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## I. INSTALLING PC-51

The ORDER of the procedures in this instruction manual is ESSENTIAL for a satisfactory installation and configuration of PC-51. Please follow all the instructions in this manual accurately. Read the entire manual before you begin.

--- --

Your new PC-51 Software runs under the Disk Operating System (DOS) Version 2.0 or higher supplied with your IBM PC, therefore you must start up your computer using your DOS diskette in order to use PC-51.

If you are a first time user of the IBM PC and DOS, you should become familiar with the operation of the PC, DOS, and special equipment on your system before you setup PC-51.

```
* * * * *
*   NOTE:  You should make a backup copy of your DOS
*           diskette as specified in your DOS manual.
* * * * *
```

After having made a copy of your DOS diskette, you will be ready to prepare for the use of PC-51.

## I. INSTALLING PC-51

### 1. GETTING READY

-----  
Start your IBM PC using your DOS diskette as specified in your DOS manual.

Now take a look at the two PC-51 diskettes supplied by CORE. Check the serial numbers on both diskettes (located under the bar code) to make sure they match.

If you look carefully at the label, you will note that one diskette has PRODUCTION printed on it and the other has BACKUP printed on it. Take the BACKUP PC-51 diskette and store it in a safe place. The BACKUP diskette is not meant for daily use. If you ever need to use the backup diskette, refer to the BACKUP DISKETTE INFORMATION section in this manual.

Now take the PC-51 diskette that says PRODUCTION (from now on we will call this diskette simply: PC-51 diskette) and place it in Drive A:.. Close the drive, type:

DIR

and then press execute.

On the screen you will see the following directory:

```
+ - - - - - +
|
|   Volume in drive A has no label
|   Directory of A:\
|
| PC51      EXE      195073    9-17-84      1:14p
| PC51FORM  EXE      3328      8-10-84      2:37p
| CONFIGPC  COM      3712      8-03-84      12:28p
| PC51      CON      768       9-18-84      11:03a
| DRIVER    BIN      2900      8-31-84      8:16p
| CONFIG    SYS       35       9-18-84      10:53p
| PC51DIR   UTL      1408      9-20-84      3:35p
| FILE0001  UTL      5102      9-20-84      3:35p
|
+ - - - - - +
```

This directory shows the files on your PC-51 diskette. Instructions for moving your DOS system files to the PC-51 diskette are provided in subsequent sections of this manual.

```
* * * * *
*           W A R N I N G !!!           *
*       Do NOT attempt to ADD any files   *
*       to the PC-51 Diskette other than the *
*       ones specified in this manual.     *
* * * * *
```

## I. INSTALLING PC-51

### 2. BACKUP DISKETTE AND LICENSE AGREEMENT CONSIDERATIONS

-----

As stated in the CORE Program License Agreement, your PC-51 software may be used on a single machine only. You may not use, copy, modify, or transfer the program, or any copy modification or merged portion, in whole or in part, except as expressly provided in the license agreement. Any deviations from the rules set forth by the license agreement will be prosecuted to the fullest.

Since PC-51 is write-protected, CORE has supplied you with a BACKUP version of your PC-51 diskette. This diskette is only to be used if something happens to your primary (ie. PRODUCTION) version.

The BACKUP diskette contains identical files as found on the PRODUCTION diskette, but with some important differences.

One difference between the diskettes is the fact that PC-51 can be executed (run) only a limited number of times on the BACKUP diskette.

If you do need to use your BACKUP version, first be sure PC-51 is configured the same way as on the PRODUCTION diskette. A good safety rule to follow is: if a change is made to the PRODUCTION version, copy the "PC51.CON" file to the BACKUP diskette upon completion. This way your BACKUP diskette is ready to use should the need arise.

If something does happen to your primary PC-51 diskette, send in your original diskette with a written description of the problem so that you may be sent a replacement diskette. There is a \$50.00 handling fee which should be included with the return diskette.

Remember: store your BACKUP PC-51 in a safe place and do not use unless it is an EMERGENCY.

### 3. INSTALLING DOS PC-51

-----

In order to be able to start your system directly using your PC-51 diskette, you must copy IBM PC DOS onto your PC-51 diskette. If you would like to start your system from a standard DOS diskette, proceed to section 4: STARTING FROM A STANDARD DOS DISKETTE.

To install IBM PC DOS on your PC-51 diskette, follow the subsequent steps:

\*\*\*If you have a one diskette drive system:

## I. INSTALLING PC-51

Place your DOS diskette in the drive and at the A> type:

SYS B:

When the prompt returns to the screen, remove the DOS diskette from the drive and insert the PC-51 diskette. Close the drive and strike any key. This operation copies your DOS system files onto your PC-51 diskette. When completed, place your DOS diskette back in the drive and type:

COPY A:COMMAND.COM B:

When the message instructs you, remove your DOS diskette and insert your PC-51 diskette into the drive. Press EXECUTE.

When this COPY operation is complete, continue to "5. SETTING EQUIPMENT DEFINITIONS."

\*\*\*If you have a two diskette drive system:

Place your DOS diskette in drive A: and your PC-51 diskette in drive B: and type:

SYS B:

When the prompt returns to the screen, type:

COPY A:COMMAND.COM B:

This operation copies your DOS system files onto your PC-51 diskette in drive B:. When completed continue with section entitled "5. SETTING EQUIPMENT DEFINITIONS."

## 4. STARTING FROM A STANDARD DOS DISKETTE

-----

If you wish to start your system from an ordinary DOS diskette or from an IBM XT or AT internal hard disk, you will need to copy two files to your DOS diskette in the following manner:

\*\*\*If you have a one diskette drive system:

At the A> type:

COPY A:DRIVER.BIN B:

When the prompt returns to the screen, remove the PC-51 diskette from the drive and insert the DOS diskette. Close the drive and strike any key. When the prompt tells you that the copy operation was successfully completed, put the PC-51 diskette back in the drive and type:

COPY A:CONFIG.SYS B:

## I. INSTALLING PC-51

Once again the prompt tells you to remove the PC-51 diskette from the drive and insert the DOS diskette. Insert the diskette and strike any key. Again wait for the prompt to return indicating that the copy operation was successfully completed. Proceed to SETTING EQUIPMENT DEFINITIONS.

\*\*\*If you have a two diskette drive system:

Insert the DOS diskette in drive B: and leave the PC-51 diskette in Drive A:. Close the doors and at the A> prompt type:

COPY A:DRIVER.BIN B:

When the prompt tells you that the copy operation was successfully completed, type:

COPY A:CONFIG.SYS B:

When the prompt tells you that the copy operation was completed, proceed to SETTING EQUIPMENT DEFINITION.

### 5. SETTING EQUIPMENT DEFINITIONS

-----  
Now you should have a DOS diskette with DOS version 2.0 or higher and two PC-51 files named DRIVER.BIN and CONFIG.SYS on it. The next step is to take a look at the CONFIG.SYS file to see if it conforms with your system.

\*\*\*\*\* If you are not using CORE Hard Disk drives with your system, place your DOS diskette in drive A: and type:

COPY CON CONFIG.SYS  
then type: FILES=21  
then press the F6 ^Z  
key and the "^Z" will appear;

The line reading "FILES=21" sets the upper limit for how many files may be OPEN at one time. PC-51 should not require more than 21 files. This is used to store data on PC-DOS formatted diskettes and hard disk drives.

Proceed to the section entitled CONFIGURING PC-51.

\*\*\*\*\* If you will be using CORE disk drives with your system you will have to check the current drive types by typing the following:

TYPE CONFIG.SYS

then you will see:

DEVICE=DRIVER.BIN A10 A40 --- ---

## I. INSTALLING PC-51

### FILES=21

The line reading "FILES=21" sets the upper limit for how many files may be OPEN at one time. PC-51 should not require more than 21 files. This is used to store data on PC-DOS formatted diskettes and hard disk drives.

The line beginning with "device=..." will show the format for the type of CORE Hard Disk Drives. The sets of 3 dashes each "----" are place-holders and are to be filled in with the codes from the table below.

CORE MODEL NUMBER	POSITION NUMBERS			
	ONE	TWO	THREE	FOUR
=====				
5115	A10	---	---	---
5115-2	A10	---	A10	---
5116	---	A40	---	---
5116-2	---	A40	---	A40
5117	A10	A40	---	---
5111-1	I10	---	---	---
5111-2	I10	I10	---	---
=====				

Find the model number of your disk drive in the above table and use the corresponding drive position numbers for your system. For example, if you had a CORE 5117 (ie. one 10.6 MB removable cartridge and one 42.4 MB Fixed Disk drive) you would type the following:

```
then type:      COPY CON CONFIG.SYS
                 DEVICE=DRIVER.BIN A10 A40 --- ---
                 FILES=21
then press the F6  ^Z
key and the "^Z" will appear.
```

Proceed to the section entitled CONFIGURING PC-51.

## 6. CONFIGURING PC-51

-----

Before you may use PC-51, you must configure it for the type of disks that you will be using, and where they are located. The program to configure PC-51 is named "CONFIGPC", and the file containing the configuration data is named "PC51.CON".

When PC-51 is executed, the configuration information is read from the file "PC51.CON" which may reside on the default drive, or on drive A:. The default drive is checked first, and then drive A: is tested. If the file is not found on either drive, an error message is printed and PC-51 terminates.



## I. INSTALLING PC-51

The "CONFIGPC" program is used to set the default values for each of the PC-51 disk device codes (i.e. D80, D40, etc.), and printer control codes. Each device code may be individually set, and multiple device codes may be set to the same devices.

When a device code is set, the disk type is defined (i.e. DOS format, CORE hard disk, or 8" IBM 5110/20 format diskette). If a DOS disk is defined, the volume and path names must be stated. For CORE disks, only the drive letter is necessary.

To execute the configure program, while under DOS control, simply type:

CONFIGPC

The program will then ask you for the name of the configure file. The default input value is "A:PC51.CON". If the configure file is on drive A:, just press return to use the default name. If the file is on another drive, then enter the full file name preceded by the drive letter.

After entering the configure file name, the program will display the current configuration information. If this is the first time you are configuring the system, the screen will look something like this:

```
+-----+
                        CORE PC-51 CONFIGURATION PROGRAM
+-----+

DEV   DRIVE   DEFAULT   DEFAULT PATH/
CODE  TYPE    VOLUME    DOS CODE
-----
D80   3        UTL      A:
D40   0
D20   0
D10   0
D08   0
D04   0
D02   0
D01   0

DRIVE TYPES:      0 - UNUSED UNIT                3 - DOS FORMAT DISK
                  1 - CORE 10 MEG CARTIDGE        4 - 8" 5110/20 FORMAT
                  2 - CORE 42 MEG FIXED            5 - IOMEGA CARTRIDGE
=====
ENTER PRINTER TYPE: 1                          1 - EPSON MX100/80
                                                2 - OKIDATA 84, 92, 93
                UNDERLINE ON : 1B2D01  (HEX)    3 - OKIDATA 2350, 2410
                UNDERLINE OFF: 1B2D00  (HEX)    4 - OTHER

WOULD YOU LIKE TO MAKE ANY CHANGES?
+-----+
```

## I. INSTALLING PC-51

After the screen has been displayed, the cursor will be positioned at the question "WOULD YOU LIKE TO MAKE ANY CHANGES?". Entering a "Y" will allow you to change the current information, while entering "N" will terminate the program returning you to DOS.

When changes are requested, the cursor will move to the "DRIVE TYPE" column and the D80 row. At this time, you may enter the D80 drive type from the choices shown below the configure table. If that device code is not used, enter 0 for the drive type. Enter 1 or 2 for a CORE disk, 3 for a DOS format disk, 4 for 5110/20 format 8" diskettes, and 5 for IOMEGA drives.

After the drive type is entered, the cursor will move to one of three places for the next input value. If the drive type was 0, the cursor will advance to the next device code because none of the other information is applicable in that case.

If the drive type entered was a 1, 2, or 5, then the cursor will advance directly to the "DEFAULT PATH/ DOS CODE" column. At this time, enter the drive letter of the desired disk drive. The drive letter is the DOS convention for specifying the disk drive containing the file you want to access. The colon after the drive letter, as is the case with DOS disks, is not required. However, the colon can be used without harm. For example:

---- If your computer has one or two diskette drives, the drive letters start with A:. The CORE hard disk will be designated C: and the next CORE hard disk designated drive D:.

---- If your computer has one internal hard disk drive and one diskette drive, the diskette drive will be A: and the hard disk will be C:. The first CORE hard disk will be drive D: and the next CORE hard disk will be E:.

---- If your computer has two internal hard disk drives, they will be designated with the letters C: and D:. The drive designations for the CORE hard disks begin at E:. Remember, the colon is not required after the drive letter as is the case with DOS disks, however, it can be used without harm.

If the drive type is 3 (DOS disk) then the cursor will advance to the "DEFAULT VOLUME" column. The default volume name should be entered here. Remember this is a three character field that is only applicable for DOS disks. The next input field for DOS disks will be the "DEFAULT PATH/ DOS CODE" field. At this time, enter the default path name in the format as explained in this manual under the section describing path names (i.e. drive letter, directory path). The path name may be up to 54 characters long.

If the drive type is 4 (5110/20 8" diskettes), then the cursor will advance directly to the "DEFAULT PATH/ DOS CODE"

## I. INSTALLING PC-51

column. To select the first 8" diskette drive, enter a 1, and to select the second drive, enter a 2. Remember that the CORE 8" floppy diskette driver must be loaded into memory before the 8" diskettes may be used.

After all of the device codes have been configured, the program will advance to the printer type field. This field is used to set the control codes used to turn underlining on and off. By selecting printer types 1-3, the program will automatically provide the correct control characters for the indicated printers.

If printer type number 4 is selected, you are selecting a printer that is not in the list. You must then enter the hex codes required to turn underlining on and off. These codes are found in your particular printer's manual. The codes must be entered in hexadecimal and there may be no spaces in the numbers.

After all of the configuration information has been entered, the screen will clear and the program will display the updated configuration and ask if you would like to make any more changes. If everything is okay, just enter "N" to exit the program. To make changes, enter "Y" and you will be allowed to update the configuration. To leave any value unchanged, merely press the return key to advance to the next field.

To better understand the use of the CONFIGPC program, we shall look at a sample configuration. Below is a sample screen that shows the configuration for an IBM PC/XT with two DOS volumes defined as D80 and D40, and a CORE 5117 hard disk defined as D08 and D04.

## I. INSTALLING PC-51

### CORE PC-51 CONFIGURATION PROGRAM

DEV CODE	DRIVE TYPE	DEFAULT VOLUME	DEFAULT PATH/ DOS CODE
D80	3	GLP	C:\PROGRAMS\
D40	3	GLD	C:\DATA\
D20	0		
D10	0		
D08	1		D
D04	2		E
D02	0		
D01	0		

DRIVE TYPES:	0 - UNUSED UNIT	3 - DOS FORMAT DISK
	1 - CORE 10 MEG CARTIDGE	4 - 8" 5110/20 FORMAT
	2 - CORE 42 MEG FIXED	5 - IOMEGA CARTRIDGE

=====

ENTER PRINTER TYPE: 1

UNDERLINE ON : 1B2D01 (HEX)  
UNDERLINE OFF: 1B2D00 (HEX)

1 - EPSON MX100/80  
2 - OKIDATA 84, 92, 93  
3 - OKIDATA 2350, 2410  
4 - OTHER

WOULD YOU LIKE TO MAKE ANY CHANGES?

=====

First lets look at the D80 row. Under the "DRIVE TYPE" column, you can see that the type is 3 which indicates this device is a DOS format disk. The "GLP" under the "DEFAULT VOLUME" column is the volume name of the logical disk. The "DEFAULT PATH/DOS CODE" column gives the path to the files for this device which, in this example, is "C:\PROGRAMS\". The path specification indicates the files reside on drive C: (the XT hard disk), and they are in sub-directory "PROGRAMS". Note that the backslash immediately after "PROGRAMS" is required.

Remember that all 5110/20 files stored on DOS disks are named "FILEnnnn.xxx" where nnnn is the file number and xxx is the volume name. So, for the D80 volume, the complete path name for any file would be "C:\PROGRAMS\FILEnnnn.GLP" where nnnn is the file number.

If a volume resides in a root directory or if only a drive letter is used, it must be followed by a colon (:). If only the letter is entered and no colon follows it, the program will assume the letter indicates a directory name on the default drive rather than the actual drive which is desired.

The D40 row shows another DOS volume named "GLD". It also resides on drive C: in directory "DATA". The complete path name for all D40 files would be "C:\DATA\FILEnnnn.GLD" where nnnn is the file number.

## I. INSTALLING PC-51

Continuing down the screen, it can be seen that the next defined device is D08 which is defined to be a CORE 10 MB cartridge drive. The drive letter for this disk is D. Note there is no colon after the drive letter for CORE disks, and that a volume name is not applicable.

The next device is D04. It is defined for a CODE 42 MB fixed drive on drive E. Once again, note there is no colon following CORE drive letters, and no volume name is used, however the colon is optional.

The final configuration field is for the printer type. In the given example, the printer type is set for an EPSON MX100/80. The numbers shown below the printer type indicate the hex control codes required to turn the underlining function on or off.

After you have your configuration set properly, you may exit the configure program by answering N (for NO) to the question: Would you like to make any changes?

After returning to the DOS prompt you may execute PC-51 by typing :

PC51

Your computer will then respond with:

LOAD0

READY

You have now completed initial set up and may begin to use the computer.

## II. INSTALLING COREnet IN THE PC

### 1. OVERVIEW

-----

As received, your new controller for the IBM PC should consist of a black box having two blue 60-pin connectors on the front with a foot-long ribbon cable connected to a small printed circuit card. You may also have received a new shared drive controller cable with which you will attach the PC controller to the rest of your system. The PC-5i diskette contains the new device driver program that allows your PC to communicate with the CORE hard disk.

### 2. INSTALLING THE CIRCUIT CARD

-----

The first step in installing your PC controller is placing the attached circuit card into your IBM PC. This is done by first removing the five screws on the rear of the PC which hold the cover on. Making sure that all power has been disconnected, slide the metal cover forward and remove it from the PC. Inside the left rear of the PC, you will then see five to eight card slots, some already having cards plugged into them for the video monitor and disk controller. Choose any one of the available slots to contain the small printed circuit card attached to your PC controller.

### 3. CONNECTING THE CABLES

-----

Before plugging the card into the PC, you must first remove the screw and small metal plate behind (and slightly to the right of) the slot you want to place the circuit card into. A vertical slot should then be visible through which the foot-long ribbon cable will run from the circuit card to the black box. Since the circuit card will not fit through this slot, you will need to disconnect the ribbon cable from the circuit card by carefully removing the black 60-pin connector, remembering exactly how it was originally attached. Then run the ribbon cable through the slot in the back of the PC and carefully reattach it to the circuit card. Check to be sure that the top three wires going to the card are brown (pin 1), light brown, and red, respectively. The card may now be carefully inserted into the chosen card slot, with the connector side towards the rear of the PC. Be sure the card is firmly seated so that it won't fall out if you accidentally jerk on its cable. If a metal bracket is attached to the card, use the screw formerly holding the metal plate in place to fasten down the card. If you can wiggle the card so that it touches a nearby card, place some cardboard inside the PC to keep it from shorting out while in operation. The IBM PC's metal cover may now be replaced.

The PC controller is now attached to your PC. Notice that

## II. INSTALLING COREnet IN THE PC

the ribbon cable attaching the black controller box to the circuit card in the PC is short. This reduces external interference and thereby increases reliability.

Next, the shared drive controller cable will be used to attach the PC controller to COREnet.

The PC controller must now be connected to the rest of the system via the shared drive controller cable. This cable may be identified by its 60-pin connector and white 6-pin connector at each end, and black insulation. Plug one end of this cable into the outer pair of connectors on the PC controller (labelled "DISK"), paying attention to the notches on each connector which prevent you from putting the connector on upside down. Now, if this PC will be the only computer accessing this CORE hard disk, simply plug the other end of the shared drive controller cable into the connectors on the back of the CORE hard disk, and be sure the terminator pack is in the other 60-pin connector on the PC controller.

If this PC is to be connected to other computers accessing the same CORE hard disk, simply remove the terminator pack from the last controller in the existing network. Plug the other end of our shared drive controller cable into the connector that the terminator was removed from. This connector should be labelled "TERMINATOR OR NEXT CONTROLLER" on the controller. If there won't be any more computers connected to this disk, be sure to place a terminator pack in the last controller's "TERMINATOR OR NEXT CONTROLLER" connector.

Now your PC controller is connected to the rest of the system. Notice that each computer (or printer) in your network is connected to a controller. Each controller has a shared drive cable going towards the disk (labelled "DISK"), and one going to the next controller down the line (labelled "TERMINATOR OR NEXT CONTROLLER").

### 4. TESTING THE SYSTEM

-----

In order for your PC to communicate with the CORE hard disk, you must next modify the file CONFIG.SYS so that the disk driver program on your PC-51 diskette will know which type of CORE disk drives you have connected to your system. Please see the "SETTING EQUIPMENT DEFINITIONS" part of this manual for details. After changing this file, restart, and configure PC-51 using the CONFIGPC command (under "CONFIGURING PC-51"). You should then be ready to test your system using PC-51.

One good way to see if your PC controller is connected correctly is to try the "UTIL" command on the CORE hard disk while using PC-51. Please note that some "garbage" file names may be printed instead of actual file names if your CORE hard disk have

## II. INSTALLING COREnet IN THE PC

not been initialized yet. If everything works as expected, you can now begin celebrating. If it doesn't work, chances are that you either hooked something up wrong or didn't initialize the system properly.

### 5. WHAT TO DO IF IT FAILS

-----

If the PC does not come on at all when the power switch is placed in the ON position, check to be sure that the circuit card placed inside of the PC is installed properly. Also check to be sure the PC system unit and monitor are connected to power.

If the "UTIL" command takes more than a minute or two or you get an error during this operation, write down the error code received and look for the problem as described in the IBM manual. Read the following section for more information on common failures and general recovery procedures.

**ERROR 13** - This means the device code you used is not attached to the computer. Check both the CONFIG.SYS file and PC-51 configuration (CONFIGPC command in DOS). Remember to restart after changing the CONFIG.SYS file. Also check to be sure you have the correct device code.

**ERROR 92** - This means there was a parity error. Check to be sure that cables are installed properly, especially the connector on the circuit card placed inside the PC system unit. This error is also caused by having the shared drive controller cables reversed on any of the shared drive controllers on the system. Check to see that none of the cables are reversed.

**ERROR 96 or 97** - These are drive timeout errors. They are caused by the disk not communicating with the computer. First check to be sure the drives are on and "READY" lights are visible. If this is OK, then switch off the CORE disk with the power switch located on the back of the drive. Wait five seconds, and then switch back on. After the drives come ready, retry the command. If the error reoccurs, check all cables and make sure that they are in the correct places on the controller.

**ERROR A3** - This means that the drive has detected a write fault. Check to be sure that the "WRITE/PROTECT" switch is set to write if you wish to write to the disk. On removable cartridges check the write plug to be sure it is installed in the back corner of the cartridge.

**ERROR A4** - This means the drive is not ready for use. Wait for the drive to come ready and retry the command.

**OTHER ERRORS** - Most other errors are caused by problems not related to the connection of the PC controller. See the IBM manual or the other error list in this manual for details.



### III. UNDERSTANDING THE KEYBOARD

#### 1. Keyboard Layout

-----

The following description of the PC-51 keyboard layout assumes a knowledge of the IBM 5110/20 keyboard layout and key functions. For further information on 5110/20 keyboard, refer to your IBM 5110/20 manuals.

Included with PC-51 is a keyboard template which shows common and special characters found on both the IBM PC and 5110/20 systems. The template can be placed on top of the keyboard and used for quick reference.

#### 2. Alphabetic Character Keys

-----

Each of the alphabetic characters are found in the standard layout of typewriters (and likewise of the IBM 5110/20). You can alternate between the use of upper and lower case alphabetic characters by holding down the shift key when striking a character, such as you would on a standard typewriter. Also available is the <CAPS LOCK> key, that allows you to remain in either an upper case or lower case mode.

The top row of the alphabetic portion of the keyboard has the numbers 1 - 9 and 0 in their standard positions. If you look carefully, you will see the shift characters of these keys are the shift characters for a standard typewriter which is different from the IBM 5110/20. The access of these Special 5110/20 characters will be discussed in the Special Characters section.

#### 3. BASIC Command Keywords

-----

Each of the BASIC command keywords available on the 5110/20 are located on the same keys (top row keys) when using PC-51. These BASIC command keywords can be obtained by holding down the <ALT> key and then pressing the key for the desired command. For example, to enter the LOAD command keyword, hold down the <ALT> key and press 1 on the top row of the keyboard.

#### 4. BASIC Statement Keywords

-----

Each of the BASIC statement keywords present on the 5110/20 keyboard are located on the corresponding keys with PC-51. These may be obtained by holding down the <ALT> key and pressing down the key of the desired keyword on the alphabetic keyboard. For example, to obtain the GOTO keyword, hold down the <ALT> key and press the D character key.

### III. UNDERSTANDING THE KEYBOARD

#### 5. Special Characters

-----

Most of the special characters available on the 5110/20 are also directly available on the PC-51 keyboard. However, some of the special characters of the 5110/20 do not have representation on the IBM PC and, therefore, are represented by a substitute special character in PC-51. These substitute special characters perform the exact function as their equivalent on the 5110/20.

Most of the characters are located on the same keys as on the 5110/20 and can be obtained by holding down the <CTRL> key and pressing the key of the desired character.

#### 6. Numeric Keypad

-----

The numeric keypad to the right of the alphabetic characters can be operated in two modes. The <NUM LOCK> key allows you to switch between the use of the numeric keys as cursor control keys or as numeric keys.

As a numeric keypad, the keys serve their normal purpose of data entry of numbers. As cursor control keys, they allow you to move the cursor up, down, left, and right. There are also a number of added features not available on the 5110/20:

- a <HOME> key, which allows you to move the cursor to the beginning of a display field; this function is also available on the <F5> key;
- an <END> key, which allows you to move the cursor to the end of a display field; this function is also available on the <F6> key;
- an insert mode that allows you to insert an entire string of characters while shifting the rest of the characters on a line to right; this mode is accessible by either pressing the <INS> key or by pressing the <F3> function key;
- <delete character> and <insert character> keys are present on the numeric keypad; <delete character> is obtained by holding down the <CTRL> key and pressing 4; <insert character> is obtained by holding down the <CTRL> key and pressing 6; the delete character and insert character functions are also available on the <F1> and <F2> keys, respectively;
- an <erase end> key; holding down the <CTRL> key and pressing the 1 on the numeric key pad allows you to erase all of the characters from the present cursor position to the end of the line; this function is also available on the <F4> function and ATTN:/BREAK keys.

### III. UNDERSTANDING THE KEYBOARD

#### 7. Function Keys

-----

The keys on the left side of the PC-51 keyboard serve two purposes. When pressed individually, each has its own function:

- F1 -- delete character; this key is also equivalent to the <delete character> key on the numeric keypad: (<CTRL>4);
- F2 -- insert character; this key is also equivalent to the <insert character> key on the numeric keypad: (<CTRL>6);
- F3 -- insert mode; allows you to insert strings while shifting the remaining characters on the line down; this insert mode is equivalent to the insert mode on the numeric keypad: ("O" key)
- F4 -- erase all characters up to end of line; this key is the same as the <erase end> on the numeric keypad: (<CTRL>1) or ATTN:/BREAK;
- F5 -- home: puts cursor at the beginning of the display field; this key is equivalent to the <HOME> key on the numeric keypad;
- F6 -- end; puts cursor at the end of the display field; this key is the same as the <END> key on the numeric keypad;
- Cursor Control: (these keys serve the same purpose as the cursor control keys on the numeric key pad)
- F7 -- moves screen up
- F8 -- moves screen down
- F9 -- moves cursor left
- F10 -- moves cursor right

As you have already noticed, all of the function keys have equivalent keys on the numeric keypad. This may prove to be very convenient when using PC-51.

When the function keys are used with the <CTRL> key, they can be used as the IBM command keys 1 through 9. CMD 0 on the 5110/20 is <CTRL> <F10> on the PC.

#### 8. Editing Keys

-----

The 5110/20 <ATTN> key is replaced on the PC-51 keyboard by the <BREAK> key.

The 5110/20 <HOLD> key is replaced on the PC-51 keyboard by

### III. UNDERSTANDING THE KEYBOARD

holding down the <CTRL> key and pressing the <NUM LOCK> key. To release <HOLD>, on the 5110/20 it was necessary to press the <HOLD> key a second time. However on the PC, pressing any key will cause operation to continue.

The <ESC> key functions as a field clear key in PC-51; it erases all of the characters on a display field.

Another added feature in PC-51 that is not available on 5110/20 is the presence of <TAB> and <BACKTAB> keys. The tab key moves the cursor to the right in intervals of eight spaces at a time. The <BACKTAB> key is accessed by holding down the <SHIFT> key and pressing the <TAB> key. This key moves the cursor to the left eight character positions at a time.

#### 9. Summary of keyboard operation

-----

- all the alphabetic and numeric keys are in the standard typewriter layout
- the <SHIFT> key is used to access ordinary typewriter uppercase and lower case keys
- the <ALT> key is used to access all BASIC keywords
- the <CMD> key is used to access the 5110/20 special characters
- upper case, lower case, special characters, and BASIC keywords are all accessible at any time with use of the proper access keys
- the <NUM LOCK> key switches the numeric keypad between the access of numbers and editing functions
- each of the editing functions of the numeric keypad are also available on the function keys

#### IV. OPERATING PC-51 UNDER IBM PC DOS

##### 1. GENERAL STRUCTURE - EQUIPMENT SUPPORTED

-----

The file structure of the PC-51 file system was designed to allow maximum flexibility along with ease of use. PC-51 will support CORE hard disks, IBM 8 inch diskettes, DOS 5.25 inch diskettes, and DOS hard disks (i.e. XT and AT hard disks).

These disk types may be divided into two categories.

1. 5110/20 format disks
2. DOS format disks

When using the 5110/20 format, these files are only accessible by a 5110/20 or PC-51. The DOS format may be used by both PC-51 and PC DOS compatible programs. Therefore, files created under DOS format cannot be accessed by a 5110/20 system.

There is one major difference between standard PC DOS files and PC-51 DOS files. Files created by PC-51 under DOS format are stored in EBCDIC form (the 5110/20's native character set), as where the PC normally functions in ASCII. Therefore, if the PC-51 files are read by a standard PC DOS program, EBCDIC data will be read, and most likely the PC-DOS program would not know how to interpret the data correctly.

CORE produces a special program which can convert PC-51 files into standard PC DOS files which can then be used by most programs.

##### 2. 5110/20 FILES ON DOS DISKS

-----

To understand how and why the DOS file interface works the way it does, it helps to know how the concepts were conceived. When PC-51 was under development, it was determined that many users would like to eliminate their 8" diskettes and convert to an XT or AT hard disk. Other users expressed an interest in being able to use 5-1/4" diskettes as well. And still others wanted to continue to use their 8" diskettes.

Some of the problems that were encountered when trying to put 5110/20 files on DOS diskettes are listed below:

1. 5110/20 file names are 17 characters long and DOS files are only 11 characters long.
2. 5110/20 file headers are 128 bytes long and DOS file headers are only 32 bytes.

These two problems were solved by placing the 5110/20 file headers in a DOS file, and the 5110/20 data in individual DOS files. This means that a 5110/20 diskette with 10 files would require 11 files on a DOS disk.

#### IV. OPERATING PC-51 UNDER IBM PC DOS

This method works well for diskettes, but not as well for hard disks because the additional space would need to contain multi-volumes. The problem is that you could not put two versions of the same file on the disk because of name and number conflicts. However, this problem was avoided by allowing different "volume" and "path" names for a given logical diskette. In other words, PC DOS formats can easily support multi-volumes on the same media, which could be a diskette or hard disk drive.

The volume name is used to identify a logical diskette from other diskettes within the same directory. The path name is used to specify which directory and drive the volume is located on.

### 3. VOLUME, PATH, AND FILE NAMES

#### VOLUME NAMES

A volume name is a three character string. This string actually becomes the file name extension. The directory file as well as all files in the given volume have the same extension (which is the volume name). This permits easy identification of files belonging to a particular volume.

The volume name was designed to be associated with an 8" diskette. For example, suppose a user has four diskettes, two accounts receivable, and two payroll. One diskette of each set contains programs, and the other contains the data. The volume names might be assigned as follows:

VOLUME	DISKETTE
ARP	Accounts Receivable Program diskette
ARD	Accounts Receivable Data diskette
PRP	PayRoll Program diskette
PRD	PayRoll Data diskette

If the user would normally place the program diskette in D80 and the data diskette in D40, PC-51 could be configured to reference D80 as volume ARP and D40 as volume ARD on any DOS disk.

The default volume name for a PC-51 disk (i.e. D80, D40, etc) is specified in the configuration file (PC51.CON). When PC-51 is loaded, the default volume name is used. It may be changed at any time while running PC-51, either directly under program execution or through the keyboard (both explained later).

#### IV. OPERATING PC-51 UNDER IBM PC DOS

##### PATH NAMES

-----

A path name is a character string that specifies where a volume is located (i.e. which drive and which directory). The format of the path name is:

[d:][path]\

Where "d:" is the drive letter of the disk that contains the volume. If this parameter is omitted, the default drive is assumed. The colon after the drive letter is REQUIRED.

The "path" string specifies the directory that contains the volume. If this parameter is omitted, the root directory is assumed. The backslash (\) is required. For more information on path name specification, see your DOS manual.

##### FILE NAMES

-----

As stated above, since 5110/20 file names are 17 characters and DOS file names are only 11 characters, the 5110/20 file names and headers are stored in a DOS file. This file is identified as "PC51DIR.xxx" where "xxx" is the volume name.

Since 5110/20 file names are too long for standard DOS rules, the file name assigned to them use a combination of the file number and volume name to uniquely identify a file. Each file is identified as "FILEnnnn.xxx" where "xxx" is again the volume name, and "nnnn" is the four digit 5110/20 file number.

For example, suppose a volume was named "PRD", and there were two files in that volume (say, numbers 2 and 15). The directory file would be called "PC51DIR.PRD", and the two data files would be called "FILE0002.PRD" and "FILE0015.PRD". These are the files which would be seen if a DIR command is executed under PC DOS.

There is only one directory file for each volume, but there may be multiple files for any given volume. The directory file is created when the volume is formatted by the PC51FORM program. The data files are created when a file is MARKed.

#### 4. SPACE ALLOCATION AND MARKING FILES

##### SPACE ALLOCATION

-----

Remember that on a 5110/20, files are allocated (MARKed) before they can be used. The MARK operation requires the user to

#### IV. OPERATING PC-51 UNDER IBM PC DOS

specify the file size. This was necessary because the 5110/20 would allocate contiguous space for the file on the disk, thus allowing the file to contain up to, but not above, a reserved amount of data. Since the file size was specified in advance of actual use, this usually caused much of the available disk file space to be wasted. This means that if a file was MARKed for 100K but only 32K was in use, the unused 68K still took up space on the disk.

DOS files, on the other hand, do not require a MARK command before they may be used. The file is just written and it grows in size as needed to hold the necessary data. This is known as dynamic file allocation (i.e. space is only allocated as needed).

PC-51 gives the user the best of both methods. When files are stored on DOS disks, the space is dynamically allocated. So the 100K file that contained 32K of data would only use 32K of space on the diskette.

#### MARKING FILES

When using CORE hard disks, and IBM 8" diskettes, files must be MARKed as normal. When using DOS format, the files need not be MARKed before use. If a file is opened OUT and the file number and name are specified, and the file does not exist, it is automatically MARKed at 8000K. Remember, the file does not actually use 8000K of disk space, but only what has been actually written to it.

When MARKing files on DOS formats, the file size specifies the maximum amount of data the file can hold. So, if a file were MARKed at 20K, then that file could never hold more than 20K. To increase the file size, the file would need to be re-MARKed. As on the 5110/20 format, reMARKing already existing files will cause the data to be lost.

#### 5. CREATING DOS VOLUMES

Before you can use a PC-51 volume under a DOS format, the disk must be "formatted". The format operation is used to specify the volume name, VOLID, OWNERID, sector size, and number of file headers. Note that the disk is NOT formatted in the normal sense, and the program DOES NOT destroy the data on a diskette or hard disk.

To create a volume, you must use the "PC51FORM" program executed under PC DOS. It will ask you for the necessary parameters (i.e. volume name, number of file headers, etc.).



#### IV. OPERATING PC-51 UNDER IBM PC DOS

This program can ONLY be run while in DOS (i.e. it will NOT work while in PC-51).

As a standard rule in the PC51FORM program, when you are asked for an input response and there is a default value, it is printed in brackets. If you just press return, then the default value is used.

To execute the PC51FORM program, type:

PC51FORM

The program will then print its introduction message and ask you for the drive letter specifying on which disk to format the volume. Volumes may ONLY be formatted on DOS format disks, NOT on CORE hard disks or 5110/20 8" formatted diskettes. Enter the single letter specifying which drive to format (A or B for floppies, C or D for hard disks).

Next the program will prompt you for the volume name. This is a three character string used to identify a logical diskette. The three characters may be any valid DOS file name extension with the exception of EXE, COM, BAS, SYS, and BAT.

The program will ask for the VOLID next. This is the same as on the 5110/20 diskettes. The field may be up to 6 characters long.

The next input prompt is for the OWNERID. Once again, this is the same as on 5110/20 diskettes. The field may be up to 14 characters long.

Next, the program will prompt you for the sector size. Like on 5110/20 diskettes, you may specify a variety of sector sizes. This does not alter the physical sector size of the drive, but only changes the way that BASIC sees the disk. For most applications, use a sector size of 2 (512 bytes/sector).

The valid values for the sector size and the corresponding number of bytes per sector are listed below:

Input Value	Bytes per Sector	
0	128	
1	256	
2	512	<--- Recommended sector size
3	1024	<--- Only for data files, NOT programs or files that need to be sorted.

The next question is for the number of file headers. These parameters will set the limit on the number of files you may place in a given volume. The default value is 71 because this is the standard number of file headers for a normal 5110/20 2D diskette.

#### IV. OPERATING PC-51 UNDER IBM PC DOS

There may be up to 2000 files on any one volume. Remember that each file header in the directory requires 128 bytes, so don't enter a number that is too large if the files will never be used.

After all of the parameters have been entered, the program will then create the PC-51 volume by writing the directory file. To create another directory, just run the program again.

All of the parameters to format a volume may be specified on the PC51FORM command line. This is done by entering each input value, separated by commas, on the command line after the PC51FORM name.

For example, suppose you want to format a volume on drive B: and it was named APP. The VOLID will be TESTAP, and the OWNERID will be the default value. The sector size will be 256 bytes per sector, and there will be 30 files allocated for the volume. For this example, the command would be:

```
PC51FORM B,APP,TESTAP,,1,30
```

The program would then create the directory file and return to DOS when complete and the questions would not be asked.

#### 6. CHANGING VOLUME/PATH NAMES THROUGH THE KEYBOARD

-----

One major feature of PC-51 is the ability to change volume and path names whenever desired. This feature allows the user to easily change logical diskettes by changing the path and volume name of any DOS disk using only a few key strokes. This is kind of like electronically changing diskettes without having to physically remove or swap diskettes.

For a description of how to change volume and path names from a program, see the section entitled UNDERSTANDING BASIC in this manual.

From the keyboard this feature is accessed by holding down the <CTRL> and <ALT> keys together and then pressing the V key (the V is for volume). After this is done, the following two lines will appear at the top of the screen:

```
DRIVE:      (O TO EXIT)
1=D80      2=D40      3=D20      4=D10      5=D08      6=D04      7=D02      8=D01
```

The cursor will then be positioned at the "DRIVE:" prompt. Enter the number of the device code for which you would like to change the path and volume and then press execute. After you have selected the desired device code and it is a valid DOS disk, then

#### IV. OPERATING PC-51 UNDER IBM PC DOS

the current volume and path for that device are displayed. The screen would look something like this:

```
DRIVE: 1    (O TO EXIT)
VOLUME: UTL  PATH: A:
```

In this example, the current volume is UTL, and the path is "A:". The cursor is then positioned at the volume name, allowing the user to change the volume code. If the volume code is left blank, it is left unchanged from the previous value. After changing the volume code and pressing execute, the cursor is positioned at the current path and the user is allowed to change it as necessary.

After updating the path and volume names, the cursor is positioned back to the DRIVE prompt. Another device code may then be modified, or the volume update routine may be exited by entering a device code of 0.

The volume update routine may be executed at ANY time by just pressing <CTRL> and <ATL> followed by V. When a drive code of 0 is entered, the program that was running will continue exactly where it left off.

This feature can be executed whenever desired, even while a program is running. This is discussed in the section entitled "UNDERSTANDING BASIC" in this manual.

#### 7. AUTO START-UP

When PC-51 is first executed, the programmer may give the first command for PC-51 to perform. To do this, simply place the command to be performed after the PC51 command line. There must be at least one space separating PC51 and the command.

For example, suppose you wanted to run a PROCedure file named "START" on D04 to load and run the main system menu. Your PC-51 command would look as follows:

```
PC51 PROC 'START',D04
```

When PC-51 begins execution, the PROC 'START',D04 command would be processed first. Only one command may be processed on startup, so this is normally a PROC statement.

#### 8. DOS EXAMPLE

The IBM PC/XT in this example is assumed to have one 5 1/4" diskette drive, one internal hard disk drive, and one or two external 8" diskette drives.

For this example we will go through the steps involved in

#### IV. OPERATING PC-51 UNDER IBM PC DOS

converting a typical payroll system from a set of two 5110/20 8" diskettes to an IBM PC/XT hard disk (which has drive letter C). We will be placing both diskettes in the same sub-directory. It is assumed that you are familiar with DOS sub-directories and the commands associated with their use.

Before we can begin, some things must be decided like the name of the directory the files will be placed in and the name of the volumes for each diskette. We will call the directory "PAYROLL" and the volumes "PRP" and "PRD" for the program and data diskettes respectively. We will be following standard 5110/20 conventions by using D80 for programs, and D40 for data.

The first thing that is required is to create the directory for the files. To do this, we must first create the PAYROLL directory by typing:

```
MKDIR \PAYROLL
```

Now we must change to the PAYROLL directory so that the files may be placed there. Do this by typing:

```
CHDIR \PAYROLL
```

Now that the directory has been created, the next step is to create the volumes for this directory. This is done using the PC51FORM program. We will first create the program volume then the data volume. To create the program volume, type:

```
PC51FORM
```

The program will then print a startup message and ask you for the drive number to format. Your screen should look something like this:

```
PC-51 DOS Diskette Volume Format Program
Copyright 1984 (C) Core International, Inc.
```

```
Enter letter of DOS drive to format [C]:
```

The program is now asking for the drive that the volume is to be placed on. For this example, we want to place it on drive C (the hard disk). The [C] at the end of the prompt indicates that "C" is the default input value. So, just press return and the program will use the default drive C.

Next, the program will ask for the volume name by displaying the following input prompt:

```
Enter 3 character volume name [P51]:
```

Since we are creating the program volume first, and its name is "PRP", type PRP and press return.

#### IV. OPERATING PC-51 UNDER IBM PC DOS

The next prompt is for the VOLID. The message is:

Enter 1-6 character volid [CORE]:

This is the same as the VOLID that is used on 5110/20 diskettes. If you do not want to enter a VOLID, just press return to use the default value.

Next the program will ask you for the OWNERID. The message will be:

Enter 1-14 character OWNERID [OWNERID]:

As with the VOLID, this is the same as the 5110/20 diskettes. Just press execute to use the default or enter your own value.

The next prompt is for the sector size:

Enter sector size (0-3) [2]:

Like 5110/20 diskettes, PC-51 volumes can be formatted for different sector sizes. For our example, just press return to use the default sector size of 512 bytes. For more details on the sector size parameter, see the complete description on the PC51FORM program.

The final prompt is for the number of file headers:

Enter number of file headers [71]:

For our example, both diskettes contain no more than 71 files, so we can use the default value for this parameter.

After entering the number of file headers, the program will create the PC-51 volume. When complete, the system will exit PC-51 and the screen will display the DOS prompt.

To format the second (data) volume, follow the same procedures as above except change the volume name to "PRD". So after you format the second volume, the screen should look like this:

C>PC51FORM

PC-51 DOS Diskette Volume Format Program  
Copyright 1984 (C) Core International, Inc.

Enter letter of DOS drive to format [C]: C  
Enter 3 character volume name [P51]: PRD  
Enter 1-6 character VOLID [CORE]:  
Enter 1-14 character OWNERID [OWNERID]:  
Enter sector size (0-3) [2]:  
Enter number of file headers [71]:

#### IV. OPERATING PC-51 UNDER IBM PC DOS

PC-51 DOS format complete

C>

Now that the volumes have been properly formatted, we must configure PC-51 so that it will reference the proper files on the DOS disk. Before we configure, we should copy the configure file to the current directory. This is done to allow multiple configuration files for multiple directories. To copy the configuration file, type:

COPY A:PC51.CON

This will copy "PC51.CON" to the current directory of the default drive.

Now that we have a copy of the configuration file, we must make the necessary changes to tell PC-51 where the files are located. This is done using the configure program which may be executed by typing:

CONFIGPC

When the program asks for the configuration file name, enter:

PC51.CON

The configure program will then display the current configuration information on the screen. Update the configure information to show D80 as a DOS disk with volume name "PRP" and path name "C:\PAYROLL\". Likewise, set D40 to a DOS disk with volume name "PRD" and path name "C:\PAYROLL\". Configure your 8" diskette drives as D20 and D10. We will also need a device code (say, D08) to point to volume "UTL" with path "A:". This volume contains the copy program which we will be using soon. Read the section on the configure program for help with the configure operation.

The final step is to copy the files from the 8" diskettes to the XT hard disk. This is done using the copy program provided with PC-51. Before this program may be executed, the user must have PC-51 loaded. To do this, put your PC-51 production diskette in drive A: and type:

A:PC51

After a few moments, the screen should clear then you will see "LOAD0 READY". We are now ready to copy the files from the 8" diskettes to the hard disk. Remember that you should have the copy program on device D08 which we set during the configure program. To run the copy program, type:

LINK 'COPY',D08

#### IV. OPERATING PC-51 UNDER IBM PC DOS

The program will then ask for source and destination drives and file numbers. Enter the values to copy all files from D20 (first 8" diskette drive) to D80 (hard disk). This copy operation is used to copy the program diskette to the hard disk. The source drive number would be 3, starting file number 1, ending file number 9999, destination drive 1, starting file number 1.

When the copy operation is complete, follow the same procedure to copy the files from device D10 to device D40. This will copy the data files to the hard disk.

After the files have been copied, you are ready to begin. You could then enter your normal startup commands to enter the payroll system.

## V. UNDERSTANDING BASIC

### 1. LANGUAGE

-----

For a complete description of the IBM 5110/20 BASIC computer language, refer to IBM 5110/20 BASIC Introduction, BASIC User's Guide, and BASIC Reference manuals.

### 2. CHANGING VOLUME/PATH NAMES THROUGH PROGRAM CONTROL

-----

The volume and path names may also be controlled from within BASIC programs. The current values may be both read and set. All reading and writing of volume/path names is done through commands written to file FLS.

To read the current path and volume names, you must write a special command to file FLS. The command consists of the device code to read the path for and the scalar string variable (not an array reference) that is to contain the returned value. The string should be 64 characters long to hold the returned values. The format of the command to FLS is as follows:

Rz\$xxx

Where: R - Command to read current volume and path  
z\$ - Scalar variable to hold returned values  
xxx - Device code to read (i.e. D80, D40, etc.)  
SYS may be used for the system default device

For example, to read the volume name of device D04 into the scalar variable A\$, use the following statement:

WRITE FILE FLS, 'RA\$D04'

The variable A\$ will then contain the volume name in the first three characters and the path name in the remaining characters. If the string length is less than 3 characters, the device is not a DOS disk, or the device code is invalid, then the string value remains unchanged. If the string is not declared long enough to hold both the path and volume names, it will contain as much of the path name as possible. Path names may be up to 54 characters, so a string length of 64 is suggested when reading volume and path names.

To set the current path and volume, a similar command is given. Once again, this is done by writing a special command to file FLS. The command consists of the device code to set the path and volume for and the scalar string variable (not an array reference) that contains the new path and volume names. The first three characters specify the new volume name, and the remaining characters specify the new path name. The format of the command to FLS is as follows:



## V. UNDERSTANDING BASIC

Wz\$xxx

Where: W - Command to set current volume and path  
z\$ - Scalar variable containing new volume and path  
xxx - Device code to set (i.e. D80, D40, etc.)  
SYS may be used for the system default device

For example, to set the volume and path name of device D20 to "VOL" and "A:\PROGRAMS\", the following statements should be used:

```
A$='VOLA:\PROGRAMS\  
WRITE FILE FLS,'WA$D20'
```

After completion of the command, the volume name for D20 will be "VOL", and the path will be "A:\PROGRAMS\". If either the path or volume names are blank, then that parameter remains unchanged. If an invalid, or non-DOS device is specified, then the command is ignored.

### 3. OTHER BASIC LANGUAGE ENHANCEMENTS

-----

#### DETERMINING COMPUTER TYPE FROM WITHIN BASIC A PROGRAM

-----

You can determine whether you are running on an IBM 5110/20 or on an IBM PC under PC-51 from within a BASIC program. This is done by using the READ FILE statement referencing FLS.

File FLS is the 35-byte, system-oriented file that allows you to specify console control and allows you to access other programmer valuable information.

Byte 16 of this file will contain a 0 or a 1 if you are running on a IBM 5110/20. If you are running on a IBM PC under PC-51, byte 16 will contain a 2.

This information would be necessary, for example, if you will be LINKing to a program, such as COPY, from your BASIC program. Since there is a different COPY program for each of the computers, it is necessary to know what type of computer you are running on so that you can LINK to the correct program.

## VI. UTILITY SUPPORT FUNCTIONS

### 1. COPY Program - File 1

-----

The COPY program is used to move files from one disk to another disk. It can be used with floppies or hard disks. Files are kept in 5110/20 format and may be copied from one disk to another without regard to sector size or diskette type. The only restriction is the output disk must be large enough to hold the incoming files. If the error occurs an "ERROR ON THE MARK" will be displayed and COPY will terminate. COPY does not support multi-volumes and should be used only to move 5110/20 files within a volume. To move a complete volume use PC DOS copy functions.

Disks which already contain files can be used with the following results. If the file is already MARKed and is large enough to hold the incoming file, it will not be reMARKed, but it will be renamed with the new file. If the file is not MARKed or it is too small, it will be MARKed the same size and name as the incoming file. Should the file name already exist, an error will be displayed. The operator can then enter a new name or terminate COPY. However, if the input drive is the same as the output drive, the file name is not changed and no error is displayed. Programmers can use this function in sort procedures to efficiently copy back output files without having to rename files.

When you receive your PC-51 diskette, the COPY program is on the diskette in a volume called UTL. To execute COPY, type:

LINK 1,D80

while in PC-51 and with the diskette in drive A:. Be sure D80 is configured to point to volume UTL on path A:. COPY will then display the following screen:

#### DISK TO DISK COPY

COPY DATA FROM DRIVE (1-8):1 (0 TO STOP)  
FIRST FILE NUMBER TO COPY :1  
LAST FILE NUMBER TO COPY :9999

COPY DATA TO DRIVE (1-8) :2  
FIRST FILE NUMBER :1

ARE YOU SURE ?

The operator must answer these questions, unless executing from procedure files, before the copy is accomplished.

## VI. UTILITY SUPPORT FUNCTIONS

### COPY PROGRAM - EXECUTION FROM PROCEDURE FILES

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When executing COPY from a procedure file, one, two or three input lines may be present. They specify what to copy, what command to execute after copy and what command to execute if there was an error on termination. The lines are given below along with a description of their use.

COPY input, ffile, lfile, output, tfile  
RETURN command  
ERROR command

Where:

input	- Drive number of the files to be copied (1-8). The default value is 1.
ffile	- Number of the first file to be copied. The default value is 1.
lfile	- Number of the last file to be copied. The default value is 9999 (copy all files).
output	- Drive number the files are copied to. The default value is 2.
tfile	- First file number to copy to on the output drive. The default value is 1.
command	- Command line to execute when COPY is done or if an error occurs on termination. (maximum 30 chars)

These procedure statements are optional, however they must appear in the given order if any two are present. The values in the COPY statement must be numeric and may contain spaces. If non-numeric values are found, the operator will be prompted to enter correct data. All fields must be separated by a comma. If a field is left out (no value entered), the default value is used. If the COPY statement is omitted, the operator will be asked to enter the input values. If the RETURN statement is omitted, the program will do a LOAD 0 when done. Should an error occur on termination and the ERROR statement not used, a LOAD 0 is done, not the command.

#### EXAMPLE:

Below is a sample procedure file in which files 1 to 10 are copied from D08 to D40. The procedure is called "FILE.NAME" on D04 and is then continued after COPY is done.

```
0001:SKIP 3
0002:COPY 5,1,10,2,,
0003:RETURN PROC 'FILE.NAME',REC=6,D04
0004:ERROR PROC 'ERROR',D04
0005:LINK 'COPY',D04
0006:LOAD 'NEXT.PROGRAM',D04
0007:RUN
```

The "SKIP" command in the procedure file is necessary because the COPY, RETURN and ERROR statements are not valid 5110/20 system

## VI. UTILITY SUPPORT FUNCTIONS

commands.

### 2. BACKUP Program - File 2

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COMING SOON !

### 3. RESTORE Program - File 3

-----

COMING SOON !

### 4. DISKTEST Program - File 4

-----

COMING SOON !

\*\*\* APPENDICES \*\*\*

A1. PC-51 Error Codes

Error	DOS	Description
02		Unknown command
		Bad request structure length
03		Write protected
04		Seek error
05		Unknown media type
06		Sector not found
07		Write fault
08		Read fault
11		General failure
13		Device not attached/Bad unit
17		Data error (CRC)
20	2	File not found
21	3	Path not found
22	4	Too many files open
23	5	Access denied
24	6	Invalid handle
25	12	Invalid access code
26	15	Invalid drive specifier
27		DOS error
28		End of data file
29		End of diskette (diskette full)
30	2	Directory file not found
45		Drive not ready/Door open

REFER TO YOUR 5110/20 BASIC REFERENCE MANUAL FOR OTHER ERROR CODES.