

PLAN 4000™

General Information Manual

NESTAR

NESTAR SYSTEMS, INCORPORATED

PLAN 4000 (TM)

GENERAL INFORMATION MANUAL

PRERELEASE MATERIAL

DISCLAIMER OF WARRANTIES

The information in this document has been carefully reviewed and is believed to be reliable; nevertheless, Nestar Systems, Incorporated makes no warranties, either express or implied, with respect to this manual or with respect to the software described in this manual, its quality, performance, merchantability, or fitness for any particular purpose. The entire risk as to its quality and performance is with the buyer. The software herein is transferred "AS IS".

Nestar Systems, Incorporated, reserves the right to make changes to any products described herein to improve their functioning or design. Nestar programs are licensed products whose use is defined in the Nestar System Software License Agreement. Server Programs usually require a separate license for each machine on which they run.

During a set period (specified in the Software License Agreement: Schedule A) immediately following initial availability of each licensed program, the customer may submit documentation to a designated Nestar location when he encounters a problem which his diagnosis indicates is caused by a licensed program error. During this period only, Nestar through its service organization, will respond to an error in the current unaltered release of the licensed program and/or issue corrected code or notice of availability of corrected code. However, Nestar does not guarantee service results or represent or warrant that all errors will be corrected. Any onsite programming services or assistance will be provided at a charge.

In no event will Nestar Systems, Incorporated be liable for direct, indirect, incidental, or consequential damages at law or in equity resulting from any defect in the software, even if Nestar Systems, Incorporated has been advised of the possibility of such damages. Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you.

PLAN 4000, LID, and Messenger are trademarks of Nestar Systems, Inc. The Regents of the University of California, Apple Computer, Inc. and International Business Machines, Inc., make no warranties, either express or implied, regarding the computer software programs described herein, their merchantability or their fitness for any particular purpose. UCSD, UCSD Pascal, and UCSD p-System, are all trademarks of the Regents of the University of California. CP/M is a registered trademark of Digital Research, Inc. Z-80 is a registered trademark of Zilog, Inc. Softcard is a trademark of Microsoft Consumer Products.

This document is copyrighted and all rights are reserved. This document may not, in whole or part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form without prior consent, in writing, from Nestar Systems, Incorporated.

Copyright 1981, 1982 by Nestar Systems, Incorporated
2585 E. Bayshore, Palo Alto, California, 94303
(415) 493-2223 Telex 171420 Nestar PLA

Publication number GA40-0100-0
All rights reserved.

How To Use This Manual

This manual introduces local area networks and the PLAN 4000 (TM) system. Read it for general information on Nestar's networking products.

For many users, the PLAN 4000 network and their desktop computers are "turnkey": their computers automatically connect to the network and run programs. No knowledge of networks or personal computer operating systems is necessary.

Turnkey users need only study the material provided with the programs that run automatically for them. For those interested, however, this manual will provide insight and a general background into the network processes that are "transparent" or invisible to them.

Other user workstations run less automatically. Users communicate, control which programs run on their computers, and share network resources in a direct way. For them, this is the first in a series of manuals and guides, and will serve as an introduction to the PLAN 4000 system. A PLAN 4000 bibliography appears at the end of the manual.

The system is powerful, linking hundreds of desktop workstations, nearby and remote. Workstation use is simple, once a few fundamental concepts have been mastered. No prior experience with networks is necessary, and none is assumed in this manual. Familiarity with your particular workstation is useful (and sometimes necessary), however. Details of its operation are provided by the manufacturer.

PRERELEASE MATERIAL

Contents

Disclaimer..... ii

How To Use This Manual.....iii

Contents v

Introduction..... 1

The Network Community..... 2

Essential Components..... 4

Optional Components..... 6

Expanding the Network..... 8

A Server Example: Request Files..... 9

A Communications Example: Electronic
Mail..... 11

Sharing Storage..... 13

Network Commands..... 19

Security..... 20

Bibliography

Reader Comment Form

THE PLAN 4000 SYSTEM

INTRODUCTION

The PLAN 4000 system is a fast, expandable, local area computer network. Connecting a variety of desktop workstations, the system allows users to communicate with each other and to share data, mass storage, and other network resources.

Recent advances in computers have multiplied the power of desktop systems. At the same time, computer networking has grown more sophisticated. The PLAN 4000 system merges these two technologies, providing a business environment that answers current corporate needs for widespread computer use by employees.

In business, a wide spectrum of individuals must share information; rarely is true "personal" data encountered in corporate situations. One person might enter the basic data, another will edit or modify it, a third will produce reports or graphic displays from it. Information is typically supplied by many sources, but must be merged, managed, and distributed to be useful. Also, because information is a valuable resource, it must be protected from malicious or accidental misuse.

Traditional multiuser computer systems, whether mainframe or minicomputer, are not well suited to this new breed of automated applications. Conventional systems require large, centralized facilities, inaccessible to the "user". They require costly support staffs. Maintenance problems make it difficult to justify new development, resulting in today's widespread

applications backlog.

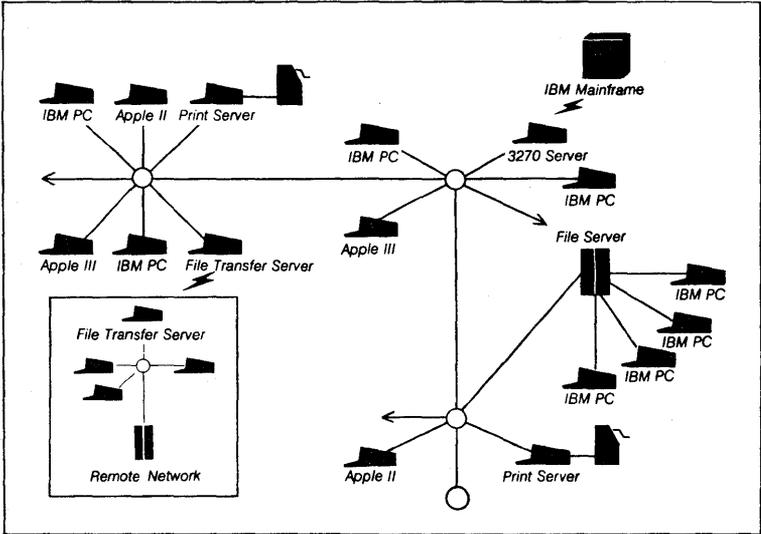
Conventional systems also lack the responsiveness, ease of use, and user orientation of the newer desktop systems. They expect a more sophisticated, trained user, decreasing their usefulness to the far broader class of new computer users.

THE NETWORK COMMUNITY

Personal Local Area Networks (PLANs) use familiar personal computers as desktop workstations. The computers retain all of their standalone capabilities; in addition, they connect automatically to the network at startup, and users can send commands over the network as easily as they can use them on a standalone.

Off-the-shelf software can run on the station, while major resources are centralized and shared by the community. From their desks, users can access data mutually, issue commands to shared printers, and communicate with each other.

The PLAN 4000 (TM) System



Workstations and "servers" are connected by coaxial cable in a variety of topologies. Servers process network commands and requests. Running special software, they control mass storage devices, printers, and databases. They also function as communication gateways, connecting networks to mainframes and to each other.

The "file server" is especially important to the personal local area network. A high powered unit, the file server links users to shared mass storage on the network.

ESSENTIAL COMPONENTS

The simplest PLAN 4000 installation contains one network segment, which must have:

- * One File Server, consisting of hardware and software that together manage access to attached hard disks. The file server cabinet is a movable unit containing the file server hardware, a high density tape unit (used to make disk backups), and an optional hard disk. Additional storage cabinets can be attached to it. At least one hard disk will always be present.
- * Up to 255 desktop workstations of various types.
- * Network Interface Cards, installed like disk controller cards in the workstations. Network interface cards are similar to controller cards, linking workstations to the file servers and their shared hard disks in the same way that controller cards link microcomputers to local disk drives.

Network interface cards and local disk controller cards can reside in a workstation simultaneously, connecting microcomputers to networks and to local peripherals at the same time. Network cards transform desktop computers into network workstations without impairing any of their stand-alone capabilities.

- * Coaxial cable and Line Isolation Devices (called LIDs) connect all workstations and servers. LIDs amplify and split network signals, and can be installed within servers or externally in walls and ceilings. Each LID contains multiple connectors that attach to

coaxial cable and amplify network signals over 2,000 additional feet. Using LIDs, network segments can span over four miles and can support up to 254 workstations.

- * User Station Network Software, which supports many personal computer operating systems. At power on, workstations attach to the network. Users can then run programs stored on the network in shared libraries.

OPTIONAL COMPONENTS

STORAGE

- * Up to 3 additional hard disks can be connected to the file server for increased mass storage.
- * For storage beyond the four disks on a network's first file server, additional file servers can be added, each connected to four hard disks of its own. Multiple file servers can receive and service requests concurrently. In this way, unlimited storage is available to users.

SERVERS

A variety of servers are available. They can share space in the file server cabinets, occupy cabinets of their own, or transform ordinary workstations into servers.

- * Print Servers control network printers, processing users' print requests. Print requests issued by users are stored on shared hard disks. Print servers find them there.
- * File Transfer Servers transmit data across phone lines, linking many network communities.
- * Gateway Servers link network segments.
- * 3270 and 3780 servers link network segments to mainframes.

- * Applications Servers perform special tasks for bankers, brokers, hospitals, and others. Your installation may have one or more of them.

USER SOFTWARE

- * Special network software packages allow users to run popular personal computer programs in the network environment.

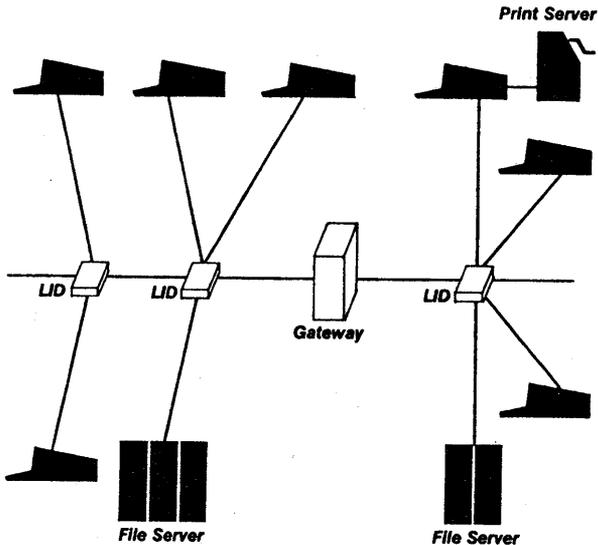
EXPANDING THE NETWORK

There are several ways to expand the network:

- * LIDs can be added to extend the distance between stations and groups of stations.
- * Additional network segments can be added. Each additional segment must contain the essential components listed above. Gateway servers connect segments.

With segments connected, users can access resources and communicate throughout the system.

- * File Transfer Servers transmit data across phone lines, linking many network communities.



LIDS, GATEWAYS, AND FILE TRANSFER SERVERS

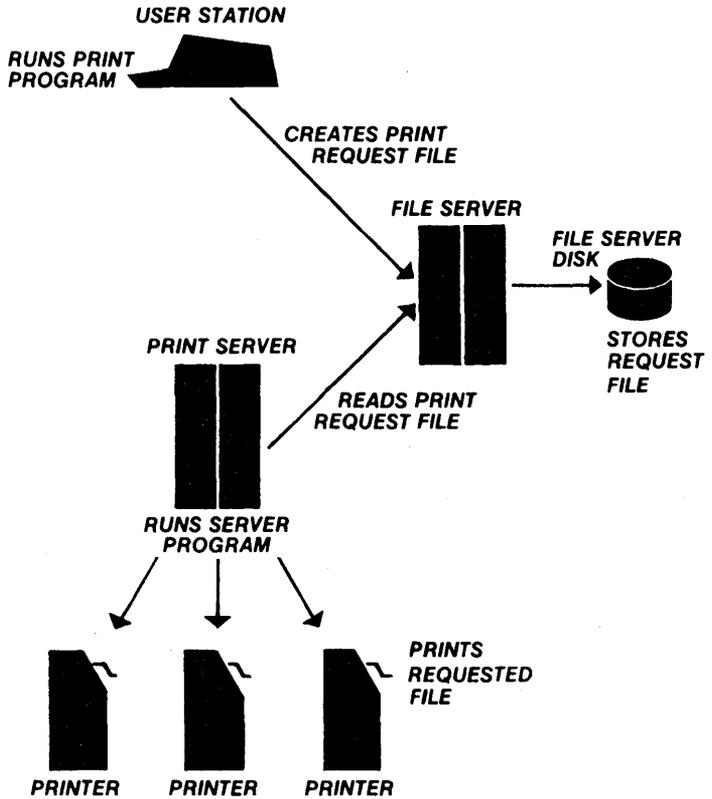
A SERVER EXAMPLE: REQUEST FILES

"Request files" are frequently used to allow workstations to share network resources. In the figure on the following page, a user runs a print-request program on his or her computer. The program sends a message to a file server on the network, which creates a "print request file" and places it in mass storage.

Print servers periodically check storage for such requests. When one is found, a server processes it. Requests can specify files to be printed, printer to be used, format, number of copies, priority, and other options. Requests can be handled by print servers on any network segment or on remote networks, if the proper gateways are present.

For this kind of network function, the user need only turn on his or her desktop station, log on according to instructions, run a print request program, and respond to the prompts that follow.

PRINT REQUEST FILES



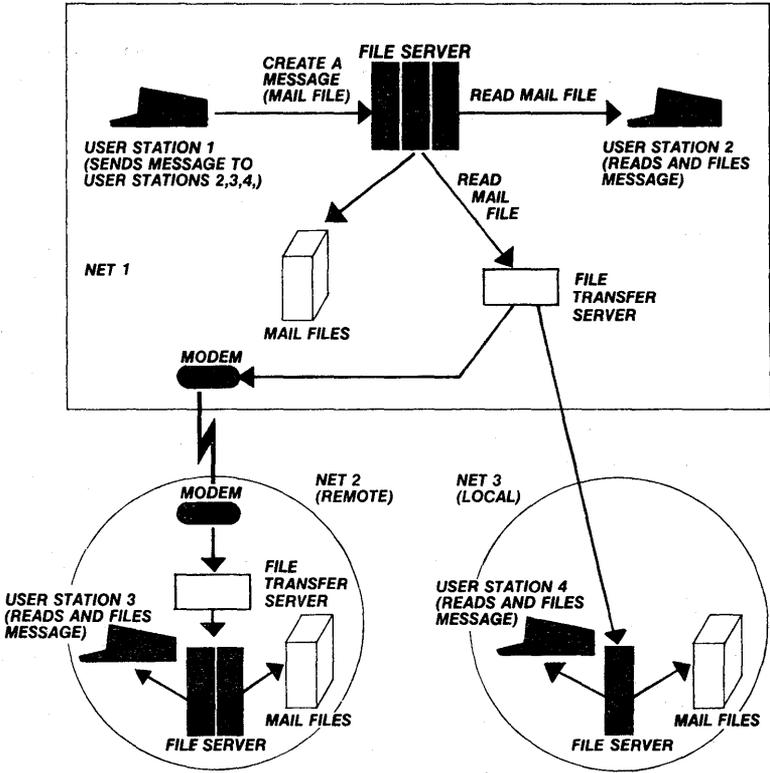
A COMMUNICATIONS EXAMPLE: ELECTRONIC MAIL

Electronic mail works in the same way. As shown in the following figure, users run a mail program at their stations. Guided by prompts, they type in messages, which are stored on the shared hard disk by a file server.

When users ask to read new mail, the program checks the mail storage areas and displays the stored messages found there.

A good mail program allows users to file, forward, print, and otherwise manipulate mail, as well as to read and send it to individuals and groups. As with request files, message files can be sent to file servers on other segments or on remote networks, if the proper gateways are present. Nestar provides an electronic mail program called the MESSENGER (TM).

ELECTRONIC MAIL



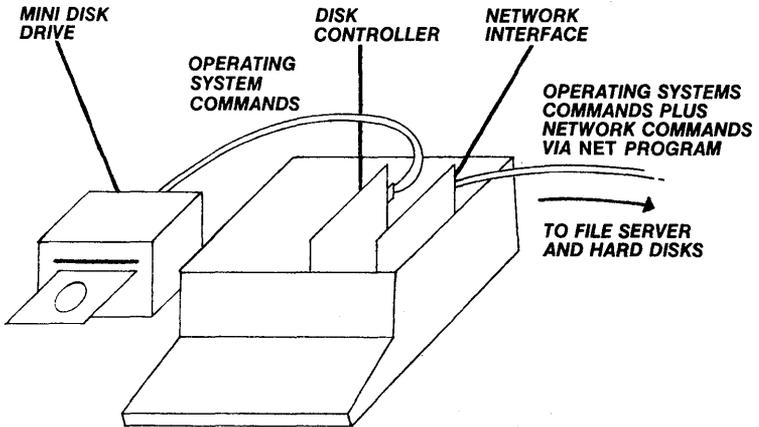
SHARING STORAGE

The PLAN 4000 network allows users to share mass storage devices. Special stations on the network, called "file servers", regulate this sharing.

Desktop computers use "disk controller cards" (hardware) and operating systems (software) to move data to and from floppy disks. To move the same information to and from shared storage, the network uses a "network interface card", masquerading as a disk interface card, together with the same operating system (with a program of network commands added).

Whether you know how to use floppy disks with your desktop computers or not, learning to share storage is easy. A NET program, which runs at your workstation like any other program, enables you to issue commands to your file servers for you. These commands, and the NET program, are discussed in a later section. First, however, more on the way that existing personal computer environments are used when connected to a network.

INTERFACE CARDS



VIRTUAL VOLUMES

Network hard disks are divided into sections, which are used by one or more workstations on the network. These sections are called "virtual volumes" or "virtual diskettes" (virtual here means "in essence"). Virtual volumes are formatted to resemble real diskettes, so that they can be used with a specific microcomputer operating system.

Virtual volumes are created by the NET program. They can contain files, in the same way that real diskettes do. The manual for your operating system explains how to create, delete, and otherwise handle these files. The volumes

themselves, being sections on network hard disks, are created, deleted, and otherwise handled by the NET program.

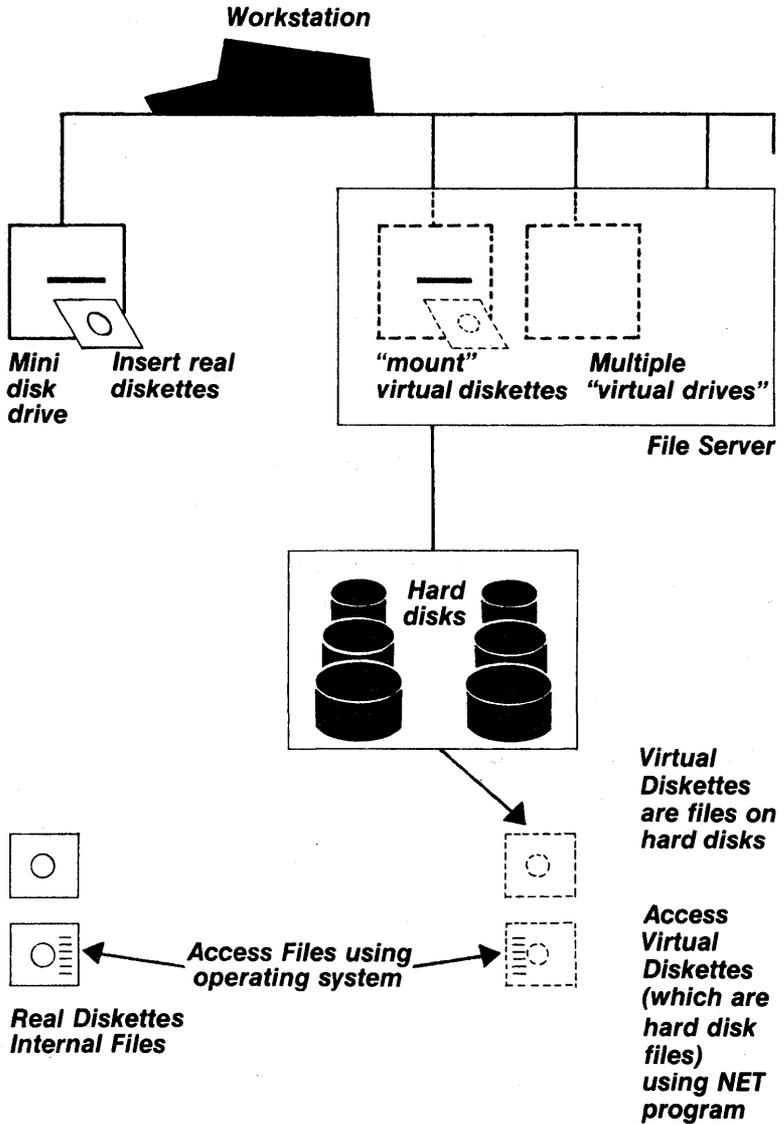
Virtual volumes and other sections of storage can be thought of as files on the hard disks. We avoid this use of the word "file" because virtual volumes can then be confused with the files that they contain. However, the word "file" in "file server", "file transfer server", and some other terms usually does refer to virtual volumes.

VIRTUAL DRIVES

Each personal computer allows you to attach a certain number of local disk drives, which read data from real diskettes and write data to them.

On the network, additional "virtual" drives are available. As might be expected, virtual volumes are inserted into these virtual drives by commands issued from the NET program.

VIRTUAL VOLUMES AND VIRTUAL DRIVES



PATHNAMES

Each virtual volume contains files, which are named and used according to the operating system that you use to handle them. The volume itself might also be given a name by the operating system. This name, if present, is the volume's "internal" name.

At the same time, however, virtual volumes are sections of mass storage. As such, they must have network names, which are separate and different from any volume names or file names held internally. Network names are called pathnames.

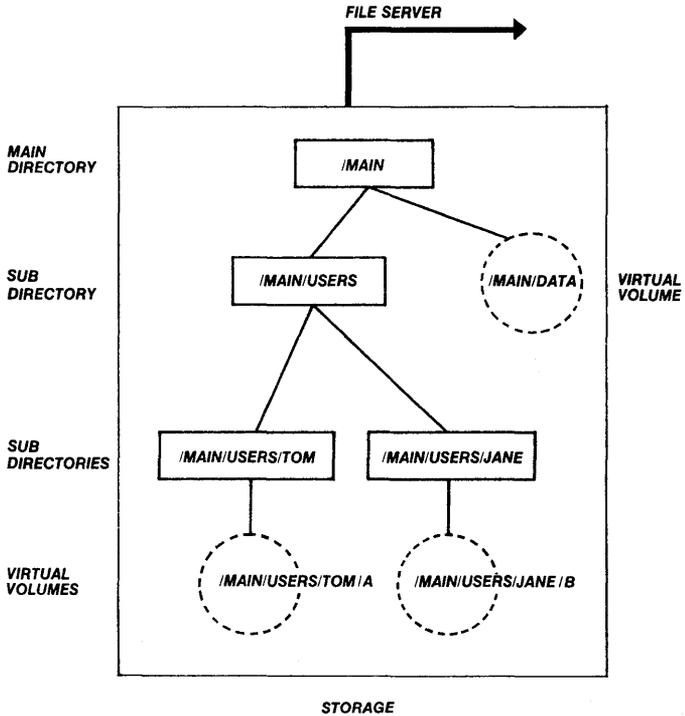
When a virtual volume is created, it is given a pathname. This pathname is used whenever the volume is to be handled. The figure on the following page shows how pathnames are used to identify areas of mass storage.

Network hard disks can be referenced by unit number or name. In the figure, the disk is called MAIN. A directory on MAIN, called /MAIN, contains the names of subdirectories and some volumes on the disk. Directories are small, special purpose volumes that contain a partial list of virtual volumes and subdirectories on the disk.

In the example, network data is stored in a virtual volume called /MAIN/DATA, which is listed in the /MAIN directory. Users' directories, which contain the names of their volumes, are listed in a subdirectory called /MAIN/USERS.

Treelike collections of directories and volumes provide a useful means of dividing up large

amounts of storage space. By specifying a particular directory, every directory and volume below it can be renamed, deleted, or otherwise handled, without the need to name every volume involved.



NETWORK COMMANDS

When a user logs onto his or her machine, an operating system is loaded into it. The user then runs programs and uses operating system commands as needed. The NET program is available to create and handle virtual volumes. From NET, commands are issued to file servers on the network.

At the workstation, real diskettes are inserted into real disk drives. Virtual volumes, however, are "mounted" on virtual drives. The user types in a command such as

```
MOUNT /MAIN/USERS/TOM/1,D3
```

and the virtual volume with the pathname /MAIN/USERS/TOM/1 is made available on drive number 3 (commands vary somewhat according to the personal computer operating system being used; In some cases, for example, drives are given letters rather than numbers).

Commands exist to

```
CREATE  
RENAME  
and DELETE
```

volumes, as well as to

```
MOUNT  
and UNMOUNT
```

them.

Commands such as

SHOW INFO
SHOW TYPE
SHOW DRIVES
and SHOW MOUNTS

provide a variety of information on virtual volumes and network activity.

These and many other commands are described in detail in the File Server User's Manual, and in Guides written for each operating system environment.

SECURITY

The PLAN 4000 system provides a number of ways to control access to network volumes and directories, and to control their usage.

For volumes, three groups of users are defined:

PUBLIC GROUP PRIVATE

Four types of usage are defined:

READ WRITE CREATE DELETE

Using the NET program, passwords are set to control access and usage:

```
PROTECT /MAIN/DATA/1,  
        PRVPW = GOLD,  
        GRPPW = SILVER,  
        PUBPW = GLASS,  
        PRVACC= RWCD,  
        GRPACC= RW,  
        PUBACC= R,
```

Here, the data found in the virtual volume /MAIN/DATA/1 can be read by anyone knowing the public password GLASS. Those who know the group password SILVER can read and write in the volume. Those who provide the private password GOLD can read and write into the volume, and delete and recreate the volume itself.

The user specifies access and provides passwords when issuing NET commands:

```
MOUNT /MAIN/DATA/1:GOLD,D3,RW
```

Here, the private password GOLD is given and READ/WRITE usage is specified for the data volume to be mounted on drive 3.

A FINAL WORD

Now that the PLAN 4000 system has been introduced to you, read the manuals listed on the following pages for more information. Network users will want to read the File Server User's Manual next. Those who do not yet own a PLAN 4000 network can contact a Nestar representative for more information.

PLAN 4000 PUBLICATIONS

General Information Manual	GA40-0100
PLAN 4000 Physical Planning and Installation Manual	GA40-0101
File Server User's Manual	SC40-0200
File Server Apple II Pascal User's Guide	SC40-0501
File Server Apple II DOS User's Guide	SC40-0502
File Server Apple II CP/M (R) User's Guide	SC40-0503
File Server Apple /// SOS User's Guide	SC40-0504
File Server IBM PC DOS User's Guide	SC40-0505
File Server IBM PC UCSD p-System (TM) User's Guide	SC40-0506
File Server Installation and Operation Manual	SC40-0300
PLAN 4000 System Service Manual	LA40-0401
Print Server User's Manual	SC40-0201
Print Server Installation and Operation Manual	SC40-0301
Messenger User's Manual	SH40-0204
Messenger Installation and Operation Manual	SH40-0304

Reader Comment Form

PLAN 4000
NESTAR SYSTEMS, INCORPORATED

You are encouraged to use this form to communicate to Nestar any problems or suggestions associated with Nestar products. We would like your comments on improving the system itself, as well as on this documentation.

Nestar installation location:

Submitter's name :

Address :

Description of problem or suggestion:

Please mail this form to :

Nestar Systems, Incorporated
2585 E. Bayshore Road
Palo Alto, California 94303

