Chapter 1

Unpacking and Installation

This chapter describes unpacking and installing your modem.

1.1   Feature

FDSP (Full –duplex speakerphone)

- Acoustic and line echo cancellation

- Microphone gain & muting

- Speaker volume control and muting

Data modem throughput up to 115.2K bps

- V.90   56000,53333,51200,50667,49333,48000,46667,45333,44000,
          42667,41333,40000,38667,37333,36000,34667,33333,32000,
          30667,29333,28000 bps

- K56flex   56000,54000,52000,48000,46000,44000,42000,40000,38000,
          34000,32000 bps

- V.34   33600,31200,28800,26400,24000,21600,19200,16800,14400,
          12000,9600,7200,4800,2400 bps

- V.32bis   14400,12000,9600,7200,4800 bps

- V32   9600,4800 bps

- V.23   1200/75 bps

          (originating mode transmit at 75 bps and receive at 1200 bps;

          answering mode transmit at 1200 bps and receive at 75 bps)

-V.22bis   2400,1200 bps

-V.22   1200 bps

-V.21   300 bps

- Bell 212A 1200 bps

- Bell 103   300 bps

- automatic modulation negotiation using ITU-T V.8bis/V.8/V.32
  Annex A.

Fax modem send and receive rates up to 14400 bps

- ITU-T G3 FAX Modulation

- CLASS 1 & CLASS 2 Command

- ITU-T T.30

- ITU-T V.17	14400 to 9600 bps
- ITU-T V.29	9600 to 4800 bps
- ITU-T V.27ter	4800 to 2400 bps
- ITU-T V.21 Channel2	300 bps

Error Correction & Data Compression

- MNP2 – 4 (ALT)
- MNP5 (ALT/CLASS5)
- V42 (LAPM)
- V42bis (BTLZ)

Voice/audio mode

- Voice transmit mode : PCM or ADPCM
- Enhanced ADPCM compression/decompression
- Tone detection/generation and call discrimination
- Concurrent DTMF detection
- 8-bit monophonic audio data encoding at 11.025K HZ or 7.2K HZ

NVRAM directory and stored profiles

- NVRAM SIZE:	256byte
- NO OF SCP:	2
- NO OF TEL SET:	4
- Length of each set:	31byte
- Total length:	124byte

Package

- R6764-61	100-Pin PQFP	(Rockwell)
- L2800	80-Pin PQFP	(Rockwell)

H/W SPEC.

- Freq.	: 28.224 MHz	
- Working Currency	: 350mA (max)	
- Working Voltage	: DC +5V	: +5.50V ~ +4.50V
	: DC+12V	: +15V ~ 9V
- Working Temperature	: 0 – 55 ℃	
- Ring Spec.	: Fq=15Hz ~ 71Hz, V=35Vrms (above)	

| - Tone Spec. | : HGF=-4, LGF=-6, $\pm$2db |
| - Pulse Spec. | : M.B.R=39 $\pm$2 , P.P.S=10 $\pm$0.5 |
| - PCB Size | : 96mm X 90mm |

EMC & PTT Support: FCC Part15 / FCC Part68 / CE

1.2   Unpacking the Modem

The complete modem package should include:

1) The modem unit.
2) This user manual.
3) An RJ-11 to RJ-11 phone cable.
4) Data and fax communications software (Optional).
5) Windows 95/98 Driver

Carefully inspect the package for shipping damage. If damage is found, repack the modem in the original packing material and contact your dealer.

1.3   A Look at the Modem Card
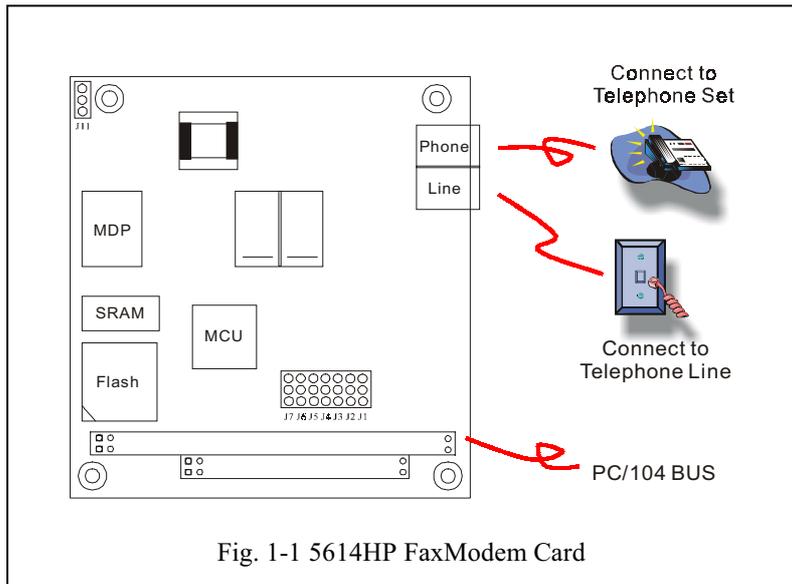
Fig. 1-1 5614HP FaxModem Card

Phone: Accepts a Telephone set Connected Parallel to your Modem.

Line: Accepts the RJ-11 Cable that links your Modem to a Telephone line or to a 2-Wire Leased-Line.

PC/104: The PC/104 connectors give you the flexibility to attach PC/104 modules.

1.4 The Serial Port and Interrupt of the Modem Card

Each peripheral device, such as a modem, uses a port that is either serial or parallel, depending on its design. Each port can only accept one device; otherwise, there is a conflict.

Your modem is designed for use with serial ports. You can use any COM port, COM1 to COM4. Some computers, may support only two serial ports. See your computer manual for the number of ports on your computer.

Computers use interrupts (IRQ) to control the data flow between computers and peripherals. An interrupt signals data to flow or to stop, much like a traffic light controls the flow of traffic. Each serial port needs an interrupt to control that particular port.

1.5 Setting the COM Port and Interrupt of the Modem Card

Your modem is factory set for use on COM4 with IRQ3. If you choose to use it with another serial port or interrupt, you need to change the COM jumper and IRQ jumper. Make sure the port and interrupt set-up you use are not used by any other peripheral.

The COM/IRQ settings should appear as in the diagram below. If you have any questions about setting a port for your modem consult your dealer.

IRQ Jump \ Pin	1-2	2-3
J3	IRQ3	IRQ4
J4	IRQ5	IRQ7
J5	IRQ9	IRQ10
J6	IRQ11	IRQ12
J7	IRQ15	

IRQ Jump \ COM Port	J1	J2
COM1	1-2	1-2
COM2	2-3	1-2
COM3	1-2	2-3
COM4	2-3	2-3

Fig 1-2 Modem Card COM/IRQ Setting

1.6 Installing the Modem Card

The modem card is designed for reliability, but it should be kept away from static electricity, shock, heat, and humidity.
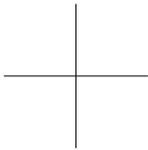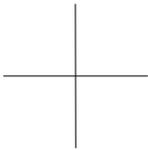
Install the modem into your computer as follows.

1) Turn off the computer

2) Remove the cover of your computer and locate the 5614HP expansion slot. Refer to your computer installation guide.

3) Plug in your 5614HP modem to the expansion slot, and make sure the connectors of the modem card are exactly aligned with the expansion slot.

4) Secure the modem card to the computer with screw.

5) Connect the telephone line from the wall outlet to the jack labeled LINE.

6) Connect the line from your telephone to the jack labeled PHONE. You may leave the PHONE jack unconnected.

> *CAUTION:*
> Handle the card only by its edges. The card precision components are easily damaged by static electricity or abuse.
> The metal bracket of the modem card should rest firmly on the rear panel bracket of the computer. If not, remove the modem card and try again.

1.7   Testing the Telephone Line Prior to Connection

The quality of the telephone line significantly affects the reliability and quality of data communications. Make sure that both the telephone system and telephone line are in good order before the modem is connected.

Test the line by lifting the telephone handset and listening for a clear dial tone. Try placing a few calls. If the calls do not go through well or are not loud and clear, you may have a poor quality telephone line. In this case, find a better quality line for your modem to ensure reliable data communications.

We strongly recommend that you connect the modem directly to an outside telephone line. Do not connect your modem to a Private Branch Exchange (PBX) telephone system unless the system is proven to perform well under data transmission conditions.
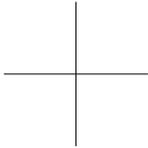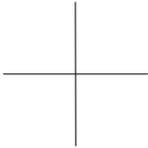
1.8   The Communications Software Configuration

Your modem follows the standard modem command set. Most of the popular communications software packages work with your modem. If you have any problem using the software, please contact your software dealer, publisher, or modem dealer.

To install the software, turn on your computer and modem, and boot the communications software. Follow the software manual instructions to execute software installation.

Software configuration procedures vary with each software program, computer, and application. Refer to your software manual for more information. If you experience any difficulty, consult your dealer.

When installing the software, pay particular attention to the following parameter settings, as many beginners fail to successfully set them correctly.

1) The serial port number.
2) The communications protocol.
3) The data format, including data bit, stop bit, and parity.

The serial port specified in your communications software must match the serial port to which the modem is actually connected. No matter whether it is COM1, COM2, COM3, or COM4, a port can be only be connected to one peripheral device, and should be specified so. Otherwise, the two devices will conflict with one another, or your computer will not be able to find the proper COM port or other device.

To communicate successfully, the protocol and data format of the two modems on-line must be identical. For example, if the bulletin board you are going to dial supports Bell standard, 8 data bits, no parity, 1 stop bit, you should specify this set-up exactly. Otherwise, the connection will be unsuccessful and any data received will be unreadable (garbled).

1.9   Software Configuration Tips

For most PC data communication applications using up-to-date communic-ation software, the factory default settings are sufficient. However, you may have to reconfigure your modem if this is not the case.

Almost all compatible software applications use a similar dialing prefix command summary. If required, you can use the command summary to overwrite modem parameters.

Most popular communication software packages allow users to specify a command string and the dialing prefix that is sent to the modem prior to dialing telephone number digits. The dialing prefix reconfigures the modem
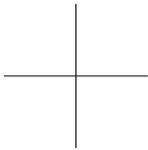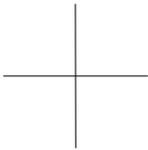
according to your commands.

Below are some examples of a dialing prefix string:

ATS0=3	Instructs the modem to auto-answer an incoming call on the third ring.
ATX4DT9W	Instructs the modem to first tone-dial the number 9 and hold it until a dial tone is detected.
ATS6=10DP	Instructs the modem to wait for 10 seconds before proceeding to dial.
ATM2L3DT	Turns on the modem monitoring speaker at all times, and uses high volume.
ATB0DT	Uses the CCITT protocol to establish connection with the remote modem.
AT&P1DP	Pulse dials with the make/break ratio of 33/67 (for use in most European countries).
AT&P0DP	Pulse dials with the make/break ratio of 39/61 (for use in the USA).

You may use any command or combination you need. Refer to the chapters in this manual regarding modem commands for more details.

1.10 Getting Started

Now, you can dial a bulletin board, data base, or remote computer. Your modem establishes the connection automatically. Once there is a connection, you can,

1) read or send electronic mail,
2) view up-to-date news or information,
3) upload or download computer programs,
4) transmit or receive a text message or spread sheet data, or, perform whichever on-line data communication tasks you require.

Note that the remote modem should be set to accept digital loopback request by issuing AT&T4.
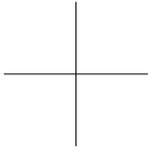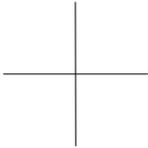
Chapter 2

Modem Fundamentals

This chapter provides a brief overview of how modems work.

2.1   Modem Basics

Modems let computers communicate with other computers using normal telephone lines or leased lines. Your modem sends communications by modulating (converting) data into sound waves that a telephone can transmit and another modem can receive. Your modem receives communications by demodulating sound waves from the telephone into data your computer can recognize. The term modem is an abbreviated way of describing this modulation/demodulation process.

In addition to converting data to sound, a modem performs functions such as dialing, answering calls, and adjusting settings for local telephone condi-tions. Commands must be issued to the modem to control these functions and settings.

2.2   Data Format

In asynchronous serial communications, data bytes are disassembled into individual bits and then transmitted bit by bit along with interval bits and checksum bits, in the order of start bit, data bits, parity, stop bits, and so on.

The interval bits, start bit, and stop bit, signal to the receiving party the beginning and end of a byte. The checksum bit and parity allow the receiving party to check the accuracy of the received data.

The pattern in which a byte is disassembled is called the data format. Modems at both ends of a link should use the same data format. Otherwise, the data may be misinterpreted and appear garbled.

The most commonly used data formats include the following types. Before you dial a bulletin board or connect on-line with any remote modem, make sure your modem supports the required data format, your software can specify the required data format, and that you have specified the correct data format.

Start Bit	Data Bits	Parity	Stop Bit	Total
1	8	none	1	10
1	7	none	2	10
1	7	even, odd	1	10
1	7	mark, space	1	10

2.3   Communications Protocol

Two popular groups of communications protocol are currently used in data communications throughout the world, the Bell standard and the CCITT recommendation. For 1200bps protocols, the Bell standard is used mainly in the United States and Canada, while the CCITT standard is used in most other countries. For 2400bps and faster protocols, the CCITT standards are used internationally. The following table shows common communications protocols listed from the highest to the lowest DCE speed.

DCE Speed	Bell	CCITT	Synchronous
56000bps	N/A	V.90	async
33600bps	N/A	V.34+	async
28800bps	N/A	V.34	async
14400bps	N/A	V.32bis (TCM)	async
9600bps	N/A	V.32 (QAM & TCM)	async
2400bps	N/A	V.22bis	async
1200/75bps	N/A	V.23 Main (host)	async
75/1200bps	N/A	V.23 Back (user)	async
1200bps	212A	V.22	async
0-300bps	103	V.21	async

Data communications requires that both modems on a link use the same protocol. The protocol determines the communications speed and transmission standard (Bell or CCITT). To change protocols, you can issue a B command and the modem automatically goes to the highest speed of that protocol. If you want to specify a particular protocol speed, issue a %B command.
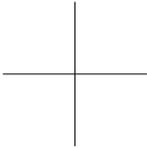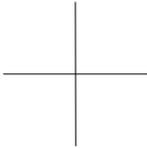
2.4   Speeds of the Modem

During an on-line communications path, your modem is located between the local computer and remote modem. It has to communicate with both the remote modem and local computer, through the telephone line and serial port cable, respectively. Figure 1-1 describes the DCE speed relationship between modems.

The speed over the telephone line at which your modem communicates with the remote modem is called the on-line speed. Since the modem is Data Communications Equipment, the communications speed is called the DCE speed.

On the other hand, the speed over the serial port at which your modem communicates with the local computer is called the serial port speed. Since the computer is Data Terminal Equipment, it is called the DTE speed.

2.5   On-Line Speed (DCE Speed)

Your modem supports one or more communication protocols, depending on its modem type. When your modem answers a call and establishes a connection, it adjusts its speed according to that of the calling modem. As a result, the speed at which the calling modem dials becomes the on-line speed.

2.6   Serial Port Speed (DTE Speed)

Each time the modem receives a command string from the computer, the AT prefix instructs the modem of the serial port speed. This speed remains as the active serial port speed, (i.e., the active speed DTE speed).

For example, if your modem is set at 2400bps and the remote modem is calling at 1200bps, the connection is established at 1200bps. Your modem sends the response code CONNECT 1200" at 2400bps to the local computer and then adjusts its DTE speed to 1200bps. Your modem will no longer recognize characters received from the local computer at 2400bps. If you are writing communications software, be sure to have the local computer determine the speed from the response code and adjust its serial port speed accordingly.

In normal applications, the baud rate adjustment capability of your modem should be enabled so that the DTE speed shall always follow the DCE speed. you can issue the \J command to turn the serial port adjustment on or off.

However, in a reliable link or a direct link the baud rate adjustment capability may be disabled, so that the serial port speed may be different to the on-line speed. If data comes in faster than it goes out, the faster incoming data is
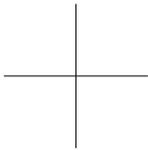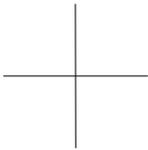
stored in the data buffer.

Therefore, when flow control capability is enabled, it is advisable that the on-line (DCE) speed be at a rate equal to or higher than the serial (DTE) port speed. Otherwise, data may be lost after the buffer is full.

2.7   Error-Correction and Data Compression (ECDC)

Many modems support error-correction and data compression (ECDC) protocols. Error-correction assures error-free data transmission because the modem re-transmits the incorrect block of data once a transmission error is detected. Data compression can increase data throughput which results in savings of transmission time and telephone bill costs. Common ECDC protocols include CCITT V.42, V.42bis, and MNP 2-5.

The CCITT V.42 recommendation offers an error-correction protocol referred to as LAPM (Link Access Procedure for Modems), which is the modem protocol for point-to-point communications.

The CCITT V.42bis provides both error-correction and data compression features. In addition to its compatibility to V.42 in error-correction, V.42bis offers a 4:1 data compression rate so that data can be transferred up to 4 times faster than a non-MNP modem. For example, a 14,400bps modem can reach a data throughput of 57,600bps when the compression rate is 4:1 on a V.42bis ECDC link. However, the true compression rate depends on the pattern of the transmission file.

As an alternative to CCITT recommendations, MNP Class 2 to 4 offers error-correction capability, while MNP Class 5 offers a 2:1 data compression. The MNP protocol was popular before CCITT ECDC protocols were released and there are still some modems using this protocol.

Note that V.42/V.42bis and MNP are different both in format and operation. Two modems must support the same ECDC protocol in order to connect in ECDC mode. For example, a V.42bis modem connects in V.42bis mode only when the remote modem also supports the V.42bis protocol. For example, if your modem supports all three ECDC protocols, but the remote modem only supports MNP5, the connection can only be established in MNP5 mode.

You should use the V.42bis recommendations as long as the on-line modem at the remote end supports the same. This way, you can achieve higher data throughput. To select the ECDC mode, use the command \N.

2.8   Flow Control

While on-line, your modem is between your computer and the remote modem (or the remote computer, if you consider the remote modem as a transparent
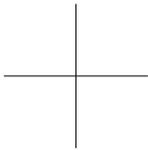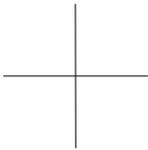
device). Your modem communicates with your computer (the local computer) through RS-232 serial port interface, and communicates with the remote modem via telephone line.

If data comes to your modem faster than it goes out, some data may be lost because your modem can not pass on all the received data to the other end. To overcome this problem, your modem is equipped with a data buffer to store excess data received. Once the buffer is full, your modem must signal the sending device to stop transmission. When the buffer is clear, your modem signals to resume data transmission. This is called flow control.

Two kinds of flow control methods are commonly used, the hardware flow control and the software flow control. Hardware flow control is also called RTS/CTS control, as it uses the RS-232 hardware signals (RTS and CTS) to stop or resume data transmission. This is the best method of flow control because you can send any data characters using this method.

The software flow control uses two data characters (XON and XOFF) to indicate when the sending device shall stop or resume. Since it uses data characters as control, you can not send binary data or file-transfer protocols such as XMODEM with this type of flow control. To select a method for flow control, use command \Q. You should use hardware flow control at all times, if your modem supports it.

2.9   Non-Volatile Memory (NVRAM)

The NVRAM is a special type of read-write memory element which can retain data even when the power is turned off. Your modem NVRAM retains configuration profiles and telephone numbers.

The NVRAM does not require a back up battery so that you can eliminate the threat of data loss due to a dead battery, as well as avoid hardware damage due to electrolyte leakage.

2.10 Factory Default Profile (FDP)

The FDP is the default configuration profile stored in your modem read-only memory (ROM), which can not be modified by the user. The FDP is intended for rescuing the modem in case the user misconfigures the modem settings.

To display the FDP, use command &F to place the profile into the active configuration area (ACA), then issue AT&V. Note that some modems may have more than one built-in FDP; in which case, each FDP serves as the default for a particular application requirement.

2.11 Stored Configuration Profile (SCP)
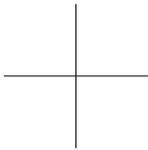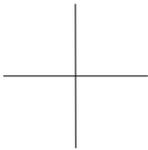
The SCP is the configuration profile stored in the NVRAM of the modem to be retrieved for later use.

Initially the factory sets the SCPs identically to the FDPs. To view all the SCP configurations, issue command &V. note that once an SCP is selected and loaded into ACA, it becomes the major SCP and provides the control characteristics of the modem.

If you hav edited the ACA and wish to write it to an SCP, issue a &W command. The modified configuration profile overwrites the original SCP and becomes the new SCP.

For information on the SCPs of your particular modem, refer to your Getting Started manual.

2.12 Major Stored Configuration Profile (Major SCP)

The major SCP is the SCP that is loaded into the ACA each time the modem is turned on or reset by ATZ. To designate an SCP as the major SCP, issue &Y followed by the SCP number. For example, issuing &Y1 designates SCP1 as the major SCP.

2.13 Active Configuration Area (ACA)

The ACA is a portion of the random-access-memory (RAM) in your modem that holds the configuration settings that determine the modem current operating characteristics.

When the modem is turned on or reset by command ATZ, the ACA is first loaded with the FDP, and then is overwritten by the major SCP. The commands you issue to the modem actually change the contents of the ACA. However, once the modem is turned off, all the settings in the ACA vanish.

To save the current ACA configuration to a SCP for further use, issue command &W followed with the number of the SCP. For example, issue &W1 saves the current configuration to SCP1.

The next time you want to use the same configuration, just issue AT&1 to load the ACA with the SCP1 previously saved.

Issuing &V0 command displays the current configuration profile, the stored configuration profiles, as well as the current speed, data format, parity and protocol.
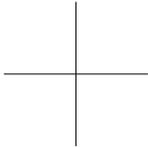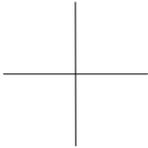
2.14 Stored Telephone Numbers (STN)

The STN are the digits retained in the modem NVRAM and used for speed dialing. You may use it to save frequently used telephone numbers, passwords, or credit card numbers.

To store a telephone number as an STN, use &Z followed by the STN number, the"=" sign, and the telephone number. For example, &Z2=886-2-2782-0305 stores 886-2-2782-0305 as STN2.

Note that only digits can be stored in STN. Other characters or symbols are discarded.

To view the STN, issue command &V1. To dial an STN, issue S=n, where n denotes the nth STN. For the example above, issuing ATDS=2 instructs the modem to dial 886-2-27820305.
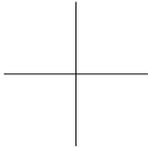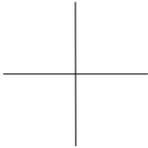
Modem Operation and Response Codes

This chapter describes modem states, commands and response codes and explains how to issue commands to the modem.

3.1   Command State and Data State

During operation, your modem is either in command state or data state. The figure below shows the relationships between the two states and how to enter and abort from each of them.

In command state, the modem interprets all the characters it receives as commands. The command state may either be on-line or off-line. When the modem is holding a connection with a remote modem or when it is in an analog loopback test, it is on-line. Otherwise, it is off-line.

In data state, the modem is a transparent receiving and sending device. It assumes everything it receives (except the escape sequence) as data and conveys them to the local computer or remote system.

3.2   The Escape Sequence (+++)

The escape sequence instructs the modem to leave (escape) the data state and enter the command state, without breaking the connection. It is the only data string that is interpreted as a command when the modem is in data state.

After switching to command state, the user can issue further commands, such as changing parameter settings, etc. To resume data state, simply issue ATO.

The escape command in default is three consecutive "+" characters. For the modem to distinguish the escape command from the data, a certain duration of guard time is defined to exist both prior to and after the three consecutive escape characters. The escape sequence includes a guard time, three consecutive escape characters, and a guard time, in that order.

The default guard time is 1 second. It can be changed by assigning a different value to register S12.

In the same manner, you may change the escape character to a different one by assigning the ASCII value (in decimal) of the new escape character to register S2.
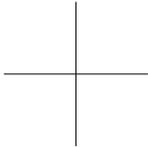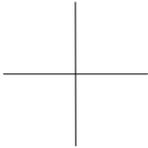
3.3 Issuing Commands

When the modem is in command state, you can issue commands to the modem by typing them on the keyboard. A command line shall always begin with AT (or at), followed by the command or commands, and completed with a return key. The only exception is A/, which does not require the AT prefix and a return key.

Some commands, such as M1, M2 or M3, require a parameter after the command letter. If the parameter is missing, the modem treats the command as having a parameter of 0. For example, M would be recognized as M0.

When multiple commands are issued in a command line, you can insert spaces between commands to make the command line easier to read.

3.4 Command Buffer

The command buffer has a capacity of 40 characters. All the commands you type on the keyboard are stored in the command buffer before the return key is pressed. However, the AT or at, the carriage return, the optional line feed characters, and the spaces in the command line are not stored in the command buffer.

The command line stored in the command buffer is not executed until you have pressed the return key. If the command buffer overflows, the modem sends the ERROR response code upon receiving the carriage return character, and all the commands in the command buffer are ignored.

3.5 Deleting Commands

If you make a mistake while typing a command line, you can press the backspace key to delete the last character you have entered. However, the backspace key does not delete the AT prefix.

To delete the entire command line, press the backspace key until every command character (except AT) is deleted. Then, press the return key.

You may change the backspace character to another ASCII character by assigning a new value to register S5. For example, ATS5=27 designates ESC as the backspace character.

3.6 Modem AT Response Codes

Unless you have instructed the modem not to send response codes by issuing command Q1, it will always send a response code after executing a command line. The response code can be displayed in word or in digit form depending on the V command issued.
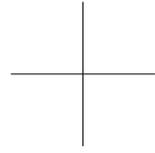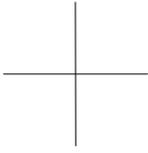
Command X0 to X4 lets you select different response sets of the modem, which enables or disables certain response codes. In general application, you can select X4, the default, which enables all response codes so that the most specific response message can be displayed. If you plan to write your own software for special applications, you may select the response set you require by issuing an appropriate X command.

The following table shows the response codes from 0 to 8 related to each command. The means the response code is disabled for the corresponding command. The remaining response codes are enabled.
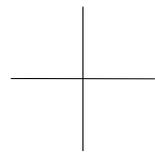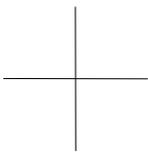
AT Commands

This chapter describes the basic modem commands in alphabetical order. Some commands have factory default settings, for which you can refer to your Getting Started manual Command Summary table.

4.1 Prefix, Repeat and Escape Commands

AT Attention. Precede all command lines except A/ and +++
A/ Re-execute the last command in command buffer
+++ Escape characters, requires guard time before and after

4.2 Dial Commands and Dial Modifiers

D	Originate a call	**L**	Re-Dial the last valid telephone number
S=n	Dial the nth stored number		
T	Touch tone dialing	**,**	Pause
P	Pulse dialing	**!**	Flash
R	Dial in answer mode	**;**	Return to command state
W	Wait for second dial tone		

4.3 Operation Commands

A	Answer incoming call	**N0**	Fixed data rate follow *N command
B0	CCITT or ITU-T compatibility	**N1**	**Enable adaptive data rate**
B1	Bell protocol only	**O0**	**Return to data-link without retrain**
E0	Disable command echo	**O1**	Return to data-link with retrain
E1	**Enable echo command characters**	**Q0**	**Modem sends response codes**
H0	Hang up the connection (on-hook)	**Q1**	Do not send response codes
H1	Go off-hook to make a call	**Sr?**	Display the value in register r
		Sr=n	Set register r to a value n
I0	Reports product code	**V0**	Display response codes in digit form
I1	Calculates the ROM checksum		
I3	Reports firmware version	**V1**	**Display response codes in words**
L0	Low volume	**W0**	Disable V.42 response codes, display DTE speed
L1	Low volume		
L2	**Medium volume**	**W1**	**Enable V.42 response codes, display DCE speed**
L3	High volume		
M0	Speaker off at all times	**W2**	Disable V.42 response codes, display DCE speed
M1	**Speaker on until CD detected**		
M2	Speaker always on		

X0	Enable basic response codes 0-4
X1	Do not detect dial tone and busy signal
X2	Include dial tone detection response
X3	Include busy detection response
X4	**Enable all response codes**
Y0	**Do Not send (and ignore) break signal**
Y1	Send break signal for 4 seconds before disconnect
Z0	Reset modem with SCP0
Z1	Reset modem with SCP1
&C0	Turn CD signal to always on
&C1	**CD on at remote carrier detected**
&D0	Alone with any of following &Q0, &Q5, &Q6 then, DTR is not functional. Alone with any of following &Q1, &Q4 then DTR drop causes the modem hang up, Auto-answer is not affected. Alone with any of following &Q2, **&Q3** DTR drop causes the modem to hang up, Auto-Answer is inhibited
&D1	Alone with any of following &Q0, &Q1, &Q4, &Q5, &Q6 DTR drop is interpreted by the modem as if the asynchronous escape sequence had been entered. the modem return to asynchronous command state without disconnecting. Alone with any of following &Q2, &Q3 DTR drop causes the modem to hang up. Auto-Answer is inhibited.
&D2	**Alone with any of following &Q0 through %Q6 then, DTR drop causes the modem to hang up Auto-Answer is inhang.**
&D3	Alone with any of following

	&Q0, &Q1, &Q4, &Q5, &Q6 DTR drop causes the modem to perform a softreset as if the z command were received. The & Y setting determines which profile is loaded. Alone with any of following &Q2, &Q3 DTR drop causes the modem to hang up Auto-Answer is inhibited.
&F0	Restore factory default profile FDP0 (as ECDC modem)
&F1	Restore factory default profile FDP1 (as non-ECDC modem)
&G0	**Disable guard tone**
&G1	Disable guard tone (default for us models)
&G2	Enable 1800 Hz guard tone
&Ln	Leased line dial line operation
&L0	Dial-Up line operation
&L2	Leased line operation
&K0	Disable flow control
&K3	RTS/CTS flow control
&K4	XON/OFF flow control
&K5	Unidirectional XON/OFF
&K6	RTS/CTS, XON/XOFF flow control
&M0	**Set modem for async operation**
&P0	**M/B ratio 39/61(USA)**
&P1	**M/B ratio 33/67(UK, Hong Kong)**
&P2	**M/B ratio 39/61 at 20 pulses**
&P3	**M/B ratio 33/67 at 20 pulses**
&Q0	See & M0
&Q5	The modem will try to negotiate an error-corrected link
&Q6	Select asynchronous operation in normal mode
&R0	Modem turns CTS on when detects RTS from the local computer
&R1	Ignore RTS. Modem turns CTS on when ready to receive

synchronously	**&V** Display modem profiles and numbers
&S0 Modem forces DSR always on	
&S1 Set DSR to follow RS-232 spec	**&W0** Write ACP to SCP0
	&W1 Write ACP to SCP1
&T0 Terminates test in progress	
&T1 Initiates local analog loopback, V.34 Loop3, Sets S16 bit0. If aconnect exists when this command is issued, the modem hangsup, The connect xxxx message is displayed upon the start of the test.	**&Y0** Designate SCP0 as the active SCP
	&Y1 Designate SCP1 as the active SCP
&T5 Disable digital loopback acknowledgment for remote request.	**&Zn=** Save up to three numbers to NVRAM. Use DS=n to dial the stored number
	Note: &Q,&M: for Sync mode only
&T8 Initiates local analog loopback, V.34 Loop3, with selftest.	

4.4   Call Back Security Command Set   Option

$DTXCn   n=0,   1,2

              n=0   Disable Call Back Security (Default)

              n=1   Enable Call Back Security

              n=2   Display current status

$DTXP=XXXXXXXX   Set Password (MAX 8 chars)

              P?   Display Password

$DTXN=n Set call back redial count (n=1~31 default: 3)

              N?   Display call back redial count

$DTXT0=n Set call back delay time

              T?   Display call back delay time (n=10~255 Sec. Default: 10)

$DTXT1=n Set time-out time

              T?   Display time-out time (n=30~255 Sec. Default: 60)

4.5   Lease Line/Dial Line command set   Option

&Ln   n=0,1

&L0   Disable Lease Line mode, select dial line mode.

&L1   Disable Dial line mode, select lease line mode.

4.6   Lease Line Backup Dial Line command set   Option

$DTXB=0 Disable Lease Line Backup Dial Line.

$DTXB=n Enable Lease Line Backup Dial Line (n=1~255 min. default: 10)

$DTXB?   Display current status.

4.7 Display Dialing Number (if AT&In Command support)   Option

$DTXAn   n=0,1

         n=0   Disable display Dialing number.

         n=1   Enable display Dialing number.

         A?   Display Current status.

4.8 Auto Dial/Redial mode   Option

&In   n=0, 1, 2, 3

         n=0   Disable auto dial/redial mode.

         n=1   auto dial/redial &Z0.

         n=2   auto dial/redial &Z0, &Z1, &Z2, &Z3.

         n=3   auto dial/redial last dial number.

4.9 Others   Option

&DTXU?   Display NVRAM data

&D5   Ignore DTR & Ignore dialing key-abort.

V.42bis and MNP Command

This chapter explains ECDC commands and Extended commands, which are in addition to the basic modem commands listed in the previous chapter. Some commands have a factory default setting. Refer to your Getting Started manual for information on default settings.

5.1   Maximum ECDC Block Size   [\A]

\A0	MNP block size 64 characters
\A1	MNP block size 128 characters
\A2	MNP block size 192 characters
\A3	**MNP block size 256 characters**

5.2   Transmit Break   [\B]

\Bn	Send n/10 seconds of line break to the modem (n = 0 ~ 9, default 3)

5.3   Set Break Control   [\K]

\K0	Enter command mode, do not send a break signal to remote (To send a break after use the \B command)
\K1	Clear data buffer and send a break
\K2	Same as \K0
\K3	Immediately send a break
\K4	Same as \K0
\K5	**Send a break in sequence with any data received from the port**

5.4   ECDC Operation Mode Selection   [\N]

\N0	Set modem to normal mode
\N1	Set modem to direct mode
\N2	Set modem to MNP reliable mode
\N3	Set to MNP/V.42 auto-eliable mode
\N4	V.42 reliable with phase detection

5.5   MNP Response Code Option   [\V]

\V0   Connect messages are controlled by the command settings X, W, and S95.

\V1   Connect message displayed in the single line format described below subject to the command settings V (Verbose) and Q(Quiet). In Non-Verbose mode(V0), single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE.

5.6   Data Compression   [%C]

%C0   Disable data compression

%C1   **Enable MNP5 data compression negotiation**

%C2   Enable V.42bis data compression

%C3   Enable both V.42bis and MNP5 data compression (default)

5.7   Automatic Retrain   [%E]

%E0   Disable auto-retrain

%E1   Enable auto-retrain

%E2   Enable fallback/fall forward

Modem Register

The registers of the modem determine its operation characteristics. This chapter describes the modem registers, except for those reserved registers that can not be modified by the user.

S-Register Summary _____

Register	Range	Units	Default	Function
S0	0-255	Rings	0	Rings to Auto-Answer
S1	0-255	Rings	0	Rings Counter
S2	0-255	ASCII	43	Escape character
S3	0-127	ASCII	13	Carriage return character
S4	0-127	ASCII	10	Line Feed Character
S5	0-255	ASCII	8	Backspace character
S6	2-255	s	2	Wait Time for Dial Tone
S7	1-255	s	50	Wait Time for Carrier
S8	0-255	s	2	Pause Time for Dial Delay Modifier
S9	1-255	0.1s	6	Carrier Detect Response Time
S10	1-255	0.1s	14	Carrier Loss Disconnect Time
S11	50-255	0.001s	95	DTMF Tone Duration
S12	0-255	0.02s	50	Escape Prompt Delay
S13	-	-	-	Reserved
S14	-	-	138(8Ah)	General Bit Mapped Options Status
S15	-	-	-	Reserved
S16	-	-	0	Test Mode Bit Mapped Options Status(&T)
S17	-	-	-	Reserved
S18	0.255	s	0	Test Timer
S19	-	-	0	AutoSync Options
S20	0-255	-	0	AutoSync HDLC Address or BSC Sync Character
S21	-	-	52(34h)	V.24/General Bit Mapped Options Status
S22	-	-	117(75h)	Speaker/Results bit Mapped Options Status
S23	-	-	62(3Dh)	General Bit Mapped Options Status
S24	0-255	s	0	Sleep Inactivity Timer
S25	0-255	s or 0.01s	5	Delay to DTR Off
S26	0-255	0.01s	1	RTS-to-CTS Delay
S27	-	-	73(49h)	General Bit Mapped Options Status
S28	-	-	0	General Bit Mapped Options Status
S29	0-255	10ms	70	Flash Dial Modifier Time
S30	0-255	10s	0	Disconnect Inactivity Timer
S31	-	-	194(C2h)	General Bit Mapped Options Status
S32	0-255	ASCII	17(11h)	XON Character

Register	Range	Units	Default	Function
S33	0-255	ASCII	19(13h)	XOFF Character
S34-S35	-	-	-	Reserved
S36	-	-	7	LAPM Failure Control
S37	-	-	0	Line Connection Speed
S38	0-255	s	20	Delay Before Forced Hang-up
S39	-	-	3	Flow Control Bit Mapped Options Status
S40	-	-	104(68h)	General Bit Mapped Options Status
S41	-	-	195(C3h)	General Bit Mapped Options Status
S42-S45	-	-	-	Reserved
S46	-	-	138	Data Compression Control
S48	-	-	7	V.42 Negotiation Control
S82	-	-	128(40h)	LAPM Break Control
S86	0-255	-	-	Call Failure Reason Code
S91	0-15	dBm	10(country dependent)	PSTN Transmit Attenuation Level
S92	0-15	dBm	10(country dependent)	Fax Transmit Attenuation Level
S95	-	-	0	Result Code Messages Control

♦ Register value may be stored in one of two user profiles with the &W command.

Appendix B

Result Codes

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
0	OK	x	x	x	x	x	
1	Connect	x	x	x	x	x	
2	Ring	x	x	x	x	x	
3	No Carrier	x	x	x	x	x	
4	Error	x	x	x	x	x	
5	Connect 1200	1	x	x	x	x	
6	No dial tone	3	3	x	x	x	
7	Busy	3	3	3	x	x	
8	No Answer	x	x	x	x	x	
9	Connect 600	1	x	x	x	x	
10	Connect 2400	1	x	x	x	x	
11	Connect 4800	1	x	x	x	x	
12	Connect 9600	1	x	x	x	x	
13	Connect 7200	1	x	x	x	x	
14	Connect 12000	1	x	x	x	x	
15	Connect 14400	1	x	x	x	x	
16	Connect 19200	1	x	x	x	x	
17	Connect 38400	1	x	x	x	x	
18	Connect 57600	1	x	x	x	x	
19	Connect 115200	1	x	x	x	x	
20	Connect 230400	x	x	x	x	x	
22	Connect 75TX/1200RX	1	x	x	x	x	
23	Connect 1200TX/75RX	1	x	x	x	x	
24	Delayed	4	4	4	4	x	
32	Blacklisted	4	4	4	4	x	
33	Fax	x	x	x	x	x	
35	Data	x	x	x	x	x	
40	Carrier 300	x	x	x	x	x	
44	Carrier 1200/75	x	x	x	x	x	
45	Carrier 75/1200	x	x	x	x	x	
46	Carrier 1200	x	x	x	x	x	
47	Carrier 2400	x	x	x	x	x	
48	Carrier 4800	x	x	x	x	x	
49	Carrier 7200	x	x	x	x	x	
50	Carrier 9600	x	x	x	x	x	
51	Carrier 12000	x	x	x	x	x	
52	Carrier 14400	x	x	x	x	x	
53	Carrier 16800	x	x	x	x	x	
54	Carrier 19200	x	x	x	x	x	
55	Carrier 21600	x	x	x	x	x	
56	Carrier 24000	x	x	x	x	x	
57	Carrier 26400	x	x	x	x	x	
58	Carrier 28800	x	x	x	x	x	
59	Connect 16800	1	x	x	x	x	
61	Connect 21600	1	x	x	x	x	
62	Connect 24000	1	x	x	x	x	
63	Connect 26400	1	x	x	x	x	

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
64	Connect 28800	1	x	x	x	x	
66	Compression: Class 5	x	x	x	x	x	
67	Compression: V.42bis	x	x	x	x	x	
69	Compression: None	x	x	x	x	x	
70	Protocol: None	x	x	x	x	x	
77	Protocol: LAPM	x	x	x	x	x	
78	Carrier 31200	x	x	x	x	x	
79	Carrier 33600	x	x	x	x	x	
80	Protocol: ALT	x	x	x	x	x	
81	Protocol: ALT-Cellular	x	x	x	x	x	
84	Connect 33600	1	x	x	x	x	
91	Connect 31200	1	x	x	x	x	
150	Carrier 32000	x	x	x	x	x	
151	Carrier 34000	x	x	x	x	x	
152	Carrier 36000	x	x	x	x	x	
153	Carrier 38000	x	x	x	x	x	
154	Carrier 40000	x	x	x	x	x	
155	Carrier 42000	x	x	x	x	x	
156	Carrier 44000	x	x	x	x	x	
157	Carrier 46000	x	x	x	x	x	
158	Carrier 48000	x	x	x	x	x	
159	Carrier 50000	x	x	x	x	x	
160	Carrier 52000	x	x	x	x	x	
161	Carrier 52000	x	x	x	x	x	
162	Carrier 56000	x	x	x	x	x	
165	Connect 32000	x	x	x	x	x	
166	Connect 34000	x	x	x	x	x	
167	Connect 36000	x	x	x	x	x	
168	Connect 38000	x	x	x	x	x	
169	Connect 40000	x	x	x	x	x	
170	Connect 42000	x	x	x	x	x	
171	Connect 44000	x	x	x	x	x	
172	Connect 46000	x	x	x	x	x	
173	Connect 48000	x	x	x	x	x	
174	Connect 50000	x	x	x	x	x	
175	Connect 52000	x	x	x	x	x	
176	Connect 54000	x	x	x	x	x	
177	Connect 56000	x	x	x	x	x	
+F4	+FCERROR	x	x	x	x	x	

Notes:
An "x" in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of "n" (shown at the top of the column) has been selected by the use of ATXn. If the (verbose or short form) will be output for that X option.

Appendix C

Fax Command Codes

Fax Class I

Command	Function
Service Class ID	
+FCLASS=	Service Class
Fax Class 1 Commands	
+FAE=n	Data/Fax auto Answer
+FTS=n	Stop Transmission and Wait
+FRS=n	Receive Silence
+FTM=n	Transmit Data
+FRM=n	Receive Data
+FTH=n	Transmit Data with HDLC Framing
+FRH=n	Receive Data with HDLC Framing

Fax Class II Commands

Command	Function
+FCLASS=n	Service class
+FAA=n	Adaptive answer
+FAXERR	Fax error value
+FBOR	Phase C data bit order
+FBUF?	Buffer size (read only)
+FCFR	Indicate confirmation to receive
+FCLASS=	Service class
+FCON	Facsimile connection response
+FCIG	Set the polled station identification
+FCIG:	Report the polled station idendification
+FCR	Capability to receive
+FCR=	Capability to receive
+FCSI:	Report the called station ID
+FDCC=	DCE capabilities parameters
+FDCS:	Report current session
+FDCS=	Current session results
+FDIS:	Report remote capabilities
+FDIS=	Current sessions parameters
+FDR	Begin or continue phase C receive data
+FDT=	Data transmission
+FDTC:	Report the polled station capabilities
+FET:	Post page message response
+FET=N	Transmit page punctuation
+FHNG	Call termination with status
+FK	Session termination
+FLID=	Local ID string
+FLPL	Document for polling
+FMDL?	Identify model
+FMFR?	Identify manufacturer
+FPHCTO	Phase C time out
+FPOLL	Indicates polling request
+FPTS:	Page transfer status
+FPTS=	Page
+FREV?	Identify revision
+FSPL	Enable polling
+FTSI:	Report the transmit station ID
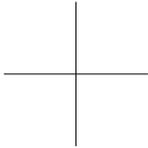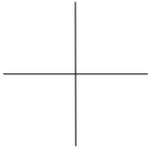
Installation of Modem Driver in Win 95/98

STEP 1.

Turn on computer. Move mouse to "Start" at left hand side, enter "Setting-s" and select "Control panel" go to Next Windows.

STEP 2.

Under "Control Panel" select "Modems". (or Move mouse to "My compu-ter" at right hand side, enter "Control panel and Modems".)

STEP 3.

In Install New Modem, please tick "Don't detect my modem; I will select it from a lost", and then go to next step.

STEP 4.

Because the modem is not listed, you click "Have Disk" for other modem models.

STEP 5.

Insert the installation disk or CD-ROM into the driver selected, click "Browse", select one of the 5614hp.inf files.

STEP 6.

Click the manufacturer and model of your modem, please select it and then go to next step.

STEP 7.

Select the port to use with this modem, for example the modem setting COM port, and then click "Next".

STEP 8.

Your modem has been set up successfully. Click "Finish".

STEP 9.

Select the modem you have, and then click "Close".