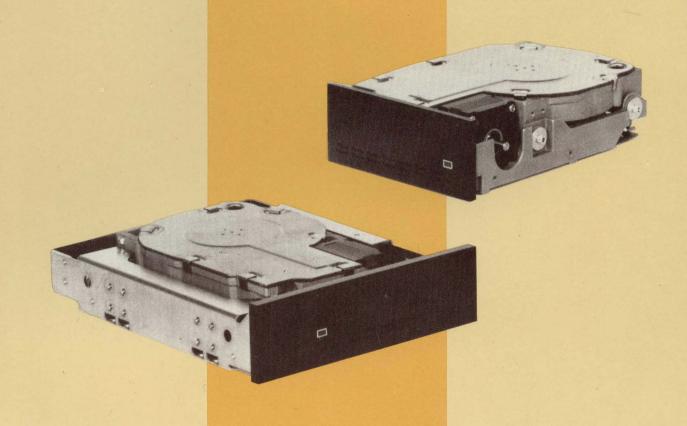
Tandon

TM362 AND TM262

RIGID DISK DRIVES



PRODUCT SPECIFICATION AND USER'S MANUAL

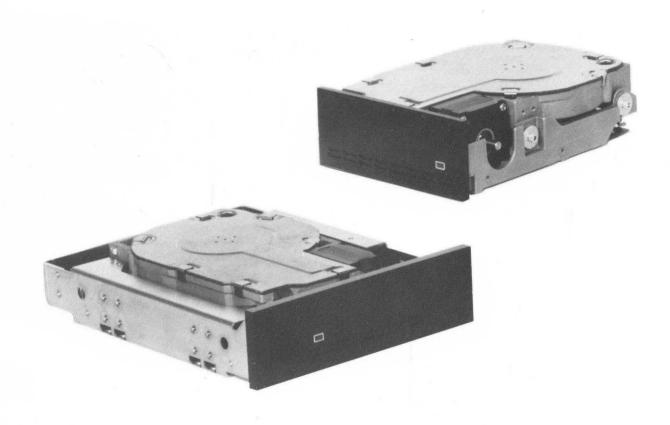
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TM362 AND TM262 3.5-INCH RIGID DISK DRIVES PRODUCT SPECIFICATION AND USER'S MANUAL



20320 PRAIRIE STREET CHATSWORTH, CALIFORNIA 91311

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SECTION 1

GENERAL DESCRIPTION

INTRODUCTION

This manual provides useful information to assist the customer when incorporating the Tandon rigid disk drive into a system.

The TM362 and TM262 disk drives are full feature, compact units that use a pseudo-closed-loop head positioning system in conjunction with standard Winchester technology to store data on 3.5-inch plated media. Voltage and signal requirements for both drives are identical to those of Tandon Corporation's standard 5-1/4-inch family of rigid disk drives.

Frame size is the only difference between the TM362 drive and the TM262 drive. The TM362 is designed to fit in a standard 3.5-inch drive cavity, and the TM262 is designed to fit in a standard 5-1/4-inch drive cavity.

The storage media is contained within the drive in a fixed, nonoperator-removable configuration.

1.1 SCOPE OF THE DOCUMENT

Section 1 of this manual contains a general description of the TM362 and TM262 disk drives. Section 2 contains the product specifications. Section 3 provides information on operation of the drives.

1.2 PURPOSE OF THE DRIVE

These drives are rotating disk memory devices designed for random access data storage and retrieval. Typical applications include word processing systems, entry level microprocessor systems, intelligent calculators, program storage, small business computer systems, and any application in which low cost, high speed random access data storage is required.

1.3 MAJOR FEATURES

PSEUDO-CLOSED-LOOP HEAD POSITIONING SYSTEM

The pseudo-closed-loop head positioning system used in these drives is inherently more accurate than the traditional open-loop system, yet it does not require a dedicated servo surface on the recording media. Servo positioning data is embedded in each Head 0 track, and the drive uses this data to monitor head location and, thereby, maintain accurate servo positioning.

MICROPROCESSOR CONTROL

The TM362 and TM262 drives feature an onboard microprocessor, providing five major functions:

- 1. Self-calibration on power-up.
- 2. Seek timing for the head positioning mechanism.
- 3. Write current switching for optimal data recording quality.
- 4. Power and track fault detection.
- 5. Compensation for positioning errors caused by temperature and mechanical variations.

DAISY CHAIN/RADIAL CAPABILITY

The circuit board provides address selection and gating functions that allow a user to daisy chain up to four drives or configure the drive for radial connection. A SIP resistor pack is used to terminate the interface. The resistor pack is removed from its SIP socket on all drives except the last one in a daisy chain. When a single-drive system or a radial configuration is used, the resistor pack remains plugged into the SIP socket.

INDUSTRY STANDARD INTERFACE COMPATIBILITY

Both drives are compatible with controllers that use an ST506/412 industry standard interface.

FRONT PANEL

Front panels equipped with an activity indicator are available for each of the drives.

AIR FILTRATION

A self-contained, recirculating air filtration system supplies clean air through a 0.3-micron filter. A secondary breather filter is provided to allow pressure equalization with the ambient atmosphere without contamination. The entire head-disk-actuator compartment is maintained at a slightly positive pressure to further ensure an ultraclean environment.

1.4 FUNCTIONAL DESCRIPTION

The functional characteristics of the TM362 and TM262 drives are identical. The drives are fully self-contained and require no operator intervention during normal operation. During the power-up sequence, the spindle motor reaches 3,568 RPM, and the positioning mechanism recalibrates the recording heads back to Track 0. If the spindle motor does not get up to speed within 15 seconds, the drivers to the spindle motor will be turned off. A new power up sequence will be attempted when the power is momentarily removed and then restored.

The drives are designed to optimize MFM write and read data recording methods, as specified by the ST506/412 interface. Data recovery electronics include

a low-level read amplifier, differentiator, a zerocrossover detector, and digitizing circuits. No data encoding or decoding features are provided on the drives.

The heads are positioned over the desired track by means of a stepper motor and a rack and pinion mechanism. Servo positioning pulses are recorded on the final segment of each Head 0 track, and, by continuously monitoring the location of the heads in relationship to those pulses, the drive is able to maintain highly accurate servo positioning.

The onboard microprocessor monitors all functions that could affect drive performance. If a problem exists, the drive will abort its power-up sequence or (after achieving a Ready state) declare a fault condition.

A parking zone is provided for the read/write heads at cylinder 663. The parking function is under the control of the drive controller.

1.5 PHYSICAL DESCRIPTION

The TM362 and TM262 drives differ only in the physical dimensions of their frames. The TM362 uses the smaller frame, and the TM262 the larger.

The TM362 drive is shown in Figure 1-1 and the TM262 drive in Figure 1-2. Both drives contain 3.5-inch storage media.

The head disk assembly and the read/write preamplifiers are enclosed in a sealed cast aluminum housing, which includes an air filtration system to ensure a contamination-free environment. The housing is shock mounted to a metal frame. A front panel may be attached to either drive. Threaded holes are provided on the sides and bottom of the frame for mounting the drive onto a chassis.

In addition, both drives include read/write control electronics and servo spindle control electronics.

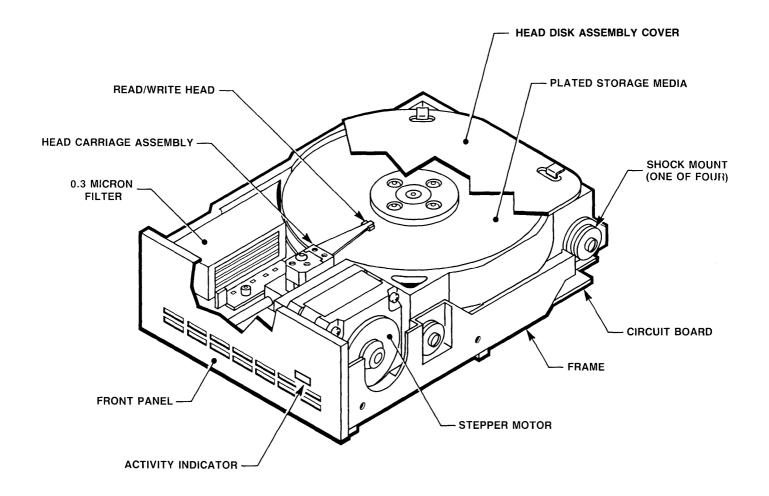


FIGURE 1-1 TM362 DISK DRIVE

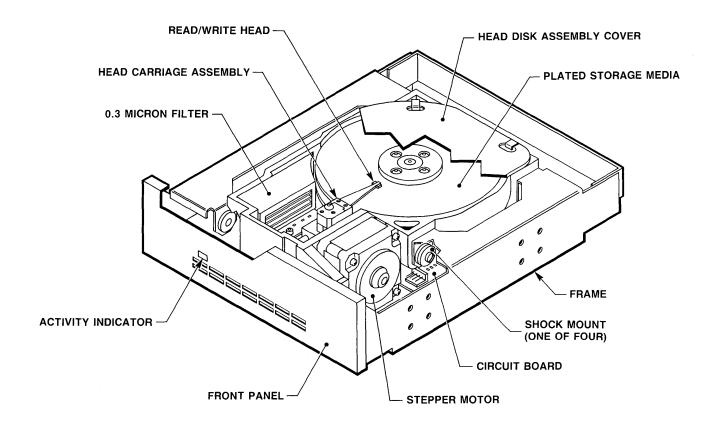


FIGURE 1-2 TM262 DISK DRIVE

SECTION 2

PRODUCT SPECIFICATIONS

INTRODUCTION

This section contains the mechanical, electrical and operational, reliability, and environmental specifications for the TM362 and TM262 drives. Other than their physical dimensions and nonoperating shock specifications both drives are identical.

2.1 MECHANICAL SPECIFICATIONS

The mechanical and physical dimensions of the TM362 and TM262 drives are contained in Figures 2-1 and 2-2, respectively.

2.2 **ELECTRICAL AND OPERATIONAL SPECIFICATIONS**

The electrical and operational specifications are contained in Table 2-1.

2.3 RELIABILITY SPECIFICATIONS

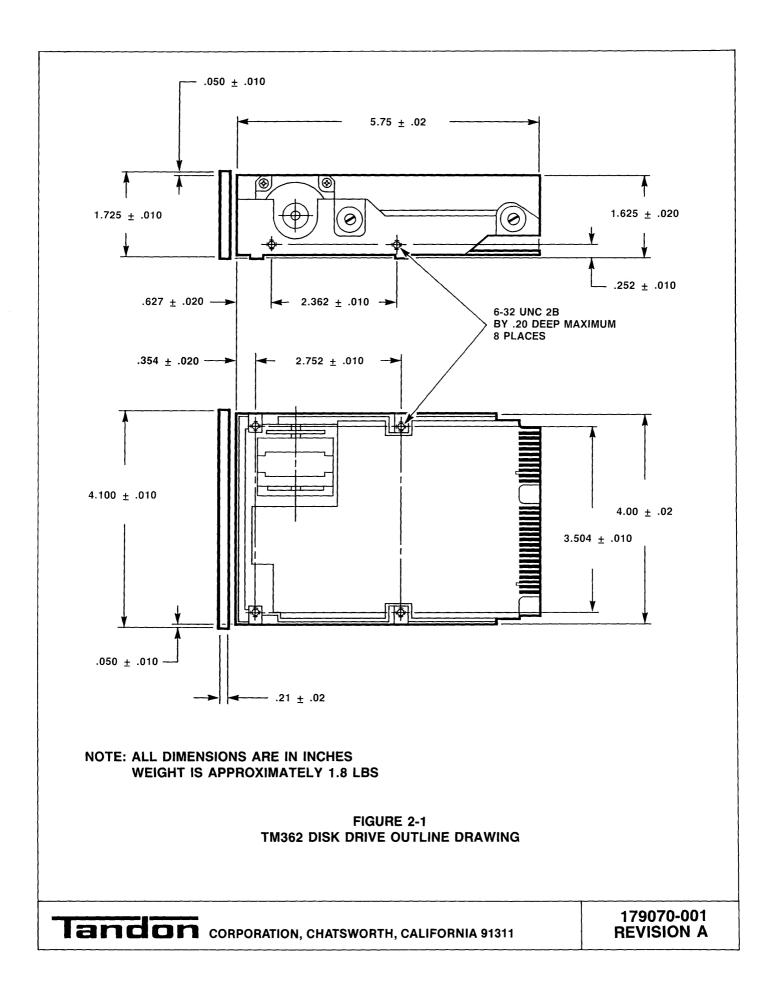
The reliability specifications are contained in Table 2-2.

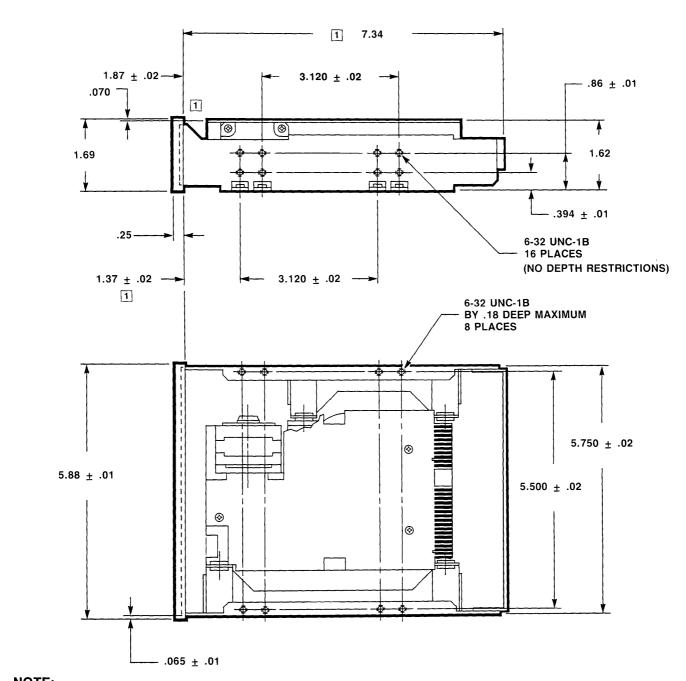
2.4 **ENVIRONMENTAL SPECIFICATIONS**

The environmental specifications are contained in Table 2-3.

2.5 RECOGNITION AND CERTIFICATION

This product is recognized under U. L. EMRT2, Component, Data Processing Equipment, Electronic, and certified under Standard Number C22.2.





NOTE:

ALL DIMENSIONS ARE IN INCHES

1 ADD .160 TO GET TRUE FRAME LENGTH WHEN NOT USING FRONT PANEL **WEIGHT IS APPROXIMATELY 2.3 LBS**

FIGURE 2-2 TM262 DISK DRIVE OUTLINE DRAWING

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TABLE 2-1 **ELECTRICAL AND OPERATIONAL SPECIFICATIONS**

Media

Tracks Per Inch

Spacing, track to track

Number Of Cylinders

R/W Head Parking Cylinder

Number Of Tracks

Disk Speed

Average Latency

Motor Start Time

Seek Time, track to track

Head Settling Time

Average Track Access Time, using buffered seek, including head settling time

Maximum Access Time, using buffered seek, including head settling time

Transfer Rate

Maximum Flux Reversals Per Inch (FRPI)

Unformatted Recording Capacity Per Drive

Unformatted Recording Capacity Per Surface

Unformatted Recording Capacity Per Track

3.5-inch rigid disks (2)

804 TPI

1.24 milinches

615 data cylinders

663

2,460 tracks

 $3,568 \text{ RPM} \pm 0.5 \text{ percent}$

8.41 milliseconds

15 seconds, typical

3 milliseconds

15 milliseconds

80 milliseconds

195 milliseconds

5.0 megabits per second

13,810 FRPI

25 megabytes

6.25 megabytes

10.4 kilobytes

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TABLE 2-1 (CONTINUED) ELECTRICAL AND OPERATIONAL SPECIFICATIONS

POWER REQUIREMENTS

Start Up: + 12 volts D. C. ± 5 percent, 2.0 amperes maximum, not to exceed 10 seconds.

+ 5 volts D. C. There is no surge current on the + 5 volt D. C. line.

Running: + 12 volts D. C. ± 5 percent, 0.8 ampere maximum, with no more than 100 millivolts Perodic and Random Deviation (PARD).

+ 5 volts D. C. ± 5 percent 0.6 ampere maximum, with no more than 100 millivolts Periodic and Random Deviation.

POWER DISSIPATION

Power requirement at 5.0 volts and 12.0 volts is 10.0 watts typical.

POWER SEQUENCING

No power sequencing is required. The microprocessor starts the spindle motor when both voltages are present.

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TABLE 2-2 RELIABILITY SPECIFICATIONS

SOFT AND HARD READ ERROR RATES, EXCLUSIVE OF MEDIA DEFECTS

For data that has been verified previously as error free, and when used in conjunction with a data separator and phase lock loop of good design, the recoverable (soft) read error rate for any subsequent read operation shall not exceed one error in 1 x 10¹⁰ bits transferred. A recoverable read error is an error that may be corrected within five attempts to reread the data.

The nonrecoverable (hard) read error rates shall not exceed one error in 1 x 10¹² bits transferred. A nonrecoverable read error is an error that may not be corrected within five attempts to reread data, providing that the writing of the data previously has been verified as correct. The seek error rate is not to exceed one error in 1 x 106 seeks.

MEDIA DEFECTS

Any defects on the media surface will be identified on a defect map provided with each drive. This defect map will indicate the head number, track number, and the number of bytes from index for each defect. Each defect shall be no longer than 16 bits. Cylinders 000 and 001 are guaranteed error free.

The defect map is offered as a guide only. The number of defects and their locations can change due to customer system variations, such as data separators.

NOTE

A parking track is located at cylinder 663, to reduce the probability of damage to data tracks during extreme shock conditions.

Mean Time Between Failures

15,000 power on hours

Mean Time To Repair

30 minutes

Component Design Life

5 years

Preventative Maintenance

Not Required

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TABLE 2-3 ENVIRONMENTAL SPECIFICATIONS

Ambient Temperature

Operating

Nonoperating

Temperature Gradient

Operating

Nonoperating

Maximum Wet Bulb Temperature

Relative Humidity

Elevation

Operating

Nonoperating

Shock

Operating, read/write without exceeding error rate

Operating, no damage

4°C to 50°C, 39°F to 122°F

-40°C to 60°C, -40°F to 140°F

10°C per hour, 18°F per hour

Below that causing condensation

26 °C, 78 °F, without condensation

8-to-80 percent, noncondensing

Density Altitude:

-457 to 2,972 meters -1,500 to 9,750 feet

-457 to 12,195 meters, -1,500 to 40,000 feet

10G for 11 milliseconds (any axis, half sine wave)

20G for 11 milliseconds (any axis, half sine wave)

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TABLE 2-3 (CONTINUED) ENVIRONMENTAL SPECIFICATIONS

Nonoperating, heads over landing cylinder

TM362

40G for 25 milliseconds (any axis, square wave)

TM262

40G for 25 milliseconds (any axis, half sine wave)

Vibration

Operating

.048 inch double amplitude (5-17 Hertz) .73G, 17 to 150 Hertz

.33G, 200 to 500 Hertz

Nonoperating

1.0G, 5 to 200 Hertz, sweep rate of .067 decades per minute

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SECTION 3

OPERATION

INTRODUCTION

This section contains information pertinent to the handling, inspection, installation, and operation of the TM362 and TM262 drives.

Each drive is shipped in a protective container which, when bulk packaged, minimizes the possibility of damage during shipment.

The following procedures give instructions for unpacking typical single-pack and multi-pack shipping containers.

3.1 HANDLING

The drive may be damaged if it is subjected to excessive shock, and, consequently, not meet published performance specifications for data reliability, margins, and function.

CAUTION

Take care to prevent the drive from being damaged by electrostatic discharge.

As an additional safety factor, it is recommended that:

- 1. Drives are shipped only with heads positioned over the parking cylinder.
- Individual drives are handled carefully; e. g., receiving and in-process personnel are properly trained, surface mats are used on working surfaces to prevent the possibility of "handling shock", and padding is placed on racks and carts.

CAUTION

The critical aspects of handling these drives must be emphasized. Tandon provides technical assistance on packing and handling to customers upon request.

3.2 UNPACKING THE DRIVE

For Typical Single-Pack Containers (Figure 3-1)

- 1. Place the single-pack container on a flat work surface.
- 2. Visually inspect the shipping container for damage.
- 3. Cut the tape on the shipping container.
- 4. Remove the foam lid and pads from the shipping container.
- 5. Remove the inner container.
- 6. Remove the drive from the inner container.
- 7. Remove the drive from the anti-static/dust protective bag and place the drive on a grounded, foam-covered surface.
- 8. Notify the carrier immediately if any damage is found.

For Typical Multi-Pack Containers (Figure 3-2)

- 1. Place the multi-pack container on a flat surface.
- 2. Visually inspect the container for shipping damage.
- 3. Open the shipping container.

- 4. Remove the inner container.
- 5. Remove the packaged drives from their foam cells.
- 6. Remove the drives from their anti-static/dust protective bags and place the drives on a grounded, foam-covered surface.
- 7. Notify the carrier immediately if any damage is found.

CAUTION

Do not manually rotate the spindle or stepper motors. Damage to the heads and disks may result.

NOTE

The inside chamber of the drive is a sealed compartment that must not be opened.

When returning a drive to the service center, ensure that the heads are parked at cylinder 663. Head parking is a function of the controller card. Use the prior steps in reverse order. Be sure the drive is packed in its anti-static/dust protective bag.

3.3 PREINSTALLATION CHECKOUT

Before applying power to the drive, inspect for the following:

- 1. The circuit board is secure.
- 2. The connectors are firmly seated.
- 3. There is no debris or foreign material between the frame and the casting, or any part of the drive.
- 4. The head/disk housing can move freely on the shock mounts of the frame.
- 5. The termination resistor pack and jumper block are firmly seated and in the correct configuration.

3.4 MOUNTING THE DRIVE

The drive can be mounted in any vertical or horizontal plane. On the TM362, eight 6-32 tapped holes are provided for mounting: two on each side and four on the bottom of the frame (see Figure 2-1). On the TM262, twenty-four 6-32 tapped holes are provided for mounting: eight on each side and eight on the bottom of the frame (see Figure 2-2). The drive is manufactured with some critical internal alignments that must be maintained. Hence, it is important the mounting hardware does not introduce significant stress on the drive.

Any mounting scheme in which the drive is part of the structural integrity of the enclosure is not permitted. Mounting schemes should allow for adjustable brackets or incorporate resilient members to accommodate tolerances.

A sway space is required between the head disk assembly and other assemblies in the user system to allow for movement of the housing on its shock mounts, 0.060 inches, minimum.

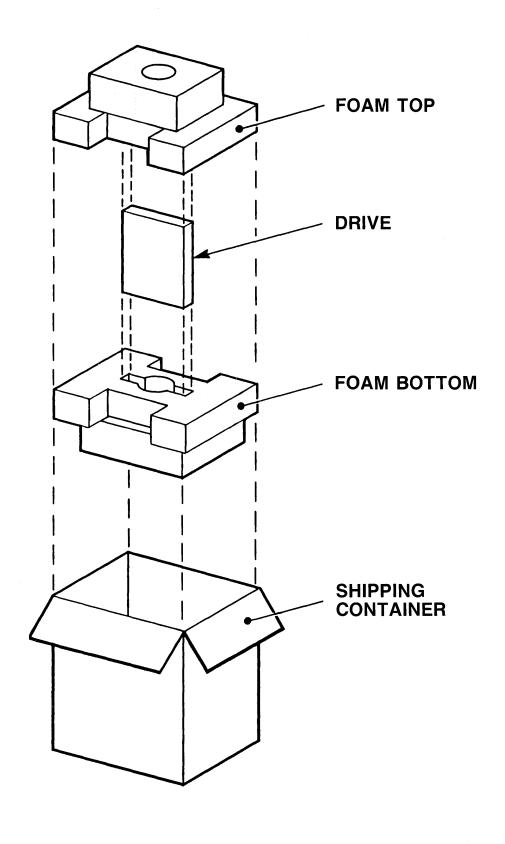


FIGURE 3-1
TYPICAL SINGLE-PACK SHIPPING CONTAINER

3-3

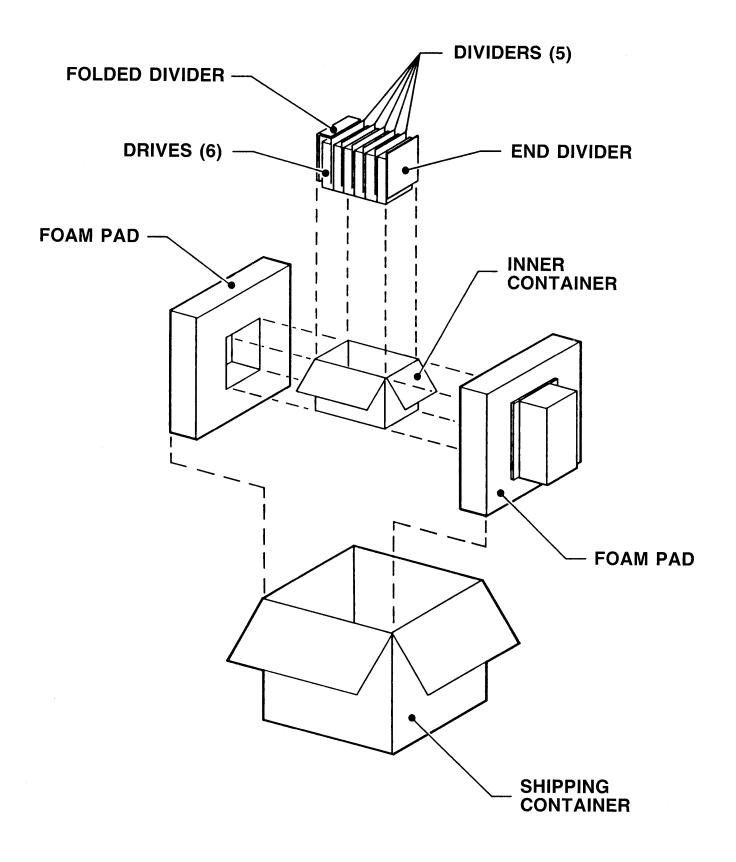


FIGURE 3-2
TYPICAL MULTI-PACK SHIPPING CONTAINER

DUST COVER

The design of an enclosure should incorporate a means to prevent contamination from loose items (e. g., dust, lint, and paper chad) since the drive does not have a dust cover.

FREE AIR FLOW

When the drive is mounted so the components have access to a free flow of air, normal convection cooling allows operation over the specified temperature range (see Table 2-3).

CONFINED ENVIRONMENT

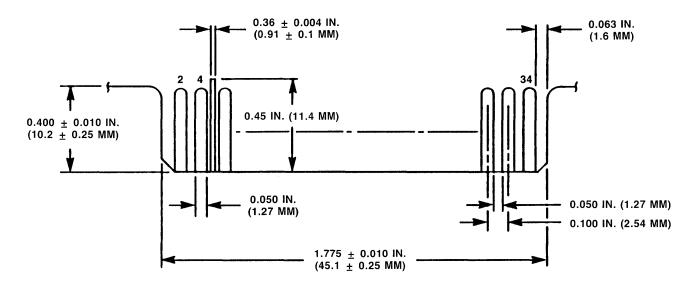
When the drive is mounted in a confined environment,

sufficient air flow must be provided to maintain specified air temperatures in the vicinity of the motor and the circuit board.

3.5 INTERFACE CONNECTORS

The electrical interface between the drive and the host system is via three connectors. J1 provides control signals for the drive (see Figure 3-3). J2 provides for the radial connection of read/write data signals (see Figure 3-4). J3 provides for D. C. power (see Figure 3-5). Figure 3-6 shows the locations of these connectors.

Table 3-1 contains interface lines. The interface description of the connectors, and the location of each, is contained in this section.



BOARD THICKNESS 0.062 \pm 0.007 IN. (1.59 MM \pm 0.18 MM)

FIGURE 3-3
J1 EDGE CONNECTOR DIMENSIONS

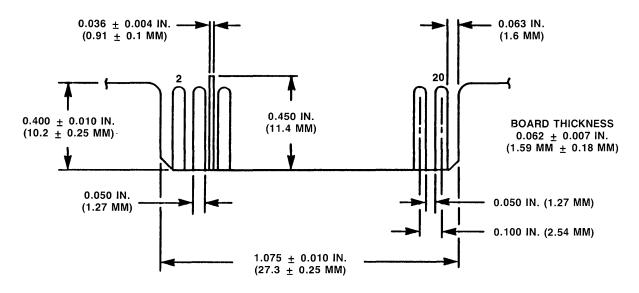


FIGURE 3-4
J2 EDGE CONNECTOR DIMENSIONS

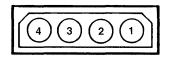


FIGURE 3-5
J3 POWER CONNECTOR

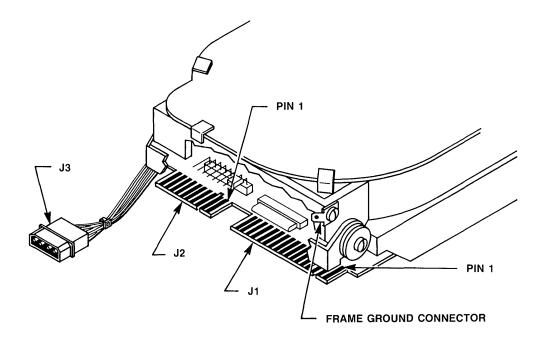


FIGURE 3-6 CONNECTOR LOCATIONS

TABLE 3-1 DRIVE INTERFACE SIGNALS AND PIN ASSIGNMENTS

		erface Number			
Connector	Signal	Ground	Signal Type	I/O	Name of Signal
P1	2	(1)	S	I	Spare
↑	4	(3)	S	Ι	Spare
	6	(5)	S	I	Write Gate
	8	(7)	S	O	Seek Complete
	10	(9)	S	O	Track 0
34-Pin	12	(11)	S	O	Fault
Ribbon	14	(13)	S	I	Head Select 2 ^o
Daisy	16	(15)	-	-	Reserved (To J2-7)
Chain	18	(17)	S	I	Head Select 2 ¹
	20	(19)	S	O	Index
	22	(21)	S	O	Ready
	24	(23)	S	I	Step
	26	(25)	S	I	Drive Select 0
	28	(27)	S	I	Drive Select 1
	30	(29)	S	I	Drive Select 2
<u>↓</u>	32	(31)	S	I	Drive Select 3
P1	34	(33)	S	I	Direction In
P2	1	(2)	S	0	Drive Select
1	3	(4)	S	_	Spare
	5	(6)	-	_	Motor On (optional)
	7	(8)	-	_	Reserved (To J1-16)
20-Pin	9	(10)	-	_	Spare
Ribbon	11	(12)	-	_	Ground
Radial	13	` <u> </u>	D	I	+ Write Data
	14	_	D	I	Write Data
	15	(16)	-	-	Ground
	17		D	O	+ Read Data
\downarrow	18	_	D	O	Read Data
P2	19	(20)	· _	O	Ground
D2	1				. 10 1, 5 5 7
P3	1			-	+ 12 volts D.C. In
4-Pin	2 3			-	+ 12 volts D.C. Return
Radial				-	+ 5 volts D.C. Return
P3	4			-	+ 5 volts D.C. In

NOTES:

- S = Single Ended
 D = Differential

- 3. I = Drive Input
 4. O = Drive Output

J1/P1 CONNECTOR

Connection to J1 is through a thirty-four-pin circuit board connector. Figure 3-3 contains the dimensions of this connector. The pins are numbered 1 through 34. The even pins are located on the solder side of the circuit board. A key slot is provided between Pins 4 and 6. The recommended mating connector for P1 is AMP ribbon connector P/N 88383-3, without ears.

J2/P2 CONNECTOR

Connection to J2 is through a twenty-pin circuit board edge connector. Figure 3-4 contains the dimensions of this connector. The pins are numbered 1 through 20. The even pins are located on the solder side of the circuit board. The recommended mating connector for P2 is AMP ribbon connector P/N 88373-3, without ears. A key slot is provided between Pins 4 and 6.

J3/P3 CONNECTOR

D. C. power connector J3 is a four-pin AMP Mate-N-Lok connector, P/N 1-480426-0. The recommended

mating connector, P3, is AMP P/N 1-480424-0, utilizing AMP pins P/N 60619-4. J3 pins are labeled on the J3 connector (see Figure 3-5). J3 cabling must be 18 AWG, minimum.

FRAME GROUND CONNECTOR

The frame ground connector is Faston AMP P/N 61761-2. The recommended mating connector is AMP P/N 62187-1. To realize error rates (see Table 2-2), it must be connected directly to the centrally located logic ground via an 18 AWG, minimum, cable.

3.6 INTERFACE LINE DESCRIPTIONS

The interface for the TM362 and TM262 drives is available in one configuration. It is compatible with ST506/412 industry standard drives. Compatibility is defined as using the same pin assignment where the signal and function are common. Table 3-1 contains pin assignments.

The interface may be connected in the radial or daisy chain configuration (see Figures 3-7 and 3-8).

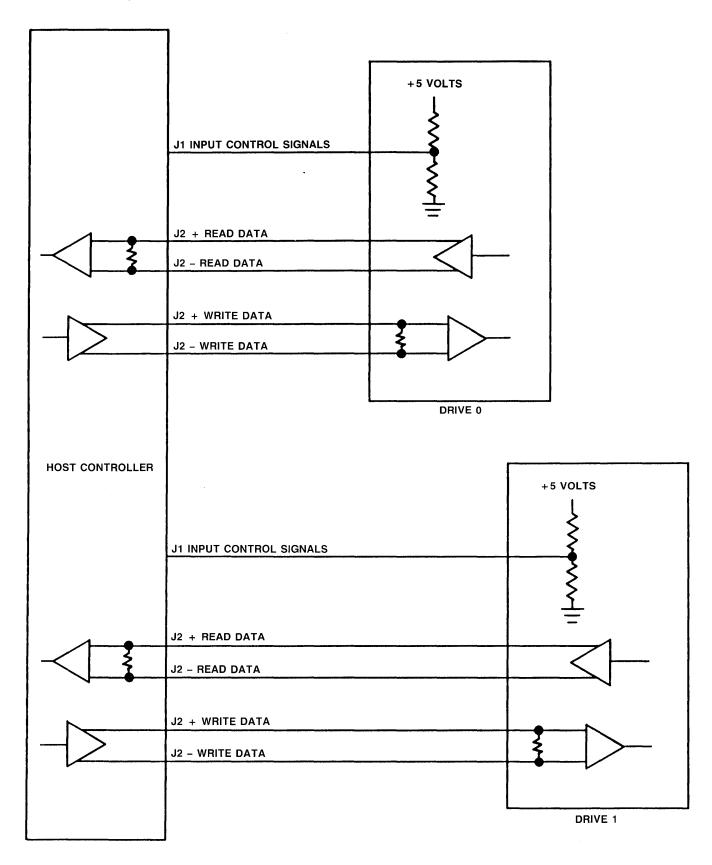


FIGURE 3-7
RADIAL CONFIGURATION

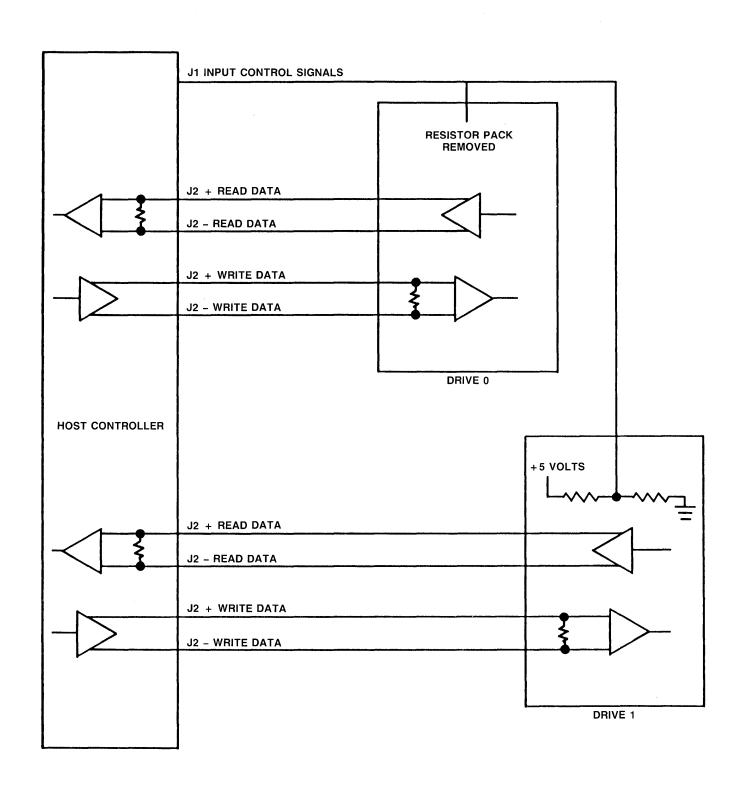


FIGURE 3-8
DAISY CHAIN CONTROL LINES

INPUT CONTROL SIGNALS

The input control signals are of two kinds: those to be multiplexed in a multiple drive system and those that do the multiplexing. The input control signals to be multiplexed are: Write Gate, Head Select Line 2⁰, Head Select Line 2¹, Step, and Direction In. The multiplexing signal is Drive Select 0, Drive Select 1, Drive Select 2 or Drive Select 3.

The input signals have the following electrical

specifications, as measured at the drive. Figure 3-9 illustrates the recommended circuit.

True: 0.0 volt D. C. to 0.8 volt D. C. at I = -40 milliamperes, maximum

False: 2.5 volts D. C. to 5.25 volts D. C. at I = 250 microamperes, maximum (open)

All input lines share a 220/330 ohm resistor pack for line termination. Only the last drive in the chain should have the resistor pack installed.

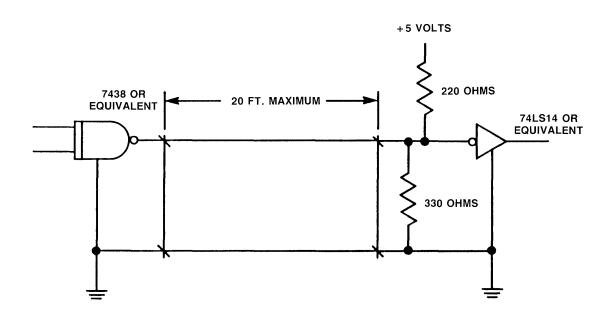


FIGURE 3-9
CONTROL SIGNAL/DRIVER RECEIVER
CIRCUIT COMBINATION

WRITE GATE

The active state of this signal or logical zero level inhibits movement of the read/write heads and enables write data to be written on the disk. The inactive state or logical one level of this signal enables the data to be transferred from the drive, with a read recovery time of three microseconds maximum. Write Gate is inhibited from writing during the last 150 microseconds of a track.

HEAD SELECT LINES 20, 21

These two lines provide for the decoding of each read/write head in a binary coded sequence. Head Select line 2° is the least significant line. The heads are numbered 0 through 3. When all Head Select lines are false, Head 0 is decoded. Table 3-2 describes which head is chosen for each Head Select line.

Head recovery time (head-to-head select, write-to-read recovery, or read-to-write recovery) is three microseconds maximum.

STEP

This interface line is a control signal that causes the read/write heads to move in the direction defined by the Direction In line.

The access motion is initiated at the logical true-to-logical false transition or the trailing edge of this signal pulse. Any change in the Direction In line must be made at least 100 nanoseconds before the true-to-false edge of the step pulse. The quiescent state of this line should be held logically false.

In a nonbuffered seek mode, the read/write head moves at the rate of incoming step pulses. The minimum time between successive steps is three milliseconds. The minimum pulse width of the step pulse is one microsecond. Figure 3-10 illustrates the step mode timing.

	TABLE 3-2 HEAD SELECT LINES				
Head S	elect Line	Head Selected			
21	20	TM362 and TM262			
1	1	0			
1	0	1			
0	1	2			
0	0	3			

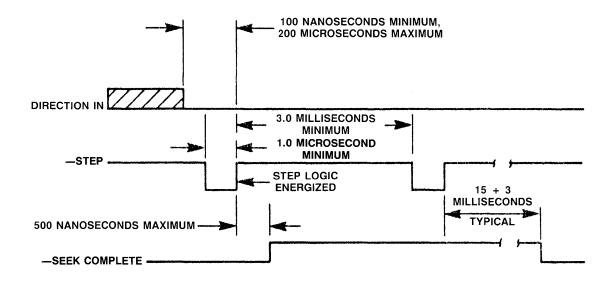


FIGURE 3-10 STEP MODE TIMING

BUFFERED SEEK

In a buffered seek mode, the controller may burst step pulses to the drive. Step pulses are issued in a 1:1 ratio to the cylinders to be moved. They are accepted until the time after the last pulse exceeds 200 microseconds, at which time the drive begins the seek operation. The onboard microprocessor selects the most efficient seek algorithm for the positioner. At the end of the seek operation, the microprocessor checks for any additional step pulses that occurred during the seek opera-

tion before seek complete is activated. If more pulses are received than there are cylinders left to move, i. e., if the target cylinder is less than zero or greater than 663, the heads will recalibrate to Track 0.

The pulse repetition rate must not be less than five microseconds. The duty cycle may be varied, provided the one microsecond minimums are met (see Figure 3-11).

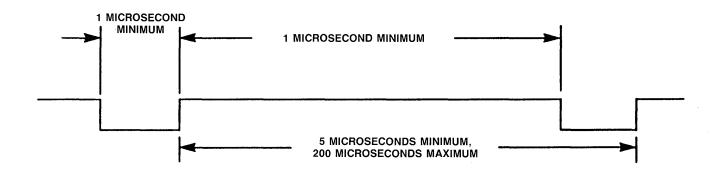


FIGURE 3-11 BUFFERED SEEK STEP PULSES

DIRECTION IN

This signal defines the direction of motion of the read/write heads when the Step line is pulsed. An open circuit or logical false defines the direction as "out". If a pulse is applied to the Step line, the read/write heads move away from the center of the disk. If this line is true, the direction is defined as "in", and the read/write heads move in toward the center of the disk.

Seek Complete must be true prior to changing directions and the application of additional step pulses.

REDUCED WRITE CURRENT

The Reduced Write Current line (Pin 2) is left open and is not used in the TM362 or TM262 drives. The microprocessor automatically controls write current.

DRIVE SELECT 0 THROUGH DRIVE SELECT 3

These control signals enable the selected drive's input receivers and output drivers. When logically false, the output drivers are open circuits and the input receivers do not acknowledge signals presented to them.

Drive addresses are assigned via a program jumper. Selecting the appropriate jumper at W1 through W4 determines which select line activates the drive.

NOTE

Only one drive may be selected at a time.

OUTPUT CONTROL SIGNALS

The output control signals are driven with an open collector output stage capable of sinking a maximum of 32 milliamperes in a logical true state, with a maximum voltage of 0.4 volt measured at the driver. When the line driver is in the logical false state, the drive transistor is off, and the collector cutoff is a maximum of 250 microamperes.

All J1 output lines are enabled by the respective Drive Select lines.

SEEK COMPLETE

The Seek Complete signal goes true when the read/write heads have settled on the desired track at the end of a seek. Reading or writing should not be attempted when Seek Complete is false.

Seek Complete goes false:

- 1. When a recalibration sequence is initiated by the drive logic at power on because the read/write heads are not over Track 0.
- 2. 500 nanoseconds, maximum, after the trailing edge of a step pulse or a series of step pulses.
- 3. When power is momentarily lost, Seek Complete is false. When power is restored, Seek Complete remains false until an automatic recalibration is completed.

TRACK 0

The Track 0 signal indicates a true state only when the drive's read/write heads are positioned at Track 0, the outermost data track.

FAULT

This signal is used to indicate a condition exists at the drive that could cause improper writing on the disk. When this line is true, further writing is inhibited, as are other drive functions, until the condition is corrected.

Fault is caused by any of the following conditions:

- 1. Write Data applied to head, but no Write Gate present.
- 2. Write Gate active and drive selected, but no Write Data applied to head.
- 3. D. C. voltages below specified limits.
- 4. Spindle speed outside of 1 percent.

INDEX

The Index signal is provided once each revolution, 16.82 milliseconds nominal, to indicate the beginning of the track. Normally, this signal is false and makes the transition to true to indicate Index. Only the transition from logical false to logical true is valid.

READY

When true, the Ready signal, together with Seek Complete, indicates that the drive is ready to read, write, or seek, and the I/O signals are valid. When this line is false, all controller-initiated functions are inhibited.

The typical time after power on for Ready to be true is fifteen seconds. Track 0, Seek Complete, and Ready come true sequentially during power on.

SELECT STATUS

Select status when true indicates that the drive has been

selected. Select status is dependent on location of the program jumpers W1 through W4.

NOTE

Select status is the only output control line on 12.

DATA TRANSFER SIGNALS

All lines associated with the transfer of data between the drive and the host system are differential in nature and may not be multiplexed. These lines are provided at the J2/P2 connector on all drives. Signal levels are defined by RS-422A. Two pair of balanced lines are used for the transfer of data: MFM Write Data and MFM Read Data. Figure 3-12 illustrates the driver/receiver combination used with the drive for data transfer signals.

Timing requirements for Write Data and Read Data signals are shown in Figure 3-13.

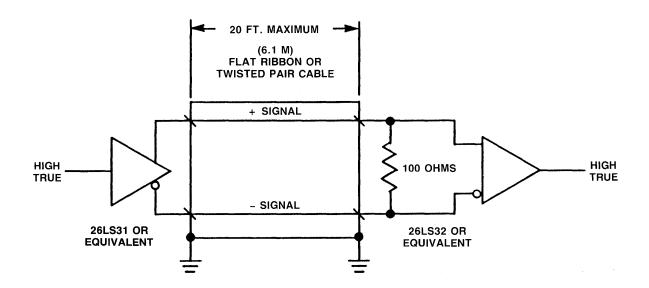


FIGURE 3-12
DATA TRANSFER LINE EQUIVALENT DRIVER/RECEIVER

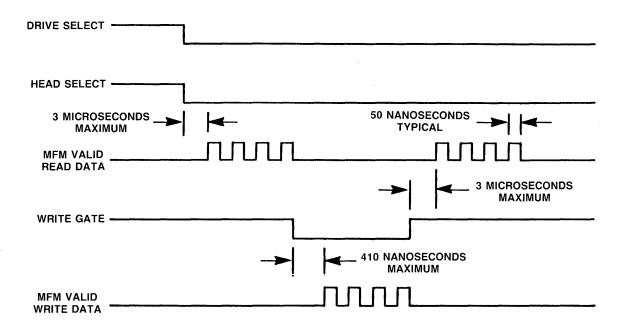


FIGURE 3-13
WRITE AND READ DATA TIMING

MFM WRITE DATA

This is a differential pair that defines the transitions to be written on the track. When Write Gate is active the transition of the signal + MFM Write Data going more positive than – MFM Write Data causes a flux reversal to be recorded on the track. When Write Gate is inactive the host system must hold + MFM Write Data more negative than – MFM Write Data. The standard MFM Write Data transmission rate is 5 megabits per second. The actual occurrence of flux reversals may differ due to write precompensation.

WRITE PRECOMPENSATION

Tandon does not recommend write precompensation.

MFM READ DATA

The data recovered by reading a pre-recorded track is transmitted to the host system via a 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.

Read data is suppressed during writing operations and when the drive is not selected. Following a write operation and/or a Head Select change the read data will not be valid for a period of up to 3 microseconds. If the drive is already selected at the end of a seek operation, read data will appear immediately upon Seek Complete. When the drive has been deselected, read data will not reappear for a period of up to 100 microseconds after it is reselected.

3.7 DRIVE ADDRESS

This option allows the user to daisy chain up to four drives, and to enable one drive at a time. Drive Select is implemented by shorting one of the four connections, using the Drive Select Jumper. The W5 location is used for radial configurations. The drive is selected at all times with the W5 jumper installed.

If jumper configurations are changed, power should be cycled off and on, so that the microprocessor can recognize the new configuration. The shunt plug programming guide is contained in Table 3-3, and the drive address jumper locations are shown in Figure 3-14.

The terminator resistor pack, located on the logic circuit board should be installed in the last drive of the daisy chain. All other drives on the interface must have the resistor pack removed. For a radial configuration, all drives should have the terminator resistor pack installed.

TABLE 3-3 SHUNT PLUG PROGRAMMING GUIDE			
Shunt	Signal		
W4	Drive Select 3		
W3	Drive Select 2		
W2	Drive Select 1		
W1	Drive Select 0		
W5	Radial Configuration		

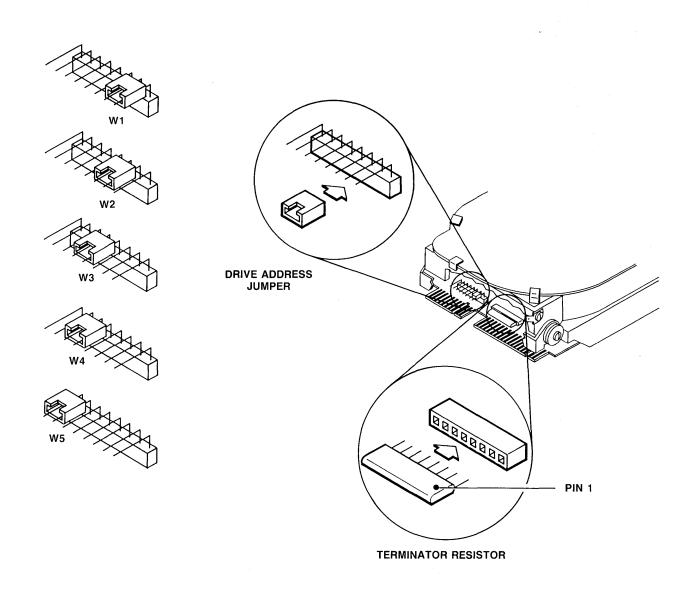


FIGURE 3-14
DRIVE ADDRESS JUMPER AND TERMINATOR RESISTOR

Tandon

CORPORATE OFFICES 20320 PRAIRIE STREET CHATSWORTH, CA 91311

TEL. NO.: (818) 993-6644 TELEX NO.: 194794 TWX NO.: 910-494-1721

P/N 179070-001A (T5030A 8-85)

MAILING ADDRESS: P.O. BOX 2107, CHATSWORTH, CA 91313-2107

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