

 Digital Research

# DR DOS<sup>®</sup> 6.0

Operating System for Personal Computers

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Optimization and  
Configuration Tips







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**Optimization and  
Configuration Tips  
for  
DR DOS® 6.0**

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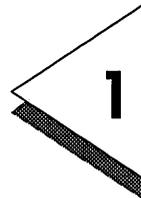
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# 1. Introduction



**T**HIS guide is provided by Digital Research as a supplement to the *DR DOS® 6.0 User Guide*. It is designed to provide you with information, techniques, and extensive discussions regarding optimizing your configuration when using the DR DOS 6.0 operating system.

If you have questions after installing the DR DOS 6.0 operating system, we recommend that you take the following steps:

1. Review the appropriate sections of the *DR DOS 6.0 User Guide*, the *ViewMAX™ User Guide*, and the *DOSBOOK™* online guide. These Guides should be the primary source for information about the DR DOS 6.0 operating system and for resolving most problems.
2. Read the **readme** file, which is included on one of the DR DOS diskettes, or the Release Notes, if included. They contain technical information that became available after the *DR DOS 6.0 User Guide* was printed.

With the distribution diskette in your drive A:, you can read the file on your computer screen by entering the command:

```
A:> TYPE README /P
```

To send a copy of the file to your printer, use the command:

```
A:> TYPE README > PRN
```

(The ">" symbol is on the same key as the period on U.S. keyboards.)

3. Before calling your dealer or support center for assistance, review this guide. Most problems that you will encounter can be quickly resolved using the information found in this guide.



# Memory Management Overview

The purpose of a memory management system is to effectively manage the Random Access Memory (RAM) available on your computer and to maximize memory in which to load your applications. When personal computers were first introduced, they operated with as little as 64 kilobytes (Kbytes) of RAM. However, as PCs became more sophisticated and powerful, so did the application programs that ran on them.

Today, modern applications frequently require 540 Kbytes of memory, or more, to load. Ten years ago, that amount of required RAM would have seemed vastly excessive. Many common configurations do not have sufficient memory for proper fractioning of large applications.

And, although today's computers typically have over 1 Mbyte of RAM available, only a portion of the first 640 Kbytes are available for DOS applications. Device drivers and TSRs are also typically loaded into this area, reducing the memory available for an application.

Memory management software is designed to overcome the problem of insufficient conventional memory. The DR DOS memory management system is called MemoryMAX™.

## The DR DOS MemoryMAX System

The term MemoryMAX describes the collection of device drivers and commands that are used for memory management under the DR DOS 6.0 operating system to take advantage of *all* RAM memory available on your computer.

The MemoryMAX system is designed to free-up as much conventional memory as possible. It achieves this goal by utilizing certain previously unused areas of high and lower memory and by remapping and moving other memory areas.

The MemoryMAX system extends the amount of memory available to applications, so that even with network drivers and TSRs loaded, there can still be 620 Kbytes, or more, conventional memory available. However, the exact amount of additional memory that MemoryMAX provides is dependent on your particular system's configuration.

The MemoryMAX system consists of three device drivers and six commands. The MemoryMAX device drivers and commands

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are detailed in Chapter 11 of the *DR DOS 6.0 User Guide*, "Customizing your system." This table lists MemoryMAX drivers and features by various hardware configurations.

#### MemoryMAX Features Available with Hardware/Device Driver Combinations

Applicable Hardware	Driver	LIM	DR DOS Kernel Relocation	XMS	DR DOS Upper Memory
386sx™, 386™, or 486™	EMM386.SYS	•	•	•	•
386sx, 386, or 486	HIDOS.SYS with Third-Party XMS Memory Manager	?	•	•	—
IBM® PS/2® 80286® with IBM XMA card	EMMXMA.SYS	•	—	—	—
80286 with Extended Memory	HIDOS.SYS	—	•	•	—
80286 with Mappable Shadow Ram, with Extended Memory	HIDOS.SYS	—	•	•	•
80286 with Mappable Shadow Ram, No Extended Memory	HIDOS.SYS	—	•	•	•
80286 with NeAT™, LeAP™, or SCAT™	HIDOS.SYS	—	•	•	•
80286 with LIM 4.0 driver and extended memory	HIDOS.SYS with third-party LIM 4.0 driver	•	•	•	•
8088®/8086®/80286 with LIM 4.0 EMS card and no extended	HIDOS.SYS with third-party LIM 4.0 driver	•	•	—	•

- Supported feature
- Unsupported feature
- ? This entry depends on the features offered by third-party memory manager

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### Note

If upper memory is not supported, **HIDEVICE**, **HIBUFFERS**, **HIINSTALL**, and **HILOAD** commands have no effect. **HIDOS=ON|OFF** might be supported if the third-party memory manager allocates XMS upper memory blocks (UMBs).

---

## MemoryMAX System Commands and Drivers

The following is a listing and brief description of the components of the MemoryMAX memory management system. Refer to the *DR DOS 6.0 User Guide* for a complete description of each of these features and commands.

### EMM386.SYS

EMM386.SYS is a device driver that allows the DR DOS 6.0 operating system to make better use of the memory available on Intel® i386™, i386SX™, and i486™-based computers. Using EMM386.SYS, you can use LIM 4.0 expanded memory without the need for special add-on cards; relocate the DR DOS operating system kernel to upper or high memory, and enable upper memory to be used for TSRs, device drivers and operating system data structures by using the **/AUTOSCAN**, **/INCLUDE**, **/EXCLUDE**, and **/USE** options. You can also add up to 96 Kbytes to conventional memory using the **/VIDEO** option.

### HIDOS.SYS

If you have an Intel 80286-based computer with extended memory, you can use the HIDOS.SYS driver to relocate the DR DOS operating system kernel to high memory (see the **/BDOS** option). On computers that support Shadow RAM, HIDOS.SYS relocates the kernel to upper memory, and enables you to load TSRs, drivers and operating system data structures into upper memory. Using the **/VIDEO** option, you can also add up to 96 Kbytes to conventional memory.

Example **config.sys** entry:

```
DEVICE=C:\DRDOS\HIDOS.SYS /BDOS=AUTO
```

HIDOS.SYS can also work in conjunction with LIM 4.0 expanded memory (EMS) device drivers to provide upper memory support on 8088/8086/80286 computers. This feature is detailed in the **readme** file or Release Notes.

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**Note**

The HIDOS.SYS driver should not be confused with the similarly-named DR DOS MemoryMAX "HIDOS = ON/OFF" command (see below).

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**EMMXMA.SYS**

Use this driver on PS/2 80286 computers with IBM XMA and 100% compatible memory cards, to convert memory from extended to LIM expanded memory.

Example **config.sys** entry:

```
DEVICE=C:\DRDOS\EMMXMA.SYS /FRAME=D000
```

---

**Note**

The EMMXMA.SYS driver can be used only on PS/2 computers, and you cannot use the EMMXMA.SYS driver with any third-party memory managers (e.g., the Qualitas 386/MAX, or the Quarterdeck Expanded Memory Manager 386™). You can use HIDOS.SYS following EMMXMA.SYS to obtain upper memory support.

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The MemoryMAX commands listed below can be used when upper memory is supported by loading the EMM386.SYS or HIDOS.SYS drivers in the **config.sys** file.

**HIBUFFERS**

Use HIBUFFERS to specify the number of memory buffers that the DR DOS 6.0 operating system uses. HIBUFFERS performs the same function as BUFFERS, except that HIBUFFERS allocates as many buffers as possible into high memory rather than conventional memory.

The following entry in your **config.sys** file sets the number of buffers to 20 and forces the DR DOS 6.0 operating system to allocate as many as possible from high memory. Example **config.sys** entry:

```
HIBUFFERS = 20
```

---

---

### HIDEVICE

The **HIDEVICE** command loads specified device drivers into upper memory. If the device is unable to load into upper memory using **HIDEVICE**, it will be loaded into conventional memory. The following command loads the **ANSI.SYS** device driver into upper memory:

```
HIDEVICE=C:\DRDOS\ANSI.SYS
```

### HIDOS

The **HIDOS** command relocates as much of the DR DOS operating system data structures as possible into upper memory. The default is **OFF**. Example **config.sys** entry:

```
HIDOS=ON
```

### HIINSTALL

The **HIINSTALL** command loads specified TSRs into upper memory. If there is insufficient upper memory for the specified TSR, it is loaded into conventional memory.

Although similar to the **HILOAD** command (see below), **HIINSTALL** must be loaded via the **config.sys** file. Use **HIINSTALL** when you want a TSR permanently loaded at boot time because of best memory allocation (see the example in Chapter 2). The following command installs the **CURSOR** program into upper memory:

```
HIINSTALL=C:\DRDOS\CURSOR.EXE
```

Notice that you must give the full path name to the program and its extension (.com or .exe).

### HILOAD

**HILOAD** loads specified TSRs and network drivers into upper memory. **HILOAD** is similar to the **HIINSTALL** command (which must be loaded using the **config.sys** file), but can be executed from the command line or from the **autoexec.bat** or other batch file.

Before using **HILOAD**, you must be sure that upper memory has been enabled with the **MEMMAX +U** command. For example,

```
C:> HILOAD C:\LAN\NET3
```

---

---

## MEMMAX

The MEMMAX command selectively enables and disables those enhanced memory areas provided by the DR DOS 6.0 operating system that might conflict with some applications. By using the MEMMAX +V switch, MEMMAX also enables extra memory if it has been reserved in the video adapter area by EMM386.SYS or HIDOS.SYS. You can execute the MEMMAX command from the command line or a batch file (see Chapter 10 of the *DR DOS 6.0 User Guide*).

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### Note

If you enabled the video adapter area by using MEMMAX +V, you must use the MEMMAX -V command to release this memory before loading graphics applications.

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The HIDOS.SYS and EMM386.SYS device drivers can increase the conventional memory available to applications by using upper memory. However, some programs fail because they do not expect to find memory in this region. MEMMAX allows you to selectively enable and disable upper and lower memory from the command line or from batch files. MEMMAX +U and -U will respectively enable and disable upper memory. The DR DOS 6.0 installation will place the command "MEMMAX -U > nul" into the **autoexec.bat** file. The "> nul" disables the display of the MEMMAX status message on the screen.

MEMMAX -L and +L will respectively disable and enable the first 64 Kbytes of conventional memory. This region is termed "low memory." Usually the operating system resides in low memory; however, by using the DR DOS 6.0 MemoryMAX features, most of this area can be made available for running applications. Some applications were written using packing utilities that become confused when run in this low memory. If this happens, the following message appears:

```
!Packed file is corrupt.
```

To correct this situation, use the MEMMAX -L command to disable low memory before running the application. After exiting the application, use MEMMAX +L to enable the low memory area once again.

---

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### Example

The following example shows how you can use the MEMMAX command in a batch file that loads network drivers into upper memory. The example assumes that you have already loaded a DR DOS 6.0 device driver that supports upper memory.

```
REM * * * MEMMMAX to open upper memory * * *  
MEMMAX +U  
HILOAD C:\LAN\IPX  
HILOAD C:\LAN\NET3  
REM * * * * Disable lower memory * * *  
MEMMAX -L  
I:  
CD LOGIN  
REM * * * * Reopen lower memory * * * *  
MEMMAX +L
```

### Conclusion

While the MemoryMAX memory system works well with most application programs, you might still encounter occasional difficulty. The following chapters present the steps recommended for resolving such memory conflicts.

## 2. System Memory Optimization

Because the DR DOS 6.0 operating system has been designed to work with all IBM-compatible personal computers and software applications, there is no single “perfect” memory setup that will optimize memory use for all situations. Memory optimization will depend both on your particular hardware setup and the software applications you will be using. However, with a bit of trial-and-error system fine tuning, you can optimize DR DOS memory management to meet your particular needs. Below are techniques and suggestions that will help you optimize your computer/software setup.

### Changing Order of Memory Allocation

The first step in optimizing your system memory can be as simple as rearranging the order in which memory blocks are assigned by the **config.sys** and **autoexec.bat** files. The general rule here is to use upper memory and high memory as much as possible to free conventional memory for your applications. With this in mind, you should typically use **HIBUFFERS** and relocate the DR DOS kernel code to high memory by using the **/BDOS=FFFF** option of the DR DOS memory management drivers, **HIDOS.SYS** and **EMM386.SYS**. Also, if you have any add-on cards that use RAM, make sure that they are configured so that their RAM is allocated from the beginning or end of upper memory. For example, place a network card immediately above the video RAM area instead of in the middle of upper memory.

---

Following this, device drivers and TSRs can be loaded into upper memory. For best memory allocation, those drivers and TSRs that occupy the largest blocks of memory should be loaded first and contiguously. For example, if you need to load three device drivers and two TSR programs, order them in descending order in your **config.sys** file, beginning with the driver that will occupy the most RAM, to the driver or TSR that will occupy the least RAM. The documentation for the drivers and TSRs should indicate the amount of RAM they require; however, if they do not, you can determine this yourself by using the following procedure:

- 1 Load the driver or TSR.
- 2 Use the **MEM /U** or **/B** command to see a report of your memory usage (see Chapter 10 of the *DR DOS 6.0 User Guide* for a full description of the **MEM** command and Chapter 12 regarding loading device drivers and TSRs).

## Expanding Files

If, after determining the size of your drivers and TSRs and loading them into high memory, a driver or program fails to run properly or produces an “out of memory” error message, the problem might be that the driver or program is “expanding” itself in RAM.

Some device drivers and TSR programs occupy a minimal amount of RAM after they are loaded into memory, but, while initializing, might actually expand and take up considerably more RAM than they will ultimately need.

Another method of verifying the program’s true RAM size is to load it into conventional memory (i.e., by deactivating the **HIDEVICE**, **HIINSTALL**, or **HILOAD** commands), activate the program, and then run the **MEM /B** command to see the actual amount of RAM the program occupies. If the program or driver is “expanding” itself in RAM, and you want to load it into upper memory, you will have to allow sufficient upper memory RAM to accommodate the initialization size of the program. It might be necessary to use trial-and-error to determine this size. See also “Using MemoryMAX with NetWare” on page 33 for an example.

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## Example

In the following example, let's assume you want to load Device Drivers 1, 2, and 3, and TSR programs 1 and 2, each requiring the following amounts of memory:

Driver #1 = 13Kbyte of RAM  
Driver #2 = 10Kbyte of RAM  
Driver #3 = 16Kbyte of RAM  
TSR #1 = 4Kbyte of RAM  
TSR #2 = 6Kbyte of RAM

Using the MemoryMAX HIDEVICE and/or HIINSTALL commands, enter these lines into your **config.sys** file:

```
HIDEVICE = C:\DRIVER#3.SYS      ; which uses 16kb RAM
HIDEVICE = C:\DRIVER#1.SYS      ; which uses 13kb RAM
HIDEVICE = C:\DRIVER#2.SYS      ; which uses 10kb RAM
HIINSTALL = TSR#2                ; which uses 6kb RAM
HIINSTALL = TSR#1                ; which uses 4kb RAM
```

---

### Note

There can be exceptions to loading TSRs and drivers in the “largest first” system described previously. Some device drivers *must* be loaded in a specific order. Read the manufacturer's documentation carefully before installing any driver.

---

Note that in the above example, you can load the two TSRs with the HILOAD command placed in the **autoexec.bat** file. For a discussion of the MemoryMAX HIINSTALL, HIDEVICE, and HILOAD commands, see “MemoryMAX System Commands and Drivers” on page 4 and in the *DR DOS 6.0 User Guide*.

## LIM Page Frame

Some applications run better with the availability of LIM memory (sometimes called EMS, or expanded memory). The documentation for each of your applications will indicate if LIM memory is required.

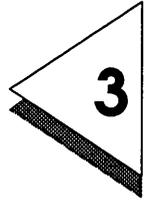
If the application does not require LIM memory, be sure that no LIM page frame is defined. This will save 64 Kbytes of upper

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memory. In the EMM386.SYS line of your **config.sys** file, disable the page frame with the switch /F=NONE. If using HIDOS.SYS on a machine with a LIM 4.0 memory card, you can disable the page frame by specifying /CHIPSET=EMSALL.

# 3. Troubleshooting



## Isolating the Problem

If you encounter memory conflicts after you have arranged your device drivers and TSRs in the manner described in the previous chapter, your next step should be to isolate and identify the offending conflict. The best way to do this is to methodically load each of your drivers, TSRs, and application programs one at a time until you encounter the problem driver or program.

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### Note

To complete the following steps, you should be familiar with editing your **config.sys** and **autoexec.bat** files with a wordprocessor or text editor such as the DR DOS EDITOR, and with the REM command. Refer to Chapters 7 and 11 of the *DR DOS 6.0 User Guide*.

---

Whenever you experiment with and change your **config.sys** and **autoexec.bat** files, you should *always* have a separate bootable floppy disk available containing the unedited, original versions of your **config.sys** and **autoexec.bat** files in case you need to reboot your computer from the A: drive. Then, if you need to go back to your original configuration, you can copy the original **config.sys** and **autoexec.bat** files from your backup diskettes onto your boot disk. (See Chapter 10 in the *DR DOS 6.0 User Guide* for information on how to create a bootable floppy disk.)

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---

To isolate the source of your memory conflict, turn off those lines in your **config.sys** or **autoexec.bat** file that might be causing the problem. Do this by editing the **config.sys** or **autoexec.bat** file and placing a REM comment at the beginning of each line you want to turn off. For example, to turn off the following **config.sys** line:

```
DEVICE = C:\DRDOS\EMM386.SYS /F=AUTO /K=2024
```

add the REM comment to the beginning of the line:

```
REM DEVICE = C:\DRDOS\EMM386.SYS /F=AUTO /K=2024
```

If you find a particular line is not causing a problem, you can reactivate it by simply removing the REM statement.

---

### Note

You can also use the DR DOS conditional “?” statement to activate/deactivate **config.sys** line commands. See Chapter 11 of the *DR DOS 6.0 User Guide* for details. If you use this option, make careful note of whether you said “yes” or “no” to loading each line.

---

After turning off the suspect lines with a REM statement, reboot your computer to retest the driver/application with which you first encountered your memory problem. If the system runs correctly, reenter your **config.sys** or **autoexec.bat** file and remove the REM command from one line and then reboot and reload the application. Continue this process until you again encounter the memory problem. When it recurs, you will have isolated the line in the **config.sys** or **autoexec.bat** file that is causing the memory conflict. You can now take action to resolve the conflict, as described in the following sections.

## Possible Problems

After you have isolated the problem driver or program, you can use the techniques described below to make the appropriate corrections to your computer’s configuration.

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Some problems that you might encounter after installing the MemoryMAX drivers include:

- Insufficient conventional memory to load a particular driver or program
- HILOAD, HIINSTALL, or HIDEVICE features do not seem to operate correctly
- Computer locks up
- Upper memory conflicts
- Video problems
- Error message: “!Packed file is corrupt.”

Each of these problems, and the techniques to correct them, are described below.

## Insufficient Conventional Memory

After using the DR DOS 6.0 memory management system to increase conventional memory, there should not be a problem due to insufficient memory. However, if a large number of device drivers or TSRs are in use, this problem might still occur. Review Chapter 1 of this guide to ensure you have taken the proper steps to optimize system memory.

Try the MEMMAX +L command in case an earlier command or batch file disabled available low memory. Finally, if the application does not use the graphics display area, try the /V switch of the DR DOS 6.0 memory manager, followed by MEMMAX +V before loading your application.

## HILOAD, HIINSTALL, or HIDEVICE Considerations

Each of these commands requires the availability of upper memory blocks (UMBs). You can verify that the UMBs are available by using the DR DOS MEM /B or /U commands to see a report of your memory usage (see Chapter 10 of the *DR DOS 6.0 User Guide* for a full description of the MEM command). Available UMB blocks will be marked as “FREE” under the Type column in the MEM listing.

The HILOAD, HIINSTALL, and HIDEVICE commands require prior installation of the EMM386.SYS or HIDOS.SYS driver. If the MEM report shows that upper memory is not being utilized, check your **config.sys** to make sure the driver has been

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properly installed and that the option switches have been entered correctly. If they are set, pay particular attention to the `/FRAME`, `/AUTOSCAN`, `/INCLUDE`, `/BDOS`, and `/EXCLUDE` switches to ensure that any upper memory address specified by these switches have been correctly set (a common error is using an “oh” instead of a zero).

If you use Microsoft® Windows™ 3.0, the `/WINSTD` switch might have been set. The `/WINSTD` switch automatically blocks access to the UMBs, making them unavailable to `HILOAD`, `HIINSTALL`, and `HIDEVICE`. Windows 3.0 will not run properly in standard mode if UMBs have been used by something else. (See the “Using EMM386.SYS with Windows” on page 22.)

If you do not require the use of expanded memory, set the `/FRAME` switch to `/FRAME=NONE`.

The `HILOAD` command must be invoked *before* using the `MEMMAX -U` command to disable upper memory. Use the `MEMMAX +U` command to re-enable upper memory, if necessary. (Note that the DR DOS installation program automatically inserts the `MEMMAX -U` command in the `autoexec.bat` file; therefore, you must either put `HILOAD` above it, or use `MEMMAX +U` to enable upper memory).

If there appears to be sufficient upper memory available, but `HILOAD`, `HIINSTALL`, or `HIDEVICE` fail to put a particular TSR or driver into upper memory, some device drivers and TSR programs when initializing might actually expand and take up considerably more RAM than they will ultimately need. See “System Memory Optimization” on page 9 for a complete description of this problem.

### Computer will not boot or “locks up”

Reboot your machine with a bootable floppy disk in drive A:. Follow the instructions in “Isolating the Problem” above and edit the C: drive `config.sys` and/or `autoexec.bat` files to turn off and isolate, with the `REM` command, those lines in the files that might be causing the problem.

The most probable cause is that the DR DOS 6.0 memory manager has moved something into a region of upper memory required by a hardware device driver attempting to use the same areas of memory. Use the `/EXCLUDE` option (see page 18) switches to remedy the problem.

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If a hardware device is not causing a conflict, and the lockup occurs with a particular program, this program might become confused when upper or low memory is available. Try using the command `MEMMAX -U` and/or `MEMMAX -L` before loading the program.

## Upper Memory Conflicts: Using /EXCLUDE

Your machine or the accessories in your machine might be using upper memory addresses that are also being accessed by the DR DOS 6.0 memory manager. To prevent this, exclude `EMM386.SYS` or `HIDOS.SYS` access to the upper memory address range that is causing the conflict. The following recommendations apply to the `EMM386.SYS` driver for 386 and 486 computers, or the `HIDOS.SYS` driver on 286 computers with shadow RAM.

Some typical symptoms of upper memory conflict include:

- inability to log onto networks
- inability to access hard or floppy disk drives
- inability to format low-density floppy disks in high density drives
- error messages such as "card not found."

A good starting place to check for upper memory usage is the documentation for any accessory boards or drivers you have installed; if they require upper memory, it will usually be indicated in the documentation.

- If you encounter such problems and suspect that upper memory conflicts can be the cause, first `REM` out the memory manager line of the **config.sys** file completely. If the problem disappears, you know that the memory driver is part of the conflict and you can begin to look at changing switches to correct the problem. Use the `DR DOS EDITOR` and change the following settings in your **config.sys** file:

- 1 If the `EMM386.SYS /BDOS` option is set to `/BDOS=AUTO`, switch it to `/BDOS=FFFF`,
  - 2 Save **config.sys**.
  - 3 Reboot.
  - 4 Retest.
- 
-

- ❑ If the problem recurs, change the `/R=AUTO` setting to `/R=NONE`, and then save the **config.sys** file, and reboot the computer to retest.
- ❑ You can also use the `/EXCLUDE` switch to exclude an area of upper memory that the `/AUTOSCAN` feature detects as being available but, in fact, might be used by another device, such as a network card.

### The `/EXCLUDE` Option

If the hardware documentation does not specify a memory range to be excluded, you can use the `/EXCLUDE` option to discover if there is an upper memory conflict. This option is used to systematically exclude sections of upper memory from being used by `EMM386.SYS` by excluding upper memory “half-at-a-time.” For example, use this “halving” method to exclude the top half of the upper memory range first, reboot the computer and test the problem. Then, if the problem recurs, change the `/EXCLUDE` setting to exclude the lower half of upper memory, reboot, and retest.

After discovering in which half of upper memory the conflict resides, repeat the process by dividing *that* memory range in half. You can use this technique to break down the entire upper memory range, half-by-half, until you pinpoint the area of conflict.

You must use the hexadecimal notation of the memory address with the `/EXCLUDE` switch. The following brief explanation is provided for those unfamiliar with using the hexadecimal system.

#### Hexadecimal Addresses

The 384 Kbyte range of upper memory resides between the hexadecimal memory addresses of `A000` and `FFFF`. The upper half of this range lies between the addresses `D000` and `FFFF`; the lower half lies between `A000` and `CFFF`. Because `A000` to `BFFF` is typically reserved for video display, you will normally work only with addresses `C000` to `FFFF`.

To exclude the lower half of the `C000` to `FFFF` range, enter the following `/EXCLUDE` command in your `EMM386.SYS` or `HIDOS.SYS` line in the **config.sys** file:

```
/E=C000-DFFF
```

---

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Then, reboot your computer to test the exclusion. If the problem persists, edit the `/EXCLUDE` statement to exclude the other half of the `C000` to `FFFF` range by entering the following in the `config.sys` file:

```
/E=E000-FFFF
```

Continue excluding a smaller and smaller range of memory until you have found the smallest possible exclusion, which still permits proper functioning.

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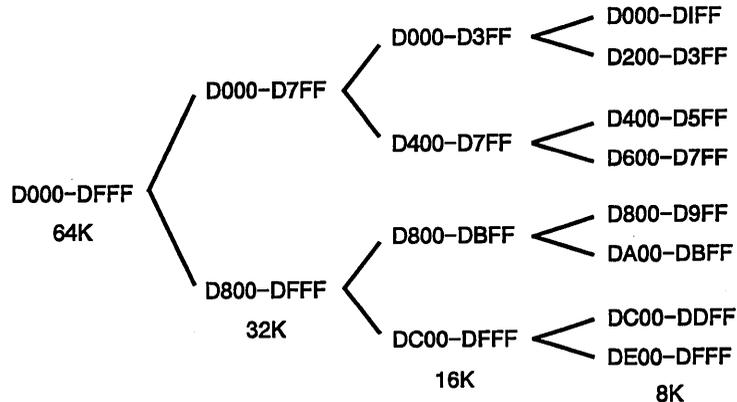
### Note

The first address in each range of memory (`EXCLUDE`, `INCLUDE`, etc.) must end in "00" and the second must end in "FF."

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Note that you can also exclude multiple memory ranges with the `/EXCLUDE` statement by separating the ranges with a comma, e.g., `/E=D000-D7FF,DA00-DBFF`.

The chart below shows how this process works, and shows the



memory address for the 64 Kbyte range in the "D" segment of upper memory.

(The first "D" in each hex address above can be replaced with C, E, or F when working with those segments.)

Once you find the conflicting range of upper memory, permanently exclude it from being used by `EMM386.SYS` or `HIDOS.SYS` by using the `/EXCLUDE` statement.

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## Video Problems

If you experience problems with your video display after installing MemoryMAX drivers, a possible cause is that your video adapter is attempting to use some of the same upper memory addresses being allocated by EMM386.SYS or HIDOS.SYS.

A quick way to determine if your current memory setup is causing a conflict with a video (or other device) board is to “turn off” the entire memory driver line in your **config.sys** file by using the REM command or the “?” technique discussed previously in “Isolating the Problem.” If the problem does not recur with the memory driver “turned off,” the cause of the problem is probably an upper memory conflict.

See “The DR DOS MemoryMAX System” on page 2 for information about how to determine if upper memory is being used by drivers and hardware boards.

Use the EMM386.SYS or HIDOS.SYS /VIDEO option to reserve graphics memory addresses normally occupied by video display adapters (see Chapter 11 of the *DR DOS 6.0 User Guide*).

If the /VIDEO option is set, and the video corruption is occurring with a graphics program, be sure that the MEMMAX -V switch is operative. When only text displays are required, the MEMMAX +V switch can borrow some of the graphics memory areas and add it to conventional memory, providing more space for text applications. However, if an application requires graphical displays, you must be sure this memory area is available to video by issuing the MEMMAX -V command.

If the video display is corrupted only during use with the DR DOS TaskMAX™ task switcher, refer to the **readme** file (in the DR DOS directory) or the Release Note for instructions on how to use the TaskMAX /F switch.

## Network Hardware Interfacing

It is common for network hardware to utilize areas of upper memory and thus conflict with MemoryMAX allocations of that memory. If this occurs, you might be unable to log onto the network or random lockups might occur. See “Upper Memory Conflicts” on page 17 and “Using Network Software” on page 30 for a full discussion of how to deal with upper memory conflicts

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such as these and how to use the EMM386.SYS /EXCLUDE switch to exclude the conflicting areas of upper memory.

Another possible cause of network problems is that your network driver is designed for use with MS-DOS® versions other than versions 3.3+. Network drivers designed for use with MS-DOS versions 4.0+ and 5.0 would not be appropriate for the DR DOS 6.0 operating system. (See “Using Network Software” on page 30.)

## Floppy Drive Does Not Work

If you have installed Super PC-Kwik™ and have enabled the /D+ switch, your disk controller must be 100% IBM compatible. Reset the /D+ switch to /D- (the /D# switch works on some controllers) to turn off PC-Kwik’s advanced caching for the floppy drives (advanced caching for your hard drive remains in effect).

## SCSI Disk Drive Problems

The DR DOS 6.0 operating system supports virtual DMA and bus master controllers. Any problem with SCSI drives is probably due to a memory conflict (see “Upper Memory Conflicts” on page 17).

## Expanded (EMS) Memory Problems

If a program that requires EMS memory reports that no EMS is available or locks up when executed, the problem might be that the application assumes that the LIM page frame starts at a specified address.

Remedy this problem by ensuring that the LIM page frame defined in the application’s SETUP program or documentation matches the settings in EMM386.SYS or EMMXMA.SYS. The /F= switch defines the *start* of the LIM page frame.

Another cause of insufficient LIM memory occurs if you are using TaskMAX in expanded memory and too many tasks have been loaded. Unload a few of the tasks and restart the program.

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### Error message: “!Packed file is corrupt.”

This error might occur when the first 64 Kbytes of conventional memory (called low memory) have been made available through the use of MemoryMAX. Normally, the operating system occupies this entire area. Some applications were written using packing utilities that become confused when run in this low memory. If this happens, the following message appears:

```
!Packed file is corrupt.
```

For an easy workaround, use the MEMMAX -L command to disable low memory before running the application. Then load and run your application. After exiting the application, use MEMMAX +L to enable the low memory area once again.

Because this problem can occur with other memory managers, including QEMM.386, your application vendor might be able to supply you with an updated application that does not exhibit this problem.

## Using EMM386.SYS with Windows

### Using Windows in Real mode

Note that before you load Windows in Real mode, ensure that upper memory (and additional memory created by the /VIDEO option of EMM386.SYS or HIDOS.SYS) is *disabled*. (Use the default MEMMAX -U -V commands to disable upper memory; see Chapter 10 in the *DR DOS 6.0 User Guide*.)

### Using Windows in Standard Mode

#### The /WINSTD Switch

When using Windows 3.0 in Standard mode, Windows attempts to use the UMB memory addresses; when these addresses have been previously allocated by EMM386.SYS, Windows is unable to operate in the Standard mode. To make the UMBs available to Windows, you must use the EMM386.SYS /WINSTD switch—this switch forces compatibility with Windows 3.0 in Standard mode by freeing all upper memory.

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Note that using `/WINSTD` reduces the amount of conventional memory available to applications because upper memory is reserved for Windows. Therefore, the `/WINSTD` command also disables the `HIDEVICE`, `HIINSTALL`, `HILOAD`, and `HIDOS=ON` functions.

## Using Windows in Enhanced Mode

Microsoft recommends a minimum of 1 Mbyte of extended memory to run Windows 3.0 in enhanced mode, however, 2 Mbytes or more is recommended. Although Windows can be forced to run in the enhanced mode with less extended memory, its operational speed might be extremely degraded.

Note that on a system with only 1 Mbyte of extended memory, using the High Memory Area (HMA) for `HIBUFFERS` or `/B=FFFF` will reduce the extended memory by 64 Kbytes. If this causes a problem, use the `/B=AUTO` option and the `BUFFERS=` instead of `HIBUFFERS=` command.

For more information about using Windows with the DR DOS 6.0 operating system, refer to Appendix E of the *DR DOS 6.0 User Guide*, "Using Windows with DR DOS."

Occasionally, you will continue to experience difficulty in loading Windows 3.0 in enhanced mode even after reviewing the documentation. This situation can usually be corrected by reconfiguring the DR DOS 6.0 memory manager or adjusting other DR DOS 6.0 utilities, such as Super PC-Kwik. If you need to call your dealer or support center for additional assistance, be sure to have the serial number from your DR DOS 6.0 diskettes and a copy of your `config.sys` and `autoexec.bat` files available.

## Using Super PC-Kwik and Windows 3.0

Disk caching with Super PC-Kwik is recommended for improved performance with Windows. Important notes on using PC-Kwik with Windows are in Chapter 13 of the *DR DOS 6.0 User Guide*.

Although PC-Kwik attempts by default to use all available extended memory, it lends back up to *half* of that to applications as requested.

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Windows is unique in that it allocates *all* extended memory as it is loaded. Other applications use varying amounts of extended memory as they need it.

Because Windows needs 2 Mbytes or more of extended memory to run efficiently in enhanced mode, you must force PC-Kwik to lend at least 2 Mbytes of extended memory back to Windows on systems with insufficient extended memory for both the cache and Windows (i.e., those with less than 4 Mbytes of extended memory).

For example, on a system with a total of 4 Mbytes of memory (3 Mbytes extended), Super PC-Kwik would lend only 1536 Kbytes by default ( $3072 / 2 = 1536$ ). Because Windows prefers 2048 Kbytes or more, increase the default by using the following command:

```
SUPERPCK /L:2048
```

If total system memory is 5 Mbytes, or more, the Super PC-Kwik default lending of one-half of extended memory is sufficient to have an effective cache and run Windows in enhanced mode. If you run several applications through Windows and run out of memory, you can increase the lending amount with the PC-Kwik /L:xxxx switch.

If total system memory is large, for example 8 Mbytes or more, and you use Windows extensively, turn off lending completely and set the allocated amount for the cache buffer. For example, on a system with a 10 Mbyte total (9 Mbyte extended) use the following PC-Kwik switch: SUPERPCK /L- /S:3072. This keeps the cache buffer high, while giving Windows 6,144 Kbytes of extended memory for its own use. Once again, enable lending if Windows is running out of memory.

## Using SuperStor™ with Windows 3.0

The Windows permanent swap file cannot exist on a compressed volume.

To use SuperStor with Windows, we suggest you first delete the existing Windows permanent swap file on the target partition *before* creating a SuperStor volume. You can then create a permanent swap file on a non-SuperStor partition. Refer to your Windows documentation for specific instructions.

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## Using TaskMAX with Windows

You can load Windows 3.0 from TaskMAX, but you cannot go back to TaskMAX until you exit Windows. This is because Windows takes over control and will not co-exist with another task-switcher or multi-tasker. Windows takes control of the keyboard from DOS.

You can configure TaskMAX to use extended memory for tasks. If the available extended memory falls below 1 Mbyte of memory because of use by TaskMAX, Windows cannot run in enhanced mode. To correct this problem, exit some of the applications loaded in TaskMAX.

TaskMAX can also use disk space as swap space. If you do not have a permanent swap file in Windows and have too many applications loaded in TaskMAX, Windows might run out of room on the disk as it tries to create its temporary files. To correct this problem, exit some of the applications loaded in TaskMAX.

## Using DISKOPT with Windows

DISKOPT will not defragment the Windows permanent swap file. We recommend that you delete your Windows swap file, run DISKOPT, and then immediately create a new swap file. This process ensures that the new file will use contiguous disk space for best performance.

Note that you should *not* run disk utilities such as CHKDSK and DISKOPT under Windows.

## Using Super PC-Kwik

### Size of Cache

Super PC-Kwik moves as much of its code into upper memory as possible; you do not need to use HILOAD or HIINSTALL on Super PC-Kwik. Super PC-Kwik will use the least amount of memory for its executable code if it is configured to cache in expanded (EMS) memory. The Super PC-Kwik code "footprint" is typically about 17 Kbytes in upper memory.

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When Super PC-Kwik is configured to cache extended memory, the code footprint in the first 1 Mbyte of memory varies in size according to the amount of extended memory that is cached.

The Super PC-Kwik footprint in upper memory can be controlled by limiting the amount of extended memory allocated to the cache. If your system has more than 8 Mbytes of RAM, you might want to use the Super PC-Kwik /S:xxxx switch to limit the cache buffer size.

The Super PC-Kwik maximum cache buffer size is 16 Mbytes.

For information about running Super PC-Kwik with Windows, see "Running EMM386.SYS with Windows" on page 22 and Chapter 13 of the *DR DOS 6.0 User Guide*.

## Using Super PC-Kwik with Networks

You can load Super PC-Kwik on a DOS-based network server (e.g., Lantastic 4.0). However, advanced cache reads and writes should be disabled (use the Super PC-Kwik /H- and /D-switches.)

If you are using Novell® NetWare™, load Novell drivers *before* loading Super PC-Kwik to permit unloading the cache. You can load the Novell drivers after, but you must then leave Super PC-Kwik in memory.

Super PC-Kwik will not cache remote network drives (i.e., across the network). However, local drives can be cached.

When used on a network, the DR DOS 6.0 operating system must reload COMMAND.COM after Super PC-Kwik loads. You must use the DR DOS SHELL and SET COMSPEC commands to point to the location of COMMAND.COM. See Chapter 11 of the *DR DOS 6.0 User Guide* for a discussion of how to use the SHELL command, and Chapter 10 on how to use the SET command.

Do not use the DR DOS VERIFY=ON command when using a network as it will negate any gain from caching.

Also, when using Super PC-Kwik, the BUFFERS=4 command in the **config.sys** file is adequate, and the FASTOPEN command is generally not needed.

Generally, Super PC-Kwik should be loaded early in **autoexec.bat**. TSRs loaded after Super PC-Kwik must be

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unloaded from memory before Super PC-Kwik can be unloaded with the /U parameter.

If you use Lotus 1-2-3 v3.1, note that it uses the Rational Systems DOS Extender. Use the DR DOS SET DOS16M=:384 command in the **autoexec.bat** file and use the Super PC-Kwik /R:400 switch.

## Troubleshooting Super PC-Kwik

If, after eliminating the factors listed above, Super PC-Kwik still malfunctions, check the parameters used when loading Super PC-Kwik. Begin with the simplest settings, such as /H-, /T-, and /D-.

If you suspect an upper memory conflict, use the Super PC-Kwik /&U- switch to prevent parts of Super PC-Kwik from moving into upper memory.

If you are having problems reading a drive, try the Super PC-Kwik /I+, /X /I+, or /T- switches. Also, see "Upper Memory Conflicts" on page 17.

## Using TaskMAX

If you have loaded a task that abnormally terminates, the TASKMAX.SWP file size might have increased in size. If this occurs, delete the file to free the disk space. A new file by the same name will automatically be created.

When using the /C switch with TaskMAX (either from the **autoexec.bat** file or from the command line), be sure to wait approximately 10 seconds before making any keystrokes. This allows TaskMAX to regain control after the application has loaded.

You cannot change the MEMMAX settings while TaskMAX is active. Be sure to make appropriate MEMMAX settings (for example, MEMMAX to +V) before executing TaskMAX.

You can only copy *text* when using the COPY (F5) function in TaskMAX to export data. You will get the following error message if you attempt to copy from graphics mode: "Warning: Cannot copy data from Graphics Screen. ESC to cancel."

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If you are in the process of importing/exporting data and you switch tasks before the importing is completed, the importing halts. However, all the information that was copied is still in memory and if you press the F6 key, importing will start from the beginning. In fact, the information that has been copied can be pasted over and over until you import new text.

You can load the DR DOS Editor more than once while using TaskMAX; however, you will get the following error message if you attempt to simultaneously edit the same file in two task sessions: "Disk error—file already open." Most single-user applications will produce the same type of error message.

If you are working on a laptop computer and have chosen "LCD/Plasma" and it appears that you do not have a highlight bar, go back through SETUP and choose the ColorSet0 "Monochrome" option.

If you are using GeoWorks™ with TaskMAX, you can use *only* CTRL/ESC as your hotkeys. GeoWorks intercepts all other hotkey combinations.

## Using SuperStor Disk Compression

### Installation Tips

The DR DOS 6.0 version of SuperStor recognizes and will operate correctly on SuperStor partitions created with the AddStor retail SuperStor version 1.3. The DR DOS 6.0 version of SuperStor was not designed to be compatible with other operating systems and should not be expected to work properly except with DR DOS 6.0.

Before using SuperStor, backup the data on the drives to be compressed. If there is a power failure during the compression, some data could be lost.

SuperStor requires that a **config.sys** file be present on the bootable drive to run properly. If you do not have a **config.sys** file, you can create one using the DR DOS 6.0 Editor. Use the DR DOS "DEVICE=" statement to load the SSTORDRV.SYS driver. SSTORDRV.SYS will automatically move into upper memory (through the use of XMS UMBs) if space is available. This is true regardless of whether the XMS UMBs are allocated

by the DR DOS 6.0 operating system or by a third party memory manager.

Determine the maximum amount of uncompressed space you want to leave on the disk. Note that a Windows 3.0 permanent swap file cannot reside on a compressed volume. The actual amount left uncompressed will depend on the data compression ratio and the disk space available before the compression was done (in other words, SuperStor will use as much space as necessary to compress all of your files).

If you are using a disk partitioning utility or removable drive that requires a device driver, you might need to experiment to determine if that driver should come before or after SSTORDRV.SYS in your **config.sys** file. The following list is in the correct loading sequence for some of the more common of these device drivers:

- ❑ DiskManager<sup>®</sup> or SpeedStor<sup>™</sup> partitioning utility drivers should be loaded before SSTORDRV.SYS.
- ❑ The Bernoulli<sup>®</sup> RCD.SYS driver must be loaded before SSTORDRV.SYS; also, to use SuperStor on a bootable Bernoulli cartridge, the RCD.SYS driver must be on an uncompressed partition.
- ❑ The Plus<sup>®</sup> Hardcard<sup>®</sup> driver must be loaded after SSTORDRV.SYS.

Many customers make a backup bootable floppy diskette in case of unexpected problems such as a hard disk controller failure. After creating a SuperStor partition, be sure you update the **config.sys** file on your backup bootable floppy to include the SuperStor driver (and DEVSWAP.COM, if required), and copy these files onto the bootable diskette.

SuperStor should typically not be used on a network server, however it will work as designed on a workstation drive.

## Troubleshooting SuperStor

The largest partition you can create with SuperStor is 512 Mbytes, using a physical partition of 256 Mbytes. If you have a partition larger than 256 Mbytes, you will need to back up your data and use the FDISK utility to create smaller partitions before creating a SuperStor volume.

Some customers have reported difficulty installing SuperStor onto a second physical hard drive. This might occur if DOS operating system files are present. Because system files are

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hidden, a DIR listing will not detect them. Use the command XDIR I\*.\* to determine if the files IBMBIO.SYS or IBMDOS.COM are present. If they are, use the ATTRIB command to remove the system and hidden attributes, then remove or rename the system files.

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### Note

Do not remove or rename these files on your first physical hard drive.

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If you accidentally remove the SuperStor partition while the DR DOS 6.0 DELWATCH utility is active, you might be able to undelete the SuperStor partition file, thus restoring the SuperStor partition.

If you use a third party disk optimizer on a SuperStor partition, data should not be lost or corrupted. However, because the third party optimizers might not properly recognize the structure of the SuperStor partition, they might actually cause worse fragmentation than that which existed prior to the optimization process. Therefore, we recommend that you use the DR DOS 6.0 DISKOPT utility, which will properly handle the SuperStor partition.

## Using Network Software

The DR DOS 6.0 operating system is internally compatible to the COMPAQ® DOS 3.31 data structures and should work with network drivers intended for DOS versions 3.x. If you are upgrading from DOS 3.x to the DR DOS 6.0 operating system, it should not be necessary to upgrade your existing driver. However, if you were using DOS 4.01 or 5.0, you might have to use a network driver intended for MS-DOS 3.x. If you do not presently have a DOS 3.x driver, your network manufacturer will usually supply you with one.

The following are examples of some of the many networks that will run on the DR DOS 6.0 operating system with their existing DOS 3.x drivers.

- 3COM3+ OPEN and 3+ SHARE
- Lantastic 4.0
- Lan Manager 1.2 and 1.3
- MS-NET
- Novell NetWare 2.15 and higher
- Banyan<sup>®</sup> Vines

When configuring your network, keep in mind that the DR DOS 6.0 operating system reports a DOS 3.31 internal version number when drivers or applications make an INT 21 DOS version call.

Problems rarely occur when the correct network driver is used. If you experience error messages such as "Error: can't find server," or your system crashes when you first log on to the network, your system is probably encountering upper memory conflicts between your network driver and the DR DOS memory driver settings.

See "Upper Memory Conflicts" on page 17 for instructions on how to resolve upper memory conflicts by using the EMM386.SYS and the HIDOS.SYS /EXCLUDE command to reserve areas of upper memory for network drivers.

You can also isolate the problem by using the techniques described in "Isolating the Problem" on page 13.

## The Novell NetWare Program

The DR DOS 6.0 operating system has been thoroughly tested on the Novell NetWare program from version 2.15 and above.

The vast majority of questions about the NetWare program deal with:

- Installation/Compatibility considerations of the DR DOS 6.0 operating system on a Novell network.
  - Using TaskMAX with NetWare.
  - Using MemoryMAX with NetWare, or maximizing the amount of conventional memory for applications.
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### Installation/Compatibility Considerations

The DR DOS 6.0 operating system is internally compatible with DOS 3.31 data structures. As a result, when programs like the Novell NetWare shell programs ask the DR DOS 6.0 operating system for a version number, the DR DOS 6.0 operating system reports "3.31." It is important to understand this when installing the DR DOS 6.0 operating system onto NetWare workstations and onto NetWare servers. If you have a mix of different DOS versions, follow the manufacturer's suggestions in regard to configuring the network for COMPAQ DOS 3.31 workstations.

### Server Installation

If you choose to install the DR DOS 6.0 operating system onto a non-dedicated server, consult the Novell NetWare reference manuals or your network administrator for information on installing and configuring a non-dedicated server. The DR DOS 6.0 operating system requires no unique consideration in this case.

When configuring a network so that all the system utilities are loaded on the server, the NetWare server should contain copies of all the required DOS files used at each workstation. If certain workstations are running DOS 4.x, then a particular directory on the server will hold a copy of the set of all DOS 4.x system files used by the workstation when it is running independent of the network. When a DR DOS 6.0 workstation is logged onto the network, at least one of the workstation's network drives will be "mapped" to the directory on the server holding the DR DOS 6.0 system files.

Refer to the *DR DOS 6.0 User Guide*, Appendix F, for information on configuring a NetWare server to properly load the DR DOS 6.0 operating system on remote diskless workstations.

### Workstation Installation

When installing the DR DOS 6.0 operating system on a network workstation that is part of an existing network, you will usually not have to make any changes to the workstation; simply install the DR DOS 6.0 operating system once the NetWare server has been "updated" with the DR DOS 6.0 operating system. If you are upgrading from DOS 3.x to the DR

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DOS 6.0 operating system, it should not be necessary to upgrade your existing NetWare shells. However, if you are upgrading from DOS 4.x or MS-DOS 5, you will have to use NetWare shells intended for use with DOS 3.x. You can use the proper set of NetWare shell programs obtained from your network administrator or Novell, or you can use the set provided in the NETWARE directory on the DR DOS 6.0 ViewMAX installation diskette.

If you have to change shell programs, you might need to generate a new IPX.COM program to accompany the new shell version. Consult the Novell NetWare reference manuals or your network administrator for information on how to accomplish this.

### Using TaskMAX with NetWare

Before using TaskMAX on a NetWare workstation, you must update your NetWare shell programs. The necessary files are provided in the NETWARE directory on the last DR DOS 6.0 operating system diskette (typically labelled ViewMAX). This update should be done by your Network System Administrator.

Under most circumstances, no further adjustments will be necessary to run TaskMAX on a NetWare workstation.

Load the NetWare shell programs and all drives and printers mapped before loading TaskMAX. If NetWare utilities like MAP, LOGIN, and SESSION are run from more than one DR DOS command prompt via TaskMAX, the resulting drive and printer mappings might not work as expected.

If within one or more tasks under TaskMAX, you choose to run an application that makes direct calls to the Novell IPX or SPX TSR program (sometimes called a peer-to-peer application), you might need to load the IPX data buffering program called TBMI2.COM before loading TaskMAX. This program will handle the buffering of information from IPX or SPX so that data is not lost after switching away from one of these peer-to-peer applications. Further information on TBMI2.COM can be found in a file called TBMI2.DOC on the DR DOS 6.0 ViewMAX diskette.

### Using MemoryMAX with NetWare

When using the DR DOS 6.0 operating system on a NetWare workstation that supports upper memory, you can move both of

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the required NetWare programs outside conventional memory and into upper memory to maximize the amount of memory available to applications running after the NetWare programs have been loaded. (See Appendix C in the *DR DOS 6.0 User Guide* for a description of the various regions of memory within a computer, and Chapter 12 for information on what regions will be available on your particular computer.)

When upper memory is available, the NetWare programs IPX.COM and NETX.COM or NET3.COM (NETX is hereafter used to describe either program), can be loaded into upper memory using the HILOAD command from the **autoexec.bat** file or from the DR DOS command line.

### Memory Usage

To determine if IPX and NETX programs will “fit” into upper memory, do the following:

- 1 Determine the memory size requirements of these programs by examining the output of the MEM /A /P command after the programs have been loaded into conventional memory or loaded without MemoryMAX. (See the *DR DOS 6.0 User Guide*, Chapter 10, for more information on the MEM command.)
- 2 Disable any and all upper memory used by device drivers, TSRs, and/or applications by inserting a REM statement or a “?” command at the beginning of each line containing HIDEVICE, HIINSTALL, and HILOAD commands in your **config.sys** and **autoexec.bat** files. Use the DR DOS Editor program.
- 3 Make upper memory available on your machine by inserting the appropriate MemoryMAX device driver line into your **config.sys** file or by running SETUP, and then reboot your computer by typing **Ctrl-Alt-Del**.
- 4 Without having loaded any of the NetWare programs, examine the size of areas in upper memory that are marked as FREE in the TYPE column of the MEM /U /P command output.

As a general rule, when the size of one or more of these upper memory areas marked as FREE exceeds the size of a program that is loaded into conventional memory, it will be possible to relocate that program into upper memory. It is important to note that the size of total FREE upper memory is not as

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important as the size of the individual FREE areas of upper memory, because applications require contiguous free memory to load.

## Using HILOAD

When upper memory is available and when FREE areas exist large enough to contain the NetWare programs, the HILOAD command can be used to move the NetWare programs into upper memory. Upper memory is made available by loading the appropriate MemoryMAX driver at boot time and executing the MEMMAX +U command to “open” upper memory so that it will accept programs loaded by HILOAD. The following four lines describe one way you can load the NetWare programs using HILOAD:

```
MEMMAX +U
HILOAD IPX.COM
HILOAD NETX.COM
MEMMAX -U
```

These lines can be appended to your **autoexec.bat** file or they can be executed from the DR DOS command line. Note that the DR DOS INSTALL program will automatically insert the command, MEMMAX -U >NUL, into your **autoexec.bat** file, so you must insert MEMMAX +U to override it. (The >NUL portion of the command instructs the DR DOS 6.0 operating system not to display the output of the MEMMAX command on the screen.)

In addition, please note the following about the HILOAD command:

- ❑ HILOAD will work only with the DR DOS MemoryMAX drivers, and not with third party memory managers such as QEMM386.SYS and 386MAX.SYS.
- ❑ HILOAD will not run after NET3.COM has been loaded. This is because Novell replaces the DOS routines (INT 21 functions) that handle HILOADs under the DR DOS 6.0 operating system with their own routines, which cannot place programs into upper memory.

## Troubleshooting

**NetWare shell programs won't load into upper memory.**

Make sure that upper memory is available and that the size of one or more upper memory areas marked as FREE exceeds the

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size of the NetWare shell program that is loaded into conventional memory instead of upper memory. (See the *DR DOS 6.0 User Guide*, Chapter 10, for more information on the MEMMAX and MEM commands and how they can be used to determine if the above conditions are met.) Also, consider the following.

For EMM386.SYS users:

- ❑ You can append the /LOWEMM switch to the EMM386.SYS device driver line in your **config.sys** file. The EMM386.SYS device driver leaves its program code in conventional memory, which should give you an additional 28K of upper memory.
- ❑ If LIM (Expanded memory) is not really necessary, you might consider disabling it: change the /FRAME switch on the EMM386.SYS device driver line so that it reads /F=NONE.
- ❑ If LIM is necessary, you might consider using another NetWare shell instead of NETX.COM. (Refer to your Novell reference manuals for information on how EMSNETX.COM and XMSNETX.COM work.)
  - ❑ With both EMSNETX.COM and XMSNETX.COM, do not use the HILOAD command.
  - ❑ With XMSNETX.COM, the /BDOS switch on the EMM386.SYS device driver line should be changed so that it reads /B=AUTO or /B=NONE.
- ❑ Try changing the line that reads HIDOS=ON in your **config.sys** file so that it reads HIDOS=OFF. This prevents the DR DOS 6.0 operating system from automatically relocating certain portions of the operating system into upper memory.
- ❑ If only text-based applications will be run at this workstation, use the /VIDEO switch on the EMM386.SYS device driver line along with the MEMMAX +V command to enable the use of video RAM for extending conventional memory. This relieves the need to relocate the NetWare shell programs into upper memory.

For HIDOS.SYS users:

- ❑ Make sure that your machine will support upper memory. (See the *DR DOS 6.0 User Guide*, Chapter 12, for information on what regions are available on your particular computer.)
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- ❑ Consider using XMSNETX.COM instead of NETX.COM. With XMSNETX.COM, change the /BDOS switch on the HIDOS.SYS device driver line so that it reads /B=AUTO or /B=NONE.
- ❑ If you are using HIDOS.SYS with the /CHIPSET option set to EMSUMB, consider disabling the LIM (Expanded memory) support provided by your LIM 4.0 driver by using the /CHIPSET=EMSALL option instead. EMSALL will disable the LIM 4.0 page frame and make available a larger region of upper memory for mappable RAM.
- ❑ If your machine is equipped with at least 64K of extended memory above one megabyte, make sure that the /BDOS switch on the HIDOS.SYS device driver line reads /B=FFFF.
- ❑ Try changing the line that reads HIDOS=ON in your **config.sys** file so that it reads HIDOS=OFF. This prevents the DR DOS 6.0 operating system from automatically relocating certain portions of the operating system into upper memory.
- ❑ Use the /VIDEO switch on the HIDOS.SYS device driver line along with the MEMMAX +V command to enable the use of video RAM for extending conventional memory. This relieves the need to relocate the NetWare shell programs into upper memory.

### **Machine locks up when trying to load NetWare shell programs**

Some network cards maintain ROM addresses in the upper memory region. It is possible that the MemoryMAX driver (EMM386.SYS or HIDOS.SYS) is not able to recognize such areas as being already in use by the network card. If the DR DOS 6.0 operating system has written some portion of the operating system to a region of upper memory, which later gets used by the network card's ROM, the system might hang unpredictably. To correct this problem, you can append an /EXCLUDE switch to the MemoryMAX device driver line in your **config.sys** file to prevent the MemoryMAX driver from attempting to use an area known to be used by the network card. Refer to your documentation on the network card for information on areas used in upper memory and follow the instructions for using the /EXCLUDE switch on those areas as shown in the HIDOS.SYS and EMM386.SYS sections of Chapter 11 in the *DR DOS 6.0 User Guide*.

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If you installed Novell NetWare, or you installed additional hardware in your computer after you installed the DR DOS 6.0 operating system, it is possible that the IRQ or DMA settings on the new hardware might be conflicting with existing hardware. In this case, it is best to resolve hardware conflicts by changing the configuration of one or more installed boards before changing the configuration of the DR DOS 6.0 operating system.

**Machine locks or generates “!Packed file corrupt” error message when executing Novell NetWare utility programs**

This situation might occur in older versions of the NetWare utilities. The error message does not reflect the true cause of the problem. Use the MEMMAX -L command before executing the problematic NetWare utility, and then use the MEMMAX +L command after. The following is an example of how this might look in your **autoexec.bat** or login file:

```
MEMMAX -L
LOGIN
MEMMAX +L
```

## Using Third-party Memory Managers

### Relocating the Kernel

When you use a memory manager from another vendor, you can gain additional conventional memory space by relocating the DR DOS kernel to upper or high memory. The third-party memory manager must support the XMS specification, and upper or high memory must be available.

To relocate the kernel, insert the statement:

```
DEVICE=C:\DRDOS\HIDOS.SYS
```

after the statement that loads the third-party memory manager.

HIDOS.SYS attempts, by default, to relocate the DR DOS kernel to upper memory. If upper memory is not supported or not available, the kernel is placed in high memory. You can force the kernel to high memory by using the following DEVICE statement:

```
DEVICE=C:\DRDOS\HIDOS.SYS /BDOS=FFFF
```

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The following examples show how and where to add the statement when loading Qualitas® 386MAX® or the Quarterdeck QEMM or QRAM drivers.

#### Qualitas 386MAX

```
DEVICE=C:\386MAX\386MAX.SYS [...etc.]  
DEVICE=C:\DRDOS\HIDOS.SYS [...etc.]  
DEVICE=C:\386MAX\386LOAD.SYS [...etc.]
```

#### Quarterdeck QEMM.386

```
DEVICE=C:\QEMM\QEMM.SYS [...etc.]  
DEVICE=C:\DRDOS\HIDOS.SYS [...etc.]  
DEVICE=C:\QEMM\LOADHI.SYS [...etc.]
```

#### Quarterdeck QRAM (with Intel AboveBoard™)

```
DEVICE=C:\ABOARD\EMS.SYS AT 208 MC  
DEVICE=C:\GRAM\GRAM.SYS  
DEVICE=C:\DRDOS\HIDOS.SYS  
DEVICE=C:\GRAM\LOADHI.SYS [...etc.]
```

---

#### Note

EMM386.SYS cannot be used with other memory managers.

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When a third-party memory manager is loaded, the following **config.sys** statements have no effect:

```
HIINSTALL  
HIDEVICE
```

HIDOS= [ON/OFF] will work with third party memory managers that provide XMS UMB support. However, HILOAD, HIDEVICE, and HIINSTALL commands have no effect. Most memory managers offer equivalent commands that you can use.

## Quarterdeck DESQview™

When running the Quarterdeck DESQview program under the DR DOS 6.0 operating system, use the QEMM386.SYS driver as the primary memory management driver instead of EMM386.SYS provided with the DR DOS 6.0 operating system. When QEMM386.SYS loads from the **config.sys** file, it then becomes responsible for controlling both the upper memory area, between 640 Kbytes and 1 Mbyte, and the high memory area, the first 64 Kbytes above 1 Mbyte.

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Move device drivers and memory resident software to upper memory using the normal QEMM LOADHI commands. After loading QEMM386.SYS, the operating system kernel can still be moved to upper memory or high memory by loading the DR DOS HIDOS.SYS driver in the **config.sys** file right after the QEMM386.SYS driver. To move the kernel to upper memory, use the option /B=AUTO at the end of the HIDOS.SYS line in **config.sys**. To specify that the kernel should be placed in high memory, leaving more upper memory available for device drivers and memory resident programs, use the option /B=FFFF.

Depending on the configuration of DESQview, a gain in available memory might not be seen after loading HIDOS.SYS. DESQview uses the high memory for 63Kbytes of code that normally sit in conventional memory, while HIDOS.SYS moves approximately 45Kbytes into that area. Because the high memory area can be used by only one application at a time, experiment with /B=AUTO, /B=FFFF, or do not load HIDOS.SYS.

These different options can be quickly tested using the DR DOS 6.0 question mark option (?) in **config.sys**. Placing a ? in front of any line in **config.sys** displays that line at boot-up and then you can select Y(es) or N(o) to execute that instruction.

You might insert the following lines while experimenting:

```
? "Do you want to avoid moving the KERNEL (Y/N) "GOTO SKIP
?"Kernel in Upper Memory (Y/N) "
DEVICE=C:\DRDOS\HIDOS.SYS /B=AUTO
?"Kernel in High Memory (Y/N) "
DEVICE=C:\DRDOS\HIDOS.SYS /B=FFFF
:SKIP
```

Refer to Chapter 11 of the *DR DOS 6.0 User Guide* for a full discussion of this feature.

If you are running QEMM386.SYS without DESQview, you should always move the kernel to high memory.

## The DR DOS 6.0 Version Numbers

A few applications and device drivers have been encountered which, when loading under the DR DOS 6.0 operating system,

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display an error message that states the current version of operating system is not supported. This can occur for several reasons, which are outlined below.

Device drivers for disk drives or networks are sometimes produced for specific versions of DOS or occasionally will use specific configurations for different versions of DOS. The DR DOS 6.0 operating system will appear to be COMPAQ DOS 3.31 to applications and drivers. Usually, a DOS 3.3 driver works properly. If you have been running previously with MS/PC DOS 4.x, the driver that you have been using might be designed specifically for that version. Contact the manufacturer of the driver to see if they have any specific configuration information or drivers for DOS 3.3x.

When applications request the DOS version number from the operating system, the DR DOS 6.0 operating system returns version 3.31. The application then knows that it should expect support for DOS 3.3-level calls and support for larger than 32 Mbyte partitions using the COMPAQ Extended Interrupt 25 and 26 convention. Most applications do follow these conventions and therefore work without any difficulty.

However, some applications have been designed to go beyond those conventions and actually attempt to directly manipulate DOS data structures or replace sections of the operating system code with their own. These applications depend on having intimate knowledge of each DOS version they detect and have been written to react differently for each of those versions. If an application uses this type of technique, the manufacturer will have to design the application to take the DR DOS 6.0 operating system into account as well. It is possible that the manufacturer has already produced another version of your application that runs under the DR DOS 6.0 operating system. Contact the manufacturer to see if there is any information about upgrades or specific configuration steps for the DR DOS 6.0 operating system. If the manufacturer is interested in more information about the DR DOS 6.0 operating system, they are welcome to contact Digital Research Inc. directly and we will work with them on the situation.

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## Using Large-capacity Hard Drives

When assigning drive partition letters, you might use up to 26 drive letters (A through Z) with the DR DOS 6.0 operating system.

You can use the DR DOS FDISK command to create disk partitions up to 2 gigabytes (Gbytes) apiece and up to 1,024 cylinders on a physical hard drive.

The DR DOS 6.0 operating system supports larger drives if the drive controller handles drive translation (check the drive documentation).

If your hard drive has more than 1,024 cylinders, and the controller does not support translation, we recommend the use of hard drive partitioning software such as the Ontrack Disk Manager.

## Using the DR DOS MEM Command

When using the EMM386.SYS device driver, you might notice that the MEM command can display a memory report that seems to show more memory available than exists on your computer. For example, consider the following EMM386.SYS device driver line on a computer with 3,072 Kbytes of Extended memory:

```
DEVICE=C:\DRDOS\EMM386.SYS /F=AUTO /K=AUTO /B=FFFF /R=AUTO
```

This line has the effect of converting all Extended memory into Extended via XMS and EMS (expanded) memory. The resulting MEM report might show that the computer has 3,072 Kbytes of Extended memory and 3,072 Kbytes of EMS memory under the “Total Bytes” column, with 2,864 Kbytes of Extended via XMS memory and 2,864 Kbytes of EMS memory under the “Available” column as shown below.

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Memory Type	Total Bytes (Kbytes)		Available	
Conventional	655,360	( 640K)	641,216	( 626K)
Upper	98,304	( 96K)	80,960	( 79K)
High	65,520	( 64K)	18,800	( 18K)
Extended	3,145,728	( 3,072 K)	0	( 0K)
Extended via XMS	N/A		2,932,736	(2,864 K)
EMS	3,145,728	( 3,072 K)	2,932,736	(2,864 K)

To understand this, it might be helpful to view the total Extended memory available on a computer as comprising a dynamic pool of memory. This memory can be viewed as dynamic because it is available to be accessed either as Extended via XMS memory or as EMS (expanded) memory depending on the "/K" setting on the EMM386.SYS device driver. In the case shown above, "/K=AUTO" tells EMM386.SYS to allow *all* of the Extended memory pool to be accessed as Extended via XMS memory and EMS memory in equal portions. Therefore, the MEM command shows both amounts of memory as being available because you or your applications might want to use a portion or all of the memory pool as either Extended via XMS memory or EMS memory.

Use the "/K" switch to limit the amount of EMS memory to be created from the total memory pool.

The following EMM386.SYS device driver line on the same computer with 3,072 Kbytes of Extended memory will limit the amount of EMS memory to be created from the total memory pool by setting the "/K" option to "/K=1024":

```
DEVICE=C:\DRDOS\EMM386.SYS /F=AUTO /K=1024 /B=FFFF /R=AUTO
```

This line instructs EMM386.SYS to convert all the memory pool into expanded via XMS, but it limits the amount of EMS to 1,024 Kbytes. The resulting MEM report might show that the computer has 3,072 Kbytes of Extended memory and 1,024 Kbytes of EMS memory under the "Total Bytes" column, with 2,864 Kbytes of Extended via XMS memory still available but only 896 Kbytes of EMS memory under the "Available" column as shown below.

Memory Type	Total Bytes (Kbytes)		Available	
Conventional	655,360	( 640K)	641,200	( 626K)
Upper	98,304	( 96K)	80,960	( 79K)
High	65,520	( 64K)	17,997	( 17K)
Extended	3,145,728	(3,072 K)	0	( 0)
Extended via XMS	N/A		2,932,736	( 2,864K)
EMS	1,048,576	( 1,024K)	917,504	( 896K)

Notice in both of the above examples, that there is a difference between the “Total Bytes” of Extended memory and the “Available” bytes of Extended via XMS memory and a similar difference between the “Total Bytes” of EMS memory and the “Available” bytes of EMS memory. This is due to the amount of “overhead” memory used by the EMM386.SYS software to convert the memory pool into both types of available memory.

XMS memory is extended memory created by memory management software which conforms to the XMS specification developed by Lotus, Intel, and Microsoft. The DR DOS memory management software device driver (EMM386.SYS) fully supports this specification and, as a result, initially converts all of the computer’s available extended memory into XMS extended memory. This is the reason that there is no “Extended” memory listed in the “Available” column of the DR DOS MEM report; it has all been converted to XMS memory by the EMM386.SYS device driver. This is also the reason why Extended via XMS lists as “N/A” under the “Total Bytes” column; XMS memory is created by a software device driver and is not present at boot time.

---

#### Note

EMS memory is listed with a specific value under the “Total Bytes” column by the MEM report unlike the Extended via XMS listing. EMS memory can be created by a software device driver (like EMM386.SYS alone) or can be created by EMS (LIM 4.0) hardware memory boards and their accompanying device driver. This specific value is intended to reflect this EMS memory created by the “/K” option on the EMM386.SYS device driver line or “hardware” EMS memory created by certain platforms, typically non-386/386sx/486 platforms, which

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actually contain EMS (LIM 4.0) hardware.

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## Memory Management for Advanced Users

Because the DR DOS 6.0 operating system has been designed to be compatible with a wide range of hardware, networks, and application software, we cannot prescribe a “perfect” or “best” memory optimization scheme. However, for users interested in fine-tuning their system to the maximum performance and finding that last Kbyte of usable memory, we can make the following suggestions regarding the EMM386.SYS memory manager.

### The /LOMEMM Option

You might need to use a very large block of upper memory for a single driver (for a network adapter, for example). Normally, EMM386.SYS loads approximately 28 Kbytes of its own code into upper memory; this, combined with a LIM page frame, for example, might not leave enough upper memory to load the large network driver into upper memory.

Use the EMM386.SYS /LOMEMM option to load EMM386.SYS code into conventional memory, freeing approximately 28 Kbytes of upper memory for your driver.

If you are upgrading from the DR DOS 5.0 operating system, also note that the DR DOS 6.0 EMM386.SYS driver has been rewritten, and uses approximately 4 Kbytes more than the DR DOS 5.0 version. This extra 4 Kbytes might “bump” a previously loaded driver out of upper memory and back into conventional.

### The /XBDA Option

Some PC-compatibles use a special area at the top of conventional memory for machine-specific uses. This area is called the XBDA (extended BIOS data area). Because placement at the top of conventional memory might interfere with the /VIDEO option, by default, EMM386.SYS relocates any extended BIOS data area to the bottom of the free area of conventional memory. However, there are some programs that

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require the extended BIOS data area to be kept at the top of conventional memory. Use the `/XBDA` option to disable this relocation.

If you use the `/XBDA` option, the BIOS data area sitting at the top of conventional memory will interfere with the contiguous placement of any memory gained by using the `/VIDEO` option (see below).

### The `/VIDEO` Option

The area of memory immediately above the 640 Kbytes of conventional memory is normally reserved for use by video adapters. A large amount of this reserved video memory is set aside to accommodate graphic displays. If you do not require graphics on your display, you can use the `/VIDEO` option to convert part of this memory for use as conventional memory. Depending on your system, you can gain from 64 Kbytes to 96 Kbytes of additional conventional memory using the `/VIDEO` option. Note that if your system uses an EGA or VGA display, you must *also* use the `MEMMAX +V` command to realize any memory gain. (See Chapter 11 of the *DR DOS 6.0 User Guide* for details.)

Also note that if you want to use the `EMM386.SYS /INCLUDE` or `/USE` options in the range A000-C000 to increase available upper memory, do not use the `MEMMAX +V` option.

### The `/AUTOSCAN` and `/INCLUDE` Options

You can use both of these options to scan 4 Kbyte blocks of upper memory to test whether they are available for use by `EMM386.SYS`. The `/AUTOSCAN` option is more “cautious” than `/INCLUDE` and is more likely to define an area as unavailable.

If, for example, `/AUTOSCAN` reports an area of upper memory as being unavailable, and there is no obvious reason why it should be, you can use `/INCLUDE` more aggressively to test and define the area for availability.

### The `/Use` Option

Use the `/USE` option of `EMM386.SYS` with caution and only if you are experienced in the art of upper memory management. The `/USE` option overrides all `EMM386.SYS` memory scans,

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and can map RAM over any hardware or ROM present in the specified range. In extreme cases, this might lock up the machine.

Therefore, we *strongly* recommend that any time you want to try the /USE option, you use the “?” comment with your EMM386.SYS line in the **config.sys** file (see Chapter 11 of the *DR DOS 6.0 User Guide*), and have a bootable floppy disk with original copies of your **config.sys** and **autoexec.bat** files handy.

## Final Notes

There are software products that are specifically designed to locate every free byte of upper memory that might be more effective than the /AUTOSCAN and /INCLUDE features of EMM386.SYS. Check your local software dealer for details.

Finally, if you are interested in memory issues, we also recommend that you research your local technical bookstores for information on books about memory management on the Intel 80xxx-based processors and IBM PC-compatible computers. A wide array of such books exist for all levels of technical expertise.

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# 4. Command Comparison

THIS chapter contains a comparison chart of the DR DOS 6.0 operating system commands and the PC DOS and MS-DOS command sets. Note that -E indicates an external command and -I indicates an internal command.

Commands	DOS 3.3 (PC DOS)	DOS 4.1 (MS-DOS)	DR DOS 5.0	MS-DOS 5	DR DOS 6.0
APPEND-E	X	X	X	X	X
ASSIGN-E	X	X	X(Internal) (Enhanced)	X	X(Enhanced)
ATTRIB-E	X	X	X(Enhanced)	X	X(Enhanced)
BACKUP-E	X	X	X	X	X
BREAK-I	X	X	X	X	X
CACHE			X		Super PC-Kwik
CHCP-I	X	X	X	X	X
CHDIR/CD-I	X	X	X	X	X
CHKDISK-E	X	X	X(Enhanced)	X	X(Enhanced)
CLS-I	X	X	X	X	X
COMMAND-E	X	X	X	X	X
COMP-E	X	X	X(Enhanced)	X	X(Enhanced)
COPY-I	X	X	X(Enhanced)	X	X(Enhanced)
CTTY-I	X	X	X	X	X
CURSOR			X		X
DATE-I	X	X	X	X	X
DEBUG	X	X	SID	X	SID

Commands	DOS 3.3 (PC DOS)	DOS 4.1 (MS-DOS)	DR DOS 5.0	MS-DOS 5	DR DOS 6.0
DEL-I	X	X	X(Enhanced) DELQ	X	X(Enhanced) DELQ
DELPURGE-E					X
DELQ-I			X		X
DELWATCH-E					X
DIR-I	X	X	X(Enhanced)	X	X(Enhanced)
DISKCOMP-E	X	X	X(Enhanced)	X	X(Enhanced)
DISKCOPY-E	X	X	X	X	X(Enhanced)
DISKMAP-E					X
DISKOPT-E					X
DOSBOOK-E					X
DOSKEY				X	
DOS SHELL			VIEWMAX	X	VIEWMAX
EDIT				X	
EDLIN-E	X	X	EDITOR	X	EDITOR
EMM386		X	X	X	X
ERAQ-I			X		X
ERASE-I	X		X(& ERAQ)	X	X(& ERAQ)
EXE2BIN-E		X	X	X	X
EXIT-I		X	X	X	X
EXPAND				X(required for MS-DOS 5 compressed files only)	
FASTOPEN-I/E	X	X	X	X	X
FC-E		X		X	X
FDISK-E	X	X	X(Enhanced)	X	X(Enhanced)
FILELINK-E			X		X
FIND-E	X	X	X(Enhanced)	X	X(Enhanced)
FOR-I				X	
FORMAT-E	X	X	X(Enhanced)	X	X(Enhanced)
GRAFTABL-E	X	X	X	X	X
GRAPHICS-E	X	X	X	X	X

Commands	DOS 3.3 (PC DOS)	DOS 4.1 (MS-DOS)	DR DOS 5.0	MS-DOS 5	DR DOS 6.0
HELP-I			X(-h option)	X	X(-h option) DOSBOOK
HILOAD-I			X		X
JOIN-E	X	X	X	X	X
KEYB-E	X	X	X	X	X
LABEL-E	X	X	X	X	X
LOADHIGH				X	HILOAD
LOCK-E					X
MEM-E		X	X(Enhanced)	X	X(Enhanced)
MEMMAX-E			X		X
MIRROR				X	DISKMAP
MKDIR/MD-I	X	X	X	X	X
MODE-E	X	X	X	X	X
MORE-I	X	X	X	X	X
MOVE-E					X
NLSFUNC-E	X	X	X	X	X
PASSWORD-E			X		X
PATH-I	X	X	X	X	X
PRINT-E	X	X	X	X	X
PROMPT-I	X	X	X	X	X
QBASIC				X	
RECOVER-E	X	X	X	X	X
RENAME-I	X	X	X	X	X
RENDIR-E					X
REPLACE-E	X	X	X(Enhanced)	X	X(Enhanced)
RESTORE-E	X	X	X(Enhanced)	X	X(Enhanced)
RMDIR/RD-I	X	X	X	X	X
SCRIPT-E					X
SELECT-E	X	X			
SET-I	X	X	X	X	X
SETUP-E			X		X(Enhanced)
SETVER				X	

Commands	DOS 3.3 (PC DOS)	DOS 4.1 (MS-DOS)	DR DOS 5.0	MS-DOS 5	DR DOS 6.0
SHARE-E	X	X	X(Enhanced)	X	X(Enhanced)
SID-E			X		X
SORT-E	X	X	X	X	X
SSTOR-E					X
SUBST-E	X	X	X(Internal)	X	X
SUPERPCK					X
SYS-E	X	X	X(Enhanced)	X	X(Enhanced)
TASKMAX-E					X
TIME-I	X	X	X	X	X
TOUCH-E			X		X
TREE-E	X	X	X(Enhanced)	X	X(Enhanced)
TYPE-I	X	X	X(Enhanced)	X	X(Enhanced)
UNDELETE				X	X
UNFORMAT				X	X
UNINSTAL				X	X
VER-I	X	X	X	X	X
VERIFY-I	X	X	X	X	X
VIEWMAX-E			X		X
VOL-I	X	X	X	X	X
XCOPY-E	X	X	X(Enhanced)	X	X(Enhanced)
XDEL-E			X		X
XDIR-E			X		X



