

Comet 3356P-LAN

User's Manual

Version 1.0

ZyXEL

ACCESSING THE INTERNET AND INTRANET

Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two (2) years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its option, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or remanufactured functionally equivalent product of equal value, and will be solely at the option of ZyXEL. This warranty shall not apply if the product is modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

Note: Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind or character to the purchaser.

Acknowledgments

The trademarks and brand names mentioned in this manual are used for plain informational purposes. Trademarks and brand names are the property of their respective owners.

FCC Part 15 Information

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operations.

This equipment has been tested and found to comply with the limits for a CLASS B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio/television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded RS-232 cables are required to be used to ensure compliance with FCC Part 15, and it is the responsibility of the user to provide and use shielded RS-232 cables.

FCC Requirements

This equipment complies with Part 68 of the FCC Rules. On the base unit of this equipment is a label that contains, among other information, the FCC Registration Number and the Ringer Equivalence Number (REN) for this equipment.

IF REQUESTED, THIS INFORMATION MUST BE GIVEN TO THE TELEPHONE COMPANY.

The REN is useful to determine the quantity of the devices you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the total RENs, you should contact your local telephone company to determine the maximum REN for your calling area.

If your equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact the Address and Phone number listed in the warranty card for information on obtaining service or repairs.

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure the equipment is not malfunctioning.

The user is not authorized to repair or modify the equipment.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

You will find also this information on a sticker on the bottom of the modems case.

The modem is connected to a public switched line using a USOC (Universal Service Order Code) RJ-11C modular jack.

Contacting ZyXEL

If you have questions about your ZyXEL product or desire assistance, contact ZyXEL Communications Corporation in one of the following ways:

- **Phone:** In North America call between 8:00 AM and 5:00 PM PST at (714) 693-0808.

Outside North America, you can dial +886-3-5783942 EXT 252 between 8:00AM and 5:00PM Taiwan time (GMT +8:00).

- **Fax:** ZyXEL in North America: (714) 693-8811 or Taiwan: +886-3-5782439.
- **E-mail:**
 - **Sales inquiries:** sales@zyxel.com in North America.
sales@zyxel.hinet.net outside North America.
 - **Technical support:** support@zyxel.com in North America.
support@zyxel.hinet.net outside North America.
- **Product information:** Visit our site on the World Wide Web:
<http://www.zyxel.com>.
- **FTP:** Information , such as ZyXEL software and ROM updates for North America can be found at this FTP address: <ftp.zyxel.com>

For European versions and related files, use the address: <ftp.zyxel.co.at>

- **Postal Service:** You can send written communications at the following address:

ZyXEL Communications Corporation

6, Innovation Road II, Science-Based Industrial Park

Hsinchu, Taiwan 300, ROC

or

ZyXEL Communications Inc.

4920 E. La Palma Avenue

Anaheim, CA92807, USA

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1 Introduction

Congratulations on the purchase of your Comet 3356P-LAN Type II PCMCIA card, one of ZyXEL's premier high-performance products. The Comet is world renown for its ability to maintain ultra high speeds and clear, quality connections while communicating around the globe.

Unpacking Your Modem

Before you proceed, check all items you received with your modem against this list to make sure nothing is missing. The complete package should include:

- One Comet 3356 P-LAN
- One detachable interface cable with RJ-11 cable and plug.
- One detachable interface RJ-45 LAN cable and plug.
- One FAX & Data Communication software package.
- One INF file disk for Windows 95 and Windows NT 4.x.

Hardware Overview

The Comet is an intelligent high-speed fax/modem and Ethernet LAN adapter. The modem can be used as both a send/receive fax machine and a data modem. When connecting to another modem/fax, the modem automatically negotiates the fastest speed possible. The PC Card FAX/MODEM/LAN is designed to work with many of the popular fax/modem and LAN communication software packages. Some software packages will control and configure the fax/modem for you automatically, however, they are usually only useful to those who need the modem to perform special tasks. AT commands can also be used to control the fax/modem manually.

Required Equipment

Make sure you have the additional equipment below before proceeding with Installation:

- An IBM compatible PC or notebook with PCMCIA type II slot and 386SX or better CPU.
- PCMCIA Socket Service and Card Service drivers. (These drivers are usually included with the computer. If not, check with your computer dealer.)
- A telephone line with RJ-11 connector.
- Data and/or Fax communication software.

2 Installation

This chapter describes how to install your Comet hardware. Installation procedures also cover Windows 3.x, Windows 95, Windows NT 4.0, and DOS operating systems.

Hardware

You can insert your Comet with your computer turned on or off. Follow the steps below to complete the hardware installation:

1. Hold the card label up and insert the card into the computer's PCMCIA slot with the 68 pin connector facing the computer.
2. Plug the 15-pin PC Card connector with both RJ-45 LAN cord and RJ-11 telephone cord into the 15-pin socket on the PC Card. Now the hardware installation is completed. The PC Card is powered directly by the PC.
3. Connect the RJ-45 (8-pin) plug to the LAN and the RJ-11 (6-pin) plug to the telephone wall outlet.

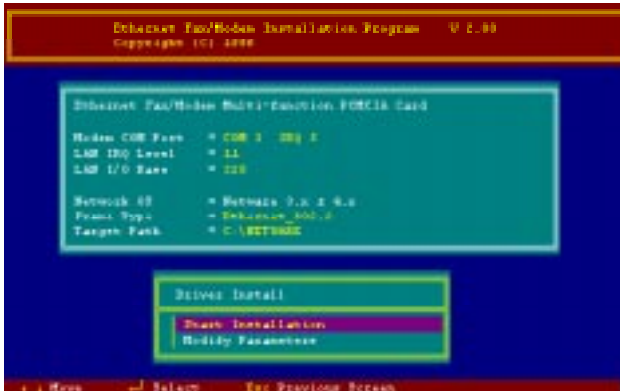
Non-Windows 95 & Windows NT Operating Systems



Novell Netware Installation

Follow the steps bellow to complete Novell Netware installation:

1. Insert the driver diskette into the floppy drive and set to the appropriate drive (A:). Then type **INSTALL** and press **Enter**.
2. Select **Netware 3.x and 4.x Workstation** from the installation program dialog box.
3. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
4. Select the appropriate values then press **Enter**. When you are finished, press **OK** to exit.



5. The installation program will install all necessary drivers and modify your computers **AUTOEXEC.BAT** and **NET.CFG** directories.
6. Select **Yes** then press **Enter** to modify the files.
7. Reboot your computer and the new settings will take effect.

For manual installation of ODI drivers, follow the instructions below:

1. Copy the files **\NETWARE\LM28ODI.COM** **\NETWARE\NET.CFG** and **\ENABLER\CARDEN.EXE** **\ENABLER\LMVXD.386** from the driver disk to your hard disk.
2. Use a text editor to edit the **NET.CFG** and set the frame type. The frame type default is set to 802.3 for Netware 3.11 server and 802.2 for Netware 3.12 and 4.x servers. The frame type set in **NET.CFG** must match that set in Netware servers.
3. Using following format to create a startup batch file:

```

CARDEN /IOP=nnn /IRQ=nnn /COM=n /MIR=n
LSL          ;Link Support Layer Module
              ;provided by Novell
LM28ODI      ;Hardware Specific Module
IPXODI       ;IPX Protocol Stack Module
              ;provided by Novell
NETx         ;Shell Support Module provided by
              ;Novell

LOGIN
  
```

MS LAN Manager Installation

1. Before installing the drivers, make sure that the Microsoft LAN Manager has been installed in the target path. The installation program will check and modify the **PROTOCOL.INI** file for LAN Manager.

2. Insert the driver diskette into the floppy drive and set to the appropriate drive (A:\). Then type **INSTALL** and press **Enter**.
3. Select **Microsoft LAN Manager** from the menu screen.
4. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
5. Select the appropriate values then press **Enter**. When you are finished, press **OK** to exit.
6. The installation program will install all necessary drivers and modify your computers **AUTOEXEC.BAT** and **NET.CFG** directories.
7. Select **Yes** then press **Enter** to modify the files.
8. Reboot your computer and the new settings will take effect.

Example of PROTOCOL.INI:

```
[PROTMAN]
```

```
DRIVERNAME = PROTMAN$  
DYNAMIC = YES  
PRIORITY = NETBEUI
```

```
[NETBEUI_XIF]
```

```
Drivername = netbeui$  
SESSIONS = 6  
NCBS = 12  
BINDINGS = "LMNDIS_NIF"  
LANABASE = 0
```

```
[LMNDIS_NIF]
```

```
; protocol.ini session for multifunction
```

```
LAN/MODEM driver.
```

```
IOADDRESS = 0x320  
INTERRUPT = 11  
DRIVERNAME = LMNDIS$
```

Packet Driver Installation

1. Insert the driver diskette into the floppy drive and set to the appropriate drive (A:\). Then type **INSTALL** and press **Enter**.
2. Select **Packet Driver** from the menu screen.
3. Check the card settings. If current settings are correct, select **Start Installation** and go to step 5. Otherwise, select **Modify Parameters** to change settings.
4. Select the appropriate values then press **Enter**. When you are finished, press **OK** to exit.
5. The installation program will install the drivers and modify the **AUTOEXEC.BAT** directory. Select **Yes** then press **Enter** to modify the files.
6. Now, the installation is completed.
7. Reboot your computer and the new settings will take effect.

Windows for Workgroups 3.11 Installation

1. Insert the driver diskette into the floppy drive and set to the appropriate drive (A:\). Then type **INSTALL** and press **Enter**.
2. Select **Windows for Workgroups** from the Network Operating System screen.
3. If current settings are correct, select **Start Installation** and go to step 13. Otherwise, select **Modify Parameters** to make modifications.
4. Move the cursor to the setting you wish to change, then press **Enter**. When the configuration is accepted, press **Enter** from the OK field to exit the screen and go back to step 3.
5. Select **NDIS Server (LAN Manager,...)** as the network server that you will attach to then press **Enter**.
6. The installation program will install the drivers and modify the **AUTOEXEC.BAT** directory. Select **Yes** then press **Enter** to modify the files.
7. Run Windows for Workgroups and click on the **Network Setup** icon in the Network group.
8. From the Network Settings dialog box, click **Networks...** to select the network operating system.
9. From the Networks dialog box, choose the **Install Microsoft Windows Network** selection and **No Additional Network** selection. Click **OK** to go back the Network Settings screen.
10. Click the **Drivers...** button to select the network driver.

11. From the Network Drivers dialog box, press the **Add Adapter...** button to enter the Add Network Adapter dialog box. Select **Unlisted or Updated Network Adapter** and click **OK**.
12. Windows will prompt a Install Driver dialog box; put the driver diskette into floppy drive then press **OK**.
13. Select **Enhanced mode NDIS3 for....** then press **OK**.
14. Follow Windows instructions to complete the installation and exit Windows.
15. Reboot your computer and the new settings will take effect.

Windows NT 3.51 Installation

1. Choose **Program Manager, Main, Control Panel, Network** and remove all existing network components. Remove all adapters first, then servers, then workstations, etc.
2. Choose **Program Manager, Main, Control Panel, Ports** and remove all serial port support. After all serial port devices are removed, press **Close**.

Adding PCMCIA to Your Laptop

1. Choose Program Manager, Main, Control Panel, Devices.
2. Select PCMCIA.
3. Press STARTUP.
4. Select BOOT, then press OK.
5. When all PCMCIA adapters are added, press Close and restart Windows. Check the Event Viewer after your system reboots.

Ethernet + Fax/Modem PC Card Installation for NT 3.51

1. Insert the Ethernet + /Fax/Modem multifunction PC Card into one of the PCMCIA slots.
2. Choose **Program Manager, Main, Control Panel, Network**.
3. Press **YES** to install network components.
4. Enter the correct path for NT installation media (CD-ROM). For example, **D:\i386**.
5. Press **“Do not detect for the network adapter”**.
6. Open the **Network Adapter Card** selection box.
7. Select **<OTHER> REQUIRES DISK FROM MANUFACTURER** and click the **CONTINUE** button.

8. Insert the driver disk into floppy disk drive, then enter the correct path (A:\).
9. Select **Ethernet + Fax/Modem PC** then click **OK**.
10. Set the appropriate system resources for the Ethernet + Fax/Modem PC Card. Make sure the settings you choose do not conflict with any other devices.

Resource Recommendations

I/O Base	I/O:300. Possible alternative: 320, 340, 360
Interrupt (IRQ)	IRQ:5. If your laptop is equipped with multimedia devices, a higher interrupt (IRQ:11) may be needed.
Base Memory	D000. Possible alternative: D800
COM Port	COM2 to COM4. Select one of the COM port that is not in use by other communication devices.

11. When all settings are completed, press **OK**.

Windows NT will load network and grant configurations for:

- NWLink
- TCP/IP
- Netbeui

Typically configurations for each network are unique. Ask your network administrator for help if you want to change them.

12. Once all network software is loaded, press **OK**. The configuration and bindings for the PC Card might ask for confirmation. Answer any questions accordingly.
13. Connect to your network using the provide 10BaseT cord with 8-pin RJ-45 plug.
14. Reboot the system.

Windows NT4.0 Installation

1. Remove all existing PC Cards from the system.
2. Run Windows NT 4.0
3. Login with a full access level i.e. ADMINISTRATOR.
4. Choose **My computer, Control Panel, Network, Adapters** and remove all existing network components.
5. Click **CLOSE** after all network components have been removed.

6. Choose **My computer, Control Panel, Ports** and remove all existing network components.
7. Press **CLOSE** after all serial port devices are removed.

Ethernet + Fax/Modem PC Card Installation for NT 4.0

1. Insert the Ethernet + Fax/Modem PC Card into a PCMCIA Slot.
2. Start Windows NT 4.0.
3. Login with a full access level i.e. ADMINISTRATOR.
4. Choose **My computer, Control Panel, Network**.
5. If a Network has not been installed select **YES** to start Network installation, then press **Next** and press **SELECT FROM LIST** button, then press **HAVE DISK** button.
6. Insert the Ethernet + Fax/Modem driver disk into the floppy drive, then enter the correct path.
7. Select the only choice for the Ethernet + Fax/Modem PC Card, then press **OK** and **NEXT**.
8. Windows NT 4.0 will grant configurations for:
 - TCP/IP
 - NWLink IPX/SPX
 - NetBEUI
 - ...

Typically configurations for each network are unique. Ask your network administrator for help if you want to change them.

9. Click **Next** twice to use default NETWORK SERVICES settings.
10. Enter the correct path for NT 4.0 system source files.
11. A dialog box will pop up. Give appropriate system resources to the Ethernet + Fax/Modem PC Card; the settings must be unique for this device. Refer to "Resources Recommendation" for NT 3.51 details.
12. Click **NEXT** twice. Enter **COMPUTER NAME** then press **NEXT**.
13. Click **FINISH**.

If **Network** has been installed

1. Choose **My computer, Control Panel, Network, Adapters**.
2. Click **ADD** to add network adapters.

3. Click the **HAVE DISK** button.
4. Insert the Ethernet + Fax/Modem PC Card driver disk into floppy drive.
5. Enter the correct path for Windows NT 4.0 drivers then press **OK**.
6. A dialog box will pop up. Give appropriate system resources to the Ethernet + Fax/Modem PC Card; the settings must be unique for this device. Refer to “Resources Recommendation” for NT 3.51 details.
7. Press **OK** when all setting are complete.
8. Press **CLOSE** to complete NETWORK setting.
9. Reboot Windows NT.

Modem configuration for NT 4.0

1. Choose **My computer, Control Panel, Modems**.
2. Press **NEXT**.
3. From the Modem manufactures & Models list screen, choose your modem and click **FINISH** and then **CLOSE** to complete the modem configuration.
4. Reboot the system.

Windows 95 Installation

1. Windows 95 should automatically detect new hardware. From the **New Hardware Found** dialog box, select **Driver from disk provided by hardware manufacturer**.
2. Enter the correct path, i.e. “A:\”, then insert Ethernet + Fax/Modem PC Card driver disk. The driver will be installed automatically, and system may ask for the Windows 95 installation CD/disks to update the existing files or drivers. After the update, system will reboot automatically.
3. After installation is complete, **My computer, Control Panel, Network** to add Protocols according to your application requirements.
4. Reboot the machine to complete the installation.

Artisoft Lantastic 6.0 Installation

1. Install LANTASTIC 6.0.
2. Run INSTALL.EXE in the Ethernet + Fax/Modem multifunction PC Card driver disk’s root directory.
3. Select **LANTASTIC 6.0** from the Network Operating System screen, then enter **Driver Install** screen.

4. If current settings are correct, select **Start Installation** and go to step 6. Otherwise, select **Modify Parameters** to make changes.
5. Move the cursor to each field you want to make modification and press **Enter** to set the correct values. Click **Enter**, then **OK**.
6. After installation is complete reboot the computer to have new settings take effect.

3 Basic Modem Operation

This chapter covers the basic commands and techniques involved in modem operation. In many cases, this is the only information you will need in order to get your Comet up and running with communication software, and to start making connections with your Comet.

Understanding AT Commands

The Comet communicates asynchronously with computers using AT commands. AT commands are used to configure and control the Comet. Commands are usually sent to the modem by way of communication software, but can also be entered manually with the computer keyboard.

Command statements must be written in a specific form in order for the Comet to recognize them. A command statement always begins with the letters **AT** or **at**. It is then followed by one or more commands and the <Enter> key.

AT commands can only be issued when the Comet is in “command mode” or “off-line.”

Once the Comet has established a connection with another modem it is said to be “on-line” or in “data mode.” In this mode, the characters sent to the Comet by your computer are transmitted to the remote modem rather than being interpreted by the Comet as commands.

Using the Windows 95 Hyper Terminal Program

In order to issue an AT command statement, you first need to run a communication program such as the Microsoft Windows “Hyper Terminal” program. This program provides a simple method to manually enter AT commands so you can do such things as “customize” the settings of your Comet, or store phone numbers you will commonly connect to.

Once the Comet is connected to your computer’s serial port and telephone line, Open the Windows 95 “Accessories” program group, and open the Hyper Terminal Program.

The program will prompt you for a name and Icon to use for your new connection. Type the name **Test Connection** and press <Enter>.

Next, you will be prompted for country information, area code, and phone number, and the device used to make the connection. For this test purpose, do not enter a phone number; simply choose the COM port your Comet is connected to from the “Connect Using” list. Click “OK” when finished.

The next window sets the COM port settings. The settings used for the Comet should be as follows:

Bits per second:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Flow Control:	Hardware

Click “OK” when finished. After you have done this, save your new connection by selecting “Save” from the “File” menu and click “OK.” A new connection icon will be added to your Hyper Terminal folder.

You are now ready to start entering AT commands.

In the terminal window, type:

```
AT<Enter>
```

Comet responds

```
OK
```

This confirms that the modem and your computer are communicating correctly.

To test the telephone line connection issue the manual answer command.

Type:

```
ATA<Enter>
```

The Comet will pick up the phone line, and try to communicate. Normally, this command is only used to answer an incoming call made from another modem. Thus the high pitched noise you will hear from the speaker. To abort the operation, press any key, or select “Disconnect” from the “Call” menu.

Dialing and Answering Techniques

Depending on what communications software you use to make modem connections, you may not have as much control of how the modem dials the telephone number. This section shows some useful examples of the AT commands used for dialing and answering operations. The command characters specific to each function are shown in bold type.

Dialing using the ATD Command

Touch Tone Dialing: **ATDT** 555 1212

Pulse Dialing: **ATDP** 555 1212

Tone and Pulse Dialing: **ATDP** 555 1212 **WT** 24

Pausing During Dialing:	ATDT 9,,555 1212
Dialing Without Waiting for Dial Tone:	ATX0D, 555 1212
Originating a call using an Answer Tone:	ATDT 555 1212,,,,,R
Redialing the Last Number Called:	ATDL
Waiting for Five Seconds of Silence:	ATDT 800 555 1212 @ 123456,1 714 555 1212
Transferring a Call (using flash hook):	ATDT! 2468

Auto-Answer and Hook Controls

Enabling Auto-Answer: **ATS0=n**

Note: In this example, n is a number from 1 to 255 that corresponds to the number of rings after which your modem answers an incoming call.

Disabling Auto-Answer: **ATS0=0**

Manually Answering a Call: **ATA**

Take modem off-hook: **ATH1**

Hang up modem (on-hook): **ATH0**

Manually Disconnecting a Call: **+++ATH**

Making Your First Connection

Use the connection you created in the Hyper Terminal program to dial the ZyXEL BBS. If you are using a different terminal program, run the program according to the instructions provided with it.

Start the terminal program by double-clicking the **Test Connection** icon. When the terminal window appears, enter the dial command with ZyXEL's BBS (+88635776274) as the phone number.

Type:

```
ATDT<Phone number> <enter>
```

The modem will go off-hook, dial the number, and after a few seconds of negotiation tones, you should be connected to our BBS.

You will receive a login message asking for your name. For the purposes of this example you need not continue. Just click the "disconnect" icon on the toolbar.

Quick Tips when issuing AT Commands

- The ENTER or RETURN key must be pressed to execute a command.

- Multiple AT commands can be combined into one line. For example, AT&D2 and AT&K0 can be combined into one line AT&D2&K0.

The Comet processes commands from left to right. The AT command that appears to the right might over-write the command to the left if they are trying to accomplish tasks or set modes that cannot coexist.

- If you see duplicated characters for each one you type, your Comet and software both have their “echo” feature turned. The Comet command echo state is switched off using ATE0 and on using ATE1 (default). To eliminate the double characters, turn off the software’s command echo rather than using the ATE0 command. If you see no characters in your terminal window when you type, the modem’s echo setting is probably set to off. In this case, issue the ATE1 command.
- When a command is successfully issued and accepted, a modem responds with what is called a “Result Code.” The Comet supports both “verbose” result codes (i.e. “OK”), and “numerical” result codes (i.e. “0”).

You can use the ATV command to set it one way or the other as follows:

Command	Description
ATV0	Select numerical result code
ATV1	Select verbose result code

There are a few basic commands that do not require the “AT” command prefix. These are as follows:

Command	Description
A/	Repeats the last issued AT command once
<any key>	Terminates the current connection attempt, if pressed while modem is handshaking.
+++	Escape code sequence. Entered while the modem is in Data Mode. Returns modem to Command Mode.

The Comet supports several groups of AT commands:

AT Command Set/Type	Example
Basic AT commands (compatible)	ATB0
Extended AT& commands	AT&D0
Extended AT\ commands	AT\N3
Extended AT% commands	AT%C1
Extended AT- commands	AT-C0
S-Register command	ATS0=1
S-Register inquiry command	ATS0?

Modem Result Codes

When you execute or try to execute an AT command, your modem sends a result code to let you know whether the command was executed. An OK result code means the AT command you sent was executed. If you receive an ERROR code, it means the command was invalid.

The Comet also provides result codes that show:

- Whether or not a Dial Tone was detected when the modem originated a call.
- If a busy signal was detected when the modem originated a call.
- The speed, protocol, and error control/data compression method used.
- If your modem has detected an incoming ring.

Result codes can originate from any of eight result code sets. The **ATX n** and **ATW n** command lets you choose which set of result codes your modem uses. By default, your modem uses result codes equivalent to the **ATX4** and **ATW2** command.

Viewing S Register Values

Status registers (or "S-registers") contain values that determine the modem's operating characteristics. Whenever you send an AT command to your modem, you are actually changing the value of an S-register.

You can use the **Sr?** command to view the value of S-register ' r '. For example, to view the value of S-register S0, which controls auto-answering, type **ATS0?** and press Enter. The modem responds with a three-digit character showing the value of this register, followed by OK. A value of 002, for example, means your modem will auto-answer incoming calls after the second ring.

Changing S Register Values

You can use the **ATSr= n** command to change the value of an S-register r .

For example, to have your modem auto-answer an incoming call after two rings, set S-register 0 to 2. Be sure the n value is between 1 and 255. If n is set to 0, your modem will not answer incoming calls.

Non-Volatile Memory

The Comet has memory set aside for storing user information such as frequently used phone numbers and default command settings. This section covers the topics of storing phone numbers, and saving default settings in the power-on profile.

Storing Phone Numbers

The AT command to store a phone number is in the format **AT&Zs= n** .

The 's' is a number from 0 to 3 that represents the location in memory that the phone number is to be stored, and the 'n' is the phone number itself.

Example: To store the number '1-714-555-1212' in memory location '2', type:

```
AT&Z2=17145551212<Enter>
```

You can store up to 4 telephone numbers.

Dialing Stored Phone Numbers

The AT command syntax used to dial a store number is **ATDS=*n***.

The '*n*' is the memory location of the stored number you want to dial.

Note: As a general rule, when a letter in an AT command definition is shown in italic type, the letter is not to be entered as part of the command, but rather is representative of a number or string expected as input. For example: The letter 'S' in the ATDS=*n* command is actually typed, unlike the 's' in the AT&Zs=*n* command which represents a number.

Saving Settings and User Profiles

There are some cases where you may wish to save the settings you have made as the default settings that are recalled when the Comet is powered up. The **AT&W** command stores the current settings as the power-on profile.

The following table lists the syntax for the command involved in storing, recalling, and viewing the profile settings.

AT&V	Views the current settings and the stored phone numbers
AT&W	Stores the current settings in user profile
ATZ	Resets the current settings with the settings in profile
AT&F	Resets the current settings with the factory settings

Default Modem Settings for PC's

The Comet factory settings are configured for operation with PC type computers and communications software. In most cases, no additional settings will be required. The following are some of the default settings that are used for operation with PC computers and software:

AT Command	Description
E1	Echoes command characters
&C1	Carrier detect follows remote carrier
&D2	Modem disconnects on DTR on-to-off transition
\N3	Use both V.42 and MNP error correction

AT Command	Description
%C1	Use both V.42bis and MNP 5 data compression

4 AT Command Set Summaries

Basic AT Command Set

Command	Options	Function & Description
A/		Re-execute the last command string
<any key>		Terminate the current connection attempt when entered in handshaking state
All the following commands require an "AT" prefix		
A		Go off-hook and attempt to establish a connection without waiting for a ring
Bn		Line modulation options
	B0	Select V.22 mode for 1200 bps connection
	B1 *	Select Bell 212A for 1200 bps connection
	B2	Select V.23 1200 bps for receiving, 75 bps for transmitting in originate mode; 75 bps for receiving and 1200 bps for transmitting in answer mode
	B3	Select V.23 75 bps for receiving, 1200 bps for transmitting in originate mode; 1200 bps for receiving and 75 bps for transmitting in answer mode
	B15	Select V.21 for 300 bps connection
Dn	B16	Select Bell 103 for 300 bps connection
		Dial command, beginning the dialing sequence. The string "n" (telephone number and modifiers) listed as follows is entered after the "D" command
	L	Re-dial last number. Should be the first character following ATD, ignored otherwise
	P	Pulse dial.
	R	Reverse dial. Originate call in answer mode (go on-line in answer mode)
	S=n	Dial the phone number stored in NVRAM at location "n" (n=0, 1, 2, 3)
	T	DTMF tone dial.
	W	Wait for second dial tone. The modem waits for the second dial tone before processing the dial string
	,	Pause. Cause the modem to pause for a time before processing the next character in the dial string (specified by S8 register)
	!	Hook Flash (for call transfer). Cause the modem to go on-hook for 0.5 second then return to off-hook
@	Wait for 5 seconds of silence after dialing number	
;	Return to command state after dialing a number without disconnecting the call	
En		AT command echo options
	E0	Echo disabled
	E1 *	Echo enabled
Hn		Switch-hook control
	H0 *	Modem goes on-hook
	H1	Modem goes off-hook
Mn		Speaker control
	M0	Speaker always off
	M1 *	Speaker on until carrier present

Command	Options	Function & Description
	M2	Speaker always on
	M3	Speaker off during dialing and on until carrier present
Nn		Select negotiate handshake
	N0	When originating or answering, handshake only at the communication rate specified by S37 register and "ATBn" and no fallback
	N1 *	When originating or answering, start handshaking only at the communication standard specified by S37 register and "ATBn" During handshake, fallback to a lower speed may occur.
On		Go on-line
	O0	Return modem to a previously established state (return to data mode).
	O1	Begin an equalizer retrain sequence, then return to on-line state.
	O3	Force modem to a new rate defined by user New rates are defined in S62 register.
P		Enable pulse dialing
Qn		Result code display options
	Q0 *	Result code enabled
	Q1	Result code disabled
T		Enable tone dialing
Vn		Result code form
	V0	Display result code in numeric form (see also the result code options table)
	V1 *	Display result code in verbose (text) form
Wn		Select extended result code options
	W0	CONNECT result code reports DTE speed. Disable protocol result codes. (see also the "Result Code Options Table")
	W1	CONNECT result code reports DTE speed. Enable protocol result codes.
	W2 *	CONNECT result code reports DCE speed. Enable protocol result codes.
Xn		Select result codes/call progress options
	X0	Display CONNECT or "1" for all speeds. Ignore dial tone and busy tone detection.
	X1	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Ignore dial tone and busy tone detection.
	X2	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Check dial tone before proceeding dialing, ignore busy tone detection.
	X3	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Ignore dial tone before proceeding dialing, check busy tone after making dialing.
	X4 *	Display connect message and the modem's data rate, and an indication of the modem's error correction and data compression. Check dial tone and busy tone.
	X5	Same as X4.
	X6	Same as X4.
	X7	Display CONNECT or "1" for all speeds. Check dial tone and busy tone.
Zn		Recall stored profile

Command	Options	Function & Description
	Z0	Reset and recall user profile 0. Either Z0 or Z1 restores the same single profile.

* Manufacturer default

Extended AT& Command Set

Command	Options	Function & Description
&Cn		Data carrier detect option
	&C0	State of carrier from remote modem is ignored. DCD circuit is always on
	&C1 *	DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected.
&Dn		Data Terminal Ready (DTR) option.
	&D0	DTR ignored
	&D1	Go to command mode on on-to-off DTR transition
	&D2 *	Hang up and go to command mode on on-to-off DTR transition. Auto-answer is disabled if DTR is low
	&D3	Hang up and reset from user profile 0 on the on-to-off DTR transition
&F		Recall factory default setting as active configuration
&Gn		V.22bis guard tone option
	&G0 *	No guard tone
	&G1	550 Hz guard tone
	&G2	1800 Hz guard tone
&Kn		Set local flow control
	&K0	Disable flow control
	&K3 *	Enable bi-directional hardware flow control (CTS/RTS)
	&K4	Enable bi-directional software flow control (XON/XOFF)
&Pn		Pulse dialing make/break ratio selection
	&P0	Make=39%, Break=61%, international version (Default) Make=33%, Break=67% for use in 20 pps, Japanese version
	&P1	Make=33%, Break=67%, international version Make=33%, Break=67% for use in 10 pps, Japanese version (Default)
&Qn		Async communications mode options
	&Q0	Async mode, buffered (same as "AT\N0")
	&Q5 *	Error control mode, buffered (same as "AT\N3")
	&Q8	MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current setting in S36 register.
	&Q9	V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current setting in S36 register.
&Sn		Data Set Ready (DSR) option
	&S0 *	DSR always on
	&S1	DSR on during handshake and on-line, off in test mode or idle mode
&Tn		Self-test commands
	&T0	Terminate any test in progress
	&T1	Local analog loopback test
	&T3	Local digital loopback (LDL) test
	&T6	Remote digital loopback test
&V		View active file and stored phone numbers

Command	Options	Function & Description
&W		Store active configuration into the modem's NVRAM
&Zn=x		Store telephone number n=0 to 3 x=<string> see also the dial modifier in "ATDn" command The maximum number of digits per string is 40.

* Manufacturer default

Extended AT\ Command Set

Command	Options	Function & Description
\Jn		Constant DTE speed option
	\J0 *	DCE and DTE rates are independent
	\J1	Force the DTE interface speed to the DCE connection rate (line speed) after on-line
\Nn		Error control mode options
	\N0	Buffered mode, no error control (flow control is allowed).
	\N1	Direct mode, no error control (no flow control is allowed).
	\N2	MNP reliable mode. If MNP 2-4 error control establishment fails, the modem disconnects.
	\N3 *	V.42, MNP or buffer mode. The modem attempts to connect in V.42 mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode.
	\N4	V.42 or disconnect. The modem attempts to connect in V.42 mode. If this fails, the call will be disconnected.
\Qn		Local flow control options
	\Q0	Disable flow control (same as "AT&K0")
	\Q1	XON/XOFF software flow control (same as "AT&K4")
	\Q3 *	RTS/CTS hardware flow control (same as "AT&K3")
\Tn		Set inactive timer (for buffer mode only)
	n=0 *	Disable inactive timer
	n=1 - 255	Enable inactive timer. Length in minutes
\Vn		Protocol result codes
	\V0	Disable protocol result code appended to DCE speed
	\V1 *	Enable protocol result code appended to DCE speed

* Manufacturer default

Extended AT% Command Set

Command	Options	Function & Description
%B		View numbers in blacklist. If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in the countries that do not require blacklisting.
%Cn		Data compression control
	%C0	No data compression
	%C1 *	V.42bis/MNP 5 data compression enabled.

* Manufacturer default

Extended AT- Command Set

Command	Options	Function & Description
-Cn		Data calling tone options
	-C0 *	Disable data calling tone
	-C1	Enable data calling tone (the freq. is 1,300 Hz with a cadence of 0.5 sec. ON and 2 sec. OFF)

- Manufacturer default

5 Status Registers & Result Codes

Register	Dec.	Function & Description	Default
S0=	0 - 255	Set the number of the rings required before the modem automatically answers a call. Set "S0=0" to disable auto-answer mode.	000
S1=	0 - 255	Count the incoming rings and store the value to this register. The value of this register is incremented with each ring. If no rings occur over an 8 sec. interval, this register is cleared. User can read but should not change this value.	000
S2=	0 - 255	S2 holds the decimal value of the ASCII character used as the escape character. The default value (043) corresponds to an ASCII character "+". A value of 128 to 255 disables the escape process, i.e., no escape character will be recognized.	043
S3=	0 - 127	Hold the decimal value of the Carriage Return <CR> character used as the command line and result code terminator. Pertain to asynchronous operation only.	013
S4=	0 - 127	Hold the decimal value of the character recognized as a line feed. The line feed control character is output after the carriage return control character if verbose result code are used.	010
S5=	0 - 32, 127	Hold the decimal value of the character recognized as a backspace. The modem will not recognize the backspace character if this register is set to a value greater than 32.	008
S6=		Set the length of time, in seconds, that the modem must wait (minimum 2 seconds even if the value is less than 2) after going off-hook before dialing the first digit of the telephone number.	
	2 - 65	For international version.	002
	4 - 65	For Japanese version.	004
S7=		Set the time, in seconds, that the modem must wait before hanging up because carrier is not detected.	
	1 - 255	For international version.	050
	35 - 59	For Japanese version.	050
S8=	0 - 65	Set the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string.	002
S10=	1 - 255	Set the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier.	020
S11=	50 - 150	DTMF duration and inter digit delay. Set the duration and spacing, in mini-seconds, in DTMF touch tone dialing.	095
S12=	0 - 255	Define the maximum period, in 2-hundredths of a second, allowed between consecutive asynchronous escape character "+" (plus) for the escape sequence to be considered valid.	050
S28=	0 - 255	V.34 modulation en-/disabler. 0: disabled. 1- 255: enabled.	001
S30=	0 - 90	Inactivity timer. Set the length of time, in minutes, that the modem counts when there is no data flow in or out the DTE serial port. A connection is disengaged when the counter reaches the preset value. Set S30 =0 to disable the inactivity timer. For buffer mode only.	000
S36=		Negotiation fallback options.	007

Register	Dec.	Function & Description	Default
	0, 2	Hang up.	
	1, 3	Fall back to an async connection.	
	4, 6	Attempt MNP mode. If MNP fails, hang up.	
	5, 7	Attempt MNP mode. If MNP fails, fallback to async connection..	
S37=		Desired DCE speed (line speed).	000
	0	Maximum modem speed.	
	2	Attempt 1200/75 bps connection.	
	3	Attempt a 300 bps connection.	
	5	Attempt a 1200 bps connection.	
	6	Attempt a 2400 bps connection.	
	7	Attempt a 4800 bps connection.	
	8	Attempt a 7200 bps connection.	
	9	Attempt a 9600 bps connection.	
	10	Attempt a 12000 bps connection.	
	11	Attempt a 14400 bps connection.	
	12	Attempt a 16800 bps connection.	
	13	Attempt a 19200 bps connection.	
	14	Attempt a 21600 bps connection.	
	15	Attempt a 24000 bps connection.	
	16	Attempt a 26400 bps connection.	
	17	Attempt a 28800 bps connection.	
	18	Attempt a 31200 bps connection.	
	19	Attempt a 33600 bps connection.	
S38=		56K Dial Line Rate Options. Set to maximum downstream speed at which the modem attempts to connect.	001
	0	56K disabled.	
	1	56K enabled. Auto speed selection, max modem speed.	
	2	32000 bps	
	3	34000 bps	
	4	36000 bps	
	5	38000 bps	
	6	40000 bps	
	7	42000 bps	
	8	44000 bps	
	9	46000 bps	
	10	48000 bps	
	11	50000 bps	
	12	52000 bps	
	13	54000 bps	
	14	56000 bps	
S48=	7, 128	LAPM error control and feature negotiation. S48=7 Negotiation enabled S48=128 Negotiation disabled. Force immediate fallback options specified in S36 S36=0 or 2, and S48=7 LAPM or hang up S36=0 or 2 and S48= 128	

Register	Dec.	Function & Description	Default
		Don't use S36=1 or 3, and S48=7 LAPM or async S36=1 or 3, and S48=128 Async S36=4 or 6, and S48=7 LAPM, MNP or hang up S36=4 or 6, and S48=128 MNP or hang up S36=5 or 7, and S48=7 LAPM, MNP or async S36=5 or 7, and S48=128 MNP or hang up	
S89=	0, 5 - 60	Sleep mode control timer. Specify the number of seconds of inactivity (no character sent from DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of "0" prevents standby mode. If a number between 1 and 4 is entered for this register, it will set the value to 5.	030
S91=	6 - 15	Transmitting power level adjustment (Japanese version only) Range: -6 dBm to -15 dBm Default: -15 dBm	014

Result Code Options

Result Code Options Table

ATV0	ATV1	X0	X1	X2	X3	X4	X7
0	OK	✓	✓	✓	✓	✓	✓
1	CONNECT	✓	✓	✓	✓	✓	✓
2	RING	✓	✓	✓	✓	✓	✓
3	NO CARRIER	✓	✓	✓	✓	✓	✓
4	ERROR	✓	✓	✓	✓	✓	✓
5	CONNECT 1200 EC*		@	@	@	@	
6	NO DIAL TONE			✓		✓	✓
7	BUSY				✓	✓	✓
8	NO ANSWER	✓	✓	✓	✓	✓	✓
10	CONNECT 2400 EC *		@	@	@	@	
11	CONNECT 4800 EC *		@	@	@	@	
12	CONNECT 9600 EC *		@	@	@	@	
13	CONNECT 14400 EC *		#	#	#	#	
14	CONNECT 19200 EC *		@	@	@	@	
18	CONNECT 57600 EC *		%	%	%	%	
24	CONNECT 7200 EC *		#	#	#	#	
25	CONNECT 12000 EC *		#	#	#	#	
28	CONNECT 38400 EC *		%	%	%	%	
40	CONNECT 300 EC *		@	@	@	@	
55	CONNECT 21600 EC *		#	#	#	#	
56	CONNECT 24000 EC *		#	#	#	#	
57	CONNECT 26400 EC *		#	#	#	#	
58	CONNECT 28800 EC *		#	#	#	#	

ATV0	ATV1	X0	X1	X2	X3	X4	X7
59	CONNECT 31200 EC *		#	#	#	#	
60	CONNECT 33600 EC *		#	#	#	#	
70	CONNECT 32000 EC *		#	#	#	#	
71	CONNECT 34000 EC *		#	#	#	#	
72	CONNECT 36000 EC *		#	#	#	#	
73	CONNECT 38000 EC *		#	#	#	#	
74	CONNECT 40000 EC *		#	#	#	#	
75	CONNECT 42000 EC *		#	#	#	#	
76	CONNECT 44000 EC *		#	#	#	#	
77	CONNECT 46000 EC *		#	#	#	#	
78	CONNECT 48000 EC *		#	#	#	#	
79	CONNECT 50000 EC *		#	#	#	#	
80	CONNECT 52000 EC *		#	#	#	#	
81	CONNECT 54000 EC *		#	#	#	#	
82	CONNECT 56000 EC *		#	#	#	#	
86	CONNECT 16800 EC *		#	#	#	#	
87	CONNECT 115200 EC *		%	%	%	%	
88	DELAYED **						
89	BLACKLISTED **						
90	BLACKLIS FULL **						

@ DTE/DCE speed

DCE speed (line speed)

% DTE speed

* EC only appears when the Extended Result Code options are enabled.

** For Blacklisting function enabled countries only.

Extended Result Code Options Table

ATV0	ATV1	W0	W1	W2	W2\V0
5	CONNECT 1200	✓			✓
5	CONNECT 1200 EC*		✓	✓	
10	CONNECT 2400	✓			✓
10	CONNECT 2400 EC *		✓	✓	
11	CONNECT 4800	✓			✓
11	CONNECT 4800 EC *		✓	✓	
12	CONNECT 9600	✓			✓
12	CONNECT 9600 EC *		✓	✓	
13	CONNECT 14400				✓
13	CONNECT 14400 EC *			✓	
14	CONNECT 19200	✓			✓
14	CONNECT 19200 EC *		✓	✓	
18	CONNECT 57600	✓			
18	CONNECT 57600 EC *		✓		
24	CONNECT 7200				✓
24	CONNECT 7200 EC *			✓	
25	CONNECT 12000				✓
25	CONNECT 12000 EC *			✓	
28	CONNECT 38400	✓			✓
28	CONNECT 38400 EC *		✓	✓	

ATV0	ATV1	W0	W1	W2	W2\ V0
40	CONNECT 300	✓			✓
40	CONNECT 300 EC *		✓	✓	
55	CONNECT 21600				✓
55	CONNECT 21600 EC *			✓	
56	CONNECT 24000				✓
56	CONNECT 24000 EC *			✓	
57	CONNECT 26400				✓
57	CONNECT 26400 EC *			✓	
58	CONNECT 28800				✓
58	CONNECT 28800 EC *			✓	
59	CONNECT 31200				✓
59	CONNECT 31200 EC*			✓	
60	CONNECT 33600				✓
60	CONNECT 33600 EC *			✓	
70	CONNECT 32000				✓
70	CONNECT 32000 EC*			✓	
71	CONNECT 34000				✓
71	CONNECT 34000 EC*			✓	
72	CONNECT 36000				✓
72	CONNECT 36000 EC*			✓	
73	CONNECT 38000				✓
73	CONNECT 38000 EC*			✓	
74	CONNECT 40000				✓
74	CONNECT 40000 EC*			✓	
75	CONNECT 42000				✓
75	CONNECT 42000 EC*			✓	
76	CONNECT 44000				✓
76	CONNECT 44000 EC*			✓	
77	CONNECT 46000				✓
77	CONNECT 46000 EC*			✓	
78	CONNECT 48000				✓
78	CONNECT 48000 EC*			✓	
79	CONNECT 50000				✓
79	CONNECT 50000 EC*			✓	
80	CONNECT 52000				✓
80	CONNECT 52000 EC*			✓	
81	CONNECT 54000				✓
81	CONNECT 54000 EC*			✓	
82	CONNECT 56000				✓
82	CONNECT 56000 EC*			✓	
86	CONNECT 16800				✓
86	CONNECT 16800 EC *			✓	
87	CONNECT 115200	✓			
87	CONNECT 115200 EC *		✓		

* EC is replaced by one of the following symbols.

- V.42bis V.42 error control and V.42bis data compression
- V.42 V.42 error control only
- MNP5 MNP 4 error control and MNP 5 data compression
- MNP4 MNP 4 error control only

NoEC No error control and data control protocols