

Setting up a Small Business Computer Network

By Lenny Bailes

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Chapter 1 -- Welcome

Congratulations. By deciding to set up a connected office, you've made a decision that will pay for itself in the currency of increased productivity and greater efficiency in running your business. The faster you can receive, distribute, and manipulate information, the faster your business is likely to grow.

When two or more personal computers in your office are linked into a network, you'll be able to share files and documents for better customer, supplier, and employer communications. As employees work together simultaneously on projects, your business can achieve real productivity gains. A network reduces duplication of effort. You'll get more work done in less time -- which can gain you a competitive business advantage.

Your network will also allow you to trim dollars from your hardware budget by sharing expensive peripherals such as printers, scanners, CDROM drives, and modems. Your organization may not be able to afford a new laser printer for every computer, but with a network you can buy a fast Laserjet 5SI and share it with your team. A CD-ROM drive is a must for installing new software, but upgrading every workstation in your office may be a real chore. Your Windows 95 network can make a single CD-ROM drive available to everyone.

Windows 95 is an ideal operating platform for a small business network. It runs faster than Windows 3.x, and is easier to use. You'll find that Windows 95 makes multitasking applications a seamless process. You can effortlessly run a spreadsheet, type a letter, send a fax, or read e-mail without closing a single program. Windows 95 avoids the "out of memory" issues and program conflicts that interfered with multitasking in Windows 3.x. The latest, most powerful productivity suites (such as Office 97) consist of 32-bit applications designed for Windows 95. 32-bit programs run faster and more reliably in Windows 95 than their 16-bit counterparts did under Windows 3.x. The new interface of Windows 95 links your applications together, making it easier to compose, design, fax, transmit, receive, organize and transfer data. Your existing Windows and DOS programs also run safely and even more conveniently under Windows 95.

If you are running Windows 3.x or Windows for Workgroups 3.11 today, the Windows 95 upgrade will make your computers faster, more reliable, and easier to use. Windows 95 was specifically designed to support peer-to-peer networks and Internet connectivity. All of the software you'll need is built right into the operating system.

Tools and Materials Checklist

To set up a peer-to-peer network using Windows 95 you need:

- Two or more personal computers with 486DX33 or higher processors, 16MB of memory, VGA display, mouse or other pointing device, 3.5" high-density floppy drive, and at least 100 MB of free hard disk space on each machine. One ISA or PCI slot on each computer should be available to contain a network card. (Notebook units may support the use of PCMCIA sockets.)

- Microsoft Windows 95 operating system for each machine. (To install Windows 95 from CD-ROM, the target computer should have a CD-ROM drive.)
- Network hardware: Network Interface Cards (NICs) for each machine, plus appropriate cables. (A network hub is required for a twisted-pair 10BaseT network configuration. In this booklet, we use the 3COM OfficeConnect Networking kit as a simple demonstration model.)

If any of your office computers fall short of the requirements listed above, some simple hardware upgrades may make them Windows 95 network-ready. For instance, you might need to upgrade a machine from 8MB to 16MB of RAM, to replace a small hard drive with a larger one, or purchase a mouse. To make the most of your network it's recommended that at least one computer contain a double-speed or higher CD-ROM drive, and a 9600 baud or faster modem.

Chapter 2 -- Installing your network

This chapter of the booklet assists you in upgrading the computers in your office to the Windows 95 operating system and setting up your network hardware. You'll also learn how to configure the network software.

The easiest way to implement your Windows 95 peer-to-peer network is to follow the following steps in sequence:

Install Windows 95, first, on all the machines that will be part of the network.

After your DOS, Windows 3.1, or Windows for Workgroups workstations have been upgraded to Windows 95, power down, open each machine and insert a network adapter in an available slot.

Close the machines and set up your network cabling. This may involve connecting the computers to a network hub.

Switch the machines back on. The plug and play features of Windows 95 will detect and configure most network cards for you automatically

Installing network hardware

If you have just upgraded existing network hardware to Windows 95, skip this section and go directly to the section labeled *Configuring Your Windows 95 Network Software*.

If you are installing your network hardware for the first time:

1. Shut down your Windows 95 computers. Open each machine and insert a network adapter in an available motherboard slot.
2. Close the machines and set up your network cabling. This may involve connecting the Ethernet cables from the computers to a shared network hub. (See below)
3. Switch the machines back on. The plug and play features of Windows 95 will detect and configure most network cards for you automatically.
4. Reboot each computer after its network card has been detected. Examine the status LEDs on the network card or hub.

The Network Interface Cards in the 3COM OfficeConnect Networking kit are designed for insertion in an ISA (old style) peripheral slot on your motherboard. If your network card is designed for the PCI or EISA bus, you'll need to find an appropriate matching slot on your motherboard.

Turn off the computer, but leave it plugged into the wall, so that it will be grounded. Open the computer's case and choose an appropriate peripheral slot on the motherboard. If there is a backplate shielding the slot, remove it by loosening the screw that holds it in place. Insert the network adapter into the slot. Push down firmly and evenly on the top of the network card to insure that it is seated properly, then resecure the backplate screw.

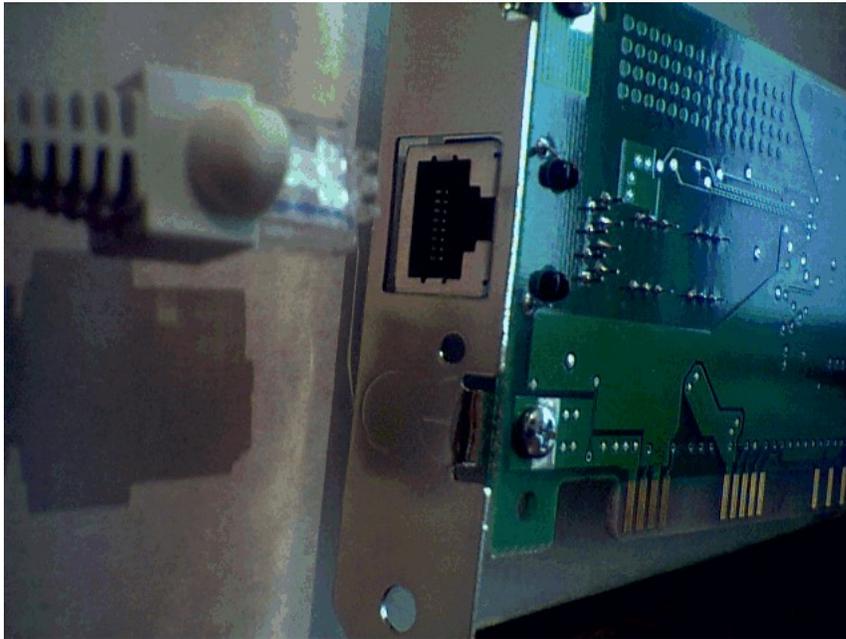
Reattach the computer's cover.

After you've inserted a network adapter into each computer, you will cable the machines together. The Ethernet cables that link your computers may plug in through one of two common types of network connector:

The first type, BNC, resembles the coax cable that links a television set to a VCR.



The second type, twisted-pair, resembles the cable that connects a telephone receiver to a wallsocket jack. The plastic modular plugs on twisted-pair cables link the indented socket on the back of each network card to a network hub.



Caution: although twisted-pair ports look like the one that your telephone line uses, don't plug a telephone or phone line into the hub or NIC, as these devices require a different voltage.

If your network cards and cables use the BNC architecture...

You can simply string the cables between two or more computers in a straight line. The network card interface on each computer has a T-shaped BNC connector. The extra BNC jacks on the computers at each end of the network are capped with a metal terminator. No hub is required for this network architecture.

If you have other BNC-network peripherals, such as printers, they should be added sequentially to the chain. Plug thin BNC cables into each end of the T-connector, as you would with a computer. If the printer is on the extreme end of the chain, place a metal terminator cap on the second T-connector port.

Once the cables are in place and you switch on the computers, the network cards will automatically attempt to negotiate a hardware connection. Many network cards have visible LED indicators to display network status. The status LED will light up solid green if the card has been properly configured.

[[Picture]]

After the first reboot with the network card installed, your computers may request a network login or display network error messages. If the login prompt appears, you may enter a username and password (see section xxx for more information), or, you may press the ESC key to bypass the network login for now.

If Windows 95 reports that your network adapter is not working properly, you may acknowledge the message by clicking OK. It may be necessary to adjust the network configuration to complete the setup. See the next section for details.

If your network cards and cables use the twisted-pair architecture...

Each computer on the network is cabled directly to a network hub, instead of to another computer. The 3COM OfficeConnect kit uses this interface (also known as 10Base-T) and includes a network hub.

To complete the cabling for a twisted-pair network, switch on the hub and connect the cables from each computer or network peripheral to an appropriate 10Base-T hub port. When the cables are in place and you power up your network, the hardware connection will be negotiated automatically. Status LEDs on the network adapters and on the hub will generally flash green to indicate a functional network connection.

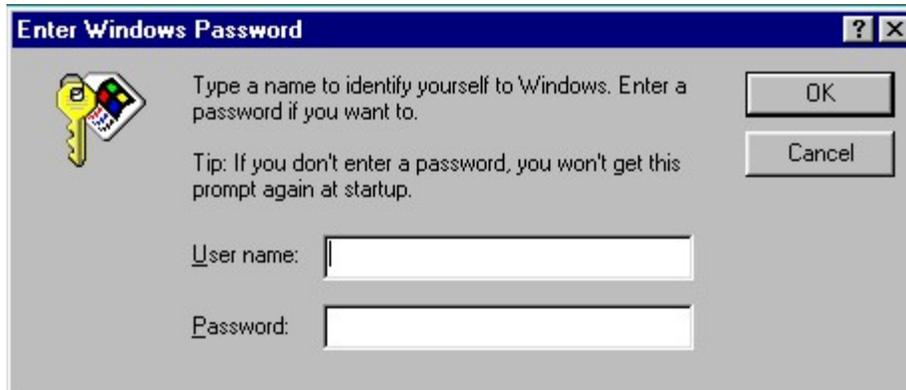
On a twisted-pair network, the hub acts as a central traffic manager for all of the computers and other peripherals. The OfficeConnect Hub 8/TPC accepts connections from up to eight network devices. The eighth twisted-pair port (nearest the power input) can be used to connect this section of the network to a second hub. Multiple network sections can also be linked through the hub's single BNC coaxial connector. See Appendix B of the Getting Connected User Guide for more information.

After the first reboot with the network card installed, your computers may request a network login or display network error messages. If the login prompt appears, you may enter a username and password (see section xxxx for more information), or, you may press the ESC key to bypass the network login for now.

If Windows 95 reports that your network adapter is not working properly, you may acknowledge the message by clicking OK. It may be necessary to adjust the network configuration to complete the setup. See the next section for details.

Checking/Confirming Your Windows 95 Network Setup

If Windows 95 has successfully configured the network cards in your computers, each machine should display a Microsoft Networking login prompt on the next reboot.



If you do not see a login prompt, or if Windows 95 reports a problem with the network adapter, this can probably be resolved by adjusting hardware settings in the Windows 95 Control Panel.

1. Click the Start Button; point to settings and click once on Control Panel.
2. Open (double-click) the System Component and select the Device Manager tab.

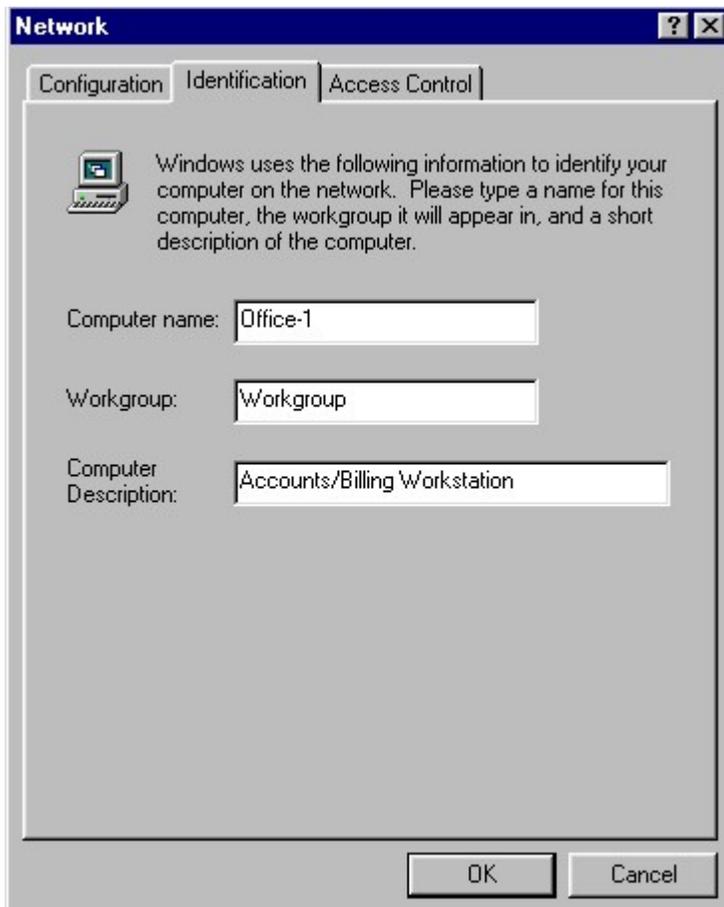
[[insert screenshot]]
3. Inspect the entry for Network Adapter. (Click the + sign in front of the entry, if it is not already open.) A yellow exclamation point next to the entry for your adapter indicates a conflict with some other hardware device.
4. Select your network adapter in the Device Manager window and click the Properties button.
5. Select the Resources Tab in the Network Properties window and inspect the settings for "Interrupt Request" and "Input/Output Range." If conflicts are reported under "Conflicting device list, you may reassign either of these values. For instance, if your
6. If you don't find a network adapter entry in the Device Manager list, close this window. You can ask Windows 95 to redetect your adapter by selecting the Control Panel/Add New Hardware module. Choose the option that asks Windows 95 to perform an automatic search. If the network adapter still isn't detected, shut down the computer, open the case and make sure the card is properly inserted in its motherboard slot.

Identifying Yourself on the Network

After your basic network support is installed, you will need to give each of your machines a unique network name and assign it to a network workgroup.

1. Go to the first workstation, right-click the Network Neighborhood icon on the desktop and select Properties. (If you don't find the Network Neighborhood icon, the computer's basic network support has not been properly configured. If you've verified that all the steps in this section have been followed, refer to "Network Troubleshooting" in Chapter 3 for guidance in overcoming setup problems.)
2. Select the Identification Tab in the Network Configuration Window. Under "Computer Name", enter the name this workstation will use to identify it on the network. (You may have more than one user account for this machine, but only one unique name for the computer, itself. You may also enter an optional description of the workstation in the "Computer Description" field.)

3. Assign a name for your network workgroup (You may keep the default "Workgroup" designation). Computers that will connect frequently to one another should all be placed in a common workgroup. For a large one another should be placed in the same workgroup. If you are planning a large network with several divisions, you may want to establish multiple workgroups (examples: Payroll, Billing, Administration, etc.).



4. Pick one of the workstations on your network to serve as a "test server." For that machine, select the Configuration Tab and click the button labeled "File and Print Sharing." Make sure the "I Want to Give Others Access to My Files" box is checkmarked and click OK. (You don't need to share any specific resources at this time, but selecting this option will cause this workstation to appear in the Network Neighborhood list for all the other workstations. This will help you verify that your network is up and running.
5. Click OK to close the configuration dialog. Windows 95 will prompt you to reboot the machine.
6. Repeat this procedure on each workstation (you may omit the installation of "File and Print Sharing" on all but one machine).

Testing Your Network Connection

You should now have created a network ID for each of your workstations, assigned them to common workgroups, and installed File and Print Sharing on at least one machine. You may verify that your network is up and running as follows:

Double-click the Network Neighborhood icon on the Win95 desktop of each workstation. After a minute, or so, you should see an icon for the "test file server" appear in the window under the "Entire

Neighborhood" icon. If you don't see it, try double-clicking the "Entire Neighborhood" icon. A child window should appear that lists the names of your workgroups. Double-click on the workgroup that contains your test server and you should see it listed. Each workstation on the network that has File and Print Sharing enabled should appear in the Network Neighborhood, even if no specific resources have yet been shared.

If you can't see the test server icon in the Network Neighborhood window, wait a minute or two and try again. If you still can't see it, there is a problem with your network configuration. Refer to "Network Troubleshooting" section in Chapter 4 for further assistance.

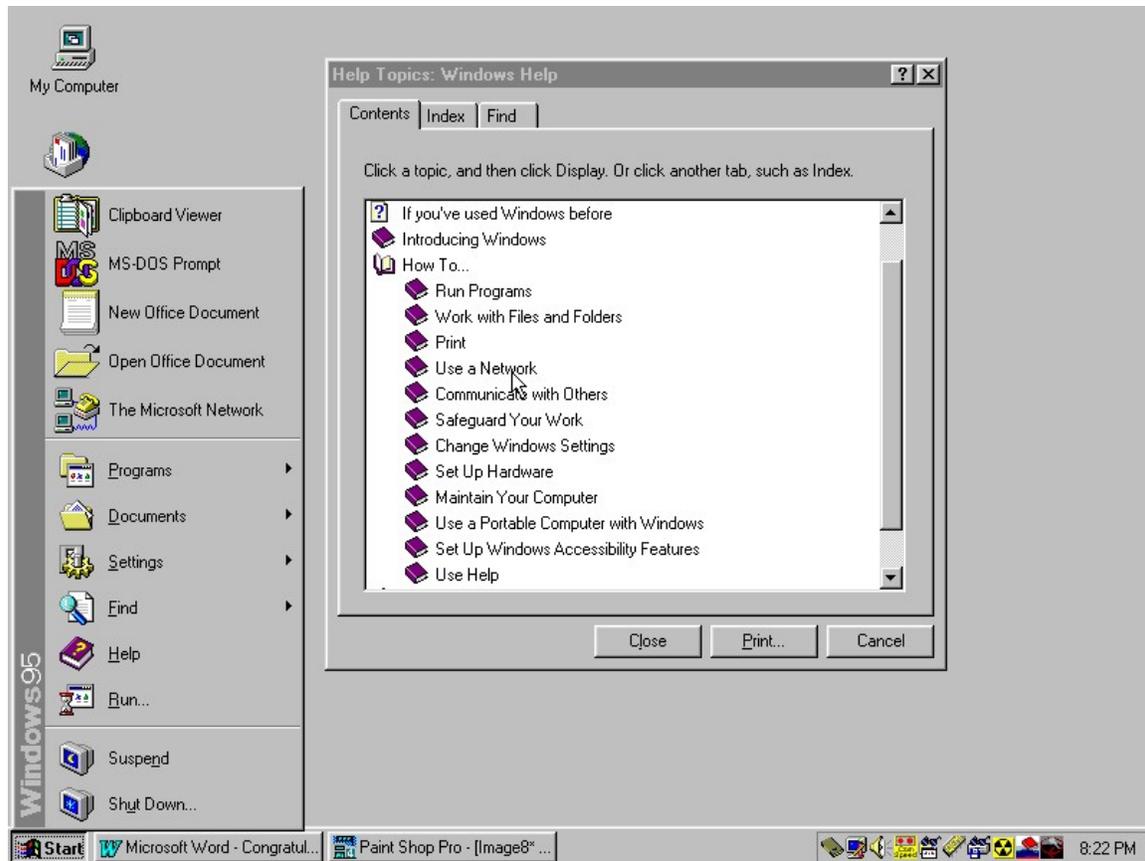
Chapter 3 -- Using the Network

In this section of the booklet, you'll learn how to use your Windows 95 network to share basic resources among the workstations in your office. Step-by-step instructions show you how to:

- Share a folder and set its access permissions.
- Share a CD-ROM drive
- Install and share a network printer
- Setup and use Microsoft Fax
- Set up a Windows 95 Workgroup Postoffice
- Send and receive e-mail on the network

If you've used Windows for Workgroups

If you have previous experience with Windows for Workgroups, note that Windows 95 makes some important changes in the way you connect to a network resource and share folders or printers. Instead of performing these functions through File Manager and Print Manager, Windows 95 adds a "Network Neighborhood" icon to the desktop and a new "Printers" folder to the Control Panel. Individual drive and folder resources are shared through My Computer or Windows Explorer. These features make it very easy to share network resources. After you connect to a folder, drive, or printer, you can drag a shortcut for it directly to the desktop. You can then access the shared resource by double-clicking or dragging files over its desktop shortcut. We'll show you exactly how to do that later in this section. (An introduction to Windows 95 Networking is also available in Windows Help: Start Menu\Help\Contents -- double-click the "How to..." book icon, then double-click on "Using a Network.")



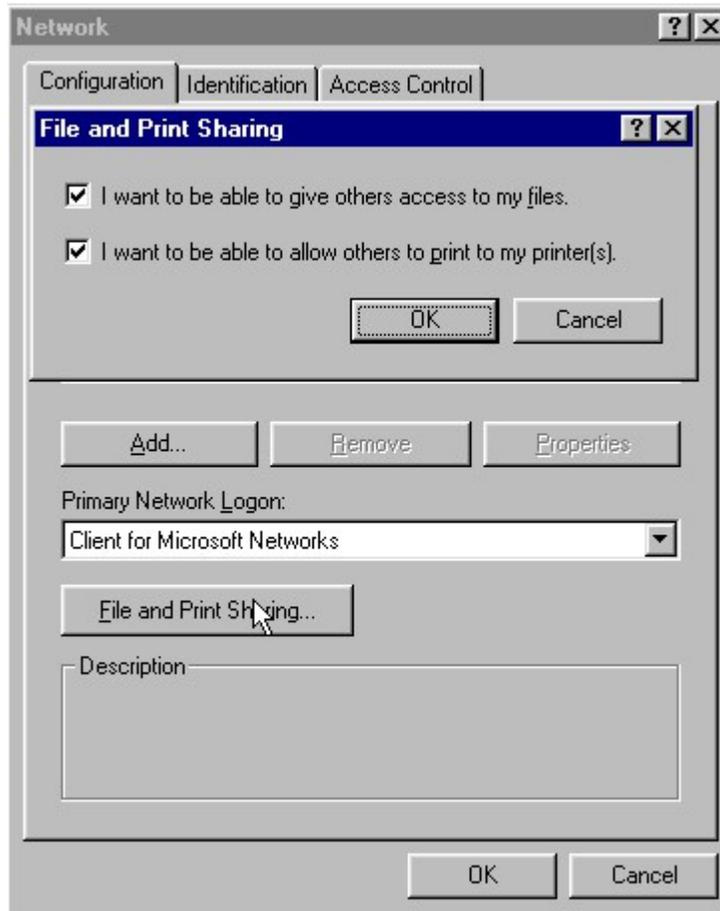
Enabling File and Print Sharing

Windows 95 networking uses a peer-to-peer architecture. This means that any workstation on the network can be a file and print server, a network client, or fulfill both roles.

To share a workstation's local resources with other network users, you must install the Microsoft File and Print Sharing service on that computer:

1. Right-click the Network Neighborhood icon on the desktop and select Properties.
2. Click on the "File and Print Sharing" button on the Configuration tab.
3. Place checkmarks in the File and Print Sharing dialog box to enable file sharing and/or print sharing.

4. Click OK twice, to close the Network Properties dialog boxes. Windows 95 will prompt you to restart the computer.



Sharing a folder, disk-partition, or CD-ROM drive

Your Windows 95 network permits you to make documents or other files on one computer accessible to other computers through a shared folder. For instance, you might create a "Memo of the Day" in Wordpad or Microsoft Word that you wish all employees to read. By saving that document in a shared folder, you make it available to authorized users on the network. You may share any standard folder on your hard disk, optionally assigning password protection to prevent unauthorized access to the folder's contents. The same procedure can be used to share an entire disk partition or a CD-ROM drive.

To share a folder:

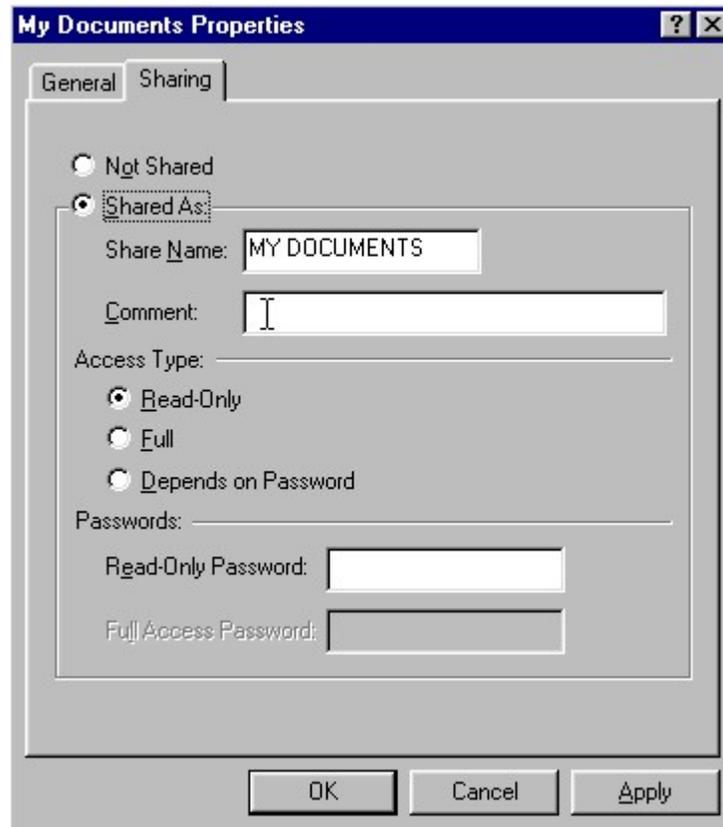
1. Open My Computer or Windows Explorer and choose the folder you would like to share. Right-click on the folder and click on the Sharing option in the pop-up menu.
2. Click the Shared As button. You may assign a special name for the shared folder or accept the default folder name. What you place in the "Shared Name" field is what other users will see to identify the folder in their Network Neighborhood list. You may also enter a descriptive comment in the comment field.
3. Determine the type of access to the folder that you would like to grant:

Read-Only Access means that other users will be able to open and view files in the folder, but they will not be allowed to modify file contents, delete files, or to create new files within

the folder.

Full Access means that other users will be able to open and view files in the folder, modify file contents and resave files, delete or create new files within the shared folder.

Depends on Password means that users will be granted either Read-Only or Full Access to a folder, depending upon the password they are required to enter when they initially request access to the folder.

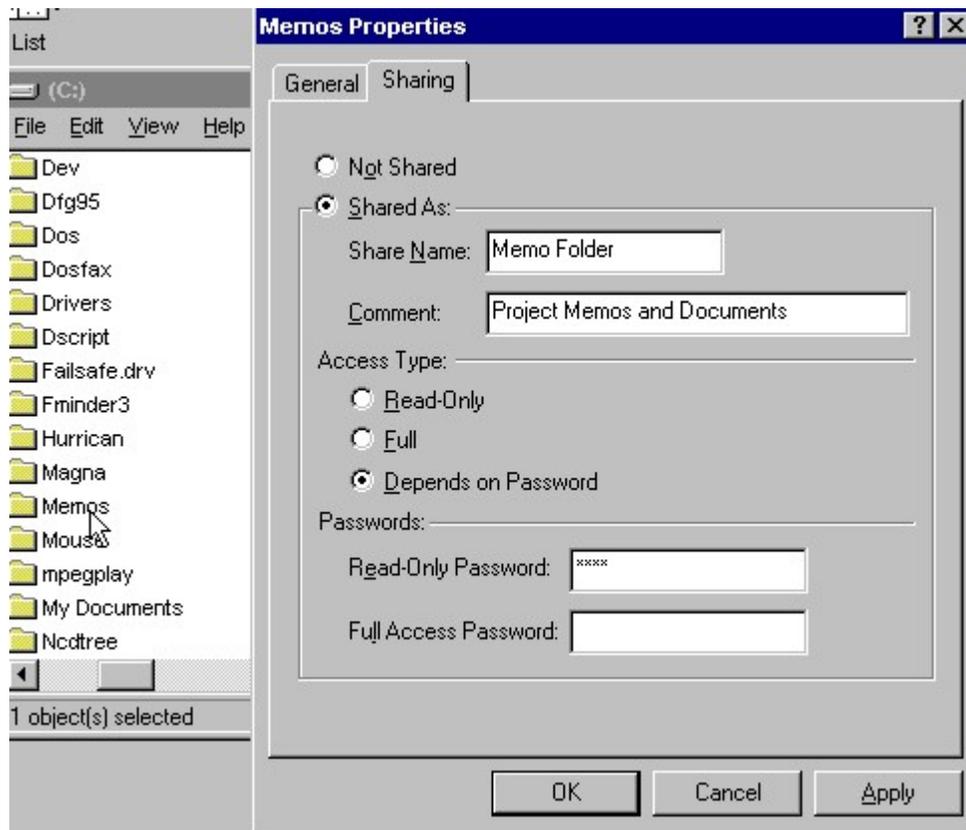


4. Click OK to close the Shared Properties dialog box. An extended hand icon for the folder will appear in My Computer or Windows Explorer to show that it is a shared resource.

To share an entire drive partition (or a CD-ROM drive):

1. Open My Computer and select the drive you would like to share. (The icon for a CD-ROM drive is different than the icons for standard disk partitions, but the procedure is the same.) Right click on the icon and select Sharing from the pop-up menu.
2. Click the Shared As button. You may assign a special name for the shared drive or accept its default name. What you enter is what other users will see to identify the drive in their Network Neighborhood list.
3. Determine the type of access to the folder that you would like to grant. (Proceed as in sharing a folder, described above.)

- Click OK to close the Shared Properties dialog box. An extended hand icon for the folder will appear in My Computer or Windows Explorer to show that it is a shared resource.



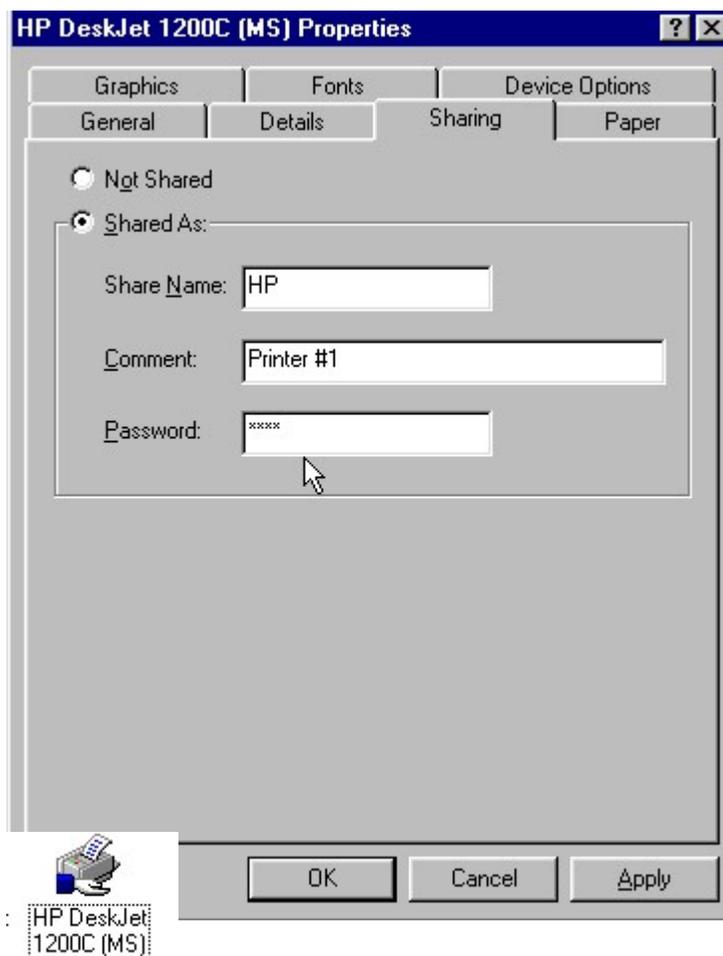
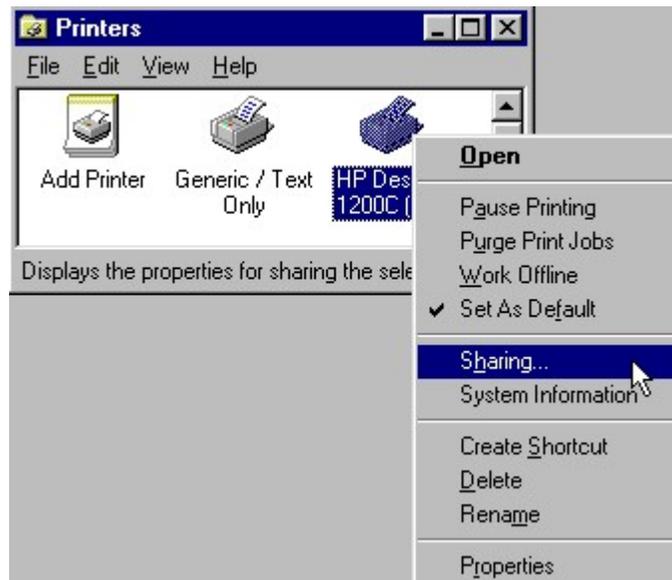
Sharing A Printer

You can make any printer connected to one of the computers in your Windows 95 network available to other users on the network.

To share an already-installed printer:

- Open the Printers Folder (Start Menu\Settings\Printers)
- Right-click on the icon for the printer and select Sharing
- Click the "Shared As" button on the Sharing Tab of the Printer Properties dialog box. You may accept the default name for the printer or enter a new one in the Share Name field. You may set up a password to restrict printer access to authorized users, or leave the password field blank. If no password is entered, all users on the network will be able to access the printer.

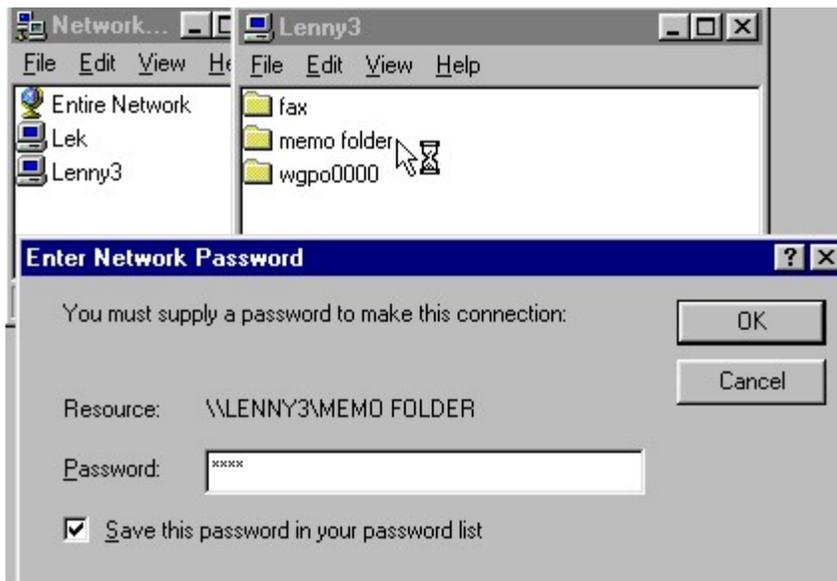
- Click OK to close the dialog box. An extended-hand icon will appear to show that the printer is now a shared resource.



Accessing a shared folder, disk-partition, or CD-ROM drive

Once a folder, disk-partition, or CD-ROM drive has been shared, users on other workstations may connect to it through Network Neighborhood.

1. Double-click the Network Neighborhood icon on the desktop. A windowed list of File and Print sharing computers in your workgroup will appear.
2. Double-click on the server that has the resource you want to access. A new window opens, listing the shared resources available through that computer.
3. Double-click on the icon that represents the folder or drive you want to access. If the resource is available to anyone, a new window will open that displays its file contents. If the resource is password-protected, you'll be prompted to enter the password before the file contents are displayed.



Note: the same procedure is used to access either a shared folder or a shared drive. The same type of "shared folder" icon in Network Neighborhood represents both kinds of resource. The way to provide a clear distinction between shared folder and shared drive resources is to assign them distinctive "share names" (See To Share a Folder, step 2, in the *Sharing a folder, disk-partition, or CD-ROM drive* section). Shared Name Examples: "Our Folder", "John's C-Drv", "M's CDRom."

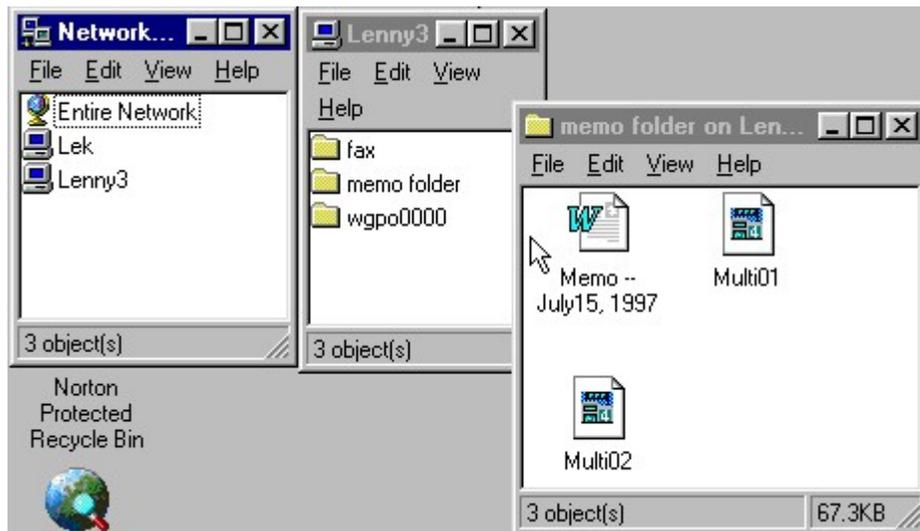
File windows opened for network drives and folders behave very much like local My Computer file listings. You can sort the contents by name, filetype, or date, and change the display view. You can double-click remote documents to open them in a local application. You can also drag copies of individual files from the shared folder to your desktop or copy them to a local folder.

If you have full access to a remote resource, you can also add new files or subfolders to the shared folder, and you may modify the contents of existing files.

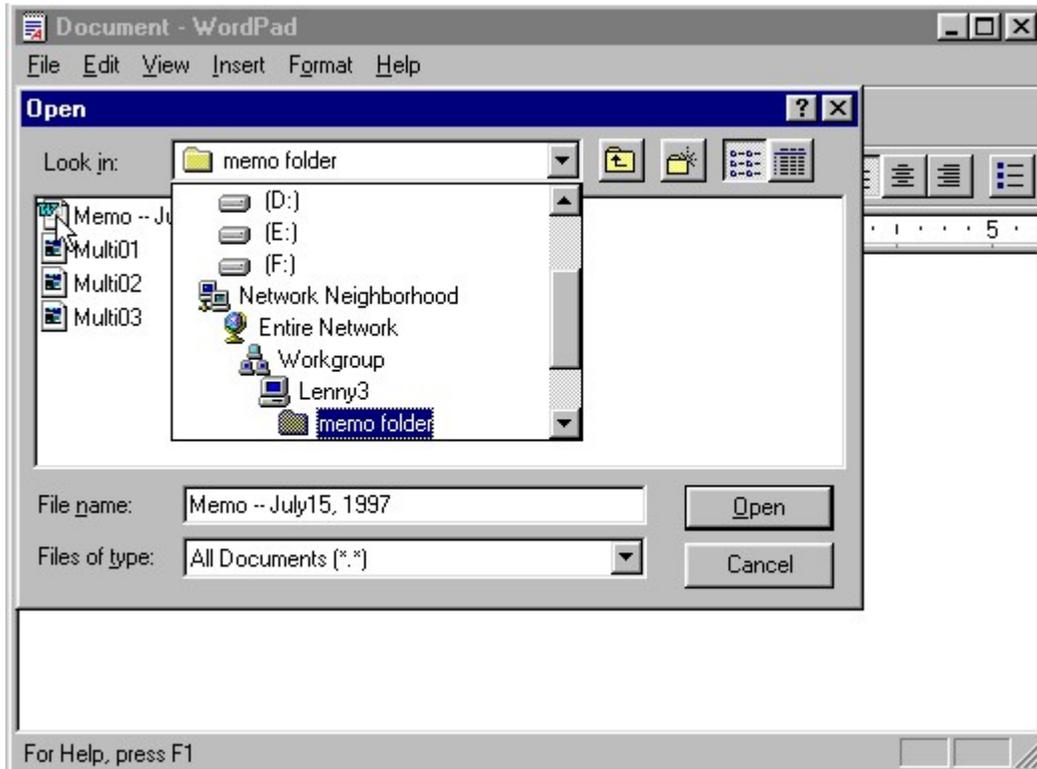
If you have read-only access to a remote folder or drive, you can copy its files or open a shared document in a local program -- but you are not permitted to add or delete files, or to change the contents of shared documents.

Here are some useful examples of how to put this feature to work:

A project leader may create a shared folder that contains a "memo of the day" and/or other documents that members of the team should have. The other members of the team log on to the network at the beginning of the day, and inspect the project leader's folder for new instructions. The first time team members access the project leader's folder they will open Network Neighborhood, double-click on the Project Leader's computer, and open the shared folder to get to the memo and other shared files.

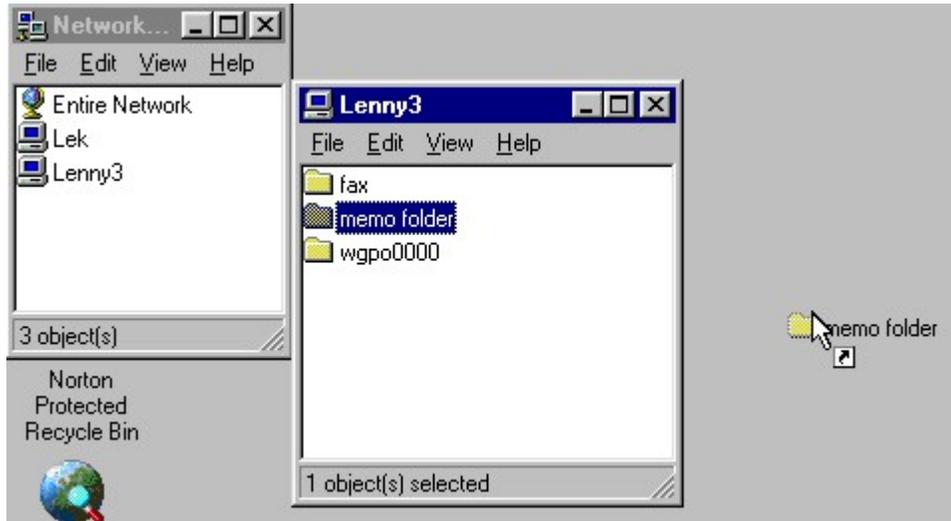


Windows 95 Applications (such as WordPad, found in the Accessories group) can open files in the shared folder when you select the Network Neighborhood option in the program's File Open dialog box.



Once the shared folder is visible in Network Neighborhood, team members can create a fast shortcut to it on their desktops:

Point the mouse at the memo folder icon in the Network Neighborhood window and drag the icon to the desktop. Windows 95 will tell you that you can't move or copy the folder to this location, but you can create a desktop shortcut for it. Your desktop shortcut will save you time and keystrokes. You don't have to search for the folder through Network Neighborhood each time you want to connect. From now on, you can open the folder quickly by double-clicking its desktop shortcut icon.



Sharing one computer's CD-ROM drive among the other workstations in your office is another useful network trick. A CD-ROM drive is not only valuable for its ability to run multimedia applications and browse clipart libraries. Workstations without their own CD-ROM unit can use the shared drive to install new applications.

1. Insert a CD (such as the Microsoft Office 97 installation CD) in the shared CD-ROM drive. (See the *Sharing a folder, disk-partition, or CD-ROM drive* section to review how to share the CD drive on the server.)
2. Open Network Neighborhood on the client workstation. Locate the icon for the computer that has shared its CD-ROM drive and double-click to open it..
3. Locate the CD-ROM drive in the shared resource list for the computer you've just opened. Double-click to open it.
4. When the file list window for the CD-ROM drive opens, you can run the SETUP program to install Office 97 on your local computer from the CD in the remote drive.



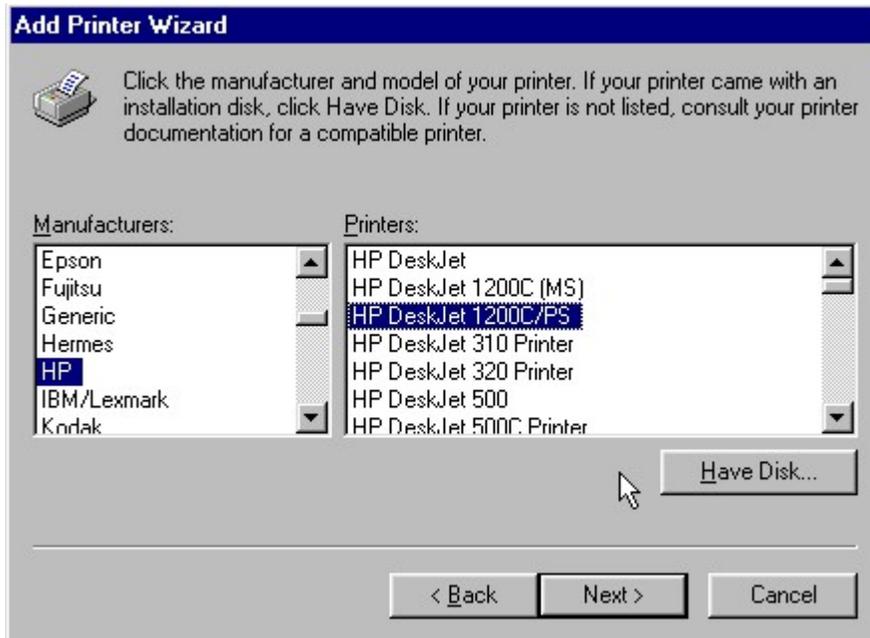
Accessing a Shared Printer

Once a printer has been shared on the network, users on other workstations may connect to it. First, an icon for the network printer must be created on the client workstation. There are several ways to do this. Here is one method:

1. Open Network Neighborhood. Open (double-click) the server that is sharing the network printer.
2. Find the printer you want to use in the server file list window (shared printers have distinct icons that distinguish them from shared folders or drives). Right-click on the printer icon and select Install from the pop-up menu.



3. The Windows 95 Printer Installation Wizard opens. The first screen asks whether you want to use the network printer with MS-DOS-based programs. Select either "Yes" or "No", and click the Next> button to continue. Windows 95 may prompt you to install a driver for the printer. If this screen appears, select the manufacturer and printer from the list, or choose the "Have Disk" option to install a custom OEM driver. Then click the Next> button to continue

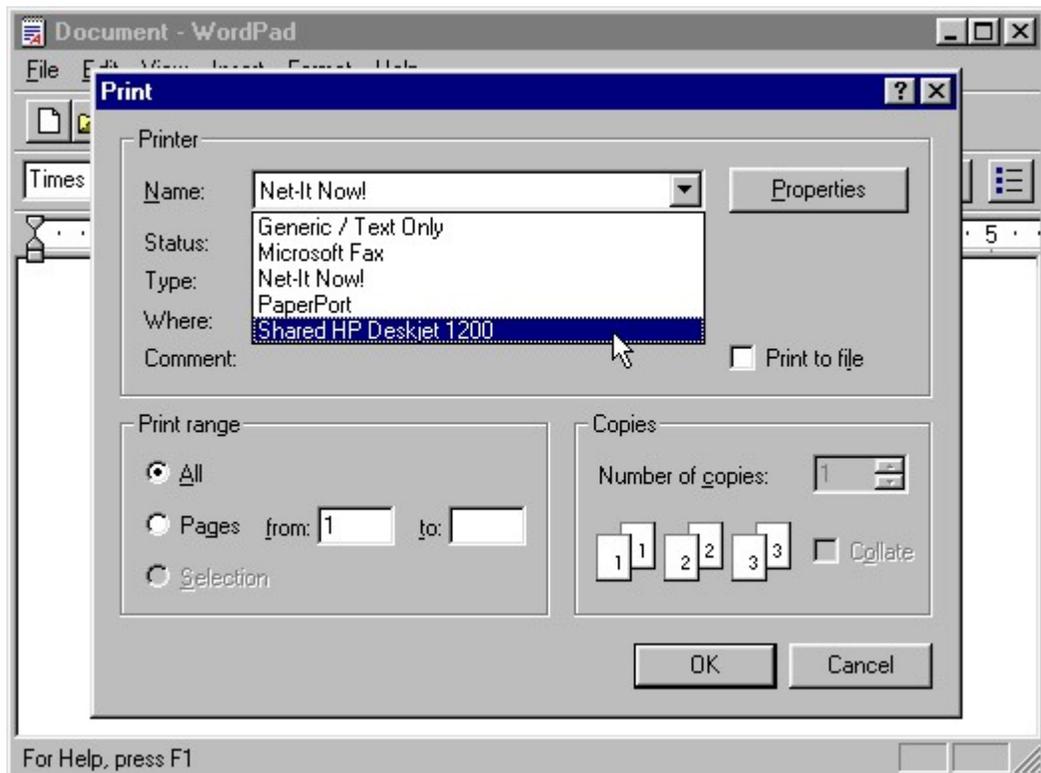


4. On the next screen, you may enter a custom name to identify the printer to your local workstation, or accept the default. You may also indicate whether your Windows 95 programs should use this printer as the default printer. Click the Next> button to continue.



5. The Printer Installation wizard asks if you would like to print a test page. Select "Yes" to test your printer connection immediately and click the "Finish" button.
6. Open the Printers Folder (Start Menu\Settings\Printers). You should see a new printer icon for the network printer you have just installed.

If you decided to make your shared printer the default printer for this workstation (see step 4), your applications will print to it automatically, when you select the "Print" command from the File menu. Otherwise, the printer will appear in the scroll-down list of available printers when you select File, Print.



Chapter 4 Troubleshooting and Additional Resources

If you are experiencing difficulty with any aspect of your Windows 95 network, the first step you should take is to review the procedure for installing the network hardware and configuring the software, outlined in Chapters 2 and 3 of this booklet. Here are a few common problems you might encounter and suggested solutions:

There is no Network Neighborhood icon on my desktop

Try right-clicking on the desktop and selecting "line up icons" to make sure Network Neighborhood isn't concealed behind another icon. If the icon is still missing, open the Control Panel, open the Network settings and make sure that the Configuration tab contains listings for a Network Interface Card, the Client for Microsoft Networks and the NETBEUI or IPX/SPX transport protocols.

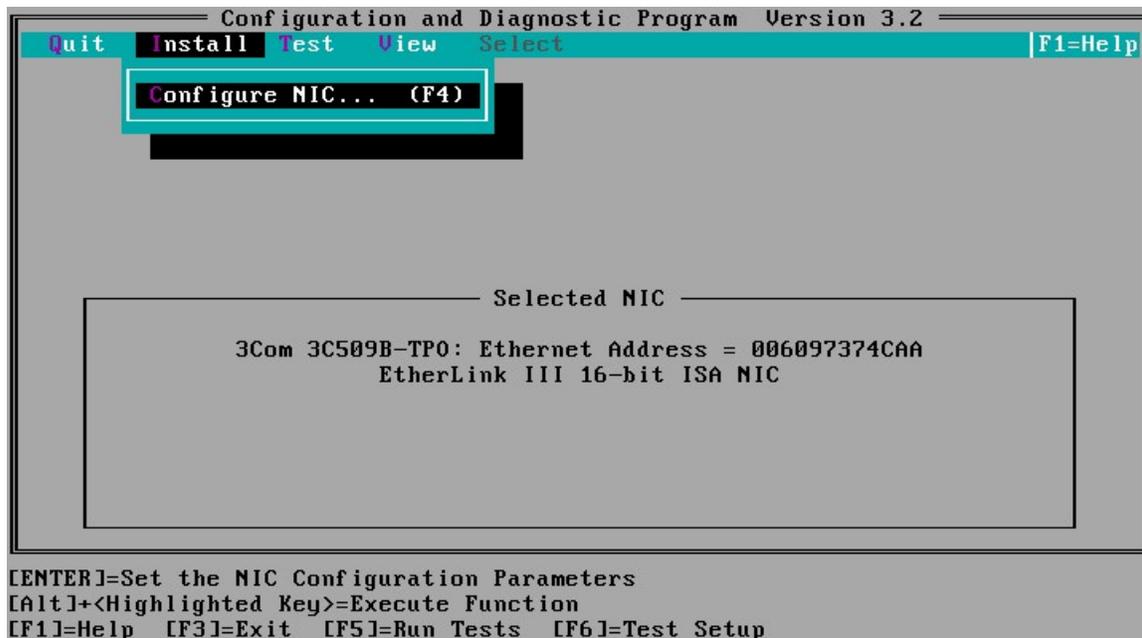
No computer listings appear when I open Network Neighborhood

If you can't see shared resources in Network Neighborhood, review *the Checking/Confirming Your Windows 95 Network Setup, Identifying Yourself on the Network, and Testing Your Network Connection Settings* sections on pp. Xx--yy.

Check the following elements of your network setup:

1. All computers on the network have installed network cards and proper cabling. (A BNC network is terminated at both ends; a 10-BaseT network has all nodes properly plugged into the hub and the hub's power is switched on.)
2. All workstations attached to the network have been assigned unique computer names. (See page xx for instructions on how to assign a computer name to a workstation.)
3. The network card in each computer is working properly. If you suspect that a machine has problems, power it down, restart it and watch the system startup process for error messages that may help you identify the problem. Inspect the network card listing in the Windows 95 Device Manager to see whether the system reports it to be functioning properly. Write down any reported details about hardware conflicts. (See *Checking/Confirming Your Windows 95 Network Setup, p xx.*)
4. At least one computer on the network has been configured as a file or print server (File and printer sharing for Microsoft Networks will appear on the Network Properties Configuration tab in the network components list.)

If you've followed these steps and continue to receive logon error messages (or Network Neighborhood continues to remain empty), you may need to adjust the internal settings of your Network



Interface Card. For the 3COM Etherlink III cards included in the 3COM Office Connect kit, you can do this by booting your machine to a real DOS session (start the machine, press F8 when the "Starting Windows 95" message appears on the screen and select the "Command Prompt Only" startup option). Insert the 3COM "Ether Disk" disk in drive A and run the network configuration program (3C5X9CGF.EXE). Select "Configure NIC" from the pull-down Install menu. If Windows 95 reported an I/O Address or Interrupt conflict, select that setting in the NIC configuration window and choose a



different setting.

Note: If your network has BNC cabling and no hub, the Transceiver Type setting should be changed to "Coax/BNC." If you are using a non-3COM set of networking cards, consult your documentation for instructions on how to change the network card's default I/O Address, Interrupt Request, and Thin Coax/10BaseT settings.