MiniScribe I
PRODUCT MANUAL

MINISCRIBE I

PRODUCT MANUAL

MSI/002/981
Issue O

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1.0   INTRODUCTION

The MiniScribe I is a 5 1/4 inch rigid media disk drive
employing Winchester technology.   MiniScribe I is available
in two models providing respectively 6.4 and 12.8 MBytes of
unformatted storage capacity.   Both models are identical
except for the number of heads and disks.

MiniScribe I employs the industry standard ST506 interface,
employs the same DC voltages and fits within the same
physical form factor as the 5 1/4 inch floppy drives.

2.0 PRODUCT SPECIFICATIONS

2.1 MODEL SPECIFICATIONS

	Model 1006	Model 1012
Storage Capacity-unformatted		
Per Drive	6,374,592 bytes	12,749,184 bytes
Per Surface	3,187,296 bytes	3,187,296 bytes
Per Track	10,416 bytes	10,416 bytes
Per Cylinder	20,832 bytes	41,664 bytes
Disks	1	2
Recording Heads	2	4
Cylinders	306	306
Data Tracks	612	1224

2.2 PERFORMANCE SPECIFICATIONS

Rotational Rate   3600 rpm ± 1%

Data Transfer Rate   5.0 Mbits per second ± 1%

Access Time
    Average Latency   8.33 milliseconds ± 1%

    Seek Time (Linear)
        Track-to-track   1.75 milliseconds minimum
        Average   179 milliseconds (102 cylinders)
        Maximum   534 milliseconds

    Seek Time (Software Scheduled - see Table 2-1)
        Track-to-track   1.75 milliseconds minimum
        Average   125 milliseconds
        Maximum   375 milliseconds

    Settling Time   15 milliseconds

2.3 POWER REQUIREMENTS

DC Input   +12 Volts DC
(at J3)   Steady State: ±5%, 1.6 amps maximum.
                    Maximum ripple allowed is 1% with equivalent
                    resistive load.

                    Start Surge: ±10%, 3.5 amps maximum.
                    Less than 2 amps in 5 seconds (typical)

              +5 volts DC
                    ± 5%, 0.7 amps. Maximum ripple allowed
                    is 1% with equivalent resistive load.

AC Input   None Required

2.4 PHYSICAL CHARACTERISTICS

Outline Dimensions	See Figure 2-1
Mounting Dimenstions	See Figure 2-1
Weight	5.5 pounds
Heat Dissipation (maximum)	22.7 watts (77.5 BTU per hour)

2.5 ENVIRONMENTAL CHARACTERISTICS

Temperature

Operating (stabilized)	40^0 F (4.4^0 C) to 115^0 F (46.1^0 C)
Non-operating	32^0 F (0^0 C) to 135^0 F (57.2^0 C)

Humidity

Operating & non-operating	8% to 80% Noncondensing
Maximum Wet Bulb	78^0 F (26^0 C)

2.6 RELIABILITY AND MAINTENANCE

MTBF	8,000 hours (continuous operation)
MTTR	30 minutes
Preventive Maintenance	None
Component Design Life	5 years
Data Reliability	1 recoverable error in 10^{10} bits read 1 permanent error in 10^{12} bits read (not recoverable in 16 rereads) 1 seek error in 10^6 seeks

Media Defect Criteria (as shipped from MiniScribe)

Model 1006	32 defects maximum $\leqslant$ 2 bytes in length Cylinder 000 defect free
Model 1012	64 defects maximum $\leqslant$ 2 bytes in length Cylinder 000 defect free

2.7 GENERAL CHARACTERISTICS

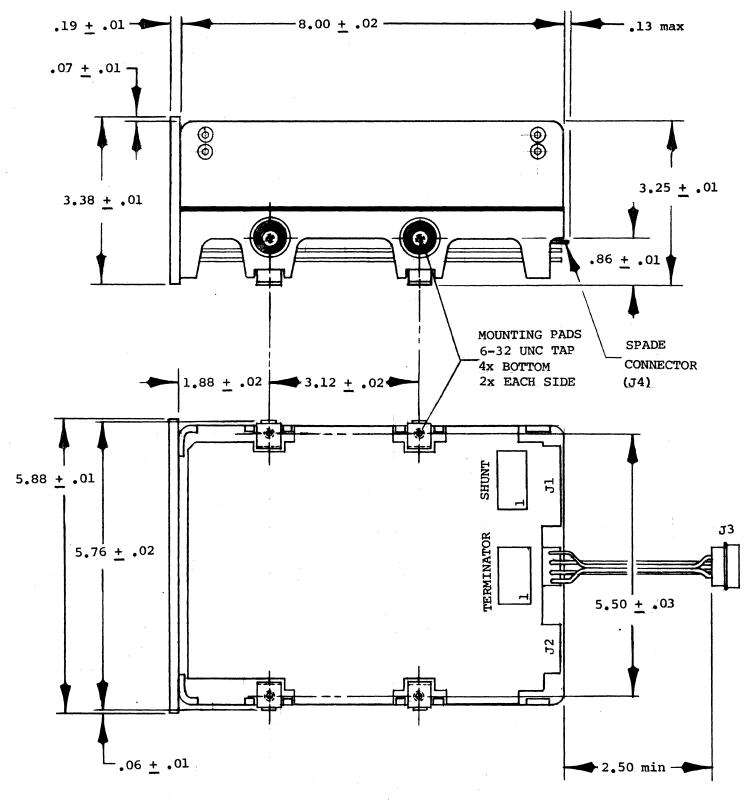|	
Start Time (typical)	20 seconds from power application to −READY
Stop Time (typical)	15 seconds from power removal

```
                  Table 2-1
              SOFTWARE SCHEDULED
                 SEEK PROFILE


Seek Length            Half Steps
 (tracks)          (Number and Rate)

      1.........aa
      2.........aaaa
      3.........aabbaa
      4.........aabccbaa
      5.........aabcddcbaa
      6.........aabcdeedcbaa
      7.........aabcdeffedcbaa
      8.........aabcdefggfedcbaa
      9.........aabcdefghhgfedcbaa
     10.........aabcdefghiihgfedcbaa

  11-305......aabcdefghi(2Ni)ihgfedcbaa

Where --- Half Step Rate (microseconds)
      a = 875      f = 640
      b = 790      g = 624
      c = 730      h = 612
      d = 690      i = 600
      e = 660

Where --- N = Seek Length - 10
```

Figure 2-1

OUTLINE AND MOUNTING DIMENSIONS

3.0 FUNCTIONAL DESCRIPTION

The MiniScribe I contains all necessary mechanical and electronic parts to interpret control signals, position the recording heads over the desired track, read and write data, and provide a contaminant free environment for the heads and disks.

3.1 READ/WRITE AND CONTROL ELECTRONICS

Electronics are packaged on two external printed wire boards and an integrated circuit within the sealed enclosure.

The Read/Write and Logic Board Assembly to which the Control and Data input/output signals are connected includes the head positioning/actuator circuit, read circuit, write circuit, step motor drive circuit, Track 000 detection circuit, and input/output line driver and receiver circuits.

The Power/Spin Board Assembly, mounted to the baseplate under the Read/Write and Logic Board Assembly receives the external DC power, develops a -12V DC internal voltage, provides the power and speed control to the drive motor, and performs index detection.

The integrated circuit within the sealed enclosure is mounted in close proximity to the read/write heads and provides 1 of 2 or 1 of 4 head selection, read preamplification, and write drive circuitry.

3.2 DRIVE MECHANISM

A brushless DC direct drive motor rotates the spindle at 3600 rpm. The motor/spindle assembly is dynamically balanced to provide minimal mechanical runout to the disks. A dynamic brake is used to provide a fast stop to the spindle motor when power is removed.

3.3 AIR FILTRATION SYSTEM

Within the sealed enclosure a 0.3 micron filter coupled with a breather filter, provides over the drive life a clean, above atmospheric pressure environment to the heads and disks.

3.4 HEAD POSITIONING MECHANISM

Two or four read/write heads are supported by a carriage mechanism coupled to the 550^0 rotation stepper motor through a rack and pinion motion translator. The rack and pinion translator allows for the increased number of data tracks while retaining the full step holding torque and positioning repeatability characteristics of the stepper motor.

3.5 READ/WRITE HEADS AND DISKS

Data is recorded on 1 or 2 lubricated magnetic oxide coated 130mm diameter aluminum substrates (disks) through 2 or 4 low force, low mass Winchester type nickel-zinc ferrite heads.

3.6 MECHANICALLY ISOLATED MOUNTING POINTS

Four side mounting and 4 base mounting points are provided to the customer. Each mounting point is mechanically isolated from the drive.
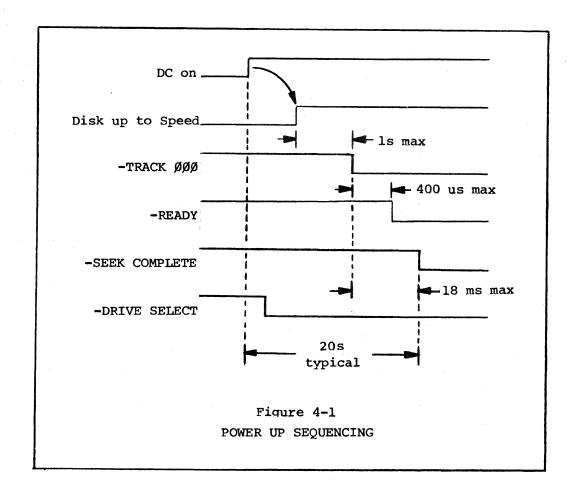
3.7 TRACK 000 DETECTOR

The Track 000 Detector resides within the sealed enclosure. This optical sensor consists of a light source (activated only when a seek is initiated) and a receiver which when blocked by the positioner assembly indicates the logical/physical track 000.

4.0   OPERATIONAL DESCRIPTION

4.1   POWER SEQUENCING

+5 volts DC and +12 volts DC may be applied in any order.
The +5VDC should be applied within 15 seconds of the +12VDC
to insure proper automatic Track 000 calibration.

+12 VDC powers the spindle drive motor.   A speed sensing
circuit verifies that the disks are spinning at 3600 rpm and
then activates the automatic Track 000 positioning.   -TRACK
000, -SEEK COMPLETE, and -READY will become true upon
completion of the Track 000 positioning sequence.   Refer to
Figure 4-1 for the Power-Up Sequencing.

Figure 4-1
POWER UP SEQUENCING

4.2   DRIVE SELECTION

Drive selection occurs when one of the -DRIVE SELECT signals
is true.   Only the drive selected will respond to Control
Input Signals, and only that drive's Control Output Signals
will be gated to the interface (see Paragraph 5.4.2 for the
exception).

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4.3   TRACK ACCESSING

Read/write head positioning is accomplished by:

o Setting -WRITE GATE false
o Setting the appropriate -DRIVE SELECT true
o Selected drive having -READY and -SEEK COMPLETE true
o Setting the appropriate state of -DIRECTION IN
o Pulsing the -STEP

Each -STEP pulse will cause the R/W heads to move either one track in or one track out, depending on the state of -DIRECTION IN. -DIRECTION IN true will cause the R/W head to move inward toward the spindle; -DIRECTION IN false will cause the R/W head to move outward toward Track 000. The drive will prevent any outward movement beyond Track 000 regardless of -STEP pulses.

4.4   HEAD SELECTION

Any of the 2 or 4 heads can be selected by placing the heads binary address on the two -HEAD SELECT input lines. Note that -HEAD SELECT 2^l is only used for the Model 1012.

4.5   READ OPERATION

Reading data from the drive is accomplished by:

o Setting -WRITE GATE false
o Setting the appropriate -DRIVE SELECT true
o Selected drive having -READY and -SEEK COMPLETE true
o Selecting the appropriate -HEAD SELECT binary address

4.6   WRITE OPERATION

Writing data to the drive is accomplished by:

o Setting the appropriate -DRIVE SELECT true
o Selected drive having -READY and -SEEK COMPLETE true
o Selecting the appropriate -HEAD SELECT binary address
o Assuring -WRITE FAULT is false
o Setting -WRITE GATE true and placing the data to be written on the MFM WRITE DATA lines.

5.0   ELECTRICAL INTERFACE

The interface to the MiniScribe I can be divided into three categories each of which are physically separated: Control Signals, Data Signals, and DC Power.

All Control Signals are digital in nature (open collector TTL) and either provide signals to the drive (input) or signals to the controller (output).   The Data Signals are differential in nature and provide data either to (write) or from (read) the drive.

Table 5-1 provides the connector pin assignments for J1 and J2.   The interconnect cable between the drive and controller may be flat ribbon or twisted pairs of a length not to exceed 20 feet.   The signal return lines and ground lines for J1 and J2 should be grounded at both the drive and the controller.

Table 5-1 also provides the connector pin assignments for J3.   The voltage return lines of J3 should only be grounded at the power supply.

Connector J4/P4 is a spade lug connector tied to frame ground.

The cable interconnection for a 4 drive system is defined in Figure 5-1.

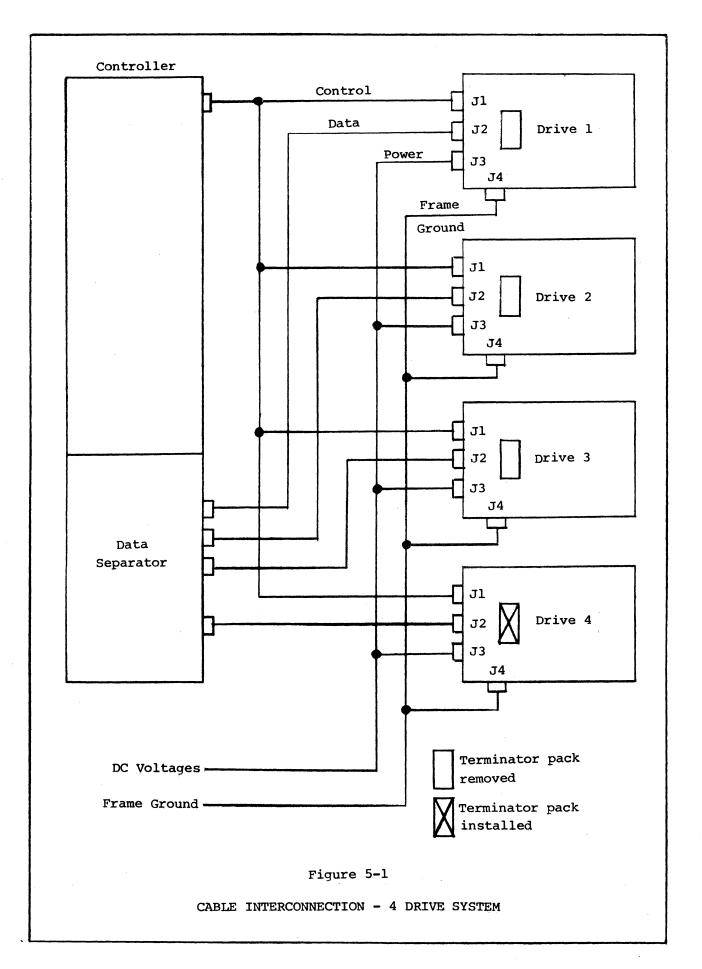## 5.1   CONTROL INPUT SIGNALS

The Control Input Signals are gated into the drive by the activation of the appropriate -DRIVE SELECT line.   Refer to Figure 5-2 for the driver/receiver circuit and signal level specification.   Each Control Input Signal is terminated by a 220/330 ohm resistor network in the drive.
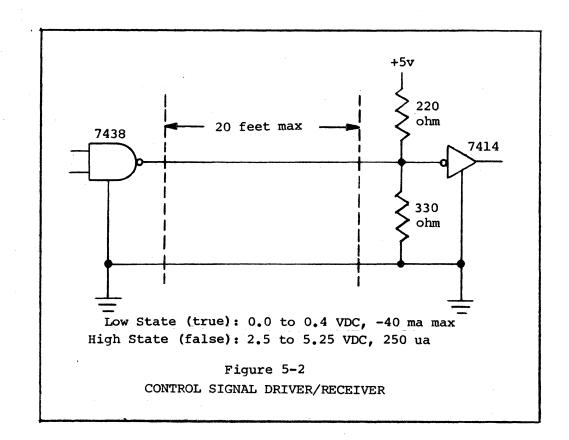
5.1.1   -REDUCED WRITE CURRENT

This signal, when true together with -WRITE GATE, causes the write circuitry to write on the disk with a lower write current.   It is required that this signal be set true when writing is to be performed on cylinders 153 through 305, and set false when writing is to be performed on cylinders 0 through 152.

Table 5-1
J1/J2/J3 CONNECTOR PIN ASSIGNMENT

Signal	Ground Return	Signal Name
J1-2	J1-1	-REDUCED WRITE CURRENT
J1-4	J1-3	Reserved
J1-6	J1-5	-WRITE GATE
J1-8	J1-7	-SEEK COMPLETE
J1-10	J1-9	-TRACK 000
J1-12	J1-11	-WRITE FAULT
J1-14	J1-13	-HEAD SELECT 2^0
J1-16	J1-15	Reserved
J1-18	J1-17	-HEAD SELECT 2^1
J1-20	J1-19	-INDEX
J1-22	J1-21	-READY
J1-24	J1-23	-STEP
J1-26	J1-25	-DRIVE SELECT 1
J1-28	J1-27	-DRIVE SELECT 2
J1-30	J1-29	-DRIVE SELECT 3
J1-32	J1-31	-DRIVE SELECT 4
J1-34	J1-33	-DIRECTION IN
J2-1	J2-2	-DRIVE SELECTED
J2-3	J2-4	Reserved
J2-5	J2-6	Spare
J2-7	J2-8	Reserved
J2-9		Spare
J2-10		Spare
J2-11	J2-12	GROUND
J2-13		+MFM WRITE DATA
J2-14		-MFM WRITE DATA
J2-15	J2-16	GROUND
J2-17		+MFM READ DATA
J2-18		-MFM READ DATA
J2-19	J2-20	GROUND
J3-1		+12 volts DC
J3-2		+12 volts DC return
J3-3		+5 volts DC return
J3-4		+5 volts DC

Figure 5-1

CABLE INTERCONNECTION - 4 DRIVE SYSTEM

```
                                            +5v
                                             │
                                            ╱╲
                           20 feet max      ╲   220
                      ┌──────────────────┐  ╱   ohm
            7438      │                  │  ╲
                      │                  │  │           7414
         ┌──────┐     │                  │  ├───────────▷○─────
         │      ╲     │                  │  │
    ─────┤       ╲    │                  │  ╱
    ─────┤        )o──┼──────────────────┼──┤   330
         │       ╱    │                  │  ╲   ohm
         └──────╱     │                  │  ╱
            │         │                  │  │
            ├─────────┼──────────────────┼──┤────────┬───
            │         │                  │  │        │
            ▼         └──────────────────┘  ▼        ▼
           ═══                            ═══
```

Low State (true): 0.0 to 0.4 VDC, -40 ma max
High State (false): 2.5 to 5.25 VDC, 250 ua

Figure 5-2
CONTROL SIGNAL DRIVER/RECEIVER

5.1.2   -WRITE GATE

The true state of this signal enables write data
to be written on the disk. The false state of
this signal enables data to be transferred from
the drive or enables -STEP pulses to step the R/W
head positioner.

5.1.3   -HEAD SELECT 2^0 AND 2^1 .

These two signals provide for the selection of
each individual read/write head in a binary coded
sequence. HEAD SELECT 2^0 is the least significant
signal. Heads are numbered 0 through 3. When
both HEAD SELECT lines are false Head 0 will be
selected. -HEAD SELECT 2^1 is used with the Model
1012. If -HEAD SELECT 2^1 is set true on a Model
1006, during write, -WRITE FAULT will become true
and during read only amplified noise will be
presented to the interface.

5.1.4   -DIRECTION IN

This signal defines direction of motion of the R/W
head when the -STEP line is pulsed. A high level
defines the direction as "out" and if a pulse is
applied to the -STEP line the R/W heads will move
away from the center of the disk. If this line is
a low level the direction of motion is defined as
"in" and the R/W heads will move toward the center
of the disk. Change in direction must meet the
requirements shown in Figure 5-3.

5.1.5   -STEP

This control signal causes the R/W head to move
with the direction of motion defined by the
-DIRECTION IN line.

The access motion is initiated at the low level to
high level transition or the trailing edge of this
signal pulse. Any change in the -DIRECTION IN
line must be made at least 100ns before the
leading edge of the step pulse.

The R/W head will move at the rate of the incoming
step pulses. The minimum time between successive
steps is 1.75 milliseconds. The minimum pulse
width is 1.0 usec. See Figure 5-3 for step
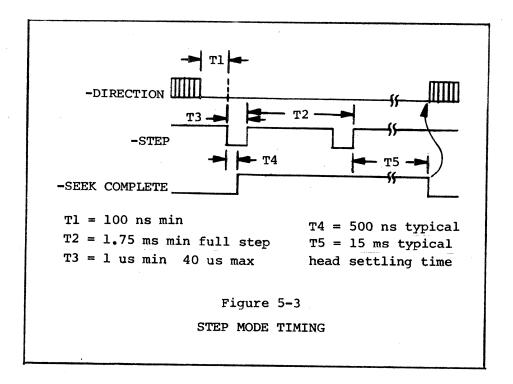timing.

NOTE
For input step rate greater
than 3 msec an audible noise
may be heard from the head
positioner. This audible
noise has no affect on drive
performance or reliability.

Full step pulses are issued at 1.75 millisecond
intervals and results in a random average seek
time of 179 milliseconds. A "Half Step" pulse
option allows a decrease in this time. See
Paragraph 5.4.3 and Table 2-1.

5.1.6   -DRIVE SELECT 1,2,3 AND 4

-DRIVE SELECT, when low, connects the drive to the
control lines. Cutting the appropriate shunts on
the R/W and Logic Board Assembly (See Paragraph
5.4.1) will determine which select line on the
interface will activate that drive.

Figure 5-3

STEP MODE TIMING

The figure shows timing waveforms for -DIRECTION, -STEP, and -SEEK COMPLETE signals with intervals T1, T2, T3, T4, T5 marked.

T1 = 100 ns min

T2 = 1.75 ms min full step

T3 = 1 us min   40 us max

T4 = 500 ns typical

T5 = 15 ms typical
head settling time

5.2   CONTROL OUTPUT SIGNALS

The Control Output Signals are gated from the drive by the activation of the appropriate -DRIVE SELECT line.   Refer to Figure 5-2 for the driver/receiver circuit and signal level specifications.   Each Control Output Signal should be terminated in the controller with a 220/330 ohm resistor network.

5.2.1   -SEEK COMPLETE

This signal will go true when the R/W heads have settled on the final track at the end of a seek. Reading or writing should not be attempted when -SEEK COMPLETE is false.

-SEEK COMPLETE will go false if a recalibration sequence is initiated (by drive logic) at power-on, or 500nS (typical) after the leading edge of a step pulse.

5.2.2   -TRACK 000

This interface signal indicates a true state only when the drive's R/W heads are positioned at Track 000 (the outermost data track).

5.2.3   -WRITE FAULT

This signal is used to indicate a condition exists
in the drive which will result in improper writing
on the disk.   When this signal is true, further
writing and stepping is inhibited at the drive
until the condition is corrected.   It cannot be
reset via the interface (See Paragraph 5.4.4 for
the exception).

Any of the following four conditions could cause
-WRITE FAULT to be true.

1.   Write current sensed by the drive in a head
      without -WRITE GATE active or no write
      current sensed in the drive in the head with
      -WRITE GATE active and -DRIVE SELECTED.

2.   The drive senses multiple heads selected, no
      head selected, or heads improperly selected.

3.   No transitions on MFM WRITE DATA lines when
      -WRITE GATE true.

4.   DC voltages are out of tolerance.

5.2.4   -INDEX

This 200 microsecond (typical) interface pulse is
provided   by the drive once each   revolution
(16.67mS nominal) to indicate the beginning of the
track.   Normally, this signal is a high level and
makes the transition to the low level to indicate
-INDEX.   Only the transition from high to low is
valid.

5.2.5   -READY

This interface signal when true together with
-SEEK COMPLETE, indicates that the drive is ready
to read, write or seek, and that the I/O signals
are valid. When this signal is false, all writing
and seeking are inhibited.

The typical time after power on for -READY to be
true is 20 seconds.
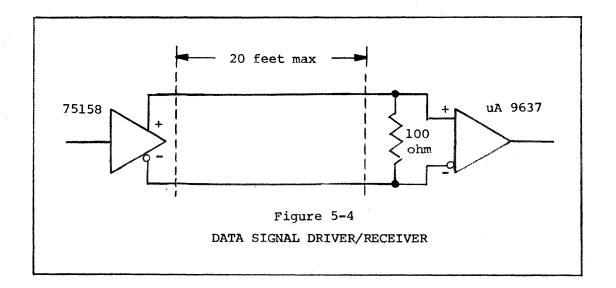
5.2.6   -DRIVE SELECTED

The -DRIVE SELECT signal will go true only when
the drive is programmed as drive X (X = 1,2,3, or
4) and the -DRIVE SELECT X line is activated by
the controller.

5.3 DATA TRANSFER SIGNALS

All signals associated with the transfer of data between the drive and the controller are differential in nature and are not gated by -DRIVE SELECT.

Two pairs of balanced signals are used for the transfer of data: MFM WRITE DATA and MFM READ DATA. Figure 5-4 illustrates the driver/receiver combination used in the MiniScribe I for data transfer signals.

Figure 5-4
DATA SIGNAL DRIVER/RECEIVER

5.3.1   MFM WRITE DATA

This is a differential pair that defines the transitions to be written on the track. The transition of +MFM WRITE DATA line going more positive than the -MFM WRITE DATA line will cause a flux reversal on the track provided -WRITE GATE is true. The timing of the write operation is illustrated in Figure 5-5.

In MFM recording, to optimize data integrity and meet the error rate specified, the write data presented by the controller must be pre-compensated on all tracks. ± MFM Write Data pulses bounded on one side by a 200ns period (1/2F) and bounded on the other side by a 300ns (1/1.5F) or 400ns (1/F) period must be pre-compensated by 12ns towards the side of the 200ns (1/2F) period. The pre-compensation is illustrated in Table 5-2.
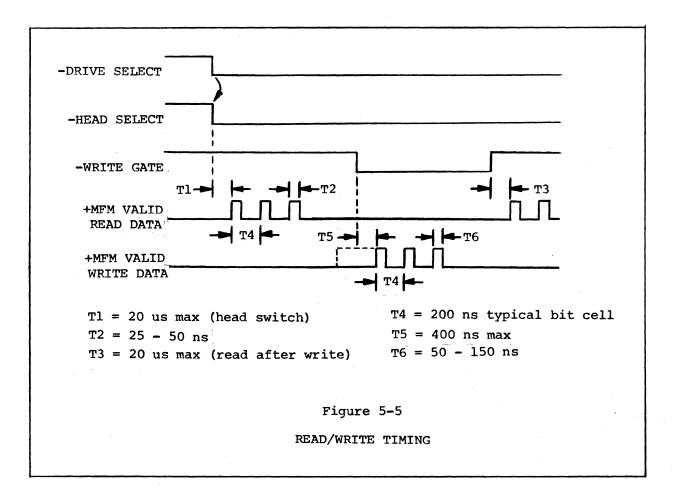
Table 5-2
WRITE PRE-COMPENSATION RULES

Bit 1	2	3	4	Compensation
1	0	0	0	12nsec late on first clock
0	0	0	1	12nsec early on second clock
0	1	1	x	12nsec late on first data
1	1	0	x	12nsec early on second data

5.3.2   MFM READ DATA

The data recovered by reading a pre-recorded track is transmitted to the controller via the differential pair of MFM READ DATA lines. The transition of the +MFM READ DATA line going more positive than the -MFM READ DATA line represents a flux reversal on the track of the selected head. The timing of the read operation is illustrated in Figure 5-5.

T1 = 20 us max (head switch)
T2 = 25 - 50 ns
T3 = 20 us max (read after write)

T4 = 200 ns typical bit cell
T5 = 400 ns max
T6 = 50 - 150 ns

Figure 5-5

READ/WRITE TIMING

5.4 CUSTOMER OPTIONS

Customer optional features are implemented via a shunt block on the R/W and Logic Board Assembly. See Figure 2-1 for the location of the shunt block.

5.5.1 -DRIVE SELECT

As shipped, the 16-pin shunt block has all pin pairs shorted with the "Radial" option selected (see Paragraph 5.4.2). To select the desired drive number in a daisy-chain operation, refer to Table 5-3.

Table 5-3
DRIVE SELECTION CONFIGURATION

Pin Pair	DRIVE SELECT NUMBER			
	1	2	3	4
8 - 9	short	open	open	open
7 - 10	open	short	open	open
6 - 11	open	open	short	open
5 - 12	open	open	open	short
1 - 16	open	open	open	open

5.4.2 "RADIAL" OPTION

As shipped, the 16-pin shunt block has pin pair 1/16 shorted resulting in a radial operation. In this case, all output signals are active, even if the drive is not selected. However, the front panel LED will not be on. -DRIVE SELECT must be active to light the LED. When pin pair 1/16 is open the drive is in a daisy chain mode where output signals are active when the appropriate -DRIVE SELECT line is activated.

5.4.3 "HALF STEP" OPTION

As shipped, the 16-pin shunt block has pin pair 4/13 shorted. In this case, step pulses are applied to the interface at an interval of 1.75 milliseconds as shown in Figure 5-3. Opening pin pair 4/13 allows a significant decrease in access time when used in conjunction with the simple software algorithm provided by the controller (Table 2-1).

5.4.4   "CONTROLLER RESET" OPTION

As shipped, the 16-pin shunt block has pin pair 3/14 shorted. In this case -WRITE FAULT conditions cannot be reset by the controller. Opening pin pair 3/14 allows the controller to reset -WRITE FAULT by deselecting the drive. This function is valid whether or not the "Radial" option is selected.

5.5 TERMINATORS

Each drive is shipped with a terminator pack providing the 220/330 ohm termination for the Control Input Signals. If multiple drives are configured in a daisy chain configuration (see Figure 5-1), the terminator pack must be removed from all drives except the last unit on the daisy chain. Figure 2-1 shows the location of the terminator pack.

6.0 PHYSICAL INTERFACE

The electrical interface between the MiniScribe I and the host controller and DC power supply is via four connectors: J1 - Control Signals, J2 - Read/Write Signals, J3 - DC Power input and J4 - Frame Ground.

Refer to Figure 2-1 for connector locations.
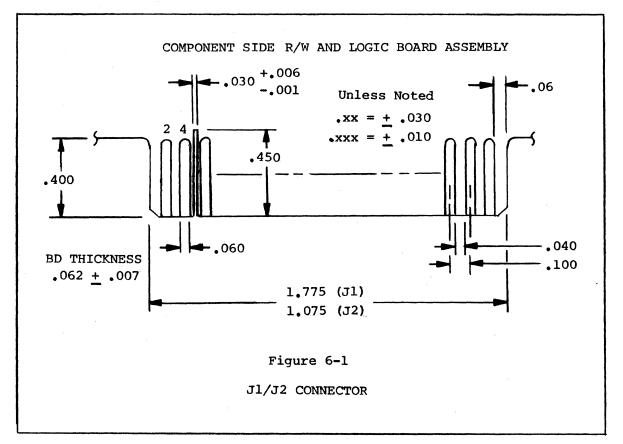
6.1 J1/P1 CONNECTOR - CONTROL SIGNALS

Connection to J1 is through a 34 pin PCB edge connector. The dimensions for this connector are shown in Figure 6-1. The pins are numbered 1 through 34 with the even pins located on the component side of the R/W and Logic Board Assembly. A key slot is provided between pins 4 and 6.
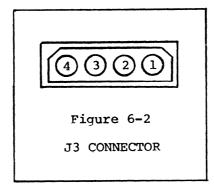
The recommended mating connector (P1) is AMP Ribbon Connector P/N 88373-3.

6.2 J2/P2 CONNECTOR - DATA SIGNALS

Connection to J2 is through a 20 pin edge connector. The dimensions for the connector are shown in Figure 6-1. The pins are numbered 1 through 20 with the even pins located on the component side of the R/W and Logic Board Assembly. A key slot is provided between pins 4 and 6.

The recommended mating connector (P2) is AMP Ribbon Connector P/N 88383-6.

COMPONENT SIDE R/W AND LOGIC BOARD ASSEMBLY

$.030 \begin{array}{c} +.006 \\ -.001 \end{array}$

Unless Noted

.xx = ± .030

.xxx = ± .010

.06

2 4

.450

.400

.060

.040

.100

BD THICKNESS
.062 ± .007

1.775 (J1)
1.075 (J2)

Figure 6-1

J1/J2 CONNECTOR

6.3 J3/P3 CONNECTOR - DC POWER

DC power connector (J3) is a 4 pin AMP Mate-N-Lok connector P/N 350211-1 mounted in a cable extended 4 inches from the drive. J3 pins are numbered as shown in Figure 6-2.

The recommended mating connector (P3) is AMP P/N 1-480424-0 utilizing AMP Pins P/N 350078-4.

Figure 6-2

J3 CONNECTOR

6.4 J4/P4 CONNECTOR - FRAME GROUND

Faston AMP P/N 61761-2

Recommended mating connector is AMP 62187-1.

If used, the hole in J4 will accomodate a wire size of 18AWG max.

7.0 TRACK FORMATTING GUIDELINES

The purpose of a format is to organize a track into smaller addressable records called sectors. The MiniScribe I is a soft sectored device allowing the customer to define the sector format. When establishing the track format of MiniScribe I certain rules should be observed to accomodate the physical timing relationships within the drive.

7.1 GAP 1

If head switching occurs at index time, then, to reliably read the content of the first sector, Gap 1 must be provided to allow the read amplifier to stabilize. The minimum length of Gap 1 is 12 bytes.

7.2 SYNC

A sync field precedes each addressable record (ID or record) and should be of a length to accommodate the "lock up" characteristics of the phase-lock-loop within the data separator portion of the customers controller.

7.3 GAP 2

Following each sector it is recommended a gap be placed to accommodate spindle speed variations between write operations on the same track to insure that overwrite will not occur on adjacent recorded data. To accommodate the $\pm$ 1% speed tolerance of MiniScribe I, Gap 2 should be a minimum of 1 byte for each 32 bytes of data within the sector. Additionally the customer should increase the gap to accommodate the spin speed-asynchronous frequency variation of the controller generated MFM WRITE DATA signals.

7.4 GAP 3

This gap is a speed tolerance buffer for the entire track to insure that the last sector does not overflow beyond the index. Gap 3 precedes index and should be of a length to accommodate the spin speed variations of MiniScribe I ($\pm$ 1%) and the frequency variations of the controller generated MFM WRITE DATA signals.

8.0 INSTALLATION

8.1 UNPACKING AND INSPECTION

Retain the packing materials for reuse. Refer to Figure 8-1 for the following steps:

Step 1:   Inspect the shipping container for evidence of intransit damage. If damage is evident, notify the carrier immediately.

Step 2:   Open the outer carton by carefully cutting the tape on the top of the carton.

Step 3:   Lift the inner carton out of the outer carton and remove the end foam cushions.

Step 4:   Open the inner carton by carefully cutting the tape on the top of the carton.

Step 5:   Lift the drive from the inner carton and remove the end foam cushions and the cardboard wrap.

Step 6:   Place the two pairs of end cushions, the cardboard wrap and the inner carton within the outer carton and store for subsequent use.

Step 7:   Inspect the drive for shipping damage, loose screws or components and correct if possible. If damage is evident without noticable damage to the shipping cartons, notify MiniScribe immediately for drive disposition.

8.2 CONFIGURING THE MINISCRIBE I.

The customer should determine the drive select number required and the options desired and configure the 16-pin shunt as defined in Paragraph 5.4.

8.3 MOUNTING THE MINISCRIBE I

The drive should be mounted to the customer frame through the mechanically isolated mounting points on the bottom or sides of the drive using 6-32 machine screws, 1/4 inch maximum penetration. See Figure 2-1 for mounting dimensions. The customer should allow adequate ventilation to the drive to insure reliable drive operation over the operating temperature range.
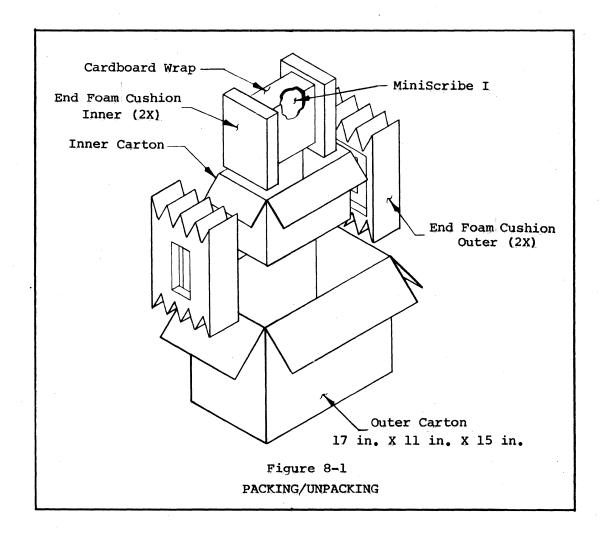
8.4 CABLING THE MINISCRIBE I

Connect interface cables with connectors P1, P2, P3 and P4 to J1, J2, J3, and J4 respectively. Insure connectors P1 and P2 have keys installed as indicated in Figure 6-1. If multiple drives are to be interconnected, remove the terminator packs in all but the last drive in the daisy chain. See Figure 2-1 for the terminator pack location.
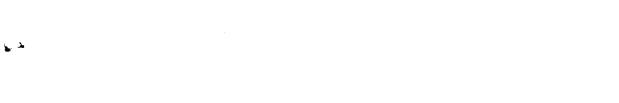
8.5 REPACKING THE MINISCRIBE I

Should the MiniScribe I require shipment, repack the drive using the MiniScribe packing materials following Steps 1-5 of Paragraph 8.1 in reverse order.

NOTICE
The MiniScribe I product warranty is void if the drive is returned to MiniScribe in other than the standard MiniScribe shipping carton packed in accordance with the enclosed procedure.

Figure 8-1
PACKING/UNPACKING

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