

PLAN 4000™

System
Physical Planning and Installation Manual

NESTAR

NESTAR SYSTEMS, INCORPORATED

PLAN 4000 (TM)

SYSTEM PHYSICAL PLANNING
AND INSTALLATION MANUAL

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How to Use This Manual

This manual has been written to assist you in planning and completing the installation of your PLAN 4000 system. For an overview of the system, read the PLAN 4000 General Information Manual.

This manual assumes a simple, trouble free system installation. Details of hardware included here are most often provided only for informational overview purposes. As with any sophisticated system, however, technical questions of a trouble shooting nature may arise at the time of installation. Information necessary to address such questions is included in the PLAN 4000 System Service Manual.

The File Server Installation and Operation Manual should also be used during installation. A bibliography of PLAN 4000 system manuals and guides will be found at the end of this manual.

The material in this document applies to Version 2.0 of the File Server software.

We welcome criticisms and suggestions. Forms for reporting program errors and documentation errors or inadequacies are provided at the back of this guide.

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Chapter 1

General Principles

1.0 Introduction

The Nestar PLAN 4000 system connects up to 255 user workstations and "server" stations. The system is easy to install, and this manual does not assume that you have any specialized technical knowledge. Nevertheless, you will find it helpful to read the PLAN 4000 General Information Manual before beginning. A general knowledge of microcomputers is also desirable.

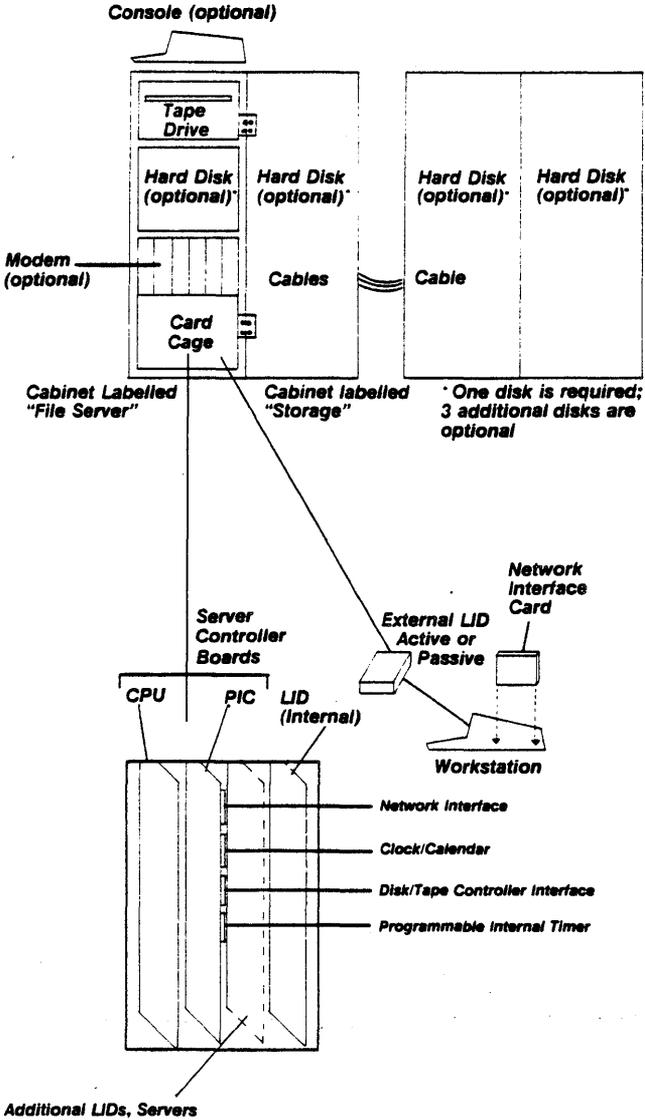
"File Servers" allow network users to share hard disk storage and programs. Figure 1-1 shows a file server consisting of three cabinets: the cabinet labeled "File Server", and two cabinets labeled "Storage". Up to three storage cabinets, each containing a 14" hard disk, can be cabled to the file server cabinet, which can also stand alone if it contains an 8" hard disk. Any two cabinets can be physically connected to form a single unit.

The cabinet labeled "File Server" contains the server controller hardware, a cartridge tape backup subsystem, power supply and disk/tape controller. An 8" hard disk and its power supply are optional for the first cabinet.

Single and dual cabinet systems arrive assembled in one shipping crate. Systems of three or four cabinets arrive in two shipping crates (two attached cabinets in one crate, one cabinet or two attached cabinets in the second crate).

PRINCIPLES

Figure 1-1
PLAN 4000 Hardware



When three or four cabinets are present, the third cabinet must be cabled to the second at installation (the third and fourth cabinets will arrive cabled and bracketed together). Otherwise, file server hardware installation simply consists of unpacking the cabinets, attaching an optional file server terminal or console, unlocking the hard disks, plugging the power cord into a wall socket, and cabling the file server to the network.

User stations are connected to the file server station by industry standard RG62/U coaxial cable. Installation of user stations consists of laying out the cable, installing Network Interface cards (NIC's) in the workstations, and attaching them to the cable.

Hardware installation is described in detail in Chapter 3. Before installation begins, however, some planning of network layout is necessary. Physical layout is discussed in Chapter 2.

1.1 Hardware Components

The hardware components of the PLAN 4000 system (see definitions in following section):

1. Workstation computers
2. Network Interface Card for each workstation computer
3. Line Isolation Devices (LIDs) - can be "active" or "passive" (see definitions below). Active LIDs can be "internal" or "external". Passive LIDs are "external".

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4. File server cabinet (labeled "File Server"), which contains:

CPU card

Peripheral Interface Card with:

Network Interface

Clock/Calendar device(with battery backup)

Programmable interval timer

Disk & tape controller interface

(handles up to 4 disk drives and 4 tape drives)

0-3 optional internal Line Isolation Device (LID) boards

62M byte hard disk and power supply (factory option)

20 or 45MB cartridge tape drive, 90 in/sec.

Power supplies

Cooling fans

5. Storage cabinets contain 14" winchester disk and power supply. Minimum of one 14" disk in a storage cabinet or 8" disk in the file server cabinet is required.
6. Console (optional but recommended)
7. Modem (optional)
8. Coaxial cable: any commercial grade RG62/U 93 ohm coaxial cable can be used. However, if BNC connectors supplied with the network are to be used, outside cable diameter must equal .242 ±.003 inches. The cable should be chosen with regard for environmental conditions and agency approvals. The

following table shows information for some standard cables, although many others are available.

93 ohm Coaxial Cables

<u>DESIGNATION</u>	<u>MFR</u>	<u>UL</u>	<u>STYLE</u>	<u>SPECIAL</u>	<u>NOTES</u>
RG62A/U	Belden Alpha	9269 9062A	1478	general	indoor use
RG62A/U	Belden Alpha	9268 9805	1478	general	outdoor use
RG62A/U	Belden Alpha	89269 9162	----	plenum use	(teflon jacket)
	Belden Alpha	9393 9806	1354	miniature cable	requires special connectors
RG62B/U	Belden	8255	1354	stranded center conductor	

1.2 Definitions

Server - a generic term referring to any network station that performs some function on behalf of other network stations. The server generally consists of three functional units: server software, server hardware, and a shared resource (disk, printer, etc.).

File Server cabinet - the cabinet containing a tape drive, optional 8" hard disk and power supply, optional internal LIDs, and hardware for one or more servers.

File Server - hardware and software that control access to network disk storage (up to 4 hard disks) and system backup.

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LID - a Line Isolation Device that splits the network signal and boosts and conditions the signal. Each user workstation and server controller station on the network must be connected to a LID by coaxial cable. LIDs can be "external" boxes cabled throughout the network, or "internal" cards that reside in the file server cabinet.

Storage cabinet - labeled "storage". Contains a 14" hard disk and power supply.

External LID - a small box, located in an accessible place outside the controller cabinets or workstations, with multiple ports, to which workstation, server controller, and other LIDs attach via coaxial cable.

Internal LID - an active LID contained in a file server controller cabinet, with 10 ports for user workstation and other controller and LID connections. The file server cabinet can contain up to 3 LIDS. A LID board is the same as an Internal LID.

Passive LID - a LID that splits the network signal but does not boost or condition it (external only; active LIDs can be internal or external).

Node - any user workstation or server hardware station on the network.

PIC - Peripheral Interface Card. Part of the file server. Contains a Network Interface, Clock/Calendar with battery, and disk/tape interface.

BNC connector - a circular twist lock connector used to attach coaxial cables to equipment. Male connectors are used on cables, females on the equipment.

Chapter 2

Physical Layout

2.0 Network Topology: LIDs and Passive LIDs

To connect nodes (workstations or server controllers) to the network, at least one Line Isolation Device (LID) is required. The LID is a device that boosts and conditions the network signal. The LID also provides a signal splitting function so that each node's coaxial cable can connect to the network.

LIDs are available in 3 forms:

- as a board that resides in a server controller (Internal LID). Each LID board has 10 ports, and each server controller can have up to 3 LID boards.
- as a separately packaged box (LID box) with 8 or 16 ports, to which nodes are attached using coaxial cable.
- as a separately packaged box (passive LID box) that provides the signal splitting function but does not boost and condition the network signal. Passive LIDs contain 3 ports that connect to the server controller, user stations, or an active LID box via coaxial cable. Passive LIDs cannot be connected to each other. All passive LID ports MUST be terminated by a NIC card or caplike terminator provided by the manufacturer.

Two examples of a small PLAN 4000 network are shown in figures 2-1 and 2-2 below. In these examples, the internal LID has 10 ports, the external 8 or 16.

Figure 2-1

Example PLAN 4000 Topology
using Internal LID

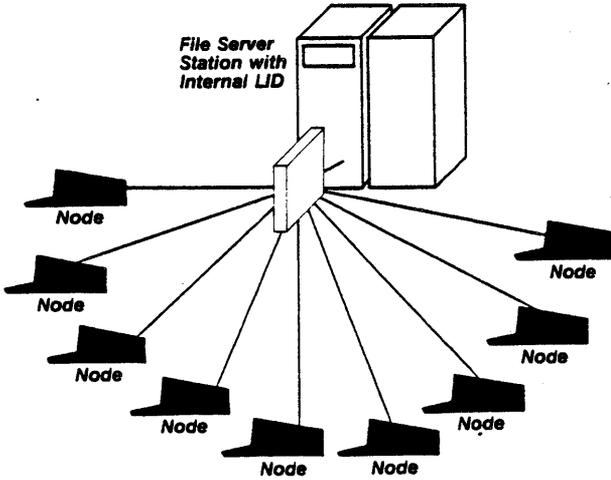
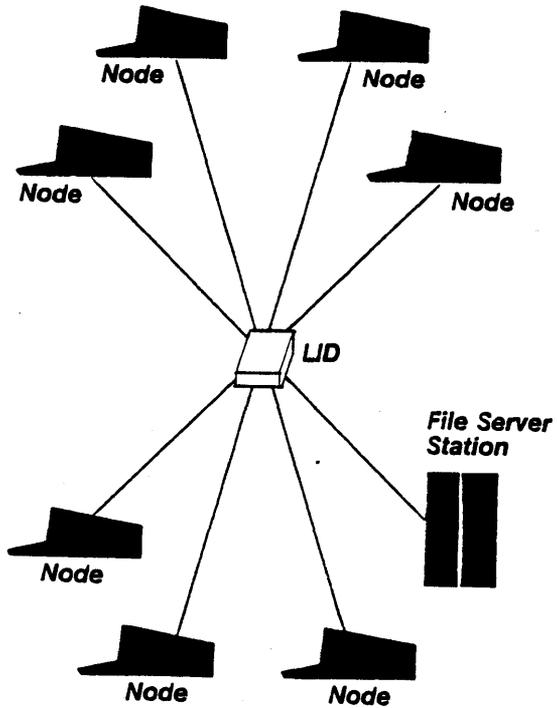


FIGURE 2-2

Example PLAN 4000 Topology
using 8-port External LID box



LAYOUT

Note that each node has a coaxial cable run between it and the LID. It is NOT possible to combine multiple nodes on a single coaxial cable run to the LID. Not all ports on an active LID need to be used. This is very useful in environments where additional nodes or LIDS may be added in the future.

The connection of the File Server to the network requires the use of one port on the LID, whether the LID is installed in the server controller or is a separate LID box.

The LID pictured in Figure 2-2 is an 8 port LID with a node connected to every port. More stations can be added by:

1. Exchanging the 8 port LID for a LID with more ports, thus providing additional ports for node connection, or
2. Disconnecting one of the nodes from the LID, attaching a coaxial cable run from the first LID to another LID, and reattaching the node to the second LID. In this way, networks with up to 255 nodes can be created by connecting multiple LIDS together.

An example of a multiple LID network is shown in Figure 2-3.

Figure 3
Network Using Multiple LIDS

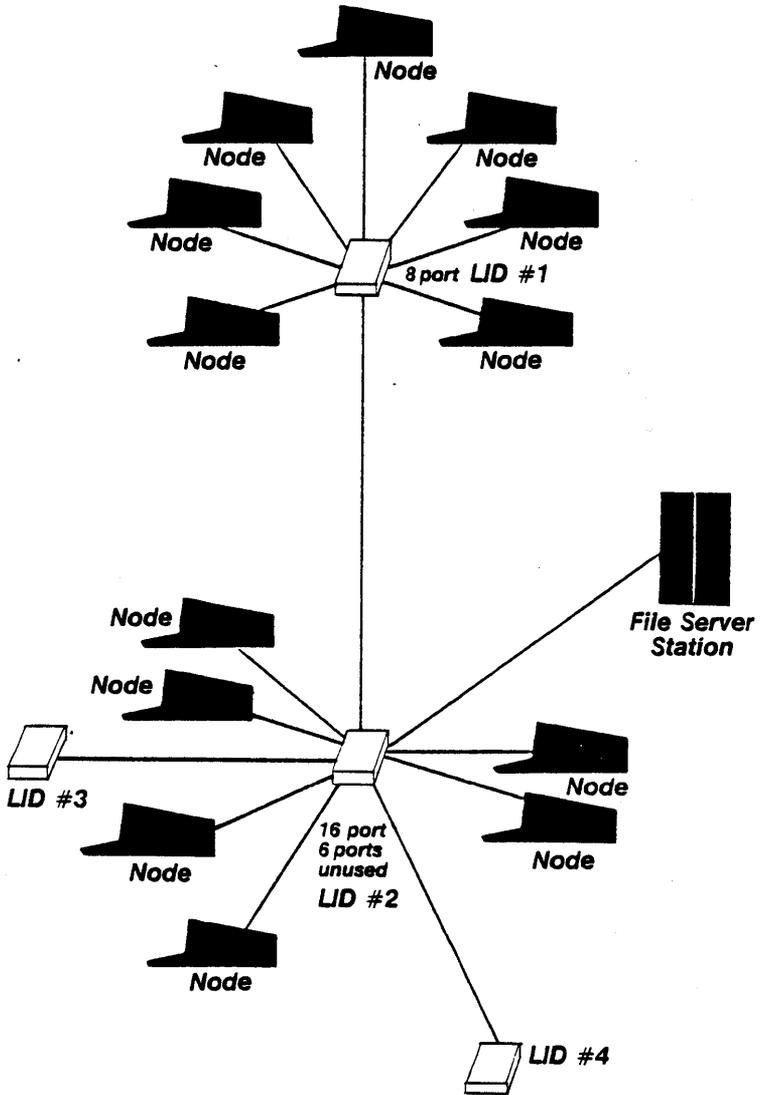
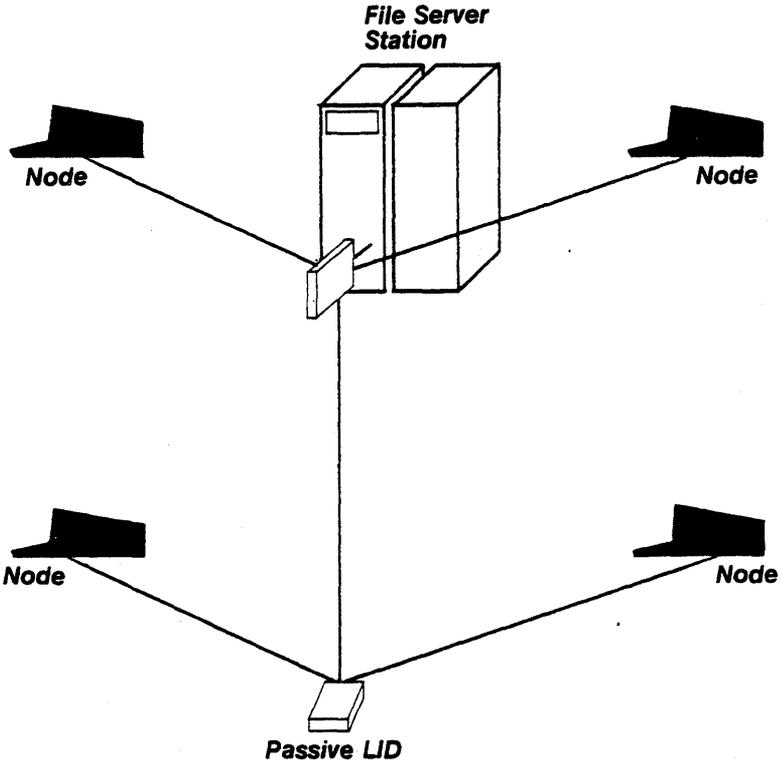


Figure 2-4

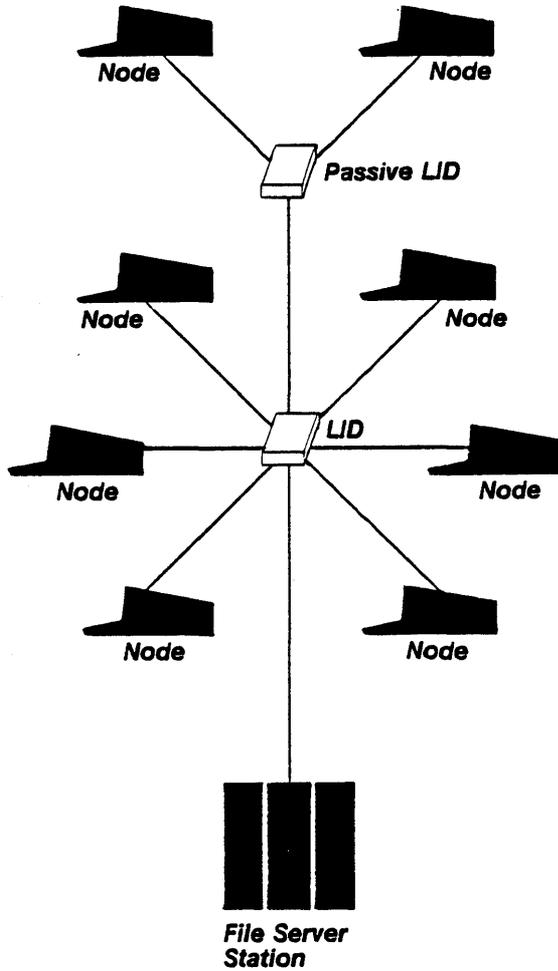
Network with Internal LID and Passive LID



*all passive LID ports
must be terminated*

Figure 2-5

Network with External Active LID and Passive LID



*all passive LID ports
must be terminated*

LAYOUT

2.1 LID and Passive LID Placement

The maximum cable length between a node and a LID or between two connected LIDs is 2000 feet. The length of cable between a Passive LID and a node or between a LID and a Passive LID is 200 feet. Two passive LIDs cannot be connected.

Plan the location of LIDs and nodes to minimize the total amount of cable: physically place the LID(s) closest to the largest concentration of nodes. For example, if there are 10 nodes physically located close to each other and 2 nodes that are some distance from this cluster, the optimum LID placement would be somewhere near the 10 clustered nodes. In this way, there are only two long coaxial cable runs required from the two distant nodes to the LID. Cable runs between the LID and the 10 nearby nodes would be relatively short.

In networks with multiple LIDS, this same principle applies. LIDS should be placed near the greatest concentration of nodes, so that long cable runs are kept to a minimum.

Active LIDs require 110 VAC (United States) or 220 VAC (European) power from a grounded outlet, on a "clean" circuit, though a dedicated circuit is not necessary. Clean electrical circuits have no other electro-mechanical equipment on them (e.g. typewriters, copy machines, heavy machinery, etc.).

LIDS can be placed in a variety of places in a building. Often they are placed in an electrical closet. They can be placed in a room corner on the floor or on a shelf, and the coaxial cables coming out of them can be hidden. There should be easy access to a clean AC power circuit. Since physical access to each LID may be

required for servicing of the network, LIDS should not be placed where accessibility is difficult or impossible for the service technician.

LIDs can be grouped together if necessary, to provide ease of access, or spread out, to minimize cable runs.

2.2 Cable Placement

2.2.1 Lengths

The distance between a node and a Passive LID is restricted to 200 feet. The maximum cable length between interconnected LIDS on the network is 2000 feet. Thus, for example, a node might be installed that is over a mile away from the rest of the nodes on the network, by installing 3 active LIDS as "repeaters" and boosters for the signal. A diagram of such an installation is shown in Figure 2-6.

In this way, a network can traverse long distances. The maximum distance between any two nodes or LIDS in a network is 22,000 ft (over 4 miles). The number of LIDS between any two nodes in a network cannot exceed 10. Since LIDS may be arranged in star-like configurations, the total number of LIDS and total amount of cable possible in a single network is far larger than will ever be needed (more than 65000 LIDS and 130 million feet of coaxial cable).

To summarize the interconnection rules:

1. User station, server controllers, and LIDs can be connected in any topology without loops. (There can never be more than ONE cabled path from any station or LID to any

LAYOUT

other LID.)

2. Passive LIDs can not be connected to each other without an intervening active LID
3. Cable lengths from nodes to active LIDs can be up to 2000 feet.
4. Cable lengths from nodes to passive LIDs can be up to 200 feet.
5. No two communicating stations can be separated by more than 10 LIDs.
6. All passive LID ports must be terminated: all three ports must be terminated with a resistor or attached to a user or server station, OR one (and only one) port must be attached to an active LID, with the other two ports terminated with a resistor or attached to a user or server station.

2.2.2 Walls, Floors, Ceilings

Cable can be run along walls, on floors (if a rubber mat is placed over the cable run to prevent tripping), or in ceilings. Many installations use the ceilings for long cable runs. If your building has a false ceiling, this may be the most convenient location.

2.2.3 Fire Codes and Other Codes

Each component of the PLAN 4000 system conforms to the Underwriters Laboratory Standards 114 (Business and Appliance) and 478 (Electronics Data Processing), and to the appropriate Canadian Standards Association safety standards. Check with your local fire department for any local requirements that may need to be addressed.

2.2.4 Wall Sockets

Since the connectors used in the PLAN 4000 are standard BNC type connectors, a standard BNC type female wall socket can be used with the PLAN 4000. This often provides for a very neat installation: the BNC wall socket provides a female receptacle for the network. Use of this receptacle requires enough RG62/U coaxial cable to run from the receptacle to the work station. The coaxial cable needs a male BNC connector on both ends. Additional LIDs can also be connected to the network in this way. In such a case, a cluster of workstations can be connected to the LID, which is then connected to the rest of the network through the wall socket.

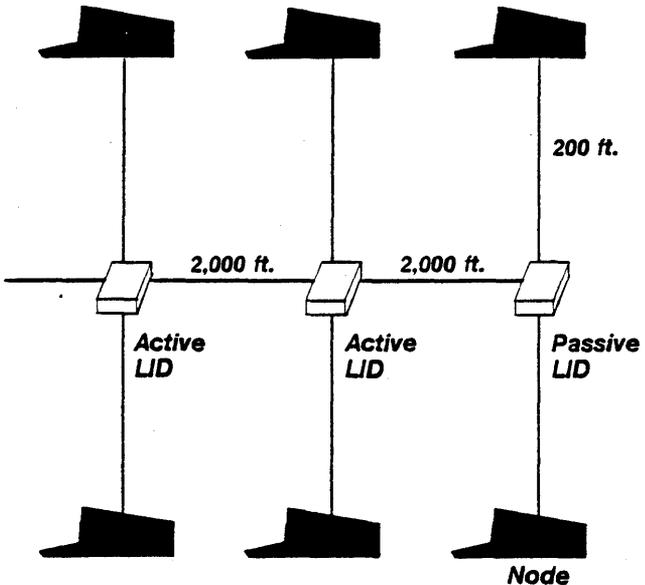


Figure 2-6

Cable Lengths

LAYOUT

2.3 Servers

2.3.1 File Server Placement and Configuration

There are no special physical constraints on file server placement. The file server should be placed to:

1. Maximize convenience to network system managers
2. Minimize the danger of physical damage
3. Allow easy access to service technicians
4. Provide a source of clean power. Active LIDS require 110 VAC (United States) or 220 VAC (European) power from a grounded outlet, on a "clean" circuit, though a dedicated circuit is not necessary. Clean electrical circuits have no other electro-mechanical equipment on them (e.g., typewriters, copy machines, heavy machinery, etc.)

If the file server contains internal LIDS, server placement should allow convenient access for connecting network cables at the back of the unit.

2.3.2 Other Servers

Like the file server, other servers can be placed anywhere on the network. User convenience will be the primary consideration (e.g., a print server will be placed near the greatest number of printer users). Access to required hardware (e.g., phone line and modem for communications servers, printers for print servers, etc.) will be necessary for the specialized servers.

Chapter 3

Hardware Installation

3.0 Hardware Installation Overview

Once you have planned the layout of your system using the information presented in Chapters 1 and 2, system hardware can be installed. Installation consists of the following steps:

1. Install file server station hardware (Section 3.2).
2. Prepare coaxial cable sections (Section 3.3).
3. Install user workstation hardware, including NICs in workstations; connect coax cables to NICs (Section 3.4).
4. Follow procedures for specific microcomputer workstation environments (Chapter 4).

3.1 File Server Hardware

This section presents, for informational purposes, a brief description of the hardware found in the cabinet labeled "File Server" and the cabinets (if present) labeled "Storage". The actual installation of the cabinet(s) is quite simple, and consists of :

1. Uncrating and positioning the cabinets (Section 3.2.1).
2. Attaching one cable from the second to the third cabinet, when more than two cabinets are present (Section 3.2.2).

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3. Unlocking hard disks (Section 3.2.3).
4. Plugging in any local and/or remote terminals or consoles to the file server cabinet; setting terminal switches (Section 3.2.3).
5. Plugging in the cabinet power cords (Section 3.2.4).

The file server consists of the server hardware and the software that runs on it. Powering on the file server and installation of file server software is discussed in the File Server Installation and Operation Manual.

The cabinets that comprise the file server are shown from front and rear in Figures 3-1 and 3-2. The cabinet labeled "File Server" will always be present. However, the hard disk in it is optional. If the hard disk is present, the cabinet may stand alone; otherwise, at least one additional cabinet, containing a hard disk and labeled "Storage", will be present. The maximum number of hard disks is four; the maximum number of cabinets is five (where no hard disk is present in the cabinet labeled "file server").

Two cabinets can be attached to each other, to form one unit; this is done at the factory. When four cabinets are present, the first and second are connected as are the third and fourth. The two two-cabinet units are linked by a logic cable attached at installation. ("Logic" or "signal" cables are those that transmit digital information, rather than AC or DC power.)

Use the following figures and text for reference. Actual installation will not require detailed knowledge of all the material presented on the following pages. Should any problems develop as steps 1-4 above are carried out, contact your network service representative.

Figure 3-1
 File Server Cabinets
 (Front View)

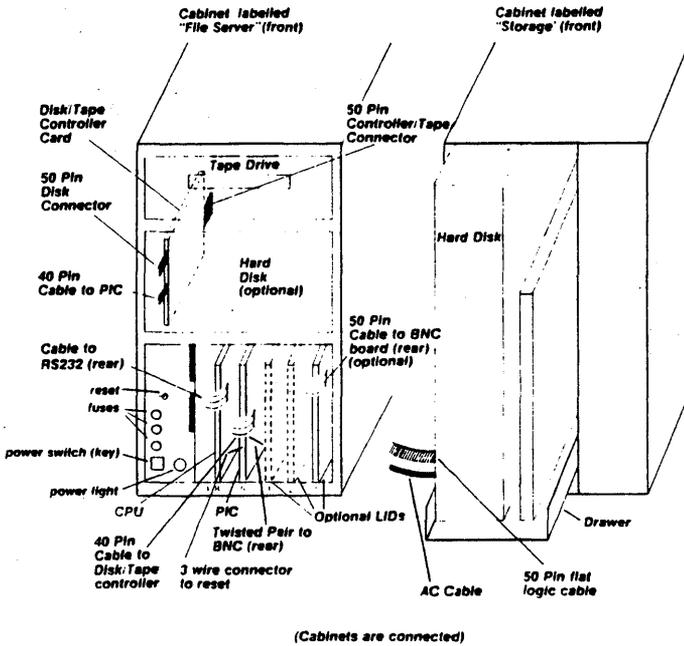
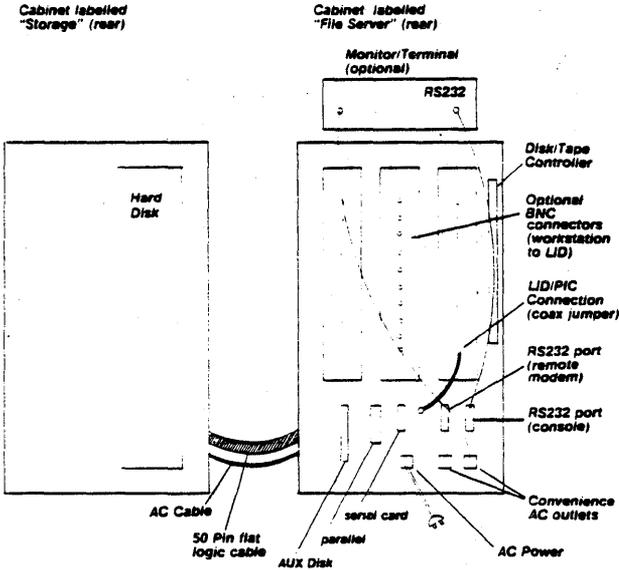


Figure 3-2
File Server Cabinets
(Rear View)



(Cabinets are connected)

The file server cabinet contains various types of boards: the card cage in the cabinet contains a CPU board and a peripheral interface card (PIC) for each server present. In addition, it may contain up to three Line Isolation Device (LID) boards. If the file server contains no LID boards, at least one LID box (external LID) or external Passive LID box is required. If one or more LID boards are within the server controller, no LID boxes or Passive LID boxes are required (although they can be present).

Number of LID boards	Number of workstations or external LIDs that can be networked
1	9
2	19
3	29

A third board, the disk/tape controller, is located on the left side wall of the file server cabinet.

All internal hardware connections are completed before shipment. These connections are listed below for your information. You will need only to inspect most connections visually as part of your installation procedure, to insure that they have, in fact, been made. If a third cabinet is present, or a third or fourth cabinet attached to each other, the third cabinet must be linked to the second via a logic cable (Section 3.2.2.).

Signal connections are all listed. Several important AC power connectors are listed, but most AC connections, which are permanently made during manufacturing, are not listed or depicted in figures.

HARDWARE

3.1.1 Internal File Server Cabling

Connections between cards (boards) in server and server back panel (Figures 3-1, 3-2 and 3-5):

LOGIC

- a. CPU card - 1 50 pin ribbon cable, going to 2 RS232 ports on back panel (cable is split in rear)
- b. PIC card - twisted pair cable to back panel BNC
- c. PIC card - connection to reset button on front of server box
- d. PIC card - cable to the disk/tape controller
- e. Each LID card - 50 pin ribbon cable to BNC "board" that forms part of back panel
- f. If multiple LID cards are present, LID cards are "jumpered" together by a twisted pair connection from one LID card to the physically adjacent LID card
- g. Cable from disk/tape controller on the side of the cabinet to tape drive
- h. Cable from disk/tape controller to first disk

DC CONNECTORS

- a. Connection of 8" hard disk drive to power supply (tape drive and 14" hard disk have built-in power supplies).
- b. Connection of card cage to power supply

AC CONNECTIONS

- a. 1 cord from power supply to wall outlet
- b. Connections of power supplies to AC power
- c. Connection of fan to AC power
- d. Connection of power cord to 14" or 8" disk power supply hard disk
- e. Connection of tape subassembly to AC power

Each server controller cabinet has a slot at the bottom back of each side panel. When casters are attached, the slots are invisible. If cabinets are joined, the slots provide access from one cabinet to the next. Cables need not be routed out the back of one cabinet and into the back of the other. These slots are used to run cables from the file server cabinet to the proper locations in the first storage cabinet, if present. If cabinets are not bracketed together, they are connected via a logic cable that plugs into the rear "aux disk" ports of adjacent cabinets (Figure 3-3).

The "serial" and "parallel" ports on the rear of the file server cabinet are reserved for future expansion.

3.2 File Server Hardware Installation Procedure

The following six sections discuss:

1. Unpacking and positioning the file server cabinets
2. Cabling unattached cabinets together, when present
3. Attaching local and remote terminals to the file server cabinet
4. Plugging in the file server
5. Unlocking hard disks
6. Internal cabling information

3.2.1 Unpacking the File Server Cabinets

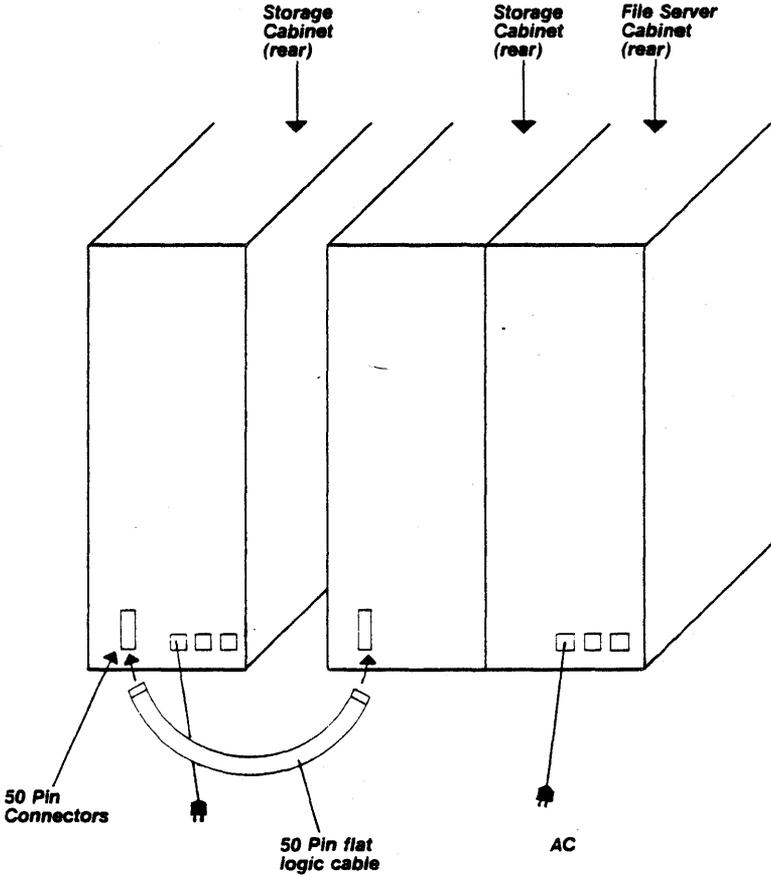
Before unpacking your file server cabinets, read carefully the unpacking instructions provided with them.

Note that a single file server cabinet weighs 117 lbs and a double cabinet, 175 lbs.

HARDWARE

Figure 3-3

Connecting Unattached Storage Cabinets



3.2.2 Cabling Unattached Cabinets Together

Standalone and factory connected cabinets require no cabling. If a third cabinet is present, or a third and fourth attached to each other, the third cabinet must be cabled to the second by plugging the 50 pin cable provided into the 50 pin connector on each cabinet, in the "aux disk" port (Figure 3-3).

3.2.3 Unlocking Hard Disks

Figure 3-7 shows the 8" hard disk head lock and the 14" hard disk head and spindle locks. At installation, these are to be unlocked.

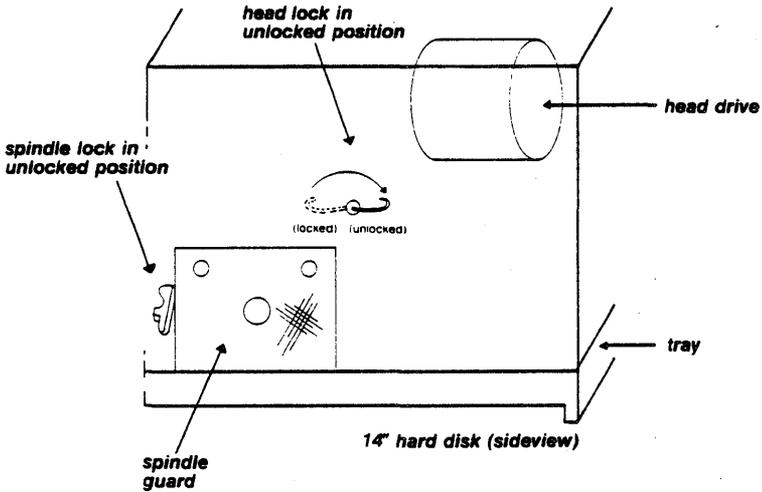
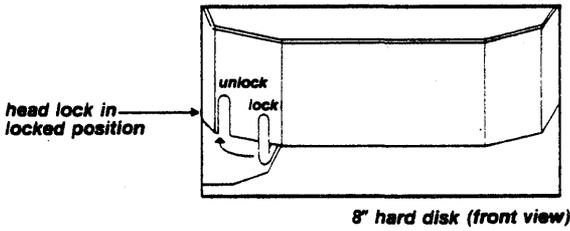
Do not unlock the hard disks until the file server and storage cabinets have been placed in their permanent positions. The cabinets should not be moved once the hard disks are unlocked, and the locks on the front caster wheels on the cabinets should be set in the up (locked) position.

As shown, the 8" spindle lock is located in the front of the disk unit. To reach it, remove the file server cabinet's front panel.

The 14" disk locks are located on the side. To access them, remove the front panel, remove the screws that hold the disk in the closed position, then pull the disk out of the storage cabinet in its drawer. You must unlock both head and spindle locks on the 14" disk.

Figure 3-4

Unlocking Hard Disks



3.2.4 Connecting Terminals to the File Server Cabinets

The file server cabinet has two standard RS232 connector ports in the rear. File server console and terminal use are discussed in the File Server Installation and Operation Manual.

To connect a terminal or modem to the cabinet, simply attach the terminal or modem cable to a rear connector port.

Plug the file server console, if any, into the RS232 port labeled "console" on the back panel. If remote diagnostics are to be used, plug in the modem cable to the RS232 port labeled "modem" on the back panel.

AC convenience outlets for terminal and modem are located on the back of the file server cabinet.

3.2.4.1 Setting Terminal Switches

Before attaching your terminal to the file server, follow the terminal manufacturer instructions to set it up as follows:

TRANSMIT DATA RATE	9600
RECEIVE DATA RATE	9600
STOP BITS	1
PARITY ENABLE	OFF
PARITY SENSE	OFF
DATA LENGTH	8
DUPLEX	FULL
EOM CHAR	CR
XON/OFF	OFF
AUTO LF/CR	OFF
AUTO WRAP	ON

HARDWARE

3.2.5 File Server Cabinet Power Cord

Plug the file server cabinet into a convenient outlet using the cabinet's power cord.

There is only one external AC power cord for each set of attached cabinets or for each standalone cabinet.

Powering on the file server is discussed in the File Server Installation and Operation Manual.

3.2.6 Internal Cabling Information

Powering on the file server is discussed in the File Server Installation and Operation Manual. Should difficulties be encountered in powering on the file server, contact your network service representative.

The following checklist of cabling procedures should only be used by a qualified service representative for troubleshooting.

The checklist requires access to both front and back of the cabinets. There should be 3-4 feet of space in front of and behind the cabinets to make the checkout easier.

Checklist:

1. Make sure no power cords are plugged in.
2. Remove the front panel from the file server cabinet.
3. Inspect all physical connections visible from the front of the box (Figure 3-1, 3-5; Section 3.1.1):
 - a. 50 pin cable from CPU board

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- b. 1 twisted pair cable from PIC board
- c. 1 50 pin flat cable from each LID board
- d. 1 40 pin cable from PIC card to disk/tape controller
- e. 4 wire cable from PIC to front panel (Reset)
- f. 15 pin dc connector to backplane (visible only when card cage has been removed).

All these cables should be connected to the specified board in the card cage. The cables should all extend to the left or right side of the card cage or backplane where cut-out sections allow them to be positioned so that they can wrap around the card cage to the backpanel.

- 4. Examine the boards in the card cage to assure that all are firmly seated; if any are not, push them toward the back of the card cage until they are.

<u>BOARD</u>	<u>SLOT</u>
PIC	3
CPU	5
LIDs	7,8,9

- 5. Replace the front panel.
- 6. Remove the exterior back panel of the file server cabinet. The BNC board and a rear view of the cabinet is shown schematically in Figure 3-2. The boards will be fiberglass, with 10 BNC connectors each, with a metal panel included in the assembly.
- 7. Inspect all physical connections visible from the back of the server controller cabinet. The connections are:
 - a. The cable from the CPU card to the 2 RS232

HARDWARE

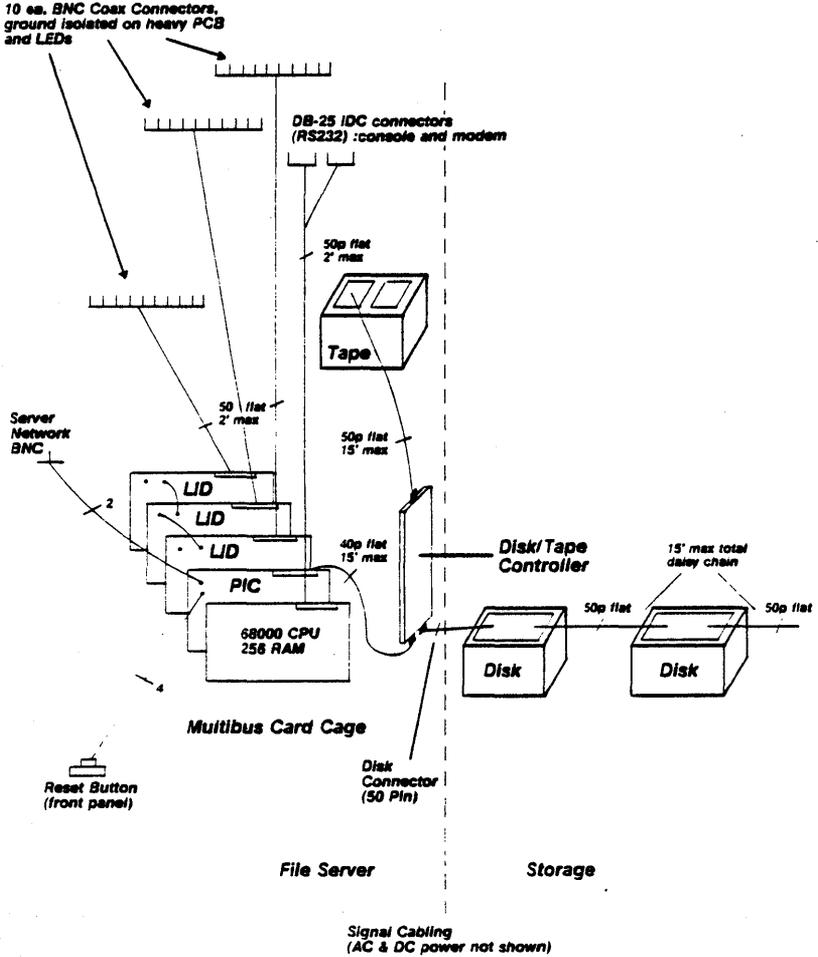
ports on the back panel

- b. The 50 pin cable from each LID board in the card cage to one of the BNC panels
 - c. The twisted pair cable from the PIC board to the bottom BNC connector on the back panel (not part of the BNC board).
8. If a hard disk is present in this cabinet, make sure that the cable from the disk/tape interface on the PIC is plugged into the controller residing on the side of the cabinet. Also make sure that the cable from the tape drive plugs into the disk/tape controller and that the cable from the disk plugs into the disk/tape controller.

When more than one 50 pin cable connector has been attached, both the male and female halves of the connector are clearly, identically marked, to prevent incorrect cabling.

See Section 3.4 and Chapter 4 for procedures for connecting workstations to the file server.

Figure 3-5
Signal Cables



HARDWARE

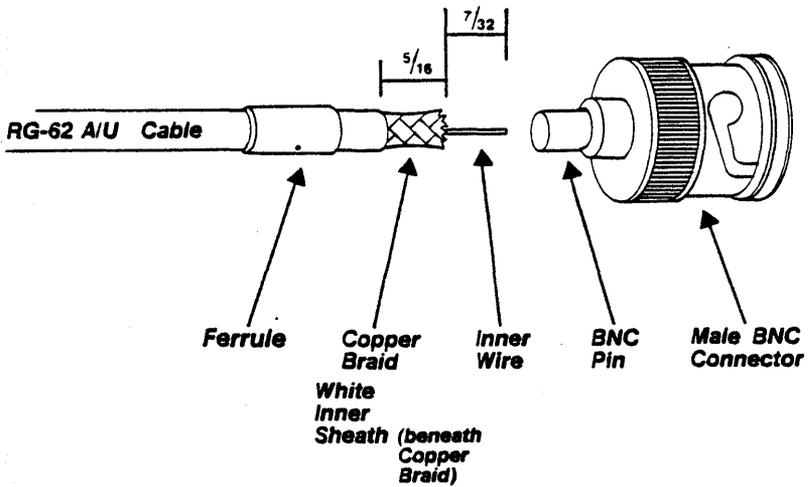
3.2.7 Final File Server Installation Procedures

1. Attach any coaxial cables leading to user stations, LID boxes or Passive LIDs:
 - a. If no LID boards are in the server controller, a LID box must be used in the configuration. Plug the coaxial cable leading to the LID box into the lone BNC connector in the back panel.
2. If only internal LID boards are involved, plug the coax cables from each workstation into the BNC connectors on the backpanel of the server box.

Use the small jumper coaxial cable provided to connect the bottom BNC connector (from the PIC) to any BNC connector on the internal lid.

3. Move server cabinets to their permanent location, release disk locks as described in Section 3.2.3. Plug the file server electric cord into a wall outlet.
4. Bring up the file server, as described in the File Server Installation and Operation Manual.

Figure 3-6
Cable Connectors



Coax diameter = $.242 \pm .003$ "

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3.3 Coaxial Cable Preparation and Installation

If coaxial cable segments are fabricated at your site, male BNC connectors must be reliably attached to each end. Considerable care must be exercised to insure that the connection is mechanically and electrically sound.

Equipment needed:	Part Number
Belden RG62 Indoor Teflon Cable	89269
Belden RG62 Indoor Cable	9269
Commercial Hand Tool	220190-1
AMP cable cutting tool	11186
AMP BNC crimping die	220189-2
AMP BNC male connectors	227079-3

Procedure (See Figure 3-6):

1. Cut through the top (black) layer of the cable 1/2" from the end. Take care not to cut through the copper braid beneath the black layer. Strip off 1/2" of black layer.
2. Separate the copper braid thus exposed and cut off 7/32" of the braid, exposing 7/32" of the white plastic inner sheath underneath it.
3. Cut off this 7/32" of the white plastic sheath. Take care not to cut the inner wire that it contains. 7/32" of the wire will now be exposed.
4. Slip a ferrule (metal sleeve) up the cable.
5. Slip a BNC pin onto the exposed inner wire and use a crimping tool to fasten the pin to the wire.
6. Slip a BNC male connector over the pin. The BNC sleeve should fit over the white plastic

sheath, but under the fringe of the upper braid.

7. To secure the connector, slip the ferrule down until flush with the connector, creating a sandwich of metal sleeve (outer), coax (middle), and connector (inner). Use a crimping tool to compress the metal sleeve and lock the assembly.

This procedure varies according to the type of cable and brand of BNC connectors used. The description given applies to RG-62A/U cable and the BNC kit distributed with the system.

3.4 Procedures for Connecting Workstations to the File Server

Attach workstations one at a time, following the instructions below, and verifying for each one individually that communication with the file server is successful.

For each workstation, follow the instructions in the manual provided by its manufacturer for installation.

3.4.1 Address Shunts on the NIC

Each workstation and server on the network requires a network interface card or "NIC" (file server NICs are also called Peripheral Interface Cards, or "PICs"). Every NIC contains an 8 position device called an "address shunt", which, when properly set, gives the NIC and its station a unique address on the network. Each station MUST have a unique address programmed on its NIC address shunt. This section describes how to set the NIC address shunts for network

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stations.

WARNING:TURN OFF COMPUTER BEFORE INSERTING CARD!

To match NICs to the correct type of microcomputers (if your network contains more than one type), see Chapter 4.

For Apple // and /// cards: when holding the card in your hand with the edge connector at the bottom, the shunts are read as follows:

bit	7	6	5	4	3	2	1	0
most significant								least significant

where bit 0 is closest to the bottom of the board and bit 7 is at the top.

For IBM PC interface cards, bit 0 and bit 7 are indicated by the numbers 0 and 7 on the board.

For file server controller PIC cards, 0 (least significant) and 7 (most significant) are indicated by the letters LS and MS on the board.

A broken shunt signifies a binary digit one and a closed shunt signifies a binary digit zero. All user station cards are shipped with all shunts intact and therefore have address \$00 (the '\$' signifies hexadecimal). Addresses from 1 to \$FF are available for use by user stations.

WARNING: If any stations have address \$00, the network will not work. All stations must use NICs with non-zero station addresses (at least one shunt broken).

Addresses are programmed by breaking the shunts where a one is desired, using a small sharp tool

(a standard office push pin works quite well). For example, if shunts 2,4 and 5 are broken on a user station card, its address would be 00110100 (binary) or \$34 (hex).

The first file server must be labeled \$FE; it is suggested that subsequent file servers be labeled \$FD, \$FC, etc. Other stations must be set to unique numbers in the range 1 to \$FD (254).

It is suggested that the numbering begin with 1, that labels be placed on the cards to indicate station number, and that a record be kept of user station locations and numbers. Having more than one station on the network (or on connected networks) with the same address will cause no physical damage, but will result in a variety of network and file server problems that may be difficult to diagnose.

3.4.2 Completing Workstation Connection

1. Plug in the Network Interface Card. (See Chapter 4 of this manual for specific information on each machine supported: slot locations, etc.).
2. Plug the coax cable into the user station NIC.
3. If not already connected, plug in the other end of the cable originating in the workstation to
 - a. a Passive LID, or
 - b. a LID box, or
 - c. the backpanel of the server controller.

Chapter 4

Microcomputer Workstation Environments

For additional information on use of the network by workstation computers, see the bibliography at the end of this manual.

4.1 Apple // and //e

Do normal hardware installation as described in the appropriate Apple manuals. Recommended use of the Apple expansion slots is as follows:

slot 0 16K language card if Apple Pascal or CP/M to be used (not used with an Apple //e since this is built-in).

slot 1 local printer controller card

slot 3 80 column video card (MNR, ALS, VIDEX). Instructions in video card booklet. (Use the 80 column card slot for the Apple //e's special 80 column card.)

slots 4,5 local floppy controller

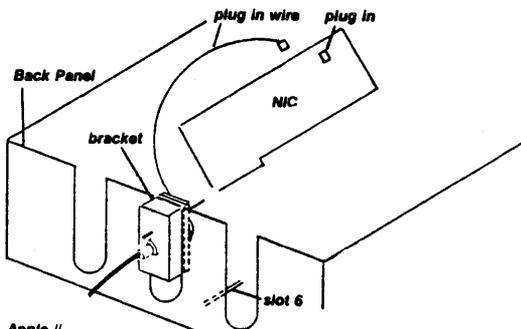
slot 6 Network Interface Card

any slot Z-80 card if CP/M is to be used (do not use slot 3 in the //e).

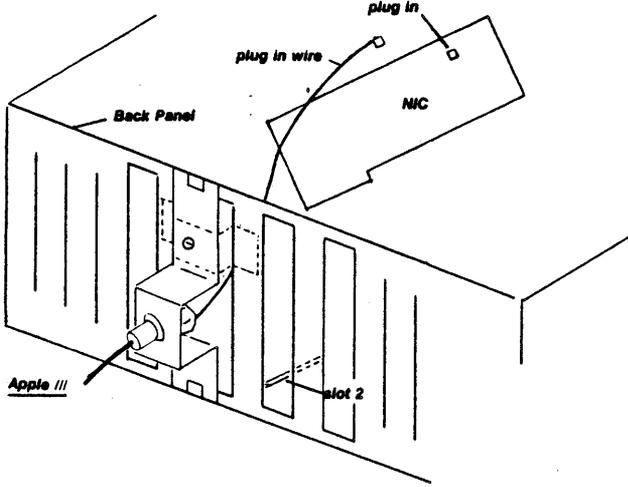
An Apple // can communicate directly with more than one network if multiple Network Interface Cards are installed, each connected to a different network.

Figure 4-1

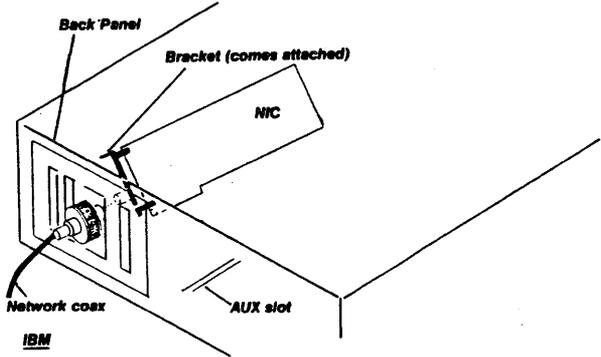
NIC Installation



Apple II



Apple III



IBM

NICs connect to the network coax via a twisted pair cable from the NIC to a BNC connector on a bracket on the back of the workstation. (See Figure 4.1).

To connect the NIC to the network, once the card has been inserted in slot 6:

1. Attach the bracket, with the twisted pair cable attached to it, to the back of the workstation.
2. Plug the twisted pair cable into the polarized 3-pin socket on the NIC board.
3. Connect the network coax cable to the BNC connector on the bracket.

4.2 Apple ///

Do normal hardware installation as described in the appropriate Apple manual. Recommended use of the Apple expansion slots is as follows:

slot 2 Network Interface Card

slot 4 PROFILE hard disk controller

An Apple ///
can communicate directly with more than one network provided that multiple Network Interface Cards are installed, each connected to a different network.

NICs connect to the network coax via a twisted pair cable from the NIC to a BNC connector on a bracket on the back of the workstation (Figure 4.1).

To attach the NIC to the network, after it has been inserted in slot 2:

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1. Attach the bracket, with the twisted pair cable attached to it, to the back of the workstation.
2. Plug the twisted pair cable into the polarized 3-pin socket on the NIC board.
3. Connect the network coax cable to the BNC connector on the bracket.

4.3 IBM PC

Do normal hardware installation as described in the appropriate IBM manual. Any expansion slot can be used for the NIC. To attach the workstation to the network, simply plug a network coax into the BNC connector on the back of the machine.

There are two lights on the IBM NIC's BNC bracket. The upper light (green), when lit, signifies network activity. It should always be lit (steadily, with no flashing) when the workstation is properly connected to the network and the network is functioning.

The bottom light (red) signifies workstation network activity, and will only be lit when network software is executing in the workstation. This light should not be lit steadily, but should flash to indicate workstation/network communication.

The PLAN 4000 Network Interface Card for the IBM Personal Computer can be installed in any vacant expansion slot. Connection to the network is made using the BNC connector on the backplate of the Interface Card.

Configurable parameters of the card are:

station address (blank shunt supplied)

memory address (set to C0000 hex)

IRQ line used (set to IRQ 2).

Station Address

Every station or server on the network must have a different, non-zero, station address. A user programmable dual-in-line shunt package in the "STN" socket on the card is used to set up the station address. The bit positions are indicated on the card. Links are broken for 1's, left intact for 0's. (See Section 3.4.)

Memory Address

The Network Interface Card is memory mapped, occupying an 8K byte area starting on an 8K byte boundary.

While the hardware allows the interface card to be mapped to any 8K byte boundary within the 1 Mbyte addressing range, the supplied driver software expects Network Interface Cards to have start addresses in the range C0000-EE000 hex inclusive.

Bits A13-A19 of the card address are established by a programmable shunt package in the "ADD" socket on the card; bit positions are indicated on the card. Links are broken for 1's, left intact for 0's.

The card is supplied with a shunt set up for address C00000.

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IRQ line

The Network Interface Card uses one IRQ line. This must not conflict with other interrupt use within the computer - only one device may use a given IRQ line.

The card is supplied configured to use IRQ 2 - this does not conflict with present IBM use (Monochrome/printer adapter, parallel printer adapter, color graphic adapter, 5.25" diskette adapter, asynchronous communications adapter). If interfaces other than these are being used, be sure that the Network Interface Card does not use their IRQ lines.

To use a different IRQ line:

cut the set links on the reverse side of the Interface Card under link areas W1 and W2,

solder the appropriate link (the positions are marked on the card - '2' for IRQ2 etc.) into W2,

solder the following links into W1:

<u>IRQ use</u>	<u>link 0</u>	<u>link 1</u>	<u>link 2</u>
IRQ2	*		*
IRQ3			*
IRQ4	*	*	
IRQ5		*	
IRQ6	*		
IRQ7			

(* represents a link; the numbers are as marked on the card). Failure to set W1 and W2 to the same IRQ will cause the card to function unpredictably.

Appendix A

Error Codes

A.1 Introduction

Errors in this Appendix are listed in the following order:

<u>Section</u>	<u>Error Type</u>
A.2	Hard Disk and Tape Errors
A.2.1	Hard Disk and Tape Error Codes
A.2.2	Device Error Subcodes
A.2.2.1	Hard Disk Device Subcodes
A.3	Errors While Booting the File Server
A.3.1	Errors While Booting From Hard Disk
A.3.2	Errors While Booting From Server Boot Tape
A.4	System Errors
A.5	File Server Error and Information Messages

A.2 Hard Disk and Tape Errors

Disk error codes are reported in hexadecimal by the file server (the file server program and the various offline utilities). They consist of two parts:

ERRORS

- a. a Disk error code, described in the Disk Error Code table in A.2.1.
- b. a device subcode, which is device dependent and describes the details of the error.

You should contact your service representative immediately upon discovery of a hard disk error. Record both the error code and the subcode for your service representative.

A.2.1 Hard Disk and Tape Error Codes

HARD DISK ERROR CODES

CODE (HEX)	DEFINITION	STATUS	REQ. 1
00	GOOD EXECUTION		
01	GOOD EXECUTION; SEEK RETRY AFTER SEEK FAULT ERROR		
02	GOOD EXECUTION; SEEK RETRY AFTER CYL MISMATCH ERROR		
04	GOOD EXECUTION; DATA RETRY AFTER ID CHECK SUM ERROR		
05	GOOD EXECUTION; DATA RETRY AFTER CRC ERROR		
08	TAPE READ OPERATION COMPLETE, TERMINATED BY FILE MARK		
13	DRIVE SEEKING		
18	REWIND; POSITION COMMAND IN PROGRESS		
19	ERASE TAPE; POSITION COMMAND IN PROGRESS		
1A	RETENSION; POSITION COMMAND IN PROGRESS		
1B	ADVANCE FILE MARK; POSITION COMMAND IN PROGRESS		
1C	XPARENT BACKUP IN PROGRESS		
1D	XPARENT RESTORE IN PROGRESS		
20	DISK DRIVE NOT PRESENT		

ERRORS

21 SEEK FAULT
22 CYLINDER MISMATCH ERROR
23 SECTOR NOT FOUND
24 ID CHECKSUM ERROR
25 DATA CRC ERROR
28 HEAD WRITE PROTECTED
30 INVALID CONTROLLER COMMAND
31 INVALID DISK DRIVE
32 INVALID HEAD
33 INVALID CYLINDER
34 INVALID SECTOR
36 INVALID DRIVE ID
37 INVALID SECTOR SIZE
(OTHER THAN 128,256, OR 512)
38 DISK OVERRUN (MAX CYLINDER)
40 BAD SECTOR DETECTED BY
CRC VERIFY ROUTINE
60 TAPE DRIVE NOT PRESENT
61 TAPE CARTRIDGE WRITE PROTECTED
62 FILE MARK DETECTED
63 BLOCK IN ERROR NOT FOUND
65 HARD DATA ERROR
68 CARTRIDGE NOT IN PLACE
69 END OF TAPE
6A TAPE NOT ONLINE
6C BOTTOM OF TAPE
6D NO DATA DETECTED
6E ILLEGAL COMMAND
(TO TAPE DRIVE FROM FORMATTER)
70 INVALID COMMAND WITH
TAPE WRITE MODE SET
71 INVALID COMMAND WITH
TAPE READ MODE SET
73 TAPE NOT AVAILABLE
(CURRENTLY BEING USED IN XPARENTCOM)
80 CONTROLLER RESET HAS OCCURRED
F0 NO COMMAND; AWAITING ACKNOWLEDGEMENT
F4 XPARENT COMMAND NOT COMPLETE
F8 NO XPARENT COMMAND IN PROGRESS

ERRORS

A.2.2 Device Error Subcodes

When a device dependent error occurs, a subcode is displayed whose interpretation depends on the device type. This code is displayed in hexadecimal.

Each subcode is a single byte whose bits represent various conditions, and several bits may be on simultaneously, so that their sum represents the total subcode. Not all bits indicate errors; some are simply status information. A device error subcode of 0 indicates no subcode is given for the device causing the error.

A.2.2.1 Hard Disk Device Subcodes

BIT	NAME	DESCRIPTION
0	Ready	The drive is up to speed, servo system is locked onto a servo track, and the unit is in a state to read, write or seek.
1	Seek Complete	The bit is set when seek operation is completed.
2	Seek Fault	This bit indicates that a fault was detected during a seek operation.
3	Cylinder Zero	The access arm is positioned over cylinder 0.
4	Busy	The drive is in the process of executing a command.
5	Drive Fault	A fault was detected by the drive error monitoring circuitry.

- | | | |
|---|-------------------|---|
| 6 | Write
Protect | The head selected is write protected. Write protection is set by switches in the drive or when the drive is not sequenced up. |
| 7 | Command
Reject | A control or Register Load Command was received while the drive was not ready, or an undefined command was received. |

A.3 Errors While Booting the File Server

A.3.1 Errors While Booting From Hard Disk

If a hardware error occurs during boot, an attempt is made to diagnose the problem and report it. The following table is a list of the messages and their meaning.

Disk drive not attached to PIC.

Indicates the Peripheral Interface Card (usually in slot 3 of the card cage) is not communicating with the controller. Possible causes are a damaged PIC, cable or disk controller.

Drive Error when identifying drive. Code is xx.

A hard disk error occurred while accessing the boot drive. See Section A.2.1 for list of the error codes and their meanings.

ERRORS

Drive Error while reading boot volume. Code is xx.

A hard disk error (error code xx) occurred while reading the boot volume //SYSTEM/FILESERVER. See Section A.2.1 for a list of the error codes and their meanings.

PIC missing or not working.

Indicates the file server could not access the PIC (usually in slot 3 of the card cage). The PIC is not present in the machine or is not working.

Disk sector 0 is not initialized.

The disk does not have a directory structure placed upon it. Indicates corruption of the disk structure.

Disk is not initialized.

Indicates there is no boot volume set for this drive.

All errors that occur while booting from the hard disk are serious and should be reported to your service representative immediately.

A.3.2 Errors While Booting From Server Boot Tape

If a hardware error occurs during the boot process, an attempt is made to diagnose the problem and to report it. The following is a list of the messages and their meanings.

Tape is not a Server Boot tape.

Indicates a tape of the wrong type was inserted in the drive. Only diagnostic boot tapes, not backup tapes, can be used to boot the server.

Version of the Boot tape must be Version 2.0 or later.

Indicates an attempt was made to boot from a tape older than the boot ROM.

Checksum error on Boot tape.

Indicates an error while reading tape. Possible causes are a damaged tape or a defective drive or controller.

Error during tape read. Result is xx.

Indicates an error occurred while reading the boot tape. See Section A.2.1 for a list of the error codes.

A.4 System Errors

If the file server detects a run-time error,

```

***** SYSTEM ERROR *****
error type _____
System stack is: nnnn
Hit return to reboot server...
    
```

will be displayed, where error type is a message describing the error.

ERRORS

If this should happen, you should contact your network service representative immediately. You should also record the full contents of the file server's console (for your service representative's use). Then reboot the file server and check the consistency of the disk (see the File Server Installation and Operation Manual, Section 4.9) before allowing the file server software to execute.

A.5 File Server Error and Information Messages

When the file server receives a file server command from a user station, it executes the command, if possible, and returns two variables:

- return code - an integer between 0 and 300
- return message, such as OK, ILLEGAL COMMAND, or TYPE=PASCAL

Messages are of several types:

- information, such as OK, IN USE, TYPE=BINARY
- user errors such as syntax errors or attempting to access a Network file without the necessary access rights
- system errors such as memory full or disk full; these should be reported to the system manager.

In this list, messages are classified as:

general syntax

pertaining to a specific command

system errors

file system errors.

General Syntax (0-19)

0,OK

(Not an error.) The command was syntactically correct and was executed without error.

1,ILLEGAL COMMAND

The command verb cannot be recognized, or cannot be executed from this user station operating system environment. The command verb is the first word of the command, and must be separated from the rest of the command with one or more blanks.

2,NAME PARAMETER REQUIRED

The first parameter of the command must be a non-null pathname.

3,UNRECOGNIZED PARAMETER

A keyword parameter was not recognized. Check the spelling carefully, and make sure that it is properly separated from the previous and following items with commas.

4,ILLEGAL DRIVE NUMBER

A drive number must be specified with "D" followed by an integer in the range supported for your environment. Example: "D4".

5,ILLEGAL STATION NUMBER

A station number must be specified as a two-digit hexadecimal number preceded with \$, in the range \$1 to \$FE. Example: "\$2D".

ERRORS

7,PARAMETER APPEARS TWICE

A keyword parameter appears more than once in a single command. There can only be one occurrence of a keyword parameter, even if multiple occurrences have the same value.

8,ILLEGAL TYPE PARAMETER

The "T=" value is not one of the legal volume types. It must be one of the following:

P (Apple // Pascal)	B (binary)
D (Apple // DOS),	S (system)
C (Apple // CP/M)	Y (directory)
3 (Apple /// SOS)	T (text)
U (IBM PC p-SYSTEM PASCAL)	I (IBM PC DOS)

Example: T=P

9,COMMAND TOO LONG

A file server command must be no longer than 80 characters. In unusual cases where this is a problem, long commands can often be shortened by using a default directory, or by assigning access rights in a subsequent PROTECT command.

10,PARAMETER TOO LONG

The new name given as the second parameter of the RENAME command must be no more than 15 characters long. Remember that RENAME changes only the last name in the sequence of names which constitute a pathname. If you wish to change the name of a directory, give the pathname of the directory itself as the first parameter of RENAME.

11,ILLEGAL PROTECTION PARAMETER

The value of the PUBACC, GRPACC, or PRVACC protection item is incorrect. The value must be some combination of the letters RWECD (read, write, erase, create, and delete), or may be null. For example, "GRPACC=RW" or "PUBACC=".

12,NO STATION CMD; USE \$NN PREFIX

The "station" command has been removed. Use "\$nn <command>" where nn is the station number on whose behalf you wish to issue the command. (file server console only.)

13,ILLEGAL NUMBER (NEGATIVE OR TOO BIG)

The number was less than 0 or bigger than 32767. Number may be specified in decimal, or in hexadecimal preceeded by \$. Examples: "42", "\$1A3".

19,HELP FILE NOT FOUND

There is no HELP file for the word used as an operand of the HELP command. Use the HELP command with any parameters to see what the possible HELP parameters are. (The system manager has the option of removing all HELP files to save space.)

Create (20-25)

20,TYPE PARAMETER REQUIRED (T=?)

The type parameter was missing. Example:"T=D".

ERRORS

21,SIZE OUT OF RANGE (<0B OR >32752B)

The value of the SIZE parameter was negative or greater than 32752 blocks. Each block is 512 bytes. Other units that can be specified are C (characters), and K (1024 bytes). If the units are omitted, B (512-byte blocks) is assumed. Examples: "SIZE=280", "SIZE=2000S".

23,SIZE PARAMETER REQUIRED WITH T=B, =T

The SIZE parameter must be specified to create a binary volume. The size may be an overestimate of the size of the data to be BSAVED into the volume, but it must not be less.

24,SIZE OUT OF RANGE (<1C OR >48K)

The limits on the size of a binary (T=B) file are between 1C (one byte) and 48K (49152 bytes) regardless of the units used in the specification.

Delete (25-29)

29,CURRENTLY MOUNTED OR DEFAULT DIR

You cannot delete a volume which is currently mounted by any station, or which is the default directory (see the SET DIR command) of any station.

Mount (30-34)

30,DRIVE REQUIRED

You must specify what drive the volume is to be mounted on. Example: "D4".

31, IN USE

The volume you asked to mount is in use by another station. You are therefore denied exclusive use of that volume.

32, IN EXC USE

The volume you asked to mount is in exclusive use by another station. You are therefore denied any use of the volume.

34, RW NOT ALLOWED ON DIRECTORIES

You are not allowed to mount a directory (T=Y) volume for write access.

Unmount (35-39)

35, DRIVE OR "ALL" REQUIRED

You must specify a drive number or "ALL" on the UNMOUNT command. Examples: "UNMOUNT D1", "UNMOUNT ALL".

36, NOT CURRENTLY MOUNTED

The drive number specified in the UNMOUNT command does not have any virtual volume mounted on it by the file server.

Lock (40-44)

40, ILLEGAL LOCK NAME

A lock name must be 1 to 15 characters long.

ERRORS

41, IN USE

The lock name specified is in use by another station. You are therefore denied exclusive use of the lock.

42, IN EXC USE

The lock name specified is in exclusive use by another station. You are therefore denied any use of the lock.

Unlock (45-49)

45, NOT HELD

The lock name specified is not currently held by your station.

BSAVE, BRUN, BLOAD (50-55)

50, CMD NOT ALLOWED FROM THIS STATION

The BSAVE/BLOAD/BRUN/OFF commands may only be executed from an Apple // user station.

51, NOT BINARY

The pathname identifies a volume which is not binary (T=B). Only binary volumes can be used for BSAVE, BLOAD, or BRUN commands.

52, NOT PREVIOUSLY SAVED

The binary volume was created but has never had any data written into it using the BSAVE command. It can not be used with BLOAD or BRUN until it has been BSAVED into.

53, FROM PARAMETER REQUIRED

For BSAVE, the FROM parameter, which specifies the memory area from which data is to be taken, must be provided. Example: "FROM=\$1000".

54, SIZE PARAMETER REQUIRED

For BSAVE, you must provide the SIZE parameter on the BSAVE command to indicate how much data is to be saved. This value must be less than or equal to the size of the volume specified on the original CREATE command. Example: "SIZE=256.C".

55, FILE WAS THERE; REP NOT SPECIFIED

Data has already been saved in the binary volume. To replace that data, you must specify "REPLACE" as a parameter in the BSAVE command.

Set/List (57-58)

57, FILE IS NOT A DIRECTORY

The pathname given in a SET DIR command identifies a volume which is not a directory (T=Y).

58, USE: SET TIME [YYMMDD] [,HH[MM]]

If the date parameter was supplied, it was incomplete or contained invalid fields. If the time of day parameter was supplied, it contained invalid fields.

ERRORS

Show (59-69)

59,TYPE=SYSTEM

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is a system volume (T=S).

60,SHOW OPTION NOT RECOGNIZED

The operand of a "SHOW" command was not recognized. Check the spelling and make sure there are no extraneous items in the command.

61,DRIVE REQUIRED

For the "SHOW TYPE" command you must specify the drive number on which the volume is mounted. Example: "SHOW TYPE D12".

62,NOT CURRENTLY MOUNTED

The drive number specified has no volume mounted on it by the file server.

63,TYPE=APPLE // CP/M

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is an Apple // CP/M volume. (T=C).

64,NO DEFAULT DIRECTORY SET

(Not necessarily an error.) This response to the "SHOW DIR" command indicates that there is no default directory established for this station by the file server.

65,TYPE=APPLE // PASCAL

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is an Apple // Pascal volume (T=P).

66,TYPE=APPLE // DOS

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is an Apple // DOS volume (T=D).

67,TYPE=BINARY

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is a binary volume (T=B).

68,TYPE=DIRECTORY

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is a directory (T=Y).

69,UNKNOWN TYPE

The volume mounted on the drive for which you did a "SHOW TYPE" is not a standard volume type.

70,yyymmddhhmmssw

(Not an error.) Returns date and time information in encoded form. For example, the FS command `TIMESTAMP` returns the current year, month, day, hour, minute, second, and day of the week in the form 70,8104301859381 (that is, 6:59 P.M., Sunday, April 30, 1981).

ERRORS

71,--t--tt--t-t----

(Not an error.) Returns types of virtual disks currently mounted on drives 1-16. (Each t is one of Y,P,D,B,S,C,3,I,U,T). The system responds to the FS command SHOW TYPES using this format.

72,TODAY IS DD-MON-YYYY HH:MM:SS

(Not an error.) This is the response to the SHOW TIME command.

73,TYPE=TEXT

(Not an error.) The volume mounted on the drive for which you did the SHOW TYPE is a text volume (T=T).

74,TYPE=APPLE /// SOS

(Not an error.) The volume mounted on the drive for which you did the SHOW TYPE is an Apple /// SOS volume (T=3).

75,TYPE=IBM PC DOS

(Not an error.) The volume mounted on the drive for which you did the SHOW TYPE is an IBM PC DOS volume (T=I).

76,TYPE=IBM PC P-SYSTEM PASCAL

(Not an error.) The volume mounted on the drive for which you did a "SHOW TYPE" is an IBM PC p-System Pascal volume (T=U).

Local Commands (90-92)

Vary according to user environment. See the appropriate User Guide.

System Errors (94-99)

94,NOT CONNECTED

This is a network error that indicates that the connection to another station has been terminated prematurely.

95,UNRECOGNIZABLE NETWORK RESPONSE

The last response message from file server did not contain a numeric error code, as expected. This may indicate incorrect logic in the use of NETUNIT procedures from within Pascal programs.

96,NO NETWORK CARD IN SLOT

The slot number specified does not have a Nestar network interface card installed, or the card is defective.

97,FILE SERVER MEMORY FULL

The file server has no space left for tables needed to complete your request. This does NOT refer to memory space in the user station.

ERRORS

98, NETWORK ERROR

The network routines were unable to complete the transaction. The error may be transient; see the description of NETUNIT for more information. This error does not occur from most user level programs, such as NET.

99, USER ABORT

The network abort key was pressed while a network transaction was queued up or in progress. The transaction was aborted.

File System Errors (100-140)

101, END OF FILE OR RECORD OUT OF RANGE

An attempt was made to read a block or sector of a volume which is outside the legal range for that volume.

102, FILE NOT FOUND

The volume specified by the pathname was not found, or one of the directories in the pathname was not found. Check the spelling of each filename in the pathname. If the name does not begin with a slash, check that the current default directory is the correct one.

103, BAD DELIMITER IN PATHNAME

A delimiter other than "/" or ":" was found in a pathname. Make sure that you have not omitted a comma separating the pathname from other operands in the command.

104, FILE NAME OR PASSWORD TOO BIG

A single filename (the part between slashes in a pathname), or password (the part after a colon in a pathname) is longer than the maximum of 15 characters.

105, NO ACCESS FOR READ TO DIRECTORY

You have been denied read access to a directory which is part of the specified pathname.

106, NON DIRECTORY FOUND IN PATHNAME

One of the names in the pathname (other than the last name) identifies a volume which is not a directory (T=Y). Only the last thing in a pathname can be other than a directory.

107, END OF PATHNAME IS A DIRECTORY

The pathname specifies a directory (T=Y) in a context where a non-directory volume is required.

109, ROOT DIR NOT SPECIFIED NO DEFAULT

The specified pathname does not begin with a slash, and there is no default directory recorded for this station by the file server. If you wish to completely specify the pathname, begin with a slash and the name or number of the disk unit. If you wish to use the current default directory, do not begin the pathname with a slash. You may use the "SHOW DIR" command to find out the current default directory, and the "SET DIR" command to establish one.

ERRORS

110,NO ACCESS FOR READ

You have been denied read access to the volume specified by the pathname, or to a directory along the path.

111,NO ACCESS FOR WRITE

You have been denied write access to the volume specified by the pathname.

112,NO ACCESS FOR APPEND (not yet implemented)

You have been denied append access to the volume specified by the pathname.

113,NO ACCESS FOR ERASE

You have been denied erase access to the volume specified by the pathname. Erase access is necessary to delete the file.

114,NO ACCESS FOR CREATE

You have been denied access to create or rename an entry in one of the directories specified in the pathname.

115,NO ACCESS FOR DELETE

You have been denied access to delete or rename an entry in one of the directories specified in the pathname.

116,CANT DELETE NON-EMPTY DIRECTORY

The pathname specified in a DELETE command identifies a directory, and that directory is not empty, that is, it still points to other volumes. Only empty directories can be deleted by a single file server DELETE command. To delete non-empty directories (i.e. subtrees) see the description of the TREEWALK utility in the User's Manual for supported environments.

117,FILE SERVER MEMORY FULL

The file server has no space left for tables needed to complete your request. This does NOT refer to memory space in the user station.

118,DISK FULL

There is not enough contiguous space left on the disk unit to create the volume. The LIST command when used to display the root directory will give information about the space available on a disk unit. Example: "LIST /MAIN".

119,DIRECTORY FULL

There is not enough space left to create more entries in the directory, and the directory cannot be expanded. Directories are automatically expanded as necessary to accomodate new entries.

120,INTERNAL ERROR

An internal error has been detected by the file server. Additional information is written on the console of the file server. That information and the circumstances surrounding the error should be transmitted to your support organization for diagnosis. The file server should be restarted as soon as practical.

ERRORS

121, UNINITIALIZED DISK

The disk unit has not been initialized. All disks must be formatted and initialized using the file server FORMAT DISK utility; see the File Server Installation and Operation Manual.

122, WRONG SOFTWARE VERSION

The disk format is not compatible with version of the file server currently running. (This error cannot occur with any file servers so far released.)

123, FILE ALREADY EXISTS

The file you have asked to create, or the new name used in a RENAME command, already exists in the directory.

124, DISK I/O ERROR, SUBCODES x,y

A hardware I/O error was detected. The details of the error are described in the subcodes; for more information, see the table of I/O errors in Appendix A of the File Server Installation and Operation Manual.

125, VERIFY FAILED (BAD MEMORY)

All disk write operations are verified by reading back the recorded data and comparing it to the data stored in memory. This error indicates that the disk data did not compare correctly. It sometimes indicates a memory error in the file server, and not a disk error.

128, BAD UNIT NUMBER IN PATHNAME

The first item after the initial slash in a pathname is a number, but it is not in the legal range for unit numbers (1 to 4).

130,NEED PRIVATE PASSWORD FOR PROTECT

In order to execute the PROTECT command for any volume, the private password must be specified in the pathname or as a default private password. The password must be specified whenever the volume has a non-null private password, regardless of the access rights currently assigned to the volume.

131,UNIT NAME NOT FOUND

The name after the initial slash of a pathname is not the name of a disk unit currently recognized by the file server. You can also use the unit number in place of a name, if you wish.

133,DISK NOT READY

The disk unit specified is not ready. The one minute warmup period after initial power up may not have elapsed. It may also indicate a controller or disk drive failure.

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File Server IBM PC UCSD p-System User's Guide	SC40-0506
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Print Server Installation and Operation Manual	SC40-0301
Messenger User's Manual	SH40-0204
Messenger Installation and Operation Manual	SH40-0304

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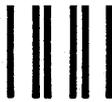
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