

**EPSON PORTABLE COMPUTER**

**PX-4**

---

**DISK UTILITIES OPERATING MANUAL**

---

## **Trademark Acknowledgments**

CP/M® is a registered trademark of Digital Research, Inc.  
EPSON is a registered trademark of EPSON CORPORATION.

### **NOTICE**

- \* All rights reserved. Reproduction of any part of this manual in any form whatsoever without EPSON's express written permission is forbidden.
- \* The contents of this manual are subject to change without notice.
- \* All efforts have been made to ensure the accuracy of the contents of this manual. However, should any errors be detected, EPSON would greatly appreciate being informed of them.
- \* The above notwithstanding, EPSON can assume no responsibility for any errors in this manual of their consequences.
- \* The section on ED and Appendix B "CP/M MESSAGES" are reproduced with the permission of Digital Research, Inc.

# *Table of Contents*

<b>PREFACE</b> .....	i
Overview of the Manual .....	i
Conventions Used in This Manual .....	i
<b>Chapter 1 GETTING STARTED</b> .....	1-1
Opening the Package .....	1-1
Installation Requirements .....	1-2
Making a Copy of Utilities Disk .....	1-3
<b>Chapter 2 STARTING UP THE DISK UTILITIES</b> .....	2-1
From the MENU Screen .....	2-1
From the CP/M Command Line .....	2-2
Outline of the Utility Program .....	2-4
Format of Program Explanations .....	2-5
<b>Chapter 3 UTILITY COMMANDS</b> .....	3-1
ASM .....	3-2
CONFIG .....	3-6
COPYDISK .....	3-19
CTRLP .....	3-45
DDT .....	3-47
DEXSUB .....	3-64
DIRINIT .....	3-65
DUMP .....	3-66
ED .....	3-67
FILINK .....	3-96
LOAD .....	3-104
PIP .....	3-106
STAT .....	3-118
SUBMIT .....	3-127
TERM .....	3-131
XSUB .....	3-137
<b>Chapter 4 MAKING PRACTICAL USE OF THE UTILITIES</b> .....	4-1
BDOS Function Call Program .....	4-1
Using a Submit File to Assemble a COM File .....	4-12

**Appendices**

A. DISK WRITE PROTECTION..... A-1  
B. CP/M MESSAGES ..... B-1  
C. ERROR MESSAGES..... C-1

**Index** ..... Index-1

# ***PREFACE***

## **Overview of the Manual**

This manual explains how to use the 16 utility programs which are included on the EPSON PX-4 Utility Disk for the EPSON PF-10 or TF-15 disk drive units. Some of the commands included on the utility disk are later versions of commands which are included in PX-4's utility ROM. Duplicate commands are used in the same manner as their counterparts in the utility ROM.

Be sure to observe the precautions described in your disk drive unit's operating manual when handling your disk and drive unit.

Topics discussed in this manual are as follows.

Chapters 1 and 2 .....	Preparing the utility disk for use
Chapters 3 and 4 .....	How to use the utilities
Appendices .....	Other information

Unless you are already experienced in using the disk utilities, we recommend that you start reading from Chapter 1. Experienced users may proceed directly to information desired by checking the Table of Contents and Index.

## **Conventions Used in This Manual**

Conventions used in explaining the utilities are as follows.

1. Keys which are to be pressed by you are shown in a box .
2. When you must press two keys in succession, these boxes are connected by a hyphen (-).
3. The symbol “^” or the letters “CTRL” are used to indicate when you must press the control key together with another key. For example, ^C or  +  means to press and hold the  key, then to type  and release the  key. “ESC” means to press the  key.
4. Characters which you must type in during operation are shown in italics. For example, if you see

**A > *ASM***

you must type *ASM* on the CP/M command line.

**IMPORTANT**

Please note that all the examples in this manual assume that the utility disk has been inserted into drive D:.

# *Chapter 1*

## ***GETTING STARTED***

### **Opening the Package**

Make sure that the Disk Utilities package contains all of the following.

- The disk which contains the PX-4 utilities
- EPSON Software License Agreement
- PX-4 Disk Utilities Operating Manual (this manual)

If any of the above items are missing or damaged, notify your dealer as soon as possible.

# **Installation Requirements**

Set up PX-4 and your disk drive unit as follows. (See your disk drive unit's operating manual for detailed instructions.)

1. Connect the disk drive unit to PX-4 using the specified cable.
2. Turn on the PX-4's power and the disk drive unit.



## Making a Copy of the Utilities Disk

No disk is immune to accidental destruction, and your utilities disk is no exception. Disks can be destroyed by accidental exposure to magnetic fields (such as from speakers and certain types of stereo headphones), heat, physical scratches, cigarette ashes, and even fingerprints. Needless to say, such destruction can be very inconvenient (even disastrous), especially if you do not have an extra copy of the disk.

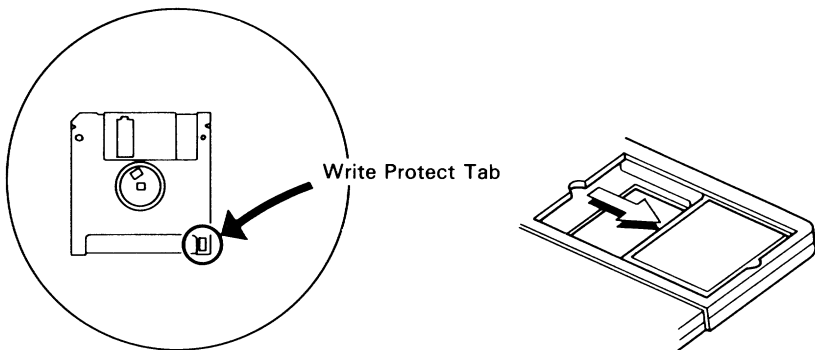
There, the first thing you must do before using the utilities disk is to make a copy of it.

Procedures for copying the disk are described below. Note that procedures differ slightly depending on how many drives you have; if you have only one drive, it will be necessary to exchange the source disk (the original utilities disk) with the destination disk (the disk on which you are making the copy) from time to time; this is not necessary if you have two or more drives.

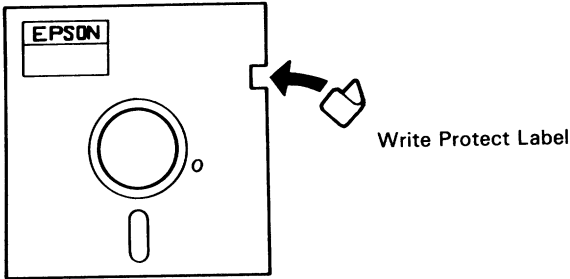
### IMPORTANT

There are two things you should do before you start copying.

First, write protect your utilities disk. If you have a 3.5" micro floppy disk, slide the write protect tab toward the edge of the disk.



If you have 5.25" floppy disk, cover the notch with the write protect tab that came with the diskette.



Second, set the RAM disk size to 0K bytes in the system initialize or using CONFIG in the utilities ROM. This is especially important if you only have one drive since it helps reduce the number of times you will have to exchange disks.

Now let's start copying.

First, insert your write protected utilities disk into disk drive D:. If your drive unit has a disk lock button, lock it.

When the CP/M prompt (A>) appears, the disk utility commands are ready for use. Type "D:COPYDISK" and press **RETURN**, then wait until the following screen appears.

```
COPYDISK  ver 1.0 (C) 1984 by EPSON
Press ESC to restart, STOP to exit, or
CTRL/STOP to abort during operation.
How many drives connected ? 2
1. One drive
2. Two or more drives
```

If you have only one disk drive, press the **[1]** key, then press **RETURN**; if you have two or more drives, press the **[2]** key then press **RETURN**.

When the **RETURN** key is pressed, the screen changes as follows.

```
Select COPYDISK operation   3
1. Format
2. Copy system tracks
3. Copy complete diskette
4. Format and Copy system tracks
5. Format and Copy complete diskette
6. Initialize directory tracks
```

Type in **5** to format the destination disk before making the copy. After making this selection, press the **RETURN** key.

**NOTE:**

*Blank disks sold by EPSON are preformatted, and thus do not need to be formatted before use. However, it will not such disks to format them again. Procedures for copying disks when the destination disk has already been formatted are described under "COPYDISK" in Chapter 3.*

The screen which appears next and subsequent procedures to follow differ according to whether or not you have more than one disk drive. Procedures when using one disk drive are as described below. See page 1-8 for procedures when using two or more disk drives.

**Procedures when using one disk drive**

If you selected "1" in the initial COPYDISK screen (that is, if you are using just one disk drive), the screen now changes as follows.

```
***** FORMAT & COMPLETE COPY *****
Drive name choice (D,E,F,G)
Enter drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Enter the name of the drive being used to make the copy (D: in this example) and press **RETURN** ; the screen changes as follows.

```
***** FORMAT & COMPLETE COPY *****  
Drive D selected  
Insert Destination diskette.  
Press RETURN when ready.  
ESC:restart STOP:exit CTRL/STOP:abort
```

Insert the destination disk into the specified drive and press **RETURN** to start formatting. The disk will be formatted track by track as follows:

```
***** FORMAT & COMPLETE COPY *****  
Drive D selected  
Formatting <TRACK NO.> 01  
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is formatted.

When the formatting is completed, the screen changes as follows. Remove the destination disk and insert the source disk.

```
***** FORMAT & COMPLETE COPY *****  
Drive D selected  
Diskette exchange countdown 20  
Insert Source diskette.  
Press RETURN when ready.  
ESC:restart STOP:exit CTRL/STOP:abort
```

When ready, press **RETURN** to start reading the contents of source disk.

```
***** FORMAT & COMPLETE COPY *****  
Drive D selected  
Diskette exchange countdown 10  
Reading <TRACK NO.> 00  
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is read.

The "Diskette exchange countdown" line tells you the number of times disks must be exchanged before copying is completed.

The COPYDISK utility starts reading the source disk from track 00.

After the first tracks have been read, the display changes as follows; remove the source disk and insert the destination disk.

```
***** FORMAT & COMPLETE COPY ****  
Drive D selected  
Diskette exchange countdown      20  
                                <TRACK NO.> 01  
Insert Destination diskette.  
Press RETURN when ready.  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

When ready, press **RETURN** to start writing to the destination disk; the screen changes as follows.

```
***** FORMAT & COMPLETE COPY ****  
Drive D selected  
Disk exchange countdown          10  
Writing                          <TRACK NO.> 00  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is written.

After the first tracks have been written, the message "Insert Source diskette" is displayed again and the "Disk exchange countdown" is reduced by one. Insert the source disk again and press **RETURN** to read the next tracks, then insert the destination disk and press **RETURN** to write them. Repeat this sequence until the disk has been completely copied.

After all tracks have been copied, the following screen is displayed.

```
***** FORMAT & COMPLETE COPY ****  
  
Repeat with new diskette(s) (Y/N)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to make another copy of the utilities disk, press **[Y]**. Otherwise, press **[N]**. If **[N]** is pressed, the following screen is displayed to ask whether you want to copy some other disk, or return to the CP/M command line or menu screen.

```
***** FORMAT & COMPLETE COPY *****  
  
eXit or Continue COPYDISK (X/C)?  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want end COPYDISK operation, type **[X]**; otherwise, type **[C]**.

### Procedures when using two or more disk drives

After selecting “5” from the screen shown in Figure 1.4, the following screen is displayed to prompt you to input the name of the drive containing the source disk (the original utilities disk).

```
***** FORMAT & COMPLETE COPY *****  
  
Drive name choice (D,E,F,G)  
Enter Source drive name  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Type “D” and press the **[RETURN]** key. After doing this, the screen changes as follows to prompt for input of the drive containing the destination disk (the blank disk being used to make the copy).

```
***** FORMAT & COMPLETE COPY *****  
  
Drive name choice (D,E,F,G)  
Enter Source drive name D  
Enter Destination drive name  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Type "E" and press the **RETURN** key.

```
***** FORMAT & COMPLETE COPY *****
Copy from D to E
Press RETURN when ready.

ESC:restart STOP:exit CTRL/STOP:abort
```

When the above screen is displayed, check once more to make sure that the original utilities disk is in drive D: and that the blank disk is in drive E:, then press the **RETURN** key to start formatting the blank disk.

While the disk is being formatted, the screen appears as shown below.

```
***** FORMAT & COMPLETE COPY *****
Copy from D to E
Formattins          <TRACK NO.> 00

ESC:restart STOP:exit CTRL/STOP:abort
```

Changes as each track is formatted.

After all tracks have been formatted, the disk in drive D is copied onto the disk in drive E:. During copying, the screen appears as shown below.

```
***** FORMAT & COMPLETE COPY *****
Copy from D to E
Copyins            <TRACK NO.> 00

ESC:restart STOP:exit CTRL/STOP:abort
```

Changes as each track is formatted.

After all tracks have been copied, the following screen is displayed.

```
*****  FORMAT  &  COMPLETE COPY  *****  
  
Repeat with new diskette(s) (Y/N)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to make another copy of the utilities disk, press  Y . Otherwise, press  N . If  N is pressed, the following screen is displayed to ask whether you want to copy some other disk, or return to the CP/M command line or menu screen.

```
*****  FORMAT  &  COMPLETE COPY  *****  
  
exit or Continue COPYDISK (X/C)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want end COPYDISK operation, type  X ; otherwise, type  C .

After copying the original utilities disk (the one that you finished copying), store it in a safe place. From this point on, use the copy for day-to-day operation.



## *Chapter 2*

# ***STARTING UP THE DISK UTILITIES***

There are two ways to start up the disk utilities: from MENU screen or from the CP/M command line.

### **From the MENU Screen**

If the MENU screen display function has been turned on in the System Display, "COM" has been set as a <MENU> file type, and the drive containing the Utilities Disk has been set as a <MENU DRIVE>, files on the Utilities Disk will be displayed on two or more pages of the menu screen whenever the power is turned on in the restart mode or a warm start is made. Files on different pages of the menu screen can be displayed by pressing the **SHIFT** key together with the UP or DOWN cursor keys, and the utility desired can be started by selecting it with the cursor keys and pressing **RETURN**.

## From the CP/M Command Line

If the drive containing the Utilities Disk has not been set as a <MENU DRIVE>, the utility program file names will not be displayed in the menu screen. In this case, programs on the disk can be executed from the CP/M command line. If the menu screen is displayed, you can go to the CP/M command line by pressing the **ESC** key once. Do so if necessary, then carefully follow the instructions below.

1. The name of the disk drive which is currently logged in is indicated by the CP/M prompt (A>, B>, C>, and so forth). Log in to the drive which contains the Utilities Disk by typing in the drive name followed by a colon (D: to G:) and pressing the **RETURN** key.

Assuming that you are using the PF-10 (which has only a single drive) and that CP/M is currently logged into drive A: (the RAM disk), the screen would appear as follows.

```
A>D: RETURN  
D>
```

2. After logging into drive D, CP/M assumes that this is the drive which is being referred to when any CP/M command or program is executed (except when you specifically instruct CP/M that you want to refer to some other drive). For example, try executing the DIRectory command.

```
D>DIR RETURN
```

When this command is executed, the names of all files on the logged-in disk are displayed as follows.

```
D: ASM      COM : LOAD      COM  
D: DDT      COM : DUMP      COM  
D: PIP      COM : STAT      COM  
D: SUBMIT   COM : XSUB      COM  
D: ED       COM : CTRLP     COM  
D: DEXSUB   COM : COPYDISK  COM  
D: TERM     COM : FILINK    COM  
D: CONFIG   COM
```

3. You can execute any of these programs simply by typing in its file name and pressing the **RETURN** key.

**D>STAT** **RETURN**

Do not type in the file in the file name extension “.COM”. All files with this extension can be executed by specifying the file name by itself.

## **Outline of the Utility Programs**

Functions of the utility programs are outlined below:

### **ED (Editor)**

Used to create new text files or to edit existing files.

### **ASM (Assembler)**

Reads source files created with the ED command and converts them to Intel 8080 hex files (files in which machine language codes are represented in hexadecimal format). Also produces an assembly list file.

### **COPYDISK**

Used to make backup copies of master disks, to format new disks, or to copy system files from an original disk to a new disk.

### **CTRLP**

Used in submit files to toggle echoing of text to the printer.

### **DDT (Dynamic debugging tool)**

Used for debugging Intel 8080 HEX files or COM files.

### **DUMP**

Displays the contents of specified files in ASCII and hexadecimal format.

### **LOAD**

Generates executable machine code COM files from HEX files.

### **DEXSUB**

Used in submit files to cancel the XSUB command.

### **DIRINIT**

Erases the disk file directory and reinitializes it.

# Format of Program Explanations

The disk utility programs are described in alphabetical order in Chapter 3. The following format is used to describe the programs.

**Purpose** Explains the purpose of the utility.

**Format** Illustrates the general format for executing the utility. Commands can be typed using either uppercase or lower case letters, but (unless otherwise specified) you must include one or more spaces where any space is shown.

Special symbols and abbreviations used in illustrating the general format are shown in the table below.

## Format Notation

Symbol	Meaning
<i>n</i>	Indicates a number which must be input by the user (you).
< >	Indicates items which are optional. When specified, optional items change the manner in which the utility operates.
*	Wildcard character - Can be specified in the file name or file name extension to indicate "any group of characters". For example, "*.COM" indicates any file whose extension is ".COM".
?	Wildcard character - Replaces any single character in a file-name or file name extension. For example, "TEXT? .TXT" indicates any five-letter file name which begins with "TEXT" and whose extension is ".TXT".
<b>Explanation</b>	Gives detailed instructions for using the utility.
<b>Example</b>	Gives an example of use of the utility. In the examples, characters which must be typed by you are shown in italics.
<b>NOTE:</b>	Outlines precautions which should be observed when using the utility.
See also	Indicates other information in this manual which is related to using the utility.

# Chapter 3

## UTILITY COMMANDS

This chapter describes procedures for using the programs included on the Utilities Disk. Each description includes an explanation of the command's purpose, format, and operation, as well as an example illustrating its use.

ASM.....	3-2
CONFIG .....	3-6
COPYDISK .....	3-19
CTRLP.....	3-45
DDT .....	3-47
DEXSUB .....	3-64
DIRINIT.....	3-65
DUMP.....	3-66
ED.....	3-67
FILINK .....	3-96
LOAD.....	3-104
PIP .....	3-106
STAT.....	3-118
SUBMIT.....	3-127
TERM.....	3-131
XSUB .....	3-137

## Purpose

ASM loads source program assembly language files (.ASM files) generated with the ED command, converts the assembly mnemonics into object code in Intel hex format, stores the object programs produced as object files (.HEX files). It also produces an assembly language listing which is stored on the disk as a .PRN file.

## Explanation

The file name extension of the source file must be ASM. The object file and assembly list file generated are stored under the same file name as the source file; the extension “.HEX” is automatically assigned to the object file, and the extension “.PRN” is automatically assigned to the list file.

Since this assembler is written for the 8080 microprocessor, mnemonics which are peculiar to the Z80 instruction set cannot be used in source files. For the full set of Z80 mnemonics, you may use an assembler program such as MAC or M80.

## Format 1

### ASM dr:filename

Assembles the source file “filename.ASM” from the drive whose name is specified for “dr:”, then saves the object file (“filename.HEX”) and list file (“filename.PRN”) on the same disk. The drive name may be omitted if the disk is in the drive which is currently logged in.

## Format 2

### ASM filename.SOL

Destination drive for list (PRN) file  
Destination drive for object (HEX)  
file  
Drive containing source (ASM) file

Assembles the source file (“filename.ASM”) from the drive specified by S, outputs the object file (“filename.HEX”) to the drive specified by O, and outputs the list file (“filename.PRN”) to the drive specified by L. The drive names specified for “S”, “O”, and “L” must correspond to a connected device, and must be other than “B” or “C” (ROM drives).

If “Z” is specified for “O” or “L”, the corresponding file will not be generated. If “X” is specified for either of the two, the corresponding file is output to the display screen (but not to disk). If you want to print the assembly listing while the source file is being assembled, press **CTRL** + **P** before executing ASM.

### Examples

**D> ASM SAMPLE** **RETURN**

This example assembles source file SAMPLE.ASM from the disk in drive D:, then outputs files SAMPLE.HEX and SAMPLE.PRN to the same disk.

**D> ASM A:SAMPLE** **RETURN**

This example assembles file SAMPLE.ASM from drive A: (the RAM disk), then outputs files SAMPLE.HEX and SAMPLE.PRN to the same drive.

**D> ASM SAMPLE.ASM** **RETURN**

This example assembles file SAMPLE.ASM from drive A:, outputs file SAMPLE.HEX to the same drive, and outputs file SAMPLE.PRN to the disk in drive F:.

**D> ASM SAMPLE.DZX** **RETURN**

This example assembles SAMPLE.ASM from the disk in drive D: and outputs the assembly list to the display, but does not create an object file.

**D> ASM SAMPLE.DZZ** **RETURN**

This example assembles SAMPLE.ASM, but does not create object or list files.

Since neither HEX nor PRN files are written to the disk in this case, this format is often used to make a fast check for errors in assembly. Any errors encountered are listed on the screen.



If ‘Z’ is specified for ‘O’ or ‘L’, the corresponding file will not be generated. If ‘X’ is specified for either of the two, the corresponding file is output to the display screen (but not to disk). If you want to print the assembly listing while the source file is being assembled, press **CTRL** + **P** before executing ASM.

## Structure of HEX and PRN files

### 1. HEX files

The records of HEX files are divided into blocks as shown in the table below.

Block	Bytes	Contents
A	1	Contains a colon (:) which indicates the beginning of the record.
B	2	Block B indicates the record length in bytes.
C	4	Block C indicates the loading address.
D	2	Always 00.
E		Block E contains data which is loaded into memory when the file contents are converted to COM format by the LOAD command. The number of bytes loaded is indicated in block B.
F	2	Block F contains a checksum code for the record.

### 2. PRN files

The records of PRN files are divided into blocks as shown in the table below. One record is used for each line.

Block	Bytes	Meaning
A	4	Loading address of line
B	10	Data in the hexadecimal format; same as the data in block E of HEX files as indicated in the table above. The maximum length of this block is 10 bytes.
C		Assembly language source code from ASM source file.

## ASM Error Messages

When ASM detects an error in the source program during assembly, it displays an error code and the line containing the error, then goes on to assemble the remainder of the file. An example of assembler display when errors are encountered is shown below.

```
A>d:asm p×
CP/M ASSEMBLER - VER 2.0
S          inc      e
0112
000H USE FACTOR
END OF ASSEMBLY

A>
```

The meanings of the various error codes are as follows.

Error code	Meaning
D	Data error: An element in a data statement cannot be placed in the specified area.
E	Expression error: An expression is ill-formed and cannot be computed by the assembler.
L	Label error: A label has been used out of context (may be a duplicate label).
N	Not implemented: Features (e.g., macros) have been used which are not implemented in this version of ASM.
O	Overflow: The expression is too complicated (i.e., has too many pending operators) for assembly.
P	Phase error : A label does not have the same value on two subsequent passes through the program.
R	Register error: A non-existent or illegal register was specified.
S	Syntax error: Statement is not properly formed.
U	Undefined label
V	Value error: An operand encountered in an expression is improperly formed.

# CONFIG

## Purpose

The CONFIG program is used to set those system parameters which are not changed very often. It is complementary to the System Display, and the current values of some of the parameters changed by the CONFIG program are shown on the System Display. The CONFIG program can also be used to check the settings of parameters not shown on the System Display.



## WARNING:

*Do not switch off PX-4 (either manually or by allowing the auto power-off function to operate) after changing the RAM disk or USER BIOS size without exiting from the CONFIG program. If PX-4 is switched off, the RAM disk contents could be destroyed and it might be necessary to re-initialize the system.*

## Format

## CONFIG

## Explanation

When CONFIG is started, (either from the MENU screen or CP/M command line), the screen shows the following:

```
*** MAIN MENU ***          CONFIG V1.0
  Select alphanumeric or ESC to exit.
0=consecutive settings    6=disk drives
1=auto power off          7=RAMdisk, user BIOS
2=CP/M function key      8=communication
3=country                 9=screen mode
4=cursor                  A=printer (serial)
5=date & time
```

The CONFIG program is used in almost the same way as the System Display, but it has 11 options. As with the System Display the **[ESC]** key is used to move back to the main menu and to exit. The 0 key is used to display option menus.

## 1. Auto power-off function

Press the **[1]** key from the main CONFIG menu to change the auto power-off time. The screen changes as follows.

```
*** AUTO POWER OFF ***
Set time(1 to 255) in minutes or ESC
to exit. (0 disables auto power off)

auto power off time ?

auto power off      : 5
```

The value shown next to the semi-colon on the 7th line is the current setting in minutes for the auto power-off time. This is the time which PX-4 waits before switching itself off if no key is pressed while an application program or the operating system is waiting for input. It is advisable to keep the time short; otherwise the battery will run down more quickly. The purpose of this function is to conserve the battery.

As can be seen from the display, the time can be set in one-minute increments (the maximum time is 255 minutes). The auto power-off function can also be switched off altogether by selecting option 0. After entering the desired time, press **[RETURN]**; the specified time is displayed on the 7th line. At this point, you can use the **[ESC]** key to return to the main CONFIG menu.

## 2. CP/M function key assignments

When option 2 is selected from the main CONFIG menu, the display changes to:

```
*** CP/M FUNCTION KEY ***
Select key No.(PF10=0) or ESC to exit.■

PF1 dir          PF6 config
PF2 type         PF7 submit
PF3 stat         PF8 term
PF4 pip          PF9 filink
PF5 basic        PF10 EPIC
```

These are the strings which are assigned to the programmable function keys at the top of the keyboard. The screen above shows the default settings; i.e. the strings which are assigned when the system is initialized or the reset button is pressed.

Note that some of the strings terminate in the **CTRL - M** character, which is denoted by [M]. These strings have a carriage return ( **CTRL - M** ) added to them because there is no possibility that any more characters will need to be typed following the string. For example, the **PF6** key can be used to run the CONFIG program as follows: On the CP/M command line, type the name of the drive containing the CONFIG program (e.g., D:), then press the **PF6** key. The word CONFIG appears, then a carriage return is also typed. In a few seconds, the CONFIG main menu appears on the screen.

**CTRL - M** is not added to all commands because some of them might require extending. For example, with DIR you might want to add the name of a drive other than the current one instead of first changing the logged-in drive. When the **PF1** key is pressed, the letters "DIR" are printed, then PX-4 waits for further input. If you simply press the **RETURN** key, the directory of the current drive will be printed. If you type "D:" and press the **RETURN** key, the directory of drive D: will be displayed.

To change a function key string, press the number corresponding to that **PF** key (i.e., 1 for **PF1** , 2 for **PF2** , and so forth; remember that 0 is used for **PF10** ). The following message is then displayed on the second line of the screen:

### **Terminate the function key string with HELP**

The third line of the screen shows the name of the key whose function is to be changed with the cursor to the right of the name. Up to 15 characters can be assigned to each **PF** key. If a control key command is to be added (e.g., a line feed, **CTRL - J** ), this can be added by pressing **CTRL** and the appropriate alphabetic key. However, in the special case of the carriage return simply pressing the **RETURN** key will add the characters [M] to denote the **CTRL - M** for the carriage return.

If you accidentally press an incorrect key, use the backspace key ( **BS** ) to erase it.

Since the **RETURN** key can be used to enter a carriage return as ( **CTRL** - **M** ), the **HELP** key is used to terminate the string. After pressing the **HELP** key, the **ESC** key is used to return to CONFIG's main menu.

### 3. Changing the character set by country

The DIP switches are normally used to set the keyboard layout. Occasionally, it is useful to be able to temporarily change the characters but not the keyboard layout so that, for example, a word processor file written in French can be read on the screen with the correct characters. Pressing the **3** key from CONFIG's main menu make it possible to select character sets of different countries for display. The menu shows:

```
*** COUNTRY ***
Select number or ESC to exit. █

COUNTRY                0=ASCII                5=Italy
                        1=Denmark                 6=Japan
                        2=England                 7=Norway
                        3=France                  8=Spain
                        4=Germany                 9=Sweden
```

The country whose characters are displayed is changed by pressing the key corresponding to that country in the table on the right of the screen. The currently selected country is displayed on the 6th row on the left side of the screen. Pressing the **6** key selects the ASCII character set.

### 4. Setting the display cursor

If option 4 is selected from CONFIG's main menu, the display changes to:

```
*** CURSOR ***
Select number or ESC to exit. █

cursor tracking : vertical 1=on      2=off
                  3=vertical
cursor display  : on      4=on      5=off
cursor type     : █      6=█      7=█
                  8=_     9=_
```

The left side of the screen shows the current status of parameters which can be altered by this section of the CONFIG program. The right part of the screen shows which keys will change these parameters, parameter settings are altered simply by pressing the appropriate key. For example, if the **[9]** key is pressed, the left hand side of the screen will show “\_” to indicate that type of cursor is selected.

Keys **[1]** and **[2]** switch the tracking mode on and off. In the tracking mode, the cursor follows the window as it moves through the virtual screen. In the non-tracking mode, the window is locked to a particular part of the virtual screen and the cursor (the position where characters are input or where PX-4 displays the next character) moves through the virtual screen; thus, the cursor disappears when it moves outside the window.

### 5. Setting the date and time

The date and time can be set by selecting option 5 of CONFIG's main menu. The time is entered the moment the **[RETURN]** key is pressed. When the date is input, the day of the week is calculated automatically.

When option 5 is selected from CONFIG's main menu, the display changes to:

```
*** DATE & TIME ***
Select date and time or ESC to exit.
Date as MM/DD/YY ?
Date       :      01/16/00   (TUE)
Time      :      21:37:34
```

At this point, PX-4 is waiting for the date to be input; however, simply pressing the **RETURN** key will switch it to time input. To input the date, type the month, day and the last two digits of the year, separating each item from the following one with a slash (“/”). If you make any mistakes, use the **BS** key to back up and erase. Items consisting of a single digit need not be preceded by a zero; however, data must be entered for all these items (month, day, and year) or an error will be detected and the input line cleared. The data is entered when the **RETURN** key is pressed. If an illegal date is entered (e.g., if the specified day of the month is greater than the number of days in that month), the input line is cleared to allow the data to be entered again.

Change the time by inputting the hour, minute and second, with a colon between each. If you make any mistakes, use the **BS** key to back up and correct. When the desired time has been entered, press the **RETURN** key to enter it into the computer's memory. PX-4 starts updating the time when the **RETURN** key is pressed.

When a date has been entered, the display changes to time input.

Press the **ESC** key at any time to return to CONFIG's main menu.

## 6. Disk drive assignments

Selecting option 6 from CONFIG's main menu cause's the screen to change as follows:

```
*** DISK DRIVES ***
Select disk name or ESC to exit.
  Logical          Physical
A:RAMdisk  F:FDD3      0=RAMdisk  5=FDD3
B:ROMcfs1  G:FDD4      1=ROMcfs1  6=FDD4
C:ROMcfs2  I:RAMcrt    2=ROMcfs2  7=RAMcrt
D:FDD1     J:ROMcrt1   3=FDD1     8=ROMcrt1
E:FDD2     K:ROMcrt2   4=FDD2     9=ROMcrt2
```



First, select a logical drive name by pressing [A] to [K], but not [H]. Other keys other than [A] to [K], (except [H]) and [ESC] are ignored. For example, pressing [A] causes the screen to change as follows:

```

*** DISK DRIVES ***
  Select disk number. A:
    LOGICAL
A:RAMdisk  F:FDD3      0=RAMdisk  5=FDD3
B:ROMcfs1  G:FDD4      1=ROMcfs1  6=FDD4
C:ROMcfs2  I:RAMcrt  2=ROMcfs2  7=RAMcrt
D:FDD1     J:ROMcrt1  3=FDD1     8=ROMcrt1
E:FDD2     K:ROMcrt2  4=FDD2     9=ROMcrt2
    PHYSICAL

```

Select the physical drive which is to be assigned to the first logical drive selected by typing a number 0 to 9. Keys other than 0 to 9 are ignored.

The microcassette drive is always drive H:, and thus is not shown in this menu. The terms FDD1, FDD2, FDD3 and FDD4 refer to external Floppy Disk Drives which can be connected to PX-4 via the serial interface.

## 7. RAM disk & user BIOS

This option is used to change the amount of memory set aside for the RAM disk and user BIOS areas.

When option 7 is selected from CONFIG's main menu, the screen changes as follows:

```

*** RAM DISK & USER BIOS ***
  Set parameter or ESC to exit.
  RAM disk size ?

RAM disk size      :      26K bytes
Max. RAM disk size is 35K bytes
user BIOS size    :      0 pages
Max. user BIOS size is 38 pages

```

The current RAM disk size is shown on the fifth line, and can be changed by typing 0 or a number from 2 to 35. If the size is reduced, any files presently in the RAM disk will be destroyed. However, files are not destroyed if the RAM disk size is increased. The RAM disk size typed is temporarily stored in memory when the **RETURN** key is pressed, but the input line is merely cleared if an illegal value has been entered. If the value entered is less than the current value, the following message and a blinking cursor are displayed on the fourth line of the screen.

### **RAM disk will be destroyed (Y/N) ?**

If the **Y** key is pressed, the new RAM disk size becomes effective and existing RAM disk files are destroyed. If the **N** key is pressed, the fourth line is cleared and the “RAM disk size ?” message is displayed again.

When the **RETURN** key is pressed, the third line of the screen changes as shown below.

```
*** RAM DISK & USER BIOS ***
Set Parameter or ESC to exit.
user BIOS size(256 bytes/page) ? █
RAM disk size      :    26K bytes
Max. RAM disk size is 35K bytes
user BIOS size     :    0  pages
Max. user BIOS size is 38  pages
```

The current user BIOS size is shown on the seventh line, and can be changed by typing in a new size in 256-byte pages. If the value input is less than the current value, the following message is displayed on the fourth line.

### **hook initialization (Y/N) ?**

If the **Y** key is typed, all hooks are initialized and the new BIOS size is set. If the **N** key is pressed, the message disappears and CONFIG waits for you to type in some other value.

If an External RAM disk is connected, its size cannot be extended using part of PX-4's main memory. In this case, the screen appears as shown below when option 7 is chosen from CONFIG's main menu, and only the size of the user BIOS area can be changed.

```

*** RAM DISK & USER BIOS ***
Set parameter or ESC to exit.
user BIOS size(256 bytes/page) ?

RAM disk size      : 128K bytes
<<An external RAM disk is connected>>
user BIOS size    :      6 pages
Max. user BIOS size is 142 pages

```

The **ESC** key can then be used to return to CONFIG's main menu.



### **WARNING**

*Do not switch off PX-4 (either manually or by allowing the auto power-off function to operate) after changing the RAM disk size without exiting from the CONFIG program. If PX-4 is switched off, the RAM disk may be destroyed and it may also be necessary to re-initialize the system.*

## **8. Communications**

Option 8 on CONFIG's main menu is used to set communications parameters.

The RS-232C interface or direct modem is used to transmit data to and from PX-4. For example, if a text file has been written on PX-4 and it needs to be transferred to desk top computer such as the EPSON QX-10, the file can be sent to the other computer using the TERM or FILINK program in the CP/M UTILITY ROM. The two computers can either be connected directly by cable, or through a telephone line.

When option 8 is chosen from CONFIG's main menu the screen changes to display:

```

*** COMMUNICATION ***
Select alphanumeric or ESC to exit. █

bit rate      1=38400      6=1200      B=110
: 4800        2=19200     7=600      C=75/1200
              3=9600      8=300      D=1200/75
              4=4800     9=200      (TX/RX)
              5=2400    A=150

```

The bit rate (number of bits per second or baud rate) currently set is shown on the fifth line. It can be changed to various settings using keys **1** to **9** and **A** to **D**. Keys **1** to **9**, **A**, and **B** set the same bit rates in both directions (send and receive). The **C** and **D** keys set different bit rates for transmitting and receiving. The **C** key sets 75 bps for send and 1200 bps for receive, and the **B** key sets 1200 bps for send and 75 bps for receive.

Pressing the **ESC** key returns to CONFIG's main menu. Pressing the **RETURN** changes the screen as follows.

```
*** COMMUNICATION ***
Select alphanumeric or ESC to exit.
data bits: 8          1=7          2=8
Parity    : none     3=none     4=odd     5=even
stop bits: 2          6=1          7=2
xon/xoff  : disable  8=disable  9=enable
si/so    : disable  A=disable  B=enable
```

The number of data bits (i.e., the number of bits per character) is shown on the fourth line and can be changed using the **1** and **2** keys.

The type of parity used is shown on the fifth line and can be changed using the **3**, **4** and **5** keys.

The number of stop bits is shown on the sixth line and can be changed using the **6** and **7** keys.

The xon/xoff control setting is shown on the seventh line and can be changed using the **8** and **9** keys.

The si/so control setting is shown on the eighth line and can be changed using the **A** and **B** keys.

After all parameters have been set or checked, the **ESC** key returns PX-4 to CONFIG's main menu.

## 9. Screen

This option is used to change the screen configuration. When option 9 is selected from CONFIG's main menu, the screen changes as follows, with a blinking cursor on the fourth line.

```
*** SCREEN ***
Set screen parameter or ESC to exit.
virtual screen size(horizontal) ? █
virtual screen size(40,80x8-50): 80 x 25
horizontal scroll step(20,40) : 20
vertical scroll step(1-8) : 1
```

The current virtual screen size is shown on the sixth line. You can type in 40 or 80 as the horizontal size of the virtual screen when the "virtual screen size (horizontal)?" prompt is displayed. If a number other than 40 or 80 is typed, the input line is cleared when the **RETURN** key is pressed, but nothing else changes. If a valid number has been entered, the message on the fourth line changes to "virtual screen size (vertical)?".

Now you can type in as the vertical size of the virtual screen as a number from 8 to 50. If the value typed is outside of this range, the input line is cleared when the **RETURN** key is pressed, but nothing else changes.

If a valid number has been entered, the prompt on line 4 changes as follows when the **RETURN** key is pressed.

### horizontal scroll step ?

You can type in 20 or 40 as the horizontal scroll step. If any other number is typed, the input line is cleared when **RETURN** is pressed, but nothing else changes.

If a valid number has been entered, the prompt on line 4 changes as follows when **RETURN** is pressed.

### vertical scroll step ?

Enter the vertical scroll step as a number from 1 to 8. If any other number is typed, the input line is cleared when **RETURN** is pressed, but nothing else changes.

After changing the screen configuration, press the **ESC** key to return to CONFIG's main menu.

## 10. Serial printer parameters

A printer with a RS-232C interface can be connected to PX-4's serial or RS-232C connector. (The connector used for printer output is determined by the setting of bits 5 and 6 of the DIP switch in the ROM capsule compartment. See Chapter 4 of the PX-4 Operating Manual for details.) The serial interface parameters for connecting such a printer can be set by selecting option A from CONFIG's main menu. When the **A** key is pressed, the screen changes to:

```
*** PRINTER (serial) ***
Select alphanumeric or ESC to exit.
bit rate   1=19200   5=1200   9=150
: 4800     2=9600   6=600   A=110
           3=4800   7=300
           4=2400   8=200
```

The current bit rate setting is shown on the fifth line and can be changed using keys **1** to **9** and key **A**. Keys other than these keys or **ESC** and **RETURN** are ignored. Pressing the **ESC** key returns to CONFIG's main menu. If the **RETURN** key is pressed, the screen changes to:

```
*** PRINTER (serial) ***
Select alphanumeric or ESC to exit.
data bits  : 8       1=7       2=8
Parity     : none   3=none   4=odd   5=even
stop bits  : 2       6=1       7=2
```

The current data bits setting is shown on the fourth line and can be changed using keys **1** and **2**.

The current parity setting is shown on the fifth line and can be changed using keys **3**, **4** and **5**.

The current stop bits setting is shown on the sixth line and can be changed using keys **6** and **7**.

Pressing the **ESC** key returns to CONFIG's main menu. If the **RETURN** key is pressed, the first screen (the bit rate selection screen) is displayed again.  
Keys other than the above are ignored.

# COPYDISK

---

## Purpose

The COPYDISK utility formats new disks to prepare them for data storage and makes it possible to copy the system tracks or the entire contents of another disk onto the new one. (See Appendix C for COPYDISK error messages.)

## Explanation

To start the COPYDISK utility, type COPYDISK and press **RETURN**. Subsequent operation differs according to whether or not you are using a single-drive disk unit, and according to whether you want to (1) format a new disk, (2) copy the system tracks to a new disk from another disk, (3) copy the entire contents of one disk to another, (4) format a disk and do one or the other of the copy operations, or (5) initialize the directory tracks on a disk.

When a disk is formatted, hexadecimal code E5H (decimal code 229) is written to all data bytes of all tracks on the disk. Therefore, any data on the disk before formatting will be destroyed. Accordingly, the COPYDISK utility should only be used to format blank disks or disks whose data is no longer required.

### **NOTE:**

*Floppy disks sold by EPSON are preformatted, and can be used without executing the COPYDISK utility.*

When the “Copy system tracks” option is selected, tracks 0 to 3 of the source disk (the tracks on the Utilities Disk which contain the disk operating system) are copied from the source disk to the new disk. Since both the PF-10 and TF-15 already have this DOS in ROM, it is not necessary to copy the system when using these drive units.

When the “Copy complete diskette” option is selected, all tracks of the source disk (the disk being copied) are copied onto the destination disk (the disk on which the copy is being made).

Now let's activate the COPYDISK program. Log into the drive containing the Utilities Disk and enter “COPYDISK” following the system prompt as shown below. (If COPYDISK is displayed in the menu screen, move the cursor to it with the cursor control keys and press **RETURN**.)



D>COPYDISK RETURN

The initial menu screen is displayed as shown below.

```
COPYDISK ver 1.0 (C) 1984 by EPSON
Press ESC to restart, STOP to exit, or
CTRL/STOP to abort during operation.
How many drives connected ? 2
1. One drive
2. Two or more drives
```

If you are using a single-drive unit, type 1 and press RETURN.  
If you are using two or more drives, simply press RETURN to select 2. The screen changes as shown below.

```
Select COPYDISK operation 3
1. Format
2. Copy system tracks
3. Copy complete diskette
4. Format and Copy system tracks
5. Format and Copy complete diskette
6. Initialize directory tracks
```

This screen displays operations which can be performed by the COPYDISK utility, and is referred to as the “COPYDISK menu”. Select the operation to be performed by typing in the corresponding number and pressing RETURN. Subsequent procedures differ according to operation selected and number of drives as described below.

### 1. Format

This option formats all tracks on a disk and writes hexadecimal code E5H (decimal code 229) into all data bytes. Procedures for using the option are as follows.

#### a. When using a single-drive unit

The following screen is displayed when “1” is selected from the COPYDISK menu.

```
*****          FORMAT          *****
Drive name choice (D,E,F,G)
Enter Destination drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Formatting starts at track 00 and ends at track 39. When the formatting is completed, the following is displayed.

```
*****          FORMAT          *****  
  
Repeat with new diskette(s) (Y/N)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to format another disk, press **[Y]** and repeat the steps described above beginning with drive name specification. Otherwise, press **[N]**; if **[N]** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*****          FORMAT          *****  
  
exit or Continue COPYDISK (X/C)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **[X]** (for eXit) and press **[RETURN]** to return to the MENU screen or CP/M command line. Otherwise, type **[C]** (for Continue) and press **[RETURN]** to redisplay the COPYDISK menu.

#### **b. When using two or more drives**

The following screen is displayed when "1" is selected from the COPYDISK menu.

```
*****          FORMAT          *****  
  
Drive name choice (D,E,F,G)  
Enter Destination drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the logical name of the drive to be used for formatting, then press **RETURN** . The display changes as follows.

```
*****          FORMAT          *****
Drive E selected
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the destination disk (disk to be formatted) into the specified drive, then press **RETURN** to start formatting.

```
*****          FORMAT          *****
Drive E selected
Formattine      <TRACK NO.>      00

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Formatting starts at track 00 and ends at track 39. When formatting is completed, the following is displayed.

```
*****          FORMAT          *****

Repeat with new diskette(s) (Y/N)?

ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to format another disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N** ; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*****          FORMAT          *****
```

```
eXit or Continue  COPYDISK (X/C)?
```

```
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

## 2. Copy system tracks

This option copies the contents of tracks 0 to 3 (the system tracks) from a disk which contains the disk operating system to another disk. Procedures for using this option are as follows.

### a. When using a single-drive unit

The following screen is displayed when "2" is selected from the COPYDISK menu.

```
*****  SYSTEM TRACK COPY  *****
```

```
Drive name choice  (D,E,F,G)
```

```
Enter drive name
```

```
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Enter the name of the drive being used (for example, "D") and press **RETURN**.

```
*****  SYSTEM TRACK COPY  *****
```

```
Drive name choice  (D,E,F,G)
```

```
Enter drive name    D
```

```
ESC:restart  STOP:exit  CTRL/STOP:abort
```

When the **RETURN** key is pressed, the screen changes as follows. In this screen, the "Diskette exchange countdown" line indicates the number of times disks must be exchanged before copying is completed.

```
***** SYSTEM TRACK COPY *****
Drive D selected
Diskette exchange countdown 02
Insert source diskette.
Press RETURN when ready.

ESC:restart STOP:exit CTRL/STOP:abort
```

Next, insert the source diskette into the specified drive and press **RETURN**. COPYDISK begins reading the system tracks, starting with track 00. The screen appears as follows while tracks are being read.

```
***** SYSTEM TRACK COPY *****
Drive D selected
Diskette exchange countdown 02
Reading <TRACK NO.> 01

ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is read.

After the first tracks have been read, the screen changes again as follows.

```
***** SYSTEM TRACK COPY *****
Drive D selected
Diskette exchange countdown 02
Insert Destination diskette.
Press RETURN when ready.
ESC:restart STOP:exit CTRL/STOP:abort
```

Remove the source diskette from the drive and insert the destination diskette. When ready, press **RETURN** to start writing the first tracks. The screen appears as follows while tracks are being written.

```
***** SYSTEM TRACK COPY *****
Drive D selected
Diskette exchange countdown 02
Writing <TRACK NO.> 01
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is written.

After the first tracks have been written, the message “Insert source diskette” is displayed again if there are any tracks remaining to be copied; insert the source diskette again and press **RETURN** to read the next tracks, then exchange disks again and press **RETURN** to write those tracks. Repeat this sequence until the following screen is displayed.

```
***** SYSTEM TRACK COPY *****
```

```
Repeat with new diskette(s) (Y/N)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to copy the system tracks to another disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** SYSTEM TRACK COPY *****
```

```
exit or Continue COPYDISK (X/C)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

#### **b. When using two or more drives**

The following screen is displayed when “2” is selected from the COPYDISK menu.

```
***** SYSTEM TRACK COPY *****
Drive name choice (D,E,F,G)
Enter Source      drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the names of the source drive (for example, "D") and press **RETURN**. The screen changes as follows.

```
***** SYSTEM TRACK COPY *****
Drive name choice (D,E,F,G)
Enter Source      drive name  D
Enter Destination drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the destination drive (for example, "E") and press **RETURN**. Now the screen changes as shown below.

```
***** SYSTEM TRACK COPY *****
Copy from D to E
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the source and destination disks into the specified drives, then press **RETURN** to start copying. During copying, the screen appears as follows.

```
***** SYSTEM TRACK COPY *****
Copy from D to E
Copying          <TRACK NO.> 00

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Copying starts at track 00 and ends at track 03. When copying is completed, the following screen is displayed.

```
***** SYSTEM TRACK COPY *****
```

```
Repeat with new diskette(s) (Y/N)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to copy the system tracks to another disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** SYSTEM TRACK COPY *****
```

```
eXit or Continue COPYDISK (X/C)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

### 3. Copy complete diskette

This option copies the entire contents of one disk to another. Procedures for using this option are as follows.

#### a. When using a single-drive unit

The following screen is displayed when "3" is selected from the COPYDISK menu.

```
***** COMPLETE COPY *****
```

```
Drive name choice (D,E,F,G)
```

```
Enter Source drive name
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```



Enter the name of the drive being used (for example, "D") and press **RETURN** .

```
***** COMPLETE COPY *****
Drive name choice (D,E,F,G)
Enter drive name      D

ESC:restart  STOP:exit  CTRL/STOP:abort
```

When the **RETURN** key is pressed, the screen changes as follows. In this screen, the "Diskette exchange countdown" line indicates the number of times disks must be exchanged before copying is completed.

```
***** COMPLETE COPY *****
Drive D selected
Diskette exchange countdown  20
Insert Source diskette.
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Next, insert the source diskette into the specified drive and press **RETURN** . COPYDISK begins reading the disk, starting with track 00. The screen appears as follows while tracks are being read.

```
***** COMPLETE COPY *****
Drive D selected
Diskette exchange countdown  20
Reading <TRACK NO.>         01

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is read.

```
***** COMPLETE COPY *****
Drive D selected
Diskette exchange countdown  20
Insert Source diskette.
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Remove the source diskette from the drive and insert the destination diskette. When ready, press **RETURN** to start writing the first tracks. The screen appears as follows while tracks are being written.

```
***** COMPLETE COPY *****  
Drive D selected  
Diskette exchange countdown      19  
Writing <TRACK NO.>              01  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is written.

After the first tracks have been written, the message "Insert source diskette" is displayed again; insert the source diskette again and press **RETURN** to read the next tracks, then exchange disks again and press **RETURN** to write those tracks. Repeat this sequence until the following screen is displayed.

```
***** COMPLETE COPY *****  
  
Repeat with new diskette(s) (Y/N)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to make another copy of a disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** COMPLETE COPY *****  
  
eXit or Continue COPYDISK (X/C)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

#### b. When using two or more drives

The following screen is displayed when "3" is selected from the COPYDISK menu.

```
***** COMPLETE COPY *****
Drive name choice (D,E,F,G)
Enter Source      drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the names of the source drive (for example, "D") and press **RETURN**. The screen changes as follows.

```
***** COMPLETE COPY *****
Drive name choice (D,E,F,G)
Enter Source      drive name  D
Enter Destination drive name

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the destination drive (for example, "E") and press **RETURN**. Now the changes as shown below.

```
***** COMPLETE COPY *****
Copy from D to E
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the source and destination disks into the specified drives, then press **RETURN** to start copying. During copying, the screen appears as follows.

```
***** COMPLETE COPY *****  
Copy from D to E  
Copying <TRACK NO.> 00  
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is copied.

Copying starts at track 00 and ends at track 39. When copying is completed, the following screen is displayed.

```
***** COMPLETE COPY *****  
  
Repeat with new diskette(s) (Y/N)?  
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to do the copy operation again, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** COMPLETE COPY *****  
  
exit or Continue COPYDISK (X/C)?  
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

#### 4. Format and copy system tracks

This option formats a disk to prepare it for use, then copies the entire contents of another disk to the disk formatted. Procedures for using this option are as follows.

**a. When using a single-drive unit**

The following screen is displayed when "4" is selected from the COPYDISK menu.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive name choice (D,E,F,G)  
Enter drive name  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Enter the name of the drive being used (for example, "D") and press **RETURN** .

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive name choice (D,E,F,G)  
Enter drive name D  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

When the **RETURN** key is pressed, the screen changes as follows.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive D selected  
Insert Destination diskette.  
Press RETURN when ready.  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Insert the disk to be formatted in the specified drive, then press **RETURN** to start formatting. During formatting, the screen appears as shown below.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive D selected  
Formattine <TRACK NO.> 00  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is formatted.

After all tracks have been formatted, the screen changes as shown below. In this screen, the "Diskette exchange countdown" line indicates the number of times disks must be exchanged before copying is completed.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive D selected  
Diskette exchange countdown      02  
Insert Source diskette.  
Press RETURN when ready.  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Next, insert the source diskette into the specified drive and press **RETURN**. COPYDISK begins reading the system tracks, starting with track 00. The screen appears as follows while tracks are being read.

```
*** FORMAT & SYSTEM TRACKCOPY ***  
Drive D selected  
Diskette exchange countdown      02  
Reading      <TRACK NO.>      01  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is read.

After the first tracks have been read, the screen changes again as follows.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive D selected  
Diskette exchange countdown      02  
                          <TRACK NO.>      01  
Insert Destination diskette.  
Press RETURN when ready.  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Remove the source diskette from the drive and insert the destination diskette. When ready, press **RETURN** to start writing the first tracks. The screen appears as follows while tracks are being written.

```
*** FORMAT & SYSTEM TRACK COPY ***
```

```
Drive D selected  
Diskette exchange countdown 02  
Writing <TRACK NO.> 01
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

Number changes as each track is written.

After the first tracks have been written, the message "Insert source diskette" is displayed again if there are any tracks remaining to be copied; insert the source diskette again and press **RETURN** to read the next tracks, then exchange disks again and press **RETURN** to write those tracks. Repeat this sequence until the following screen is displayed.

```
*** FORMAT & SYSTEM TRACK COPY ***
```

```
Repeat with new diskette(s) (Y/N)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to format another disk and copy the system tracks to it, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*** FORMAT & SYSTEM TRACK COPY ***
```

```
eXit or Continue COPYDISK (X/C)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

### b. When using two or more drives

The following screen is displayed when "4" is selected from the COPYDISK menu.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive name choice (D,E,F,G)  
Enter Source      drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the source drive (for example, "D") and press **RETURN**. The screen changes as follows.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Drive name choice (D,E,F,G)  
Enter Source      drive name  D  
Enter Destination drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the destination drive (for example, "E") and press **RETURN**. Now the screen changes as shown below.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Copy from D to E  
Press RETURN when ready.  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the source and destination disks into the specified drives, then press **RETURN** to start operation. During formatting, the screen appears as follows.

```
*** FORMAT & SYSTEM TRACK COPY ***  
Copy from D to E  
Formatting      <TRACK NO.> 00  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is formatted.



Formatting starts at track 00 and ends at track 39. After formatting has been completed, the system tracks are copied from the source disk to the destination disk, then the screen changes as follows.

```
*** FORMAT & SYSTEM TRACK COPY ***

Repeat with new diskette(s) (Y/N)?

ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to repeat operation with another source and/or destination disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*** FORMAT & SYSTEM TRACK COPY ***

exit or Continue COPYDISK (X/C)?

ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

## 5. Format and copy complete diskette

This option formats a disk to prepare it for use, then copies the entire contents of another disk to the disk formatted. Procedures for using this option are as follows.

### a. When using a single-drive unit

The following screen is displayed when "5" is selected from the COPYDISK menu.

```
***** FORMAT & COMPLETE COPY ****  
Drive name choice (D,E,F,G)  
Enter drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Enter the name of the drive being used (for example, "D") and press **RETURN** .

```
***** FORMAT & COMPLETE COPY ****  
Drive name choice (D,E,F,G)  
Enter drive name      D  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

When the **RETURN** key is pressed, the screen changes as follows.

```
***** FORMAT & COMPLETE COPY ****  
Drive D selected  
Insert Destination diskette.  
Press RETURN when ready.  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the destination disk (the disk to be formatted for copying) into the specified drive, then press **RETURN** to start formatting. During formatting, the screen appears as shown below.

```
***** FORMAT & COMPLETE COPY ****  
Drive D selected  
Formatting      <TRACK NO.>      00  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is formatted.

After all tracks have been formatted, the screen changes as shown below. The "Diskette exchange countdown" line indicates the number of times disks must be exchanged before copying is completed.

```
***** FORMAT & COMPLETE COPY *****
Drive D selected
Diskette exchange countdown      20
Insert source diskette.
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Next, insert the source diskette into the specified drive and press **RETURN**. COPYDISK begins reading the system tracks, starting with track 00. The screen appears as follows while tracks are being read.

```
***** FORMAT & COMPLETE COPY *****
Drive D selected
Diskette exchange countdown      20
Reading <TRACK NO.>              01

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is read.

After the first tracks have been read, the screen changes again as follows.

```
***** FORMAT & COMPLETE COPY *****
Drive D selected
Diskette exchange countdown      20
                          <TRACK NO.>  01
Insert destination diskette.
Press RETURN when ready.

ESC:restart  STOP:exit  CTRL/STOP:abort
```

Remove the source diskette from the drive and insert the destination diskette. When ready, press **RETURN** to start writing the first tracks. The screen appears as follows while tracks are being written.

```
***** FORMAT & COMPLETE COPY ****
```

```
Drive D SELECTED  
Diskette exchange countdown 19  
Writing <TRACK NO.> 01
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

After the first tracks have been written, the message “Insert source diskette” is displayed again; insert the source diskette again and press **RETURN** to read the next tracks, then exchange disks and press **RETURN** to write those tracks. Repeat this sequence until the following screen is displayed.

```
***** FORMAT & COMPLETE COPY ****
```

```
Repeat with new diskette(s) (Y/N)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to repeat the operation with another source and/or destination diskette, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** FORMAT & COMPLETE COPY ****
```

```
exit or Continue COPYDISK (X/C)?
```

```
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

**b. When using two or more drives**

The following screen is displayed when "5" is selected from the COPYDISK menu.

```
***** FORMAT & COMPLETE COPY *****  
Drive name choice (D,E,F,G)  
Enter Source      drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the source drive (for example, "D") and press **RETURN**. The screen changes as follows.

```
***** FORMAT & COMPLETE COPY *****  
Drive name choice (D,E,F,G)  
Enter Source      drive name D  
Enter Destination drive name  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Type the name of the destination drive (for example, "E") and press **RETURN**. Now the screen changes as shown below.

```
***** FORMAT & COMPLETE COPY *****  
Copy from D to E  
Press RETURN when ready.  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Insert the source and destination disks into the specified drives, then press **RETURN** to start operation. During formatting, the screen appears as follows.

```
***** FORMAT & COMPLETE COPY *****  
Copy from D to E  
Formatting      <TRACK NO.> 00  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Number changes as each track is formatted.

Formatting starts at track 00 and ends at track 39. After all tracks have been formatted, the contents of the source diskette are copied to the destination disk, then the screen changes as follows.

```
*****  FORMAT  &  COMPLETE COPY  *****  
  
Repeat with new diskette(s) (Y/N)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to repeat operation with another source and/or destination disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*****  FORMAT  &  COMPLETE COPY  *****  
  
eXit or Continue  COPYDISK (X/C)?  
  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

## 6. Initialize directory tracks

This option erases and initializes the directory track of a disk, thereby effectively erasing all files. (This option does not actually erase the entire disk, but the contents of all files are nullified by erasure of the directory information.) Procedures for using this option are as follows.

### a. When using a single-disk drive unit

The following screen is displayed when "6" is selected from the COPYDISK menu.

```
***** DIRECTORY INITIALIZE *****
Drive name choice (D,E,F,G)
Enter drive name

ESC:restart STOP:exit CTRL/STOP:abort
```

Type the logical name of the drive being used (for example, "D") and press **RETURN** ; the screen changes as follows.

```
***** DIRECTORY INITIALIZE *****
Drive D selected
Insert Destination diskette.
Press RETURN when ready.

ESC:restart STOP:exit CTRL/STOP:abort
```

Remove the Utilities Disk from the drive and insert the disk whose directory is to be initialized, then start operation by pressing **RETURN** . During initialization, the screen appears as follows.

```
***** DIRECTORY INITIALIZE *****
Drive D selected (D,E,F,G)
Initializine <TRACK NO.> 04

ESC:restart STOP:exit CTRL/STOP:abort
```

Initialization starts at track 04 and ends at track 05. When initialization is completed, the following is displayed.

```
***** DIRECTORY INITIALIZE *****

Repeat with new diskette(s) (Y/N)?

ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to initialize the directory on another disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
***** DIRECTORY INITIALIZE *****  
  
eXit or Continue COPYDISK (X/C)?  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise, type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

**b. When using two or more drives**

The following screen is displayed when “6” is selected from the COPYDISK menu.

```
***** DIRECTORY INITIALIZE *****  
  
Drive name choice (D,E,F,G)  
Enter Destination drive name  
  
ESC:restart STOP:exit CTRL/STOP:abort
```

Type the name of the drive containing the disk whose directory is to be initialized (for example, “E”), then press **RETURN**. The display changes as follows.

```
***** DIRECTORY INITIALIZE *****  
  
Drive E selected  
Press RETURN when ready.  
  
ESC:restart STOP:exit CTRL/STOP:abort
```



Insert the destination disk (the disk whose directory is to be initialized) into the specified drive, then press **RETURN** to start initialization.

```
*****  directory  initialize  *****  
Drive E selected  
Initializin   <TRACK NO.>    04  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

Initialization starts at track 04 and ends at track 05. When initialization is completed, the following is displayed.

```
*****  DIRECTORY  INITIALIZE  *****  
  
Repeat with new diskette(s) (Y/N)?  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to initialize the directory on another disk, press **Y** and repeat the steps described above beginning with drive name specification. Otherwise, press **N**; if **N** is pressed, the following screen is displayed to ask whether you want to continue COPYDISK operation or exit to the system (MENU screen).

```
*****  DIRECTORY  INITIALIZE  *****  
  
eXit or Continue  COPYDISK (X/C)?  
ESC:restart  STOP:exit  CTRL/STOP:abort
```

If you want to end COPYDISK operation, type **X** (for eXit) and press **RETURN** to return to the MENU screen or CP/M command line. Otherwise type **C** (for Continue) and press **RETURN** to redisplay the COPYDISK menu.

# CTRLP

---

## Purposes

Toggles the printer echo function in the same manner as **CTRL** - **P** .

## Format

**CTRLP**

## Explanation

The CTRLP utility can be used in the same manner as the **CTRL** - **P** key sequence (the sequence which determines whether characters displayed on the LCD screen are echoed to the printer). (See the PX-4 User's Manual for more information on this and other control key commands.) However, the CTRLP utility can be included in submit files (see the explanation of the SUBMIT utility), whereas the **CTRL** - **P** sequence (“^P”) is not effective in submit files.

Functions of the CTRLP command are as follows.

- o If the printer echo function is off, CTRLP turns it on and displays the following message to show that it has been turned on.

### Example:

```
A>D:CTRLP RETURN  
(^P turned on)  
A>
```

- o If the printer echo function is on, CTRLP turns it off and displays a message to show that it has been turned off.

### Example:

```
A>D:CTRLP RETURN  
(^P turned off)  
A>
```

The printer must be ready and ON LINE when CTRLP is executed.

**NOTE:**

*The CTRLP command also deactivates the XSUB function (see the explanation of XSUB). Therefore, the CTRLP command must precede the XSUB command in the submit file. Further, the printer echo function is turned off whenever the XSUB function is deactivated by execution of the DEXSUB command in a submit file. Therefore, the CTRLP command must be executed following DEXSUB if the printer echo function is to be turned back on.*

**Example**

The following illustrates use of CTRLP in a submit file.

```
D : CTRLP  
D : XSUB  
D : PIP  
CON : = E.TEST.DAT  
^C  
D : DEXSUB  
D : PIP CON : = E : TEST.DAT
```

**Purpose**

The DDT utility is a debugging tool for 8080 assembly language programs; i.e., a program is used to load, execute, examine, and modify assembly language programs (Intel HEX files generated using the ASM utility, or machine language programs generated using the LOAD utility). DDT can also be used to display the results of assembly language program execution.

**Format 1****DDT**

Loads the DDT utility into main memory.

**Format 2****DDT filename.COM**

or

**DDT filename.HEX**

Loads file “filename.COM” or “filename.HEX” into main memory for debugging.

**Explanation**

When DDT is loaded, it replaces the console command processor (CCP) as the system which is responsible for handling input from the keyboard. Like the CCP, it displays a prompt, then waits for input of DDT commands from the keyboard. Screen display following DDT execution is as shown below.

```
D>DDT   
32k DDT ver 2.0
```

—

In this screen, the hyphen (“-”) is the command prompt. DDT has its own set of commands, which can be input whenever the cursor is displayed following this prompt.

The DDT commands are summarized in the table below, and are explained in detail following the table.

Command	Format	Function
A (Assemble)	Aaddress	Assembles 8080 mnemonics entered from the keyboard and stores the resulting instruction codes in memory starting at the specified address.
D (Display)	D<<address1><,address2>>	Displays the contents of memory in both hexadecimal and ASCII format. Display starts at <address1> and ends at <address2>.
F (Fill)	Faddress1,address2,C	Writes the hexadecimal constant specified for C into memory addresses from address1 to address2.
G (Go)	G<<address><<,bp1><,bp2>>>	Begins program execution at <address>, and stops execution temporarily at break points <bp1> and <bp2>.
H (Hex calculate)	Hnnnn mmmm	Calculates the sum and difference of hexadecimal values specified for nnnn and mmmm and displays the results in hexadecimal format.
I (Input)	Ifilename	Writes the specified file name into the File Control Block (FCB) starting at address 5CH. The specified file can then be loaded with the R (Read) command.
L (List)	L<<address1><,address2>>	Displays 8080 mnemonics corresponding to machine language instruction codes in the area from <address1> to <address2>.
M (Move)	Maddress1,address2, address3	Moves the contents of the memory area starting at address1 and ending at address2 to the memory area starting at address3.
R (Read)	R<offset>	Loads the HEX or COM file whose name was specified with the I (Input) command.
S (Set)	Saddress	Displays the current contents of the specified address in hexadecimal format and allows a different value to be written into that address.

Command	Format	Function
T (Trace)	Tm	Traces m steps of the program starting at the program counter address. Trace results are displayed for each step traced.
U (Untrace)	Um	Traces m steps of the program starting at the program counter address. Trace results are displayed only for the last step traced.
X (eXamine)	X<P>	Displays the register content and flag settings. When <P> is specified, displays the value of the program counter and allows it to be changed.

**Format****A**

Assembles 8080 mnemonics entered from the keyboard and stores the resulting instruction codes in memory starting at the specified address. Numeric values specified in the operands of instructions must be specified in hexadecimal format; however, do not specify “H” following the number.

**Example:**

```
– A100   
0100
```

Type a mnemonic instruction and press

```
0100 LXI SP,80   
0103
```

This stores the machine language instruction corresponding to “LXI SP,80H” in memory addresses from 0100H to 0102H.

To end the assembly mode and return to the DDT prompt, press the  key without entering any instruction.

```
0103   
–
```

## Format

**D****Daddress1****Daddress1,address2**

Displays the contents of memory in both hexadecimal and ASCII format. If D is specified by itself, display starts at the address following that which was last displayed and ends after 12 lines have been displayed. If Daddress1 is specified, display starts at the specified address and ends after 12 lines have been displayed. If Daddress1,address2 is specified, display starts at address1 and ends at address2.

**Example 1:**

– D    **RETURN**

When first executed, displays the contents of memory starting at 0100H and ending at 01B9H.

**Example 2:**

– D200    **RETURN**

Displays the contents of memory from address 0200H to 02B9H.

**Example 3:**

– D200,400    **RETURN**

Displays the contents of memory from address 0200H to 0400H.

**NOTE:**

*Since up to 12 lines are displayed at one time, the first lines displayed may be scrolled off the top of the physical screen. To see these lines, press **SHIFT** + **^** .*



Further, up to 16 bytes of memory are displayed on each line. Since this may require up to 69 characters per display line, lines may extend beyond the right side of the physical screen. To see the right ends of lines, press **SHIFT** + **→** .

If you want to output the contents of memory to a printer, press **CTRL** + **P** before executing the **D** command.

**Format****F**address1,address2,C

Writes the hexadecimal constant specified for C into memory addresses from address1 to address2.

**Example:**

– *F0195,01A3,4C* RETURN

–

Fills the memory area from 0195H to 01A3H with the hexadecimal constant 4CH.

**Format****G****Gaddress****Gaddress, bp1****Gaddress, bp1, bp2**

Starts execution of a program loaded with the DDT command. If no address is specified, execution starts at the current program counter address; otherwise, execution starts at the address specified.

Up to two break points (bp1 and bp2) can be specified in this command. When a break point is specified, execution stops temporarily and the program counter address is displayed when the program counter reaches that value. Execution can then be resumed by executing the G command by itself.

**Example 1:**

– **G** RETURN

Starts program execution at the program counter address.

**Example 2:**

– **G100,120** RETURN  
\* 120  
–

Starts program execution at address 0100H and stops execution when the program counter value reaches 0120H.

**Format****Hnnnn mmmm**

Calculates the result of addition and subtraction of hexadecimal numbers, i.e. nnnnH + mmmmH and nnnnH – mmmmH.

Numbers may be up to four digits in length and must be hexadecimal digits. When the **RETURN** key is pressed, the result is displayed on the next line. The addition is displayed on the left and the subtraction on the right regardless of which way round the numbers are entered. However, if the first number is smaller than the second, the subtraction result will be calculated from the first number and so will be shown negative i.e. possibly less than FFFF.

Results of up to 4 digits are displayed, and overflow and underflow errors are ignored.

**Example:**

```
– H1F00 100  RETURN  
2000 1E00  
–
```

**Format****Ifilename**

Loads the specified file name into the File Control Block (FCB) starting at address 5CH. The file specified must be either a HEX file or a COM file, and must be located on the currently logged in drive. After execution of this command, the specified file can be loaded with the R (Read) command.

**Example:**

– *IABC.COM!*   
–

**Format**

**L**  
**Laddress1**  
**Laddress1,address2**

Disassembles the contents of the specified memory area; that is, displays 8080 mnemonics corresponding to machine language instruction codes in that area.

If L is specified by itself, 11 instructions are disassembled. Disassembly starts at the address following that which was last disassembled. If the L command has not been executed previously, disassembly starts at address 0100H.

If Laddress1 is specified, disassembly starts at the specified address and continues until 11 instructions have been disassembled.

If Laddress1,address2 is specified, disassembly starts at address1 and ends at address2.

**Example:**

– *L100,105* RETURN

Disassembles the contents of memory from address 0100H to 0105H.

# M

(Move)

**Format**

**Maddress1,address2,address3**

Moves the contents of the memory area starting at address1 and ending at address2 to the memory area starting at address3.

# R

(Read)

**Format**

**R**  
**Roffset**

Loads the HEX or COM file whose name was specified with the I (Input) command. Specifying an offset makes it possible to append a file from storage to a program which is currently in memory.

**Example:**

```
- IABC.HEX  RETURN  
- R5       RETURN
```

**NOTE:**

*< offset > can be specified when the file being loaded is a HEX file, but not when it is a COM file. When < offset > is not specified, the file is loaded into the memory area starting at the ORG address specified in the assembly language source list. If < offset > is specified, the starting address of the memory area into which the file is loaded is the ORG address + < offset >.*

**Format****Saddress**

Displays the current contents of the specified address in hexadecimal format and makes it possible to write another value into that address. The value remains unchanged if **RETURN** is pressed without entering a different value. This “memory editor” mode is terminated by typing a period instead of another value.

**Example:**

```
- S100 RETURN  
0100 01 02 RETURN  
0101 BC RETURN  
0102 4C . RETURN  
-
```

Displays the contents of 0100H (01H), changes the contents of 0100H to 02H, and displays the contents of 0101H, which are left unchanged. Editing is terminated when the period (.) is typed following display of 0102H.



**Format****Tm**

Traces *m* steps of the program starting at the program counter address. Flag settings, register contents, and program mnemonics prevailing prior to execution of each step are displayed as each step traced. An asterisk and the value of the program counter after instruction execution are displayed following the mnemonics.

If *m* is omitted, one step is traced. When several steps are being traced, operation can be interrupted by pressing any key.

**Example:**

```

- T2  [RETURN]
COZOM0E010 A = 00 B = 0000 D = 0000 H = 0000 S = 0100
P = 0100 MVI A,25 * 0102
COZOM0E010 A = 25 B = 0000 D = 0000 H = 0000 S = 0100
P = 0102 MVI B,4C * 0104
-

```

Traces two steps of the program in memory, starting at the current program counter value (in this case, 0100H). Flags and registers displayed are as follows.

CxZxMxExIx:	Settings of the Carry, Zero, Minus, Even parity, and Interdigit carry flags.
A = xx:	Contents of the accumulator.
B = xxxx:	Contents of register pair BC.
D = xxxx:	Contents of register pair DE.
H = xxxx:	Contents of register pair HL.
S = xxxx:	Contents of the stack pointer.
P = xxxx:	Contents of the program counter.

**NOTE:**

*If you want to stop tracing momentarily to examine the contents of the register status line, press [CTRL] - [S]. Tracing can then be resumed by pressing any key.*

Since the register status line extends beyond the right side of the physical screen, press **SHIFT** + **→** to see the right end of the line.

If you want to output results to a printer, press **CTRL** + **P** before executing the T command.

# U

(Untrace)

**Format**

**Um**

Traces m steps of the program starting at the program counter address. Trace results are displayed only for the last step traced.

# X

(eXamine)

**Format**

**X**  
**Xr**

Displays the register contents and flag settings. When a flag, register, or register pair is specified, displays the corresponding value and allows it to be changed. Flags and registers which can be specified for r are as follows.

**Flags**

C - Carry flag  
Z - Zero flag  
M - Minus flag  
E - Even parity flag  
I - Interdigit carry flag

**Registers**

A - Accumulator  
B - Register pair BC  
D - Register pair DE  
H - Register pair HL  
S - Stack pointer  
P - Program counter

**Example 1:**

- X RETURN  
COZOM0E0I0 A = 00 B = 0000 D = 0000 H = 0000 S = 0100  
LXI B,0FBC  
-

**Example 2:**

```
- XP RETURN  
P = 0100 RETURN  
-
```

Displays the contents of the program counter, then returns to the DDT command prompt.

**Example 3:**

```
- XA RETURN  
A = 25 3E RETURN  
-
```

Displays the contents of the accumulator, changes the contents of the accumulator, then returns to the DDT command prompt.

# DEXSUB

---

**Purpose**

Used in submit files to deactivate the XSUB function.

**Format**

**DEXSUB**

**Explanation**

After XSUB has been executed in a submit file, DEXSUB can be executed to deactivate XSUB and cause commands which use buffered console input to wait for parameters to be typed in from the keyboard instead of looking for them in the submit file.

For further information, see the explanations of SUBMIT and XSUB.

**NOTE:**

*The DEXSUB command also unconditionally deactivates the printer echo function (the function which causes output to the CRT screen to be echoed to the printer). This is indicated by the following message.*

**(xsub deactivated; ^P turned off if on)**

Therefore, the CNTLP command must be executed following DEXSUB if the printer echo function is to be turned back on.

# DIRINIT

---

## Purpose

The DIRINIT command initializes the directory track of the RAM disk or a disk in a disk drive. This makes it possible to use the disk as a new one without formatting it.

## Format

**DIRINIT**

## Explanation

Type DIRINIT following the CP/M prompt, then press the  key. After doing this, the screen changes as shown below.

```
D>DIRINIT   
PX-4 DIRectory INITIALize
```

**Destination drive name (or RETURN to reboot)**

Set the disk whose directory is to be initialized in a disk drive, then type the drive name (A: or D: to G:). In the following example, the disk is set in drive D:.

```
D>DIRINIT   
PX-4 DIRectory INITIALize
```

**Destination drive name (or RETURN to reboot) D**

**Destination on D, then press RETURN**

**Function complete**

When “Destination on D, then press RETURN” is displayed, press the  key. The disk directory is initialized, then “Function complete” and the message “Destination drive name (or RETURN to reboot)” is displayed again. At this time, another the directory of another disk can be initialized by specifying the drive name and pressing  as described above. Control is returned to CP/M if  is pressed without entering a drive name or if the  key is pressed.

## NOTE:

*The following message is displayed if an illegal drive name is specified.*

**Invalid drive name**

**Destination drive name (or RETURN to reboot)**

# DUMP

---

## Purpose

The DUMP command displays the contents of the specified file on the screen in hexadecimal format. Each 16-byte section of the file is displayed on one line, with the starting address of each section listed at the beginning of the line.

## Format

**DUMP filename.filetype**

or

**DUMP dr:filename.filetype**

## Example

**D > DUMP E:TEST.ASM** RETURN

```
0000 4F 52 47 20 31 30 30 48 0D 0A 4D 56 49 20 41 2C
0010 32 35 48 0D 0A 4D 56 49 20 42 2C 34 43 48 0D 0A
0020 52 45 54 0D 0A 45 4E 44 0D 0A 1A 1A 1A 1A 1A 1A
0030 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A
0040 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A
0050 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A
0060 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A
0070 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A 1A
```

**D >**

### *NOTE:*

*Since the display lines will extend beyond the right side of the physical screen, press SHIFT + → to see the right end of the line.*

If you want to output results to a printer, press CTRL + P before using the DUMP utility.

**Purpose**

Used for creating and editing text files (such as submit files and assembly language source files).

**Format**

**ED dr:filename.typ**

**Explanation**

The name of the file to be edited (the source file) must be specified when the ED utility is started (it is not possible to specify the file name after executing ED by itself). The file name specified may be either that of an existing file or a new file.

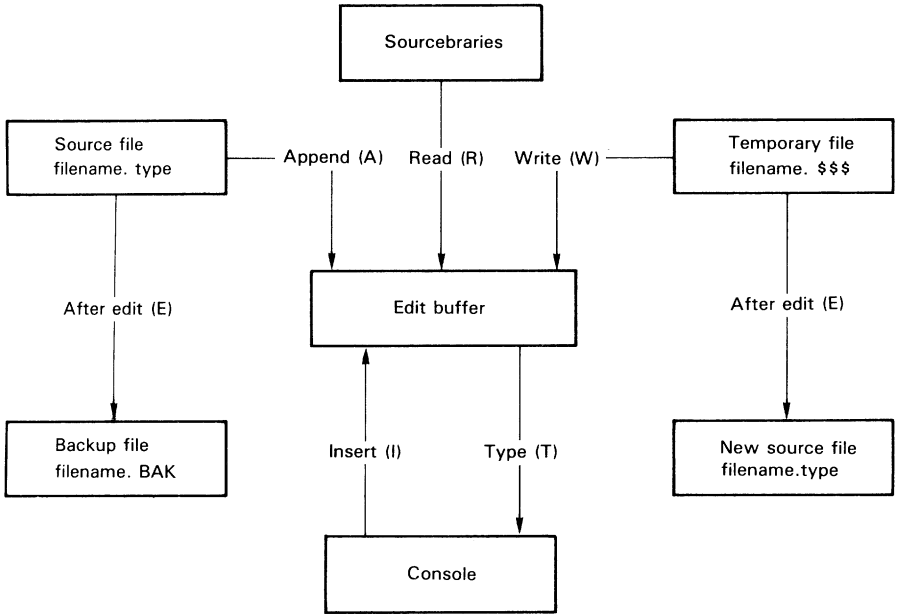
Files are created or edited using an edit buffer in memory. When you are creating a new file, you will type lines of text can be inserted into this buffer, edit them, then write the contents of the edit buffer to the file. When you are editing an existing file, you will load lines of text into the buffer for editing, then save the contents of the buffer after editing has been completed.

Since the capacity of the edit buffer is limited to about 6,000 characters, long files must be edited in sections. When the buffer becomes full, edited sections can be saved to a temporary file; lines saved are deleted from the edit buffer, allowing new lines to be loaded from the original file or inserted from the keyboard. The user can append the contents of the edit buffer to the temporary file or load additional lines of text into the edit buffer at any time.

Once editing has been completed, the temporary file is saved under the file name specified when the ED utility was started (i.e., its file type is changed from .\$\$\$ to that specified when "ED dr:filename.typ" was executed). The original source file (if any) is not changed, but is renamed using the original file name and the file type ".BAK" (for backup).

The relationship between the various types of files and the edit buffer is shown in the figure below.





- |                    |                   |
|--------------------|-------------------|
| A - Append command | R - Read command  |
| E - End command    | T - Type command  |
| I - Insert command | W - Write command |

The ED utility operates in two modes: the insert mode and the command mode.

In the insert mode, lines of text can be inserted into the text buffer from the keyboard. The ED utility uses a character pointer (the CP) to keep track of the position into which characters typed are inserted.

In the command mode, an asterisk is displayed to indicate that ED is ready to accept editing commands. The editing commands make it possible to move the character pointer, append text to the edit buffer from other files, delete characters or lines from the edit buffer, and so forth.

The following pages describe the edit commands, control characters which can be used during editing, and action to take when the edit buffer becomes full. Error messages displayed by the ED utility are described in Appendix B.

## 1. Text Transfer Commands

### 1.1 Appending text into the edit buffer

After starting ED, you can use the A (Append) command to add text to the edit buffer.

#### **NOTE:**

*ED can number lines of text to help you keep track of data in the edit buffer. The colon that appears when you start ED indicates that line numbering is turned on. Type -V after the ED prompt to turn off line number display. After doing this, line numbers appear on the LCD screen but do not become part of the final file.*

### The V (Verify Line Numbers) Command

The V command turns the line number display in front of each line of text on or off. The V command also displays the free bytes and total size of the memory buffer. The forms of the V command are:

**V, -V, 0V**

Initially, the line number display is on. Use -V to turn it off. If the edit buffer is empty, or if the current line is at the end of the memory buffer, ED represents the line number as five blanks.

The 0V command prints the edit buffer statistics in the form:

**free/total**

where free is the number of free bytes in the edit buffer, and total is the size of the edit buffer. For example, if you have a total of 6,071 bytes in the edit buffer and 5,051 of them are free, the 0V command displays this information as follows.

## 5051/6071

If the buffer is full, the first field (which indicates free space) is blank.

### The A (Append) Command

The A command appends (copies) lines of text into the memory buffer from an existing source file. The A command takes the following form:

***n*A**

where *n* is the number of lines of text to be brought into the edit buffer.

If a pound sign (#) is specified for *n*, the integer 65,535 is assumed. When the source file is small enough to fit completely into the edit buffer, #A can be used to read the entire source file into memory.

When 0 is specified for *n*, ED appends text into the edit buffer from the source file until the buffer becomes approximately half full. If A is executed without specifying *n*, ED appends one line of text into the edit buffer from the source file.

### 1.2 Saving text and ending ED operation

You can use the W (Write) command and the E (Exit) command to save the edited contents of the edit buffer. The W command writes lines from the edit buffer to the temporary file without ending ED operation. The E command saves the contents of the buffer and any unprocessed material from the source file, then exits ED to the CCP command line or menu screen.

### The W (Write) Command

The W command writes lines from the edit buffer to the temporary file. The general format for this command is as follows:

## *nW*

where *n* is the number of lines to be written from the beginning of the buffer to the end of the temporary file. If *n* is greater than 0, ED writes *n* lines from the edit buffer to the temporary file. If *n* is 0, ED writes lines until the buffer is half empty. The OW command is a convenient way of making room in the edit buffer for more lines from the source file. If the buffer becomes full, you can use the OW to make room for more lines from the source file. If # is specified for *n*, ED writes the entire contents of the edit buffer to the temporary file; afterwards, you can use the OA command to read in more lines of text from the source file.

### **NOTE:**

*If you want to reedit lines of text which have been saved with the W command, you must use the H command to save the contents of the edit buffer and the remainder of the source file, then restart editing for the same file.*

## The E (Exit) command

The E command saves the contents of the edit buffer and any remaining lines of text in the source file, then terminates ED operation.

When you enter the E command, ED first writes all lines of text from the buffer and the remainder of the source file to the temporary file, then changes the file type of the source file to BAK (if there is any other BAK file with the same file name, ED deletes that file). Finally, ED changes the file type of the temporary file from \$\$\$ to the file type of the original source file and returns control to the operating system.

The manner in which the E command operates makes it unwise to edit backup files. When you edit a BAK file and exit with the E command, ED erases the original file because its file type is BAK. To avoid this, always rename the backup file to some other file type before editing it.

### **NOTE:**

*Any command which terminates an ED session must be the only command on the line.*

## 2. Basic Editing Commands

The commands discussed above make it easy to bring text into the edit buffer for editing, and to save edited text and end the editing session. This section discusses commands which are used to edit the contents of the edit buffer.

The commands discussed above make it easy to bring text into the edit buffer for editing, and to save edited text and end the editing session. This section discusses commands which are used to edit contents of the edit buffer.

ED treats a file as a long chain of characters grouped together in lines. ED displays and edits characters and lines in relation to an imaginary device called the character pointer (CP). During an editing session, you must mentally picture the CP's location in the edit buffer and issue commands to move the CP and edit the file.

The following commands move the CP through the edit buffer or display text in the vicinity of the CP. These commands consists of a numeric argument and a single command letter and must be followed by a carriage return. The numeric argument (n) determines the number of times ED executes the command; however, there are four special cases to consider in regard to the numeric argument:

- If the numeric argument is omitted, ED assumes an argument of 1.
- Use a negative number if the command is to be executed backwards through the edit buffer. (The B command is an exception.)
- If you enter a pound sign (#) in place of a number, ED uses the value 65,635 as the argument. The pound sign can be preceded by a minus sign to cause the command to execute backwards through the buffer (-#).
- ED accepts 0 as a numeric argument only with certain commands. In some cases, 0 causes the command to be executed approximately half the possible number of times, while in other cases it prevents movement of the CP.

The examples in this section illustrate how the editing commands affect the position of the CP in the edit buffer (the character pointer is represented by the symbol “?”). Later examples in section 3. “Combining ED Commands” illustrate how commands appear on the screen.

### **2.1 Moving the character pointer**

This section describes commands that move the CP in useful increments but do not display the line to which the CP is moved. Although ED is used primarily to create and edit program source files, plain text is used in the examples below to make them easier to understand.

#### The B (Beginning/Bottom) Command

The B command moves the CP to the beginning or bottom of the edit buffer. The B command takes the following forms:

**B, -B**

-B moves the CP to the end (bottom) of the edit buffer, and B moves it to the beginning of the buffer.

#### The C (Character) command

The C command moves the CP forward or backward the specified number of characters. The C command takes the following forms:

**nC, -nC**

where *n* is the number of characters the CP is to be moved. A positive number moves the CP towards the end of the line (toward the bottom of the buffer). A negative number moves the CP towards the beginning of the line (toward the top of the buffer). If the number specified is large enough, the CP will be moved to a different line; however, when doing this, remember that each line is separated by two characters (a carriage return and a line feed) which are not displayed on the screen. In the examples, a carriage return is denoted by <cr> and a line feed is denoted by <lf>.