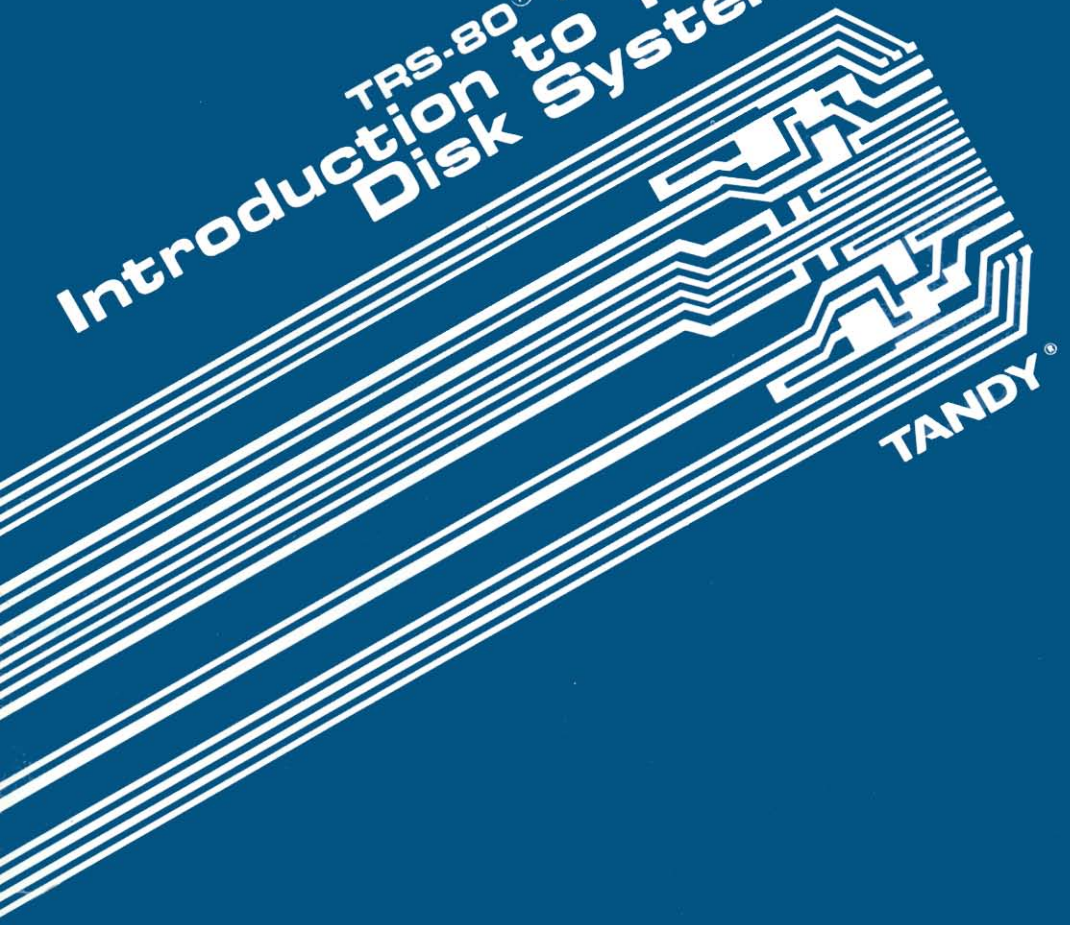
TRS-80® Model 4D
Introduction to Your Disk System



TERMS AND CONDITIONS OF SALE AND LICENSE OF TANOY COMPUTER EQUIPMENT AND SOFTWARE PURCHASED FROM RADIO SHACK COMPANY-OWNED COMPUTER CENTERS, RETAIL STORES AND RADIO SHACK FRANCHISEES OR DEALERS AT THEIR AUTHORIZED LOCATIONS

LIMITED WARRANTY

I. CUSTOMER OBLIGATIONS

A. CUSTOMER assumes full responsibility that this computer hardware purchased (the "Equipment"), and any copies of software included with the Equipment or licensed separately (the "Software") meets the specifications, capacity, capabilities, versatility, and other requirements of CUSTOMER.

B. CUSTOMER assumes full responsibility for the condition and effectiveness of the operating environment in which the Equipment and Software are to function, and for its installation.

II. LIMITED WARRANTIES AND CONDITIONS OF SALE

A. For a period of ninety (90) calendar days from the date of the Radio Shack sales document received upon purchase of the Equipment, RADIO SHACK warrants to the original CUSTOMER that the Equipment and the medium upon which the Software is stored is free from manufacturing defects. **This warranty is only applicable to purchases of Tandy Equipment by the original customer from Radio Shack company-owned computer centers, retail stores, and Radio Shack franchisees and dealers at their authorized locations.** The warranty is void if the Equipment's case or cabinet has been opened, or if the Equipment or Software has been subjected to improper or abnormal use. If a manufacturing defect is discovered during the stated warranty period, the defective Equipment must be returned to a Radio Shack Computer Center, a Radio Shack retail store, a participating Radio Shack franchisee or a participating Radio Shack dealer for repair, along with a copy of the sales document or lease agreement. The original CUSTOMER'S sole and exclusive remedy in the event of a defect is limited to the correction of the defect by repair, replacement, or refund of the purchase price, at RADIO SHACK'S election and sole expense. RADIO SHACK has no obligation to replace or repair expendable items.

B. RADIO SHACK makes no warranty as to the design, capability, capacity, or suitability for use of the Software, except as provided in this paragraph. Software is licensed on an "AS IS" basis, without warranty. The original CUSTOMER'S exclusive remedy, in the event of a Software manufacturing defect, is its repair or replacement within thirty (30) calendar days of the date of the Radio Shack sales document received upon license of the Software. The defective Software shall be returned to a Radio Shack Computer Center, a Radio Shack retail store, a participating Radio Shack franchisee or Radio Shack dealer along with the sales document.

C. Except as provided herein no employee, agent, franchisee, dealer or other person is authorized to give any warranties of any nature on behalf of RADIO SHACK.

D. **EXCEPT AS PROVIDED HEREIN, RADIO SHACK MAKES NO EXPRESS WARRANTIES, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS LIMITED IN ITS DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES SET FORTH HEREIN.**

E. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation(s) may not apply to CUSTOMER.

III. LIMITATION OF LIABILITY

A. **EXCEPT AS PROVIDED HEREIN, RADIO SHACK SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED OR ALLEGED TO BE CAUSED DIRECTLY OR INDIRECTLY BY "EQUIPMENT" OR "SOFTWARE" SOLD, LEASED, LICENSED OR FURNISHED BY RADIO SHACK, INCLUDING, BUT NOT LIMITED TO, ANY INTERRUPTION OF SERVICE, LOSS OF BUSINESS OR ANTICIPATORY PROFITS OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OR OPERATION OF THE "EQUIPMENT" OR "SOFTWARE." IN NO EVENT SHALL RADIO SHACK BE LIABLE FOR LOSS OF PROFITS, OR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY BREACH OF THIS WARRANTY OR IN ANY MANNER ARISING OUT OF OR CONNECTED WITH THE SALE, LEASE, LICENSE, USE OR ANTICIPATED USE OF THE "EQUIPMENT" OR "SOFTWARE."**
NOTWITHSTANDING THE ABOVE LIMITATIONS AND WARRANTIES, RADIO SHACK'S LIABILITY HEREUNDER FOR DAMAGES INCURRED BY CUSTOMER OR OTHERS SHALL NOT EXCEED THE AMOUNT PAID BY CUSTOMER FOR THE PARTICULAR "EQUIPMENT" OR "SOFTWARE" INVOLVED.

B. RADIO SHACK shall not be liable for any damages caused by delay in delivering or furnishing Equipment and/or Software.

C. No action arising out of any claimed breach of this Warranty or transactions under this Warranty may be brought more than two (2) years after the cause of action has accrued or more than four (4) years after the date of the Radio Shack sales document for the Equipment or Software, whichever first occurs.

D. Some states do not allow the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to CUSTOMER.

IV. SOFTWARE LICENSE

RADIO SHACK grants to CUSTOMER a non-exclusive, paid-up license to use the TANOY Software on **one** computer, subject to the following provisions:

A. Except as otherwise provided in this Software License, applicable copyright laws shall apply to the Software.

B. Title to the medium on which the Software is recorded (cassette and/or diskette) or stored (ROM) is transferred to CUSTOMER, but not title to the Software.

C. CUSTOMER may use Software on one host computer and access that Software through one or more terminals if the Software permits this function.

D. CUSTOMER shall not use, make, manufacture, or reproduce copies of Software except for use on **one** computer and as is specifically provided in this Software License. Customer is expressly prohibited from disassembling the Software.

E. CUSTOMER is permitted to make additional copies of the Software **only** for backup or archival purposes or if additional copies are required in the operation of **one** computer with the Software, but only to the extent the Software allows a backup copy to be made. However, for TRSDOS Software, CUSTOMER is permitted to make a limited number of additional copies for CUSTOMER'S own use.

F. CUSTOMER may resell or distribute unmodified copies of the Software provided CUSTOMER has purchased one copy of the Software for each one sold or distributed. The provisions of this Software License shall also be applicable to third parties receiving copies of the Software from CUSTOMER.

G. All copyright notices shall be retained on all copies of the Software.

V. APPLICABILITY OF WARRANTY

A. The terms and conditions of this Warranty are applicable as between RADIO SHACK and CUSTOMER to either a sale of the Equipment and/or Software License to CUSTOMER or to a transaction whereby Radio Shack sells or conveys such Equipment to a third party for lease to CUSTOMER.

B. The limitations of liability and Warranty provisions herein shall inure to the benefit of RADIO SHACK, the author, owner and or licensor of the Software and any manufacturer of the Equipment sold by Radio Shack.

VI. STATE LAW RIGHTS

The warranties granted herein give the **original** CUSTOMER specific legal rights, and the **original** CUSTOMER may have other rights which vary from state to state.

12/84

SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all TANDY/Radio Shack computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer products, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack and Tandy computer products it sells are broken, Radio Shack reserves the right to refuse to service the product or to void any remaining warranty on the product.
2. If any computer product purchased from Radio Shack has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the product, void any remaining warranty, remove and replace any non-Radio Shack part found in the product, and perform whatever modifications are necessary to return the product to original factory manufacturer's specifications.
3. The cost for the labor and parts required to return the computer product to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.

Introduction to Your Disk System

Tandy® TRS-80® Model 4D

The FCC Wants You to Know

This equipment generates and uses radio frequency energy. If not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception.

It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, you should consult the dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*.

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Warning

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

TRSDOS® Version 6 Operating System: © 1984 Logical Systems.
All Rights Reserved. Licensed to Tandy Corporation.

BASIC: © 1984 Microsoft.
All Rights Reserved. Licensed to Tandy Corporation.

Introduction to Your Disk System:
© 1985 Tandy Corporation. All Rights Reserved.

Reproduction or use, without express written permission from Tandy Corporation, of any portion of this manual is prohibited. While reasonable efforts have been taken in the preparation of this manual to assure its accuracy, Tandy Corporation assumes no liability resulting from any errors or omissions in this manual, or from the use of the information contained herein.

TRSDOS, TRS-80, and Tandy are registered trademarks of Tandy Corporation.

DeskMate and Radio Shack Computer Center are trademarks of Tandy Corporation.

CompuServe is a registered trademark of CompuServe, Inc.

Dow Jones News/Retrieval is a registered trademark of Dow Jones & Co., Inc.

The Tandy® TRS-80® Model 4D Microcomputer System and its circuitry are patented under U.S. Pat. Nos. 4,468,752 and 4,443,883.

10 9 8 7 6 5 4 3 2 1

To Our Customers . . .

Congratulations on purchasing the Tandy® TRS-80® Model 4D Microcomputer System. You'll find it powerful and simple to use.

Your computer can run a complete line of programs, including programs for:

- Business
- Education
- Personal finance
- Programming
- Entertainment

This includes all Radio Shack Model III programs, as well as all Model 4 programs.

How to use this Manual . . .

This manual is for beginners. It explains the important things you need to know about your computer:

- How to set up your computer
- How to use important commands
- How to run application programs
- How to store information
- What to do in case of trouble

After you finish reading this manual, you can immediately begin running DeskMate™ or any other Tandy application programs you have purchased for your computer.

Later, when you become comfortable with your computer, you may want to learn how to use more of its features. You can then read some other manuals:

Getting Started with TRS-80 BASIC (sold separately, Cat. No. 26-2107). This is a simple and entertaining manual that teaches you to program in the BASIC language.

Disk System Owner's Manual (included with your computer). This reference manual gives complete details on the 4D commands and 4D Disk BASIC.

Model III Mode BASIC Reference Manual (sold separately, Cat. No. 26-2112). This manual gives complete details on your computer's built-in (ROM) BASIC, which you can use when running your computer in Model III Mode.

Contents

Chapter 1 How Computers Work 1

Chapter 2 Getting to Know Your Computer 5

Chapter 3 Using TRSDOS to Prepare Diskettes 13

Chapter 4 Writing a BASIC Program ... 19

Chapter 5 In Case of Trouble 23

Chapter 6 An That's Just the Beginning 27

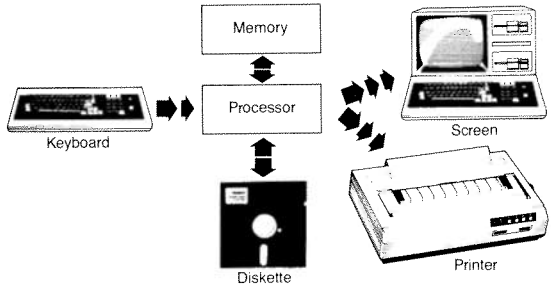
Appendix A Removing the MODELA/III File 33

Chapter 1
How Computers Work

Your disk system consists of *hardware* and *software*. The equipment is the hardware. The instructions that tell the hardware what to do are software, also called *programs* or *systems*. As you can see, hardware and software are dependent upon each other.

Computer Hardware

This picture shows the parts of the hardware and how they relate to each other:



Keyboard. For *entering* information into the computer.

Screen and Printer. For receiving information from the computer.

Memory. For storing information and software inside the computer. There are two kinds of memory:

- ***Random access memory (RAM)*** — for temporary storage of information and software that you enter. When you turn off the computer, the contents of RAM disappear.
- ***Read-only memory (ROM)*** — for permanent storage of essential, built-in software, such as the software that tells the computer what to do when you turn it on. You cannot change the contents of ROM.

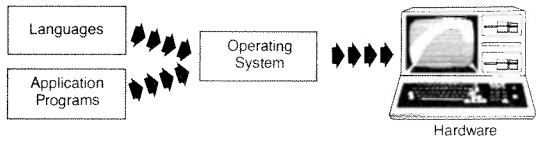
Diskette. For permanently storing information and software outside the computer. A diskette has a magnetic coating that stores information in much the same way an audio tape stores sound.

Diskettes that can store information on only one side are called *single-sided diskettes.* Diskettes that can store information on both sides are *double-sided*. Your computer uses both types.

Processor. For gathering, manipulating, and sending information within the computer. The processor ties together all other parts of hardware.

Computer Software

This picture shows the kinds of software and how they relate to the hardware:



Application Programs. To get the computer to do something practical, such as compile a mailing list, you need an application program. Tandy has many applications for such tasks as accounting, education, and word processing.

Languages. A programming language, such as BASIC, is one kind of application program. It has a set of codes you can use to write other application programs. Your computer lets you use two kinds of BASIC:

- The BASIC provided on a diskette with your computer. Use this when writing programs for use on the 4D.
- Model III Mode BASIC, the BASIC that is built into your computer. Use this when writing programs for use on the Model III, in addition to the 4D.

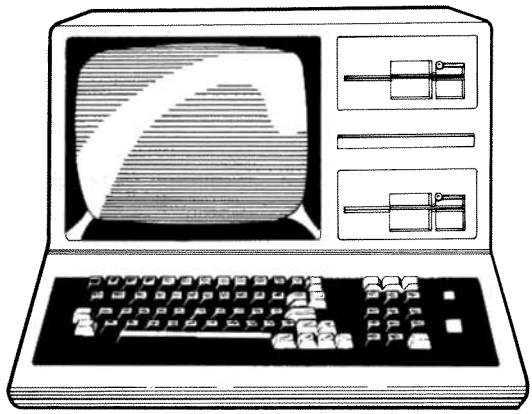
Disk Operating System. An application program seldom talks to the hardware directly. It talks through a disk operating system.

Your computer's disk operating system is TRSDOS Version 6.2.1 (or any later version). It is on the diskette that comes with the computer, and is referred to throughout this manual as either "TRSDOS" (pronounced Triss Doss) or — when further clarification is needed — as "TRSDOS Version 6."

To accomplish anything with your disk system, you need TRSDOS. For example, assume you want the computer to print a list of your checking transactions. Your application program decides what to print. It then leaves the operation of the printer to TRSDOS.

The rest of this manual shows you how to store information, using your computer, TRSDOS, and a short BASIC program that you write.

Chapter 2
Getting to Know Your Computer

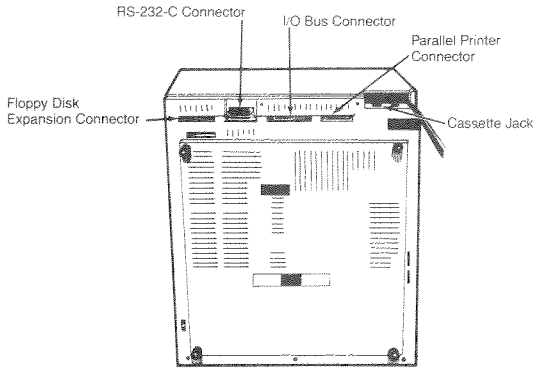


Plug your computer into a grounded, 3-prong outlet of the appropriate voltage. (Voltage requirements are on a label attached to your unit.) Because electrical interference and surges can destroy data, do not use an outlet that powers other heavy equipment.

For the best protection against electrical surges, we suggest you use a grounded power strip. A good one to use is Radio Shack's Automatic Power Strip, Cat. No. 26-1429.

Installing Other Equipment

If you purchased additional equipment (such as a printer), connect it to the bottom of your computer. The connectors are shown below. **When connecting equipment, be sure to refer to the manual that comes with the equipment, in addition to the illustration provided here.**



Floppy Disk Expansion Connector — Use to connect one or more external floppy disk drives. Connect the cable so it exits to the rear of the computer.

RS-232C Connector — Use to connect a modem.

I/O Bus Connector — Use to connect one or more *hard disks* or a *graphics board*. Connect the cable so it exits to the rear of the computer.

Parallel Printer Connector — Use to connect a printer. Connect the cable so it exits to the rear of the computer.

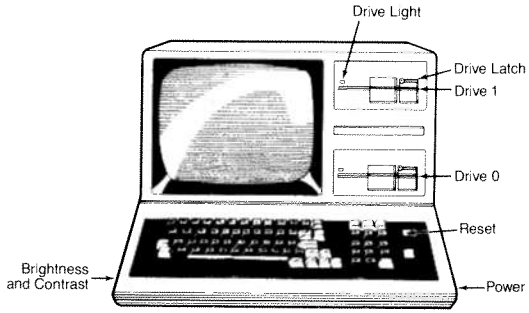
Cassette Jack — Use to connect a cassette recorder.

Starting Up Your Computer

Turn on any additional equipment first. Then push your computer's power switch forward to turn on the computer. The switch is on the bottom of the computer on the right side.

After you turn on the computer, one of the following happens:

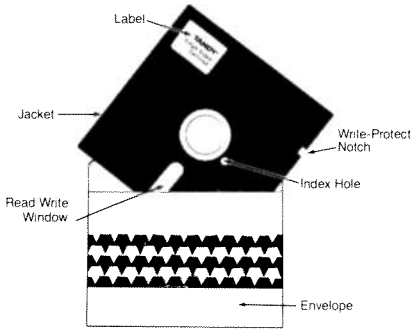
- You'll hear a whir coming from the drive. The sound stops in a few seconds.
- You'll see a "Diskette?" prompt on the screen.



You are ready to insert a diskette and start up TRSDOS. Before you do, however, take a minute to read about how to handle diskettes.

Handling Diskettes

Diskettes are sensitive. To avoid losing information, handle them with care.



Never touch a diskette's exposed shiny surfaces.

Never turn the computer on or off while a diskette is in a drive. Doing so can destroy data.

Never leave a diskette inserted in a drive — either fully or partially — when the computer is off.

Do not insert or remove a diskette while the drive light is on, unless the "Diskette?" message is displayed.

Keep diskettes away from heat, direct sunlight, dust, cigarette ashes, other particles, and magnetic fields (such as transformers, AC motors, magnets, TVs, radios, and the computer's display console).

Do not bend diskettes.

After attaching a label to a diskette, do not write on the label with a ball point pen or lead pencil. Use a felt-tip pen only.

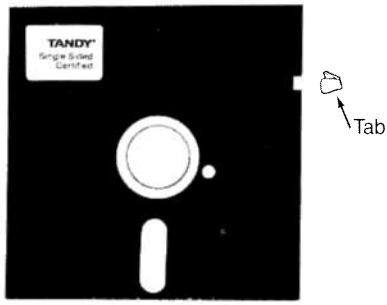
Always put the diskette back in its protective envelope after use.

Store diskettes in an upright position, never in a stack. Never place anything on a diskette.

We recommend that you keep your diskettes either in the manual in which they came or in a diskette storage box, such as those available at your Radio Shack store.

Write Protecting a Diskette

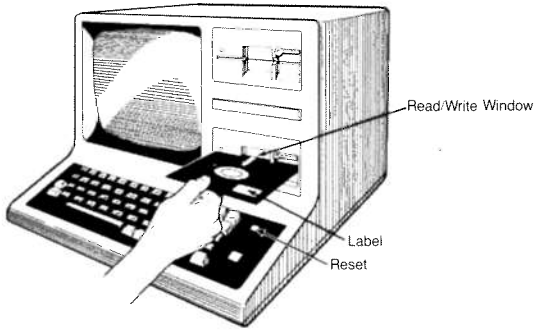
Inside your *Disk System Owner's Manual* is a diskette labeled "TRSDOS and BASIC Interpreter." You'll find a foil, adhesive tab with this diskette. Cover the diskette's "write-protect notch" with the foil tab. (Do not pinch the tab into the notch.)



When the write-protect notch is covered, you cannot change the contents of this *master* diskette. In the next chapter, we'll have you make copies of the master diskette.

Starting Up TRSDOS

Insert the TRSDOS and BASIC Interpreter diskette into Drive 0 as shown below. (**Note:** If the "Diskette?" message is displayed, the drive light stays on. Insert the diskette anyway.) Be sure the label faces up and the read/write window points into the drive. After fully inserting the diskette, close the drive door by turning the latch down, over the drive opening.



Note: The drive latch is designed so that it can be turned only when the drive contains a diskette.

Now, you can start up TRSDOS. To do this, press the reset button.

You hear the disk drive load TRSDOS from the diskette to memory. The screen then shows the TRSDOS copyright/startup message.

Whenever you press reset, the system returns to this startup message.

At the bottom of the startup message, TRSDOS asks you for the date. Enter today's date in the form *mm/dd/yy*. For example, for June 14, 1985, type:

```
06/14/85 ENTER
```

TRSDOS displays the date in an expanded form and then displays the TRSDOS prompt:

```
TRSDOS Ready
```

Your computer is now under the control of TRSDOS and is ready for use.

> **Note:** If the screen shows a "Cannot boot, DATA DISK," "No system," or "Not a SYSTEM disk" message, the diskette in Drive 0 is not an operating system diskette. Remove the diskette and insert a diskette that contains TRSDOS. If no startup message is displayed or if the "Diskette?" message is displayed:
>
> - The diskette may be in backwards or upside-down. Remove the diskette — even if the drive light is on — and correctly insert it.
> - Adjust the brightness and contrast controls.
> - If the drive light is off, press reset.

Using the Keyboard

Your computer's keyboard is much like a typewriter keyboard, except for a few different keys. To find out what some of these keys do, type anything you like at "TRSDOS Ready." When you reach the end of the line, the blinking *cursor* stops. Press (SHIFT) (←) to erase the line.

Continue typing, noting the uses of the following keys:

(BACKSPACE) or (←) — Backspaces and erases.

(→) — Moves the cursor to the next tab position, much like a typewriter's (TAB) key. Tab positions are at 0, 8, 16, 24, and so on.

(CAPS) — Locks the keyboard so you can enter the alphabet keys in upper-case only (or unlocks it so you can enter them in either upper or lower-case).

Some keys have a function only when you are using an application program. If so, the application manual explains how to use the keys.

When finished, press (ENTER). This moves the cursor to the beginning of the next line. It also executes a command or program, as we'll show in the next chapters. Ignore any messages, such as "Program not found." "TRSDOS Ready" should be the last line on your screen.

Turning Off Your Computer

Before continuing to the next chapter, please note the proper way to turn off your computer system:

1. To avoid losing any information, be sure "TRSDOS Ready" is the last message displayed. If it isn't already, press ENTER; "TRSDOS Ready" should now be displayed.
2. Carefully remove any diskettes from the drives.
3. Then, turn off any additional equipment.
4. Now, turn off your computer.

   Note: If you have all the equipment connected to a power strip, then you can turn it all off at the same time, using the switch on the power strip.

Chapter 3
Using TRSDOS to Prepare Diskettes

TRSDOS' major role is that of a file clerk. It organizes each diskette like a file cabinet and stores your information in *disk files,* similar to file folders.

TRSDOS stores the disk files wherever there is space. Files and even parts of files may be stored almost anywhere on the diskette. The key to where the files are located in the *directory*, which TRSDOS also puts on the diskette.

The CAT Command

If you turned off your computer at the end of Chapter 2, turn it on again. Then, insert your master TRSDOS System Diskette as before.

To let you see which files are on your diskette, TRSDOS has a catalog (CAT) command. Load TRSDOS and at "TRSDOS Ready," type:

```
CAT (ENTER)
```

TRSDOS displays the names of all *visible*, non-system files that are stored on all diskettes being used. Notice that it also displays the amount of *free* (available) space on the diskette(s). Now type:

```
CAT (S,I) (ENTER)
```

TRSDOS displays the names of **all** the files on the diskette(s), including system files and invisible files.

Study these files for a moment. In particular, note the FORMAT and BACKUP files. You will use them later in this chapter.

The FORMAT and BACKUP Commands

When you put information on a diskette, it is important to make a copy. In an instant, you can lose weeks of work as a result of:

- Worn-out or mishandled diskettes
- Mishandled equipment
- The power going out while you're using the computer

To avoid this, you should make backup copies of your diskettes at regular intervals. Begin now by copying your master TRSDOS System Diskette and **use the copy from now on**.

> **Note:** The TRSDOS System Diskette is a single-sided diskette. Initially, you should copy it to a single-sided diskette. Later, you can copy TRSDOS to a double-sided diskette to increase the amount of data you can place on the system diskette.

To make a copy, you must first use the FORMAT command to organize a blank diskette into a filing system in which you can put disk files. Then, you must use the BACKUP command to copy all the files from your system diskette to the formatted diskette.

Follow the steps below:

1. Insert a blank, single-sided diskette into Drive 1. (Be sure the diskette's write-protect notch is not covered by a foil tab.) Close the drive door.

2. At "TRSDOS Ready," type:

   FORMAT :1 (Q=N) ENTER

   (Be sure to type the number "1," not a lower-case letter "L." This tells TRSDOS to format the diskette in Drive 1.)

3. If the system thinks that the Drive 1 diskette already contains information, it asks if you want to format over the diskette, erasing all data. If the diskette is new or contains information that you no longer want, press (Y) (ENTER). (You may take the diskette from the drive to check the label.) If you want to use another diskette, press (BREAK) and return to Step 1.

4. When the formatting is complete, the computer displays:

```
Formatting complete
TRSDOS Ready
```

5. To copy all the files from the *source* diskette in Drive 0 to the *destination* diskette in Drive 1, type:

```
BACKUP :0 TO :1 (ENTER)
```

(Be sure to type a zero, not an upper-case letter "O.")

TRSDOS displays the message:

```
Destination disk ID is
  different: Name=DATADISK
  Date=mm/dd/yy
Are you sure you want to
  backup to it <Y,N>
```

Don't worry about this message. It is not an error. It's simply an extra precaution to keep you from backing up over information you may need. Press (Y) (ENTER) to continue.

6. When the backup is complete, the system displays:

```
Backup complete
TRSDOS Ready
```

It also displays:

```
Source disk is write
protected; MOD flags not
updated
```

Don't worry about this message. It is not an error.

7. Type:

```
CAT :1 (S,I) ENTER
```

The directory of Drive 1 should show that all the information from the master diskette is copied onto the backup.

Insert your backup diskette into Drive 0. Press reset. From now on, use your backup as your working diskette. Put your master TRSDOS System Diskette in a safe place. Never use it, except to make copies. Never remove the write-protect tab from this master diskette.

Preparing Data Diskettes

Because your computer system has more than one disk drive, you can save storage space by using *data diskettes*. A data diskette is a formatted diskette that does not contain an operating system (TRSDOS).

You can create data diskettes using single- or double-sided diskettes. Double-sided diskettes have more than twice as much storage capacity. One disadvantage of them, however, is that Model III and older Model 4 computers cannot read double-sided diskettes.

To create a single-sided data diskette, simply format a blank diskette by repeating Steps 1-4 of the procedure under "The FORMAT and BACKUP Commands." This time, do not back up the system diskette.

After formatting the diskette, check its directory by typing:

```
CAT :1 (S,I) ENTER
```

As you can see, the diskette contains only the files BOOT/SYS and DIR/SYS. Because the diskette does not contain an operating system, it has plenty of free space.

To create a double-sided data diskette, you must use a different FORMAT command. After inserting a double-sided diskette in Drive 1, type this command:

```
FORMAT :1 (Q=N,SIDES=2) (ENTER)
```


Using Expansion Drives

If you have expansion drives, you can format data diskettes for them also. They may not be able to use double-sided diskettes, but they **can** use single-sided diskettes created in a double-sided drive.

You must apply the following *patches* to TRSDOS in order to use your external drives:

1. Turn on your computer and start up TRSDOS with a backup copy of your TRSDOS System Diskette in Drive 0. (First, be sure the diskette's write-protect notch is not covered.)
2. At "TRSDOS Ready," type:

   ```
   PATCH BOOT/SYS.LSIDOS:0
   (D02,84=C3:F02,84=C9) (ENTER)

   PATCH BOOT/SYS.LSIDOS:0
   (D02,8E=C3:F02,8E=C9) (ENTER)
   ```

   Note: After you apply the patches, you must reset the computer before using the external drives.
3. At "TRSDOS Ready," remove the diskette from Drive 0 and write protect it with a foil tab. Label the diskette "TRSDOS 6.*x* 4-Drive Master."
4. Reinsert the patched diskette into Drive 0 and make a backup of it for day-to-day use.
5. When finished making the backup, remove the diskettes. Store the 4-Drive Master diskette in a safe place, with your master TRSDOS System Diskette.

The drive numbers are:

Drive 0 — lower built-in drive
Drive 1 — upper built-in drive
Drive 2 — first expansion drive
Drive 3 — second expansion drive

Chapter 4
Writing a BASIC Program

You have used TRSDOS to copy diskettes and see what is on them. Now you will see how TRSDOS interacts with an application program to help you do something practical.

In this chapter, you will create and run a sample BASIC program. After running the program, you will learn how to copy the file to another diskette and how to remove it from the diskette.

Loading BASIC

Load BASIC by typing:

```
BASIC (ENTER)
```

BASIC displays its startup message and:

```
Ready
```

"Ready" indicates that BASIC, not TRSDOS, is ready to accept a command or program statement.

You cannot directly execute a TRSDOS command from within an application program, such as BASIC. For example, type:

```
CAT (S,I) (ENTER)
```

Your screen shows:

```
Syntax error
Ready
```

"Syntax error" indicates that BASIC doesn't understand the TRSDOS command. (To view the directory from within BASIC you must type `SYSTEM "CAT (S,I)" (ENTER)`.)

Writing and Running a Program

Write a BASIC program by typing:

```
10 CLS (ENTER)
20 PRINT @ 672, "HELLO!"
   (ENTER)
30 PRINT @ 818, "I SEE WE
   SPEAK THE SAME
   LANGUAGE..." (ENTER)
40 PRINT @ 986, "BASICALLY
   SPEAKING." (ENTER)
```

When you run this program, the CLS command will clear the screen. The PRINT @ command will tell BASIC to print the text at the specified position.

If you type a line incorrectly, simply press (ENTER) and type it again, correctly. When finished typing the program, press (ENTER).

Test the program by typing BASIC's RUN command:

```
RUN (ENTER)
```

Your screen shows:

```
                HELLO!
I SEE WE SPEAK THE SAME LANGUAGE...
          BASICALLY SPEAKING.
Ready
```

Saving and Loading a Program

Your program is stored in temporary memory. You can run it whenever you wish until you exit the BASIC program (TRSDOS resumes control). To run it later, you must store it permanently on disk.

To save a permanent copy of the program for future use, type (at "Ready"):

```
SAVE "HELLO/BAS" (ENTER)
```

To return to TRSDOS, type (at "Ready"):

```
SYSTEM (ENTER)
```

If you type CAT (ENTER), you will see that the HELLO/BAS program is now in the directory.

You can run HELLO/BAS whenever you wish. To do so, use the diskette you are using now. At "TRSDOS Ready," load BASIC by typing:

BASIC (ENTER).

Then, at "Ready," load the program by typing:

LOAD "HELLO/BAS" (ENTER)

When "Ready" reappears, the HELLO/BAS program has been loaded into memory. To run the program, type:

RUN (ENTER)

Listing and Printing a Program

To see the HELLO/BAS program, type:

LIST (ENTER)

The HELLO/BAS program is short enough for all program lines to fit on the display at once. If it were longer, you would have to freeze the display to view it. To do that, press (SHIFT) and (@) at the same time; then press any key to continue the listing.

If you have a printer, you can print the program by typing:

LLIST (ENTER)

BASIC has more than 50 words that you can use to write a program. To learn how to use them, see the *Getting Started with BASIC Manual* (sold separately) and your *Disk System Owner's Manual.*

Copying and Removing a File

Using SAVE, you created a disk file named HELLO/BAS, which contains your HELLO program. Now we will show you how to use two useful TRSDOS commands to copy HELLO/BAS to another diskette and then remove it. Follow the steps below:

1. In Chapter 3, you formatted a data diskette. Insert this diskette into Drive 1.

2. The TRSDOS COPY command lets you copy a single file from one diskette to another. To copy the HELLO/BAS file from the system diskette to the data diskette, type:

   ```
   COPY HELLO/BAS:0 TO
   HELLO/BAS:1 (ENTER)
   ```

3. To see if HELLO/BAS is now on the diskette in Drive 1, type:

   ```
   CAT :1 (ENTER)
   ```

4. The TRSDOS REMOVE command deletes a file from a disk, removes that file's information from the directory, and frees the space allocated to it. Remove HELLO/BAS by typing:

   ```
   REMOVE HELLO/BAS:1 (ENTER)
   ```

   Check the directory of the diskette in Drive 1 to be sure that HELLO/BAS is removed.

Chapter 5
In Case of Trouble

The first part of this chapter describes how to avoid losing important information. The second part describes *error messages*, the computer's way of warning you about trouble.

The Keys to Keeping Information

Backups

The best way to avoid losing important information is to have a complete library of backups. Whenever you store information, keep at least two copies of it:

- Working — for daily use
- Backup — for backing up your working diskette whenever you make significant changes to it.

Whenever you get a diskette containing a new operating system or application program, write protect it immediately (as shown in Chapter 2). Use this as a master diskette to make your working and backup diskettes. Then, store this master diskette in a safe place and use it only for making backups.

Drive Maintenance

Proper care of your disk drives also is essential to keeping information. Disk drives have small, fragile *heads* that read from and write to the diskette. The head can become dirty from particles in the air, such as dust and cigarette smoke. Therefore, you must clean the head regularly. Failure to do so may cause not only information loss, but damage to the diskette or even the drive head.

The only Tandy-approved method of head cleaning is the use of a Universal Disk Drive Head Cleaning Kit (Cat. No. 26-408). Regular cleaning with this kit will help prevent costly disk drive repair later.

The Computer's Warning System

When an error message appears on your screen, it can come from one of three sources: an application program, a TRSDOS command, or TRSDOS.

Application Program Messages

An application program gives you an error message to warn you that you may be using the program incorrectly. For example, suppose you try to delete from a mailing list data file an entry that does not exist. The program displays a message to that effect.

For help in understanding application program messages, see your application program manual.

TRSDOS Command Messages

Some TRSDOS commands give you an error message to warn you that you are misusing the command. These messages tell you exactly what to do about the problem.

For example, suppose you try to format an old diskette; this would erase all its information. So that you do not unknowingly do this, FORMAT displays a message similar to:

```
Disk contains data --
Name=DATADISK
Date=Ø1/12/86
Are you sure you want to
format it?
```

Press (Y) (ENTER) if you are sure you want to format the diskette (and erase all its information). Press (N) (ENTER) or (BREAK) if you've changed your mind.

For help in understanding TRSDOS command messages, see your Disk System Owner's Manual.

TRSDOS Messages

TRSDOS gives you an error message if there is an operator error or a hardware or software problem. Usually, TRSDOS displays a complete error message, but sometimes it displays only a decimal or hexadecimal error number.

For help in understanding TRSDOS errors, see your Quick Reference Guide.

An operator error tells you that you are asking the computer to do something it can't do.

Perhaps the most common operator error is typing a command or program name incorrectly. For example, suppose you type this for the CAT command:

```
CATS (ENTER)
```

TRSDOS gives you this error message:

```
Program not found
```

You simply need to type the command again, spelling it correctly:

```
CAT (ENTER)
```

Another common operator error is trying to store too much information on a diskette. For example, suppose you are in the middle of storing information and run out of disk space. TRSDOS warns you with this message:

```
Disk space full
```

Either (1) use another diskette or (2) use the REMOVE command to delete files, freeing disk space.

A hardware error warns you of a hardware problem, usually a flawed diskette or faulty disk drive. For example, suppose the diskette does not receive your information within the allotted time. TRSDOS displays the message:

```
Lost data during write
```

Try the operation again, first with a new diskette and then with another drive. If you still get the hardware error, contact your Radio Shack Service Center.

A software error warns you of a problem in your application program. For example, suppose your application program tries to access information beyond the end of the disk file. TRSDOS warns you by displaying the message:

```
End of file encountered
```

Notify your programmer if you get a software error.

Chapter 6
And That's Just the Beginning

Tandy offers many Model 4 programs that you can use on your computer and is constantly developing more. Also, your computer is 100% compatible with the Model III. This means you can use any Model III software on your computer **without changing it.**

Application Programs

The most popular application programs fall in these categories:

Word Processing (an electronic typewriter). Lets you type information into the computer and then insert, delete, or replace the information. You can print as many copies of the information as you want and store it on the diskette for future use.

Data Base Management (an electronic filing system). Lets you organize and store large amounts of related information on diskettes. You can quickly retrieve all or part of the information — as screen displays or printed reports — in many combinations.

Computer Spreadsheet (an electronic decision-making tool). Lets you type in varying information and formulas and immediately see the results. Depending on the program, you can see the results as a table or chart.

Communications (an electronic telephone). Lets you connect your computer to another computer (by purchasing a modem) and communicate over a telephone line. A popular use of this is to receive information from a large computer network such as:

- CompuServe®, which connects you to newspapers such as the New York Times and Washington Post.
- Dow Jones News/Retrieval®, which gives you daily information on the New York Stock Exchange.
- A bulletin board service, which lets you share information with other people, on a local or national basis.
- Data base services, which offer large amounts of information on a given subject.

(Your computer has its own communication program that you can immediately begin using. It is the TRSDOS COMM command, which we'll talk about later.)

General Accounting. Performs the routine accounting procedures required in most offices: payroll, accounts payable, accounts receivable, general ledger, and inventory.

Education. Teaches by asking questions and giving immediate feedback on the answers.

Personal. Assists you in managing your home and finances, and lets you play electronic games.

Specialized. Performs the tasks required by a specialized group. Examples are real estate and agricultural programs.

For added possibilities, many new programs accept information from another program. For example, a word processing program might let you use information that you stored with a data base management program.

For More Information: *Tandy offers a complete line of programs for your computer and the Model III, which you can find at any Radio Shack Computer Center®. Also, many independent companies offer programs for these computers. You can use Radio Shack's TRS-80 sourcebook listing to locate sources of software.*

Languages

There is large demand for innovative new application programs. Should you decide you want to program, these are your tools:

Interpreter. Translates each instruction into machine code as you run the program. An interpreter is best suited for beginners, because it lets you see the results of your program immediately. The BASIC that comes with your computer is an interpreter.

Compiler. Compiles an entire program into machine code at once. When you are ready to run the program, it is already in machine code. Tandy offers compilers for popular languages such as BASIC, COBOL, and FORTRAN.

Assembler. Assembles a program consisting of symbolic instructions into machine code. An assembler is best suited for an advanced programmer, because its instructions talk directly to the hardware.

For More Information. *All Tandy computer languages come with reference manuals. Also, your Radio Shack store sells tutorials that teach you how to program.*

If you plan to use an assembler, you'll need technical information on your computer's hardware, as well as on TRSDOS SVC routines you must use. This information is contained in the Model 4/4P Technical Reference Manual *(Cat. No. 26-2119).*

TRSDOS Commands

Many TRSDOS commands are useful programs in and of themselves. Some commands you might want to use are:

LOG. Tells the system to re-examine a disk to determine the disk type, number of cylinders, number of sides, density, and location of directory. Use LOG whenever you switch diskettes in Drive 0.

ROUTE/LINK. Lets you connect one part of the hardware to another. For example, you can connect your screen to your printer. By doing this, all information normally printed on your screen is printed on the printer.

BUILD/DO/JCL. Lets you create a disk file consisting of a group of TRSDOS commands and programs. For example, you could create a file that shows you a directory, loads BASIC, and then runs a program — all automatically.

FORMS. Lets you change your printer's settings, such as the characters per line or lines per page.

SPOOL. Lets you print reports while you are using the computer.

MEMDISK. Lets you store information in memory in the same way you store information in a disk file. You will want to use this command if you purchase the extra 64K memory. It offers speed and convenience.

CONV. Moves information from a diskette formatted by TRSDOS Version 1 (the Model III operating system) to a diskette formatted by TRSDOS Version 6 (your computer's operating system). See "Operating Systems" below.

COMM. Lets you connect your computer to another computer and use the other computer's hardware and software.

KSM/FLT. Lets you save TRSDOS and BASIC instructions that you most often use and quickly *recall* them from the keyboard. For example, you can reprogram the "C" key to represent the CAT :1 (catalog) command.

SET/FILTER. If you are an assembly language programmer, lets you change the programs that control each part of the hardware.

For More Information. *All Tandy computer languages come with reference manuals. Also, your Radio Shack store sells tutorials that teach you how to program.*

Operating Systems

If you purchase an application program for the Model III, you'll find it comes with a different version of TRSDOS than the one we've described in this manual. Model III programs run under TRSDOS Version 1, rather than TRSDOS Version 6.

You need not be concerned about this during normal operation of the program, since your computer is 100% compatible with TRSDOS Version 1. Simply follow the instructions in your application program manual. The few differences you will notice are:

- An application program running under TRSDOS Version 1 can display 64 characters on 16 lines. A program running under TRSDOS Version 6 can display 80 characters on 24 lines.
- TRSDOS Version 1 commands work slightly differently from TRSDOS Version 6 commands. Follow the instructions in your application manual, and you'll have no problems.

One other difference could concern you, but only in a rare situation. The two versions of TRSDOS format diskettes differently. They cannot read each other's diskettes.

TRSDOS Version 6 offers a CONV command that moves files stored on a TRSDOS Version 1 diskette to a TRSDOS Version 6 diskette. Check your *Disk System Owner's Manual* for details. **But remember, you are not required to do the conversion to run a Model III program on your computer.**

For More Information. *The* Model III Disk System Owner's Manual *(Cat. No. 26-2111) contains complete information on TRSDOS Version 1.*

And Now It's Your Turn

This chapter has touched on some popular applications of the Tandy TRS-80 Model 4D. As you grow accustomed to using your computer, you'll think of more ways of expanding it to meet your own needs. Applications for your computer are limited only by the imagination!

Appendix A
Removing the MODELA/III File

Your TRSDOS System Diskette contains a file called MODELA/III. Because you own a 4D, you do not need this file, and you may remove it from your backup system diskette to increase the amount of free space. To do so, follow these steps:

1. Turn on your computer and start up TRSDOS with the backup system diskette in Drive 0. (First, be sure the diskette's write-protect notch is not covered.)
2. At "TRSDOS Ready," type:

   ```
   REMOVE MODELA/III:0 (ENTER)
   ```

3. To verify that the file is no longer on the diskette, type:

   ```
   CAT (S,I) (ENTER)
   ```

Index

Application programs 2, 19, 27-29
BASIC (see BASIC) 2, 19-22
Communications 28
Computer spreadsheet 27
Data base management 27
Education 28
Error messages 24
General accounting 28
Languages 2, 29
Model III 27, 30, 31, 32
Personal 28
Specialized 28
Word processing 27
Assembler 29
BACKUP 14-15
BASIC 2, 19-22
Brightness 7, 10
BUILD/DO/JCL 30
Bulletin Board Service 28
CAT 13
CLS 20
COMM 30
Commands, BASIC 20-21
Clearing the screen (CLS) 20
Listing the program (LIST) 21
Listing the program to the printer (LLIST) 21
Loading the program (LOAD) 21
Printing the text at (Print @) 20
Running the program (RUN) 20
Storing the program (SAVE) 20
Commands, TRSDOS .13-15, 22, 30-31
Connecting to another computer (COMM) 30
Converting TRSDOS Version 1 to TRSDOS Version 6 (CONV) 30
Copying one file (COPY) 22
Copying all files (BACKUP) 14-15
Creating a file of commands or programs (BUILD/DO/JCL) 30
File names, displaying (CAT) 13
Formatting a diskette (FORMAT) 14-15
Hardware, connecting parts of (ROUTE/LINK) 30
Printer settings, changing (FORMS) 30
Printing while using the computer (SPOOL) 30
Programs that control hardware, changing (SET/FILTER) 31
Re-examining a disk (LOG) 30
Removing a file (REMOVE) 22
Saving TRSDOS and BASIC instructions (KSM/FLT) 31
Storing information in memory (MEMDISK) 30
Compiler 29
CompuServe 28
Contrast 7, 10
CONV 30
COPY 22
Data Base Service 28
Data diskettes 17
Destination diskette 15
Disk file 13
Disk operating system 3
Diskette
Backup 14-15
Data 17
Destination 15
Master 9
Parts of 7
Source 15
Working 16
Write protecting 8-9
Dow Jones 28
Drive lights 7, 8
Drive numbers 7, 18
Entering information (keyboard) 1
Equipment, connectors 6
Cassette jack 6
Floppy disk expansion 6
I/O bus connector 6
Parallel printer 6
RS-232C 6
Equipment, installing 5-6
Cassette recorder 6
Floppy disk drive 6
Graphics board 6
Hard disk 6
Modem 6
Parallel printer 6
Error messages 10, 24-26
Application program messages 24
Cannot boot, DATA disk 10
Disk space full 25
Diskette? 10
End of file encountered 26
Lost data during write 26
No system 10
Program not found 25
TRSDOS messages 25-26
Hardware error 26
Operator error 25

Software error 26
TRSDOS command messages 24-25
Expansion drives 17-18
FORMAT 14-15
FORMS 30
Freezing the screen (in BASIC) 21
Handling diskettes 7-8
Hardware 1
Information loss, causes of 14
Inserting a diskette 9
Interpreter 29
Keyboard, using the 11
KSM/FLT 31
Language programs 29
Assembler 29
Compiler 29
Interpreter 29
LIST 21
LLIST 21
LOAD 21
LOG 30
Machine code 29
MEMDISK 30
Memory 1
Random access memory (RAM) ... 1
Read-only memory (ROM) 1
MOD flags 15
Model III programs 29, 31-32
Networks 28
Bulletin Board Service 28
CompuServe 28
Data Base Service 28
Dow Jones 28
Newspaper service (CompuServe) .. 28
Operating system 3
Plugging in your computer 5
Power strip 5
Power switch 7
Preparing diskettes 13-17
Print @ 20
Printer 1
Processor 1
Programs 2, 19, 27-29, 31-32
Application 2, 19, 27-29
Operating system 1
Model III 29, 31-32
Receiving information (screen and printer) 1
REMOVE 22
Reset button 7
ROUTE/LINK 30
RUN 20
SAVE 20
Screen 1
SET/FILTER 31
Software 1
Source diskette 15
Starting up your computer 7
Starting up TRSDOS 9-10
Storing information inside the computer 1
Permanently (read-only memory) ... 1
Temporarily (random access memory) 1
SPOOL 30
SVC routines 29
Syntax error 19
Systems 1
TRSDOS 9-10, 13-17, 24-26, 31-32
Command error messages 24-25
Differences between versions .. 31-32
Error messages 25-26
Ready 10
Starting up 9-10
Using to prepare diskettes 13-17
Turning off your computer 12
Write protecting a diskette 8-9

**CUSTOM MANUFACTURED FOR RADIO SHACK,
A DIVISION OF TANDY CORPORATION**

**U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5**

TANDY CORPORATION

AUSTRALIA	BELGIUM	U. K.
91 KURRAJONG AVENUE MOUNT DRUITT, N.S.W. 2770	PARC INDUSTRIEL 5140 NANINNE (NAMUR)	BILSTON ROAD WEDNESBURY WEST MIDLANDS WS10 7JN

7/85-TM

874-9747

Printed in U.S.A.