Chapter 1

UNPACKING AND INSTALLATION

This chapter describes the procedures for unpacking and installing your modem. Chapter 1 is designed to have normal PC users on-line quickly.

1.1 Unpacking the Modem

The complete Discovery LCD Fax/Audio modem package includes:

1. Discovery LCD Faxmodem unit
2. User's manual
3. Power supply unit
4. Data and fax communication software
5. RJ-11 to RJ-11 cable
6. RJ-45 to Y terminal cable
7. 6 by 2 terminal block

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

1.2 Modem Front Panel and LED Indicators

Located on the modem front panel are the LCD, LCD configuration buttons, LCD Panel Lock switch, the Voice/Data switch, and the LED indicators. The modem LCD, LCD configuration buttons, Panel Lock switch and Voice/Data switch are described in Chapter 2. The LED indicators display current modem operation and status, as explained below:

MR	Modem Ready
	Lit when modem is turned on. Flashes when modem is in test mode.
TR	Terminal Ready
	Lit when the computer or terminal is ready.

RTS	Request To Send
	Lit when local computer (DTE) requests to send data to local modem for transmission.
CTS	Clear To Send
	Lit when local modem is ready to receive data from local computer (DTE) for transmission.
AA	Auto Answer
	Lit when modem is set for auto-answer. Flashes when incoming rings are detected.
RL	Reliable Link
	Lit when error correction mode is enabled. Flashes when an error is detected.
RD	Receive Data
	Flashes when modem is receiving data from a remote modem or when sending data to the local computer.
SD	Send Data
	Flashes when the modem is sending data to a remote modem or when receiving data from the local computer.
CD	Carrier Detected
	Lit when a remote modem carrier is detected.
OH	Off Hook
	Lit when the modem is using the telephone line (off hook). Off when the modem is not using the line (on hook).

1.3 Modem Rear Panel

Located on the modem rear panel are the power switch, power socket, volume control, RS-232 connector, and two modular jacks, as shown in the schematic.

The power socket is labelled 9V or 12V AC (optional) and corresponds with the power supply unit packaged with your modem. Never use a non-specified power supply unit, as it might damage your modem.

To turn on the modem, toggle the power switch to ON. Likewise, to turn off the modem, toggle the power switch to OFF. Always turn your computer on prior to turning on your modem and turn off your modem prior to turning off your computer.

The RS-232 connector on the modem rear panel corresponds to the RS-232 cable and connects the local computer to the modem. It is a DB25F (female) and a RS-232 cable in pin assignment and electronic standards. See the following section for more information about the RS-232 cable.

Two modular jacks are also on the modem rear panel (RJ-11 and RJ-45). The jack labelled LINE is for an incoming telephone line (RJ-11) and the jack labeled PHONE LEASED is for a telephone set or an incoming leased line(RJ-45). If you do not wish to use a telephone set with your modem, leave the PHONE jack unconnected.

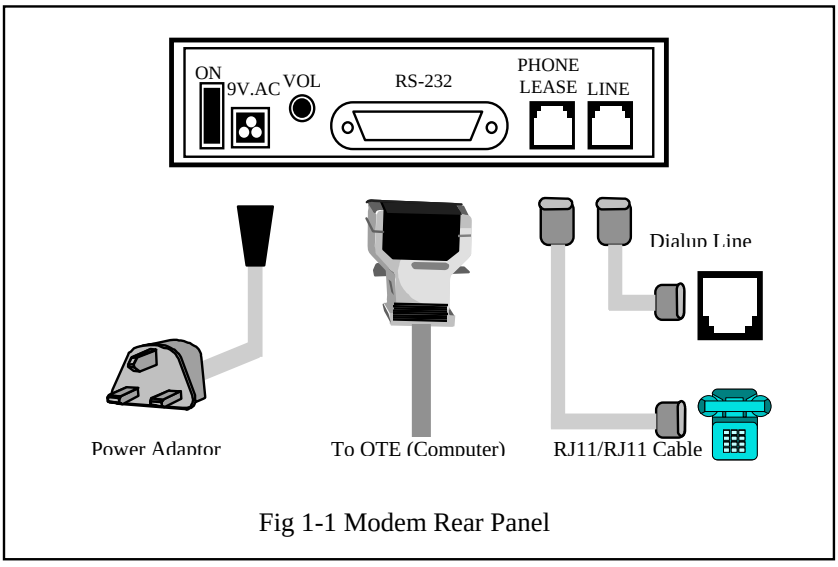


Fig 1-1 Modem Rear Panel

1.4 Serial Port and RS-232 Cable

Your computer requires an industry standard RS-232 serial port in order to use this modem or any other external modem. If you do not have a standard RS-232 serial port, consult your dealer to acquire a RS-232 interface card for your computer.

You also need a serial cable between your modem and your computer's serial port. A proper cable for your modem includes:

1) DB25M (male) connector at one end to match the modem connector.
2) A connector that corresponds to your computer's serial port at the other end. For PC users, a standard serial port card has either a DB25M or DB9M connector, and your cable must possess one of these two connectors.
3) A correct pin-to-pin cable connection. Your modem complies with industry standard pin assignments, and most standard modem cables should fit. However, refer to Appendix B in this manual for more information concerning the pin assignment for your modem connector.

If you have any problem acquiring the appropriate RS-232 cable, consult your modem distributor or computer dealer.

1.5 Telephone Line Test and Phone Cable

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

First, test the line condition by lifting the telephone handset, listening for a clear dial tone, and then 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. If this is the case, find a better quality line for your modem to ensure reliable data communications.

Connect your modem directly to an outside telephone line. Do not connect the modem to a private branch exchange (PBX) telephone system unless the system is proven to perform well in data transmission applications.

You need a phone cable to connect the incoming telephone line to the modem. The cable must have an RJ-11 plug at one end and a connector which fits the telephone line wall outlet at the other end. If the cable included with your modem does not fit your wall outlet, acquire an appropriate cable.

1.6 Modem Installation

The distance between the computer and modem is determined by the length of the RS-232 cable. However, a RS-232 cable should not be longer than fifty feet, as signal distortion and interference might occur. A suitable location for your modem includes:

1) A reliable AC power source and a good quality telephone outlet that are not too far away from the computer.
2) A location where the LED indicators and LCD are easy to monitor, and where the LCD buttons on the front panel and the power switch on the rear panel are easy to reach.

Once you have chosen a proper location for your modem, follow the procedures below to connect the hardware:

1) Make sure both the modem and the computer are turned off.
2) Connect the modem to the computer by plugging the DB-25M end of the RS-232 cable into the modem and plugging the other end of the cable into your computer's serial port. Secure all the connector screws.

   NOTE:
   Verify and write down which serial port (COM1 to COM4) connects your modem to the computer, as the port number is required during communications software installation. Refer to the manual for your serial interface card or your terminal to find out how the port is set or configured.
3) Using an appropriate cable, connect the modem to the incoming telephone line through the LINE jack on the modem rear panel. Be sure you tested the line quality as described in the previous section.
4) Insert the cable-plug end of the power adaptor into the power jack marked AC9V or AC12V (optional) on the modem rear panel, and then plug the adaptor into a reliable power outlet. Be sure to only use the adaptor that came with your modem. Also check that the power source voltage is correct before plugging in the adaptor.

1.7 Communication Software Installation

Since your modem has a standard modem command set, most popular communication software packages are compatible. To install the software, turn on your computer and modem and then follow the software manual instructions.

Unfortunately, we are unable to describe software configuration procedures in detail, as the procedures vary with each software package, computer, and application. Refer to the software manual with your modem package for more information. If you experience any difficulty regarding use of the software package, please contact the software publisher or us.

However, pay particular attention to the following parameter settings, as an unsuccessful modem installation is probably due to an incorrect setting.

1) The serial port number is set from COM1 to COM4.
2) The communications protocol is either ITU-T or Bell.
3) The data is formatted correctly, including: data bit, parity, and stop bit (8N1 or another valid format).

A serial port can accept only one peripheral device, and vice-versa. The serial port number specified in the communications software must be consistent with the computer's serial port to which the modem is actually connected.

The selection of a serial port is done on the serial port card. The ports are usually denoted as COM1 to COM4. Refer to the serial port card's manual for details.

In order to communicate successfully, the protocol and data format of the two on-line modems must be the same. For example, if the bulletin board you are going to dial supports ITU-T standard (8 data bits, no parity, 1 stop bit), you should specify exactly the same. Otherwise, the connection will not be established or the data received will be unreadable (garbled).

1.8 Software Configuration Tips

Many popular communications software packages allow users to

specify a command string which is sent to the modem prior to a dialing session. This string is usually called the Dialing Prefix or Dialing String, and it instructs the modem prior to dialing and going on-line.

Listed below are common commands which are helpful for setting the software Dialing Prefix/Dialing String.

ATS0=3	Instructs the modem to auto answer an incoming call on the third ring by setting register S0 to 3.
ATX4DT9W	Instructs the modem to tone dial the number 9 and hold it until a dial tone is detected. This string also selects the X4 response set.
ATS6=10DP	Instructs the modem to wait for 10 seconds and then use pulse dial the call.
ATM2L3DT	The modem monitoring speaker is always on, with high volume, and tone dials the call.
ATB0DT	Instructs the modem to use ITU-T protocol to establish a connection with the remote modem and tone dial the call.
AT&P1DP	Pulse dials with a make/break ratio of 33/67 (for most European countries).
AT&P0DP	Pulse dials with a make/break ratio of 39/61 (for USA).
AT\N1	Instructs the modem to operate in direct mode and function as an ordinary non-MNP/V42 modem.

Configuring the modem for ECDC operation with error correction and data compression enabled will result in better performance and higher speeds from your modem.

The following two examples set the modem to auto reliable mode, use CTS/RTS flow control, and enable ECDC extended response code sets without baud rate adjustment:

AT\J0\N3\Q3\V4%C1	Error correction and Data compressinare both enabled.
AT\J0\N3\Q3\V4%C0	Error correction enabled but Data compression disabled.

For general PC users in normal applications, the recommended Dialing Prefix is:

AT\J0\N3\Q3\V4%C1

To set the modem to auto reliable mode with a carriage return (ASCII 13) as the fallback character, the Dialing Prefix is:

AT\C2\N3\Q3\V4%A13

To set the modem to operate in MNP reliable mode and hang up when a MNP reliable link cannot be established, the Dialing Prefixes are:

AT\J0\N2\Q3\V0%C1	Data compression enabled.
AT\J0\N2\Q3\V0%C0	Data compression disabled.

1.9 Getting Started

Now you are ready to dial a bulletin board, data base, or remote computer, and your modem will automatically establish a connection. As soon as a connection is established, you can:

1. Read or send electronic mail.
2. View the most up-to-date news or information.
3. Upload or download computer programs.
4. Transmit or receive text messages or spread sheet data.
5. Play interactive games with remote uses.

Or, you can establish whatever kind of on-line data communication link you wish.

Chapter 2

LCD OPERATION AND FUNCTIONS

This chapter describes the operation and functions of the modem LCD control panel. Instructions for LCD control panel operation as well as the LCD main menu, directories, subdirectories, and their contents are provided. This chapter is designed to minimize the time required to learn the LCD control panel operation and get the modem on-line.

2.1 LCD Control Panel Operation

The LCD control panel has four configuration buttons: ESC (escape), Left Arrow, Right Arrow, and ENTER. These configuration buttons are used to enter, view, configure, and reconfigure the modem main menu, directories, subdirectories, and their contents.

The modem LCD main menu is divided into four areas: STATUS, SETUP, PROFILE, and EXECUTE. Moreover, the four main menu areas contain directories, and some contain subdirectories as well. Follow the directions below to enter the LCD main menu, directories, subdirectories, and their contents.

1. Using the power switch located on the modem rear panel, turn the modem on. After the power has been turned on, the LCD displays:

POWER ON
INITIAL

Then the modem immediately displays the current specified modem configuration status. For example, the LCD might display:

AUTO ASY V.42bis
DL ORI IDLE

This means that the modem is currently in auto, asynchronous, V.42bis mode, on a dedicated line, being the originating modem, and currently idle (no connection).

You can press the ESC button to view factory EPROM version, LCD will display such as:

DATATRONICS
341-008-137

2. Press the ENTER button to view the LCD Main Menu. The LCD will display:

<MAIN MENU>
STATUS

Remember that STATUS is the first possible directory users can view. However, you can not configure the contents of STATUS.

3. Pressing either the left or right arrow buttons on the LCD control panel allows users to choose either the STATUS, SETUP, PROFILE or EXECUTE Directories.

4. After choosing a directory, first press ENTER, then use LIFT, RIGHT and ENTER button to view either that directory's contents, subdirectory, or both. Continue to use the LEFT, RIGHT or ENTER button to choose directory contents or subdirectory contents for configuration. Once users are in a particular directory or subdirectory and viewing its contents, pressing the ENTER button will assign configurations to the modem for operation. At this point users should be able to hear a "beep" from the modem and see an asterisk (*) next to the configuration, representing that the configuration is now enabled.

5. Once you enter any particular directory, subdirectory, or the contents of either, use the left and right arrow buttons to begin modem configuration. In general, if the contents of any directory or subdirectory are standard (not modifiable by users and permanently entered in the modems NVRAM), use either the left or right arrow buttons to go forward or backward to view the contents before pressing ENTER and enabling a configuration. In contrast, if the contents of a directory or subdirectory include user modifiable configurations, such as passwords, telephone numbers, speeds, or times, which may amount to a long string of characters, modem configuration is slightly different. Pressing the right

arrow button allows users to move along the character string to any particular point in the sting. Pressing the left arrow button then allows users to select the possible characters for that point in the string. When all the characters in the particular string are shown on the LCD as desired, pressing ENTER will enable the configuration for use.

6. Pressing the ESCAPE button allows you to exit any particular directory, subdirectory or the contents of either. Continuing to press the ESCAPE button will retrace your steps and eventually bring users back to the main menu and then to the modem's current operational status.
7. Now you are ready to begin modem operation and configuration.

2.2 LCD Panel Lock Switch

The Panel Lock switch located on the modem control panel secures the LCD panel buttons from unauthorized use and protects your communications and configurations from interruption due to accidental panel button operation.

To use the Panel Lock switch, press and hold the Panel Lock switch and the LCD will display PANEL LOCKING with a cursor crossing the LCD below the message, until the panel is locked. The LCD will then display DATATRONICS PANEL LOCKED. Remove your finger from the Panel Lock switch and the LCD displays the original status message.

To unlock the panel, press and hold the Panel Lock switch and the LCD will display PANEL UNLOCKING with a cursor crossing the LCD below the message, until the panel is unlocked. The LCD will then display DATATRONICS PANEL UNLOCKED. Remove your finger from the Panel Lock switch and the LCD displays the original status message.

2.3 Voice/Data Switch

The Voice/Data switch on the modem control panel lets you switch between data link and voice link while on-line, without breaking on-line status. In data link you can transmit or receive data through the modem. In voice link you can talk to the other party.

To use the Voice/Data feature, both modems need a telephone set connection. To switch a call from data link to voice link:

1. Request a talk link by typing a message on your keyboard such as "Request for voice link, pick up your phone."
2. Lift your telephone handset and press your modem's Voice/Data switch to VOICE.

You can now talk to the other party on the telephone connected to your modem as soon as they pick up their telephone handset connected to their modem.

As soon as the link is switched to talk link, your modem will issue a NO CARRIER message on the screen and the connection is bypassed to the telephone handset connected to your modem. If the handset is not picked up before flipping the switch to VOICE, the call is disconnected.

When the conversation ends, follow the procedures below to resume data link:

1. Inform the other party of your request to resume data link.
2. Press the Voice/Data switch to DATA and hang up your telephone handset.
3. Have the other party press their Voice/Data switch to DATA and hang up their handset upon hearing a high-pitched tone from their modem.

If the remote modem does not have the same Voice/Data function as your modem, the other party should issue command ATX1D to force their modem to go into dialing mode and then hang up their handset.

You may also use the modem as an auto dialing device. First, instruct the modem to dial the desired telephone number. When you hear the remote party answer your call, pick up your telephone handset, press the Voice/Data switch to VOICE and then talk to the other party.

2.4 Main Menu and Directories

The Modem Main Menu has four directories. The directories are: STATUS, SETUP, PROFILE, and EXECUTE. Refer to the following descriptions of the directories and their contents for moden status, functions, and control. All modem commands and modem registers for any particular setting are indicated by **bold** type.

2.5 STATUS Main Menu

STATUS in the Main Menu is set up to provide a quick reference for the operation status of the modem.

QUALITY (line quality):	GOOD, MEDIUM, BAD
S/N RATIO:	xx dB
RX LEVEL:	-xx dBm
TX LEVEL:	-xx dBm
RETRAINS:	xxxxx
RLSD LOSS:	xxxxx
DTE:	xxxxx xxx xx
TX&RX THROUGHPUT:	xxxxxx xxxxxx
DISCONNECT MESSAGE:	NONE, ATH DISC, DTR OFF, VOICE/DATA DISC, CARRIER LOSS,NOANSWER,V42 FRAME ERROR, NO MATCH, USER KEY ABORT

2.6 SETUP Main Menu

SETUP in the Main Menu contains the following directories: DTE, DCE, COMMAND, LINE, PROTOCOL, CALL BACK,REMOTE ACCESS and MISC. SETUP in the Main Menu provides most of the directories needed for setting and monitoring basic modem functions.

2.7 SETUP Main Menu: DTE Directory

The DTE directory contains the following settings:

DTE SPEED:	AUTO, 110, 300, 600, 1200, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 115200
DATA BITS:	7, 8
PARITY:	NONE, SPACE, EVEN, ODD
STOP BIT:	1, 2
FLOW CONTROL (**Q**):	NONE, XON/XOFF, CTS ONLY, RTS/CTS
DTR CONTROL (**&D**):	IGNORE DTR, COMMAND STATE, DISCONNECT, RESET
DTR DROP TIME (**S25**):	xx 10ms
DTR RISE TIME:	xx 10ms
RTS CONTROL (**&R**):	CTS TRACK RTS, IGNORE RTS
RTS/CTS DELAY (**S26**):	xx 10ms
DSR CONTROL (**&S**):	FORCE ON, FOLLOW DTE
DCD CONTROL (**&C**):	FORCE ON, TRACK CARRIER

2.8 SETUP Main Menu: DCE Directory

The DCE directory contains the following settings:

DCE SPEED (**%B**):	AUTO, 300, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800
PROTOCOL TYPE (**-V**):	V.34 AUTO, V.FC AUTO, V.32BIS AUTO, V.34/V.FC/V.32BIS, V.FC/ V.32BIS, V.34 ONLY, V.FC ONLY, V.32BIS ONLY
SYN MODE (**&M**):	ASYN, SYN1, SYN2, SYN3
CNG TONE:	DISABLE, ENABLE
TX CLOCK (**&X**):	INTERNAL, FROM DTE, FROM REMOTE
DCD ON TIME (**S9**):	xxx 100ms
DCD OFF TIME (**S10**):	xxx 100ms
GUARD TONE (**&G**):	DISABLE, 550Hz, 1800Hz
RLSD LEVEL :	-43/-48dBm, -33/-38dBm, -26/-31dBm, -16/-21dBm
AUTO RETRAIN (**%E**):	DISABLE, ENABLE, WITH SPEED
DISCONNECT (**Y**):	NORMAL, LONG SPACE, CLEAR DOWN

2.9 SETUP Main Menu: COMMAND Directory

The COMMAND directory contains the following settings:

MODE SELECT:	AT, V25BIS, DUMB
DATA FORMAT:	ASYNC, HDLC, BISYNC, MONOSYNC

DATA BITS:	5,6,7,8
PARITY:	NONE, EVEN, ODD, SPACE
STOP BIT:	1, 2
COMMAND ECHO (**E**):	ON, OFF
RESULT CODE (**Q**):	ON, OFF
RESULT FORM (**V**):	SHORT, LONG
ESCAPE CHAR (**S2**):	xxx
ESCAPE GUARD (**S12**):	xxx 20ms
CR CHAR (**S3**):	xxx
LF CHAR (**S4**):	xxx
BS CHAR (**S5**):	xxx

2.10 SETUP Main Menu: LINE Directory

The LINE directory contains the following settings:

TYPE SELECT (**&L**):	DIAL LINE, 2W LEASED, 4W LEASED
DIAL METHOD**(@Y)** :	NORMAL DIAL, DL SIMU LL, LL BACKUP DL
BACKUP TIMER (**S15**):	xxx min (1-255)
BACKUP TIMES (**S13**):	xxx (0-225)
BACKUP RETRY **(-B)**:	xx (0-15)
RI OFF TIME:	xx sec (0-15)
PULSE M/B (**&P**):	US, UK

2.11 SETUP Main Menu: PROTOCOL Directory

The PROTOCOL directory contains the following settings:

LINK MODE (**N**):	NORMAL,DIRECT MNP RELIABLE, V42/MNP AUTO, V42 RELIABLE
COMPRESSION (**%C**):	ON, OFF
MNP BLOCK (**A**):	64, 128, 192, 256
SEND ADP/ODP:	ON, OFF
BREAK CTL (**K**):	x (0-5)
DCE FLOW CTL **(\G**):	ON, OFF
XON/XOFF PASS (**X**):	ON, OFF
CONNECT CODE (**V**):	DCE SPEED, DTE/EC, DCE/EC, DTE EC/COMP, DCE EC/COMP
QUICK RESET:	NORMAL ATZ AT&F, QUICK ATZ, QUICK AT&F, QUICK ATZ AT&F

2.12 SETUP Main Menu: CALL BACK Directory

The CALL BACK directory contains the following settings:

CB ACTIVE (**@A**):	ENABLE, DISABLE
CB TIME (**@D**):	xxx sec
SET CLOSE MSG (**@G**):	xx characters
SET OPEN MSG (**@O**):	xx characters
SET PASSWORD (**@Wn=**):	#0 - #9, xx characters or letters
SET PHONE NO (**@Zn=**):	#0 - #9, xx characters
VIEW PASSWORD (**@V0**):	#0 - #9
VIEW PHONE NO (**@V1**):	#0 - #9

2.13 SETUP Main Menu: REMOTE ACCESS Directory

The REMOTE ACCESS directory contains the following settings:

RA SEC CHANNEL:	ON, OFF
RA PASSWORD (***P**):	xxxxxxxxx

2.14 SETUP Main Menu: MISC Directory

The MISC directory contains the following settings:

FB THRESHOLD:	26400, 24000, 21600, 19200, 16800,14400, 12000, 9600, 7200, 4800, 2400 (not available yet)

SECURITY :

DTMF CONNECT (**@E**):	ENABLE, DISABLE
SET DTMF (**@P**):	xxxxxxx
WAIT DTMF:(**S48**):	x sec
SET VAR A (**@S0**):	xxxxxxxxxxxxxxx
CHECK VAR A(**@C0**):	xxxxxxxxxxxxxxxxx
SPK CONTROL (**M**):	DISABLE, OFF UNTIL CD ON, ALWAYS ON, OFF WHEN DIAL
SPK VOLUME (**L**):	OFF, LOW, MEDIUM, HIGH
DL TX LEVEL (**K0**):	-xx dBm
LL TX LEVEL (K0):	-xx dBm

2.15 PROFILE Main Menu

The PROFILE Main Menu contains the following settings:

LOAD DEFAULT (**&F**):
0. ASY-D-AT-V42BIS
1. ASY-A-AT-V42BIS
2. ASY-D-AT-DIRECT
3. ASY-A-AT-DIRECT
4. ASY-D-AT-NORMAL
5. ASY-A-AT-NORMAL
6. SYN-D-AT-DIRECT
7. SYN-A-AT-DIRECT
8. ASY-V25BIS
9. SYN-BSC-V25BIS
10. SYN-HDLC-V25BIS
11. PWR-2W-LEASED
12. PWR-4W-LEASED

SET S REG: Sxx=xxx

LOAD PROFILE (**Z**): #1, #2, #3, #4

SAVE PROFILE (**&W**): #1, #2, #3, #4

MAJOR DEFINE (**&Y**): #1, #2, #3, #4

2.16 EXECUTE Main Menu:

DIAL、ANSWER、TEST and HANG UP Directories

(1) The DIAL directory contains the following settings:

DIAL A TEL# (**D**): xxxxxxxxxxxxxxxx

POWER ON DIAL (**&An**):#0, #1, #2, #3, #4, #5, #6, #7, #8, #9,

#99(OFF)

EDIT A TEL# (**&Zn=**):	#0, #1, #2, #3, #4, #5, #6, #7, #8, #9
DIAL STORED (**DS=**):	#0, #1, #2, #3, #4, #5, #6, #7, #8, #9
MULTI PHONE(-**M**):	ON, OFF
REDIAL ORDER(-**Z=**):	xxxxxxxxxx
TONE CHECK (**X**):	NONE, DIAL TONE, BUSY TONE, DIAL + BUSY TONE
WAIT FOR DIAL (**S6**):	xxx sec
PAUSE TIME (**S8**):	xxx sec
CALL TIME (**S7**):	xxx sec
REDIAL DELAY(**N5=**):	xxx 2sec
REDIAL TIMES (**N=**):	xx
DIAL TYPE:	TONE, PULSE
DTMF DURING (**S11**):	xxx ms

(2) The ANSWER directory, contains the following settings:

MANUAL ANSWER (**A**):	ON, OFF
RING TIMES (**S0**):	xxx

(3) The TEST directory, contains the following settings:

CLEAR TEST (**&T0**):	ON, OFF
LAL (**&T1**):	ON, OFF
LDL (**&T3**):	ON, OFF
RDL (**&T6**):	ON, OFF
RDLST (**&T7**):	ON, OFF
LALST (**&T8**):	ON, OFF
GRANT RDL:	ON (**&T4**), OFF (**&T5**)
PATTERN:	511

RDL BY 140: ON, OFF

AL BY 141: ON, OFF

TEST TIMER (**S18**): xxx sec

(4) The HANG UP directory, contains the following settings:

HANG UP: ON, OFF

Chapter 3

MODEM OPERATION

This chapter describes modem operation states, protocols, speeds, data formats, error correction, data compression, and modem operation modes. It is designed to help the user understand the modem in a greater detail.

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.

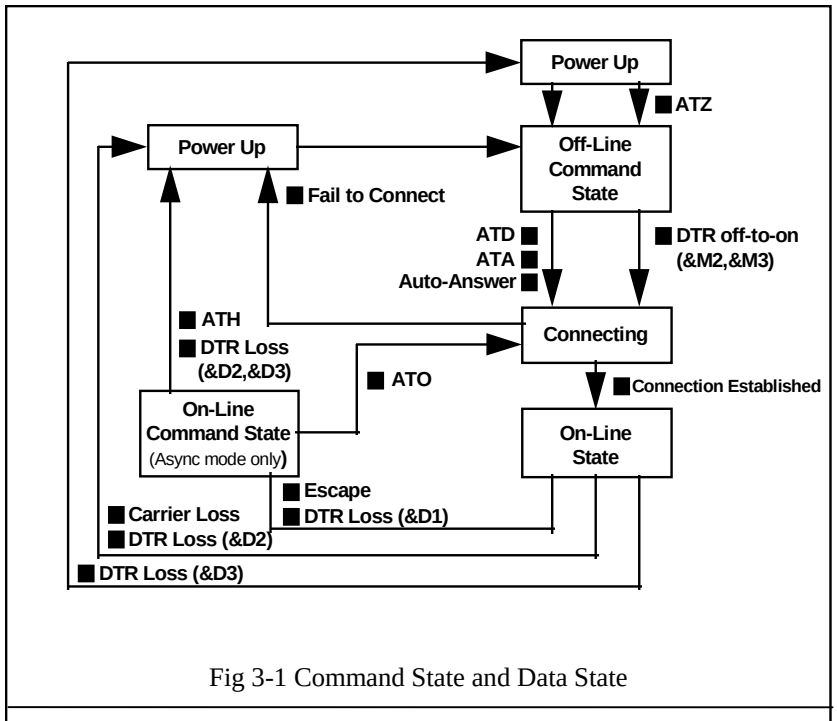


Fig 3-1 Command State and Data State

In command state, the modem interprets all characters it receives as

commands. 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 interprets everything it receives (except the escape sequence) as data and conveys the data to the local computer or remote system.

3.2 Escape Sequence

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

After switching to command state, users 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. In order for the modem to distinguish an escape command from data, a certain duration of guard time should exist both prior to and after the three consecutive escape characters. Therefore, the escape sequence includes first, a guard time, second, three consecutive escape characters, and last of all, a guard time.

The guard time in default of S12 is 1 second and is changed by assigning a different value to register S12. Likewise, you may change the escape character by assigning an ASCII value (in decimal) for the new escape character to register S2.

3.3 Modem Speeds

During an on-line communication 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.

The speed over the telephone line at which your modem communicates

with remote modems is called the on-line speed. Since modems are Data Communication Equipment, this 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 computers are Data Terminal Equipment, this is called the DTE speed.

3.4 Smart and Dumb Mode

Smart/Dumb Mode configures the modem to either smart or dumb mode. In smart mode, the modem recognizes commands and echoes the response codes. This is the modem's default setting and applies to general modem applications in dialup operations.

In dumb mode, the modem ignores commands and refrains from sending response codes. Dumb mode allows the modem to act as a dedicated auto-answer modem or configures the modem for synchronous mode 2 or 3 operation. Smart/Dumb mode is configured through the LCD control panel in the SETUP Main Menu: Command Directory, under MODE SELECT or by issuing the proper @I command.

To exit Dumb Mode, and return to start mode by entering the SETUP Main Menu: Command Directory, under AT. Enable AT (you should hear a "beep" and see an "*" before AT). Now press the Voice/Data button on the modem front panel. On your computer monitor you should see NO CARRIER. If not, continue to press the V/D button until it appears.

After you've changed smart mode to dumb mode or dumb mode to smart mode, if you want next time you turn on the modem and still keep the change, you shound use keyboard to enter the command AT&W or use LCD control panel into PROFILE main directory: under SAVE PROFILE to save the change to NVRAM.

3.5 Factory Default Profile FDP

The FDP is the default configuration profile stored in your modem's read-only memory (ROM), which is not to be modified by the user. For convenience in different applications, the modem supports 13 FDPs (FDP0 through FDP12).

3.6 Stored Configuration Profile SC

The SCP is the configuration profile stored in the modem NVRAM which can be retrieved for further use. There are 4 SCPs your modem can retain: SCP0, SCP1, SCP2, and SCP3.

SCP1 is the configuration profile factory setting for ECDC operation for PC users. SCP2 is for non-ECDC use for PC users. SCP3 is for Macintosh or terminal users for ECDC operation. SCP4 is for Macintosh or terminal users for non-ECDC operation. The table below lists the SCPs and their corresponding profiles and operation modes.

	Operation Mode	&F Command
SCP1	ECDC	(&C1,&D2)
SCP2	non-ECDC	(&C1, &D2)
SCP3	ECDC	(&C0, &D0)
SCP4	non-ECDC	(&C0, &D0)

3.7 Major Stored Configuration Profile Major SCP

The major SCP is loaded to ACA each time the modem is turned on or reset by ATZ. To designate an SCP as the major SCP, issue command &Y followed by the SCP number.

You may load a selected SCP to ACA by issuing ATZ followed by the SCP number. In this case, however, the selected SCP is used only in that particular session. Once the modem is turned on or reset by ATZ, the major SCP is still loaded.

3.8 Active Configuration Area ACA

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

When the modem is turned on or reset by command Z, the ACA is loaded with the FDP (from the modem firmware ROM) and then overwritten by the major SCP (from the NVRAM). The commands you issue to modify the modem configuration actually changes the content of the ACA. However, once the modem is turned off, all the settings in the ACA will vanish.

To save the current ACA configuration to a SCP for further use, issue command &W followed by the SCP number.

Issuing command &V0 will display the current major configuration profile, the stored configuration profiles, as well as the current speed, data format, parity, and protocol.

3.9 Stored Telephone Numbers STN

STNs are the digits retained in the modem NVRAM to be used for dialing. You may save frequently used telephone numbers, passwords, or credit card numbers in it. Note that only digits can be stored in STN and other characters or symbols will be discarded.

To store a telephone number as an STN, use commands &Z0 through &Z9, followed by "=" and the telephone number. To view STN, issue command &V1. To dial an STN, issue S=n or /n, n denoting the nth STN.

For example:

AT&Z2=886-2-782-2456	Stores 88627822456 as STN2.
ATDT/3/7	Dials STN3 followed by STN7.

Chapter 4

SPECIAL FUNCTIONS

This chapter describes special modem operation functions and is designed to help users understand the modem in a greater detail.

4.1 Speed Dialing

Speed dialing lets you issue abbreviated dialing codes instead of whole telephone numbers and requires telephone numbers to be saved in STN. To use speed dialing, specify command S=n or command /n (n=0-9).

For example:

AT &Z2=782-2456	Stores 782-2456 as STN2.
AT DT S=2	Dials STN2 (782-2456).
AT DT /2	Dials STN2 (782-2456).
AT DT 886-2 /2	Dials 886-2 STN2 (782-2456).
AT DT 886-2 S=2	Dials 886-2 STN2 (782-2456).

4.2 Swap Dialing

Swap dialing automatically dials another telephone number when the first number is busy, by specifying two numbers spaced by swap dialing command N. When the modem goes to dial, it dials the first number. If the first specified number is busy, the modem dials the second number.

For example:

ATX4DT7822456N7822591	The modem dials 782-2456 first, if busy, then disconnects and dials 782-2591 if the first number is busy.
ATX4DT S=2 N S=5	Speed dialing can be combined

ATX4DT /2 N /5

with swap dialing. Both command lines instruct the modem to dial STN2 first. If STN2 is busy, STN5 is swap dialed. Note that to use swap dialing, busy detection must be enabled by command X3 or X4.

4.3 Redialing

Your modem can automatically redial a call if the line is busy. To do so, issue the appropriate N= and N5= commands.

For example:

AT X4 N=5 N5=15 DT 782-2456

Redials the number 782-2456 every 30 seconds and up to 5 times if the line is busy. Note that command X3 or X4 should be issued to enable busy detection.

4.4 Leased Line Operation

In addition to dialup line operation, the modem can be used on a leased line for dedicated communications between two destinations. To set up a pair of modems for leased line communications, follow the procedures below:

1. Connect two modems on the 2 wire or 4 wire leased line and make sure the 2 wire or 4 wire leased line is connected to the modem phone jack. Use the RJ-45 to Y-connector cable supplied with your modem (see Appendix B). Leased line wires should be connected to the two or four outside wires.
2. Make sure both modems are in smart mode so they can accept commands.
3. Issue command &L1 (2 wire) or &L2 (4 wire) to both modems to select leased-line operation.
4. Issue command ATD to one modem to initial it for dialing mode.

5. Issue command ATA to the other modem to initial it for answering mode.
6. The two modems should then establish a connection and go on-line through the leased line.

Note that two modems on a leased line link must be set to exactly the same protocol, one in dialing mode and the other in answering mode.

To set the modem to auto answer mode, assign a non-zero value to register S0. The AA (Auto Answer) indicator on the modem front panel will be lit.

4.5 Power On Leased Line Operation

In leased line applications, the modem can be set to automatically connect with a remote site each time it is turned on and continuously attempt to establish a leased line connection with a remote modem until successful. For power on leased line operation:

1. Set your modem for leased line operation as explained in the previous section.
2. Issue AT&F&L1S0=1@I1&W to one modem, setting it as the 2 wire leased line answering modem.
3. Issue AT&F&L1S0=0@I1&W to the other modem, setting it as the dialing modem(Simply change &L1 to &L2 in step 2 and step 3 for 4 wire leased line system.).
4. Both modem are now ready for power on leased line operation.
5. You can also set up your modem by using LCD control panel from step 2 to step 3.
6. Once you've saved dumb mode setting to your modem's NVRAM and next time when you turn on your modem it will not accept AT command, you should only use LCD control panel to change it return to smart mode.

4.6 Leased Line Dialup Backup

The modem supports a dialup backup capability, which automatically dials STN0 through the connected dialup line when the leased line carrier is lost. Thus, a backup connection is automatically initiated if the leased line is disconnected.

AT@Y2	Issue this command after connecting both the leased line and dial up line to the modem.
AT@Y0	Issue this command to disable the dial up back up function, whether the dial up line is connected or not.
ATS15=10	Switches back to the leased line 10 minutes after establishing a connection through the dialup line and detects if a leased line connection can be established. Functional only in dial mode.
ATS13=200	Limits the number of times the modem switches between the leased line and dial up line to 200 times.
ATN=3	When the dial up line is busy, the redial times does not exceed 3 times.
AT-B2	After the leased line is disconnected, the number of retries does not exceed 2 times.
ATD or ATA	Executes the Dial or Answer commands.

4.7 ITU-T V.23 Operation

In ITU-T V.23 mode, the modem operates at 1200 bps in one direction and 75 bps in another. In many countries this protocol is mainly used for Videotex services, including BTX and Minitel.

B2 The modem uses the V.23 backward channel, transmits at

75 bps and receives at 1200 bps. For Videotex service.

B3 The modem uses the V.23 main channel, transmits at 1200 bps and receives at 75 bps. For host side use.

With either user or host channels, once the modem connects in V.23 mode, it responds with CONNECT 1200 and data speed between the modem and computer is fixed at 1200bps in both directions. The 75bps path is buffered by the modem and controlled by the RS-232C CTS (Clear To Send) signal to prevent overflow.

4.8 Power On Auto Dialup

After the power is turned on, the modem can immediately dial the Nth telephone number set. Note that telephone numbers must first be set up with command &Zn= before using this function.

AT&A&W	When the power is turned on, the modem dials the STN 0 telephone number set and saves it as the major profile.
AT&A3&W	When the power is turned on, the modem dials the STN3 telephone number set and saves it as the major profile.

4.9 Dialup Simulate Leased Line

If the dial up line is disconnected due to the line circuit, the modem can immediately establish a connection. If the disconnection is due to human factors, such as DTR disconnection or ATH, then the modem will not attempt to establish a connection.

AT@Y1	Enables the dialup simulate leased line function.
ATDxxx	Executes the Dial command.

4.10 Connection Password Security

Your modem supports connection password security, which prevents unauthorized connection to your modem.

@E1	Enables connection password security and your modem waits for a password from the calling modem. If the correct password is received, the modem establishes a connection, otherwise it responds with NO CONNECTION.
ATDT 782-2456,,,123	Remote modem callers should type 123 for connection, if your connection password is 123.

The modem waits 15 seconds for passwords, and assigning a different value to register 48 changes the waiting period. Note that the number of commas (waiting period) you type after the telephone number can not not exceed the S48 value.

@P=	Sets the connection password (up to 9 digits, 0-9, *, and # on a touch tone telephone keypad.
AT@P=7452	Sets the local modem connection password.
AT@E1	Enables the local modem to connect the password.
ATS48=15	Instructs the local modem to disconnect if no password is entered within 15 seconds.
ATA or S0=1	Determines when the ring comes in.
@F	Views the password.

4.11 Remote Access (RA)

The modem supports remote access operation and remote access security. For remote access, first turn on the remote access second channel in the LCD SETUP Main Menu: Remote Access Directory. After the RA SEC CHANNEL is ON, you can configure or issue commands from remote sites. If the RA SEC CHANNEL is OFF, you cannot use the remote access function.

@F	Views the RA password.
*E	Enables (*E1) or disables (*E0) RA capability and is used for security purposes. Issue command *E1 for RA links, but note that RA links are only possible if the RA SEC CHANNEL in the REMOTE ACCESS directory is activated, in addition to command *E1.
*P	Set RA Password.

4.12 VAR Password Protection

With VAR Password Protection, software developers (Value-Added Reseller, VAR) can implement check points so software executes pre-designed subroutines or quits execution if incorrect VAR passwords are detected. If passwords are correct the modem responds with OK, otherwise it responds with ERROR. Besides many other applications, this feature protects VARs from software pirates who illegally duplicate software.

AT@S0<old password>; <new password> (Set new VAR Password)

AT@C0=<password> (Checks the VAR password)

4.13 Call Back Security

Call back security protects against callers without the right to access your system, allowing you to limit incoming calls to selected persons. Call back security allows 10 telephone numbers to be stored in the NVRAM.

After connection with the local modem, an opening message is sent to the caller. Then, at the password prompt, callers have ten seconds to enter the call-back password.

If the correct password is received, a goodbye message is sent, ending the call back security checking procedure and followed by a hang up. The telephone number corresponding to the received password is called in the delay time specified by command @D. If an incorrect password is received or if there is inactivity for more than ten seconds, the modem hangs up.

AT@A1	Enables call back security.
AT@Z3=7820041	Sets the 3rd telephone number set as 782-0041.
AT@W3=MISC	Sets the 3rd telephone number set password as MISC.
AT@D10	Enables a 10 second delay between successful password entry and the matching dial back telephone number set.
ATA or S0=1	Determines when the ring comes in.

4.14 Automatic Detection of Data/Fax/Voice Call

With standard AT, fax and Voice/Audio command set, the Discovery 2814LC modem can automatically detect data, facsimile, and voice call, and give a proper response immediately. For more details about the usage, please refer to the Data/Fax/Voice multi-communication software user's manual bundled with the modem.

4.15 V.25bis Operation

Your modem is equipped with ITU-T V.25bis protocol, which allows you to enter PSDN through PSTN, while in synchronous mode.

The Discovery LCD modem supports Asynchronous Mode, Synchronous HDLC Mode (Bit Sync Mode), and Synchronous BSC Mode (Byte Sync Mode). The following are the commands to enter the three modes:

*C0	Disable V.25bis.
*C1	V25bis Async.
*C2	V25bis Bisync.
*C3	V25bis HDLC

Please note the following before setting you modem to the above mentioned modes.

1. Remember to issue command &W after the setting if you want to save it.
2. Only in V.25bis Asynchronous Mode you can issue V.25bis commands (hardware control). In HDLC Mode and BSC Mode you need a synchronous card to issue V.25bis commands.

Command Instructions:

The following are V.25bis commands, their definitions, and instructions for use.

1.) CIC (Connect Incoming Call)

Definition:	To clear DIC (Disregard Incoming Call), to respond to incoming call**.**
Limits:	DTR should be on and INC counter >0(S1>0).

Message: If commands are issued properly, you can execute ATA actions (manual answering), and you will receive a CNX response. If the proper commands were not issued, you will receive an INV (failure) response.

2.) CRN (Call Request with Number)

Definition: Dial command like ATD.
Limits: None.
Message: If a failure occurs while executing CRN commands, the following responses will be issued:

CONDITION	RESPONSE
1. DTR Off	INV
2. Parameter Error	INVPV
3. No Dial Tone	CFIAB
4. No Carrier	CFIRT
5. No Answer	CFINT
6. Busy	CFIET

For example:

Command and Response	Status	Instruction
1. CRN2577125 INV	DTR Off	Dial DTR is off
2. CRN257AB25 INVPV		Telephone number: only 0-9, w, , , >, P, T, !, and spaces.
3. CRN2577125 CFIET	Busy	Dial Busy

3.) CRS (Call Request with Memory Address)

Definition: Like command ATDS.
Limits: None.
Message: Same as CRN.

Example: CRS 1 (Dials STN1)
2577125
CFIRT (No Carrier)

4.) CNL (Extended V.25bis Command Set)

Definition: Executes any AT command except *, %, +, -, &T, &V(Note:&V only effect in Async V.25bis mode.)
Limits: None.
Message: Successful response is VAL.
Failed response is INVCU.
Example: 1.CNLX4B1
VAL
2.CNL&T
INVCU (&T is not the correct command)

5.) DIC (Disregard Incoming Call)

Definition:
Limits: S0 and S1 can not equal 0.
Message: Successful response is VAL.
Failed response is INV.

Example: 1. INC (S0 not equal to 0, S1 not equalto 0)
DIC (DTE command)
VAL
2. (S0=0)
DIC
INV
3. (S0 not equal to 0, S1 not equal to 0)
DIC
INV

6.) RLN (Request List of Stored Telephone Number)

Definition: Similar to command &V1.
Limits: None.
Message: Successful response is VAL.
Failed response is INVPV.

Example:

1. RLN (Lists all)
   LSN 0;
   LSN 1; 318
   :
   :
   LSN 9 ; 7822456
   VAL
2. RLN 1 (Lists STN1)
   LSN 1; 318
   VAL
3. RLN 10 (Lists STN0)
   INVPV (Range: 0-9)

7.) PRN (Program Telephone Number)

Definition: Stored telephone number to STNn.
Limits: None.
Message: Successful response is VAL.
Failed response is INVPS.

Example:

1. PRN 2 ; 433 (Sets STN2=433)
   VAL
   RLN 2 (List STN2)
   LSN 2 ; 433
   VAL
2. PRN 2 (Clears STN2)
   VAL
   RLN 2
   LSN 2

VAL

3. PRN 10
   INVPV (Range: 0-9,)

Reponse Message Definitions

The following are response messages followed by their definition.

1. INC: Like AT command "ring message."
2. CNX: Like AT command "connect message."
3. VAL: Like AT command "OK message."
4. INVxx: Like AT command "error message."
5. CFIxx: Like AT command ATD's "error message"

INVCE: Command Unknown/Unexpected Error

INVMS: Message Syntax Error

INVPS: Parameter Syntax Error

INVPV: Parameter Value Error

CFUET: Remote Busy

CFINS: Telephone Number not stored

CFICB: Local Busy

CFIRT: No Carrier

CFIAB: Abore Call/No Dialtone

CFINT: No Answer

CFIFC: Forbidden Call

4.16 Voice/Audio Function

In addition to data communication and fax transmission, Discovery 2814LC also can run with Voice/Audio management software. Running with the software, Discovery 2814LC can support about 1000 voice mail boxes., receive voice messages, and listen to the voice message or delete message at any time even from remote site. The functions are better not only than answering machine but also telephone-secretary system. For more details, please refer to the Data/Fax/Voice multi-communication software user's manual. The author of the software also release complete Voice/Audio command (appendix E) as a reference for Voice/Audio programmer.

Chapter 5

COMMAND REFERENCE

This chapter describes all the available modem commands. The default settings, if applicable, are indicated by bold characters. Note that in order to meet local telephone company regulations, some modem commands might have been removed or set to a different default.

5.1 Answer Call Immediately A

Command A instructs the modem to take the telephone line off hook and generate a carrier tone. Incoming calls are manually answered.

5.2 Manual Answer and Auto Answer An

Range: n=0-255 Unit: Rings

Command An instructs the modem to immediately answer incoming calls. The number of rings by which the modem goes off hook to answer is determined by register S0.

If a number follows command An, the modem goes off hook to answer on the specified number of rings.

For example:

A3 Instructs the modem to auto answer on the third ring and then enter data state after a connection is successfully established.

5.3 Attention Code AT

Command AT clears the command buffer and informs the modem of your computer‘s transmission speed and data format. Any command line, except A/ and +++, must start with an AT prefix and end with a carriage return.

5.4 Repeat Last Command A/

Command A/ instructs the modem to re-execute the last command line stored in the command buffer. This is the only command that does not require an AT prefix and carriage return.

5.5 Bell or ITU-T Standard B

Command B selects the following communications protocols:

B0 Selects ITU-T/Bell auto protocol, used in most countries around the world.

B1 Selects Bell protocol, used mainly in U.S.A. and Canada.

B2 Selects ITU-T V.23, Back Channel.

B3 Selects ITU-T V.23, Main Channel.

5.6 Dial In Originate Mode D

Command D instructs the modem to dial the number following it and enter data state after a connection is established.

The number following command D may include the digits 0 through 9, dial modifiers A, B, C, D, N, P, T, R, S, S=n, W, the symbols *, #, @, , (comma), ! (exclamation), ; (semicolon), and /n.

Swap Dialing N

Inserting command N between two telephone numbers in a dial command line instructs the modem to swap dial the second specified number if the first number is busy.

For example:

AT X4 DT 782-2456 N 782-0305	The modem dials 782-2456 first; if 782-2456 is busy, it swap dials 782-0305.

To use swap dialing, either X3 or X4 must be in effect so the modem can detect a busy signal.

Dial In Answer (Reverse) Mode R

Attaching command R at the end of a dial command line instructs the modem to place a call and establish a connection in answer mode. Reverse mode dialing is useful when calling an originate-only modem.

Dial Stored Telephone Number S=n(or/n)

Issuing dial modifier S=n after dial command D instructs the modem to dial the stored telephone number (STN) previously saved with command &Zn.

For example:

AT &Z2=782-2456	Saves 782-2456 to STN2.
AT DT S=2(or/2)	Dials 782-2456 (STN2).
AT DT 886-2 S=2(or/2)	Dials 886-2-782-2456.
AT DT S=2 N/4	Dials STN2; if STN2 is busy, STN4 is swap dialed.

When dial modifier S=n is used, the command buffer will count S=n as three characters. Also, dial modifier S=n must be preceded by dial command D, DT, or DP.

Pause , (Comma)

Command , (comma) instructs the modem to wait for the time interval specified by register S8 before proceeding with the commands following it in the command line.

The duration of the pause is default at 2 seconds and is changed by assigning a new value to register S8. You may use multiple commas in sequence for a longer pause time.

Wait For Silent Answer @

Command @ instructs the modem to wait for the time specified by register S7 and followed by 5 seconds of continuous silence, before proceeding to dial the following digits.

The modem will disconnect and respond with NO ANSWER if it fails to detect continuous silence, or respond with BUSY if it detects a busy tone (either X3 or X4 must be in effect).

Flash ! (exclamation)

Command ! (exclamation) instructs the modem to go on hook for half a second and then off hook. This command is used for call transferring.

Return to Command State ; (semicolon)

Ending a dial command line with command ; (semicolon) instructs the modem to enter command state after dialing, rather than going on-line and into data state. Other commands may follow command ; in the same command line.

5.7 Command Character Echo E

Command E enables or disables the sending of command characters back to the computer. It is only effective in command mode.

E0 Displays the echo of command characters. It is used when command characters appear in double on your screen or when you use the modem with a host computer and do not want the command characters echoed.

E1 Enables the modem to echo command characters to your computer to view and verify the command line on the screen.

5.8 On or Off Hook H

Command H instructs the modem to go off hook (use the telephone line) or go on hook (hang up).

H0 Modem goes on hook.

H1 Modem goes off hook.

5.9 Identification I

Command I allows the modem‘s product code and firmware version to be checked, and executes firmware tests.

I0 Displays the modem‘s product code (Part I).

I1 Displays the checksum code of the modem‘s firmware ROM in ASCII digits followed by a carriage return and line feed.

I2 Executes the modem‘s checksum test and sends an OK or ERROR response code.

5.10 TX Level K0=n

Range: n=0~15 default: 10

Command K0=n determines the carrier level control (-n dbm).

TX level setting:

Leased line TX level: 0 ~ -31dBm

Dial line TX level: 0 ~ -15dBm

5.11 Speaker Volume L

Command L adjusts the modem speaker volume for call progress monitoring. When the speaker is turned on:

L0 Selects off speaker volume.

L1 Selects low speaker volume.

L2 Selects medium speaker volume.

L3 Selects maximum speaker volume.

5.12 Speaker On or Off M

Command M turns the modem‘s speaker on or off for call progress monitoring.

M0 Turns the speaker off at all times.

M1 Turns the speaker on until a connection is established.

M2 Turns the speaker on at all times, even after a connection is established.

M3 Turns the speaker on until a carrier is detected, but turns the speaker off when the modem is dialing.

5.13 Redial Times N=n

Range: n=0-15 Unit: Times Default: 0

Command N=n determines how many times the modem redials a call if a busy signal is detected. The default setting is N=0 so the modem will not redial.

Note that the redial function is cancelled if you abort dialing.

5.14 Redial Interval N5=n

Range: n=0-255 Unit: 2 sec Default: 1

Command N5=n adjusts the time interval between redialing, where n denotes the interval in seconds.

For example:

N5=45 Instructs the modem to redial a call every 90 seconds.

5.15 Read Redial Count N?

Issuing N? displays the redial times setting.

5.16 Read Redial Interval N5?

Issuing command N5? displays the time interval between the number of redial times.

5.17 On-Line O

Command O instructs the modem to enter on-line data state.

- O0 Instructs the modem to enter on-line data state and resume data transmission with the remote modem.
- O1 Instructss the modem to enter on-line data state and initiates an equalizer retrain sequence at the same speed. This is used when excessive bit error rates occur and a retrain might reduce the errors attributed to a loss of equalization. Note that this command is effective only at 2400 bps or above.

5.18 Pulse Dialing P

Inserting command P before a telephone number instructs the modem to pulse dial the number. You may insert command P anywhere in a dial command line, even between digits.

For example:

AT DT 9 , P 782-2456	Instructs the modem to tone dial 9, wait for two seconds (comma character), and then pulse dial 782-2456.

5.19 Response Codes Q

Command Q enables or disables the sending of response codes after a command line is executed.

Q0 Enables the sending of response codes.

Q1 Disables the sending of response codes. This feature is useful if the modem is connected to a printer that prints out undesired response code characters.

5.20 Read Register Sr?

Command Sr? displays the content of register r.

For example:

ATS7?	Displays the value stored in register S7.
ATS5?S7?	Displays the values in both register S5 and S7.

5.21 Set Register Sr=n

Command Sr=n sets register r to value n.

For example:

ATS0=3	Sets register S0 to3.

5.22 Touch Tone Dialing T

Inserting command T before a telephone number instructs the modem to tone dial the number. The tone dialing speed is determined by register S11.

You may insert command T anywhere in a dial command line, even between digits, to have the modem tone dial the following digits.

For example:

AT DP 9 , T 782-0002	Instructs modem to pulse dial 9, wait for two seconds (comma character), and then tone dial 782-0002.

5.23 Word or Digital Response Codes V

Command V instructs the modem to send response codes in either word or digit form.

V0 Sends response codes in digital form. This form is convenient when using the modem with software that does not handle character strings efficiently.

V1 Sends response codes in word form, such as OK or CONNECT. This form is easier for users to read.

5.24 Wait For Second Dial Tone W

Inserting command W in a dial command line causes the modem to wait for a three second continuous dial tone before proceeding to dial the digits following it. The modem will respond with NO DIAL TONE if it fails to detect the tone or with BUSY if the line is busy.

5.25 Response Set Xn

Range: 0~4 Default: 4

Command Xn determines which response code is enabled or disabled.

X0 Enables basic set of response codes 0-4.

X1 Enables response codes 0-5, and 10-end.

X2 Enables response codes 0-6, and 8-end.

X3 Enables response codes 0-5, and 7-end.

X4 Enables all standard response codes.

5.26 Clear Down Disconnect Y

This command enables or disables the modem clear down disconnect feature.

Y0 Disables clear down and long space disconnect.

Y1 Enables long space disconnect. The modem hangs up when it receives 1.6 seconds of continuous break signal. Also, it sends a 4 second break signal before disconnecting when it receives command ATH or when it detects a DTR on-to-off transition if &D2 option is selected.

Y2 Enables clear down disconnect.

5.27 Reset Zn

Command Zn resets the modem a with factory default profile (FDP) and a stored configuration profile (SCP).

Z0 Resets the modem with FDP and then with the major SCP (if command &Y is in effect).

Z1 Resets the modem with SCP1.

Z2 Resets the modem with SCP2.

Z3 Resets the modem with SCP3.

Z4 Resets the modem with SCP4.

5.28 Power On Auto Dial with STN &An

Range: n=0-9, 99. Default: 99 (disable)

Command &An instructs the modem to automatically dial a STN (denoted by n and saved with the appropriate &Z= command) everytime the modem is turned on.

5.29 CD Option &C

Command &C determines how the modem reacts to the conditions of a CD (Carrier Detect) interchange circuit.

&C0 CD is always forced ON.

&C1 Modem tracks the data carrier from the remote modem and initials CD accordingly.

5.30 DTR Option &D

This command determines how the modem reacts to a DTR (Data Terminal Ready) on-to-off transition.

&D0 Instructs the modem to ignore a DTR.

&D1 Instructs the modem to assume command state upon detecting a DTR on-to-off transition, but maintains an active line connection.

&D2 Instructs the modem to go on hook, assume command state, and disable auto answer upon detecting a DTR on-to-off transition. The auto answer function can be re-enabled by turning DTR on again.

&D3 Instructs the modem to re-initialize itself when it detects a DTR on-to-off transition. The ACA is overwritten by the active SCP.

5.31 Load Factory Default Profile &F

Commands &F0 through &F12 load the factory default profile (FDP) into the modem's Active Configuration Area (ACA). The FDP is viewed by issuing command &V.

&F0 For asynchronous, dialing, V.42bis ECDC links.

&F1 For asynchronous, answering, V.42bis ECDC links.

&F2 For asynchronous, answering, direct links.

&F3 For asynchronous, answering, direct links.

&F4 For asynchronous, dialing, normal links.

&F5 For asynchronous, answering, normal links.

&F6 For synchronous, dial in links.

&F7 For synchronous, answering, direct links.

&F8 For synchronous, V.25bis links.

&F9 For synchronous, V.25bis Bisync links.

&F10 For synchronous, V.25bis, Data package links.

&F11 For power on, 2 wire, leased line.

&F12 For power on, 4 wire leased line.

5.32 Guard Tone &G

Command &G selects the guard tone in ITU-T V.22 and V.22bis modes and is effective only in these modes.

&G0 Disables guard tone.

&G1 Selects 550 Hz guard tone.

&G2 Selects 1800 Hz guard tone.

5.33 Leased Line or Dialup Line &L

Command &L is issued according to the type of telephone line used with the modem.

&L0 Sets the modem for dialup line operation.

&L1 Sets the modem for 2 wire leased line operation.

&L2 Sets the modem for 4 wire leased line operation.

5.34 Asynchronous or Synchronous Mode &M

Command &M is issued to determine synchronous or asynchronous communications mode operation. Note that this command has the same function as command &Q.

&M0 Sets the modem to asynchronous mode to accept asynchronous commands.

&M1 Sets the modem to synchronous mode 1 (asynchronous dialing).

&M2 Sets the modem to synchronous mode 2 (DTR on-to-off transition, can dial STN0 immediately).

&M3 Sets the modem to synchronous mode 3 (DTR on-to-off transition, starts handshaking directly).

5.35 Pulse Dialing &P

Command &P determines the pulse dialing method. Note that command &P is effective only when pulse dialing.

&P0 Selects the make/break ratio of 39/61 for modem use in U.S.A. or Canada.

&P1 Selects the make/brake ratio of 33/67 for modem use in United Kingdom or Hong Kong.

5.36 Asynchronous or Synchronous Mode &Q

Command &Q has the same functions as command &M. See the command &M section.

5.37 CTS to RTS Option &R

Command &R determines how the modem reacts to a CTS (Request To Send/ Clear To Send) signal. Note that command &R is effective only in synchronous mode.

&R0 CTS will follow the condition of RTS.

&R1 RTS is ignored and CTS is forced on.

5.38 Data Set Ready (DSR) Option &S

Command &S determines how the modem operates the DSR Data Set Ready) signal. Note that command &S is effective only in synchronous mode.

&S0 DSR is forced on.

&S1 DSR operates according to EIA RS-232C specifications.

5.39 Diagnostic Tests &T

Command &T instructs the modem to perform various diagnostic tests. See the Chapter 6 of this manual for further details.

5.40 Read Configuration Profile &V

Command &V displays the stored configuration profile (SCP), the stored telephone number (STN), and current modem operation states.

&V0 Displays ACA, SCP, and current modem operational status.

&V1 Displays STN.

5.41 Write Configuration Profile &W

Command &W writes the content in the active configuration area (ACA) to one of the stored configuration profiles (SCP).

&W0 Writes ACA to the major SCP.

&W1 Writes ACA to SCP1.

&W2 Writes ACA to SCP2.

&W3 Writes ACA to SCP3.

&W4 Writes ACA to SCP4.

After saving a profile, enable it by issuing the proper &Y command.

5.42 TX Clock &X

Command &X selects the TX clock setting in synchronous mode.

&X0 Sets Internal TX clock to Pin 15 (RS-232).

&X1 Sets External TX clock from Pin 24 (RS-232).

&X2 Sets Slave TX clock to Pin 15 (RS-232).

5.43 Major Stored Configuration Profile &Y

Command &Y assignees a stored configuration profile (SCP) as the major SCP, which is used when command Zn or &W are executed or when the modem is turned on.

&Y1 Assigns SCP1 as the major SCP.

&Y2 Assigns SCP2 as the major SCP.

&Y3 Assigns SCP3 as the major SCP.

&Y4 Assigns SCP4 as the major SCP.

5.44 Stored Telephone Number &Zn=

Range: n=0-9

Command &Zn=x stores the telephone number following it as an STN, to be used later by issuing dialing modifiers S=n or /n.

For example:

AT &Z0=782-2456	Stores 782-2456 as STN0.
AT &Z9=02-782-0305	Stores 02-782-0305 as STN9.
AT &Z9=	Clears STN9.

Each STN can contain up to 49 digits with a total length of not more than 10 sets per 100 digits. Spaces are ignored and will not be stored.

5.45 Escape Character +++

Escape character (+++) instructs the modem to leave data state and enter command state without breaking the connection. Note that this command is only effective in asynchronous mode.

For the modem to distinguish escape characters from data, escape characters must be preceded and proceeded by a guard time period. This is called the escape sequence. To enter the escape sequence while the modem is on line in data state:

1. Wait for one second of guard time without typing or transferring anything.
2. Enter the three consecutive escape characters (+++). Do not press the return key.
3. Wait for another second of guard time without typing or transferring anything.

Upon recognition of the escape sequence, the modem sends an OK response code and escapes to command state.

The default escape character is + (ASCII 43) and the default guard time is one second. Both are changed by adjusting the values in registers S2 and S12, respectively.

5.46 Call-Back Security @A

Command @A enables or disables the call back security function.

@A0 Disables callback security.

@A1 Enables call back security.

5.47 Ring Sound Control @B

Command @B enables or disables the ringing sound generated through the modem speaker when an incoming ring is detected.

@B0 Disables incoming ring sound.

@B1 Enables incoming ring sound.

5.48 Check VAR Password @Cn

This command checks the passwords VP0 and VP1.

@C0 Check VAR Password VP0.

@C1 Check VAR Password VP1.

To check the VAR password VP0 or VP1, you can flow the syntax below with the corresponding response depending on the validity of the password issued.

Syntax:

AT@Cn=<pattern> <CR>,where<pattern>is the VPn.

Response:

OK	If<pattern>=<VP0>or<VP1>
ERROR	If<pattern>is not equal to <VP0/VP1>

5.49 Call Back Security Time Delay @Dn

Range: 1-255 Unit: sec Default: 30

Command @Dn instructs the modem to wait for the specified delay time before proceeding to dial the caller's telephone number.

5.50 Connection Password Security @E

Command @E enables or disables connection password security. If enabled, callers must include the correct password in the dial command string. If the password is correct, a connection is established. Otherwise, there will be no modem connection.

@E0 Disables connection password security.

@E1 Enables connection password security.

5.51 View Connection and Remote Access Passwords @F

Command @F displays the connection password defined by @P, as well as the RA password defined by command *P.

5.52 Closing Message @G

String length up to 60 characters.

Command @G sets a closing message. Refer to the syntax below.

AT@G <enter>

Message: <enter message string> <enter>

OK

The default closing string is:

THANK YOU! YOU WILL BE CALLED BACK!

5.53 Smart/Dumb Mode @

Command @I instructs the modem to enter smart or dumb mode.

@I0 Sets the modem to smart mode.

@I1 Sets the modem to dumb mode and is disabled when the modem is turned off.

5.54 Opening Message @O

String length up to 60 characters.

Command @O sets an opening message. Refer to the syntax below.

AT@O <enter>

Message: <enter message string> <enter>

OK

The default opening string is:

PLEASE ENTER CALL BACK PASSWORD.

5.55 Set Connection Password @P=x

String length up to 9 characters, numbers 0 through 9, *, or #.

Command @P=x defines the password required to establish a connection when connection password security is enabled.

5.56 View VAR Buffer A @Q0

This command views the VAR buffer VP0. It's optional and only available when customer gives his request.

5.57 Set VAR Password @S0

This command writes the protection VP0 defined by @S0

To write the password to the VAR buffer follow the syntax below:

Syntax: AT@S0=<old password>;<new password><CR>

Response: OK if<old pattern>=<VP0>then<VP0>=new password

5.58 View Call Back Settings @Vn

Command @V allows you to view and check passwords, messages, and telephone numbers stored in the modem memory.

@V0 View call back security password dictionary.

@V1 View call back security telephone directory.

@V2 View call back security opening/closing message.

5.59 Set Call Back Password @Wn=x

n=0-9 x=up to 10 numbers or letters.

@Wn=x sets the call-back password of set n into x.

5.60 Line Selection @Y

Command @Y selects modem telephone line operation.

@Y0 Selects normal line operation.

@Y1 Selects dial up simulate leased line operation.

@Y2 Selects leased line backup dialup operation.

5.61 Set Call Back Telephone Number @Zn=

n=0-9 String can contain up to 49 dial modifiers.

To set the call back telephone number, issue command:

@Zn= <dial modifier string>

5.62 V25bis Operation Modes *C

Command *C determines V25bis operation modes.

*C0 Disables V25bis operation.

*C1 Enables V25bis asynchronous operation.

*C2 Enables V25bis bi-synchronous operation.

*C3 V25bis HDLC operation

5.63 Remote Access Operation *E

Command *E enables or disables RA operation.

***E0 Disables RA operation.**

*E1 Enables RA operation.

5.64 Set Remote Access Password *P

Command *P sets an RA password, which is required to establish an RA link. No password is set at the factory. Please note the following before setting the RA password:

1) Command *P must be the last command in a command line.
2) The RA password is limited to 9 printable ASCII characters.
3) The RA SEC CHANNEL in the LCD SETUP Main Menu: Remote Access Directory must be ON before an RA connection is possible.

5.65 Maximum MNP Block Size \A

Command \A sets the maximum MNP block size for reliable links.

\A0 Block size is 64 characters.

\A1 Block size is 128 characters.

\A2 Block size is 192 characters.

\A3 Block size is 256 characters.

5.66 Transmit Break \Bn

Range: 0-9 Units: 100 ms Default: 3 (300 ms)

Command \Bn instructs the modem to transmit a break signal to the remote system. In direct links, the break length depends on the value of n.

For example:

\B1 Indicates a break of 100 milliseconds.

\B2 Indicates a break of 200 milliseconds.

In reliable links, the break length is a constant 300 milliseconds, regardless of the value of n. If either \B or \B0 are issued, the modem sends a fixed 300 millisecond break to the remote system.

5.67 Auto Reliable Buffer Option \C

Command \C determines how the modem handles data it receives during the initial waiting period when answering a call in auto reliable mode.

\C0 Instructs the modem not to buffer data during auto reliable connection. All data received during this period will be discarded.

\C1 Instructs the modem to buffer the data it receives during the waiting period. In reliable links, the modem discards the data. If the waiting period (4 seconds) expires or 200 characters have been buffered, the modem falls back to normal mode and passes the buffered data to the local computer.

\C2 Instructs the modem not to buffer data and immediately switch to normal mode upon receiving the auto reliable fallback character defined by command %A. Data received prior to the auto reliable fallback character will be discarded and the fallback character is passed on to the computer.

Note that this command is valid only in answer mode. If the modem is in originate mode, it ignores command \Cn and will not buffer data during the MNP handshake period.

5.68 Normal Link Flow Control \G

Command \G enables or disables the XON/XOFF flow control on the communications port in a normal link. An XOFF signals the remote modem to stop sending data, while an XON resumes the transmission.

\G0 Disables XON/XOFF flow control on modem's communications port.

\G1 Enables flow control on modem‘s communications XON/XOFF port.

In direct links, no flow control is used. In reliable links, a special default scheme for flow control is used. In both cases, command \Gn is ignored.

5.69 Serial Port Baud Rate Adjustment \J

Command \J turns the modem's serial port baud rate adjustment capability on or off.

\J0 Turns off serial port baud rate adjustment. The serial port speed is fixed, regardless of the on-line speed. This is used when the modem is in normal or reliable link.

\J1 Turns on serial port baud rate adjustment. The modem automatically adjusts its serial port speed to match on-line speed, as a non-MNP modem.

5.70 Break Control \Kn

Command \K determines how the modem reacts to a break signal received from the local computer or the remote system.

Upon receiving a break signal from the local computer in on-line data state during a reliable or normal link, the modem reacts as follows:

n Modem response (in on-line data state).

0, 2, 4 Modem immediately enters command state but does

not send a break signal to the remote system.

1 Modem clears its buffer and immediately sends a break signal to the remote system.

3 Modem immediately sends a break signal to the remote system.

5 Modem sends a break signal to the remote system in sequence with the data received from the serial port.

5.71 Operation Modes \N

\N0 Selects normal mode.

\N1 Selects direct mode.

\N2 Selects MNP reliable mode only.

\N3 Selects ECDC auto reliable mode (V.42/MNP).

\N4 Selects V.42 reliable mode only.

5.72 Serial Port Flow Control Option \Q

Command \Q determines which flow control method the modem uses.

\Q0 Disables serial port flow control.

\Q1 Uses bi-directional XON/XOFF hardware flow control. An XOFF will stop transmission and an XON will resume it. XON/XOFF characters are generated by the modem with the same parity as data characters. The serial port also responds in the same way to an XON/XOFF sent from the local computer.

\Q2 Uses uni-directional CTS flow control. Data transmission from the local computer stops if the modem turns CTS OFF and resumes when CTS is turned ON.

\Q3 Uses bi-directional RTS/CTS flow contrl. Data transmission from the local computer to the modem

stops when CTS is OFF and resumes when CTS is ON. In contrast, data transmission from the modem to the local computer stops when RTS is OFF and resumes when RTS is ON.

\Q4 The serial port generates, but does not respond to XON/XOFF flow control characters.

\Q5 Uses uni-directional flow control just as \Q2 does, but kept CTS OFF until a connection is established.

\Q6 Uses bi-directional hardware flow control just as \Q3 does, but kept CTS OFF until a connection is established.

Note that flow control is not used if the modem is in a direct connection. Similarly, command \Q is ignored.

5.73 Inactivity Timer \Tn

Range: 0-255 Unit: Minutes Default: 0

Command \Tn determines how many minutes of inactivity the modem waits for before hanging up, if no data is sent or received during a normal or reliable link. The inactivity timer is effective in normal and reliable links, and must be set before the modem enters on-line state.

5.74 Result Code Form \V

Command \V determines whether the V.42bis/MNP extended response codes are displayed, as well as with or without data compression identifiers. In addition, it also selects to display the DCE or DTE speed.

\V0 Displays DCE speed but disables MNP/V.42 extended result codes (response codes 17 and higher).

\V1 Displays DTE speed and enables MNP/V.42 error correction response codes, without specifying if the connection is with data compression or not. The /REl identifier means the modem is in reliable link (error-correction, MNP Class 4), while the /V.42 identifier means the modem is in reliable link (error correction,

V.42) with or without data compression (MNP Class 5/V.42bis). The /NOR identifier means the modem is in normal link.

\V2 Displays DCE speed and enables MNP/V.42 error correction response codes, without specifying if the connection is with data compression or not. The /REL identifier means the modem is in reliable link (error correction, MNP Class 4), while the /V.42 identifier means the modem is in reliable link (error correction, V.42) with or without data compression (MNP Class 5/V.42bis). The /NOR identifier means the modem is in normal link.

\V3 Displays DTE speed and enables MNP/V.42 error correction response codes with data compression indicated. /REL COMP identifier means the modem is in MNP Classs 5 mode, while the /V.42BIS identifier means the modem is in V.42bis mode.

\V4 Displays DCE speed and enables MNP/V.42 error correction response codes with data compression indicated. The /REL COMP identifier means the modem is in MNP Class 5 mode, while the V.42BIS identifier means the modem is in V.42bis mode.

5.75 XON/XOFF Pass Through \X

Command \X determines whether the modem passes the XON/XOFF control characters it receives to the local computer or to the remote modem, to further process the characters. Note that command \X is valid only in normal or reliable modes. Note that data is lost if data transmission from the remote system starts before the modem is ready to receive it.

\X0 Disables XON/XOFF pass through if flow control is enabled by command \Q1 (DTE side) or \G1 (modem side). If flow control is disabled, the XON/XOFF characters are always sent as regular data.

\X1 Enables the XON/XOFF characters pass through to the local computer or the remote system.

5.76 Auto Reliable Fallback Character %An

Range: 0-127 Units: ASCII Default: 0

Command %An defines the ASCII character to be recognized as the auto reliable fallback character during the initial waiting period when the modem auto answers a call.

For example:

%A13 Defines the carriage return (ASCII 13) as the auto reliable fallback character.

When a carriage return is received during the initial waiting period, the modem immediately goes into normal mode.

The auto reliable fallback character is recognized only when the modem answers a call in auto-reliable (\N3) mode and \C2 is in effect.

5.77 Maximum Port Baud Rate %Bn

n=0, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800

Command %Bn sets the maximum modem port baud rate speed. The default is %B0, which sets the maximum on-line speed according to the serial port speed.

5.78 Data Compression %C

Command %C enables or disables data compression (MNP Class 5&V.42bis) capability during a reliable link.

%C0 Disables data compression.

%C1 Enables data compression (both MNP Class 5 and V.42bis).

5.79 Automatic Retrain %E

Command %E determines if the modem automatically initials a retrain when telephone line quality is poor.

%E0 Disables automatic retrain capability.

%E1 Enables automatic retrain. When line quality is poor, the modem attempts three times with same speed to re-establish the connection, for a total of six seconds, before hanging up.

%E2 Enables automatic retrain. When line quality is poor, the modem attempts three times with speed adjustment to re-establish the connection, for a total of six seconds, before hanging up.

5.80 DCE Speed %H

Command %H either enables or disables fixed DCE speed

%H0 Disables fixed DCE speed.

%H1 Enables fixed DCE speed.

5.81 Answer Tone Detection %I

Command %I enables or disables answer tone detection.

%I0 Enables answer tone detection.

%I1 Disables answer tone detection.

5.82 RX Line Level %L

Command %L reports the RX line level.

5.83 Signal Quality %Q

Command %Q reports signal quality (S/N).

5.84 Leased Line Retry -Bn

In leased line dialup backup operation, command -Bn determines the number of times (n) the modem attempts to establish a connection on a leased-line.

5.85 Multi-Phone Backup -M

Command -M determines the type of phone system connected to the modem

-M0 Disables multi-phone backup.

-M1 Enables multi-phone backup.

5.86 Modem Protocol -V

Command -V adjusts the modem's speed.

-V0 V.34 Auto.

-V1 V.FC Auto.

-V2 V.32bis Auto.

-V3 V.34/V.FC/V.32bis.

-V4 V.FC/V.32bis.

-V5 V.34 only.

-V6 V.FC only.

-V7 V.32bis only.

-Z= Multi-phone redial order set.

-Z? Multi-phone redial order query.

For example:

AT N=3	Set redial times to 3.
AT-M1	Enables multi-phone redial.
AT-Z=426	Dials STN 4, 2, and 6.
ATDT 782-2456	If the line is busy, the modem dials STN4,2, and 6; if STN 4,2, or 6 are busy, the modem redials 782-2456 for 3 cycles.

Chapter 6

DIAGNOSTIC TESTS

There might be times when the modem does not seem to cooperate no matter what you do. Because your communications system is made up of many links, the source of the problem might be the modem, your computer, the telephone circuit, the remote modem, the modem cable, or the remote computer. However, diagnostic tests can isolate system problems and eliminate time consuming guess work when communication failure or high error rates occur.

6.1 Diagnostic Test Functions

The following are the diagnostic tests your modem performs. Note that &T6, &T7, and &T3 are not applicable in Bell 103, CCITT V.21, or V.23.

Local Analog Loopback Test (LAL) &T1

Tests the communications path between the local modem and the local computer.

Local Digital Loopback Test (LDL) &T3

Tests the communications path between the modem, remote modem, remote computer, and telephone circuit.

Remote Digital Loopback Test (RDL) &T6

Tests the communications path between the modem, local computer, remote modem, and telephone circuit.

Remote Digital Loopback With Self Test (RDLST) &T7

Tests the communications path between the modem, remote modem, and telephone circuit.

Local Analog Loopback With Self Test (LALST) &T8

Tests the modem.

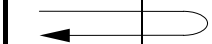
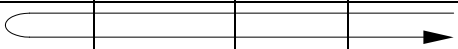
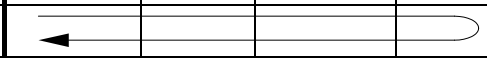
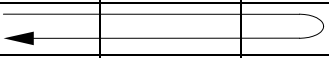
6.2 Preliminary Diagnostic Guide

A communications problem can stem from the telephone company circuit, local computer, remote computer, modem, or the remote modem. Even if the communications path is in order, communications software parameters may be set incorrectly.

The following are suggestions regarding diagnostic tests. Note that all tests should be initiated when the modem is in asynchronous command state with both the computer and modem set to full duplex operation.

1. To determine a failure due to the modem, perform an LALST test. This test verifies the modem itself.
2. To determine a failure due to the computer, perform LAL and LALST tests. If an LAL test fails but an LALST passes, the computer (or path) is probably at fault.
3. To determine a failure due to a faulty telephone circuit, perform LAL and RDLST tests to both the local modem and the remote modem. If both modems pass an LAL test but fail an RDLST test, the telephone circuit is probably at fault.

Modem problems most often arise from poor quality telephone lines. It is advisable that your modem is on a good direct line (without PBX).

	Local Side		Telephone	Remote Side	
	Computer	Modem		Modem	Computer
&T1(LAL)					
&T3(LDL)					
&T6(RDL)					
&T7(RDLST)					
&T8(LALST)					

6.3 Using the Test Timer S18

Register S18 determines all selftest duration's, and the modem automatically ends tests and returns to command state when the S18 time expires. The S18 default is zero, to disable the test timer.

6.4 Ending a Test &T0

A test can be terminated at any time by issuing the escape sequence, causing the modem to enter command state and then issue AT&T0. Any command following &T0 in a command line is ignored.

6.5 Local Analog Loopback Test &T1

The local loopback test (LAL) verifies the path between the computer and the modem. Everything you type on the keyboard during the test will be echoed by the modem back to the computer.

To initialize an LAL test, issue AT&T1. The test begins after the modem responds with a carriage return and a line feed. Type any character string on the keyboard, and the string should appear correctly on the screen. If errors are found, the modem, computer or path might be at fault.

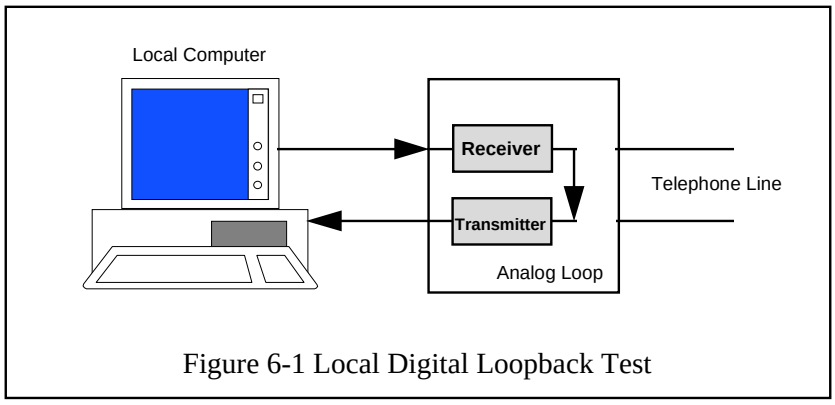


Figure 6-1 Local Digital Loopback Test

6.6 Local Digital Loopback Test &T3

The local digital loopback test (LDL) verifies both the modem and the telephone circuit. This is primarily used to permit a modem that is not ITU-T V.54 compatible to engage in an RDL test with your modem.

To initialize the test, issue command AT&T3 with your modem on-line and in command state. Your modem will loop the data it receives back to the remote station so the remote modem can perform an RDL test with your modem.

6.7 Grant or Deny RDL Request &T4/&T5

Issue AT&T4 as the default if you want the modem to accept an RDL test request from a remote modem. Issue AT&T5 to prohibit the modem from accepting an RDL test request.

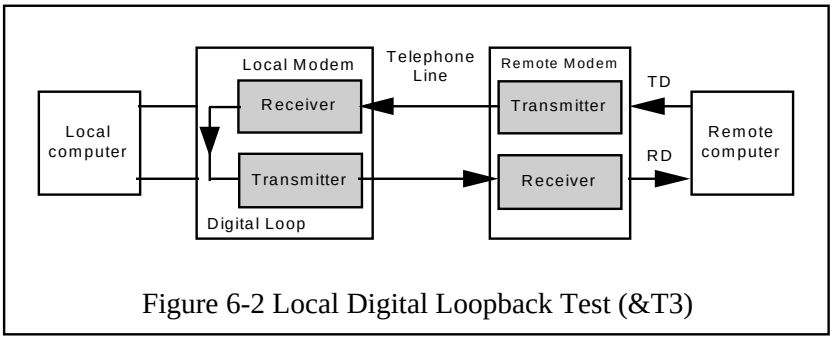


Figure 6-2 Local Digital Loopback Test (&T3)

6.8 Remote Digital Loopback Test &T6

The remote digital loopback test (RDL) verifies the local computer and modem, the telephone circuit and the remote modem. Issue AT&T6 to initiate the test. Note that the remote modem should issue AT&T4 to accept the digital loopback request.

The test begins after the modem has sent a carriage return and line feed. Type any character string on the keyboard and the string should appear correctly on the screen. If errors are found, either your computer, your modem, the remote modem or the telephone circuit is at fault. You can initiate LAL tests on both local and remote sides to further isolate the

problem.

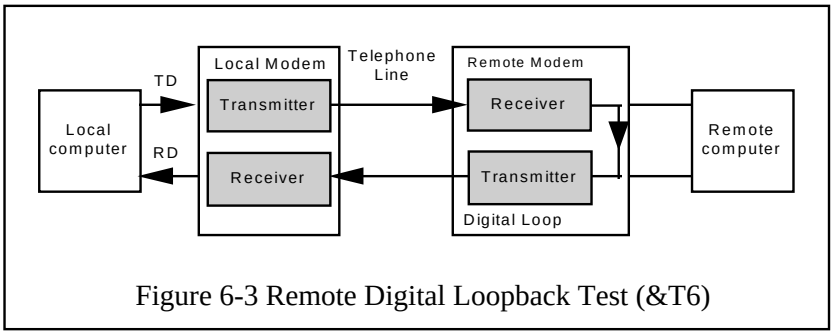


Figure 6-3 Remote Digital Loopback Test (&T6)

6.9 Remote Digital Loopback with Selftest &T7

The remote digital loopback selftest RDLST) verifies the local modem, telephone circuit and remote modem. In this test, your modem sends a self-generated test message to the remote modem. The remote modem then loops the test message back to your modem and your modem compares the received string with the original message to verify the path. To initiate the test, issue either of the following command lines when on-line in asynchronous command state.

AT S18=0 &T7	Test timer is disabled.
AT S18=30 &T7	Test timer is set for 30 seconds.

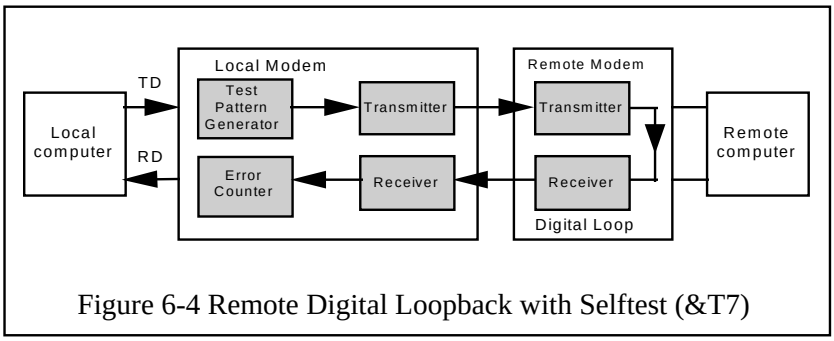


Figure 6-4 Remote Digital Loopback with Selftest (&T7)

The test begins after the modem sends a carriage return and line feed. To terminate the test when S18 is set to zero, use the escape sequence to bring the modem to command state and issue command AT&T0.

The modem then lists the number of errors detected within the time interval. A value of 000 means no errors and 255 means 255 or more errors.

6.10 Local Analog Loopback with Selftest &T8

In the local analog loopback selftest (LALST), the modem generates a test pattern to verify itself. Issue either of the following command lines to initiate the test.

AT S18=0 &T8	Test timer is disabled.
AT S18=30 &T8	Test timer is set for 30 seconds.

The test begins after the modem sends a carriage return and line feed.

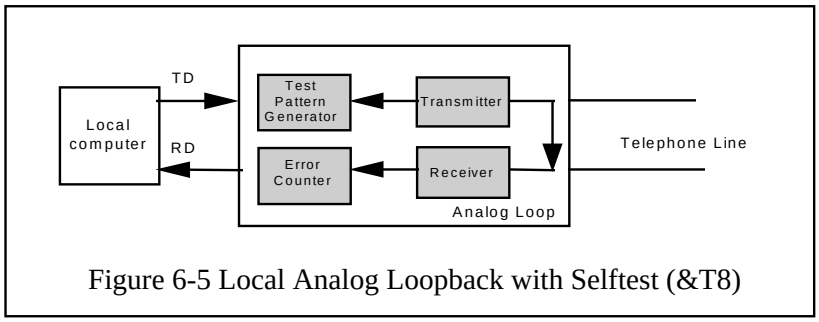


Figure 6-5 Local Analog Loopback with Selftest (&T8)

When the test is terminated, the modem responds with the number of errors detected during the test. A value of 000 means no errors and 255 means 255 or more errors.

Appendix A

MODEM REGISTERS

Modem registers determine operation characteristics. Appendix A describes each register individually, except for registers which cannot be modified. Registers in **bold** represent default settings.

Reading or Changing a Register

To read the current content of a register, issue command Sr?. To change the register, use command Sr=.

For example:

AT S7?	Reads register S7.
AT S7=150	Sets register S7 to 150.
AT S0?S16?	Reads registers S0 and S16.

Auto Answer Ring Number S0

Range: 0-255 Unit: Ring Default: 0

Register S0 determines the number of rings before the modem answers a call.

For example:

S0=0	Will not auto answer calls.
S0=3	Answers incoming calls after the third ring.

Ring Count S1

Register S1 counts the number of rings on the telephone line when the modem is set to auto answer. Register S1 is cleared eight seconds after the last ring. The default is 0.

Escape Character S2

Range: 0-127 Unit: ASCII Default: 43

Register S2 stores the escape character ASCII decimal value. Default value 43 is an ASCII "+."

Carriage Return Character S3

Range: 0-127 Unit: ASCII Default: 13

Register S3 stores the carriage return character ASCII decimal value, which terminates the command line and the response code.

Line Feed Character S4

Range: 0-127 Unit: ASCII Default: 10

Register S4 stores the line feed character ASCII decimal value, which follows a carriage return after a response code is sent. You might need to set this register to a different value if a non-standard DTE is used.

Backspace Character S5

Range: 0-32,127 Unit: ASCII Default: 8

Register S5 stores the backspace character ASCII decimal value, which is used as the backspace key for editing and as the echoed character to move the cursor backwards on the screen.

Wait Time Before Dialing S6

Range: 2-255 Unit: sec Default: 2

Register S6 determines how long the modem waits (after off hook) before proceeding to dial. This delay allows the central office to detect the off hook line status and apply a dial tone. If the delay time is too short, the modem will start dialing too early and the call will not go through because the central office did not receive the first few dialing

digits.

Register S6 is valid only when X0, X1, or X3 is in effect. If X2 or X4 are in effect, dial tone detection is enabled and the modem will not blind dial.

Wait for Carrier After Dialing S7

Range: 2-255 Unit: sec Default: 45

Register S7 determines how long the modem waits for a remote carrier signal after dialing or answering. If a carrier is detected, the modem goes on-line. Otherwise, the modem disconnects and responds with NO CARRIER.

Pause Time for a Comma (,) Dial Modifier S8

Range: 0-255 Unit: sec Default: 2

Register S8 determines how long the modem pauses when a comma command is given.

For example:

ATDP9,782-2456	Instructs the modem to dial the PBX access number 9 and then pause for 2 seconds before dialing 782-2456.

More than one comma command can be combined for a longer delay.

Carrier Detect Response Time S9

Range: 1-255 Unit: 0.1sec Default: 6

Register S9 determines how long a carrier signal must continuously exist before it is recognized as a valid signal by the modem. A longer S9 time gives the modem more time to distinguish the carrier signal from noise.

Loss of Carrier to Hang Up Delay S10

Range: 1-255 Unit: 0.1sec Default: 14

Register S10 determines how long the modem waits before hanging up after detecting a loss of carrier. This delay permits the carrier to momentarily disappear without causing the modem to disconnect. If this register is set to 255, the modem will ignore carrier status as though a carrier were always present.

Always set S10 to a value larger than S9. The acceptable length of time for momentary carrier loss is the difference between S10 and S9.

Touch Tone Dialing Speed S11

Range: 50-255 Unit: ms Default: 95

Register S11 determines the touch tone dialing speed. This register sets tone duration and spacing during touch tone dialing. The default is approximately 5.26 digits per second.

Escape Code Guard Time S12

Range: 0-255 Unit: 20ms Default: 50

Register S12 determines the required guard time before the first escape characters and after the last escape characters are entered. This allows the modem to distinguish the escape command from transmission data.

Leased Line Dialup Backup Times S13

Range: 0-255 Default: 5

Bits Mapped S14

Bit 0:		Reserved.
Bit 1:	0	Disable command echo. (E0)
	1	Enable command echo. (E1)
Bit 2:	0	Enable result code. (Q0)
	1	Disable result code. (Q1)

Bit 3:	0	Short form result code. (V0)
	1	Long form result code. (V1)
Bit 4:	0	Smart mode state.
	1	Dumb mode state.
Bit 5:	0	Tone dial calls. (T)
	1	Pulse dial calls. (P)
Bit 6:	0	Smart modem. (@I0)
	1	Dumb modem. (@I1)
Bit 7:	0	Answer state. (A, S0=1)
	1	Originate state. (D)

Leased Line Dialup Backup Timer S15

Range 0-255 Unit: min Default: 5

Bits Mapped S16

Bit 0	0	Disable Local Analog Loopback Test.
	1	Enable Local Analog Loopback Test. (&T1)
Bit 1	0	Disable Local Digital Loopback Test.
	1	Enable Local Digital Loopback Test. (141)
Bit 2	0	Disable Local Digital Loopback Test.
	1	Enable Local Digital Loopback Test. (&T3)
Bit 3	0	Loopback state OFF.
	1	Loopback state in progress.
Bit 4	0	Disable Remote Digital Loopback Test.
	1	Enable Remote Digital Loopback test. (&T6)
Bit 5	0	Disable Remote Digital Loopback Selftest.
	1	Enable Remote Digital Loopback Selftest. (&T7)
Bit 6	0	Enable Local Analog Loopback Test.
	1	Disable Local Analog Loopback Test. (&T8)
Bit 7	0	Enable Remote Digital Loopback Test.

1 Disable Remote Digital Loopback Test. (140)

Carrier Detect (CD) Timer S17

Range: 0-255 Unit: 0.1sec Default: 10

Register S17 determines how long after CD off the auto retrain begin.

Test Timer S18

Range: 0-255 Unit: Second Default: 0

Register S18 determines the length of a diagnostic test before termination. The default 0 means the test timer is disabled.

Auto Redial Interval Time S19

Range: 0-255 Unit: sec Default: 2

Bits Mapped S20

Bit 0-3	0	Try dialup redial times. (N)
Bit 4-7	2	Try leased line rehandshake times. (-B)

Bits Mapped S21

Bit 0	0	RJ-11/41S/45S modular jack.
	1	RJ12-12/13 modular jack.
Bit 1:	0	DSR always ON. (&S0)
	1	DSR reflects real. (&S1)
Bit 2:	0	CTS tracks RTS. (&R0)
	1	CTS always ON. (&R1)
Bit 3,4	0	Ignore DTR. (&D0)
	1	DTR ON to OFF causes command state. (&D1)
	2	DTR ON to OFF causes hang up. (&D2)
	3	DTR ON to OFF causes initialization. (&D3)

Bit 5	0	DCD always ON. (&C0)
	1	DCD reflects real. (&C1)
Bit 6,7	0	Disable special disconnect. (Y0)
	1	Enable long space disconnect. (Y1)
	2	Enable clear down disconnect. (Y2)

Bits Mapped S22

Bit 0,1	0	Speaker volume off.
	1	Speaker volume low.
	2	Speaker volume medium.
	3	Speaker volume high.
Bit 2,3	0	Disable speaker. (M0)
	1	Speaker on until carrier detected. (M1)
	2	Speaker always on. (M2)
	3	M1, but speaker off during dialing. (M3)
Bit 4-6	0	Short connect result code. (X0)
	1	Full connect result code. (X1)
	2	Wait for dial and check answer. (X2)
	3	Check busy and answer. (X3)
	4	Wait for dial, check busy and answer. (X4)
	5-7	Reserved.
Bit 7	0	Make/break ratio 39/61. (&P0)
	1	Make/break ratio 33/67. (&P1)

Bits Mapped S23

Bit 0	0	Disable request from RDL. (&T5)
	1	Enable request from RDL. (&T4)
Bit 2	0	Disable 140 active RDL.
	1	Enable 140 active RDL.
Bit 3	0	Disable 142 active.
	1	Enable 142 active.
Bit 4,5	0	Reserved.

Bit 6,7	0	Guard tone disable. (&G0)
	1	Guard tone 550 Hz. (&G1)
	2	Guard tone 1800 Hz. (&G2)
	3	Reserved.

Bits Mapped S24

Bit 0	0	Disable V25bis mode. (*C0)
Bit 1	0	Enable V25bis asyncronous mode. (*C1)
	1	Enable V25bis synchronous mode.
Bit 2	0	Enable V25bis HDLC mode. (*C3)
	1	Enable V25bis Bisynchronous mode. (*C2)
Bit 3-7	0	Reserved.

Delay to DTR S25

Range: 0-255 Unit: sec or 10 ms Default: 5

Register S25 determines how long the modem waits in sync/async mode from connection sequence completion to DTR status examination. This delay allows the modem to be switched from an asynchronous data terminal to a synchronous data terminal without breaking the connection. In this mode the unit register is in seconds and the default is 5 seconds.

In asynchronous and other synchronous modes, a DTR change (ON or OFF) which lasts for less than the time defined by register S25 is ignored by the modem. In these modes the unit register is 10 milliseconds and the default is 0.05 seconds.

RTS to CTS Delay Interval S26

Range: 0-255 Unit: 10 ms Default: 0

Register S26 determines how long the modem waits from an RTS OFF-to-ON transition detection to the time CTS is turned on. This register is valid only in synchronous mode with &R0 in effect.

Bits Mapped S27

Bit 0-2	0	Asynchronous mode. (&M0)
	1	Synchronous mode 1. (&M1)
	2	Synchronous mode 2. (&M2)
	3	Synchronous mode 3. (&M3)
Bit 3	0	Normal speed pulse dialing.
	1	Fast speed pulse dialing.
Bit 4,5 source.	0	Local modem synchronous transmit clock (&X0)
	1	Local DTE synchronous transmit clock source. (&X1)
	2	Remote modem synchronous transmit clock source. (&X2)
	3	Reserved.
Bit 6,7	0	ITU-T/Bell auto mode. (B0)
	1	Bell 103, 212A mode. (B1)
	2	ITU-T V.23 back channel. (B2)
	3	ITU-T V.23 main channel. (B3)

Bits Mapped S28

Bit 0-4

0	75bps serial port speed.
1	110bps serial port speed.
2	300bps serial port speed.
3	600bps serial port speed.
4	1200bps serial port speed.

	5	2400bps serial port speed.
	6	4800bps serial port speed.
	7	7200bps serial port speed.
	8	9600bps serial port speed.
	9	12000bps serial port speed.
	10	14400bps serial port speed.
	11	16800bps serial port speed.
	12	19200bps serial port speed.
	13	21600bps serial port speed.
	14	24000bps serial port speed.
	15	26400bps serial port speed.
	16	28800bps serial port speed.
	17	38400bps serial port speed.
	18	57600bps serial port speed.
	19	115200bps serial port speed.
Bit 5,6	0	Serial port even parity.
	1	Serial port space.
	2	Serial port odd parity.
	3	Serial port none/mark.
Bit 7	0	Serial port, 8 data bits.
	1	Serial port, 7 data bits.

Bit 0,1	0	DCE, 5 data bits.
	1	DCE, 6 data bits.
	2	DCE, 7 data bits.
	3	DCE, 8 data bits.
Bit 2,3	0	DCE, none parity.
	1	DCE, space parity.
	2	DCE, even parity.
	3	DCE, odd parity
Bit 4	0	DCE, 1 stop bit.
	1	DCE, 2 stop bits.

Bit 5-7	0	Reserved.

Set Major SCP as Default S30

Default: 1 1<=n<=4 (&Yn)

Set Call Back Delay Timer S31

Default: 10 Unit: sec 0<=n<=255 (@Dn)

Bit 1	0	Disable 141 active RDL.
	1	Enable 141 active RDL.

Bits Mapped S32

Bit 0	0	Disable ring sound. (@B0)
	1	Enable ring sound. (@B1)
Bit 1	0	Disable call back security. (@A0)
	1	Enable call back security. (@A1)
Bit 2	0	Disable hardware data security. (@E0)
	1	Enable hardware data security. (@E1)
Bit 3	0	Open message working bit.
	1	Close message working bit.
Bit 4	0	Disable V.32 forward/backward link.
	1	Enable V.32 forward/backward link.
Bit 5	0	Command AT&Z working bit.
	1	Command AT@Z working bit.
Bit 6,7	0	Dialup line. (&L0)
	1	2 wire leased line. (&L1)
	2	4 wire leased line. (&L2)

Service Class S33

Bit 0-5	0	Reserved.
Bit 6	0	MNP synchronous link. (@L0)
	1	MNP asynchronous link. (@L1)
Bit 7	0	Disable second channel.
	1	Enable second channel.

Bits Mapped S34

Bit 0	0	V.32 TCM.
	1	V.32 QAM.
Bit 1	0	Disable ignore DTR dump in handshaking.
	1	Enable ignore DTR dump in handshaking.
Bit 2,3	0	RLSD on -43dBm, off -48dBm.
	1	RLSD on -33dBm, off -38dBm.
	2	RLSD on -26dBm, off -31dBm.
	3	RLSD on -16dBm, off -21dBm.
Bit 4,5	0	Normal AT&F ATZ.
	1	Quick ATZ.
	2	Quick AT&F.
	3	Quick AT&F ATZ.
Bit 6,7	0	Reserved.

Bits Mapped S35

Bit 0-3	0-9	STN for power on auto dial. (&A0~9)
	15	Disable power on auto dial. (&A99)
Bit 4,5	0	Disable all. (@Y0)
	1	Dialup line simulate leased line. (@Y1)
	2	Leased line backup dialup line. (@Y2)
Bit 6	0	Single phone system. (-M0)

	1	Multi-phone system. (-M1)
Bit 7	0	Disable disconnect reset.
	1	Enable disconnect reset.

Set Auto Reliable Fallback Character S36

Default: 0 0<=n<=127 Unit: ASCII (%An)

Modem Port Link Speed S37

Default: Range: 0-17

0	Auto (follow AT speed)
1	Attempt connection at 1200/75 bps
2	Attempt connection at 300 bps
3	Attempt connection at 600 bps
4	Attempt connection at 1200 bps
5	Attempt connection at 2400 bps
6	Attempt connection at 4800 bps
7	Attempt connection at 7200 bps
8	Attempt connection at 9600 bps
9	Attempt connection at 12000 bps
10	Attempt connection at 14400 bps
11	Attempt connection at 16800 bps
12	Attempt connection at 19200 bps
13	Attempt connection at 21600 bps
14	Attempt connection at 24000 bps
15	Attempt connection at 28800 bps
16	Attempt connection at 31200 bps
17	Attempt connection at 33600 bps

Bits Mapped S39

Bit 0	0	Disable data compresssion. (%C0)
	1	Enable data compression. (%C1)
Bit 1,2	0	Disable auto retrain. (%E0)
	1	Auto retrain on same speed. (%E1)

	2	Auto retrain with speed change.(%E2)
	3	Reserved.
Bit 3,4	0	Neither direction.
	1	TX direction only.
	2	RX direction only.
	3	Both directions.
Bit 5	0	Enable answer tone check.
	1	Disable answer tone check.
Bit 6	0	Enable compromise equalizer.
	1	Disable compromise equalizer.
Bit 7	0	Disable detect phase.
	1	Enable detect phase.

Bits Mapped S40

Bit 0	0	Disable remote access. (*E0)
	1	Enable remote access. (*E1)
Bit 1-4	0	Reserved.
Bit 5	0	Disable remote access security.
	1	Enable remote access security.
Bit 6,7	0	Reserved.

Remote Access Attention Character S41

Default: 42 0<=n<=255 Unit: ASCII

V.42bis Compression Dictionary Max. String Length S4

Default: 16 0<=n<=255 Unit: Byte

Bits Mapped		S43
Bit 0,1	0	Set maximun MNP block to 64 characters. (\A0)
	1	Set maximum MNP block to 128 characters. (\A1)
	2	Set maximum MNP block to 192 characters. (\A2)
	3	Set maximum MNP block to 256 characters.(\A3)
Bit 2	0	Reserved.
Bit 3,4	0	Set maximum dictionary size to 512 entries.
	1	Set maximum dictionary size to 1024 entries.
	2	Set maximum dictionary size to 2048 entries.
	3	Set maximum dictionary size to 4048 entries.
Bit 5	0	Reserved.
Bit 6,7	0	Does not buffer data. (\C0)
	1	Buffers data for 4 seconds until 200 characters or when a SYN character is detected, then switches to normal. (\C1)
	2	Does not buffer data, switches to normal. (\C2)
	3	Reserved.

Bits Mapped		S44
Bit 0	0	Reserved.
Bit 1	0	Reserved.
Bit 2	0	Disable on-line data echo. (\E0)
	1	Enable on-line data echo. (\E1)
Bit 3	0	Disable modem port flow. (\G0)
	1	Enable modem port flow. (\G1)
Bit 4-6	0	Reserved.
Bit 7	0	Independent serial port speed connection. (\J0)
	1	Dependent serial port speed connection. (\J1)

Bits Mapped S45

Bit 0-2	0	Break control type. (default: 5) 0<=n<=5 (\Kn)
Bit 3	0	Stream link (interactive).
	1	Block link (file transfer).
Bit 4	0	Disable fixed DCE speed. (%H0)
	1	Enable fixed DCE speed. (%H1)
Bit 5-7	0	Normal Mode. (\N0)
	1	Direct mode. (\N1)
	2	MNP mode. (\N2)
	3	Auto reliable mode. (\N3)
	4	LAPM mode. (\N4)
	5	LAPM ® normal mode.
	6	LAPM ® MNP mode.
	7	MNP ® normal mode.

Bits Mapped S46

Bit 0-2	0	Disable flow control. (\Q0)
	1	Enable bi-directional XON/XOFF flow control.(\Q1)
	2	Enable uni-directional hardware flow control.(\Q2)
	3	**Enable bi-directional hardware flow control.(\Q3)**
	4	Enable uni-directional XON/XOFF flow control. (\Q4)
	5	CTS off until connection and \Q2. (\Q5)
	6	CTS off until connection and \Q3. (\Q6)
Bit 3	0	RI on after handshake.
	1	**RI off after handshake.**
Bit 4-6	0	Disable V42/MNP result code. (\V0)
	1	Enable V42/MNP4 result code in DTE speed. (\V1)

	2	Enable V42/MNP4 result code in DCE speed. (\V2)
	3	Enable V42bis/MNP5 result code in DTE speed. (\V3)
	4	**Enable V42bis/MNP5 result code in DCEspeed. (\V4)**
	5	Enable V42bis/MNP5 debug code in DTE speed.
	6	Enable V42bis/MNP5 debug code in DCE speed.
Bit 7	**0**	**Process flow control character. (\X0)**
	1	Process flow control character and pass through to local or remote system. (\X1)

Inactivity Timer S47

Default: 0 0<=n<=255 Unit: min (\Tn)

Wait for Connection Password S48

Range: 0-255 Unit: Second Default: 15

Register S48 determines how many seconds the modem waits for a connection password after it answers an incoming call. If the password is not received during this period, the modem will hang up.

Redial Limit S49

Range: 0-15 Default: 10 Unit: Times

Dialup Line TX Level S50

Range: 0-15 Default: 1 Unit:-dBm

Leased-Line TX Level S51

Range: 0-31 Default: 1 Unit: -dBm

Bits Mapped S52

Default: 0

Bit 0-7	0	Auto speed.
	1	Others the same as register S28.

Bits Mapped S53

Bits 0-3	8	RI reset timer.
Bit 4	0	Disable V25 calling tone.
	1	Enable V25 calling tone.
Bit 5	0	Disable T30 calling tone.
	1	Enable T30 calling tone.
Bit 6,7	0	Reserved.

Bits Mapped S54

Default: 0

Bit 0-2	0	V.34 auto mode. (-V0)
	1	V.FC auto mode. (-V1)
	3	V.32bis auto mode. (-V2)
	4	V.34, V.FC, V.32bis.(-V3)
	5	V.FC, V.32bis. (-V4)
	6	V.34 only. (-V5)
	7	V.FC only. (-V6)
	8	V.32bis only. (-V7)
Bit 3-7	0	Reserved.

Appendix B

MODULAR JACK WIRING DIAGRAM

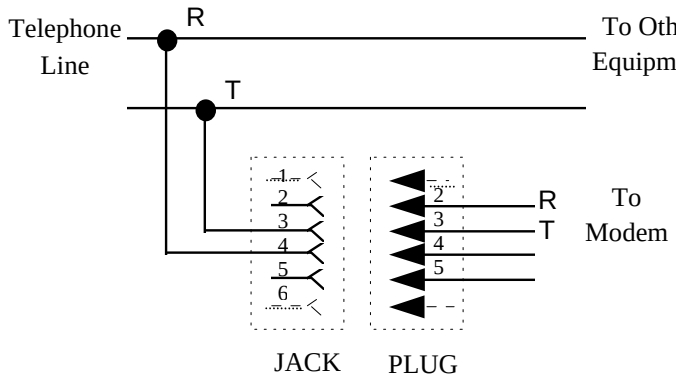
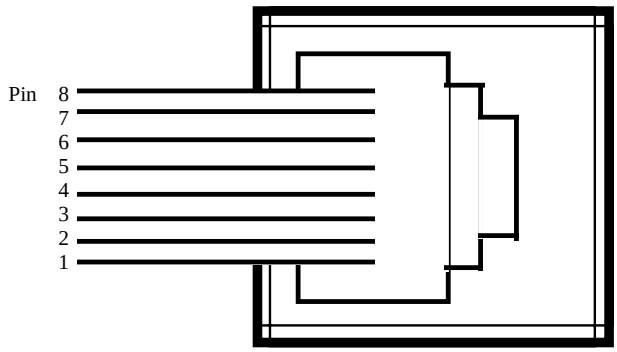


Fig B-1 RJ-11/JM8 Modular Jack Wiring Diagram



CONNECTIONS

Phone Line: Connect Pin 4 & Pin 5

2-Wire Leased-Line: Connect Pin 1 & Pin 2

4-Wire Leased-Line:

Local		Remote
Pin 1 (TX)	----------	Pin 7 (RX)
Pin 2 (TX)	----------	Pin 8 (RX)
Pin 7 (RX)	----------	Pin 1 (TX)
Pin 8 (RX)	----------	Pin 2 (TX)

Fig B-2 RJ-45 Modular Jack Wiring Diagram

Appendix C

RS-232 PIN ASSIGNMENT

RS-232		V.24	Description	Signal Direction		
1	AA	101	Protective Ground	computer	⇔	modem
2	BA	103	Transmit Data	computer	⇨	modem
3	BB	104	Receive Data	computer	⇦	modem
4	CA	105	Request to Send	computer	⇨	modem
5	CB	106	Clear to Send	computer	⇦	modem
6	CC	107	Data Set Ready	computer	⇦	modem
7	AB	102	Signal Ground	computer	⇔	modem
8	CF	109	Carrier Detected	computer	⇦	modem
12	CI	112	Select Alternate Rate	computer	⇦	modem
15	DB	114	Transmit Clock	computer	⇦	modem
17	DD	115	Receive Clock	computer	⇦	modem
18		141	Loopback/Maintenance	computer	⇨	modem
20	CD	108	Data Terminal Ready	computer	⇨	modem
21	CG	140	Local Loopback	computer	⇨	modem
22	CE	125	Ring Indicator	computer	⇦	modem
23	CI		Select Alternate Rate	computer	⇦	modem
24	DA	113	Transmit Clock	computer	⇨	modem
25		142	Test Indicator	computer	⇦	modem

✳ Pin CI outputs on both pin 12 (Bell 103) and pin 23 (EIA RS-232)

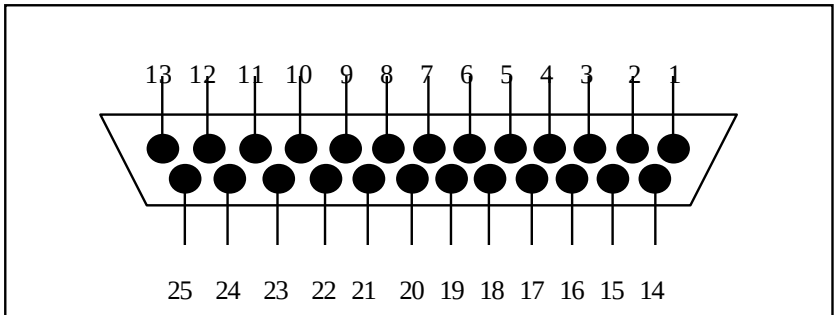


Fig C-1 RS-232 Connector (DB-25) Pin Assignment

Appendix D

FAX COMMAND REFERENCE

Appendix D explains individual fax commands and is designed for value added users who want to write fax communication software. General users may skip this section.

Fax Auto Answer +FAA=

This command instructs the faxmodem to auto answer in data mode or in fax mode.

+FAA=0	Auto answers as a +FCLASS type faxmodem.
+FAA=1	Automatically determines whether to answer as a fax or data modem.

Service Class Indication +FCLASS=

This command determines whether the faxmodem is in fax or data mode. It also indicates the fax command set service class.

+FCLASS=0	Data mode.
+FCLASS=2	Class 2 mode.
+FCLASS=?	Inquires service class capability.
+FCLASS?	Inquire service class identification.

Capability to Receive +FCR=

This command inquires about receive function capability.

+FCR=0	Indicates the faxmodem will not receive message data and is not able to poll a remote device.
+FCR=1	Indicates the faxmodem can receive message data.

Syntax：+FDCC=VR,RB,WD,LN,DF,EC,BF,ST

This command determines the parameters required for fax communication operation. The following is a list of definitions and values for each parameter.

VR	Vertical Resolution	
	0	Normal mode, 98 lines per inch
	1	Fine mode, 196 lines per inch
BR	Bit Rate	
	0	2,400 bps, ITU-T V.27ter
	1	4,800 bps, ITU-T V.27ter
	2	7,200 bps, ITU-T V.29 or V.17
	3	9,600 bps, ITU-T V.29 or V.17
	4	12,000 bpsITU-T V.17
	5	14,400 bpsITU-T V.17
WD	Page Width	
	0	1,728 pixels in 215 mm
LN	Page Length	
	0	A4 size, 297 mm
	2	Unlimited length
DF	Data Compression Format	
	0	1-D modified Huffman
EC	Error Correction	
	0	Disable error correction
BF	Binary File Transfer	
	0	Disable binary file transfer

ST	Scan Time Per Line	
0	0 ms, VR = normal	0 ms, VR = fine
1	5 ms, VR = normal	5 ms, VR = fine
2	10 ms, VR = normal	5 ms, VR = fine
3	10 ms, VR = normal	10 ms, VR = fine
4	20 ms, VR = normal	10 ms, VR = fine
5	20 ms, VR = normal	20 ms, VR = fine
6	40 ms, VR = normal	20 ms, VR = fine
7	40 ms, VR = normal	40 ms, VR = fine

To display the current +FDCC parameter settings, issue command +FDCC?.

Current Session Results +FDIS=

Syntax：+FDIS=VR,RB,WD,LN,DF,EC,BF,ST

This command determines how the faxmodem returns the negotiated T.30 parameters for the current session. See the +FDCC= section for parameter definitions. Command +FDIS=? displays the help message of this command.

Begin or Continue Phase C Data Reception +FDR

This command initiates a transition to Phase C data reception and forces a transition in the control software from command parsing to background processing.

Note that you can only issue this command at the moment when negotiation is complete and upon entering Phase C. Issuing this command at any other time results in an ERROR message.

Begin Phase C Data Transmission +FDT

This command prefix begins Phase C data transmission and forces a transition in the control software from command parsing to background processing.

Note that you can only issue this command at the moment when negotiation is complete and upon entering Phase C. Issuing this command at any other time results in an ERROR message.

Transmit Page Punctuation +FET=

This command is used to punctuate page and document transmission, after one or more +FDT commands. The following is a list of the parameters:

Value of n	Definition
0	[PPS-]MPS
	Another page, same document.
2	[PPS-]EOP
	No more pages or documents.

Local ID String +FLID=

Syntax：+FLID=<local ID string>

This command sets the local faxmodem ID. The command syntax is +FLID=<local ID string>, and the local ID string can be up to 20 printable ASCII characters (ASCII value 32 to 127).

Issue command +FLID? to display the current local faxmodem ID string.

Request Model Identification +FMDL?

This command instructs the faxmodem to send one or more lines of information text (not exceeding 2048 characters), used to identify the product.

Manufacturer Identification +FMFR?

This command instructs the faxmodem to send one or more lines of information text (not exceeding 2048 characters), used to identify the manufacturer.

Minimum Phase C Speed +FMINSP=

This command determines minimum Phase C speed, the lowest negotiable speed for a session. The following is a list of the definitions for the value of n.

Value of n	Definition
0	2,400 bps, ITU-T V.27ter
1	4,800 bps, ITU-T V.27ter
2	7,200 bps, ITU-T V.29 or V.17
3	9,600 bps, ITU-T V.29 or V.17
4	12,000 bps, ITU-T V.17
5	14,400 bps, ITU-T V.17

Issue +FMINSP? to display the current n value.

Request Product Revision Identification +FREV?

This command instructs the faxmodem to send one or more lines of information text (not exceeding 2048 characters) used to identify the version, the revision level, data, or other pertinent information.

Fax Operation Response Codes

+FCFR Indicates confirmation to receive. The reception of an acceptable TCF training burst and valid DCS signal from the remote modem are received.

+FCON Facsimile connection response. Indicates connection with a fax machine. Generated in response to an originate command or answer command.

+FCSI Reports the called station's ID.

+FDCS Reports DCS frame information. The negotiated parameters for the current session are reported. The sub-parameters are also reported.

+FDIS Reports DIS frame information. The remote fax capability and intentions are reported. The sub-parameters are reported by command +FDCS.

+FDTC Reports DTC frame information. The remote fax capability and intentions are reported. The sub-parameters are described by command +FDCS.

+FHNG Call termination. Indicates that the call has been terminated.

+FNSF Reports received non-standard negotiation frames.

+FPTS Receive/Transmit page transfer status. Reports a number representing the copy quality and related postpage messages. The meanings of the numbers are listed as below.

0	PPR	Partial page error.
1	MCF	Page good.
2	RTN	Page bad; retrain requested.
3	RTP	Page good, retrain requested.

+FTSI Reports the transmitting station's ID.

Appendix E

VOICE/AUDIO COMMANDS

Voice/Audio Submodes

Online Voice Command Mode

Online Voice Command Mode is the default Voice submode entered when the #CLS=8 command is issued, and may also be entered from Voice Receive Mode or Voice Transmit Mode. Entry into Online Voice Command Mode is indicated to the DTE via the VCON message, after whice AT commands can be entered without aborting the telephone line connection.

If the modem is the answerer, it enters Online Voice Command Mode immediately after going off-hook, and can report instances of DTMF tones and calling tones to the DTE. When this mode is entered as a result of going off-hook with the D or A command, VCON is aslways sent to the DTE, after which the modem accepts commands. If this mode is entered from Voice Transmit Mode, the DTE has issued the <DLE><ETX>, and the modem responds with VCON. If this mode is entered from the Voice Receive Mode because of a key abort, the modem issues the <DLE><ETX> followed by VCON.

Voice Receive Mode

Voice Receive Mode is entered when the DTE issues the #VRX command in order to receive voice data. This typically occurs when either recording a greeting message, or when recording voice messages from a remote station.

In Voice Receive Mode, voice samples from the modem analog-to-digital converter (ADC) are sent either to the ADPCM codes for compression, or to the PCM coder for linear PCM coding, and can then be read by the host. AT commands control the voice sampling rate as well as codes bits-per-sample rates, and can also be used to

select (optional) silence detection including adjustment of the silence detection period and sensitivity level when ADPCM compression is selected.

In this mode, and when the sampling rate is 7.2 kHz, the modem detects and reports DTMF, dial tone, and busy tone cadence as enabled by the #VTD command. Additionally, the modem detects and reports inactivity (periods of silence) as enabled by the #VSS command.

Voice Transmit Mode

Voice Transmit Mode is entered when the DTE issues the #VTX command in order to transmit voice data. In this mode, when the sampling rate is 7.2 kHz, the modem continues to detect and report DTMF and calling tones if enabled by the #VTD command. This mode is typically used when playing back greeting messages or previously received/recorded messages.

In this mode:

If the Voice Sub-configuration is in operation, voice decompression is provided by the ADPCM codes, and the decompressed ADPCM voice data is then reconstituted into analog voice by the DAC at the original compression quantization sample-per-bits rate. Optional silence interpolation is enabled if silence detection was selected for voice compression.

If the Audio Sub-configuration is in operation, PCM decoding is provided by the linear PCM decoder, and the decode audio data is then reconstituted into analog voice by the DAC at the original 1 sample/8 bits or 1 sample/16 bits rate.

AT Voice Command Summary

Commnad	Function	
	A	Answering in Voice/Audio Mode.
	D	Dial command in Voice/Audio Mode.
	H	Hang up in Voice/Audio Mode.
	Z	Reset from Voice/Audio Mode.
	#BDR	Select baud rate.
	#CID	Enable Caller ID detection and select reporting format.
	#CLS	Select data, fax or voice/audio mode.
#MDL?	Identify manufacter.	
#MFR?	Identify model.	
#REV?	Identify revision level.	
#TL	Audio output transmit level.	
#VBS	Bits per sample.	
#VBT	Beep tone timer.	
#VLS	Voice line select.	
#VRX	Voice Receive Mode.	
#VSD	Silence detetion tuner.	
#VSP	Silence detection period.	
#VSR	Sampling rate selection.	
#VSS	Silence detection tuner.	
#VTD	DTMF tone reporting capability.	
#VTS	Generate tone signals.	
#VTX	Voice Transmit Mode.	

Result condes for Voice Operation

VCON	VCON is sent when the modem is configured for voice/audio (#CLS=8), or when after answering or originating a call, the modem enters the Online Voice Command Mode for the first time. Typically, this is immediately after an off-hook in answer mode, and after ringback ceases in originate mode. VCON is also sent when the DTE requests switch from Voice Transmit Mode to Online Voice Command Mode by issuing a <DLE><ETX> to the modem, or when the DTE requests a switch from Voice Receive Mode to Online Voice Command Mode via the key abort.
CONNECT	CONNECT is sent when switching from the Online Voice Command Mode to either Voice Receive Mode via the #VRX command, or to Voice Transmit Mode via the #VTX command. This message is sent to the DTE to inform it that it may begin receiving or sending ADPCM or PCM data.

Recommendation:

During the software installing steps, most of software will asks user to select the modem type. Please do not run auto detection, you may select modem type with "Rockwell Based Voice Modem" by manually. This action's purpose is to select the appropriate voice commands for modem to process correctly.

Appendix F

Code in Digit and Word Form		Response Code Definition
0	OK	Command line executed successfully
1	CONNECT	Connection at 300 bps or 1200 bps
2	RING	Incoming ring detected
3	NO CARRIER	Remote carrier lost or not detected
4	ERROR	Command line error
5	CONNECT 1200	Connection at 1200 bps
6	NO DIAL TONE	Dial tone not detected
7	BUSY	Busy signal detected
8	NO ANSWER	5 second silence not detected
10	CONNECT 2400	Connection at 2400 bps
11	CONNECT 4800	Connection at 4800 bps
12	CONNECT 9600	Connection at 9600 bps
13	CONNECT 7200	Connection at 7200 bps
14	CONNECT 19200	Connection at 19200 bps
15	CONNECT 14400	Connection at 14400 bps
16	CONNECT 38400	Connection at 38400 bps
17	CONNECT 57600	Connection at 57600 bps
18	CONNECT 12000	Connection at 12000 bps
20	CONNECT 300/V42	Connection at 300 bps in reliable mode (error correction only)
21	CONNECT 600/V42	Connection at 600 bps in reliable mode (error correction only)
22	CONNECT 1200/V42	Connection at 1200 bps in reliable mode (error correction only)
23	CONNECT 2400/V42	Connection at 2400 bps in reliable mode (error correction only)
24	CONNECT 4800/V42	Connection at 4800 bps in reliable mode (error correction only)
25	CONNECT 9600/V42	Connection at 9600 bps in reliable mode (error correction only)
26	CONNECT 19200/V42	Connection at 19200 bps in reliable mode (error correction only)
27	CONNECT 7200/V42	Connection at 7200 bps in reliable mode (error correction only)
28	CONNECT 14400/V42	Connection at 14400 bps in reliable mode (error correction only)
29	CONNECT 38400/V42	Connection at 38400 bps in reliable mode (error correction only)
2A	CONNECT 57600/V42	Connection at 57600 bps in reliable mode (error correction only)
2B	CONNECT 12000/V42	Connection at 12000 bps in reliable mode (error correction only
2C	CONNECT16800/V42	Connection at 16800 bps in reliable mode (error correction only
2D	CONNECT21600/V42	Connection at 21600 bps in reliable mode (error correction only
2F	CONNECT24000/V42	Connection at 24000 bps in reliable mode (error correction only
30	CONNECT 26400/V42	Connection at 26400bps in reliable mode (error correction only
31	CONNECT28800/V42	Connection at 28800bps in reliable mode (error correction

		only
40	CONNECT 300/V42bis	Connection at300 bps in ECDC reliable mode
41	CONNECT 600/V42bis	Connection at 600 bps in ECDC reliable mode
42	CONNECT 1200/V42bis	Connection at 1200 bps in ECDC reliable mode
43	CONNECT 2400/V42bis	Connection at 2400 bps in ECDC reliable mode
44	CONNECT 4800/V42bis	Connection at 4800 bps in ECDC reliable mode
45	CONNECT 9600/V42bis	Connection at 9600 bps in ECDC reliable mode
46	CONNECT 19200/V42bis	Connection at 19200 bps in ECDC reliable mode
47	CONNECT 7200/V42bis	Connection at 7200 bps in ECDC reliable mode
48	CONNECT 14400/V42bis	Connection at 14400 bps in ECDC reliable mode
49	CONNECT 38400/V42bis	Connection at 38400 bps in ECDC reliable mode
4A	CONNECT 57600/V42bis	Connection at 57600 bps in ECDC reliable mode
4B	CONNECT 12000/V42bis	Connection at 12000 bps in ECDC reliable mode
4C	CONNECT 16800/V42bis	Connection at 16800 bps in ECDC reliable mode
4D	CONNECT 21600/V42bis	Connection at 21600 bps in ECDC reliable mode
4F	CONNECT 24000/V42bis	Connection at 24000 bps in ECDC reliable mode
50	CONNECT 26400/V42bis	Connection at 26400bps in ECDC reliable mode
51	CONNECT 28800/V42bis	Connection at28800bps in ECDC reliable mode
60	CONNECT 300/NOR	Connection at 300 bps in normal mode
61	CONNECT 600/NOR	Connection at 600 bps in normal mode
62	CONNECT 1200/NOR	Connection at 1200 bps in normal mode
63	CONNECT 2400/NOR	Connection at 2400 bps in normal mode
64	CONNECT 4800/NOR	Connection at 4800 bps in normal mode
65	CONNECT 9600/NOR	Connection at 9600 bps in normal mode
66	CONNECT 19200/NOR	Connection at 19200 bps in normal mode
67	CONNECT 7200/NOR	Connection at 7200 bps in normal mode
68	CONNECT 14400/NOR	Connection at 14400 bps in normal mode
69	CONNECT 38400/NOR	Connection at 38400 bps in normal mode
6A	CONNECT 57600/NOR	Connection at 57600 bps in normal mode
6B	CONNECT 12000/NOR	Connection at 12000 bps in normal mode
6C	CONNECT 16800/NOR	Connection at 16800 bps in normal mode
6D	CONNECT 21600/NOR	Connection at 21600 bps in normal mode
6F	CONNECT 24000/NOR	Connection at 24000 bps in normal mode
70	CONNECT 26400/NOR	Connection at 26400 bps in normal mode
71	CONNECT 28800/NOR	Connection at 28800 bps in normal mode

＊The above codes are in ITU-T V.42/V.42bis. If in MNP, /V.42 is replaced with/REL and /V42bis is replaced with/REL COMP.

Commands X0 through X4 combine to enable and disable various response codes. In general applications, select command X4 (default) to enable all response codes, so the most specific response code messages are displayed.

If you plan to write your own software for special applications, select the response set you require by issuing the appropriate X command.

The following table shows response codes 0 through 8 and how they are related to each X command. The "-" denotes that the response code is disabled for that X command. The remaining response codes are enabled by commands X1, X2, X3, and Command Syntax and Response Co-Descommand Syntax and Response Co-Descommand Syntax and Response Codes X4 (but disabled by command X0).

RESPONSE CODES		XO	X1	X2	X3	X4
0	OK	X0	X1	X2	X3	X4
1	CONNECT	X0	X1	X2	X3	X4
2	RING	X0	X1	X2	X3	X4
3	NO CARRIER	X0	X1	X2	X3	X4
4	ERROR	X0	X1	X2	X3	X4
5	CONNECT 1200	-	X1	X2	X3	X4
6	NO DIAL TONE	-	-	X2	-	X4
7	BUSY	-	-	-	X3	X4
8	NO ANSWER	-	-	X2	X3	X4

Appendix G

Prefix, Repeat, and Escape Commands

A	Answer call immediately
AT	Attention, precedes all command lines except A/ and +++
A/	Re-execute the last command in command buffer
+++	Escape characters, guard time before and after +++

Dial Commands and Dial Modifiers

0~9, A, B, C, D, *, #	DTMF signal (S11=255)
L	Dial last number (only in MNP)
D	Originate a call
S=n	Dial the n^{th} stored number
T	Touch tone dialing
P	Pulse dialing
R	Reverse dialing, dial in answer mode
N	Swap dialing
W	Wait for second dial tone
@	Wait for silent answer Pause
,	Pause
!	Flash
;	Return to command state
/n	Dial n + 1th stored number

Operation Commands

An	Auto-Answer after n rings
B0	ITU-T/Bell auto
B1	Bell 103/121A (300/1200)
B2	ITU-T V23 (Tx75/1200) back channel
B3	**ITU-T V23 (Tx1200/75) main channel**
E0	Disable command echo
E1	**Enable command echo**
H0	Hang up the connection (on-hook)
H1	Go off-hook to make a call
I0	Modem product code
I1	ROM version
I2	Verify ROM checksum
K0=n	**Carrier level control (-n dbm)**
L0	**Speaker volume off**
L1	Speaker volume low
L2	**Speaker volume medium**
L3	Speaker volume high
M0	Speaker always off
M1	**Speaker on before connect**
M2	Speaker always on after off hook
M3	M1 but off during dialing
N?	Display redial count
N=n	Set redial count on busy
N5?	**Display redial count**
N5=n	**Set redial interval (in 2sec)**
O0	Return to on-line mode
O1	Return to on-line mode with retrain
Q0	Enable sending result code to DTE
Q1	Disable sending result code to DTE
Sr?	Read register Sr
Sr=n	Set register Sr to value n
V0	Digit result code
V1	**Word result code**
X0	Enable basic result code set
X1	Extended result code set
X2	X1 with dial tone detection
X3	X1 with busy tone detection
X4	**X1 with busy and dial tone detection**
Y0	Disable long space and clear down

disconnect

Y1 Enable long space disconnect

Y2 **Enable clear down disconnect**

Zn Warm reset with profile n (n=0,1,2,3,4)

&An Power on auto dial (default &A99 to disable)

&C0 CD always true
&C1 **Actual CD**

&D0 Ignore DTR control
&D1 Track DTR, command mode
&D2 **Track DTR, hang up**
&D3 **Track DTR, reset**

&F0 **ASY-D-AT-V42BIS**
&F1 ASY-A-AT-V42BIS
&F2 ASY-D-AT-DIRECT
&F3 ASY-A-AT-DIRECT
&F4 ASY-D-AT-NORMAL
&F5 ASY-A-AT-NORMAL
&F6 **SYN-D-AT-DIRECT**
&F7 SYN-A-AT-DIRECT
&F8 ASY-V25BIS
&F9 SYN-BSC-V25BIS
&F10 SYN-HDLC-V25BIS
&F11 PWR-2W-LEASED
&F12 **PWR-4W-LEASED**

&G0 Disable guard tone
&G1 Guard tone 550 Hz
&G2 **Guard tone 1800 Hz**

&L0 **Dialup line**
&L1 2W leased line
&L2 **4W leased line**

&M0 **Asynchronous mode**
&M1 Sync mode 1, asyn dial to syn connect
&M2 Sync mode 2, dial STN0
&M3 **Sync mode 3, manual (DTR or V/D)**

&P0 **Pulse M/B 39/61 USA, Canada**
&P1 Pulse M/B 33/67 UK, HK

&Q0 **(&M0)**
&Q1 **(&M1)**
&Q2 **(&M2)**
&Q3 **(&M3)**

&R0 CTS tracks RTS in sync mode

&R1 CTS always on in sync mode

&S0 **DSR always on**
&S1 DSR according to RS-232 specification

&T0 Terminate any test in progress
&T1 Local analog loopback test
&T3 Local digital loopback test
&T4 **Grant RDL request**
&T5 Deny RDL request
&T6 Remote digital loopback test
&T7 Remote digital loopback with selftest
&T8 Local analog loopback with selftest

&V0 View ACP and SCP settings
&V1 View STN

&W0 Write ACP to major SCP
&W255 Clear NVRAM
&Wn Write ACP to SCPn (n=1,2,3,4)

&X0 Internal Txx clock (to pin 15)
&X1 External Tx clock (from pin 24)
&X2 Slave Tx clock (to pin 15)

&Y1 **Assign SCP1 as major profile**
&Yn **Assign SCPn as major profile (n=2,3,4)**

&Zn=X Save phone number x to STNn (n=0~9)

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

\Bn Transmit break (n=0~9; default/Bn)

\C0 Does not buffer data in auto reliable mode
\C1 Buffer all data
\C2 Does not buffer data, switch to normal mode on %A

\G0 Disable DCE-DCE port flow control
\G1 DCE Flow control XON/XOFF (normal mode)

\J0 Disable DTE baud rate adjust
\J1 Enable DTE baud rate adjust (DTE=DCE)

\Kn Break control (n=0~5; default\K5)

\N0 Set to normal mode
\N1 Set to direct mode (DTE=DCE)

\N2	Set to MNP reliable mode only
\N3	Set auto reliable mode (V42 to MNP)
\N4	**Set to V42 reliable mode only**
\Q0	Disable DTE flow control
\Q1	Bi-directional XON/XOFF flow control
\Q2	Uni-directional CTS/RTS flow control
\Q3	Bi-directional RTS/CTS flow control
\Q4	One way XON/XOFF flow control
\Q5	One way CTS, connect on flow control
\Q6	**Two way CTS, connect on flow control**
\Tn	**Inactivity timer 90~90; default=0min)**
\V0	Disable MNP/V42bis extended message
\V1	Reliable; DTE speed
\V2	Reliable; DCE speed
\V3	Reliable and compression; DTE speed
\V4	**Reliable and compression; DCE speed**
\X0	Disable Xon/Xoff pass through
\X1	Enable XON/XOFF pass through
%An	Auto reliable fallback character (default %A0)
%Bn	Maximum DCE speed (default %B0)
%C0	Disable data compression
%C1	**Enable data compression**
%E0	**Disable auto retrain**
%E1	Enable auto retrain with same speed
%E2	Enable auto retrain with speed adjustment
%H0	**Disable fixed DCE speed**
%H1	Fix DCE speed
%I0	Enable answer detection
%I1	Disable answer detection
%L	Report RX line level
%Q	Report signal quality (S/N)
-Bn	Leased line retry (n=0~15)
-M0	**Disable multi-phone backup**
-M1	Enable multi-phone backup
-V0	V.34 auto
-V1	V.FC auto
-V2	V.32bis auto
-V3	V.34/V.FC/V.32bis only
-V4	V.FC/V.32bis
-V5	V.34 only
-V6	V.FC only
-V7	V.32bis only
-Z=	Multi-phone redial order set
-Z?	Multi-phone redial order query
@A0	Disable call back security
@A1	Enable call back security
@B0	Disable ring sound
@B1	**Enable ring sound**
@Cn	Check VAR password
@Dn	Call back delay timer (default@D30)
@E0	Disable connection password security
@E1	Enable connection password security
@F	Display remote access and connection security password
@G	Set callback close message (75 char)
@I0	Set to smart mode
@I1	Set to dumb mode
@O	Set callback open message (75 char)
@P=x	Set H/W security password
@Q0	View VAR buffer A
@S0	Set VAR password
@V0	View call back password
@V1	View call back phone number
@V2	View call back open/close message
@Wn=x	Set call back password of set n into x
@Y0	**Normal line**
@Y1	Dialup simulate leased line
@Y2	Leased line dialup backup
@Zn=	Set call back phone backup
***C0**	**Disable V25bis**

***C1**	V25bis async
***C2**	V25bis bi-sync
***C3**	V25bis HDLC

***E0**	**Disable remote access**
***E1**	Enable remote access
***P**	Set remote access password

Appendix H

ABBREVIATIONS

ACA	Active Configuration Area
ASYN	Asynchronous
BS	Back Space
CD	Carrier Detect
CNG	Calling Tone
CR	Carriage Return
CTS	Clear To Send
DCD	Data Carrier Detect
DCE	Data Communications Equipment
DL Simu LL	Dialup Line Simulate Leased Line
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dial Tone Multi-Frequency
DTR	Data Terminal Ready
ECDC	Error Correction & Data Compression
FB	Fall Back
FDP	Factory Default Profile
LL Backup DL	Leased Line Backup Dialup Line
LALST	Local Analog Loopback with Selftest
LAL	Local Analog Loopback
LCD	Liquid Crystal Display
LDL	Local Digital Loopback
LF	Line Feed
MNP	Microcom Networking Protocol
NVRAM	Non Volatile Random Access Memory
PSTN	Public Switched Telephone Network
PSDN	Packaged Switched Data Network
RA	Remote Access
RDL	Remote Digital Loopback

RDLST	Remote Digital Loopback with Selftest
RLSD	Received Line Signal Detector
RI	Ring Indicator
ROM	Read Only Memory
RTS	Request To Send
SCP	Stored Configuration Profile
SPK	Speaker
STN	Stored Telephone Number
SYNC	Synchronous
VAR	Value-Added Reseller
XOFF	Flow Control Character 13H
XON	Flow Control Character 11H