

DR NET USER'S MANUAL

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INTRODUCTION

DR Net is a **network operating system** that allows up to 255 MC-DOS computers to be linked in a **local area network**. A local area network is a group of computers, physically connected and running under a single network operating system, that are able to share resources. A user at a workstation of one computer can access information or equipment on a different networked computer.

Networks were developed because they offer several major advantages over other technologies. Compared to non-networked personal computers, networks allow files and programs to be shared, so that files are not corrupted by conflicting changes made by computers that are not in communication. Files can also be transferred via the network at roughly a thousand times the speed of modems, serial links, or floppy diskette exchanges. Networks also allow peripheral devices to be shared by all users, so that high-performance mass storage devices, printers, and plotters can be accessible from every workstation, without duplicating costly devices for each user. Compared to multiuser microcomputers, whose capacity is typically limited to a range from three to a few dozen users, a DR Net network can easily be expanded to hundreds of users by linking additional multiuser or personal computers to the network. Compared to mainframe and supermini computers, the distributed processing architecture of a DR Net network involves less costly hardware, software, and maintenance, and is more robust: If a computer within a DR Net network is disabled or powered down, only the workstations physically attached to that computer are affected.

The methods of physical connection and "token passing" used in Gifford's implementation of DR Net are based upon the ARCNET protocols that Datapoint Corporation developed in the 1970s for use in networks of mainframe and minicomputers. Because these are invisible to the user, this manual only concerns the commands and files that are used to obtain "network service," the operations in which an operator accesses the resources of another computer within the network. The software to accomplish this was developed by Digital Research Inc., and has been implemented by Gifford Computer Systems for several types of multiuser and single-user computers that can support Gifford's proprietary Multiuser Concurrent DOS (MC-DOS) operating system.

Shared Resources

Each workstation of an MC-DOS system can support up to four **virtual terminals**. A virtual terminal is like a channel on a television set, in that it uses the screen of a physical terminal to display files, program output, messages from the operating system, messages from other users, or whatever you are doing on that virtual terminal. By pressing a function key, you can switch the screen to other virtual terminals. The status line at the bottom of the screen can show which virtual terminal you are monitoring, and what programs each of your virtual terminals are running. (The number of virtual terminals that you have is limited by how much RAM memory is available in your system, what kind of physical terminal you have, and how the system manager has set up your MC-DOS system. Details on Virtual Terminals are presented in Gifford's VIRTUAL TERMINALS USER'S MANUAL.)

DR Net works by allowing resources of the network to be shared by virtual terminals. The resources that can be accessed via DR Net include:

- o Files, Programs, and Logical Drives, including both hard disks and floppies. You can run programs or access data files stored on the logical drives of other network computers, or you can transfer programs or data files from one drive to another within the network.
- o Printers and plotters. You can cause information from one part of the network to be printed or plotted by a device elsewhere in the network, either directly or by the DR Net SPOOLER command. By using a spooler system, your virtual terminal can be free for other work while your file waits for a printer to complete prior jobs.
- o Queues. A **queue** is a named data structure which can be used by MC-DOS or by programs to record information needed for later use. Shared queues provide a way for programs or MC-DOS operating systems in different parts of a DR Net network to communicate. Although typically used mostly with spooler systems, shared queues can enable software written for a network environment to operate with great efficiency.

Note that networks do **not** allow you to share RAM, central processing units, or terminals. Programs that you access on other parts of the network are executed by your local computer, after loading in its RAM memory. Terminals and modems are not objects to be shared in DR Net, because they are the subjects that share.

The resources of a DR Net network are shared by the virtual terminals within the network by a process called **mapping**. The most important function of the DR Net commands and files described in this manual is to "map" resources of another computer onto your virtual terminals. With a mapping command or file, you tell the operating system that whenever you call for a device like "drive K:" or "printer 5," or whatever names you use in your mapping, you are in fact referring to a specific device on some other part of the network. Once the mapping has been established, no further special commands are required to access the network resources, and whatever ordinary MC-DOS commands you use to access files on K: or to output to printer 5 (in this example) are carried out at the part of the network onto which your virtual terminal has been mapped.

Two remarkable features of DR Net should be noted. First, since DR Net maps resources for virtual terminals, rather than for physical terminals, each virtual terminal can be independently mapped. That means that even though MC-DOS limits you to no more than 16 logical drives (A: through P:), a DR Net workstation that supported four virtual terminals could have a much larger number of logical drives on line, if its four virtual terminals were mapped to different logical drives within a large network.

Second, the mapping commands that connect you to the various parts of the network that you need to access do not have to be remembered or repeated each time that you log in. Gifford provides a special command to save the current network mapping of your virtual terminal as a file. At a future time you can tell the system to read that file, configuring your virtual terminal within the network according to that template. This greatly simplifies and speeds use of the network.

Attaching and Detaching Terminals

A computer on the network that will allow terminals on other parts of the network to access its resources is called a **server**. A computer whose terminals can ask another part of the network to do something is called a **requester**. In a DR Net network, any computer in the network can be a server, or a requester, or both, according to what the system manager specifies in the CONFIG.NET file of each computer (described in **Section 3.1**).

Your computer keeps track of each virtual terminal and its mapping by means of a **requester configuration table (RCT)**. A table is created when a terminal "connects" to the network by a NET command (**Sections 1.1, 1.7, 2.5, and 2.8** show alternative ways). The LOGIN.SUB feature of MC-DOS can automate this process at login if an account routinely uses the same network configuration. Since RCTs occupy space in RAM, you free the space for others if you "disconnect" from the network when you no longer need network services. Gifford's software makes provision for automatic connect/disconnect (**Section 1.1**), since these internal details of DR Net may be hard for some users to remember.

Restricting Access to Network Resources

Although DR Net provides many advantages, including those listed at the beginning of this section, in many situations it may be undesirable if all network resources are available to everyone with access to a terminal. Gifford's DR Net allows a system manager to control access to network resources at several levels: through the MC-DOS login PASSWD file, which can restrict accounts to an arbitrary list of user areas and terminals, and even to a single program, on an individual basis; through the CONFIG.NET file, which can set passwords on computers within the network, which can limit (or set at zero) the number of servers or requesters, and can designate logical drives as "private" (not available to the network); and through user passwords, file passwords, and node passwords which restrict access to those who can present specific passwords. Remember also the importance of physical security, which requires that unauthorized persons should not have access to places where computers, sensitive data, or records of passwords are kept.

USER'S GUIDE TO THIS MANUAL

This manual has been written to aid you in the operation of your DR Net networking package. DR Net is a network operating system which runs in conjunction with Multiuser Concurrent DOS (MC-DOS), Gifford Computer System's implementation of Digital Research's Concurrent DOS. DR Net enables you to network two or more properly equipped computer systems (called **nodes**) by issuing specific commands or selecting menu options. These commands and their applications are described in this manual.

The NET program is the most commonly used utility in DR Net networks, and is documented in **Section 1.0** and **Section 2.0** of this manual. The NET program can be either menu-driven or command driven. Instructions for using the NET program as a menu-driven utility are documented in **Section 1.0**. Instructions for using the NET program by invoking special command words with arguments are documented in **Section 2.0**. The menu-driven NET program essentially invokes the command words and their arguments for you, allowing you to choose from the options available from the menu itself.

Section 3.0 explains how to "customize" the local node by establishing specific network defaults and security values. These parameters are established in a file called CONFIG.NET, which contains essential information about network configuration and default resource mapping. The SETNET command is used to configure the local node according to the specifications that are designated in the CONFIG.NET file. Instructions for specifying node names and network message of the day files (NETMOTD) are also contained in this section.

The security features of the MC-DOS operating system have been extended to accommodate the networking abilities of DR Net. These security features and their specific applications are documented in **Section 4.0**. This section explains how to limit the number of server processes for your node, and how to establish node passwords, user passwords, file passwords, and private drives. Instructions for changing your password on a remote node are also documented in **Section 4.0**.

For clarity and for your reading convenience, Gifford Computer Systems has written this user's manual to conform to certain stylistic conventions. They are as follows:

- 1) System prompts and any messages that appear on your screen are in **boldface** lettering, e.g. **OA>**.
- 2) The status of any toggle switch is in UPPER CASE lettering, e.g. "The printer is **OFF**."
- 3) System commands are in UPPER CASE lettering, e.g. "Type **DIR L:**."
- 4) Single-keystroke commands are encased in parentheses, e.g. (Y).
- 5) File names and file types appear in UPPER CASE lettering, e.g. **CONFIG.NET**.
- 6) References to any other sections of this manual appear in **boldface** lettering, e.g. "Refer to **Section 3.0**."
- 7) When a caret (^) appears before a character, you should press down the Control key while typing the character. Thus, ^C means to press the CTRL and C keys simultaneously.
- 8) Command word arguments that are encased in square brackets ("[" or "]") are optional, e.g. [filename].
- 9) A list of command word arguments separated by vertical bars (|) indicates that one of the listed words might be provided as an argument. For example, the line "A [X | Y | Z]" can be typed as "A," "A X," "A Y," or "A Z."
- 10) The introduction of any new term will be displayed in **boldface** lettering, e.g. "A **remote device** is the remote resource that is do become a part of the local node's resource map."
- 11) References to other manuals are displayed in UPPER CASE lettering and are underlined, e.g. "Refer to the MULTIUSER CONCURRENT DOS USER'S MANUAL."

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1.0 THE MENU-DRIVEN NET PROGRAM

The menu-driven NET program allows you to perform a variety of networking tasks by choosing from the available options in the menu. By typing NET, followed by a carriage return, the following menu will be displayed on your screen.

What do you want to do?

- 0) Change a printer, drive, or queue assignment
- 1) Display the NETWORK status
- 2) Display the NETWORK node names
- 3) Connect to a NETWORK node
- 4) Disconnect from a NETWORK node
- 5) Save the current NETWORK configuration
- 6) Configure the NETWORK to a previously saved state
- 7) Change the SPOOLER configuration
- 8) Clear all printer, drive, queue, and node assignments
- 9) Disconnect completely from the NETWORK
- 10) Display command line help information
- 11) Exit

The NET program is invoked by typing the keyword "NET." You can then choose from the menu options listed above. Each of these menu options contains additional sub-menus which give you the choice of making further specifications. The NET program sub-menus contain certain terms that need defining here:

Node: A "node" means an MC-DOS computer that is linked to a DR Net network by ARCNET hardware. Nodes are uniquely identified by **node ID** symbols. A node ID can either be a node name or node number. To see a list of all valid node names and numbers, choose option 2 from the NET menu. If a node name or number is not specified when you are creating a resource map for the local node, DR Net will assume the node ID specified in the "DEFAULT" line of the CONFIG.NET file (explained in Section 3.1.)

System Node: The node whose ID number is 00. MC-DOS requires that the mail (MAIL), appointment calendar (AP), and NETUSERS files be stored in user area 0 of logical drive A: of this node.

Local Node: The computer system to which your terminal is physically attached. If you are working at the node called MARKETIN, then MARKETIN is your local node. All other nodes are **remote**. Connections must be made between the local and remote node before any useful networking processes can be executed. This is further documented in **Section 1.4** of this manual.

Remote Node: All other non-local computer systems that are attached to the network.

Local Device: A local drive, printer, plotter, or queue that is to become a part of a virtual terminal's resource map.

Remote Device: The remote physical drive, printer, plotter, or queue that is to become a part of the local node's resource map.

Requester: A node that can send networking requests to another node; the node receiving requests is called a **server**.

Server: A node that can service requests from other nodes.

Resource Map: A list of the names that are currently assigned to local and remote devices. Each virtual terminal has its own independent resource map.

Name: Refers to a user's login account name. Account names are located in the PASSWD file of each node.

Filename: Used as arguments for options 5 and 6, which enable you to save and then configure your system according to your current resource mapping. The default for this filename is to use the local login account name. The default file type is .NET. For example, if the user on the local system logged in as "eric," the default filename would be ERIC.NET. (If a user named Eric logged in to his system as "pat," the default filename would be PAT.NET.)

Queue: A queue is a like an internal bulletin board in MC-DOS, where the operating system or programs can leave messages for subsequent use. A queue might contain information like a list of files waiting to be printed or processed.

Every node attached to the network has a **default server**. A default server is the node whose resources DR Net will connect you to by default if you do not supply a node name when you are prompted to do so. In the examples shown in this manual, 00 is used for the default node ID number, and the word "SYSTEM" has been designated as the default node name. The default server is specified in the CONFIG.NET file of your local node (**Section 3.1**), and can in fact be any node within a network. Different nodes can specify different default servers.

When you establish a node name for a particular system using the CONFIG.NET file, (documented in **Section 4.1**.) refer to the rules in the table below to make sure that you do not use any illegal characters in a node name:

First character:	A-Z
Subsequent characters:	A-Z, 0-9
Maximum number of characters:	8

If the first character of the node name is a numerical digit (0-9), the NET program will interpret it as a node number and not a node name. DR Net does not distinguish between upper and lower case characters.

In many of the sub-menus, the last two options are "Changed my mind," and "Exit." If you select "Changed my mind," you will be returned to the NET menu. If you select "Exit," you will be returned to the operating system prompt.

1.1 Change a Printer, Drive, or Queue Assignment

This first menu option (0) is used to map a device on the local node to a device on a designated remote node. By selecting this option, the following sub-menu will appear on your screen:

What do you want to do?

- 0) Change device with automatic connect/disconnect
- 1) Change device without automatic connect/disconnect
- 2) Changed my mind
- 3) Exit

The automatic connect/disconnect option that you see in lines zero (0) and one (1) of the sub-menu displayed above gives you the choice of mapping two devices together and either automatically connecting the nodes to which the devices are attached, or simply map two devices together without connecting their respective nodes. This is discussed in more detail in Sections 1.4 and 1.5. If you choose option 1 to enable the automatic connect/disconnect feature, the following sub-menu will be displayed on your screen:

What do you want to do?

- 0) **Make a device local**
- 1) **Make a device remote**
- 2) **Changed my mind**
- 3) **Exit**

The "make a device local" option that you see in line 0 of the sub-menu, enables to you erase any mapping that you have previously established for a particular local device. By choosing this option, you can assign a local device to a device name that was once mapped to a remote node. This option will ask you to supply the **device name** that you intend to make local.

A **device name** describes the device that you intend to map in such a way that it will be recognized by the NET program. There are three types of devices: drives, printers, and queues. Note that the local device and remote device must always be of the same type for any one invocation of the NET command. In other words, you cannot connect the default printer on the local node to a drive on a remote node. You must always connect printers to printers, drives to drives, and queues to queues. The parameters that the NET program uses to recognize the various types of device names are listed below:

drives: A drive name is a single character (A through P) followed by a colon (:). If a drive is not supplied, and you press RETURN instead, then the default logical drive (system drive) of the default remote node will be used, as specified in the CONFIG.NET files. Examples: A:, C:, or M:.

printers: A printer name consists of the three characters "LST" followed by an optional printer number, or just the printer name encased in parentheses. The printer numbers appear in the first field of the LPRS file of each node. Printer names are the fifth LPRS field. The default value for the printer number is the default (current) printer for local device arguments and zero (0) for remote device arguments. For example, if a printer is not specified in the remote field prompt, and instead you just type LST, then printer zero of the remote node will be used. Examples: LST, LST4, or (diablo).

queues: A queue name is a word enclosed in quotation (") marks. To enter a lower case letter, that letter must be preceded by a backslash (\). Under no circumstances should any of the following queues be mapped: MXdisk, MXload, VOUTQxx, or VINQxx. Also, command queue names should not be mapped. If a queue is not supplied when you are prompted to do so, then the queue name specified in the local device field will be used on the remote node. Examples: "MXSPL", "MX\A\MIN", or "AC80DATA".

Default mapping: The NET program will assume certain default assignments for the remote devices if you do not supply the values when you are prompted to do so. A summary of these default values is listed below:

Remote device default assignments

drives: system drive of the remote node

printers: LST0

queues: same as local queue name

After you specify the device name that you intend to make local, and then press RETURN, you will be returned to the NET program menu.

If you choose to detach a remote device from the sub-menu, by choosing option 2, you will be prompted to supply the following information:

Local device name:

Remote device name (return if same as local device):

Remote node (return for default node):

Remote user name (return for your name):

The way that the information you supply to the prompts displayed above is processed by the NET program depends on whether or not you chose to enable the automatic connect/disconnect feature from the first sub-menu that we showed you. If you chose to enable this feature, then not only will the devices that you have specified be mapped to the devices on the designated remote nodes, but the respective nodes to which these devices are connected will also be mapped together.

1.2 Display the NETWORK Status

This option (1) is used to display the status of your drives, printers, and queues, and shows the nodes to which you are currently attached. By choosing this option, the following sub-menu will be displayed on your screen:

What do you want to do?

- 0) Display the status of this node
- 1) Display network device assignments
- 2) Display status of all nodes
- 3) Display all of the above
- 4) Changed my mind
- 5) Exit

By selecting the first option, 0, to display the status of the local node, a list of information similar to the one below will be displayed on your screen:

NET local node status:
Number of server processes 08
Number of requester processes 08
Number of RCTs 08
Transaction timeout 05
Default server is named **SYSTEM** node number 00

The definitions for each of the status lines displayed above follow:

Number of server processes: This is the number of remote users that can connect to the local node simultaneously. One server process is the equivalent of one virtual terminal process. In our sample, the number of server processes has been limited to eight (8), so only eight remote virtual terminals can connect to our node simultaneously.

Number of requester processes: This is the number of users, or virtual terminal processes, on the local node that can connect to other nodes of the network simultaneously. In our sample, the number of requester processes has been limited to eight (8), so only eight (8) users, or virtual terminals on the local node, can connect to remote nodes of the network at the same time.

Note: The sum of the requester and server processes fields can not exceed 30. Any combination of servers and requesters can be used, provided that the sum of the two fields is under 31. For example, you could set the limit for the number of server processes to 28, and the limit for the number of requester processes to 2.

Number of RCTs: This stands for Requester Configuration Table. These tables specify which local devices (drive, queues, or printers) are actually mapped over the network. One RCT exists for each virtual terminal that is attached to the network. In our sample, we have limited the number of RCTs to eight (8).

Transaction timeout: This is an error timeout that specifies the number of seconds between the time that a local node sends a network message to a remote node and then receives a reply to that message. If the local node does not receive a reply within the time specified in this field, it will automatically discontinue trying to communicate with the remote node, and an error message will appear on the screen of the local node. In our sample, we have entered a five (5) in this field, so we have given any remote node to which we send a network message, five (5) seconds to respond to that message. It is recommended that if you have heavy floppy disk I/O over the network, that you change the default in this field from five (5) seconds to ten (10) seconds.

The second option (1) available with the NET status sub-menu is to display the network device assignments. By selecting this option, a list of information similar to the one below will be displayed on your screen:

device type	local	remote	name	connected
Drives:	L:	A:	SYSTEM	NO
	M:	B:	RESEARCH	YES
	N:	C:	SYSTEM	NO
	O:	D:	SALES	YES
	P:	E:	SYSTEM	NO
Printers:	lst05	lst00	SYSTEM	NO
Queues:	"MXSPL"	"MXSPL"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPLOUT"	"SPLOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
RESEARCH	04	A:	7:13
SALES	05	A:	2:45

The table above shows you the drives, printers, and queues that have been mapped to the drives, printers, and queues of the remote nodes, and whether or not the local node is currently connected to that node.

The third option (2) available with the NET status sub-menu is to display the status of all of the nodes. This option will show you a list of all of the node names, their corresponding node ID numbers, the number of Virtual Terminal accounts that are currently logged in to each node, and the amount of time that each node has been up and running. There will also be a plus sign (+) next to your local node. This list will look something like the one which follows:

Name	Number	Up	Users
SYSTEM	00	11:42	00
SERVICE	01	9 days	01
MARKETIN	02	+ 0:58	04
RECEPTIO	03		down
RESEARCH	04	21:51	00
SALES	05		down

The example above indicates that both the RECEPTIO and SALES nodes are currently not turned ON and that the SYSTEM and RESEARCH nodes are turned ON, but do not have any users currently logged in. The SERVICE node currently has one user logged in, and the MARKETIN node currently has four users logged in to the system. Also, there is a plus sign (+) next to the MARKETIN node, indicating that it is the local node. The SERVICE node has been up and running the longest at 9 days.

You can also see the status information that is accessed by using options 0, 1, and 2 by selecting option 3 which will show you a combined list of the information available from options 0, 1, and 2. This extensive list might look something like the following:

NET local node status:

```

Number of server processes      08
Number of requester processes  08
Number of RCT'S                 08
Transaction timeout             05
Default server is named SYSTEM node number 00

```

device type	local	remote	name	connected
Drives:	L:	A:	SYSTEM	NO
	M:	B:	RESEARCH	YES
	N:	C:	SYSTEM	NO
	O:	D:	SALES	YES
	P:	E:	SYSTEM	NO
Printers:	lst05	lst00	SALES	YES
Queues:	"MKSP"	"MKSP"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPLOUT"	"SPLOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
RESEARCH	04	A:	7:13
SALES	05	A:	2:45

Name	Number	Up	Users
SYSTEM	00	11:42	00
SERVICE	01	9 days	01
MARKETIN	02	+ 0:58	04
RECEPTIO	03		down
RESEARCH	04	21:51	00
SALES	05		down

1.3 Display the NETWORK Node Names

This option (2) from the main menu is used to access information about the names and addresses of the various nodes that are attached to the network. The node names option enables you to see this information sorted in two different ways; either by node names or by node numbers. If you select this option, the following sub-menu will be displayed on your screen:

What do you want to do?

- 0) Sorted by node numbers
- 1) Sorted by node name
- 2) Changed my mind
- 3) Exit

If you select the first option (0), you will see a list of the various nodes attached to the network sorted by node ID numbers in ascending numerical order. An example of this follows:

```
00 SYSTEM    01 SERVICE    02 MARKETIN    03 RECEPTIO
04 RESEARCH  05 SALES
```

The other option that is available from the node names sub-menu is to alphabetically sort the network nodes by their names. This can be done by selecting option 1. An example of this follows:

```
MARKETIN 02    RECEPTIO 03    RESEARCH 04    SALES 05
SERVICE 01    SYSTEM 00
```

1.4 Connect to a NETWORK Node

The fourth option available with the NET program (3) is to connect to a network node. This will establish a logical connection between the local node and a designated remote node.

Each node that is to be a part of the network has a node name, as well as a unique decimal ID number, called a node number. No two nodes on the network can have the same name or number. These names or numbers identify the location of each node on the network, and are used to identify the node to which you intend to connect. Legal characters that can be used when creating a node name are documented in **Section 1.0** of this manual.

It is necessary that a connection be made between the local and the remote node before any useful networking processes can be executed. This connection is established automatically when you choose the automatic connect/disconnect option from the sub-menu in option 0 of the main menu. For example, if you map two drives together and select the automatic connect/disconnect option, it will automatically connect the two nodes whose drives you want to map to each other. The "connect to a network node" option, therefore, is mostly useful for changing the status of a connection in the CONFIG.NET file. For example, if you choose to display the network device assignment status from option 1 in the main menu, and the first line of the display looks something like the following:

```
Drives:      L:           A:           SYSTEM      NO
```

You can use the "connect to a network" node option (3) from the main menu to change the status of the connection from "NO" to "YES" between local drive L: and remote drive A:. When you select option 3, the following prompts will be displayed on your screen:

```
Remote node (return for default node):  
Remote user (return for your name):
```

If you supply an account name whose password is different in the PASSWD file on the local node from the remote node to which you want to connect. You will be prompted to supply the password that has been established for that account on the remote node.

If you don't specify a name with the remote node to which you want to connect your virtual terminal, the NET program will default to your current login account name and prompt you for the password that has been established for that account, unless the passwords are the same for both accounts. If you supply the wrong password, the following error message will be displayed on your screen:

```
Password incorrect  
NETwork device assignment not made
```

The instructions for changing a password with the **PASSWORD** command are documented in **Section 3.7** of this manual.

1.5 Disconnect from a NETwork Node

This option (4) is used to disconnect your terminal from a designated remote node. When you choose this option, the following prompts will be displayed on your screen:

```
Remote node (return for default node):  
Remote user name (return for your name):
```

If you were connected to the default node, and you want to disconnect from that node, simply press the **RETURN** key when you are prompted to supply a node name from which you want to disconnect, and you will automatically disconnect from the default node. In all other cases, however, you must supply a node name or node ID number.

When you finish using a remote node, you should disconnect your terminal from that node. There is a limit to the number of users that can be connected to a given remote node simultaneously. (This is explained in **Section 3.1**.) When that limit is reached, no one else can attach their terminal to that node.

1.6 Save the Current NETWORK Configuration

This option (5) allows you to store a permanent image of the current mapping scheme as a template. The scheme is recreated automatically when the account to which you assign the mapping template configures the network using option 6 from the main menu.

Option 5 is used to store commonly used DR Net commands into a command file. For example, suppose that the network device assignment option (1) showed your resource map to be the following:

device type	local	remote	name	connected
Drives:	L:	A:	SALES	YES
	M:	B:	SYSTEM	NO
	N:	C:	RESEARCH	YES
	O:	D:	SYSTEM	NO
	P:	E:	RECEPTIO	YES
Printers:	lst05	lst00	SERVICE	YES
Queues:	"MXSPL"	"MXSPL"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPLOUT"	"SPLOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
SALES	05	A:	7:13
RESEARCH	04	C:	2:45
RECEPTIO	03	E:	1:02
SERVICE	01	A:	2:58

When you choose option 5, you can save the mapping displayed above into a file to use at a later time. You will be prompted:

Enter file name (return to use default):

You can specify a name for the template, such as TUESDAY.NET or any valid name. If you supply no name, but press RETURN, the program will use your current account name, with the .NET extension as the name. If you logged in to your node as ERIC, and then enter ERIC as your file name, the NET program will use NET as the default file type, so that the following line will appear on your screen:

Creating file eric.net

If a file called ERIC.NET already exists on your node, the following system prompt will be displayed on your screen:

```
File ERIC.NET already exists.  
Do you want to overwrite it?
```

You may answer "yes" or "no" to this question by typing (Y) or (N), followed by a carriage return.

The template file that you have created will look like this:

```
clear  
map L: = A: @ SALES  
map M: = B: @ SYSTEM  
map N: = C: @ RESEARCH  
map O: = D: @ SYSTEM  
map P: = E: @ RECEPTIO  
map lst5 = lst 0 @ SERVICE  
map "MXSPL" = "MXSPL" @ SYSTEM  
map "SPLIN" = "SPLIN" @ SYSTEM  
map "SPLOUT" = "SPLOUT" @ SYSTEM
```

The first line of the mapping template listed above clears out the existing network mapping resource maps. The subsequent lines of the file map local resource devices to similar resource devices on various remote nodes.

1.7 Configure the NETWORK to a Previously Saved State

This option (6) is used to execute the mapping template that you have created with option 5, explained in **Section 1.6**. For example, to execute all of the commands that are contained in the file above, ERIC.NET, choose option 6, and you will be prompted to supply the file name that configures the network:

Enter file name (return to use default):

If you wanted a configuration specified by a file called TUESDAY.NET, you could enter that file name here. If you press RETURN to use the default file that has been established using your login name, the following message will appear on your screen:

Reading configuration from: eric.net

You will now automatically log on to the SYSTEM node, the specified drives will automatically be networked together, and your printer 2 will now be attached to printer 0 on the SERVICE node.

This default option is executed automatically when you log in to your system. As soon as you type your account name and optional login password, the system will read your **name.net** file and configure the system according to the specifications contained in that file. This option creates a requester configuration table for your current virtual terminal. It cannot be executed if the number of virtual terminals on your local node that are already attached to the network is equal to or greater than the number of RCTs specified in your CONFIG.NET file.

1.8 Change the SPOOLER Configuration

This option (7) is used to establish a connection between two nodes by mapping the three queues (MXSPL, SPLIN, SPOUT) that are designated in the CONFIG.NET file. You can then use the

SPOOL program to print a file on the node to which you are attached. By choosing option 7, the following sub-menu will appear on your screen:

What do you want to do?

- 0) Remove spooler from system
- 1) Begin spooling to a remote system
- 2) Changed my mind
- 3) Exit

If you choose option 0 from the sub-menu displayed above, this will make the three spooling processes (MXSPL, SPLIN, SPOUT) local devices. In other words, by choosing option 0, you will have removed any mapping that you had previously established for the spooling process.

If you choose option 1 from the sub-menu displayed above, you will be prompted for the remote node to which you want to map the spooler process. For example, if you map your spooler process to the SALES node, you can now use the SPOOL command to print a file over the network on the SALES printer. Instructions for using the SPOOL command over the network are documented in Section 2.9.

1.9 Clear All Printer, Drive, Queue, and Node Assignments

This option (8) is used to clear the internal network connection table and resource maps. By choosing this option, you can detach the local node from all remote nodes all at once, but you will still be attached to the network. This option saves you the trouble of disconnecting from each node individually with option 4 ("disconnect from a network node").

1.10 Disconnect Completely from the NETWORK

This option (9) is used to clear out the map of the currently attached virtual terminal screen. After this option has cleared out all resource mapping, it will reconnect the maps

that are designated in the CONFIG.NET file. However, you will still not be mapped to any nodes until you resubmit a network mapping option.

1.11 Display Command Line Help Information

This option (10) supplies information about the commands available with the NET program. By choosing this option, the following help menu will be displayed on your screen:

Usage:

```
NET [DEvIce]      local_device [[=] remote_device [node | name [@] node]
NET MAP          local_device [[=] remote_device [@] [node]
NET STATus       [NODes | ALL]
NET NAMEs        [ALPhabetically]
NET CONNect      [node name [@] node]
NET DISconnect  [@] [node]
NET MAKE         [DISPLAY] [filename]
NET CONFig       [DISPLAY] [filename]
NET SPOol        [node | name [@] node]
NET CLear
NET OFF
NET HELp
```

Instructions for using each of the NET program commands and command arguments displayed above are documented in **Section 2.0**

1.12 Exiting from the NET Program

This option allows you to disconnect completely from the NET program and return to the operating system.

2.0 THE COMMAND-DRIVEN NET PROGRAM

The NET program can also be utilized as a command-driven program, meaning that you can issue commands directly from the command line without choosing options listed in the NET program menu. By typing NET HELP, or by selecting option 10 from the NET program menu, the following help file will be displayed on your screen:

Usage:

```
NET [DEVICE]      local_device [[=] remote_device [node | name [ @ ] node]
NET MAP          local_device [[=] remote_device [ @ ] [node]
NET STATUS      [NODEs | ALL]
NET NAMES       [ALPhabetically]
NET CONNECT     [node name [ @ ] node]
NET DISconnect  [ @ ] [node]
NET MAKE       [DISPLAY] [filename]
NET CONFig     [DISPLAY] [filename]
NET SPOol     [node | name [ @ ] node]
NET CLear
NET OFF
NET HELp
```

Possible command words are DEVICE, MAP, STATUS, NAMES, CONNECT, DISCONNECT, MAKE, CONFIG, SPOOL, CLEAR, OFF, and HELP as indicated in the second column of the help file displayed above. If a word that is not included in this list is entered after you type NET, the NET command will assume DEVICE as the default command word. The first three or four letters of these command words are displayed in upper case lettering. This signifies the minimum number of characters that the NET program needs to recognize the command. For example, you could type NET CONF for the NET CONFIG command.

Several of the commands include optional command word arguments which modify the effects of the command. These arguments are shown in the third column of the help file displayed on the previous page. If an argument is not specified with the command word, then a default argument value will be used. The specific nature of the default values are explained in **Section L1**, under **Default Mapping**.

Every node attached to the network has a default server. A default server is the node that your node will default to if you do not specify a node name or number on the command line. For the purposes of this manual, 00 is used for the default node ID number, and the word "SYSTEM" has been designated as the default node name.

When you establish a node name for a particular system, refer to the table below to make sure that you don't use any illegal characters in the node name:

First character: A-Z,
Subsequent characters: A-Z, 0-9
Maximum number of characters: 8

If the first character of the node name is a numerical digit (0-9), DR Net will interpret it as a node ID number and not a node name. DR Net does not distinguish between upper and lower case characters.

In the list of NET command options displayed at the top of the previous page, words given in upper case must be entered on the command line as they are shown.

Words that are given in lower case are arguments whose value must be filled in. There are five of these command word arguments: local_device, remote_device, node, name, and filename. These command word arguments are explained on page 1.

It is critical that you are at all times aware that the NET command only affects the virtual terminal screen from which you have issued the command. A device mapping executed from one virtual terminal will have absolutely no effect on any of the other virtual terminals attached to your node.

2.1 The NET DEVICE Command

The NET DEVICE command is used to network a device on the local node to a device on a designated remote node. The format for the NET DEVICE command follows:

```
NET [DEVICE] local_device [[=] remote_device [node | name [@] node]
```

Definitions for the valid device names that can be used as command word arguments for the NET DEVICE command can be found in **Section 1.0**. A summary of DR Net default mapping can also be found in **Section 1.0**.

Suppose that the default printer on the local node has been designated as printer 1. If you type:

```
0A>NET DEVICE LST = LST SALES
```

when you request printer 1 on the local node you will be attached to printer 0 on the SALES node. In other words, printer 1 of the local node will be mapped to printer 0 on the SALES node.

If you want to map printer 2 of the local node to printer 1 on the SERVICE node, type the following:

```
0A>NET DEVICE LST2 = LST1 SERVICE
```

Suppose that you are situated at the SALES node and you want to map your default printer (which is 1) to printer 0 on the SERVICE node, but you don't have an account on the service node. However, you do know that there is an account called Eric on the SERVICE node and you know that account's password. To map your default printer to printer 1 on the SERVICE node, using Eric's account name and password, type:

```
0A>NET DEVICE LST = LST1 ERIC @SERVICE
```

You will be prompted for Eric's password on the SERVICE node unless your password is the same as Eric's. (Refer to **Section 4.0** for a complete explanation of DR Net security features.)

To restore your default printer to local service, you must type NET DEVICE LST. If you have mapped a printer other than the default printer on the local node to a printer on a remote node, you must type NET DEVICE LST followed by the local printer number, to restore that printer to local service.

So, to restore your your default printer to local service, type:

```
0A>NET DEVICE LST
```

To detach your printer 2 from any remote printer to which you are currently mapped, type:

```
0A>NET DEVICE LST2
```

2.2 The NET MAP Command

Like the NET DEVICE command, the NET MAP command is used to map devices on the local node to similar resources on a designated remote node. Unlike the NET DEVICE command, the NET MAP command does not automatically connect you to the node to which you've mapped a device. The NET MAP command produces the same effect as the automatic connect/disconnect option available with option 1 from the main menu. The format for the NET MAP command follows:

```
NET MAP local_device [[=] remote_device [@] [node]]
```

Suppose that you want to map printer 1 on the local node to printer 4 on the RECEPTION node, but you don't necessarily want to connect your terminal to the RECEPTION node. This can be done with the NET MAP command by typing:

```
0A>NET MAP LST1 = LST4 RECEPTION
```

Assuming that you have not made any other node or device connections, when you type NET STATUS NODES you will get the following display:

```
NET device status:
device type      local      remote      name      connected
Printers :      lst01:    lst04:      RECEPTIO  NO
NET server status:
Currently not connected to any servers
```

2.3 The NET STATUS Command

The NET STATUS command is used to display the status of your virtual terminal. The NET STATUS command gives you information about the status of your drives, printers, queues, and shows the nodes to which you are currently attached. The format of the NET STATUS command follows:

```
NET STATUS [NODES | ALL]
```

The words contained within the square brackets are the two command argument options available to you.

By typing the following command:

0A>NET STATUS

you will be shown a table of status information similar to the one that is displayed below:

device type	local	remote	name	connected
Drives:	L:	A:	SYSTEM	NO
	M:	B:	RESEARCH	YES
	N:	C:	SYSTEM	NO
	O:	D:	SALES	YES
	P:	E:	SYSTEM	NO
Printers:	1st05	1st00	SYSTEM	NO
Queues:	"MXSPL"	"MXSPL"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPLOUT"	"SPLOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
RESEARCH	04	A:	7:13
SALES	05	A:	2:45

The table above shows you which drives, printers, and queues have been mapped to the drives, printers, and queues of the remote nodes, and whether or not your terminal is currently connected to that node.

The NET STATUS command can also be used to find out status information about each of the individual nodes that are attached to the network. For example, you can type:

0A>NET STATUS NODES

and you will be shown a list of all of the node names, their corresponding node ID numbers, the number of Virtual Terminal accounts that are currently logged in to each node, and the amount of time that each node has been up and running. The NET STATUS NODES command will also place a plus sign (+) next to the physical node at which you are situated. This list will look something like that which follows:

Name	Number	Up	Users
SYSTEM	00	11:42	00
SERVICE	01	9 days	01
MARKETIN	02	+ 0:58	04
RECEPTIO	03		down
RESEARCH	04	21:51	00
SALES	05		down

The example above indicates that both the RECEPTIO and SALES nodes are currently not turned ON and that the SYSTEM and RESEARCH nodes are turned ON, but do not have any users currently logged in. The SERVICE node currently has one user logged in, and the MARKETIN node currently has four users logged in to the system. The SERVICE node has been up and running the longest at 9 days. Also, there is a plus sign (+) next to the MARKETIN node, indicating that this is the local node.

The other option available with the NET STATUS command is the ALL argument. By typing NET STATUS ALL, you will be shown extensive status information about the nodes, devices, and server

processes that are currently attached to the network. This long list of information will look something like this:

NET local node status:

Number of server processes 08
 Number of requester processes 08
 Number of RCT'S 08
 Transaction timeout 05
 Default server is named SYSTEM node number 00

device type	local	remote	name	connected
Drives:	L:	A:	SYSTEM	NO
	M:	B:	RESEARCH	YES
	N:	C:	SYSTEM	NO
	O:	D:	SALES	YES
	P:	E:	SYSTEM	NO
Printers:	lst05	lst00	SALES	YES
Queues:	"MXSPL"	"MXSPL"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPLOUT"	"SPLOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
RESEARCH	04	A:	7:13
SALES	05	A:	2:45

Name	Number	Up	Users
SYSTEM	00	11:42	00
SERVICE	01	9 days	01
MARKETIN	02	+ 0:58	04
RECEPTIO	03		down
RESEARCH	04	21:51	00
SALES	05		down

2.4 The NET NAMES Command

The NET NAMES command is used to access information about the names and ID numbers of the various nodes that are attached to the network. The NET NAMES command enables you to see this information sorted in two different ways. The format of the NET NAMES command is as follows:

```
NET NAMES [ALPhabetically]
```

By typing NET NAMES you will be shown a list of the various node names and node ID numbers that are attached to the network. This list will be sorted by node ID numbers in ascending numerical order. It might look something like the following:

```
00 SYSTEM    01 SERVICE    02 MARKETIN    03 RECEPTIO
04 RESEARCH  05 SALES
```

The other option that is available with the NET NAMES command is ALPhabetically. This command argument can be reduced to the first three letters of the word by typing:

```
QA>NET NAMES ALP
```

By typing the command above, you will be shown a list of the various node names and node ID numbers that are attached to the network. This list will be sorted alphabetically by node names. An example of the results of this command is displayed below:

```
MARKETIN 02    RECEPTIO 03    RESEARCH 04    SALES 05
SERVICE 01    SYSTEM 00
```

2.5 The NET CONNECT Command

The NET CONNECT command is used to establish a logical connection between devices on the local node and a remote node. The format for using the NET CONNECT command follows:

```
NET CONNECT [node | name [@] node]
```

Each node that is to be a part of the network has a node name, as well as a unique decimal ID number, called a node number. No two nodes on the network can have the same name or number. These names or numbers specify each node in the network, and are used to identify the node to which you intend to connect. Legal characters that can be used when creating a node name with the NAMENODE command are documented in **Section 2.0**.

It is necessary to make a logical connection between the local and the remote node before any useful networking processes can be executed. This connection is normally established automatically. For example, if you use the NET DEVICE command to map two printers together, it will automatically connect the two nodes whose printers you want to map to each other. The NET CONNECT command, therefore, is mostly useful for changing the status of a connection in the CONFIG.NET file. For example, if you type:

```
OA>NET STATUS
```

and the first line of the file that appears on your screen looks like this:

```
Drives:      L:           A:           SYSTEM      NO
```

you can use the NET CONNECT command to change the status of the connection from "NO" to "YES" between local drive L: and remote drive A:.

Suppose that you want to connect to the SALES node (05), and your login account name on that node is Eric. You must type:

```
QA>NET CONNECT ERIC @SALES
```

You could also type:

```
QA>NET CONNECT ERIC @05
```

to connect to the SALES node using the node ID number, instead of the node name.

The DR Net program will prompt you for the login password in the PASSWD file of SALES for the account called Eric, unless his account in the PASSWD file on your node is the same as the password that was on the SALES node. If you supply the correct password, you will have successfully connected to the SALES node and the message of the day (MOTD) of the remote node will be displayed on your screen, if one exists.

If you don't specify a name with the remote node to which you want to connect your terminal, the NET program will default to your current account name. For example, if you logged in to your node as Eric, and then attempt to connect to the sales node by typing:

```
QA>NET CONNECT @SALES
```

you will be prompted for the password that has been created for the Eric account on the SALES node, unless the password for Eric both the local and remote nodes is the same. If you supply the correct password for Eric's account, you should be able to

successfully connect to the SALES node by typing the command displayed above. If you supply an improper password, the following error message will be displayed on your screen:

**Password incorrect
NETwork device assignment not made.**

The instructions for changing a password with the PASSWORD command are documented in **Section 4.7** of this manual.

2.6 The NET DISCONNECT Command

The NET DISCONNECT command is used to detach your virtual terminal from a designated remote node. The format for this command follows:

```
NET DISconnect [@] [node]
```

Suppose that you have connected to the SALES node (05) and you want to detach yourself from that node. You must type:

```
0A>NET DISCONNECT SALES
```

or

```
0A>NET DISCONNECT 05
```

If you were connected to the default node, and you wanted to disconnect from that node, you could type the NET DISCONNECT command without a node name or node ID argument, like this:

```
QA>NET DISCONNECT
```

and you would automatically disconnect from the default node. In all other cases, however, you must supply a node name or node ID argument.

When you finish using a remote node, you should disconnect your node from that node. There is a limit to the number of users that can be connected to a given remote node simultaneously. (This is explained in **Section 3.1.**) When that limit is reached, no one else can connect their node to that particular remote node. So a user who needs that server must wait for someone to disconnect themselves with the NET DISCONNECT command.

2.7 The NET MAKE Command

The NET MAKE command allows you to store a permanent image of the current mapping scheme so that the scheme is recreated automatically when the user for the account to which you assign the map types NET CONFIG. The formula for the NET MAKE command follows:

```
NET MAKE [DISPLAY] [filename]
```

The NET MAKE command is used to store commonly used NET program commands as a file. For example, suppose that the NET STATUS command showed your resource map to be the following:

device type	local	remote	name	connected
Drives:	L:	A:	SALES	YES
	M:	B:	SYSTEM	NO
	N:	A:	MARKETIN	YES
	O:	D:	SYSTEM	NO
	P:	B:	SERVICE	YES
Printers:	lst01:	lst00:	SYSTEM	NO
	lst05:	lst00:	SERVICE	YES
Queues:	"MXSPL"	"MXSPL"	SYSTEM	NO
	"SPLIN"	"SPLIN"	SYSTEM	NO
	"SPOUT"	"SPOUT"	SYSTEM	NO

NET server status:

Name	Number	Default	Up
SALES	05	A:	7:13
MARKETIN	02	A:	2:45
SERVICE	01	A:	1:02

By typing NET MAKE, a mapping file will be created, using the information displayed on the previous page, in the user area of the virtual terminal from which you issued the command. This mapping command file will look like the one below:

```
clear
connect SALES
connect MARKETIN
connect SERVICE
map L: = A: @ SALES
map M: = B: @ SYSTEM
map N: = A: @ MARKETIN
map O: = D: @ SYSTEM
map P: = B: @ SERVICE
map lst01: = lst00: @ SYSTEM
map lst05: = lst00: @ SERVICE
map "MXSPL" = "MXSPL" @ SYSTEM
map "SPLIN" = "SPLIN" @ SYSTEM
map "SPLOUT" = "SPLOUT" @ SYSTEM
```

The first line of the file above clears out the existing network resource maps. The subsequent lines of the file map local resource devices to similar resource devices on various remote nodes.

The name of this file will default to your login account name. For example, if you log in to your system as LUCY, and type NET MAKE, the name of your command file will be LUCY.NET. A message like the following will be displayed on your screen, indicating that the program is creating your file:

Creating file lucy.net

If a file called LUCY.NET already exists on your node, the following system prompt will be displayed on your screen:

```
File LUCY.NET already exists.
Do you want to overwrite it?
```

You may answer "yes" or "no" to this question by typing (Y) or (N), followed by a carriage return.

The NET MAKE command has an optional command argument called the DISPLAY argument. If you type NET MAKE DISPLAY, the NET program prints out on your screen each line of the LUCY.NET file as it is being written.

2.8 The NET CONFIG Command

The formula for the NET CONFIG command follows:

```
NET CONFig [DISPLAY] [filename]
```

The NET CONFIG command is used to execute the mapping template file that you have created using the NET MAKE command, explained in Section 2.7. For example, to execute all of the commands that are contained in the file LUCY.NET, explained in the previous section, type the following command:

```
QA>NET CONFIG LUCY
```

By typing the command above, you will automatically be connected to the SALES, MARKETIN, and SERVICE nodes. Local drives L: through P: will be mapped to various remote nodes. Printer 1 will be mapped to printer 0 of the SYSTEM node, and printer 5 will be mapped to printer 0 of the SERVICE node. The three spooling queues will be mapped to the SYSTEM node, to which you are not connected.

The NET CONFIG command is executed automatically when you log in to your system. As soon as you type your account name and optional login password, the system will read your name.net file and configure the system according to the specifications contained in that file.

Like the NET MAKE command, the NET CONFIG command also has a DISPLAY command argument that lets you see each line of the LUCY.NET file as the NET CONFIG command is reading it.

2.9 The NET SPOOL Command

The NET SPOOL command is used to establish a connection between the local node and a designated remote node by mapping the three queues (MXSPL, SPLIN, SPOUT) that are designated in the CONFIG.NET file. You can then use the SPOOL command, followed by a filename, to print a file on the node to which you are attached. The format of the NET SPOOL command follows:

```
NET SPOOl [node | name [@] node]
```

Suppose that you want to use the NET SPOOL command to print a file called EXAMPLE.TXT on the SALES node. To map the SPOOL process from the local node to the SALES node, type:

```
QA>NET SPOOL SALES
```

Now you can use the SPOOL command to print your file on the default printer on the SALES node by typing:

```
QA>SPOOL EXAMPLE.TXT
```

The NET DEVICE command can also be used to print files on remote nodes. The advantage of using the NET DEVICE command to print files is that it allows a program to print "directly" to a remote printer without having to save the printer data in a file.

2.10 The NET CLEAR Command

The NET CLEAR command is used to clear the internal network connection table and resource maps. By typing NET CLEAR, you can detach your virtual terminal from all remote nodes all at once, but you will still be attached to the network. This command saves you

the trouble of disconnecting from each node individually with the NET DISCONNECT command. The format of the NET CLEAR command follows:

NET CLear

2.11 The NET OFF Command

The NET OFF command is used to clear out the map of the currently attached screen. After the NET OFF command has cleared out all resource mapping, it will reconnect the maps that are designated in the CONFIG.NET file. However, you will still not be mapped to any nodes until you resubmit a NET MAP, NET DEVICE, or NET CONNECT command. The format of the NET OFF command follows:

NET OFF

2.12 The NET HELP Command

The NET HELP command supplies information about the NET program. The format for the NET HELP command follows:

NET HELP

By typing NET HELP you will be shown a list of all of the commands and their arguments that are available with the NET program.

3.0 CUSTOMIZING THE LOCAL NODE

In addition to the various applications that can be used with the NET program to establish custom resource maps across the network, the CONFIG.NET and NAMSVR.DAT files, and the SETNET and NETMOTD commands, can be used to customize the local node. These files and commands and their various applications are described in the following sections.

3.1 The CONFIG.NET File

The CONFIG.NET file contains essential information about network configuration and default resource mapping. A CONFIG.NET file will be supplied for you on your networking diskette. If at any time you wish to change the contents of this file, use ED, WordStar or a similar text editor in non-document mode. The CONFIG.NET file can be used to modify certain features of the initialization process. The CONFIG.NET file is read by the SETNET program, invoked during network initialization, which uses that information to configure the network.

Provided below is a sample CONFIG.NET file:

```
password  PASSWORD                ;Node password, also default password
node      9                       ;Local node number
default   0                       ;Default node number
servers   8                       ;Number of server processes
requester 8                       ;Number of requester processes
buffers   3                       ;Number of message buffers
timeout   5                       ;Seconds till timeout
rct       8                       ;Number of RCT's
private   f: g:                   ;Private drives
drive     l: = a:                 ;Map a drive
drive     m: = b:
drive     n: = c:
drive     o: = d:
drive     p: = e:
printer   5 = 0 0                 ;Map a printer
queue     MXSPL = MXSPL 02        ;Map a queue
queue     SPLIN = SPLIN 02
queue     SPLOUT = SPLOUT 02
nodename  HAL                    ;Name of node for NAMSVR.DAT file
```

Please Note: Only node numbers, and not names, can be used to designate the remote node to which you want to map a drive, printer or queue.

The rightmost column of the file displayed on the previous page indicates the function of the data in the other two columns. A definition of each line in the sample CONFIG.NET file is provided below:

Node password, also default password: This is the local node password. In our example, "PASSWORD" is the password of the local node. Note that if the password of the local node matches the password of a remote node, the user at the local node will not be prompted for a password during the CONNECT procedure. If the password is different in the same field of another node, you will be prompted to supply the password for that node.

Local node number: The ID number of the node from which you are issuing commands. This number must match the number that is set on the controller board. In our sample, 09 has been designated as the local node number. This number must be different for each node.

Default node number: Certain network command utilities (NET and PASSWORD) have node ID arguments. If a node ID argument does not exist on the command line, a default node ID is supplied. The DEFAULT command specifies this default node ID number. In our sample, we have designated 0 as the default node ID number.

Number of server processes: This is the number of remote users that can connect to one particular node simultaneously. One server process is the equivalent of one virtual terminal process. In our sample, the number of server processes has been limited to eight (8), so only eight remote virtual terminals can connect to our node simultaneously.

Number of requester processes: This is the number of users, or virtual terminal processes, on the local node that can connect to other nodes of the network simultaneously. In our sample, the number of requester processes has been limited to eight (8), so only eight (8) users, or virtual terminals, can connect to remote nodes of the network at the same time.

Note: The sum of the requester and server processes fields can not exceed 30. Any combination of numbers can be used, provided that the sum of the two fields is under 31. For example, you could set the limit for the number of server processes to 28, and the limit for the number of requester processes to 2.

Number of message buffers: This is a temporary storage area where network messages are stored. The minimum value is 2. More buffers (about 10) should be specified if heavy network usage is anticipated.

Transaction timeout: This is an error timeout that specifies the number of seconds between the time that a local node sends a network message to a remote node and then receives a reply to that message. If the local node does not receive a reply within the time specified in this field, it will automatically discontinue trying to communicate with the remote node, and an error message will appear on the screen of the local node. In our sample, we have entered a five (5) in this field, so we have given any remote node to which we send a network message, five (5) seconds to respond to that message. It is recommended that if you have heavy floppy disk I/O over the network, that you change the default in this field from five (5) seconds to ten (10) seconds.

Number of RCTs: This stands for Requester Configuration Table. These tables specify which local devices (drives or printers) are actually mapped over the network. One RCT exists for each virtual terminal that is attached to the network. In our sample, we have limited the number of RCTs to eight (8).

Private Drives: This field enables you to specify the drives on your local node that you do not want remote nodes to access. In our sample, drives F: and G: have been designated as private drives on the local node.

Device Mapping Lines: Three different types of Multiuser Concurrent DOS resources may be mapped over the network (drives, printers and queues). Mapping a resource simply means that if a user attempts to use that resource, those resource references will be transferred via the network to the remote node that is specified in a mapping line. Note that the remote node (server) must be logged on to the network. If a user attempts to access a mapped resource and the corresponding remote node is not connected, the following error message will appear on the screen:

Network Error: Server Not Connected

All three resource mapping lines follow a consistent format which is very similar to the NET DEVICE command:

```
resource local = remote node
```

In the format that is displayed above, "resource" is the type of resource that is to be mapped. "Local" and "remote" are resource type dependent identifiers for the particular resource that is to be mapped. "Node" is optional and specifies the remote server to be accessed when the mapped resource is used. If the "node" parameter is not provided, the default node ID will be used. The three resources that may be mapped over the network are explained below:

Map a Drive: The "drive lines" in this field enable you to map drives over the network. In our sample, we have mapped drives L:, M:, N:, O:, and P: of the local node to drives A:, B:, C:, D:, and E: of the default node, respectively.

Map a Printer: The "printer lines" in this field enable you to map printers over the network. In our sample, we have mapped printer 5 of the local node to printer 0 of node 0.

Map a Queue: Queues are special types of "memory files" that are used by certain programs. The "queue lines" in this field enable you to map queues over the network. The three lines in our sample have mapped the printer spooling process to node 02.

Node Name: Each unique node name is contained in a file called NAMSVR.DAT which is located on user area 0, drive A: of the system node. This name must be different for each node. Refer to the table below to make sure that you don't use any illegal characters when you establish the node name.

First character: A-Z,
Subsequent characters: A-Z, 0-9
Maximum number of characters: 8

If the first character of the node name is a numerical digit (0-9), the NET program will interpret it as a node ID number and not a node name. DR Net does not distinguish between upper and lower case characters.

3.2 The SEINET Command

The SEINET command is used to configure the local node to the specifications that are designated in the CONFIG.NET file. Some of the lines of the CONFIG.NET file are static, and can only be changed when the system is rebooted. These are:

node number
number of servers
number of requesters
number of message buffers
number of RCT'S

If you have changed any of these lines in the CONFIG.NET file, you must reboot your system for the changes to be implemented into the operating system.

The rest of the lines in the CONFIG.NET file can be changed dynamically using the SEINET command. These are:

default user password
timeout
list of private drives
mapping of: drives
 printers
 queues

If you have changed any of these lines in the CONFIG.NET file, you may implement these changes into the operating system simply by typing the following command from the drive and user area where the CONFIG.NET file resides:

```
QA>SEINET
```

3.3 The NAMENODE Program

The NAMENODE program is used to modify the list of node names that are attached to the network. This list of node names is contained in a file called NAMSVR.DAT which is located on user area 0, drive A: of the system node. There will already be a NAMSVR.DAT file established for you when you receive your system. This file should only be modified by the system manager.

The NAMENODE program is run automatically by the local system when that system is booted. This program logs in to the system node and writes the node ID number and node name to a communication queue. The "receive" option is invoked by typing:

```
QA>NAMENODE R
```

from the system node. The NAMENODE program will detach and hang in the background to read the communication queue for the node ID number and node name to update the NAMSVR.DAT file. The NAMENODE scanning option from the system node scans the communication queue periodically to maintain the NAMSVR.DAT file.

To display a list of the existing node names and their corresponding ID numbers that are attached to the network, use the NET NAMES command.

3.4 The NAMSVR.DAT File

The NAMSVR.DAT file is a binary data file which contains a list of the node names that exist on the network. This list is automatically modified with the NAMENODE.COMD program. Your Gifford system will come supplied with an existing NAMSVR.DAT file, so you should never have to create a new one. The NAMSVR.DAT file should always be located on user area 0 of drive A: on the system node. To view the NAMSVR.DAT file, use the NET NAMES command.

3.5 The NETMOTD File

NETMOTD is the message of the day file for all systems attached to the network. When a user logs in, the network message of the day is displayed as well as the message from the MOTD file of the local node. The file name for the network message of the day is NETMOTD and the file is kept on user area 0 of drive A: of the system node. Use this file for messages that you want all users on the network to see when they log in to the system. This file can contain anything you wish, including escape sequences to control the user's screen. Create and update the NETMOTD file with an editor such as ED or WordStar (in non-document mode).

3.6 The PWASK.NET File

The PWASK.NET file is a security option of DR Net. If the file PWASK.NET exists on user area 0 or drive A: of a node, the network operating system will demand that a login account password be presented whenever a remote virtual terminal attempts to attach to the node. Unless the current account name exists on the PASSWD file of the node, and unless the password that is presented matches the login password, permission to connect is denied. The file PWASK.NET can be empty, and is created by the command:

```
QA>MAKE PWASK.NET
```

3.7 The NETUSERS File

If your local node is the system node (the node with node ID = 00), then user area 15 of drive A: will hold all of the MAIL and AP files for the entire network. For that reason, this drive should provide sufficient space to store the messages and reminders created by these MC-DOS office automation utilities.

The system node should have a file called NETUSERS. This lists all of the account names that can receive MAIL or AP messages. Create this file by using a text editor, like NewWord or WordStar, in non-document mode. Each line of NETUSERS consists only of one account name, in lower-case letters, beginning in column one. The NETUSERS file must exist on user area 0 of drive A: of the system node for the MAIL and AP programs to operate within a network.

4.0 DR NET SECURITY FEATURES

Most of the security features of DR Net are related to controlling access to local files from remote nodes. Also, the system manager has some control over local users accessing remote systems.

There are five layers to the security system that protect local data files from remote access. Three of these layers are in the DR Net network operating system, one is in the Gifford enhancement to DR Net, and another is in the Concurrent DOS file system (BDOS). The first three layers control the connect process and the last two are used to restrict users once they have connected to a system. The five layers are:

- | | |
|-------------------------------|---------|
| 1) Number of server processes | DR Net |
| 2) Node password | DR Net |
| 3) User password | Gifford |
| 4) Private drives | DR Net |
| 5) File passwords | BDOS |

4.1 The Number of Server Processes

The number of server processes is specified in the CONFIG.NET file which is read when the system is booted. If this value is set to zero (0), a remote system will not be able to connect to the local system. However, local users will still be allowed to connect and map resources to remote systems.

4.2 The Node Password

Like the number of server processes, the node password is also specified in the CONFIG.NET file. If a node password is specified in the CONFIG.NET file, then remote users will be prompted to supply a password each time that they attempt to connect to the local node. If an incorrect password is supplied, the mapping will be denied.

4.3 The User Password

The user password is the login password for the current login account name, as it appears in the PASSWD file on a node from which a remote user attempts to connect to the local node. If an account of the same login name exists on the local system and the login passwords are the same for both systems, then the connection is allowed without prompting for a password. If the passwords are different or there is no matching account on the local node, then the remote user is prompted for a password. If the password entered matches the local password then the connection is allowed.

There is a small security hole in this layer where the user password is prompted. This hole occurs when the local and remote passwords are the same and a user attempting to map to the local node will not be prompted. This hole can be sealed by creating a file call PWASK.NET on the local node. (Type OA>MAKE PWASK.NET.) If the PWASK.NET file is present, the remote user will always be prompted for a password when attempting to map onto the local system. Most systems will not need to create a PWASK.NET file unless your system contains sensitive data (like an accounting system).

4.4 The Private Drives

Private drives are drives listed in the PRIVATE line of the CONFIG.NET file. If a drive is designated as private then no remote access to that drive will be allowed. If a remote user attempts to map and then use a private drive, a network error will be displayed and the remote user's program will be terminated. Note that drive A: should be left available to remote users as certain files on it are used during the connection process.

4.5 The File Passwords

The last security layer in the DR Net network operating system is the use of file passwords. File passwords are a feature of Concurrent DOS and are documented in the CONCURRENT CP/M OPERATING SYSTEM USER'S GUIDE. A file protected by a file password cannot be accessed via DR Net beyond the password restrictions, unless the file password is presented.

4.6 Restricting Local Users

Another aspect of the security system is the control of local users attempting to map onto the network. The only mechanisms for this level of security are the REQUESTER and RCT lines in the CONFIG.NET file. If either (or both) of these fields is set to zero (0), all attempts to connect to a remote node will be denied.

4.7 The PASSWORD Command

The MC-DOS PASSWORD command functions in much the same way as the MP/M 8-16 PASSWORD command. When a user on the local node attempts to connect to a remote node, the NET command checks to see if your account name is contained in the PASSWD file of the remote node. If your name is not contained in the PASSWD file of the remote node, you will not be allowed to map onto that node. If your name is contained in the PASSWD file of the remote node, the NET command checks to see if the encrypted password is the same as the name of the account that you logged in to. If the local and remote passwords do not match, you will be prompted to supply the correct password for your account that has been established in the PASSWD file of the remote node.

Suppose that you want to map onto the SALES node, and your login name on that node is Eric. To do this, type:

```
QA>NET CONNECT ERIC @SALES
```

The following prompt will be displayed on your screen:

```
Password (eric @ SALES):
```

If the password that you supply is the same one that has been established for Eric's account on the remote node, you will be able to map onto the remote node. If the password is different, you will not be allowed to map onto that node.

To change your password on a remote node, type `PASSWORD @` and then the name of the node. For example, to change your password on the sales node, type:

```
QA>PASSWORD @ SALES
```

You will be prompted to supply a password. The next time that you map onto the SALES node, or login from a terminal that is connected directly to the SALES node, you must supply the new password. You must already have an account on the remote node and know the password for that account in order to change it. If you don't have an account on a remote node that you wish to access, an account must be created on the remote node by the system manager for that node using the `NEWUSER` command. The `NEWUSER` program can only be used to create new accounts on the local node.

5.0 DR NET BUG REPORT

This form should be used to report problems with DR Net or with this manual to Gifford Computer Systems. Every report will be reviewed by our Customer Support Department.

Date: _____

Name: _____

Company/Organization: _____

Address: _____

City, State, Zipcode: _____

Telephone: _____

MC-DOS System Number: _____

MC-DOS Release Version: _____

State the exact problem and symptoms that you encountered with DR Net:
