

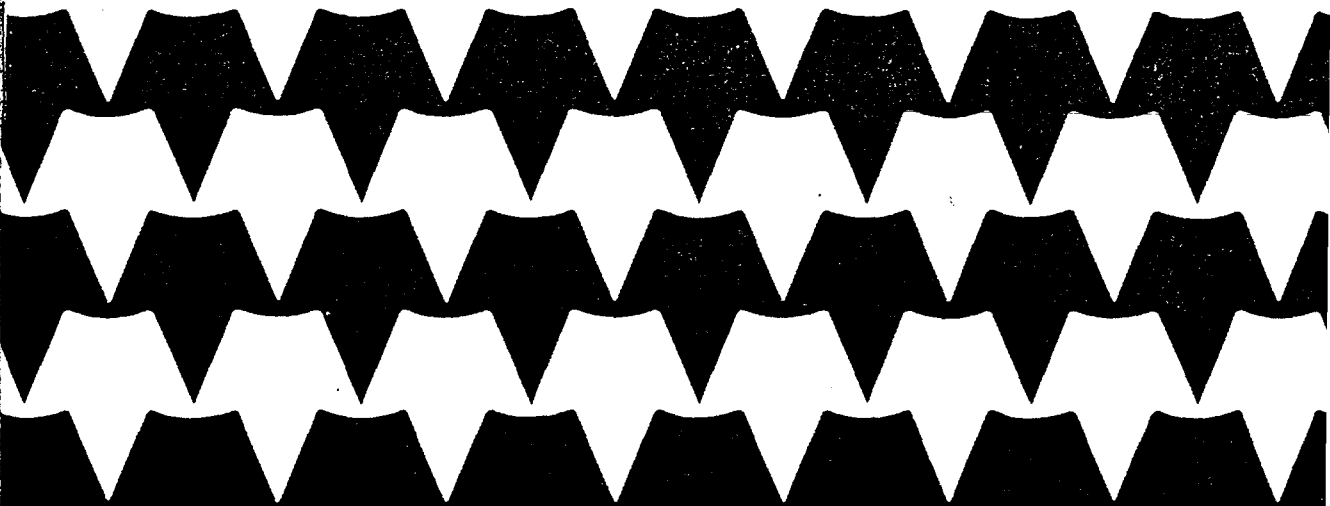


Cat. No. 25-1007

# **Tandy® 1000**

## **Hard Disk Controller Board**

### **Installation and User's Guide**



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# Introduction

Congratulations upon your purchase of the Hard Disk Controller Board for your TANDY 1000. This board will enable you to extend your data storage capabilities by allowing you to add an external hard disk unit, Drive C and/or Drive D, to your TANDY 1000, in addition to the present internal floppy drives, A and B.

Your TANDY 1000 must already have had a first memory expansion option board installed. This will not only mean that the unit will have on board the required direct memory access controller chip but also that your system memory will be at a minimum of 256K.

**If you have any doubts as to your abilities to install this board, please do not proceed. Instead, we suggest that you have it installed by the experienced professional technicians at your local Radio Shack Computer Center. Doing so assures you that the finest in computer service techniques and that proper procedures are followed.**

If, however, you **do** decide to install the board yourself, follow the steps outlined with this manual exactly.

Before actual installation of this board, you will need to determine the **type** of hard disk you plan to use and configure the controller board jumper options according to the charts on page 4.

# Preparation for Installation

Before the board is actually installed into your computer:

1. Locate the various sockets, jumper option points and other parts of the board to facilitate subsequent connections and installation, see Figure 1.
2. Based on the hard disk you are going to use, refer to the charts shown to determine the proper jumper configuration for your particular hardware.
3. Attach and route the connecting cables to your hard disk.

## CHART ONE

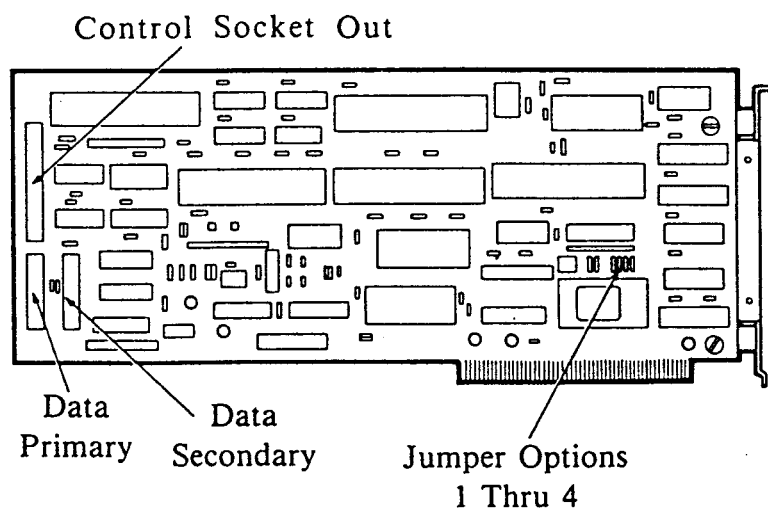
HARD DISK TYPE	CAT. NO. / TYPE	CYL	HEADS	STORAGE
0	Reserved			
1	26-4172	480	8	35 meg
2	25-1025	306	4	10 meg
3	26-4156	306	6	15 meg

## CHART TWO

Drive C (Jumper 1 & 2)		
TYPE	ON	OFF
0	1 & 2	
1	1	2
2	2	1
3		1 & 2

## CHART THREE

Drive D (Jumper 3 & 4)		
TYPE	ON	OFF
0	3 & 4	
1	3	4
2	4	3
3		3 & 4



## IDENTIFICATION

Figure No. 1

# Identification of Board Connection/Jumper Components

1. Place the hard disk controller board on a clean, well lighted surface. Make sure that you avoid any static electricity buildup while handling the board, since it can destroy certain integrated circuits. Touch a grounded metal object before touching the board. Do **not** stand or work on a carpeted floor.

2. Refer to Figure 1. With the board oriented so that the edge connector is down and to your right, locate the CONTROL OUT socket and the two DATA OUT sockets towards the left-hand edge of the board. Locate the JUMPER OPTION strip which is labeled OPT on its right side. The jumper pins are labeled 1 through 4.

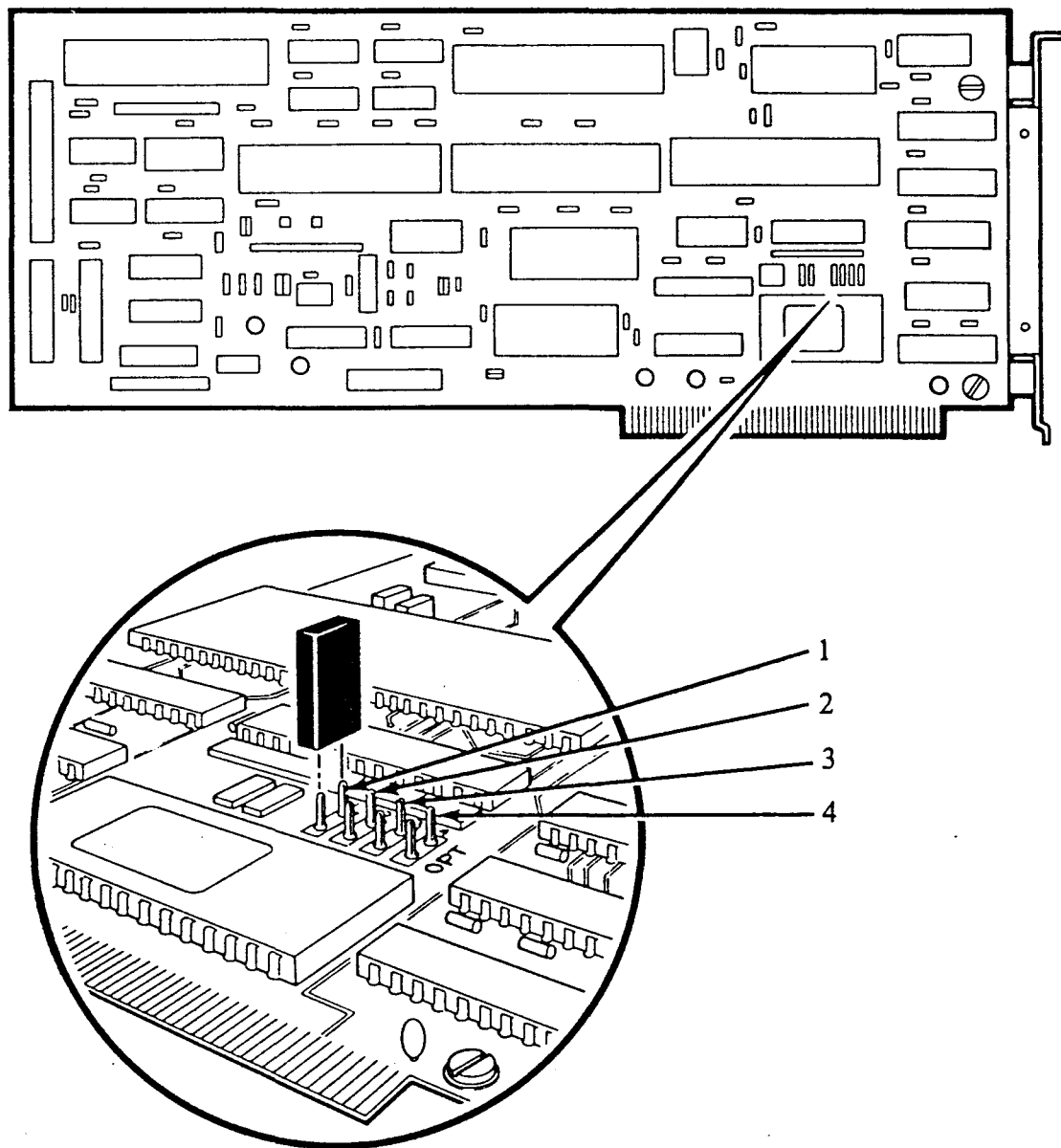
## Jumper Configuration

1. The hard disk controller board can be tailored to perform with several different external hard disk units. The first hard disk unit that you use is called Drive C. If you have Drive C all ready, then your second unit will be called Drive D.

2. **Both** Drive C and Drive D are, in actuality, **secondary** hard disk units. However, in the case of Drive C, a secondary unit is being used as a primary hard disk.

3. **Before** you install this controller card, **be sure that if this installation is for your secondary hard disk, Drive D**, that you have had the disk internally configured to perform as Drive D by your nearest Radio Shack Service facility.

4. To adjust the board to work properly with your particular hard disk, there is a strip of 4 pairs of pins which protrude above the surface of the board, which can be connected into the circuit, a pair at a time, by means of a jumper. A jumper is a small, black plastic block which is placed over a pair of pins and connects them together. For the purpose of this board, a jumper is said to be either ON or OFF the board, see Figure 2.



## JUMPER IDENTIFICATION

Figure No. 2

5. Look at Chart 1. Find the Catalog Number/Type of the hard disk you have. Having determined the TYPE number, if this drive is to be Drive C, refer to Chart 2. If this is your second hard disk, Drive D, refer to Chart 3.

6. Find the type number and look across the chart to determine which of the jumpers is to be ON or OFF. If the jumper is to be ON then place a black, plastic block over the pair of pins indicated and press the jumper downwards, firmly, until it is seated. If the jumper number is shown as OFF, leave the pair of pins uncovered.

### Attaching and Routing Cables

1. Refer to Figure 3. Two cables are supplied with the Hard Disk, one wider than the other. The cables have provision for making an electrically secure ground connection in one of two methods. Your cables will either have a short wire, ending in a plastic coated push-on connector, extending from one end or it will be supplied with a copper foil strip that encircles the cable approximately nine inches from one end.

2. The wider of the two cables is designated the controller cable while the other is data. If you are connecting only Drive C, you will need only one narrow cable. If you are installing a secondary hard disk, Drive D, you will need a second data cable supplied in Cable Kit Cat. No. 25-1026.

3. The edge connector at the end of the cable with the short wire or the end closest to the copper foil strip, should be inserted into the similar width socket on the hard disk controller board. One pin of the connector is blocked so that the connector can be inserted only one way. Route the cables towards the right hand edge of the board.

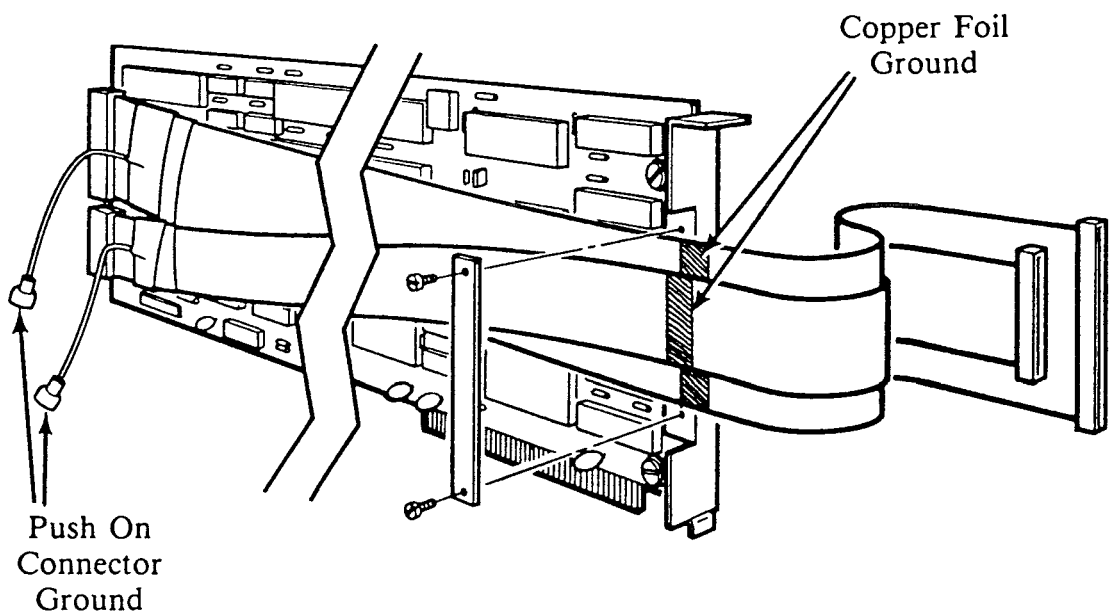
4. Remove the two self-tapping screws from the strain-relief clamp. Then remove the clamping plate from the bracket. Put the clamp and screws aside for the moment.

5. Dress both cables across the board and over the strain-relief bracket. If your cables have the copper foil strip, be sure to position the strip of both cables so that they are directly beneath the clamping plate when it is re-attached. It is important that a good contact is made between the plate and the foil on both cables.

If your cables are provided with the short wire and push-on connector, the ground connection will be made according to the directions in Step 6 under Installation of the Board.

Replace the clamp plate and affix the plate with the two sheet metal screws. Do not overtighten the screws.





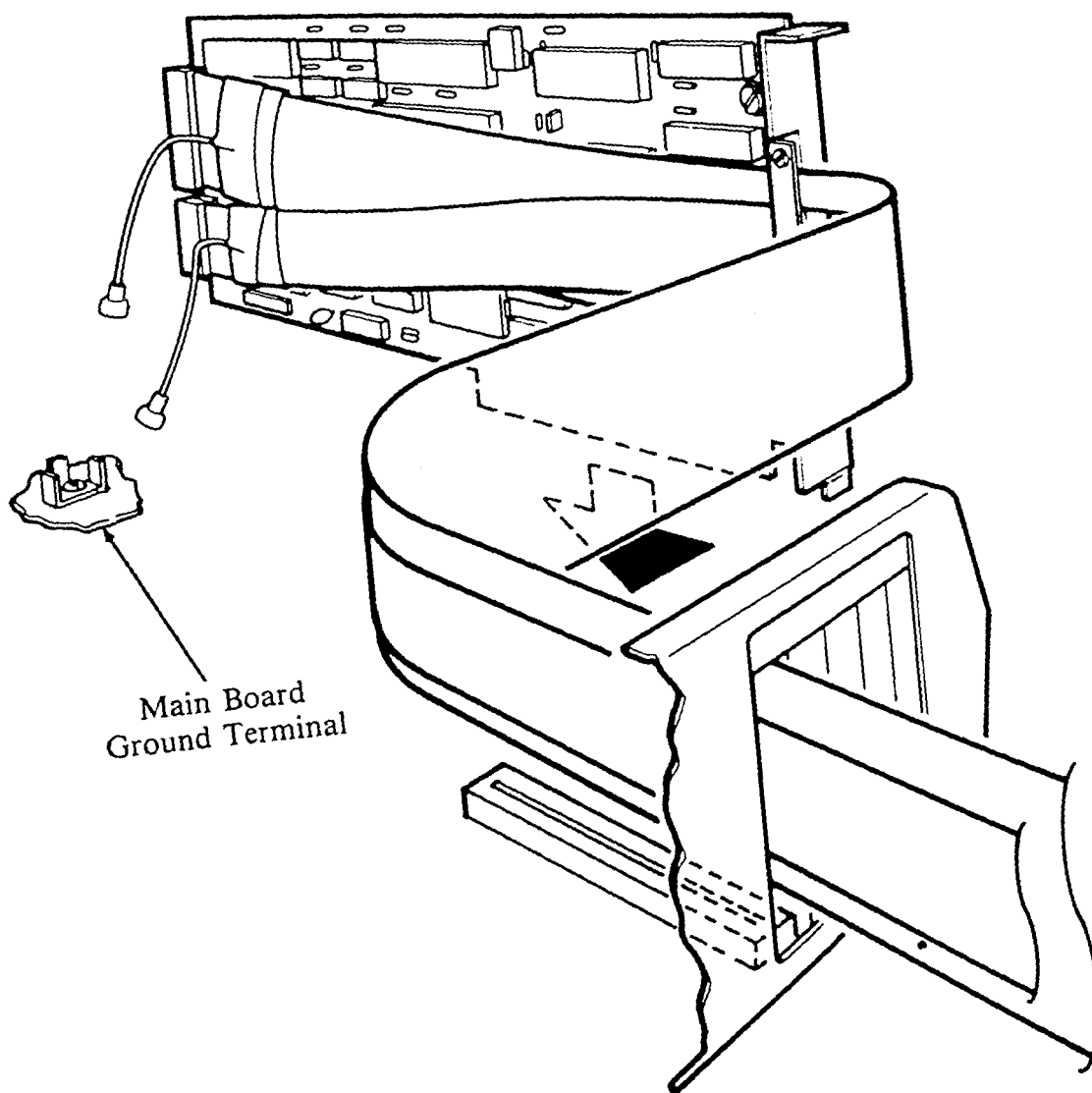
## CABLE ROUTING AND CLAMPING

Figure No. 3

## Installation of the Board

Since your computer should have one memory expansion board already within it, preferably in the extreme left-hand slot as you face the front of the machine, we suggest that this board be installed in the extreme right-hand slot to allow suitable room for the two cables.

1. **Turn off all equipment.** If any unit is on, you can damage the integrated circuits on either the controller board or within the computer itself. Allow a minimum of 10 seconds to pass before any board is either inserted or removed from the Tandy 1000.
2. Repeat the procedure of discharging any potentially dangerous static electricity buildup by touching a grounded metal object before handling the controller board or the CPU.
3. Remove the 2 screws on the front of the main unit. Remove the cover by sliding it away from the rear of the unit, parallel to the computer.
4. Rotate the chassis so that the fan faces you. Locate the option slot cover furthest to your left as you face the rear of the unit. Remove the sheet metal screw from this cover. Tilt the metal strip away from you and lift the strip so that the tab on the panel clears the bottom of the slot. Store the cover in a safe place for possible future replacement.
5. See Figure 4. Insert the free ends of both cables into the open slot from the inside of the computer. Guide the cables through so that the board is positioned over the third edge connector socket. Insert the tab on the bottom of the controller board mounting bracket into the vacated slot on the rear of the computer chassis. At the same time, apply even downward pressure, engaging the edge-connector of the board into the socket. Align the entire board so that the U-shaped cutout on the top of the board's bracket is positioned over the screw-hole on the rear of the chassis. Replace the screw you removed before and tighten it to secure the board. Do not overtighten the screw.
6. Before replacing the cover of the computer, examine the main circuit board. Toward the front of the unit, directly below the slots of the speaker panel, you will see a gold colored, three-pronged bracket approximately one-half inch square. If your unit does not have this bracket, contact your Radio Shack Computer Center to arrange for installation of one. Grasp the short wires which protrude from each of the ribbon cable plugs and slide the terminal of each onto one of the prongs of the bracket.
7. Replace the top cover, securing it with the screw previously removed.



# BOARD INSERTION

Figure No. 4

# Connections to the Hard Disk

## For Type 1 and 3 Hard Disks

1. Refer to Figure 5 for the following cable connections to your primary or secondary hard disk.
2. There are generally three sockets on the rear of the hard disk unit. Assuming this to be your first external hard disk, or Drive C, connect the cable with the wider of the two plugs to the socket on the disk drive marked CONTROL IN. If your cable has a thin red stripe on one edge, position the stripe to the right as you face the rear panel of the drive.
3. The cable with the narrow plug is then inserted into the socket marked DATA IN. Also position the red stripe to the right. In both cases, the ribbon cable should exit the plug in a downwards fashion.
4. If you have already connected your first external disk, Drive C, and this unit is being used as your secondary, Drive D, the additional DATA cable, equipped with narrow plugs, which is supplied with Cable Kit Cat. No. 25-1026, must be inserted into the second narrow socket on the board, adjacent to the one used for Drive C. This cable is also routed beneath the strain-relief clamp and through the same slot in the rear panel of the Tandy 1000. Then the cable is inserted into the DATA IN socket of Drive D.
5. The Tandy secondary hard disk is supplied with an interconnecting cable, which is routed between the CONTROL OUT socket on Drive C and the CONTROL IN socket on Drive D.

## For Type 2 Hard Disk

1. Refer to Figures 6 and 7 for the cabling connections for the 10 Megabyte hard disk.
2. There are only two sockets on the rear of this hard disk; one for CONTROL and one for DATA. If this is your first external hard disk, or Drive C, refer to Step 2 and 3 under connections to a Type 1 or 3 hard Disk.
3. If this unit is to be used as your secondary, Drive D, and after having connected a second DATA cable to the controller board as noted in Step 4 of the preceding section, connect the short, multi-socketed cable to the end of the control cable coming from the board.
4. Place Drive D on top of Drive C.

5. Bring the short cable from the bottom of Drive C and insert the lower 34 pin plug into the control socket of Drive C which is located in the upper right corner as you face the rear of the units.

6. Then, insert the upper 34 pin plug into the control socket on Drive D.

7. Insert the respective data cable into the corresponding socket located in the upper left corner of the rear of both Drive C and Drive D.

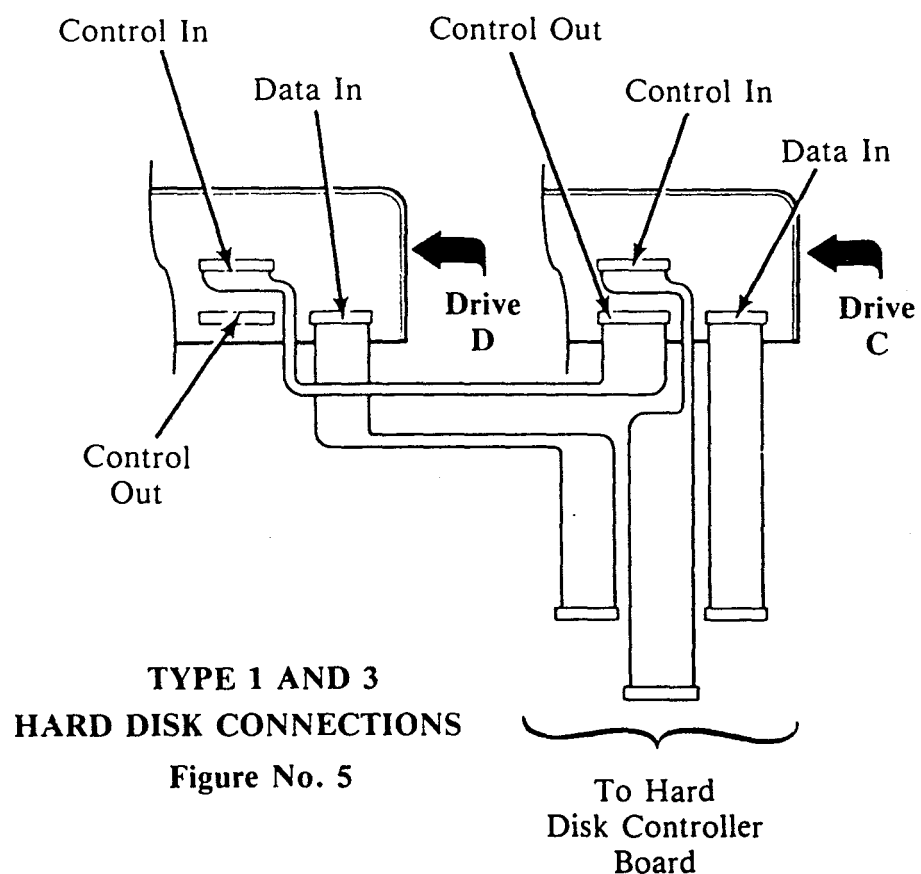
### Combining Types 1 and 3 with Type 2

You may decide to use a Type 1/3 for Drive C and a Type 2 for Drive D or vice-versa. If you do, note the following.

1. Be sure to first verify correct jumper configuration using Chart Two and Chart Three.

2. Depending upon which Type is selected as Drive C and Drive D, refer to the appropriate Figure that illustrates the initial control cable input connection.

3. Then, to connect Drive C to Drive D, use either the extension cable shown in Figure 6 or the short, inter-connecting cable shown in Figure 5. Your choice will depend upon whether you have selected a Type 1/3 or a Type 2 as your Drive C.



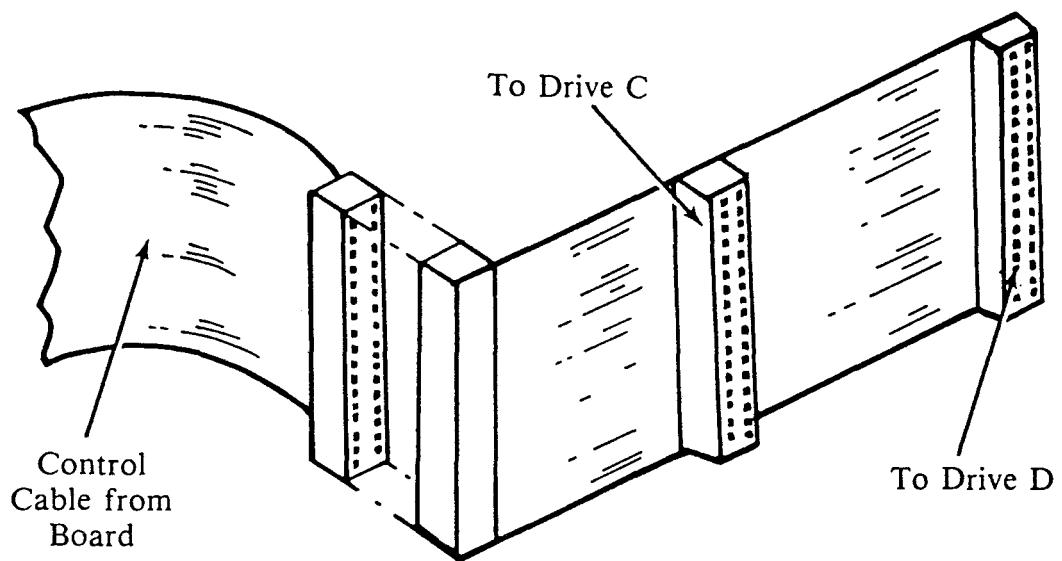
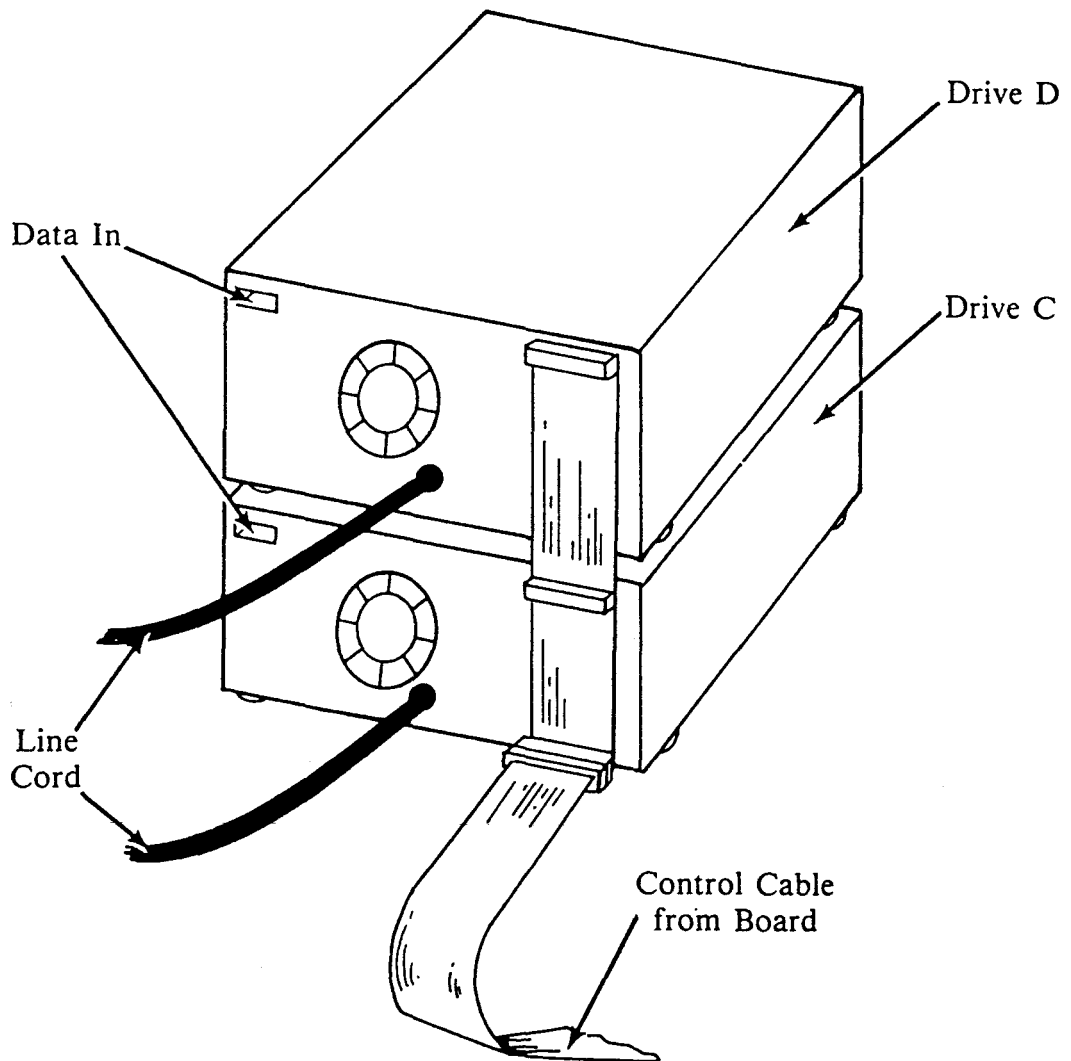


Figure No. 6



## TYPE 2 HARD DISK CONNECTIONS

Figure No. 7

# Formatting the Hard Disk

Once you have made all appropriate cable connections from the hard disk controller board to your hard disk, the following steps will enable you to set up the disk for use. The directions essentially apply to the installation of the primary, or Drive C hard disk. Be sure that you use MS-DOS version 02.11.01 or later.

If you use MS-DOS version 02.11.00, note that you must allocate the entire hard disk for one MS-DOS 02.11.00 partition.

Formatting Drive C consists of three main sections:

- a. Formatting the Hard Sectors — HSECT.COM
- b. Partitioning the Disk — FDISK.COM
- c. Formatting the Soft Sectors — HFORMAT.COM

The operation is accomplished by means of a utilities disk, included in this package.

1. Power up the system by turning on the Tandy 1000.
2. Insert an MS-DOS Disk into Drive A.
3. Insert the Hard Disk Utilities disk into Drive B.
4. Boot up the system. You may wish to verify the contents of the utility disk in Drive B. If you type:

A> dir b: (ENTER)

You will see the directory of the utility disk listing the three command files noted in a, b and c above.

5. At the prompt A>, type b:hsect (ENTER). You will see:

“Press any key to start formatting drive C”

If no drive is specified in the above command, the default is drive C. Then, press any key to initiate the format process. The screen will then announce “Formatting. . . .” while the green light on your hard disk flickers. While the time required to complete formatting will vary with the size of your hard disk, typically, with the 15 meg unit, your formatting time will be about 6 minutes. At the end of the procedure the screen will read “Format completed!”

**Note:** If this installation is for your secondary hard disk, Drive D, be cautious when formatting. The utility default is Drive C. **If you fail to specify Drive D by typing b:hsect d:, the screen will warn you that you are about to re-format Drive C with the message:**

**The disk has already been formatted.  
All data on disk will be DESTROYED!!**

**You may then press (ESC) or (CTRL) C to cancel.**

# Partitioning

## Type 2 and 3 Hard Disks

At the prompt A> type **b:fdisk** (**ENTER**). The screen will display the following menu:

1. Create DOS Partition
2. Change Active Partition
3. Delete DOS Partition
4. Display Partition Data
5. Select Next Hard Disk Drive
6. Select Previous Hard Disk Drive

Enter Selection--->  
ESC to Exit to MS-DOS

A hard disk may be **partitioned** to place more than one operating system on it or for other specialized applications. You are effectively able to determine where and how much of the total disk to allocate for DOS 1 and DOS 2. Up to 4 partitions may be made. Under normal conditions and for those just beginning, we recommend that the entire disk, or 1 partition, be allocated for your present MS-DOS.

To verify the present status, select 4. The display should read:

No Partition Yet

If you have already installed Drive C, you may choose option 5 to verify the status of Drive D. Then, press 1, Create DOS Partition. The screen will ask:

Do you wish to use the entire hard disk for DOS (Y/N)-->

If you have no need for special applications, answer Y. However, if there is a specific need for selecting more than 1 partition, for advanced applications, note that the maximum available space in cylinders will be displayed and you will be requested to enter the partition size as the number of cylinders for the partition as well as the starting cylinder number for that partition. Your answer will be based upon your requirements.

**Example:** Let us say that you wish to partition 50 cylinders starting at cylinder 0. At the prompt shown above you would answer N. The screen would then ask:

Enter Partition size-->

You would input 50. If you wished to verify the input, select option 4, Display Partition Data. The screen would show:



Partition	Status	Type	Start	End	Size
1	N	DOS	0	49	50

The Status column refers to Active or Non active. The default is non active. An active partition may be chosen so that you can boot up directly from your Drive C. However, this is only applicable for an active partition on Drive C. All other partitions should be non active.

To change the status from Non active to Active, type 2. Change Active Partition. You will be asked to enter the number you wish to make active. To verify the change, press 4 again to Display Partition Data. This time the N will be an A.

#### Type 1 Hard Disk

If you use the 35 meg Type 1 Hard Disk, Cat. No. 26-4172, then the answer to the **Create DOS Partition** question must be N.

This is a result of the limit placed on the number of megabytes that MS-DOS will address. In order to use the maximum amount of storage space on your 35 meg unit, which is nominally 33.4 meg, use the following example:

At the prompt:

Do you wish to use the entire hard disk for DOS (Y/N)-->

Answer N. The screen will then show:

Max avail space is 511 cyls at cyl 0.  
Enter Partition size-->

You would type 480  
Then you will see:

Enter starting cylinder number-->

You would type 0

FDISK then returns you to the main menu. You can confirm that the partition was set up correctly by selecting 4. from the menu. The following should then be displayed:

Partition	Status	Type	Start	End	Size
1	N	DOS	0	479	480

Total hard disk space is 511 cylinders.

## System Transfer and Label Assignment

To transfer the MS-DOS system and system files from the floppy in Drive A to the hard disk, Drive C, which will enable you to boot from Drive C, and to name or label that disk, at the prompt, type:

**A>b:hformat c:/s/v ENTER**

If you are formatting Drive D, substitute "d" for "c" in the above command. The formatting message following will indicate ". . . formatting D."

The screen will show:

Press any key to begin formatting C:

After you press any key, the screen will display:

Formatting. . . . .

When the process is completed, the message: "System transferred" will be seen.

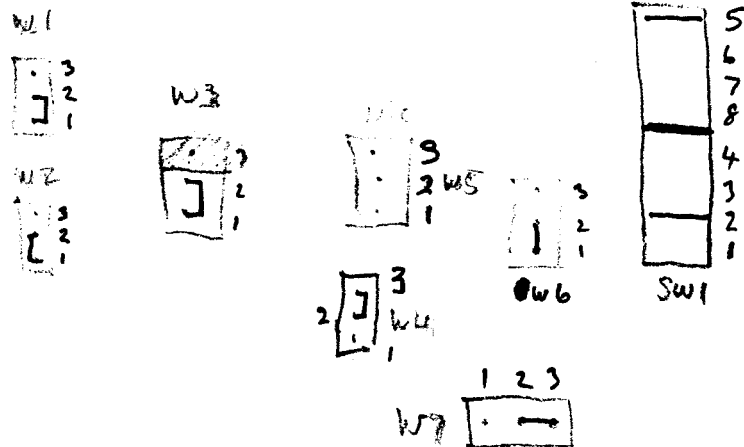
Then, you will be asked for a Volume label of 11 characters or less. For NONE, simply press ENTER.

Finally, at A> type **copy \*.\* c:** to transfer all the existing files on your floppy MS-DOS disk in Drive A onto the Drive C Hard Disk. Then, the next time you use the system, you may boot-up directly from Drive C.

TADBY 1000 HD CONT.

WD1002S - WX2 REV C - D2

- LINH



W1

W2

W3

? BIOS ROM ENABLED CHSE.

W4

1-2

2KPK1 CONT

2-3

- 320 - 323 H

PRIMARY CONT

W5

1-2

2764 - 2732 BIOS ROM

2-3

2716 BIOS ROM.

W6

1-2

16 NORD

2-3

8 NORD

W7

IRQ

2 3

INT 2

+ ?

57 ON

SW1.

1-2

INT 5

SW1

~~IRQ~~ IRQ 2

? 7

(5) 17 SECTORS ?

8 X7 mode. 0/0n.

## Tandy 1000 - Hard Disk Upgrade ( Do It Your Self )

For all you Model 1000 owners out there who would like the advantage of having a 20 , 30 or 40 meg hard drive in their system but have been put off by the exorbitant cost of having to use the TANDY hard drive and controller card, then take heart.

It is quite feasible to achieve it all for less than \$500.

However there are several limitations which I have noted down for your reference as not all controller cards have a ROM\_BIOS which is compatible with the TANDY\_1000, or the ability to select the correct IRQ vector which TANDY in their wisdom decided to vary from the rest of the IBM world . Tandy IRQ 2 (Pin B4) the rest of the world IBM IRQ 5 (Pin B23).

- (1) You must have TANDY BIOS version 01.01.00 or later. If you don't have it then either get it updated from TANDY or contact me and I'll send you one for a small fee.
- (2) Get a WESTERN DIGITAL controller card , specifically models WD\_1002\_A for standard MFM encoding format or WD\_1002\_27X for RLL encoding.  
N.B. If you decide to use the RLL format which gives 30 meg. Instead of 20 meg. Then the actual Hard drive you purchase must be of very high quality.
- (3) On the cards themselves are several jumper locations.  
W\_3        IRQ\_5 or IRQ\_2 vector select  
JP\_1       Positions 6        No. of Heads per Hard Drive  
  
Extra for RLL only  
JP\_1       Position 7        ROM\_BIOS IRQ\_2 enable  
W\_9        Sector Translation Selects 17 or 26 sectors per track
- (4) When formatting low level use interleave of 4  
Optimum transfer rate for TANDY machines.
- (5) Beware of MINISCRIBE hard drives as they are now defunct as a company, and don't be bluffed by any computer expert or salesperson boffin .

Also there is a product called SPINRITE which is invaluable for setting up and maintaining your Hard drive , however if you find that the extra cost is prohibitive then the same program (virtually .. as it's the same author is available in Public Domain software called SPINTEST. Catalogue # A\_097. This can be purchased for the extreme cost of \$5.00 plus postage.

From :-

Or Myself

S.M.E. Systems  
22 Queen Street  
Mitcham 3132

Gavan Anderson  
41 Aylmer Street  
North Balwyn 3104

In addition, if you replace the 8088\_CPU in the machine with an NEC\_V\_20 processor, you will find that your processing throughput is increased about 40% .If you have any questions I can be reached at the following numbers .

Tel.        03 699 6155 ( Work )  
            03 859 5811 ( Home )

Fax        03 690 8337

Good luck with your endeavours.

Gavan Anderson. 22-Feb-1990  
Updated on        16-Dec-1991