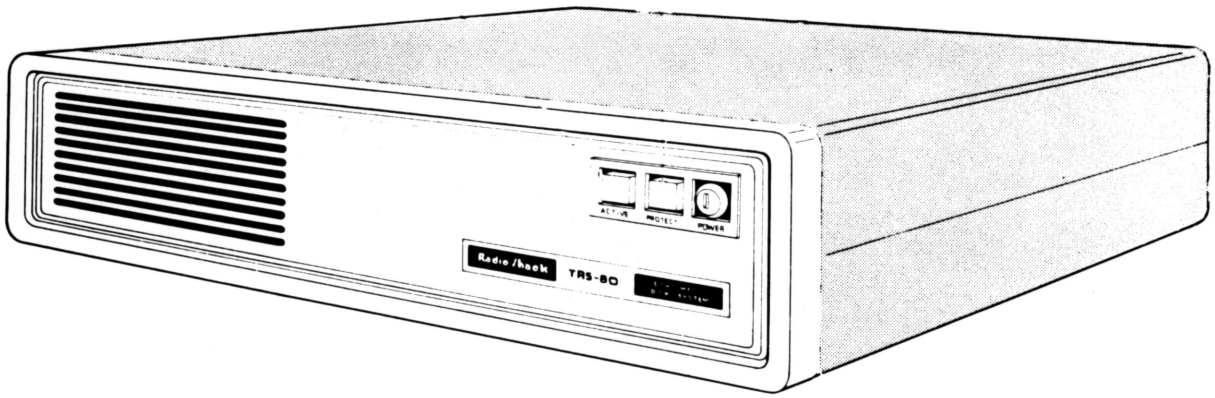
Catalog Number 26-4150

TRS-80®

Hard Disk Owner's Manual



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FORT WORTH, TEXAS 76102

The FCC wants you to know....

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense wil be required to take whatever measures may be required to correct the interference.

Important Note!

Never move the Disk Drive unit while the drive is running! Permanent damage to the Drive or Disk may occur if you do move the unit while it is running.

If you do find it necessary to move a Disk Drive unit, be sure the Spindle Lock (located on the bottom on the unit) is locked before you move the Disk Drive!

To lock the Spindle, follow the instructions on the bottom of the Drive. Do not turn the Disk Drive upside down! (Then be sure to unlock the Spindle before you begin using the Disk Drive again.)

Also, do not expose a Disk Drive unit to a strong magnetic field (such as a bulk eraser); doing so may cause you to lose data or damage the unit. You cannot bulk erase a hard disk!

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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.

Read the following before going ahead...

It's important to note that your TRS-8Ø Computer will need a hardware modification before you can connect a Hard Disk to it. This must be done by a qualified Radio Shack service technician. Also, the last Hard Disk Drive in your System must always contain a Line Terminator. Check with your Radio Shack Computer Center for details.

Never move the Disk Drive Unit while the Drive is running!

If you do find it necessary to move a Disk Drive Unit, be sure the Spindle Lock (located on the bottom of the unit) is locked before you move the Disk Drive! (Then be sure to unlock the Spindle before you begin using the Disk Drive again.)

Also, do not expose a Disk Drive Unit to a strong magnetic field (such as a bulk eraser); doing so may cause you to lose data or damage the unit. You cannot bulk erase a Hard Disk!

To Our Customers...

Congratulations on your purchase of the TRS-8Ø Eight Meg Hard Disk System. You'll find it to be a valuable tool which gives you more information storage and faster data retrieval than ever before with a TRS-8Ø Computer.

To use the Hard Disk System, you'll need a Model II that has 64K of RAM memory or a Model 16 that has 128K of RAM memory.

It's important to note that your Computer will need a hardware modification before you can connect a Hard Disk to it. This must be done by a qualified Radio Shack service technician. Also, the last Hard Disk Drive in your System must always contain a Line Terminator. Check with your Radio Shack Computer Center for details.

This manual will explain:

- What a TRS-8Ø Hard Disk System is.
- How to connect a Hard Disk to your Computer.
- How to power-up and use a TRS-8Ø Hard Disk System.
- How the Hard Disk Operating System (called TRSDOS-II) differs from Floppy Disk TRSDOS 2.Øa (referred to simply as TRSDOS from now on).

and much more!

If you're already familiar with Model II TRSDOS, you'll find TRSDOS-II easy to use. We'll try not to repeat too much of the information found in your Model II Owner's Manual--just tell what's new or what's changed. You'll still need to refer to your Computer's Owner's Manual and any other publications you've been using with your Model II or 16.

TRSDOS-II has been designed to be fully compatible with all Radio Shack programs, including Model II and Model 16 BASIC, COBOL, EDTASM, etc.

Notational Conventions

The following conventions are used to show syntax in this manual:

CAPITALS	Any words or characters which are uppercase must be typed in exactly as they appear.
lowercase underline	Fields shown in lowercase underline are variable information that you must substitute a value for.
<KEYBOARD>	Any word or character contained within a box represents a keyboard key to be pressed.
...	Ellipses indicate that a field entry may be repeated.
filespec	A field shown as filespec indicates a standard TRSDOS file specification of the form: filename/ext.password:d(diskette name) Note that with TRSDOS-II, d (Drive) can be any number between Ø-7.
punctuation	Punctuation other than ellipses must be entered as shown.
delimiters	Commands must be separated from their operands by one or more blank spaces. Multiple operands, where allowed, may be separated from each other by a comma, a comma followed by one or more blanks, or by one or more blanks. Blanks and commas may not appear within an operand.

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Operation

Introduction

The Radio Shack TRS-8Ø Hard Disk is a non-removable direct access, mass storage device designed for use with the TRS-8Ø Model II or Model 16.

Radio Shack provides two versions of the Hard Disk Drive--your Model II/16 Hard Disk System must include one Primary Drive and may include up to three Secondary Drives.

You'll find the Hard Disk System provides more storage and faster access than Floppy Diskette Systems. Its special features include:

- Maximum storage capacity of 8.9 megabytes.
- 4.34 Mbits/second data transfer rate which is at least 1Ø times faster than floppy diskettes.
- Environmentally sealed head and disk chamber for safer data storage and longer disk life.
- Keyed power switch for minimum security and prevention of data loss due to inadvertent power-off.
- Write-Protect Switch so you don't accidentally write over stored data.
- An enhanced floppy diskette data storage format that lets you store more information on an 8" diskette than ever before.

1/A Brief Description of the System

The TRS-8Ø Hard Disk System consists of the following major components:

- TRS-8Ø Model II or Model 16 (includes one or two built-in Floppy Disk Drives -- Drives Ø and 1).
- Floppy Diskette Expansion Unit (optional/extra). You can have up to three floppy diskette expansion drives in your Hard Disk System (Drives 1, 2, and 3).
- Primary Hard Disk Drives. You will need one Primary Unit (Drive 4).
- Secondary Hard Disk Drives (optional/extra). You can have up to three Secondary Drives in your Hard Disk System (Drives 5, 6, and 7).

You can also use any optional add-ons (printers, modems, etc.) that are used with a Model II or Model 16 when it's operating under floppy disk control. (See your Model II or Model 16 Owner's Manual for details.)

What Is A Hard Disk?

Unlike a floppy diskette, a hard disk cannot be removed from it's drive. With minor exceptions, however, the only difference you should notice between hard disk and floppy diskettes is that a hard disk drive has faster access time and more storage space than floppy diskettes.

There are two versions of the Eight Meg Hard Disk Drive -- a Primary Drive which contains TRSDOS-II, the Hard Disk Operating System (once the Primary Drive is initialized) and up to three Secondary Drives which are used for data and program storage.

Basically, the Hard Disk Unit consists of two platters (or disks) spaced approximately one inch apart. There are four Read/Write heads (one on each side of each platter) which move toward or away from the center of the disk as needed.

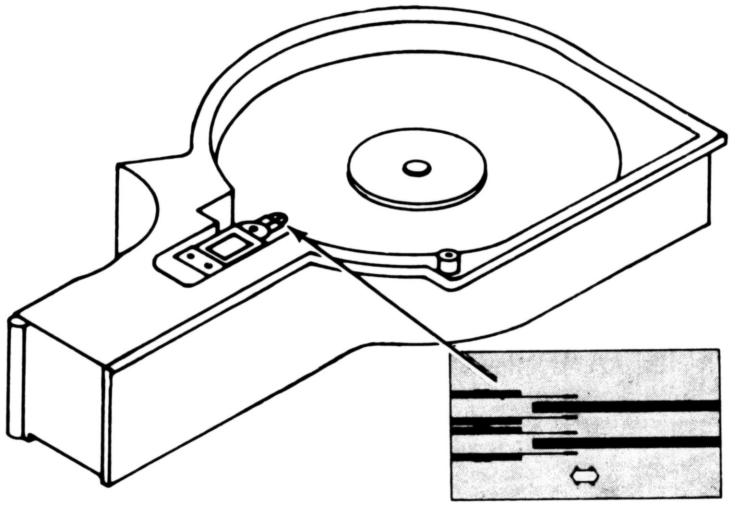


Figure 1. 8" Hard Disk

The Disks and Read/Write Heads are fully enclosed in a sealed chamber. A special air filtration system prevents dust and other particles which might destroy data from reaching the disks. There is also a separate filtering system that permits pressure equalization with the "outside" air pressure.

To store information, each hard disk unit is organized into 256 "cylinders."

Each cylinder is made up of four tracks that have the same radius on each of the four surfaces (4 x 256 = 1Ø24 total tracks per disk).

Each track contains 34 sectors (34 x 1Ø24 = 34,816 total sectors per disk).

Each sector is made up of 256 bytes (256 x 34,816 = 8,912,896 total bytes per disk). A sector is the most basic unit of space allocation on the hard disk. Note that granules (the basic unit of space allocation on the floppy diskette) are not used by the hard disk or floppy diskettes formatted under the Hard Disk Operating System.

Tables 1 and 2 show the difference in storage space between hard disk and floppy diskettes.

Hard Disk	Cylinders	Tracks	Sectors	Bytes
1	256	1,Ø24	34,816	8,912,896
---	1	4	136	34,816
---	---	1	34	8,7Ø4
---	---	---	1	256

Table 1

Floppy Diskette	Tracks	Sectors	Bytes
1	76	2,432	622,592
---	1	32	8,192
---	---	1	256

Table 2

Note: Track Ø on the 8-inch floppy diskette is reserved for System use and is not available for user storage. It is formatted single density with 26 sectors that contain 128 bytes each. The total capacity of the floppy diskette is 661,5Ø4 + (3,328) = 664,832 bytes.

Each Primary Hard Disk Drive has a minimum of 8.5 megabytes of user storage while each Secondary Drive has approximately 8.8 megabytes of user storage. (In other words, TRSDOS-II takes up to 4ØØK bytes of storage area on Drive 4.)

It's important to note that hard disks have their own, built-in error detection and correction scheme. These errors are due to minor defects in the media as well as signals from external sources. There will be no more than 12 tracks per head with defects. Of these 12 tracks, no more than four tracks will contain mulitiple errors.

On all Hard Disk Units, flaws in the media are identified before the Disk Drives are delivered to you. Attached to the bottom of your Hard Disk Unit is a DISK FLAW RECORD which specifies the errors on your particular unit. **Do not throw this map away!** You may need to refer to it when

formatting the Disk and Radio Shack service technicians may need to refer to it if your Drive ever needs servicing.

What Happens To Your Floppy Diskette?

When the TRS-8Ø Hard Disk System is fully operational, all Floppy Diskette Drives -- including Drive Ø -- are used for data and program storage only (for exceptions, see INIT and FCOPY).

One difference between a TRS-8Ø Floppy Diskette System and a TRS-8Ø Hard Disk System is the Computer goes to Drive 4 first (instead of Drive Ø) when searching for the operating system or any other file (once Drive 4 is initialized). In fact, with TRSDOS-II, the search sequence always begins at Drive 4, then goes to Drives 5, 6, 7, Ø, 1, 2, and finally 3. (In other words, if you give a command such as KILL TEST/A, TRSDOS-II will look for the file named TEST/A on Drives 4, 5, 6, 7, Ø, 1, 2, and 3 -- in that order).

Can you still use your Floppy Diskette programs under TRSDOS-II?

Yes, but...

There's more involved than just inserting a diskette into a drive and running the program.

Floppy diskettes formatted under TRSDOS-II are different from floppy diskettes formatted under TRSDOS.

TRSDOS-II formats floppy diskettes into 32 sectors per track instead of the TRSDOS floppy diskette 26 sectors per track. These additional sectors are due to a more efficient use of diskette media, allowing more storage space on the same size diskettes.

What this means is you can copy (see FCOPY) data which is stored on TRSDOS floppy diskettes to either a hard disk or to a TRSDOS-II formatted floppy diskette. But it also means **you can't read or write to a TRSDOS formatted floppy diskette (26 sectors) directly with TRSDOS-II.** Nor can you use an TRSDOS-II formatted floppy diskette (32 sectors) when you are operating under TRSDOS floppy diskette control.

If your Computer is operating under TRSDOS-II and you want to return to TRSDOS floppy diskette control, press RESET. Then **immediately** press the key-combination of <REPEAT> <BREAK> or <REPEAT> <ESC> during "white-out." You can then begin floppy diskette control as described in your Model II Owner's Manual.

Note that when TRSDOS (floppy diskette) is in control, it is impossible to access the Hard Disk Drives.

Connections

Although the Hard Disk System must be installed by a Radio Shack computer technician, there may be times when you'll have to connect or disconnect the Disk Drive Units. It is very important that the drives be properly connected to the Computer as well as to each other. Carefully study the following section for proper connections.

Important Note! Never move the Disk Drive Unit while the drive is running! Permanent damage to the drive may occur, resulting in the loss of information or replacement of the disk.

If you do find it necessary to move a Disk Drive Unit, be sure the Spindle Lock (located on the bottom of the unit) is locked before you move the drive unit! To lock the Spindle, follow the instructions on the bottom of the drive. Do not turn the disk drive upside down! (Then be sure to unlock the Spindle before you begin using the disk drive again.)

While the minimum requirements for a TRS-8Ø Hard Disk System are a Computer (with 64K of RAM) and Drive 4, you'll eventually want to expand your System to include up to three Secondary Drives.

When you're ready to expand beyond the Primary Drive, simply take Drive 4 to your Radio Shack Computer Center for modification and add Drive 5 (which contains a Line Terminator) to your System. If you later want to add Drives 6 and 7, see your Radio Shack Computer Center for details on expanding the System.

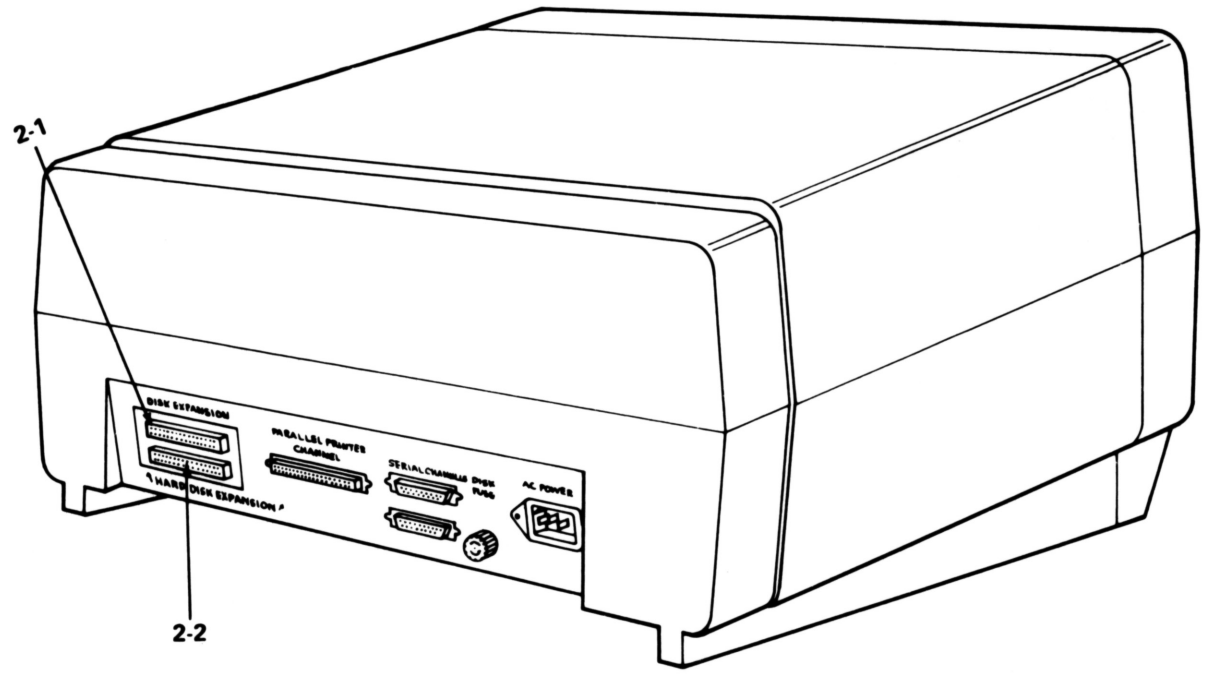


Figure 2. TRS-8Ø Connection Panel

2-1. Floppy Diskette Expansion Jack (5Ø-pin). One end of the Floppy Diskette Expansion Cable should be connected to this jack and the other end attached to the Floppy Diskette Expansion Drive (Drive 1).

Note: If Floppy Disk Expansion Drives are not connected, you must insert a Terminator Plug into this jack. If your system requires one, one will be included; otherwise you do not need to use a Terminator Plug.

2-2. Hard Disk Expansion Jack (5Ø-pin). Connect one end of a Hard Disk Expansion Cable to this jack. The other end should be connected to the Hard Disk Primary Drive (Drive 4).

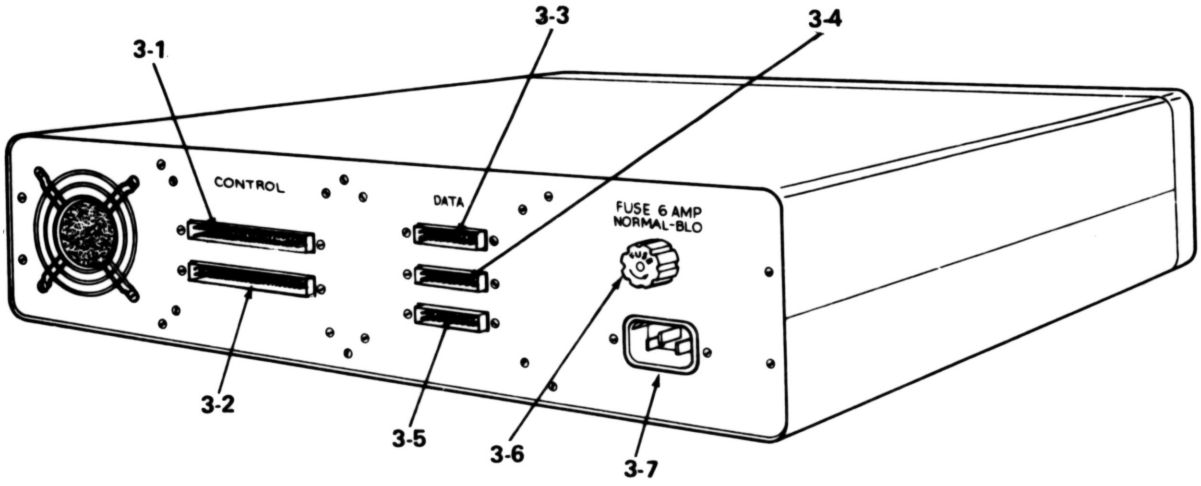


Figure 3. Primary Drive (26-415Ø) (Rear View)

3-1. Hard Disk Expansion Jack (5Ø-pin). Connect the Hard Disk Expansion Cable from the Computer to this jack (Drive 4).

3-2. Secondary Drive Expansion Jack (5Ø-pin). Connect one end of a Secondary Hard Disk Expansion Cable to this jack.

3-3. Drive 5 Data Jack (2Ø-pin). Connect one end of the Data Cable for the Secondary Drive you've labeled as Drive 5 to this jack.

3-4. Drive 6 Data Jack (2Ø-pin). Connect one end of the Data Cable for the Secondary Drive you've labeled as Drive 6 to this jack.

3-5. Drive 7 Data Jack (2Ø-pin). Connect one end of the Data Cable for the Secondary Drive you've labeled as Drive 7 to this jack.

3-6 Fuse.

3-7 Power Cord Connector.

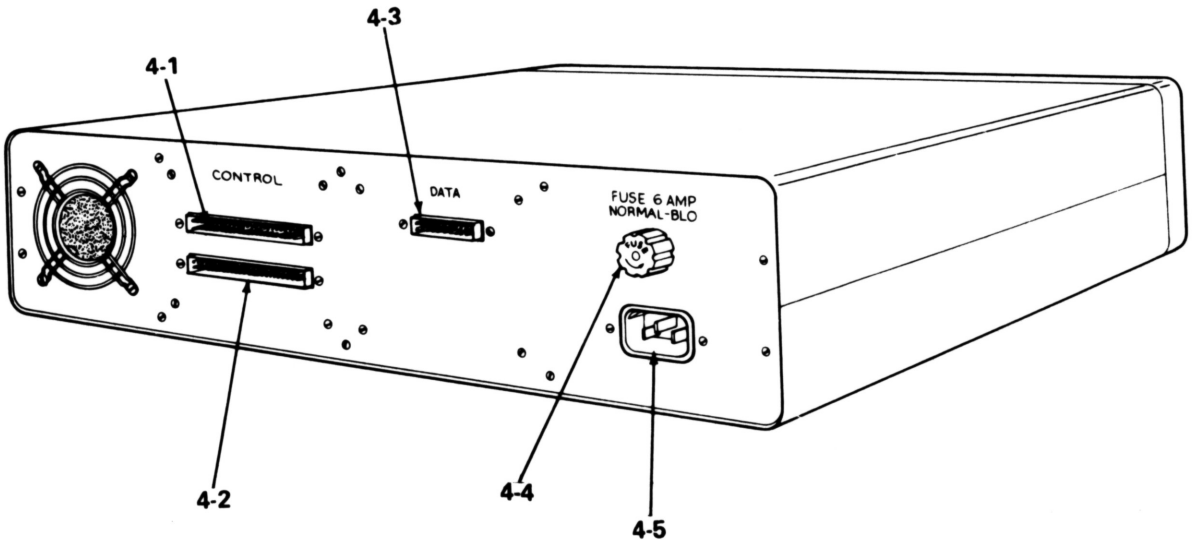


Figure 4. Secondary Drive (26-4151) (Rear View)

4-1. Secondary Drive Expansion Jack (IN) (5Ø-pin). Connect the Hard Disk Expansion Cable from the next lower numbered drive to this jack.

4-2. Secondary Drive Expansion Jack (OUT)(5Ø-pin). Connect the Hard Disk Expansion Cable which goes to the next higher numbered drive to this jack.

4-3. Data Cable (2Ø-pin). Connect the Data Cable from the Primary Drive to this jack.

4-4 Fuse.

4-5 Power Cord Connector.

When the complete system is properly connected, it should look like Figure 5.

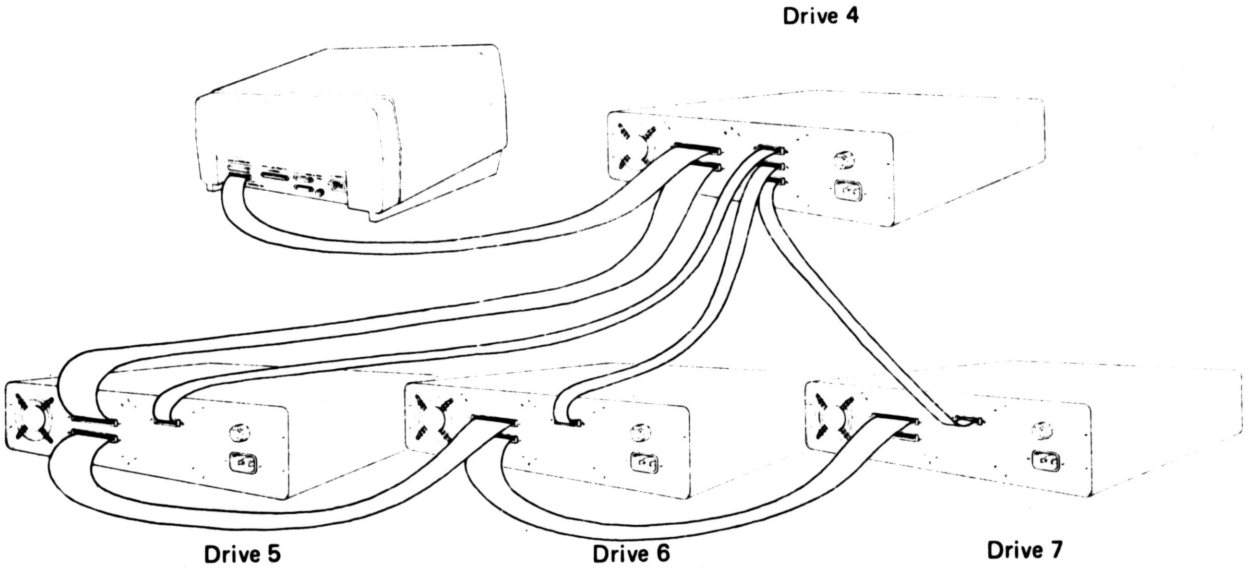


Figure 5. Hard Disk System (with optional drives).*

*Cables shown do not represent actual cable length. Also, multi-drive systems may be "stacked" to conserve space.

2/Using the Hard Disk Drive

Once the System is properly connected, it is relatively simple to use the Hard Disk Drive. Figure 6 details the controls found on the front panel of the Hard Disk Unit.

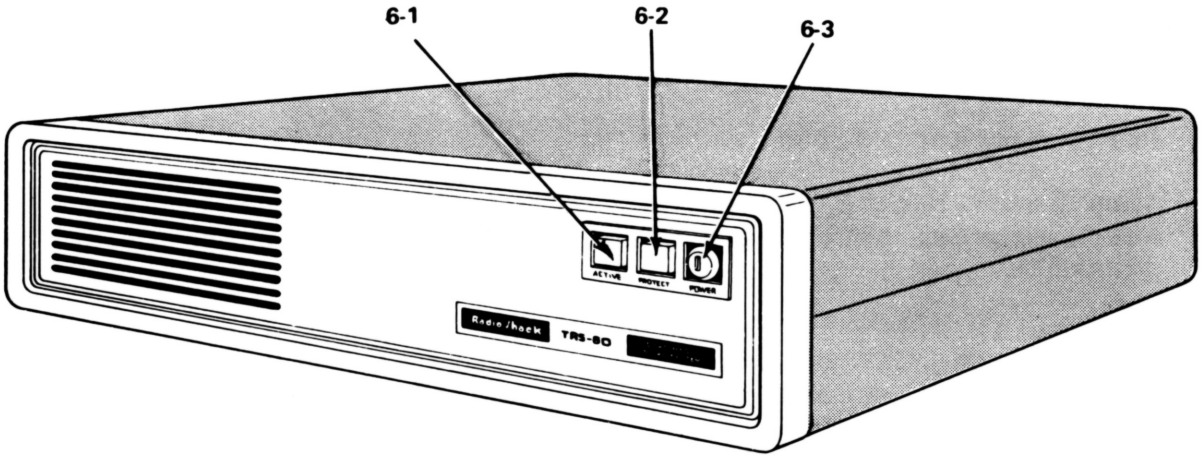


Figure 6. Eight Meg Disk Drive (Front View)

6-1. Drive Active Light (Green).

6-2. Write-Protect Switch (Red).

6-3. Power Switch.

Drive Active Light

When this light is illuminated, the Drive is being used or is ready to be used.

In other words, the Active Light is on whenever the Read/Write heads are stationary and a drive has been selected.

When you power-up, the Drive 4 Active Light will light up and remain illuminated until another drive is accessed.

Under no conditions should more than one Active Light in the System be on at any one time. If you have a multi-drive System, more than one light may appear to be on (or off) under extreme "seek" operations but, in reality, only one light is on. If more than one light actually is on, turn the System off, wait a few minutes and turn the System on again. If the problem recurs, contact a Radio Shack service technician.

Write-Protect Switch

The Write-Protect Switch serves the same purpose for the hard disk as the Write-Protect notch serves for the floppy diskette.

When this Switch is illuminated, you cannot write to the drive (although you can read from it). If you try to write to a write-protected drive, an ERROR 15 will occur.

Press this button once to light up (write-protect), once more to turn the light off (so you can write to the disk).

Although the Write-Protect Switch may be pressed at any time, we suggest you press it only when the drive is in the idle state (not reading or writing). If you press the Write-Protect when the Computer is "writing" to the hard disk, data may be lost or destroyed.

When you power-up, the Write-Protect Switch is at the same setting as when the drive was last used.

Power Switch

You must use a key to turn the disk drive on or off. Turn the key clockwise to turn the Drive ON. Turn the key counterclockwise to turn the Drive OFF. (See Figure 7)

OFF ON

Figure 7. Power Switch

You'll find it's a good idea to power-up the System, then remove the key until you're ready to turn the entire System off.

Note that the key is used for minimum security only. If you lose this key, you can obtain another one from the nearest Radio Shack Computer Center since all Radio Shack Hard Disk Drives use the same key.

Power-Up

1. Be sure all floppy diskette drives are empty and all components are turned OFF.
2. Turn Drive 4 (the Primary Drive) ON.

   Be sure Drive 4 is turned ON first or data may be lost or destroyed.

3. Turn all Secondary Drives ON. Allow 1 minute warm-up for the Disk Drives.
4. Turn your Computer ON.

5. Turn all peripherals (including Floppy Disk Expansion Unit) ON.

   If your operating system is stored on Hard Disk (TRSDOS-II), the Computer will go to Drive 4 and automatically load the operating system. You can then begin using your Model II/16 System as described in the Owner's Manual.

   If Drive 4 hasn't been INITialized (or you've had a problem and are re-INITializing it), the display will "white out" and the message BOOT ERROR HN will appear. Press RESET, then press <REPEAT> <ESC> or <REPEAT> <BREAK> and control will go to Drive Ø (under Floppy Disk control). You will then need to INITialize (format) Drive 4 (see INIT later in this section) or use the Floppy Disk TRSDOS Operating System.

When turning the power OFF...

Always be sure Drive 4 (the Primary Drive) is the last Disk Drive turned off. If Drive 4 is not the last Drive turned off, data may be lost or destroyed. For example:

1. Turn all peripherals (including Floppy Disk Drives) OFF.
2. Turn all Secondary Hard Disk Drives (Drives 5-7) OFF.
3. Turn the Primary Drive (Drive 4) OFF.
4. Turn the Computer OFF.

Preparing Drive 4 For Use (INIT)

When the Hard Disk System is installed, all hard disk drives are effectively "blank." Consequently, each drive (Drive 4 and all Secondary Drives) must be formatted before the Hard Disk System can operate under hard disk control.

Once the System is powered-up, you must initialize the Primary Drive by transferring the operating system (TRSDOS-II) to Drive 4. To do this, use the command **INIT**, which is contained on the 2.Øa TRSDOS diskette (labeled **Hard Disk Operating System** and supplied with the Hard Disk). Note: We suggest you make a backup copy of the supplied diskette before you begin transferring the operating system to Drive 4.

INIT
Transfer TRSDOS-II To Drive 4

INIT {options}

options is one or more of the following:

ABS tells TRSDOS not to tell you if the destination disk drive contains data. If ABS is omitted, TRSDOS will always warn you before overwriting any data already existent on the hard disk.

ID= disk-name tells TRSDOS the name to assign to the disk. If omitted, TRSDOS will be used.

PW= password tells TRSDOS the master password to assign to the disk. If omitted, PASSWORD will be used. The master password allows access to all user files (via the PROT command).

DIR= cylinder-number tells TRSDOS where to place the primary directory. cylinder-number may be any number between 1-251. If omitted, 13Ø will be used.

ALT= cylinder-number tells TRSDOS where to place the alternate directory. cylinder-number can be any number between 1-251. If ALT=ØØ, an alternate directory will not be created. If omitted, the directory cylinder + 3 will be used.

SIZ= nnn tells TRSDOS how many filenames to allow for in the initial directory. nnn can be any number between 1-122Ø. INIT will always round the specified number to the next greater multiple of 8. If omitted, 336 is used.

Note: SYSTEM/SYS requires two cylinders following the directory.

INIT allows you to specify placement of both main and alternate directories and the size of the initial directory. The only time you will be able to specify the directory size and placement is when you use INIT. (Information about the directories may be found in the Model II/16 Owner's Manual under **FORMAT**.)

If you want to change the size and placement of directories, you will have to INIT again. However, if you have data or programs stored on Drive 4, you will need to COPY or SAVE that information to another drive since INIT will erase the entire disk each time INIT is specified.

Note that INIT will only work with a Primary Drive (Drive 4). Do not attempt to use INIT with a Secondary Drive (Drives 5, 6, or 7) -- use **FORMAT** instead.

Once your Computer has been modified and all Hard Disk Drives have been properly connected, follow this procedure to initialize Drive 4:

1. Power up your System as described earlier.

2. The error message **BOOT ERROR HN** will be displayed. Press RESET then <REPEAT> <BREAK> or <REPEAT> <ESC>.

   If Drive 4 has previously been INITialized and if you wish to re-INIT, you will need to insert the floppy diskette containing the INIT program into Drive Ø and start-up the System under control of floppy diskette TRSDOS as described earlier. (The INIT program takes about 15-2Ø minutes to run.)

3. When the prompt **INSERT DISKETTE** appears, insert the supplied floppy diskette (labeled **Hard Disk Operating System**) into Drive Ø and close the drive door.

4. Answer the date and time prompts as described in your Computer's Owner's Manual.

5. When **TRSDOS READY** appears, type **INIT**, specify any options, and press <ENTER>. (INIT <ENTER> by itself will use the default values described earlier.)

   The INIT program will then load and initialize Drive 4.

6. When **TRSDOS READY** re-appears, press RESET.

7. The System will then repeat the power-up sequence but "go" directly to Drive 4 and load TRSDOS-II. The prompt **TRSDOS-II Ready** will then appear.

8. Remove the supplied floppy diskette (which contains TRSDOS-II) and store it in a safe place.

You will then be ready to format any Secondary Hard Disk Drives (Drives 5, 6, and 7) which are in the System. For details on doing this, see **FORMAT** later in this manual.

3/ Power-Up Diagnostic Messages

Whenever the Computer is turned on or reset, it executes a built-in diagnostic program to help insure that the System is in good working order. If the Computer detects a hardware fault or other problem, it will display an error message--then stop. This checkout program reduces the chance that you will lose time or data without knowing it because of a defective system.

If one of these error messages is displayed, the first thing you should do is RESET the Computer and attempt to duplicate the error. If the message re-appears, consult Table 3.

This program does not check for multiple faults; as soon as the first fault is found, the Computer displays the appropriate message and stops.

Before suspecting hardware problems, try the operation several times. Recheck to see that all power and interconnections are correct. As a last resort, try re-INITializing the Operating System on the Hard Disk Drive. Remember! INIT will erase all data on Drive 4. To prevent losing data altogether, be sure to keep backup copies of all data on the disk as you go along.

Note: All of the error messages listed in the Model II Owner's Manual (for floppy diskettes) apply to the Hard Disk System as well. If a diagnostic message appears that is not listed in Table 3, see your Computer's Owner's Manual.

Error Code	What it means	What to do about
HT	Time-out while waiting for Ready. Hard Disk Drive not powered up.	Turn Hard Disk ON.
	Hard Disk Drive is not turned on and ready within 1Ø seconds after Model II/16.	Press RESET.
	Error will occur if Hard Disk Drive is disconnected.	Press <BREAK> or <ESC>.
HC	CRC Error--Invalid data in data field.	Re-INIT Hard Disk.
HI	CRC Error -- Invalid data in ID field.	Re-INIT Hard Disk.
HN	ID Not Found -- No Boot Track with INIT.	Re-INIT Hard Disk
HA	Aborted Command -- Problem during boot-up. Controller Error.	
HØ	Track Ø Error -- Didn't find Track Ø before timeout. (Also occurs in multi-drive Systems when Secondary Drives are not powered-up.)	Press RESET.
HM	Data Address Mark Not Found	Re-INIT Hard Disk.
HD	Busy Not Reset -- Controller Error.	
ML	RAM Fault. Defective RAM in address range X'ØØØØ'-X'ØFFF'	
CT	CTC Chip Failure	
CH	CTC Chip Failure (Hard Disk Interface Board)	
MF	Memory Failure (Hard Disk Interface Board)	

Table 3

4/ Specifications

Power Requirements

AC Power Requirements
5Ø/6Ø Hz +/- Ø.5 Hz
1ØØ/115 VAC Installations (9Ø to 127V at 1.1A typical)
2ØØ/23Ø VAC Installations (1ØØ to 253V at Ø.6A typical)
Fuse 6 Amp - Fast Blow
DC Voltage Requirements
+24VDC +/- 1Ø% 2.8A typical during stepping
(Ø.2A typical stepping steady state, non-stepping)
+5VDC +/- 5% 2.ØA typical during stepping
(3.6A typical non-stepping)

Dimensions

Height	6" (15.24 cm)
Width	18.5" (47 cm)
Depth	19.25" (48.9 cm)
Weight	17 lbs. (7.73 kg)

Environment

Ambient Temperatures	5Ø to 115 degrees F. (1Ø to 46 degrees C.)
Relative Humidity	1Ø% to 2Ø%
Maximum Wet Bulb	78% non-condensing
Heat Dissipation	15Ø Watts (511 BTU/Hr) Max.
Altitude (Feet)	Operating -- Ø to 6ØØØ Storage -- -1ØØØ to 12ØØØ

Warm-Up Period

Minimum To Turn System On After Turning Off	15 seconds

Hard Disk Drive

Disk Organization	
Cylinders per Disk	256.Ø
Tracks per Unit	1Ø24.Ø
Tracks per Platter	512.Ø
Sectors per Track	34.Ø
Bytes per Sector	256.Ø

Average Latency	9.6	msec
Rotational Speed	3125.Ø	rpm
Recording Density	627Ø.Ø	bpi
Flux Density	627Ø.Ø	fci
Track Density	172.Ø	tpi

Storage Capacity (Hard Disk)

Unformatted		
Per Drive	1Ø.Ø	Mbytes
Formatted		
Per Drive	8.5	Mbytes (Primary)
	8.9	Mbytes (Secondary)

Storage Capacity (TRSDOS-II Formatted Floppy Diskette)

Sectors per Track	32.Ø	
Bytes per Sector	256.Ø	
Bytes per Diskette	664,832.Ø	
Tracks (single-side)	76.Ø	

TRSDOS-II

Introduction

TRSDOS-II is a powerful, easy-to-use Operating System (originally designed exclusively for hard disk use) which has all of the features of Floppy Diskette TRSDOS plus the speed and storage space of a Hard Disk System.

If you're familiar with the TRSDOS operating system, you shouldn't have any trouble using TRSDOS-II. If you're new to TRSDOS, we suggest you become familiar with Model II TRSDOS as described in the **TRS-8Ø Model II Owner's Manual** -- then go on to TRSDOS-II.

All of your programs created with TRSDOS should run with TRSDOS-II (except those which require ANALYZE, CLOCK, or XFERSYS).

1/General Information

TRSDOS-II vs. TRSDOS

Is TRSDOS-II different from TRSDOS?

Not really, but there are a few changes you'll need to be aware of.

There are a number of new commands available with TRSDOS-II. These are listed in Table 4.

Name	Function
DRIVE	Allows you to turn hard and floppy secondary disk drives offline and gain the optimum use of the floppy disk drives by changing the seek rate, disk swap detect, and wait for drive ready status.
FC	Edits and repeats last command line entered.
FCOPY	Transfers files on floppy diskette TRSDOS 1.2a, 2.Ø, 2.Øa and 2.Øb to either the hard disk or to a floppy diskette formatted under TRSDOS-II (and vice versa).
FILES	Displays a list of filenames in a diskette's Directory.
FLOPPY	All floppy diskette drives can be enabled with FLOPPY to enable hard-coded drive specifications to work.
I	Lets you swap diskettes while under TRSDOS-II control.
RESTORE	Whenever you SAVE data to a floppy diskette, you must retrieve that information with RESTORE.
SAVE	Allows you to "compress" and store hard disk information onto floppy diskette(s) even though there's more information there than will normally fit on a floppy diskette.

Table 4

See the individual listing in **Section 2/ Library Commands and Utility Programs** for details on each new command.

In addition, several of the existing commands have been enhanced to allow the most efficient use of your Hard Disk System. These are listed in Table 5.

Name	Function
BACKUP	Duplicates floppy diskettes
BUILD	Creates an automatic command input file.
DIR	Displays a diskette's directory.
FORMAT	Formats a diskette for data storage.
FREE	Displays the number of free contiguous sectors and the total amount of free space on a diskette.
LIB	Displays Library Commands
VERIFY	Verifies readable data.

Table 5

Additional changes include:

HELP, which provides assistance with TRSDOS-II commands, cannot be used with the TERMINAL utility or from BASIC. Do not attempt to do so.

These commands are no longer available with TRSDOS-II:

ANALYZE
CLOCK
XFERSYS

They still can be used with TRSDOS, however.

Other Changes

Operation

When in reverse video mode (black characters on white background--Model II; black characters on green background--Model 16) and in scroll mode, the video will scroll a white (Model II) or green (Model 16) line instead of a black line.

Drive Specifications

Under TRSDOS-II, drive specfications have the range of Ø-7. This applies to all drive specfications in the Model II or Model 16 Owner's Manuals (unless stated otherwise). For instance, the Library command PROT (to change file protection) can now include Drives 4, 5, 6, or 7 as the drive specification (such as PROT 6 OLD=PASSWORD, NEW=H2O).

Drive Search Sequence

The TRSDOS-II search sequence is Drive 4, 5, 6, 7, Ø, 1, 2, and 3. (For more details on the search sequence and System requirements, see the **Operation** section of this manual.)

If you start-up the System under floppy diskette TRSDOS control (by pressing <REPEAT> <BREAK> or <REPEAT> <ESC> during "white-out"), the drive search sequence is Drive Ø, 1, 2, 3, 4, 5, 6, and 7.

Method of Allocation

With TRSDOS-II, allocation of disk space is by sectors instead of granules. For example, when files are written, space is allocated in single sectors, not granules. (For an exception, see CREATE.)

Number of Files

With floppy diskette TRSDOS, the number of files is fixed at 96. With TRSDOS-II, however, you can specify up to 122Ø files (see FORMAT and INIT). If you do not specify the number of files you need, TRSDOS-II will use 336 for hard disk, 18Ø for floppy diskettes formatted under TRSDOS-II. (See DIR)

Flawing Technique

When hard disk or floppy diskettes are formatted (using the TRSDOS-II command FORMAT), flawed areas are locked out in sectors, not tracks.

Error Codes

An additional error code is now available:

ERROR 5Ø -- BAD SPACE DESCRIPTOR

When this error is displayed, an internal system error has occurred within a file. To recover your file, use the COPY command, then KILL off the old file.

Disregard Errors 2Ø, 21, 22, and 23 which are described in the Model II Owner's Manual.

BASIC will not return an Error 49 or Error 5Ø. BASIC will return a UE ERROR.

BASIC will also return FL ERROR (too many files).

Supervisor Calls (SVCs)

With TRSDOS-II, there are certain enhancements to the SVC's available under TRSDOS and several new SVCs (RDDIR, KBPUT, REWIND, and RS232) have been created for use under TRSDOS-II (note that these Supervisor Calls can only be used under TRSDOS-II -- not TRSDOS).

Name	Function	Code
DISKID	Reads Disk ID	15
KBPUT	Puts characters in a type-ahead keyboard buffer.	3Ø
LOCATE	Returns Record Number	33
DIRRD	Reads Specified Record	35
OPEN	Opens/Creates a File	4Ø
DIRWR	Writes Specified Record	44
REWIND	Rewinds a Disk File	48
RAMDIR	Get Disk Directory into RAM	53
RDDIR	Reads Next Directory Record and Builds an ASCII string	54
RS232	Sets up or Disables Serial Channels.	55

Table 6

See the SVC's individual listing for details.

We also recommend that you restrict your use of the SVCs RAMDIR and FILPTR since they are restricted to 96 files each (i.e., information about files past the 96th file is not accessible). If you are familiar with these Supervisor Calls, you should change your existing programs to use RDDIR instead.

Memory Requirements

Memory requirements for TRSDOS-II are:

ØH-27FFH	TRSDOS-II Resident Area
28ØØ-2FFF	Utility Command Overlay Area

FØØØ-FFFF TRSDOS-II Demand Resident Area

Loading TRSDOS-II

See the Operation section of this manual for instructions on connection, power-up, and initialization of Drive 4.

After the System starts up, you will be prompted to enter the date. Type the date in the form of MM/DD/YYYY and press <ENTER>. For example:

Ø4/13/1981 <ENTER>

for April 13, 1981.

Next the System will prompt you to enter the time.

To set the time, use the HH.MM.SS 24-hour form. Periods are used instead of colons since they're easier to type in. The seconds are optional. For example, type:

14.3Ø <ENTER>

for 2:3Ø P.M.

To skip this question, simply press <ENTER>. The time will start at ØØ:ØØ:ØØ.

The System will remember the time and date and return with the message:

TRSDOS-II Ready
.....

Note: If the message **TRSDOS READY** appears, you are under floppy diskette (TRSDOS) control.

File Specification

The only difference between TRSDOS and TRSDOS-II file specification is that d (drive specfication) for TRSDOS-II can be a number between Ø-7. d for TRSDOS must be a number between Ø-3.

Wildcards

In addition to the wildcard mask (*), there is now a super wildcard (!). It is the same as */* (used with files that have extensions) and * (used with files that do not have extensions). For example:

```
KILL !:3
```

deletes all files on Drive 3 -- those with and those without extensions.

Record Processing Capabilities

Machine-language programming has also been enhanced when you use the extended access mode. (For more details, see the **Technical Information** section of this manual.) For instance:

Under TRSDOS-II control, direct access to record numbers larger than 65534 is possible. A file may contain up to 16,777,216 bytes of storage. (Note: The hard disk will hold eight megabytes.)

With TRSDOS, files with record numbers (LRN) larger that 65534 cannot be accessed directly (DIRRD and DIRWR).

With TRSDOS-II, however, Direct Access to records 65534-16777214 is done via Extended File Access mode, specified when the file is OPENed. This Extended mode specifies the LRN in 3 bytes, allowing the larger number.

Therefore, if a six megabyte file (possible with the Hard Disk Drive) is used with a 3-byte record length, it would hold approximatly 2,ØØØ,ØØØ records.

To determine the number of records a file will hold, use the formula:

```
16777216 / logical record length  =  number of records
```

For example:

```
16777216/38 = 441,5Ø5 records
```

BASIC is still restricted to the same number of Logical Records because integers in BASIC have a limit of 32,767.

2/ Library Commands and Utility Programs

Introduction

All rules governing TRSDOS commands and utilities apply to TRSDOS-II as well.

All TRSDOS commands and utilites (except CLOCK, ANALYZE, and XFERSYS) can be used with TRSDOS-II although some have been enhanced slightly. This section will discuss the commands and utilities particular to TRSDOS-II and point out specific differences between TRSDOS-II and TRSDOS.

Note that ANALYZE, CLOCK, and XFERSYS are the only TRSDOS commands/utilities which are not used by TRSDOS-II.

BACKUP
Duplicate a Diskette

BACKUP source **TO** destination (options)

source and destination are drive numbers in the form of d, where d is a floppy diskette (Ø-3) only.
options is one or more of the following:

PW= source-password tells TRSDOS-II the master password of the source diskette. TRSDOS-II will not duplicate the diskette unless you give the correct password. If omitted, TRSDOS-II will assume the password is **PASSWORD**.

NEW= destination-password tells TRSDOS-II the password to assign to the destination diskette. The master password allows access to all user files via the **PROT** command. If omitted, TRSDOS-II will use the same password as the source diskette.

ID= diskette-name tells TRSDOS-II the diskette name to assign to the destination diskette. If omitted, TRSDOS-II will use the diskette name of the source diskette.

ABS tells TRSDOS-II not to prompt you if the specified drive contains data. If ABS is omitted, TRSDOS-II will prompt before overwriting any data that already exists on the floppy disk.

This utility allows you to make a "mirror image" of a TRSDOS-II floppy diskette onto another floppy diskette. Diskettes do not need to be formatted before BACKUP. BACKUP automatically formats during the track-by-track duplication.

Note: BACKUP is used for floppy-to-floppy duplication only. If you want floppy-to-hard, use **FCOPY**, **SAVE/RESTORE**, or **COPY**.

The TRSDOS-II BACKUP utility is much faster than the TRSDOS BACKUP because it makes a "mirror image" on a track-by-track basis instead of file-by-file.

Single drive BACKUPs are not allowed with the TRSDOS-II BACKUP command.
TRSDOS-II BACKUP will not allow the following TRSDOS options:

- wildcarding.
- prompting before each file.
- NOAUTO.
- SYS.

It simply makes a mirror copy of the source diskette.

Examples

```
BACKUP 3 TO 1 {PW=ASHER} <ENTER>
```

makes a mirror image copy of the diskette in Drive 3 to the diskette in Drive 1, using the password ASHER.

```
BACKUP :2 TO :Ø {NEW=TEST} <ENTER>
```

BACKs UP the diskette in Drive 2 to Drive Ø and assigns the password TEST to the new diskette.

BUILD
Create an Automatic Command Input File

BUILD <u>file</u>

<u>file</u> is a file specification which cannot include an extension.

The BUILD command has been enhanced to allow you to edit a single command line.

When you enter a BUILD file that already exists, TRSDOS-II will display the first line of the file, followed by the prompt:

Keep, Delete, Fix, Replace, Insert or Quit?
Enter (K/D/F/R/I/Q)..?

The Fix option lets you edit the displayed command line.

Example

Suppose you have a command file named TRANSFER that consists of the lines:

```
COPY FILE/1
COPY FILE/2
COPY FILE/3
DIR
```

You can fix one of the lines of the command file without retyping the entire line.

Load the command file by typing:

BUILD TRANSFER <ENTER>

TRSDOS-II will display the first line of the file, followed by the options:

COPY FILE/1
Keep, Delete, Fix, Replace, Insert or Quit?
Enter (K/D/F/R/I/Q)..?

To change the filename in the first line, type F <ENTER>. TRSDOS-II will display the line with the cursor over the first character in the line. Use the <-->> (rightarrow) to position the cursor over the letter F, then type:

NEWFILE <ENTER>

TRSODS-II will position the cursor at the beginning of the line. Press <ENTER> again and the Fixed line will be saved. You can now edit the next command line.

DIR
List Drive Directory

DIR wildcard:d (SYS,PRT)

wildcard tells TRSDOS-II to list all files that have the specified wildcard.
d is the drive specification and is a number between Ø-7. If omitted, 4 is used.
SYS tells TRSDOS-II to list only system files. If omitted, only user files are listed.
PRT tells TRSDOS-II to list the directory to the Printer. If omitted, the directory is displayed on the Console.

The other DIR parameters described in your Computer Owner's Manual may also be used with this syntax.

If SYS is used, only those system files with a matching extension will be included in the listing.

The TRSDOS-II directory is not limited to 96 files. You can specify the size of the directory you need when you format the disk with FORMAT (or Drive 4 with INIT).

TRSDOS-II also allows full wildcarding. This means all wildcard specification may be used. For more details, see the **TRSDOS** section of your Computer's Owner's Manual.

The directory display will be in the form of the following example:

```
 Disk Name:TRSDOS                        Drive:4          11/Ø2/81    ØØ.1Ø.32
 File Name       Created    Updated        Atrb Fil    Rec    # of    ----Sectors----
                 MM/DD/YY   MM/DD/YY             Typ    Len  Records    Alloc     Used
USRPROG1         11/11/81   11/12/81       P*XØ  F     256        3        3        3
FASH/BAS         11/3Ø/81   12/Ø2/81       D*XØ  F     256        1        1        1
2 Files Displayed
```

Examples

DIR {SYS} <ENTER>

displays the DIRectory listing for all system files on the primary drive.

DIR B* <ENTER>

displays the DIRectory listing for all user files beginning with B without extensions on the primary drive.

DIR 5 <ENTER>

displays the DIRectory listing for all user files on Hard Disk Drive 5.

DRIVE
Set Drives for Most Efficient Use

DRIVE :d (options)

:d is a drive specification and number between Ø - 7
(options) can be:

RATE=n (used for floppy drives only) Sets the seek rate of the floppy disk drive. n may be:
Ø = 3 milliseconds
1 = 6 milliseconds
2 = 1Ø milliseconds
3 = 15 milliseconds
RATE is optional; if omitted, setting does not change.

DETECT (used for floppy drives only) Sets the diskette swap detection which causes TRSDOS-II to check the drive hardware for a "door opened" condition. Set DETECT for **Push-Button** and **Thinline** drives.

NODETECT (used for floppy drives only) Sets the diskette swap "no detection". This causes TRSDOS-II to ignore any "door opened" conditions received from the drive hardware. Set the latch drives for NODETECT.

WAIT (used for floppy drives only) Sets TRSDOS-II to wait for the drive to gain proper motor speed if a "Drive Not Ready" error occurs, then try again. If the error occurs again, then the drive is considered not ready and an error code is generated. Set WAIT for **Thinline** drives.

NOWAIT (used for floppy drives only) Sets TRSDOS-II to not wait if a "Drive Not Ready" error occurs. Generate error code immediately. Set **Push-Button** and **Latch** drives to NOWAIT.

OFFLINE (all drives) Sets a drive offline. TRSDOS-II ignores that drive entirely.

ONLINE (all drives) Sets a drive online. ONLINE is the default.

If you do not specify any options, DRIVE returns the current settings for the specified drive.

DRIVE allows you to:

Turn your secondary hard disk or floppy disk drives OFFLINE.

Gain optimum use of a floppy disk drive by changing the following disk drive settings:

- seek rate (the rate the computer is able to access the diskette)
- diskette swap detection
- wait (for a drive ready condition)

Turning The Drives Off-Line

The OFFLINE option turns a secondary disk drive off-line; ONLINE turns it back on-line. You can use both options with hard or floppy secondary disk drives:

- Hard Disk Drives. If you have more than one hard disk drive, you can MOVE or COPY files to your secondary drive(s), turn these drives OFFLINE, and thus protect your files from access and/or change.
- Floppy Drives. By turning a non-existing or unused secondary floppy drive OFFLINE, TRSDOS-II will access your disks much more quickly.

The default is ONLINE. When you turn a floppy disk drive back ONLINE after it was OFFLINE, you must also use the I command to reinitialize the drive.

Examples

```
DRIVE 5 (OFFLINE) <ENTER>
```

allows you to protect files on Drive 5 from access.

```
DRIVE 3 (OFFLINE) <ENTER>
```

allows you to tell TRSDOS-II not to attempt to access Drive 3; this speeds up access time.

```
DRIVE 5 (ONLINE) <ENTER>
```

tells TRSDOS-II that Drive 5 is accessible.

You might find it helpful to create a Command file (see the **BUILD** command for details) consisting of these commands:

```
DRIVE 6 {ONLINE}
MOVE !:5 TO 6 {ABS}
DRIVE 6 {OFFLINE}
```

This will cause TRSDOS-II to "backup" Drive 5 by turning Drive 6 ONLINE, MOVEing all the files on Drive 5 to Drive 6 and then turning Drive 6 back OFFLINE.

Gaining Optimum Use of Floppy Disk Drives

On power-up, each of the floppy drives are set to the following seek, swap detect/nodetect, and wait/nowait settings:

DRIVE	SEEK RATE	SWAP DETECT	WAIT/NOWAIT STATUS
Ø	1Ø ms	DETECT	WAIT
1 - 3	15 ms	NODETECT	WAIT

Any type of Model 16/Model II floppy drive can operate under these settings. However, to get the optimum use out of your particular drive, we suggest you try different settings.

There are three types of drives that could be on your Model 16 or Model II computer. Each type of drive has its own set of specifications that determines how it can be set-up. The three types of drives are:

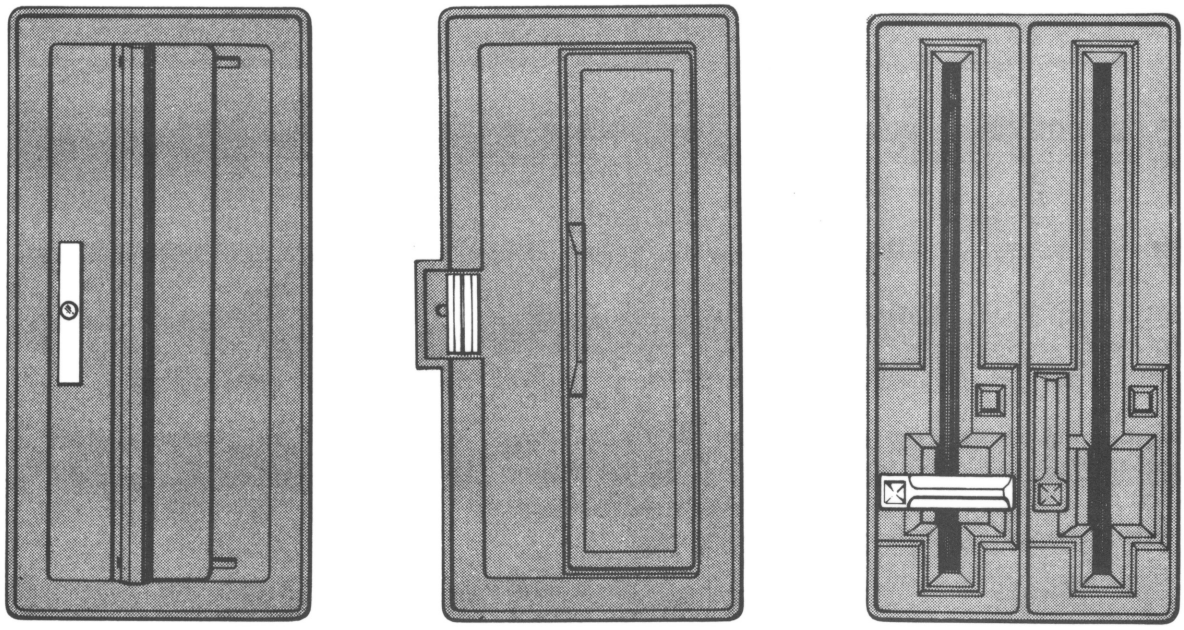
- Push-Button — used as Drive Ø in most Model II's and as the secondary drives in some Model II Expansion Bays
- Latch — used as the secondary drives in some Model II Expansion Bays
- Thinline — used in the Model 16

We suggest you try the following settings for each of these drives.

Drive	Minimum Rate	Swap Detect	Wait Nowait
Push-Button	1Ø ms	DETECT	NOWAIT
Latch	15 ms*	NODETECT*	NOWAIT
Thinline	3 ms	DETECT	WAIT*

* These settings are required for the particular drives and are set at start-up.

You can determine the type of drive you have by looking at Figure 8.



Push-Button Latch Thinline

Figure 8. The Three Types of Drives

When using DRIVE with the seek rate, swap detect, and wait options, be sure to note the following:

- When reset, TRSDOS-II always returns to the start-up settings. Use the AUTO command (or a command file) to automatically implement the DRIVE command upon power-up or reset.

- If you receive numerous I/O errors on disk read/writes after changing the seek rate, you probably set the rate too fast for that particular drive. To remedy this, either re-issue the DRIVE command with the proper seek rate or reset the computer.

- **Latch Drives** cannot properly detect if a drive door has been opened since the last disk access. Always set **Latch Drives** with the NODETECT option.

- **Thinline Drives** have a built-in feature to reduce the wear on the floppy diskette. If a **Thinline Drive** is not accessed for 2Ø seconds or more, the drive motor shuts off until the next drive access. At the next access, it takes approximately 8/1Ø of a second for the motor to reach proper speed.

- Always set **Thinline Drives** with the WAIT option. If a **Thinline Drive** is run with the NOWAIT option, a "Drive Not Ready" error will occur since the motor could not reach proper speed before the access.

Using AUTO to Set Drives

You can also build a special command file that will automatically set your floppy disk drives for maximum efficiency and turn any non-existent drive offline as you start-up.

For example, if you have a Model 16 with two floppy thinline drives and two hard disk drives, you can use the following as your automatic command file. (See **AUTO**, **BUILD**, and **DO** for more information.)

First get into the BUILD command mode by typing:

```
BUILD DRIVESET <ENTER>
```

Now you can enter program lines such as:

```
DRIVE Ø {RATE=Ø,DETECT,WAIT} <ENTER>
DRIVE 1 {RATE=Ø,DETECT,WAIT} <ENTER>
```

```
DRIVE 2 {OFFLINE} <ENTER>
DRIVE 3 {OFFLINE} <ENTER>
DRIVE 6 {OFFLINE} <ENTER>
DRIVE 7 {OFFLINE} <ENTER>
<ESC>
```

The last line saves the program lines.

To set this command file as the AUTO command, type:

```
AUTO DO DRIVESET <ENTER>
```

Now whenever you start-up your computer, the DRIVESET command file will automatically execute and set all your drives to their maximum efficiency.

When you set a command file like DRIVESET as the AUTO command, any previously set AUTO is overwritten. To set a command file and keep the previously set AUTO, you could use an example like the following.

The SCRIPSIT system diskette has the AUTO command STARTUP set. When you enter the date and time, this AUTO command initializes the SCRIPSIT system diskette and goes directly to the SCRIPSIT menu.

If you want to set an AUTO file that will use this AUTO STARTUP and also set the drives to their maximum efficiency, you could use the following command file.

If you have a Model II with four floppy push-button disk drives and one hard disk drive, get into the BUILD command mode and enter lines such as:

```
DRIVE Ø {RATE=2,DETECT,NOWAIT} <ENTER>
DRIVE 1 {RATE=2,DETECT,NOWAIT} <ENTER>
DRIVE 2 {RATE=2,DETECT,NOWAIT} <ENTER>
DRIVE 3 {RATE=2,DETECT,NOWAIT} <ENTER>
DRIVE 5 {OFFLINE} <ENTER>
DRIVE 6 {OFFLINE} <ENTER>
DRIVE 7 {OFFLINE} <ENTER>
STARTUP <ENTER>
<ESC>
```

Now when you enter the command:

```
AUTO DO DRIVESET <ENTER>
```

the AUTO will set the drives to their greatest efficiency, turn non-existing drives off-line and then start-up SCRIPSIT.

Examples

If Drive Ø is a Thinline drive, this command:

```
DRIVE Ø {RATE=Ø,DETECT,WAIT} <ENTER>
```

allows you to get the optimum use out of Drive Ø.

If Drive 1 is Push-Button, this command:

```
DRIVE 1 {RATE=2,DETECT,NOWAIT} <ENTER>
```

allows you to get the optimum use out of Drive 1.

If Drive 1 is a Latch, this command:

```
DRIVE 1 {RATE=3,NODETECT,NOWAIT} <ENTER>
```

allows you to get the optimum use out of Drive 1.

FC
Edit and Repeat Last Command

```
FC
```

When you specify FC ("fix command"), TRSDOS-II will display the last command entered, allow you to edit that command, and then re-execute the command when you press <ENTER>.

After a "fix," a command can only be executed when the cursor is in the first character position in the line. (All the way to the left.) To move the cursor to this position, press <ENTER>; press <ENTER> again to execute the "fixed" command.

Use the following subcommands for editing command lines:

Key	Function
<F1>	Insert blank spaces. (Note: Blank spaces are the only insertions that are allowed with FC. If you need to insert characters, insert spaces and type over the spaces with the desired characters.
<F2>	Delete character.
<CTRL> <E>	Move cursor to the end of line.
<ESC>	Start over; all previous changes are disregarded by TRSDOS-II.
<BREAK>	Return to TRSDOS-II Ready.
<ENTER>	Moves cursor to left-most line position. If cursor is already there, the command is executed.
(<-) (leftarrow)	Moves cursor to the left. Wrap-around will not occur.
(->) (rightarrow)	Moves cursor to the right. When cursor reaches the last position on the line, it will return to the left-most position.
<TAB>	Tab (skip) over eight spaces; will not erases characters.
<CTRL> <T>	Back-tab. Will not erase characters.
<CTRL> <W>	Delete to end of line starting at current cursor position.

Example

```
COPY PAYROLL/DAT:1 :4
```

To change this command line so TRSDOS-II will COPY to Drive 3, type:

```
FC <ENTER>
```

TRSDOS-II will display the line again:

```
COPY PAYROLL/DAT:1 :4
```

Move the cursor so it is on top of the number 4 -- press <TAB> or rightarrow -- and type: 3. Press <ENTER> to return the cursor to the beginning of the line; press <ENTER> again to execute the command.

FCOPY
TRSDOS / TRSDOS-II File Transfer

FCOPY *source* **TO** *destination* (*options*)

source is one or more of the following:
- *filespec*:*d* where *filespec* is a TRSDOS file and *d* is a drive specification between Ø-7.
- *wildcard*:*d* where *wildcard* is a TRSDOS wildcard and *d* is a drive specification between Ø-7.
- :*d* where *d* specifies the drive and is a number between Ø-7. If this option alone is used, ALL must also be specified.

destination is one of the following:
- *filespec*:*d* where *filespec* is a valid TRSDOS filespec and only if source is also a TRSDOS file specification.
- :*d* where *d* specifies the drive and is a number between Ø-7. *destination* must be specified.

(*options*) is one of the following:
- **ABS** tells TRSDOS-II not to prompt you if the specified drive contains data. If ABS is omitted, TRSDOS-II will prompt before overwriting any data that already exists on the hard disk.
- **PROMPT** tells TRSDOS-II to prompt you before it copies a file. You should press **Y** (yes), **N** (no), **Q** (quit), or **S** (stop prompting).
- **ALL** tells TRSDOS-II to copy all files. If :*d* is used as *source*, ALL must be used.
- **SYS** tells TRSDOS-II to copy language and application programs. If used, destination must be a primary drive.

or

FCOPY :d {DIR,SYS,PRT}

:d is a number between Ø-3 and specifies a floppy disk drive. d must be specified.
{DIR,SYS,PRT} will display the directory of the specified drive. **SYS** is optional; if omitted, only user files are displayed. **PRT** is optional; if included, TRSDOS-II send the DIRectory display to the printer.

FCOPY lets you transfer your TRSDOS formatted programs and files so you can use them with TRSDOS-II. You cannot use FCOPY with FLOPPY {OFF} (see FLOPPY).

Because TRSDOS-II formats diskette into 32 sectors and TRSDOS does so in 26, it is important to remember that you cannot simply insert a TRSDOS formatted diskette into Drives Ø-3 when the System is controlled by TRSDOS-II.

Before using floppy diskettes in a Hard Disk System, you must first format them under TRSDOS-II (see FORMAT). Then you can use FCOPY to copy files or data created under TRSDOS to a TRSDOS-II floppy diskette or to a hard disk drive.

FCOPY also allows you to copy files or data created under TRSDOS-II (on floppy diskette or hard disk drive) to a TRSDOS diskette.

There are five rules governing FCOPY which must be followed:

- You must specify the drive (:d) on both source and destination.
- You cannot FCOPY between like systems (i.e., TRSDOS-II to TRSDOS-II or TRSDOS to TRSDOS) Use COPY instead.
- Single-drive FCOPYs for floppy diskettes cannot be performed on Drive Ø. They can be performed on Drives 1 - 3.
- You cannot FCOPY onto TRSDOS 1.2 or 1.2a.
- You can read system files to TRSDOS-II but you cannot write system files to any other version of TRSDOS.

FCOPY allows the following transfer of files or data:

- From TRSDOS floppy diskette to TRSDOS-II floppy diskette (and vice versa).
- From TRSDOS floppy diskette to TRSDOS-II hard disk (and vice versa except for TRSDOS-II to TRSDOS 1.2).

If you want to transfer TRSDOS floppy diskette files to another TRSDOS diskette or if you want to transfer data from a hard disk to a TRSDOS-II floppy diskette, use COPY--not FCOPY!

The only way to FCOPY floppy diskette-to-floppy diskette files on a single-floppy drive system (Drive Ø) is to FCOPY the data to a hard disk (Drive 4-7), then COPY it back to Drive Ø.

You cannot FCOPY over existing versions of system files. For instance, an error will result if you try to copy BACKUP from a TRSDOS 2.Øa diskette to a TRSDOS-II disk. This is FCOPY's way of protecting its own operating system.

The second syntax for FCOPY -- FCOPY :d {DIR,SYS,PRT} -- allows you to get a DIRectory listing of your Model II TRSDOS files while under the control of TRSDOS-II.

Examples

```
FCOPY NEWFILE/TXT:7 TO :3 <ENTER>
```

copies NEWFILE/TXT on drive 7 to the TRSDOS formatted diskette in Drive 3.

```
FCOPY :3 {DIR} <ENTER>
```

returns the directory listing for the floppy diskette in Drive 3 while under TRSDOS-II hard disk control.

```
FCOPY 2 TO 5 {ALL} <ENTER>
```

copies all user files on the TRSDOS diskette in Drive 2 to the TRSDOS-II format on Drive 5.

```
FCOPY F*/*:4 TO Ø <ENTER>
```

copies all files on Drive 4 beginning with F and having an extension to the TRSDOS diskette in Drive Ø.

FILES
List Filenames

FILES filespec {options}

filespec may be any of the following:
a standard TRSDOS file specification and may include an optional drive specification.
a standard TRSDOS wildcard (full wildcarding is allowed) and may include a drive specification.
a drive specification between Ø-7; if omitted, the first available drive is used.
{options} are:
SYS will list all System files. SYS is optional; if omitted, only user files will be listed.
PRT will list files on the Printer. PRT is optional; if omitted, files will be listed on the Display.

This command will list filenames that are stored on the specified drive. This is not the same as DIRectory -- only filenames will be listed. The filenames will be alaphabetically listed in five columns (from left to right) across the screen.

FILES allows full wildcarding. For details on wildcarding, see your Model II Owner's Manual.

Examples

```
FILES */BAS 4 {PRT} <ENTER>
```

will list all files with the extension /BAS on Drive 4 to the Printer.

FILES 4 {SYS} <ENTER>

will list all System files on Drive 4. (The System directory is on Drive 4.)

FLOPPY
Enable/Disable Floppy Disk Drives

FLOPPY {switch}

switch is **ON** or **OFF**. If omitted, current command status will be displayed.

On power-up, TRSDOS-II uses FLOPPY {ON}.

When FLOPPY {OFF} is entered, TRSDOS-II will ignore all references to Drives Ø-3 within a file specification and the search sequence will begin at Drive 4 and end with Drive 3. TRSDOS-II will ignore explicit drive specifications within a filename when FLOPPY {OFF} is in effect.

Only those commands which require file specifications (filename/ext.password:d) are affected by FLOPPY ON/OFF. These include:

ATTRIB	CREATE	LOAD	RENAME
APPEND	DUMP	MOVE	
BUILD	KILL	OPEN	
COPY	LIST	PATCH	

Commands and utilities which do not require file specifications are not affected by FLOPPY {OFF}. These include:

BACKUP	FORMAT	PROT
DIR	FREE	PURGE

Examples

FLOPPY {OFF} <ENTER>

TRSDOS-II will ignore all drive numbers within file specifications and start searching for a file on the first available drive.

FLOPPY <ENTER>

TRSDOS-II will display the current status of FLOPPY.

FLOPPY {ON} <ENTER>

TRSDOS-II will use the drive number when inlcuded in a file specification.

FORMAT
Erase and Initialize a Disk/Diskette

FORMAT :d {options}

d specifies the drive to be formatted and is the number Ø-3 and 5-7. (drive 4 may not be used.) d is optional; if omitted, TRSDOS-II will prompt for the drive number.

{options} is one or more of the following:

ABS tells TRSDOS-II not to prompt if the specified drive contains data. If ABS is omitted, TRSDOS-II prompts before overwriting any existent data.

ID= disk-name tells TRSDOS-II the name to assign to the disk. If omitted, TRSDOS will be used.

PW= password tells TRSDOS-II the master password to assign to the disk. If omitted, PASSWORD is used. The master password allows access to all user files (via the PROT command).

DIR= nnn tells TRSDOS-II where to place the primary directory. For hard disks, nnn can be any number between Ø-253; for floppy diskettes, 1-71. If omitted, cylinder 44 is used for floppy diskettes, cylinder 13Ø for hard disks.

ALT= nnn tells TRSDOS-II where to place the alternate directory. If nnn= ØØ, an alternate directory will be not created. If omitted, the formula directory + 3 is be used to compute the placement of the alternate directory. For floppy diskettes, 3 represents three tracks; for hard disks, 3 represents three cylinders. For hard disks, nnn can be any number between Ø-253; for floppy diskettes, any number between 1-71.

SIZ= nnn tells TRSDOS-II how many filenames to allow for in the initial directory. For hard disks and floppy diskettes, nnn can be any number between 1-122Ø. If omitted, 18Ø is used for floppy diskettes; 336 for hard disks. If **SIZ=** nnn is specified, TRSDOS-II rounds off to the next multiple of 4.

verification level is one of the following:

FULL reads the value of each sector and compares that value with what was written during initialization.

NONE No verification is done.

verification level is optional; if omitted, FULL is used.

With TRSDOS-II, this FORMAT consists of 32 sectors per track instead of the TRSDOS 26. Because of this, floppy diskettes formatted by TRSDOS-II cannot be used under TRSDOS and vice versa.

For more details on FORMAT, see your Model II/16 Owner's Manual.

Examples

```
FORMAT 5 <ENTER>
```

formats the disk on Drive 5, using the default values for options.

```
FORMAT 2 <ENTER>
```

formats the diskette in floppy Drive 2, using the default values for floppy diskettes.

```
FORMAT <ENTER>
```

prompts you for the drive to use before it begins formatting. Since no options are specified, the disk will have the options defaults.

```
FORMAT :6 {DIR=75} <ENTER>
```

formats the disk in Drive 6, placing the primary directory on cylinder 75.

FREE
List Disk Free Space

FREE :d (PRT)

d is a drive specification and a number between Ø-7. d is optional; if omitted, 4 is used.
PRT tells TRSDOS-II to send the list to the Printer. PRT is optional; if omitted, the list is displayed on the Console.

FREE will list areas of contiguous sectors which are available for data and program storage in the format:

```
nnnn  nnnn  nnnn  nnnn  nnnn
nnnnn Free Sectors in n Extents
```

where nnnn is a decimal number telling you how many free sectors are available in an area.

Since TRSDOS-II space allocation is by sectors (instead of granules), the FREE display is different from the TRSDOS free display.

Examples

```
FREE 5  <ENTER>
```

displays the number of free sectors on Drive 5.

```
FREE 5 PRT <ENTER>
```

lists the number of free sectors for Drive 5 on the printer.

I
Swap Diskettes

I :d

d is a number between Ø-3 and specifies a drive. d is optional; if omitted, I can be used with floppy diskette drives only (Drives Ø-3).

Whenever you swap floppy diskettes, you must execute this command immediately after the swap. This command tells TRSDOS-II to read the diskette ID's on all drives in the system.

You should use the I command after:

- Swapping diskettes.
- Using FORMAT to move the directory.
- Inserting a different diskette into Drives Ø-3.
- Using FCOPY, BACKUP, SAVE, or RESTORE.

If the diskette you insert after the swap is a TRSDOS formatted diskette (instead of a TRSDOS-II format), TRSDOS-II will ignore all references to the drive which contains the TRSDOS formatted floppy diskette.

Examples

```
I <ENTER>
```

tells TRSDOS-II to read the diskette ID's on all floppy drives in the sytem.

```
I:3 <ENTER>
```

tells TRSDOS-II to read the diskette ID on floppy Drive 3.

LIB
Display Library Commands

```
LIB
```

The LIB command (described in the Model II Owner's Manual) includes only those commands located below 28ØØ Hex. Consequently, LIBrary commands can be run with BASIC, TERMINAL, etc. The LIBrary commands CLEAR, DEBUG, RESET, DO will return to **TRSDOS-II Ready.**

Some LIBrary commands have been changed to utilities and vice versa.

Examples

```
LIB <ENTER>
```

returns a complete list of TRSDOS-II LIBrary commands.

RESTORE
Recover SAVEd Files

RESTORE source **TO** destination {options}

source specifies a floppy diskette and is one of the following:
- d where d is a drive specification and a number between Ø-3.
- filespec:d where filespec is a standard TRSDOS file specification and drive is a drive number between Ø and 3.
- wildcard:d where wildcard is a standard TRSDOS wildcard and drive is a number between Ø and 3.

destination is optional and is one of the following:
- d where d is a drive specification and a number between Ø-7. d cannot be the same as source.
- filespec:d where filespec is a standard TRSDOS-II file and d a drive specification. If IND is used, d is optional.

{options} is one or more of the following:
- **ABS** tells TRSDOS-II to retrieve the specified files(s). If used, an already existing file with the same name will be written over.
- **DIR** If VOLUME Ø is in source drive, TRSDOS-II will display the DATASET directory and identifier; if VOLUME Ø is not a source drive, TRSDOS-II will display only the DATASET identifier.
- **IND** (indirect) tells TRSDOS-II to use the contents of the destination file as a list of destination filespecs that meet the requirements stated above.
- **KILL** tells TRSDOS-II to kill the specified destination file before it is opened for RESTOREing.
- **PROMPT** will prompt for verification of each file for RESTOREing. Press **Y** (yes), **N** (no), **Q** (quit restoring), or **S** (stop prompt).
- **PRT** can only be used with the DIR option. Prints the DIRectory listing on the line printer.
- **SYS** TRSDOS-II will retrieve only System files. This includes System (language) and Applications programs. If used with DIR, SYS will list the directory of System files.

RESTORE is used to recover any files stored on floppy diskettes that were saved with the SAVE command. Since SAVE stores files in a special format, RESTORE is the only way to restore these files back to the TRSDOS-II formatted disk.

RESTORE reads information from a DATASET created by SAVE. If a VOLUME of this DATASET is entered out of sequence, TRSDOS-II will inform you of this mistake. The System will also inform you if a VOLUME from a different DATASET is accidentally entered during a RESTORE. (See SAVE for further information on DATASET and VOLUME.)

If there is more than one VOLUME in your DATASET, when RESTOREing files in a DATASET, TRSDOS-II prompts you with:

Mount Volume X in Drive n. Press ANY Key to Continue.

Examples

```
RESTORE 3 TO 6 <ENTER>
```

recovers files from the floppy diskette in Drive 3 and puts them on hard disk Drive 6.

```
RESTORE 1 PROGRAMS {IND} <ENTER>
```

where PROGRAMS is a file created by BUILD to be:

```
MAILIST/PRG 6
MAILDAT/TXT 6
CHANGES/TXT 6
```

This restores files from the floppy diskette in Drive 1, to the filespecs defined in PROGRAMS on Drive 6. Note: TO is optional.

SAVE
Backup File to Floppy Diskette

SAVE source **TO** destination {options}

source may be one of the following:
:d which is a drive specification and is a number between Ø-7.
filespec:d specifies a TRSDOS-II file or INDirect file to be saved.
wildcard:d is a TRSDOS-II wildcard and includes a hard disk drive number (Ø-7).
destination specifies a floppy disk drive number and is a number between Ø-3 in the form d.
{options} is one or more of the following:
ABS tells SAVE not to prompt for destination disk status. SAVE will format the destination disk if it is not already in SAVE format.
DC value date will compare the creation date of each specified source file against the date entered and SAVE the file if all other criteria are met. value is <, >, or = where < (less than) and > (greater than) mean less than or equal to and greater than or equal to. date must be in the form: MMDDYY
DM value date will use the last modification date in the manner specified above. value is <, >, or = where < (less than) and > (greater than) mean less than or equal to and greater than or equal to. date must be in the form: MMDDYY
IND (indirect) tells SAVE to use the contents of the source file as a list of source filespecs that meet the requirements stated above.
PROMPT will prompt for file verification before SAVEing. You may respond with **Y** (yes), **N** (no), **Q** (quit) or **S** (stop prompting and continue).
ALL tells TRSDOS-II to save all files. (ALL won't transfer System files, use SYS.) If you use drive as source, you must use ALL.
SYS allows you to SAVE language and application programs.

This utility creates a serial file-by-file backup of a TRSDOS-II disk onto a specially formatted floppy diskette. Unlike BACKUP (which creates a mirror image which may be used in place of the original), SAVE stores files onto floppy diskettes in a special format which cannot be used under TRSDOS.

SAVEing Multiple Diskettes

Since the hard disk drive is a larger storage system than the floppy diskette, it is sometimes necessary for SAVE to store information on more than one diskette. When this is the case, SAVE prompts for the insertion of a new diskette.

There are two terms relative to SAVE which you need to be familiar with:

DATASET A set of one or more diskettes created by SAVE.

VOLUME An individual diskette that is a member of a DATASET.

TRSDOS-II numbers the VOLUMEs sequentially from Ø. Each DATASET contains a unique identifier so each SAVE VOLUME is identified by its serial position in a specific DATASET. This prevents the accidental mixing of DATASETs within each other.

If a SAVEd file requires more than one floppy diskette, the DATASET identifier enables you to keep track of diskettes in the same VOLUME. For instance, DATASET identifier 84 4E 56 may include VOLUMEs Ø, 1, and 2.

When you are SAVEing files that require more than one VOLUME, TRSDOS-II prompts with:

Insert NEXT Blank Diskette on Drive n -- Press ANY Key to Continue.

When you do this, TRSDOS-II then displays:

The Diskette Presently on Drive n will be referred to as "VOLUME 1"

When all files have been SAVEd, TRSDOS-II then prompts:

Insert "VOLUME Ø" on Drive n -- Press ANY Key to Continue

When you re-insert VOLUME Ø, TRSDOS-II then writes its housekeeping information to this diskette. This allows it to record the number of volumes in the DATASET, etc., for use when it RESTOREs the SAVEd files.

Examples

There are a variety of ways to use SAVE. The simplest of these is:

SAVE !:4 TO 2 <ENTER>

which copies all the files on the Drive 4 in a compacted form onto the diskette in Drive 2.

Wildcarding

Wildcards also offer a simplified method of SAVEing files (these can be several files, or an entire disk). For example:

SAVE */CBL:4 TO Ø <ENTER>

SAVES all files with the extension /CBL from Drive 4 to the diskette in Drive Ø.

Using The INDirect Option

The INDirect option allows you to save groups of files by creating an INDirect file (a file similar to a command file consisting of one or more filespecs). The only way to do this is to create a file with the BUILD command.

Type:

BUILD PROGRAMS <ENTER>

and TRSDOS-II prompts you to enter the command line. To do so, type in the names of the files you wish to store. For example, type:

```
ORDERS:5 <ENTER>
REPORTS/*:6 <ENTER>
```

and press <BREAK> to return to TRSDOS-II Ready.

You can now SAVE your INDirect file from hard disk to the specially formatted floppy diskette. Type:

```
SAVE PROGRAMS:4 TO Ø {IND} <ENTER>
```

Both ORDERS and REPORTS are now found in the file named PROGRAMS on the floppy diskette in Drive Ø.

Note: Because the INDirect option allows you to SAVE multiple files from more than one disk, there is the chance that you could SAVE more than one file with the same name. The SAVE and RESTORE DIRectory does not specify drive number for files, therefore you could possible lose sqme of the duplicate filenames.

For example, if you created an INDirect file made of these files:

```
*/FOR:4
*/CBL:4
*/FOR:5
```

there is the chance that there are duplicate filenames on Drives 4 and 5. Therefore, before using the INDirect option, we suggest that you examine all the files to be SAVEd. If there are duplicate names, RENAME those files before SAVEing.

Using the DC and DM Options

Another way to SAVE files is to do so in respect to their creation or modification date. For example, if your directory showed these creation and update dates for your files:

Filename	Created	Updated
MENU/PRG	6/1/81	9/2/81
PRGONE/PRG	6/1/81	8/16/81
PRGTWO/PRG	6/1/81	7/3Ø/81
PRGTHR/PRG	6/1/81	6/16/81
PAYROLL/DAT	9/15/81	1Ø/15/81
CHECKS/DAT	9/15/81	1Ø/15/81
TEST/PRG	1Ø/29/81	1Ø/29/81

SAVE */PRG:5 TO Ø

The most efficient way to SAVE these files is by comparing the file creation date to a specified date. For example, all of the first four files were created on June 1, 1982 (6/1/81). Therefore, type:

SAVE */PRG:5 TO Ø {DC=Ø6Ø181} <ENTER>

and the first four files would be SAVEd to the floppy diskette in Drive Ø.

In the same sense, the first four files were modified (updated) on or before September 2, 1982 (9/2/81). Therefore, type:

SAVE */PRG:5 TO Ø {DM<Ø91581) <ENTER>

and all files modified on or before the specified date would be SAVEd.

SAVE as a Standard Procedure

It is a good idea to periodically (and regularly) SAVE the contents of your hard disk. Because there is always a chance of something happening to your system that would cause you to lose all your files, you should perform a SAVE operation at least once a month. To do so, follow this procedure.

1. Insert a blank diskette in Drive Ø.

2. SAVE the contents of the primary hard disk by typing:

   SAVE 4 TO Ø {SYS,ALL} <ENTER>

   This SAVEs all files including the System files.

3. Once this SAVE is complete, record the Dataset and Volume numbers on each diskette.

4. Repeat steps 1, 2, and 3 for each hard disk drive on your system.

It is also a good idea to SAVE the files that you worked on each day. The DC/DM option will allow you to do this most efficiently.

1. Insert a blank diskette in Drive Ø.

2. SAVE the files on the primary hard disk drive that you used on that day by entering this command if the date is May 11, 1982:

```
SAVE !:4 TO Ø {DM=Ø51182} <ENTER>
```

3. Record the Dataset and Volume information on the diskette.

4. Repeat Steps 1, 2, and 3 for each hard disk drive.

In addition to doing periodic SAVEs, if you also re-INIT your hard disk system every few months and then RESTORE the files you SAVEd, you can reduce the file fragmention. The RESTORE process will restore your files in a contiguous manner.

When a Boot Error Occurs

If your Hard Disk System returns a boot error, the first thing you should do is flip the RESET button on the front of your computer and try to start-up your system again. If your system continues to return a boot error, you have probably lost the boot track--Track Ø.

Even when this happens, there is a way to save the contents of your primary hard disk. But, to do so, you must have at least two floppy disk drives on your system.

To save the contents of your hard disk system:

1. Transfer control to the floppy disk system (press <BREAK> <REPEAT> during "white-out").

2. Insert a diskette containing the floppy version of TRSDOS-II 4.1 in Drive Ø and start-up the system so that you see the TRSDOS-II prompt.

3. To ensure that there is a chance to save the contents of your hard disk, try to get a directory of your primary hard disk drive. Type:

   DIR 4 <ENTER>

   If you can get a directory, then you will probably be able to save the contents of your hard disk.

4. Now use the SAVE command to save the contents of your primary hard disk drive. Insert a blank diskette in Drive 1 and type:

   SAVE 4 TO 1 {SYS,ALL,ABS} <ENTER>

5. Re-INIT your primary hard disk drive. Once the contents of your hard disk have been SAVEd, you will have to re-INIT your primary hard disk drive. See the INIT command for details.

6. RESTORE the files to hard disk. When the INIT process is finished, (it takes approximately 15 to 2Ø minutes), you can RESTORE the files that you SAVEd by typing:

   RESTORE 1 TO 4 <ENTER>

VERIFY
Verify Readable Data

VERIFY {switch}

switch is either ON or OFF. switch is optional; if omitted, current VERIFY status is displayed.

On power-up, VERIFY {ON} is used.

This command controls the verify function. When it is ON, TRSDOS-II will read after each write operation, to ensure that the data is readable. If data is not readable,

TRSDOS-II will attempt to read it again. If it still is not readable, TRSDOS-II will return an error message telling you the operation was not successful.

TRSDOS-II will always verify directory writes. User writes (writing data into a file) are only verified when VERIFY ON is in effect.

Examples

```
VERIFY ON
```

Turns the VERIFY function ON.

```
VERIFY OFF
```

Turns the VERIFY function OFF.

```
VERIFY
```

Displays the status of the VERIFY switch.

3/Technical Information

Disk Files

Method of File Allocation

Allocation of disk space is by sectors instead of granules when operating under TRSDOS-II. For example, when files are written, space is allocated in single sectors. (For an exception, see CREATE.)

Number of Files

With floppy diskette TRSDOS, the number of files is fixed at 96. With TRSDOS-II, however, you can specify up to 122Ø files (see FORMAT and INIT). If you do not specify the number of files you need, TRSDOS-II will use 336 for hard disks, 18Ø for floppy diskettes formatted under TRSDOS-II. (See DIR)

Flawing Technique

When hard disk drives are formatted (using the TRSDOS-II command FORMAT), flawed areas are locked out in sectors, not tracks.

TRSDOS-II Supervisor Calls

Supervisor Calls (SVC's) are Operating System routines available to any user program. The routines alter certain System functions and conditions, provide file access, perform I/O to the Keyboard, Video Display, and Printer; and perform various computations.

All of the SVC's described in your Model II/16 Owner's Manual may be used with TRSDOS-II, although a few have been enhanced. In addition, TRSDOS-II makes available several other SVC's which cannot be used under TRSDOS. Because RAMDIR (function code 53) and FILPTR (function code 58) are

restricted to 96 files, it's recommended that you use DIRREC under TRSDOS-II instead. If you use RAMDIR or FILPRT, your old programs will still run, however.

Note that you may add the extended mode option (E, see DIRRD) to all SVC's that are available under TRSDOS 2.Øa and the programs will run (but not vice versa). For specific details on using SVC's, see your Model II/16 Owner's Manual.

DISKID
(function code 15)

(Enhancements only)

This routine reads the disk ID from any or all of Drives Ø-7.

Entry Conditions

B= Drive Select Code. If B=Ø, read from Drive Ø, etc. B must be one of the following: Ø, 1, 2, 3, 4, 5, 6, 7 or 255. If B=255, then routine reads from all eight drives.

(HL) Buffer to hold the disk/diskette ID(s). If B=Ø, 1, 2, 3, 4, 5, 6, or 7 then buffer must be 8-bytes long. If B=255, then buffer must be 64 bytes long.

Drive Ø ID will be placed in the first 8 bytes, then Drive 1, etc.

A= 15

Exit Conditions

The disk ID(s) are placed in the buffers pointed to by register-pair HL. If a drive is not ready, blanks are placed into the buffer.

NZ = Error
A = Error Code.

KBPUT
(function code 3Ø)

(New Function)

This routine puts one character into the keyboard type-ahead buffer in the same manner that pressing that key on the keyboard does.

Note: If the character to be put into the buffer is X'ØØ', it will be put into the buffer if HLDKEY SVC is turned off, and will trigger hold processing if HLDKEY SVC is turned on. (See HLDKEY SVC in Model II/16 Owner's Manual for more information.)

If the character is X'Ø3', it will cause <BREAK> key processing to be invoked. (See SETBRK SVC in Model II/16 Owner's Manual for more information.)

Entry Conditions

B = Character to be put into the buffer
A = 3Ø

Exit Conditions

Z = Character was put into buffer
NZ = Buffer full -- character could not be put into buffer
A = Error Code

RDDIR
(function code 32)

(New Function)

This routine reads in one directory record from a single drive at a time. It also allows you to use a wildcard mask. The directory record is then put into a 128-byte ASCII string in user memory.

To read the directory of a specific file, use the filename for the wildcard mask. (do not use the asterisk.) RDDIR will then search for the specified file.

See DIRSET for details on OPEN file directory information.

Entry Conditions

BC = Address of an 8=byte block in user memory defined as:

binary drive #	directory index*						**
	FF	FF	FF	FF	FF	FF	ØØ

* = FF FF FF FF FF FF sets index to beginning of directory

** = end of list terminator

DE = Wildcard Mask. For example:

```
MASK    DEFM    '*/BAS'
        DEFB    ØDHY   ;must end with CR
```

If DE = Ø, then no wildcard selection will take place. See the TRSDOS Section of the Model II Owner's Manual for specific details.

HL = Address of 128-byte area where data is to be placed.

Exit Conditions

HL = Address of 128-byte area where data is placed. This data line will be in the form of the TRSDOS-II DIR format.

Z set if error does not occur.

RETURN C,NZ = EOF encountered. (i.e., no further directory entries.)

RETURN NC,NZ = I/O Error occurred. (A = error code)

Offset Table For HL Buffer

Offset	Description	# bytes
Ø	Length Byte	1
1-12	Filename	12
13	File-Left-Open Marker	1
16-23	Date Created	8
25-32	Date Updated	8
39-42	Attrib	4
45	File Type	1
48-51	Record Length	4
53-61	Number of Records	9
64-7Ø	Sectors Allocated	7
73-79	Sectors Used	7
8Ø-127	Reserved	48

Example

```
LOOP    LD      BC,CTLBLK
        LD      DE,MASK
        LD      HL,IMAGE

        LD      A,54
        RST     8
        JR      NZ,END      ; END OR ERROR HAS OCCURRED

        (display "IMAGE")

        JR      LOOP

END     JR      C,EOF       ; INDICATES END OF FILE
        (exit routine, otherwise an error occurred)

CTLBLK  DEFB    Ø4          ; DRIVE #
        DEFB    -1,-1,-1    ; BEGINNING OF DIRECTORY INDEX
        DEFB    -1,-1,-1    ;
        DEFB    Ø           ; END OF LIST TERMINATOR

IMAGE   DEFS    128

MASK    DEFM    '*/BAS'     ; FIND /BAS FILES ONLY
        DEFB    ØDH         ; CR
```

LOCATE
(function code 33)

(Enhancements only)

This function returns the number of the current record, i.e., the number of the last record accessed. You can use this call with fixed-length record files only.

For information on Entry and Exit Conditions, see your Model II Owner's Manual.

If "E" (Extended) mode was set at file open, then:

BC = Address of 3 bytes of RAM where LRN will be stored in the following format:

upper byte	middle byte	lower byte

where ØØ ØØ ØØ = first record of file.

Note: record number must be less than

16777216 / logical record length

where 16777215 = EOF

For a file with a LRL=1, the number of records cannot exceed 16777214.

DIRRD
(function code 35)

(Enhancements only)

This routine reads the specified record, allowing direct access.

For details on Entry and Exit Conditions, see your Model II Owner's Manual.

If "E" (Extended) mode was set at file open then:

BC = Address of 3 bytes in RAM whose format is:

upper byte	middle byte	lower byte

where ØØ ØØ ØØ = beginning of file (first record)
and FF FF FF = end of file (EOF)

Note: record number must be less than

16777216 / logical record length

where 16777215 = EOF

For a file with a LRL=1, the number of records cannot exceed 16777214.

OPEN
(function code 4Ø)

(Enhancements only)

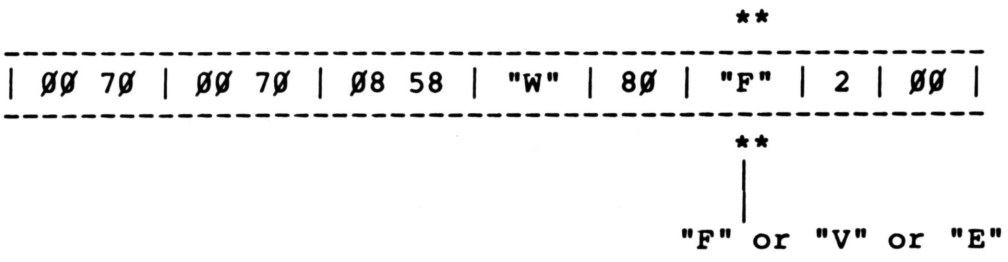
This call handles both the creation and opening of files.

For Entry and Exit Conditions, see your Model II Owner's Manual.

The (HL) parameter list field in TRSDOS-II incorporates the "E" (Extended) mode. The "E" mode tells the system to use a 24-bit record number. This is used when record numbers over 65534 are to be accessed.

Example

Contents of Parameter List



"V", "F", or "E" (variable- or fixed-length, or fixed-length extended)

This one-byte field contains either an ASCII V for variable-length, or ASCII F for fixed-length, or ASCII E for extended mode. If E, then position read or write (DIRRD or DIRWR) and LOCATE will use a 24-bit, indirect 3-byte record number. The E specifies F (fixed) type of records and an "extended" mode of specifying Logical Record Numbers. The Directory will show F, even though the E mode was specified.

Note: record number must be less than

16777216 / logical record length

where 16777215 = EOF

For a file with a LRL=1, the number of records cannot exceed 16777214.

DIRWR
(function code 44)

(Enhancements only)

This routine writes the specified record. It writes your record into the specified record position of the file.

For details on the Entry and Exit Conditions, see your Model II Owner's Manual.

If E mode was set at file open then:

BC = Address of 3 bytes in RAM whose format is:

upper byte	middle byte	lower byte

where ØØ ØØ ØØ = first record of file
and FF FF FF = record after current end-of-file (EOF + 1)

Note: record number must be less than

16777216 / logical record length

where 16777215 = EOF

For a file with a LRL=1, the number of records cannot exceed 16777214.

REWIND
(function code 48)

(New Function)

This routine rewinds a disk file. After this routine is executed, the next read/write will access the first record of that file.

Entry Conditions

DE = DCB of Open File

Exit Conditions

NZ = Error occurred
A = Error Code

RAMDIR
(function code 53)

(Enhancements only)

This routine allows you to examine a drive's directory or determine the free space. The information is then written into a RAM buffer.

For more details, see your Model II Owner's Manual.

Entry Conditions

A = 53
B = Drive Number, binary Ø, 1, 2, 3 for Floppy Disk Drives
binary 4, 5, 6, 7 for Hard Disk Drives

RS232C
(function code 55)

(Enhancement Only)

This routine sets up or disables either Channel A or B.

For Entry and Exit Conditions, see your Model II Owner's Manual.

If you modify the (HL) parameter list field, called the End of List Marker, you can specify a larger receive buffer than the 16-character default buffer.

The format of the old parameter list is:

Channel	Baud Rate	Word Length	Parity	Stop Bits	End of List Marker

The Channel, Baud Rate, Word Length, Parity, and Stop Bits are described in the Model II/16 Owner's Manual.

If the End of List Marker is a ØØH, then the 16-character default receive buffer as described in the Model III/16 Owner's Manual will be used.

New Feature

If the End of List Marker is a Ø1H, then the buffer area specified by the contents of five bytes which follow the End of List Marker will be used to specify the receive buffer:

byte Ø	End of List marker -- Ø1H
bytes 1-2	Buffer Start Address (LSB/MSB)
bytes 3-4	Buffer End Address (LSB/MSB)
byte 5	ØØH Terminator

The buffer must be at least 49-bytes long and the entire buffer (both front and back) must reside below 8ØØØH.

To determine the size of the buffer, use the following formula:

$$n * 2 + 15 = \text{buffer size}$$

where n is the number of characters you wish the buffer to hold. n must be at least 17, but small enough so the entire buffer can be stored below 8ØØØH.

DIRSET
(function code 59)

(New Function)

To get the directory information on any currently open file, use DIRSET. This routine sets up the 8-byte block of memory that is one of the entry parameters for RDDIR (function code 32). After the file is opened, you may:

- Find out which drive contains the file (see RDDIR).
- Set up the 8-byte block in user memory (BC) for RDDIR. This allows RDDIR to obtain directory information about the currently open file.

Entry Conditions

DE = Address of the open DCB
BC = Address of the 8-byte block of user memory

Exit Conditions

All registers returned unmodified except "A".
BC = Address of 8-byte block of user memory set for RDDIR all to get the directory information of the open DCB (pointed to by DE).
Z = No error.
NZ = I/O error occurred.

Note: Be sure to load register pair DE with zero (LD DE,Ø) after executing DIRSET and before executing the RDDIR. If DE is non-zero, RDDIR will expect a wildcard mask and, in most cases, will not be able to find a match.

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SERVICE POLICY

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