



Network
OPERATING
SOFTWARE **3**

**Network 3
Model III
Hard Disk
Operating Software**

Catalog Number 26-277B

The Network 3 Model III Hard Disk Operating Software enables student computers that are connected to a TRS-80® Network 3 Controller (Cat. No. 26-1212) to share printing and disk access at a central Host computer. The Network 3 Operating System creates a Model III TRSDOS-like environment for the Student Station computers and provides Network 3 BASIC. From Student Stations, students load and save programs and access data files using the Host's hard disk storage, and share the Host's printer, all without teacher intervention. The Host must be a two-disk Model 4 (Cat. No. 26-1069) or Model III (Cat. No. 26-1066). The Host must be equipped with the Model III Hard Disk Operating System (LDOS™) and one Radio Shack® Hard Disk: either 15 megabyte (Cat. No. 26-4155) plus Model III Installation Kit (Cat. No. 26-1133), or the 5 megabyte (Cat. No. 26-1130). (All Model 4 computers will operate in Model III mode.) Student Station computers can be Model 4 or III, disk or non-disk, with RS-232C interface and at least 32K memory. Computers equipped with Network 3 ROM chip sets (including many Model 4s) can load the Student Station operating software directly from the Host; all others will require a cassette recorder, a disk drive, or a Network 2 Controller.

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Network 3 Model III Hard Disk
Operating Software

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Second Edition

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INTRODUCTION

The Network 3 Model III Hard Disk Operating Software enables you to operate from one to 16 TRS-80® Model 4 or III computers as Student Stations in a classroom network when they are connected through a TRS-80 Network 3 Controller to a hard-disk-equipped Model 4 or III Host computer. (All Model 4 computers in the Network 3 system will operate in the Model III mode.)

This Operating Software provides the Student Stations with most of the capabilities of a stand-alone, disk-equipped Model III system. Student Stations load and store programs and other information using the hard disk at the Host, and share a parallel printer attached to the Host, all without interrupting other students or the teacher. Students can even learn to program in Disk BASIC at non-disk Student Stations. Any Student Station can optionally be used as an independent, stand-alone unit without disturbing the network connections. This flexibility helps make the Network 3 system an ideal choice for classroom purposes.

This manual will introduce you to the Network 3 system and serve as a reference manual for your continued use. Begin with the first section, Using the Operating Software. This section shows how to start up the Network 3 hardware and load the Host and Student Station software. It includes instructions for running MAILBOX, a program included with this package that demonstrates the Network 3 system. This section also gives an example of transferring new courseware from floppy diskettes to the hard disk for use by the Student Stations.

Before you go through the rest of the manual, please examine the Table of Contents for an overview of its organization and topics. Refer to the following sections as needed:

- Two reference sections for the Operating Software. These sections explain the features of the Network 3 Operating System and Network 3 BASIC (NBASIC). They also explain utility programs and software functions such as printing and spooling.
- Reference section for teachers. Here you will find helpful information about the Network 3's hardware and software, such as classroom arrangements for the computers and cables, and guidelines for using the Network 3 system with your classes. Suggestions for protecting courseware and student files and for maintaining these files on the hard disk are included in this section. A troubleshooting guide, hints for writing programs for network use, and instructions for using an optional Network 2 Controller with the Network 3 system can also be found here. An abbreviated reference for the Hard Disk Operating System (LDOS) is included at the end of this section to help you use commands at the Host computer to convert programs from TRSDOS diskettes to the hard disk and work with them under LDOS.
- Appendices and index.

Network 3 Model III Hard Disk
Operating Software

EQUIPMENT REQUIREMENTS

The minimum hardware required for use of this package is:

- One TRS-80 Network 3 Controller (Cat. No. 26-1212).
- Host: one two-disk TRS-80 Model 4 computer (Cat. No. 26-1069) or Model III computer (Cat. No. 26-1066). A single-drive Model 4 or Model III can operate as a Network 3 Host as long as it is equipped with RS-232C interface and at least 32K memory. Two disk drives are necessary for some procedures related to network operation.
- Either one TRS-80 15 megabyte Hard Disk (Cat. No. 26-4155) plus Model III Installation Kit (Cat. No. 26-1133), or one TRS-80 5 megabyte Hard Disk System (Cat. No. 26-1130). The Host system must operate under LDOS, the Model III Hard Disk Operating System. *
- Student Stations: one to 16 TRS-80 Model 4 or Model III computers with RS-232C interface and at least 32K memory.
- One RS-232C cable for each Student Station.

A printer for the Host computer is optional. However, some network applications might require use of a printer.

These items plus the Network 3 Model III Hard Disk Operating Software form the Network 3 system.

The Controller connects as many as 16 Student Stations to the central hard-disk-equipped Host. (The RS-232C cables can extend to a maximum of 100 feet. The Network 3 Controller includes an RS-232C cable for the Host.) The student computers can be Model 4 or Model III, disk or non-disk, in any combination, as long as they meet the minimum requirements listed above.

The programs that are loaded into the Host and Student Station computers create the Network 3 Operating System. This operating system emulates a TRSDOS 1.3 environment and provides Network 3 BASIC, providing most of the capabilities of a stand-alone disk-equipped Model III for all Student Stations.

* Model 4 owners may also want the Model 4 Installation Kit (Cat. No. 26-1134). A special initialization described in the Model 4/4P Hard Disk System Start-up Manual lets LDOS (for Model III mode) share space on the hard disk with TRSDOS 6.2 (for Model 4 mode). Then the hard-disk-equipped Model 4 can operate either as a Model III (to host the Network 3 system) or as a Model 4 (to run administrative programs, for example). In the LDOS configuration, the computer's floppy-disk drives must be specified as Drive 4 and Drive 5.

TRS-80 computers made specifically for use as Student Stations have a Network 3 ROM chip set that accepts a simple command to load the Student Station software from the Host. This includes both the Model 4 Student Station (Cat. No. 26-1059) and the Model III Student Station (Cat. No. 26-1060). Many disk-equipped Model 4s also have this chip set.

You can operate TRS-80s not equipped with the Network 3 chip set as Student Stations by following one of these alternative loading procedures.

- **Cassette loading:** Using a cassette recorder, you can copy the program STUDENT onto a cassette tape (as described on page 198). Then you can load this Student Station software from the cassette tape into each computer (as described on page 183).
- **Disk loading:** At a computer equipped with a disk drive, you can quickly load the DSTUDENT program from the TRSDOS Student Software Diskette included in this package (as described on page 186).
- **Network 2 loading:** You can add a Network 2 Controller (Cat. No. 26-1211) to the Network 3 system for loading the STUDENT program from the Host into the Student Stations (as described on page 184). You can also use this controller to simultaneously load a BASIC program into selected Student Stations. Students can then run the program under the Network 3 Operating System. (See page 131.)

STARTING UP THE NETWORK SYSTEM

If someone has already performed the First Time Start Up procedure outlined below to set up the hard disk Network 3 system, then skip to Daily Start Up. Follow the Daily Start Up sequence each time you want to use the Network 3 system with your class.

FIRST TIME START UP

1. Connect the Host, Student Stations, and Network 3 Controller according to the instructions in the Network 3 Controller Operation Guide. Please refer to pages 105-106 of this manual for suggestions on arranging your classroom or computer lab to protect the Network 3 system's RS-232C cables.
2. Connect the hard disk unit to the Host according to the instructions in the Hard Disk System Start-up Manual. Make sure the hard disk expansion cable is securely connected.
3. Connect any other peripheral devices (a printer or external floppy disk drives) to the Host according to the instructions which were included with the devices. Make sure all cables are securely connected.
4. If the hard disk has already been "initialized" so that the Host can operate as a hard disk system, go to Step 5 below.

If the hard disk is new, or if you wish to re-initialize it for Network 3 use, perform the appropriate procedure before you continue:

- To initialize a 15 megabyte hard disk, turn to Appendix IV of this manual. The Educational Initialization procedure described there will prepare a 15 meg hard disk to store the greatest possible number of files. If you are already using a 15 meg hard disk, you might want to re-initialize it in this way. **You must re-initialize your hard disk if Drive 4 is not configured as a floppy disk drive.**
 - To initialize or re-initialize a 5 megabyte hard disk, follow the standard instructions in the Hard Disk System Start-up Manual.
5. Power up the Host computer as described in Steps 1 to 9 on the next page. When you see "LDOS Ready" on the Host screen, continue with Step 6.
 6. Follow the steps in Appendix III to make a backup copy of the Network 3 Operating System Diskette included in this package.
 7. Follow the steps in Appendix V to transfer files from your backup copy of the Network 3 Operating System Diskette to the hard disk. Then, if you want to begin using the Network 3 system, turn to page 9 to load the Network 3 software.

DAILY START UP

Powering Up the Host Computer

1. Make sure all Host floppy disk drives are empty.
2. Turn on the Network 3 Controller. (When it is on, the POWER button on the front of the unit will be illuminated.) Make sure the MODE button isn't illuminated. (If it is, press it once and the light will go off.)
3. Turn on any peripheral devices (for example, a printer or external floppy disk drives) attached to the Host.
4. Turn on the hard disk by turning the power key clockwise. Then remove the key.

NEVER move the hard disk unit when it is turned on. Also, don't expose the hard disk to magnetic fields, such as those produced by a bulk eraser, monitor, or motor.

5. Turn the Host computer on. (The On/Off switch is under the right side of the keyboard.)
6. When the red light on the Host's bottom floppy disk drive goes off, insert a backup copy of the Hard Disk Start-up Diskette with the square notch to the left and the label facing up. Then close the door.

Keep a backup copy of your Start-up Diskette near the Host. The Start-up Diskette was made for your hard disk system during hard disk initialization. To use the hard disk, you must insert a Start-up Diskette in the bottom disk drive whenever you start up or reset the Host. For more information, refer to the Hard Disk System Start-up Manual.

7. Press and release the orange Reset button.
8. In a few seconds the screen shows the large LDOS logo. When you see the message "Date ?", type the date using two digits each for the month, day, and year, with a slash separating each pair. (Example: type 01/23/85 for January 23, 1985.) Then press [ENTER].
9. When the prompt "LDOS Ready" appears, you can remove the Start-up Diskette and replace it in its protective envelope. (You need this diskette only when you start up or reset the hard-disk-equipped Host.)

The Host is now running under LDOS, the Hard Disk Operating System. Keep in mind that this system is substantially different from TRSDOS 1.3, the TRS-80 Disk Operating System that you have used with your floppy disk-equipped Model III and Model 4 computers (in Model III mode).

A hard-disk-equipped Host computer has eight "logical" drives to access (determined by the available read/write heads in the system). The system's "configuration" is the arrangement and numbering of these logical drives. (For more information, please see the General Information section of the Hard Disk Operating System Reference Manual.)

Under normal configuration, the hard disk contains Drives 0, 1, 2, and 3. The bottom floppy disk drive on the Host is considered Drive 4 and the top floppy disk drive is Drive 5. Any external floppy disk drives attached to the Host computer are Drives 6 and 7. If a 15 megabyte hard disk is used with the Host, the system might be configured so that Drives 6 and 7 are additional hard disk drives, instead of floppy disk drives.

While running under the Hard Disk Operating System, the Host can access only those diskettes (floppy disks) that are in the LDOS format. You can use a diskette in the TRSDOS format **only** when you convert its files to the hard disk or an LDOS-format diskette (as described in the example beginning on page 17).

If you attempt to use a TRSDOS diskette in one of the Host's floppy disk drives, LDOS will try to read that diskette for several seconds. DO NOT OPEN that drive door until its red access light goes off and an error message appears on the Host screen.

Loading the Host Software

Now let's load the HOST program into the Host computer. This program will handle the file input/output requests and printer output from the Student Stations.

1. When you see the prompt "LDOS Ready" on the screen, type **HOST** and press **[ENTER]**.
2. When "Baud rate ?" appears, press **[ENTER]**.
The Host will now display the Network 3 status screen:

**Model III Network 3 HOST - Ver 2.1.4
Copyright 1982, Micro-Systems Software, Inc.
Licensed to Tandy Corp. All rights reserved**

**Student : --
Spool : --
Files : --**

Loading the Student Station Software

Now let's load the STUDENT program at **each** computer that will be used as a Network 3 Student Station. This program will provide a Model III TRSDOS-like operating environment for the Student Stations.

If the Student Stations are equipped with the Network 3 ROM chip set, you or your students can load the STUDENT program directly from the Host, as described below. Otherwise, use one of the alternative loading methods described in Appendix I. (If you're not sure a computer has the Network 3 ROM chip set, try this loading procedure to find out.)

1. Turn the Student Station computer on. (The On/Off switch is under the right side of the keyboard.)
2. If the Student Station is equipped with a floppy disk drive, hold down the [BREAK] key while you press and release the orange Reset button.

3. When the screen shows: You type or press:

Cass? [ENTER]

Memory Size? [ENTER]

READY SYSTEM [ENTER]

>

*? /12363 [ENTER]
(Model 4 computer)

OR

/12327 [ENTER]
(Model III computer)

There will be a slight delay while the STUDENT program is loaded from the Host.

4. When the message "Baud rate ?" appears, press [ENTER]. The Student Station will now display Network 3 STUDENT copyright information and the prompt "Network 3" with a flashing cursor.

If "Baud rate ?" won't appear on a Student Station's screen, try one of the alternative loading methods described in Appendix I (page 183). If "Baud rate ?" still won't appear, refer to the troubleshooting guide beginning on page 133.

When "Network 3" appears on its screen, the computer is operating under the Network 3 Operating System. As a Student Station, it can begin sharing disks and the printer at the Host. From a Student Station you can:

- Execute one of the Network 3 Operating System commands. For example, type the command LIB and press [ENTER] to see a list of available library commands. (These commands are explained beginning on page 31.)
- Run an assembly-language program that is stored at the Host. Type the file specification of the program (for example, SCRIPSIT) and then press [ENTER].
- Run a BASIC program that is stored at the Host. First you must load Network 3 BASIC (NBASIC). Type NBASIC [ENTER]. Soon the screen will display the NBASIC prompt "READY >". Then type RUN "program" [ENTER], substituting the name of the desired program for the word program. (Or, from "Network 3", you can load both NBASIC and program by typing the command NBASIC program [ENTER]. Be sure a space separates NBASIC and program.)
- Write a program in BASIC. First you must load NBASIC by typing NBASIC [ENTER]. When the screen displays the "READY >" prompt, you can write a program using all the features of Model III ROM BASIC and most of the features of Model III Disk BASIC. (A Network 3 BASIC reference section begins on page 53.)

When "Network 3" is displayed on all Student Station screens, turn to page 12 for a demonstration of the Network 3 system.

DEMONSTRATION OF THE NETWORK 3 SYSTEM

HOW TO RUN A PROGRAM (MAILBOX)

As a demonstration of the Network 3 system, let's run the BASIC program MAILBOX. This is a Network 3 Operating System utility program, one of the files that you transferred to your hard disk from the Network 3 Operating Software Diskette.

At each Student Station that is to participate, load Network 3 BASIC. Type NBASIC and press [ENTER]. (If several Student Stations send this load request at once, expect a slight delay before you receive NBASIC at your Student Station.)

You'll see a display like this on the Host's screen as it responds to each Student Station request it receives:

```
Model III Network 3 HOST - Ver 2.1.4      *
Copyright 1982, Micro-Systems Software, Inc.
Licensed to Tandy Corp. All rights reserved
```

```
Student : 3
Spool   : —
Files   : 1
```

The Host's screen displays the current activity of the network. The two dashes next to "Student:" are replaced by the number of the Student Station that is contacting the Host. (Each Student Station number corresponds to its numbered connection on the back of the Network 3 Controller.) The two dashes next to "Files:" are replaced by the number of files that the Student Station has opened for loading or other access at the Host. When a Student Station is sending data to be printed on the Host's printer, a Student Station number will replace the dashes next to "Spool:".

Notice the flickering character "*" in the upper right corner of the status screen. This star appears while data or a program is moving between the Host and a Student Station. During normal operation of the Network 3, the Student Station number and the "data transfer star" remain on the status screen only briefly. When the Student Station's request has been completed, the star and any numbers disappear. The Host then checks each other Student Station in turn, according to the sequence of the connections on the back of the Network 3 Controller. When another Student Station has a request, its number will be displayed and the star will reappear as data is transferred to or from the Student Station. This cycle repeats continuously.

Certain unusual circumstances can cause the Host to "lock on" to one Student Station, interrupting this network cycle. Then the Host can't proceed to the requests from other Student Stations. If a Student Station's number remains on the status screen, and the data transfer star either doesn't flash or isn't visible, then use one of the procedures on page 108 to overcome the interruption.

When the NBASIC prompt "Ready >" appears on the Student Station screen, you're ready to load the MAILBOX program. Type **RUN"MAILBOX"** and press [ENTER].

In this demonstration, the Host must respond to two requests from each participating Student Station. In the first cycle, the Host sends Network 3 BASIC (NBASIC) to each Student Station. The Host's status screen displays the number of each Student Station as it loads NBASIC. The Host then repeats the cycle, this time loading the MAILBOX program into each Student Station.

When MAILBOX is loaded and running, the Student Station screen will show the heading "POST OFFICE" and a list of options:

May I help you?

1. I'd like to send a message.
2. Are there any messages for me?
3. Goodbye.

Choose 1, 2, or 3 >

MAILBOX is designed to illustrate the operation of the Network 3. The Student Stations have loaded the program from the Host. Now they will access the Host as they run it.

MAILBOX allows students to send messages to one another from Student Stations. Up to 25 messages are stored in and retrieved from a data file called POSTAMT/DAT on a drive of the Host hard disk. (Both MAILBOX and POSTAMT/DAT are on the Network 3 Model III Hard Disk Operating Software Diskette. MAILBOX and other utility programs were copied onto the hard disk the first time the network was started up.)

To send a message, type 1. When the question "Who do you want to send it to?" appears, type the student's name (up to eight characters) and press [ENTER]. When "Please type the message." appears, you can type up to 248 characters (a little less than four lines). After you finish your message, press [ENTER]. When the Host gets to your Student Station, you can see the number of your Student Station appear on the status screen as your message is stored in the file POSTAMT/DAT. Then the MAILBOX menu will reappear.

To receive a message, type 2. When you see "What is your name?", type your name and press [ENTER]. The message "I'm looking." is displayed while your Student Station waits for its turn to access the Host. Your Student Station number will be displayed on the Host's screen when the POSTAMT/DAT data file is opened to look for a message. The first message found for your name will be sent to your Student Station. Then the data file will be closed so that the Host can continue to the next Student Station's request.

After viewing your message, press [ENTER] to continue. The question "ERASE?" will appear (unless the message was sent by the teacher to all students, as explained next). To delete the message from the data file, type Y for Yes. Or, type N for No to leave the message in the data file. Message retrieval from the data file at the Host continues until all messages for you have been displayed. Then you'll see "That's all for you." and the MAILBOX menu will reappear.

You can leave a "bulletin board" message that will be seen by all students using the program. To do so, begin by selecting Option 1. Respond to the question "Who do you want to send it to?" by typing ALL and pressing [ENTER]. Unlike other messages, these bulletin board messages can't be erased when they are received by the students. You can remove a bulletin board message by selecting Option 2, then typing ALL and pressing [ENTER]. When the question "ERASE?" appears, you can type Y to erase the bulletin board message.

To erase all messages in the MAILBOX data file, select Option 1. When the question "Who do you want to send it to?" appears, press the [SHIFT] and [@] keys at the same time, then press [ENTER].

Selecting Option 3 will end the program and return you to NBASIC.

Suggestions for using the MAILBOX program with your students can be found on page 25.

HOW TO EXIT THE NETWORK 3 OPERATING SYSTEM

When you finish using the MAILBOX program, try the two procedures below. They demonstrate how network computers should leave the Network 3 Operating System to avoid losing data and interrupting network operation.

At a Student Station:

1. Exit the program you are currently running by pressing [BREAK] or by following any special termination instructions for that program.
2. When the program ends, you will see either the NBASIC prompt "Ready >" or the Network 3 Operating System prompt "Network 3". If you see "Ready >", return to the Network 3 Operating System by typing CMD"S" and pressing [ENTER].
3. When you see the prompt "Network 3" and a flashing cursor,* press and release the orange Reset button.

Press Reset at a Student Station ONLY when you see the "Network 3" prompt and a flashing cursor. Pressing Reset at any other time could disrupt data transfer between the Host and the Student Station, causing an interruption of normal Network 3 operation.

Now you can use the Student Station computer independently, or turn it off, without affecting the Network 3 system.

You can rejoin the Network 3 system while it's in use. Reload the STUDENT program from the Host (as described on page 10), or use one of the alternative loading methods described in Appendix I (page 183).

Note: Loading the Student Station software from the Host takes longer now (when many Student Stations are sharing the Host) than it did when you started up the network. The Host must send three small program modules to the Student Station before it can load the STUDENT program. That means the Host must complete three cycles around the busy network while it loads these modules. These three loading sequences are so brief that the Student Station's number won't appear on the network status screen. On the fourth cycle, you'll see the Student Station's number appear while it loads the STUDENT program.

Don't press Reset at a Student Station after you begin loading the Student Station software from the Host. Pressing Reset could disrupt data transfer between the Host and the Student Station, causing an interruption of normal Network 3 operation.

* Some programs use a cursor that doesn't flash. If the graphic block displayed at "Network 3" or "Ready >" is a cursor, it will move to the right when you press the spacebar.

At the Host:

1. Check the printer attached to the Host to make sure it has finished the last print request from the Student Stations. The power should be on, and it should be in the "On Line" mode. (Ending the Host program erases all data stored in the printer spooler.)
2. When the printer stops, check the status screen to make sure that no Student Station numbers appear next to "Student:" or "Spool:". (If your students are running a program like MAILBOX that frequently accesses the Host, they might have to pause briefly so that no numbers will appear on the status screen.)
3. Exit the HOST program by holding down the [SHIFT] key and pressing [BREAK]. You'll see the prompt "LDOS Ready" appear.

Note: When the Host computer isn't running the HOST program, the Student Stations lose their access to the Host's disks and printer. However, requests sent during this time won't be lost.

When you see the prompt "LDOS Ready", you can:

- Use the Host computer and hard disk independently. (Some useful commands for LDOS, the Hard Disk Operating System, are explained beginning on page 159.)
- Reload the HOST program. Follow the instructions under Loading the Host Software on page 9. After you reload the HOST program, the Host will begin servicing any waiting requests from the Student Stations.
- Shut down the Network 3 system. Remove diskettes from the Host's floppy disk drives and turn off the power to all network equipment.

This concludes the demonstration of the Network 3 system. For an example of how you can convert a program from a floppy diskette for use with the hard-disk-equipped Network 3 system, continue to the next page.

ADDING NEW COURSEWARE TO THE NETWORK 3

This section describes the steps you should follow to transfer a program to the Network 3 system. Briefly, you should:

1. Find out if the program is compatible (if it will work, or can be made to work) with the Network 3 system.
2. Convert the program's files from the floppy diskette to the hard disk.
3. Make any adjustments to the files you have added to the hard disk.
4. Test the program on the Network 3 system.

Step 1: Find Out if the Program is Compatible

Many programs that run at independent TRS-80 computers under TRSDOS 1.3 can be added to the hard disk and run at Student Stations. Programs are considered fully compatible if they can be added and used without modification. Some programs can be used with the Network 3 system only after you make minor modifications at the time you add them to the hard disk. Other programs can't be used at all; they won't transfer to the hard disk, they use commands that aren't available under the Network 3 Operating System, or they require so much Host access time by each Student Station that they aren't practical for network use.

A list of Radio Shack educational software packages that can be used with the Network 3 system is in Appendix II, page 187. For this explanation, we will use Radio Shack's K-8 Math with Student Management Program (Cat. No. 26-1725). K-8 Math with Student Management provides mathematics exercises with student record-keeping. The list in Appendix II shows that this package is fully compatible with the Network 3 system. (Some packages require conversion by programs that are included with the Operating Software. This procedure is explained on page 189.)

For help with software packages from other publishers, contact the publisher that supplied the program.

- Ask if copyright restrictions allow the use of the software in a network environment.
- Ask if the program is compatible with the Network 3 Operating System and Network 3 BASIC.
- Ask if the program can be shared efficiently by several student computers.
- To avoid confusion with Radio Shack's floppy disk Network 3 system, mention that your Network 3 system is equipped with a hard disk. (A program might need its passwords replaced after conversion from TRSDOS to the LDOS format.)

Step 2: Convert the Program

Most programs for Model III mode computers are provided on diskettes in the TRSDOS 1.3 format, but the hard-disk-equipped Host requires all files to be in the LDOS format. Before you can use files stored on TRSDOS diskettes, you must transfer them to a hard disk or to an LDOS floppy diskette. An LDOS utility, CONV (for "convert"), does this for you. CONV copies files from a TRSDOS 1.3 diskette to another drive in the Host system, where they are stored in the LDOS format.

Here's how you'd convert files from the ADDITION and FIRST diskette of the K-8 Math with Student Management Program.

1. Power up the Host computer (as described on page 8)
OR exit the HOST program (as described on page 16).
2. With "LDOS Ready" on the screen, insert the Model III diskette into Drive 4 (the bottom floppy disk drive).
3. Let's say you want to convert the files from this diskette to hard disk Drive 1. Type **CONV :4 :1 (VIS,INV)** and press **[ENTER]**. This command instructs LDOS to convert both "visible" and "invisible" files from the TRSDOS diskette to the hard disk.
4. You will be asked before each file is converted.

Enter **N** for No in case one of these TRSDOS "system" filenames is displayed: BASIC/CMD, CONVERT/CMD, HERZ50/BLD, LPC/CMD, MEMTEST/CMD, and XFERSYS/CMD.

Enter **Y** for Yes when each other filename is displayed. However, if you see the message "**File exists -- replace it?**", enter **N** for No and make a note of the file's name. Then continue to convert the rest of the files on the TRSDOS diskette. To deal with a duplicate filename, refer to the suggestions on page 181.

For example, when you see: You type:

Convert file ADDITION? Y [ENTER]

Convert file K8ADDFIR/UTI? Y [ENTER]

Convert file RESULTS/ADD? Y [ENTER]

Convert file RESULTS/FIR? Y [ENTER]

Convert file FIRST? Y [ENTER]

When "LDOS Ready" reappears, these files have been successfully transferred to the hard disk.

5. Remove the TRSDOS diskette from the Host.

In this example, you'd repeat Step 4 with the other four Model III diskettes of the K-8 Math with Student Management Program.

Step 3: Prepare the Program for Network 3 Use

When all files of the program package are stored under LDOS, you can make all necessary and optional changes to prepare the files for use with the Network 3 system.

In some cases, the program itself requires modification to make it work with the Network 3 Operating System. You might have to add new program lines, change drive specifications, or enter the commands or patches provided by the publisher. (In this example, no modifications are needed.)

Optional program modifications can be made at this time, if you are familiar with the computer language the program was written in. For example, you might want to edit a program so that it will automatically run another program when it ends. In this example, you would edit the ADDITION and FIRST programs. You might want to replace all END commands in each program with the command `RUN"menuname"`, where menuname is the filename for a "menu" program that lists the other titles in the K-8 Math package. (You can create your own menu programs with the Network 3 MENU utility, which is explained on page 27. Suggestions for creating branching menu programs can be found on page 112.)

Many LDOS commands can help you prepare the files you have added to the hard disk for use with the Network 3 system. A few are described briefly in this manual, beginning on page 159.

- You can RENAME a file, COPY a file to another disk or diskette, or KILL an unwanted file.
- One especially helpful command is ATTRIB, which should be used to protect all files stored at the Host (as discussed in the section on protecting courseware and student files, page 119).
- For a student-management program like K-8 Math, you might want to move empty records files onto an LDOS-format data diskette. Then you could make backup copies of the data diskette to make a separate records diskette for each class that will use K-8 Math with Student Management on the Network 3. (For more suggestions on using data diskettes with the Network 3 system, see page 115.)

Step 4: Test the Program on the Network 3

Now you are ready to run the program.

1. Load the software for the Host and a Student Station by following the steps beginning on page 9.
2. When "**Network 3**" appears on the Student Station screen, follow the loading instructions provided in the program's manual. Substitute the screen prompt "**Network 3**" for "**TRSDOS Ready**", and NBASIC for BASIC if the program is in that language.

For example, here's how to load the ADDITION program that was converted to the hard disk.

With "**Network 3**" on the Student Station screen, load BASIC by typing NBASIC and pressing [ENTER].

When "Ready >" appears, type RUN"ADDITION" and press [ENTER]. The program will load and run on the Student Station as if it were running on an individual disk-equipped computer.

3. As you run the program, be sure to test all its features to make sure that it will work properly for your students.
4. You should also try to gauge how well the program will work when it is shared by many users. (A suggestion for determining the best number of Student Stations to operate while running a particular program is offered on page 110.)

NETWORK 3 OPERATING SYSTEM

NETWORK 3 OPERATING SYSTEM

EQUIPMENT CHOICES AND CONSIDERATIONS

Any TRS-80 Model 4 or III microcomputer with the minimum features listed under Equipment Requirements on page 5 can be used with the Network 3 Controller and the Network 3 Operating System. Student Stations can be any combination of models, whether non-disk or disk-equipped. All Student Stations retain use of the cassette Input/Output port (the round socket where the cassette is plugged in). But a Student Station's floppy disk drives will be disabled as long as it is participating in the network.

You can use a Student Station independently without disconnecting the RS-232C cable that carries network communications. You can also return to the Network 3 Operating System by reloading the Student Station software. (To exit or rejoin the Network 3 Operating System, refer to the instructions beginning on page 15.)

The Host computer is completely dedicated to the Network 3 system while the HOST program is running. That means that it can only receive requests from Student Stations and perform those requests. While the Host computer is running the HOST program, you should use one of the Student Stations to examine student records, print reports, or view the contents of the network's hard disk. When you want to operate the Host computer independently, you can do so without disconnecting its RS-232C cable (as described on page 16).

Even though 16 Student Stations can run under the Network 3 Operating System, the number you decide to operate may depend on the programs you want your students to use. The 16-station maximum is a good choice when students will be interacting with the Host moderately or infrequently (to load and save programs, read or write to disk files, or use the printer). If your students will be interacting with the Host frequently, then operating fewer Student Stations is recommended to decrease the length of time each Student Station must wait to have its request serviced by the Host. (A suggestion for determining the optimum number of Student Stations to operate while running a particular program is offered on page 110.)

When the Network 3 is used in a teacher-centered classroom (as opposed to a lab or resource room), you can reduce the time required to load BASIC programs into Student Stations by adding a Network 2 Controller to the Network 3 system. This option enables you to send a BASIC program to all or selected Student Stations simultaneously. Each student would then run the program under Network 3 BASIC and the Network 3 Operating System. (Instructions for using a Network 2 Controller with the Network 3 system begin on page 131.)

PRINTING AND SPOOLING

The Network 3 Operating System routes all Student Station printing requests to the printer at the Host. When a print request goes to the Host, the HOST program uses a "spooler" to intercept it before it gets to the printer. The spooler supervises the network's printing by storing the data to be printed until the printer is ready for it. On the Host monitor screen, you'll see the number of any Student Station that may be sending data to be printed displayed next to "Spool:". As soon as the spooler stores the data, it releases the Student Station.

The first request sent to the printer is the first request that was stored by the spooler. To keep Student Station access time brief, the spooler stores requests faster than they can be printed. The spooler also stores print requests when the printer isn't ready (when it's turned off, Off Line, out of paper, or disconnected). Therefore, the spooler's storage space may fill up when a large amount of printing is requested.

If the spooler fills while a Student Station is sending data to be printed, the Host will "lock on" to that Student Station until the spooler can store all the data. When more printing has been completed (making more spooler space available), that Student Station is released.

If you don't have--or don't want to use--a printer at the Host, you should use one of the following procedures to avoid filling the spooler.

- Use one of the commands described on page 177 to route the Host's printer output away from the printer. You can either discard printer output or save it in a disk file for printing at another time.
- Periodically erase the spooler's contents by exiting the HOST program (as described on page 16).

Using the Spooler

In a Host with 32K memory, approximately 23K is allocated for the spooler. That's enough space to store five full pages of print output (assuming a maximum page equals 80 characters on 60 lines). In a Host with memory of 48K or more, approximately 39K is allocated for the spooler. Assuming the same maximum page size, that's enough space to store eight full pages of print output.

If requests are small enough, many can be stored at the Host by the spooler during a class period. Ten minutes before the end of class the printer can be turned on to print them all at one time. This technique can be used to keep printer noise from interrupting other activities.

Remember to print all requests from the Student Stations before you end the HOST program or press the Host's Reset button. If you don't, the requests stored at the Host by the spooler will be lost. To make sure spooler memory has been emptied, send a print request to the network printer. If no print requests are being stored (and the printer is operational), your request will begin printing as soon as it reaches the Host.

After storing a print request, the spooler waits three seconds for another request before releasing the Student Station. If the spooler doesn't receive another request from that Student Station, it instructs the printer to advance three lines. This automatic spacing separates the printouts from different Student Stations.

You can follow this procedure to prevent blank lines and requests from other Student Stations from appearing in a printout:

1. At the beginning of class, send a form feed command to the Host's printer from a Student Station. At the NBASIC prompt "Ready >", enter the command `LPRINT CHR$(12)`.
2. Manually line up the printer paper so that the print head is at the top of a sheet.
3. Instruct your students to prepare their entire document (or at least one complete page) before they request a printout. (That is, they shouldn't try to print part of the document and then process the rest of the data.)
4. Instruct your students to follow each print request with the form feed command described in Step 1.

The Network 3 Operating System also allows use of a local printer (one attached to a Student Station) while that Student Station participates in the network. (For more information, see CMD"H" on page 60.) In a word-processing class, for example, you could connect another printer to a Student Station and establish it as a "printer station".

The Host's printer speed may decrease in some circumstances. If slow printing is a problem, try these solutions:

- Change the printer's print mode, if it is selectable.
- Print locally, from a Student Station (as described above).
- Add a print buffer (Cat. No. 26-1269) to the Host's printer.

Printer Control Codes

The network's printer will accept as valid print control codes the ASCII characters 12 and 13 when they are used under Network 3 BASIC (NBASIC).

`CHR$(12)` = Form feed (advance to top of next page)
`CHR$(13)` = Carriage return and line feed

In an assembly language program, print control codes 10 and 11 can be used in addition to 12 and 13.

character 10 = Line feed
character 11 = Vertical tab

If code 13 is used exclusively, the spooler will add three blank lines at the end of each printout to separate it from the next print request. But if code 10, 11, or 12 is also used, the extra blank lines will not be added. (Use of character 12 cancels the necessity of spacing between documents.)

To control the Host printer's output (length and width of printing, lines per page, etc.), enter the appropriate commands at the Host before you load the HOST program. Use the LDOS printer filter as described on page 176.

To control the output of a printer attached to a Student Station, POKE the appropriate values into that Student Station's memory, as described in the Model III/4 Operation and BASIC Language Reference Manual.

UTILITY PROGRAMS

Three BASIC programs are included with the Network 3 Model III Hard Disk Operating Software to help you and your students use the Network 3 system. They are MAILBOX, DATETIME/SET, and MENU. These "utility" programs and their data files were transferred to a drive of the hard disk, along with other Operating Software files, when the network was started up for the first time.

To run these programs at a Student Station, set up the Network 3 Operating System by following the Daily Start Up sequence beginning on page 8. Then follow the instructions below.

MAILBOX PROGRAM

The MAILBOX program was designed to illustrate how Student Stations share files stored at the Host. Instructions for running the MAILBOX program begin on page 12 as part of the demonstration of the Network 3 system.

You may find MAILBOX helpful in other ways.

- Use it as an ongoing bulletin board, and instruct your students to check it for assignments, messages, or suggestions for optional activities.
- Use MAILBOX with programming students as an example of a BASIC program using Random Access files that is designed to run under the Network 3 Operating System.

The MAILBOX program listing shows how Student Station access time is kept brief and how files are opened and closed to avoid network interruptions. To see the program listing, press [BREAK] when MAILBOX is loaded at your Student Station. Then enter the command LIST. If a printer is attached to the Host, enter the command LLIST for a copy.

DATETIME/SET PROGRAM

Since the date and time are not set when Student Stations start up under the Network 3 Operating System, the DATETIME/SET utility program performs this function.

To load this program when the Student Station screen reads "Network 3", type NBASIC DATETIME/SET and press [ENTER]. (Or, at the NBASIC prompt "Ready >", type RUN"DATETIME/SET" and press [ENTER].)

When DATETIME/SET is loaded and running, you'll see the current values for date and time at the top of the Student Station screen. For example, the line 00/00/00 01:11:45 shows that the date hasn't been set and that the Student Station has been running one hour, 11 minutes, and 45 seconds (in military time format).

The program prompts you to type new values. If you don't want to change a value, just press [ENTER]. For a demonstration, let's set the date for January 23, 1985, and leave the time unchanged.

```
When the screen shows:      You type or press:
TYPE THE DATE (MM/DD/YY)?   01/23/85 [ENTER]
TYPE THE TIME (HH:MM:SS)?   [ENTER]
```

You'll see the message "Date and Time are set." followed by the new values: "01/23/85 01:12:36" (or whatever the current time is for that Student Station).

Note: This program sets the date and time only in the Student Stations where it has been used.

If your students will be running programs that record scores or other information by date or time, instruct them to run DATETIME/SET first. Computer programming students won't need this utility to date the programs that they save to a disk at the Host, since that function is provided by the Host.

If you are familiar with BASIC programming, you could edit some programs to duplicate or include this simple utility. For example, you might be able to insert the essential lines from DATETIME/SET at the beginning of a BASIC courseware program that records scores by date or time.

MENU PROGRAM

This utility program lets you create option lists or "menus" of BASIC programs that are stored at the Host. These menus help your students run the programs they need or desire. Keep in mind that your menu programs can run BASIC programs **only**.

To load this program when the screen reads "Network 3", type **NBASIC MENU** and press [ENTER]. (If the screen shows "Ready >", type **RUN"MENU"** and press [ENTER].) Once the program is loaded and running, you'll see the heading "MENU MAKER". Below it is the question, "What is the filename for the new menu?".

First provide a filename for the menu program you are creating. The filename can contain up to eight letters and numbers, beginning with a letter (for example, FILENAME, VOCAB, PERIOD3). You can include any of these options with the filename to provide a full file specification for your menu program:

- A filename extension, containing a slash (/) followed by up to three letters and numbers, beginning with a letter (for example, FILENAME/EXT).

Note: The MENU program will automatically add the extension MNU for "menu" to your filename unless (1) you provide your own filename extension, or (2) you type / followed by no characters (to indicate no filename extension). The MNU extension helps you and your students differentiate menus from other programs when a directory list of files stored at the Host is displayed.

- A password, containing a period (.) followed by up to eight letters and numbers, beginning with a letter (for example, FILENAME.PASSWORD or FILENAME/EXT.PASSWORD).

Note: Including a password restricts access to the program. The password must be entered with the filename in order to run the program. You should only restrict access to menus that won't be used by your students.

- A drive specification, containing a colon (:) followed by the number of the drive where the menu will be stored (for example, FILENAME:3, FILENAME/EXT:3, or FILENAME/EXT.PASSWORD:3).

You can create many menus with the MENU utility program, as long as each filename (or filename plus extension) is different. After typing the filename for your menu, press [ENTER].

For example, let's say you want to create a menu for one group of Radio Shack courseware packages in secondary level mathematics. You decide to use MATH1HS for a filename, accept the extension /MNU, and store this file on the Drive 2 hard disk. You would type **MATH1HS:1** and press [ENTER].

In this example, you would see the extension /MNU appear within the file specification. The message "<<< PLEASE WAIT >>>" is displayed at the bottom of the screen while MENU checks Drive 0 (or the disk drive you specified) for an error or a filename conflict:

- If an error is encountered (bad filename, write-protected disk, disk drive not available), you'll start over so that you can enter a different filename.
- If a file with the same name is already stored on the disk or diskette in the destination drive, the message "File already exists. Replace it?" will appear. To leave that file unchanged, type N for No, and you will be prompted again for a filename. (You could create a different filename, or use the same filename with a different drive specification.) If you want to replace the old file, type Y for Yes.

Next the message "Type the heading you want at the top of your menu:" will appear. Type the name or heading that you want to appear on your menu program's screen, then press [ENTER].

For this example, let's use the heading MATH MENU 1. You would type MATH MENU 1 and press [ENTER].

After you enter the menu heading, these instructions will appear:

MENU MAKER

Type MENU entries and FILENAMES. Type "END" to end list.

MENU ENTRY

FILENAME

1.

Now you can type a descriptive name or title for up to nine options that you want to appear on your menu screen, followed by the file specification of each corresponding BASIC program. If you make a mistake while typing, you can correct the error before you press [ENTER]. Press the left arrow key [←] to move the cursor back one space. Or, hold down [SHIFT] and press [←] to erase the entire menu entry or filename.

The option you type under the "MENU ENTRY" column can be up to 40 characters long. You can include any special characters except the quotation mark. After typing the option, press [ENTER]. The cursor will move to the "FILENAME" column so that you can type the appropriate filename. You must also include any extension, password, or drive number that the program requires. (This information can be found on the program diskette or in its user's manual under the loading instructions.) Remember that the file specification you type under the "FILENAME" column must be that of a BASIC program.

After providing a filename for the menu entry, press [ENTER]. The message "<<< PLEASE WAIT >>>" will be displayed while the MENU utility program checks to be sure that the format of your file specification is valid. If it isn't acceptable, then you must type a different entry under "FILENAME". If it is acceptable, the next option number will appear.

The MENU utility prompts you for up to nine menu entries and filenames. If you want fewer than nine entries in your menu, enter all desired entries and filenames, then type END and press [ENTER] for the next entry in the "MENU ENTRY" column.

Here's one way you could complete this sample MATH MENU 1. When you see the number appear for an option, you would type these package titles and program filenames:

- | | |
|--|---------------------|
| 1. NUMBER THEORY [ENTER] | NTHEORY [ENTER] |
| 2. INVESTIGATIONS IN INTEGRAL CALCULUS [ENTER] | CALCULUS:2 [ENTER] |
| 3. QUADRATIC EQUATIONS [ENTER] | QUADEQ [ENTER] |
| 4. MATRICES & DETERMINANTS [ENTER] | MATRICES [ENTER] |
| 5. DETERMINANTS/SIMULTANEOUS EQUATIONS [ENTER] | SIMULEQ [ENTER] |
| 6. EUCLID GEOMETRY TUTOR [ENTER] | GEOMETRY:2 [ENTER] |
| 7. PLANE ANALYTIC GEOMETRY [ENTER] | PGEOM [ENTER] |
| 8. --NEXT MENU [ENTER] | MATH2HS/MNU [ENTER] |
| 9. END [ENTER] | |

In this sample menu, note that drive specifications are included with the filenames for the programs in Option 2 and Option 6. This menu specifies the CALCULUS and GEOMETRY programs that are stored on the Drive 2 hard disk. When a student selects Option 6, for example, the Euclid Geometry Tutor Program on Drive 2 will load and run--not a different program that is stored under the same filename, GEOMETRY, on a preceding hard disk drive.

One menu program can also lead to other menus. Option 8 of the sample program does this. Selecting "--Next menu" will display a menu of similar secondary level mathematics programs, stored under the filename MATH2HS/MNU. (For more information about creating branching menu programs, see the suggestions beginning on page 112.)

After you type END and press [ENTER] to end your menu program, you'll see the message "<<< PLEASE WAIT >>>". The menu program you have created is automatically saved on the Host's Drive 0 hard disk (or whatever other disk drive you may have specified with the filename). When this is complete, you'll see the message "DONE" and the NBASIC prompt "Ready >".

Now that your menu program has been saved, you should load it and save it to the Host again. This extra step stores the program in a "compressed" form so that it will load much faster when your class uses it. Here's how you would load and save the sample menu of mathematics programs.

1. Under "Ready >", type `LOAD"MATH1HS/MNU"` and press `[ENTER]`.
2. When you see "Ready >", type `SAVE"MATH1HS/MNU"` and press `[ENTER]`.

When you see "Ready >" again, you can type `RUN` and press `[ENTER]` to run your menu program and see how it looks. The sample menu would look like this:

MATH MENU 1

OPTIONS

1. NUMBER THEORY
2. INVESTIGATIONS IN INTEGRAL CALCULUS
3. QUADRATIC EQUATIONS
4. MATRICES & DETERMINANTS
5. DETERMINANTS/SIMULTANEOUS EQUATIONS
6. EUCLID GEOMETRY TUTOR
7. PLANE ANALYTIC GEOMETRY
8. —NEXT MENU

Enter selection: █

Only the descriptive names or titles that you entered for the programs are displayed (not the list of corresponding filenames). To choose an option from the menu, type the number that appears next to the option. The menu program will automatically load that program.

If you want to limit students to running only the options listed by the menu program, you can edit the program to lock out the `BREAK` key. If you want to change an option or a file specification in a menu program, you can edit the program's data lines. These techniques are explained on page 114.

When you want to remove a menu program from a disk or diskette, use the `KILL` command (as described on page 38 or page 71).

LIBRARY COMMANDS

Whenever you see the prompt "Network 3", you can enter commands that control the Network 3 Operating System. These are known as "library" commands. They are listed below with brief descriptions. Detailed descriptions follow in alphabetical order.

CLEAR	Clear contents of Student Station's user memory...	33
CLS	Clear the Student Station screen.....	33
DIR	Display the directory of a disk.....	34
FREE	Display amount of unused space on a disk.....	37
HELP	Explain library commands.....	37
KILL	Remove a file from a disk.....	38
LIB	Display library commands.....	38
LIST	Display the contents of a file.....	39
VIEW	Display contents of Student Station's user memory.	40

These Network 3 Operating System commands are stored at the Host, not the Student Station. When used, each command must be loaded into the Student Station. The commands DIR, FREE, and KILL require a second Host access to load data from a disk at the Host. The LIST command requires three accesses. Therefore, these commands will take longer to execute when the Network 3 is being used by several Student Stations. (Any of these commands may be purged from the Host as described on page 178.)

Syntax and Notations

All commands must be entered in a particular form that the Network 3 Operating System can understand. This is called the **syntax** of the command (like the structure of a sentence). The explanations of each library command use the following special notations and abbreviations:

- **CAPITALS, punctuation, and spaces** indicate material which must be entered exactly as it appears. In the line

LIST MATH/MNU:2

every letter, character, and space should be typed.

- **lowercase underlining** represents a value that you supply from a set of acceptable values for a particular command. For example, the line:

LIST filename

indicates that you must supply a valid filename after LIST.

- **Braces { }** signify optional parts of a command. (The braces aren't typed.) For example, the line:

LIST filename{:d}

indicates that you can supply the drive specification :d for a particular filename, or leave it out of the command.

- **X'nnnn'** indicates that the number nnnn is in hexadecimal form. All other numbers are in decimal form. (The notation **&Hnnnn** will be used in BASIC portions of the manual.)

Command Terms

Explanations of the library commands (and other features of the Operating Software) use the following terms:

- **Disks** refer to either hard disks or floppy diskettes. A disk's location is its **drive number**. The hard disks are numbered 0, 1, 2, and 3. The floppy disk drives are numbered 4 and 5. Drives 6 and 7 may be floppy or hard disk drives.
- **File** defines any set of information (either program or data) that is stored on a disk. No matter what kind of file you deal with, the file's name must use the following format:

filename/ext.password:d

The information in this form is called a **file specification**. A file specification contains these four parts:

filename--up to eight letters or numbers, beginning with a letter. All files must have a filename.

/ext--an optional filename extension. If used, up to three letters or numbers (beginning with a letter) can be included after the slash.

Note: Identical filenames, or identical filenames that also include the same extension, cannot exist on one disk.

.password--an option that assigns a protection status to a file. If used, up to eight letters and numbers (beginning with a letter) can be included after the period.

:d--an option called the **drive specification**. This specifies a particular drive number. Any number from 0 through 7 can be included after the colon, depending on the number of drives in the Host system. If a drive is specified, the Network 3 Operating System looks only at the directory of the disk in that drive for the file or information requested. If no drive is specified, the Network 3 Operating System starts at Drive 0 and searches all drives for the file or information requested.

CLEAR
Clear User Memory

```
.....  
: :  
: CLEAR :  
:.....:
```

This command erases all data stored in the Student Station's user memory.

CLEAR sets a value of zero for each user memory address up to Top of Memory. Student Station user memory covers the addresses from approximately X'5200' to X'BFFF' hexadecimal, or approximately 20992 to 49151 decimal, in a 32K Student Station. In a Student Station with memory of 48K (or more), user memory covers the addresses from approximately X'5200' to X'FFFF', or approximately 20992 to 65535.

Note: CLEAR does NOT recognize any Top of Memory protection.

Example

CLEAR

This command erases the Student Station's user memory. (If you then VIEW the contents of the Student Station's user memory, as described on page 40, zeroes will be displayed in each memory location.)

CLS

Clear the Screen

```
.....  
: :  
: CLS :  
:.....:
```

This command erases whatever was displayed on the Student Station's screen and puts it in the 64 character-per-line mode. The "Network 3" prompt is then displayed on the top line.

DIR

Display the Directory of a Disk

```
.....  
:  
: DIR {file}{:d}  
:  
:   file is the filename and/or extension for  
:   the files to be displayed. If omitted, all  
:   filenames are displayed.  
:  
:   Wildcard characters may be used to select  
:   certain files from the directory:  
:  
:   ? accepts any character in its position  
:   in the filename or extension.  
:  
:   * accepts all characters that follow  
:   it in the filename or extension.  
:  
:   :d is the drive number containing the  
:   desired disk. If omitted, the Drive  $\emptyset$   
:   directory is displayed.  
:.....
```

This command displays a directory of the visible user files stored on one disk at the Host. (When the Host computer is not running the Host program, you can view and print the entire directory--including system and invisible files--of all disks. Use the LDOS command DIR as explained on page 17 \emptyset .)

After the directory you specify is loaded from the Host, the filenames are sorted into alphabetical order and displayed under a heading. This heading shows the drive number, whether it contains a hard or floppy disk, and the number of filenames displayed.

If the directory contains more filenames than can be displayed on the screen, you will see these instructions at the top of the screen: "Press UP or DOWN arrow" and "Press BREAK to Exit".

- Press [\downarrow] to display the next line of the directory, or press [SHIFT] [\downarrow] to move rapidly through the directory. When you display the last line of the directory, the message "BOTTOM" will appear in the heading.
- Press [\uparrow] or [SHIFT] [\uparrow] to move back in the directory. When you display the first line of the directory, the message "TOP" will appear in the heading.
- To terminate the directory, press [BREAK].

Examples

DIR

This command displays a directory of all visible user files on the Drive 0 hard disk, since no drive was specified. To view the directory of the disk or diskette in another drive (not Drive 0), you must specify the drive number. **DIR :3** displays the directory of the Drive 3 hard disk, and **DIR :5** displays the directory of the diskette in Drive 5 (the top floppy disk drive).

DIR :1

This command displays the directory of all visible user files on hard disk Drive 1. The directory display might look like this:

```
DRIVE :1 HARD                                35 Files
-----
ADDITION      CORAID      CORGAME      CORSHARE/BAS
DAVID/DBT     FIRST       J3DRYDE/B05  J3DRYDE/B07
J3HOLLA/B06   J3KELLE/B07 J3KEMP/B06   J3KEMP/B07
J3MOORE/B09   J3MOORE/B10 J3TANNE/B09  J3THOMP/B07
J3THOMP/B09   J3TJARK/B08 J3TJARK/B09  J3VARTD/B07
MERGEPRO/UTL  MJD11       MYFILE       MYFILE/BAS
MYFILE/DAT    MYFILE/DEM  MYFILE2/BAS  MYOB
MYOPIA        MYPROGS/MNU PERIOD3A/UTL PERIOD3B/UTL
TEST17/BAS    TEST17/DAT  TESTER/D
```

Since this directory doesn't fill the entire screen of the Student Station, it can be printed on the Host's printer (if one is available). At "Network 3", press the keys [SHIFT] [↓] [*] at the same time to send the screen display to the printer.

The following examples show how the DIR command can be controlled to display a limited directory of files from this sample Drive 1 directory.

DIR MYFILE:1

This command provides part of a file specification, a filename. This command limits the directory to those files on the Drive 1 hard disk which start with the filename MYFILE (MYFILE, MYFILE/BAS, MYFILE/DAT, MYFILE/DEM).

DIR /BAS:1

This command also provides a partial file specification. It will display a directory of only those files on the Drive 1 hard disk which have the filename extension /BAS (CORSHARE/BAS, MYFILE/BAS, MYFILE2/BAS, TEST17/BAS).

DIR MYFILE/DAT:1

This command's full file specification instructs the Network 3 Operating System to display the file called MYFILE/DAT from the Drive 1 hard disk (if it is stored there).

DIR MY*:1

This command uses wildcard * in a partial file specification to display files on the Drive 1 hard disk which have filenames beginning with MY (MYFILE, MYFILE/BAS, MYFILE/DAT, MYFILE/DEM, MYFILE2/BAS, MYOB, MYOPIA, MYPROGS/MNU).

DIR /D*:1

This command uses wildcard * in a partial file specification to select files from the Drive 1 hard disk which have a filename extension beginning with /D (DAVID/DBT, MYFILE/DAT, MYFILE/DEM, TEST17/DAT, TESTER/D).

DIR MY????:1

This command uses wildcard ? in a partial file specification to limit the directory display to those files from the Drive 1 hard disk that have filenames beginning with MY and followed by four characters or less (MYFILE, MYFILE/BAS, MYFILE/DAT, MYFILE/DEM, MYOB, MYOPIA).

DIR MY????/D*:1

This command uses both wildcards to select files from the Drive 1 hard disk that have filenames beginning with MY and followed by four characters or less, with an extension beginning with /D (MYFILE/DAT and MYFILE/DEM).

DIR M*/:1

This command uses wildcard * and a slash / followed by no letters and numbers. This produces a directory display of files on the Drive 1 hard disk that have filenames beginning with M but having no extension (MJD11, MYFILE, MYOB, MYOPIA).

Note: Hard disk directories cannot be enabled or disabled. That feature is part of the Network 3 Operating Software for the TRSDOS floppy-disk Network 3. If you want to remove the ability to display all disk directories from a Student Station, purge the library command DIR/CMD from the Host as described on page 120. If you want to remove the ability to display certain files of a disk directory, make those files "invisible" as described on page 120.

FREE

Display Amount of Unused Space on a Disk

```
.....  
:  
: FREE {:d}  
:  
:   d is the drive number containing the  
:   hard disk or diskette. If omitted, free  
:   space on Drive 0 is displayed.  
:.....
```

This command shows you how much unused or "free" space remains on one of the disks or diskettes at the Host. This space is allocated in granules. On a hard disk, one granule equals 4096 bytes (4K). On an LDOS-formatted floppy diskette, one granule equals 1536 bytes (1.5K). When you enter the FREE command, a message will appear showing the drive number specified, whether it is a hard or floppy disk, and the number of granules free.

Example

FREE

This command displays the amount of free space remaining on the Drive 0 hard disk (since no drive number was specified).

To see how many granules remain on a disk or diskette in another drive (not Drive 0), you must specify the drive number. For example, FREE :3 displays the free space on hard disk Drive 3, FREE :4 displays the free space on the floppy diskette in Drive 4, and so on.

HELP

Explain Library Commands

```
.....  
:  
: HELP {command}  
:  
:   command is the Network 3 Operating System  
:   command to be explained. If omitted or if an  
:   invalid command is typed, a list of all  
:   available commands will be displayed.  
:.....
```

This command displays the available library commands and explains the syntax for using the specified command.

Example

HELP DIR

This command requests help for using the directory command DIR. A brief explanation of the command then appears on the Student Station screen.

KILL

Remove a File from a Disk

```
.....  
:  
: KILL file{:d} :  
:  
: file is the complete file specification :  
: for the file. The extension and password :  
: (if any) must be included. :  
:  
: :d is the number of the drive containing :  
: the disk or diskette which holds the file. :  
: If omitted, the first file with a matching :  
: specification will be killed (if it isn't :  
: on a write-protected disk or diskette.) :  
:.....
```

This command lets you remove any file stored on a hard disk or floppy diskette at the Host. (Make sure that you have another copy of the file you are removing, if you will want to use it in the future. The KILL command destroys this copy of the file.)

Examples

KILL PROGRAM3

This command removes the first file named PROGRAM3 found on a disk or diskette at the Host. To kill a copy of this file stored on a different disk, include that drive number. For example, you would enter the command **KILL PROGRAM3:4** to remove this file from the floppy diskette in Drive 4.

KILL POSTAMT/DAT

This command will cause the error message "File access denied" to be displayed. The correct password must be included with the KILL command to remove this protected file from the hard disk.

KILL MYPROGS/MNU.SECRET:3

This command removes the file named MYPROGS/MNU, which has a password of SECRET, from hard disk Drive 3.

LIB

Display Library Commands

```
.....  
:  
: LIB :  
:.....
```

This command displays the list of library commands that are available under the Network 3 Operating System. For help with a particular command, use HELP.

LIST

Display the Contents of a File

```
.....  
:  
: LIST file{:d}  
:  
:   file is the complete file specification  
:   for the file. The extension and password  
:   (if any) must be included.  
:  
:   :d is the number of the drive containing  
:   the disk or diskette which holds the file.  
:   If omitted, the first file found will be  
:   listed.  
:.....
```

This command lets you display the contents of any unprotected file stored on a hard disk or floppy diskette at the Host. Only printable characters from the file are listed to the Student Station screen; periods are displayed for all other values.

The message "Network 3 List" and the file specification you entered will appear at the top of the Student Station screen. If no drive specification is included, all drives will be searched for the file. When the file is found, its drive specification will be displayed. When the file is sent to the Student Station, up to 14 lines of the file will be displayed in ASCII form.

- To display one more line of the file list, press the spacebar once.
- To bring more lines into view, hold down the spacebar.
- To display the next 14 lines of the list (one full screen), press [ENTER].

After the last line has been displayed, the message "EOF" (for "End of File") and the "Network 3" prompt will appear. To exit the LIST command before reaching EOF, press [BREAK].

Examples

LIST MENUSORS

This command displays the contents of the file named MENUSORS. Since this program is stored on the hard disk in ASCII format, all contents are visible and recognizable.

LIST MENU

This command displays the contents of a file stored in BASIC compressed format. You will recognize only the program's name and screen messages amid the listed characters and periods.

LIST MYPROGS/MNU.SECRET:4

This command displays the contents of a file named MYPROGS/MNU, which is protected by the access password SECRET. Without this password, the file couldn't be displayed. The drive specification instructs LIST to look only on the disk in Drive 4 for this file.

VIEW

Display User Memory

```
.....  
: :  
: VIEW :  
:.....:
```

This command displays the contents of the Student Station's user memory. The user memory displayed covers the addresses from approximately X'5200' to X'FFFF' hexadecimal, or approximately 20992 to 65535 decimal (even for a 32K Student Station, in which memory ends at X'BFFF' or 49151).

When you enter this command, a screen showing the first section of the Student Station's user memory will appear. You'll see the contents in hexadecimal form that are stored from addresses X'5200' to X'52FF', with corresponding ASCII display on the right. This 256-byte page of memory roughly corresponds to one disk record. (If you erased the Student Station's user memory with the CLEAR command, as described on page 33, zeroes will be displayed in each address, and the right side of the screen will be blank.)

- Press [↑] to display the next screen of user memory. Hold down [↑] to display screens repeatedly, or press [SHIFT] [↑] to move rapidly through memory to the desired address.
- Press [↓] to display the previous screen of user memory. Hold down [↓] to display screens repeatedly, or press [SHIFT] [↓] to move rapidly back through memory.
- To end the memory display, press [BREAK].

Example

VIEW

This command displays the first section of the Student Station's user memory, from X'5200' to X'52FF'. Press [↑] to display the next screen, which shows the contents stored from X'5300' to X'53FF'.

Press [↓] to move back to the first screen. Then press [↓] one more time to display the contents stored from X'FF00' to X'FFFF', Top of Memory.

Hold down [SHIFT] and press [↑] until you display memory address X'7600' at the top of the screen. If you used the DIR command recently at this Student Station, you will see that directory's filenames appear in the right column, corresponding to memory address X'7600'.

ASSEMBLY ROUTINES

Almost all Model III BASIC ROM subroutines that are described in the TRS-80 Model III/4 Operation and BASIC Reference Manual are accessible under the Network 3 Operating System and NBASIC. Refer to that manual and its green quick-reference card for explanations of ROM subroutines. The few exceptions are listed on page 129 of this manual.

Note that USR routine calling addresses are not the same as those used by Model III ROM BASIC. The NBASIC command DEFUSR replaces the need to POKE calling addresses.

Other system routines for assembly-language I/O are available under the Network 3 Operating System. This section explains the calling sequence and parameters for users who wish to write their own routines. **Knowledge of Z-80 machine code is assumed.** (The information presented here is excerpted, with minor changes, from the TRS-80 Model III Disk System Owner's Manual.)

The routines are arranged here according to function. The explanations that follow will be presented alphabetically.

Disk I/O

\$INIT	Open a file or create it if non-existent.....	46
\$OPEN	Open a file that exists in the directory.....	47
\$POSN	Position file record pointer to read or write a particular logical record.....	48
\$READ	Read one logical record from disk to RAM.....	48
\$WRITE	Write one logical record from RAM to disk.....	50
\$VERF	Write one logical record from RAM to disk.....	50
\$CLOSE	Close a file and update the directory accordingly.	44
\$KILL	Delete directory entry for a file.....	47
\$SYNTAX	Move a file specification to DCB.....	49
\$PUTEXT	Add an extension to a filename in the DCB.....	48
\$BKSPC	Position file record pointer to previous record...	44
\$REWIND	Position the file record pointer to beginning of the file.....	49
\$POSEOF	Position the file record pointer to the end of the file.....	47

System Control

\$JP2DOS	Transfer control to "Network 3".....	46
\$COMDOS	Execute a system command and return to "Network 3"	44
\$CMDTXT	Buffer address for last system command entered....	44
\$ERRDSP	Displays a system error message.....	46
\$MEMEND	Storage location of pointer to the highest address available.....	47
\$DATE	Return the date in ASCII format.....	45
\$DATLOC	Address storing the date in binary format.....	45
\$TIME	Return the time in ASCII format.....	49
\$TIMLOC	Address storing the time in binary format.....	49

Arithmetic Functions

\$DIVIDE	Divide a 16-bit number by an 8-bit number.....	45
\$DMULT	Multiply a 16-bit number by an 8-bit number.....	45

Format and Notations

Call routines and system locations are presented in the following format:

- **\$name--Entry address nnnnn/X'nnnn'**

The "\$" is used before the name of routines and locations for convenience, so that they won't be confused with other commands (for example, \$CLOSE). The entry address is given in decimal/hexadecimal form, with hex notation in the form X'0000' (for example, hexadecimal address 402D is X'402D'). This is the address you use in a Z-80 call.

- **Function Summary**
- **Entry Conditions**
- **Exit Conditions**

Entry and exit conditions are given for Z-80 programs. If a Z-80 register isn't mentioned here, then you can assume it is unchanged by the routine. Note that all system calls use register F and do not restore its value before return.

(HL)=xxxx Registers HL contain the address of (point to) xxxx in machine format. (For example, if address of xxxx=34B2H then the values in the registers are H=34H and L=B2H.) Other register pairs will also be indicated this way.

A=xx Register A contains the value xx. Register A is used to return the error code for I/O calls. Other registers will also be indicated this way.

Condition=Interpretation Exit conditions are interpreted as follows:

Z=Zero flag is set (1)
NZ=Zero flag is not set (0)

C=Carry flag is set (1)
NC=Carry flag is not set (0)

DCB Device Control Block, defined as 50 contiguous bytes of RAM designated by the user. Before \$OPEN and after \$CLOSE, it is a left-justified, compressed (no spaces) ASCII string, as in a standard file specification. This string is terminated with a carriage return, character 13 (0DH).

LRL Logical Record Length, from 1-256 bytes. You can define records any length you wish up to 256 bytes maximum. In the DCB, LRL=256 bytes is indicated by the use of LRL=0.

BUFFER 256 user-designated bytes in RAM for Network 3 Operating System to read sectors from or write sectors to. If LRL=0, you must manage this area before and after I/O. The Network 3 Operating System manages this area if LRL is between 1 and 255 bytes. Do not alter this area when processing if you select LRL<256.

UREC User Record. The address of the contiguous RAM byte-string that you assign to your logical record area. Its length must be equal to LRL (when LRL≠0). It is a different area from BUFFER.

LSB/MSB Least-significant byte followed by most-significant byte. This is the standard Z-80 format for addresses.

\$BKSPC--17477/X'4445'

This routine positions the file record pointer of an open file to the previous record.

Entry Conditions

(DE)=DCB
CALL \$BKSPC

Exit Conditions

Z=Valid position
NZ=Invalid position in file

\$CLOSE--17448/X'4428'

\$CLOSE closes a file from the last processing done. It is very important to do a \$CLOSE on every file opened as soon as I/O is complete. Leaving files open interrupts communication between the Host and other Student Stations. And if you don't close a file before the program ends, the directory entry for this file is incorrect if any new records have been written to the file.

Entry Conditions

(DE)=DCB
CALL \$CLOSE

Exit Conditions

Z=No error
A=Network 3 Operating System error code

\$CMDTXT--16933/X'4225'

This is the start address of a buffer containing the last command line entered under "Network 3". Using this buffer, your program may recover parameters that were included in the last command line. When a program begins executing, (HL)=first non-blank character following the program name.

\$COMDOS--17049/X'4299'

This routine executes a Network 3 Operating System command and returns to "Network 3" prompt.

Entry Conditions

(HL)=Text of command, terminated by X'0D'
JP \$COMDOS

Exit Conditions

None

\$DATE--12339/X'3033'
\$TIME--12342/X'3036'

These routines return the date and time in ASCII format:

Date: MM/DD/YY
Time: HH:MM:SS

Entry Conditions

(HL)=Eight-byte buffer to receive the date or time text
CALL \$DATE
CALL \$TIME

Exit Conditions

(HL)=Date or time text

\$DATLOC--16922/X'421A'
\$TIMLOC--16919/X'4217'

These locations store the date and time in binary format:

\$DATLOC (Three bytes): YY DD MM
\$TIMLOC (Three bytes): SS MM HH

\$DIVIDE--17489/X'4451'

The divide routine takes a 16-bit dividend and an 8-bit divisor. After division, the quotient replaces the 16-bit dividend and the remainder replaces the 8-bit divisor.

Entry Conditions

HL=Dividend
A=Divisor
CALL \$DIVIDE

Exit Conditions

HL=Quotient
A=Remainder (Ø indicates no remainder)

\$DMULT--17486/X'444E'

The multiply routine uses a 16-bit multiplicand and an 8-bit multiplier. After multiplication takes place, the product is a 24-bit result.

Entry Conditions

HL=Multiplicand
A=Multiplier
CALL \$DMULT

Exit Conditions

H=High order byte
L=Middle order byte
A=Low order byte

\$ERRDSP--17417/X'4409'

This routine displays a Network 3 Operating System error message determined by the contents of the accumulator (A). This register contains an error code (0=no error) after completion of many system routines.

Entry Conditions

A=Network 3 Operating System error code
Bit 7 of register A is normally not set (off) so \$ERRDSP interprets it as a control to return to "Network 3" on completion.
Setting bit 7 results in a return to the calling program.

Exit Conditions

None

\$INIT--17440/X'4420'

\$INIT is provided as an entry point to Network 3 Operating System which will create a new file entry in the directory and open the DCB for this file. \$INIT scans the directory for the file specification given in the DCB. If the file specification is found, \$INIT simply opens the file for use. If the file specification is not found, a new file is created with that file specification.

Entry Conditions

(HL)=BUFFER
(DE)=DCB
B=LRL
CALL \$INIT

Exit Conditions

IY=Changed
Z=No error
C=A new file was created
A=Network 3 Operating System error code

\$JP2DOS--16429/X'402D'

This routine transfers control to "Network 3".

Entry Conditions

JP \$JP2DOS

Exit Conditions

None

\$KILL--17452/X'442C'

\$KILL deletes the directory entry for a file and releases the disk storage. The file may be open or closed; \$KILL will operate in either case.

Entry Conditions

(DE)=DCB
CALL \$KILL

Exit Conditions

Z=No error
A=Network 3 Operating System error code

\$MEMEND--17425/X'4411

This storage location contains the highest address available. It is normally the same as the physical end of RAM, but you may change it for special purposes.

The address is in LSB/MSB sequence.

\$OPEN--17444/X'4424'

\$OPEN provides a way to open the DCB of a file which already exists in the directory. The DCB **must** contain the file specification of the file to be opened **before** entry to \$OPEN. If the file doesn't exist, it will not be created. (See \$INIT.)

Entry Conditions

(HL)=BUFFER
(DE)=DCB
B=LRL
CALL \$OPEN

Exit Conditions

Z=No error
A=Network 3 Operating System error code
IY=Changed

\$POSEOF--17480/X'4448'

Point to the end of the file. This routine positions the file pointer to the last record in the file. This may be used to extend a sequential access file.

Entry Conditions

(DE)=DCB
CALL \$POSEOF

Exit Conditions

Z=No error

\$POSN--17474/X'4442'

\$POSN positions a file to read or write a selected logical record. Since it deals with logical records, the proper computation is done by the system to locate which physical record(s) contain the data. Following a \$POSN with a \$READ or \$WRITE will transfer the record to or from RAM.

Entry Conditions

(DE)=DCB (must have been opened previously)
BC=Logical record number to position for
CALL \$POSN

Exit Conditions

Z=No error
A=Network 3 Operating System error code

\$PUTEXT--17483/X'444B'

This routine will add an extension to a filename in the DCB if an extension doesn't already exist. An extension to a filename may be useful for identifying the type of data in the file.

Entry Conditions

(DE)=DCB
(HL)=The extension to be added to the file
CALL \$PUTEXT

Exit Conditions

None

\$READ--17462/X'4436'

If LRL>Ø, \$READ transfers the "current" logical record into the RAM area addressed as UREC for the length LRL as defined at open time. If the Network 3 Operating System must read a new physical record to satisfy the request, it will do so. "Spanned" logical records will be re-assembled as necessary. \$READ automatically increments the record number after the transfer is completed. The record number is set to Ø when the file is opened.

If LRL=Ø, \$READ transfers one physical record into BUFFER, defined at open time, from the disk file. Registers HL are ignored. \$READ increments the record number as above.

Entry Conditions

(HL)=UREC if LRL is not zero; unused if LRL=Ø
(DE)=DCB
CALL \$READ

Exit Conditions

Z=No error
A=Network 3 Operating System error code
(EOF=error X'1C' or X'1D'. See page 52.)

\$REWIND--17471/X'443F'

Point to the beginning of the file. This routine positions the file pointer to the first record in the file. This is useful when the same file must be processed more than once.

Entry Conditions

(DE)=DCB
CALL \$REWIND

Exit Conditions

Z=No error (good file specification)
NZ=Bad file specification

\$SYNTAX--17436/X'441C'

Move a file specification to DCB. This routine takes a file specification and checks it for validity, then moves it to the DCB at (DE) so that the file may be opened.

Entry Conditions

(HL)=Filename
(DE)=DCB
CALL \$SYNTAX

Exit Conditions

Z=No error (good file specification)
NZ=Bad file specification

\$TIME--12342/X'3036'

\$DATE--12339/X'3033'

These routines return the time and date in ASCII format:

Time: HH:MM:SS
Date: MM/DD/YY

Entry Conditions

(HL)=Eight-byte buffer to receive the date/time text
CALL \$TIME
CALL \$DATE

Exit Conditions

(HL)=Time or date text

\$TIMLOC--16919/X'4217'

\$DATLOC--16922/X'421A'

These locations store the time and date in binary format:

\$TIMLOC (Three bytes): SS MM HH
\$DATLOC (Three bytes): YY DD MM

\$VERF--17468/X'443C'
\$WRITE--17465/X'4439'

If LRL>0, \$VERF or \$WRITE transfers the one logical record from the RAM area addressed as UREC for the length LRL as defined at open time. If the Network 3 Operating System must write a physical record in order to satisfy the request, it will do so. "Spanning" will be handled by the Network 3 Operating System as necessary. At \$INIT/\$OPEN time, the record number is set to 0 so that the first record will be written. After each logical record is transferred, the record number value will be incremented by 1.

If LRL=0, \$VERF or \$WRITE transfers one physical record from BUFFER into the disk file at the current record number. BUFFER is defined at \$INIT/\$OPEN time only. The record number is updated as above, after \$VERF or \$WRITE.

Entry Conditions

(HL)=UREC if LRL is not zero, unused if LRL=0
(DE)=DCB
CALL \$VERF or CALL \$WRITE

Exit Conditions

Z=No error
A=Network 3 Operating System error code

ERROR CODES AND MESSAGES

The following error codes and messages may be encountered at a Student Station under the Network 3 Operating System. These error messages represent one or more TRSDOS error messages.

Code		Message	Explanation
Dec	Hex		
00	00H	No error	The error routine was called and no error condition was found.
05	05H	Disk I/O error	One of several possible errors occurred during input to or output from a disk or diskette at the Host: CRC Error During Disk I/O Disk Drive Not in System Lost Data During Disk I/O Disk Sector Not Found Disk Drive Hardware Fault Disk Drive Not Ready Illegal I/O Attempt Time Out on Disk Drive I/O Attempt to Non-system Disk Write Fault on Disk I/O Directory Read Error Directory Write Error
15	0FH	Disk write protected	A write request was sent to a disk or disk drive that was protected from write requests.
19	13H	Bad filename	The file specification provided to the system didn't conform to the proper file specification syntax (filename/extension:drive).
24	18H	File not found	The file you requested doesn't exist at the Host. Perhaps you specified the wrong drive or a disabled drive, misspelled the name of the file, or left off the filename extension. Or, if you are using files stored on diskettes, perhaps you inserted the wrong diskette at the Host.
25	19H	File access denied	An attempt was made to: 1) access a file protected by a password without specifying the password; 2) access a file protected by a password while specifying the wrong password; or, 3) access a file not protected by a password (password = " ") while specifying a password.

27	1BH	Disk space full	An error occurred while a file was being written to a disk or diskette. Either the directory was full (so that it couldn't accept another file entry), or all available space on the disk was allocated before the file was completely written. (You will probably encounter a full directory more often than a full disk. In that case, adding a secondary hard disk unit will not solve your space problem.) An attempt to create a new file on a write-protected disk or disk drive can also return this error message.
28	1CH	EOF encountered	An attempt was made to read past the end of file.
29	1DH	Out of file space	An attempt was made to read outside of file limits.
34	22H	File format error	An attempt was made to load a file that didn't conform to the format structure required by the system loader.
35	23H	Memory fault	An improper memory value was detected while a program was loading.
38	26H	File not open	An I/O attempt was made to a file that wasn't open.
41	29H	File open for write	A read attempt was made to a file that was already open for output.

NETWORK 3 BASIC LANGUAGE

NETWORK 3 BASIC LANGUAGE

A version of the BASIC language called Network 3 BASIC, or NBASIC, is provided by the Network 3 Model III Hard Disk Operating Software for use under the Network 3 Operating System. NBASIC utilizes nearly all capabilities of TRS-80 Model III ROM BASIC, as described in the Model III/4 Operation and BASIC Language Reference Manual. Refer to that manual and its green reference card for information on these NBASIC capabilities.*

In addition, NBASIC includes many of the enhancements to Model III BASIC (page 57) and input/output commands of Model III Disk BASIC (page 69). This reference section explains these features of the NBASIC language. (The information presented here is excerpted, with minor changes, from the TRS-80 Model III/4 Disk System Owner's Manual.)

Syntax and Notations

All commands must be entered in a particular form that Network 3 BASIC can understand. This is called the command's syntax (like the structure of a sentence). The explanations of each NBASIC command use the following special notations and abbreviations:

- **CAPITALS and punctuation** indicate material which must be entered exactly as it appears. For example, in the line:

```
CMD"H","OFF"
```

every letter and character should be typed as indicated.

- **lowercase underlining** represents a value that you supply from a set of acceptable values for a particular command. For example, the line:

```
DEFUSRn=address
```

indicates that you must specify values for n and address.

- **Braces { }** signify optional parts of a command. (The braces aren't typed.) For example, the line:

```
SAVEfile$(,A)
```

indicates that you can add ",A" after file\$, or leave it out of the command.

* This manual and its green reference card were included with Model III computers; both are still included with Model 4 Student Station computers (Cat. No. 26-1059). The manual (Cat. No. 26-2112) and card are available from your local Radio Shack Computer Center.

- **Ellipsis ...** indicates that the preceding item can be repeated. For example, the line:

`CLOSE{buffer{,buffer...}}`

indicates that you have the option of supplying values for more than two buffers in the command.

- **nnnnH** indicates that the number nnnn is in hexadecimal form. All other numbers are in decimal form.

Command Terms

Explanations of Network 3 BASIC commands (and other features of the Operating Software) use the following terms:

- **Disks** refer to either hard disks or floppy diskettes. A disk's location is its **drive number**. The hard disks are numbered 0, 1, 2, and 3. The floppy disk drives are numbered 4 and 5. Drives 6 and 7 may be floppy or hard disk drives.
- **File** defines any set of information (either program or data) that is stored on a disk. In this reference section, **program files** will be differentiated from data files when a command applies only to them. No matter what kind of file you deal with, the file's name must use the following format:

filename/ext.password:d

The information in this form is called a **file specification**. A file specification contains these four parts:

filename--up to eight letters or numbers, beginning with a letter. All files must have a filename.

/ext--an optional filename extension. If used, up to three letters or numbers (beginning with a letter) can be included after the slash.

Note: Identical filenames, or identical filenames that also include the same extension, cannot exist on one disk.

.password--an option that assigns a protection status to a file. If used, up to eight letters and numbers (beginning with a letter) can be included after the period.

:d--an option called the **drive specification**. This specifies a particular drive number. Any number from 0 through 7 can be included after the colon, depending on the number of drives in the Host system. If a drive is specified, only that drive is checked for the file or information requested. If no drive is specified, all drives are searched sequentially for the file or information requested.

LOADING NBASIC

Network 3 BASIC must be loaded under the Network 3 Operating System (when "Network 3" is displayed on the Student Station screen). The request to load NBASIC includes three options.

```
.....  
:  
: NBASIC {program}{-F:files}{-M:address}  
:  
: program is the file specification of a BASIC  
: program. NBASIC loads first. On the next  
: network cycle, the program is loaded.  
:  
: -F:files reserves buffer space for the  
: number of files that may be open at one  
: time (whether fixed length or variable).  
: files is an integer from 0 to 15. If  
: omitted, 3 is used.  
:  
: -M:address tells NBASIC not to use memory  
: above the specified address.  
: address is a decimal integer less than Top  
: of Memory (which is 49151 in a 32K Student  
: Station, or 65535 in 48K and 64K Student  
: Stations). If omitted, NBASIC uses all  
: available memory.  
:.....
```

If the program option is omitted, NBASIC loads and then displays the version number of NBASIC you are using and the "Ready >" prompt. No requests for files or memory will appear.

When the files and memory options are omitted, NBASIC automatically prepares for up to 3 files to be used and provides all remaining available memory. (User memory is approximately 21K in a 32K Student Station, and approximately 38K in a Student Station with memory of 48K or 64K).

The options allow you to specify any or all of the following:

- A program to run under NBASIC. NBASIC loads on the first network cycle. On the second cycle, the program loads and executes.
- The maximum number of files that may be open at one time. The larger the number of files, the less area available for storing and executing your programs.

Note: When NBASIC is loaded, all file buffers are created for standard 256-byte files as well as non-standard length files (also called variable length files). Either type can be specified using the OPEN command (page 77).

- The highest address to be used by NBASIC during program execution. Omit this unless you need to protect assembly-language subroutines or data-storage areas in high memory.

Examples

NBASIC

NBASIC loads with 3 file buffers and all available memory.

NBASIC -F:1

This option loads NBASIC with 1 file buffer and all available memory.

NBASIC -M:380000

This option loads NBASIC with 3 file buffers and an upper limit of memory available to NBASIC programs at RAM address 380000 (decimal). Memory above 380000 is protected for some use that is unknown to NBASIC.

NBASIC -F:2-M:600000

These options load NBASIC with 2 file buffers and memory above 600000 protected.

NBASIC MAILBOX-F:1

These options load NBASIC, then load and run the program MAILBOX, with 1 file buffer and all available memory.

To exit NBASIC and return to the Network 3 Operating System at "Ready >", type CMD"S" and press [ENTER].

If you haven't entered any commands since leaving NBASIC, you can return to a BASIC program from the Network 3 Operating System. At "Network 3", type NBASIC * and press [ENTER]. When NBASIC reloads, you'll see the NBASIC prompt "Ready >". The program that was in memory should still be there, although you may not be able to run it.

If you want to **recover** the program, you should immediately save it and return to the Network 3 Operating System level. Then load NBASIC again without the asterisk. This procedure should be used for emergencies only, as the results are unpredictable.

ENHANCEMENTS TO MODEL III BASIC

NBASIC adds many enhancements to Model III ROM BASIC that are not disk-related. They are listed below with brief descriptions. Detailed descriptions follow in alphabetical order. (Explanation of disk-related features begins on page 69.)

Note: Differences exist between NBASIC and Disk BASIC 1.3 in the commands marked with a "*" below.

&H	Hexadecimal-constant prefix.....	58
CMD"B"	Enable/Disable the BREAK key.....	59
CMD"E"	Display previous system error message.....	59
CMD"H" *	Route printer output to network/local printer.....	60
CMD"P"	Check printer status.....	60
CMD"R" *	Enable interrupts.....	61
CMD"S"	Normal return to Network 3 Operating System.....	61
CMD"T" *	Disable interrupts.....	61
DEF FN	Define NBASIC-statement function.....	62
DEF USR	Define entry point for a USR subroutine.....	63
FN	Perform user-defined function (see DEF FN)	
INSTR	Instring function; find substring in target string	64
LINEINPUT	Input a line from the keyboard.....	65
MID\$=	Replace portion of target string (on left of =)...	66
USR<u>n</u>	Call assembly-language subroutine <u>n</u>	67

The following features of Disk BASIC 1.3 are not available under Network 3 BASIC:

CMD"A"	CMD"C"	CMD"D"	CMD"I"	CMD"J"
CMD"L"	CMD"O"	CMD"X"	CMD"Z"	NAME

&H
Hexadecimal Constant

```
.....  
:  
: &Hhhhh :  
:  
: hhhh is a 1 to 4 character sequence composed :  
: of hexadecimal numerals 0 to 9, A to F. :  
:.....
```

The prefix &H allows you to use hexadecimal (base 16) constants rather than their decimal counterparts. For example, memory addresses and byte values are easier to manipulate in hex form. &H lets you introduce such constants into your program.

The constants always represent signed integers. Any hex number greater than &H7FFF will be interpreted as a negative quantity. The following table illustrates this:

Hex	Decimal
&H1	1
&H2	2
&H10	16
&H7FFF	32767
&H8000	-32768
&H8001	-32767
&H8002	-32766
&HFFFE	-2
&HFFFF	-1

Hex constants can't be typed in as responses to an INPUT prompt or be contained in a DATA statement. Often the hex constant must be enclosed in parentheses to prevent a syntax error from occurring.

Examples

PRINT &H5200

prints the decimal equivalent 20992 of the constant 5200H.

POKE &H3C00,42

puts decimal 42 (ASCII code for an asterisk) into video memory address 3C00H.

CMD"B"
Enable/Disable BREAK Key

```
.....  
:  
: CMD"B",switch$  
:  
: switch$ is a string expression that must  
: be either ON or OFF.  
:  
:.....
```

This command enables or disables the BREAK key. While the function is "OFF", the BREAK key will be ignored except during printer output and cassette output.

The BREAK key will remain disabled even after the program has ended. To enable the BREAK key, use the CMD"B","ON" command.

Note: Returning to Network 3 Operating System via the CMD"S" command will NOT enable the BREAK key.

Examples

CMD"B","OFF"
disables the BREAK key.

CMD"B","ON"
returns the BREAK key to its normal function.

CMD"E"
Display Previous System Error Message

```
.....  
:  
: CMD"E"  
:  
:.....
```

This command displays the last Network 3 Operating System error message. If no errors have occurred prior to the command, the message "No error" or "Unknown error code" will be displayed.

Examples

RUN"MENU:∅"
causes "?NM" to appear. NM is the NBASIC error message for a bad filename. (NBASIC error messages are explained beginning on page 101.) Entering CMD"E" displays "Bad filename", the Network 3 Operating System message for the error that occurred.

RUI"MENU:∅"
causes "?SN" to appear. SN is the NBASIC error message for a syntax error. This error occurred in NBASIC, not at the Network 3 Operating System level. Entering CMD"E" displays the last system-level error message, such as "Bad filename".

CMD"H"

Route Printer Output to Network or Local Printer

```
.....  
:  
: CMD"H",switch$  
:  
: switch is a string expression that must  
: be either ON or OFF.  
:  
:.....
```

This command routes printer output to the Host's printer or to a local printer, attached to the Student Station. The command **CMD"H","OFF"** directs the Student Station's printer output to a local printer. **CMD"H","ON"** restores the Host's printer as the destination of printer output. (This is the normal condition under the Network 3 Operating System.)

CMD"P"

Check Printer Status

```
.....  
:  
: CMD"P",status$  
:  
: status is a string variable which will  
: receive the results of the printer test.  
:  
:.....
```

CMD"P" makes it possible for NBASIC to check the status of the printer.

Printer output is normally directed to the Host. There the SPOOL function of the HOST program intercepts and stores all printer output, regardless of the status of the Host's printer. Therefore, CMD"P" will always return a "ready" status from the network's printer. (See Printing and Spooling, page 22.)

However, printer output can be routed to a local printer (a printer attached to the Student Station) by the command **CMD"H","OFF"**. In this case only, CMD"P" returns the true status of the destination printer.

Note: The Model III ROM BASIC PEEK for printer status works under NBASIC only with a local printer attached to the Student Station, after **CMD"H","OFF"** has been executed.

Example

This program line tests for printer status using CMD"P":

```
CMD"P",X$: IF (VAL(X$) AND 240) <> 48 THEN PRINT "WAIT" ELSE PRINT "READY"
```


CMD"R"
Enable Interrupts

```
.....  
: :  
: CMD"R" :  
:.....
```

CMD"R" enables interrupts that have been disabled by CMD"T".

An "interrupt" signal causes the computer to interrupt whatever it is doing to perform some other specified task. When that task is completed, the computer will resume execution of the previous task. For example, interrupts flash the cursor and increment the real-time clock. This is the normal condition under the Network 3 Operating System and NBASIC.

CMD"S"
Return to Network 3 Operating System

```
.....  
: :  
: CMD"S" :  
:.....
```

This command exits NBASIC, returning control to the Network 3 Operating System.

Note: Exiting NBASIC automatically closes all files that may be open.

CMD"T"
Disable Interrupts

```
.....  
: :  
: CMD"T" :  
:.....
```

This command disables the Student Station's interrupt-driven features described above under CMD"R".

Examples

CMD"T"
stops the cursor from flashing. Also, the Student Station's real-time clock stops incrementing.

CMD"R"
restores the flashing cursor. The Student Station's real-time clock resumes operation.

DEF FN
Define Function

```
.....  
:                                                                    :  
: DEF FN function name{(argument,...)}=formula                :  
:                                                                    :  
:   function name is any valid variable name.                    :  
:                                                                    :  
:   argument and any subsequent arguments are                    :  
:   used in defining the types of values which                    :  
:   will be passed to the function. Variable                      :  
:   names are given as arguments.                                  :  
:                                                                    :  
:   formula is an expression usually involving                    :  
:   the argument(s) passed on the left side                       :  
:   of the equals sign.                                           :  
:                                                                    :  
:.....
```

The DEF FN statement (or DEFFN--the space is optional) lets you create your own function. That is, you only have to call the new function by name, and the associated operation or operations will automatically be performed. Once a function has been defined with the DEF FN statement, you can call it simply by inserting FN in front of function name. (For example, FN X or FNX--the space is optional.) You can use it exactly as you might use one of the built-in functions, like SIN, ABS, and STRING\$.

The type of variable used for function name determines the type of value the function will return. For example, if function name is single precision, then that function will return a single-precision value, regardless of the precision of the arguments.

The particular variables you use as arguments in the DEF FN statement are not assigned to the function. They are given to the function to define a pattern (of variable type and number of variables) that is necessary for the function to operate. When you call the function later, any variable name of the same type can be used. Any variable name used in the DEF FN statement may be used in any way elsewhere in the program without any interference occurring.

Examples

DEFFNR = RND (90) + 9 (or DEF FN R = RND (90) + 9)

The function can be defined with no arguments at all, if none are required. This statement defines function R, which returns a random value between 10 and 99. Once defined, this function can be utilized by FN. The commands PRINT FNR or PRINT FN R would display an integer between 10 and 99.

DEF FNR(A,B) = A + INT((B - (A - 1)) * RND(0))

This statement defines function R which returns a random number between integers A and B. The values for A and B are passed when the function is "called," that is, used in a statement like Y = FNR(R1, R2). If R1 and R2 have been assigned the values 2 and 8, this line would assign Y a random number between 2 and 8.

DEF FNL\$(X) = STRING\$(X, "-")

defines function L\$ which returns a string of hyphens, X characters long. The value for X is passed when the function is called. For example, **PRINT FNL\$(30)** displays a string of 30 hyphens.

DEF FN\$(A#, B#) = (A# - B#) * (A# - B#)

uses DEF FN for a complex computation in double-precision. This statement defines FN\$(A#, B#) which returns the double-precision value of the square of the difference between A# and B#. The values for A# and B# are passed when the function is called (for example, **S# = FN\$(A#, B#)**), assuming the values for A# and B# were assigned elsewhere in the program).

DEFUSR

Define Entry Point for USR Routine

```
.....  
:  
: DEFUSRn=address :  
:  
: n equals one of the digits from 0 to 9. :  
: If n is omitted, 0 is assumed. :  
:  
: address specifies the entry address :  
: to an assembly-language routine. address :  
: must be in the range [-32768,32767]. :  
: address may be any numeric expression :  
: or constant from -32768 to 32767. :  
:.....
```

DEFUSR (or DEFUSR--the space is optional) lets you define the entry points for up to 10 assembly-language routines.

Note: This statement makes it unnecessary to POKE calling addresses into RAM. User routine calling addresses in NBASIC are NOT the same as those given in the manual for Model III ROM BASIC.

Examples

DEFUSR3 = &H7D00

assigns the entry point 7D00H (32000 decimal) to the USR3 call. When your program calls USR3, control will branch to your subroutine beginning at 7D00H.

DEFUSR = (BASE + 16)

assigns start address (BASE + 16) to the USR0 routine.

See USR on page 67.

Note: When decimal addresses are given, they are evaluated as signed two-byte integers. So, for addresses above 32767, use **desired decimal address minus 65536**.

INSTR

Search for Specified String

```
.....  
:  
: INSTR({position,}string 1,string 2)  
:  
:   position specifies the position from 1 to 255  
:   in string 1 where the search is to begin.  
:   position is optional. If omitted, search  
:   automatically begins at the first character  
:   in string 1. (Position 1 is the first  
:   character in string 1.)  
:  
:   string 1 is the string to be searched.  
:  
:   string 2 is the substring you want  
:   to search for.  
:.....
```

This function searches through a string to see if it contains another string. If it does, INSTR returns the starting position of the substring in the target string; otherwise, zero is returned. Note that the entire substring must be contained in the search string, or zero is returned. Also, note that INSTR only finds the first occurrence of a substring in the position you specify.

Examples

In these examples, A\$ = "LINCOLN":

```
INSTR(A$, "INC")  
returns a value of 2.
```

```
INSTR(A$, "12")  
returns a zero.
```

```
INSTR(A$, "LINCOLNABRAHAM")  
returns a zero.
```

```
INSTR(3, "1232123", "12")  
returns 5.
```


LINE INPUT

Input a Line from Keyboard

```
.....  
:  
: LINE INPUT "prompt";variable$  
:  
: prompt is a prompting message.  
:  
: variable$ is the string variable name that  
: will be assigned to the line typed.  
:.....
```

LINE INPUT (or LINEINPUT--the space is optional) is similar to INPUT, except:

- The computer will not display a question mark when waiting for operator input.
- Each LINE INPUT statement can assign a value to just one variable.
- Punctuation marks can be used as part of the string input.
- Leading blanks aren't ignored--they become part of variable\$.
- The only way to terminate the string output is to press the ENTER key.

LINE INPUT is a convenient way to input string data without having to worry about accidental entry of delimiters (commas, quotation marks, etc.). The ENTER key serves as the only delimiter. If you want the operator to be able to input information without special instructions, use the LINE INPUT statement.

Examples

LINE INPUT A\$

inputs A\$ without displaying any prompt.

LINE INPUT "LAST NAME, FIRST NAME? ";N\$

displays the prompt message and inputs data. Commas will not terminate the input string, as they would in an INPUT statement.

MID\$=
Replace Portion of String

```
.....  
:  
: MID$(oldstring,position,{length})=newstring :  
:  
: oldstring is the variable name of the :  
: string containing the substring that :  
: you want to change. :  
:  
: position is the numeric expression :  
: specifying the beginning of the substring :  
: to be replaced. Position 1 is the start :  
: of oldstring. :  
:  
: length is a numeric expression specifying :  
: the number of characters to be replaced. :  
: If length is omitted, all following :  
: characters will be replaced. :  
:  
: newstring is a string expression to replace :  
: the specified portion of oldstring. :  
: Any characters in newstring longer than :  
: length will be ignored. :  
:.....
```

This statement lets you replace any part of a string with a specified new string, giving you powerful string manipulation capability.

Note that the length of the resultant string is always the same as the original string.

Examples

In these examples, A\$ = "LINCOLN":

MID\$(A\$, 3, 4) = "12345": PRINT A\$
returns LI1234N.

MID\$(A\$, 1, 2) = "": PRINT A\$
returns LINCOLN.

MID\$(A\$, 5) = "01": PRINT A\$
returns LINC01N.

MID\$(A\$, 1, 3) = "***": PRINT A\$
returns ***COLN.

USR_n
Call to User's External Subroutine

```
.....  
:                                     :  
:  USR{n}(argument)                :  
:                                     :  
:   n specifies one of ten available USR calls.  :  
:   n equals one of the digits from 0 to 9.    :  
:   If n is omitted, 0 is assumed.             :  
:                                     :  
:   argument is an integer from -32768 to 32767 :  
:   and is passed as an integer argument       :  
:   to the routine.                            :  
:                                     :  
:.....
```

These functions--USR0 through USR9--transfer control to assembly-language routines previously defined with DEFUSR statements.

When a USR call is encountered in a statement, control goes to the address specified in the DEFUSR_n statement. This address specifies the entry point to your assembly-language routine.

Note: If you call a USR_n routine before defining the routine entry point with DEFUSR_n, an FC Error (Illegal Function Call) will occur. Also, if the USR_n routine contains an error, an NBASIC error message will be displayed for the line calling the routine. (The actual error message will be meaningless, but the line number of the error indicates that the assembly-language routine is probably at fault.)

Example

```
10 DEFUSR1=&H7D00  
20 REM...MORE PROGRAM LINES HERE  
100 A=USR1(X)
```

The effect of this sequence is to:

1. Define USR1 as a routine with an entry point at X'7D00'
(line 10).
2. Transfer control to the routine; the value X can be passed to the routine if the routine makes the CALL described below
(line 100).
3. When the routine returns to NBASIC, the variable A will contain the value passed back from the routine (if your routine makes the JUMP described below); otherwise, A will be assigned the value of X (line 100).

Passing arguments to and from USR routines:

There are several ways to pass arguments back and forth between your NBASIC main program and your USR routines. The two major ways are listed below.

1. POKE the argument(s) into fixed RAM locations. The assembly-language routine can then access these values and place results in the same or other RAM locations. When the routine returns control to NBASIC, your program can PEEK into these addresses to pick up the "output" values. **This is the only way to pass two or more arguments back and forth.**
2. Pass one argument to the routine as the argument in the `USRn` call, then use special ROM calls to access this argument and return a value to NBASIC. **This method is limited to sending one argument and returning one value (both integers).**

ROM Calls:

CALL 0A7FH Puts the USR argument into the HL register pair; H contains MSB, L contains LSB. This CALL should be the first instruction in your USR routine.

For example, if the BASIC program calls the assembly-language routine with the instruction `X=USR1 (A)`, and the first instruction in the assembly-language routine is `CALL 0A7FH`, the value of the variable A will be placed in HL.

JP 0A9AH Use this JUMP to return to NBASIC; the integer in HL becomes the output of the USR call. In the example immediately above, the value in HL would be returned to the variable X.

If you don't care about returning HL, then execute a simple RETURN instruction instead of this JUMP.

DISK-RELATED FEATURES

Network 3 BASIC provides a powerful set of commands, statements, and functions relating to disk input/output under the Network 3 Operating System. These fall into two categories:

1. File manipulation: dealing with files as units on a hard disk or floppy diskette, rather than with the distinct records the files contain. (Explanations begin on page 71.)
2. File access: preparing data files for I/O; reading and writing to the files. (Explanations begin on page 76.)

Note: Differences exist between NBASIC and Disk BASIC 1.3 in the commands marked with a "*" below.

File Manipulation includes the following commands:

KILL	Remove a program or data file from a disk.....	71
LOAD *	Load a BASIC program from a disk.....	72
MERGE	Merge an ASCII-format BASIC program stored on disk with one currently in RAM.....	73
RUN *	Load and execute a BASIC program stored on disk...	74
SAVE *	Save the program currently in RAM to disk.....	75

File Access includes the following statements and functions:

Statements

OPEN	Open a file for access (create one if necessary).	77
CLOSE	Close access to the file.....	79
INPUT#	Read from disk, sequential mode.....	80
LINEINPUT#	Read a line of data, sequential mode.....	84
PRINT#	Write to disk, sequential mode.....	85
FIELD	Assign field sizes and variables to a random-access file buffer.....	88
GET	Read from disk, random-access mode.....	90
PUT	Write to disk, random-access mode.....	91
LSET	Place value in specified buffer field, add blanks on the right to fill field.....	92
RSET	Place value in specified buffer field, add blanks on the left to fill field.....	92

Functions

CVD	Restore double-precision number to numeric form after GETting from disk (see MKD\$).....	93
CVI	Restore integer to numeric form after GETting from disk (see MKI\$).....	93
CVS	Restore single-precision number to numeric form after GETting from disk (see MKS\$).....	93
EOF	End-of-File detector.....	94
LOC	Identify current record number.....	95
LOF	Return number of last record in file.....	96
MKD\$	Convert double-precision number to string so it can be PUT on disk (see CVD).....	97
MKI\$	Convert integer to string so it can be PUT on disk (see CVI).....	97
MKS\$	Convert single-precision number to string so it can be PUT on disk (see CVS).....	97

FILE MANIPULATION

Each of these commands is followed by a string expression. The string expression is a valid file specification (as explained on page 54) for a file that is stored at the Host.

- If a string constant is used, it must be enclosed in quotes. For example, `RUN"PROGRAM/BAS"`.
- If a string variable is assigned, the quotes are not used. For example, `A$="PROGRAM/BAS":RUN A$`.

Remember that if the drive number (:d) is omitted from the file specification, these commands will manipulate the first file with that name found at the Host.

KILL

Remove a File from a Disk

```
.....  
:  
: KILLfile$ :  
:  
: file$ defines a file specification :  
: for a program OR data file in the format :  
: filename/ext.password:d. :  
:.....
```

This command works like the Network 3 Operating System KILL command. (See page 38 of Library Commands.)

Note: The file specification must include the appropriate password (if any) in order to KILL the file. Also, a file cannot be removed from a write-protected disk or diskette.

Examples

KILL"PROGRAM3"

This command removes the first file named PROGRAM3 found on an unprotected disk at the Host. To kill a copy of this file stored on a different disk, include that drive number. For example, **KILL"PROGRAM3:4"** removes this file from the floppy diskette in Drive 4, without affecting a program with the same name on Drive 0, 1, 2, or 3.

KILL"MYFILE/DAT:2"

removes the data file MYFILE/DAT from Drive 2.

KILL"MYPROGS/MNU.SECRET:3"

This command removes the file named MYPROGS/MNU from hard disk Drive 3. The file has a password of SECRET.

LOAD

Load BASIC Program File from Disk

```
.....  
:  
: LOADfile${,R}{,V}  
:  
:   file$ defines a file specification for a  
:   BASIC program file in the format  
:   filename/ext.password:d.  
:  
:   Two options are available:  
:  
:   ,R instructs NBASIC to leave all files open  
:   while loading, then run the new program.  
:  
:   ,V instructs NBASIC to preserve all  
:   variables while loading.  
:.....
```

This command loads a BASIC program file into RAM. With no options specified, LOAD will clear all variables, close all open files, and return to the command mode ("Ready >"). Like the command RUN, LOAD can be used inside programs to allow program chaining (one program calling another).

Two options can be added to NBASIC's LOAD command:

- If the R option is used, LOAD leaves all files open and clears all variables, then starts the program. LOAD with the R option is equivalent to the command `RUNfile$,R`.
- If the V option is used, LOAD retains all variables and closes all open files, then returns to "Ready >".

Note: Simple string assignment statements are **not** preserved. You must perform a string operation on each string you want preserved when the program is loaded with the V option.

- If both R and V are used, LOAD retains all variables and leaves all files open, then starts the program.

Examples

`LOAD"MYPROG5/BAS.CKM"`

clears the resident program, closes all files, clears out all variables, and loads MYPROG5/BAS (which is protected by password CKM), then returns to "Ready >".

`LOAD"MYPROG6/BAS",V`

clears the resident program, closes all files, and loads MYPROG6/BAS, then returns to "Ready >". All variables are retained in memory.

`LOAD"MODUL3:2",V,R`

loads and runs MODUL3 from Drive 2 without clearing variables or closing files.

MERGE

Merge Program from Disk with Resident Program

```
.....  
: :  
: MERGEfile$ :  
: :  
: file$ defines a file specification in :  
: the format filename/ext.password:d for :  
: an ASCII-format BASIC program file :  
: (a program saved with the ",A" option). :  
:.....
```

MERGE is similar to LOAD--except the program you merge **must** be in ASCII format (see SAVE on page 75). Also, the resident program is not erased before the new program is loaded. Instead, the new program is merged into the resident program. Program lines in the new program will simply be inserted into the resident program in sequential order. If the line numbers in the new program coincide with the line numbers in the resident program, the resident lines will be replaced by those from the new program.

Example

Let's say you've saved these program lines in ASCII format under the filename SETUP/UTL. (These sample lines check for and correct conditions at a Student Station that could affect a new program.)

```
11 CMD"B", "ON": CMD"R": CMD"H", "ON": CLEAR 50: POKE 16409,1: POKE 16412,0:  
    POKE 16419,176: POKE 16913,1: POKE 16916,0  
12 PRINT CHR$(23);: PRINT@1, CHR$(200);: IF PEEK(15361)=200 PRINT CHR$(21);:  
    GOTO12  
13 IF (PEEK(16912) AND 8) <>8 THEN PRINT CHR$(22): GOTO 13  
14 PRINT CHR$(28);
```

Now you want to add these lines to the program currently in the Student Station's RAM. Let's say the program you have written or loaded begins with these lines:

```
5 REM H.S. THOMPSON, PERIOD 3 COMPUTER SCIENCE, MRS. JACKSON, PROGRAM #9: GPA  
10 P$="J3THOMP/B9.SASQATCH:5"  
11 REM LEAVE 4 LINES HERE FOR SETUP/UTL  
15 CLS:PRINT,"GRADE POINT AVERAGE"  
20 PRINT,"CALCULATION PROGRAM" REM PROGRAM CONTINUES HERE
```

The command MERGE"SETUP/ASC" would insert the lines as follows. Note that line 11 of the program in memory has been replaced.

```
5 REM H.S. THOMPSON, PERIOD 3 COMPUTER SCIENCE, MRS. JACKSON, PROGRAM #9: GPA  
10 P$="J3THOMP/B9.SASQATCH:5"  
11 CMD"B", "ON": CMD"R": CMD"H", "ON": CLEAR 50: POKE 16409,1: POKE 16412,0:  
    POKE 16419,176: POKE 16913,1: POKE 16916,0  
12 PRINT CHR$(23);: PRINT@1, CHR$(200);: IF PEEK(15361)=200 PRINT CHR$(21);:  
    GOTO12  
13 IF (PEEK(16912) AND 8) <>8 THEN PRINT CHR$(22): GOTO 13  
14 PRINT CHR$(28);  
15 CLS:PRINT,"GRADE POINT AVERAGE"  
20 PRINT,"CALCULATION PROGRAM" REM PROGRAM CONTINUES HERE
```

RUN
Load and Execute a Program from Disk

```
.....  
:  
: RUNfile$(,R){,V} :  
:  
:   file$ defines a file specification in the :  
:   format filename/ext.password:d for a :  
:   BASIC program file. :  
:  
:   Two options are available: :  
:  
:   ,R leaves all files open. :  
:  
:   ,V preserves all variables. :  
:.....
```

This command loads and executes a BASIC program stored on a disk or diskette at the Host. It may be used inside a program to allow chaining (one program calling another).

RUN clears all variables and closes all open files unless these options are included:

- If the R option is used, RUN leaves all files open and clears all variables before starting the program.
- If the V option is used, RUN retains all variables and closes all open files.

Note: Simple string assignment statements are **not** preserved. You must perform a string operation on each string you want preserved when the program is loaded and run with the V option.

- If both R and V are used, RUN retains all variables and leaves all files open, then starts the program.

Examples

RUN"PROGRAM"

clears the resident program, then loads and executes the file called PROGRAM (if it is a BASIC program file).

P\$="NEXTPROG/BAS:1"

RUN P\$,V

loads and executes NEXTPROG/BAS from Drive 1, without clearing the current variables.

RUN"MODUL3:2",V,R

loads and runs MODUL3 from Drive 2 without clearing variables or closing files.

SAVE

Save Resident Program onto Disk

```
.....  
:  
: SAVEfile${,A}                               :  
:  
:   file$ defines a file specification in the  :  
:   format filename/ext.password:d.          :  
:  
:   The option ,A causes the file to be stored :  
:   in ASCII format. If omitted, the file is  :  
:   stored in compressed format.              :  
:.....
```

This command lets you save the resident program onto a disk or diskette at the Host. You can save the program in compressed or ASCII format.

- A program saved in compressed format occupies less disk space and takes less time to SAVE, LOAD, and RUN.
- A program saved in ASCII format can MERGE with another program or be read by another program as data. (For example, the program MENUSORS is stored in ASCII format so the MENU utility program can read it in and attach DATA statements as they are entered.)

If you have the Network 3 version of SCRIPSIT on your hard disk, you can load an ASCII-format BASIC program in SCRIPSIT. Then you can edit the program as if it were a text file, using SCRIPSIT's word-processing features. After you save the finished SCRIPSIT file, you can run it again under NBASIC (if you edited correctly).

Examples

```
SAVE"MYPROG5/BAS.CKM:3"
```

saves the resident BASIC program in compressed format with the filename MYPROG5, the extension /BAS, and password .CKM; the file is stored on Drive 3.

```
P$="THOMP3J/B9.SASQATCH:5"
```

```
SAVE P$
```

The first statement assigns the file specification to variable P\$. This step eliminates the need to remember and retype the complicated file specification whenever you want to SAVE the current version of the program. (To save the program in ASCII format using the string variable, you would enter the command SAVE P\$,A.)

```
SAVE"FILE13/TXT",A
```

saves the resident program in ASCII format, under the name FILE13/TXT, on the first non-write-protected disk or diskette.

FILE ACCESS

This section is divided into four parts:

1. Creating Files and Assigning Buffers (below)
2. Commands for Sequential and Random Access (page 80)
3. Sequential Input/Output Techniques (page 99)
4. Random Input/Output Techniques (page 100)

If this is your first experience with disk file access, you should concentrate on parts 1, 3, and 4, perhaps just skimming through part 2 to get the general idea of how the statements and functions work. Later you can refer to part 2 for details of statement and function syntax.

File Access Part 1:

Creating Files and Assigning Buffers

When you load NBASIC, you can tell NBASIC how many buffers to create to handle your disk accesses (reads and writes). Otherwise, NBASIC automatically sets aside 3 buffers. (See page 55.)

Each buffer is given a number from 1 to 15. If you enter the command NBASIC -F:4, NBASIC sets aside 4 buffers, numbered 1, 2, 3, 4.

You can think of a buffer as a waiting area that data must pass through on the way to and from the disk file. When you want to access a particular file, you must tell NBASIC which buffer to use in accessing that file. You must also tell NBASIC what kind of access you want--sequential output, sequential input, or random input/output.

Sequential access is stream-oriented. That is, the number of characters read or written can vary, and is usually determined by delimiters in the data.

Random access is record-oriented. That is, data is always read or written in fixed-length blocks called records.

File access always begins with the OPEN statement and ends with the CLOSE statement.

OPEN
Open a File

```
.....  
: OPENmode$,buffer,file$,record-length  
: mode$ is a string expression containing  
: one of the following:  
:  
: I Sequential input starting at the first  
: record. If the file is not found,  
: it will not be created.  
:  
: O Sequential output starting at the  
: first record. If the file is not found,  
: it will be created.  
:  
: E (Extend) Sequential output starting  
: at end of file. If the file is not found,  
: it will be created.  
:  
: R Random input/output. If the file is  
: not found, it will be created.  
:  
: If mode$ is a constant (for example, "R"),  
: it must be enclosed in quotation marks.  
:  
: buffer is a numeric constant or variable that  
: specifies which buffer (1 to 15) to use.  
:  
: file$ is a string expression defining a  
: file specification in the format  
: filename/ext.password:d. If a constant  
: is used (for example, "MYFILE/DAT"), it must  
: be enclosed in quotation marks.  
:  
: record-length is a numeric expression from  
: 0 to 256 specifying the logical record  
: length. 0 is the same as 256. If omitted,  
: 256 is used. record-length is used with  
: Random access only.  
:.....
```

This statement lets you open or create a file so that you can write data into it, update it, and read it. For details on file access, see the sections on sequential I/O techniques and random I/O techniques later in this section.

If file\$ included a drive specification, NBASIC will use only the specified drive. If no drive is specified, NBASIC will sequentially search all operating drives for a matching file, starting with Drive 0.

Examples

OPEN"O",1,"DATAFILE"

opens DATAFILE (or creates it if it doesn't already exist) for sequential output. Output will be done through buffer #1. Since the "O" mode is specified, output will start at the first record in the file. (If "E" is used instead of "O", output will start at the end of the file.)

OPEN "R", 2, "PAYROLL/A:1",64

opens/creates PAYROLL/A on Drive 1 for random input/output. Access will be through buffer #2. Records will be 64 bytes long.

MODE\$="R"

BUFFER=3

FILE\$="TESTFILE/DAT.TURING:4"

RECLN=128

OPEN MODE\$, BUFFER, FILE\$, RECLN

opens/creates a file on Drive 4 named TESTFILE/DAT, which is protected by the password TURING, for random input/output. Access will be through buffer #3. Records will be 128 bytes long.

CLOSE
Close Access to the File

```
.....  
:  
: CLOSE{buffer{,buffer...}}  
:  
:   buffer is a numeric constant or variable  
:   that refers to the buffer number assigned  
:   when a file was opened. If buffer is  
:   omitted, all open files will be closed.  
:.....
```

This command terminates access to a file through the specified buffer(s). If buffer has not been assigned in a previous OPEN statement, then CLOSE buffer has no effect.

In a network environment, where many computers share access to disk storage, file access must be kept brief. Don't leave files open while waiting for operator input or processing data. Always CLOSE immediately after completing access with a disk file (or group of files).

This technique also helps prevent data loss, whether the program is running on a Student Station or an independent computer. If you remove a diskette that contains a file that is opened for writing (mode = O, E, or R), the last 256 bytes of data could be lost and any data written past the old EOF marker will be lost completely. Closing the file will write the data, if it hasn't already been written.

Commands that modify or use the resident program (EDIT, MERGE, LOAD, RUN, NEW, etc.) will cause open files to be closed. Also, a return to the Network 3 Operating System level by the command CMD"S" will close any files that the Student Station has left open.

Examples

CLOSE
closes access to all open files.

CLOSE 1,2,8
terminates the file assignments to buffers 1, 2, and 8. These buffers can now be assigned to others files by OPEN statements.

I=3
CLOSE I
terminates the file assignment to the buffer 3 specified by the value of I.

File Access Part 2:
Commands for Sequential and Random Access

INPUT#
Sequential Read from Disk

```
.....  
:  
: INPUT#buffer,var{,var...}  
:  
: buffer is a numeric constant or variable that  
: specifies a sequential input file buffer.  
:  
: var is the variable name to contain the  
: data from the file.  
:.....
```

This statement inputs data from a disk file into the Student Station's memory. The data is input sequentially. That is, when the file is first opened, a file record pointer is set to the beginning of the file. Each time data is input, the pointer advances. To start over reading from the beginning of the file, you must close the file and re-open it.

INPUT# doesn't care how the data was placed on the disk--whether a single PRINT# statement put it there, or whether it required 10 different PRINT# statements. What matters to INPUT# are the positions of the terminating characters and the EOF marker.

To INPUT# data successfully from disk, you need to know ahead of time what the format of the data is. Here is a description of how INPUT# interprets the various characters it encounters when reading data.

When inputting data into a variable, NBASIC ignores leading spaces; when the first non-space character is encountered, NBASIC assumes it has encountered the beginning of the data item.

The data item ends when a terminating character is encountered or when a terminating condition occurs. The particular terminating characters vary, depending on whether NBASIC is inputting to a numeric or a string variable.

Numeric INPUT# Examples

Suppose the data image on the disk or diskette is

```
1.234 -33 27 [ENTER]
```

where [ENTER] denotes a carriage-return--CHR\$(13). Then the statement

```
INPUT#1, A,B,C  
or the sequence of statements
```

```
INPUT#1,A: INPUT#1,B: INPUT#1,C
```


will assign the values as follows:

```
A=1.234  
B=-33  
C=27
```

This works because spaces and [ENTER] serve as terminators for input to numeric variables. The space before 1.234 is a "leading space"; therefore, it is ignored. The space after 1.234 is a terminator; therefore, NBASIC starts inputting the second variable at the "-" character, inputs the number -33, and takes the next space as a terminator. The third input begins at the 2 and inputs the 27 to the C variable. The space following this number terminates input.

String INPUT# Examples

When reading data into a string variable, INPUT ignores all leading spaces. The first non-space character is taken as the beginning of the data item.

If this first character is a quotation mark ("), then INPUT will evaluate the data as a quoted string. It will read in all subsequent characters up to the next quotation mark. Commas, spaces, and [ENTER] characters will be included in the string. The quotes themselves don't become part of the string.

If the first character of the string item isn't a quotation mark, then INPUT will evaluate the data as an unquoted string: it will read in all subsequent characters up to the first comma, or [ENTER]. If quotation marks are encountered, they will be included in the string.

For example, if the data on the disk or diskette is:

```
PECOS, TEXAS"GOOD MELONS"
```

Then the statement

```
INPUT#1, A$,B$,C$  
would assign values as follows:
```

```
A$=PECOS  
B$=TEXAS"GOOD MELONS"  
C$=null string (empty)
```

If a comma is inserted in the data image before the first quotation mark, B\$ will contain TEXAS and C\$ will get the value GOOD MELONS.

These are very simple examples just to give you an idea of how INPUT works. However, there are many other ways to input data--different terminators, different target variable types, etc. They can't all be explained here. Instead, what follows is a generalized description of how input works and what the terminating characters and conditions are, with examples.

The list below defines the various terminating sets INPUT# will look for. It will always try to take in the largest set possible. Note that a space functions as a terminator only for numeric input, and that it is a weak terminator. If another terminator follows one or more spaces, it will be treated as the terminator for that set.

Numeric-input terminator sets

```
(space)=CHR$(32)
, (comma)=CHR$(44)
[ENTER]=CHR$(13)
end of file encountered
255th data character encountered
```

Quoted-string terminator sets

```
" (quotation mark)=CHR$(34)
end of file encountered
255th data character encountered
```

Unquoted-string terminator sets

```
, (comma)=CHR$(44)
[ENTER]=CHR$(13)
end of file encountered
255th data character encountered
```

In the following examples, [ENTER] is a single character with an ASCII value of 13. [ENTER]=CHR\$(13).

INPUT#1,A,B,C

will assign various values to A, B, and C, given the following data images on the disk:

Image on disk:	Values assigned:
1. 123.45 8.2E4 7000[ENTER]	A=123.45 B=82000 C=7000
2. 6[ENTER]7[ENTER] A12 eof	A=6 B=7 C=0
3. 1,,2,3,4 [ENTER]	A=1 B=0 C=2
4. 1,3,eof	A=1 B=3 C=0 (end-of-file error)

In the second example above, note that C gets the value 0. The space following [ENTER] is a leading space, so it is ignored. The item A12 returns a zero because the first character is non-numeric (it is evaluated by a routine just like the VAL function of BASIC).

In the third example above, when INPUT# goes looking for the second data item, it immediately encounters a terminator (the comma). Therefore, variable B is given the value zero.

INPUT#1,A\$,B\$

will assign various values for strings A and B, given the following data images on the disk:

Image on disk:	Values assigned:
1. "ROBERTS,J.""ROBERTS,M.N. eof	A\$=ROBERTS,J. B\$=ROBERTS,M.N.
2. "ROBERTS,J."ROBERTS,M.N. eof	A\$=ROBERTS,J. B\$=ROBERTS
3. ROBERTS,J., ROBERTS,M.N. [ENTER]	A\$=ROBERTS B\$=J.
4. THE WORD "QUO",12345.789 [ENTER]	A\$=THE WORD "QUO" B\$=12345.789
5. BYTE [ENTER] UNIT OF MEMORY eof	A\$=BYTE B\$=UNIT OF MEMORY
6. "BYTE [ENTER] UNIT OF MEMORY eof	A\$=BYTE (ENTER) UNIT OF MEMORY B\$=null (end-of-file error)

In the fourth example, the first character is not a quote, causing this to be read as an unquoted string. Therefore, the quotes are not terminators, and become part of A\$.

In the sixth example, the first data item is a quoted string. Therefore, [ENTER] isn't a terminator.

LINE INPUT#

Read a Line of Text from Disk

```
.....  
:  
: LINE INPUT#buffer,var$  
:  
: buffer is a numeric constant or variable that  
: specifies a sequential output file buffer.  
:  
: var$ is the variable name to contain the  
: string data.  
:.....
```

Similar to LINE INPUT from keyboard, this statement reads a "line" of string data into var\$. This is useful when you want to read an ASCII-format BASIC program file as data, or when you want to read in data without following the usual restrictions regarding leading characters and terminators.

LINE INPUT# (or LINEINPUT#--the space is optional) reads everything from the first character up to:

1. an [ENTER] character, CHR\$(13)
2. the end of file
3. the 255th data character (this 255 character is included in the string)

Other characters encountered--quotes, commas, leading blanks--are included in the string.

For example, if the data looks like:

```
10 CLEAR 500 [ENTER]  
20 OPEN"I",1,"PROGRAM" [ENTER]  
,  
,
```

then the statement

```
LINE INPUT#1,A$
```

could be used repetitively to read each program line, one line at a time.

PRINT#
Sequential Write to Disk File

```
.....  
:  
: PRINT#buffer,{USING format$;}exp{p exp...}  
:  
: buffer is a numeric constant or variable that  
: specifies a sequential output file buffer.  
:  
: format$ is a string expression of field  
: specifiers for the USING option. (See  
: PRINT USING, Model III/4 BASIC Manual.)  
:  
: exp is the expression to be evaluated and  
: PRINTed to disk.  
:  
: p is a delimiter that must be placed between  
: expressions to be PRINTed to disk. p can  
: be either a semi-colon or comma.  
:.....
```

This statement writes data sequentially to the specified file. When you first open a file for sequential output, a pointer is set to the beginning of the file. Therefore, your first PRINT# places data at the beginning of the file. At the end of each PRINT# operation, the pointer advances, so the values are written in sequence.

PRINT# doesn't compress the data before writing it to disk. A PRINT# statement writes an ASCII-coded image of the data to the disk, similar to what a PRINT to display creates on the screen. Remember this, and you'll be able to set up your PRINT# list correctly for access by one or more INPUT# statements.

Numeric PRINT# Examples

A=123.45
PRINT#1,A
will write this nine-byte character sequence onto disk:

(SPACE)123.45(SPACE)[ENTER]

The punctuation in the PRINT# list is very important. Unquoted commas and semi-colons have the same effect as they do in regular PRINT to display statements. For example:

A=2300
B=1.303
PRINT#1,A,B
writes the data on the disk as:

2300 1.303 [ENTER]

The comma between A and B in the PRINT# list causes 16 extra spaces in the disk file. Generally you wouldn't want to use up disk space this way, so you should use semi-colons instead of commas.

```
PRINT#1,A;B
```

writes the data as:

```
2300 1.303 [ENTER]
```

The spaces are always added before and after when numeric variables are printed. Using PRINT# with numeric data is quite straightforward: just separate the items with semi-colons. (Remember that the space character functions as a delimiter between **numeric** variables.)

String PRINT# Examples

Using PRINT# with string data requires more care, primarily because you have to insert delimiters so the data can be read back correctly. In particular, you must separate string items with explicit delimiters if you want to INPUT# them as distinct strings. For example:

```
A$="JOHN Q. DOE"
```

```
B$="100-01-001"
```

```
PRINT#1,A$;B$
```

would produce this image on disk:

```
JOHN Q. DOE100-01-001[ENTER]
```

Spaces are not added to B\$ when printed because it is a string variable, not a numeric variable. Also, this image could not be INPUT# back into two variables because there is no delimiter. (For example, INPUT#1,A\$,B\$ would make A\$="JOHN Q. DOE100-01-001" and B\$="" for null string.)

The statement PRINT#1,A\$,B\$ would write this image on disk:

```
JOHN Q. DOE          100-01-001
```

Note the use of quotation marks around the comma in this example. PRINT#1,A\$;",";B\$ would produce this image on disk:

```
JOHN Q. DOE,100-01-001
```

This image could be INPUT# back into two variables.

This method of printing the delimiter on the disk (using a comma within quotation marks) is adequate if the string data contains no delimiters--commas or [ENTER] characters. But if the data does contain delimiters or leading blanks that you don't want to ignore, then you must supply explicit quotes to be written along with the data. For example:

```
A$="DOE, JOHN Q."
```

```
B$="100-01-001"
```

```
PRINT#1,A$;",";B$
```

writes this image on disk:

```
DOE, JOHN Q.,100-01-001 [ENTER]
```


When you try to input this with a statement like

```
INPUT#2,A$,B$
```

A\$ will get the value DOE, and B\$ will get JOHN Q.--because of the comma after DOE in the disk image.

To write this data so that it can be input correctly, you must use the CHR\$ function to insert explicit quotation marks into the disk image. Since 34 is the ASCII code for the quotation mark, use CHR\$(34) as follows:

```
PRINT#1,CHR$(34);A$;CHR$(34);B$
```

This produces the disk image

```
"DOE, JOHN Q."100-01-001 [ENTER]
```

which can be read with a simple

```
INPUT#2,A$,B$
```

Note: You can also use the CHR\$ function to insert other delimiters and control codes into the file. For example:

CHR\$(10)	[↓] Line feed
CHR\$(13)	[ENTER] Carriage return
CHR\$(11) or CHR\$(12)	line-printer top-of-form

USING Option

This option makes it easy to write files in a carefully controlled format.

For example, suppose:

```
A$="LUDWIG"  
B$="VAN"  
C$="BEETHOVEN"  
PRINT#1,USING"! . !. %    %";A$;B$;C$
```

would write the data in nickname form:

```
L.V.BEET (ENTER)
```

See the section on PRINT USING in the Model III/4 Operation and BASIC Language Reference Manual for a complete explanation of the field-specifiers that can be used with this option.

FIELD

Organize a Random File-buffer into Fields

```
.....  
:  
: FIELDbuffer,n1 AS field1${,n2 AS field2$...}  
:  
: buffer is a numeric constant or variable that  
: specifies a random access file buffer.  
:  
: n1 specifies the length of the first field  
: ( $0 < n < 256$ ).  
:  
: field1$ defines a variable name for the  
: first field.  
:  
: n2 specifies the length of the second field.  
:  
: field2$ defines a variable name for the  
: second field.  
:  
: Subsequent n AS field$ pairs define  
: other fields in the buffer.  
:  
: Note: The sum of all the field-lengths may  
: equal the record length, and must not  
: exceed the record length.  
:.....
```

Before FIELDing a buffer, you must use an OPEN statement to assign that buffer to a particular disk file (you must use random access mode). Then use the FIELD statement to organize a random file buffer so that you can pass data from NBASIC to disk storage and vice-versa.

Each random file buffer has up to 256 bytes which can store data for transfer from disk storage to NBASIC or from NBASIC to disk. (When non-standard length files are used, maximum may be from 1 to 255.) However, you need a way to access this buffer from NBASIC so that you can either read the data it contains or place new data in it. The FIELD statement provides the means of access.

You may use the FIELD statement any number of times to "re-organize" a file buffer. FIELDing a buffer doesn't clear the contents of the buffer; only the means of accessing the buffer (the field names) are changed. Furthermore, two or more field names can reference the same area of the buffer.

Examples

The following program lines demonstrate the use of FIELD to organize a random-access file buffer:

```
90 OPEN"R",1,"FILENAME/DAT:1"  
100 FIELD1, 128 AS A$, 128 AS B$  
110 GET1  
120 PRINT A$;B$  
130 CLOSE
```


Line 100 tells NBASIC to assign the first 128 bytes of the buffer to the string variable A\$ and the remaining 128 bytes to B\$. When you print A\$ and B\$, you will see the contents of the buffer. (This value would be meaningless without using GET to read a 256-byte record from disk.)

Note: All data--both strings and numbers--must be placed into the buffer in string form. Three pairs of functions (MKI\$/CVI, MKS\$/CVS, MKD\$/CVD, described later) are used for converting numbers to strings and vice-versa.

FIELD3, 16 AS NM\$, 25 AS AD\$, 10 AS CY\$, 2 AS ST\$, 7 AS ZP\$
The first 16 bytes of buffer 3 are assigned the buffer name NM\$; the next 25, AD\$; the next 10, CY\$; the next 2, ST\$; the next 7, ZP\$.

More on Field Names

Field names, like NM\$, AD\$, CY\$, ST\$, and ZP\$, are not string variables in the ordinary sense. They do not consume the string space available to NBASIC. Instead, they point to the buffer field which you assigned with the FIELD statement. You can use:

100 FIELD1,255 AS A\$, 1 AS B\$
without worrying about whether 255 bytes of string space are available for A\$.

If you use a buffer field name on the left side of an ordinary assignment statement, that name will no longer point to the buffer field. Therefore, you won't be able to access that field using the previous field name. For example,

A\$=C\$
nullifies the effect of the FIELD statement above (line 100). See LSET and RSET on page 92 for related information.

During random input, the GET statement places data into the 255-byte buffer, where it can be accessed using the field names assigned to that buffer, so you can then PUT the buffer contents into a disk file.

Often you'll want to use a dummy variable in a FIELD statement to "pass over" a portion of the buffer and start fielding it somewhere in the middle. For example:

FIELD1, 16 AS CLIENT\$(1), 100 AS HIST\$(1), 12 AS DUMMY\$, 16 AS CLIENT\$(2), 100 AS HIST\$(2)

In the FIELD statement, DUMMY\$ serves to move the starting position of CLIENT\$(2) to position 129. In this manner, two identical "subrecords" are defined on buffer number 1. DUMMY\$ won't actually be used to place data into the buffer or retrieve it from the buffer.

GET
Read a Record from Disk--Random Access

```

.....
:
: GETbuffer{,n}
:
:   buffer is a numeric constant or variable
:   that specifies a random access file buffer.
:
:   n specifies the record number in the file
:   that you want to read. If omitted, the
:   current record will be read.
:
:.....

```

This statement gets a data record from a disk file and places it in the specified buffer. Before GETting data from a file, you must OPEN the file. That is, statements like:

```

OPEN"R",buffer,file$
FIELDbuffer, 255 AS var$

```

are required **before** the statement:

GETbuffer,n

GET tells NBASIC to read record n from the file, place it into buffer, and increment the record pointer. If you omit the record number in GET, NBASIC will read the current record.

The "current record" is the record whose number is one higher than that identified by the record pointer. The record pointer points to the last record accessed. When you open a file, before you perform GET or PUT, the record pointer is set equal to 0. For example:

Program statement	Effect
100 OPEN"R",1,"NAME/DAT"	Open NAME/DAT for random access using buffer 1
110 FIELD 1,...	Structure buffer
120 GET 1	GET record 1 into buffer 1
125 REM...USE BUFFER CONTENTS	
130 GET 1,30	GET record 30 into buffer 1
135 REM...USE BUFFER CONTENTS	
140 GET 1,25	GET record 25 into buffer 1
145 REM...USE BUFFER CONTENTS	
150 GET 1	GET record 26 into buffer 1

If you are using non-standard records, an attempt to GET past the end of file will produce an error.

If you are using fixed-length records, the same attempt will return a null record and no error will occur. To prevent this, you can use the LOF function to determine the number of the highest numbered record.

PUT

Write a Record to Disk--Random Access

```
.....  
:  
: PUTbuffer{,n}  
:  
:   buffer is a numeric constant or variable  
:   that specifies a random access file buffer.  
:  
:   n specifies the record number in the file  
:   that you want to write. If omitted, the  
:   current record will be written.  
:.....
```

This statement moves data from a file's buffer into a specified place in the file. Before you PUT data in a file, you must:

1. OPEN the file, thereby assigning a buffer and defining the access mode (which must be R).
2. FIELD the buffer, so that you can
3. place data into the buffer with LSET, RSET, or GET statements.

When NBASIC encounters the statement:

PUTbuffer,n

it does the following:

- Finds the information needed to access the disk file.
- Checks the access mode for this buffer (must be R).
- Acquires more disk space for the file if necessary to accommodate the record indicated by n.
- Copies the buffer contents into the specified record of the disk file.
- Updates the current record number to equal n + 1.

The "current record" is the record whose number is one higher than that identified by the record pointer. The record pointer points to the last record accessed. When you open a file, before you perform GET or PUT, the record pointer is set equal to \emptyset .

If the record number you PUT is higher than the end-of-file record number, then n becomes the new end-of-file record number.

LSET and RSET

Place Data in a Random Buffer Field

```
.....  
:  
: LSETfield$=data$ and RSETfield$=data$ :  
:  
:   field$ is a field name.           :  
:  
:   data$ is a string expression containing :  
:   the data to be placed in the buffer field :  
:   named by field$.                   :  
:.....
```

These two statements let you place character-string data into fields previously set up by a FIELD statement.

For example, suppose NM\$ and AD\$ have been defined as field names for a random file buffer. NM\$ has a length of 18 characters, and AD\$ has a length of 25 characters.

Now we want to place the following information into the buffer fields so it can be written to disk:

```
Name:      TYRONE SLOTHROP  
Address:   2000 NORTH VECTOR RD.
```

This is accomplished with the two statements:

```
LSET NM$="TYRONE SLOTHROP "  
LSET AD$="2000 NORTH VECTOR RD. "
```

This puts the data in the buffer as follows:

```
.....  
:TYRONE SLOTHROP   2000 NORTH VECTOR RD. :  
:.....  
          NM$                AD$
```

Note that filler spaces were placed to the right of the data strings in both cases. If we had used RSET instead of LSET statements, the filler spaces would have been placed on the left. This is the **only** difference between LSET and RSET.

For example:

```
RSET NM$="TYRONE SLOTHROP "  
RSET AD$="2000 NORTH VECTOR RD. "
```

places data in the fields as follows:

```
.....  
: TYRONE SLOTHROP   2000 NORTH VECTOR RD.:  
:.....  
          NM$                AD$
```

If a string is too large to fit in the specified buffer field, it is always truncated on the right. That is, the extra characters on the right are ignored. This is true with both LSET and RSET.

CVD, CVI and CVS
Restore String to Numeric Form

(See MKD\$, MKI\$, and MKS\$ for information on processing needed before CVD, CVI, and CVS are used.)

```

.....
:
: CVD(8-byte$)
:
:   8-byte$ defines an eight-character string,
:   typically the name of a buffer field
:   containing a number converted to a string
:   by MKD$. If LEN(8-byte$)<8, an Illegal
:   Function Call error occurs. If
:   LEN(8-byte$)>8, only the first eight
:   characters are used.
:
: CVI(2-byte$)
:
:   2-byte$ defines a two-character string,
:   typically the name of a buffer field
:   containing a number converted to a string
:   by MKI$. If LEN(2-byte$)<2, an Illegal
:   Function Call error occurs. If
:   LEN(2-byte$)>2, only the first two
:   characters are used.
:
: CVS(4-byte$)
:
:   4-byte$ defines a four-character string,
:   typically the name of a buffer field
:   containing a number converted to a string
:   by MKS$. If LEN(4-byte$)<4, an Illegal
:   Function Call error occurs. If
:   LEN(4-byte$)>4, only the first four
:   characters are used.
:
.....

```

These functions let you restore data to numeric form after it is read from disk. Typically the data has been read by a GET statement, and is stored in a random-access file buffer.

The functions CVD, CVI, and CVS are inverses of MKD\$, MKI\$, and MKS\$, respectively.

For example, suppose the name GROSSPAY\$ references an eight-byte field in a random-access file buffer, and after GETting a record, GROSSPAY\$ contains a MKD\$ representation of the number 13123.38. Then the statement:

PRINT CVD(GROSSPAY\$)-TAXES

prints the result of the difference, 13123.38-TAXES.

Whereas the statement:

```
PRINT GROSSPAY$-TAXES
```

will produce a Type Mismatch error, since the string values stored in GROSSPAY\$ can't be used in arithmetic expressions.

Using the same example, the statement:

```
A#=CVD(GROSSPAY$)
```

assigns the numeric value 13123.38 to the double-precision variable A#.

EOF

End-Of-File Detector

```
.....  
:                                                                    :  
: EOF(buffer)                                                         :  
:                                                                    :  
:   buffer is a numeric constant or variable                          :  
:       that specifies a file buffer.                                  :  
:                                                                    :  
:.....
```

This function checks to see whether all characters up to the end-of-file marker have been accessed, so you can avoid Input Past End errors during sequential input. This function does not work if the file was opened in "O" or "E" mode.

Assuming buffer specifies the buffer number of an open file, then EOF(buffer) returns 0 (false) when the EOF record has not yet been read, and -1 (true) when it has been read.

Examples

```
IF EOF(5) THEN PRINT "END OF FILE " FILENM$  
IF EOF(NM%) THEN CLOSE NM%
```

The following sequence of lines reads numeric data from DATA/TXT into the array A(). When the last data character in the file is read, the EOF test in line 30 "succeeds," so the program branches out of the disk access loop, preventing an Input Past End error from occurring. Also note that the variable I contains the number of elements input into array A().

```
5 DIM A(100) 'ASSUMING 100 OR FEWER NUMBERS ARE STORED IN THE FILE  
10 OPEN "I", 1, "DATA/TXT"  
20 I%=0  
30 IF EOF(1) THEN 70  
40 INPUT#1, A(I%)  
50 I%=I%+1  
60 GOTO 30  
70 CLOSE1: REM PROGRAM CONTINUES HERE AFTER DISK INPUT
```


LOC
Get Current Record Number

```
.....  
:                                     :  
: LOC(buffer)                          :  
:                                     :  
:   buffer is a numeric constant or variable :  
:     specifying the number for a currently-open :  
:     random access file buffer.         :  
:                                     :  
:.....
```

LOC determines the record pointer number (the number of the last record read since the file was opened). LOC is only valid after GET.

Note: In NBASIC, this function can only be used to find the current record number of a random-access file. Neither LOC nor LOF can be used with sequential files. (Instead, create a record which contains the number of records in the file. Use this value and FOR-NEXT to input data until the end of file. Or, trap the EOF error using the ON ERROR routine described in the Model III/4 Operation and BASIC Language Reference Manual.)

Example

This is a portion of a program. If the field variable N\$ matches A\$, the record number in which it was found is printed.

```
1300 OPEN "R", 1, "NAME/DAT"  
1310 FIELD 1,255 AS N$  
1320 A$="WILLIAM WILSON"  
1330 GET 1  
1340 IF N$=A$ THEN PRINT "FOUND IN RECORD" LOC(1): CLOSE: END  
1350 GOTO 1330
```

LOF

Get End-Of-File Record Number

```
.....  
:  
: LOF(buffer)  
:  
: buffer is numeric constant or variable  
: specifying the number for a currently-open  
: random access file buffer.  
:.....
```

This function tells you the number of the last record in a file (that is, the highest-numbered record). For example, during random access of a pre-existing file, you often need a way to know when you've read the last valid record.

LOF is valid as soon as a previously created file is opened. If a file is extended, LOF is not valid until a GET is executed.

Note: In NBASIC, this function can only be used with random access files.

Examples

In line 30, LOF(1) specifies the highest record number to be accessed.

```
10 OPEN "R", 1, "UNKNOWN/TXT"  
20 FIELD 1,255 AS A$  
30 FOR I%=1 TO LOF(1)  
40 GET 1, I$  
50 PRINT A$  
60 NEXT
```

Note: If you attempt to GET record numbers beyond the end-of-file record in a standard-length file (LRL=256), NBASIC simply fills the buffer with hexadecimal zeroes. No error is generated.

When you want to add to the end of a file, LOF tells you where to start adding:

```
100 I%=LOF(1)+1 'HIGHEST EXISTING RECORD  
110 PUT 1, I$ 'ADD NEXT RECORD
```


MKD\$, MKI\$, and MKS\$
Convert Data, Numeric-to-String

```
.....  
:  
: MKD$(double-precision exp)  
:  
: double-precision exp represents a  
: double-precision variable or number.  
:  
: MKI$(integer exp)  
:  
: integer exp represents a variable or number  
: from -32768 to 32768. If integer exp  
: exceeds this range, an Illegal Function Call  
: error occurs. Any fractional component in  
: integer is truncated.  
:  
: MKS$(single-precision exp)  
:  
: single-precision exp represents a  
: single-precision variable or number.  
:.....
```

These functions change a number to a compressed "string." Actually the byte values which make up the number are not changed; only one byte, the internal data-type specifier, is changed, so that numeric data can be placed in a string variable. That is:

MKD\$ returns an eight-byte string.
MKI\$ returns a two-byte string.
MKS\$ returns a four-byte string.

Examples

LSET TALLY\$=MKI\$(I%)

Field name TALLY\$ would now contain a two-byte representation of the integer I%.

A\$=MKI\$(8/I)

A\$ becomes a two-byte representation of the integer portion of 8/I. Any fractional portion is ignored. Note that A\$ in this case is a normal string variable, not a buffer-field name.

Suppose the file `BASEBALL/DAT` has been opened for random access using buffer 2, and the buffer has been `FIELDed` as follows:

Field:	<code>NM\$</code>	<code>YRS\$</code>	<code>AVG\$</code>	<code>HRS\$</code>	<code>AB\$</code>	<code>RBI\$</code>
Length:	16	2	4	2	4	4

`NM$` is intended to hold a character string; `AVG$`, `AB$`, and `RBI$`, converted single-precision values; `YRS$` and `HRS$`, converted integers.

Suppose we wanted to write the following data record:

Henry A. Wiggins played 11 years; lifetime batting average .185; career homeruns, 23; at bats, 32768; runs batted in, 57.

Then we'd use the `make-string` functions as follows:

```
1000 LSET NM$="HENRY A. WIGGINS"  
1010 LSET YRS$=MKI$(11)  
1020 LSET AVG$=MKS$(.185)  
1030 LSET HRS$=MKI$(23)  
1040 LSET AB$=MKS$(32768)  
1050 LSET RBI$=MKS$(57)
```

After this sequence, you can write Henry A. Wiggins' information to disk with the `PUT` statement. When you read it back from disk with `GET`, you will need to restore the numeric data from string to numeric form, using `CVI` and `CVS` functions.

File Access Part 3: Sequential Access Techniques

This is the simplest way to store data in and retrieve it from a file. It is ideal for storing free-form data without wasting space between data items. You read the items back in the same order in which they were written.

There are several important points to keep in mind.

- You must start reading or writing at the beginning of the file. If the data you are seeking is somewhere inside, you have to read until you find it.
- Each time you OPEN a file for sequential output (mode O), the file's previous contents are lost. To add more entries to a file without losing its contents, re-OPEN the file with mode E (extend) instead of O (output). Then PRINT# the extra data, starting from the end of the previous data.
- Another way to update a sequential file is to leave the old file intact and output a new file:
 1. OPEN the file for sequential input (mode I).
 2. OPEN another new data file for sequential output (mode O).
 3. Input a block of data and update the data as necessary.
 4. Output the data to the new file.
 5. Repeat Steps 3 and 4 until all data has been read, updated, and output to the **new** file. Then go to Step 6.
 6. Close both files.
- Data written sequentially usually includes delimiters (markers) to signify where each data item begins and ends. To read a file sequentially, you must know ahead of time the format of the data. For example: Does the file consist of lines of text terminated with carriage returns? Does it consist of numbers separated by blank spaces? Does it consist of alternating text and numeric information?
- Sequential files are always written as ASCII-coded text, one byte for each character of data. (For example, the number 5.6789 requires 8 bytes of disk storage, including the leading and trailing blanks that NBASIC supplies. The text string JOHNSON, ROBERT requires 15 bytes of disk storage.)
- Sequential files are always written with a record length of 256.

File Access Part 4: Random Access Techniques

For the purposes of random access--also called direct access--you can think of a disk file as a set of boxes, like a wall of post-office boxes. Like post-office boxes, the file boxes are numbered. These boxes are called "records." You can place data in any record, or read the contents of any record, with statements like:

PUT1,5 Write contents of RAM I/O buffer 1 to record 5 in disk file

GET1,5 Read contents of disk file record 5 into ram I/O buffer 1

The buffer in the computer's RAM is a waiting area for the data. Before writing data to a file, you must place the entire record in the buffer assigned to the file. This is accomplished by 1) dividing the buffer up into fields and naming them then 2) placing the string or numeric data into the fields. After reading data from a file, you must retrieve it from the buffer.

Random access offers several advantages over sequential access:

- It's more efficient--data is read and written faster.
- Opening a file for random access allows you to alternately write to and read from the file via the same buffer.
- Instead of having to start reading at the beginning of a file, you can read any record you specify.
- Random access provides many powerful statements and functions to structure your data. Once you have set up the structure, direct input/output becomes quite simple.
- To update a file, you don't have to read in the entire file, update the data, and write it out again. You can rewrite or add to any record you choose, without having to go through any of the other records. The general procedure is:

1. OPEN the file (mode R).
2. FIELD the buffer.
3. GET the record to be updated.
4. Display current contents of the record (use CVD, CVI, CVS, if appropriate, before displaying numeric data).
5. LSET and RSET new values into the fields (use MKD\$, MKI\$, MKS\$ with numeric data before setting it into the buffer).
6. PUT the updated record.
7. To update another record, repeat from Step 3. Then go to Step 8.
8. CLOSE the file.

NBASIC ERROR CODES AND MESSAGES

The following error codes and messages may be encountered in NBASIC. Error codes 1-23 are the same as those for Model III ROM BASIC. See pages 223-225 of the TRS-80 Model III/4 Operation and BASIC Reference Manual for further explanation of these codes. Beginning with error code 51, this section explains the codes and messages which may occur following a disk input/output error between the Host and Student Station.

Code	Message	Explanation
1	NF	NEXT without FOR
2	SN	Syntax error
3	RG	RETURN without GOSUB
4	OD	Out of data
5	FC	Illegal function call
6	OV	Overflow
7	OM	Out of memory
8	UL	Undefined line number
9	BS	Bad subscript (out of range)
10	DD	Redimensioned array
11	/0	Division by zero
12	ID	Illegal direct command
13	TM	Type mismatch
14	OS	Out of string space
15	LS	String too long
16	ST	String formula too complex
17	CN	Can't continue
18	NR	No RESUME
19	RW	RESUME without error
20	UE	Undefined error
21	MO	Missing operand
22	FD	Bad file data
23	L3	Disk BASIC feature not supported by NBASIC

51 FO Field overflow

With a random access file, an attempt was made to FIELD a buffer which was longer than the logical record length of the file opened.

52 IE Internal error

An internally generated error with the file structure or the Network 3 Operating System has occurred. This error will occur after a file left open by a Student Station is closed by the "DROP" command at the Host (explained on page 108). The Student Station doesn't know that the file has been closed, so this error message appears following the commands EDIT, LOAD, MERGE, NEW, RUN (which try to close all open files). In these cases, just repeat the command to continue.

53 BN Bad file number

A statement or command accessed a file with a buffer number that isn't open or is out of the range of file numbers specified when NBASIC was loaded.

54 FF File not found

The file you requested doesn't exist on the hard disks and diskettes at the Host. Perhaps you specified the wrong drive number, misspelled the name of the file, or left off the filename extension (such as /BAS, /MNU, or /DAT). Or, if you are using files stored on diskettes, perhaps you inserted the wrong diskette at the Host.

55 BM Bad file mode

This message occurs when you: 1) use random access statements to manipulate sequential files; 2) use sequential statements to access random files; 3) write to a file that is open for input; or, 4) read a file open for output. Try to use EOF with files opened in the "O" or "E" mode.

56 AO File already open

This message is generated when your program tries to open the same file a second time, without closing it between the two requests.

58 IO Disk input/output error

This message appears whenever the disk read/write head is unable to perform the operation the Student Station or Host told it to do, or whenever there is an inadequate transfer of information between the read/write head and the diskette. One of several possible errors could have occurred:

- CRC Error During Disk I/O
- Disk Drive Not in System
- Lost Data During Disk I/O
- Disk Sector Not Found
- Disk Drive Hardware Fault
- Disk Drive Not Ready
- Illegal I/O Attempt
- Time Out on Disk Drive
- I/O Attempt to Non-system Disk
- Write Fault on Disk I/O
- Directory Read Error
- Directory Write Error

These errors could be caused by a poor connection, a dirty or misaligned disk drive, or a flawed hard disk or diskette. (See DS Error--code 67--for possible solutions to the problem.)

62 DF Disk full

If this error message appears while saving a program to a disk or diskette, the program probably wasn't saved in its entirety. Either the directory was full (so that it couldn't accept another file entry), or all available space on the disk was allocated before the file was completely written. (You will probably encounter a full directory more often than a full disk. In that case, adding a secondary hard disk unit will not solve your space problem.) An attempt to create a new file on a write-protected disk or disk drive can also return this error message. (See WP Error--code 69.)

63 EF End of file encountered

This error occurs when a program attempts to read data beyond the end of the file or outside file limits.

64 RN Bad record number

A record number that is greater than or less than the number allowed was used (random access files).

65 NM Bad filename

The file specification provided to the Network 3 Operating System didn't conform to the proper file specification syntax (**filename/extension:drive**).

67 DS Direct statement in file

When you LOAD or RUN a file, the file must be a BASIC program. If the file is a program in another language (such as Assembly, Pascal, or PILOT), or data (such as SCRIPSIT text or an AUTHOR I lesson), it can't be loaded by NBASIC and this error results. If a BASIC program with more than 254 characters in a program line is saved in ASCII format, the DS Error occurs when NBASIC attempts to read the program file. This error also occurs if there was either a write error when the file was saved or a read error during loading. A flawed track on a disk or diskette could also cause this message. (Possible solutions at the Host are: 1) COPY the file to another disk or diskette and try again, or 2) BACKUP the file or diskette.)

68 FL Too many files

The number of files opened exceeds the number of buffers available. (You need to specify more files when you load NBASIC.)

69 WP Disk write protected

This error occurs when a write request can't be completed for one of these reasons: 1) the destination disk is write protected; 2) the destination disk drive is write protected; 3) the destination disk drive is disabled; or 4) the destination floppy disk drive is empty or its door is open.

70 AD File access denied

This error message occurs: 1) when a file protected by a password is called without the password; 2) when the wrong password is used; or 3) when a password is given and none exists (password=" ").

**TEACHER'S REFERENCE:
MORE INFORMATION
FOR CLASSROOM USE**

Attention: Parts of this reference section contain information that you might not want students to see. This section should be removed before the Network 3 manual is made available for student reference.

**TEACHER'S REFERENCE:
MORE INFORMATION FOR CLASSROOM USE**

ARRANGING THE CLASSROOM

When setting up the Network 3 equipment, arrange the classroom or lab to protect the RS-232C cables that connect the computers to the Network 3 Controller. If these cables are loose or damaged, network communications can be lost or "garbled."* The following suggestions will help ensure proper network communications:

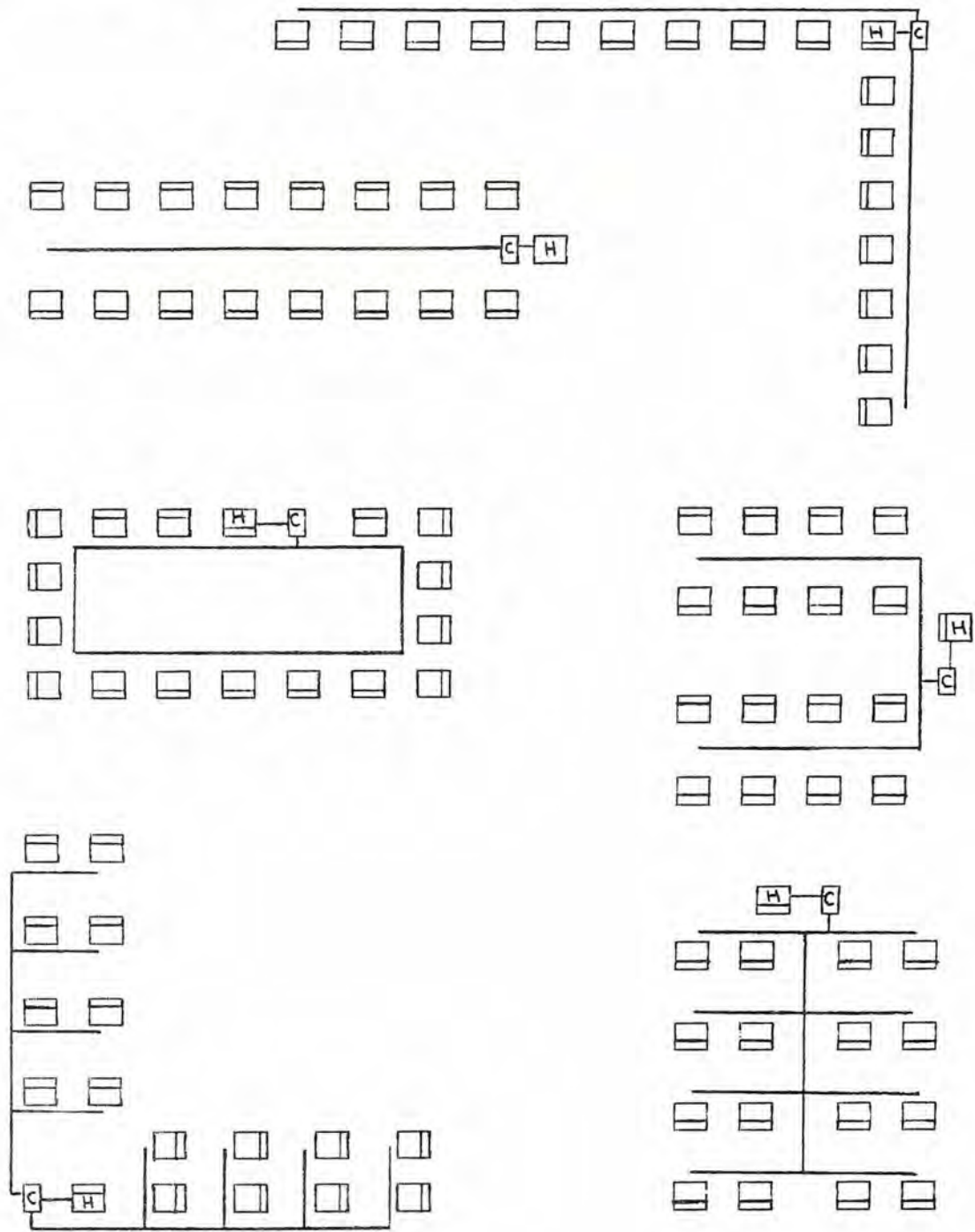
- Securely fasten RS-232C cables to the ports of the Network 3 Controller and the computers with the screws provided.
- Run RS-232C cables behind Student Stations. Make sure the cable or extender connected to each computer's port exits to the rear without being crimped, stretched, or twisted.
- Where cable extenders are used, fasten both cables with the screws provided. Tape this connection to the table.
- Tape or tie RS-232C cables together to limit any movements that might loosen their connection to the Student Stations and Network 3 Controller. Prevent cable damage and accidents by keeping these cable bundles off of the floor. Try to route RS-232C cables so they won't cross an aisle or doorway.
- Avoid sources of electrical interference. Don't run RS-232C cables near fluorescent lights or bundle them with power cords. Keep the cables from touching power cords.

Before connecting the RS-232C cables to the Student Stations, note the number sequence for the ports on the back of the Controller. This will be the sequence which the Host follows to perform requests from the Student Stations. As you connect the Student Stations in the desired sequence, write each port's number on a card and tape it to the Student Station. This Student Station number will help you monitor the activity of the network and quickly guide you to a Student Station that is interrupting the network's access sequence.

Many designs are possible for the Network 3. Your particular arrangement will depend on the room's configuration: the space available, the number of tables or desks, and the number and location of electric outlets. Try to keep the distance between the Controller and the Student Stations short. The diagrams below can help you plan your Network 3 classroom or lab. The Controller is designated by a "C", and the Host is designated by an "H". The lines connected to the Controller indicate the paths of the RS-232C cables. The squares represent Student Stations, which can be connected to the Network 3 Controller in any desired sequence.

* As additional protection against network interference, a power source dedicated to the network classroom is recommended.

The hard disk and the network's printer are not shown. These peripheral devices would be located close to the Host. The Host should be accessible, but not necessarily located at the teacher's desk or the front of the classroom (since this computer runs unattended during normal operation of the Network 3 system). If possible, position the Host so that the network status screen is visible from the majority of Student Stations. Then, if a student doesn't receive a prompt response to a file or print request, a quick look at the Host screen will show which Student Station is communicating with the Host. Be sure to explain the network's sharing sequence to your students so that they can monitor the Host to know when their turn will come.



CHANGING THE NETWORK'S BAUD RATE

"Baud rate" is a measurement of the speed at which data is transferred between the Host and the Student Stations. The baud rate for the Network 3 is set when the programs HOST and STUDENT are loaded (as described in the Daily Start Up sequence beginning on page 8). By pressing [ENTER] when you see the prompt "Baud rate ?", you set this data transfer rate at 9600 baud.

This is the normal baud rate for the Network 3 system. This rate must be selected when loading HOST so that computers equipped with the Network 3 ROM can load the Student Station Operating Software directly from the Host computer.

The Host and all Student Stations must be set at the same baud rate. The Network 3 system can operate at any one of the following rates:

50	75	110	134
150	300	600	1200
1800	2000	2400	3600
4800	7200	9600	

The normal rate for the Network 3, 9600 baud, is the fastest rate shown here. Lower baud rates should be used only to help alleviate interference problems. In a school, sources of interference could be communications equipment and electric motors (typewriters, sewing machines, shop equipment, fans, or compressors) located near the classroom.

To change the baud rate for the Network 3:

1. Follow the Daily Start Up sequence (page 8) to power up the Host and load the HOST program (at 9600 baud).
2. At **each** Student Station, continue the Daily Start Up sequence (or follow one of the alternate loading sequences described in Appendix I) to load the STUDENT program. But when you see "Baud rate ?", type the new baud rate and press [ENTER].
3. When all Student Stations have been loaded and set at the new baud rate, change the baud rate at the Host. Exit the HOST program by pressing [SHIFT] and [BREAK]. Reload the HOST program. But when you see "Baud rate ?", type the new baud rate and press [ENTER].

The Network 3 system will now operate at the designated baud rate. Remember that when any Student Station wants to join the network by loading the STUDENT program from the Host, the Host must be operating at 9600 baud. That means you have to repeat the sequence above, which interrupts all other Student Stations' access to the Host and empties the contents of the printer spooler. When the Host's baud rate is the same as that of the Student Stations, it will resume servicing the requests of the Student Stations.

OVERCOMING NETWORK INTERRUPTIONS

Certain circumstances can cause the Host to "lock on" to one Student Station. This interrupts sharing of the Host's printer and disk storage by the other Student Stations. The Host can't continue to the requests of the waiting Student Stations without your help. If the network seems not to be operating properly, check the status screen at the Host for one of the following conditions.

Operating Interruption:

In most cases of network interruptions, a Student Station number stays on the Host's screen for a long time, and the data-transfer star may or may not be visible. (If this character is visible, look closely to make sure that it does NOT flash or flicker.)

- If a Student Station number is displayed next to "Spool:", then the Host can't store or "spool" that Student Station's printer request. Prepare the network's printer and turn it on. As its contents are printed, the spooler will empty, making room for the latest print request.

If you don't have a printer, you must empty the spooler. At the Student Station, press [BREAK] or exit the program if you can. Then exit the HOST program (see page 16) or press the Reset button at the Host. Reload the HOST program (see page 9). You may also have to start up the Station Station.

- If a Student Station number is displayed next to "Student:" and a number is displayed next to "Files:", then a disk file that was opened by the Student Station must be closed.
 1. At the Student Station indicated, exit the BASIC program or press [BREAK] to display the NBASIC prompt "Ready >". Then enter the command **CLOSE**.
 2. If the Student Station isn't in NBASIC, or can't display the "Ready >" prompt, try this command at the Host. Press the keys **D R O P** at the same time. This command instructs the Host to "drop" contact with the Student Station. **Use this command only to close open files that are NOT being accessed by the Student Station.** A flashing data transfer star indicates file access is taking place.

These two commands safely close all open files so that no data will be lost. The Student Station's number and the number beside "Files:" will disappear from the status screen. The Host will go on to the next waiting request.

- If a Student Station's number is still on the status screen, then communication was broken between that Student Station and the Host. While data was being transferred, one of the following events probably occurred: the power to the Student Station was turned off or otherwise disrupted; the Reset button was pressed at the Student Station; the power to the Network 3 Controller was turned off or otherwise disrupted; or the Mode button was pressed at the Controller.

You must reload the appropriate operating software at both the Host and the Student Station. (Note: This procedure erases all data stored in the Host's printer spooler.)

1. At the Student Station, make sure the power is on. Press and release the orange Reset button. (If the Student Station isn't needed, turn it off.)
2. At the Host, make sure there is a Start-up Diskette in the bottom disk drive. Then press and release the orange Reset button. Reload the HOST program.
3. After the Host services the requests of the waiting Student Stations, start up the Student Station and reload STUDENT.

Keep in mind that network activity increases the time it takes to load the Student Station software from the Host.

Loading Interruption:

When using the ROM loader to load the Student Station operating software, the Host must send three small program modules to the Student Station before it can load the STUDENT program. These three loading sequences are so brief that the Student Station's number won't appear on the network status screen. On the fourth cycle, the Student Station's number will appear and the data-transfer star will flash while the STUDENT program loads.

It is possible for a lockup to occur even though no Student Station number is displayed on the status screen, and the data-transfer star is not visible or not flashing. In this case, communication between a Student Station and the Host was broken early in this loading cycle by one of the following events: the power to the Student Station was turned off or otherwise disrupted; the Reset button was pressed at the Student Station; the power to the Network 3 Controller was turned off or otherwise disrupted; or the Mode button was pressed at the Controller.

- If you know which Student Station was in touch with the Host when the interruption occurred, follow the three steps at the top of this page to resume normal network operation.
- If the interruption occurred while all Student Stations were loading the Student Station operating software from the Host, follow the steps above. Reset all Student Stations that did not finish loading, and reload STUDENT at those Student Stations.
- If interruptions recur during loading, make sure your students know **not** to press the Reset button. Repeat the steps above for all Student Stations. But for Step 3, reload the Student Stations one at a time according to the network's sequence.

If interruptions to your network's operation occur frequently, start a network logbook to see if a problem exists. Keep track of all interruptions, the time they occur, and the conditions under which they occur. A complete troubleshooting guide for the Network 3 system begins on page 133.

DETERMINING THE BEST NETWORK SIZE

The 16-station maximum size for the Network 3 is very suitable for moderate to infrequent Host access (loading programs, reading and writing to files, and using the network's printer). Each Student Station should have to wait only a short time to have its request serviced by the Host.

Some programs and classes, however, demand heavy Host access. The program your students run could require frequent use of disk files and a printer. In a programming or word-processing class, Student Stations interact with the Host very often (to load, save, and kill programs, read and write to files, and print program listings, screen displays, or documents). Delays for these procedures are brief when independent disk-equipped computers are used. But when the Network 3 system is used, the delays increase according to the number of Student Stations that must share access to one disk and one printer. Each Student Station must wait longer to have its request serviced by the Host.

At some point, you might wonder if the Student Stations are waiting too long. Here's one way to gauge the frequency of Host access by a particular program or class. While the full Network 3 system is operating, watch the network's status screen (the Host screen display) for 10 minutes. During this time, note how often the network is idle (when no Student Station numbers are displayed on the status screen). If the network is idle for a total of one minute or less, then reducing the number of Student Stations by one will significantly decrease the length of time each Student Station must wait to have its request serviced by the Host. Recheck the frequency of Host access, reducing the number of Student Stations until you feel that the system is of an acceptable size. Try to achieve two or even three minutes of idle time per 10-minute period (if your course objectives and the availability of the network for class time permit fewer students to work with this resource).

PLANNING FOR PERIODS OF HEAVY USAGE

No matter how many Student Stations operate in the Network 3 system, delays are to be expected whenever all Student Stations try to access the Host at once. Such heavy Host access occurs at the beginning and end of a period, and in a teacher-centered application (for example, when you demonstrate a new program). Plan ahead to prepare for delays at these times:

- If the Network 3 wasn't used by a previous class, start up the Host and load the Host and Student Station software before your students arrive. This saves about five minutes of class time.
 - If you must load the STUDENT program from cassette tape into any Student Station computers, start loading well before the beginning of class.* (With the help of a Network 2 Controller, you can simultaneously load STUDENT into all or selected computers so that they can operate under the Network 3 Operating System. Network 2 loading is described on page 184.)
 - If all students will run the same program, start loading the program at the Student Stations before the period begins. This can save several minutes of class time, especially if the program is quite large. (By adding a Network 2 Controller to the Network 3 system, you and your students can load a BASIC program simultaneously at all or selected Student Stations. There it will run under Network 3 BASIC and the Network 3 Operating System. See page 131 for more information.)
 - If students are waiting for a program to load at the beginning of the period, use the time for classroom business such as taking attendance, announcing the day's topic or future assignments, and returning tests or other papers.
 - If the class is running a program that requires each student to store data or record scores before leaving the program, tell them to begin these routines at least five minutes before the end of class. If each student must save a program, write a large data file, or print long program listings or documents before the end of the period, allow even more time.
 - Instruct students to remain at their Student Stations at the end of class until they see the prompts "Network 3" or "Ready >". This ensures that their last command or Host request has been completed without error.
- * To avoid having to re-load the STUDENT program by cassette each day, you may leave these computers on overnight. As long as a Student Station remains on and the Reset button isn't pressed, the Operating Software remains in that computer's memory and doesn't have to be reloaded. Note: If a computer is left on overnight, the screen brightness should be turned all the way down (using the brightness control under the left edge of the computer) to prolong the life of the video display.

CREATING BRANCHING MENU PROGRAMS

The utility program MENU lets you create option lists or "menus" of BASIC programs for your students. (Refer to the explanation beginning on page 27.)

Since other menu programs that you have created can be listed as options on a menu, you can "branch" from one menu to another. This allows you to continue a list of options for one class or a particular subject area (as shown in the sample menu program on page 29). For example, you could create a first or main menu with your name as the filename (for example, TEACHER/MNU). This would be the only filename that your students must remember. At NBASIC "Ready >", they would enter the command `RUN"TEACHER/MNU"` to gain access to all the BASIC programs you have selected for them.

Note: Branching menus work well in lab situations and classes in which students may select their own programs during the period. To save class time when all students will run the same program, instruct them to load the particular program instead of a menu.

With a little planning, you can create a hierarchy of branching menus. Here's an example, starting with MASTER/MNU. Each menu following the MASTER/MNU would also include an option that returns to the preceding menu. This is the only file specification you would need in order to run or examine any BASIC courseware program.

MEGABYTE HIGH SCHOOL MASTER MENU

OPTIONS

1. Mathematics
2. Science
3. Computer Science
4. Business
5. History/Social Studies
6. Reading/Vocabulary
7. Language Arts
8. Foreign Languages

Enter selection: Mathematics
<<< Please wait >>>



MEGABYTE HIGH SCHOOL MATH MENU

OPTIONS

1. Arithmetic/Concepts
2. Geometry
3. Algebra
4. Calculus
5. Trigonometry
6. Statistics
7. Math Games
8. --Return to Master Menu

Enter selection: Arithmetic/Concepts

<<< Please wait >>>



BASIC ARITHMETIC AND NUMBER CONCEPTS

OPTIONS

1. Essential Math Vol. I
2. Essential Math Vol. II
3. High School Math Review
4. High School Math Review (Spanish)
5. Number Cruncher Math Program
6. K-8 Math with Student Management
7. Number Theory
8. --Continue to next menu
9. --Return to Math Menu

Enter selection: Essential Math Vol. I

<<< Please wait >>>



ESSENTIAL MATH VOLUME I

OPTIONS

1. Number Concepts: Lessons R1-68
2. Number Concepts: Lessons 69-74
3. Number Concepts: Lessons 75-80
4. Number Concepts: Lessons 81-90
5. Addition
6. Subtraction
7. Multiplication
8. Division
9. --Return to Arithmetic/Concepts Menu

Enter selection: ■

The branching menus you create should always include an option that allows the user to return to the previous menu. You might even want the programs of a courseware package to return to one of your menu programs when they end. If so, each program must be edited by someone who is familiar with BASIC programming. In many cases, this only involves finding all the END commands in the appropriate program and changing them to RUN"menuname", where menuname is the file specification for the desired menu program.

If the students who will use the Network 3 have no knowledge of BASIC, you can limit their control over the Student Stations. Edit your menu programs so that they disable the BREAK key by changing "ON" to "OFF" in line 5 of each menu program. (Don't forget to SAVE the new version.) Once the first menu program is loaded, it is in control: the student at that Student Station can only run the options offered. (For more protection, menu programs can be saved in a Network 3 "execute only" format so that they can't be loaded, listed, or edited. See page 120.)

While you're running a menu program, you can view the file specification for one of the options displayed by pressing the BREAK key. (If the BREAK key is disabled, LOAD the menu instead of RUNning it.) At "Ready >", type LIST 1000- and press [ENTER]. The lines displayed (the data lines from number 1000 on) contain each menu entry and the file specification for that option.

Line 1000 for the sample Essential Math menu on the previous page would look like this:

```
1000 DATA "Number Concepts: Lessons R1-68","NUMBER1"
```

The information inside the second set of quotation marks is the file specification. If you want to create a menu program that will run the NUMBER1 program, you must enter this file specification under the "FILENAME" column. (You can provide your own title or description under the "MENU ENTRY" column.)

If you want to change the information in an existing menu program, you can edit lines 1000-1080. Each data line represents one menu entry. If you delete a line, that one item will disappear from the menu program. (Don't forget to SAVE the new version.)

USING DATA DISKETTES

Not all programs and data files must be stored on the hard disk. In some cases, you may want to insert one or more data diskettes at the Host for special file storage.

Remember that only diskettes in the LDOS format can be used in the Host's disk drives. (To make an LDOS-format data diskette, follow the instructions on page 173.) Also, keep in mind that diskette access speed is slower than hard disk access speed.

Here are some suggestions for using your own diskettes with the hard-disk-equipped Network 3:

- To save space on the hard disk, consider restricting student file storage to one or more diskettes per class. (Instructions on pages 121-122 show how you can easily write protect the hard disk unit, forcing storage of all student files to a diskette in one of the Host's floppy disk drives.)

Floppy diskettes are more efficient than hard disks for storing small files. The minimum file storage space allowed on either disk is one granule. On a hard disk, one granule equals 4096 bytes; on an LDOS-format diskette, one granule equals 1536 bytes. That means that a file as small as a one-line program will occupy more physical space when it is stored on a hard disk. Also, each of the hard disk drives has a maximum directory size of 240 user filename entries. When the directory space fills, no more files can be added to that drive. If you ever encounter a "Disk space full" error message, it will most likely be caused by a lack of directory space, not a lack of free granules.

- Store student record files for separate classes on diskettes.
 1. If you can identify the necessary score files for a program that keeps student records, COPY or BACKUP these files to a diskette. (See pages 167 or 162).
 2. BACKUP this diskette for each class (see page 163).
 3. KILL or PURGE the original score files from the hard disk that contains the program. (See pages 175 or 178.)

Before students begin using the program, insert the class data diskette at the Host. As these students finish a lesson or test, the record-keeping program will automatically store their scores on the class diskette.

Note: This technique cannot be used with the Network 3 TRS-80 AUTHOR I Lesson Presentation Package. Score files cannot be separated from their corresponding lesson files.

- Convert infrequently used programs to LDOS-format diskettes instead of a hard disk drive, then insert at the Host when needed. These diskettes might contain "extra credit" programs, educational games, or special-application programs.

- You might want to store confidential files (those containing attendance, grades, and correspondence, for example) on diskettes. Then you can remove the diskettes and store them in a safe place. When you need to update a diskette you would insert it into a floppy disk drive at the Host and access it from any available Student Station. (It's possible that you might not be able to run the program that accesses these files at the Host computer when it is running under LDOS.)
- Teachers and students with access to TRS-80 Model 4 or Model III computers at home or in another part of the school may want to use their personal diskettes with the Network 3. Remember that these files must be stored in the LDOS format, or else be converted to an LDOS hard disk or diskette (as described in the example on page 17).

Note: Files can't be converted back to TRSDOS from LDOS.

- In an emergency, when the hard disk unit isn't available, it is possible to operate the hard-disk Network 3 system using only diskettes at the Host. Operating an LDOS floppy-disk Network 3 system requires two or more floppy disk drives at the Host, and backup copies of your courseware and student files. (You should backup to floppy diskettes those hard disk files that are periodically updated, as part of a regular file maintenance routine.)

1. Power up the Host computer as described on page 8. After you type the date and press [ENTER], hold down the [CLEAR] key until you see "LDOS Ready".

This step bypasses the hard-disk configuration file so that the Host will operate using only its floppy disk drives and those LDOS system files that are stored on the Start-up Diskette. You must press [CLEAR] whenever you start up or reset the Host in order to use the computer as an LDOS floppy-disk Host.

2. Insert a backup copy of the Network 3 Model III Hard Disk Operating Software Diskette in Drive 1 (the top drive). You should transfer the necessary Operating Software files to your Start-up Diskette to free this drive for other diskettes that you want to use with the Network 3 system. When you see "LDOS Ready", enter these commands:
BACKUP /CMD:1 :Ø and **BACKUP /CIM:1 :Ø**.
 If you'll need the Network 3 utility programs, enter these commands:
BACKUP M:1 :Ø and **BACKUP POSTAMT/DAT:1 :Ø** and **COPY DATETIME/SET:1 :Ø**.
3. Load the Host and Student Station software as described on pages 9 and 1Ø.

The Start-up Diskette containing LDOS system files and the Network 3 Operating Software must remain in Drive Ø. The Student Stations can access the LDOS-format diskettes that you place in the Host's Drive 1 (or in Drives 2 and 3, if these external drives are connected).

ASSIGNING STUDENT FILENAMES

If your students create their own programs and data files, you may want to plan a standard filename pattern for student files. A password and drive number should also be added to complete each student's file specification.

Require students to follow the assigned pattern whenever they store a file. This prevents them from accidentally duplicating the name of a file that is already stored at the Host. Filename duplication causes an existing file to be erased and replaced by the new file.

Also, using a standard file specification pattern extends the usefulness of some operating system commands. Students can easily display a directory of their files only with the DIR command of the Network 3 Operating System (as shown on page 35). You can use LDOS commands at the Host to take care of the large number of files that are stored on the hard disk. For example, you can display and print a directory of files for one student, one class, or all classes that you teach. You can backup and delete groups of files with common filename elements in the same way. (These file maintenance procedures are described in the section beginning on page 125.)

Student Filenames

The eight-character filename and its three-character extension could include any combination of the following letters and numbers (as long as the first character of each part is a letter).

- The first letter of the teacher's surname.
- A number representing the class period.
- The student's initials or the first four or five letters of the student's surname. To ensure unique student filenames, watch for students with the same last name or common letters in their names. Assign an altered name element for their filenames, such as SMITH1, SMITH2, and SMITH3 for students Smith, Smith, and Smithfield.
- An initial representing the type of file (for example, A for ASCII, B for BASIC, C for assembly or command language, D for data, S for Scripsit, etc.).
- A number or letter representing the particular student file. Files could be kept distinct by following the sequence A, B, C or 1, 2, 3. Or, a letter and number combination could signify the assignment and the file(s) for that assignment.

Students should change only the last two items listed above when they create a new program or data file, or save a modified version of a program. The other items should remain the same for every file the student creates.

Here's an example of a filename that follows an assigned pattern, and an explanation of the information that each item represents:

J3THOMP/B09
abcccc dee

a = Teacher	Jackson
b = Class period	Period 3
c = Student name	THOMPson
d = File type	BASIC program
e = File indicator	Assignment, program, or version 09

If students will be programming in the PASCAL language, you might want to create a filename model without a filename extension. Then student files can automatically utilize the PASCAL default extensions /PCL and /OBJ. In this example, the pattern uses only seven of the eight characters available for a filename. You could include one character in the filename to specify the file number: J3THOMP9/PCL and J3THOMP9/OBJ, or J39THOMP/PCL and J39THOMP/OBJ. (A letter could be used instead of a number, depending on the number of files you allow each student to store at once.)

Student Passwords

You may also want to have your students include a password whenever they create a file. The password consists of a period followed by up to eight alphanumeric characters starting with a letter, included after the filename and before the drive specification. For example, J3THOMP/B09.HULAHOO, TEST3/CM5.A1, and J3MOORE/C11.NO2MUCH are valid password-protected filenames. If a student creates a file with a password, that password must be used each time the file is accessed. It serves as both an access and an update password, eliminating potential duplication of the student's filename on that disk.

Passwords can be assigned or student-created. **In any case, passwords should be written down and stored in a secure place.** Without the correct password, the file can't be accessed by you or the student who created it. (Student passwords won't interfere with file maintenance, however. You can still copy and remove password-protected files with the commands BACKUP and PURGE.)

Drive Specifications

Tell your students which hard disk and floppy disk drives are available for their use. Instruct them to include a drive number with their file requests in order to:

- Speed file access. When a drive is specified, the Host's operating system (LDOS) doesn't have to search each disk directory to find the filename.
- Avoid loading the wrong file (one with the same name but stored on a different drive).
- Store files on the correct hard disk or diskette.

PROTECTING COURSEWARE AND STUDENT FILES

When many users share a mass-storage device like a hard disk, the opportunity exists for files to be removed, read, and altered, either accidentally or intentionally. You can prevent such problems with a combination of the following techniques. The first eight are strongly recommended for all Network 3 applications.

- **Remove the power key** from the hard disk after start up. This locks the unit's power ON while your class uses the Network 3. If power is switched off during disk access, data can be lost and an open file can be destroyed.

Also, when the HOST program isn't running and you're not working at the Host under the Hard Disk Operating System, turn the hard disk's power off and remove the power key.

- **Assign a standard filename pattern** for students to follow. This reduces the chance that a student might accidentally duplicate the filename of an unprotected file stored at the Host, or that you might accidentally erase a file that used an unauthorized filename. (See page 117.)
- **Require passwords** to be added when students save their own programs or create data files. The password can be assigned to, or invented by, the student. It serves as both an access and an update password, eliminating potential duplication of the student's filename on that disk. **Passwords should be written down and stored in a secure place.** Without the correct password, the program or data file can't be accessed by you or the student who created it. (See page 118.)
- **Protect all courseware programs and data files** stored at the Host. Use the LDOS command ATTRIB, described on page 160, to provide these files with an update password and limit access to them at the READ level (read and execute only). Then students can run the assigned program without having to know an access password, but they can't change or remove the program (without the update password). Data files that will be written to by a program should be protected at the WRIT level (write, read, and execute) so they can be updated but not erased.

Note: READ is the highest protection level (the level permitting the least amount of access) that can be designated for files used with the Network 3 Operating System. If you use ATTRIB to set protection at the EXEC level (execute only), the Host can't send the program or data file to a Student Station.

To prevent students from loading or running a file, use the command ATTRIB to set or change an access password for the file. Then this password must be specified in order to gain any access to a file. **Be sure to write down all passwords and keep them in a secure place.** As an added precaution, don't use your passwords when anyone is watching.

- **Give sensitive files "invisible" status** so they can't be displayed at the Student Stations. Use the LDOS command ATTRIB, as described on page 160 to change the status of certain files from visible to invisible. For example, you should ATTRIB data files containing student records so that they are invisible. Then these files can't be displayed in a directory at a Student Station. (You can still view and print the entire directory of files stored on any hard or floppy disk from the Host, as described on page 170.)
- **Remove operating system files** from Student Station access, if you feel these programs could be misused by your students.

For example, the Network 3 Operating System command LIST can reveal a program's internal data and the passwords of files that it loads. LIST can even display the questions and answers of an AUTHOR I lesson file. The VIEW command, which displays the contents of the Student Station's memory, can be similarly used after a program has been loaded or completed. The LDOS file-editing utility FED (included with LDOS Version 5.1.4) can be used to modify the contents of disk files.

To remove these or other files from the Host, COPY each file to a diskette. Then PURGE the original files from the hard disk. Insert that diskette as needed. For example, insert a formatted diskette in Drive 4. At "LDOS Ready", enter the commands COPY LIST/CMD :4, COPY VIEW/CMD :4, and COPY FED/CMD :4. Then enter the command PURGE /CMD:0 (I). When each of these filenames appears, enter Y to remove the file from Drive 0.

- **Protect BASIC programs** by restricting them to a special "execute only" access (described below). This restriction protects a program in two ways.

First, the program will work only under the Network 3 Operating System. If it isn't used at a Network 3 Student Station, an error prohibits its execution.

Second, the program can only RUN. It will not LOAD. During program execution, the Student Station's user memory will be cleared if the BREAK key is pressed, if an untrapped error occurs, and if the commands END or STOP are encountered in the program. That means the program lines--and filenames of the programs or data files that it utilizes--can't be viewed or modified by any Network 3 user.

To protect a program in this form, you must first LOAD it under NBASIC. Then SAVE the program, adding the parameter "P" for "protect": SAVE"filename/ext",P. Remember that if you have previously protected the program by adding an update password to it with ATTRIB, you must include that update password: SAVE"filename/ext.password",P.

While the program is loaded at your Student Station, you might want to save an unrestricted version. Save the program onto a diskette without the ",P", or save it with an access password. Then you'll have a copy that you can list and edit.

Note: ",P" can't be included with the ",A" option to protect a program stored in ASCII format. Also, please note that ",P" isn't explained with the SAVE command in the NBASIC reference section. Apply this option at your discretion to protect "permanent" programs like courseware and network utilities, not student programs and those that frequently change.

- **"Lock" the Hard Disk Operating System** from unauthorized use of the its master system password. In order to manipulate groups of files, LDOS utilizes a system password that overrides all file passwords. If students know this password, every file at the Host is in jeopardy. Simple commands from a Student Station could erase or read data files, modify courseware and student programs, even destroy the HOST program and LDOS system files.

If you think that students might know and misuse the LDOS system password, "lock" the system by changing its password. At "LDOS Ready", insert the backup copy of the Operating Software Diskette in Drive 4. Enter the command **DO LOCK**. You can "unlock" the system, returning the password to normal so that you can use LDOS commands like BACKUP. At "LDOS Ready", insert the backup copy of the Operating Software Diskette in Drive 4. Enter the command **DO UNLOCK**.

- **Use data diskettes** to store sensitive files. Then you can remove a diskette from the network system and store it in a safe place. When you need a program or data file, insert the proper diskette into a floppy disk drive at the Host and access it from a Student Station. (To make an LDOS-format data diskette, follow the instructions on page 173.)
- **Write protect disk drives** to prohibit modification of all files stored on those drives. Then no one can add to, delete, or change the contents of any disk in a write-protected drive (whether hard disk or floppy diskette). For example, you could store courseware on Drives 1, 2 and 3, then write protect those drives. This leaves Drive 0 (and other disk drives) accessible for storage of student files and those courseware data files that must be updated.

To write protect a disk drive, use the LDOS command SYSTEM at the Host before loading the HOST program. At "LDOS Ready", enter the command **SYSTEM (DRIVE=d,WP=ON)** to write protect the files on drive number d. You must specify one drive at a time, or all drives in the system by entering the command **SYSTEM (WP=ON)**. (The entire contents of a hard disk unit can also be write protected by using the PROTECT switch, as described later.) Repeat the command to write protect several drives.

To switch off a drive's write protection, change ON to OFF. At "LDOS Ready", enter the command **SYSTEM (DRIVE=d,WP=OFF)** to restore full access to the files on Drive d. You must specify one drive at a time, or all drives in the system by entering the command **SYSTEM (WP=OFF)**.

- **Write protect a disk itself** instead of the drive where the disk is located (as described above). To write protect a diskette that you insert in one of the floppy disk drives at the Host, cover the diskette's write protect notch with a tab or piece of tape. All disks in a hard disk unit can be similarly protected by means of the PROTECT button.

When the Host displays "LDOS Ready", press the red PROTECT button on the front of the hard disk unit. While the PROTECT button is illuminated, no one can add to, delete, or change the contents of that hard disk's drives. To un-protect a hard disk unit, press the red PROTECT button when the Host displays "LDOS Ready".

Press the red PROTECT button only when the unit is not in use (when the Host is at "LDOS Ready"), or data may be lost or destroyed.

Pressing the PROTECT button on the network's hard disk is a convenient way to force storage of all student-created files onto a class floppy diskette. You must prepare an LDOS-format diskette and have it available in one of the Host's floppy disk drives when students create files or use a program with a student records feature.

- **Prohibit access to a hard disk drive** so that its files can't be accessed at all from the Student Stations. For example, if you have reserved Drive 3 for storage of administrative files, then you would want to disable that drive while students are using the Network 3. To the Student Stations, Drive 3 would simply not exist. Drives 0, 1 and 2 would still be available for network access.

To temporarily disable one or more hard disk drives, use the SYSTEM command under LDOS before loading the HOST program. When you see the prompt "LDOS Ready", enter the command **SYSTEM (DRIVE=d,DISABLE)** to lock out access to drive number d. Once disabled, any attempt to access that drive will return an error message (such as "NOT AVAILABLE" after an attempt to display the drive's directory at a Student Station, or "File not found" after an attempt to access a file stored on the drive.)

To restore access to a drive, change DISABLE to ENABLE. At "LDOS Ready", enter the command **SYSTEM (DRIVE=d,ENABLE)** to restore access to Drive d. Or, at "LDOS Ready," insert the Start-up Diskette and press and release the orange Reset button. The system will return to the previous configuration.

This command can also disable any floppy disk drives that were assigned during hard disk initialization. However, it's easier to prevent access to a floppy disk drive by just opening the drive door when the red access light is off.

- **Automatically configure the Host** for each class. After you decide on an appropriate combination of SYSTEM commands to write protect and disable the Host's disk drives, save that particular configuration on a Start-up Diskette. Then you won't have to enter those commands before the class begins. Just insert the Start-up Diskette for that class in Drive 4 and press the orange Reset button to establish the right protection.

To modify a Start-up Diskette for a particular system configuration:

1. At "**LDOS Ready**", insert a backup copy of the hard disk system's Start-up Diskette in Drive 4. Press and release the orange Reset button. (For instructions on how to make a backup Start-up Diskette, see page 202.)

Note: Only modify a backup copy of the Start-up Diskette. Store the master Start-up Diskette (the diskette produced for your Host hard-disk system when the hard disk was initialized) and one backup copy in a safe place.

2. Enter the appropriate commands (described previously) to write protect or disable the Host's disk drives (except Drive 0). You can write-protect Drive 0 as described on page 124; Drive 0 cannot be disabled.

You can also enter the commands at this time to create a "printer filter." This LDOS feature, described on page 176, formats data sent to the network's printer to control lines per page, characters per line, etc. (Note: Don't use the INDENT or MARGIN parameters with the printer filter. These parameters adversely affect the spooler for the Network 3 Operating System.)

3. Enter the command **SYSTEM (SYSGEN)**. This stores the commands you specified in Step 2 in the LDOS system configuration file named CONFIG/SYS. This file is located on hard disk Drive 0 with other LDOS system files.
4. Move the new configuration file to the Start-up Diskette in Drive 4. Enter the command **BACKUP CONFIG/SYS:0 :4**.
5. Make a backup copy of this modified Start-up Diskette.
6. **Label** both modified Start-up Diskettes. Store one in a safe place. Use the other as a working copy. Whenever you start up or reset the Host with this Start-up Diskette in the Host's bottom floppy disk drive, the configuration you specified will go into effect.

You might want to repeat this procedure to create a Start-up Diskette for each class that will use the Network 3 system. You can create Start-up Diskettes that will configure the Host's disk storage differently for each group of network users, to protect those files that aren't needed by a class.

If you want to write-protect Drive 0, follow this procedure after you modify the Start-up Diskette:

1. At "LDOS Ready", insert the modified Start-up Diskette into the Host's bottom floppy disk drive.
2. Hold down the [CLEAR] key while you press and release the orange Reset button. The Host will start up as a floppy disk system.
3. At "LDOS Ready", type `AUTO SYSTEM (DRIVE=0,WP=ON)` and press [ENTER].
4. When "LDOS Ready" reappears, remove the modified Start-up Diskette. Insert your normal Start-up Diskette into the bottom floppy disk drive. Press and release the orange Reset button to start up the Host as a hard disk system.

The modified Start-up Diskette will automatically write protect hard disk Drive 0 when it is used to start up the Host.

Here's an example showing how you can use modified Start-up Diskettes with the Network 3. You would reset the Host with the Start-up Diskette for Period 3 before those students begin using the network. Then they would have read-only access to Drive 0 (a write-protected drive containing the Network 3 Operating Software, general courseware, etc.) and full access to Drive 2 (the drive reserved for their files and their specific courseware). Drives 1 and 3 would be disabled, so they would have no access to any files stored there. All programs and data files stored by these students will be contained automatically on their drive, Drive 2 (unless they specify one of the floppy disk drives with their file specification). Before the students arrive for the next class, you would reset the Host with the Period 4 Start-up Diskette.

Note: Whenever you need unrestricted access to the hard and floppy disk drives, you must either reset the Host with a copy of the original Start-up Diskette or enter the necessary SYSTEM commands under "LDOS Ready". The LDOS command DEVICE, briefly explained on page 168, will show you the current system configuration. For more information on the DEVICE and SYSTEM commands, refer to the Hard Disk Operating System Reference Manual.

MAINTAINING FILES ON THE HARD DISK

File maintenance simply means taking care of the files stored on your network's hard disk. This involves carefully planning and monitoring your use of the Network 3, making backup copies of frequently-updated files, and removing unwanted files when disk space is limited. These suggestions, like all others presented in this section, are entirely dependent upon your use of the Network 3 system: the number and type of classes operating the network, the number and size of files created by students, etc.

Consider the following when planning your use of the hard-disk-equipped Network 3:

- Establish one person as the hard disk's "librarian." The librarian will be responsible for performing the file maintenance procedures on a regular schedule. To have full access to all files stored on the hard disk system, the librarian must be equipped with the following items: a backup copy of the original Start-up Diskette; the master password that was assigned to the hard disks at initialization; and a backup copy of the Network 3 Operating Software Diskette, if the Hard Disk Operating System is "locked" to prevent misuse of the LDOS system password. (See page 121.)
- Develop a standard filename pattern for files that students will store on the network's hard disk. (See page 117 for suggestions.) Require every student to follow this pattern so that you, other teachers, and the librarian can quickly differentiate student files from other files. You can enforce this rule by periodically removing all files that don't match the pattern and aren't listed on your master file directory.
- Maintain a master directory of all the files stored on the hard disk. Start by printing a directory of each hard disk at the beginning of the month, semester, or year, depending on your use of the hard disk. The command `DIR (A,I,S,P)` prints a complete directory of all files on all disks present in the system.

Annotate this list for quick reference. For example, beside all courseware filenames, write the name of the package, the publisher, and a brief label describing the file's purpose. Beside utility programs for student and teacher use, describe the program's function and list the name of the teacher who added the file.

- Restrict student file storage on the hard disk. Determine a maximum number of files allowed per student (overall, or within each class). The number of files will be more crucial than their actual size, since the number of file entries per disk directory is limited. The maximum number of user files is fixed at 240 per hard disk and 112 per floppy diskette. When the directory fills, the disk is considered full, no matter how much storage space is still unused. In most cases, the directory will fill long before the free disk storage space is used.

- Protect courseware and student files stored on the hard disk (as described in the section beginning on page 119).

Despite the safety of hard disk file storage, accidents and hardware failure can still occur. The following suggestions can help you plan how to guard against losing files that are important to you and your students.

- Make backup copies. The common rule for file insurance is "make a copy of everything you don't want to lose." For some classes it may be desirable to regularly copy the entire contents of a hard disk drive to floppy diskettes. This can be done by you or by the hard disk librarian with the LDOS utility BACKUP (as described on page 163).

In many cases you can compromise by regularly copying only those student-created programs and data files, class records, and other files that are updated frequently. BACKUP allows you to quickly copy large numbers of files with common filename characters to a floppy diskette. It can copy those files that have been modified since the last backup. It can also copy only those files that were last modified on a specific date or within a range of dates. (See page 164 for examples.)

The contents of certain data files can be preserved in other ways. Programs that record student scores usually enable such data to be printed. Or, these files can be stored on your own data diskettes instead of the hard disk (as described on page 115). Those relatively "permanent" files stored on the hard disk might not need to be copied at all. In most cases, courseware and other files have been converted from floppy diskettes to one of the hard disk drives. As long as you store those diskettes in a safe place, you can consider them your backup copies.

- No matter what files you decide to duplicate, establish a regular schedule for making backup copies. Backups could be made daily or weekly, depending on the importance of the files and the frequency of their modification.
- Perform a full backup of your hard disk every week, month, or semester, depending on the amount of use. Having a backup of all hard disk drives lets you quickly reconstruct the hard disk in case the unit must be repaired or reinitialized. (Both events involve formatting, which erases all data stored on the hard disks.)

You can reverse the BACKUP command to copy files from the floppy diskettes back to hard disk drives. Also, if your hard disk is unavailable for some reason, you can continue to use the Network 3 by operating it as a floppy disk system (as described on page 116).

Although file storage on a hard disk unit seems endless, the hard disks can quickly fill to capacity. Adding a second hard disk unit will not improve file storage capability. You must monitor each disk regularly and remove files when necessary.

- Use the LDOS command FREE (described on page 174) to display how many directory entries remain for each hard disk and how much free space remains on the disk itself. If a disk's **directory** fills to capacity, it won't accept another filename entry. If a disk's **space** fills to capacity, it won't accept any more data. Both conditions will generate a "disk full" error, prohibiting storage of any more data on that disk. Maximum number of user file entries is 240 per hard disk, 112 per floppy diskette. Maximum disk storage is 1.25 or 2.5 megabytes per hard disk. In most cases, the directory will fill long before disk storage space is used.

Monitor free space regularly: check it every day, week, or month, depending on the amount of hard disk use.

- When a disk approaches its capacity for files and storage space, remove unwanted files with the LDOS command PURGE (described on page 178). PURGE allows controlled removal of multiple files, even if they are password protected. You can quickly erase many files with common filename characters, as well as those files that were last modified on a specific date or within a range of dates. Also, unneeded Network 3 Operating Software and LDOS files can be removed from Drive 0. (See page 204 for necessary Network 3 files, and page 1-17 of the Hard Disk Operating System manual for system files.)
- Remove unwanted files regularly: purge the hard disks every day, week, or month, depending on the amount of use.

After a class completes a lesson, you could purge an entire set of files (the group or individual data files created by the courseware, or experimental programs saved by the students). A printed directory for all visible files stored on each hard disk drive will help you decide which files to purge and which files to keep. For example, you could remove all student files that haven't been modified since the date of the last purge, the oldest file(s) for any student who exceeds the storage limit, every student file with a specific program number in its filename, etc.

- After the end of a semester, you might want to purge all non-system files from your hard disk drives. Then you would copy the desired "permanent" files (courseware, utility programs, and related data files) to the hard disk from your backup floppy diskettes. This maintenance procedure protects large files from too much "segmentation," which results when one file is extended to several storage locations on a disk.

PROGRAMMING FOR NETWORK 3 COMPATIBILITY

The following programming techniques minimize the interference that can occur when several Student Stations share one Host printer and disk system. If you want to write a program that is compatible with the Network 3 Operating System, incorporate these suggestions. Or, to modify a program to make it compatible with Network 3, check the program's use of these techniques.

Disk Access

- When you OPEN a file, remember to CLOSE it. The Host must receive a command to close all open files before it can continue to the next Student Station's request.
- CLOSE your files as soon as possible to keep access time short. Nothing should be done between opening and closing a file except output to disk or input from disk. Don't leave a file open while printing data, waiting for user input, or performing long calculations.
- As much as possible, every student should create his or her own data files and use them exclusively.
- If your program requires several Student Stations to read and write to one data file, then you should prevent access to this file while one Student Station is searching, sorting, or updating it. For example, an "access flag" can be managed by your program to restrict access to the entire file or certain records in it.
- When using sequential files, don't use the LOF or LOC functions. Instead, use EOF or create a record that contains the number of records in the file. Use this value and FOR-NEXT to input data until the end of the file, or trap the EOF error.
- The "execute only" level of file access can't be applied to any file used with the Network 3 Operating System. (This restriction prohibits the HOST program from sending the file to a Student Station.) The lowest level of file access allowed is READ--"read and execute."
- When TRSDOS files are converted to LDOS, the utility CONV removes all passwords. That means a program won't run if it contains LOAD, RUN, and OPEN commands that specify password-protected modules or data files. To replace your TRSDOS program's necessary passwords, use the LDOS command ATTRIB at the Host (as described on page 160).

Printing Techniques

- Print an entire document or at least a full page at one time to avoid having another Student Station print its job between parts of your program's document. You could store the print output data in an array until all data is ready to print.

- Keep your loops to output print data as short as possible.
- If the printer paper is vertically aligned (rolled so that the printer head is at the top of the page) at the beginning of class, you can use the formfeed command CHR\$(12) before an LPRINT to print your document on a clean page.
- CMD"P" is an accurate test for presence or readiness of a local printer only. The PEEK for printer status that works with Model III ROM BASIC at an independent computer doesn't work with Network 3 BASIC.
- If you want to send print output to a "local printer", execute CMD"H","OFF". Before ending the program, execute CMD"H","ON" to route print output back to the network's printer.

Miscellaneous Suggestions

- Use only the commands listed in this manual and in the TRS-80 Model III/4 Operation and BASIC Language Reference Manual.

These commands **do not work** under the Network 3 Operating System and NBASIC:

SYSTEM command under NBASIC

POKE 16526-16527 to store entry address for a USR call

POKE 16928 to identify \$ROUTE destination device

POKE 16930 to identify \$ROUTE source device

USR call to address 108 to activate \$ROUTE request

\$PRSTAT check for printer status

\$RSRCV, \$RSINIT, and \$RSTX control of RS-232 port

- When programming for network use, remember that conditions set by a previous program may still be in effect when your program is loaded. Neither RUN nor NEW can solve any of the following problems.

Establish conditions you want at the beginning of your program. Besides enabling or disabling the BREAK key, your program should POKE any desired values into memory to select character input (caps only or upper and lower case), define the cursor, and set video display scroll protection. The Student Station's character set mode (character, alternate character, or space compression) should be identified and switched accordingly. For example, these three command lines reset conditions in effect at the Student Station that might disrupt a new program.

```

11 CMD"B","ON": CMD"R": CMD"H","ON": CLEAR 50: POKE 16409,1:
   POKE 16412,0: POKE 16419,176: POKE 16913,1: POKE 16916,0
12 PRINT CHR$(23);: PRINT@1, CHR$(200);: IF PEEK(15361)=200 PRINT
   CHR$(21);: GOTO12
13 IF (PEEK(16912) AND 8) <>8 THEN PRINT CHR$(22): GOTO 13
14 PRINT CHR$(28);

```

See MERGE, page 73, for a sample use for lines like these.

Before ending your program, re-establish the default conditions of NBASIC and Network 3 Operating System (enable the BREAK key, route printer output to the Host, etc.).

- Assembly-language programs are executed from the Network 3 Operating System prompt of the Student Station. They should terminate at hexadecimal address X'402D', not X'0000', to avoid erasing the STUDENT program in the Student Station.
- When a computer is operating as a Student Station under the Network 3 Operating System, memory location 17408 (X'4400' hexadecimal) contains value 195. If you PEEK for this value when setting up execution choices, your program can run differently on independent and Student Station computers.

For example, you should display a "Please Wait" message on the screen of a Student Station while it is accessing--or waiting to access--files at the Host. Your program won't use this routine when it runs on an independent computer, because the user will know when access occurs (the drive access light and the disk drive motor provide this feedback). You can also PEEK for this value to prevent certain routines from being used at a Student Station.

- You can control a real-time clock display in the top right corner of the Student Station screen with two BASIC command lines. When the clock is on, the 24-hour time will be displayed and updated once each second.

POKE 16912, PEEK (16912) OR 1 Turn on clock display.

POKE 16912, PEEK (16912) AND 254 Turn off clock display.

Since no date and time input is required to start up a Student Station computer, the current time must be set by means of the utility DATETIME/SET or similar commands in your program. (Load and list DATETIME/SET to see how this is done. You may even want to add this utility to your own program.)

Note: CMD"T" causes the Student Station's clock to stop incrementing. (See CMD"T" and CMD"R" on page 61.)

- You can control the operating speed of a Model 4 Student Station with two BASIC commands. The first command line sets the Model 4 Student Station at four MHz, twice the speed of its operation in the Model III mode (its normal mode under the Network 3 Operating System). The second command line returns the Model 4 to operation at two MHz. (These commands have no effect on Model III computers.)

POKE 16912, PEEK (16912) OR 64: OUT 236, PEEK (16912) 4 MHz

POKE 16912, PEEK (16912) AND 191: OUT 236, PEEK (16912) 2 MHz

Keep in mind that the faster calculating and video display capability also speeds up time delay loops and the real-time clock. If you choose to use the high speed mode, return to normal speed for INPUT from the keyboard.

Warning: Operating an independent Model 4 at high speed under TRSDOS 1.3 or LDOS can cause disk I/O errors and data loss.

USING A NETWORK 2 CONTROLLER WITH THE NETWORK 3 SYSTEM

You can add a Network 2 Controller to the Network 3 system for loading BASIC programs and for loading the Student Station software (as described on page 184). The Network 2 Controller (Cat. No. 26-1211) can be used for other purposes, but this section will describe how you can load a BASIC program into all or selected Network 3 Student Stations.

Please note that the Network 2 loading procedure requires your involvement and supervision, and the cooperation of your students. A Network 2 is most helpful in a classroom setting where time is limited and several students need the same program at the same time (as opposed to a resource room, where students run different programs on the Network 3 at their own pace).

The Network 2 Controller simultaneously transmits one program from a Host computer to as many as 16 Student Station computers. The Network 2 uses cables that attach to each computer's cassette port (the round socket on the back of a Model 4 or Model III). Therefore, Network 2 cables don't interfere with the Network 3's RS-232C cable connections. (These cassette cables are included with the Network 2 Controller.)

The following instructions assume that the Network 3 system is already in operation. The Host should display the network status screen, and all participating Student Station computers should show the "**Network 3**" prompt of the Network 3 Operating System.

1. Set up the Network 2 according to the instructions in the manual for the Network 2 Controller. A cable should run from each Student Station's cassette port to the Network 2 Controller.
2. Connect one Student Station's cassette cable to the plug marked CPU on the back of the Network 2 Controller. **This Student Station is now the Host computer for the Network 2.** (Use the shortest possible cassette cable to connect the Student Station to the Network 2 Controller.)

At the Network 2 Controller:

3. Turn the POWER switch ON.
4. Set the MODE switch to MPLX.
5. Set the BAUD RATE switch to 1500.

At the Network 2 Host:

6. At the prompt "**Network 3**", load Network 3 BASIC. Refer to the loading instructions for the program that you want your class to run. If the program needs more than three files or requires user memory to be protected, you must include these instructions in the NBASIC load command (as described on page 55). For example, enter the command NBASIC -M:63000 to load Network 3 BASIC and set an upper limit of memory available to the program at RAM address 63000.

7. When you see the NBASIC prompt "Ready >", load the desired program. For example, you would enter the command LOAD "MAILBOX" to load the MAILBOX program into the computer.

At each participating Student Station:

8. Instruct the students to load Network 3 BASIC. Be sure to explain any special instructions for files and memory protection.
9. When the NBASIC prompt "Ready >" appears, they should type CLOAD and press [ENTER].

The red lights on the Network 2 Controller that correspond to the Student Stations that are ready for the transfer should now be lit.

At the Network 2 Host:

10. At the "Ready >" prompt, type CSAVE"A" (or type the program's filename instead of A) and press [ENTER].

The program you loaded into the Network 2 Host's memory will now load into the participating Student Stations. Two asterisks (**) will appear in the upper right corner of each Student Station screen. The right asterisk will blink.

At each participating Student Station:

11. When the "Ready >" prompt appears, the students should type RUN and press [ENTER].

The program loaded by you and your students will now run under NBASIC and the Network 3 Operating System. If the program requires any file data when it begins execution, its file(s) will load from the Network 3 Host into each Student Station.

If the program didn't begin running at a Student Station, check to see if a "D" or "C" or "BK" is displayed in the upper right corner of a Student Station's screen. If so, reload the program to that Student Station by repeating from Step 9 above.

At the Network 2 Host:

12. When all stations have successfully loaded the program, you can type RUN and press [ENTER] to start the program at this computer. (This Network 3 Student Station is no longer required as a Network 2 Host.)

Note: The Network 2 Controller will not work with Model 4 computers whose processors are operating at increased clock speed (4MHz).

TROUBLESHOOTING THE NETWORK 3 SYSTEM

The Network 3 Model III Hard Disk Operating Software was designed and tested to provide you with trouble-free operation. If you do experience problems, there is a good chance that you can solve them with the help of the troubleshooting guide below. These procedures will help you find the cause of your network difficulties, so that you can refer to the specific Network 3 problems and solutions that follow.

Before proceeding, make sure that your network problem isn't caused by one of the circumstances described in *Overcoming Network Interruptions* on page 108. Follow suggestions on that page to overcome "lock ups" of the Host and one Student Station that can interrupt normal operation of the Network 3 Operating System.

TROUBLESHOOTING GUIDELINE

Step 1: Check the Manual

Always check the available instructions to eliminate problems caused by the network's users. Then you can start looking for problems involving the Network 3 hardware and software.

- If you can't get the Network 3 system to work, refer to the first section of this manual. Follow the steps beginning on page 8 to start up the Network 3 system, then continue the demonstration of the network by loading and running the MAILBOX program. If you can't load the Host or Student Station software, or run the MAILBOX demonstration, make sure that all steps have been followed to set up the Network 3 system for the first time (as outlined on page 7).

- If you encounter any error messages, look them up.

For errors that occur at the Host computer under LDOS, refer to the *Hard Disk Operating System Reference Manual* (page 6-66).

Refer to this manual for errors that occur at a Student Station under the Network 3 Operating System (page 51) and NBASIC (page 101).

- If you have trouble using any command or procedure of the Network 3 Operating Software, look it up in the Index beginning on page 205 of this manual. If the feature is listed, refer to the appropriate page(s) for complete information. When you find the explanation of an available command or feature:
 1. Carefully check syntax and spelling.
 2. Check the order in which you enter commands.
 3. Review all notes and special instructions.
 4. Verify your understanding of the purpose of the feature.

If the feature is NOT listed in this manual's index, check the Model III/4 Operation and BASIC Language Reference Manual for an explanation. Almost every routine, command, statement, and function of Model III non-disk BASIC is incorporated in the Network 3 Operating System and NBASIC. (The few exceptions are noted on page 129 of this manual.)

If the feature is not explained in this manual or the Model III/4 Operation and BASIC Language Reference Manual, it isn't available under the Network 3 Operating System.

- If you have trouble running a new program under the Network 3 Operating System and NBASIC, refer to page 17 of this manual. Check the procedure beginning on that page for adding new courseware to the Network 3. Remember, the program might NOT be fully compatible with the Network 3 Operating System. Contact the publisher that supplied the program for more information. (For a list of Radio Shack's network-compatible programs, see Appendix II of this manual.)

Step 2: Try Again

After referring to the appropriate instructions or explanations, repeat the troublesome procedure.

If the problem still exists, perhaps the HOST or STUDENT programs didn't load properly. Try exiting and reloading the Network 3 Operating System at ALL affected or idle computers:

1. Exit the Network 3 Operating System at the Student Stations as described on page 15.
2. Exit the HOST program as described on page 16. At "LDOS Ready", remove all diskettes.
3. Turn off the power to all computers for 15 seconds.
4. Start up the Network 3 system as described on page 8.
5. Repeat the procedure.

If the problem recurs, one file of the Network 3 Operating Software might be damaged or missing. Use the procedure for transferring the Network 3 Operating Software from diskette to hard disk to replace the necessary files.

1. Exit the HOST program as described on page 16.
2. Repeat the transfer procedure in Appendix V, page 203.
3. Reload the HOST program as described on page 9.
4. Repeat the troublesome procedure.

If the problem persists, take note of the steps and condition(s) required to produce the problem.

Step 3: Evaluate the Conditions

At this point, you know how to reproduce the problem. Examine the conditions at the Host, the Student Station(s), and in between, and ask yourself these questions:

- If a procedure won't work at all, is some element missing, or some condition not present? For example, check to see if the right files and disk drives are available.
- If it worked before, what has changed since then? For example, check all cables and cable connections, power cords, and mode switches.

The Network 3 system is sensitive to some conditions that never affect the operation of an independent computer. By evaluating the situation in this way, you narrow the general problem to more specific possible causes that can be checked in the next step.

When seemingly random events cause trouble with your Network 3 system, start a network logbook to help you track these problems. Maintain a daily log of the problems, the time they occur, and the conditions under which they occur. Review this log every week for patterns or conditions that will help you isolate the cause of the problem.

Step 4: Check Network 3 Problems and Solutions

Find your Network 3 situation in the chart that follows this troubleshooting guide (beginning on page 137). Check the solutions listed for the problem(s) that possibly cause that situation. But keep in mind that several problems may occur at one time, so you may have to repeat the troubleshooting steps to overcome your network difficulty.

Step 5: Refer the Problem to Radio Shack

If you cannot solve your Network 3 problem after referring to the "Network 3 Problems and Solutions" guide beginning on page 137, and you need further assistance, call the appropriate Computer Customer Service group between 8 a.m. and 5 p.m. Central Time.

For questions regarding the Network 3 system and the Network 3 Operating Software, call Educational Software at (800) 433-5682. In Texas call (800) 772-8538.

For questions regarding LDOS, the Hard Disk Operating System, call Operating Systems and Languages Group 1 at (817) 338-2392.

In order to make efficient use of this service, please follow these guidelines when you call:

- If you're the one who has experienced the problem and performed the troubleshooting, then you should be the one who calls for assistance.

- Have your notes in hand when you call. The more detailed the notes, the better. Be ready to describe your operating system, hardware and software, and the solutions that you have tried. If possible, call from the room where the Network 3 is located.
- Name the operating system you're using and the specific version. The LDOS version number is displayed in the top right corner of the screen when you power up or reset the Host computer (for example, "Ver 513/R" or "Ver 5.1.4"). The version of Network 3 Operating System is displayed at the top of the screen when the HOST, STUDENT, and DSTUDENT programs are loaded (for example, "Ver 2.1.4").
- Name the command, feature, or procedure you're using, or name the program you're using under the Network 3 Operating System.
- Specify that your Network 3 system is equipped with a hard disk.
- Describe the equipment involved: the model and catalog number of the computer(s) (printed on the bottom of each computer); the memory size and number of disk drives in the computer(s); the model of printer, and where it is connected; and any information you have on past servicing or upgrading of the equipment involved.
- When you explain your problem, describe the condition or steps that led to your problem and all messages and screen displays associated with it. Note which solutions you have applied to try to overcome the problem. If you've called about a problem that has recurred, mention this and explain what instructions you were given.

NETWORK 3 PROBLEMS AND SOLUTIONS

Refer to the following charts only after completing Steps 1 to 3 of the troubleshooting guide. These charts are arranged in the following general categories:

Startup Problems.....	137
Operation Problems.....	146
Printing/Spooling Problems.....	155

Under the proper category, find the heading that describes your general Network 3 situation. Beneath this heading you'll find some specific problems that could cause this situation. For each appropriate problem, try the suggested solution(s) or sequence.

If you can't solve your Network 3 problem with these charts and the help of your local Radio Shack Service Center (RSSC), go to Step 5 of the troubleshooting guide (page 135).

Startup Problems

Situation: Host computer won't start up correctly.

Possible problem	Solutions
No power to computer	<ul style="list-style-type: none">● Check the On/Off switch under the right side of the keyboard. (When the switch is On, the side closest to the front of the computer will be pushed in.)● Press the orange Reset button. If the red light and drive motor for the bottom disk drive don't come on, make sure the power cord is plugged into a grounded outlet.● Make sure the extension cord or power strip is plugged into a grounded outlet.● Check for an on/off switch in the extension cord or power strip.● Check for a switch or circuit breaker controlling the room's electric outlets.● Try powering up the computer in different rooms.<ul style="list-style-type: none">● If it starts in another room, have an electrician check the grounding of the power source for the original room.● If it won't start in any other location, have the computer checked by RSSC.
No screen display	<ul style="list-style-type: none">● If the computer is already in use, press [BREAK] or press [SHIFT] [BREAK] to exit a program or procedure the computer may be trying to execute. "LDOS Ready" should appear.● Check the power source for the computer.● Insert a Startup Diskette in the bottom disk drive with the label facing up, and close the door. Press and release the orange Reset button.

Can't get to "LDOS
Ready" prompt

- If the screen is still blank and dark, adjust the Brightness and Contrast controls under the left side of the video display.
- If nothing appears on the screen when you power up using the Startup Diskette or any other system diskette in the bottom disk drive, have the computer checked by RSSC.
- If the computer is already in use, press [BREAK] or press [SHIFT] [BREAK] to exit a program or procedure the computer may be trying to execute.
- If the date prompt won't appear on the LDOS startup screen, remove all diskettes and turn the computer off. Make sure the hard disk expansion cable is properly connected to the computer and hard disk. (See Chapter Two of the Hard Disk System Start-up Manual for complete instructions.)
- If the date you enter after the startup prompt "DATE ?" isn't accepted:
 - Enter the date using two digits each for month, day, and year. (For January 23, 1985 you would type 01/23/85).
 - Make sure you're not typing the letter keys O and L for the numbers "0" and "1".
 - Enter a date that's within the range 01/01/80 to 12/31/87.
- If you see the message "HD" in the top right corner of the startup screen, remove all diskettes and turn the computer off.
 - Make sure the expansion cable is securely connected to the computer and hard disk.
 - Make sure the hard disk has power and is turned on. (The key will be horizontal).

HOST program won't load

- At "LDOS Ready", enter the command DEVICE to display a list of the available disk drives. (For more information, see page 168 or refer to the Hard Disk Operating System Reference Manual.) If only floppy disk drives 0-3 are available, then reset the computer with a copy of the original Startup Diskette. Be sure you don't press the CLEAR key during startup.
- At "LDOS Ready", enter the command DIR HOST (I) to search the directories of all available disk drives for the HOST program. If the filename HOST appears more than once, load the file listed HOST/CMD by including its drive specification (for example, HOST:4).
- If ALL drives are available and the filename HOST/CMD doesn't appear on any directory, then repeat the transfer of the Operating Software to the hard disk (as described on page 203).

- If all drives are NOT available and the filename HOST/CMD doesn't appear on any directory, then restart the Host with a copy of the original Start-up Diskette.
- If the HOST program won't accept the baud rate you try to enter, refer to page 107. Only the baud rates listed on that page are supported for use by the Network 3 system.
- If errors continue to occur when you load HOST, or if the Host display doesn't look like the screen shown on page 9, then the file HOST/CMD may be damaged. Repeat the transfer of the Operating Software to the hard disk (as described on page 203).

Situation: Student Station operating software won't load from Host.

Possible problem

Solutions

Student Station not ready to load from Host

- If the computer is being used independent of the Network 3 system, press and release the orange Reset button. The prompt "Cass?" of Model III ROM BASIC will appear. (If the computer is equipped with a disk drive, hold down the BREAK key while you press and release the orange Reset button.)
- If the prompt "Cass?" doesn't appear, make sure the computer is on. (When the switch is On, the side closest to the front of the computer will be pushed in.)
- If the computer is switched on and the screen is blank and dark, adjust the Brightness and Contrast controls under the left side of the video display.
- If the computer is switched on and the screen is still blank and dark, check the power source for the computer.
- Power up the computer in different rooms:
 - If it starts in another room, have an electrician check the grounding of the power source for the original room.
 - If it won't start in any other location, have the computer checked by RSSC.

Student Station not sending load request

- The Student Station computer must be connected by RS-232C cable to a port on the back of the Network 3 Controller. Make sure both connections are secure by using the screws provided with the cable.
- Be sure you're typing the correct ROM entry address for your computer model:
Model 4 = /12363 Model III = /12327
- Don't press the orange Reset button at the Student Station after entering the load command. Allow enough time for the Host to establish contact with the Student Station. (See page 108 to overcome data transfer interruptions.)

Computer not equipped
to send load request

The computer you want to use as a Student Station might not be equipped with the ROM for Host loading. Check the catalog number (printed on the bottom of the computer):

- Student Station computers (Model 4 Cat. No. 26-1059 and Model III Cat. No. 26-1060) ARE equipped with this ROM. Try all solutions for this situation. If the computer still can't load the Student Station operating software from the Host, have the unit's ROM checked by the RSSC.
- Some disk-equipped Model 4s (Cat. Nos. 26-1069, 26-1068) and many disk-equipped Model IIIs (Cat Nos. 26-1066, 26-1065) ARE NOT equipped with the Network 3 ROM. Load using the DSTUDENT Diskette, or else try all solutions for this situation. If the computer is unable to load the Student Station operating software from the Host, you might choose to have a new ROM installed by the RSSC.
- Cassette computers (Model 4 Cat. No. 26-1067 and Model III Cat. No. 26-1062) that have been upgraded for Network 3 use should contain the correct ROM. Check the computer's service log or contact the RSSC that performed the upgrade. Load these computers using cassette tape or Network 2. Or, you might choose to have a new ROM installed by the RSSC.

Host computer not ready
to receive requests

- The Host computer must be connected by RS-232C cable to the port labeled CENTRAL on the back of the Network 3 Controller. Make sure both connections are secure by using the screws provided with the cable.
- If the Host computer doesn't display the Network 3 status screen (like the one shown on page 9), then load the HOST program.
- Make sure the Host computer isn't "locked on" to one Student Station, as described on page 108.
- The Host MUST be set at 9600 baud, the normal Network 3 data transfer rate, to receive a Student Station's initial load request and send the operating software. When no Student Station numbers appear on the Host's status screen, exit the HOST program to be sure the computer is set at 9600 baud. Reload HOST, and press [ENTER] when the prompt "Baud rate ?" appears.
- Check to see if the LDOS spooler is active. Exit the HOST program. At "LDOS Ready", enter the command DEVICE. If "Spool" is listed beside "Options:", you must turn this function off. At "LDOS Ready", enter the command SPOOL *PR (OFF). Then reload the HOST program.

- At the Host computer under "LDOS Ready", enter the commands DIR STUDENT (I) and then DIR RBOOT (I) to search the directories of all available disks for these programs. If ALL drives are enabled and the filenames STUDENT/CMD, RBOOT1/CIM, and RBOOT2/CIM don't appear on any directory, repeat the transfer of the Operating Software to the hard disk (as described on page 203).

Network 3 Controller
not ready

- If the POWER button on the front of the Network 3 Controller isn't illuminated, press it.
 - If it doesn't light up, make sure the cable to the power supply box is plugged securely into the back of the Controller.
 - Make sure the power supply box is plugged into a power source.
- The MODE button on the front of the Network 3 Controller must not be illuminated. If it is, press it once.

Data loss between Host
and Student Station

- Check all RS-232C cables for crimping, twisting, and signs of damage.
- Check all RS-232C cable connections. Each cable should be securely fastened with the screws provided.
- Follow these steps to isolate a hardware failure in the Network 3 system:
 - 1 Turn off the Network 3 Controller and all Student Stations.
 - 2 Reload the HOST program. When the prompt "Baud rate ?" appears, press [ENTER].
 - 3 Turn on the Controller.
 - 4 Turn on Student Station #1 and test it:
 - Try loading the Student Station operating software from the Host (see page 10). If "Baud rate ?" appears, press [ENTER], leave the computer on, and go to Student Station #2.
 - If the computer won't load from the Host, turn it off, and go to Student Station #2.
 - 5 Repeat Step 4 with all Student Stations.
 - 6 If ALL Student Stations can't load from the Host, replace the RS-232C cable connecting the Host to the Controller. Start over from Step 1.
 - 7 If all Student Stations still can't load from the Host, use one of the alternative loading methods. When "Network 3" appears enter the command CLS. If the screen clears, leave the computer on and go to Student Station #2. If the screen doesn't clear, turn the computer off and go to Student Station #2. If ALL Student Stations can't get a response from the Host, have RSSC check the Controller.

- 8 If SOME Student Stations can't get a response from the host, replace the RS-232C cables for these computers one at a time. Start over from Step 1 for each of these Student Stations.
- 9 If SOME Student Stations still can't get a response from the Host, move RS-232C cables for these computers to different ports at the Controller. (For example, if Student Station #3 gets no response from the Host, disconnect its cable from port #3 and switch it with port #4, which does work.) Start over from Step 1 for each of these Student Stations.
 - If a Student Station can access the Host when it's connected to one port and not another, check the cable for bent pins. Have the Controller checked by the RSSC.
 - If a Student Station won't work using any operable port on the Controller, have the computer checked by the RSSC.

Situation: DSTUDENT program won't load from the DSTUDENT Diskette.

Possible problem

Solutions

Student Station not ready to disk load

- Press and release the orange Reset button. If the red light and drive motor for the bottom disk drive don't come on, check the power source for the computer. Check the On/Off switch under the right side of the keyboard. (When the switch is On, the side closest to the front of the computer will be pushed in.)
- Press and release the orange Reset button while holding down the [BREAK] key. If the screen is blank and dark, adjust the Brightness and Contrast controls under the left side of the video display.
- Power up the computer in different rooms:
 - If it starts in another room, have an electrician check the grounding of the power source for the original room.
 - If it won't start in any other location, have the computer checked by RSSC.

Computer can't read the DSTUDENT Diskette

- Be sure to insert the DSTUDENT Diskette in the BOTTOM disk drive. The label must face up with the notch to the left. Close the drive door, then press and release the orange Reset button.
- Try using a new backup copy of the original DSTUDENT Diskette.
- The DSTUDENT program can't be converted to LDOS for use as an LDOS DSTUDENT Diskette.
- For recurring disk access errors, clean the disk drive or have it checked by the RSSC.

Situation: STUDENT program won't load from cassette player.

Possible problem

Solutions

Student Station not ready to cassette load

- If the computer is already in use, press [ENTER] or press [BREAK] to exit a program or procedure the computer may be trying to execute. A "Ready >" prompt should appear.
- If the Student Station is a Model 4 and its cursor is flashing rapidly, press and release the orange Reset button to return it to operation at Model III speed.
- If the screen is blank and dark, press and release the orange Reset button. Adjust the Brightness and Contrast controls under the left side of the video display.
- If the screen is still blank and dark, check the power source for the computer. Check the On/Off switch under the right side of the keyboard. (When the switch is On, the side closest to the front of the computer will be pushed in.)
- Power up the computer in different rooms:
 - If it starts in another room, have an electrician check the grounding of the power source for the original room.
 - If it won't start in any other location, have the computer checked by RSSC.

Computer can't receive tape input

- If the cassette player motor doesn't start when you press ENTER, check its power source and the cassette cable connection.
- Rewind the cassette tape completely. Be sure to use the correct side of the tape.
- Adjust the volume control on the cassette player to a higher or lower setting before repeating the loading procedure.
- Make sure you didn't press L when the prompt "Cass ?" was displayed.
- Check the cable connecting the player to the Student Station:
 - 1 Make sure the round DIN plug on the cable is correctly mated to the jack marked CASSETTE on the back of the computer.
 - 2 Make sure the three plugs on the other end of the cable are correctly connected to the recorder: the black plug into the EAR jack, the gray plug into the AUX jack, and the small gray plug into the MIC jack.
- Replace the cable connecting the recorder to the Student Station.

Bad tape of STUDENT

The version of the STUDENT program stored on the cassette tape might not be current, or the tape and its contents might be damaged. Follow the instructions on page 198 to make a new STUDENT cassette tape.

Situation: Student Station operating software won't load by Network 2.

Possible problem	Solutions
Host computer not ready to download software	<ul style="list-style-type: none">● The Network 3 Host computer must be connected by the short cassette cable to the port labeled CPU on the back of the Network 2 Controller.● Refer to the first three problem sections under Host computer startup (page 137). The Network 3 Host computer must be at "LDOS Ready" to begin loading STUDENT to the Student Stations via Network 2.● Make sure the necessary command file, NET2, is available at the Host:<ul style="list-style-type: none">● At "LDOS Ready", enter the command DEVICE to display a list of the available disk drives. (For more information, see page 168 or refer to the Hard Disk Operating System Reference Manual.) If all drives aren't available, reset the computer with a copy of the original Startup Diskette.● At "LDOS Ready", enter the command DIR NET2 (I) to search the directories of all disk drives for this filename. If ALL drives are available and the filename NET2/JCL doesn't appear on any directory, then repeat the transfer of the Operating Software to the hard disk (as described on page 203).
Student Station not ready to receive program from Network 2	<ul style="list-style-type: none">● If a Student Station isn't ready to receive a program via Network 2, the light above its number on the front of the Controller will be dark. Make sure the proper loading procedure was followed at that Student Station.● If the Student Station is a Model 4 and its cursor is flashing rapidly, press and release the orange Reset button to return it to operation at Model III speed.● If the prompt "Cass ?" doesn't appear when you press and release the orange Reset button, check the On/Off switch under the right side of the keyboard. (When the switch is On, the side closest to the front of the computer will be pushed in.)● If the computer is on and the screen is blank and dark, adjust the Brightness and Contrast controls under the left side of the video display.● If the screen is still blank and dark, check the power source for the computer.● Power up the computer in different rooms:<ul style="list-style-type: none">● If it starts in another room, have an electrician check the grounding of the power source for the original room.● If it won't start in any other location, have the computer checked by RSSC.

Network 2 Controller
not ready

- Make sure the Controller is turned on.
 - If the power light isn't illuminated, make sure the cable to the power supply box is plugged securely into the back of the Controller.
 - If the power light still isn't illuminated, make sure the power supply box is plugged into a power source.
- The MODE switch must be set to MPLX.
- The BAUD RATE switch must be set to 15000.

Data loss between Host
and Student Station
on Network 2

- If a Student Station isn't ready to receive a program via Network 2, the light above its number on the front of the Controller will be dark.
 - 1 Check the corresponding port on the back of the Controller to be sure that Student Station's cable is securely connected. Also, make sure the cable is securely connected to the Student Station.
 - 2 Repeat the load procedure at the Student Station. If the light on the Controller doesn't come on, replace that Student Station's cassette cable.
 - 3 Even if the Student Station's light still won't come on, try downloading the STUDENT program. (The Student Station light on the Controller might be burned out.)
 - 4 If the Student Station still can't load from the Network 2 Host, try moving the cassette cable for that computer to a different port at the Controller. (For example, if the light for Student Station #3 won't come on, disconnect the cable from port #3 and connect it to port #4, which does work.) If a Student Station will work on one port and not on another, have the Controller checked by the RSSC.
 - 5 If a Student Station will not load using any operable port on the Controller, have the computer checked by the RSSC.
- If ALL Student Stations can't load STUDENT from the Host, replace the short cassette cable connecting the Host to the Network 2 Controller. If all Student Stations still can't load, have the Controller checked by the RSSC.

Operation Problems

Situation: Host doesn't respond to all Student Stations.

Possible problem	Solutions
Host isn't ready to receive requests	<ul style="list-style-type: none">● If the Host computer doesn't display the Network 3 status screen (like the one shown on page 9), then load the HOST program.● Make sure the Host isn't "locked on" to one Student Station, as described on page 108.● The Host must be set at the same baud rate as the Student Stations. Reload the HOST program, and when the prompt "Baud rate ?" appears, enter the rate that is being used by the Student Stations.● Check to see if the LDOS spooler is active. Exit the HOST program. At "LDOS Ready", enter the command DEVICE. If "Spool" is listed beside "Options:", you must turn this function off. At "LDOS Ready", enter the command SPOOL *PR (OFF). Then reload the HOST program.
Host unable to receive requests	<ul style="list-style-type: none">● The Host computer must be connected by RS-232C cable to the port labeled CENTRAL on the back of the Network 3 Controller. Make sure both connections are secure by using the screws provided with the cable.● If the POWER button on the front of the Network 3 Controller isn't illuminated, press it.<ul style="list-style-type: none">● If it doesn't light up, make sure the cable to the power supply box is plugged securely into the back of the Controller.● If it still doesn't light up, make sure the power supply box is plugged into a power source.● The MODE button on the Controller must not be illuminated. If it is, press it once.● If no Student Stations can access the Host, test for hardware failure:<ol style="list-style-type: none">1 Check the RS-232C cable connecting the Host to the Network 3 Controller for crimping, twisting, and signs of damage.2 Replace the RS-232C cable connecting the Host to the Controller.3 If all Student Stations still can't access the Host, have the Controller checked by the RSSC.

Situation: One Student Station gets no response from Host.

Possible problem

Student Station not
part of Network 3

Solutions

- If the Student Station is in use, test to see if it is operating under the Network 3 Operating System. Exit the program or press [BREAK].
 - If the prompt "TRSDOS Ready" appears, load the DSTUDENT program to join the Network 3 system.
 - If the prompt "Ready >" appears, enter the command CMD"S". If "?L3 Error" or "TRSDOS Ready" appears, load the STUDENT program to join the Network 3 system.
- The Student Station computer must be connected by RS-232C cable to a port on the back of the Network 3 Controller.

Data loss between Host
and Student Station

- Check the RS-232C cable:
 - Use the screws provided with the cable to insure a secure connection at the Network 3 Controller, at the Student Station, and wherever a cable extender or connector is used.
 - If a cable extender is used, tape it to the table or desk to minimize stress and movement.
 - Examine the cable for crimping, twisting, and signs of damage. Replace the cable if any wires are exposed.
- Move the RS-232C cable for this Student Station to a different port on the Network 3 Controller. (For example, if Student Station #3 gets no response from the Host, disconnect its cable from port #3 and connect it to port #4, which does work.)
 - If the Student Station can't access the Host when it's connected to an operable port, replace the RS-232C cable.
 - If the Student Station can access the Host when it's connected to one port and not another, have the Controller checked by the RSSC.

Situation: Network status screen shows wrong Student Station number.

Possible problem

Power to Controller
was interrupted

Solutions

The Network 3 system will still operate, even if the same number appears for two Student Stations when they access the Host, or if the numbering of the Student Stations has changed (for example, 11 is displayed for Student Station #3, 12 for #4, etc.).

- Let the Student Stations complete their access of the Host. When the Host is idle, reload the STUDENT program at all Student Stations that display an incorrect number.
- If the numbers for the Student Stations change frequently, and unexplained lockups of Host and various Student Stations occur:
 - Make sure the cable from the power supply box plugs tightly into the back of the Controller.
 - Prevent any movement of the power cord.
 - Have your school's electrician check for a "floating ground" in the network's power source. When tested with a digital multimeter, the voltage between neutral and ground should be zero.
 - Provide a constant voltage transformer and a protective filter to regulate line voltage and prevent electrical "noise" from reaching the Controller and computers.
 - Secure a dedicated power line for the computer lab or classroom.

Controller mode changed

If the MODE button on the front of the Controller has been pushed, the button will be illuminated. When several Student Stations send their requests to the Host, these Student Stations' numbers will be displayed rapidly on the Host's status screen. Student Station numbers might also be duplicated and out of sequence. The Network 3 system will NOT operate correctly in this mode:

- When the Host is idle, press the MODE button once.
- If Host is locked on to a Student Station (a Student Station number is displayed, and the data transfer star is not flashing or not visible):
 - Press and release the orange Reset button at the Host, and reload the HOST program.
 - Press and release the orange Reset button at the Student Station indicated on the Host's screen, and reload the STUDENT program.
- At all Student Stations that display an incorrect number on the Host's status screen, press and release the orange Reset button. Reload the STUDENT program.

Situation: Program won't execute under the Network 3 Operating System and Network 3 BASIC.

Possible problem

Improper environment
for the program

Solutions

- Only assembly-language programs can be executed from the Network 3 Operating System level (when the prompt "**Network 3**" is displayed.) For example, you could load and run one of the library command programs (DIR/CMD), the Network 3 word-processing program (SCRIPSIT/CMD), and the Network 3 BASIC language (NBASIC/CMD).
- In most cases, the program you want to use requires a language to be loaded first under the Network 3 Operating System (for example, NBASIC, PASCAL, PILOT, or TEACH for AUTHOR I). When the appropriate language is loaded and ready at the Student Station, the desired program can be loaded and run.
- The Student Station must have adequate user memory to load both the language and the program that will run under that language.
- Be sure to set the proper conditions for a language that operates under the Network 3 Operating System. For example, a BASIC program might require memory protection or the availability of more than 3 file buffers. These parameters must be set when you load NBASIC. (See page 55.)

SYSTEM command was used
at Student Station

Once a Student Station has loaded the STUDENT program, the ROM command SYSTEM must not be used. If this command is entered at a Student Station under NBASIC, it will disrupt the STUDENT program. Reload STUDENT, even if a "**Ready >**" prompt appears after you press the BREAK key. (Assembly-language programs should be loaded from the Host under the Network 3 Operating System at the "**Network 3**" prompt.)

Program was loaded
from Network 2

If the BASIC program was sent via Network 2 to the Student Station:

- Make sure that NBASIC is loaded at the Student Station with whatever memory protection and number of file buffers that the program requires.
- Connect the Network 2 Host computer by the shortest cassette cable to the back of the Network 2 Controller. Using a longer cable can cause interference problems.
- Model 4 computers used in the Network 2 system must operate at Model III speed. If the Network 2 Host or Student Station is a Model 4 and its cursor is blinking rapidly, press and release the orange Reset button to return it to Model III speed.

- Not all files available
- If a program is designed to chain to other program modules and read or write to data files, all of these files must be available to the program. Otherwise, "file not found" or "file access denied" error messages will prevent successful execution of the program.
- 1 Refer to the program's instructions or to a full directory of the original program diskette for a list of the required filenames. Refer to the program's publisher for any passwords that must be replaced after conversion.
 - 2 At the Host computer under "LDOS Ready", use the DIR command (described on page 170 and in the Hard Disk Operating System Reference Manual) to search all directories for the necessary filenames and display them in full allocation format. All required files must be present, and the number of records for each file must be greater than zero. If possible, compare each program's hard disk directory entry to its directory entry on the original floppy diskette: the number of records must be the same. If not, then erase the program from the hard disk and convert it again.
 - 3 If all of the original filenames are shown, then make sure these same drives are available at the Host when the program is used. Start up the Host using the class Start-up Diskette and repeat Step 2.
 - If the drives containing the necessary files are available to the class that uses the program, examine the full directory for each disk to see if any of the necessary filenames are duplicated on other disks.
 - If the disks containing the necessary programs and data files aren't available:
 - BACKUP these files to a disk in a drive that is available to the class. (Do this while the Host is under full system configuration).
 - Modify the configuration file on the Start-up Diskette for that class (as described on page 123).
 - 4 If some of the original filenames are shown, the others may have been renamed. (Ask whoever converted the package to the hard disk.)
 - If all files weren't converted, convert the remaining files from the original program diskette.
 - If any files were renamed, search the directories at the Host for the different filenames. If all files aren't present, convert the remaining files from the original program diskette.

- If any files were renamed, you may have to alter the program(s). Change the filenames that are imbedded in each program so that the new filenames are recognized by their file manipulation commands (such as LOAD, RUN, OPEN). If you can't change the program, convert all files from the original diskette to a hard disk drive where there is no filename conflict.
- 5 Examine all programs to see if they contain file access commands that specify a drive number for program modules and data files. The drive specification in each request must match the location of the file.

Files damaged

The program, module, or data file might have been overwritten or stored on a flawed portion of an LDOS diskette or hard disk. Repeat the conversion of all files from the original diskette to a different hard drive.

Program incompatible with Network 3 Operating System and NBASIC

The program might not work properly under the Network 3 Operating System and Network 3 BASIC because it uses system routines and BASIC commands which are not supported by this emulation of TRSDOS 1.3 and Model III Disk BASIC.

- Contact the customer service department of the publisher who provided the program. Perhaps a network version of the program is available, or they could help you modify your version so that it will work with the Network 3 Operating System and NBASIC.
- If a program that you have written and converted appears to be incompatible, perhaps you can modify it to work with the Network 3 Operating System and NBASIC. Refer to pages 128-130, then check your program code carefully.

Situation: Random lockups, lost or garbled data, recurring I/O errors, random system crashes

Possible problem

STUDENT program altered

Solutions

A Student Station's operation can be affected adversely if a program or a student POKES new values into memory used by STUDENT.

Loose cable connections

Make sure every cable connection in the Network 3 system is tight and protected from all movement during network operation. Be sure to check:

- The expansion cable connecting the Host computer to the hard disk unit. Check the data cable(s) connecting any secondary hard disk unit(s) used with the Host system.

- The expansion cable connecting the Host to any external floppy disk drive(s).
- The printer cable connecting the Host to the parallel printer shared by the network.
- The RS-232C cable connecting the Host to the Network 3 Controller.
- All RS-232C cables connecting the Student Stations to the Controller.
- All cable connectors used to join RS-232C cables for longer runs.
- All cable extenders used to connect round RS-232C cables to Student Stations' ports.
- All cassette cables used with the Network 2 Controller, if this system is used with the Network 3 system.

Bad cables and cable connections

- Replace cables one at a time, allowing some days of network operation between cable changes to see if random problems recur.
- If problems continue after new cables are installed, have the RSSC clean dirt and oxidation from the RS-232C ports of the Host and Student Station computers, and the card edges of the printer and expansion ports of the Host computer.

Cables too long

Under ideal conditions, the maximum length recommended for RS-232C cables is 100 ft. If the Student Stations farthest from the Network 3 Controller frequently experience problems with data transmission, shorten their RS-232C cables. You may have to change your network layout so that you can use RS-232C cables less than 50 ft. long. (See pages 105-106 for possible arrangements.)

Dusty environment

A computer's disk drives and connections can be adversely affected by airborne particles in the computer lab or classroom. Try to keep the area free of contaminants like chalk dust and sawdust or sprays from nearby shop classes. Cover computers and peripheral devices when not in use. Clean the hard disk unit's fan filter regularly.

Static electricity

Charges of static electricity can damage data stored magnetically on a disk or diskette. Larger charges can even wipe out a computer's memory or cause it to lock up. If you can feel static discharge when you touch a metal object, or if the humidity level is below 40%, guard against static buildup in your computer lab or classroom.

- Use a non-carpeted room, a room carpeted in a static-free fabric, or anti-static spray.
- Install a humidifier for the room.
- Ground the computers, tables, and chairs to drain off static buildup.

- Power line interference The Network 3 system is sensitive to power line conditions affecting the voltage and current. The loss of even one bit of information can cause a program to crash or a data file to be lost or garbled.
- If the Network 3 equipment shares a circuit with any machinery (fans, compressors, shop equipment, typewriters, sewing machines), secure a dedicated power line for the room.
 - Provide a constant voltage transformer and a protective filter to regulate line voltage and prevent electrical "noise" from reaching the Network 3 equipment.
- Bad electrical ground The grounding of the school's electrical power could be unsatisfactory for sensitive equipment. A "floating ground" can cause frequent disruption of computers and other devices. Have your school's electrician check for a "floating ground" in the network's power source. When tested with a digital multimeter, the voltage between neutral and ground should be zero.
- Interference with network communications Sources of power line interference, such as shop equipment, typewriters, sewing machines, fans, or compressors, can also create "noise" that disrupts communications through the network's RS-232C cables. In a few cases, Network 3 cables have even picked up interference from nearby power transmission lines and high-powered communications devices (such as satellite dishes and airport guidance and tracking systems).
- Secure a dedicated power line for the computer lab or classroom. Provide a line filter or line conditioner to prevent electrical "noise" from reaching the Network 3 equipment.
 - Reduce the length of RS-232C cables as much as possible.
 - Operate the Network 3 system at a slower baud rate. (See page 107.)
 - Replace the network's cables with shielded RS-232C cables.
- Faulty disks or disk drives
- Clean the read/write head of the Host's floppy disk drive(s) with a kit available from Radio Shack. You can't clean the disk drive heads of a hard disk unit, but you can keep the unit's fan filter clean.
 - After heavy usage, floppy diskettes can wear out. If you see signs of flaking or excess wear on a diskette, backup all files to a new diskette and discard the old one. Diskettes that cause excessive I/O errors should also be replaced.

- If a FREE space map of a hard disk shows an excessive number of locked out grants, have the hard disk unit checked by RSSC. (See the FREE space map on page 2-49 of the Hard Disk Operating System Reference Manual.)
- If I/O errors with the Host's floppy disk drive(s) recur frequently, have the Host's drive alignment checked by RSSC.
- If I/O errors with the hard disk drives recur frequently, have the hard disk unit checked by RSSC.

Situation: DISK ERROR message (TRS-80 MicroPILOT) prevents use of HMRS packages with the Student Record System.

Possible problem
End of file error

Solution

Two short programs will fix this problem, which occurs when Student Records are used with a High Motivation Reading Series package. Note: This modification will also erase ALL records stored in the student file.

1 At a Student Station, load NBASIC. Enter and run this BASIC program:

```
5 CLS: CLEAR1000
10 OPEN"R", 1, "STUFILE"
20 FIELD 1, 128 AS A$, 128 AS B$
30 LSET A$="": LSET B$=""
40 FOR I=1 TO 251
50 PUT 1, I
60 PRINT @ 540, I;
70 NEXT
80 CLOSE
```

2 At a Student Station, load PILOT. Then enter and run this PILOT program:

```
1 C: R$="1"
2 H: >"STUFILE"
3 H: 1, ^: R$
4 H: <"STUFILE"
```

Situation: Model III Student Stations can't load a complete SCRIPSIT document from the Host (Network 3 SCRIPSIT Version 3.2.2)

Possible problem
SCRIPSIT patch needed

Solution

Copies of Network 3 SCRIPSIT received before February 1984 should be modified. Otherwise, Model III Student Stations might not receive the end of a SCRIPSIT document loaded from the Host. At the Host computer under "LDOS Ready", enter the following command:

```
PATCH SCRIPSIT/CMD (D0B,7E=18)
```

To correct the copy of Network 3 SCRIPSIT on its original TRSDOS diskette, you must start up the Host computer with the Network 3 SCRIPSIT diskette. At "TRSDOS Ready", enter the following command:

```
PATCH SCRIPSIT/CMD (ADD=5E11,FIND=30,CHG=18)
```

Printing/Spooling Problems

Situation: No Student Station can print at Host's printer.

Possible problem

Printer not ready to print output from Host

Solutions

Refer to the manual for your printer for help setting up the printer. Some common problems:

- Check the printer for a switch or button labeled ON LINE and OFF LINE. The printer must be ON LINE to begin printing.
- Load the printer with paper. The paper must feed straight with no jamming. Turn the paper feed knob manually to roll the paper past the paper sensor.
- Make sure the printer's ribbon isn't jammed or used up.
- Make sure some object hasn't dropped inside the printer.
- Check to be sure the printer is turned on.
- If you can't hear any sound or see any movement when the printer is turned on, check the power source for the printer.
- If the printer is receiving power, replace its safety fuse (usually located inside the printer or on its back panel).
- Power up the printer in different rooms:
 - If it starts in another room, have an electrician check the voltage level of the power source for the original room. (Printers should stop if operated below a certain percentage of rated voltage.)
 - If the printer won't start in any other location, have it checked by RSSC.

Printer can't receive output from Host

If the printer is ready, test the print output from the Host computer when it isn't running the HOST program. At "LDOS Ready", enter the command **FREE (P)** to print free space information. If no data prints:

- Some LDOS commands may be active that are directing printer output to other system devices. To make sure that such commands aren't interfering with printer output, enter the command **RESET *PR** to direct print output back to the printer. (See the Hard Disk Operating System Reference Manual for explanations of **DEVICE**, **FILTER**, **LINK**, **ROUTE**, **SET**, **RESET**, and **SYSTEM**).
- Check the printer cable connections for proper insertion and a tight fit.
- Replace the printer cable.
- Try using the printer with other computers.
 - If the printer works with computers other than the Host, have RSSC check the Host.
 - If the printer doesn't work with other computers, have RSSC check the printer.

Situation: One Student Station can't print at the Host's printer.

Possible problem

Print output routed
away from Host

Solutions

The Student Station must be operating under the Network 3 Operating System to share the Host's printer. If it is, check the computer's print routing:

- 1 Exit a program or procedure at the Student Station so that it displays "Network 3" or NBASIC "Ready >", and a flashing cursor.
- 2 When the Host is idle (when no numbers appear on the Host screen), dump the Student Station's screen display to the printer by pressing [SHIFT] [↓] [*].
- 3 If the cursor stops flashing and the Student Station's number doesn't appear on the Host screen beside "Spool:", then the computer's output is routed to its print port for local printing. Press [BREAK] to exit the print routine.

At NBASIC "Ready >", enter the command CMD"H", "ON" to restore the Host as the destination for print output. (See page 60.) Repeat Steps 2 and 3 to verify contact with the Host's printer.

Program can't print
at Host's printer

Some programs use a printer status check that is incompatible with the Network 3 Operating System and Network 3 BASIC. When such a program tries to print, a "printer not ready" error message might be displayed, or the Student Station keyboard might lock up (it won't accept any key input, or any key except BREAK).

- Before running the program, route the print output to a local printer with the NBASIC command CMD"H" (see page 60). Then connect a printer to the Student Station.
- If you're able to examine and modify the program, change it to work with the Host's spooler and printer.
- Replace the ROM check for printer status (\$PRSTAT at address 14312) with the command CMD"P" (see page 60).
- Eliminate any commands to route print output to a serial port instead of normal parallel printer port.

Situation: Erratic operation of the printer

Possible problem

Loose connection or
bad cable

Solution

It's normal for the printer's speed to slow during periods of Host disk access. (The HOST program must control both the spooler's output to the printer and the network's disk I/O requests.) But if the printer starts and stops in mid-line, or stays off longer than a few seconds in mid-page, make sure the cable is connected properly. If the problem persists, replace the printer cable.

Situation: Student Station locks up when printing.

Possible problem

Print output routed
for local printing

Solutions

If the cursor stops flashing and the Student Station's number DOESN'T appear on the Host screen beside "Spool:", then the print output is routed to the computer's print port for local printing.

- 1 If you are running a program and you still have control of the keyboard, exit the program. Otherwise, press [BREAK] to exit the print routine and regain control of the keyboard. If the BREAK key won't work, you must press and release the orange Reset button at the Student Station to exit the print routine.
- 2 At NBASIC "Ready >", enter the command `CMD"H","ON"` to route print output back to the Host.

Spooler is full

If the Student Station's number is displayed on the Host screen beside "Spool:", but the data transfer symbol * either doesn't flash or isn't visible, then the spooler is full. The Host has locked on to the Student Station until it can receive all of the print output.

- If the printer isn't running, turn the power on or switch it On Line. When enough data has been printed, making more spooler space available for the Student Station's print output, the Host will release the Student Station.
- If you don't need or want the stored output from the Student Stations to be printed, release the locked Student Station and then erase the contents of the spooler. At the Student Station, press [BREAK]. If this doesn't return control to the Student Station, turn on the printer and then press [BREAK] at the Student Station. Then exit the HOST program to erase the contents of the spooler. (If the printer won't be used during class, you can enter commands at the Host to empty the spooler. See page 177.)

Situation: Student Station printing locks up the Host.

Possible problem

Incompatible printer
filter parameter

Solution

If one Student Station's number is displayed at the Host next to "Spool:", but the Host doesn't release that Student Station until all data has been printed, then an LDOS printer filter parameter is probably interfering with the HOST program's spooler.

- 1 At the Student Station, press and release the orange Reset button.
- 2 At the Host, exit the HOST program.
- 3 At "LDOS Ready", enter the command **RESET *PR** to clear the current parameters of the Host system's printer filter.
- 4 Create a new printer filter without using the parameters **INDENT** or **MARGIN**. (See page 176.) If you're using a modified Start-up Diskette, be sure to repeat the steps on page 123 to copy the new printer filter to the configuration file on the Start-up Diskette.

Situation: Meaningless characters printed (... or ← ← ← or X X X).

Possible problem

Printer mode changed

Solutions

The printer might not be operating in the normal mode.

- Turn the printer off. Wait 15 seconds, then turn it back on. This will usually reset the printer to its normal mode of operation.
- If the printer continues to print the meaningless characters, turn the printer off. Consult the printer manual to find a mode selection switch. For example, the printer could be set to print graphics characters instead of the normal alphanumeric characters and symbols. Set it to the desired mode, then turn the printer back on.
- Try the printer with other independent computers. If it prints only meaningless characters, have it checked by RSSC.

Loose connections or
bad printer cable

- Make sure the cable is inserted properly and connected tightly.
- If the problem persists, replace the printer cable.
- Try using the printer with other computers.
 - If the printer works with independent computers other than the Host, have RSSC check the Host.
 - If the printer doesn't work with other computers, have RSSC check the printer.

USING COMMANDS OF THE HARD DISK OPERATING SYSTEM (LDOS)

This section briefly explains commands of LDOS, the Hard Disk Operating System, that are mentioned elsewhere in this manual. The explanations and examples are applied to situations involving the Network 3 system. For complete information regarding these commands and the many other commands, utilities, and features of LDOS, refer to the Hard Disk Operating System Reference Manual.

Whenever you see the prompt "LDOS Ready" on the Host screen, you can use these helpful commands:

ATTRIB	Limit file access.....	160
BACKUP	Duplicate a disk or set of files.....	162
CONV	Move TRSDOS files to an LDOS disk or diskette...	165
COPY	Duplicate a file.....	167
DEVICE	Display status of system configuration.....	168
DIR	Display a directory.....	170
FORMAT	Create a data diskette.....	173
FREE	Display used and available space and files.....	174
KILL	Remove an unwanted file.....	175
PR/FLT	Printer Filter: Format output to the printer....	176
PURGE	Remove a file or set of files.....	178
RENAME	Rename a file.....	180

Several of these commands can help you avoid storing two files with the same name on one disk. This can happen when you add new courseware to the hard disk. If you duplicate a filename that is already in a disk's directory, the original file will be overwritten by the new file. For help dealing with duplicate filenames, refer to page 181.

ATTRIB
Limit File Access

```
.....  
:  
: ATTRIB file (parameter,parameter,...)  
:  
:   file is the complete file specification for  
:   a file stored on an LDOS disk or diskette.  
:   The format is filename/ext.password:d. The  
:   password is the file's update password,  
:   required if it already exists.  
:  
: Optional parameters include:  
:  
: ACC=access password  
:   access password consists of up to eight  
:   alphanumeric characters, beginning with a  
:   letter. This password must be included with  
:   the filename each time the file is used. It  
:   allows access up to and including the level  
:   of protection set by the update password.  
:  
: UPD=update password  
:   update password consists of up to eight  
:   alphanumeric characters, beginning with a  
:   letter. This password allows complete access  
:   to the file.  
:  
: PROT=protection level  
:   protection level for files used with the  
:   Network 3 system should be restricted to:  
:   READ The file can be loaded for use, but  
:   it can't be modified, killed, or  
:   renamed. Use this level for all  
:   programs and read-only data files.  
:   WRIT The file can be read and written  
:   to, but it can't be killed or  
:   renamed. Use this level for data  
:   files that will be updated.  
:  
: VIS or INV  
:   These parameters make the file VISible or  
:   INVisible in the disk's directory. If not  
:   specified, the status is left unchanged.  
:   (If the file is currently visible, it will  
:   stay visible, and vice versa.)  
:  
: Parameters can be abbreviated as follows:  
: ACC=A, UPD=U, PROT=P, VIS=V, INV=I  
:  
: Protection levels can also be abbreviated:  
: READ=RE, WRIT=WR  
.....
```

This command allows you to control a file's level of protection, its two passwords, and its visibility in the disk directory.

When you create a file, the password you specify becomes BOTH the access and update password. If you don't specify a password, a string of eight blanks is assigned as a default password for both access and update, in effect creating NO password. This is also the case after a file is converted from TRSDOS to LDOS by the CONV command. CONV strips both the access and update passwords from the TRSDOS file, replacing them with blanks (no password). At the Host computer under "LDOS Ready", you can set or change the file's protection with ATTRIB, as shown in the examples below.

If you enter the parameters incorrectly after the ATTRIB command, you might see the message "Attribute specification error". If so, make sure you're using the proper command syntax.

Note: READ is the highest protection allowed for files used under the Network 3 Operating System. Only files that will be used at the independent Host computer can be protected at the EXEC level.

Note: When you use the Network 3 AUTHOR I Lesson Presentation Package to run lessons created by the AUTHOR I language, the lessons you store at the Host should be protected like any program. Give each lesson (for example, AMERICA/LSN or SENREL3/LSN) an update password and protect it to the READ level. However, if you will use score files with these lessons (AMERICA/SCR and SENREL3/SCR), you must set the protection level for both the score files and the lesson files at the WRIT level.

Examples

**ATTRIB ADDITION:1 (ACC=,UPD=TEACHER3,PROT=READ,VIS) or
ATTRIB ADDITION:1 (A=,U=TEACHER3,P=RE,V)**

This command protects the file ADDITION on Drive 1. No password will be required to load and run this program, because the access password has been set to "null" by placing no password after ACC=. This program can't be changed in any way unless the update password TEACHER3 is used when specifying the file. The file will be visible in the directory for Drive 1 at a Student Station.

**ATTRIB RESULTS/ADD:1 (ACC=,UPD=TEACHER3,PROT=WRIT,INV) or
ATTRIB RESULTS/ADD:1 (A=,U=TEACHER3,P=WR,I)**

This command protects the data file RESULTS/ADD on Drive 1 so that its program can read and write to the file, but no one can kill or rename it without the update password TEACHER3. Notice that the file will be invisible--it won't be displayed in a directory of Drive 1 at a Student Station.

**ATTRIB GPA/UTL.JONES:4 (ACC=MONGOOSE,UPD=TEACHER5,PROT=EXEC,INV)
or ATTRIB GPA/UTL.JONES:4 (A=MONGOOSE,U=TEACHER5,P=EX,I)**

This command protects the program GPA/UTL on the diskette in Drive 4 so that it can only be used at the Host (or other stand-alone computer under LDOS). The former access password JONES has been changed to MONGOOSE. Since the protection level is EXEC (execute only), the file can't be loaded by any Student Station. GPA/UTL can only be used at the Host computer with the LBASIC command RUN"GPA/UTL.MONGOOSE". Full access is allowed (at the Host) only if the file is specified as GPA/UTL.TEACHER5.

BACKUP

Duplicate a disk or a set of files

```
.....
:
:   BACKUP :s TO :d (parameter,parameter,...)
:   BACKUP file:s TO :d (parameter,parameter,...)
:
:   s is the SOURCE drive specification.
:   d is the DESTINATION drive specification.
:
:   The file option specifies the file or group
:   of files to be duplicated. file can be:
:
:   partspec A part of a filename, extension,
:   or both (to backup only files containing
:   the partspec).
:   -partspec A "not partspec" (to backup only
:   files that don't share this partspec).
:   partspec$ A partspec plus "wildcard"
:   characters $ (to backup only files that
:   share the partspec and any characters in
:   the wildcard positions).
:
:   Optional parameters include:
:
:   VIS to backup only VISible files.
:   INV to backup only INVisible files.
:   SYS to backup only SYStem files.
:   OLD to backup only files that already
:   exist on the destination disk.
:   NEW to backup only files that don't exist
:   on the destination disk.
:   MOD to backup only files that have been
:   MODified since the date of last backup.
:   DATE="date" to backup files that have been
:   modified according to the specified date
:   (two digits each for month/day/year).
:   m1/d1/y1-m2/d2/y2 to backup only those
:   files whose mod dates fall between the
:   two dates specified, inclusive.
:   m1/d1/y1 to backup only files with mod
:   dates equal to the specified date.
:   -m1/d1/y1 to backup only files with
:   mod dates less than or equal to the
:   specified date.
:   m1/d1/y1- to backup only files with
:   mod dates greater than or equal to the
:   specified date.
:   MPW="password" supplies the disk's master
:   password (if other than PASSWORD).
:   QUERY instructs LDOS to ask before each
:   file is moved.
:
:   Parameters can be abbreviated as follows:
:   VIS=V, INV=I, SYS=S, MOD=M, DATE=D, QUERY=Q
:
:.....
```

This utility will move all or part of the files from a specified source drive to a specified destination drive. **The destination disk must be formatted before the backup begins.** You must prepare all destination data diskettes with the FORMAT command, explained on page 173. (The hard disk drives are already in the LDOS format.) You will be prompted for the disk's master password if it is a password other than "PASSWORD" and not specified with the MPW parameter.

Note: If the message **"File access denied"** appears when you try to use the BACKUP command, you must "unlock" the hard disk operating system as described on page 121.

How to duplicate a diskette:

If you don't include any parameters with the BACKUP command, LDOS will attempt to make a **"mirror image backup"** of the source disk on the destination disk. This method is used to duplicate floppy diskettes. For example, the command **BACKUP :4 :5** instructs LDOS to make a mirror image backup of the Drive 4 source diskette on the Drive 5 destination diskette.

For a step-by-step example, refer to page 194. That procedure shows how to copy the Network 3 Model III Hard Disk Operating Software Diskette to a formatted diskette using one or two floppy disk drives. For a complete explanation of the conditions required for duplication and the error messages that might appear, see "Mirror image backups" on page 3-2 of the Hard Disk Operating System Reference Manual.

How to duplicate a hard disk:

If your source disk is one of the hard disks, and you don't include any parameters with the BACKUP command, LDOS will begin a **"backup reconstruct"** of the contents of the hard disk to the destination floppy disk. For example, **BACKUP :1 :4** instructs LDOS to begin copying all files from the Drive 1 hard disk to the diskette in Drive 4.

Before you begin, you must determine how many LDOS-format floppy diskettes you need. One 1.25 meg hard disk drive requires up to seven diskettes. One 2.5 meg hard disk drive requires up to 14 diskettes. And one 5 meg hard disk drive requires up to 28 diskettes. Format as many destination diskettes as will be needed to hold all the information on the drive. (It's a good idea to format one or two extra diskettes in case of a problem.)

As the backup progresses and the first destination diskette is filled, you'll be prompted to insert a new formatted destination diskette. At this point, remove the full destination disk and insert a new formatted diskette in the floppy disk drive. Press [ENTER] to continue the backup. Perform this disk swap as many times as necessary to complete the backup.

One file won't be split to two destination diskettes. But if you have one file that is larger than 174K, the capacity of an LDOS-format floppy diskette, you won't be able to copy it with the BACKUP command. To copy a large file, use the LDOS utility **HARDCOPY/BAS** as explained in Appendix A of the Hard Disk System Start-up Manual.

How to duplicate groups of files:

The BACKUP utility allows you to copy related files from any source disk to any destination disk in the LDOS system. This is referred to as a "backup by class." However, if the source and destination disks are configured differently, then a "backup reconstruct" will be done instead. This type of backup works like the backup by class. That is, it does a file for file copy from the source to the destination diskette. In either case, files that exist on the destination diskette but are not on the source diskette will remain untouched by the backup (unlike the mirror image backup). When the backup is complete, the destination disk will contain all files moved from the source disk plus any other files that existed on the destination disk before the backup began. This type of backup can't be done on a single drive (by swapping diskettes in one of the floppy drives).

Flexible file specification and numerous parameters enable you to choose exactly which files you want to copy. All parameters can be used singly or combined in one command. In most cases, you can see exactly what files will be moved by a particular BACKUP command by doing a DIR command of the source disk using the same partial file specification and/or parameters.

BACKUP :1 TO :4 (MOD,QUERY) or BACKUP :1 :4 (M,Q)

This example will copy only files that have been modified from hard disk Drive 1 to the diskette in Drive 4. "Modified files" are those files stored on the source disk that have been written to (or newly created), but haven't been backed up. (In a directory display, a "mod flag" + is displayed beside these filenames to warn you that they are unique. After BACKUP of one of these files, its mod flag is removed.) The source disk's master password will be requested, unless it is "PASSWORD". The QUERY parameter will show you each file before it is backed up, including the file's date and mod flag status. You can press Y to copy the file or either N or [ENTER] to bypass the file and show the next one. Pressing C will copy the current file, and shut off the query function. All files from that point will be copied automatically.

**BACKUP J3:5 TO :4 (VIS,DATE="09/21/84-") or
BACKUP J3:5 :4 (V,D="09/21/84-")**

This example will copy files from the diskette in Drive 5 to the diskette in Drive 4. It will duplicate only visible files whose filenames begin with the characters J3 (such as J3MOORE/B02, J3THOMPS/B09, J3DEMO), and whose date of last modification is greater than or equal to September 21, 1984. (The modification date for each file can be displayed by a directory command that includes the A parameter, for "full allocation" format.) Note that a wildcard (\$) isn't needed after J3: LDOS automatically accepts all characters and extensions that follow the initial character(s) in the command. The wildcard can help by masking characters in certain positions. For example, **BACKUP /\$\$2:5 :4** will backup files whose extension is three characters long, ending with the character 2 (such as J3MOORE/B02, J3MOORE/D02, ASSIGNMT/J32).

Many more examples of BACKUP can be found in the Hard Disk Operating System Reference Manual.

CONV
Move TRSDOS files to LDOS

```
.....  
:  
: CONV :s TO :d (parameter, parameter,...) :  
: CONV file:s TO :d (parameter, parameter,...) :  
:  
: s is the SOURCE drive specification. :  
: d is the DESTINATION drive specification. :  
:  
: The file option specifies the file or group of :  
: files to be duplicated. file can be a :  
: partial file specification (part of a :  
: filename, extension, or both) and include :  
: "wildcard" characters $ (to stand for any :  
: characters in the wildcard positions). :  
:  
: Optional parameters include: :  
:  
: VIS to convert only VISible files. :  
: INV to convert only INVisible files. :  
: OLD to convert only files that already :  
: exist on the destination disk. :  
: NEW to convert only files that don't :  
: exist on the destination disk. :  
: QUERY=NO instructs LDOS not to ask before :  
: each file is moved. :  
: All parameters can be abbreviated to their :  
: first character. :  
:.....
```

The CONV utility allows you to move files from a Model III TRSDOS diskette onto one of the hard disks or an LDOS-format floppy diskettes. If no parameters are included, all files on the TRSDOS diskette will be considered. Specifying file specifications and/or parameters limits the files to be moved, as shown in the examples below.

Note: The following TRSDOS system files must not be converted to LDOS: BASIC/CMD, CONVERT/CMD, HERZ50/BLD, LPC/CMD, MEMTEST/CMD, and XFERSYS/CMD.

Unless you specify QUERY=NO, you will be asked before each file is moved onto the destination disk. Enter Y to move the file or enter N or press [ENTER] to bypass it. It's best to leave the query function on so that you don't accidentally convert a new file over an existing file with the same filename. If a file already exists on the destination disk, you will be asked if you want to replace it. Press either N or [ENTER] to bypass the file; you can convert that file later. Refer to page 181 for some suggestions for dealing with duplicate filenames.

Keep in mind that conversion from TRSDOS to LDOS strips the passwords and protection level from a file, and makes the file visible if it was formerly invisible. After converting a file, use the ATTRIB command (described on page 160) to restore its protection and passwords.

Note: If the message "File access denied" appears when you try to use the BACKUP command, you must "unlock" the hard disk operating system as described on page 121.

Examples

CONV :4 TO :1 or CONV :4 :1

This command allows you to move all files from the TRSDOS diskette in Drive 4 to hard disk Drive 1.

CONV :4 TO :1 (NEW,QUERY=NO) or CONV :4 :1 (N,Q=N)

This command automatically moves files from the diskette in Drive 4 to hard disk Drive 1, as long as the files don't already exist on Drive 1.

CONV :5 TO :3 (VIS,INV) or CONV :5 :3 (V,I)

This command will allow you to convert all files except TRSDOS system files from the diskette in Drive 5 to hard disk Drive 3. You'll be asked before each file is moved onto Drive 3.

CONV /LSN:4 TO :2 or CONV /LSN:4 :2

The partial file specification in this command will allow you to convert files with the extension /LSN from the diskette in Drive 4 to hard disk Drive 2.

CONV SCRIPSØ7/SCR:4 TO :5 or CONV SCRIPSØ7/SCR:4 :5

This command converts one file, SCRIPSØ7/SCR, from the TRSDOS diskette in Drive 4 to the LDOS diskette in Drive 5.

COPY

Duplicate a file

```
.....  
:  
: COPY file1 TO :d (parameter, parameter) :  
: COPY file1 TO file2 (parameter, parameter) :  
:  
: file1 is the file specification of the source :  
: file. The appropriate password is required. :  
:  
: d is the destination disk drive. :  
:  
: file2 is an optional full or partial file :  
: specification for the destination file. :  
:  
: Two parameters can be included: :  
:  
: LRL=nnn establishes logical record length :  
: for the destination file (from 1 to 256). :  
: CLONE=OFF allows the file to be copied :  
: without duplicating all parts of its :  
: directory entry. :  
:  
: Both parameters can be abbreviated to their :  
: first character. :  
:.....
```

The COPY command has many capabilities, as explained in the Hard Disk Operating System Reference Manual. The use described here is to duplicate one file onto another disk or over another file.

Unless the CLONE function is turned off by the parameter CLONE=OFF, COPY will duplicate the file's directory entry as well as its contents. That means the destination file will have the same filename and extension (unless specified with the COPY command) and the same attributes (passwords, protection level, visibility, and date) of the source file. If CLONE is turned off when an existing destination file is copied over, the attributes of the destination file (except for the date) will be unchanged.

```
COPY TEST/DAT:1 TO :3 or COPY TEST/DAT:1 TEST/DAT:3
```

```
COPY TEST/DAT:1 TEST:3 or COPY TEST/DAT:1 /DAT:3
```

These examples all create an identical copy of TEST/DAT on Drive 3, since no file specification was specified for the destination file. If a drive specification isn't included for the source file, as in the command COPY TEST/DAT :3, LDOS starts with Drive 0 to look for the filename.

```
COPY MEMO1025:0 TO MEMO1025/SCR.TEACHER3:4 (CLONE=OFF) or
```

```
COPY MEMO1025:0 /SCR.TEACHER3:4 (C=OFF)
```

This example copies the file MEMO1025 from Drive 0 to the diskette in Drive 4. The file created on Drive 4 will be named MEMO1025/SCR, and have its access and update passwords set to TEACHER3. The current date will be the file's mod date.

For examples using the logical record length parameter, refer to the Hard Disk Operating System Reference Manual, page 2-16.

DEVICE
Display status of system configuration

```
.....  
:  
: DEVICE  
:.....
```

This command displays information about the disk drives and logical "devices" which are in use in the system. Under LDOS, you can control I/O for all parts of the system, whether they are physical devices (hardware such as the video display, keyboard, and printer) or devices you create (files and "dummy" devices). For complete information, see LDOS Devices and Disk Drives beginning on page 1-18 of the Hard Disk Operating System Reference Manual. Device relationships and specifications can be changed using the commands FILTER, ROUTE, SET, LINK, SYSTEM, and RESET, explained in the LDOS manual. Only those parts of the DEVICE display that pertain to commands and troubleshooting procedures mentioned earlier in this manual are described here.

The first part of the DEVICE display is the DRIVE section:

```
:0 5" Rigid #0, Cyls=306, Fixed  
:1WP 5" Rigid #1, Cyls=306, Fixed  
:2 5" Rigid #2, Cyls=306, Fixed  
:3WP 5" Rigid #3, Cyls=306, Fixed  
:4 5" Floppy #1, Cyls= 40, Dden, Sides=1, Step=6ms, Dly=.5s  
:5 5" Floppy #2, Cyls= 40, Dden, Sides=1, Step=6ms, Dly=.5s  
:6WP 5" Rigid #4, Cyls=306, Fixed  
:7WP 5" Rigid #5, Cyls=306, Fixed
```

The sample display shows the current configuration of a two-drive computer with six hard disk drives (a 15 megabyte hard disk unit that was initialized as described in Appendix IV, page 199). The enabled drives are listed in order of access, from 0 through 7. If a drive number isn't listed, the drive was probably disabled with the SYSTEM command. Next to each drive number is its write-protection status; WP signifies a drive protected by the SYSTEM command. The drive's disk size and type (5" rigid or floppy) are also shown, followed by its head number (for hard disk drives) or cable location (for floppy disk drive). Last on the line is information about disk media and access, which can change for floppy diskettes according to parameters specified when the diskette was formatted.

The second part of the DEVICE display is the BYTE I/O section:

```
*KI <= X'FC85'  
*DO <=> X'4DB2'  
*PR => X'FB67'  
*JL = Nil  
*SI = Nil  
*SO = Nil
```

Here lines list the system devices using an asterisk followed by the two-letter device name. *KI is the Keyboard Input, *DO is the Display Output (the video screen), *PR is the PRinter.

Each device has an I/O symbol showing if it is capable of input (<=), output (=>), or both (<=>). The routing of each device, or the address of its driver or filter program, is shown last on the line. For example, ***PR => X'FB67'** indicates that output to the printer is controlled by the program at address FB67 hexadecimal. If print output is currently routed to a file, DEVICE displays a line like this: ***PR <=> PRINTER/TXT:Ø**. If print output is currently routed "nowhere" (so that no data will be stored or printed), DEVICE displays the line ***PR = Nil**.

Last is the Options line which lists the system options that are currently active:

Options: Verify, Type, JKL, PR, KI

In this example, the command VERIFY has been engaged. (This command, described on page 2-87 of the Hard Disk Operating System Reference Manual, forces all disk writes to be verified with a read-after-write operation.) **Type** shows that the LDOS key-ahead feature is in effect. **JKL** shows that a special "screen dump" capability is enabled. Both are controlled through KI, the keyboard driver program. **PR** shows that a filter program is currently active that will format output to the printer.

These options are usually established with the FILTER, LINK, ROUTE, SET, and SYSTEM commands. Refer to the Hard Disk Operating System Reference Manual for complete explanations of these features and commands.

Note: If the option SPOOL is displayed, you must deactivate it before you load the HOST program to operate the Network 3 system. At "LDOS Ready", enter the command **SPOOL *PR (OFF)**.

DIR
Display a disk directory

```
.....  
:  
: DIR :d (parameter,parameter,...)  
: DIR file:d (parameter,parameter,...)  
:  
: d is the optional drive specification. If  
: included, only the Drive d disk directory  
: is displayed.  
:  
: The file option specifies the file or group  
: of files to be displayed. file can be:  
: partspec A part of a filename, extension,  
: or both (to display only files containing  
: the partspec).  
: -partspec A "not partspec" (to display only  
: files that don't share this partspec).  
: partspec$ A partspec plus "wildcard"  
: characters $ (to display only files that  
: share the partspec and any characters in  
: the wildcard positions).  
:  
: Optional parameters include:  
:  
: A to display directory in full allocation,  
: or A=NO to disable this feature.  
: INV to display INVisible files.  
: SYS to display SYStem files.  
: P to direct output to the printer.  
: MOD to display only files that have been  
: MODified since the date of last backup.  
: DATE="date" to display files that have  
: been modified according to the specified  
: date (two digits each for month/day/year):  
: m1/d1/y1-m2/d2/y2 displays only those  
: files whose mod dates fall between the  
: two dates specified, inclusive.  
: m1/d1/y1 displays only files with mod  
: dates equal to the specified date.  
: -m1/d1/y1 displays only files with  
: mod dates less than or equal to the  
: specified date.  
: m1/d1/y1- displays only files with  
: mod dates greater than or equal to the  
: specified date.  
: N to display the directory non-stop  
: (without pausing every 15 lines).  
: SORT=NO to disable alphabetical order of  
: directory display.  
:  
: Parameters can be abbreviated as follows:  
: INV=I, SYS=S, MOD=M, DATE=D, NO=N  
:.....
```

This command allows examination of a directory, that portion of a disk reserved to store information about files and free space.

LDOS can store a maximum of 64 file records in the directory of a single density diskette, and 128 file records per double density diskette. One hard disk's directory is fixed at a maximum of 256 file records, no matter how the hard disk system is configured. In all cases, 16 file records are reserved for system files, even if there are no system files present on the disk. For example, you can store a maximum of 240 file entries on Drive 0, whether its size is 1.25 meg, 2.5 meg, or 5 meg.

Therefore, directory size as well as free space will limit your disk storage. Reaching the maximum on either will prevent any more information from being stored on the disk. It will be necessary to remove existing files before anything more can be written to that disk. (The FREE command displays both the number of remaining files and free space on a disk. Files can be removed with either the KILL or the PURGE command.)

Examples

DIR :0

This command displays the directory of visible files on hard disk Drive 0. The command DIR :4 does the same for the diskette in floppy Drive 4. Specifying a drive that is disabled or not ready causes the error message "Illegal drive number" to appear.

DIR without a drive specification causes the directories of all enabled drives to be displayed, starting with Drive 0. Visible files will always be included in the display.

DIR :0 (I) displays all visible and invisible files on Drive 0.

DIR :0 (S) displays all visible and system files on Drive 0.

DIR :0 (I,S) displays ALL files on Drive 0. This command produces a display that might begin like this:

```
Free space= 2000.0 K Drive 0 TRSHARDA -- 09/15/84
Filespec Attributes Prot / LRL #Recs / Ext File Space Mod Date

ADDITION P+      READ / 256   64 / 2 S=  16.0K 17-Sep-84
BACKUP/CMD IP    EXEC / 256   21 / 1 S=   8.0K 01-Oct-83
BASIC/CMD IP     EXEC / 256    2 / 1 S=   4.0K 01-Oct-83
BOOT/SYS SIP     EXEC / 256    5 / 1 S=   4.0K
C3DEMO/BAS +    ALL / 256   17 / 1 S=   8.0K 19-Sep-84
CLEAR/CMD IP     READ / 256    1 / 1 S=   4.0K 15-Sep-84
```

The first line gives the amount of free space on the disk, followed by the drive number, disk name, and the date that the disk was created (initialized). This "full allocation" display shows all information about each directory entry.

First is the filename and extension, followed by certain letters or a plus sign (+).

I indicates the file has been declared invisible.

P indicates the file has an update password.

S indicates the file is an LDOS system file.

+ is a "mod flag" that indicates the file has been modified since it was last backed up (or that it is newly created).

Next is the file's protection level, which can be set or changed with ATTRIB. (Files protected at the EXEC can't be loaded by a Student Station under the Network 3 Operating System.)

The file's length and number of logical records come next, followed by the number of extents (non-contiguous blocks of space) in which the file is stored. The file's space on the disk is shown in K (1K = 1024 bytes). Note that the minimum storage space for any file on a hard disk is 4K; on an LDOS-format floppy diskette, the minimum file space is 1.5K.

The last information is the file's modification date. This is the date that the file was created or last written to.

The directory display normally appears in this format under LDOS Version 5.1.4 (the version for 15 megabyte hard disk systems). If the parameter `A=NO` is specified, the directory display is arranged in three columns that contain only the filename and attributes. Under LDOS Version 5.1.3 (the version for 5 megabyte hard disk systems), the parameter `A` must be specified to display the full allocation format: `DIR :Ø (A,I,S)`.

The directory display automatically pauses after every 15 lines. Pressing `[BREAK]` will end the display, while pressing any other key will continue with another 15 lines. The display will scroll without pause if the parameter `N` is specified. Including the `P` parameter sends the directory display to the printer as well as to the screen, without pause.

`DIR RESULTS:1 (I)`

This command limits the directory display to those files on Drive 1 which contain the partial file specification `RESULTS`. Names like `RESULTS/ADD`, `RESULTS/DIV`, `RESULTS3` would be displayed, because a partial file specification will display all files whose name starts with those characters, regardless of how many other characters follow.

`DIR /CMD:Ø (P)`

Similarly, this command produces a directory of the visible files on Drive Ø that have the extension `/CMD`. The `P` parameter sends the list to the printer. Adding the parameters `I` and `S` would display ALL files on Drive Ø with that extension.

`DIR -/CMD:Ø (I,S)`

A "minus" character (`-`) before part of a file specification instructs LDOS to exclude files with that filename or extension. This command would display all files on Drive Ø that don't have the extension `/CMD`.

`DIR $$$$J3 (M)`

Here a wildcard symbol `$` is used to accept any character in its place. This partial file specification instructs LDOS to display visible files that start with any five characters, as long as the next two characters are `J` and `3` (`SMITHJ3A/BAS`, `SMITHJ3A/DAT`, `TEACHJ3/MNU`, for example). The parameter `M` further limits the directory display to files that have been created or modified. Since the command has no drive specification, all enabled disk drives will be searched for files that have this filename format and a mod flag.

FORMAT

Create a data diskette

```
.....  
:  
: FORMAT :d (parameter,parameter,...)  
:  
: d is the drive containing the diskette to  
: be formatted.  
:  
: Optional parameters include:  
:  
: NAME="name" assigns a name to the diskette.  
: name can be any eight alphanumeric  
: characters, starting with a letter.  
: MPW="password" assigns a master password  
: to the diskette.  
: QUERY=NO turns off the prompts for special  
: format instructions. Abbreviated Q=N.  
: ABS begins formatting the diskette even if  
: it is already formatted and contains data.  
:.....
```

The FORMAT utility creates the proper information on a diskette so that LDOS can read and write to it. The diskette may be blank or already formatted (for LDOS or any other system). Note: This command is used to prepare floppy diskettes only. To format a hard disk drive, refer to the Hard Disk System Start-up Manual.

If you enter the FORMAT command with no parameters, you'll see seven prompts before formatting begins. After answering the first prompt, which drive is to be used, you will be asked for the name and master password for the diskette. These two pieces of information are used by several LDOS commands. They are referred to as the "Pack ID" in screen messages and the LDOS manual. Pressing [ENTER] will cause the default values to be used (NAME=LDOSDISK and MPW=PASSWORD). You can press [ENTER] for the rest of the prompts to accept the LDOS default values (described in the Hard Disk Operating System Reference Manual, page 3-19).

Examples

FORMAT :4 (Q=N)

This command will format the diskette in Drive 4, giving it the name LDOSDISK and the master password PASSWORD. If the diskette has already been formatted, you will see the following message:

Disk contains data -- Name=DISKNAME Date=MM/DD/YY

Are you sure you want to format it?

To abort the format, enter N. To continue, enter Y. If the diskette has an incomplete or non-standard format, you will see one of the following messages: **UNREADABLE DIRECTORY**, **NON-STANDARD FORMAT**, or **NON-INITIALIZED DIRECTORY**. To abort the format, enter N. To continue, enter Y. (If the parameter ABS is specified, the message appears but formatting continues automatically.)

FORMAT :5 (NAME="COMPSCI5",MPW="TURING",Q=N,ABS)

This command automatically begins formatting the diskette in Drive 5, assigning it the name COMPSCI5 and the password TURING.

FREE

Display used and available space and files

```
.....  
:  
: FREE (P) :  
: FREE :d (P) :  
: :  
: P is an optional parameter that directs :  
: output to the printer. :  
: :  
: d is an optional drive specification, :  
: specifying a free space map of that disk. :  
:.....:
```

This command displays the used and available storage space on each disk, and the used and available file entries in each disk directory. A FREE display will look similar to this:

```
Drive 0 - TRSHARDA 09/15/84 Files=132/256, Space= 1860/2448 K  
Drive 1 - TRSHARDB 09/15/84 Files= 68/256, Space= 1008/2448 K  
Drive 2 - TRSHARDC 09/15/84 Files=130/256, Space= 2008/2448 K  
Drive 3 - TRSHARDD 09/15/84 Files= 5/256, Space= 768/2448 K  
Drive 4 - PER2DATA 09/19/84 Files= 73/128, Space= 48/ 180 K  
Drive 6 - TRSHARDE 09/15/84 Files=111/256, Space= 1320/2448 K  
Drive 7 - TRSHARDF 09/15/84 Files=119/256, Space= 308/2448 K
```

FREE checks each disk drive in the system and displays one line of information about the disk in each drive location. In the example above, a line for Drive 5 is not displayed for one of these reasons: the computer has no floppy Drive 5; Drive 5 has been disabled by the SYSTEM command; no diskette was in the drive; or the drive door was open when the command was issued.

The first information shown is the drive number that the rest of the line pertains to. Next is the disk's name and the date it was created (or, for floppy diskettes, the date of the last Mirror Image backup).

Next, file information is displayed. Files=132/256 tells you that 132 files can be added to this hard disk, which supports a maximum 256 file records in its directory. A floppy diskette will support a maximum 128 file records in its directory.

The space information displayed shows you the amount of space in K (1024 byte blocks) that remains available for use on the disk. Space= 1860/2448 K indicates that approximately 1,860 K is free for storing additional data, out of a maximum 2,448 K on this hard disk. A double-density floppy diskette will normally provide 180 K of storage space.

Including a drive specification with the FREE command displays a free space map for that disk. This map shows the details of the allocation of granular storage space on the disk.

Both types of FREE display can be printed by including the P parameter.

KILL

Remove an unwanted file

```
.....  
:  
: KILL file :  
:  
: file is the complete file specification :  
: of the file to be removed. :  
:.....
```

The KILL command removes an unwanted file from a disk, thereby freeing one record in the disk's directory and freeing the disk space previously allocated to the file.

If the file is password-protected, you must supply the proper password or the file will not be killed. To kill several files at once, regardless of each file's password protection, use the PURGE command. (See page 178, or page 2-62 of the Hard Disk Operating System Reference Manual.)

Examples

KILL RESULTS/ADD:1

This command removes the file named RESULTS/ADD from Drive 1. Killing a file renders it inaccessible, so use the command carefully.

KILL PERIOD3/MNU

This command will kill the first file that is found with the name PERIOD3/MNU. LDOS begins searching for the file on Drive 0, and continues through all enabled drives. A drive specification should always be included with the file so that you don't accidentally KILL the wrong file.

KILL PASCDEMO.BLAISE:3

This command kills the password-protected file PASCDEMO on Drive 3, as long as BLAISE is the proper password. If PASCDEMO has been assigned a protection level of NAME or higher by the ATTRIB command, BLAISE must be the update password to kill the file.

PR/FLT

Printer Filter: Format output to the printer

```
.....
:
: FILTER *PR USING PR/FLT (parameter,parameter,...)
:
:   Optional parameters include:
:
:   ADDLF Add linefeed after carriage return.
:   CHARS=nnn Set the number of characters
:   to be printed per line (from 1 to 255).
:   LINES=nn Set the number of lines to be
:   printed per page.
:   PAGE=nn Set the physical page size in lines.
:   XLATE=X'aabb' Translate specified character
:   aa to character bb, hexadecimal.
:
:   These parameters can be abbreviated to their
:   first character. USING is optional.
:
:.....
```

The FILTER program intercepts the data sent to device *PR, the printer, and formats it using the PR/FLT program. The parameters you set with the printer filter program establish the print area available for "raw" data, like screen dumps and line lists, and data formatted by SCRIPSIT and other application programs. This filter program also enhances the normal ROM printer driver routine. (If you enter a command that uses the printer, you will no longer experience lock up if the printer isn't connected to the system. However, if the printer is connected but off line or out of paper, the system will wait until the printer is ready.)

Once the printer filter has been applied, you can return the printer to its normal driver program by entering the command **RESET *PR.**

Note: The parameters INDENT and MARGIN (not listed above) can't be active while the Network 3 system is operating. These two parameters interfere with the HOST program's printer spooler.

Examples

```
FILTER *PR USING PR/FLT (CHARS=84,LINES=54)   or
FILTER *PR PR/FLT (C=84,L=54)
```

This command establishes the PR/FLT program in high memory and filters printer output using three parameters. (CHARS=84) allows a maximum of 84 characters per printed line. (For some word-processing applications, you would set the characters per line to 102.) (LINES=54) allows 54 printed lines per page.

```
FILTER *PR USING PR/FLT (CHARS=132,LINES=60)   or
FILTER *PR PR/FLT (C=132,L=60)
```

This command permits a maximum of 60 132-character lines to be printed on each page.

Additional commands for controlling print output

Besides formatting output to the printer with PR/FLT, you can control printing in other ways. The commands ROUTE and LINK enable you to direct printer output to other system devices before it reaches the printer, and even direct any output so that it won't be printed. (Refer to the Hard Disk Operating System Reference Manual for complete explanations of these commands.)

ROUTE *PR (NIL)

This command directs output intended for the printer (device *PR) to (NIL). This means the output is routed to nothing. Any input sent to a device routed (NIL) will simply be ignored. To remove this routing, enter the command **RESET *PR**.

This command could have two uses in a Network 3 application. Enter this command before loading the HOST program if your Host computer isn't equipped with a printer, or if you don't want the Student Stations to be able to use the Host's printer.

ROUTE *PR TO PRINTER/DAT:Ø!

This command routes all data normally sent to the printer (device *PR) to a file on Drive Ø named PRINTER/DAT. If the file doesn't exist, it will be created. If PRINTER/DAT already exists, data routed to it will be appended to the end of the file. By including the exclamation point (!) after the file specification, the LDOS "end-of-file maintenance mode" is invoked. This causes the end of file to be updated after each buffer is written to the file. Then, in case of an error or some network interruption, only one buffer of print data (the last 256 bytes that were being written to the file) would be lost. Without "!", the EOF won't be written to the file until the file is properly closed. To close the file and return printer output to the printer, enter the command **RESET *PR**.

You could use this command when you don't want printer noise during a class period, or when your students don't immediately require their printouts. **Remember, all print requests from the Student Stations must be printed by a command entered at the Host, when the HOST program isn't running.** To print the contents of the file, at "LDOS Ready" enter the command **LIST PRINTER/DAT:Ø (P)**. To remove the file PRINTER/DAT from Drive Ø (when you don't need it or when you want to create a new print file), enter the command **KILL PRINTER/DAT:Ø**.

ROUTE *DU TO PRINTER/DAT:Ø! and

LINK *PR *DU

These two commands cause all data sent to the printer to also be stored in a disk file. The first command creates a device named *DU (for "dummy" device) and directs its output to the file named PRINTER/DAT on Drive Ø. The second command connects the two devices, the printer and the dummy or phantom device. Therefore, all output sent to the printer will also be sent to the device *DU (in effect, written to the file PRINTER/DAT). To break the link and return printer output directly to the printer, enter the command **RESET *PR**. To remove *DU from the device table, enter the command **KILL *DU**. To remove the file PRINTER/DAT from Drive Ø, enter the command **KILL PRINTER/DAT:Ø**.

PURGE

Remove a file or a set of files

```
.....  
:  
: PURGE :d (parameter,parameter,...) :  
: PURGE file:d (parameter,parameter,...) :  
:  
: d is the mandatory drive specification. :  
:  
: The file option specifies the file or group :  
: of files to be removed. file can be: :  
: partspec A part of a filename, extension, :  
: or both (to remove only files containing :  
: the partspec). :  
: -partspec A "not partspec" (to remove only :  
: files that don't share this partspec). :  
: partspec$ A partspec plus "wildcard" :  
: characters $ (to remove only files that :  
: share the partspec and any characters in :  
: the wildcard positions). :  
:  
: Optional parameters include: :  
:  
: INV to remove invisible files. :  
: SYS to remove system files. :  
: DATE="date" to remove files that have :  
: been modified according to the specified :  
: date (two digits each for month/day/year). :  
: m1/d1/y1-m2/d2/y2 removes only those :  
: files whose mod dates fall between the :  
: two dates specified, inclusive. :  
: m1/d1/y1 removes only files with mod :  
: dates equal to the specified date. :  
: -m1/d1/y1 removes only files with :  
: mod dates less than or equal to the :  
: specified date. :  
: m1/d1/y1- removes only files with :  
: mod dates greater than or equal to the :  
: specified date. :  
: MPW="password" supplies the disk's master :  
: password (if other than PASSWORD). :  
: QUERY=NO turns off the prompt before each :  
: file is removed. :  
:  
: Parameters can be abbreviated as follows: :  
: INV=I, SYS=S, DATE=D, QUERY=Q, NO=N :  
:.....
```

The PURGE command lets you kill multiple disk files without the need to provide the individual filenames and passwords. You will be prompted for the disk's master password if it is a password other than "PASSWORD" and not specified with the MPW paramter.

PURGE affects visible files only, unless you include invisible and system files in the command line with the parameters **INV** and **SYS**.

If the parameter `QUERY=NO` isn't specified, you will be asked before each file is purged. To purge the file, enter Y. To skip the file, enter N or press `[ENTER]`. To abort the PURGE, press `[BREAK]`. If you specify the parameter `QUERY=NO`, be certain you know which files will be removed. PURGE is a very powerful and dangerous command: it can remove any file, even vital system files, from a disk.

Examples

`PURGE :3 (MPW="BABBAGE")`

This command lets you purge all visible files on Drive 3, assuming that the master password of the disk is BABBAGE. Each filename, its modification date, and its mod flag will be displayed until you enter Y (yes, purge it) or N (no, don't purge it). If the master password doesn't match the password of the disk, the purge aborts. To remove all files from Drive 3, you must specify invisible and system files in the command line:
`PURGE :3 (INV,SYS,MPW="BABBAGE")`.

`PURGE J3:1 (DATE="09/21/84-10/01/84",QUERY=NO)` or
`PURGE J3:1 (D="09/21/84-10/01/84",Q=N)`

This command will first ask for the password of the Drive 1 disk (if it isn't "PASSWORD"). Then it begins removing all visible files from Drive 1 that have a filename beginning with the characters J3, provided the date of their last modification is between September 21, 1984 and October 1, 1984. The purge is automatic, since the parameter `Q=N` was specified.

`PURGE -/SCR:4 (INV,SYS)` or
`PURGE -/SCR:4 (I,S)`

This command will first ask for the password of the diskette in Drive 4 (if it isn't "PASSWORD"). Then it will let you purge all files EXCEPT those whose extension is /SCR. You will be prompted before each file is purged.

`PURGE J3$$$$$7:5 (Q=N,MPW="TURING")`

This command will first ask for the password of the Drive 1 disk (if it isn't "PASSWORD"). Then it automatically purges visible files from the diskette in Drive 5, which has the master password "TURING". The files purged will have filenames beginning with J3, followed by any five characters and the character 7 (such as J3MOORE7/BAS, J3SMITH7/SCR, and J3THOMP7).

`PURGE :1 (INV,DATE="-12/21/84",QUERY=NO)`
`PURGE :1 (I,D="-12/21/84",Q=N)`

This command will first ask for the password of the Drive 1 disk (if it isn't "PASSWORD"). Then it automatically purges all non-system files from Drive 1 that were created or modified on or before December 21, 1984.

RENAME

Rename a file

```
.....  
:  
: RENAME file1 TO file2 :  
:  
: file1 is the file specification of the source :  
: file. The appropriate password is required. :  
:  
: file2 is the new full or partial file :  
: specification to be applied to the file. :  
:.....
```

The RENAME command allows you to change the filename and extension of a given file. Any part of the new file specification that isn't specified will default to that of the original file specification. The drive specification can't be changed, and the file's password can't be changed or deleted.

Note: Be aware that a program might not execute properly after you RENAME one of its files. If the error message "File not found" appears when you run a program, you may have to change a data file or program module back to its original name. Another alternative is to edit the file specifications used by commands in the program to access a renamed file or load a renamed program.

Examples

RENAME MENU:1 TO PACKAGE3/MNU

This command renames the file MENU on Drive 1 to PACKAGE3/MNU.

RENAME LOGO TO LOGO1/BAS

Without a drive specification for the source file, the command begins at Drive 0 to search all drives for a file named LOGO. The first file found with the name LOGO will be renamed to LOGO1/BAS.

RENAME J3SMITH5/S02:4 TO J3SMIT15

This command renames the file J3SMITH5/S02 on the diskette in Drive 4 to J3SMIT15/S02. A different extension isn't specified, so the extension /S02 from the original file will be applied.

RENAME ADDITION.SECRET:1 TO K8ADD

This command renames the file on Drive 1 named ADDITION, which is protected by the update password SECRET. The new file, named K8ADD, retains the same password.

RENAME DEMO/BAS:2 TO J3DEMO/

This command renames the file DEMO/BAS on Drive 2 to J3DEMO. The use of the / with no characters after it kept the original file's extension from being applied to the new name.

RENAME TEST/DAT TO TEST

This is an invalid command, and will produce the error message "Duplicate file name". The command doesn't change the source file specification in any way: the extension /DAT is carried to the new file specification, creating two identical names.

HOW TO AVOID FILENAME DUPLICATION

Since up to 240 user file entries can be stored in the directory for each hard disk drive, there is a good chance that a file will be added to one of these drives whose name duplicates the name of an existing file. If this happens, the new file will replace the old file. The following suggestions can help you avoid duplicating a name that already exists.

- Assign a standard filename model for students to follow when they create their own programs and data files. As described on page 117, such a format ensures that every student file specification will be unique. This precaution prevents students from accidentally duplicating each others' files and the courseware and other vital files stored at the Host.
- Before you copy files with the commands COPY and BACKUP, use the DIR command to see if the filenames you want to copy already exist on the destination disk. For example, before you COPY a file called MENU from Drive 4 to Drive 3, enter the command `DIR MENU:3 (I)`. Before you BACKUP a group of files, enter a DIR command for each disk (source and destination drive number) using the identical partial file specification and parameters. (If a printer is available, include the parameter P for a printed copy of each directory.)

If a matching file is found on the destination disk, your options are:

- Store the file on a different destination disk.
 - RENAME the file on the destination disk.
 - RENAME the source file. (Check the destination disk's directory again, using the new name, before proceeding.)
 - Proceed with COPY or BACKUP, replacing the file on the destination disk.
 - KILL or PURGE the duplicate file on the destination disk.
- While using CONV to move files from TRSDOS diskettes to the LDOS hard disk, don't turn off the QUERY parameter. You will see the message "File exists -- replace it?" appear under a duplicate filename. Enter N for No to skip that file, and continue to convert the rest of the files on the diskette. Your options are:
- CONVert the file onto a different destination disk.
 - RENAME the duplicate file on the destination disk, then CONVert the file onto the destination disk.
 - KILL or PURGE the duplicate file on the destination disk, then CONVert the file onto the destination disk.

APPENDICES

**Appendix I:
OTHER WAYS TO LOAD
THE STUDENT STATION SOFTWARE**

This appendix describes how to load the Student Station operating software from a cassette tape, Network 2 Controller, or DSTUDENT Diskette. If a Student Station isn't equipped for the Network 3 ROM loading routine (described on page 10), then one of these procedures must be followed at that computer each time it joins the Network 3. (These procedures assume that your Network 3 system has been set up as outlined by First Time Start Up, and that you have already started up the Host system as described under Daily Start up.)

CASSETTE LOADING

This procedure requires a STUDENT cassette tape (a tape containing the Student Station operating software) not included with the Network 3 Model III Hard Disk Operating Software package. To make a STUDENT cassette tape, follow the instructions on page 198 of Appendix III.

Note: If you have a STUDENT cassette tape from the floppy disk Network 3 Operating Software (Cat. No. 26-2775), or any other version of the STUDENT program, you must make a new tape containing the version in this package.

1. Turn on the Student Station computer. (The On/Off switch is under the right side of the keyboard.)
2. Connect the cassette recorder to the Student Station. (Connect the round DIN plug to the CASSETTE jack on the back of the computer. Connect the three plugs on the other end of the cable to the recorder: the **black plug** into the EAR jack, the **gray plug** into the AUX jack, and the **small gray plug** into the MIC jack.) Make sure the recorder's power is on.
3. Insert a STUDENT cassette tape into the cassette recorder.
4. Set the volume on the cassette recorder at 6.
5. Press the REWIND button on the recorder. When the tape is rewound, press STOP. Then press PLAY. (If the recorder is connected properly, it should not come on at this point.)
6. When the screen shows: Type or press:

Cass?	[ENTER]
Memory Size?	[ENTER]
Ready	SYSTEM [ENTER]
>	
*?	STUDENT [ENTER]

The cassette recorder will come on and begin to load the program. If the program is loading properly, two asterisks (**) will appear in the upper right corner of the screen. The right asterisk will blink.

If the asterisks don't appear after several seconds:

- Press the STOP button on the recorder.
- Turn the volume on the recorder a little higher.
- Press the orange Reset button on the Student Station.
- Repeat from Step 5 above.

If the asterisks appear, but the right one doesn't blink:

- Press the STOP button on the recorder.
- Turn the volume on the recorder a little lower.
- Press the orange Reset button on the Student Station.
- Repeat from Step 5 above.

If "D*" or "C*" appears on the screen, make a new copy of the STUDENT cassette tape. Follow the instructions on page 198 of Appendix III. Then start again from Step 3.

7. When "*?" reappears, type / and press [ENTER].
8. When you see "Baud rate ?" on the screen, press [ENTER]. You'll see copyright information and the prompt "Network 3". The STUDENT program version number displayed on the top line should be Ver 2.1.4.

If the Host is running the HOST program, the Student Station is ready to operate under the Network 3 Operating System.

NETWORK 2 LOADING

With the optional Network 2 Controller, you and your students can simultaneously load STUDENT (as well as other programs) into all or selected Student Stations. The Network 2 Controller (Cat. No. 26-1211) connects up to 16 Student Stations to a Host computer by cassette cables, so this network won't interfere with the Network 3 RS-232C cable connections. Either the Network 3 Host or a Student Station can serve as the Network 2 Host. Note: The Network 2 Controller will not work with Model 4 computers whose processors are operating at increased clock speed (4MHz).

1. Set up the Network 2 according to the instructions in the manual for the Network 2 Controller. Use the Network 3 Host computer as the Host for the Network 2. (Network 2 cable connections won't interfere with Network 3 connections.)

At the Network 2 Controller:

2. Turn the POWER switch ON.
3. Set the MODE switch to MPLX.
4. Set the BAUD RATE switch to 1500.

At each Student Station:

5. Instruct the students to turn on their Student Station computers. (The On/Off switch is under the right side of the keyboard.)
6. When the screen shows: They should type or press:

Cass? [ENTER]

Memory Size? [ENTER]

Ready SYSTEM [ENTER]
>

*? STUDENT [ENTER]

The red lights on the Network 2 Controller that correspond to the active Student Stations should now be lit. If not, check to see if the students have correctly entered load commands, and make sure the Student Station's Network 2 cable is securely connected to the computer and the Network 2 Controller.

At the Host:

7. When you see "LDOS Ready", type DO NET2 and press [ENTER]. (NET2 is an LDOS command file that automatically sets up the transmission of the STUDENT program through the Host's cassette port.)
8. In a few seconds, after the screen fills with messages about cassette output, you'll see the prompt "Cass ?". Type H.

The Student Station operating software will now load into the Student Stations. Two asterisks (**) will appear in the upper right corner of each Student Station screen. The right asterisk will blink.

9. When you see "LDOS Ready", load the HOST program by typing HOST and pressing [ENTER].
10. When "Baud rate ?" appears, press [ENTER]. The screen will now display the network status screen.

At each Student Station:

11. When "*?" reappears, type / and press [ENTER].
12. When "Baud rate ?" appears, press [ENTER]. The screen will now display the "Network 3" prompt.

Now the computer is ready to operate as a Student Station under the Network 3 Operating System.

DISK LOADING

The DSTUDENT Diskette included in this package is a TRSDOS-format diskette. It contains the TRSDOS operating system, a version of the Student Station software named DSTUDENT/CMD, and a program that will help you transfer certain Radio Shack educational software packages to the hard disk.

Follow the instructions on page 196 to make a backup copy of the DSTUDENT Diskette. This diskette is not backup protected, so you can provide one for each Student Station that is equipped with a disk drive.

Note: If you have a DSTUDENT program from the floppy disk Network 3 Operating Software (Cat. No. 26-2775), or any other version of the DSTUDENT program, replace it with the DSTUDENT Diskette from this package.

Disk-equipped Model 4 and Model III computers can quickly join the Network 3 using the DSTUDENT Diskette:

1. Turn the computer on. (The On/Off switch is under the right side of the keyboard.)
2. Insert a backup copy of the DSTUDENT Diskette into the bottom disk drive. Insert it with the square notch to the left and the label facing up, then close the drive door.
3. Press and release the orange Reset button.
4. The program DSTUDENT automatically loads and runs, with the Student Station set to operate at the normal Network 3 baud rate (9600 baud). In a few seconds the screen will display the "Network 3" prompt.

If the Host is running the HOST program, the computer is ready to operate as a Student Station under the Network 3 Operating System.

If you want to be able to answer the "Baud rate ?" prompt when you use a DSTUDENT Diskette, modify a backup copy as follows.

1. Repeat Steps 1 and 2 above.
2. Press and release the orange Reset button, but hold down the [ENTER] key. Keep holding [ENTER] until "TRSDOS Ready" appears.
3. At "TRSDOS Ready", type AUTO DSTUDENT and press [ENTER].

When you use this modified DSTUDENT Diskette to load the DSTUDENT program, the "Baud rate ?" prompt will appear. Then you can press [ENTER] to accept the normal Network 3 baud rate, or change the rate as described on page 107.

**Appendix II:
LIST OF RADIO SHACK EDUCATIONAL
SOFTWARE PACKAGES THAT CAN BE USED WITH
THE NETWORK 3 MODEL III HARD DISK SYSTEM**

The Radio Shack educational software packages that can be used with the Network 3 system are listed below. Remember that the programs in these packages are stored on diskettes in the TRSDOS format. All non-system files on these diskettes must be converted to LDOS, the Hard Disk Operating System, for use with the hard disk Network 3 system. Most of the packages below can be converted as described in the example beginning on page 17. Some require conversion by programs included with the Operating Software, as explained on page 189.

Catalog Number	Title
26-1714	Advanced Graphics
26-2603	C.A.R.D. I: Sentences Requires Network 3 TRS-80 AUTHOR I Lesson Presentation Package (Cat. No. 26-2713) and a minimum of 48K in each Student Station.
26-2604	C.A.R.D. II: Paragraphs Requires Network 3 TRS-80 AUTHOR I Lesson Presentation Package (Cat. No. 26-2713) and a minimum of 48K in each Student Station.
26-2605	C.A.R.D. III: Directions Requires Network 3 TRS-80 AUTHOR I Lesson Presentation Package (Cat. No. 26-2713) and a minimum of 48K in each Student Station.
26-2619	Corplan Requires a minimum of 48K in each Student Station. Requires special conversion. (See page 189.)
26-1716	Essential Math, Volume I
26-1719	Essential Math, Volume II
26-1724	Euclid Geometry Tutor
26-1722	Graphical Analysis of Experimental Data
26-2513 through 2520	High Motivation Reading Series Programs Each package requires TRS-80 MicroPILOT (Cat. No. 26-2718). Each package requires special conversion. (See page 189.)
26-2521	High Motivation Reading Series Student Record System Requires TRS-80 MicroPILOT (Cat. No. 26-2718). Note: Before using the score file, you must make the modification described on page 154.

26-2645	High Motivation History Series Basic Illustrated History of America Requires Network 3 TRS-80 AUTHOR I Lesson Presentation Package (Cat. No. 26-2713).
26-1721	Interpreting Graphs in Physics
26-1718	Introduction to the Alphabet
26-2600	Investigations in Integral Calculus
26-1715	K-8 Math, Volume I
26-1725	K-8 Math with Student Management, Volume I
26-2620	Matrices, Determinants, and Simultaneous Equations Requires special conversion. (See page 189.)
26-2739	Network PASCAL
*	Network 3 SCRIPSIT Requires special conversion. (See page 189.)
26-2713	Network 3 TRS-80 AUTHOR 1 Lesson Presentation Package Requires special conversion. (See page 189.)
26-2613	Number Theory Requires special conversion. (See page 189.)
26-2601	Numeric Data Entry Practice
26-2602	Plane Analytic Geometry
26-2623	Quadratic Equations Requires special conversion. (See page 189.)
26-2609	TRS-80 Chemistry Lab, Volume I Requires special conversion. (See page 189.)
26-2718	TRS-80 MicroPILOT
26-1720	Vector Addition

For information on newly released programs, please consult your Radio Shack Regional Educational Coordinator. For the name of the full-time Educational Coordinator in your area, call Radio Shack's Education Division at 800-433-5682 (toll free). In Texas, call 800-772-8538.

* Contact your Regional Educational Coordinator for information on obtaining this version of the SCRIPSIT word-processing program. Radio Shack's other business application programs (such as Accounts Payable) can't be used with a Network 3 system.

SPECIAL CONVERSION PROCEDURE

Certain Radio Shack educational software packages must be converted to the hard disk by the following two-part procedure. For this conversion procedure, you will need:

- A backup copy of your Radio Shack Model III TRSDOS 1.3 program diskette. (Follow the directions in the program's manual to make a backup copy.)
- A **new** backup copy of the DSTUDENT Diskette included in this package. (Follow the directions on page 196 to make a backup copy.)

The first part takes place under TRSDOS. Programs on the DSTUDENT Diskette transfer the appropriate files from your diskette to the DSTUDENT Diskette. Part two takes place under LDOS, the Hard Disk Operating System. Programs included with the Network 3 Operating Software convert the files from the DSTUDENT Diskette to a drive of the hard disk system. The entire procedure takes from five to 15 minutes to complete, depending on the package involved.

PART 1

1. If the Host computer is in use, exit the program or procedure and remove all diskettes from the floppy disk drives. (If the hard disk unit is on, you can leave it on during Part 1.)

If the Host computer is off, make sure all floppy disk drives are empty. Turn the computer on. (The On/Off switch is under the right side of the keyboard.)

2. Insert the backup copy of the DSTUDENT Diskette into the bottom disk drive (floppy Drive 0) with the square notch to the left and the label facing up, and close the door. Be sure the copy is **not** write protected. (The square notch on the edge of the diskette must be uncovered.)
3. Press and release the orange Reset button, then hold down [ENTER]. Keep holding [ENTER] until "TRSDOS Ready" appears. (If you see "Network 3" instead, try Step 3 again.)
4. At "TRSDOS Ready", type DO CONVPT1 and press [ENTER].
5. In a few moments a "menu" or option list appears under the heading "Network 3 Floppy Disk to Hard Disk Conversion Utility". Type the number displayed next to the title of the package that you want to transfer, and press [ENTER]. A menu of titles in the High Motivation Reading Series can be displayed by typing 3 and pressing [ENTER].
6. Insert the backup copy of the selected program diskette into the top disk drive (Drive 1) with the square notch to the left and the label facing up, and close the door. Press [ENTER].

7. All necessary files will be transferred to a holding file named CONVERSI/ONS on the DSTUDENT Diskette. As each file on the program diskette is transferred, you'll see its filename appear. If an error is encountered, you will be prompted to start over with a backup copy of the original program diskette.

When the program finishes, a message appears instructing you to remove this diskette so that you can start up the computer under LDOS. Remove the DSTUDENT Diskette and the program diskette.

PART 2

1. Make sure all floppy disk drives are empty.
2. Turn on all peripheral devices connected to the Host (such as the printer and Network 3 Controller), if they aren't already on. If the hard disk unit isn't already on, turn the power key clockwise.
3. Insert a Start-up Diskette into the bottom floppy disk drive with the square notch to the left and the label facing up, and close the door.
4. Press and release the orange Reset button.
5. In a few seconds the screen displays a large LDOS logo. When you see the message "Date ?", type the date using two digits each for the month, day, and year, with a slash separating each pair. (Example: type 01/23/85 for January 23, 1985.) Then press [ENTER].
6. When "LDOS Ready" appears, type DO CONVPT2 and press [ENTER].

If Drive 0 is write protected, the program will stop and display a message to that effect. If the hard disk's red PROTECT button is illuminated, press it to switch off write protection during the conversion procedure. If Drive 0 is write protected, type SYSTEM (WP=OFF) and press [ENTER]. Repeat Step 6.

7. When the program is ready, you'll see a message to insert the DSTUDENT Diskette into Drive 4. Remove the Start-up Diskette and insert the DSTUDENT Diskette with the square notch to the left and the label facing up, and close the door. Press [ENTER].
8. The holding file CONVERSI/ONS is converted from the DSTUDENT Diskette to Drive 0 for temporary storage. Then you will be prompted to remove the DSTUDENT Diskette and press [ENTER].
9. When you see the message "Which Hard Disk Drive will contain this package? Drive 0-3 :", type the desired drive number and press [ENTER].

10. Each filename of the package will be displayed as it is copied from the holding file CONVERSI/ONS to the drive you selected.

If a file with the same filename already exists on the drive, you'll be warned before the file is overwritten. To continue without replacing that file, type **N** and press **[ENTER]**. To replace that file, type **Y** and press **[ENTER]**. Unless you know that the duplicate file can be replaced, you should skip it. Some suggestions for dealing with duplicate filenames are listed at the bottom of page 181. Later you can repeat Part 2 of the conversion procedure from Step 6 to copy the file.

11. When the last file from the package has been copied (or skipped, as described above), you can print a list of the filenames that have been stored on your hard disk (or that have been skipped). To end the procedure without a printout, type **N** and press **[ENTER]**. If a printer is connected to the Host computer and ready to print, type **Y** and press **[ENTER]** for a printed copy.

At this point, a separate program will begin to modify files that have been converted to the hard disk from one of these packages:

- Corplan
- Any package in the High Motivation Reading Series
- Network 3 SCRIPSIT
- Network 3 TRS-80 AUTHOR I Lesson Presentation Package

You'll know the conversion or modification program is over when you see the message **"Conversion of software has ended."** This message remains on the screen for a minute before **"LDOS Ready"** reappears. Or, you can press **[BREAK]** to return to LDOS.

If you didn't copy all files to the destination hard disk drive (due to an error or filename conflict, for example), start again from Step 6. This time you'll see the message **"Do you want to convert the programs from TRSDOS again?"**.

- If you want to repeat the conversion of the holding file from the DSTUDENT Diskette to the hard disk, type **Y** and press **[ENTER]**. Then continue the procedure from Step 7 above.
- If you want to use the data that you have already converted to the hard disk, type **N** and press **[ENTER]**. Then continue the procedure from Step 9 above.

When all files of the educational package are stored on the hard disk, Part 2 of the conversion procedure has been successfully completed.

**Appendix III:
HOW TO MAKE BACKUP COPIES
OF THE SOFTWARE IN THIS PACKAGE**

Two diskettes are included in this package: the Network 3 Model III Hard Disk Operating Software Diskette and the DSTUDENT Diskette.

- The Operating Software Diskette is a data diskette in the LDOS format. It contains all the files needed to operate the Network 3 system from a Host computer that is equipped with a hard disk and LDOS, the Hard Disk Operating System. (Appendix IV explains how to transfer these files to the hard disk.) It also contains optional utilities that will help you use the Network 3 system and transfer certain Radio Shack educational software packages to the Host computer's hard disk.

- The DSTUDENT Diskette is a TRSDOS system diskette containing the DSTUDENT program, a version of the Student Station operating software. This diskette enables disk-equipped Model 4 or III computers to quickly join the Network 3 system. (Page 186 of Appendix I explains how use this diskette.) This diskette also contains programs that will help you transfer certain Radio Shack educational software packages to the hard disk.

Before you use these diskettes, follow the instructions below to make backup copies. One copy of the Operating Software Diskette will be sufficient. Copy the DSTUDENT Diskette for each class or for each disk-equipped Student Station, as desired. (Neither diskette is protected to restrict copying.)

To make a copy of the Student Station operating software on cassette tape, turn to page 198. A program included with the Operating Software will send the STUDENT program through the Host computer's cassette port to a tape in your cassette recorder. Then you'll be able to cassette load the STUDENT program into Model 4 or III computers that aren't equipped with disk drives or the Network 3 ROM chip set, so that they can join the Network 3 system. (The same tape output program can be used with an optional Network 2 Controller to quickly load several such computers. Both cassette and Network 2 loading procedures are described in Appendix I.)

COPYING THE OPERATING SOFTWARE DISKETTE

TWO-DRIVE HOST

1. The Host computer must be at "LDOS Ready". (If not, power up the Host as described on page 8.) Remove any diskettes from the Host.
2. Insert a blank or unneeded diskette into the bottom disk drive, with the square notch to the left and the label facing up, and close the door. (The floppy Drive 0 is considered Drive 4 of the hard disk system).
3. Type **FORMAT :4 (Q=N)** and press **[ENTER]**.

If the diskette isn't blank, you'll see the message

Are you sure you want to format it ?

FORMAT erases all data on the diskette. If you're SURE you won't need any of the information currently on the diskette, type Y and press **[ENTER]**. Otherwise, type N and press **[ENTER]**, then start over with another diskette.

LDOS then begins formatting the diskette in Drive 4. When it has finished, you'll see these messages:

Formatting complete

Note: Realtime clock no longer accurate

LDOS Ready

The second message refers to an LDOS optional "clock" feature that keeps track of the time since startup. The **FORMAT** and **BACKUP** commands turn off this clock.

4. Cover the square notch on the side of the Network 3 Model III Hard Disk Operating Software Diskette with the write-protect tab provided. (If you don't have a tab, use a piece of tape.)
5. Insert the Operating Software Diskette into the top disk drive (Drive 5) with the write-protect tab to the left and the label facing up, and close the door.
6. When you see:

LDOS Ready	You type or press:
Source drive number ?	BACKUP [ENTER]
Destination drive number?	5 [ENTER]
Different pack IDs! Abort backup?	4 [ENTER]
	N [ENTER]

LDOS then begins making the diskette in Drive 4 into an exact duplicate of the Operating Software Diskette in Drive 5.

When it has finished, you'll see these messages:

```
Can't clear Mod flags - Source disk is write protected
Backup complete
Note: Real time clock no longer accurate
LDOS Ready
```

(The first message refers to an LDOS feature which puts a "modification flag" on any disk file you modify. The BACKUP command removes these flags unless the source diskette is write protected.)

7. You now have a backup copy of the Operating Software Diskette. Put the original in a safe place and use the backup when you transfer the Operating Software to the hard disk.

If the screen shows an error message of any kind, or does not say "**Backup Complete**," then start over at Step 1. If an error still occurs, get a new blank diskette or bulk erase the diskette you have been using as a destination diskette, then start over at Step 1.

COPYING THE DSTUDENT DISKETTE

TWO-DRIVE STUDENT STATION

1. Cover the square notch on the side of the DSTUDENT Diskette with the write-protect tab provided. (If you don't have a tab, use a piece of tape.)
2. Make sure the Student Station computer's disk drives are empty. Turn on the computer. (The On/Off switch is under the right side of the keyboard.)

OR: If the computer is already on, make sure it displays a flashing cursor and a prompt (for example, "Network 3" or "Ready >"). Remove any diskettes.

3. Insert the DSTUDENT Diskette into the bottom disk drive (Drive 0) with the write-protect tab to the left and the label facing up, and close the door.
4. Insert a new, blank diskette into the top disk drive (Drive 1) with the uncovered notch to the left and the label facing up, and close the door.
5. Press and release the orange Reset button, then hold down [ENTER]. Keep holding [ENTER] until "TRSDOS Ready" appears.

6. When you see: You type or press:

TRSDOS Ready BACKUP [ENTER]

SOURCE Drive Number? 0 [ENTER]

DESTINATION Drive Number? 1 [ENTER]

SOURCE Disk Master Password? PASSWORD [ENTER]

If you see the message "Backup Complete" then you have a backup copy of the DSTUDENT Diskette. Put the original in a safe place. Use the backup to make more copies (from "TRSDOS Ready" above) or to load the Student Station software (as described on page 186).

If the screen shows an error message of any kind, or does not say "Backup Complete," then go back to Step 4. If an error still occurs, get a new blank diskette or bulk erase the diskette you have been using as a destination diskette. Then insert the blank diskette in Drive 1 and repeat from Step 4.

ONE-DRIVE STUDENT STATION

1. Cover the square notch on the side of the DSTUDENT Diskette with the write-protect tab provided. (If you don't have a tab, use a piece of tape.)
2. Make sure the Student Station computer's disk drive is empty. Turn on the computer. (The On/Off switch is under the right side of the keyboard.)

OR: If the computer is already on, make sure it displays a flashing cursor and a prompt (for example, "Network 3" or "Ready >"). Remove any diskette.

3. Insert the DSTUDENT Diskette in the disk drive (Drive \emptyset) with the write-protect tab to the left and the label facing up, and close the door.
4. Press and release the orange Reset button, then hold down [ENTER]. Keep holding [ENTER] until "TRSDOS Ready" appears.

5. When you see: You type or press:

TRSDOS Ready BACKUP [ENTER]

SOURCE Drive Number? \emptyset [ENTER]

DESTINATION Drive Number? \emptyset [ENTER]

SOURCE Disk Master Password? PASSWORD [ENTER]

Insert DESTINATION Diskette <ENTER>

After the red light on the drive goes off, remove the DSTUDENT diskette (SOURCE). Insert a new, blank diskette (DESTINATION) with the uncovered notch to the left and the label facing up. Close the door and press [ENTER].

Insert SOURCE Diskette <ENTER>Continue to switch back and forth between the DSTUDENT diskette (SOURCE) and the new diskette (DESTINATION) as instructed on the screen. Do not open the disk drive door while the red light is on.

If you see the message "Backup Complete" then you have a backup copy of the DSTUDENT Diskette. Put the original in a safe place. Use the backup to make more copies (from "TRSDOS Ready" above) or to load the Student Station software (as described on page 186).

If the screen shows an error message of any kind, or does not say "Backup Complete," then go back to Step 3. If an error still occurs, get a new blank diskette or bulk erase the diskette you have been using as a destination diskette. Then repeat from Step 3.

COPYING STUDENT TO CASSETTE TAPE

1. The Host computer must be at "LDOS Ready". (If not, power up the Host as described on page 8.) The Network 3 Model III Hard Disk Operating Software must already be stored on the hard disk.
2. Connect your cassette recorder to the Host Computer. (Connect the round DIN plug to the CASSETTE jack on the back of the computer. Connect the three plugs on the other end of the cable to the recorder: the **black plug** into the EAR jack, the **gray plug** into the AUX jack, and the **small gray plug** into the MIC jack.) Make sure the recorder's power is on.
3. Insert a blank cassette tape into the cassette recorder.
4. Set the volume on the cassette recorder at 6.
5. Press the REWIND button on the recorder to make sure the tape is rewound. When the tape is rewound, press STOP. (If necessary, use the FAST FORWARD button to advance the tape past the leader.)
6. Press the RECORD button on the recorder.
7. At "LDOS Ready", type DO NET2 and press [ENTER]. (NET2 is an LDOS command file that automatically sets up the transmission of the STUDENT program through the Host's cassette port. It is also used for loading the STUDENT program into Student Station computers via the Network 2 Controller, as described on page 184.)
8. In a few seconds, after the screen fills with messages about cassette output, you'll see the prompt "Cass ?". Type H and press [ENTER].

The STUDENT Program of the Student Station operating software will now be copied onto the cassette tape.

When it has finished, the tape stops and "LDOS Ready" appears on the Host's screen. Now you can use this tape and the cassette recorder to load the STUDENT Program into a Student Station (as described on page 183).

**Appendix IV:
HOW TO INITIALIZE THE NETWORK 3
HARD DISK SYSTEM**

The procedure described here will prepare or "initialize" a 15 megabyte Hard Disk for use with your Network 3 Host computer. (If you have a 5 megabyte Hard Disk, follow the standard initialization procedure described in Section 5 of your Hard Disk Start-up Manual.)

The following procedure, called Educational Initialization, differs somewhat from the initialization described in the manual for the 15 megabyte Hard Disk. An easy-to-use program called EDUCINIT is included with the Network 3 Operating Software. The EDUCINIT program will:

- Format all hard disk drives. This process totally erases the hard disks and prepares them for data storage. **If you are reinitializing your hard disk system for any reason, backup all files from the hard disk drives to floppy diskettes before you begin this initialization procedure.**
- Configure the Host system. EDUCINIT establishes six hard disk drives, numbered 0, 1, 2, 3, 6, and 7. The two floppy disk drives in the Host computer will become Drives 4 and 5. This configuration permits storage of the greatest possible number of files on the hard disk system. It also enables programs designed for a standard hard disk system configuration (hard disk drives 0 to 3 and floppy disk drives 4 to 7) to work with this arrangement.
- Copy the LDOS Hard Disk Operating System onto Drive 0.

If you're setting up the hard disk system for the first time, refer to the Hard Disk System Start-up Manual. There you will find general information about the hard disk, including directions for connecting the unit to your computer and for copying the two LDOS version 5.1.4 diskettes.

Initializing the hard disk requires the Network 3 Operating Software Diskette and backup copies of both LDOS version 5.1.4 master diskettes: the Initialization Diskette and Hard Disk Operating System Diskette. The hard disk unit must be securely connected to the Host computer. This procedure will take approximately one hour to complete.

1. Make sure all Host computer floppy disk drives are empty.
2. Turn on all peripheral devices connected to the Host (such as the Network 3 Controller and the printer).
3. Turn on the hard disk by turning the power key clockwise.
4. Turn on the Host computer. (The On/Off switch is under the right side of the keyboard.)

5. Insert a **backup copy** of the Initialization Diskette into the bottom floppy disk drive (Drive 0) with the square notch to the left and the label facing up, and close the door. Do **not** use the original diskette. Also, be sure the backup copy is **not** write protected. (The square notch on the edge of the diskette must be uncovered.)
6. Cover the square notch on the side of the Network 3 Operating Software Diskette with the write-protect tab provided. (If you don't have a tab, use a piece of tape.)

Insert the Operating Software Diskette into the top floppy disk drive (Drive 1) with the write-protect tab to the left and the label facing up, and close the door.

7. Hold down the [ENTER] key, then press and release the orange Reset button. Keep holding [ENTER] until a screen appears.
8. In a few seconds the screen displays a large LDOS logo. When you see the message "Date ?", type the date using two digits each for the month, day, and year, with a slash separating each pair. (Example: type 01/23/85 for January 23, 1985.) Hold down the [ENTER] key and keep holding it down until the prompt "LDOS Ready" appears.

If any other message appears: press and release the orange Reset button and immediately hold down the [ENTER] key until "LDOS Ready" appears.

9. Decide on a master password for your hard disk drives. The password can be composed of any eight letters and numbers, as long as the first character is a letter. (For example, HISCHOOL, PS126, and Z80POWER are acceptable passwords.) Unless you choose "PASSWORD", this master password will be required in order to backup and remove files stored on the hard disks. **Write the password down and store it in a secure place for future reference.**
10. At "LDOS Ready", type the following command, substituting your password for password:

DO EDUCINIT (PW=password) [ENTER]

11. LDOS then begins the initialization procedure. Shortly you'll see a message warning that formatting is about to begin. **This process totally erases all information stored on the hard disk drives. There will be no way to recover it.**

To abort initialization so that you can backup hard disk files onto floppy diskettes, press [BREAK]. To continue, press [ENTER]. Formatting and configuration of these two hard disks will take about 15 minutes.

You will be prompted again before the rest of the hard disks are formatted. Press [ENTER] to continue. Formatting and configuration of these four hard disks will take about 30 minutes.

12. When the message, "Configuration is NOT complete." appears, you must enter the four commands displayed on the screen to complete configuration.

When you see "LDOS Ready", type the following commands in order:

```
SYSTEM (SYSTEM=4) [ENTER]
```

```
SYSTEM (SYSGEN=ON) [ENTER]
```

```
BACKUP :Ø :4 (SYS,INV,MOD) [ENTER]
```

If the message "Master password ?" appears after you enter this command, type the password you assigned in Step 1Ø and press [ENTER].

```
BOOT [ENTER]
```

13. After entering the last command, you'll be prompted to remove the boot disk (the backup Initialization Diskette in the bottom floppy disk drive). The contents of this diskette are now different. It contains information on how your system is configured. Remove it and label it START-UP.

Remove the Network 3 Operating Software Diskette from the top floppy disk drive.

14. Insert the Hard Disk Operating System Diskette in the bottom floppy disk drive with the notch to the left and the label facing up, and close the door. Press [ENTER]. System files will begin copying from the diskette to hard disk Drive Ø.
15. When "LDOS Ready" appears, you have completed the hard disk initialization. Remove the Hard Disk Operating System Diskette and store it in a safe place.
16. Insert the Start-up Diskette (that you labeled in Step 13) in the bottom floppy disk drive with the notch to the left and the label facing up, and close the door.

Press and release the orange Reset button, then **immediately** hold down both the [ENTER] and the [CLEAR] keys. Keep holding down both keys until "LDOS Ready" appears.

17. At "LDOS Ready", type AUTO and press [ENTER].
(This step removes an "automatic" command from the Start-up Diskette. The command was needed during initialization only.)
18. When "LDOS Ready" appears, press and release the orange Reset button. The Host computer now reads the information from the Start-up Diskette and configures as a hard disk system. Drives Ø, 1, 2, and 3 are hard disk drives, Drives 4 and 5 are the two floppy disk drives, and Drives 6 and 7 are additional hard disk drives.

You must use this Start-up Diskette in the bottom floppy disk drive whenever you power up or reset the Host computer for use as a hard disk system. Then you can remove this diskette.

19. While the Start-up Diskette is still in Drive 4, the bottom floppy disk drive, make several backup copies of it.

Insert a blank or unneeded diskette into Drive 5, the top floppy disk drive. Insert the diskette with the square notch to the left and its label facing up, and close the door.

Type **FORMAT :5 (Q=N)** and press **[ENTER]**.

If the diskette isn't blank, you'll see the message

Are you sure you want to format it ?

FORMAT erases all data on the diskette. If you're **SURE** you won't need any information on the diskette, type **Y** and press **[ENTER]**. Otherwise, type **N** and press **[ENTER]**, then start over with another diskette.

LDOS then begins formatting the diskette in Drive 5. When it has finished, you'll see these messages:

Formatting complete
Note: Realtime clock no longer accurate
LDOS Ready

(The second message refers to an **LDOS** optional "clock" feature that keeps track of the time since startup. The **FORMAT** and **BACKUP** commands turn off this clock.)

Type **BACKUP :4 :5** and press **[ENTER]**

You might see the message **Different pack IDs! Abort backup?**. Type **N** and press **[ENTER]**

LDOS then begins making the diskette in Drive 5 into an exact duplicate of the Start-up Diskette in Drive 4.

When it has finished, you'll see these messages:

Backup complete
Note: Real time clock no longer accurate
LDOS Ready

If an error occurs, and you don't see **Backup Complete**, repeat the backup procedure using a different destination diskette in Drive 5.

Remove the master Start-up Diskette from Drive 4 and store it with your Hard Disk Operating System Diskette in a safe place. Without the information on this Start-up Diskette, you can't use the Host computer as a hard disk system.

Remove the backup Start-up Diskette from Drive 5, label it, then insert it into Drive 4. Repeat the backup procedure to make several backup copies of the system's Start-up Diskette.

**Appendix V:
HOW TO TRANSFER THE OPERATING SOFTWARE
TO YOUR HARD DISK**

Before you begin using your hard-disk-equipped network for the first time, make a backup copy of the Network 3 Model III Hard Disk Operating Software Diskette (as described on page 194). Then follow the instructions below to transfer the files from your backup Operating Software Diskette to a drive of the hard disk system. There the network operating programs will be accessed faster and stored more reliably than they would on a diskette used in a floppy disk drive at the Host.

Repeat the procedure described here any time you need to install the Operating Software or replace Operating Software files (in case one or more files get damaged or removed from your hard disk). The BASIC utility program included with the Operating Software that copies the necessary files from the diskette to a hard disk drive will first remove any previous version of each file, if one is found.

The following procedure requires about five minutes to complete.

1. With the prompt "LDOS Ready" showing on the Host computer screen, remove any diskette from Drive 4 (the bottom floppy disk drive).
2. Place the write-protect tab (provided with new diskettes) over the square notch on the side of your backup copy of the Network 3 Model III Hard Disk Operating Software Diskette.
3. Insert the backup Operating Software Diskette into Drive 4 with the covered notch to the left and the label facing up, and close the door.
4. Type DO COPYTOHD and press [ENTER].
5. When you see the message "WHICH DRIVE WILL CONTAIN THE NETWORK 3 OPERATING SOFTWARE?", type the number of the desired hard disk drive (0, 1, 2, or 3) and press [ENTER]. (Drive 0 is recommended.)
6. You will see the message "Copying Network 3 Operating Software to Hard Disk:" appear. A series of periods and numbers will be displayed while the files are transferred. When all files have been successfully copied to the specified hard disk drive, you'll see the message "Copy is complete." Then the "LDOS Ready" prompt will appear.
7. Remove your backup Operating Software Diskette and store it in a safe place.

If the message "Program not found" appears after Step 4:

1. Make sure you have the backup Operating Software diskette in Drive 4, the Host's bottom floppy disk drive.
2. Make sure that LBASIC (LDOS version of BASIC) is available at the Host. At "LDOS Ready", type the command DIR LBASIC (I) and press [ENTER]. The filenames LBASIC/CMD and LBASIC/OV3 must appear on one of the directories displayed.

If they aren't present, insert a backup copy of the Hard Disk Operating System Diskette that came with the hard disk in Drive 4. At "LDOS Ready", type the command
BACKUP LBASIC:4 :Ø and press [ENTER]. When "LDOS Ready" appears, repeat the transfer procedure from Step 4.

If the copy program can't transfer the Operating Software to the hard disk, an error message will be displayed that describes the problem and suggests what action you should take. Eliminate the problem, then repeat from Step 4.

The following files have been copied to your hard disk. Consult this list when you perform routine maintenance of the files stored on your hard disk, to avoid removing any Operating Software files.

CLEAR/CMD	CLS/CMD	CONVPT2/JCL
CP7ØØ5/BAS	CV7ØØ1/BAS	CV7ØØ2/BAS
CV7ØØ3/BAS	DATETIME/SET	DIR/CMD
FREE/CMD	HELP/CMD	HMRS7ØØ4/BAS
HOST/CMD	KILL/CMD	LIB/CMD
LIST/CMD	MAILBOX	MENU
MENUSORS	NBASIC/CMD	NET2/JCL
POSTAMT/DAT	RBOOT1/CIM	RBOOT2/CIM
STUDENT/CMD	VIEW/CMD	

If you transferred these files to a hard drive other than Drive Ø, check the directory on each preceding hard drive for duplicate filenames that could cause problems for you or your students. For example, if your Network 3 Operating Software is on Drive 2, and a BASIC program file with the filename MENU exists on Drive 1, then a drive specification MUST be included each time you want to run the Network 3 MENU utility program (RUN"MENU:2" instead of RUN"MENU").

The following files are required to operate the Network 3 system at a minimal level:

HOST/CMD NBASIC/CMD STUDENT/CMD RBOOT1/CIM RBOOT2/CIM

You can remove any of the other files listed above if they aren't needed or wanted. (Use the LDOS command PURGE described on page 178.) All Network 3 Operating Software files can be replaced by repeating the transfer procedure.

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