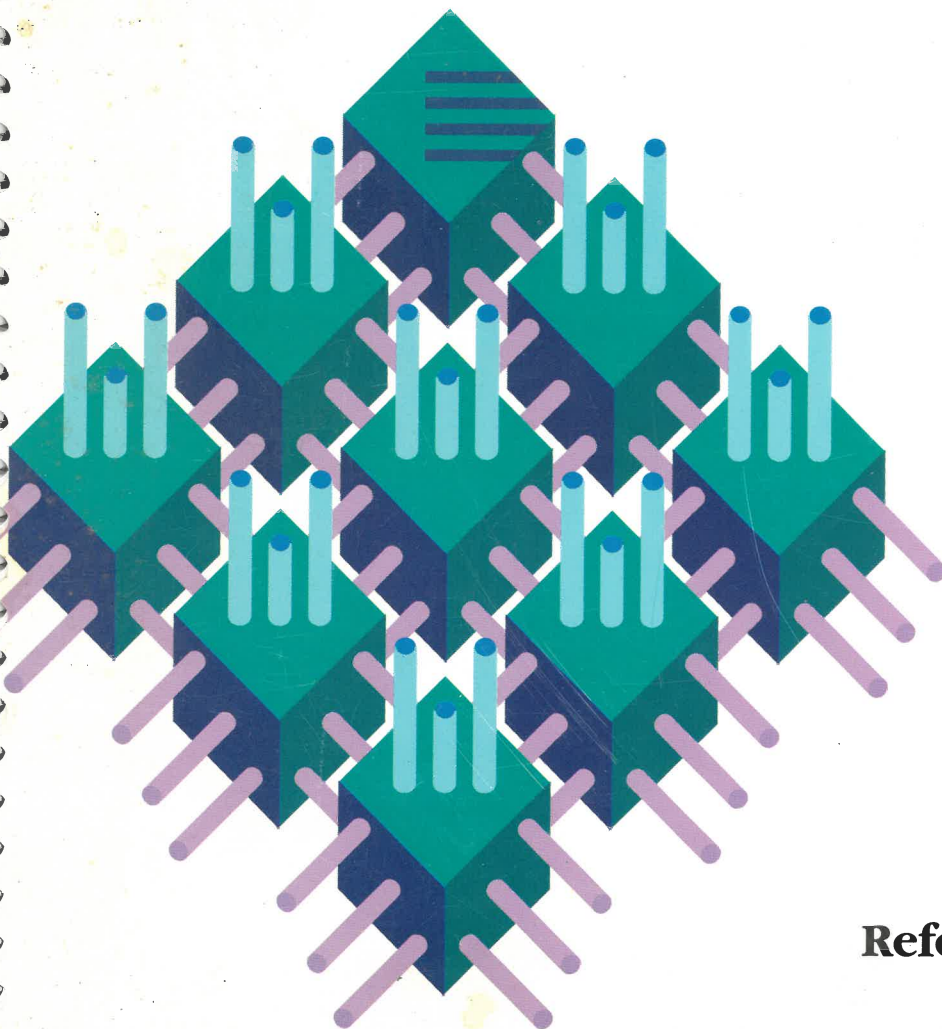




# SIMMply-RAM™

For the PS/2-16



**Reference Manual**





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**For the PS/2-16**

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## Introduction

Your SIMMply-RAM™ for the PS/2-16 lets you add up to 32 MB of memory to your PS/2-16 Model 50 series or 60 series computer or any Micro-Channel compatible system. The Productivity software supplied with your SIMMply-RAM PS/2-16 provides memory management services and productivity utilities for creating RAM disks, disk caching, and print spooling.

The diskette supplied with your SIMMply-RAM PS/2-16 contains the following:

- Configuration information
- The INSTALL program
- LIM 4.0 EMS memory manager
- Productivity utilities (RAM disk, disk cache, and print spooler utilities)

Refer to the *SIMMply-RAM PS/2-16 Quick Start Guide* for instructions about

- Installing the SIMMply-RAM board
- Configuring the system
- Running the INSTALL program

**NOTE:** You do NOT need to run the INSTALL program if you are not using the memory management software or the productivity utilities. If you want all of the SIMMply-RAM memory configured as extended memory, you can begin using the memory after you complete the system configuration.

This reference manual provides more detailed information regarding the use of extended and expanded memory and the productivity software provided with your SIMMply-RAM board. This manual provides detailed information on how to manually install the productivity software, including installation options that can be used to resolve hardware and software conflicts.

## Hardware and Software Requirements

The following hardware and software elements are required for SIMMply-RAM operation:

- PS/2 Model 50 series(50, 50Z, 55, ect.) or 60 series (60, 65, ect.) computer or other 16-bit Micro Channel system.
- DOS 2.0 and above or other PS/2-compatible operating system (OS/2, Xenix, and so forth)



## Notation

The following explanations apply to the notation used in this manual.

- **Boldface** shows the information that you enter.
- **Square brackets ([])** mean that the item is optional — you can include it or not as you choose. The brackets are not entered.
- **Angle brackets (<>)** denote a specific key. When you are to press the key, the entry is in boldface type. For example, **<Enter>** instructs you to press the Enter key.
- Combinations of keys that you press at the same time are shown as follows:

**<Alt><M>**

## Abbreviations and Acronyms

The following lists explain acronyms and abbreviations used in this manual and in the *Quick Start Guide*.

<b>Acronym</b>	<b>Meaning</b>
BIOS	basic input/output system
EMS	expanded memory specification
LIM	Lotus-Intel-Microsoft
RAM	random-access memory
ROM	read-only memory
SIMM	single-inline-memory module
<b>Abbreviations</b>	<b>Meaning</b>
bps	bits-per-second
KB	kilobyte
lpi	lines-per-inch
MB	megabyte
MHz	megaHertz
ns	nanosecond

## Related Documents

For additional technical information about expanded memory, refer to the Lotus™/Intel™/MicroSoft™ Expanded Memory Specification (LIM EMS), version 4.0.

## **README File**

Before you begin the installation, check the SIMMply-RAM diskette to see if a README file is listed in the directory. If a README file is on the diskette, it contains last-minute information that is not contained in the documentation. You should read that information first.

*To Display the README File On the Screen:* Insert the SIMMply-RAM diskette in drive A and type:

**C>TYPE A:README.DOC<Enter>**

*To Print the README File:* Insert the SIMMply-RAM diskette in drive A and type:

**C>PRINT A:README.DOC<Enter>**

A prompt similar to the following is then displayed:

Name of list device [PRN]:

Type in the printer port or printer device name that your system uses for printing (for example, PRN, LPT1, COM2, and so forth); then, press <Enter>.

## Understanding Memory types

Regardless of which type of installation you choose, one of the primary concerns for DOS systems is *allocating* the memory in the system for a specific type of memory — that is, expanded, extended, or conventional system memory.

To effectively use the SIMMply-RAM memory, you need to understand the types of memory and their use. This section is a simple explanation of the PS/2 memory types and memory mapping.

The three types of memory that you can allocate from the total memory in your system are:

### Memory Types

- **Conventional system memory:** This type of memory is the lowest 640 KB of RAM; it is reserved for programs and data. Directly addressable by DOS, conventional system memory is addressed as a continuous sequence of addresses.

This type of memory is filled on the PS/2 system board, and the SIMMply-RAM memory is therefore not usually used for conventional memory. However, SIMMply-RAM provides a Backfill option, that disables the system board memory and allows EMS memory to be used as the conventional system memory. (See the section "Backfill Option".)

- **Extended memory:** This type of memory is the memory above the 640 KB of conventional system memory that is addressed as a continuous sequence of addresses. Because the PS/2 typically comes with at least 1-MB of RAM, on the system board, a minimum 384 KB of extended memory is built in.
- **Expanded memory:** This type of memory is memory is divided into 16-KB segments (pages) that can be swapped in and out of DOS-addressable memory by DOS software that supports LIM 3.2 or 4.0 EMS. Expanded memory allows many DOS applications to go beyond the 640 KB memory limit imposed by DOS.

## Memory Addressing

Each byte of memory in your computer is identified to the computer by an address. The first megabyte of RAM in the computer is addressed sequentially. That 1 MB is called DOS addressable and consists of:

- The first 640 KB of RAM (conventional system memory), which is used to store programs and data.
- The next 384 KB of RAM (extended memory) which is called reserved high memory and is used to store the video RAM, the basic input/output system (BIOS), and other system-related functions (like I/O addresses for add-in boards).

This 384 KB is a *linear* extension (that is, the addresses are sequential) to the 640 KB of conventional system memory.

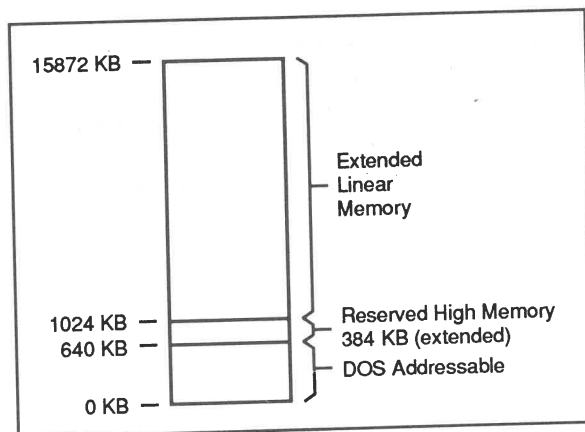
Thus, the conventional system memory and the reserved high memory together are referred to as linear memory.

When sequentially addressed RAM (extended memory) is added above that first 1 MB, it is also linear memory.

You can add up to 15.5 MB of extended memory, and it can be directly addressed by multitasking operating systems like OS/2 and Xenix or network file server systems such as Novell Netware.

Because MS-DOS can directly address only conventional memory (that is, the first 1 MB), extended memory cannot be used directly by DOS. However, DOS extender software is available that allows DOS to use extended memory for some applications and some DOS application software that uses extended is available.

Figure 2-1. Linear Memory Addressing Scheme.



The most popular method for enabling DOS to go beyond the 640-KB limit is with expanded memory. Expanded or paged memory is memory above the lower 1 MB of DOS addressable memory (up to 32 MB) that is divided into 16-KB pages, which in turn, can be brought in and out of open spaces (frames) within the DOS addressable memory.

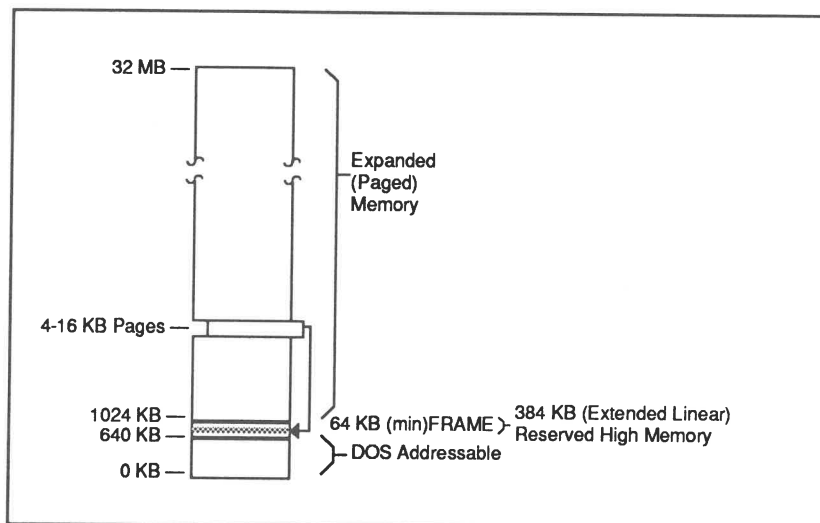
These pages of expanded memory can be swapped in and out of DOS-addressable memory from different areas within the expanded memory. Expanded memory cannot be directly addressed by sequential addresses. Instead, a memory manager program is required to handle the swapping of pages in and out of DOS-addressable memory space.

More than one 16-KB page of expanded memory can be swapped into the frame. The EMS 4.0 requirement is for a minimum frame size of 64 KB. Therefore, minimally, four 16-KB pages are swapped into and out of a 64-KB frame within reserved high memory.

The EMS Memory Manager is a device driver supplied with the SIMMply-RAM board whose purpose is to manage the memory specified to be expanded (paged) memory.

The EMS Memory Manager is installed at boot time through a device specification in the CONFIG.SYS file. Once installed, the EMS Memory Manager works in conjunction with DOS and application software that supports EMS memory to go beyond the conventional DOS 640 KB memory barrier.

**Figure 2-2. Expanded (Paged) Memory Scheme.**



To use EMS memory, your software application must be able to take advantage of expanded memory. Appendix B lists numerous programs that are designed to use expanded memory.

## Software Installation

This section provides details about the installation of the software that are beyond the information given in the *Quick Start Guide*. If you use the INSTALL program, it automatically writes the device specification lines and command lines into the CONFIG.SYS and AUTOEXEC.BAT files to install and configure the software. This section explains the entries created by the INSTALL program.

This section also explains the *manual* installation of the SIMMply-RAM software — the EMS Memory Manager and each of the Productivity Utilities (RAM disk utility, print spooler, and disk caching utility). These pieces of software are manually installed by creating or adding entries to the CONFIG.SYS or AUTOEXEC.BAT files. You can install the Memory Manager and RAM disk utility by adding device specification lines to the CONFIG.SYS file. You can install the print spooler and disk cache by a command line which you can add to your AUTOEXEC.BAT file so they execute automatically when you boot the system.

Unless you have a specific technical reason or prefer to manually enter the device specifications and command lines, using the INSTALL program is recommended. Most users can use the INSTALL program to quickly and easily install the software. Technically oriented users or system developers may need to use the manual installations in order to set up options for large or complex systems.

## Running INSTALL

If you want to quickly and easily complete the software installation, follow the directions in the Quick Start Guide for running the INSTALL program. That program provides a menu from which you can choose to install the Memory Manager, RAM disks, the print spooler, and disk caching.

The INSTALL program copies the files from the SIMMply-RAM diskette that you need to use the software. Those files are not actually copied to the fixed disk until you exit the INSTALL program by selecting the "Save Configuration" choice from the menu.

Also, the appropriate entries into the CONFIG.SYS and AUTOEXEC.BAT files are not written until you exit the INSTALL program by saving the configuration. Before the changes are made to those two files, the INSTALL program backs them up as CONFIG.BAK and AUTOEXEC.BAK in case you ever need to recover the original files.

## Copy the Files

The automatic copying of files from the SIMMply-RAM diskette to the fixed disk is provided through the INSTALL program. You specify the directory into which they should be copied and when you exit the INSTALL program, the files are copied to that directory.

The INSTALL program itself is not copied to the fixed disk. If you need to run INSTALL at a later time, you must use the SIMMply-RAM diskette or copy the INSTALL program to your fixed disk using the DOS COPY command.

If you do not use the INSTALL program to copy the files from the SIMMply-RAM diskette to the fixed disk, you should manually copy the files using the DOS COPY command. The following sample command would copy the files on the SIMMply-diskette to a directory on drive C named \SIMMPLY.

```
C>COPY A:*.* C:\SIMMPLY<Enter>
```

## Setup Memory Configuration

The Setup Memory Configuration portion of the INSTALL program lets you set up the options for the Memory Manager. The screen that is displayed from this menu choice allows you to divide the memory into extended, expanded, or system memory. When you exit the INSTALL program, saving the configuration choices, the specifications you set up for the memory allocation are used to create a device specification in the CONFIG.SYS file contained in the root directory of your system.

The line that is added to the CONFIG.SYS file using this capability specifies the size and types of memory you allocated. A typical line in the CONFIG.SYS file resulting from the INSTALL Setup Memory Configuration, with 1 MB of memory as expanded, is:

## Allocate Memory

The top portion of the Setup Memory Configuration screen actually provides fields into which you type the amount of memory to be allocated for each type of memory. These choices affect the line that is created for the CONFIG.SYS file.

## Backfill Option

The Backfill option shown on the Setup Memory Configuration screen in the INSTALL program lets you disable the memory on the system board and use paged memory for the conventional system memory. If you select the Backfill option, the device specification contains that option.

If you choose to enable Backfill (disable the system board memory), the memory on the system board is not used at all. Instead, 640 KB of expanded memory is automatically allocated as conventional system memory, i.e. it is used to *backfill* conventional memory.

Conventional system memory on the board is linear memory that cannot be swapped out by paging. However, some portions of the system memory may not be used and could be swapped out if it were paged. By disabling the memory on the system board, the Memory Manager can take any unused portion of conventional memory for paging.



If you enable Backfill, you will lose the use of the memory on the system board. Because the PS/2 Models 70 and 80 are 32-bit machines, backfill is NOT recommended.

You should only choose to enable Backfill to enhance the operation of certain programs that can take advantage of mappable conventional memory, like Windows 2.0 and DESQview. Mappable conventional memory is used only by operating systems and operating environments. It is not used by ordinary applications programs.

If you select the Backfill option, a sample line created for the CONFIG.SYS file is as follows (assumes 1 MB of expanded memory):

**device=mm.sys/M=1024/B**

## **Manually Installing the Memory Manager**

When you manually install the Memory Manager as compared to using the INSTALL program, you add the device specification line to the CONFIG.SYS file that sets up the Memory Manager. If you have a specific technical requirement that requires other than the default settings for one or more of the options of the Memory Manager, you must create the device specification line and add it to the CONFIG.SYS file.

For example, your system may use a video controller card that requires specific memory locations in reserved high memory. In order to prevent the Memory Manager from using those locations in its automatic scanning for available space, you can use the Xclude option to exclude the memory address range that your video controller uses.

Also, software developers and other technically oriented users may need to specifically set up the Memory Manager based on their system use and complexity.

The device specification for the Memory Manager must be the first driver specification in the CONFIG.SYS file and must follow the syntax explained in this section. Placing the Memory Manager as the first device driver in that file allows other device drivers, like the RAM disk driver, to use the Memory Manager's services.

The SIMMply-RAM EMS Memory Manager conforms to version 4.0 of the LIM expanded memory specification, which is upward compatible with version 3.20 and will run programs written for that version.

Once the Memory Manager is loaded, it determines the amount of expanded memory available to the system and performs any initialization necessary.



## Device Specification Syntax

The syntax for the device specification of the Memory Manager that you add to the CONFIG.SYS file is as follows:

```
device=mm.sys[/Handles=nnn][/Contexts=nn][/Depth=nn][/Start=xxx]
[/Xclude=xxx-xxxx][/L=xxx-xxxx=][/Backfill][/Memory=nnnn][/Test][/Ems]
```

The following rules apply to the syntax above:

- Any numeric parameters for the options should be specified in decimal unless noted in the following explanations of the options.
- Memory sizes should be specified in K (1024) bytes without the K on the end of the number. For example, 32,767 would be simply 32.
- The parameters enclosed in square brackets ([]) are optional.
- Only the first character of the parameter is significant. For example, "/D=" may be used for "/DEPTH=".
- If a parameter is not specified, a default value is automatically used.

The parameters and their defaults are described in the following subsections. These parameters should only be used if you have a technical understanding of EMS memory operation. For additional information, refer to the LIM EMS 4.0 Specification.

### Handles=nnn

The Handles=nnnn parameter specifies the number of handles that are available for programs that use expanded memory. A *handle* is a value that is assigned to identify a block of memory requested by an application program. The default for this parameter is 255, the maximum number allowed by the LIM EMS. The minimum number of handles that can be allocated is 3.

### Contexts=nn

The Contexts=nnn parameter specifies the number of contexts that can be saved by processes using expanded memory.

The default for this parameter is the number equal to the number of handles allocated. The maximum number of contexts is 255; the minimum, is 3.

### Depth=nn

The Depth=nn parameter specifies the number of consecutive contexts that can be saved for a given handle before a restore must be initiated.

The default for this parameter is 1. The parameter may be set to a value from 1 to 32.

**Start=xxxx**

The Start=xxxx parameter specifies the starting address for the standard 64 KB expanded memory page frame. When this parameter is not specified, the Memory Manager automatically locates a free 64-KB block of memory for mapping. When this parameter is specified, the starting address overrides the automatic mapping and begins the page frame at the address specified.

The number for this parameter should be a hexadecimal segment address on a 16-KB boundary where no ROM or RAM resides. Also, the address should not overlap with any expansion boards. In some cases, this parameter might be useful in enabling expanded memory to operate with some network or communication expansion products.

**Xclude=xxxx-  
xxxx**

The Xclude=xxxx-xxxx parameter specifies a range of addresses which should NOT be used for expanded memory mapping. This parameter allows you to specifically exclude ranges of addresses that might otherwise be included in the automatic selection process of the Memory Manager. The Memory Manager automatically excludes areas known to contain ROMs or video RAM.

You might need to use the Xclude parameter because the location (address) of a specific expansion board resides in the range of addresses that the Memory Manager uses for automatic mapping selection. You may specify multiple exclude ranges; the ranges may overlap.

The address range specified for this parameter should be hexadecimal segment addresses.

**L=xxxx-xxxx**

The L=xxxx-xxxx parameter specifies a range of addresses that should always be used for expanded memory mapping. This parameter allows you to specifically include ranges of addresses that might otherwise be excluded in the automatic selection process of the Memory Manager. The Memory Manager automatically excludes areas known to contain ROMs or video RAM so it will not overwrite information stored for those devices.

You may specify multiple include ranges; the ranges may overlap.

The address range specified for this parameter should be hexadecimal segment addresses.

The Backfill parameter specifies that the conventional memory on the system board is to be replaced with expanded (paged) memory. When this parameter is specified, the system board memory is disabled. This parameter provides mappable conventional memory that allows some multitasking programs such as Windows 2.0 and later or DESQview to run more than one program at a time.

When this parameter is specified, the of memory on the system board is not used. See the previous subsection regarding the Backfill option of the INSTALL program.

**Memory=nnnn**

The Memory=nnnn parameter specifies the amount of SIMMply-RAM memory which is to be used as expanded (paged) memory. If this parameter is not included in the device specification line, all of the available memory above the 1 MB on the system board is allocated as expanded.

**Test**

The Test parameter specifies that the memory should be tested on power-up. If this parameter is not included, memory testing during initialization is not specified.

Usually, this parameter is not needed in the device specification line because the computer BIOS automatically tests the memory at power-up.

**EMS**

The EMS parameter specifies that ONLY the standard 64-KB expanded memory page frame should be provided.

**USING CHKMEM**

The SIMMply-RAM software includes a utility named CHKMEM, which displays the amount of allocated system and expanded memory so you can verify the memory configuration. To use this utility, type the following:

**C>CHKMEM<Enter>**

An optional parameter **/A**, when included, causes all of the allocated handles to be displayed with their respective names and sizes.

This utility lets you quickly review the memory allocations that you've set up. You can use it when you think you want to change the expanded memory allocation or when you want to check to be sure the memory is allocated as you believe.

**Setup RAM Drives**

The INSTALL program provides a Main Menu choice "Setup RAM Drives". When you complete the fields on the screen to set up one or more RAM drives, the device specification line for the CONFIG.SYS file is automatically created.

A RAM drive uses a specified type and amount of memory to emulate a disk drive. You can use that disk created in memory much as you would any other disk drive in your system. The INSTALL program allows you to create up to eight RAM drives.

When you create a RAM drive, DOS recognizes that disk as another device in the system and assigns it a drive designator (like, drive D). The drive identifications are automatically assigned by DOS based on the number and type of other drives in the computer. It assigns the next sequential drive designator available. For example, in a PS/2 with two diskette drives and a fixed disk, the first RAM disk would be drive D.



## Installing A RAM Drive

When you create a RAM disk, you must choose the type of memory to allocate for it — expanded, extended, or system. The amount of memory and type of memory you specify are then reserved and can only be used to emulate a disk drive. The screen displayed in response to the “Setup RAM Disks” choice on the Main Menu allows you to specify the type and amount of memory for up to eight RAM drives.

One or two RAM disks are usually sufficient for most users.

Once you configure the RAM disks and save the new configuration information, the INSTALL program automatically creates the device specification line that is added to the CONFIG.SYS file. A sample device specification for one RAM disk made up of 360 KB of expanded memory is:

```
device=rd.sys 360/V
```

You can also type the device specification directly in the CONFIG.SYS file.

## Manually Installing the RAM Drive

When you manually install the RAM disk utility, you add a device specification line to the CONFIG.SYS file. That line sets up the size and memory type for up to eight RAM disks.

## Device Specification Syntax

The syntax for the device specification of the RAM disk driver that you add to the CONFIG.SYS file is as follows:

```
device=rd.sys nnnn/t[,nnnn/t]...[,nnnn/t]
```

The following rules apply to the syntax above:

- Any numeric parameters for the options should be specified in decimal unless noted in the following explanations of the options.
- Memory sizes should be specified in K (1024) bytes without the K on the end of the number. For example, 32,767 would be simply 32.
- The parameters enclosed in square brackets ([ ]) are optional.
- Only the first character of the parameter is significant if the parameter is a word.
- If a parameter is not specified, a default value is automatically used.

The parameters are described in the following subsections.

### nnnn

The nnnn parameter specifies the size of the RAM drive to be created. The size should be specified in KB (1024).

/t

The /t specifies the type of memory to use for the RAM drive. Valid values are:

V for expanded memory

E for extended memory

S for system memory

The square brackets show the optional elements required for specifying more than one RAM drive. When multiple RAM drives are specified, each size and type are separated by commas (.). The device specification for RAM disks should be placed after the device specification for the Memory Manager in the CONFIG.SYS file. The following line is an example of a device specification that configures two RAM disks — one of 360 KB in extended memory and one of 1024 KB in expanded memory.

```
device=rd.sys 360/E,1024/V
```

The drive letters associated with RAM drives depend on the number of other drives (floppies and fixed) in the system and are assigned sequentially by DOS. The two RAM disks created by the above specification, for example, would be drive D and E if they were added to a system containing two diskette drives and one fixed disk.

## Setup Spooler Options

The print spooler is a resident program that uses system, expanded, or extended memory to store data sent to your system printer port (usually LPT1) from an application and output it to the same or another device (LPT1-3 or COM1-COM4) as the device is ready to accept the data..

When you create a print spooler, you reserve a type and amount of memory into which jobs sent to the printer are temporarily stored pending use of the printer. The stored print jobs are printed in the order received as the printer completes the previous print job. Thus, you can queue several printing tasks up to print while you continue doing other work.

The spooler intercepts data that is being sent to the printer and saves it in the buffer. The data is then printed from the buffer to the printer at the rate at which the printer can accept it. This buffering allows the application to transfer print data to the spooler buffer very quickly although the printer operates much more slowly.

Normally, the spooler saves the data to be printed to LPT1, which is referred to as the *input or capture device*. You configure your applications program to output to LPT1, regardless of which port the printer is physically connected. You specify the *output device* or device to which the data are printed (that is, the physical port) from the spooler buffer when you run the INSTALL program.

Using the INSTALL program, the "Setup Spooler Options" choice from the Main Menu prompts you to enter the appropriate information to create the spooler.

## Installing the Print Spooler

Once you enter the information requested on the screen for setting the spooler options and save the new configuration information, the INSTALL program adds an appropriate command line to the AUTOEXEC.BAT file. An example of a command line to set up a spooler of 360 KB in *expanded* memory with the output device of LPT1 is:

```
ptls 360/V
```

The output selection field on the screen allows you to specify LPT1 through LPT3 or COM1 through COM4. The default communications settings for a COM port (9600 bps, even parity, 8-bits with 1 stop bit) are used by the INSTALL program unless you change them. These settings are displayed in brackets below the output selection field. To change the settings, use the arrow keys to move to the setting to change. Then use the <F5> and <F6> keys to scroll through the valid settings to make your selection.

## Manually Installing the Print Spooler

The manual method of installing the print spooler (PTLS.COM) requires that you either:

- Type the command line into the AUTOEXEC.BAT file so the program is executed each time you boot the system, or
- Enter a DOS command line to execute the print spooler when you want to run it.

By manually inserting the command line in the AUTOEXEC.BAT or typing a DOS command line, you can set up different options for the print spooler. The command line syntax provides options for configuring the output device as a COM port.

## Command Line Syntax

The syntax for the command line to load and execute the print spooler is shown below.

```
ptls[nnnn][device][/]
```

This command line may be added to the AUTOEXEC.BAT file or entered from DOS. If you enter the command line from DOS, the spooler is only set up for the session currently in progress. If you reboot the system, you must again enter the command line to set up the spooler.

The following rules apply to the syntax above:

- Any numeric parameters for the options should be specified in decimal unless noted in the following explanations of the options.
- Memory sizes should be specified in K (1024) bytes without the K on the end of the number. For example, 32,767 would be simply 32.
- The parameters enclosed in square brackets ([]) are optional.
- Only the first character of the parameter is significant if the parameter is a word.
- If a parameter is not specified, a default value is automatically used.

The parameters are described in the following subsections.

**nnnn**

The nnnn parameter specifies the size of the spooler buffer. The size should be specified in KB (1024). The size specified may be as large as the available memory of the type selected. The default value for the size is 64 KB.

/device

The optional /device parameter specifies the output device (port) to which the data stored in the buffer are printed. The possible values for this parameter are: LPT1, LPT2, LPT3, COM1, COM2, COM3, or COM4. If this parameter is not specified on the commands line, the default output device, LPT1, is used.

If a COM port is specified as the output device, additional values may be specified for the communication parameters based on the following syntax:

COMn:baud,p,b,s

WHERE:

*n* is the port number, 1-4, followed by a colon (:).

baud is the communications rate in bps with the allowable values being: 9600, 4800, 2400, 1200, 600, 300, 150, or 100.

*p* is the parity specification with the allowable values of N, E, or O which represent no parity, even parity, or odd parity, respectively.

*b* is the number of bits with allowable values of 7 or 8.

*s* is the number of stop bits with allowable values of 1 or 2.

**/t**

The optional /t parameter specifies the type of memory to use for the print spooler buffer. If this parameter is not present, the default, expanded memory, is used. Valid values are:

V for expanded memory

E for extended memory

S for system memory

**NOTE:** The print spooler should be loaded before any other programs that use the printer interrupts (14 or 17).

**Example of  
Command Line**

The following example loads the print spooler setting up a buffer of 128 KB of expanded memory. The output device is COM2, and the communication parameters are set up as a Baud rate of 4800, no parity, 7 bits, and 2 stop bits.

**ptls 128/COM2:4800,N,7,2/V**



## Print Spooler Setup Program

Once the Print Spooler is installed, you can control it via a “pop-up” Control Panel (Printtools Main Menu) which offers you several commands and functions. The pop-up Control Panel is activated at any time when you press **<Alt><PrtSc>**. A menu-driven setup program PTLSSSET.COM is also provided with the SIMMply-RAM Productivity Utilities. This program lets you change the printer configuration and set up the Control Panel. Through it, you can change the “hot-key” definition. See Section 5 for information about using the Control Panel (Printtools Main Menu) and the PTLSSSET.COM setup program.

## Setup Caching Options

The disk caching program buffers disk reads or reads and writes in a memory buffer. It is a resident program that, when loaded, intercepts disk requests and places them in the cache (the buffer) of either system, expanded, or extended memory. Using the INSTALL program “Setup Caching Options” choice from the Main Menu, lets you set up a disk cache.

Disk caching can substantially increase the performance of fixed disks. This increased performance is especially beneficial for “disk-bound” applications like databases. Because the reads are accessed from the memory, the speed of executing them in concert with the fixed is enhanced.

When you complete the screen of information for setting up a disk cache and then save the new configuration information, the INSTALL program adds a command line in the AUTOEXEC.BAT file so the disk cache is set up each time you boot the computer.

## Installing Disk Caching

The information you enter on the screen for installing disk caching sets up the type and amount of memory for the disk cache. It also lets you choose to enable write caching. When you complete these selections and save the configuration information, the command line inserted in the AUTOEXEC.BAT file by the INSTALL program uses the default settings for all options not configured by the INSTALL program.

A sample of the command line created by the INSTALL program which sets up a disk cache of 384 KB in *expanded* memory with *write caching enabled* is:

**cache 384/V/W**

For most users, using the automatic capabilities of the INSTALL program are sufficient. However, technically oriented users or users who are running applications, like databases, almost exclusively, may choose to manually install disk caching. Manually installing a disk cache lets you specify additional parameters that are not provided through the INSTALL program installation.





## Disk Caching

Manually installing the CACHE.COM program requires that you either:

- Type the command line into the AUTOEXEC.BAT file so the program is executed each time you boot the system, or
- Enter a DOS command line to execute the disk caching program when you want to run it.

Because the command line syntax provides for parameters in addition to those offered through the INSTALL program, technically oriented users and those who have special needs may want to use the manual installation.

## Command Line Syntax

The syntax for the command line that loads the disk caching program is as follows:

**cache [nnnn][/t]/R[/W][/W=nnn]/B=nn[/Nd]/P=nn[/l]/L=nn**

The following rules apply to the syntax above:

- Any numeric parameters for the options should be specified in decimal unless noted in the following explanations of the options.
- Memory sizes should be specified in K (1024) bytes without the K on the end of the number. For example, 32,767 would be simply 32.
- The parameters enclosed in square brackets ([]) are optional.
- If a parameter is not specified, a default value is automatically used.

The parameters are described in the following subsections.

### nnnn

The nnnn parameter specifies the size of the cache buffer in KB (1024).

### t

The t parameter specifies the type of memory to use for the disk cache buffer. Valid values are:

- V for expanded memory
- E for extended memory
- S for system memory

### R

The R parameter specifies that the cache supports only read caching. Read caching is the default condition. If you do not specify either /W or /R in the command line, /R (read caching) is assumed by default.

### W

The W parameter specifies that the cache supports both read and write caching. Unless this parameter is present, only read caching is enabled.

### W=nnn

The W=nnn parameter specifies that the cache supports both read and write caching. It also specifies that the maximum number of writes that can be stored and written to disk later is equal to the nnn parameter specified. If this parameter is not present with the number of writes to be deferred, 100 writes are allowed.

**B=nn**

The B=nn parameter specifies the number of sectors per logical cache block. The block size determines the number of sectors read each time data is saved in the cache.

The allowable values are: 1, 2, 4, 8, or 16. The default value is 2.

Depending on the data being read, different values may affect the speed of the cache.

**Nd**

The Nd parameter specifies a physical fixed disk that should NOT be cached. Usually, all physical drives in the system are cached. However, the Nd parameter can be used to explicitly inhibit caching on specific drives.

The *d* is a drive number, like 0, 1, and so forth. For example, the parameter "/N1" the command line would provide caching on physical drive 0 but would not allow caching on physical drive 1. The cache program saves data on physical drives rather than on logical drives (A, B, C, and so forth). A single physical drive may be divided into multiple logical drives.

**P=nn**

The P=nn parameter specifies the size of the preread buffer (in number of 512-byte sectors). The buffer size of the preread buffer must be at least as large as the value set in buffer size (B=nn)

**I**

The I parameter specifies that extended memory transfers be done in small blocks to allow for high speed interrupts, such as a communications device. The default for extended memory transfers is large blocks, which may interfere with fast interrupts.

**L=nn**

The L=nn parameter specifies the size of the transfer limit. If a disk transfer is larger than the transfer limit, it is not cached.

Providing this limit, prevents cache "thrashing" by large programs, which would use large portions of the cache memory. Thrashing is excess disk activity when the reading and writing heads move back and forth. The limit also reserves the cache for smaller transfers.

The default transfer limit is 24 sectors.

**Example of  
Command Line**

The following example loads the disk caching program setting up a buffer of 384 KB of expanded memory. Writes are to be cached as well as reads; the maximum number of writes to be stored is 20. The transfer limit is set to 36 sectors.

**cache 384/V/W=20/L=36**

## Write Caching

If write caching is enabled when the cache is loaded, data written to the cache are saved and written when the computer and disk are not busy doing I/O. Thus, an application program may write to the same sector many times before that sector is written to the physical disk.

Once an application program completes its reading and writing operations, the cache waits for about two seconds and then flushes its written buffers. These buffers are written in background mode while the application continues to operate.

Appropriately 10 blocks per second are written by the cache; thus, it takes about 10 seconds to write the 100 default blocks to disk. The larger the number of write blocks that can be saved before writing them to disk (/W=nnn parameter), the longer it may take to flush the write buffers.

## Errors While Writing

If an error occurs while the cache buffers are being written to disk, one long audible beep followed by two short beeps will sound. The cache is then disabled and subsequent reads and writes occur without caching.

When you hear the beep warning or suspect that an error has occurred, use the CACHE STATUS command (Section 4) to determine whether or not an error has occurred. If an error occurred, the head, track, and sector of where the error occurred is displayed. The data has been saved in the cache so you can backup any files that you think may have caused the error.

## Cautions for Write Caching

You should only use write caching if your computer environment is very stable. The following rules serve as guidelines for using write caching. The result of not considering these rules may be a loss of some or all of your disk data.

1. Do not turn off the computer or reboot until the cache completes writing its buffers to the disk.  
The cache intercepts the <Ctrl><Alt><Del> keys and flushes the write buffers before letting the computer reboot.
2. Do not use write caching if the programs hang or reboot.  
This admonition particularly applies to ill-behaved resident programs or operating environments.
3. Do not use write caching if your computer is not operating properly or you frequently lose power.
4. Do not use write caching if your fixed disk is not operating properly.

## Save New Configuration

When you complete the Setup Memory Configuration screen and return to the Main Menu, you can either choose to install the Productivity Utilities or to "Save New Configuration". If you choose to "Save New Configuration", the line created for the Memory Manager device specification is written to the CONFIG.SYS file. If you go through the installations for the Productivity Utilities (one or all), the lines that result from those installations are also written into the CONFIG.SYS or AUTOEXEC.BAT files when you choose to save the configuration.

Before the new configuration lines are written to those two files, the current CONFIG.SYS and AUTOEXEC.BAT files, if present, are automatically saved as CONFIG.BAK and AUTOEXEC.BAK. If you need to later restore those files, you can do so. In that case, use the DOS RENAME command to change the names.

Before you rename the backup files to replace the new ones created by the INSTALL program, you should either delete the files to be replaced or rename the files to be replaced if you want to save them. An example of the RENAME command to restore the saved backup of the original CONFIG.SYS file is:

```
C>RENAME CONFIG.BAK CONFIG.SYS<Enter>
```

If you exit without selecting "Save New Configuration", nothing is changed.

## Using the Software

This section provides more detail about how to use the SIMMply-RAM software that you've installed in your system — specifically, the EMS Memory Manager, the RAM disk, print spooler, and disk caching software.

### Using the Memory Manager

Once the device specification for the EMS Memory Manager is placed in the CONFIG.SYS file (either through INSTALL or manually), it is automatically loaded whenever the system is booted. The Memory Manager automatically services any other device drivers (like a RAM disk driver) or applications programs that use expanded memory. You do not need to do anything to use it.

For most applications that can use expanded memory, you simply start the program. The program and the Memory Manager work together without your knowledge while the program is running. However, some applications may require you to configure or set up the applications software for EMS use. Refer to the manuals supplied with your applications programs to determine whether or not you need to reconfigure the program to use expanded memory.

Appendix B lists software that can use expanded (EMS) memory.

### Using a RAM Drive

Like the Memory Manager, once the RAM disk driver specification is written in the CONFIG.SYS file, it is automatically loaded when the system is booted. You can use it like any other drive in your system. Based on the configuration of your computer, it is assigned a drive designator (or identification) by DOS. For example, it may be drive D. DOS assigns the next available drive letter.

You can run programs stored on the RAM disk and read and write files as you normally would with a physical drive. You can also create directories and subdirectories on the disk.

Remember, however, that anything stored on the RAM disk is being held temporarily in memory and will be lost when the computer loses power or is booted.

If you always want to copy specific programs and/or files to the RAM disk, you can add some commands to the AUTOEXEC.BAT file to automatically copy these programs and files to the RAM disk whenever the computer is booted. Another option is to create a batch file that you run whenever you want to copy a specific set of programs/files to the RAM disk.

## Using the Print Spooler

Unlike the Memory Manager and RAM disk, the Print Spooler provides several operational commands and functions that give you real-time controls. If you installed the spooler using the INSTALL program, it is loaded automatically at boot time because of an entry in the AUTOEXEC.BAT file.

You can also load it or change its configuration at any time by manually issuing a command line. (See Section 4.)

Before you set up the options for using the spooler, you need to understand its general capabilities. At any time during operation, you can press a “hot-key” (a specific key combination) that causes a “pop-up” menu of spooler commands and functions to be displayed. Termed the *Control Panel* or *Printtools Main Menu*, this window offers you a range of commands and access to two other menus, which also provide functions.

The default hot-key, which causes the Printtools Main Menu to be displayed, is **<Alt><PrtSc>**.

You can use the spooler immediately after you install it using the defaults, or you can run PTLSET to customize spooler operation before you use it.

## PTLSET Setup Program

How the Printtools menus look and how the Printtools Main Menu is accessed are areas that you can customize through the spooler setup program PTLSET. The PTLSET program also lets you set up certain parameters that govern how the spooler operates. For example, you can set up the type of screen you are using, and you can select the capture or input device.

This subsection explains:

- How the spooler works.
- How to use the spooler commands and functions that are available during operation.
- How to use the PTLSET setup program.

## How the Spooler Works

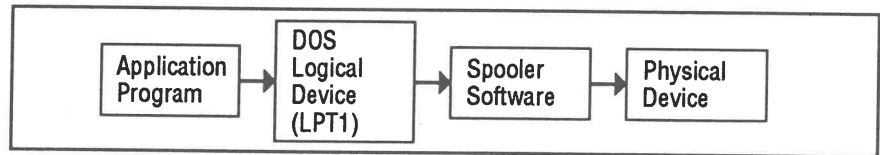
The spooler intercepts data that is being sent to the printer and saves it in a buffer. The data is then printed from the buffer to the printer at the rate at which the printer can accept it. This buffering allows the application to transfer print data to the spooler buffer very quickly, then, while the spooler is outputting data to the printer, you can continue working.

Normally, the spooler accepts the data to be printed as if it were LPT1, which is the *input* or *capture device*. You then configure your applications program to output to LPT1, regardless of which port the printer is actually connected.

If you ran INSTALL, you specified the *output device* or device to which the data are printed from the spooler buffer. If you used a command line to install the spooler, you either specified an output device or used the default LPT1.

The diagram shown in Figure 4-1 outlines the flow of data from the program to the printer.

Figure 4-1. Data Flow to the Printer.

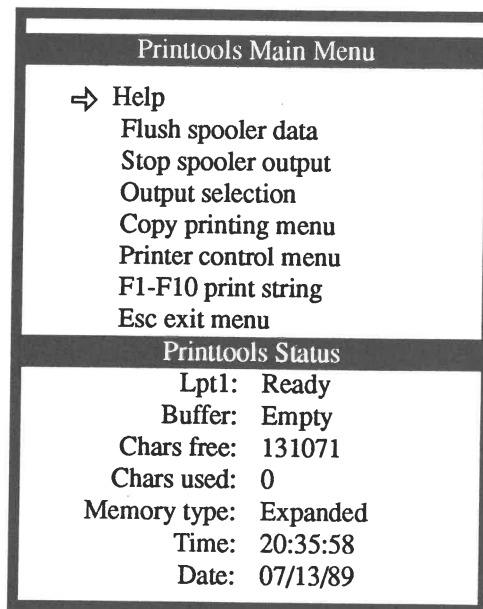


## Using the Spooler Functions

Once the spooler is loaded, it automatically buffers the print jobs. Any time during operation, you can press the hot-key combination to display the Printtools Main Menu.

Pressing the default hot-key **<Alt><PrtSc>** displays the Printtools Main Menu. (You can change the hot-key using PTLSSSET if you wish.) The Printtools Main Menu shown in Figure 4-2 is displayed.

Figure 4-2. Printtools Main Menu.



This menu provides access to the spooler commands and functions. It also provides status information "Printtools Status", which is below the menu selections. You can make selections by using the up and down arrow keys to move to your choice and pressing **<Enter>**. You can also access the functions by pressing **<Alt>** and the first letter of the menu command. (The letter is underlined on the menu.)

If you press **<Alt><H>** or select Help, information about the menu commands is displayed. You can press **<Alt><H>** from the Main Menu, the Copy Printing Menu, or the Printer Control Menu.

To exit from any menu or function, press **<Esc>**. A status line is displayed at the bottom of the screen for many functions. It provides reminders of how to move on the screen and make selections.

Table 4-1 briefly summarizes the commands. The Copy Printing Menu and the Printer Control Menu are explained in the subsequent subsections.

**Table 4-1. Main Menu Selections.**

Key	Function	Meaning
<Alt><H>	Help	Lists the help window describing the functions.
<Alt><F>	Flush spooler data	Removes all data from the spooler and cancels any copies that are active.
<Alt><S>	Stop spooler output	Pauses spooler output to the printer until the Resume command is issued.
<Alt><R>	Resume spooler output	Resumes spooler output to the printer after a Stop command has been issued.
<Alt><O>	Output Selection	Lets you select the output device.
<Alt><C>	Copy Printing menu	Displays the Copy Printing Menu, which offers commands to set up printing of multiple copies.
<Alt><P>	Printer Control menu	Lets you assign strings of control data to the function keys <F1> thru <F10>.
<F1> - <F10>	print string	Executes the control string assigned to the function key pressed.
<Esc>	Exit menu	Exits the Printtools Main Menu.

## Printtools Status

The bottom portion of the Printtools Main Menu window lists several types of status information about the spooler. The fields on that portion of the screen are listed and explained in Table 4-2..

**Table 4-2. Printtools Status Fields**

Command	Meaning
Output device	The first field shows the output device name and status. The status may be Ready, Not Ready, Paper Out, and Error. For example: LPT1:Ready
Buffer	The Buffer field shows the status of the spooler buffer. The status may be Empty, Printing, Active, Not Active, and Halted. For example: Buffer:Empty
Chars free	The Chars free field shows the number of characters in the buffer that can be filled (number not filled with characters). For example, for a buffer of 64 KB, the entry would be: Chars free:65535

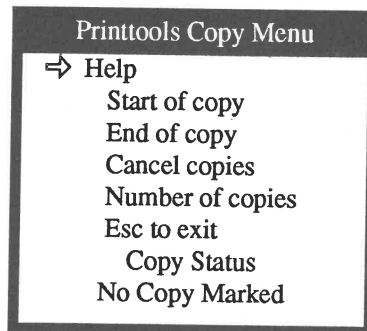


Chars used	The Chars used field shows the number of characters in the buffer that are occupied with data. When no print job is stored in the buffer, the entry is: Chars used:0
Memory type	The Memory type field shows the type of memory (expanded, extended, or system) allocated for the spooler buffer. For example: Memory type:Expanded
Time	The Time field shows the current time. You can see the seconds and minutes of this field change as you watch the screen. The time format is hh:mm:ss. For example: Time:12:48:57
Date	The Date field shows the current date in the format: mm/dd/yy. For example: Date:05/17/89

## Copy Printing Menu

Whenever you want to print a document more than one time, you use the Copy Printing Menu to set up the multiple copy printing. When you press <Alt><C> or select Copy Printing Menu from the Printtools Main Menu, the menu shown in Figure 4-3 is displayed.

Figure 4-3. Copy Printing Menu.



This menu provides additional functions that allow you to set up printing of multiple copies of a document. It also provides status information when you have initiated printing of multiple copies.

You print multiple copies of a document by accessing the Print Spooler from the application. For example, while running your word processor, you pop up the Printtools Main Menu and then the Copy Printing Menu to specify the start of the sections or pages in your document to print more than one time. The amount of data that you want to print more than once must fit within the space allocated for the spooler buffer.

For example, you cannot choose to print a text document of 32 pages multiple times if the spooler buffer you allocated is only 64 KB. A 64-KB spooler buffer only holds about 16 text pages (4 KB per page). You could choose to print 16

pages or less of the document multiple times.

The commands on the Copy Printing Menu are listed and briefly explained in Table 4-3.

**Table 4-3. Copy Printing Menu Selections.**

Command	Meaning
Help	Displays the help window describing the Copy Printing functions.
Start of copy	Marks the start of data for multiple printing
End of copy	Marks the end of data for multiple printing
Cancel copies	Cancel the multiple printing task
Number of copies	Sets the number of copies to print
Esc to exit	Exits the Copy Printing Menu.

The status information below the menu selections shows which copy is currently printing and the total number of copies printed.

If you are using an application and want to print all or part of it multiple times, you must begin the multiple copy set up **before** you issue a print command.

## Steps to Set Up Multiple Copies

Before you set up a multiple printing task, you should let any jobs currently being printed or waiting in the buffer finish printing. Once the buffer is empty, you can set up printing of multiple copies by following these basic steps:

1. From the **application** (like a word processing program or spreadsheet), press the hot-key to access the Printtools Main Menu.
2. Select the Copy Printing Menu (<Alt><C>).
3. Select the Start of copy function to specify the beginning of the data to printed multiple times. This action causes the spooler to consider any subsequent printed data as part of the copy task. This action does NOT replace the usual way you select copy to be printed through the application. You must still use the commands of the application to set up the print.
4. To return to the application, press <Esc> to exit from the Copy Printing Menu. Press <Esc> again to exit from the Main Menu and return to the application program.
5. Use the appropriate application program command to print the document.
6. When the printing is finished (the spooler buffer now contains the data), again access the Printtools Main Menu; then the Copy Printing Menu. (Repeat steps 1 and 2.)

The Buffer status field should now show "Active", and the Chars used field should contain a number that reflects the data stored in the buffer.

7. From the Copy Printing Menu, select the End of copy function to specify the end of the data to be printed multiple times. (This action notifies the Print

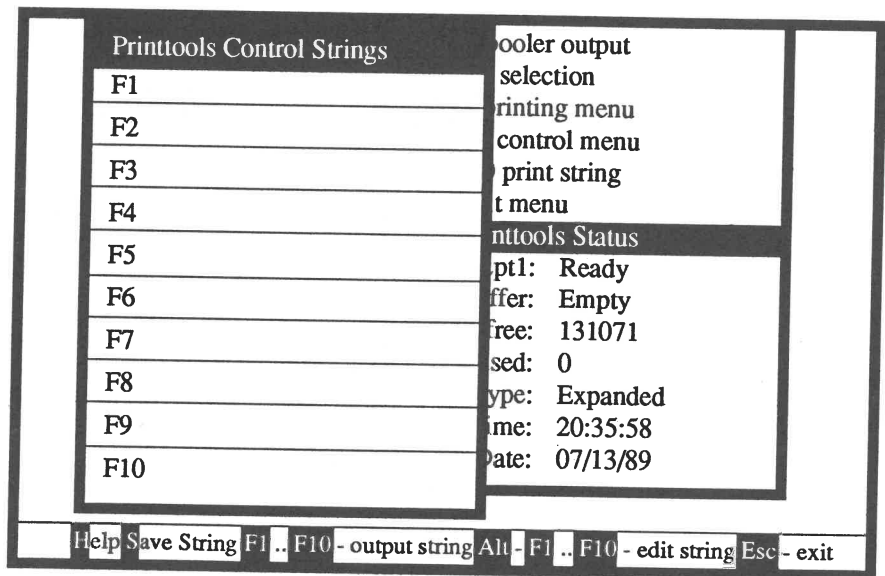
- Spooler that the data to be printed more than once is now in its buffer.)
8. Select the Number of copies function from the Copy Printing Menu and type in the number of copies you want to print.
  9. Press <Esc> to exit the Copy Printing Menu; then, press <Esc> again to exit the Printtools Main Menu.

The number of copies you specified should be printed when the printer is available.

## Using the Printer Control Menu

When you select Printer Control Menu from the Printtools Main Menu, a window with ten fields is displayed. You can set up control strings for your printer and then assign the string to a function key (F1 through F10) through this window. The control strings might, for example, change printer modes or configuration. Once the function key is assigned to the string, you press the function key to send the control string to the printer. The entry window for these control strings is shown in Figure 4-4.

Figure 4-4. Printer Control Menu.



### Help Save strings F1...F10-output string AltF1...F10 edit string Esc-exit

When you access the Printer Control Menu, the command/status line at the bottom of the screen offers you functions which you choose by pressing the letter that is highlighted.

The command/status line also prompts you as you enter the control strings. The following steps describe how to define and assign the control strings.

1. Access the Printtools Main Menu using the hot key.
2. Select the Printer Control Menu (<Alt><P>).

3. Hold down the <Alt> key and press the function key for which you want to enter a control string.
4. The status line prompts you to enter a name for the control string that is to be assigned to that function key. Type the name.
5. The status line now prompts you to enter the control string data. You can enter the information in ASCII, decimal, octal, binary, or hexadecimal format.
  - ASCII data should be surrounded by single quotes (').
  - For decimal, simply enter the digits for the decimal number.
  - For octal, binary, or hexadecimal numbers, terminate the number with an O, B, or H, respectively.
6. Once you have completed the fields that you want to assign to function keys, press **S** to save the strings.

Once the strings are saved, the Printtools Main Menu is displayed again.

Whenever you want to send the control string to the printer, press the appropriate function key from either the Printer Control Menu or the Printtools Main Menu.

As an example, you might want to change the vertical line spacing per inch to 8 lines per inch. On an Epson printer, if the control string 27 (decimal) followed by an O (ASCII) is sent to the printer, the line spacing is set to 8 lpi. You could assign F8 as the function key to send the string to the printer. To do so, you would press <Alt><8>, enter "8 lpi" as the name of the string, and then enter the following as the string:

27'O'

## How to Use PTLSSET

The spooler setup program PTLSET is an easy-to-use menu-oriented program that lets you customize how the Printtools Main Menu and submenus appear. Through this program, you can also specify the type of screen you are using; change the hot-key assignment; and select the capture or input device to which spooler input is sent.

**NOTE:** You should run PTLSET before you load the spooler (PTLS.COM) in memory. If you installed the spooler through the INSTALL program or added a line to the AUTOEXEC.BAT file manually, you should temporarily remove the command line from the AUTOEXEC.BAT file so you can use the setup program to customize spooler operation to suit your use. You can do this manually or by using INSTALL and selecting "None" as the memory type. Then boot the system when PTLS.COM is NOT loaded to change the settings. Once you reboot the system to change the settings in PTLS.COM, you can then re-install and load PTLS.COM.



When you run the setup program, a main menu is displayed from which you choose options to complete the setup. The steps given in a subsequent subsection take you through the program. However, before you use PTLSET, you should understand how to make selections from the menus and how to enter your choices.

## **PTLSET Conventions**

The setup program has only a few conventions for making selections and entering your choices. Prompts are displayed giving you directions; additionally, a set of instructions explaining the menu choices is available.

- From menus with numbered lists, type the number of the selection you choose and then press **<Enter>**.
- On lists that display an arrow pointer (**=>**), use the up and down arrow keys to move the pointer through the list. When the arrow points to the choice you want, press **<Enter>**.
- In some cases, a selection causes another menu or list to be displayed. Some selections, however, cause a prompt or question to appear beneath the menu on the screen. You then type in your response and press **<Enter>**.

## **Stepping through PTLSET**

The following steps guide you through the setup program.

1. To run the setup program, which was copied to your fixed disk when you ran the INSTALL program, change to the directory containing the PTLSET.COM file using the DOS CD command. For example, to change to a directory RAMUTIL that contains the PTLSET file, type:

```
C>CD \RAMUTIL<Enter>
```

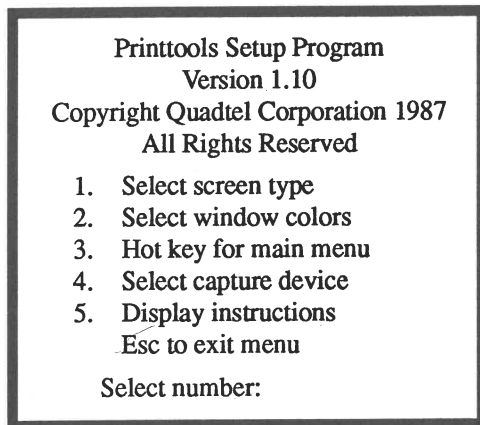
If you did not use the INSTALL program, copy the PTLSET.COM and PTLSET.COM files from the SIMMply-RAM diskette to the directory of your choice using the DOS COPY command. Then use the DOS CD command to change to that directory.

2. Type the following to run the program:

```
C:\RAMUTIL>PTLSET<Enter>
```

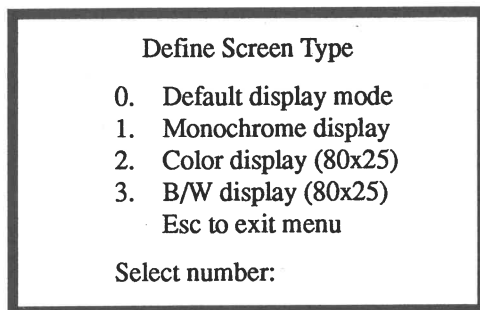
The menu shown in Figure 4-5 is displayed.

Figure 4-5. Printtools Setup Menu.



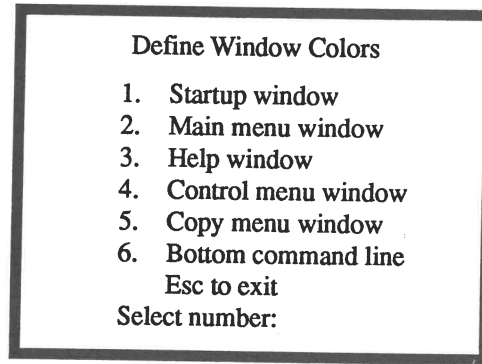
3. If you want to read the information about the menu choices, type **5** and press **<Enter>**. A window of information is displayed.
4. To select the type of screen that you are using, type **1** and press **<Enter>**. The menu shown in Figure 4-6 is displayed

Figure 4-6. Screen Selection Menu.



- Based on the type of monitor you are using, type the appropriate number and press **<Enter>**.
5. If you are using a color display and want to select colors for the various menus and windows that you can access when using the spooler, type **2** and press **<Enter>**. The menu shown in Figure 4-7 is displayed.

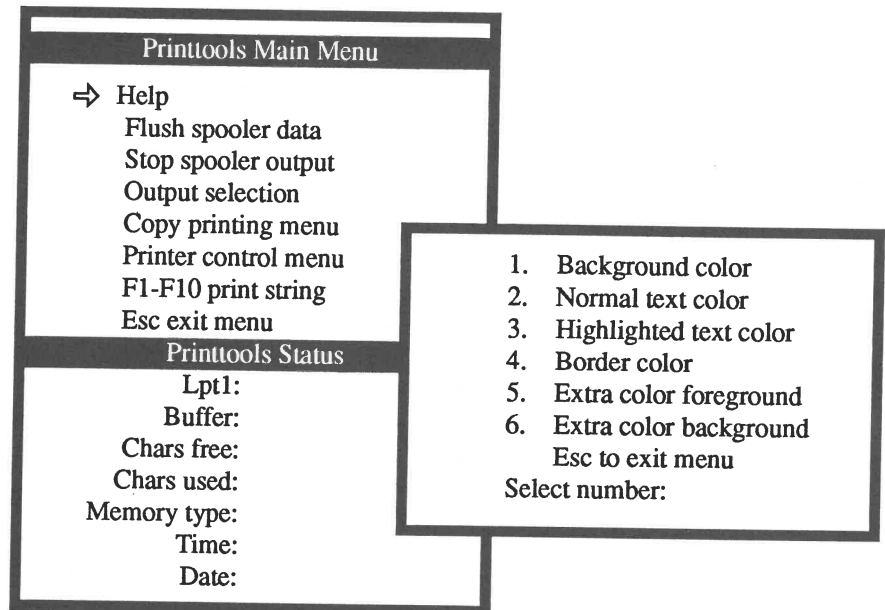
Figure 4-7. Define Window Colors Menu.



This menu lists the various windows for which you can select colors.

6. As an example of a window choice, type **2** and press **<Enter>** to select "Main menu window". Once you select a window, the next screen displayed shows the window at the upper left corner of the screen and a menu of the areas for which you can select colors. Figure 4-9 shows the screen displayed when the "Main menu window" (number 2) is selected.

Figure 4-8. Main Menu Window Area Selection Screen.



7. As an example of an area choice, type **4** and press **<Enter>** to select "Border color".

As a result, a screen is displayed with a list of colors by number. Each number is displayed in the color represented by that number. The window for which the color is being selected is again displayed in the upper left corner of the screen.

**NOTE:** Regardless of which window you select from the menu shown in Figure 4-7, the subsequent menus displayed are the same — the area selection menu and then the color list screen. However, the particular window being set up is displayed along with each of those two menus.

8. To set up a “hot-key”, type **3** and press **<Enter>** from the Printtools Setup Menu (Figure 4-5). (The default hot-key is **<Alt><PrtSc>**.) A prompt is then displayed below the menu:

**Printtools is displayed by pressing Alt and a hot key  
Press the new hot key without pressing Alt...**

Press the key that you want to select as the hot key. **DO NOT** press **<Alt>**. After a couple of seconds, the prompt below is displayed:

**Press hot key again...**

Press the key that you previously pressed as the hot key.

The program is verifying that the key read the first time and interpreted as the hot key is the key you want.

9. To choose the input or capture device, type **4** and press **<Enter>** from the Printtools Setup Menu (Figure 4-5).

A prompt is then displayed below the menu:

**Capture from Lpt or Com [L]:**

This prompt asks you to select LPT or COM as the capture device type. The default LPT is shown by the “L” enclosed in square brackets. Type in either L or C and press **<Enter>**.

Another line is displayed listing the specific choices based on whether you entered L or C. If you select L, the line is as follows:

**Select device (LPT1, LPT2, LPT3, LPT4 [1]):**

The default LPT1 is shown by the “1” enclosed in square brackets. Type in the number you choose and press **<Enter>**.

10. When you complete the setup selections, press **<Esc>** to exit the program. To effect the setup changes, reboot the system and load the spooler. You can add the spooler command line to the AUTOEXEC.BAT file to cause the spooler to be loaded automatically each time you boot the system.



## Using the Disk Cache

Once the disk cache is installed, you have several commands available to operate the cache. You type the command line from the DOS prompt. For example, the command to turn the cache function OFF is as follows:

**C>CACHE OFF<Enter>**

Each command begins with the word CACHE and is followed by the option. Whenever you enter a cache command, a window with information is displayed regarding the status of the Cache. The commands are explained in the following paragraphs.

### CACHE LIMIT

The CACHE LIMIT command switches the cache size limit ON and OFF. If ON, only reads (and writes, if enabled) of less than one track in size are cached. If OFF, all reads (and writes, if enabled) are cached regardless of size.

### CACHE STATUS

The CACHE STATUS command displays the current status of the cache. A display similar to the one shown in Figure 4-9 is displayed as a result of the CACHE STATUS command.

Figure 4-9. CACHE STATUS Display.

Disk Cache System Status	
Caching is:	Enabled
Drives being cached:	1
Operating mode:	Read only
Transfer size limit:	No limit
Cache buffer location:	Expanded memory
Cache buffer size:	131072 bytes

### CACHE ON

The CACHE ON command turns caching ON. This command causes the status display to appear plus a line showing the cache is ON.

### CACHE OFF

The CACHE OFF command turns caching OFF. This command causes the status display to appear plus a line showing the cache is OFF.

### CACHE FLUSH

The CACHE FLUSH command causes all sectors that have been changes to be written to the disk. A status line is displayed in response to this command.

## Appendix A: Trouble- shooting

### Potential Problems

The SIMMply-RAM is designed to be easy to install and reliable to operate. However, sometimes problems may occur. This appendix points out some potential situations and offers solutions to try. It also lists the possible error messages you may receive from the SIMMply-RAM software.

The following situations may occur. You should try the recommended solutions. If you cannot solve the problem, refer to your SIMMply-RAM Warranty Card for the procedures to follow to receive help.

- **Problem:** After you install the SIMMply-RAM board, the number 165 is displayed when you boot the system with the SIMMply-RAM diskette.  
**Solution:** This situation is a normal occurrence signifying that a board has been installed but not configured. To continue with the configuration, press <F1>.
- **Problem:** The memory manager does not start when the system is rebooted after you install it.  
**Solution:** Check that the memory manger driver (mm.sys) is on the boot disk or fixed disk root subdirectory. Also, check to be sure the device entry is included in the CONFIG.SYS file.  
If it is not there, repeat the installation and be sure to select "Save New Configuration".
- **Problem:** When the system is booted, the number 164 is displayed.  
**Solution:** The 164 number shows a memory size error. You may have removed memory from the SIMMply-RAM or incorrectly installed SIMM. Check to be sure the SIMMs are correctly installed.
- **Problem:** When you try to boot the computer, a string of numbers is displayed and the system does not boot.  
**Solution:** A SIMM may not be installed correctly or may be faulty. Check to be sure the SIMMs are correctly installed. Reconfigure the system and run the diagnostics program.

## Appendix B: Software that can use expanded memory

This appendix lists some software packages that can use expanded memory. Because of the number of software packages continually being produced, it is not complete. The packages are generally categorized as: CAD, Database, Graphics, Integrated, Language, Network/Communications, Operating Environment, Operating System, Productivity Tool, Programming Tool, Desktop Publishing, Spreadsheet, Utility, or Word Processing.

- AlphaWorks by Alpha Software Corp. (Integrated)
- Analyst by Turbo Power Software (Programming Tool)
- AutoCad by Autodesk, Inc. (CAD)
- Back to DOS by Software Masters, Inc. (Utility)
- Carousel by Softlogic Solutions, Inc. (Operating Environment)
- DESQview 2.2 by Quarterdeck Office Systems (Operating Environment)
- DESQview Companions 1 by Quarterdeck Office Systems (Productivity Tool)
- DOS 4.0 by IBM (Operating System)
- Double DOS by Softlogic Solutions, Inc. (Operating Environment)
- Excel by Microsoft Corp. (Spreadsheet)
- Fetch by Thought Dynamics (Network/Communications)
- FoxBase+ by Fox Software, Inc. (Database)
- Flash by Software Masters, Inc. (Utility)
- Framework III by Ashton-Tate Corp. (Integrated)
- Front Runner by Ashton-Tate Corp. (Database)
- GEMArt by Digital Research (Desktop Publishing)
- GoScript by Lasergo, Inc. (Desktop Publishing)
- Halo DPE by Media Cybernetics, Inc. (Graphics)
- Halo 88 by Media Cybernetics, Inc. (Programming Tool)
- Image Pro by Media Cybernetics, Inc. (Graphics)
- Information Engineering Workbench by Knowledgeware, inc. (Programming Tool)
- Javelin by Javelin Software Corp. (Spreadsheet)
- Kedit 4.0 by Mansfield Software (Utility)
- Keywords Advanced by Alpha Software Corp. (Utility)
- Keywords 3.0 by Alpha Software Corp. (Utility)
- Library by WordPerfect Corp. (Operating Environment)
- Lumena by Time Arts, Inc. (Programming Tool)
- Magic Mirror by Softlogic Solutions, Inc. (Utility)
- MARVIN by Ovonc Imaging Systems Inc. (Database)
- Microsoft Works by Microsoft Corp. (Integrated)
- Pageview by Microsoft Corp. (Utility)
- Paradox by Borland International (Database)
- PC Tools by Central Point Software, Inc. (Utility)
- Personal REXX by Mansfield Software Group (Utility)
- PlanPerfect by WordPerfect Corp. (Spreadsheet)
- PRD + by Productivity Software International (Utility)
- Professional File by Software Publishing Corp. (Database)

- Professional Write by Software Publishing Corp. (Word Processing)
- Publishers Paintbrush by ZSoft Corp. (Graphics)
- Publishers Type Foundry by ZSoft Corp. (Desktop Publishing)
- Q&A 3.0 by Symantec Corp. (Database)
- Quattro by Borland International (Spreadsheet)
- Ready by Living Videotext, Division of SYmantec (Productivity Tool)
- Reflection 4 PLUS Rel 3.0 by WalkerRicher & Quinn (Network/Communications)
- Reflex by Borland International (Productivity Tool)
- RIO by AT&T Graphics Software lab (Graphics)
- SAS System by SAS Institute Inc. (Integrated)
- Sidekick Plus by Borland International (Utility)
- Spool Master by Software Masters, Inc. (Utility)
- SuperCalc5 by Computer Assoc. International, Inc. (Spreadsheet)
- Symphony Rel 2.0 by Lotus Development Corp. (Integrated)
- T-DEBUS Plus 4.0 by Turbo Power Software (Programming Tool)
- The Analyst by Symantec, Turner-Hall Publishing Division (Utility)
- The Smart Software System by Informix Software, Inc. (Integrated)
- ThinkTank by Living Videotec, Division of Symantec (Productivity Tool)
- Time Line 3.0 by Symantec corp. (Productivity Tool)
- TIPS by TrueVision, Inc. (Graphics)
- TOPAS by AT&T Graphics, Software Labs (Graphics)
- Tree 86 by The Aldridge Co. (Utility)
- Turbo C 2.0 by Borland International (Language)
- Turbo Pascal 5.0 by Borland International (Language)
- Turbo Prolog by Borland International (Language)
- Turbo Professional by Turbo Power Software (Programming Tool)
- VersaCAD by Versacad Corporation (CAD)
- Windows/286 v2.1 by Microsoft Corp. (Operating Environment)
- WordPerfect 5.0 by WordPerfect Corp. (Word Processing)
- Worksheet Utilities by Funk Software Corp. (Utility)
- 1-2-3 Rel 2.0 by Lotus Development corp (Spreadsheet)



## Glossary

- Address** Each byte of memory is assigned an address by which the computer identifies that byte.
- Application program** The software you use to do certain kinds of work on the computer is an application program. Examples of types of application programs are word processors, database managers, and spreadsheets.
- AUTOEXEC.BAT file** The AUTOEXEC.BAT file is a special batch-type file for which DOS searches when the computer is booted. If present, the commands are executed immediately on boot-up.
- Backfill** Backfill refers to using add-in memory to replace conventional system memory.
- Basic input/output system (BIOS)** The BIOS is a set of input/output routines that are stored in ROM and which the computer uses to perform functions.
- Batch file** A batch file is a file that contains DOS commands to be executed when the file is run. Batch files have a file extension of .BAT. By creating these lists of commands for tasks that you do routinely or often, you can save time and work more efficiently.
- Byte** A byte is the basic unit of measure of computer memory. Memory is also measured in kilobytes (KB) — approximately 1000 bytes — and in megabytes (MB) — approximately 1,000,000 bytes. A bytes is made up of 8 bits. One byte is used for a character (letter, number, and so forth).
- COMx** COMx (COM1 through COM4) is a name by which DOS keeps track of serial devices attached to the computer system.
- CONFIG.SYS file** The CONFIG.SYS file is a special DOS file that provides information about the kinds of hardware attached to the computer. This file, if present, is read by DOS at boot-time. The commands or declarations in it are used to adapt to the hardware of the system. For example, device drivers are automatically loaded by specifying them in the CONFIG.SYS file.
- Conventional memory** Conventional memory is the first 640 KB of memory that is directly addressable by DOS.
- Disk cache** A disk cache is a buffer created in memory that stores reads (or reads and writes) in order to speed up disk-bound applications.

- DOS** DOS refers to the Disk Operating System, which is basic managerial software supplied with many PCs.
- Expanded memory** Expanded or paged memory is the memory above the first 1 MB of memory that is configured such that 16-KB pages are swapped in and out of DOS-addressable memory. The SIMMply-RAM supplies this type of memory if the add-in memory is so configured. Expanded memory can only be used by applications programs that support the LIM EMS 4.0. Also, memory management software that conforms to that specification must also be present.
- Extended memory** Extended memory is a linear extension of the 640 KB conventional memory. Extended memory above the first 1 MB cannot be directly accessed by DOS but can be addressed by multitasking operating systems like OS/2 and Xenix.
- Frame** The frame is an open area in the 1-MB DOS-addressable that can be used for paging memory in and out. In compliance with EMS 4.0, it must be 64 KB in size.
- Hexadecimal** Hexadecimal numbers are from a base-16 number system, in which values range from 0 to F (15).
- Kilobyte (KB)** A kilobyte is a measure of memory equal to 1024 bytes.
- Linear memory** Linear memory is sequentially addressed memory — that is, it is organized as series of addresses.
- LPTx** The LPTx (LPT1 through LPT3) is a name by which DOS keeps track of parallel devices attached to the computer system.
- Megabyte (MB)** A megabyte is a measure of memory equal to about one thousand kilobytes or one million bytes.
- Micro channel** Micro channel refers to computers designed with a specific architecture for transferring data to and from expansion boards. The PS/2 is a micro channel machine.
- Nanosecond (ns)** A nanosecond is one billionth of a seconds. Nanoseconds are used to measure the amount of time required to process memory. For example, SIMM speeds are described in nanoseconds.
- Operating System/2 (OS/2)** The Operating System/2 is a multitasking operating system that manages the computer. This OS can directly address about 15.5 MB of memory. It works with the PS/2 computer.



13715 Alton Parkway  
Irvine, California 92718  
(714) 454-2441

FAX: (714) 454-8527

BBS: (714) 454-8124

September 1991  
Part No. 520-00205-00A00

