripple (p to p)
1	+12 VDC		1.8 A Max. 1.5 A Start .6 A Typ.	100 mV Max Allowable
2	+12 RETURN			
3	+5 RETURN			
4	+5 VDC		.9 A Max. .7 A Typ.	50 mV Max Allowable

6.2.2 Signal Cabling

The transfer of control and status information along with actual data to and from the KISMET is accomplished using two flat ribbon cables (J1/P1 and J2/P2). The location of these connectors is shown in Figure 6-3.

Control/Status Connector

Connector J1/P1 is a 34-pin PCB edge connector. A key slot is provided between pins 4 and 5. The dimensions for this connector are shown in Figure 6-4. This connector carries all control and status information to and from the drive. The recommended mating connector for P1 is AMP ribbon connector part number 88373-3. Refer to Figure 6-5 for pin assignments.

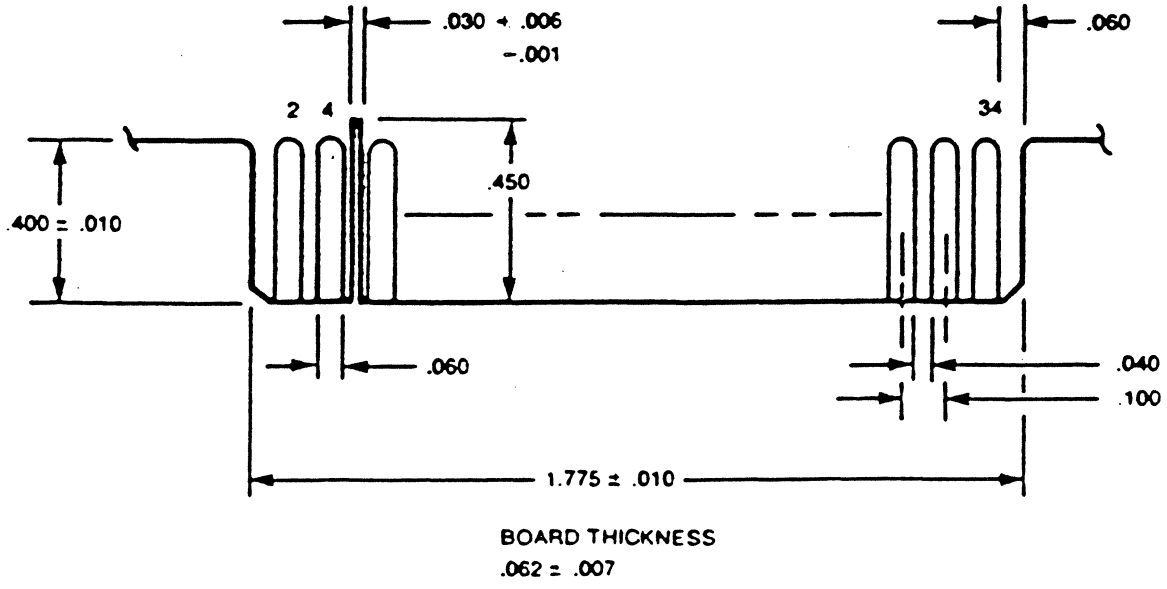


Figure 6-4 - J1 Control Connector

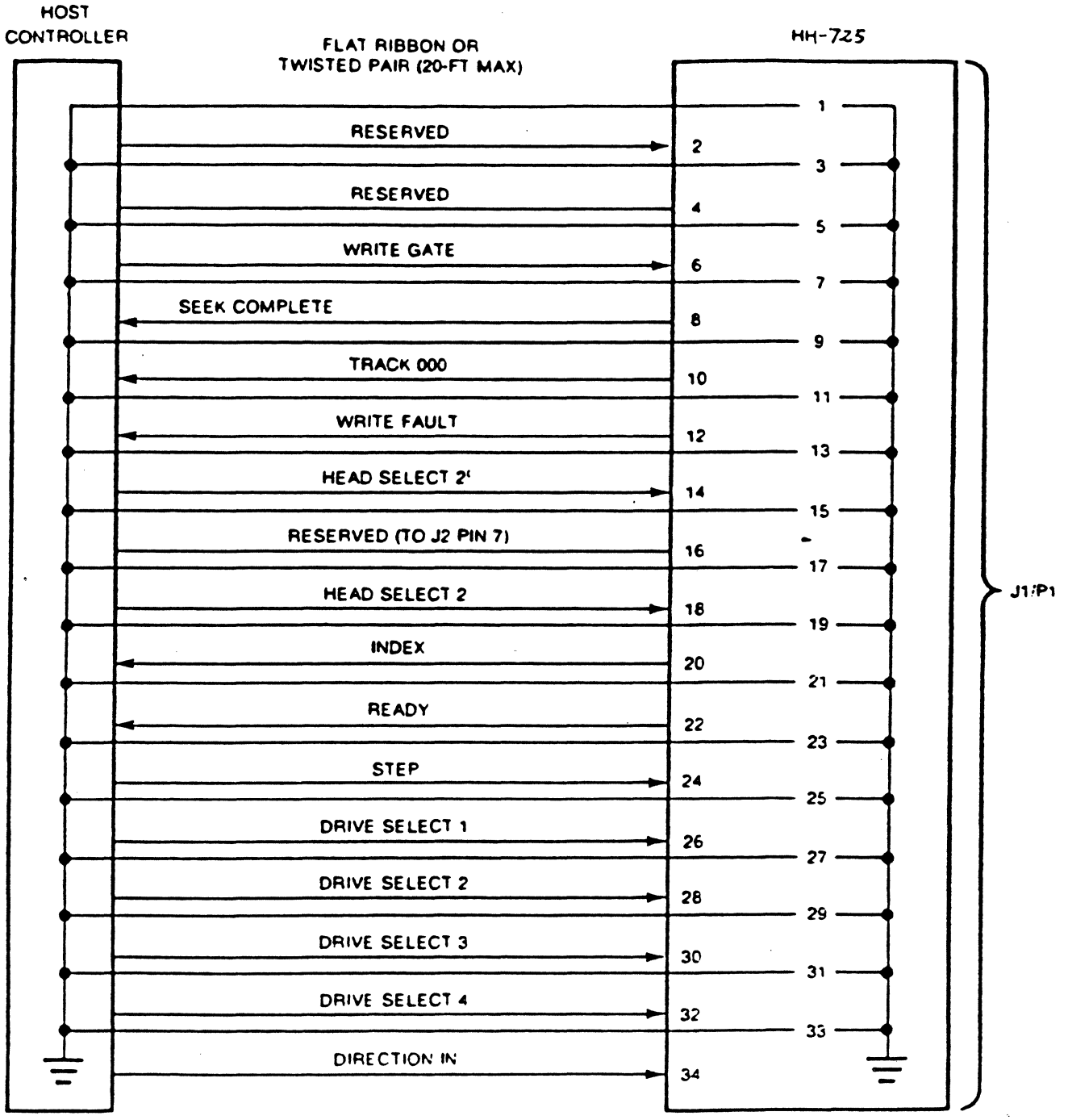


Figure 6-5 - J1 Pin Assignments

Data Connector

Connector J2/P2 is a 20-pin PCB edge connector. The dimensions for this connector are shown in Figure 6-6. This connector carries all data to and from the disk drive. The recommended mating connector for P2 is AMP ribbon connector part number 88373-6. A key slot is provided between pins 4 and 6. Refer to Figure 6-7 for pin assignments.

When connecting drives to a host controller, refer to Figure 6-3. Maximum cable length is 20 feet.

Refer to paragraph 6.2.4 for multiple drive connection.

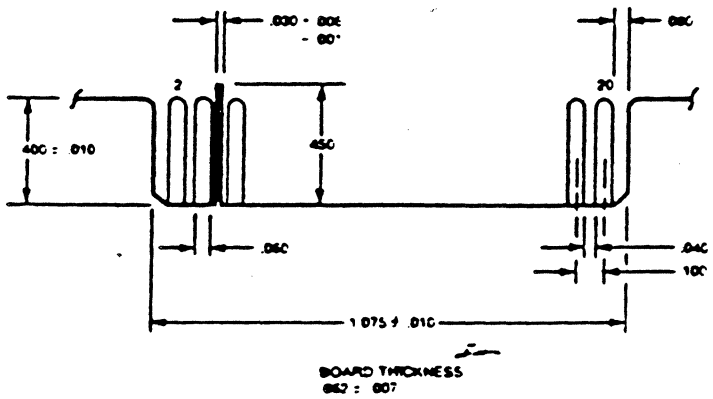


Figure 6-3 - J2 Data Connector

6.2.3 Frame Ground

It is very important to supply a good frame ground between the disk unit and the host system. Failure to do so may result in drive noise and susceptibility to random data errors.

A Faston tab is provided on the rear of the unit for this purpose Figure 6-3 illustrates the location of this tab. The recommended mating connector is AMP part number 60972-1. Recommended wire gauge is 16-18 AWG.

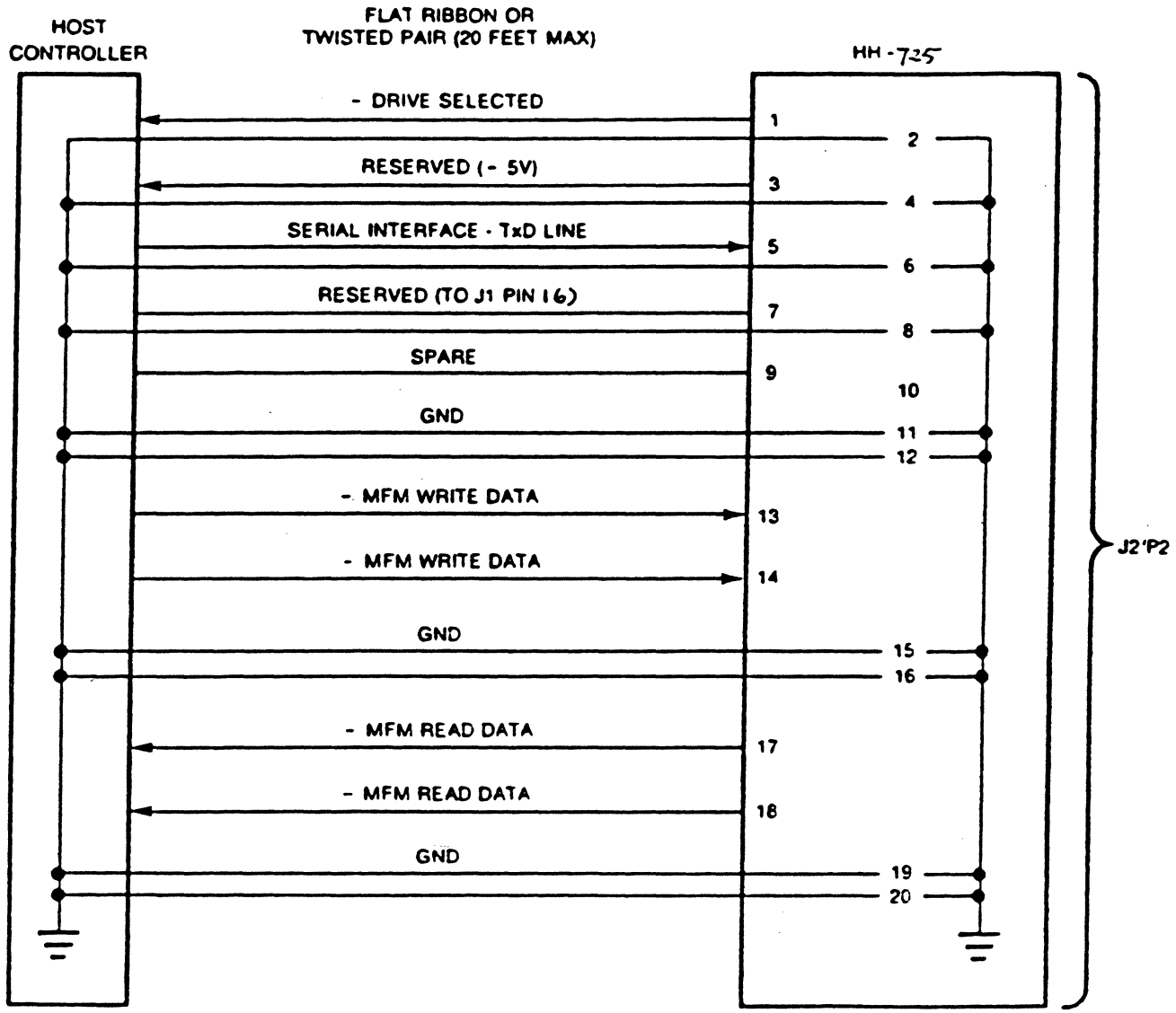


Figure 6-7 - J2 Pin Assignments

6.2.4 Multiple Drive Connection

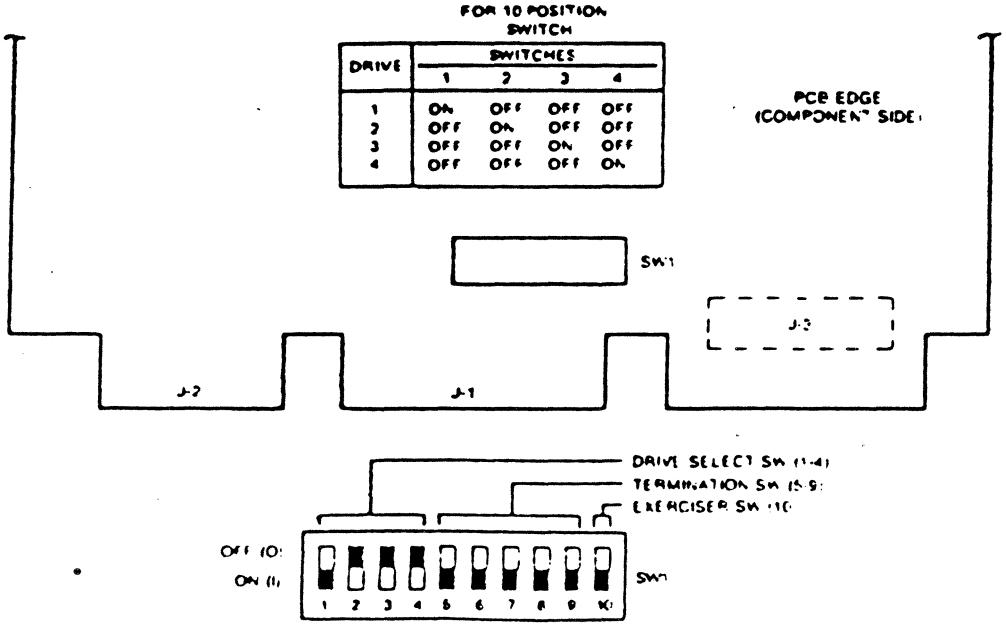
In multiple drive configurations it is necessary to configure each drive with a unique address. Address configuration is accomplished using the drive selection switch bank on the interface PCB. Figure 6-9 illustrates the location of this switch. To access this switch bank, connector J1/P1 must be removed.

Switches 1 through 4 designate drives 1 through 4 respectively. Down is towards the PC board upon which it is installed. The standard unit is shipped as Drive 1 (switch 1 is down).

The last (terminating) drive in the multiple drive configuration must have line termination for cable connector J1, the control line. Switches 5 through 9 on the drive selection switch bank are used for the terminating drive only. These switches must all be set to ON (down position) for the terminating drive ONLY. For all other drives these switches must be OFF.

WARNING: Switch 10 is used only when the drive is exercised at the factory. For operating conditions this switch should always be OFF.

Figure 6-10 illustrates the configuration used to connect multiple drives to a host controller. A maximum of four drives may be connected to each controller.



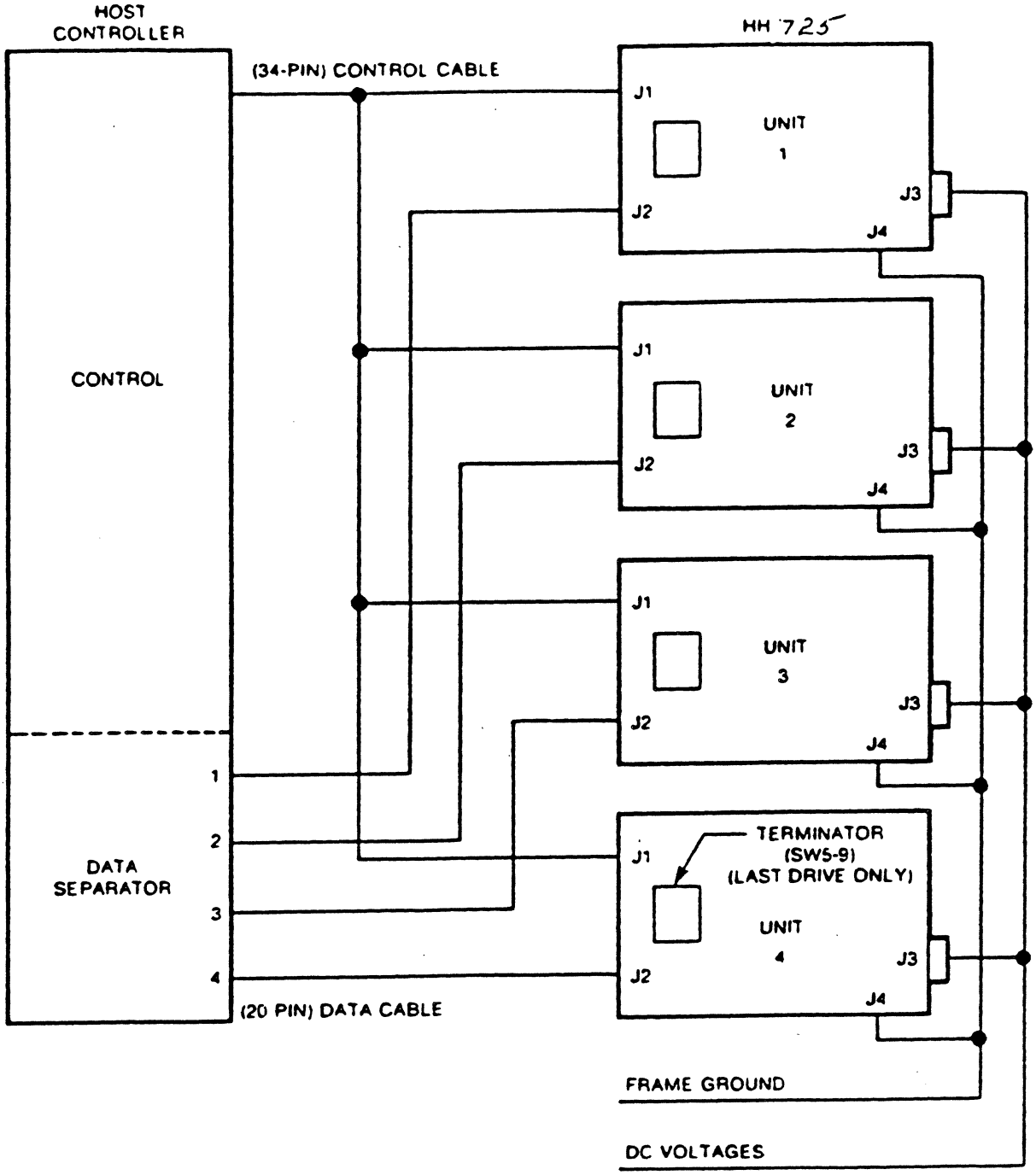


Figure 6-9 - Multiple Drive Connection Diagram