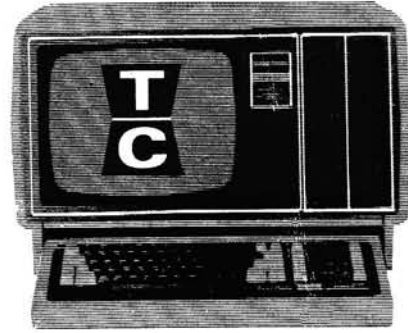


TRS-80[®]
MODEL 16
OPERATOR'S
MANUAL



READ ME FIRST

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TRS-80 MODEL 16 OPERATOR'S MANUAL

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INTRODUCTION

Your TRS-80 Model 16 or Enhanced Model II Microcomputer is two computers in one. Two microprocessors -- the MC68000 and the Z-80A -- enable you to use the Computer with either Model 16 or Model II programs. And with Radio Shack's large selection of peripherals you can expand your system to include printers, hard disks, graphics options, and more.

USING THIS MANUAL

This manual contains all the essential information you need to get started. It shows how to operate the Model 16, load a program, and use some of the more helpful commands. It also explains some terms you need to know.

Since this is a "getting-started" manual, it does not describe all the optional features available with each command. For complete information on the command, refer to the programming manuals.

For a summary of the getting started information, see the tables on the next page.



This illustration appears when there are special instructions for hard disk owners only.

<KEY> This notation represents a key you must press.

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3. The cost for the labor and parts required to return the Radio Shack computer equipment to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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 - Disk Maintenance
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MODEL 16 DISKS

FLOPPY DISKETTES	HARD DISKS
<p>Types of Diskettes: double-sided (cannot be used by Enhanced Model II's) single-sided</p> <p>Write-Protection: covering write-protection notch cancels write-protection</p> <p>Primary Drive: Drive β</p>	<p>Modes of Operation: floppy disk control (press <REPEAT> <BREAK> on start-up) hard disk control (automatic)</p> <p>Write-Protection: illuminating PROTECT button invokes write-protection:</p> <p>Primary Drive: floppy disk control -- Drive β hard disk control -- Drive 4</p>

MODEL 16 OPERATING SYSTEMS

	TRSDOS-16 OPERATING SYSTEM	TRSDOS-II OPERATING SYSTEM	TRSDOS OPERATING SYSTEM
MODE	Model 16 (68 $\beta\beta\beta$ code)	Model II (28 β code)	Model II (28 β code)
START-UP	with TRSDOS-16/TRSDOS-II in primary drive, enter date and time	with TRSDOS-II in primary drive, press <HOLD>, then enter date and time	with TRSDOS in primary drive, enter date and time
SWITCHING TO:			
TRSDOS-16	not applicable	at "Ready", enter: BOOT16 TRSDOS16/SYS	at "READY" with TRSDOS-16 in primary drive, press RESET
TRSDOS-II	at "Ready", press RESET and <HOLD> before date	not applicable	at "READY" with TRSDOS-II in primary drive, press RESET and <HOLD> before date
TRSDOS	at "Ready" with TRSDOS in Drive β , press RESET (if hard disk, press <REPEAT> <BREAK>)	at "Ready" with TRSDOS in Drive β , press RESET (if hard disk, press <REPEAT><BREAK>)	not applicable
TYPE OF DISKS RECOGNIZED	single- and double-sided diskettes, and hard disks	single- and double-sided diskettes, and hard disks	single-sided diskettes only
TRANSFERRING DISK FILES TO HARD DISK	at "Ready" enter MOVE <u>source TO destination</u> Example: MOVE 1 to 4 (ALL)	at "Ready" enter MOVE <u>source TO destination</u> Example: MOVE 1 to 4 (ALL)	must transfer to TRSDOS-II. at "TRSDOS-II Ready" enter: <u>FCOPY source TO destination</u> Example: FCOPY 1 TO 4 (ALL)
FORMATTING:			
single drive	not allowed	not allowed	at "READY" enter: FORMAT β
multi-drives	at "Ready" enter FORMAT <u>drive</u> Example: FORMAT 1	at "Ready" enter FORMAT <u>drive</u> Example: FORMAT 1	at "READY" enter: FORMAT <u>drive</u> Example: FORMAT 1
BACKUP	(formatting is automatic)	(formatting is automatic)	(must format first)
single drive	not allowed	not allowed	at "READY" enter: BACKUP β TO β
multi-drives	at "Ready" enter BACKUP <u>source TO</u> <u>destination</u> Example: BACKUP β TO 1	at "Ready" enter: BACKUP <u>source TO</u> <u>destination</u> Example: BACKUP β TO 1	at "READY" enter: BACKUP <u>source TO</u> <u>destination</u> Example: BACKUP β TO 1

SECTION 1: START-UP

This section shows how to get started operating your computer system. It is divided into two parts:

Start-Up/ For the Enhanced a Model II. Read this if you purchased a 16-Bit Enhancement Kit to upgrade your Model II to a Model 16.

Start-Up/ For the New Model 16. Read this if you purchased a new Model 16.

This manual calls the two computers the "Enhanced Model II" and the "New Model 16" only when there are differences between them. Otherwise, "Model 16" refers to both.



**START-UP/
FOR THE ENHANCED MODEL II****WHAT YOU NEED ...**

The Model II Enhancement Kit contains:

- ___ Model 16 Owner's Manual
- ___ Model 16 Systems Diskette (inside the Model 16
Owner's Manual)
- ___ Assembler-16 Programming Package Manual
- ___ Supplement to the Model II Owner's Manual

IF YOU HAVE BEEN USING A HARD DISK ...

Make sure you are now using TRSDOS-II, the new hard disk operating system. The Enhanced Model II will not operate under TRSDOS-HD, the old operating system.

To determine what your hard disk operating system is, start-up the Computer. If TRSDOS-HD appears, you need to re-initialize the hard disk to TRSDOS-II.

You should have already received a TRSDOS-II Initialization Diskette for the Hard Disk in the mail. It comes with instructions on how to SAVE your files before re-initializing. It is very important that you follow these instructions or else you could lose all the information on your hard disk.

HOW IS THE ENHANCED MODEL II DIFFERENT?

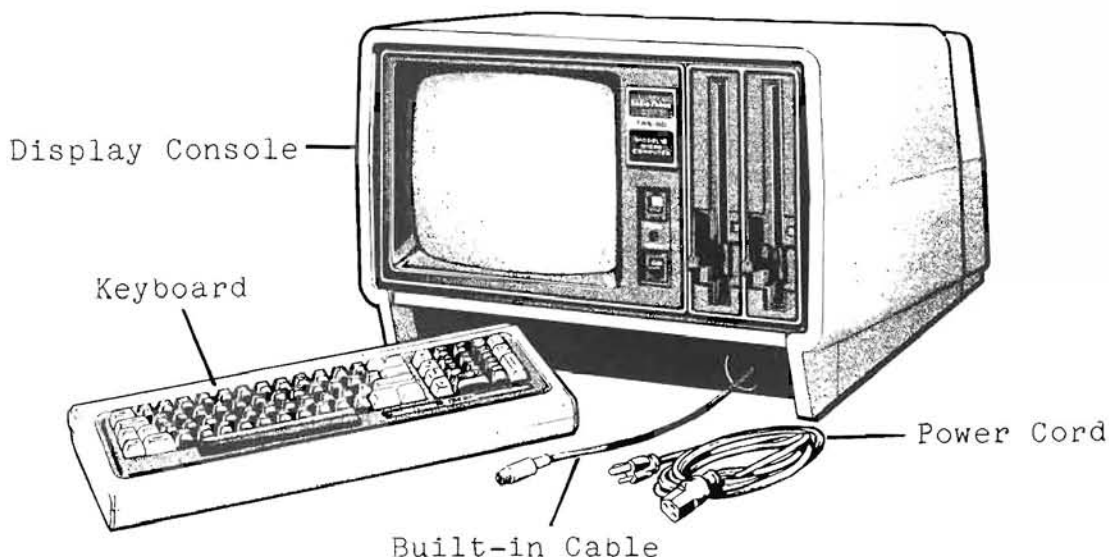
You can still use the Enhanced Model II in the same way you used the Model II. The programs will work the same.

The enhancement is that you can also use the Model II as a Model 16. This manual describes how.

START-UP/
FOR THE NEW MODEL 16

WHAT YOU NEED...

Carefully unpack the Computer system and make sure you have the following items.



You should also have these programming manuals:

- Owner's Manual
- Owner's Manual/Model II Mode (called "Model II Manual" from now on)
- Assembler-16 Programming Package Manual.
- Supplement to the Model II Manual (inside the Model II Manual)

At the front of your manuals you'll find these two diskettes:

- Model 16 Systems Diskette
- Thinline TRSDOS 2.0b Diskette



If you purchased a hard disk, you'll also need:

- Hard Disk Owner's Manual
- TRSDOS-II Initialization Diskette for the Hard Disk



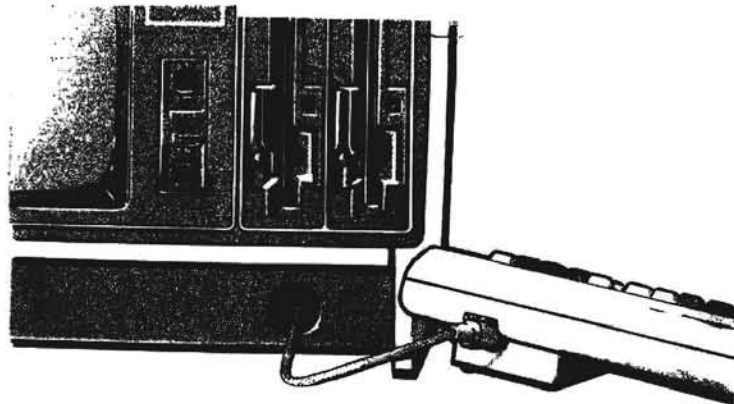
Save the packing materials in case you ever need to transport your system.

INSTALLING THE NEW MODEL 16

1. Place the display console where you'll be using the Computer. Position it close to a grounded, 120 VAC, three-prong outlet (or use a grounded power strip such as Radio Shack's Plug-In Power Strip).

Make sure it won't be plugged into an AC power line that also powers heavy equipment, copiers, or office machines with defective switches.

2. Plug the cable from the front of the display console into the jack on the right rear of the keyboard.

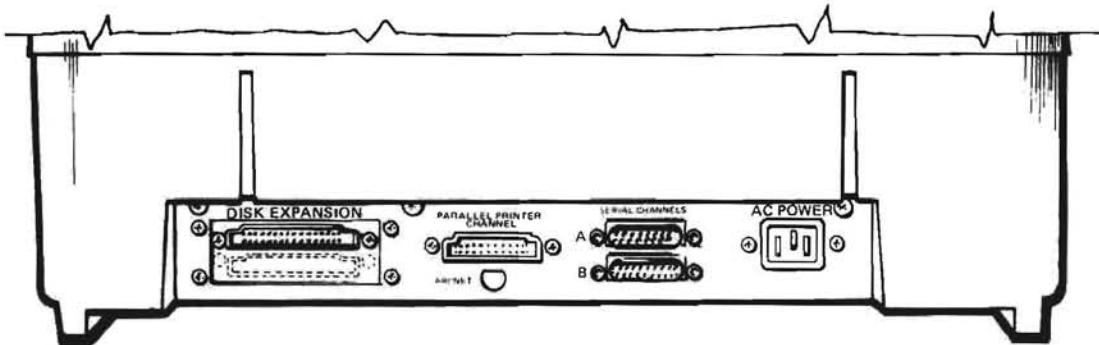


3. Plug one end of the power cord into the back of the display console. Plug the other end directly into a grounded, 120 VAC, three-prong outlet or grounded power strip.

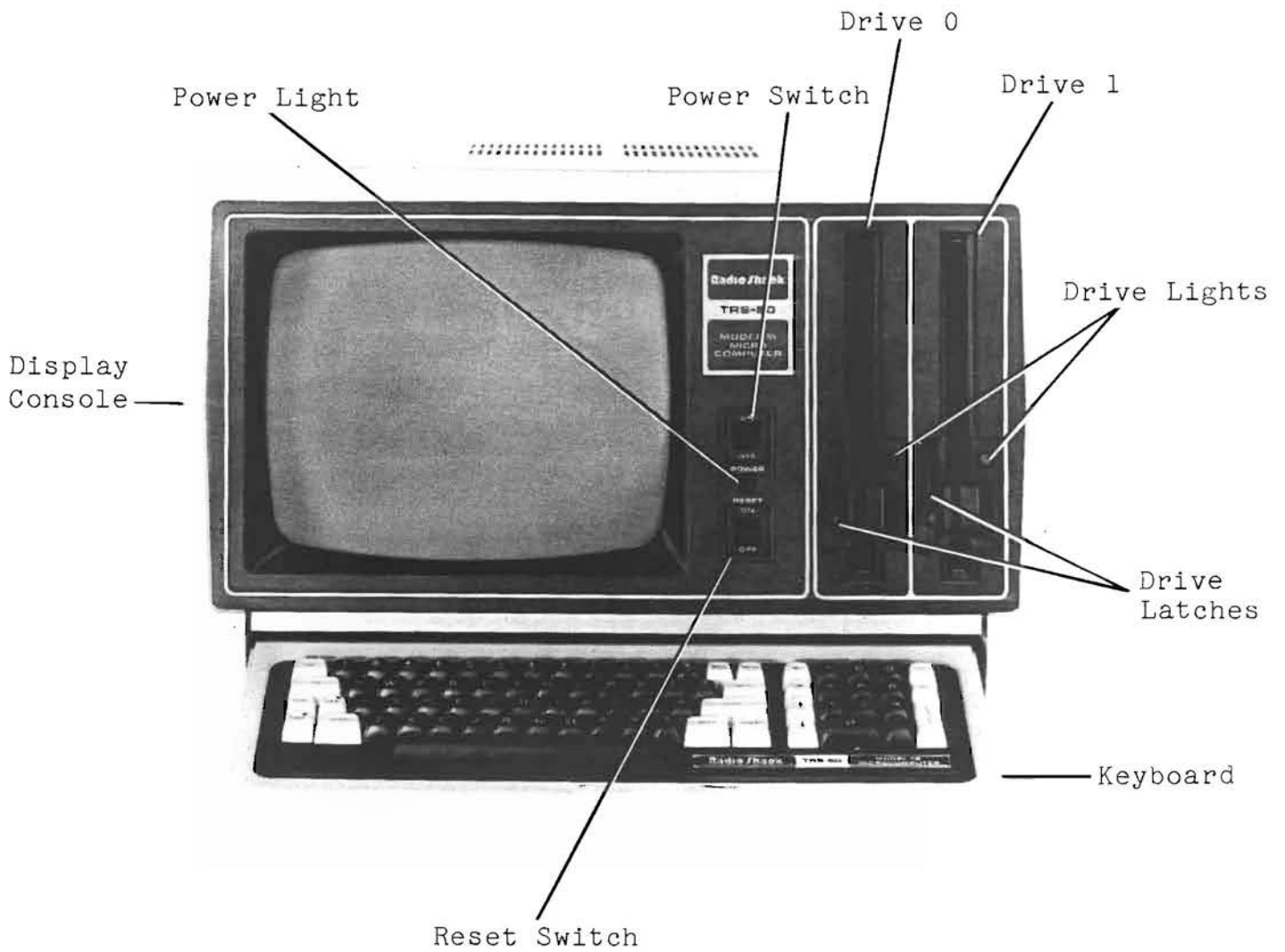
Warning: If you incorrectly connect and ground the Computer, you're exposing yourself to the danger of electrical shock as well as endangering your Computer and data.

If you have a hard disk, it must be installed by Radio Shack service technicians.

If you have any other Radio Shack equipment (such as a printer or modem), follow the installation instructions in the manual(s) supplied with them. This figure shows where to connect them to the Model 16:



An illustration of the connected Model 16 is on the next page.



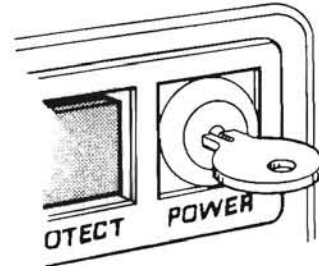
OPERATING THE NEW MODEL 16

Turning ON the Computer

1. Make sure all floppy disk drives are empty and all equipment is turned OFF.



Turn on the primary hard disk drive (Drive 4) first or data may be lost or destroyed. Then turn on any secondary hard disk drives. Allow them to warm up for one minute before going on to Step 2. (See your hard disk manual for an illustration of the primary and secondary drives.)



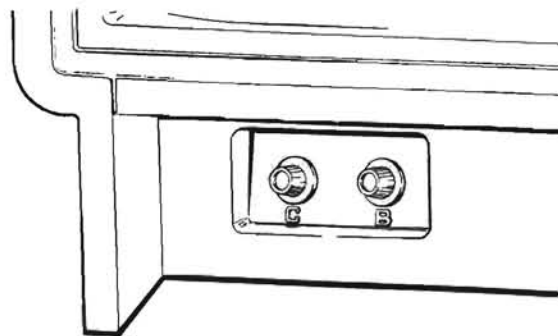
2. Flip up the power switch on your display console.



Have a floppy diskette (instead of a hard disk) control your Computer for now. Do this by simultaneously pressing <REPEAT> and <BREAK> before the screen becomes white.

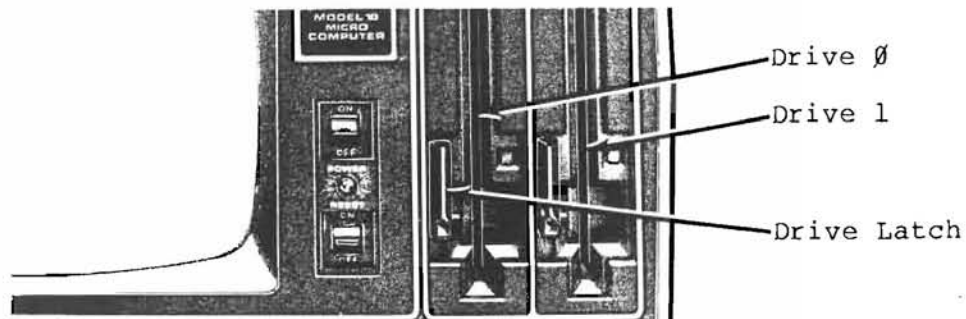
INSERT DISKETTE should appear on the screen within a few moments. If it doesn't, make sure the Computer is installed properly, flip up the RESET switch, and repeat step 2.

3. Turn ON any peripheral equipment (such as a printer or floppy disk expansion unit).
4. If necessary, adjust the brightness and contrast controls in the recessed area at the bottom left of the display console.

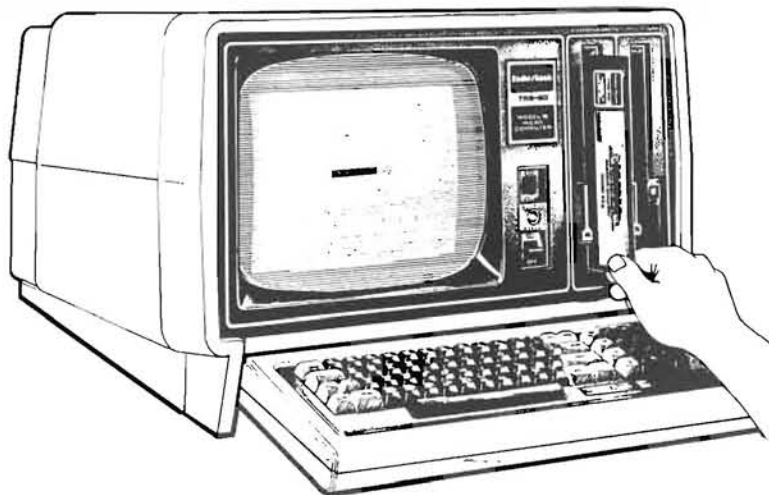


Inserting a Floppy Diskette

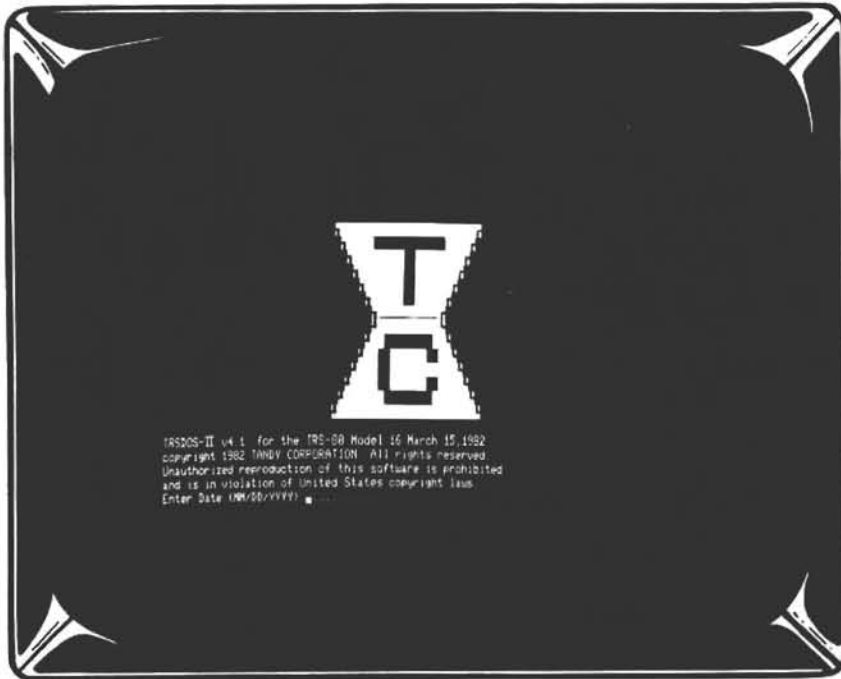
5. Make sure the Drive 0 latch is in the vertical position.



6. Carefully insert the Model 16 Systems Diskette into Drive 0, with the label facing the display.



7. Gently push the diskette into the slot until it locks into place. (Don't force it.)
8. Rotate the drive latch clockwise until it locks into a horizontal position. After a few seconds, the start-up message on the next page will appear on the display.

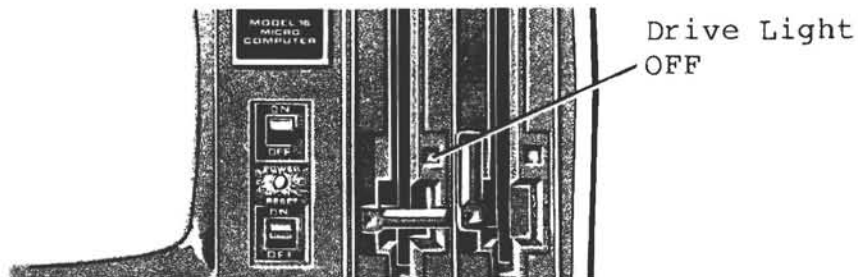


If, instead of the above start-up message:

- an error message appears, see Section 6, "Error Messages"
- the message NOT A SYSTEM DISKETTE message appears, you are not using the Model 16 Systems Diskette.
- nothing appears (within 30 seconds), you probably inserted the diskette incorrectly. Remove it and go back to step 2.

Removing a Floppy Diskette

9. Make sure the drive light is off.



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10. Rotate the drive latch counterclockwise until it is in the vertical position. The diskette will pop partially out of the drive.
11. Carefully remove the diskette from the drive, making sure its shiny surface doesn't touch anything. Put it back into its storage envelope.

Turning Off the Computer

12. Make sure all the drives are empty.
13. If you have any peripheral equipment (other than hard disk drives), turn it OFF.



Turn OFF all secondary hard disk drives first, to prevent loss of data. Then turn OFF the primary hard disk drive (Drive 4).

14. Turn OFF the display console power switch.

ERROR MESSAGES

Whenever you type a command incorrectly or try to use it in the wrong way, the Computer will notify you with an error message. If the error occurred simply because you mistyped the command, try typing it again.

If you still get the error, refer to Section 6, "Error Messages". It contains a description of the causes and appropriate action for each error.

SECTION 2: ABOUT YOUR DISKS

Computers can store information in two ways:

- . temporarily, in memory (turning the Computer off erases memory)
- . permanently, in a storage device.

Disks are one of the best storage devices available because of the way they can organize and index information.

TYPES OF DISKS

There are two types of disks:

- . floppy diskettes -- all Model 16's can use these
- . hard disks -- you must have a hard disk drive to use these (Radio Shack Catalog Number 26-4150)

This manual uses the term "disk" to refer to both types of disks.

Floppy Diskettes

Floppy diskettes are a convenient, inexpensive type of disk. The term "floppy" means the diskette will bend if mishandled. Caring for floppy diskettes is discussed later in this manual.

There are two types of floppy diskettes:

- . single-sided
- . double-sided



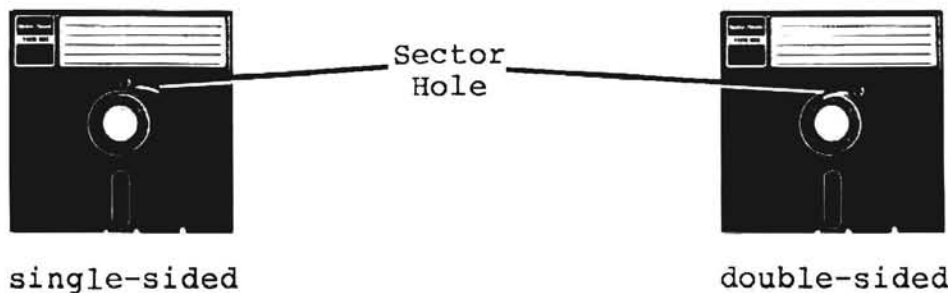
Do Not Touch

Single-sided diskettes can store around 500,000 bytes of information. Both New Model 16's and Enhanced Model II's can use them.

Double-sided diskettes can store twice as much information because they use both sides. Only New Model 16's can use them. Enhanced Model II's cannot.

You can tell whether the diskette is single- or double-sided by either:

- . the label (all new Radio Shack diskettes are labeled single- or double-sided. If it's an older diskette, it's single-sided), or
- . the sector hole (note that it is somewhat off-center on double-sided diskettes):



Hard Disks

Unlike floppy diskettes, hard disks cannot be removed from their drives. Hard disks are sturdier, faster, and will store more than 8,000,000 bytes of information.



If you have a hard disk, you will want to transfer your Model 16 Systems Diskette to your primary hard disk drive. If you do not have a hard disk, skip this and go to "Write-Protection", on the last page of this section.

Copying the Model 16 Systems Diskette to Hard Disk

To copy the Model 16 Systems Diskette to the hard disk, follow these steps:

1. Make sure all the disk drives are empty.
2. Turn on the Computer. This time, operate under hard disk control. Do not press <REPEAT> <BREAK>. The TRSDOS-II start-up message will appear.

If the start-up message does not appear, the hard disk probably hasn't been initialized yet. See your Hard Disk Owner's Manual for instructions.

3. Insert your Model 16 Systems Diskette in Drive 0.
4. If the hard disk's red PROTECT light is on, press it to turn it off.
5. At the bottom of the screen is the message:

Enter Date (MM/DD/YYYY)

Enter today's date. For example:

08/19/1982 <ENTER>

This message then appears:

Enter Time (HH.MM.SS)

Simply press <ENTER>

After a few seconds, this message appears:

TRSDOS-II Ready

(If TRSDOS-HD Ready appears instead, you are using the wrong hard disk operating system. See Section 1 in this manual for further instructions.)

6. Type:

DO COPY16:Ø <ENTER>

The Computer will display the names of the disk files as it copies them. When finished, it displays:

TRSDOS-II Ready

Your hard disk now has all the information contained on the Model 16 Systems Diskette. Store the Model 16 Diskette in a safe place to use as a backup copy.

Copying Other Diskettes to the Hard Disk

The above command was especially designed to copy the Model 16 Systems Diskette. To copy information from another diskette to the hard disk:

- . use the MOVE command, if the diskette operates under the TRSDOS-16 or TRSDOS-II operating system. For example:

MOVE Ø TO 4 {ALL} <ENTER>

copies the diskette in Drive Ø to Drive 4, the primary hard disk drive.

- . use the FCOPY command, if the diskette operates under the TRSDOS operating system. For example:

FCOPY Ø TO 4 {ALL} <ENTER>

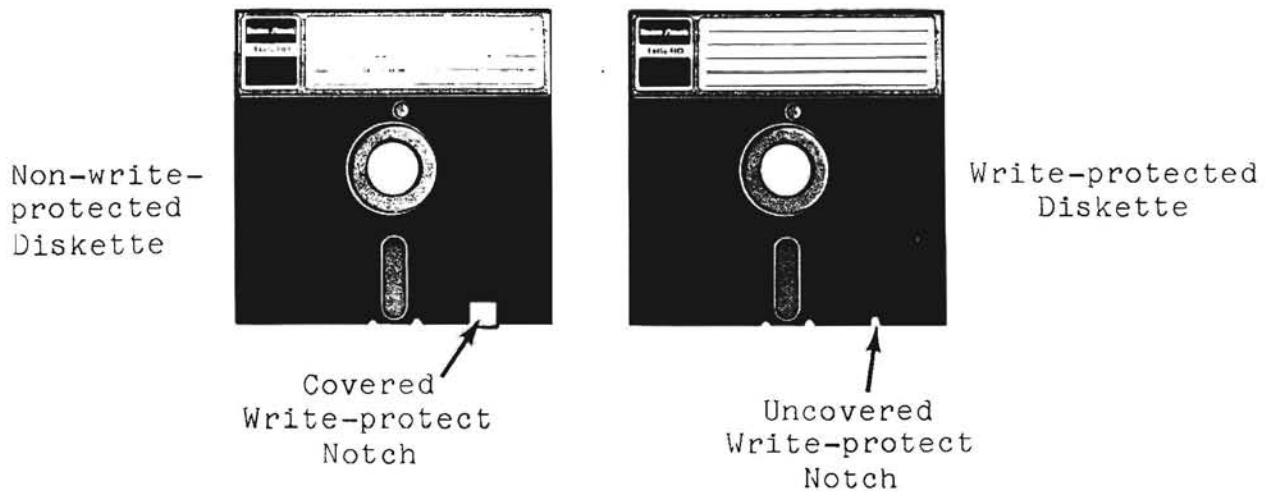
copies the diskette in Drive Ø to Drive 4, converting it to a format acceptable to the TRSDOS-II and TRSDOS-16 operating systems.

TRSDOS-16, TRSDOS-II, and TRSDOS are discussed in the next Section.

WRITE-PROTECTION

When you buy Radio Shack diskettes, they are write-protected. This means that you cannot change the information on them.

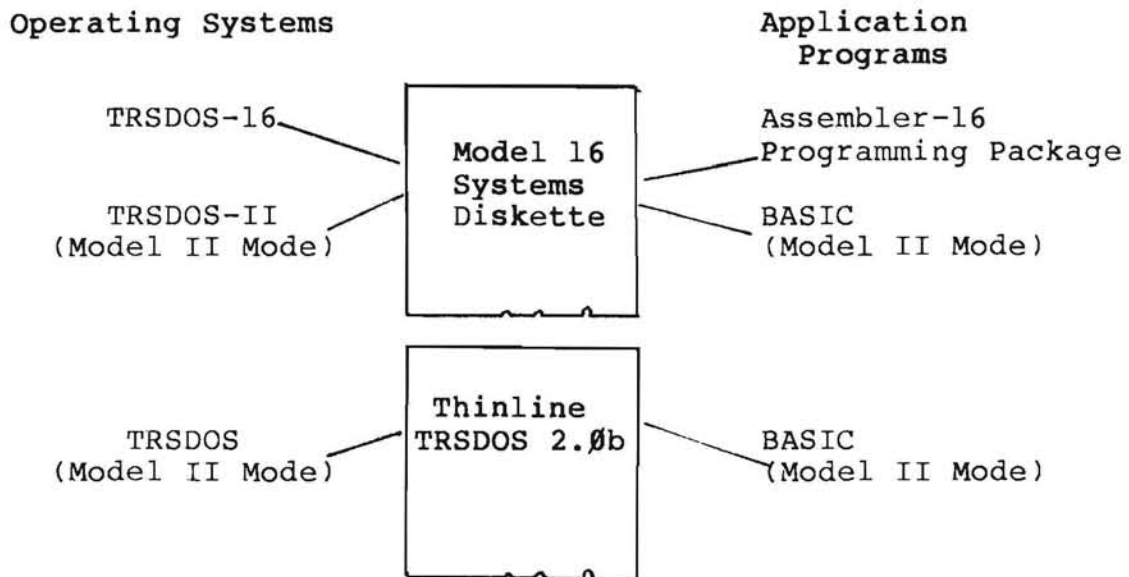
If you want to store, delete, or alter information on a diskette, you need to cancel its write-protection. To do this, cover the write-protect notch with a gummed tape. (Some gummed-foil tape comes with each diskette.)



A hard disk can be write-protected also. When the PROTECT button is illuminated, the disk is write-protected. Pushing the button turns the write protection on or off.

SECTION 3: USING YOUR DISK PROGRAMS

The diskettes which come with the Model 16 contain these programs:



(If you have an Enhanced Model II, you will not have the Thinline TRSDOS 2.0b diskette. This diskette is actually a Model II TRSDOS Diskette which works with the Model 16's new "thinline" drives.)

A complete description of these programs is in these programming manuals:

Model 16 Owner's Manual -- describes TRSDOS-16
 Assembler-16 Programming Package -- describes the
 Assembler-16 Programming Package
 Model II Owner's Manual -- describes TRSDOS and BASIC
 Supplement to the Model II Owner's Manual -- describes
 how to use TRSDOS on the New Model 16 and convert
 TRSDOS programs to TRSDOS-II

However, this section summarizes all the essential information you need to operate an application program.

TYPES OF PROGRAMS

There are two types of programs that Radio Shack distributes:

- . operating systems
- . application programs

Operating Systems

An operating system is a program that allows you to operate the Computer. Without an operating system, you cannot store data, use extra equipment, or use any application programs.

Whenever you use the Computer, it "loads" portions of the operating system, as required, from the disk into memory. For this reason, you must always have an operating system in your "primary" disk drive.

Drive 0 is the primary floppy disk drive; Drive 4 is the primary hard disk drive. All your other drives are "secondary" drives.

What this means is:

If you have ...	You must ...
a floppy system (no hard disk)	always keep a diskette containing the operating system in Drive 0
a hard disk but want to operate under "floppy disk control"	always keep a diskette containing the operating system in Drive 0
a hard disk and want to operate under "hard disk control"	have the operating system initialized or transferred to Drive 4 (the primary hard disk drive)

The Model 16 comes with three operating systems:

- . TRSDOS-16, for Model 16 application programs
- . TRSDOS-II, for Model II application programs

- . TRSDOS, for Model II application programs

Application programs which run under TRSDOS-16 are called "TRSDOS-16 programs", those running under TRSDOS-II are "TRSDOS-II programs", and those running under TRSDOS are "TRSDOS programs".

Application Programs

Radio Shack offers programs for such diverse applications as developing a program, creating a mailing list, ordering the inventory, and word processing.

The Model 16 comes with these two applications programs:

- . **The Assembler-16 Programming Package** (a "TRSDOS-16 program"), for developing programs in the computer's "native" 68000 machine language.
- . **BASIC** (a "TRSDOS-II" and a "TRSDOS" program), for writing programs in the BASIC language (Beginners' All-purpose Symbolic Instruction Code).

Note that BASIC is on two diskettes. Both versions of BASIC are the same. The only difference is that one runs under TRSDOS-II and the other runs under TRSDOS.

LOADING A PROGRAM

To use a program stored on disk, you must "load" it into memory:

1. first load the appropriate operating system (that is, the main portion of it)
2. then load the application program

The following shows how to load application programs which run under each of the three operating systems.

Loading a TRSDOS-16 Program

All Model 16 application programs are "TRSDOS-16 programs".

This example shows how to load a TRSDOS-16 program called EDIT16, which is part of the Assembler-16 Programming Package. You would load any TRSDOS-16 application program in the same way.

1. Turn on the Computer.
2. Insert the Model 16 Systems Diskette in Drive 0.



Since you've copied the Model 16 diskette onto the hard disk, you do not need to insert and use it. Simply start-up the Computer under hard disk control (as shown in the last section).

3. Notice the first line in the start-up message identifies the operating system as TRSDOS-II, rather than the TRSDOS-16 operating system.

This is because TRSDOS-16 uses TRSDOS-II as a foundation. TRSDOS-16 will always be on the same disk as TRSDOS-II.

9. At the bottom of the screen is the prompt:

Enter Date (MM/DD/YYYY)

Enter today's date using the format indicated. For example, for August 19, 1982, type:

08/19/1982 <ENTER>

10. The Computer then prompts you for the time:

Enter Time (HH.MM.SS)

Simply press <ENTER> and the Computer will keep track of the time, starting with 00.00.00.

If you want to enter the correct time, type it in the 24-hour format (seconds are optional). For example, for 3:30 PM, type:

15.3Ø <ENTER>

11. The Computer automatically loads TRSDOS-16. At this point you might find it convenient to press the <CAPS> key, since all commands must be typed in all capital letters.

At the bottom of the screen the Computer displays:

TRSDOS-16 Ready

This prompt means the TRSDOS-16 operating system is in control. While in operating system control, you can perform two types of operations:

- . enter an operating system command (such as the BACKUP command, used in Section 4)
- . load an application program

12. Since the TRSDOS-16 operating system is in control, you can load the EDIT16 program. Type:

EDIT16 <ENTER>

After a few seconds, the Computer displays:

C?

This prompt means the EDIT16 application program is in control rather than TRSDOS-16. While in an application program's control, you can use any of its commands.

13. To return to the control of TRSDOS-16, type:

QU <ENTER>

EDIT16 asks you:

FILE NOT SAVED
QUIT EDITOR Y OR N?

Press Y <ENTER> and the TRSDOS-16 Ready prompt again appears on the screen.

Loading a TRSDOS-II Program

TRSDOS-II is a new, enhanced operating system for the Model II. There is only one Radio Shack application program currently distributed which runs under TRSDOS-II. This is the BASIC program contained on your Model 16 Systems Diskette.

Radio Shack will identify any future programs which run under TRSDOS-II with "TRSDOS-II" on the diskette label.

To load TRSDOS-II and then BASIC:

1. With the Model 16 Systems Diskette still in Drive 0 and the TRSDOS-16 Ready message on the last line of your screen, flip up the RESET switch.

The Computer will reset and display its start-up message again.

2. Enter the date and time again. However, this time, press <HOLD> before typing the date:

```
<HOLD> 08/19/1982 <ENTER>
15.30 <ENTER>
```

The <HOLD> key tells the Computer not to load TRSDOS-16. The Computer loads TRSDOS-II instead and displays the prompt:

```
TRSDOS-II Ready
```

3. To load BASIC, type:

```
BASIC <ENTER>
```

After a few steps the BASIC application program displays a start-up message with its prompt:

```
Ready
>
```

meaning that BASIC is in control. To return to TRSDOS-II control, type:

```
SYSTEM <ENTER>
```

and the TRSDOS-II Ready prompt re-appears on the screen.

Loading a TRSDOS Program

All Model II programs currently distributed by Radio Shack run under the TRSDOS operating system. If you have an Enhanced Model II, you can load TRSDOS programs in the same way you always have. (Ignore this example usage.)

If you have a new Model 16, you will need to use the Thinline TRSDOS 2.0b diskette. The way to use this diskette is described below.

(This usage applies only to customers with at least two floppy disk drives. If you have only one floppy drive, refer to the Supplement to the Model II Owner's Manual.)

1. When the READY message appears on your screen, insert the Thinline TRSDOS 2.0b Diskette in Drive 0.
2. Insert the TRSDOS application program diskette in Drive 1.
3. Flip up the RESET switch.



Press <REPEAT> <BREAK> to transfer control to the floppy diskette. You can use TRSDOS only under floppy diskette control. (To use your TRSDOS programs under hard disk control, you will need to convert them to the TRSDOS-II operating system. See your Hard Disk Owner's Manual for instructions.)

4. The TRSDOS start-up message should appear on your screen. If the TRSDOS-II message appears instead, make sure the TRSDOS diskette is in Drive 0 and repeat step 3.
5. Enter the date and time (without pressing <HOLD>).
6. The Computer loads TRSDOS and displays the prompt:

TRSDOS READY

7. Type the name of the application program you have on the diskette in Drive 1 and press <ENTER>. For example:

SCRIPSIT <ENTER>

loads a TRSDOS application program named SCRIPSIT.

Please note that TRSDOS allows you to use single-sided floppy diskettes only (no double-sided diskettes or hard disks). However, you can convert most TRSDOS programs to TRSDOS-II which would allow you to use all types of disks. The Supplement to the Model II Owner's Manual explains how.

SWAPPING DISKETTES

Whenever you swap diskettes, you must:

1. Make sure the operating system's "Ready" prompt is displayed and the drive light is off.
2. If you are using TRSDOS-16, type:

DISMOUNT <ENTER>

(you do not need to type a "dismount" command if you are using TRSDOS or TRSDOS-II).

3. Remove the diskette and insert the new one.
4. If you are using TRSDOS-16, type:

MOUNT <ENTER>

If you are using TRSDOS-II or TRSDOS, type:

I <ENTER>

If you are changing from one Operating System to another, flip up the RESET switch so that a new start-up message will appear.

FORMATTING A DATA DISK

A disk is initially blank, or "unformatted". The Computer does not recognize it.

Before you can put any information on a disk, you must organize it in a way the Computer can understand. This is called "formatting" it.

To format a disk:

- . load the appropriate operating system
- . enter the FORMAT command

For example, assume you want to format an extra disk to use with a TRSDOS-16 program. This is how to format the disk:

1. Load TRSDOS-16.
2. If the disk you want to format is a floppy diskette, insert it in one of your empty floppy drives. Be sure to cancel its write protection by covering the write-protect notch.

If the disk you want formatted is a secondary hard disk, make sure the write PROTECT button is not illuminated.

3. Type FORMAT followed by the drive number. For example:

To format a floppy diskette in Drive 1, type:

```
FORMAT 1 <ENTER>
```

To format the hard disk in Drive 5, type:

```
FORMAT 5 <ENTER>
```

4. If the disk you want to format contains data, TRSDOS-16 will usually detect this and ask you if you want to format over it. Type:

```
Y <ENTER>
```

only if you are sure you want the information erased. (FORMAT erases any information you have on the disk.)

5. TRSDOS-16 will begin FORMATTing the diskette. As it formats, it will inform you if any of the tracks on the disk are flawed. It automatically "locks" all flawed tracks from being used. When finished, it returns to:

TRSDOS-16 Ready

If it informs you that the FORMAT is aborted, try again using a different disk.

A disk which has been formatted but which does not contain an operating system is called a "data disk". The term "data disk" means that you can use it in your secondary drive for storing information. However, since it does not contain an operating system, you cannot use it in your primary disk drive.

(To format a disk to use with TRSDOS-II or TRSDOS, load the operating system and follow the same steps. Please remember that TRSDOS uses single-sided floppy diskettes only. TRSDOS will not allow you to format a hard disk or a double-sided floppy diskette.)

SECTION 4: MAKING BACKUP COPIES OF DISKETTES

Sometimes part or all of the information on a diskette is lost. This happens when the diskette gets mishandled, worn-out, or a power outage occurs while it is in the drive. To avoid problems, always have at least one BACKUP copy of all diskettes.

This section shows how to use the two BACKUP methods that are available:

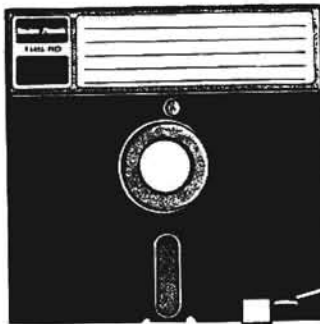
- . **Backing up a TRSDOS-16/TRSDOS-II Diskette** -- use this method on any diskette containing TRSDOS-16 or TRSDOS-II programs or data (such as the Model 16 Systems Diskette)
- . **Backing up a TRSDOS Diskette** -- use this method on on any diskette containing TRSDOS programs or data (such as the Thinline TRSDOS 2.0b diskette and the TRSDOS-II Hard Disk Operating System Initialization Diskette)

BACKING UP A TRSDOS-16/TRSDOS-II DISKETTE

TRSDOS-16 and TRSDOS-II allow you to make BACKUP copies only if you have two or more floppy disk drives. If you have one floppy disk drive and a hard disk drive, copying the data on the diskette to the hard disk serves as a form of backup protection.

New Model 16 Owners please note that TRSDOS-16 and TRSDOS-II allow you to BACKUP a single-sided diskette (such as the Model 16 Systems Diskette) onto a double sided diskette. This allows you to double the diskette's storage capacity.

1. Turn on the Computer system and load TRSDOS-16 or TRSDOS-II.
2. If the "source" diskette you want to BACKUP is not already inserted in a drive, insert it.
3. Insert a "destination" diskette in the next empty drive. (Use a blank or old diskette.) Make sure its write-protect notch is covered.



Covered
write-protect
notch

5. When the "Ready" prompt appears, type BACKUP followed by the drives containing the source and destination diskettes. For example, to BACKUP the diskette in Drive 0 to Drive 1, type:

BACKUP 0 TO 1 <ENTER>

If the destination diskette already contains information, the Computer asks if you're sure you want to change the information. Type:

Y <ENTER>

only if you're positive you don't need the information.

The Computer automatically formats the destination diskette and then copies the source diskette onto it. When finished, it tells you it has completed a successful BACKUP and returns to the "Ready" prompt.

If it displays a message that the BACKUP has been aborted, try again using a different destination diskette.

BACKING UP A TRSDOS DISKETTE

There are three differences between the "TRSDOS" method of BACKing up and the "TRSDOS-16/TRSDOS-II" method:

- . TRSDOS requires that you FORMAT before BACKing up (TRSDOS-16/TRSDOS-II automatically does this).
- . TRSDOS allows you to BACKUP using only one floppy disk drive.
- . You cannot use double-sided diskettes with TRSDOS.

**Backing Up a TRSDOS Diskette
Using Two or More Floppy Disk Drives**

1. Turn on the Computer and load TRSDOS.
2. Insert the source and destination diskettes (unless already inserted).
3. When TRSDOS READY appears, type FORMAT followed by the destination diskette's drive number. For example:

```
FORMAT 1 <ENTER>
```
4. When prompted to mount the diskette for formatting, type:

```
Y <ENTER>
```
5. When TRSDOS READY appears, formatting is complete. Enter the BACKUP command. For example:

```
BACKUP Ø TO 1 <ENTER>
```

causes TRSDOS to BACKUP the diskette in Drive Ø to Drive 1.

**BACKing UP a TRSDOS Diskette
Using Only One Floppy Disk Drive**

1. Turn on the Computer and load TRSDOS.
2. When TRSDOS READY appears, type:

FORMAT Ø <ENTER>

When:

Mount Diskette for Formatting on Drive Ø
Continue? (Y/Q)

appears, insert the destination diskette into Drive Ø and type:

Y <ENTER>

When:

Insert SYSTEM diskette
Press ANY Key to continue

appears, re-insert the diskette containing the TRSDOS operating system in Drive Ø and press a key.

6. When finished formatting the diskette, TRSDOS returns to TRSDOS READY. Type:

BACKUP Ø TO Ø <ENTER>

TRSDOS asks you:

Source Diskette Ready? (Y/Q)

Insert the source diskette (unless it is the diskette already in Drive Ø) and type:

Y <ENTER>

8. After reading some of the information on your source diskette, TRSDOS asks:

Insert DESTINATION diskette - Press ANY key to continue

remove the source diskette and insert the destination diskette.

TRSDOS writes the new information onto it and asks you to:

Insert SOURCE diskette - press ANY key to continue

TRSDOS will ask you to swap diskettes a few times. Follow it's prompts. When finished, it returns to TRSDOS READY.

SECTION 5: MAINTENANCE

DISK MAINTENANCE

Care of Floppy Diskettes

Diskettes are very sensitive. A small indentation, dust particle, or scratch can make all or part of a diskette unreadable -- permanently.

- . Don't turn the Computer system on or off while a diskette is in a drive. Don't place a diskette in a drive while you are turning the system on or off.
- . Store diskettes -- in their envelopes -- in a vertical file folder. Make sure they're protected from pressure to their sides (just as phonograph records should be protected).
- . Keep all diskettes in storage envelopes whenever they're not in disk drives.
- . Keep diskettes away from magnetic fields (transformers, AC motors, magnets, TVs, radios, etc.). Strong magnetic fields, such as the one created by your display console when it's ON, erase the data on diskettes.
- . Never touch a diskette's exposed shiny surfaces.
- . Never try to wipe or clean diskette surfaces -- they scratch easily.
- . Keep diskettes out of direct sunlight and away from heat.
- . Keep diskettes away from cigarette ashes, dust or other particles. In extremely dusty environments, provide filtered air to the Computer room.

- Don't write on the diskette jacket with a hard point device such as a ball point pen or lead pencil. Write on the label before you put it on your diskette, or write with a felt tip pen only.

Labeling Diskettes

Your original operating system and application diskettes have permanent labels on their jackets. Blank (unformatted) diskettes come with labels for you to write on and place on the diskettes' jackets.

Write on them with a felt tip pen only. Don't erase or scratch out information on these labels.

Floppy Disk Drive Maintenance

Your Computer's floppy disk drives need periodic preventative care to prevent damage to your diskettes. Make sure a Radio Shack maintenance person checks your floppy disk drives every six months or less.

Ask the people at a Radio Shack Computer Center about disk drive head cleaning kits.

Hard Disk Drive Maintenance

Hard disk drives don't require the same maintenance as floppy disk drives, but they do require special care. For example, never move your hard disk drives while they're connected or while the spindle lock is unlocked. Also, be sure that the air around your hard disk is as free of dust and other particles as possible.

For details, see your Hard Disk Owner's Manual.

AVOIDING STATIC ELECTRICITY AND POWER-LINE INTERFERENCE

If your diskettes, files, or programs are suddenly unreadable or unusable, static electricity might be the cause. Anti-static carpeting and/or a humidifier should help eliminate this problem.

Another possible cause might be fluctuations in AC power. (Even though the Model 16's built in AC line filter will usually buffer the Computer from these fluctuations.) If you think power fluctuations are the cause, try:

- . Fixing defective switches on nearby machines and appliances.
- . Installing bypass/isolation devices in noisy appliances in your area.
- . Installing a separate power line.

SECTION 7: ERROR MESSAGES

There are three kinds of error messages you might get while using your Computer:

1. operating system errors, such as ERROR 24 or FILE NOT FOUND. To get a brief description of a numbered error, type ERROR followed by the number. For example, type:

```
ERROR 31 <ENTER>
```

and your screen will show:

```
PROGRAM NOT FOUND
```

See Table 1 for a description of these errors.

2. boot errors, such as BOOT ERROR DC. See Table 2.
3. application program errors -- see your application program manual.

When an error message is displayed:

- . Try the operation several times.
- . Look up boot errors and operating system errors in Table 1 and take the recommended actions. See your application program manual for explanations of application program errors.
- . Try using other diskettes.
- . Reset the Computer and try the operation again.
- . Check all the power connections.

- . Check all interconnections.
- . Remove all diskettes from drives, turn off the Computer, wait 15 seconds, and turn it on again.
- . If you try all these remedies and still get an error message, contact a Radio Shack Service Center.

If there is more than one error message, the Computer might wait until you correct the first error before displaying the second error message.

TABLE 1/ OPERATING SYSTEM ERRORS

This table highlights two types of operating system errors:

- . the unshaded errors are usually caused by improper operation of the system and can normally be corrected by the operator.
- . the shaded errors are errors in the program and must be corrected by the programmer.

DESCRIPTION	ERROR CODE	EXPLANATION/ACTION
68000 Memory Fault at Page Address= xxxxxxx	--	See Table 2
Attempt to open a file which hasn't been closed.	6	Close file before re-opening.
Attempt to read past end of file.	28	Record Number specified is past the EOF.
Attempt to use a non program file as a program.	34	File specified for execution is not a program file or an illegal load address was given.
Bad CRT number.	133	For multi-user only.
Bad function code on SVC call or no function exists.	1	Check function code number used on an SVC call.
Bad partition number.	132	For multi-user only.
Bad SVC-Block format.	129	Check format of SVC-block for errors.
BOOT ERROR		See Table 2.

CRC error during disk I/O (input/output) operation.	4	Try operation again, using a different diskette. If problem occurs frequently call the Radio Shack Service Center.
Character not available.	2	No record or character was available when the SVC was called.
DCB is modified and is unusable.	16	DCB (used in machine-language programming) has been modified since last disk access (while the file was open).
Data lost during disk I/O (input/output). Hardware fault.	14	Contact a Radio Shack Service Center.
Debug Not Configured.	135	Include Debug at configuration time.
Device not available.	136	For multi-user only.
Device Unassigned.	137	For multi-user only.
Directory read error.	17	Error occurred while trying to read directory. Use a different diskette.
Directory space full.	26	Number of filenames exceed the amount set when diskette was formatted.
Directory write error.	18	Error occurred while trying to write to the directory. Use a different diskette.
Disk space allocation can't be made because of	33	Use a different diskette or copy files to a clean diskette to reduce

fragmentation of space (not used on TRSDOS-II).		fragmentation.
Disk space full.	27	No available space on diskette.
Disk drive not ready.	8	Drive door open or diskette not in drive. If you have a New Model 16, use the Thinline TRSDOS 2.0b.
Disk is write protected.	15	Use a diskette with a write-enable tab on it.
Disk sector not found.	5	Try a different diskette
DO-Nesting not allowed.	128	A 'DO' command was encountered within a DO file.
File access denied due to password protection.	25	Incorrect password given for protection level -- See ATTRIB in the Model 16 Owner's Manual.
File already in directory.	11	Filename already exists as a directory entry. Kill existing file (with the KILL command) or choose another filename.
File not found.	24	Filename given not found on available diskettes or file is incorrect type for desired operation.
Hardware fault during disk I/O (input/output).	49	Contact a Radio Shack Service Center.
I/O (input/output) attempt to an unopen file.	38	Open file before access.

Illegal I/O (input/output) attempt.	39	On New Model 16, use Thinline TRSDOS 2.0B Can also be caused by an attempting to access a differently formatted diskette. Format diskette under current operating system or use FCOPY.
Illegal Address.	131	SVC block or SVC argument is not within the memory range.
Illegal device name.	138	Device name specified for ASSIGN not valid.
Illegal disk change.	7	The system detected an illegal disk swap.
Illegal File Type	144	File type used is not the type required by the system (VLR or FLR).
Illegal operation	134	For multi-user only.
Improper file name (filespec).	19	Filespec given does not meet TRSDOS standard file specifications. (see the Owner's Manual)
Incorrect command parameter.	48	Option or argument given in command is incorrect.
Invalid data provided by caller.	9	Data stream to be processed has illegal characters.
Invalid Space Descriptor	50	Try a different diskette
Maximum of 16 files may be open at once.	10	Too many files opened at one time.
Memory fault during	35	Program not loaded

program load.		correctly, possibly because of faulty memory or because a bad load address was given.
No drive available for an open.	12	No on-line drive is: a) write enabled or b) has enough space to create a new file.
No error found.	0	No error occurred.
No more extents available (16 maximum). (not used on TRSDOS-II)	30	Data on diskette too fragmented, copy files to a clean diskette.
Not applicable to VLR type files.	46	Operation performed not valid for VLR files.
Odd address.	130	Address required by SVC block must be even.
Open attempt for a file already open.	37	File specified for open is already open.
Parameter error on call.	3	Parameter incorrect or required parameter (option) missing.
Parameter for open is incorrect.	36	Check OPEN statements or DCB for errors.
Program not found.	31	Program specified not found on available volumes.
Printer fault (may be turned OFF).	44	Check connections, power, ribbon, etc.
Printer not available.	45	Check connections, power, ribbon, etc.
Printer not ready.	42	Check connections, power,

		ribbon, etc.
Printer out of paper.	43	Check printer's paper supply.
Read attempt outside of file limits.	29	Use valid record numbers.
Required command parameter not found.	47	Required option or argument missing in command.
SEEK error.	40	Data cannot be read from diskette -- faulty media. Try a different diskette.
SVC Table Overflow	143	For multi-user only.
Unknown drive number (filespec).	32	Drive number specified not a valid drive number.
User Stack Overflow	139	Overflow occurred in user stack during SETBRK SVC or SETTRP SVC operation.
Write attempt to a read only file.	13	File was opened for read only, not read/write.
Write fault on disk I/O (input/output).	14	Error occurred during a write operation -- try a different diskette. If problem continues, contact Radio Shack Repair Center.

TABLE 2/ BOOT ERRORS

ERROR CODE	DESCRIPTION	ACTION
BOOT ERROR CK	Defective ROM (Checksum Error)	Contact a Radio Shack Service Center
BOOT ERROR CT	Defective CTC Chip	Contact a Radio Shack Service Center
BOOT ERROR DC	<ol style="list-style-type: none"> 1. Defective diskette. 2. Floppy disk expansion unit not on. 3. Defective FDC Chip or Drive. 	<ol style="list-style-type: none"> 1. Try a different diskette. 2. Turn on floppy disk expansion unit. 3. Contact a Radio Shack Service Center.
BOOT ERROR DM	Defective DMA Chip	Contact a Radio Shack Service Center
BOOT ERROR D0	Drive not ready. <ol style="list-style-type: none"> 1. Improperly inserted diskette. 2. Defective diskette. 3. Defective drive. 	<ol style="list-style-type: none"> 1. Insert diskette again and reset the Computer. 2. Try a different diskette. 3. Contact a Radio Shack Service Center.
BOOT ERROR HA	Controller Error. Aborted command: Problem during boot-up of hard disk.	Re-initialize hard disk or contact a Radio Shack Service Center.
BOOT ERROR HC	CRC Error. Invalid data in data field.	Re-initialize hard disk or contact a Radio Shack Service Center.
BOOT ERROR HD	Controller Error.	Re-initialize hard

	Busy not reset.	disk or contact a Radio Shack Service Center.
BOOT ERROR HI	CRC Error. Invalid data in ID field.	Re-initialize hard disk.
BOOT ERROR HM	Data address mark not found.	Re-initialize hard disk
BOOT ERROR HN	ID not found. No Boot Track.	Re-initialize hard disk
BOOT ERROR H0	Track 0 Error on hard disk 1. Didn't find Track 0 before time-out. 2. Secondary hard disk drives not turned on	1. Reset the Computer 2. Turn on your secondary hard disk drives
BOOT ERROR HT	Time-out while waiting for READY. 1. Hard disk drive not powered up. 2. hard disk Drive isn't turned ON and ready-within 10 seconds after Computer. 3. hard disk Drive is disconnected.	1. Follow correct power up procedure: turn on hard disk first. 2. Reset the Computer 3. Connect the hard disk drive or operate under floppy disk control
BOOT ERROR LD	Lost Data during read -- FDC (Floppy Disk Controller) or	Try another TRSDOS diskette or contact a Radio Shack Service Center.

	Drive fault.	
BOOT ERROR MF	Defective RAM in address range X'1000'-X'7FFF'.	Contact a Radio Shack Service Center.
BOOT ERROR MH	Defective RAM in address range X'8000'-X'FFFF'. (64K Computers only)	Contact a Radio Shack Service Center.
BOOT ERROR ML	Defective RAM in address range X'0000'-X'0FFF'.	Contact a Radio Shack Service Center
BOOT ERROR PI	Defective PIO Chip	Contact a Radio Shack Service Center
BOOT ERROR RS	The diskette in Drive 0 is not Radio Shack Model 16 or Model II Operating System format.	<ol style="list-style-type: none"> 1. Insert a TRSDOS, TRSDOS-II or TRSDOS-16 formatted diskette into Drive 0 and reset the Computer. 2. Remove diskettes and turn power off. Wait 15 seconds and turn on the system again.
BOOT ERROR SC	CRC Error. Invalid data on diskette or defective diskette.	Try a different diskette.
BOOT ERROR TK	Record not found on bootstrap track. Improperly formatted or defective diskette.	Re-format your diskette or try a different diskette.

BOOT ERROR Z8	Defective CPU.	Contact a Radio Shack Service Center
(68000 Memory Fault at Page Address=xxxxxxx)	Memory Fault. xxxxxx is the hexadecimal address of 1K block where fault occurred.	Contact a Radio Service Center

SECTION 9: ADD-ONS

Radio Shack has many computer products to make your system more efficient and useful. A few of them are described in this section. Ask the people at a Radio Shack Computer Center for more information.

- Memory Boards (for the 68000 processor) *
- Hard Disk Interface Board and Hard Disk(s) *
- High Resolution Graphics Board and diskette Printer *
- Additional floppy disk drives

* You can add only two of these extras.

More Memory**128K BYTE MEMORY BOARDS AND CHIP KITS**

Every Model 16 has at least 128K bytes of RAM (Random Access Memory) for access by the 68000 processor. You can add additional RAM -- up to a maximum of 512K bytes (256K for Enhanced Model IIs) in 128K byte increments -- by purchasing 128K Byte Memory boards and chip kits.

More Storage And Less Time**SECOND INTERNAL DISK DRIVE -- for Model 16s only**

One floppy disk drive added to your Model 16 gives you more than one million bytes (about 600 double-spaced typewritten pages) of additional on-line storage. Have the people at the Radio Shack Service Center add one more internal drive.

DISK EXPANSION UNIT -- For Enhanced Model II's only

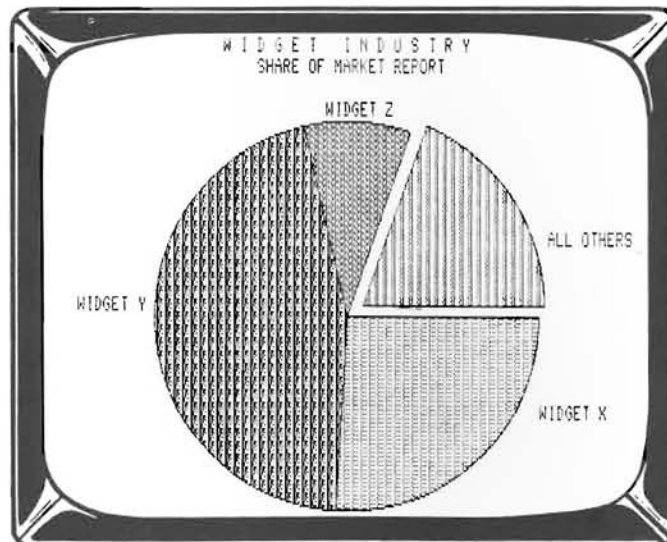
Increase the on-line storage capacity and the efficiency of your Enhanced Model II by adding a Model II disk expansion unit. You can add 1 to 3 single-sided floppy disk drives this way for a maximum of four single-sided floppy disk drives -- up to 2.5 mega-bytes of on-line storage!

Even More Storage At Faster Speeds

HARD DISK INTERFACE BOARD AND HARD DISK DRIVE

A hard disk drive supplies up to 8.9 mega-bytes of storage. You can add a maximum of 4 hard disk drives to your system. Not only do hard disk systems provide more storage, but it's also less likely that data stored on hard disk will be accidentally erased. It's faster too!

Graphics

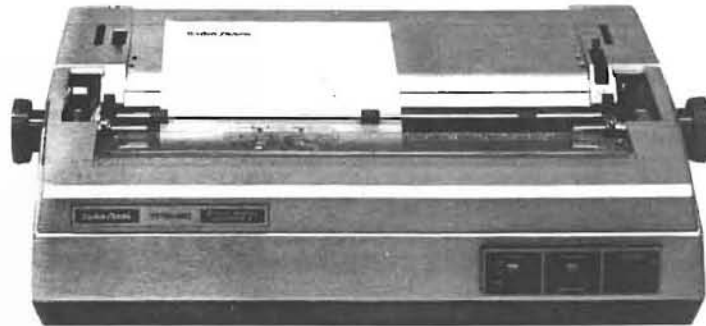


If words can't say what you want to express -- try graphics! Just look at what Radio Shack's High Resolution Graphics Board and Diskette can do: bar graphs, pie graphs, circles,

ellipses, squares -- just about any kind of pattern you want to create. And one of our special graphics printers will allow you to print out your computer-display illustrations.

Communication Beyond The Display

PRINTERS



You can connect your TRS-80 Microcomputer to a variety of Radio Shack serial or parallel printers. Contact your local Radio Shack Computer Center for details.

TRS-80 MODEM II

Use the TRS-80 Modem II for computer-to-computer communication. Contact your local Radio Shack Computer Center for details.

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