1. INTRODUCTION

This chapter offers an overview of the high speed PC Card FAX/MODEM. It includes:

General Description
Unpacking Information
Hardware Overview
What You Need To Use Your Modem

1.1 GENERAL DESCRIPTION

This PC Card Fax/Modem is a credit-card-size Type II PCMCIA card that complies with the PCMCIA 2.1 standards and works with computers that incorporate a compatible interface.

It is Bell, ITU-T (formerly CCITT) compliant and Hayes AT command compatible, allowing it to be used worldwide with today's popular communication software programs. You will be able to send and receive faxes to/from any Group 3 compatible fax machine. Using standard phone lines, the data communication functions of the modem will enable you to successfully hook up to the Internet, transmit E-mail, send and receive information and communicate with other PCs, Bulletin Board Services (BBS) or computer networks such as Compuserve.

1.2 UNPACKING INFORMATION

The PC Card fax/modem package includes following contents:

- User's Manual
- One Type II Fax/Modem PC Card.
- One detachable interface connector with RJ-11 cable and plug.
- FAX & Data Communication software package.
- One RJ-11 plug to phone jack converter.
- One INF file disk for Windows 95 and Windows NT 4.x.

1.3 HARDWARE OVERVIEW

The intelligent high speed Fax/Modem PC Card can be used as either a send/receive fax machine or a data modem. When connecting to another fax/modem, the Fax/Modem PC Card automatically negotiates to the fastest speed that other fax/modems can handle. The Fax/Modem PC Card is designed to work with most of the popular fax/modem 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. Or the users can use the AT commands to control the fax/modem manually.

1.4 WHAT YOU NEED TO USE YOUR MODEM

Following components are essential to run the Fax/Modem PC Card:

1. A computer with PCMCIA type II slot.
2. PCMCIA Socket Service and Card Service drivers. (These drivers are usually included with the computer. If not, ask your computer dealer for details.)
3. The Fax/Modem PC Card.
4. A telephone line with RJ-11 Jack.
5. Data and/or fax communication software, such as Telix, WinFax, etc..

2. INSTALLATION AND QUICK START

This chapter describes how to install your Fax/Modem PC Card and quick start in Windows 98, Windows 95, Windows 3.1, Windows for Workgroups and DOS environment. You can jump to the right section that your computer is running.

2.1 WORKING WITH WINDOWS 98

1. Turn on your computer.

2. Insert the Fax/Modem PC Card into the free PCMCIA slot, and make sure it is firmly seated.
3. Windows 98 will prompt **New Hardware Found** then **Add New Hardware Wizard** dialog box. Click **Next**.
4. Select "**Search for the best driver for your device (Recommended)",** and click **Next.**

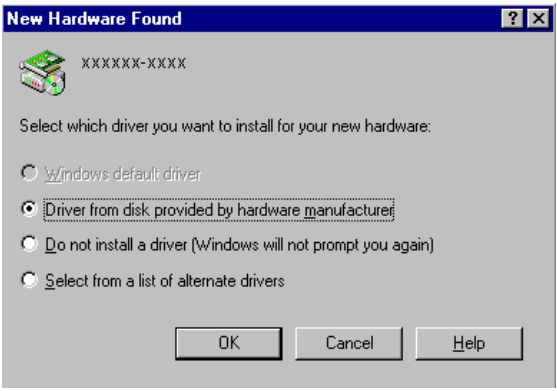
5. Insert Fax/Modem PC Card driver disk, select "**Floppy disk drives"**, and click **Next.**

6. Press **Finish** to complete the installation**.** Now the fax/modem is ready to go.

2.2 WORKING WITH WINDOWS 95

1. Turn on your computer.
2. Insert the Fax/Modem PC Card into the free PCMCIA slot, and make sure it is firmly seated.
3. Windows 95 will prompt **New Hardware Found** dialog box. Select ***Driver from disk provided by hardware manufacturer***, and click **OK**.
4. Enter the path ***A:***\, and insert Fax/Modem PC Card INF file disk. Windows 95 will install the modem driver autmatically.
5. Connect the FAX/MODEM interface cable and hook up the RJ-11 plug to the telephone line outlet.
6. Restart Windows 95, now your fax/ modem is ready to go.

☛ Note: Insert FAX/MODEM before running communication program.



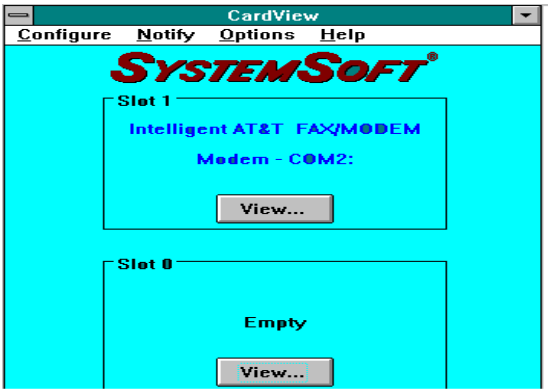
2.3 WORKING WITH WINDOWS 3.1 & WINDOWS FOR WORKGROUPS

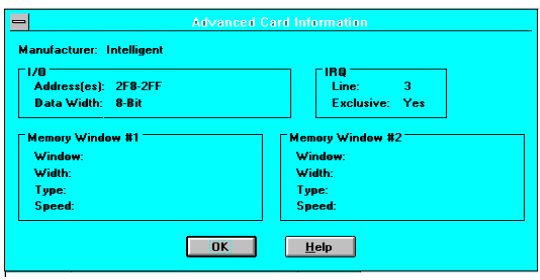
Before installation, make sure the PCMCIA Card Service and Socket Service drivers has been installed in your computer already, most of the notebook computers have those drivers by default. If not, ask your computer dealer to have one.

1. Turn on your computer.
2. Insert the Fax/Modem PC Card into the free PCMCIA slot, and make sure it is firmly seated.
3. You will hear the alert sound to inform you that the PC Card is recognized and configured.
4. Skip this step and step 5 if you don't meet any problems. Otherwise, run the PCMCIA utilities come with your computer, such as CardView (click ***View ...*** button), or run PhoenixCARD Manager to collect the COM port and IRQ information. Refer to following figures.
5. Enter the **Ports** properties in **Control Panel** to configure COM port and IRQ.
6. Install FAX/MODEM application program come with the fax/modem card.
7. Connect the FAX/MODEM interface cable and hook up the RJ-11 plug to the telephone line outlet. Now your fax/modem is

ready to go.

☛ Note: Insert FAX/MODEM before running communication program.





2.4 WORKING WITH DOS

Before installation, make sure the PCMCIA Card Service and Socket Service drivers has been installed in your computer already, most of the notebook computers have those drivers by default. If not, ask your computer dealer to have one.

1. Turn on computer.

2. Insert the Fax/Modem PC Card into the free PCMCIA slot, and make sure it is firmly seated.
3. You could hear the alerting sound to inform you that the PC Card is recognized and configured.
4. Skip this step and step 5, if you don't meet any problems. Otherwise, run, for example, ***cardinfo/v*** in the PCMCIA utility come with your computer -- usually reside in C:\CARDSOFT directory, to collect the COM port, IRQ information. For example,

SLOT 0 :
[Card Information]
Card Type : " Modem" (COM 2)
Manufacturer : "PC_CARD"
Product Name : " PCMCIA 56Kbps FAX+Modem"

[Configuration Information]
Configuring client handle is 9F20
Memory + I/O interface, Vcc 50, Vpp1 50, Vpp2 50
Config base 0100,
Config values:
Option value : 61
Status value : 08
I/O rang 2F8-2FF, 8-bit
Assigned IRQ is 3 (enabled)

SLOT 1 :
SLOT 1 is empty

Or run ***PCM*** PCMCIA utility come with your computer, usually in C:\PCMPLUS directory, you can get similar result to get the COM port, and IRQ information.

5. Run application program, such as Telix, Procom Plus, and set the appropriate COM port and IRQ which you just got from last step.
6. Connect the FAX/MODEM interface cable and hook the RJ-11 plug to the telephone line outlet.
7. Now you can make fax or modem connections with the application program.

☛ Note: Insert FAX/MODEM before running communication program.

Fax/Modem Enabler

MDMEN.EXE is the DOS enabler for the PCMCIA Fax/Modem. For the system without any Card Services, you can use the enabler in the bundled INF file disk to enable the Fax/Modem.

The enabler can be installed as DOS command or DOS driver. It means that you can load the enabler from the DOS prompt or put it in the AUTOEXEC.BAT or CONFIG.SYS to load the driver every time you start your computer.

MDMEN /COM=m /IRQ=nn /SLT=n

COM=m Specify the COM port value (m=1 - 4). Default is 2.

IRQ=nn Specify the interrupt request number in decimal. Default: value 4 for COM1 and COM3, value 3 for COM2 and COM4.

SLT=n Specify the slot number the Fax/Modem card plugged. Default: auto-detection.

Example: MODEMEN /COM=2 /IRQ=5 /SLT=1

Technical Notes for Enabler

1. Most communication software follows the following IRQ and I/O address settings:

COM Port	IRQ No.	I/O Address
COM 1	4	3F8
COM 2	3	2F8
COM 3	4	3E8
COM 4	3	2E8

2. If you are using Windows 3.x, you can change the IRQ under **CONTROL PANEL - PORTS - ADVANCED** dialog box. Once you change the COM port and IRQ under Windows, be sure that the settings match the parameters in the MDMEN.EXE command line.

2.5 WORKING WITH WINDOWS NT

1. Plug the Fax/Modem PC Card into the PCMCIA slot.
2. Run Windows NT 4.0.
3. Double click the ***Modem*** Icon in **Control Panel.**
4. In ***Install New Modem*** window, press **Next** button to detect the modem automatically.
5. Press **Change** button to change the modem type.
6. Press **Have Disk...** button.
7. Insert the INF file disk bundled with the fax/modem PC Card to the floppy drive.
8. Enter the path **A:** and press **OK** button.
9. Press **OK** to accept the modem type "***PCMCIA 56Kbps FAX + Modem".***
10. Press **Finish** button.

Now, the installation is completed and the Fax/Modem PC Card is ready to go.

3. AT COMMANDS AND S-REGISTERS

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in command mode. The format for entering AT commands is:

TYPE: **ATXn**

where **X** is the AT command, and **n** is the specific value for that command.

PRESS: **Enter**

Any command issued is acknowledged with a response in either text or numeric values known as result codes. The Result Code Options Tables in Appendix C list all the valid result codes.
All commands and command-values accepted by the modem, the **OK** message will be shown; any entries other than those show OK response cause the **ERROR** result code.

This chapter describes how to use the AT commands for the users who need special parameters in order to meet their applications. Refer to the appendix for the detailed AT command definition.

3.1 HOW TO USE AT COMMANDS

Usually, your fax and data communications software controls the modem for you. However, you may also want to use the AT commands. These commands give you complete control over your modem. Using the AT commands carefully every time, because they can cause your software to loose its ability to control the modem. When you do find any AT command causes fax/modem maul-function, turn the computer off and then on. That will reset most of the AT command settings to the factory defaults.

In order to use an AT command, you need to have done the following:

1. Run your communication software.
2. Configure the software for the appropriate COM port and IRQ setting if necessary.
3. Enter terminal mode (aka command mode, local mode, or direct mode.). This is usually the mode that communications software starts up. Then, type the AT command you need, then press **Enter** key. For example,

   ATH0<Enter> (Hang up the modem connection)
   AT&K3<Enter> (Enable bi-directional CTS/RTS hardware flow control)

Mostly the AT commands can also be entered in the same command line. For example,

AT&K3H0<Enter>

As shown above, it is not necessary to put spaces between the commands (there is no space between **AT**, **&K3**, and **H0)**.

The modem usually returns an response at the next line if it understands the command. The response is usually **OK** or **ERROR** unless the AT command has other extended messages.

Add **&W** at the end of the AT command string to save the changes to modem's memory (refer to &W commands for details), otherwise the changes will get lost when you restart or shut down the computer. You can also use **Zn** command to load the desired settings automatically when you power up the modem every time.

Type **AT&F&WZ** if you get lost in the AT command and want to go back to the factory default settings.

Use **AT&V** command to view the active settings.

3.2 EXCEPTION

Do not precede following commands with an **AT** prefix or conclude it by pressing **Enter**.

+++ Escape sequence
The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you may communicate directly to your modem using AT commands. Once you are finished, you may return to data mode using the ATO command.

A pause, the length which is set by the Escape Guard Time (S12), must be used after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data. The value of the escape sequence character may be changed using Register S2.

A/ Repeat Last Command
This command repeats the last command string entered.

3.3 S-REGISTERS

S-registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in command mode.

To display the value of an S-register:
TYPE: **ATSn?** where n is the register number.

PRESS: **Enter**

To modify the value of an S-register:

TYPE: **ATSn = r**

where n is the register number, and r is the new register value.

PRESS: **Enter**

4. PROBLEMS AND SOLUTIONS

This chapter provides a number of examples of **Problems (P:)**, **Causes (C:)**, and **Solutions (S:)**. If your modem is not functioning properly, look up the problem here, or ask your dealer to get the technical assistant.

P: The modem does not respond to AT commands.

C: The COM port that you set for the modem may be used by another card in the computer already.

S: Change the COM port for the Fax/Modem PC Card to another unused port. It might be better to set the COM port to COM3: or COM4:. Refer to Appendix B for choosing a new COM port. Even if you are not using the serial port which is set to the same COM port as the modem, it can still interfere with the modem. Be sure to update your software COM port setting as well.

C: The Interrupt that the modem is using may be the same as which another card is using.

S: Change the IRQ settings to a different unused one. Refer to Appendix B for choosing a new IRQ. Even if you are not using a serial port which is set to the same IRQ as the modem, it can still interfere with the modem. Be sure to update your software COM port setting as well.

P: The modem does not execute the command line.

C: Make sure you do type **AT** at the beginning of command line.

C: Make sure the modem is not in data mode. Type **+++** to escape to command mode if necessary.

C: Make sure your software is set to the same COM port as the

modem is.

P: The modem does not give a response after an AT command was executed.

C: The echo and/or responses may be turned off by the **ATE0Q1** commands. Use **AT&V** to check that.
S: Use **ATE1Q0** then press **Enter** to change them back.
C: Make sure the modem is in command mode instead of data mode when you type the AT command. Type **+++** to escape to command mode if necessary.

P: The modem gives an 'ERROR' response after an AT command was executed.

C: Make sure you did not type an invalid command.
C: Make sure your command line is 40 characters or less in length.

P: The modem goes off-hook and disables the telephone line.

C: The modem may be set to auto-answer the incoming calls.
S: Disable auto-answer by typing **ATS0=0** then press **Enter** at the command line to disable the auto-answer setting.

P: The modem does not auto-answer the phone.

C: Make sure the software do be configured to auto-answer the incoming calls.
S: Type **ATS0=n** then press **Enter** to set auto-answer mode. The **n** stands for the number of rings on which the modem will answer. For example,

ATS0=3

makes the modem answer on the third ring.

P: The software does not control the modem properly or can not detect the modem.

S: Make sure the software has been set up correctly. Check the initialization and dial strings.
C: Some TSRs (programs that stay in memory after they are loaded) may conflict with the communications software.

S: Try starting your computer without loading any TSRs.

P: The characters on the screen are doubled.

C: Both the modem and the software have the echo turned on.
S: Since only one needs the echo, turn off the echo feature of the software.

C: The remote modem is echoing your typed characters.
S: Type **ATE1** then press **Enter**. Then turn off the echo feature of the software.

P: No text appears on the screen when in data mode.

C: The remote modem is not echoing your typed characters.
S: Type **ATE0** then press **Enter**. Then turn on the echo feature of the software.
C: Your software may not be set to use full duplex or the remote modem may not be set to use full duplex either.
C: The remote modem may be waiting for you to type commands before it replies.

P: No text appears on the screen when in command mode.

S: If you can't see the characters you are typing, type **ATE1** then press **Enter**.

P: The modem does not dial the phone number after you execute the dialing AT command.

C: If you are using touch tone dialing for the phone line that requires rotary pulses dialing, it may not work. Try **ATDP######** instead of **ATDT#######**.

P: When your communications software drives the modem to make dialing, the PC Card does not take any action.

C: Make sure the **ATDT** dialing prefix is correctly set in the software you are using.
C: Make sure the software and modem are set to consistent COM port.
C: The modem may not hang up the last call.

S: Switch to command mode and type **ATH** then press **Enter**.

P: The modem can connect to some modems, but not others.

C: The remote modem may not support data compression or error correction. It might cause the modem to take a much longer time to negotiate a link.
S: You might try changing the way that the modem negotiates by using **AT&Qn**, **ATNn**, and **ATS37=n** commands. It might be better to start with **AT&Q0N1** .

P: When dialing another modem,, you receive a 'CONNECT' response, but nothing else.
C: The remote modem may be waiting for you to type a command.

P: The modem speaker does not make any sound when you're connecting to another modem.

C: The software may have the speaker disabled.
S: Change the setting in your software or use the **ATMn** command to turn the speaker on

P: The modem disconnects (looses the connection) in the middle of use.

C: The remote modem may have locked up.
C: The telephone line may have been disconnected. Check the telephone company.
C: Your software may have turned off the DTR signal to the modem.

P: The modem does not connect with another modem.

C: There may be a problem with the remote modem if you do not hear the high pitched tone from the remote modem.

P: Occasionally, the modem gives a burst of errors.

C: The telephone line may be noisy or bad.
S: Hang up the call and try calling again for getting a better telephone line.

C: If there are other telephones on the same line that your modem is using, someone may pick up a telephone on that extension.
C: Your telephone line may have the call waiting feature.
S: Try adding ***70** to your **ATDT** dialing command line, otherwise ask your telephone company how to disable it temporarily.

P: The modem gets errors in transmitted data randomly.

S: Try to use V.42 or MNP1-4 when possible.
S: Connect the modems at a slower baud rate.

P: After you download a file, it was not stored on your disk drive.

C: If both modems are using MNP or V.42 protocol, then the flow control may not be setup correctly.
S: Configure your software to use RTS/CTS flow control. That will cause your computer to pause long enough for the file to be stored to disk.

P: The text on the screen is not legible.

C: Your software settings may not match the settings on the remote modem's software.
S: Make sure your data bits, stop bits, and parity settings match the settings that the other computer is using. The two most common settings are: 8 data bits, NO parity, and 1 stop bit (8,N,1) or 7 data bits, EVEN parity, and 1 stop bit (7,E,1).
C: If the telephone line is very noisy, you may be seeing corrupted data on your screen.
C: Due to poor telephone line conditions, the modem may have fallen back to a slower communication speed. You may need to change the baud rate setting in your software to match this slower speed. To return the modem to the higher speed, disconnect and re-dial again.

P: When using V.42bis or MNP5, some features are disabled.

C: You may be using a non-streaming protocol, like Xmodem or Ymodem for file transfer. Those are fine unless you are using V.42bis or MNP5

S: When using V.42bis or MNP5, you should use a streaming file transfer protocol like Ymodem-G or Zmodem.
S: Configure your software to use hardware flow control (RTS/CTS ON).

P: When the modem is connecting to another modem, it reports a higher connect baud rate that it is really using.

C: The modem defaults to report the modem-to-computer baud rate (DTE speed) when it responds with **CONNECT** message.
S: Go into command mode and type **ATW2** then press **Enter**. This tells the modem to report the modem-to-modem baud rate (DCE speed or line speed) instead.

5. APPENDIX A: PRODUCT SPECIFICATIONS

Baud rates:
56,000/33,600/28,800/26,400/24,000/21,600/19,200/16,800/ 14,400/12,000/9600/ 7200/4800/2400/1200/300 bits per second.
Data: K56flex, V.34bis, V.34, V.32bis, V.32, V.22bis, V.22, and V.21, Bell 212A and Bell 103
Fax: V.17, V.29, V.27ter, and V.21 channel 2
Group 3 send and receive facsimile
Error correction: V.42 and MNP 2-4
Data Compression: V.42bis and MNP 5
Communication software compatible commands:
Hayes compatible enhanced "AT" command set
Fax Service Class 1 commands
Built-in DTE interface:
DTE speed up to 115,200 bps
16C550 UART interface
NVRAM directory stored profiles
Flow control (XON/XOFF, RTS/CTS)
Speed buffering
Automatic format/speed sensing
Diagnostics:
Remote digital loop and remote digital loop self test
Analog loop and analog loop self test
Digital loop test

Power-on self test
Auto retrain
Low power: Max. 930 mW

6. APPENDIX B: SELECTING HARDWARE SETTINGS

When installing a card in an IBM PC compatible computer, it is important to choose settings for the PC Card which do not conflict with any other cards in the computer. Following lists are some of the settings that other cards in your computer may already be using. Your goal will be to choose an Interrupt (IRQ) and a COMx: port for your modem, that does not interfere with any other devices in your computer. When you have selected the Port and Interrupt you want to use, follow the instructions in Chapter 2 for help when using the CONFIG.SYS settings. After you finish with this, remember to update your communications software to the same settings.

6.1 COM ports

Port	I/O	What cards/ports may be using it
COM1:	3F8h	The computer may already have an internal COM1: serial port.
COM2:	2F8h	The computer may already have an internal COM2: serial port.
COM3:	3E8h	The computer may already have an internal COM3: serial port.
COM4:	2E8h	The computer may already have an internal COM4: serial port.

6.2 Interrupts

IRQ	What cards/ports may be using it
0	The computer's timer (not a possible choice)
1	The Keyboard (not a possible choice)

2	If you have a PC XT: 8-bit network card, VGA card, handy scanner, bus mouse, MIDI card or a sound card. If you have a PC AT computer controller
3	Computer's COM2:, COM4:, COM6:, COM8:, network card, SCSI hard drive controller, handy scanner, bus mouse, or sound card.
4	Computer's COM1:, COM3:, COM5:, COM7:, network card, handy scanner, bus mouse, or sound card.
5	Computer's LPT2:, network card, MFM hard drive controller, MIDI card, VGA, SCSI hard drive controller, handy scanner, bus mouse, or sound card.
6	Floppy disk drive controller, network card, or sound card. (not a possible choice)
7	Computer's LPT1:, network card, handy scanner, MIDI card, or sound card.
8	Computer's clock. (only on a PC AT, not a possible choice)
9	VGA or network card. (similar to IRQ2)
10	Network card.
11	Network card.(not a possible choice)
12	Network card or bus mouse. (not a possible choice)
13	Computer's co-processor. (not a possible choice)
14	Hard drive controller or network card. (not a possible choice)
15	Second hard drive controller or network card.(not a possible choice)

7. APPENDIX C: AT COMMAND QUICK REFERENCE

7.1 Modem AT Commands

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
	B16	Select Bell 103 for 300 bps connection
Dn		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
	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 a retrain sequence, then return to on-line state.
	O3	Issue a rate re-negotiation, then return to on-line state.
P		Enable pulse dialing (Disabled in CTR 21 approved models)
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
	Z0	Reset and recall user profile 0. Either Z0 or Z1 restores the same single profile.

* Manufacturer default

Extended "AT&" (Ampersand) 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, in normal mode
&V		View active file and stored phone numbers
&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 max. number of digits per string is 40.

* Manufacturer default

Extended "AT\" (Back Slash) 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%” (Percent) 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-” (Dash) 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 cadance of 0.5 sec. ON and 2 sec. OFF)

* Manufacturer default

7.2 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 *		#	#	#	#	
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 *		✓	✓	
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

8. APPENDIX D: S-REGISTERS QUICK REFERENCE

S-Registers, "ATSn=x"

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	000

		no rings occur over an 8 sec. interval, this register is cleared. User can read but should not change this value	
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 tine dialing	095
S12=	0 - 255	Define the maximum period, in 2-hundredths of a second, allowed	050

		between consecutive asynchronous escape character "+" (plus) for the escape sequence to be considered valid	
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
	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 to a 300 bps connection	
	5	Attempt to a 1200 bps connection	
	6	Attempt to a 2400 bps connection	
	7	Attempt to a 4800 bps connection	
	8	Attempt to a 7200 bps connection	
	9	Attempt to a 9600 bps connection	
	10	Attempt to a 12000 bps connection	
	11	Attempt to a 14400 bps connection	
	12	Attempt to a 16800 bps connection	
	13	Attempt to a 19200 bps connection	
	14	Attempt to a 21600 bps connection	
	15	Attempt to a 24000 bps connection	
	16	Attempt to a 26400 bps connection	
	17	Attempt to a 28800 bps connection	
	18	Attempt to a 31200 bps connection	
	19	Attempt to a 33600 bps connection	
S38=		56K Dial Line Rate Options. Set the max. 56K downstream speed that 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 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)	014

		Range: -6 dBm to -15 dBm Default: -15 dBm	