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BASIC-2 Utilities Reference Manual
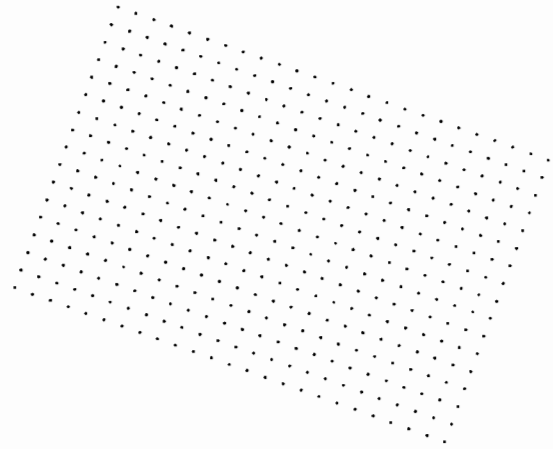
BASIC-2 Utilities
Reference Manual
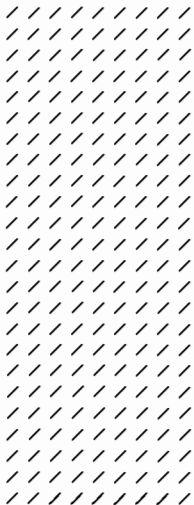
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FCC and DOC Notices

The Federal Communications Commission (FCC) and the Canadian Department of Communications (DOC) require that information regarding the interference potential of electrical equipment be included in the user documentation for the equipment. They also require that specific information be provided for components that will be connected to the Public Switched Telephone Network (PSTN).

Electromagnetic Interference Requirements

Wang Laboratories, Inc., manufactures both Class A verified computers and peripherals and Class B certified computers and peripherals. To determine which of the following warnings apply to the equipment, the user should refer to the label affixed to the device.

An example of a Class A verified label is the following:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

An example of a Class B certification label is the following:
FCC I.D. B4YPC250-16
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Warning

For Class A – This equipment[1,2,4] has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

For Class B – This equipment[1,2,3,4] has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

DOC Warning

For Class A – This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

For Class B – This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Connection to the PSTN

FCC Part 68 Requirements

If this equipment connects to the PSTN, it complies with Part 68 of the FCC Rules. A label is affixed to this equipment that contains, among other information, the FCC Registration Number (REN) and Ringer Equivalence Number (REN) for this equipment. Upon request, the user must provide this information to the telephone company.

The REN is useful to determine the number of devices that the user may connect to the telephone line and still have all those devices ring when the telephone number is called. In most but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5). To be certain of the number of devices that the user may connect to the line, as determined by the REN, the user should contact the local telephone company to determine the maximum REN for the calling area.

If the telephone equipment causes harm to the telephone network, the telephone company may discontinue service temporarily. If possible, the user will be notified in advance. However, if advance notice is not practical, the user will be notified as soon as possible. The user will be informed of the right to file a complaint with the FCC.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper functioning of the equipment. If such changes are made, the user will be notified in advance to give the user an opportunity to maintain uninterrupted telephone service.

If the user experiences trouble with this telephone equipment, the telephone company may ask that the user disconnect the equipment from the network until the problem has been corrected or until the user is sure that the equipment is not malfunctioning. For service or repairs, the user should contact the point of sales representative or Wang Laboratories, Inc.

This equipment may not be used in conjunction with coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

DOC Notice for Canadian Users

Notice – If this equipment contains a Canadian Department of Communications label, it identifies DOC-certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The DOC does not guarantee that the equipment will operate to the user's satisfaction.

Before installing this equipment, the user should ensure that it is permissible for it to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The user should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request that the user disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority or electrician, as appropriate.

Load Number – The Load Number (LN) assigned to each terminal device denotes the percentage of the total load that can be connected to a telephone loop. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100. An alphabetical suffix is also specified in the Load Number for the appropriate ringing type (A or B), if applicable. For example, LN=20A designates a Load Number of 20 and an "A" type ringer. The Load Number for this equipment can be found in the installation instructions pertaining to connection to the PSTN.

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(1) This equipment requires the use of shielded cables.

(2) If the user attaches a Class A verified device to equipment otherwise labeled as Class B, the combined system meets Class A regulations only. Class A specifications provide reasonable protection against radio and television interference in a commercial environment. Operation of Class A equipment in a residential environment may cause interference.

(3) This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Any modifications to this equipment not expressly approved by Wang Laboratories, Inc., could void the user's authority to operate this equipment.

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Preface

This manual describes the BASIC-2 utilities provided with the BASIC-2 operating system. The BASIC-2 utilities are programs that perform support and maintenance functions commonly used for system control and file maintenance.

- Chapter 1 introduces the BASIC-2 utility software and includes an overview of possible system configuration utilities. It also describes loading the system utilities.

- Chapter 2 provides specifications and operating instructions for the Partition Generator utility.

- Chapter 3 discusses the Partition Status utility.

- Chapter 4 describes the Format Disk Platter utility and includes information regarding both disks and diskettes.

- Chapter 5 discusses the Move File utility and software transportation between systems.

- Chapter 6 discusses several aspects of system back up, including such topics as when to backup, backing up to a disk or diskette of a different size, and running the Backup and Recover utilities.

- Chapter 7 provides an overview of the utility used to install new system files.

- Chapter 8 discusses using the Make a Reference List of File Names Utility.

- Chapter 9 discusses the Initialize Date and Time utility.

- Chapter 10 discusses the DS Utilities that manage storage devices and RAMdisks.

- Chapter 11 discusses the DOS Utilities that let you use DOS files and diskettes.

- Chapter 12 discusses the 2236MXE Command Mode Firmware utility and its various options for changing the configuration of the 2236MXE.

- Chapter 13 discusses the Generalized Printer Driver and its uses.

This manual should be used in conjunction with the following manuals:

CS Introductory Manual (715-1213)
BASIC-2 Language Reference Manual (700-4080F)
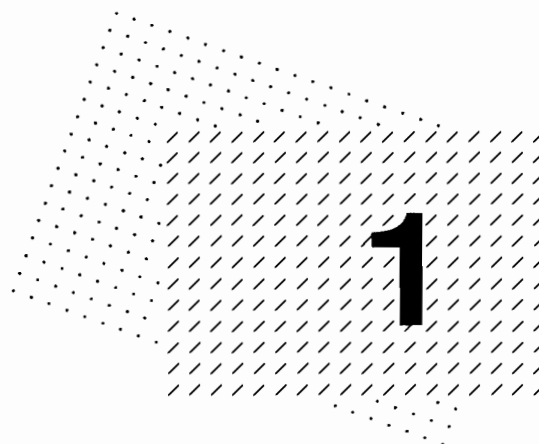
Introduction

System Configurations

The utilities described in this manual are available as part of Multiuser BASIC-2 and VP BASIC-2. The majority of the utilities are available for both systems; however, the Partition Generator and Partition Status utilities are available only for Multiuser BASIC-2.

VP BASIC-2 is used on the 2200VP and 2200SVP systems. Multiuser BASIC-2 is used on the MicroVP, 2200MVP, 2200LVP, and CS systems. However, you can load and use VP BASIC-2 with 2200MVP, 2200LVP, or CS systems.

Overview of the Utilities

Configuration Utilities

A brief description of the configuration utilities that are offered follows:

@GENPART – Partition Generator (for use with Multiuser BASIC-2). @GENPART creates, edits, saves, and executes system configurations that divide the system resources among the system users (see Chapter 2).

@PSTAT – Partition Status (for use with Multiuser BASIC-2). @PSTAT displays a table indicating the current status of each partition in the current system configuration (see Chapter 3).

@MENU – Program Menu. @MENU provides a menu structure for program selection. Multiple levels of a menu can be set up with each successive screen displaying the next menu mode. (@MENU is not displayed as an option from the System Utilities menu; it must be loaded separately.)

MXE Command Mode – MXE command mode is a firmware utility that is invoked through any Wang terminal attached to a 2236MXE. The utility enables you to change the corresponding 2236MXE configuration (see Chapter 12).

Disk Maintenance Utilities

A brief description of the maintenance utilities that are offered follows:

@FORMAT – Format Disk. @FORMAT formats software-formattable disks and diskettes, such as 2260C, 2260BC, 2275, 2280, 2200LVP, and DS (see Chapter 4).

@INSTALL – Install System Files. @INSTALL allows the installation of system files contained on new releases of Multiuser BASIC-2 or VP BASIC-2 diskettes (see Chapter 7).

@MOVEFIL – Move File. @MOVEFIL provides a general file move capability. Specified files or all active files are moved from one disk to another. If necessary, a file can span more than one output disk. This utility can create a new file, change the new file size of the output file, rename a file, and overwrite an existing file. File data can be recorded in 3741 format for software transport (see Chapter 5).

@BACKUP – Backup Disk. @BACKUP provides the ability to copy the contents of a single disk to another disk or to a series of smaller disks. The primary purpose of @BACKUP is to allow fixed disks to be backed up onto several diskettes (see Chapter 6).

@RECOVER – Recover from Backup. @RECOVER is the complementary utility to @BACKUP. The contents of the disks produced by @BACKUP are retrieved and written onto another disk by @RECOVER. This utility can be used to retrieve information only from a disk created by @BACKUP (see Chapter 6).

Clock Utility

The Clock utility program name is @CLOC (Initialize Date and Time) @CLOC allows you to edit the system date and, if a system clock exists, the system time (see Chapter 9).

Make a Reference List of File Names Utility

The Make a Reference List of File Names Utility lets you create and modify a list of file names. You can save this list either temporarily or permanently in a data orprogram file. In addition, you can edit the list or use it as input to two other utilities, copying the files to a disk surface or a disk image file (see Chapter 8).

Loading the System Utility Software

After you configure the system, you load the System Utilities menu. The following two commands display this menu.

1. SELECT DISK xxx   (Press the RETURN key)

   The 3-digit hexadecimal number (xxx) is the device address of the disk on which the system utilities reside.

2. LOAD RUN   (Press the RETURN key)

The System Utilities menu (see Figure 1-1) appears. Utilities that require user-entered information display a series of prompts requesting this information. When prompted, type in the necessary response and press RETURN. The utility requests additional information or performs the specified procedure. Each utility is handled individually in the following chapters.

```
                        System Utilities

Select an item and press RUN/EXEC                    Partition n, ddk
                                                     Terminal d

        Partition Generator
        Partition Status
        Format Disk Platter
        Move File
        Backup Platter
        Recover from Backup
        System Install
        Make a Reference List of File Names
        Initialize Date and Time
        DS Utilities
        DOS Utilities
        Game
```

Figure 1-1.   Multiuser BASIC-2 System Utilities Menu

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The BASIC-2 Partition Generator

Overview of the @GENPART Utility

The Partition Generator (@GENPART) utility available on the Multiuser BASIC-2 system divides the system resources, memory, and peripherals among the users on the system.

When the Multiuser BASIC-2 option is selected from the System Software menu during master initialization, the system loads and runs the @GENPART program from the system disk. @GENPART allows you to interactively create a system configuration. Alternatively, you can customize @GENPART to automatically execute a designated configuration stored on the system disk. @GENPART also allows other programs resident on the system disk to be loaded into designated partitions and executed automatically when the system is configured. Configuration definitions created by the operator may be saved on the system disk in a data file called @SYSFILE.

Partition Generation (System Configuration)

Partition generation (system configuration) divides the resources of the system among various users. This section discusses the use of the @GENPART utility program to create, save, and execute system configurations.

The CS/386 based BASIC-2 operating system limits user partitions to the size of user memory in the system. The CS/2200 VLSI based and earlier Wang 2200 systems restricted partition sizes to the maximum memory available in individual memory banks. (References to memory "banks" do not apply to the CS/386.)

The CS/386 operating system requires more space to store program text than does the VSLI based operating system. Individual partition size assignments may have to be increased.

System Configuration Parameters You Can Specify

You can specify the following ten parameters when configuring a system.

- The number of terminals
- The number of partitions
- The size of each partition
- The terminal associated with each partition
- The programmability of each partition
- The bootstrap program for each partition
- The addresses of the peripherals attached to the system
- The access to peripherals
- The system message
- The system reconfiguration password
- The CPU number (If the system is a CS/386)

The Process of System Configuration Using @GENPART

The process of master initialization, as described in the section entitled "Overview of the @GENPART Utility" creates a limited system having a single partition with all user memory controlled by Terminal 1. Only Terminal 1, any terminal printer attached to it, and the system disk drive are operative at this time. No other system devices are available until a configuration is executed. As a part of master initialization, the system microcode automatically loads and runs the BASIC-2 program file @GENPART from the system disk if such a file exists. (@GENPART is always assumed by the system to be the name of the system configuration program, whether Wang-supplied or user-written.) If @GENPART is not on the system disk, the READY (BASIC-2)message is displayed at Terminal 1.

When @GENPART is first executed, the parameters from the previous configuration (called "current") are loaded; a list of previously saved configurations is displayed along with a prompt inquiring if a different configuration is to be loaded; and the list of @GENPART options is displayed.

The user then proceeds to enter responses to the prompts displayed by each option and uses the function (SF) keys to advance from option to option. See the example of this general procedure in the "Generating a Sample Configuration" section of this chapter.

The standard Wang @GENPART program allows users two basic options.

- Creating configurations to be executed or stored for future use

    If you are creating a configuration for the first time, or if you wish to modify a previously defined configuration, you can use the function keys to load and modify the old configuration or to create a new definition, execute it, and/or store the configuration for future use.

- Loading and executing previously defined configurations

    If you wish to execute a system configuration that has been previously defined and stored in the configuration file on the system disk without modifying it, you can select a configuration from the list of previous configuration names displayed on the screen and manually execute one. It is also possible to modify the @GENPART utility program so that a specified configuration is loaded and executed automatically when the system is master initialized. The section entitled "Customizing @GENPART" describes how to make this modification.

@GENPART Operating Instructions

@GENPART Options

Note: References in the text below to memory "blanks" do not apply to the CS/386.

SF '00 - Clear Partitions – Clears the partition configuration parameters currently in memory. Allows you to specify the total number of terminals and the number of partitions; then advances to SF'04 (Edit Partitions). All CPU memory not assigned to partitions is available for CPU RAM disk. The Master Device Table is not altered when this function is selected.

For the CS/386 operating system, any number of terminals from 1 to 16 may be specified. The total number of partitions cannot exceed 16. There are no bank restrictions and the largest partition size is limited only by the memory in the CPU.

For the non-CS/386 operating system, any number of terminals from 1 to 16 may be specified. The number of partitions permitted in each bank can range from 1 to 16; however, the total number of partitions cannot exceed 16. There must be at least one partition in each bank that is to be used. Memory partitions must be contiguous; i.e., there should no memory remaining for partitions in Bank 1 before specifying memory for partitions in Bank 2.

SF'01 - Clear Device Table – Clears the Master Device Table currently in memory; resets the peripheral default values to /215, /310, /320 and allocates these devices to all users; then advances to SF'05 (Edit Device Table). The default device addresses can be edited if necessary.

SF'02 - Divide Memory Evenly – Divides the remaining memory in a bank equally among all partitions in that bank not yet allocated memory. By default, this division is performed for all banks. The CS/386 asks for the total amount of memory that you want to divide among the partitions. Then it divides the memory equally among all the partitions not yet allocated.

SF'04 - Edit Partitions – Displays and allows editing of partition parameters such as memory size, terminal assignment, programmability, and name of a program to be automatically bootstrapped. SF'04 does not allow addition of new partitions or deletion of defined ones for an existing configuration. The partition editing options are as follows:

Partition Size – On a CS/386 the maximum partition size is limited by the maximum memory available in the CS/386, i.e., 8MB. For all other CS units the maximum partition size is 56k (except for bank one which is 61k).

Terminal Assignment – Any terminal number from 0 to 16 is valid. Terminal 0 is the null terminal; a partition assigned to the null terminal is always available to any requesting terminal. Any partition may be assigned to any terminal (a terminal can support several partitions), but all partitions must be assigned to a terminal, even if they are to contain background jobs that never print on the CRT or require keyboard entry. In general, the lowest numbered partition(s) assigned to a terminal should contain the foreground (interactive) job(s) for that terminal. Background jobs should be placed in the higher-numbered partitions. Only the terminal that a partition is assigned to can list or modify the program in that partition. Although other partitions can access global program text and modify global variables, it is not possible for other partitions to list or modify the program text in a global partition.

Programmability – Any partition can be specified for disabled programming mode. The terminals connected to disabled programming partition(s) are inhibited from entering or modifying program text or performing a number of other system operations. As a result the operator is prevented from inadvertent or unauthorized use of certain programs and data.

Bootstrap Programs – One or more programs that reside on the system disk can be loaded into the partitions and run automatically without operator intervention when a configuration is executed. This feature is particularly useful for setting up background and global partitions and forcing terminals to execute particular BASIC-2 software. When no bootstrap program is specified for a partition, the READY (BASIC-2) display appears on the CRT of the terminal currently attached to that partition when the configuration is executed.

SF'05 - Edit Device Table – Displays and allows editing of the device addresses and allocation of all peripherals attached to the system. The Master Device Table default values are read from disk and displayed on the screen. All peripherals attached to the system (other than the terminals and terminal printers attached to them) must be specified in the Master Device Table.

By default, all peripheral devices are available to all partitions. However, devices can be assigned exclusively to one partition until the next system configuration is executed by entering the number of the partition that is to have control of the device in the Master Device Table. Console device addresses, i.e., /005 CRT, /001 keyboard, /204 terminal printers, and asynchronous MXE ports (e.g., A03, A04) are not specified in the Master Device Table.

For disk controllers that respond to more than one address, only the primary address must be specified (i.e., /310 but not /B10, et cetera). For all other multiaddress controllers, all valid addresses must be listed. For addresses that differ by the first digit only (device type), only the normal address must be specified. The default table values are the values of the saved configuration that was last used by the system. However, if the system platter was write-protected at that time, the default values are the ones used during the previous system configuration.

SF'06 - Edit $MSG – Displays and allows editing of a user-defined broadcast message that is displayed on each screen whenever the READY message is displayed. The user-defined message is displayed on line 0 of the CRT immediately above the READY message.

SF'07 - Select Printer Driver – Displays and allows editing of the Printer Table assignments to particular printer addresses and terminals. Printer Tables may be associated with a system printer by using the address associated with the controller for that particular printer. Printer Tables to be used by terminal printers all use address 204, however they are further defined as being associated with a particular terminal (the one that they are plugged into). For more information on the Generalized Printer Driver, see Chapter 12.

SF'08 - Load Configuration – Loads a configuration from the system configuration file on the system disk. You can only execute a configuration file that has a "Y" next to its name. To modify any previously defined configuration other than the most recently executed configuration (configuration "current"), this option must be used to load the named configuration from the system platter.

SF'09 - Save Configuration – Saves a system configuration in the system configuration file on the system platter under a user-specified name. The name has a maximum length of eight characters. If you specify a configuration name already in use, @GENPART verifies that you want to replace the old configuration with the configuration currently in memory. Note that the system disk must be unprotected to save configurations on it. The values of the Master Device Table currently stored in memory are saved to disk and may be used as default values during future master initializations (see '05 - Edit Device Table).

When a configuration is saved on either a VLSI or CS/386 CPU, a "Y" appears next to the configuration name indicating the type of CPU (VLSI or CS/386) that configuration will run on.

SF'10 - Delete Configuration – Deletes a configuration from the disk configuration file.

SF'11 - Edit CPU Number – For the CS/386, the relative CPU number 1-32 may be entered. This number is used with the platter hogging option.

SF'15 - Execute Configuration – Allows you to review and then execute a configuration that belongs to the appropriate CPU type (VLSI or CS/386). This configuration is automatically saved in the configuration file on disk, under the name "current," when the configuration is executed if the disk is write-enabled. A "Y" appears next to the CPU type (VLSI or CS/386) to which the configuration belongs. (You can not execute a configuration that does not have a "Y" next to the configuration name.)

Once a configuration has been executed, the system may be reconfigured again whenever the system is powered up, or when proper execution of the immediate mode form of the $INIT statement occurs. The configuration scheme, except for requested partition/terminal assignment change, remains in effect until the system is reinitialized.

Generating a Sample Configuration

The following example illustrates how @GENPART could be used to configure a system. A system with 1MB of memory, three terminals, and a telecommunications option is to be configured. The configuration, named SAMPLE, has four partitions and 3 banks (VLSI). A 16 KB (30KB for CS/386) telecommunications program is designated for automatic bootstrapping as a background job sharing Terminal 1 in partition 2. Disabled programming is specified for this partition so that it cannot be inadvertently modified. Partition 1 and 2 will have 45 KB and 16KB respectively (60 KB and 30 KB for CS/386). Partition 3 and 4 will receive 56KB (80 KB for CS/386). The remaining memory is allocated to RAM DISK. The system printer at address 215 uses the @PM016V2 printer driver.

In general, the order of executing options is as follows:

1. SF'08 to load a configuration
2. SF'00 to modify this configuration by adding or deleting partitions
3. SF'04 to create the new partition parameters
4.. SF'05 to create the Master Device Table
5. SF'06 to create the broadcast message
6. SF'07 to create/modify Printer Table assignments
7. SF'09 to save the configuration with a name other than "current"
8. SF'15 to execute the configuration
9. SF'10 to delete the configuration

In the example that follows, these options are discussed in the probable order of use.

Load a Configuration (SF'08)

When @GENPART is first executed, the screen in Figure 2-1 occurs without pressing SF'08.

```
          ***** Multiuser BASIC-2 Partition Generation Program *****
                    (c) Copr. Wang Laboratories, Inc. 19xx

                                                     List of options:
O.K.  16Configurations (#Partitions) (CPU number)  '00 - clear partitions
"Y"        current         ( 4)         ( 1)        '01 - clear device table

"Y"        CS/386          ( 4)         ( 3)        '02 - divide memory evenly
           VLSI            ( 4)         (..)        '04 - edit partitions
                                                    '05 - edit device table
                                                    '06 - edit $MSG
                                                    '07 - select printer driver

                                                    '08 - load configuration
                                                    '09 - save configuration
                                                    '10 - delete configuration

                                                    '11 - edit CPU number

                                                    '15 - execute
                                                    Press FN/TAB to exit

Configuration 'current' loaded.  Name of configuration to load?
```

Figure 2-1.   Partition Generation Screen on a CS/386

The last configuration executed, called "current," is automatically loaded if it was saved by the same CPU type (VLSI or CS/386). To load any other configuration, enter — name of a configuration that has a "Y" next to its name, then press RETURN. Since a completely new configuration is to be created, i.e., the total number of partitions in a previously defined configuration is to be modified, press SF'00 (Clear Partitions).

Clear Partitions (SF'00)

The program responds with a screen that first requests the number of terminals attached to the system. Prompts requesting the operator to specify the number of partitions in each bank of memory appear next. The amount of available memory in each bank is also calculated and displayed. The figures are then automatically updated after allocation of memory for each partition. Note that in the following display (see Figure 2-2), the system has subtracted the 3 KB of system overhead from the available memory in bank 1 and the unavailable 8 KB from the figure displayed for bank 2.

Enter 3 for number of terminals and 2 for number of partition in bank 1 also enter a 1 for bank 2 and 3. Entering a 0 for bank 4 will cause the rest of the memory to be allocated to CPU RAM Disk.

```
          ***** Multiuser BASIC-2 Partition Generation Program *****

Available memory:   61   56   56   56   56   56   56   56
Remaining memory:   61   56   56   56   56   56   56   56
                                                          List of options:
No. of terminals? 3                                       '00 - clear partitions
No. of partitions in bank 1 ? 2                           '01 - clear device table
No. of partitions in bank 2 ? 1
No. of partitions in bank 3 ? 1                           '02 - divide memory evenly
No. of partitions in bank 4 ? 0                           '04 - edit partitions
                                                          '05 - edit device table
                                                          '06 - edit $MSG
                                                          '07 - select printer driver

                                                          '08 - load configuration
                                                          '09 - save configuration
                                                          '10 - delete configuration
                                                          '11 - edit CPU number

                                                          '15 - execute
                                                          Press FN/TAB to exit
```

Figure 2-2.   Sample Clear Partitions Screen (VLSI)

In Figure 2-2, three terminals are attached to the system and there are two partitions in the first bank. The program automatically invokes option SF'04 (EDIT Partitions) to allow the editing of partition parameters.

For the CS/386, there are no memory bank restrictions. Three prompts will appear at this point. First a prompt for the CPU number appears followed by a prompt asking the number terminals and the last promps asking for the number of partitions. Enter a 1 for the CPU number, a 3 for number of terminals and 4 for the number of partitions.

```
          ***** Multiuser BASIC-2 Partition Generation Program *****
                 (c) Copr. Wang Laboratories, Inc. 19xx

Available memory: 8,251 K
CPU number ( 0 - 31 )? 1                     '00 - clear partitions
No. of terminals? 3                          '01 - clear device table
No. of partitions? 4
                                             '02 - divide memory evenly
                                             '04 - edit partitions
                                             '05 - edit device table
                                             '06 - edit $MSG
                                             '07 - select printer driver

                                             '08 - load configuration
                                             '09 - save configuration
                                             '10 - delete configuration

                                             '11 - edit CPU number

                                             '15 - execute
                                             Press FN/TAB to exit
```

Figure 2-3.   Sample Clear Partitions Screen (CS/386)

Note that in the following display (see Figure 2-3) the system is configured with 4 partitions, 3 terminals, and the CPU number is 1.

Edit Partitions (SF'04)

This option displays the default parameters for all partitions and initiates a cycle of prompts for altering these parameters. The cycle recurs continuously until another option is selected. You can modify the parameters for each partition. The display (see Figure 2-4 for VLSI and Figure 2-8 for CS386), is updated each time an item is entered.

```
          ***** Multiuser BASIC-2 Partition Generation Program *****

Available memory:  61  56  56  56  56  56  56  56
Remaining memory:  61  56  56  56  56  56  56  56

                                                        List of options:
No. of terminals? 3                                     '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM         '01 - clear device table
    1        -        1             Y
    2        -        2             Y                   '02 - divide memory evenly
    3        -        3             Y                   '04 - edit partitions
    4        -        1             Y                   '05 - edit device table
                                                        '06 - edit $MSG
                                                        '07 - select printer driver

                                                        '08 - load configuration
                                                        '09 - save configuration
                                                        '10 - delete configuration
                                                        '11 - edit CPU number

                                                        '15 - execute
                                                        Press FN/TAB to exit


Edit which partition (default = 1)?
```

Figure 2-4.   Sample Edit Partitions Screen (VLSI)

```
          ***** Multiuser BASIC-2 Partition Generation Program *****
                  (c) Copr. Wang Laboratories, Inc. 19xx

Available memory:  8,251 K
No. of terminals?       3       CPU number? 1        '00 - clear partitions
PARTITION SIZE(K)    TERMINAL PROGRAMMABLE PROGRAM    '01 - clear device table
    1        -          1             Y
    2        -          2             Y               '02 - divide memory evenly
    3        -          3             Y               '04 - edit partitions
    4        -          1             Y               '05 - edit device table
                                                      '06 - edit $MSG
                                                      '07 - select printer driver

                                                      '08 - load configuration
                                                      '09 - save configuration
                                                      '10 - delete configuration
                                                      '11 - edit CPU number

                                                      '15 - execute
                                                      Press FN/TAB to exit
Edit which partition (default = 1)?
```

Figure 2-5.   Sample Edit Partitions Screen (CS/386)

The following series of prompts is displayed in succession at the bottom of the screen.

```
Edit which partition (default = 1)?
```

In this example, the telecommunications program is run in Partition 2. Edit the parameters for Partition 2 by entering 2, then pressing RETURN. Note that an asterisk (*) appears beside the number of the partition whose parameters are being edited. The following prompt, requesting the amount of memory to be allocated to this partition, is then displayed.

```
Partition Size (default = 0 K)?
```

Any value greater than 1.25K and less than the amount of remaining user memory in the bank is a valid response. If a partition in Bank 1 is specified such that it resides entirely within the universal global area, a "u" appears next to the displayed partition number to indicate this condition. Running the telecommunications program in partition 2 requires 16 KB of memory. To allocate 16 KB of memory to Partition 2, enter 16 and then press RETURN.

The CS/386 does not have any bank requirements. A work and global partition may be any size greater than 2 K. When running programs on the CS/386 it is recommended to allow more memory space than used for the CS. To allocate 30 KB of memory to Partition 2, Enter 30 and press Return.

The following prompt is then displayed.

```
Terminal (default = 2)?
```

The telecommunications program is a background job controlled by Terminal 1. To assign Partition 2 to Terminal 1, enter 1 and press RETURN. The following prompt then occurs.

```
Enable programming (Y or N)?
```

By default, programming is allowed for all partitions. Disabled programming is specified for Partition 2, however, to prevent inadvertent modification of the telecommunications program. To specify disabled programming mode for this partition, enter N, then press RETURN. The name of a program to be automatically loaded into this partition is now requested as follows.

```
Name of program to load?
```

The name of the telecommunications program that runs in Partition 2 is TELE-COM. Enter TELE-COM and press RETURN. When the configuration is executed, the telecommunications program TELE-COM automatically loads from the system disk into Partition 2 and runs.

At this point, editing of the parameters for Partition 2 is complete. For the VLSI CPU, Partitions 1, 3, and 4, however, require further modification. The remaining memory is divided evenly among the remaining partitions. Press SF'02 (Divide Memory Evenly) and the system responds with the following prompt.

```
Divide memory evenly in which bank (default = all)?
```

Since memory is to be divided evenly in all banks, press RETURN.

For the CS/386 CPU, a prompt asks for the amount of memory you want to divide evenly; or you can enter the desired memory for partitions 1, 3, and 4. Enter 240 and press RETURN. The system will assign 80 KB for partitions 1, 3 and 4.

The system returns to the initial EDIT WHICH PARTITION? prompt. Finally, the user must assign Terminal 2 to Partition 4. Enter this value into the table for Partition 4. Upon completion of this operation, the table display appears in Figure 2-9 for the VLSI and Figure 2-7 for the CS/386.

```
***** Multiuser BASIC-2 Partition Generation Program *****

Available memory:  61  56  56  56  56  56  56  56
Remaining memory:   0   0   0  56  56  56  56  56
                                              List of options:
No. of terminals? 3                           '00 - clear partitions
PARTITION SIZE(K) TERMINAL PROGRAMMABLE PROGRAM  '01 - clear device table
     1      45.00      1        Y
     2      16.00      1        Y      TELE-COM    '02 - divide memory evenly
     3      56.00      3        Y                  '04 - edit partitions
     4      56.00      2        Y                  '05 - edit device table
                                              '06 - edit $MSG
                                              '07 - select printer driver

                                              '08 - load configuration
                                              '09 - save configuration
                                              '10 - delete configuration
                                              '11 - edit CPU number

                                              15 - execute
                                              Press FN/TAB to exit
Edit which partition (default = 1)?
```

Figure 2-6.   Sample Table for Partition 4 (VLSI)

```
                ***** Multiuser BASIC-2 Partition Generation Program *****
                         (c) Copr. Wang Laboratories, Inc. 19xx

Available memory:  8,251 K
No. of terminals?      3          CPU number? 1              '00 - clear partitions
PARTITION SIZE(K) TERMINAL     PROGRAMMABLE PROGRAM         '01 - clear device table
    1      80.00     1              Y                       '02 - divide memory evenly
    2      30.00     1              Y      TELE-COM          '04 - edit partitions
    3      80.00     3              Y                       '05 - edit device table
    4      80.00     2              Y                       '06 - edit $MSG
                                                            '07 - select printer driver

                                                            '08 - load configuration
                                                            '09 - save configuration
                                                            '10 - delete configuration

                                                            '11 - edit CPU number

                                                            '15 - execute
                                                            Press FN/TAB to exit
Edit which partition (default = 1)?
```

Figure 2-7.   Sample Table for Partition 4 (CS/386)

Once all partitions are edited, SF'05 (Edit Device Table) is used to leave the
Edit Partitions cycle and invoke the Edit Master Device Table option. Note
that it is legal to exit the Edit Partitions Cycle (SF'04) without answering all
prompts.

EDIT Device Table (SF'05)

The Edit Device Table option displays the default values in the Master Device
Table, that appear on the screen in Figure 2-8. Note that by default, devices
are available to all users.

```
***** Multiuser BASIC-2 Partition Generation Program *****
            (c) Copr. Wang Laboratories, Inc. 19xx

    DEVICE PARTITION          DEVICE PARTITION
 1. /215     all      17.                        List of options:
 2. /310     all      18.                    '00 - clear partitions
 3. /320     all      19.                    '01 - clear device table
 4. /330     all      20.
 5. /340     all      21.                    '02 - divide memory evenly
 6. /01C      1       22.                    '04 - edit partitions
 7.                   23.                    '05 - edit device table
 8.                   24.                    '06 - edit $MSG
 9.                   25.                    '07 - select printer driver
10.                   26.
11.                   27.                    '08 - load configuration
12.                   28.                    '09 - save configuration
13.                   29.                    '10 - delete configuration
14.                   30.
15.                   31.                    '11 - edit CPU number
16.                   32.
                                             '15 - execute
                                             Press FN/TAB to exit
Edit which entry (default = 1)?
```

Figure 2-8.   Sample Master Device Table

In this sample configuration a fourth device, the telecommunications controller, is used in addition to the three default devices. The device address of this controller is /01C. To add this device to the Master Device Table, enter the number 4 and then press RETURN. An asterisk (*) appears beside the number 4 in the table. Several prompts are now displayed in succession on the bottom of the screen, and the table is updated each time an item is edited. First, you are are requested to enter the device address with the following prompt:

```
Device address (default = /000, /000 to delete entry)?
```

Enter /01C and then press RETURN. Another prompt now appears requesting the user to allocate the device to one or all partitions.

```
Allocate device to which partition (default = all)?
```

Enter 2, then press RETURN to allocate the controller to Partition 2. This cycle recurs to allow you to edit all entries in the Master Device Table. Since the parameters for all peripherals and partition allocation are specified, you can select another function option to exit the Edit Device Table Cycle.

Broadcast Message (SF'06)

When you press SF'06 (Broadcast Message), the following line appears at the bottom of the CRT display.

Broadcast message:

Any message where the number of characters and spaces does not exceed the number of dashes displayed on the CRT is valid. For this example, enter * * * THE SYSTEM WILL GO DOWN AT NOON * * * and then press RE-TURN. When the broadcast message has been entered, you should next enter SF'07 to make the Printer Table assignment for the system printer at address 215.

> *Note: The system is in EDIT mode during entry of the broadcast message. While in EDIT mode, all SF keys revert to the system-defined EDIT functions. The SF keys cannot be used for their @GENPART-defined functions until the entry of the broadcast message is complete and the system leaves EDIT mode. The broadcast message is not saved on disk.*

Select Printer Table (SF'07)

When SF'07 (Select Prt Driver) is pressed, the screen in Figure 2-9 appears.

```
***** Multiuser BASIC-2 Partition Generation Program *****
           (c) Copr. Wang Laboratories, Inc. 1986, 1987

                                              List of options:
     Driver Table Name    Printer Address    Term #    '00 - clear partitions
                                                        '01 - clear device table
 1.  @PM016V3                 215
 2.                                                     '02 - divide memory evenly

 3.                                                     '04 - edit partitions
 4.                                                     '05 - edit device table
 5.                                                     '06 - edit $MSG
 6.                                                     '07 - select printer driver
 7.
 8.                                                     '08 - load configuration
 9.                                                     '09 - save configuration
10.                                                     '10 - delete configuration
11.
12.                                                     '11 - edit CPU number
13.
14.                                                     '15 - execute
15.                                                     Press FN/TAB to exit

Edit which driver entry (default = 1)?
```

Figure 2-9.   Select Printer Table Screen

In this example, the printer at address 215 is to use the Driver Table named @PM016V2. To add this association to the Generalized Printer Driver Table, enter the number 1 and then press RETURN. An asterisk (*) appears beside the number 1 in the table. Several prompts are now displayed in succession on the bottom of the screen, and the table is updated each time an item is edited. First, you are requested to enter the driver table name with the following prompt:

```
Enter Driver Table Name:    (enter "0" to delete from configura-
tion)
```

Enter @PM016V2 and then press RETURN. Another prompt now appears requesting you to enter the associated printer address.

```
Enter Associated Printer Address:
```

Enter 215 and then press RETURN.

Had the associated printer address been 204, another prompt would appear requesting the user to enter the associated terminal number.

```
Enter Terminal no. (between 1 and 16).
```

After specifying the terminal number or if no terminal number was needed, this cycle recurs to allow the user to edit up to 15 Driver Table Entries.

Since all partition generation parameters for the sample configuration have been specified, the configuration can now be saved for later use (SF'09) or executed (SF'15). Pressing SF'09 allows you to save this configuration on disk under a unique name.

Save Configuration (SF'09)

When SF'09 is pressed, the system requests a name for the new configuration by displaying the following prompt.

```
Check configuration to save.  Configuration name?
```

Note: In order to save a configuration on the system disk, the disk must be write-enabled; otherwise, an error results.

The configuration currently in memory automatically is saved under the name "current" if the system disk is not write-protected. However, each time a new configuration is executed, its parameters replace the old contents in the "current" file. A configuration should be saved under a unique name so that it can be retrieved for future use. The name to be used for the sample configuration just created is SAMPLE. Enter SAMPLE, then press RETURN. The configuration is saved under the name SAMPLE, and the edited values of the Master Device Table are saved on disk for future use as defaults.

Execute Configuration (SF'15)

Once all parameters of a configuration have been defined, the system configuration can be executed. To execute a configuration, press SF'15. The configuration table appears along with the following prompt.

```
Check configuration.  OK to execute (Y or N)?
```

This prompt requests you to verify the configuration parameters being executed. If N is entered, the system returns to the beginning of the Edit Partitions Cycle (SF'04). If Y (RETURN) is entered, the following prompt is displayed.

```
Reconfiguration password?  SYSTEM
```

The password allows the operator at Terminal 1 to reconfigure the system without powering down, while preventing unauthorized reconfiguration. Any alphanumeric string up to eight characters in length is permitted. The reconfiguration password is changed from the default value SYSTEM to some user-defined value. For example, enter SECRET. The configuration is executed and the reconfiguration password is now SECRET. In order to reconfigure the system without powering down, $INIT "SECRET" would be entered and executed to allow the system to invoke the control bootstrap routines that are usually invoked just after the system is powered up.

Delete a Configuration (SF'10)

Since this is only a sample configuration, delete it from the configuration file to save more space for actual configurations. To delete a configuration, press SF'10. The following prompt then requests which configuration to delete.

```
Delete which configuration?
```

Enter SAMPLE, then press RETURN, and the configuration is deleted from the configuration file on the system disk.

Edit CPU Number (SF 11)

For the CS/386, the relative CPU number 1-32 may be entered.

Customizing @GENPART

Once they have been initially defined and stored on disk, configuration parameters in a specified system configuration can be passed to the operating system and executed automatically during master initialization. The REM statements near the beginning of the @GENPART program tell you how to modify the program to operate in this manner.

It is also possible to create a customized configuration program by using the BASIC-2 statement $INIT. The discussion of $INIT in the *Multiuser BASIC-2 Language Reference Manual* presents various methods for producing a customized configuration program.

3

The Partition Status Utility

Overview

The Partition Status utility is available from the Multiuser BASIC-2 System Utilities menu. The Partition Status utility provides information about each partition currently defined on the system. This utility uses the BASIC-2 statement $PSTAT to obtain information about system status. A detailed description of this statement may be found in the *Multiuser BASIC-2 Language Reference Manual*.

The Partition Status Display

From the System Utilities menu (see Figure 1-1), select and run the Partition Status utility. A display, similar to the example shown in Figure 3-1, appears on the screen.

```
***** PARTITION STATUS   (c) Copr. Wang Laboratories, Inc.   1986 *****
                    MVP Release X.X                    Partition #

#PART   USER-MSG   BANK   SPACEK   PRGM   #TERM   @NAME   ERR TEXT @P DATA I/O
-----------------------------------------------------------------------------
  01                01     05.00     P     00-D     MSG    00   01  01  01   00
  02                01     20.00     P     01-W            00   02  02  02   00
  03    POS-CASH    01     36.00     P     01-A            00   03  03  03   01
  04                02     28.00     P     02-A            00   04  04  04   01
  05                02     28.00     P     03-W            00   05  05  05   00
  06                03     28.00     P     04-A            00   06  06  06   00
  07                03     28.00           05-A            00   07  07  07   01
-----------------------------------------------------------------------------
Press SF'0 to attach terminal to a different partition.
Press 'FN' or 'TAB' to return to menu.
```

Figure 3-1.   Sample Partition Status Display

The Partition Status Display consists of the following information:

#PART – The partition number.

USER-MSG – The optional partition message.

BANK – The bank in which the partition resides.

SPACEK – The size of the partition.

PRGM – Whether or not the partition is programmable.

#TERM – The terminal currently attached to the partition, and its current state of operation.

@NAME – Whether the partition is global and, if so, the name.

ERR – The numeric portion of the last error encountered in the partition.

TEXT – The number of the partition containing the program text currently being executed.

@P – The number of the partition currently selected for global operations.

DATA – The number of the partition containing the data statements to which the read pointer is currently pointing.

I/O – The address of the device that the partition is communicating with or waiting for (I/O).

Information regarding the current activity of each partition on the system may be obtained from the display shown in Figure 3-1. For example, this display shows that there are three partitions in Bank 1. Partition 1 is a programmable partition of 5K. It is also a global partition with the global name of MSG. It has no terminal number assigned and is in a detached state, indicated by the 00-D in the #TERM column. The 0 terminal number means that the partition has not requested a terminal.

The other two terminal indicators, A and W, also shown in the #TERM column, refer to attached and waiting, respectively. Partition 03 is attached to Terminal 1 as indicated in the #TERM column by 01-A. Partition 02 has requested a terminal and is waiting for it to be attached, as indicated by the 01-W in the #TERM column. An indicator of W exists in the case of a background job running in Partition 02 that has reached a point where a terminal is required to display a prompt or a message. Activity in that partition remains in a holding pattern until such time that a terminal is attached and the message or prompt can be displayed.

Partition 07 is defined as nonprogrammable, indicated by the blank in the PRGM column. Program text in this partition may not be altered.

The PSTAT display indicates what jobs are waiting for a terminal. Partitions assigned to that terminal can then be controlled in order to provide a terminal for those jobs in a wait state. You attach the terminal to the waiting partition in order to allow the background job to continue and also to release the current partition for use by another terminal. (Refer to Chapters 3 and 4 and to the $RELEASE TERMINAL and $RELEASE PART statements in the *Multiuser BASIC-2 Language Reference Manual.*)

SF'0 provides you with the ability to attach the terminal to any available partition. Pressing SF'0 prompts you for which partition the current terminal is to be attached, for example,

```
Which partition is terminal 1 to be attached to (#PART)?
```

Enter the partition number and press RETURN.

You may then release the current partition for use by another terminal. The following prompt is displayed:

```
Do you want to release partition X for another terminal
(Y or N)?
```

Following the response to this prompt, the terminal is attached to the new partition and that job continues execution. The current partition is released for another terminal (i.e., assigned to Terminal 0) and the PSTAT information is updated accordingly. At the time that the partition is released, the @PSTAT utility loads the @MENU utility into that partition. When a subsequent terminal is attached to this partition, the System Utilities menu appears on its screen.

4

Format Disk Platter Utility

Overview

Before data can be recorded, the disk must be formatted. Formatting involves assigning a unique address to each sector on the disk, along with certain control information that allows the system to maintain the disk and check the validity of information. On some disks, formatting also certifies the disk and assigns alternate sectors to those sectors that do not meet certification specifications.

The Format Disk Platter utility formats fixed disks and software-formattable diskettes. Running this utility produces the same results as executing a $FORMAT command, but prompts you to be sure that the proper disk is being formatted, since all previously recorded data is eliminated by the formatting process. On certain disk units (e.g., 2270, 2270A, and 2260B), formatting is initiated by pressing the format button located on the disk housing.

Formatting a Removable Diskette

After initializing the system, you can use the system disk drive for program and data files. However, a blank, unused diskette must be formatted before you can use it. Ordinarily, a used diskette is not formatted before storing additional files on it since formatting destroys any information previously recorded on the diskette. For this reason, diskettes containing packaged programs must never be formatted.

The permanent label attached to each diskette describes how to protect your diskette from accidental over-writing. Before programs or data can be written on the diskette, the write-protect feature must be disabled.

To format a diskette, use the following steps:

1. Remove the diskette from its envelope. Follow the instructions on the envelope to disable write protection.
2. Insert the diskette into the drive according to the arrows on the label. Close the drive latch.
3. Press the RESET key on the keyboard.
4. To initiate disk formatting, select the Format Disk Platter utility from the System Utilities menu (see Figure 1-1).
5. Respond to the prompts and follow the procedure described in the section entitled "Running the Utility."

If formatting is unsuccessful, a format error (ERR93) appears. Generally, errors result for one of three reasons.

- The drive latch is not tightly closed
- The diskette is write-protected
- The diskette is defective

Remove the diskette from the drive and use another diskette.

> *Note: If a diskette cannot be formatted, it cannot be used and should be discarded.*

Formatting a Fixed Disk

Before data can be recorded on a fixed disk, the disk must be formatted. To format the fixed disk, use the following steps:

1. Be sure the disk unit is powered on and in RUN mode.
2. Press the RESET key on the keyboard.
3. To initiate disk formatting, select the Format Disk Platter utility from the System Utilities menu (see Figure 1-1).
4. Respond to the prompts and follow the procedure described in the section entitled "Running the Utility."

If formatting is unsuccessful, a format error (ERR 93) appears. A format error may occur if the disk unit has not been properly powered on or is not in RUN mode. Turn the disk off, back on, and repeat the formatting procedure. If the error persists, call your Wang service representative.

Running the Utility

After you select FORMAT Disk Platter from the System Utilities menu, a
screen similar to Figure 4-1 appears.

```
***** SOFTWARE FORMATTABLE DISK PLATTER FORMAT UTILITY *****
        (c) Copr. Wang Laboratories, Inc.   XXXX
                    Release XX.XX.XX

Enter platter address: _____

RETURN                                           - Proceed
FN/TAB                                           - Previous Menu
```

Figure 4-1.   Software-Formattable Disk Platter FORMAT Utility Screen

The program then prompts you to mount the selected drive, shown in a screen
similar to Figure 4-2.

```
        SOFTWARE FORMATTABLE DISK PLATTER FORMAT UTILITY
                        Platter Information

Platter address =  D10
Mount disk to be formatted and press RETURN:

[1]  CS/2200 Format
[2]  DOS Format
 -
                            RETURN  - Proceed
                            FN/TAB  - Previous Screen
```

Figure 4-2.   Platter Information Screen

This screen shows the drive you have selected for formatting. If you do not
want to format this drive, press CANCEL/EDIT to return to the previous
screen.

If this is the drive you wish to use, then mount a disk in the unit as directed
and press RETURN.

The utility now attempts to read sector 0. If a format error occurs, then the
utility assumes that it is okay to FORMAT the unit.

If no error occurs, then the drive has been previously formatted. The utility updates the screen shown in Figure 4-2 to include the information shown in Figure 4-3.

```
               Current Index Information

                  Index Sectors  =  12
                  End Cat. Area   =  1260
                  Current End     =  650

                                      RETURN- Proceed
Are you sure (Y/N)?                    FN/TAB- Previous Screen
```

Figure 4-3.   Current Index Screen

If you have accidently mounted the wrong unit, press N or FN/TAB. The utility then returns to the screen in Figure 4-2. If you need to change the device address, press CANCEL/EDIT; otherwise, press Y. The following message appears in the lower left corner of the screen:

```
(Formatting)
Format Completed
```

Upon completion of the format operation, you are given the opportunity to SCRATCH the newly formatted unit by entering the following information:

- The size of the index followed by RETURN.
- The size of the disk catalog followed by RETURN.
- The NEW or OLD index structure followed by RETURN.
- RUN/EXEC to SCRATCH the unit.

The message in the lower left hand corner of the screen changes, as follows:

```
(Creating Disk Index)
```

Upon completion of the disk creation, the screen is updated to read

```
Index Created - Press Any Key to Exit
```

5

Transporting Software Utility

Overview

The Move File utility (@MOVEFIL) provides you with a general file move capability. Selected files or all active files are moved from any disk to any other. The utility has the following capabilities:

- Files can span more than one output disk; this facilitates moving from fixed disk to a set of diskettes.
- New files can be created with specified free space.
- The size of the new output file can be changed.
- Files can be renamed.
- Existing files can be overwritten.
- All active files can be moved with options to overwrite all files or not overwrite any files.

The Media

On the standard 2200 Format Disk (i.e., with 256-byte sectors) files are recorded using the standard Wang 2200 disk catalogue structure. The output disk must be initially formatted before using the @MOVEFIL utility.

For software interchange between the 2200VP and 2200MVP systems with 2270A diskette drives and the 2200LVP and 2200SVP systems with Wang double-sided, double-density (DSDD) diskettes, preformatted 3741-type disks must be used. These disks may be distinguished from other Wang-supplied diskettes by their green labels. Before they can be used by the @MOVEFIL utility, the 3741 diskettes must be formatted on the 2200LVP or 2200SVP diskette drive. The Format Disk (@FORMAT) utility is used for this purpose.

@MOVEFIL 3741 Format

The first track of the disk is used as the index, for a total of 26 index sectors (128 bytes each). Sector 0 is initialized to show the following information:

```
Index sectors = 26  (Since each sector is only 128 bytes long,
the equivalent in 2200 format is 13 sectors)

Current end = 25

End catalogue area = 18385 (last available sector in a 3741
disk)
```

Files are allocated sequentially (no hashing is used) and the index entries are identical to those used in standard 2200 catalogue structure.

@MOVEFIL Restrictions

The following restrictions apply to @MOVEFIL:

- Written in BASIC-2, this utility does not run on older models of the 2200, more specifically the 2200A, B, C, S, or T systems.
- The utility does not format or scratch any disks.
- The move operation terminates if a bad sector is encountered on either the input or output disk.
- The utility requires a 13K partition for execution.

Multivolume Files

Output Files

If the file to be moved is too large for the output disk, a file named @SPAN001 is created. This file occupies the remainder of the space on the output disk. The @SPAN001 file contains the following information:

- The actual name of the output file
- The actual size of the output file
- As much of the file as fits

An additional output disk must then be mounted. A file named @SPAN002 is created on this disk. If necessary, a third disk with @SPAN003 is created and so forth.

Input Files

If the file to be moved is not in the disk index, the utility searches for @SPAN001. If @SPAN001 contains the file to be moved, it then determines if the file spans from this disk to any subsequent disks. If so, the file is moved and the utility prompts you for the additional disks to be mounted. The digits in the @SPAN name and the name of the actual file are verified each time a new input disk is mounted.

Multivolume File Format

A multivolume file is always a data file. The first sector contains the following information:

```
Byte 1:      Status (HEX(10) if active file; HEX(11) if data
             file).
Byte 2:      Type (HEX(80) if program file; HEX(00) if data
             file).
Bytes 3-4:   The size of the original input file.
Bytes 5-6:   Number of sectors used by the original input file.
Bytes 7-8:   Portion of input file contained on the current
             disk (i.e., binary equivalent of last three digits
             in SPANxxx).
Bytes 9-17:  Name of the original file.
```

All of this information is recorded using absolute sector addressing (i.e., DATALOAD BA....). The remainder of the file contains a portion of the original file and a standard 2200 file trailer.

Running the Utility

After selecting the Move File option from the System Utilities menu (see Figure 1-1), the prompts requesting input and output addresses, as well as the disk type, are displayed.

Enter the input address and press RETURN, or press RETURN to accept the default value. Enter the disk type, either W (Wang) or I (IBM), and press RETURN; or press RETURN to accept the default value. Repeat this procedure for the output file.

After the input address, output address, and disk type are entered, a screen similar to Figure 5-1 is displayed.

```
                    ***** MOVE FILE UTILITY *****

        Press 'FN' or 'TAB' to return to menu

        Input address:    D11
Output address D10
        Input platter type:  W
Output platter Type:    W
        W = WANG 2200 type
W = WANG 2200 type
        I = IBM 3741 type
I = IBM 3741 type

        Do you wish to move all active files? N
```

Figure 5-1.   Move File Utility Screen

Enter Y or N and press RETURN. If Y (yes) is selected, the utility automatically displays the following message:

```
** Moving All Active Files **

Do you wish to overwrite files? Y
```

If Y is selected, all files of the same name on the output disk are automatically overwritten. If N is selected, the utility begins to copy files. If a duplicate file is found, the program ignores that file and continues on to the next file. The output index is scanned and parameters are obtained. All files that are not duplicates are automatically copied to the output disk. Files that already exist on the output disk and were not overwritten are then displayed on the screen as follows:

```
                    OVERWRITE EXCEPTIONS
        1) Filename 1           11)            21)
        2) Filename 2           12)            22)
        .      .                .
        .      .                .
        .      .                .
        10)    20)              30)
```

Since these files have not been moved, you must return to the options menu and re-run the Move File utility, selecting to overwrite these files on an individual basis.

If you do not wish to automatically move all active files, each file name from the input disk is displayed along with its parameters, beginning with the first file name in the index. As the utility steps through each file, if you do not want that file moved, then entering blanks ignores this file and picks up the next file in the index. If you change the input file name at any time (other than blanks) the new file name becomes the default input name until it is changed again. The following prompts are displayed:

```
Input file name: FILEOUT
Extra Sectors: 0004

Currently 6 sectors are used in FILEOUT and 4 are free.
```

Enter the number of extra sectors to be given to the output file and press RETURN. The following prompt is displayed:

```
Output file name:  FILEOUT
```

The system automatically assumes the same name for the output file. If the file name is to be different, enter the new name and press RETURN. The file is automatically moved to the output disk. If the name already exists on the output disk, a prompt to overwrite this file is displayed.

```
File FILEOUT already exists.  OK to overwrite? N
```

If it is not necessary to overwrite the file, press N and the cursor returns to the "Output file name" prompt. Enter a new file name and press RETURN. The file is then moved to the output disk with a new file name. If Y is typed, the file is moved, overwriting the existing file on the output disk.

If the output media is a 3741 disk, you have the option of initializing the diskette to @MOVEFIL 3741 format by entering Y at the following prompt:

```
Do you want to initialize the disk? Y
```

Press RETURN if you want the disk initialized, or press N (RETURN) if you do not want the disk initialized.

```
Output file name    _____
```

The name of the input file is already entered by default. Press RETURN to accept the default name, or enter a new name. Names of the form @SPANxxx are rejected. When @SPAN001 is found, @MOVEFIL displays the actual file name that is spanned; in this way you know the input file name and can rename it if you want.

A message is displayed indicating that a scan of the output index is being made. The utility checks to see if the file already exists. If so, the following prompt is displayed:

```
File "name" already exists.  OK to overwrite? N
```

Press Y (RETURN) to copy, or simply press RETURN to return to the "Output file name" prompt.

Output parameters are calculated and the file is copied to the output disk. The next file in the input index is obtained and the procedure is repeated with that file name as a default.

6
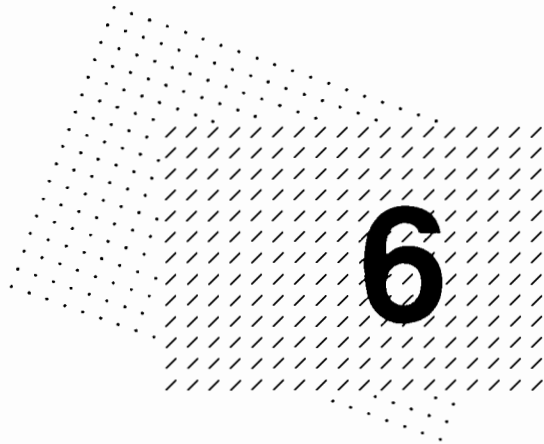
Disk Backup/Recovery Utility

Overview

File backup is simply maintaining a duplicate copy of important files. Disk storage devices are basically very reliable. However, like any other storage media, disks are subject to accidental damage or destruction. Losing power during an update, dropping a disk cartridge, or exposing a disk to a magnetic device are just a few of the things that could cause the destruction of data on disks.

When to Back Up Disks

There is no absolute rule concerning the frequency of backup. It usually depends upon several factors. One important factor is the amount of activity or the number of transactions processed on a master file. With high activity, you may wish to back up a file once a day. With fewer transactions, a frequency of once or twice a week may be sufficient.

You should carefully evaluate the factors relating to your own business and data processing requirements. It is recommended that important files be backed up with a frequency that matches the processing activity of that file. In other words, if a file is updated daily, it should be backed up daily; if a file is updated weekly, it should be backed up weekly.

It is also a good practice to create an extra copy of a backup disk and/or keep more than one generation of these disks. Often, the backup disk can be ruined by the same problem that destroyed the original disk. Having an extra backup disk provides an additional measure of protection against time-consuming and costly data reconstruction.

Fixed/Removable Disks of the Same Size

When copying from a fixed disk to a removable disk of equal size or vice versa, you may back up a disk by using one of the following methods:

- COPY statement
- MOVE statement
- @COPY/VERIFY utility
- @BACKUP utility

COPY Statement

The COPY statement allows you to copy the entire contents of a disk, or a specified portion of its contents, to another disk in the same or different disk unit. The COPY statement is the only Absolute Sector Addressing mode BASIC-2 statement that should be used in backing up a file. An example of a COPY statement follows.

```
10 COPY T/D11, (0,2000) TO T/D10,
20 VERIFY T/D10, (0,2000)
```

Statement 10 copies sectors 0 through 2000 from disk D11 to the same sectors on disk D10. Statement 20 verifies that the data recorded on the backup disk cartridge has been properly recorded.

Starting and ending sector addresses of the information to be copied should always be included in the COPY statement. If the entire contents of a disk is to be copied, the beginning sector address should be 0 and the ending address should be the last sector on the disk. (Refer to the appropriate disk manual for this value.)

If an error is encountered following a COPY operation, the process should be repeated. Repeated failure could indicate a faulty disk platter. If the error persists with another platter, a Wang representative should be called.

You can find additional information concerning the use of the COPY statement in the *Multiuser BASIC-2 Language Reference Manual*.

MOVE Statement

The MOVE statement, used only with catalogued files, provides another means of backing up disk files. In addition to copying the catalogue index and catalogued files, it also provides one additional function: the MOVE statement eliminates scratched files from the catalog and compresses still-active files into the available space.

Since it copies only active files, the MOVE statement may result in a faster copy than the COPY statement. However, when using MOVE, you should be sure that only catalogued files are on the disk. Any other files are lost unless a COPY statement is used. An example of a MOVE statement follows.

```
10 MOVE T/D11, to T/D10,
20 VERIFY T/D10,
```

Statement 10 copies all catalog information from disk D11 to disk D10. Statement 20 checks disk D10 to ensure that all information has been copied correctly.

You can find additional information concerning the use of the MOVE statement in the *Multiuser BASIC-2 Language Reference Manual*.

@COPY/VERIFY Utility

The @COPY/VERIFY method uses the ISS COPY/VERIFY utility and can be used with Wang's Integrated Support System (ISS) software package.

The @COPY/VERIFY utility offers more flexibility than the COPY and MOVE statements. This utility offers the following features:

- Copied files may be renamed and may replace existing files on the output disk.

- Selected files or all files may be copied without altering files on the output disk.

- Copying is allowed between any two disk addresses.

- The verify operation actually compares the data read from the input file to the data written on the output file to ensure that it has been copied correctly.

- Additional sectors may be allocated for the copied file.

The operating instructions for the @COPY/VERIFY utility are outlined in the *Integrated Support System User Manual*.

Systems With Fixed Disks Larger Than Removable Disks

The three previous methods of backup effectively work only for backing up files on disks of equal size. However, there are many cases when files stored on a fixed disk of 10 or 16 megabytes must be backed up onto a diskette of only 1 megabyte. In this case the ability to copy the files to multiple output disks is required. The @BACKUP utility is designed to provide this capability.

Back Up to Tape

Disks can be backed up to tape by using the 2229 Tape Cartridge unit or the DS Streaming Tape Cassette drive. Refer to the *2229 Tape Cartridge User Manual (700-7716)* or the *DS Data Storage Cabinet User Manual (715-0740)* for instructions.

@BACKUP Utility

The @BACKUP utility provides the capability of copying the contents of a single disk to another single disk or a series of smaller disks. Both source and destination disks may be from any of the several types of disk drives used on the 2200MVP, 2200LVP, 2200VP, 2200SVP, and CS systems. The primary use of this utility is to allow large fixed disks to be backed up onto several 1-megabyte diskettes. This utility moves the entire contents of the source disk, including the catalog index if one is present.

On the specified output disk(s), any information presently stored is overwritten. Additionally, since file names on the backup disk(s) are stored in a data file rather than in a copied catalogue index, the disks cannot be used for direct file access. To retrieve the information, the @RECOVER utility must be used.

Files Created by the @BACKUP Utility

The following disk files are created as a result of running the @BACKUP utility. They are written to the output disk(s) and contain control information for purposes of recovery.

START – Start module for the recovery program (@RECOVER). It is saved on each output disk.

@RECOVER – Recovery program. It is saved on each output disk, if available on the input disk.

@BADSCTR – Contains pointers to the set of bad sectors, if any, found in the portion of the source disk copied onto the current disk. This information is recorded in the form of a bit map.

@INDEX – Contains a copy of the source index and is saved on every disk of the set to allow instant file recovery from any diskette.

@DATA – Contains the portion of files copied from the source disk.

@LABEL – Created by @BACKUP and contains the following information to be used at recovery time:

- Backup identification key (randomly generated by the utility to uniquely identify the current set of output disks as part of the same set).
- Date (mm/dd/yy). Date the backup is created, input by the operator.
- Backup description.
- Operator's name.
- Total number of sectors of the source disk that are contained in the backup.
- Current disk number within the set.
- Total number of disks within the set.
- First sector of the source disk contained in the current disk.
- Last sector of the source disk contained in the current disk.

Running the @BACKUP Utility

After selecting the Backup Platter option from the System Utilities menu (see Figure 1-1), the input address prompt with a default value of D11 is displayed. Enter the input address you want and press RETURN, or press RETURN to accept D11. The value can be permanently changed by altering the A1$ value in the program code. Since the utility is designed primarily to move files from a Winchester disk to a diskette, the address D11 is selected as the default value.

If an incorrect device address is entered, the system displays an error I98, indicating that the platter requested is not mounted. Press RETURN to go back to the initial prompt.

Following the successful selection of the input address, the prompt for an output address is displayed. The default value of D10 is displayed. Enter the address of the output (backup) diskette and press RETURN, or press RETURN to accept D10. The next prompt displayed is for the date, as follows:

```
Today's date is: mm/dd/yy
```

Enter the date in the indicated format and press RETURN. This date is saved on the backup disk in the @LABEL file.

A prompt for a backup description is then displayed. Enter a text description of up to 60 characters in length and press RETURN. This is also stored in @LABEL.

Next, enter the name of the operator. A maximum of 50 alphanumeric characters is allowed. Press RETURN.

The system displays the starting and ending sectors for the copy. The starting sector is 0 so that the catalog, if it exists, is also copied and the default value for the end is the current end of cataloged data. The end of the catalog area is also displayed. For example:

```
Copy starts at sector 0 and ends at sector: 43828

    Options:
    Current end (End of Catalogue Data) - 43828
    End of Catalogue Area (As specified in the Index) - 52607
```

Enter the absolute address of the last sector to copy and press RETURN, or press RETURN to accept the current end of the catalogued data.

The system then verifies the input index and checks for valid data on the output disk. The message at the bottom of the screen is displayed if the output contains valid data (see Figure 6-1).

Press RETURN and mount a new platter at the output address. Enter Y and press RETURN. After mounting the new platter, or if the output platter did not contain valid data, the following prompt is displayed:

```
Number of Sectors in Output Platter 01232
```

The default value is the end of catalogue area as specified in the index. Enter the absolute address of the last physical sector in the output disk and press RETURN, or press RETURN to accept the default value.

The system now scratches the output platter, creates the file START, and copies the @RECOVER utility on the output disk. It then displays a message indicating the number of disks needed to copy the information, which disk is currently being copied to, and how many sectors are contained there. The unique Backup ID# is also displayed near the top of the CRT screen. This information should be copied onto the output disk's label for future reference when recovering the data.

On the bottom of the screen, messages are displayed indicating that the data files described are being created on the output platter. For example, you see START, @RECOVER, @LABEL, @BADSCTR, and @INDEX.

Across the bottom of the screen, a box is displayed indicating the progress of the copy. As the box is filled, the file is being copied. The input is first verified, the copy is performed, and then the output is verified.

As additional platters are needed, a prompt to mount the next diskette in sequence is displayed. Mount the requested platter and press RETURN. The messages are again displayed indicating that the copy is in progress. When the backup has been completed, an END OF BACKUP message is displayed (see Figure 6-1).

```
                    ***** BACKUP UTILITY *****

Input Address:          D11              Output Address:     D10
Today's Date is:        05/19/81
Backup Description:     Backup Test
Operator's Name:        Author's Name
Copy starts at sector 0 and ends at sector: 14176

    Warning:  The contents of the output platter will be replaced by the backup
    data.  Your output platter seems to contain valid data.  Are you sure you want
    to use this platter? (If not, mount a new platter) N
```

Figure 6-1.   Backup Utility Screen

@RECOVER Utility

@RECOVER is the complementary utility to @BACKUP; it retrieves the contents of the platters produced by @BACKUP and writes them onto another platter. There are three options provided by the @RECOVER utility for recovering data.

- Recover entire disk. In cases where an exact copy of the original is required or when the source was an uncatalogued disk, this option must be used.

- Recover all active files. If there are scratched files on the backup disks(s), this provides the means for eliminating them.

- Recover specified files. With this option, individual files can be recovered from the backup disk. The recovered files can be added to a catalogued disk, which does not have to be identical to the source disk. Additionally, this option enables the file size to be enlarged.

The Recover utility must be used to recover files only from disk platters created by the @BACKUP utility. For general file move capability the @MOVEFIL utility should be used.

Running the @RECOVER Utility

After selecting the Recover from Backup option from the System Utilities menu (see Figure 1-1), the prompts for the input and output addresses are displayed. The addresses D10 and D11 are set up as defaults for input and output, respectively. They are reversed from the defaults set in the @BACKUP utility because generally @RECOVER is performed on diskettes created by @BACKUP and recovered to hard disk.

Enter the input address and press RETURN, or press RETURN to accept the default value of D10.

Enter the output address and press RETURN, or press RETURN to accept the default value of D11.

The input disk is validated and the Recovery Utility screen, as shown in Figure 6-2, is displayed. The information displayed on this screen is obtained from the @LABEL file created by the @BACKUP utility. The date of backup, backup identification #, description, and author's name are all obtained during @BACKUP and stored for use by @RECOVER in @LABEL.

```
                    ***** RECOVERY UTILITY *****
Input Address:   D10                           Output Address: D11
Date of Backup: 12/02/80              Backup Identification #: 853758
Description: Backup Test
Created by: Author's Name

This is platter 1 of 2 which contains sectors 0 - 1215of original disk.

Enter the number of the desired option: ____

    1- Recover entire disk (WARNING! Output disk will be scratched)
    2- Recover all active files (WARNING! Output disk will bescratched)
    3- Recover specified files

Press 'FN' or 'TAB' to return to menu.Figure 6-2.  Recovery Utility Screen
```

Figure 6-2.   Recovery Utility Screen

Note: Recovery requires that backup platters be processed in order and contain the same ID# key. Discrepancies are displayed.

Recovering Specific Files

If the Recover Specified Files option is selected, a prompt for a printout of files that can be recovered is displayed.

A printout is provided listing the files on the set of backup platters. This list corresponds to that produced by the LIST DC statement for the original source platter. Selected files can be input for recovery.

A prompt is displayed requesting the name of the file to be recovered. Enter the name and press RETURN. The file is now recovered to the output platter. If the Backup set contains more than one diskette, you are prompted to insert each diskette in the set in sequence, with the same Backup identification number. If the file to be copied already exists on the output platter, an overwrite feature is provided.

When the selected file has been recovered, the prompt requesting another file name is displayed again. Enter the name and press RETURN, or press RETURN to end the recover function.

If @BADSCTR indicates that a bad sector was found by @BACKUP in a file on the original source disk, you are informed. @RECOVER still moves the file to the output disk, but the bad sector is filled with Hex(00) codes. About the only action that can be taken at this point is to scratch the file on the output disk and attempt to recover it from a previous backup disk.

Recovering All Active Files

Select the Recover All Active Files option to recover all but scratched files from disk. The following prompts are displayed:

```
Do you want to change the index size on the output disk? N
Default output index size (same as in backup data): 1
```

The @INDEX file is read to obtain the index parameters of the original source disk. At this time, you can alter the size of the index. Type Y (RETURN) to change index size and then provide the system with the index size you want, or press RETURN to accept the current size.

Mount the input disk that is first in the series when requested and press RETURN. The system now recovers all active files to the output disk.

If the output platter does not contain enough file space to recover the input platter, an error message is displayed. Press RETURN to discontinue processing.

Recovering Entire Disk

Select the Recover Entire Disk option to obtain an exact copy of the Backup disk. The system proceeds to recover the entire input disk. The percentage of the disk recovered is displayed at the bottom of the screen.

The @INDEX file is read to obtain the index parameters of the original index before the destination disk is scratched. The destination disk is then scratched. Each active file in @INDEX is located and moved to the destination disk.

If @BADSCTR indicates the file contains bad sectors, you are alerted. @RE-COVER still moves the file to the output disk, but the bad sector is filled with Hex(00) codes. At this time you can scratch the file on the output disk and attempt to recover it from a previous backup.

As each input disk is recovered, you are prompted to insert the next diskette in sequence. When recovery is complete, an END RECOVERY message is displayed.

Error Messages

Message

This platter does not belong to the current set.

Action

Change input platter.

Message

Error in sector #_____. Program will be terminated. Output disk must be reformatted.

Action

Press RETURN. Begin procedure again after output disk has been formatted.

Message

File size exceeds available disk space.
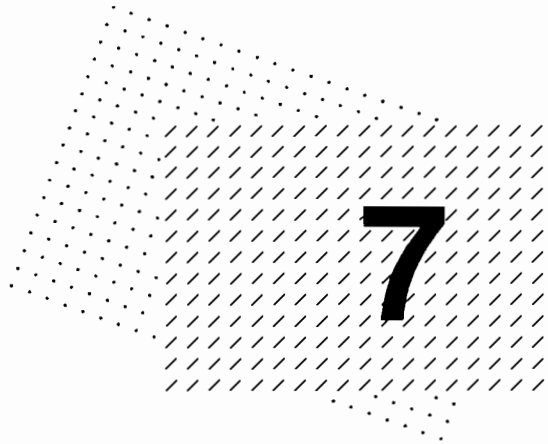
Action

Press RETURN.

Message

Input platter illegal. (Not a platter created by @BACKUP.)

Action

Mount the correct input platter and press RETURN.

If bad sectors are encountered, you may obtain a listing of these bad sectors.

7

Install System Files Utility

Overview

The Install System Files utility allows you to install system files by moving specified system files from one disk to another. You use this utility when you receive updates to the operating system. Its purpose is to move the system files contained on a new release diskette onto one of the system disks.

Installing System Files From a New Release Diskette

Many system configurations have hard disk drives that have larger storage capacities or offer faster access than the standard diskette drives. Therefore, you may want to copy the system files from the release diskette onto another hard disk. At least one copy should be made of the entire system disk in case the original is accidentally damaged or destroyed. The original diskette can act as a backup for the system disk.

Use the @INSTALL utility to copy the system files from one diskette to another disk drive. The @INSTALL utility is recommended for system updates, since it overwrites only the system files being changed and leaves the remainder of the destination disk intact. Within the @INSTALL utility is a set of DATA statements that contain the names of all the system files to be moved. With three exceptions, the utility is designed to automatically move all the system files from one disk to another. The exceptions are the START, @SYSFILE, and .STARTD files.

If the START, @SYSFILE, and .STARTD programs exist on both source and destination disks, the source file is not moved. These programs are moved only if they do not exist on the destination disk.

After the system files have been copied onto the hard disk, you can make extra backup copies of the system software by running the utility again and copying files from the destination disk to another disk.

Running the @INSTALL Utility

Select the Install System Files utility from the System Utilities menu (see Figure 1-1). The following message appears:

```
*** SYSTEM SOFTWARE INSTALLATION UTILITY ***

    (c) Copr. Wang Laboratories, Inc.  1986

Input address = D11

Press 'FN' or 'TAB' to return to menu.
```

The system defaults to an input address of D11. Enter the proper address and press RETURN, or simply press RETURN to accept the default value of D11. After pressing RETURN, the following message appears:

```
Output address = D10
```

The system defaults to an output address of D10. Enter the address of the destination disk and press RETURN, or simply press RETURN to accept D10.

The program then displays a message indicating which operating system is being installed on the destination disk. All existing system files are automatically updated. During the course of the installation, several messages appear showing the names of the files moved.

After the utility has installed all system files, the message "Completed software installation." is displayed. To return to the System Utilities menu, press the FN or TAB key.

8
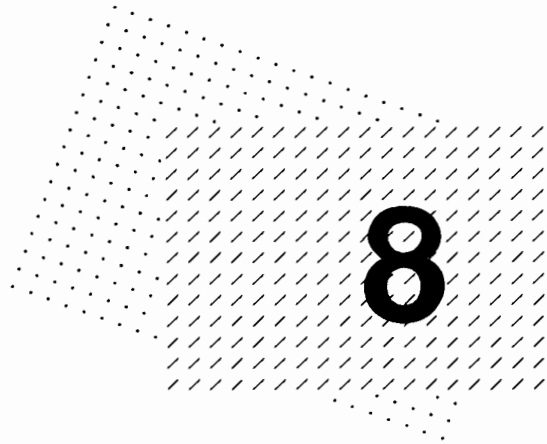
List of File Names Utility

Overview

The Make a Reference List of File Names utility is available from the Multiuser BASIC-2 System Utilities menu. With this utility, you can create or modify a list of file names. You can either save this list temporarily or permanently in a data or program file. Later on, you can edit this list and you can use it as input to two other utilities:

- Copy or modify files on a disk from a disk or disk image file
- Copy files to a disk image file

A disk image file is a single disk file that you create from one or more files (from a single surface). This data file consists of index space followed by a copy of the sectors from the original disk files.

With the file move utilities, you can copy files referenced by the list to a disk surface or a disk image file. The following four options are available:

- Replacing or adding files you selected to an existing surface
- Copying files you selected to a disk image file
- Making a permanent list in a data file
- Making a permanent list in a program file

If you want to back up file by file to a tape streamer, you should first back up files into disk images and then back up the disk image to tape. After copying the last file into the disk image, the system updates the index space of the disk image file with the file name and sector information. You can then recover individual files from a specific disk image file on disk.

Because you can write several disk image files to a single surface and then write to a tape streamer from that single surface, this procedure reduces the time required to back up several files from different surfaces to tape. If you save the disk image on the disk, you will not need the tape to restore the files.

Using the Make a Reference List of File Names Utility

To use the Make a Reference List of File Names utility, follow these steps:

1. Select "Make a Reference List of File Names" from the System Utilities menu and press RUN/EXEC.

   The screen displays:

   ```
   Make a Reference List of File Names - ( ) Copr. Wang Laborato-
   ries, Inc. 1989

       This partition has room for ddd items

       Source disk address D11
   ```

2. Enter the disk address of the files you want to reference and press RETURN.

   The screen displays:

   ```
       Existing Reference File Name, if any _____
   ```

3. Select one of the following

   - If you do not have an existing reference file name, press RETURN.

     The screen displays:

     ```
     -- Sorting disk catalog - please wait ...
     ```

     The screen then displays Figure 8-1.

   - If you have an existing reference file name, enter the reference file name and then press RETURN.

     The screen displays:

     ```
     Make a Reference List of File Names - ( ) Copr. Wang
     Laboratories, Inc. 1989

         Source disk address _____
     ```

   Enter the address that contains the files and press RETURN.

   The screen displays:

   ```
   -- Sorting disk catalog - please wait ...
   ```

The screen then displays Figure 8-1.

```
              Make a Reference List of File Names
                      Page xxx of ddd

                                          Disk Address     D11
Total sectors         xxxx                Total Files    xxxx
Sectors selected      xxxx                Files selected     dd

     Name             Type       Sectors
     FileName         D            16       ACTIVE KEYS
     FileName         'P            3      Cursor Up/Down
     FileName         'P           10      Space/Backspace
     FileName         "P           12      N/See next screen
                                           P/See previous screen

                                           Insert/Delete picks
                                           A  /Pick all files
                                           M  /Pick by mask
                                           SF '00 - Pick all P
                                           SF '01 - Pick all D
          (16 items max. are displayed)    SF '02 - Pick all SP
                                           SF '03 - Pick all SD
                                           SF '04 - Pick all 'P
                                           ERASE - Erase all picks

                                           Press RUN when done
```

Figure 8-1.   List of File Names Screen

4. Choose the items that you want to select. Use the cursor, space, back-space, insert, delete, next screen, previous screen, or letter keys to mark the items. The system marks each item that you select with a check mark.

5. Press RUN when you have finished selecting. The screen displays Figure 8-2.

```
              Make a Reference List of File Names

                                          Disk address D11
Total sectors xxxx                        Total Files xxxx
Sectors selectedxxxx                      Files selected dd

You have made a list of dd file names.
You have the option to copy files now, or else make a permanent reference
list.

Options 1 or 2 are to copy files now.
 1). Replace or add files selected to an existing surface.
 2). Copy files selected to a Disk Image file.

Options 3 or 4 are to make a permanent reference list.
3).A list in a DATA file will need d sectors of disk.
 4).A list in a PROGRAM file will need d sectors of disk.

            - Key in option 1 or 2 or 3 or 4.
                                          Press FN/TAB to exit
```

Figure 8-2.   Options Screen

6. Choose one of the following
   - To select an option, choose 1, 2, 3, or 4 and press RETURN.
   - To exit this screen and start over again, press FN/TAB.

Option 1 - Replacing and Adding Files

To replace or add files that you selected to an existing surface, choose option 1 from the options screen. The screen displays

```
                        ***DISK FILE COPY UTILITY***
                                dd files
Select Mode

        • Copy Only
        • Copy and Verify

Origin platter address:      D11
Destination platter address: _____
                                                      RUN - Accept?
©copyright Wang Laboratories, Inc. 1988               RETURN - Proceed
  All rights reserved                                 CANCEL - Exit
```

Figure 8-3.   Disk File Copy Utility Display Screen

Follow these steps to continue:

1. Choose either Copy Only, or Copy and Verify.
2. Enter the destination platter address of the file you want to copy to and press RUN.

   The system prompts:

   ```
   Start Copy?
   ```

3. Choose one of the following
   - To stop the procedure, press CANCEL.
   - To start the copy, press RUN.

   The screen displays:

   ```
   Processing File  dd: FileName    Sectors = dd(or Replacing)
   ```

   When the copy is finished, the screen then displays:

   ```
   Disk File Copy Complete, Please Press Cancel/Edit
   ```

4. Press Cancel/Edit to complete the procedure.

Option 2 - Copying to a Disk Image

To copy files that you select to a disk image file, choose option 2 from the options screen. The screen displays Figure 8-4.

```
              ***DISK FILE COPY INTO A DISK IMAGE UTILITY***
                              dd files

Select Mode

     • Copy Only
     • Copy and Verify
Origin platter address:          D11
Destination platter address:     __ _____

                                                      RUN - Accept?
©Copyright Wang Laboratories, Inc. 1988               RETURN - Proceed
   All rights reserved                                CANCEL - Exit
```

Figure 8-4.   Disk File Copy Into a Disk Image Utility Screen

Follow these steps to continue:

1. Select either Copy Only, or Copy and Verify.

2. Enter the destination platter address of the file you want to copy to.

3. Choose one of the following

   - To stop the procedure, press CANCEL.

   - To accept the information, press RUN.

     The screen displays:

     ```
                                        Cat.  Cur.   Max.
     Origin platter address:       30     7    392   1279
     Destination platter address:  340    7    210   1279
     (Scan files to copy on disk 340 and calculate space needed)
     ```

     After scanning the list, the system prompts:

     ```
     IMAGE file name:  fD30      or fD30
     File COPY will require on disk 340 a disk IMAGE file of ddd sectors.

                              RETURN - Proceed
                              (None)- Exit
     ```

4. Use the default or enter the desired file name for the disk image file on the destination platter. Press RETURN.

   The system prompts:

   ```
   O.K. to open a new file?
   ```

5. Enter Y for yes or N for no, and press RETURN to continue copying into a disk image. Otherwise, press CANCEL to stop the procedure.

   - If you press CANCEL, you return to the Disk File Copy screen.
   - If you press N, you return to the image file name prompt.
   - If you press Y, the system prompts:

     ```
     O.K. to write to this file?
     ```

6. Enter Y for yes or N for no. Press RETURN.

   - If you press N, the system returns to the image file name prompt.
   - If you press Y, the screen displays:

     ```
     COPY to disk IMAGE file in process
     Processing File  dd: FileName    Sectors = dd
     ```

   After completing the copy, the screen then displays:

   ```
   COPY to disk IMAGE file complete
   Copy Complete, Please Press Cancel/Edit
   ```

7. Press Cancel/Edit to complete this procedure.

Option 3 - Making a Permanent List in a Data File

To make a permanent list of file names in a data file, choose option 3 from the options menu. The screen displays Figure 8-5.

```
                    Make a Reference List of File Names

                                                  Disk address D11
Total Sectors xxxx                                Total Files xxxx
Sectors Selected xxxx                             Files selected  dd

You have made a list of d file names.
Option 3

Your referenced list DATA file will require d sectors on disk.
```

Figure 8-5.   Permanent List in a Data File Screen

Follow these steps to continue:

1. Enter a response to the following prompt:

   ```
   Reference file name _____
   ```

2. Enter a file name and press RETURN.

   The screen displays:

   ```
   Reference file name _____will require d sectors in a DATA file.
   ```
   The system then prompts:

   ```
   Reference file address_____
   ```

3. Enter a reference file disk address and press RETURN.

   The screen displays one of the following:

   - *FileName* on *hhh* does not exist - OK to create new file (Y/N)

   - *FileName* on *hhh* is currently a (SCRATCHED) (DATA) file ERROR - WRONG KIND OF FILE

     Old file is too small

     Can the file be junked (renamed to @JUNKAAF & scratched) ?

     (If the ERROR - WRONG KIND OF FILE statement appears, it is only for your information and can be ignored).

   - *FileName* already exists with dd sectors

4. Follow these guidelines:

   - If you receive the first message, press Y and then RETURN to continue.

   - If you receive the second or third message, choose another filename and press RETURN. Once you receive the first message, press Y and then RETURN to continue.

     The system prompts:

     ```
     Can file be overwritten (Y or N) ____
     ```

5. Enter Y for yes or N for no. Press RETURN.

   - If you respond N, you return to the options screen.

   - If you respond Y, the screen displays:

     ```
                                                   (DATA)
     Making DATA statements
     Completed file create - Key anything
     ```

6. Press any key to start again.

Option 4 - Making a Permanent List in a Program File

To make a permanent list of file names in a program file, choose option 4 from the options menu. The screen displays Figure 8-6.

```
              Make a Reference List of File Names

                                              Disk address  D11
Total Sectors  xxxx                           Total Files  xxxx
Sectors Selectedxxxx                          Files selected  dd

You have made a list of d file names.
Option 4

Your referenced list PROGRAM file will require d sectors on disk.
```

Figure 8-6.   Permanent List in a Program File Screen

Follow these steps to continue:

1. Enter a response to the following prompt:

   ```
   Reference file name_____
   ```

2. Enter a file name and press RETURN.

   The screen displays:

   ```
   Reference file name_____will require d sectors in a DATA file.
   ```

   The system then prompts:

   ```
   Reference file address_____
   ```

3. Enter a reference file disk address and press RETURN.

   The screen displays one of the following:

   ```
   - FileName on hhh does not exist - OK to create new file     (Y/N) __

   - FileName on hhh is currently a (SCRATCHED) (PROGRAM) file
   ERROR - WRONG KIND OF FILE

   Old file is too small
   Can the file be junked (renamed to @JUNKAAF & scratched)?__

   - FileName already exists with dd sectors
   ```

4. Follow these guidelines:

   - If you receive the first message, press Y and then RETURN to continue.
   - If you receive the second or third message, choose another filename and press RETURN. Once you receive the first message, press Y and then RETURN to continue.

   The system prompts:

   ```
   Can file be overwritten (Y or N) __
   ```

5. Enter Y for yes or N for no. Press RETURN.

   - If you respond N, you return to the option screen.
   - If you respond Y, the screen displays:

   ```
                                              (PROGRAM)
   Making DATA statements
   FileName contains program lines 9000 - dddd
   Program reference file on DATA statements "FileName" on disk hhh

   Completed file create - Key anything
   ```

6. Press any key to start again.

9
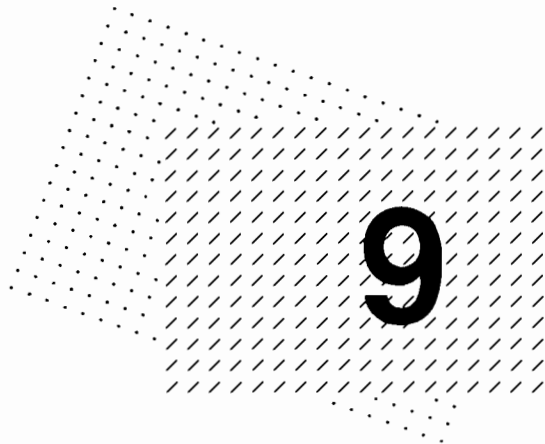
Date and Time Utility

Overview

The Initialize Date and Time utility is selected from the System Utilities menu (see Figure 9-1). The Initialize Date and Time utility (@CLOC) allows you to edit the system date and, if a system clock exists, the system time. A system equipped with a clock automatically advances the date at midnight. If the system does not have a clock, you must reset the date each day.

```
                System Utilities - ( ) Copr. Wang Laboratories, Inc. 1989


             Partition 1, 61 K
  Select item and press RUN/EXEC:
     Terminal 1

                      - Partition Generator
                      - Partition Status
                      - Format Disk Platter
                      - Move File
                      - Backup Platter
                      - Recover from Backup
                      - System Install
                      - Make a Reference List of File Names
                      - Initialize Date & Time
                      - DS Utilities
                      - DOS Utilities
                      - Game
```

Figure 9-1.   System Utilities Menu

Operation

Whenever the system password is not SYSTEM, the utility first requests the system password (see Figure 9-2). You enter the system password and press the RETURN key to edit the date and/or time.

```
                      *** Initialize Date & Time ***

mm/dd/yy
                                          Password:--------

                                          Press FN or TAB to return to menu
```

Figure 9-2.   Password Screen

When the password is entered, the utility displays the last entered date, the calendar page for the corresponding month, the calendar page for the succeeding month, and an enter date prompt (see Figure 9-3).

You can enter any valid date (in the form MM/DD/YY). When you press RETURN, the system updates the date, saves the date in a data file named @DATE, and displays the appropriate calendar pages.

If the system permits, you can enter any valid time (in the form HH:MM:SS). When you press RETURN, the system updates the time.

At this point, you can reedit the date and/or time. Pressing FN or TAB accepts the date and/or time and returns the System Utilities menu to the screen.

```
                      *** Initialize Date & Time ***

08/02/82                                                            11:28:09
  Enter date:   08/02/82                         Enter time: 11:28:09

        AUGUST 1982                                SEPTEMBER 1982
SUN MON TUE WED THU FRI SAT               SUN MON TUE WED THU FRI SAT
  1   2   3   4   5   6   7                             1   2   3   4
  8   9  10  11  12  13  14                 5   6   7   8   9  10  11
 15  16  17  18  19  20  21                12  13  14  15  16  17  18
 22  23  24  25  26  27  28                19  20  21  22  23  24  25
 29  30  31                                26  27  28  29  30

                               Press FN or TAB to accept date & time
                               Press RETURN to modify date & time
```

Figure 9-3.   Edit Date and Time Screen

10

DS Utilities

Overview

The DS Utilities screen is available from the Multiuser BASIC-2 System Utilities menu. The DS utilities provided with the CS-D/N enable you to manage the storage devices and RAMdisk of your system.

> *Note: When upgrading DS or CS-D/N units from R3 to R4 proms, all winchester addresses must be backed up to an external device, tape, or floppy prior to replacing the prom. Once the prom is replaced, the surfaces will be unreadable and must be configured and formatted for use. (Refer to the section "Configuration Utility" in this chapter for additional information.)*

After you configure the CS-D/N, load the Utilities menu. Use the following two commands to display this menu:

1. SELECT DISK xxx (Press RETURN.)

   The three-digit hexadecimal number (xxx) is the device address of the disk on which the system utilities reside.

2. LOADRUN (Press RETURN.)

The DS Utilities menu appears (see Figure 10-1). Utilities that require user-entered information display a series of prompts requesting this information. When prompted, type the necessary response and press RETURN. The utility requests additional information or performs the specified procedure.

The following sections discuss the Configuration utility and the Protect/Unprotect utility.

```
                    DS Utilities (Release 3.0)
                                                    Partition X, ddd k
                                                         Terminal dd

      Select an item and press RUN/EXEC

            DS Configuration
            Protect/Unprotect CS-D Surfaces
            RAMdisk Allocation
            Cache Usage
            Backup disk platters to Tape Cassette
            Restore disk platters from Tape Cassette
```

Figure 10-1.   DS Utilities Menu

Protect/Unprotect Surfaces Utility

The Protect/Unprotect Surfaces utility lets you write protect the surfaces of the storage devices in the CS-D/N. To run the Protect/Unprotect utility, follow these steps:

1. Select it on the Utilities Menu (Figure 10-1) and press RUN/EXEC.

    The first prompt requests the base address of the CS-D/N unit.

2. Press RETURN.

    The screen displays information on each device (including RAMdisk) in the DS or CS-D. This information includes device addresses, index size, sector end, the catalog maximum, and surface protection of each surface. Figure 10-13 is a sample Current Platter Use (DS surfaces) screen.

```
                  C u r r e n t   P l a t t e r   U s e
                      DS  S u r f a c e s

Disk       Index  Current  Catalog  Pro-   Disk     Index  Current  Catalog  Pro-
Address    Size   End      Maximum  tect   Address  Size   End      Maximum  tect

D30          7     253       1231    No
D31         24    6716      65000    No
D32         24    6824      65000    No
D33         24    4534      65000    No
D34         24    7408      65000    No
D35         24    9655      65000    No

Valid keys to alter Protect                           RUN - Accept Screen?
N to set 'No' to disable Soft Protect                 RETURN - Restart Program
S to Soft Protect;  H to Hard Protect                 FN/TAB - Exit
```

Figure 10-2.   Sample Current Platter Use (CS-D/N Surfaces) Screen

The screen shown in Figure 10-13 enables you to accept or change the surface protection values for platter surfaces.

3. Press RUN to accept the information and the surface protection values displayed on the screen.

Configuration Utility

The Configuration utility has two functions. The utility configures winchester drives into platter addresses (required when used with a Revision 4 PROM or greater). The utility is also used to list the addresses of the devices in the CS-D/N.

To run the Configuration utility, follow this procedure:

1. Select DS Configuration from the Utilities Menu (see Figure 10-1) and press RUN/EXEC.

```
                        DS Configuration

            Base Address of DS unit (D10, D20, or D30):  D10

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                                              RETURN - Proceed
                                              FN/TAB - Exit
```

Figure 10-3. DS Configuration Screen

The first prompt requests the base address of the DS or CS-D. (See Figure 10-2.)

2. Select the correct address and press RETURN. (If you are setting up a configuration, this address is used for the base disk address.)

The screen displays information on each device (including DS and DSPC RAMdisk, if configured) in the DS and CS-D. This information includes device addresses, device storage capacities, number of platters, and sectors per platter. Figure 10-3 is a sample configuration information screen.

```
                 DS  C o n f i g u r a t i o n
Drive SELECT 3
Diskette Drive               1.2 MB with 4160 sectors
4160 on D10

64 MB Fixed Hard Disk        7 surfaces
65024 on D11     38912 on D12  4096 on D13   65024 on D14   65024 on D15
65024 on D16     38912 on D17

64 MB Fixed Hard Disk        2 surfaces
65024 on D18     38912 on D19

20 MB Fixed Hard Disk        2 surfaces
38912 on D51    38912 on D52

Streaming Cassette Tape Drive  150 MB tape drive
Address: D5F                 Cassette is not in place

                                    '15 - Start Setup
                                    RUN - Expand display
            DS PROM revision level: DD     RETURN - Restart
                    Protocol level: 1      FN/TAB - Exit
```

Figure 10-4. CS-D/N Sample Configuration Information Screen

3. To display expanded information on the storage devices, press RUN from the screen shown in Figure 10-3. The expanded information appears in Figure 10-4.

If the CS-D/N PROM level is 2.0 or greater, a surface-protect feature exists and the screen displays a Protect field. (See Figure 10-4.)

```
                    C u r r e n t   P l a t t e r   U s e

     Disk      Index    Current  Catalog  Pro-   Disk      Index   Current  Catalog  Pro-
     Address   Size         End  Maximum  tect   Address   Size        End  Maximum  tect
     D10          9'       3767     4000   No
     D11         70'      24624    65023   No     D51        47&     11156    38911    No
     D12        250       30980    38911   No     D52        50'      6120    38911    No
     D13         49'      10472    65023   No
     D14         10       52977    65023   No
     D15         10'      64777    65023   No
     D16        100'      19746    65023   No
     D17        129'      61008    65023   No
     D18        129'      34267    65023   No


                                                    RUN    - Repeat Screen
                                                    RETURN - Restart Program
                                                    FN/TAB - Exit
```

Figure 10-5.   CS-D/N Configuration Information Screen (Expanded Display)

The Protect field displays the surface protection status. The contents of the Protect field are:

Content	Description
No	The surface is unprotected; writing is possible.
Soft	The surface is soft protected; writing is not possible. Soft protect is a programmable surface-write inhibit.
Hard	The surface is hard protected; writing is not possible. To remove a hard protect-write inhibit, power down and power up the CS-D/N.
n/a	The CS-D/N does not have a PROM revision greater than 1. You cannot alter the Protect field.

4. If a new configuration is not needed, press RETURN to restart the program, or press FN/TAB to exit. To start a new configuration go to step 5.
5. To "start setup" of a new configuration of surface assignments, press SF key '15 from the screen shown in Figure 10-3. The surface assignments screen appears in Figure 10-5.

It is possible to reconfigure a single Winchester drive from one to a maximum of fourteen addressable disk surfaces.

Note: This utility requires DS Prom level 4.0 or greater within a Wang DS or CS/D cabinet.

```
                  Setup D.S. Disk Surface Assignments

3 Winchesters with sectors available
No. 1 = 260,096      No. 2 = 260,096      No. 3 = 77,824

Master Disk      Catalog          Slave Disk    Catalog
Address          Maximum          Address       Maximum

D11              0                D51           0
D12              0                D52           0
D13              0                D53           0
D14              0                D54           0
D15              0                D55           0
D16              0                D56           0
D17              0                D57           0
D18              0                D58           0
D19              0                D59           0
D1A              0                D5A           0
D1B              0                D5B           0
D1C              0                D5C           0
D1D              0                D5D           0
D1E              0                D5E           0

Use D.S defaults  Y
                                              FN/TAB - Exit
```

Figure 10-6.   Setup D.S. Disk Surface Assignments

If you want to use the default disk surface assignments, type Y and press
RETURN. The program calculates the default disk assignments and takes you
to the configuration file name @DEFAULT. (See Figure 10-6.)

> *Note: DS defaults are:*
> *30 MB drive has 2 disk addresses with 10 MB each*
> *64 MB drive has 4 disk addresses with 16 MB each*
> *140 MB drive has 14 disk addresses with 10 MB each*
> *112 MB drive has 7 disk addresses with 16 MB each*

```
                Setup D.S. Disk Surface Assignments

3 Winchesters with sectors available
No. 1 = 260,096     No. 2 = 260,096     No. 3 = 77,824

Master Disk     Catalog          Slave Disk    Catalog
Address         Maximum          Address       Maximum

D11             0                D51           0
D12             0                D52           0
D13             0                D53           0
D14             0                D54           0
D15             0                D55           0
D16             0                D56           0
D17             0                D57           0
D18             0                D58           0
D19             0                D59           0
D1A             0                D5A           0
D1B             0                D5B           0
D1C             0                D5C           0
D1D             0                D5D           0
D1E             0                D5E           0


Configuration file name @DEFAULT
                                            FN/TAB - Exit
```

Figure 10-7. @DEFAULT Configuration

If you do not want to use the default disk surface assignments, type N and
press RETURN. The program enables you to tailor a unique configuration.
(See Figure 10-7.)

```
            Setup D.S. Disk Surface Configured Assignments

3 Winchesters with sectors available
No. 1 = 260,096     No. 2 = 260,096     No. 3 = 77,824

Master Disk     Catalog          Slave Disk    Catalog
Address         Maximum          Address       Maximum

D11             0                D51           0
D12             0                D52           0
D13             0                D53           0
D14             0                D54           0
D15             0                D55           0
D16             0                D56           0
D17             0                D57           0
D18             0                D58           0
D19             0                D59           0
D1A             0                D5A           0
D1B             0                D5B           0
D1C             0                D5C           0
D1D             0                D5D           0
D1E             0                D5E           0

Winchester X      Master or Slave M
B = 1.2 (4160)    C = 10MB (38912) D = 16MB  (65024)  R = Remaining or Value
Amount for surface D11 = 00260096
All entries made and acceptable? Y/N __
                                            FN/TAB - Exit
```

Figure 10-8.   Setup D.S Disk Surface Configured Assignments

The surfaces on a single Winchester drive must be assigned to either the left "Master" or the right "Slave" column that is shown on the screen. Make your selection (M or S) and press RETURN.

You must also determine the amount of disk surface space you want on your drive. To do this, follow these steps:

1. Select B, C, or D for the standard platter size numeric value that you want and then press the RETURN key.

   or

2. Enter a numeric sector value and then press the RETURN key. The utility automatically assigns the platter size beginning with the first unused platter address and consectively fills each platter.

3. Enter spaces or 0 and press RETURN to end the selection for the drive specified.

4. Select R and then press RETURN to choose the remainder of the drive's sectors.

If your entries are complete and you respond with a Y(yes) to accept the configuration, the program takes you to the Configuration file name @DEFAULT. You can change the configuration name at this time or you can use the name @DEFAULT. (See Figure 10-6.)

If your entries are not complete and you respond with a N (no), the program returns you to the "DS Configuration" screen (Figure 10-2).

Sample Configuration

The sample configuration of surface assignments shows a DS or CS-D cabinet with three Winchesters. Two 64 MB Winchesters have been assigned to the Master address columns and a 20 MB Winchester drive has been assigned to the Slave address with surface sizes varying from:

```
 4160 =  1.2 MB image
38912 =  10 MB image
65024 =  16 MB image
```

Surfaces greater than 65024 sectors require both the 3 byte addressing of the DS Prom level 4 and the 386 Release 2.0 operating system. Surfaces greater than 65024 must be established with the type 2 (&) catalogued index area.

> *Note: The hashing algorithm for 3-byte addressing is available with the CS/386 operating system Release 2.0 or greater.*

Type Index	Invoked By
0	SCRATCH DISK T /hhh
1	SCRATCH DISK ' T /hhh
2	SCRATCH DISK & T /hhh

```
                   Sample D.S. Disk Surface Assignments

3 Winchesters with sectors available
No. 1 = 260,096     No. 2 = 260,096     No. 3 = 77,824

Master Disk        Catalog          Slave Disk    Catalog
Address            Maximum          Address       Maximum

D11    1           65024            D51    3       38912
D12    1           65024            D52    3        4160
D13    1           38912            D53    3        4160
D14    1           38912            D54    3        4160
D15    1            4160            D55    3        4160
D16    1            4160            D56    3        4160
D17    1            4160            D57    3        4160
D18    1            4160            D58    3        4160
D19    1            4160            D59    3        4160
D1A    1            4160            D5A    3        4160
D1B    1           27264            D5B    3        1472
D1C    2          150016            D5C             0
D1D    2           65024            D5D             0
D1E    2           45056            D5E             0

Winchester 3    Slave    0 Sectors remaining

All entries made and acceptable? Y/N __

                                             FN/TAB - Exit
```

Figure 10-9.   Sample D. S. Surface Assignments

If your entries are complete and you respond with a Y(yes)to accept the
configuration, the program takes you to the Configuration file name
@DEFAULT. You can change the file name at this time or use the file
name @DEFAULT. (See Figure 10-6.)

If your entries are not complete and you respond with a N (no), the program
returns you to the "DS Configuration" screen (Figure 10-2).

Configuration File Name @DEFAULT

The configuration file name @DEFAULT stores your selection of surface
configuration into a six sector file on the system surface.

```
                  Configuration FileName @DEFAULT

  Configuration file name @DEFAULT

                                          FN/TAB - Exit
```

Figure 10-10. Configuration FileName @DEFAULT

You can execute your disk assignments in the configuration file @DEFAULT
from terminal 1 by following the steps listed below. You can create your disk
surface configuration from any terminal.

　　1. Press RESET and then press SF key '10 to apply. (See Figure 10-9.)

If you did not use @DEFAULT go to step 2.

　　2. Enter the FileName of your choice and press RETURN.

3. Enter printer address 005 and press RETURN. (See Figure 10-10.)

```
             Setup D.S. Disk Surface Configured Assignments

3 Winchesters with sectors available
No. 1 = 260,096    No. 2 = 260,096    No. 3 = 77,824

Master Disk      Catalog          Slave Disk    Catalog
Address          Maximum          Address       Maximum

D11              0                D51           0
D12              0                D52           0
D13              0                D53           0
D14              0                D54           0
D15              0                D55           0
D16              0                D56           0
D17              0                D57           0
D18              0                D58           0
D19              0                D59           0
D1A              0                D5A           0
D1B              0                D5B           0
D1C              0                D5C           0
D1D              0                D5D           0
D1E              0                D5E           0
Hard copy to printer 005
                                  FN/TAB - Exit
```

Figure 10-11. D.S. Surface Assignments

Note: DS Prom level 4 or greater is required in the cabinet. You can only apply changes from terminal 1.

4. Enter any remarks for the hard copy and press RETURN. (See Figure 10-11.)

```
             Setup D.S. Disk Surface Configured Assignments

3 Winchesters with sectors available
No. 1 = 260,096    No. 2 = 260,096    No. 3 = 77,824

Master Disk      Catalog          Slave Disk    Catalog
Address          Maximum          Address       Maximum

D11              0                D51           0
D12              0                D52           0
D13              0                D53           0
D14              0                D54           0
D15              0                D55           0
D16              0                D56           0
D17              0                D57           0
D18              0                D58           0
D19              0                D59           0
D1A              0                D5A           0
D1B              0                D5B           0
D1C              0                D5C           0
D1D              0                D5D           0
D1E              0                D5E           0
Hard copy to printer 005
Remark for hard copy 890101
                                  FN/TAB - Exit
```

Figure 10-12. DS Surface Assignments

5. Enter Y (yes) to execute the configuration or N (no) to go back to the screen shown in Figure 10-9 and press RETURN.

```
                 Proposed D.S. Disk Surface Assignments

3 Winchesters with sectors available
No. 1 = 260,096      No. 2 = 260,096      No. 3 = 77,824

Master Disk     Catalog          Slave Disk     Catalog
Address         Maximum          Address        Maximum

D11   1           65024          D51   3          38912
D12   1           65024          D52   3           4160
D13   1           38912          D53   3           4160
D14   1           38912          D54   3           4160
D15   1            4160          D55   3           4160
D16   1            4160          D56   3           4160
D17   1            4160          D57   3           4160
D18   1            4160          D58   3           4160
D19   1            4160          D59   3           4160
D1A   1            4160          D5A   3           4160
D1B   1           27264          D5B   3           1472
D1C   2          150016          D5C                  0
D1D   2           65024          D5D                  0
D1E   2           45056          D5E                  0


Apply Y or N __
```

Figure 10-13. Proposed D.S. Surface Assignments

The program loops to the DS Configuration utility for visual verification.

The DS or CS-D positions the cursor on the first character of the Protect field for each surface. You can change the Protect value by keying the value N (no), S (soft protect), or H (hard protect).

4. Press RUN when you set all surfaces (refer to Figures 10-14 and 10-15).

```
                 C u r r e n t   P l a t t e r   U s e
                      D S   S u r f a c e s

Disk     Index  Current  Catalog  Pro-   Disk     Index  Current  Catalog  Pro-
Address  Size   End      Maximum  tect   Address  Size   End      Maximum  tect

D30       7      253       1231    Soft   D70       5      8         200     No
D31      24     6716      65000    Soft
D32      24     6824      65000    Soft
D33      24     4534      65000    Soft
D34      24     7408      65000    No
D35      24     9655      65000    No


Highlighted fields denote changes made
Do you wish to set new defaults (Y or N) N            RETURN - Proceed
                                                      FN/TAB - Exit
```

Figure 10-14. Current Platter Use (Applying Protection on CS-D/N Surfaces) Screen

5. Continue by pressing one of the following keys and then press RETURN:
   - Press N to return to the screen in Figure 10-14.
   - Press Y to set the new protection values.

You proceed to the screen in Figure 10-15.

```
                  C u r r e n t   P l a t t e r   U s e
                       DS  S u r f a c e s

Disk      Index   Current  Catalog  Pro-  Disk     Index  Current  Catalog  Pro-
Address   Size        End  Maximum  tect  Address  Size       End  Maximum  tect

D30          7       253     1231   Soft  D70        5         8      200   No
D31         24      6716    65000   Soft
D32         24      6824    65000   Soft
D33         24      4534    65000   Soft
D34         24      7408    65000   No
D35         24      9655    65000   No

Highlighted fields denote changes made              RETURN - Proceed
Desired Protection Applied                          FN/TAB - Exit
```

Figure 10-15. Current Platter Use (Protection Applied on CS-D/N Surfaces) Screen

11
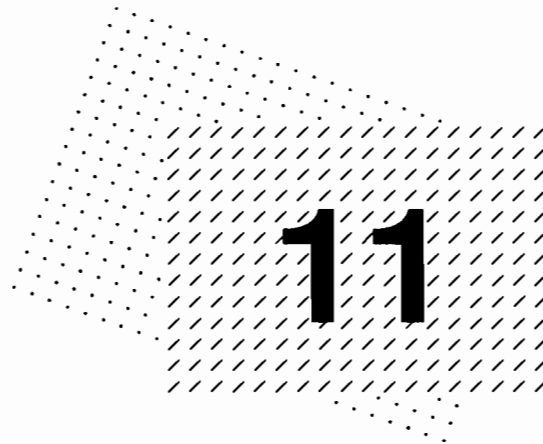
DOS Utilities

Overview

DOS utilities provide the CS/2200 user with the ability to use DOS diskettes and files without accessing a PC.

The main functions of the utilities are:

- List the contents of a DOS diskette
- Delete or rename a file
- Display or print a text file
- Format and create a DOS diskette
- Duplicate a DOS diskette
- Copy DOS files from one diskette to another DOS diskette
- Copy DOS files to CS files in block mode (or CS files in block mode to DOS files)

The main program which starts the DOS utilities is DOSSTART.

If the 2536DW, 2636DW or PC2200 are used as terminals a status line appears at line 25. The line clears when you execute the EXIT command. The system then returns to the START module.

Redirection of commands, for example, COPY {filename.ext} > PRN or DIR /W > LPT1 are not supported.

The DOS utilities are restricted to the root directory.

The DOS Utilities Display

Select DOS Utilities from the System Utilities menu (see Figure 11-1).

```
System Utilities - ( ) Copr. Wang Laboratories, Inc. 1990

                                                   Partition 1, 100 K
                                                        Terminal 1

Select item and press RUN/EXEC:

                        - Partition Generator
                        - Partition Status
                        - Format Disk Platter
                        - Move File
                        - Backup Platter
                        - Recover from Backup
                        - System Install
                        - Make a Reference List of File Names
                        - Initialize Date & Time
                        - DS Utilities
                        - DOS Utilities
                        - Game
```

Figure 11-1.   System Utilities Menu

A display, similar to the example shown in Figure 11-2, appears on the screen.

```
CS DOS Emulation Version 1.0 © Wang Laboratories, Inc., 1990
CS DOS Emul\A>

A: = D10      B: = D20      C: = D11      LPT1: = 704      Terminal 1      Partition 1
```

Figure 11-2.   CS DOS Emulation Screen

The defaults are configured as follows:

    Drive A = CS/D10

    Drive B = CS/D20

    Drive C = CS/D11

    LPT1   = CS/704 (terminal printer)

    12/24 hr = 1 (12hr display) if set to (2) the 24hr

The C: drive is a CS/2200 Catalogued drive. It handles file transfers from DOS to a CS/2200 file (or a CS/2200 file to DOS). The file transfer is in a 512-byte block. Any other CS/2200 files may be transferred, however, incoherent characters may appear at the end of the file.

Using the SETUP Command

You can reconfigure the default settings using the SETUP command. At the DOS command processor (shown in Figure 11-2), type in SETUP. The DOS SETUP program appears. (See Figure 11-3.)

```
                        DOS SETUP Program

Address for Drive A for DOS emulation:   D10
Address for Drive B for DOS emulation:   D20
Address for Drive C for DOS emulation:   D11
Address for printer (LPT1)          :   704
Clock display 12/24 hr [1/2]        :     1



Update configuration y/n

A: = D10      B: = D20      C: = D11   LPT1 = 704   Terminal 1    Partition 1
```

Figure 11-3.   The DOS SETUP Screen

If you want to use the default setting, choose n (no). If you want to change the default setting, choose y (yes). After making your selection, a display, similar to the example shown in Figure 11-4, appears on the screen.

```
                        DOS SETUP Program

Address for Drive A for DOS emulation:   D10
Address for Drive B for DOS emulation:   D20
Address for Drive C for DOS emulation:   D11
Address for printer (LPT1)          :   704
Clock display 12/24 hr [1/2]        :     1



Setup Complete - Press any Key to Continue

A: = D10      B: = D20      C: = D11   LPT1 = 704   Terminal 1    Partition 1
```

Figure 11-4.   DOS SETUP Complete

If your setup is complete, press any key to continue.

Commands

The DOS emulation package supports the following commands.

CLS

CLS clears the screen.

COPY [d:]filename.ext [d:]filename.ext

Note: This command works only on the CS/386 operating system.

The COPY command copies any file from a DOS diskette to another DOS diskette. You can copy files even if you have one drive on the CS system. You can also COPY files from 360K to 1.2 MB (as well as COPY files from 1.2 MB to 360K).

Wild cards are not supported and the CS filename is restricted to (8) characters.

Format:

```
copy a:readme.doc b:readme.txt

copy a:autoexec.bat

copy c:readme.d a:readme.doc will copy CS file to a DOS file.

copy a:readme.doc c:readme.d will copy DOS file to a CS file
        DOS/CS and CS/DOS copies are in block mode only.
```

DEL [d:]filename.ext or *.*

The DELETE command deletes a file in the root directory. The wildcard *.* deletes all files in the root directory.

DIR [d:] [/P] [/W]

DIR uses switches /P and /W to display the contents of the root directory. 12hr or 24hr time display is supported. You can set up an automatic display using the SETUP command.

Example:

DIR C: lists the contents of the 2200 drive that you defined with an address using the SETUP command.

DISKCOPY [d:] [d:]

DISKCOPY makes copies of DOS diskettes. You cannot copy from 1.2 MB to 360K (or 360K to 1.2 MB). If you do not designate a drive, the default drive is assumed.

EXIT

EXIT returns you to the START module. Before leaving the DOS command processor, EXIT clears line 25 on the workstations that support the 25th line as the status line. (See Figure 11-5.)

```
CS DOS Emulation Version 1.0 © Wang Laboratories, Inc., 1990
CS DOS Emul\A> EXIT

A: = D10     B: = D20     C: = D11     LPT1: = 704     Terminal 1     Partition 1
```
Figure 11-5.   DOS Emulation EXIT Screen

FORMAT [d:] [/V]

FORMAT initializes a DOS diskette with BOOT Track for DOS Version 3.3. The [/V] switch allows you to add the volume label to the disk.

Note: A 1.2 MB diskette can only be initialized on a 1.2 MB drive. A 360K diskette can only be initialized on a 360K drive.

HELP

HELP displays the commands currently supported in the DOS emulation package. (See Figure 11-6.)

```
CS DOS Emul\A> HELP
                    Wang CS DOS Emulation - HELP Screen

Command                                     Description

A:                                          Select drive A
B:                                          Select drive B
CLS                                         Clear screen
COPY      [d:] [name.ext] [d:] [new.ext]    Copy file
DELETE    [d:] [filename.ext]               Delete file
          [d:] [*.*]                        Delete all files
DISKCOPY  [d:] [d:]                         Duplicate diskette A & B drives
DIR       [d:] [/p] [/w]                    Display directory
EXIT                                        Exit from emulation
FORMAT    [d:] [/v]                         Format a DOS diskette
HELP                                        Display HELP
RENAME    [d:] [filename.ext]               Rename a file
SETUP                                       Alter CONFIG
TYPE      [d:] [filename.ext]               Display text file
               [>LPT1]                      Print text file
VER                                         Display version number

Note:  [d:] refers to drive A:, drive B:, or drive C:

CS DOS Emul\A>
A: = D10  B: = D20  C: = D11  LPT1= 704  Terminal 1  Partition 1
```

Figure 11-6.   CS DOS Emulation HELP Screen

RENAME [d:]filename.ext newname.ext

RENAME [d:]filename.ext newname.ext renames a file on drive [d:]. If [d:] is omitted the command renames a file on the default drive. Wildcards are not supported.

SETUP

SETUP enables you to change your system configuration. System administrators can access this utility at the system console.

Note: Individual users do not have access to SETUP. If you try to change defaults while another user is accessing the utility, problems result.

TYPE [d:]filename.ext [>LPT1]

Note: This command works on CS/386 operating systems only.

TYPE displays a text file on a DOS diskette. The character set is translated to *Extended IBM Code Page #437*. Not all characters in the IBM codepage are available on the CS character set, therefore, some characters are substituted for the nearest character. For example, A with an angstrom is displayed as A.

Optional use of the pipe command >LPT1 produces the printed text file on a printer at the designated address for LPT1. The default address is set to 704; suitable drivers must be loaded.

VER

VER displays the current version of the software.

>   *Note: [d:] is the drive designation, for example, A:, B:, or C:*

12

MXE and MXF
Command Modes

Overview

When a system is configured with a Model 2236MXE/MXF or an SVP Option-W
terminal processor, it is possible to perform certain system procedures by invok-
ing the Model 2236MXE/MXF command mode and enter in MXE/MXF com-
mands. The MXE/MXF command mode procedures include

- Setting the transmission rate of a port on the terminal processor
- Locking and unlocking the transmission rate of the current port
- Displaying the status of all ports on the terminal processor
- Changing the primary user (i.e., Port 1)

Running 2236MXE/MXF Command Mode

You can run MXE/MXF commands at any time from any powered-on terminal
currently connected to a port on the Model 2236MXE/MXF or an SVP Op-
tion-W. It is not necessary to configure the system before entering MXE/MXF
command mode. After the system is configured, the terminal from which you
issue the command does not have to be in the current configuration.

Before configuration, the system is under the control of the Bootstrap. You can
run the Set Primary Port command only when the system is under Bootstrap
control or when the system is running with VP BASIC-2.

When the system is running under Bootstrap control or running the operating system, there is a special MXE/MXF password needed to execute most commands. On power-up, this password defaults to MXEPSW. You can change the password with the Change MXE/MXF Password command. When the system is running BASIC-2, the MXE/MXF password is the same as the first six characters of the system configuration password.

Entering and Exiting 2236MXE/MXF Command Mode

Entering MXE/MXF Command mode alters the screen display. To enter MXE/ MXF Command mode, press RESET, then press LOAD three times. After the third LOAD, the prompt ENTER MXE/MXF COMMAND appears on the screen followed by a percent character (%) on the next line. When the percent character appears, you can enter the MXE/MXF command. Every MXE/MXF command begins with a 1-character command code.

After processing the command, the terminal again displays the percent character and you can enter another MXE/MXF command. Pressing RETURN after the percent prompt appears or pressing RESET exits MXE/MXF Command mode. You then return to the processing point where you entered the MXE/ MXF command.

> *Note: Although entering MXE / MXF Command mode halts processing on the current terminal, other terminals on the terminal processor operate normally. It is possible for more than one terminal to enter MXE / MXF Command mode silmultaneously. Therefore, use caution when entering MXE / MXF commands that affect the performance of the terminals, such as Set Transmission Rate.*

Status Command

Format:

```
?
```

The Status command returns a chart indicating the status of all ports on the terminal processor to which the terminal issuing the command is connected. The first line of the chart uses the following format:

```
device R# (mode) option
```

where device = the model number of the terminal processor.

R# = the revision of terminal processor firmware. This number is the number of the general BASIC-2 release with the terminal processor release number appended to it. For example, Revision 2.51 or 2.53 of the terminal processor code runs with BASIC-2 2.5, while terminal processor Revision 2.92 runs with BASIC-2 2.9. Problems may occur if the number of the terminal processor firmware does not correspond to the BASIC-2 release number.

mode = the indication that the system has been configured with an MVP BASIC-2, in which case the terminal displays MVP within the parentheses. If the system has not been configured or if the system has been configured with VP BASIC-2, the terminal displays BOOTSTRAP within the parentheses.

option = the indication of any additional options implemented by the MXE/MXF code.

The next four lines of the chart display the following information for each port on the terminal processor:

On / Off state – If the terminal connected to the port is powered on (i.e., Data Set Ready on the RS-232 connection is active), the word ON appears on the screen. Otherwise, the word OFF appears.

Software selected transmission rate – This is the transmission rate selected by MXE/MXF Command Code B, Set Transmission Rate. If MXE/MXF Command Code B has not been invoked, the transmission rate defaults to the rate set by the hardware switches.

Locked or unlocked state – The letter L indicates that MXE/MXF Command Code L has been used to lock the transmission rate of the terminal. If the terminal is not locked, this field is left blank.

Hardware selected transmission rate – This is the transmission rate set by the switches on the processor board.

Local / Remote state – This field reflects the state of the Carrier Detect signal on the RS-232 line, indicating whether the terminal is a local terminal or is connected to the MXE/MXF through a modem. A remote terminal causes an active Carrier Detect signal.

Terminal type – This field describes the format of the current communication protocol of the port. If the terminal on the indicated port is a standard Wang 2200 terminal or Wang 2200 terminal emulation (following Wang terminal protocol), the message WANG TERMINAL appears in this field. If the port is configured as a general asynchronous communications port, the message ASYNCH appears in this field.

An asterisk appears before the port to which the terminal issuing the Status command is connected.

The following is an example of the chart the Status command returns:

```
2236 MXE R2.51 (BOOTSTRAP)

*PORT 1 ON  19200 L  / (19200) LOCAL WANG TERMINAL
 PORT 2 OFF 19200    / (19200) LOCAL WANG TERMINAL
 PORT 3 OFF 19200    / (19200) LOCAL WANG TERMINAL
 PORT 4 OFF 19200    / (19200) LOCAL WANG TERMINAL
```

In this example, the terminal processor is a Model 2236MXE/MXF; the revision number is 2.51, indicating that this is the first bootstrap microcode revision that corresponds with BASIC-2 Release 2.5; and the system has not yet been configured or has been configured with a VP BASIC-2. The port issuing the Status command is Port 1, which is the only port with a powered-on terminal. Port 1 on this 2236MXE/MXF terminal processor can be Port 1, Port5, Port 9, or Port 13 on the system, depending on the number of terminal processors connected and the address of this MXE/MXF. The transmission rate at Port 1 is locked. All four ports are set to transmit at a rate of 19,200 bps and all terminals are local Wang terminals.

Change MXE/MXF Password Command

Format:

```
C password1 password2
```

where password 1 = the current MXE/MXF password, consisting of six
characters. The password does not appear on the
screen; instead, the string "012345" appears.

password 2 = the new MXE/MXF password.

Command Code C changes the MXE/MXF password used when the system is
operating under control of the Bootstrap or with VP BASIC-2.

When the system is operating with MVP BASIC-2, the 2200 system reconfiguration password is required to execute MXE/MXF commands. The Change
MXE/MXF Password command has no effect on the system reconfiguration
password. The 2200 system password is eight bytes long. The MXE/MXF
password is six bytes long. Therefore, upon configuration, the MXE/MXF password is set to the first six bytes of the system password.

After the system processes this command, the screen displays the message
"OK."

Examples of valid syntax are as follows:

```
C OLPSWD NWPSWD
C secret Psword
```

Note that password 1 itself does not appear on the screen.

Set Primary Port Command

Format:

```
A password x
```

where password = the current MXE/MXF password. The password does
not appear on the screen; instead, the string "012345" appears.

```
x = the port designator, a number between 0 and 4
    indicating which port to establish as the primary
    port of the 2236MXE/MXF.  A port designator of
    1,2,3, or 4 corresponds to the port number on the
    terminal processor.  A port designator of 0
    indicates the current terminal port.
```

Command Code A sets the primary port. The primary port supports the termi-
nal that can perform master initialization. On a system with more than one
terminal processor, you can issue this command only from a terminal connected
to the first terminal processor.

Additionally, you can issue this command only when the system is under con-
trol of the Bootstrap. Unless a Change MXE/MXF Password command has
been issued, the password is the default password, MXEPSW.

When this command is issued, Port 1 is logically swapped with the port indi-
cated in the command. MVP BASIC-2 subsequently considers the swapped port
to be Port 1 and Port 1 to be the swapped port. This command is used when
Port 1 is not functioning or is not available.

After the system processes the Set Primary Port command, the screen displays
the message "OK."

Examples of valid syntax area as follows:

```
A SYSTEM 3
A SECRET 0
A PSWORD 4
```

Note that the password itself does not appear on the screen.

Set Transmission Rate Command

Format:

```
B password x rate
```

where password = the current MXE/MXF password. The password does not appear on the screen; instead, the string "012345"appears.

x =   the port designator, a number between 0 and 4 indicating the port to which the transmission rate is set. A port designator of 1, 2, 3, or 4 corresponds to the port number on the terminal processor. A port designator of 0 indicates the current terminal port.

rate =   the transmission rate to set for the port indicated by the port designator. This command can set the transmission rate to 50, 75, 100, 110, 134.5, 150, 200, 300, 600, 1200, 2400, 4800, 9600, or 19200.

Command Code B sets the transmission rate of a particular port. Setting the transmission rate through software overrides any hardware switch settings. Master initializing or powering on the system resets the transmission rate to the hardware setting.

Command Code B can set the transmission rate of only those ports on the same terminal processor as the terminal issuing the command. The port must currently be a terminal port (i.e., the command does not work on a TC or other special type of port).

After you enter this command, the terminal displays the 2236MXE/MXF Status chart and prompts you to verify the entered information. You enter a Y to verify or an N to cancel.

Examples of valid syntax are as follows:

```
B SYSTEM 3 9600
B secret  0 300
B Psword 4 50
```

Note that the password itself does not appear on the screen.

Lock Command

Format:

L

Command Code L changes the lock state of the port issuing the command. When a port is locked, no port can chanage its transmission rate, including the locked port itself. The default condition, set when the system is powered on, is unlocked.

When this statement is issued from a port that is unlocked, the port changes to a locked state and the screen displays the statement BAUDRATE LOCKED. When this statement is issued from a port that is locked, the port changes to an unlocked state and the screen displays the statement BAUDRATE UN-LOCKED.

13

Generalized Printer Drivers

Overview

The Generalized Printer Driver (GPD) is a table-driven driver that customizes print output to the attached printer. The GPD allows the system to use Wang PC parallel printers as either terminal or system printers. The GPD also provides two transparent modes of operation, one permanent and one temporary.

The GPD intercepts each byte of data from the application and determines whether the byte represents a printable character, a control code, or part of an escape sequence. Escape sequences and control codes are translated and then sent to the printer or used to set driver modes. Characters are translated, modes and attributes are checked, and then the modified character codes are sent to the printer.

There are three cases in which the driver is not used: in transparent mode, in doing screen dumps to the terminal printer, and in any $GIO printer calls. Under these conditions, all data bypasses the driver and goes directly to the printer. As a result, applications that use $GIO to print on printers may experience problems. For example, documents printed through WP on Wang PC printers are printed without line feeds. If you want an application to use one of the printers supported by the GPD, output should be done using PRINT statements and the escape sequences provided by the GPD.

BASIC-2 allows several device types to be used with printers: 0, 2, and 7. It is recommended that when selecting a printer to be used through the GPD that you use device type 7. For example:

```
SELECT PRINT 715, DRIVER 715
```

Installing the Generalized Printer Driver

To use the GPD, you must first install it by telling the system what printer driver tables you want to use with what printers. You do this by using the @GENPART utility to configure the system.

Procedure

1. From the @GENPART menu (see Figure 2-1), press SF'07. The Printer Driver screen (Figure 13-1) appears.

```
               ***WANG PARTITION GENERATION PROGRAM***

                                            LIST OF OPTIONS:
      Driver Table Name  Printer Address  Term #   SF'00 - clear partition
                                                    SF'01 - clear device table
   1. @PM016V0           215
   2. @PM010V0           004              1         SF'02 - divide mem. evenly
   3.
   4.                                               SF'04 - edit partitions
   5.                                               SF'05 - edit device table
   6.                                               SF'06 - edit $MSG
   7.
   8.                                               SF'07 - select prt. driver
   9.                                               SF'08 - load configuration
  10.                                               SF'09 - save configuration
  11.                                               SF'10 - delete config.
  12.
  13.
  14.
  15.                                               SF'15 - execute

           Edit which driver table entry (default = 1)?
```

Figure 13-1.   Printer Driver Screen

2. At the "Edit which driver table entry" prompt, enter a number from 1 to 15. Enter 1 if no printer driver entries have yet been created.

3. Enter the name of a file containing translation tables for the GPD in response to the following prompt:

   ```
   Enter table driver name (enter 0 to delete from configura-
   tion):
   ```

4. Enter the address of the printer for the table in response to the following prompt:

   ```
   Enter associated printer address: _____
   ```

   The address consists of three digits. The first digit represents the type of printer. The second and third digits are the printer's address. For terminal printers, the address is 04.

   If the address entered is 04, @GENPART prompts you for the number of the terminal.

   ```
   Enter terminal number (between 1 and 16): _____
   ```

Your responses to these prompts appear on the screen. An example of a valid set of responses follows.

	Driver Table Name	Printer Address	Term #
1.	@PM010V0	204	12
2.	@PM016V0	216	
3.	@PM016V0	217	
4.			
"			
"			

@GENPART then repeats the prompts listed in Steps 2 through 4, allowing you to associate tables with up to 15 printers.

Since no more than seven different driver tables can be in memory at one time, you can repeat table names. However, a printer address other than 04 can be used only once.

5. To delete an entry from the GPD list, enter a zero in response to the "Driver Table Name" prompt and press the RETURN key.

When you have specified drivers for all the printers, you can select any of the functions in the LIST OF OPTIONS.

@GENPART GPD Error Messages

When @GENPART is initializing the GPD, any of the following messages may appear on the screen:

Maximum Number of Drivers have already been chosen – please enter 'RETURN'

This message appears when you specify more than seven different translation tables in @GENPART. To recover, change a table name.

Duplicate printer address – enter another

This message appears when the same printer address (other than 04) is used more than once in @GENPART. To recover, change or delete an address.

Table name indicated is not a driver table for the GPD – key 'RETURN' to check the list of driver table names

This message appears when the table name given to the @GENPART utility is not the name of a file that is a translation table for the GPD. To recover, press the RETURN key. The table input display returns to the screen.

DRIVER Tables not on current disk – mount correct disk and key 'RE-TURN'

This message appears when the disk currently mounted does not contain the tables specified by the @GENPART utility. To recover, mount the correct disk and press the RETURN key. The driver initialization then continues.

Using the $INIT Statement

It is not recommended that you write your own @GENPART utility. However, if you do, use the $INIT statement to associate driver tables with printers. Refer to the *Multiuser BASIC-2 Language Reference Manual* for a complete discussion of $INIT. To initialize the GPD, you assign the driver table file names and associated device addresses to an alpha variable string used as the seventh argument of the $INIT statement. Each entry in the alpha string must be 10 bytes long and the string itself must be 150 bytes long. Any unused bytes must be set to hex 20. The general form of the $INIT statement and the format for the entries in the seventh argument are as follows:

```
$INIT(alpha-1,alpha-2,alpha-3,alpha-4,alpha-5 [,[alpha-6]
[,alpha-7]])
```

where

```
alpha-1  = size of each partition
alpha-2  = terminal number for each partition
alpha-3  = mode of each partition
alpha-4  = bootstrap program name for each partition
alpha-5  = device table
alpha-6  = optional reconfiguration password
alpha-7  = optional printer driver associations
             where bytes 0-7 = printer driver table file name
                     byte 8 = device address in hex
                     byte 9 = terminal number in hex,if byte 8
                              is 04; otherwise, 0
```

Error Codes Generated During $INIT Statements by the GPD

Error Code 03

This error code occurs when there is not enough memory available to load all the requested printer driver tables.

Error Code 78

This error code is returned during execution of the $INIT statement when an attempt is made to load more than seven printer driver tables or when a printer address is associated with more than one GPD table.

Error Code 88

This error occurs during $INIT execution if one of the specified printer driver tables is not a true printer driver table.

Using the GPD

The following sections explain GPD default settings; the new SELECT DRIVER statement and transparent mode; the GPD character set, control codes, and escape sequences; and an enhancement to the LIST DT command to support the GPD.

GPD Defaults

Unless you set them differently, the GPD uses the following default settings:

- 10 pitch
- 6 lines per inch
- No attributes enabled
- Font #0 (if applicable)
- Automatic line feed after carriage return enabled
- Hex(0E) control code setting; emphasized print only, turn off when a hex(0F) is received

SELECT DRIVER Statement and Transparent Mode

In transparent mode, the GPD sends the codes it receives directly to the printer without interpreting them. You can select transparent mode permanently or temporarily. The statement SELECT DRIVER allows you to establish transparent mode permanently. The general form of the SELECT DRIVER statement is as follows:

```
SELECT DRIVER device-address [OFF]

                                        /taa
        where device-address =          <alpha-variable>
```

ON is the default state for the driver. OFF turns the driver off for the specified address until the system is reinitialized or until you issue another SELECT DRIVER statement for the same address without the OFF.

If you want to use a feature available on a given printer but not supported by the GPD, you can do so by using the Enter Temporary Transparent Mode Escape sequence. This sequence allows you to pass hex codes directly to the printer without having them translated by the driver. See the "Standard Escape Sequences" section in this chapter.

Generalized Printer Driver Character Set

Table 13-1 lists the standard character set for the GPD.

Note: All printers may not support all hex codes. If a printer does not support a code, the driver directs the printer to build the character, wherever possible. Where this is not possible, an underscored space is printed.

Table 13-1.   Standard Character Set

Hex Code	Printer Char.	Hex Code	Printer Char.	Hex Code	Printer Char.	Hex Code	Printer Char.
hex(00)	(*)	hex(20)		hex(40)	@	hex(60)	°
hex(01)	(*)	hex(21)	!	hex(41)	A	hex(61	a
hex(02)	(*)	hex(22)	"	hex(42)	B	hex(62)	b
hex(03)	(*)	hex(23	#	hex(43)	C	hex(63)	c
hex(04)	(*)	hex(24)	$	hex(44)	D	hex(64)	d
hex(05)	(*)	hex(25)	%	hex(45)	E	hex(65)	e
hex(06)	(*	hex(26)	&	hex(46)	F	hex(66)	f
hex(07)	(*)	hex(27)	'	hex(47)	G	hex(67)	g
hex(08)	(*)	hex(28)	(	hex(48)	H	hex(68)	h
hex(09)	(*)	hex(29)	)	hex(49)	I	hex(69)	i
hex(0A)	(*)	hex(2A)	*	hex(4A)	J	hex(6A)	j
hex(0B)	(*)	hex(2B)	+	hex(4B)	K	hex(6B)	k
hex(0C)	(*)	hex(2C)	,	hex(4C)	L	hex(6C)	l
hex(0D)	(*)	hex(2D)	-	hex(4D)	M	hex(6D	m
hex(0E)	(*)	hex(2E)	.	hex(4E)	N	hex(6E)	n
hex(0F)	(*)	hex(2F)	/	hex(4F)	O	hex(6F)	o
hex(10)		hex(30)	0	hex(50)	P	hex(70)	p
hex(11)		hex(31)	1	hex(51)	Q	hex(71)	q
hex(12)		hex(32)	2	hex(52)	R	hex(72	r
hex(13)		hex(33)	3	hex(53)	S	hex(73)	s
hex(14)		hex(34)	4	hex(54)	T	hex(74)	t
hex(15		hex(35)	5	hex(55)	U	hex(75)	u
hex(16)		hex(36)	6	hex(56)	V	hex(76)	v
hex(17)		hex(37)	7	hex(57)	W	hex(77)	w
hex(18)		hex(38)	8	hex(58)	X	hex(78)	x
hex(19)		hex(39)	9	hex(59)	Y	hex(79)	y

(continued)

Table 13-1.   Standard Character Set (continued)

Hex Code	Printer Char.	Hex Code	Printer Char.	Hex Code	Printer Char.	Hex Code	Printer Char.
hex(1A)		hex(3A)	:	hex(5A)	Z	hex(7A)	z
hex(1B)		hex(3B)	;	hex(5B)	[	hex(7B)	
hex(1C)		hex(3C)	<	hex(5C)	\	hex(7C)	
hex(1D)		hex(3D)	=	hex(5D)	]	hex(7D)	
hex(1E)		hex(3E)	>	hex(5E)	↑	hex(7E)	
hex(1F)		hex(3F)	?	hex(5F)	–	hex(7F)	(*)
hex(80)	null	hex(A0)	_	hex(C0)	@	hex(E0)	°
hex(81)	null	hex(A1)	_!	hex(C1)	_A_	hex(E1)	_a_
hex(81)	null	hex(A1)	_"	hex(C2)	_B_	hex(E1)	_b_
hex(83)	null	hex(A3)	_#_	hex(C3)	_C_	hex(E3)	_c_
hex(84)	null	hex(A4)	_$_	hex(C4)	_D_	hex(E4)	_d_
hex(85)	null	hex(A5)	_%_	hex(C5)	_E_	hex(E5)	_e_
hex(86)	null	hex(A6)	_&_	hex(C6)	_F_	hex(E6)	_f_
hex(87)	null	hex(A7)	_&_	hex(C7)	_G_	hex(E7)	_g_
hex(88)	null	hex(A8)	_(_	hex(C8)	_H_	hex(E8)	_h_
hex(89)	null	hex(A9)	_)_	hex(C9)	_I_	hex(E9)	_i_
hex(8A)	null	hex(AA)	_*_	hex(CA)	_J_	hex(EA)	_j_
hex(8B)	null	hex(AB)	_±_	hex(CB)	_K_	hex(EA)	_k_
hex(8C)	null	hex(AC)	_._	hex(CC)	_L_	hex(EA)	_l_
hex(8D)	null	hex(AD)	_–_	hex(CD)	_M_	hex(ED)	_m_
hex(8E)	null	hex(AE)	_._	hex(CE)	_N_	hex(ED)	_n_
hex(8F)	null	hex(AF)	_/_	hex(CF)	_O_	hex(EF)	_o_
hex(90)		hex(B0)	_0_	hex(D0)	_P_	hex(F0)	_p_
hex(91)		hex(B1)	_1_	hex(D1)	_Q_	hex(F1)	_q_
hex(92)		hex(B2)	_2_	hex(D2)	_R_	hex(F2)	_r_
hex(93)		hex(B3)	_3_	hex(D3)	_S_	hex(F3)	_s_
hex(94)		hex(B4)	_4_	hex(D4)	_T_	hex(F4)	_t_
hex(95)		hex(B5)	_5_	hex(D5)	_U_	hex(F5)	_u_
hex(96)		hex(B6)	_6_	hex(D6)	_V_	hex(F6)	_v_
hex(97)		hex(B7)	_7_	hex(D7)	_W_	hex(F7)	_w_
hex(98)		hex(B8)	_8_	hex(D8)	_X_	hex(F8)	_x_
hex(99)		hex(B9)	_9_	hex(D9)	_Y_	hex(F9)	_y_
hex(9A)		hex(BA)	_:_	hex(DA)	Z	hex(FA)	_z_
hex(9B)		hex(BB)	_;_	hex(DB)	_L_	hex(FB)	
hex(9C)		hex(BC)	≤	hex(DC)	__	hex(FC)	
hex(9D)		hex(BD)	=	hex(DD)	_]_	hex(FD)	
hex(9E)		hex(BE)	≥	hex(DE)	_↑_	hex(FE)	
hex(9F)		hex(BF)	_?_	hex(DF)	_	hex(FF)	_

(*) – see control sequences

Standard Control Sequences

Table 13-2 lists the GPD standard control sequences and identifies the actions associated with them. The next section, "Implementation of Control Sequences," explains these actions in detail.

Table 13-2.   Standard Control Sequences

Hex Code	Action
00 - 01	Null
02	Initiate escape code sequence
03 - 06	Null
07	Bell
08	Nondestructive backspace
09	Horizontal tab
0A	Line feed
0B	Vertical tab
0C	Form feed
0D	Carriage return
0E	Definable, see "Standard Escape Sequences"
0F	Definable, see "Standard Escape Sequences"
7F	Clear buffer

Implementation of Control Sequences

The system implements the standard control codes listed in Table 13-2 as follows (all codes are in hex):

00 - 01

Null – These codes are filtered out by the driver and are not sent to the printer.

02

Initiate Escape Code Sequence – This byte is used to start all escape code sequences.

03 - 06

Null – These codes are filtered out by the driver and are not sent to the printer.

07

Bell – If applicable, this code generates an audio alarm. The specific alarm sounded is printer-dependent.

08

Nondestructive Backspace – This code generates a nondestructive backspace in the printer's buffer or on paper.

09

Horizontal Tab – This code causes the printer to move to the next tab stop. Tab stops are located at every fifth column. A tab is not generated if it causes the carriage to move beyond the set line length.

0A

Line Feed – This code advances the paper one line when the contents of the printer buffer have printed. The size of the line-feed increment is the currently selected (by Escape Code number 19) size. The specific implementation of this code is printer-dependent.

0B

Vertical Tab – Vertical tabs are located every six lines from the top of form. The current contents of the buffer are printed before the tab is executed. If a vertical tab crosses the end of form, a form feed is generated instead.

0C

Form Feed – This code advances the paper to the next top of form after printing the contents of the printer's buffer.

0D

Carriage Return – This code causes the immediate printing of the contents of the printer's buffer. The carriage returns to the left margin without the paper being moved.

0E - 0F

The function of Control 0E's and 0F's are defined in detail in the next section, "Standard Escape Sequences."

7F

CLEAR BUFFER. This code causes the contents of the printer's buffer to be cleared.

Standard Escape Sequences

Table 13-3 lists the GPD standard escape sequences and identifies the actions associated with them. The section entitled "Implementation of Escape Sequences" explains in detail the actions associated with the escape sequences. In Table 13-3, the letters cc indicate a byte count, excluding the final hex(0E) or hex(0F). The letters dd, ee, ff, and gg indicate bytes with user-specified values. All escape sequence bytes are hex values.

Table 13-3.   Standard Escape Sequences

Escape Sequence (Hex)	Action
1. 02 01 02 01 00 0F	Execute built-in diagnostics
2. 02 02 dd 0F	Select character font
	2a. dd = 00 - font zero (default)
	2b. = 02 - alternate font # 1
	2c. = 04 - alternate font # 2
3. 02 03 0E	Reverse line feed
4. 02 03 0F	Clear platen (daisy printers only)
5. 02 04 dd ee ff gg	Define the meaning of Control hex(0E)
	dd = 00 - overstrike disabled
	02 - overstrike enabled
	ee = 00 - underscore disabled
	04 - underscore enabled
	ff = 00 - emphasized print disabled
	02 - emphasized print enabled
	gg = 0E - turn on attributes until reset or a hex(0f) is received
	= 0F - turn on attributes upon receipt of a Control hex(0E); turn off on a Control hex(0F), carriage return, or reset
6. 02 05 01 dd 0F	Horizontal tab to column dd
	dd = column number
7. 02 05 02 dd ee 0F	Horizontal tab dd inches and ee quarter inches
	dd = number of inches
	ee = number of quarter inches
8. 02 06 dd 0F	Select paper tray (daisy printers only)
	8a. dd = 01 - rear tray
	8b. 02 - front tray
	03 - middle tray
9. 02 07 0E	Select printer
10. 02 07 0F	Deselect printer
11. 02 08 01 0E	Enable superscript
12. 02 08 01 0F	Disable superscript

(continued)

Table 13-3. Standard Escape Sequences (continued)

Escape Sequence (Hex)	Action
13. 02 08 02 0E	Enable subscript
14. 02 08 02 0F	Disable subscript
15. 02 08 03 0E	Enable underscore
16. 02 08 03 0F	Disable underscore
17. 02 08 04 0E	Enable overstrike
18. 02 08 04 0F	Disable overstrike
19. 02 09 01 02 dd ee 0F	Set pitch dd ee = value of the integral and fractional values of the desired pitch, respectively Supported pitches: 5, 10, 12, 15, 16.5
20. 02 09 02 dd 0E	Select color
21. 02 0A 01 01 dd 0E	Set line-feed spacing and enable auto line feed after carriage return dd = number of lines per inch; must be greater than 00 and not greater than 0F
22. 02 0A 01 01 dd 0F	Set line-feed spacing and disable auto line feed after carriage return dd = number of lines per inch; must be greater than 00 and not greater than 0F
23. 02 0A 0E	Enable auto line feed
24. 02 0A 0F	Disable auto line feed
25. 02 0A dd 0F	Partial line feed 25a. dd = 00 - 1/4 line feed 25b. 02 - 1/2 line feed 25c. 04 - 3/4 line feed
26. 02 0B 01 dd 0F	Set left margin dd = column number of left margin
27. 02 0B 02 0E	Enable proportional spacing
28. 02 0B 02 0F	Disable proportional spacing
29. 02 0C 01 02 00 dd 0F	Set form length to dd lines dd = number of lines per form
30. 02 0C 02 dd 0F	Set form length to dd inches dd = number of inches per form
31. 02 0D 01 cc dd...dd	Enter temporary transparent mode cc = number of bytes to pass transparently dd...dd = the bytes to be passed
32. 02 0D 0C 03 0F	Restore power on defaults

Implementation of Escape Sequence

This section explains in detail how the GPD implements the escape sequences. In general, a given device accepts and acts on those sequences that have meaning for it, and it ignores those sequences that have no meaning for it. All escape sequence bytes are hex values.

1. Execute built-in diagnostics (02 01 02 01 00 0F)

   This sequence is defined for all printers with built-in diagnostic escape sequences. Before the diagnostics start, any data in the buffer is printed and a form feed is generated.

2. Select character font (02 02 dd 0F)

   2a. Default   dd = 00

   2b. Alternate #1   02

   2c. Alternate #2   04

   The new font remains in effect until a new Select Font sequence is received, until a Reset Default sequence is received, or until the printer is powered off and then back on. The exact implementation is device-dependent.

3. Reverse line feed (02 03 0E)

   This sequence causes the platen to be moved backward one line.

4. Clear platen (02 03 0F)

   The purpose of this sequence is to move a single sheet of paper or an envelope from the platen to the receiving bin without feeding a new sheet or envelope into the platen. On devices other than daisy printers, this sequence is ignored.

5. Define the meaning of Control hex(0E) (02 04 dd ee ff gg)

   dd: 00 - overstrike disabled (default)

       02 - overstrike enabled

   ee: 00 - underscore disabled (default)

       04 - underscore enabled

   ff: 00 - emphasized print disabled (default)

       02 - emphasized print enabled

   gg: 0E - turn on attributes until reset or a

       hex(0F) is received, turn on attributes

       again when a Control hex(0E) is received

       0F - turn on attributes upon receipt of a

Control hex(0E); turn off on a Control

hex(0F), carriage return, or reset

When the GPD receives a Control hex(0E), it turns on the attributes associated with the 0E and continues processing as usual. The attributes remain in effect until a condition set by gg above is met. The set of conditions used is determined by the end of the Control hex(0E) definition. If the definition ends with a 0E, the attributes are turned on immediately; if it ends with a 0F, they are not turned on until a Control 0E is received. The default value of hex(0E) and hex(0F) is specified by the following escape sequence:

02 04 00 00 02 0F

6. Horizontal tab to column dd (02 05 01 dd 0F)

dd = number of destination column

This sequence causes the printer to move to column dd of the current line. The printer moves to this column even if it has already passed it.

7. Horizontal tab dd inches and ee quarter inches (02 05 02 dd ee 0F)

dd = number of inches

ee = number of quarter inches

This sequence causes the carriage to move approximately dd inches and ee quarter inches from the current print position. If the carriage moves beyond the defined line length, the sequence is ignored. If the number of characters per inch, or per quarter inch, is not a whole number, the number of characters is rounded to the nearest whole number. The number of quarter inches can be no greater than 3.

8. Select paper tray (02 06 dd 0F)

8a. Rear tray dd = 01

8b. Front tray   02

   Middle tray   03

Upon receipt of this sequence, the current contents of the buffer are printed. The correct tray is then selected. This sequence is for daisy printers only.

9. Select printer (02 07 0E)

For those printers that support it, this sequence has the effect of putting the printer on-line.

10. Deselect printer (02 07 0F)

The Deselect Printer sequence causes all data currently in the buffer to be printed, then disables the printer for receiving data. This sequence is not supported by all printers.

11. Enable superscript (02 08 01 0E)

This sequence causes the printer to enter Superscript mode, if Superscript mode is available. If a given printer does not support superscripting, the platen moves by 1/2 of a reverse line feed. This mode remains enabled until a Restore Defaults sequence or a Disable Superscript sequence is received or, in some cases, until the printer is powered off and then back on.

12. Disable superscript (02 08 01 0F)

    This sequence causes the printer to leave Superscript mode.

13. Enable subscript (02 08 02 0E)

    This sequence causes the printer to enter Subscript mode, if available.
    If a given printer does not support subscripting, the platen moves by 1/2
    of a forward line feed. This mode remains enabled until a Restore De-
    faults sequence or a Disable Subscript sequence is received or until the
    printer is powered off and then back on.

14. Disable subscript (02 08 02 0F)

    This sequence causes the printer to leave Subscript mode.

15. Enable underscore (02 08 03 0E)

    This sequence causes all printable characters that follow it, including
    spaces, to be underscored. Underscoring remains in effect until a Re-
    store Defaults sequence or a Disable Underscore Mode sequence is re-
    ceived.

16. Disable underscore (02 08 03 0F)

    This sequence causes the printer to leave Underscore mode.

17. Enable overstrike (02 08 04 0E)

    This sequence causes all printable characters that follow it, including
    spaces, to be overstruck. Overstriking remains in effect until a Restore
    Defaults sequence or a Disable Overstrike Mode sequence is received.

18. Disable overstrike (02 08 04 0F)

    This sequence causes the printer to leave Overstrike mode.

19. Set pitch (02 09 01 02 dd ee 0F)

        dd = value of the integral pitch

        ee = value of the fractional pitch

    pitches supported: 5, 10, 12, 15, 16.5

    This sequence selects the specified pitch. The selected pitch remains in
    effect until the occurrence of another Select Pitch sequence or Reset
    Defaults sequence, or until the device is powered off and on. The default
    pitch is 10 characters to the inch. Any pitch setting not supported by
    the device is ignored.

20. Select color (02 09 02 dd 0F)

    This sequence causes the printer to use the specified color. dd is a
    1-byte hex value that specifies which of the 256 possible colors is to be
    selected. The mapping between hex values and colors is printer-depend-
    ent, as is the number of different colors supported.

21. Set line-feed spacing and enable auto line feed after carriage return (02 0A 01 01 dd 0E)

> dd = number of lines per inch; must be greater
>
> than 00 and not greater than 0F

This sequence sets the line-feed size and enables auto line feed after a carriage return.

22. Set line-feed spacing and disable auto line feed after carriage return (02 0A 01 01 dd 0F)

This sequence sets the line-feed size and disables auto line feed after a carriage return.

23. Enable auto line feed (02 0A 0E)

This sequence causes the GPD to send a line feed to the printer immediately after each carriage return. This is the default for the driver.

24. Disable auto line feed (02 0A 0F)

This sequence prevents a line feed from being sent to the printer after each carriage return.

25. Partial line feed (02 0A dd 0F)

> 25a. 1/4 feed dd = 00
>
> 25b. 1/2 feed   02
>
> 25c. 3/4 feed   04

This sequence generates partial line feeds in increments of 1/4, 1/2, and 3/4 of the currently selected, full line-feed increment. Before execution of the partial line feed, this sequence suppresses auto line feed to avoid unwanted extra line feeds. A given printer may not support all these spacings.

26. Set left margin (02 0B 01 dd 0F)

This sequence sets the left margin to column dd. After execution of this sequence, the carriage location is at the left margin of the current line.

27. Enable proportional spacing (02 0B 02 0E)

This sequence enables Proportional Spacing mode for those printers that support it. If a printer does not support proportional spacing, the sequence is ignored.

28. Disable proportional spacing (02 0B 02 0F)

This sequence disables the proportional spacing mode for those printers that support it. If a printer does not support it, the sequence is ignored.

29. Set form length in lines (02 0C 01 02 00 dd 0F)

> dd = number of lines per form

This sequence sets the form length. You should not send this code unless it is directly preceded by powering on the printer, a Reset Defaults sequence, or a form feed.

30. Set form length in inches (02 0C 02 dd 0F)

    This sequence sets the form length to dd inches, where dd is less than or equal to 16. Do not send this code unless it is directly preceded by powering on the printer, a Reset Defaults sequence, or a form feed.

31. Enter temporary Transparent mode (02 0D 01 cc dd...dd)

    cc = number of bytes to pass to the printer

    dd = the bytes to be passed

    This sequence causes the driver to enter Transparent mode for the specified number of bytes. At most, 256 bytes may be passed to the printer in any one string. The bytes passed to the printer by this sequence are not modified in any way.

32. Restore power-on defaults (02 0D 0C 03 0F)

    This sequence resets all of the power-on defaults of the printer to their original values. It also resets the driver to its default values. Any data in the buffer when this command is received is printed before the command is executed. If a partition is using the GPD with more than one printer, it should send this sequence to each printer before sending a print request whenever it uses a different printer.

Nonsupported Generalized Printer Driver Functions

The following functions are not supported by the PM-010 Printer:

- Proportional spacing
- 56 pitch
- Select font
- Select paper tray
- Set left margin
- Execute built-in diagnostics
- Clear platen
- Clear buffer
- Deselect printer
- 1/4, 1/2, and 3/4 line feed
- Select color
- Reverse line feed
- Select printer

The Vertical Tab function is supported, but it generates a carriage return during processing.

Note: For the PM-010 Printer, 12, 15, and 16.5 pitch all produce condensed output (approximately 15.5 pitch).

The following functions are not supported by the PM-016 Printer:

- 5 pitch
- Select font #2
- Select paper tray
- Execute built-in diagnostics
- Clear platen
- Clear buffer
- 1/4, 1/2, and 3/4 line feed
- Deselect printer
- Select color
- Reverse line feed
- Select printer

The Vertical Tab function is supported, but it generates a carriage return during processing.

Note: For the PM-016 Printer, 12, 15, and 16.5 pitch all produce condensed output (approximately 15.5 pitch).

The following functions are not supported by the PM-017 Printer:

- 5 pitch
- Select paper tray
- Clear platen
- Deselect printer
- 1/4, 1/2, and 3/4 line feed
- Select color
- Reverse line feed
- Select printer

Note: For the PM-017 Printer, 15 and 16.5 pitch both produce 16 pitch output.

The following functions are not supported by the PM-018 Printer:

- Select font
- Clear buffer
- 1/4, 1/2, and 3/4 line feed
- Select color
- Reverse line feed

The Emphasized Print function is deactivated when the printer receives a carriage return. This is in addition to the normal command to disable it. Also, the greater than (>), less than (<), and backslash (\ ) characters are printed as an underscored space.

The following functions are not supported by the LCS-15 Laser printer:

- 5 pitch
- Select paper tray
- Deselect printer
- 1/4, 1/2, and 3/4 line feed
- Clear buffer
- Margin – cannot reset left margin left of the last place the margin was set
- Proportional spacing

Note: This GPD works only with 2200 Word Processing Release 2.5.

The GPD drops the last line of each page in DP mode unless the following program (where XXX is the printer address) is run before each job:

```
10 SELECT DRIVER XXX OFF
   SELECT PRINT XXX
20 PRINT HEX (OA 1B 54)
30 FOR A = 1 TO 62
40 PRINT HEX (OA):  NEXT A
50 PRINT HEX (1B 4C OC)
60 SELECT DRIVER XXX
   SELECT PRINT 005
```

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