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MODEM COMMANDS

ARMADA 7000 FAMILY OF PERSONAL COMPUTERS

CONTENTS

COMPAQ

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CHAPTER 1— USING MODEM COMMANDS

Entering a Command

Use the following guidelines when issuing modem commands:

- When using AT commands, start every command line (except the A/ and +++ commands) with the attention (AT) code characters; otherwise, the modem will not execute the command.Compaq Hardware
- Type commands following the AT prefix in uppercase or lowercase letters or a combination of both.
- Always type the AT prefix in the same case (not At or aT).
- Enter telephone numbers with or without punctuation; for example,

  (123) 456-7890 or 1234567890

NOTE:
The modem ignores all characters that precede AT.

NOTE:
A maximum of 255 characters can follow the AT command. The modem doesn't count the AT prefix or carriage return (<cr>) character. It does count, but doesn't act on, punctuation such as quotation marks and tildes. If a command sequence exceeds the 255-character maximum, the modem does not execute any part of the command line and returns an error message after the <cr>. If this occurs, reentering the command within the 255-character limit executes the command.

NOTE:
Punctuation in the telephone number does take up space set aside for command storage.

Editing and Executing a Command

If you make an error while typing a command, simply backspace over the mistake then retype. You cannot backspace over the AT prefix because it is interpreted immediately after it is typed.

To execute a command line, press the **Enter** key. (Pressing the **Enter** key tells the modem to process the command line.)

Omitting a Parameter in a Command Line

If you enter a command that normally includes a numeric parameter, such as ATHn, without the numeric parameter, the missing parameter is assumed to be the default parameter.

For example, the Hn (hang-up) command can have a numeric parameter of zero **(H0),** which is the default, or of one **(H1);** however, if the parameter is missing, **ATH** plus the **Enter** key is the equivalent of **ATH0** plus the **Enter** key. This rule does not apply to the D (dial) command.

Repeating a Command

You can repeat the last command line issued by entering the A/ command. Because it also repeats the AT prefix and the **Enter** key function, you are not required to enter the AT prefix or press the **Enter** key when repeating this command.

The last previously entered command remains in the command buffer until the modem is reset or power to the modem is turned off. Both actions clear the buffer and make the A/ command invalid since there is no command for the modem to repeat.

NOTE:
Word codes are preceded and followed by the characters set in registers S3 and S4, which are typically the factory defaults: a carriage return and a line feed (LF) control character, respectively.

Understanding Result Codes

A result code is modem response to a command and may be issued in either of two possible formats: words (the long form, also known as verbose) or numeric characters (the short form, represented by digits). The result code format is set using the Vn command.

V1 (default) for words.

V0 for numeric characters.

NOTE:
Numeric characters are followed by a carriage return.

Using Online Mode

In the online mode, the transmitting modem receives characters from the computer, converts the data to analog signals then transmits these signals over the telephone line.

NOTE:
The word modem comes from the process of MOdulation/ DEModulation.

The process of altering a signal for transmission is called modulation. The receiving modem receives analog signals from the telephone when in the online mode and converts or demodulates the signal, returning it to the digital form that can be used by the computer.

Escaping from an Online Session to the Command Mode

Use the following steps to break out of a data transfer session (online mode) and return to command mode:

NOTE:
The escape code sequence (+++) must be typed within one second, or as defined in the Escape Code Guard Time found in S12.

Press and hold the **Shift** key and type +++

An **OK** result code is displayed.

Enter modem commands as needed.

Resume online session by entering AT0 command or terminate the connection with the ATH0 command.

Creating a Command Mode Shortcut

An easy way to issue commands to the modem is via HyperTerminal, included with Windows 95 and Windows NT. You can create a shortcut for accessing HyperTerminal and sending commands to the modem. To create a command mode shortcut on the Windows desktop:

1. Create a Command Mode icon.
2. From the HyperTerminal dialog box, click the Command icon.
3. Click File==>Create Shortcut
   or
   Click the right mouse button.

   A Command Mode Shortcut icon is displayed.
4. Click and drag the shortcut icon to the desktop.
5. To quit HyperTerminal, click File==>Exit.

NOTE: *To hang up the modem, type ATH0 and press* ***Enter.***

Creating a Command Mode Icon

To create a command mode icon using HyperTerminal:

1. Click Start==>Programs==>Accessories ==> HyperTerminal.
2. Double-click the Hypertrm.exe icon.

   The Connection Description dialog box is displayed.
3. Type **Command** in the Name option.
4. Click OK.

   The Phone Number dialog box is displayed.
5. Click Connect Using==>Direct to Com 2.
6. Click OK.

   The Modem Port Settings dialog box displayed.
7. Click OK.

   The command mode screen is displayed with a blinking cursor in the upper-left corner. Commands can now be sent to the modem, and the modem responds with a result code.
8. Click File, then Save to save the session.
9. Click File, then Exit to quit.

   A command mode icon is displayed in the HyperTerminal dialog box.

NOTE:
The internal modem uses the COM2 port in the system.

NOTE:
To hang up the modem, type ATH0 and press ***Enter.***

Setting S Register Default Values

The S register default values function reliably under most circumstances. However, these values may be modified if necessary.

For example, it may take an especially long time to get a dial tone in your office, so you may choose to reset S7 for a longer wait time.

Modifying an S Register

You can modify or change the value of an S register from Command Mode (Terminal Mode) or from a standard data or fax communication application. For example:

- Type **ATS11=70** then press **Enter.**

  This sets S11 to a value of 70.
- If you then enter AT = 95. it resets S11 to a value of 95, since the modem remembered that S11 was the last register referenced.
- If you enter an **S =** command with no parameter (value), the register number defaults to zero and the modem changes the value of **S0.** Therefore, the following commands are equivalent: **ATS0 = 3 and ATS = 3.**

Reading an S Register

To read the contents of a given S register in the terminal mode (command mode), type ATSn? (where "n" is the number of the register) then press **Enter.**

When modifying a register, the modem also remembers the location of the last inquiry. For example, the following sequence of commands display the contents of the S11 register.

ATS11? This command displays the value of S11.

AT? This command also displays the value of S11.

When you use an S? with no value, the register number defaults to zero and the modem responds with the value of S0 (for example **ATS?**).

CHAPTER 2— BASICS OF CELLULAR PHONE USE

Connecting the Modem to a Cellular Phone

The internal modem installed in the Armada 7000 Family of Personal Computers allows you to connect a cellular phone in North America to your computer using an optional cable and the 25-pin connector on the computer. There are AT commands associated with setting up and optimizing a cellular connection.

CAUTION: Using the wrong cable could cause permanent damage to the modem. Contact your Compaq authorized dealer, reseller, or service provider for information on purchasing a cellular cable designed for this modem. For a list of phone cables that are compatible with your modem, refer to "Compatible Cellular Phones with Compaq Cables" in the *Online Reference Guide* that is preinstalled on your computer.

Choosing Cellular Direct Components

If you are using a cellular phone, you need to purchase the following items separately:

- One of the models of cellular phones supported by this modem.
- Cellular phone connection cable. (Contact your Compaq authorized reseller or service provider.)
- Cellular airtime. (Contact a cellular carrier in your area.)

Registering the Phone with the Modem

When the modem was installed at the factory, it was not programmed to automatically expect a cellular phone connection. If you anticipate using a cellular phone with the modem, proceed as follows to register or setup the cellular phone with the modem.

NOTE:
Use Windows HyperTerminal to enter Command Mode and register the phone with the modem.

- Use **$M1** if you are using a Motorola, JVC, or Pioneer phone.
- Use **$M2** if you are using a Nokia, Technophone, AT&T (selected models), or Tandy phone.
- Use **$M4** if you are using a GE or Ericsson phone.

NOTE:
$M3 *is not supported by this modem.*

This command needs be to issued only once; thereafter, the modem checks for the presence of the phone. If a cellular phone is connected, the modem dials through the cellular phone; otherwise, it uses a standard (RJ-11) telephone connector.

CHAPTER 3— BASICS OF DIGITAL SIMULTANEOUS VOICE AND DATA (DSVD)

Digital Simultaneous Voice and Data Using AT Commands

The internal modem is equipped for digital simultaneous voice and data (DSVD) connections with other DSVD compatible modems, as well as for voice-only and data-only calls. Using DSVD technology, and the computer's speakerphone capability, a voice call can be added during a data transfer, or computer information can be sent during a voice conversation, all over a single phone line.

The speakerphone must be enabled for you to hear the voice portion of a DSVD voice and data call. The speakerphone is automatically turned on when the following applications are started:

- Windows HyperTerminal
- Microsoft NetMeeting
- Intel ProShare

Using Windows or DSVD Application Software

The following instructions apply when you are using modem drivers from Windows to communicate with the modem. If you are using a communications application other than Windows to initiate a DSVD call, refer to the software documentation for instructions on manually entering AT commands.

If you are running Windows:

1. Click Start==>Settings==>Control Panel==>double-click Modems.
2. Click Properties from the General Tab.
3. Click Advanced from the Connection Tab.
4. In the Extra Settings option, type **AT-SSE=1-SSE-AC-SSE-FNS0=1**
5. Click OK==>OK==>Close, to exit.

The command typed above has four parts:

1) **-SSE=1** enables DSVD operation.
2) **-SSE-AC** tells the modem to automatically establish a DSVD session upon connection to another DSVD-enabled modem.
3) **-SSE-FN** sets the modem to enable a full-duplex speakerphone operation after a DSVD connection occurs.
4) **S0=1** sets the modem to answer on the first incoming ring.

Using the Command Mode of Windows HyperTerminal

NOTE: Start==>Programs==>Accessories==>HyperTerminal.

- Starting with a Voice Connection

  From the Command Mode of Windows HyperTerminal, follow these instructions.

  To initiate a voice call:

  1. Type **AT-SSE=1** then press **Enter** to enable DSVD operation.
     The modem responds OK.
  2. Type **AT+FCLASS=8;DTXXXXXXX** (where X = each digit of the phone number) then press **Enter.**
  3. Type **ATD** then press **Enter** to enable DSVD mode.

  To answer a voice call:

  1. Type **AT-SSE=1** then press **Enter** to enable DSVD operation.
     The modem responds OK.
  2. If the modem is ringing, type **AT+FCLASS=8;+VLS** then press **Enter.**
     The modem is now in speakerphone mode and you can enter AT commands.
  3. Type **ATD** then press **Enter** to enable DSVD mode.

NOTE: *When -SSE=1 and speakerphone are active, the D command causes an automatic change from +FCLASS=8 to +FCLASS=0.*

- Starting with a Data Connection

  From the Command Mode of Windows HyperTerminal, follow these instructions:

  To initiate a data call:

  1. Type **AT-SSE=1** then press **Enter** to enable DSVD operation.
     The modem responds OK.
  2. Type **ATDTXXXXXXX** (where X = each digit of the phone number) then press **Enter.**
     The modem is now in data mode and you can enter AT commands.
  3. Escape to Command Mode by typing **Shift+++** wait for OK.
  4. Type **AT+VLS=7;O** then press **Enter** to enable DSVD mode.

  To answer a data call:

  1. Type **AT-SSE=1** then press **Enter** to enable DSVD operation.
     The modem responds OK.
     The modem is now in data mode and you can enter AT commands.
  2. If the modem is ringing, type **ATA** then press **Enter.**
     The modem is now in data mode and you can enter AT commands.
  3. Escape to Command Mode by typing **Shift+++** then wait for OK.
  4. Type **AT+VLS=7;O** then press **Enter** to enable DSVD mode.

NOTE: *When -SSE=1 and speakerphone are active, the D command causes an automatic change from +FCLASS=8 to +FCLASS=0.*

- Changing from a DSVD Connection to a Data Connection

  From the Command Mode of Windows HyperTerminal:

  1. Escape to Command Mode by typing **Shift+++** then wait for OK.
  2. Type **AT+VLS=0;O** then press Enter.
     The modem responds OK and is now in data mode.

NOTE: *When -SSE=1 and speakerphone are active, the D command causes an automatic change from +FCLASS=8 to +FCLASS=0.*

NOTE: *When -SSE=1 and speakerphone are active, the D command causes an automatic change from +FCLASS=8 to +FCLASS=0.*

- Changing from a DSVD Connection to a Speakerphone Connection

  While in DSVD mode from Windows HyperTerminal:

  1. Escape to Command Mode by typing **Shift+++** then wait for OK.
  2. Type **AT+VNH=2;H** then press Enter.
     The modem responds OK and is now in speakerphone mode.

NOTE:
The H command automatically sets FCLASS=0.

CHAPTER 4— AT COMMANDS

Basic AT Commands

Answer Command (A)

This command causes the modem to answer a call without waiting for a ring. This is useful in manually answering a call or when making a direct connection with another modem. When this command is entered, the modem will attempt to register with a cellular phone (if selected) to receive incoming calls.

Parameters: none

NOTE:
Any command that follows the A command on the same command line is ignored.

Attention Code (AT)

This command is the command line prefix that tells the modem a command or sequence of commands is being entered. It precedes all commands except the A/ (repeat) and +++ (escape) commands.

Entered alone, AT causes the modem to respond with OK or 0 if it is ready to receive commands.

Parameters: none

Bell/ITU Mode Selection (B)

This command sets the modem to either Bell or ITU mode (1200 bps, 300 bps).

Parameters: 0, 1, 2-3, 15, 16

n = 0	ITU V.22 mode; also causes B15 to be performed.
n = 1	Bell 212A mode; also causes B16 to be performed **(Default).**
n = 2 or 3	V.23 R1200/T75 when modem is originating; V.23 T1200/R75 when modem is answering.
n = 15	ITU V.21 mode.
n = 16	Bell 103 mode.

Character Echo (E)

This command disables or enables the local echo of entered characters while the modem is in the command (terminal) mode.

Parameters: n = 0, 1

n = 0	Disables local echo.
n = 1	Enables local echo **(Default).**

Determine Data Rate Negotiation (N)

This command determines if the modem performs rate negotiated handshake with remote modem at connection.

Parameters: 0, 1

n = 0	Automode disabled; handshake only at the rate specified by the DTE rate. S37, *H, and the J dial modifier.
n = 1	Automode enabled; handshake at or below the rate specified by the DTE rate. S37, *H, and the J dial modifier **(Default).**

NOTE:
In pulse dialing, characters A, B, C, D, and # are ignored.

Dial Command (D)

This command causes the modem to dial the number that follows D in the command line.

Identification/Checksum Option (I)

This command interrogates the modem for its product code, checksum, or ROM revision code.

Parameters: 0, 1, 2, 3, 9

n = 0	Requests product code **(Default)**.
n = 1	Requests control firmware checksum (8 bit).
n = 2	Verifies control firmware checksum; responds OK or ERROR result code.
n = 3	Requests ROM revision code formatted as: XXXXXX NNN PASS (data pump date and revision code) XXXXXX NNN PASS (ASIC date and revision code) XXXXXX NNN PASS (control firmware date and revision code). The date codes are in yymmdd format, and the revision codes are 3-digit numbers.
n = 9	Requests ROM revision and country code. For example, Compaq N.NN USA where N.NN defines the revision code for the ROM and reports the selected DAA.

Long Space Disconnect (Y)

This command enables/disables the generation and response to long space disconnect.

Parameters: 0, 1

n = 0	Disables long space disconnect **(Default)**.
n = 1	Enables long space disconnect.

Negotiation Progress Result Code (W)

This command determines whether or not to return negotiation progress result codes.

Parameters: 0, 1, 2

n = 0	DTE speed on CONNECT; CARRIER and PROTOCOL disabled **(Default)**.
n = 1	DTE speed on CONNECT; CARRIER and PROTOCOL enabled.
n = 2	DCE speed on CONNECT; CARRIER and PROTOCOL disabled.

Online Data Mode (O)

This command forces the modem to the online data mode. Use this command to return to the online mode after "escaping" to the command mode.

Parameters: 0, 1, 3

n = 0	Enters online data mode.
n = 1	Enters online data mode with a retrain.
n = 3	Enters online data mode with a rate renegotiation.

Read/Write an S Register (S)

This command sets the register r to the specified value n.

The Sr? command reads (displays) the value in register r.

Parameters:

Range (r):	0-110
Range (n):	register specific

Recall Stored Profile (Z)

This command resets the modem, recalls the specified user profile from nonvolatile memory (NVRAM), and places it in the active configuration area.

Parameters: 0, 1

n = 0	Reset modem and recall parameters stored in user profile 0.
n = 1	Reset modem and recall parameters stored in user profile 1.

Repeat Last Command (A/)-

This command causes the modem immediately to repeat the previous command such as redialing a telephone number. The previously executed command remains in the command buffer until AT is entered or power is turned off. Both actions clear the buffer and make the A/ command invalid since there is no command to repeat. It is not necessary to enter either a <cr> or AT.

Parameters: none

Result Code (X)

This command selects the result code set and dialing functions.

Parameters: 0, 1, 2, 3, 4, 9

n = 0	Basic result code set (codes 0-4). The modem waits for the period set in register S6 and blind dials. Dial tone and busy tone detection are disabled.	n = 3	Result codes 0-5, 10-14, 86, and 87. The features are the same as those for X0 and X1 except busy tone detection is enabled. The modem disconnects and sends a BUSY result code if a busy tone is detected. Dial tone detection is disabled.
n = 1	Extended result code set (codes 0-5, 10-14, 86, and 87). Other features are the same as those for X0, plus CONNECT result codes are enabled.	n = 4	Result codes 0-7, 10-14, 86, and 87. Both busy tone and dial tone detection are enabled **(Default)**.
n = 2	Result codes 0-6, 10-14, 86, and 87. The features are the same as those for X0 and X1 except dial tone detection is enabled. Disconnect occurs and the NO DIAL TONE result code is sent if a minimum, 1-second duration dial tone is not detected within 5 seconds after going off-hook or after the end of the wait period. Busy tone detection is disabled.	n = 9	Result codes 0-7, 10-14, 25, 26, 86, 87. Both busy tone and dial tone detection are enabled.

Result Code Display (Q)

This command enables the modem to send result codes.

Parameters: 0, 1

n = 0	Enables output of result codes **(Default)**.
n = 1	Disables return of result codes.

Result Code Form (V)

This command determines the type of result code. The Vn command determines if the result code is sent as words or numbers.

Parameters: 0, 1

n = 0	Result code is sent as numbers.

n = 1	Result code is sent as words **(Default)**.

Speaker Control (M)

Parameters: 0, 1, 2, 3

n = 0	Always off.
n = 1	On until carrier is detected **(Default)**.
n = 2	Always on.
n = 3	On after dialing; off when carrier detected.

Speaker Volume (L)

This command has no effect on modem operation. However, it will be accepted for compatibility. Speaker volume is controlled by the host computer.

Parameters: n = 0, 1, 2, 3

NOTE:
To turn off the speaker completely, use the M0 command.

Switch Hook Control (H)

This command initiates a hang-up sequence. When the H1 command is entered, the modem will attempt to register with a cellular phone (if selected) to receive incoming calls. If a cellular phone is found, an ERROR result is returned since it is not possible to go off-hook with a cellular phone. While ERROR is returned, the modem is registered with the cellular phone. Ignore the ERROR result in this case.

Parameters: 0, 1

n = 0	The modem will go on-hook; it will hang up **(Default)**.
n = 1	Modem will go off-hook; it will pick up the telephone line.

Tone Dial (T)

This command sets the dialing mode to tone. All calls will remain tone until pulse dialing is selected.

Parameters: none

Ampersand AT& Commands

Data Carrier Detect (&C)

This command controls the modem's use of the DCD pin of the DTE interface.

Parameters: 0, 1, 2

n = 0	DCD always ON.
n = 1	DCD ON only when a data carrier is present **(Factory Default)**.
n = 2	UNIX compatible DCD control. DCD is always ON except for a short time when the carrier is lost.

Data Set Ready (&S)

This command selects how the modem will control data set ready (DSR).

Parameters: 0, 1, 2

n = 0	DSR will remain on at all times **(Default)**.
n = 1	DSR will become active after answer tone has been detected and inactive at hang-up.
n = 2	DSR will become active at the end of handshake (before the CONNECT message is issued), and inactive at hang-up.

Data Terminal Ready (&D)

This command controls the modem use of the DTR pin of the DTE interface.

Parameters: 0, 1, 2, 3

n = 0	The modem ignores DTR.
n = 1	The modem enters the command mode when the DTR is turned OFF.
n = 2	The modem enters the command mode, disables auto-answer, and hangs up when DTR is turned OFF **(Factory Default)**.
n = 3	The modem resets to user-specified configuration when the DTR is turned OFF.

Error Control and Speed Buffering (&Q)

This command selects communications modes.

Parameters: 0, 5, 6

n = 0	Asynchronous mode, no speed buffering. **&Q0** disables all flow control (including modem-to-modem flow control), suppresses the CARRIER and PROTOCOL result codes, and causes the CONNECT result code to indicate the DCE speed regardless of the W command and register S95 settings.
n = 5	Error control mode with speed buffering **(Default)**.
n = 6	Asynchronous with speed buffering. Allows fixed DTE-DCE speed to keep applications program from changing UART data rate to match the modem transmission rate after connection.

Reliable communications over cellular networks or other impaired channels require error control. Therefore **&Q5** *[jump to the Cellular ($S Register) section]* should always be in effect when using cellular direct connection or when communicating over impaired noncellular phone lines.

Guard Tone (&G)

This command determines guard tone selection.

Parameters: 0, 2

n = 0	Disables guard tone **(Default)**.
n = 2	1800-Hz guard tone.

Load ROM Defaults and ETC (&F)

This command loads the preset factory configuration from firmware ROM into active memory and enables Enhanced Throughput Cellular (ETC). This command also restores &Y0 command option. Use AT&W to store the active memory profile in nonvolatile random access memory (NVRAM).

Parameters: 0, 5, 6, 15,16

n = 0	Loads factory configuration without ETC. Use this option for noncellular connections **(Default)**.
n = 5	Loads factory configuration for cellular ETC. Configures the modem for best results when connected to a cellular phone, regardless of the equipment in use on the other end of the connection.
n = 6	Loads factory configuration for noncellular ETC. Configures the modem for best results when your modem is connected to a noncellular phone and the other modem is connected to a cellular phone.
n = 15	Enables ETC without loading factory configuration. Configures the modem for best results when your modem is connected to a cellular phone, regardless of the equipment in use on the other end of the connection.
n = 16	Enables ETC without loading factory configuration. Configures the modem for best results when your modem is connected to a noncellular phone and the other modem is connected to a cellular phone.

Local Flow Control (&K)

This command determines the flow control selection.

Parameters: 0, 3, 4, 5

n = 0	Local flow control disabled.
n = 3	RTS/CTS **(Default)**.
n = 4	Xon/Xoff.
n = 5	Transparent Xon/Xoff (communications program support required).

Make-to-Break Ratio (&P)

This command specifies the make/break dial pulse ratio selection.

Parameters: 0, 1

n = 0	Selects 39%-61% make/break ratio **(Default)**.
n = 1	Selects 33%-67% make/break ratio.

Recall Profile on Power-Up (&Y)

This command selects which stored profile will be made active after a reset or upon power-up.

n = 0	Recall stored profile 0 **(Default)**.
n = 1	Recall stored profile 1.

Store Active Profile (&W)

This command saves the active profile to the specified stored profile.

Parameters: 0, 1

n = 0	Save active profile to stored profile 0.
n = 1	Save active profile to stored profile 1.

&W may be used to create a separate profile for dialing noncellular calls and a separate profile for dialing cellular direct calls.

Store Telephone Number (&Z)

The modem can store up to four telephone numbers. Each telephone number dial string can contain up to 36 characters. The format is AT&Zn=s, where n is the desired location from 0-3 and s is the dial string.

NOTE:
The &Zn command must not be followed by another command on the same command line.

EXAMPLE: AT &Z3=1(214)748-1414

This stores the specified dial string in stored number location 3.

Telephone Interface Control (&J)

This command specifies telephone jack selection.

Parameters:	0, 2, 3
n = 0	Auto selection mode **(Default)**.
n = 2	Internal DAA (RJ-11 type only).
n = 3	Cellular direct connection.

When the **&J0** command is in effect, the modem automatically determines which type of telephone interface is in use, then proceeds with the call.

This autoselection takes some time and may be bypassed for quicker response by using **&J2** or **&J3**. When the **&J3** command is entered, the modem will attempt to register with a cellular phone (if selected) to receive incoming calls. Even if one of these is selected in the power-up profile, it is necessary to enter the command in order to attempt this registration.

V.32/V.32 bis Auto Retrain Command (&B)

This command controls the auto retrain option for V.32 and V.32bis.

This command does not effect V.22bis retrain, which is independently controlled with the %E command. Actions taken by this command are independent of automatic rate renegotiation because of protocol errors, which are controlled by S110. It has no effect on calls that use MNP 10.

The level of channel impairments at which the &B command takes action is controlled by S108.

Parameters: n = 0, 1

n = 0	Disable auto retrain. Hang up in case of channel impairments.
n = 1	Enable auto retrain **(Default)**.

V.32 Trellis Coding (&U)

This command is applicable only to V.32, 9600 bps modulation.

Parameters: 0, 1

n = 0	Enable Trellis Coding **(Default).**
n = 1	Disable Trellis Coding.

View Active and Stored Profiles (&V)

This command displays the active profile and stored dial strings as well as the specified stored profile.

Parameters: 0, 1, 2

n = 0	Specified stored profiles 0 and 1 **(Default)**.
n = 1	Specified stored profile 0.
n = 2	Specified stored profile 1.

Percent AT% Commands

MNP 5 Auto-Retrain Control (%C)

This command enables or disables MNP 5 data compression. For compression to work, both modems must have compression enabled; otherwise, a noncompression link is established.

Parameter: 0, 1

n = 0	Disable MNP 5 data compression.
n = 1	Enable MNP 5 data compression **(Default)**.

Set Auto-Reliable Character (%A)

This command sets the auto-reliable fallback character.

Parameter: 0 - 127 **(Default 13)**

V.22 bis Auto-Retrain Control (%E)

This command instructs the modem to monitor the line quality and request a retrain when necessary during a 2400-bps connection.

Parameters: 0, 1

n = 0	Disables V.22bis auto-retrain.
n = 1	Enables V.22bis auto-retrain **(Default)**.

Backslash AT\ Commands

Accept MNP Link (\U)

This command causes the local modem to wait 12 seconds for a link request from the remote modem. Does not perform V.42 link negotiation. Assumes that the remote modem is executing the \O command.

Responds with an error message if an error control link is already active.

Adjust bps Rate Control (\J)

This command enables the modem to emulate the behavior of modems that force the DTE interface to the line speed. This feature helps prevent data loss if one or both DTE interfaces involved do not have flow control.

Parameters: 0, 1

n = 0	Turn off feature **(Default)**.
n = 1	Turn on feature.

ARQ Result Code (\V)

This command changes the format of CONNECT result codes. May also be controlled with bit 1 of S95.

Parameters: 0, 1

n = 0	Does not append /ARQ to CONNECT messages **(Default)**.
n = 1	Append /ARQ to CONNECT messages.

Auto-Reliable Buffer Control (\C)

This command controls the auto-reliable buffer operation. This feature can be used to reduce connect time to systems using non-error control modems.

Parameters: 0, 1, 2

n = 0	Does not buffer data during error-control negotiation **(Default)**.
n = 1	Buffers data received from the remote modem while waiting for error correction protocol handshaking. If error control is negotiated, the modem discards the buffer contents and proceeds with error correcting operation. If instead a fallback to speed buffering occurs, the buffer contents are delivered to the serial port. The buffer capacity is 200 characters.
n = 2	Does not buffer data during error control negotiation. Switches immediately to speed buffered operation (without error control) if the character defined by the %A command is received. This setting is useful in calling a system for which the first character sent is known and where several different types of modems are attached.

Break Control (\K)

This command sets Break Control. This command controls the sequence of events when a break is initiated.

	Break from DTE while in data mode (error control connection)	**Break from Remote while in direct mode**	**Break from DTE while in data mode (direct or speed buffered connection)**	**\Bn from DTE**
n = 0	Command state, no break	Purge buffers, send break to DTE	Purge buffers, send break to remote	Purge buffers, send break to remote
n = 1	Purge buffers, send break to remote	Same as n = 0	Same as n = 0	Same as n = 0
n = 2	Same as n = 0	Send break to DTE immediately	Send break to remote immediately	Send break to remote immediately
n = 3	Send break to remote immediately	Same as n = 2	Same as n = 2	Same as n = 2
n = 4	Same as n = 0	Send break to DTE with data	Send break to remote with data	Send break to remote with data

n = 5 **(Default)**	Send break to remote with data	Same as n = 4	Same as n = 4	Same as n = 4

DTE Flow Control (\Q)

This command selects flow control between modem and the computer (DTE).

Parameters: 0, 1, 3, 9

n = 0	Disable flow control.
n = 1	Enable Xon/Xoff flow control.
n = 3	Enables bidirectional hardware flow control (CTS and RTS are utilized) **(Default)**.
n = 9	Hayes compatible transparent Xon/Xoff flow control.

Inactivity Timer Control (\T)

This command specifies the length of time, in minutes, that the modem will wait before disconnecting when no data is sent or received.

A setting of zero disables the timer. Alternatively, this time may be specified in register S30.

Range = 0-90 (Default = 0)

Modem-to-Modem Flow Control (\G)

This command applies only when using speed-buffered operation without error control. Flow control is used between modems.

Parameters: 0, 1

n = 0	Disables flow control (Xon/Xoff) (Default).
n = 1	Enables flow control (Xon/Xoff).

Operational Mode Control (\N)

Parameters: 0, 1, 2, 3, 4, 5, 50, 51, 52, 53, 54

n = 0	Disable error control and select asynchronous mode with speed buffering.
n = 1	Disable error control and select direct (no speed buffering) mode.
n = 2	Enable V.42 LAPM and MNP error control.
n = 3	Enable V.42 LAPM and MNP error control with non-error control connection as fallback **(Default)**.
n = 4	Enable MNP error control only.
n = 5	Enable V.42 LAPM error control only.
n = 50	Selects V.42 LAPM with fallback to speed buffering.
n = 51	Selects MNP error control with fallback to speed buffering.
n = 52	Selects V.42 LAPM with direct mode fallback.
n = 53	Selects MNP error control with direct mode fallback.

n = 54	Enables V.42 LAPM and MNP error control with direct-mode fallback.

Originate MNP Link (\O)

This command causes the modem to originate an MNP link from the online command state, does not perform V.42 link negotiation, assumes that the remote modem is executing a \U command, and responds with an error message if an error-control link is already active.

Select Maximum MNP Block Size (\A)

This command selects the maximum size of blocks transmitted under MNP. Generally higher block sizes increase throughput performance. However, lower block sizes increase throughput over cellular networks and other impaired channels.

Parameters: 0, 1, 2, 3

n = 0	Set block size maximum to 64 characters.
n = 1	Set block size maximum to 128 characters.
n = 2	Set block size maximum to 192 characters.
n = 3	Set block size maximum to 256 characters **(Default)**.

Over cellular networks and other impaired channels **A0** is recommended.

Set Xon/Xoff Pass-Through (\X)

This command controls whether the flow control characters are also sent to the remote modem when using Xon/Xoff or transparent Xon/Xoff flow control.

Parameters: 0, 1

n = 0	Process flow control characters locally **(Default)**.
n = 1	Process flow control characters locally, and pass them through to the remote modem so it can process the characters.

Switch to MNP (\Y)

This command causes the modem to attempt to establish an error control link from the online command state. It is assumed that the remote modem is also executing a \Y command.

Responds with an error message if an error control link is already active.

Switch to Speed Buffering (\Z)

This command causes the modem to switch to speed buffering after an MNP link has been established. This feature does not apply to LAPM connections.

Responds with an error message if no MNP connection is in use. If this command is received from the remote modem, a CONNECT message is forced when the modem is in the online data state. If dictated by S95, it also responds.

Transmit Break to Remote Modem (\B)

This command sets the length of the transmitted break to the remote modem during an online escape state.

Parameters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

n = 0	300 ms break
n = 1	100 ms break
n = 2	200 ms break
n = 3	300 ms break
n = 4	400 ms break
n = 5	500 ms break
n = 6	600 ms break
n = 7	700 ms break
n = 8	800 ms break
n = 9	900 ms break

Cellular AT Commands

Cellular Telephone Lock Command ($L)

NOTE:
This command not supported on all manufacturers' phone models.

This command activates the lock function of the cellular telephone.

Parameters: Lock code n optional per telephone manufacturer.

Cellular Telephone Unlock Command ($U)

NOTE:
This command is not supported on all manufacturers' phone models.

This command uses the number provided to activate the unlock function of the cellular telephone.

Parameter: Optional Lock code n per telephone manufacturer.

Display Cellular Timer ($T)

NOTE:
This command is not supported on all manufacturers' phone models.

This command provides the user with a means of monitoring the air time spent during data connection, both on incoming and outgoing calls.

Parameters: 0

n = 0	Reports cumulative in use time, as follows: Total	hh:mm

Set Current $S Register Value ($Sr?)

This command displays the current value of the $Sr register.

Display Stored Dial String Option ($Zn?)

This command displays the stored dial string from cellular telephone location number n. Display dial string stored in location n.

Parameter: n = 0

Displays the last number dialed n = 1 to y (where y = maximum number of storable numbers; telephone specific).

Manufacturer Model ($M)

This command specifies which cellular phone is attached.

Parameters: n = 0, 1, 2, 4

n = 0	No cellular telephone.
n = 1	Motorola, JVC, Pioneer.
n = 2	Nokia, Technophone, AT&T.
n = 3	Not supported by this modem.
n = 4	GE or Ericsson.

Set Cellular $S Register ($Sr=n)

Sets cellular $S register r to the value n.

Store Dial String S ($Zn=S)

This command stores dial string s in the cellular telephone at location number n. When used, the $Z= command must be the last command on the command line. If the string is left blank, location will be cleared.

Parameter: n = 1

y = maximum number of storable numbers; telephone specific

CAUTION: Numbers stored in the cellular phone overwrite any number previously stored in the same location.

Telephone Information Command ($I)

This command returns a report of the manufacturer of the cellular telephone, protocol type, and active telephone numbers assigned to it.

Manufacturer Model Protocol

Active Telephone Number

Parameters: none

NOTE:
Report of Active Telephone Number may be replaced by the phrase Phone Ready on some manufacturers' models.

Telephony Commands

Enter Voice Mode (AT+FCLASS=8)

This command puts the modem in voice mode. The modem controller maintains the overall state of the system to determine when voice commands are issued using the speakerphone or telephone answering machine (or other voice contexts).

Initialize Voice Parameters (AT+VIP)

This command queries the modem for the range of modes supported.

Parameters: 0, 1, 8, 80 (data, fax, voice, VoiceView)

Distinctive Ringing and Cadence Report (AT+VDR=<enable>,<report>)

NOTE:
Distinctive ringing is not available in some countries.

This command enables the distinctive ringing feature. Distinctive ringing allows a report of DROF/DRON to follow an exact ring cadence coming over the phone line.

Return Distinctive Ringing and Cadence Report (AT+VDR?)

NOTE:
Distinctive ringing is not available in some countries.

This command returns the current values of <enable> and <report>.

Return Supported Distinctive Ringing and Cadence Report Configurations (AT+VDR=?)

NOTE:
Distinctive ringing is not available in some countries.

This command queries the modem for the range of supported distinctive ring configurations. The DCE returns (0,1), (0-255).

Analog Source/Destination Selection (AT+VLS=n)

This command attaches various analog devices to the system in voice mode.

Speakerphone On/Off

n = 0	Speakerphone off. Detaches analog devices, modem on-hook.
n = 7	Speakerphone on. Attaches internal speaker and internal microphone, modem off-hook.

Microphone Control/Phone muting

n = 5	Disables/detaches microphone analog source (leaving speaker only) when speakerphone is in operation (phone mute feature).
n = 7	Restores/attaches microphone along with speaker (normal speakerphone operation).

Report Current Analog Source/Destination (AT+VLS?)

NOTE:
AT+VLS=? queries the modem for the range of supported configurations and the list of unsolicited event codes that the modem reports to the DTE under each configuration. For speakerphone, the configurations supported are 0, 5, 7.

This command reports the current analog source/destination configuration, along with a listing of all event codes reported from the modem to the DTE under that configuration.

Speakerphone Volume Control (AT+VGT)

Range: 0-255

<level> = 0	Modem automatic volume control
<level> = 128	Nominal volume level for sending to speaker
<level> = <value greater than 128>	Increase volume above nominal level
<level> = <value less than 128>	Decrease volume below nominal level

DTE/DCE Inactivity Timer (AT+VIT=n)

This command sets the modem value for the DTE/DCE inactivity timer. This timer is initiated after a logical hang-up described by the AT=VNH=2 command. At the end of the selected inactivity period, the modem performs a physical hang-up and returns to +FCLASS=0. The timer, n, is incremented in one-second units.

Automatic Hangup Control (AT+VNH=n)

This command causes the modem to enable or disable automatic hang-ups in the data and facsimile modes.

n = 0	Enable automatic hang-ups **(Default).**
n = 1	Disable automatic hang-ups in the data and facsimile modes. The DTE performs a logical hang-up, and the modem does not physically go on-hook and returns the OK result code.

Facsimile Commands

Read Current Service Class

AT+FCLASS? interrogates the modem to determine the active configuration.

Parameters: 0, 1, 8, 80

n = 0	Data mode
n = 1	Fax Class 1
n = 8	Voice mode
n = 80	Enter VoiceView mode

Read Service Class Capabilities

Interrogates the modem to determine its operating capabilities (excluding +FTS and +FRS commands).

The responses are:

+FCLASS=?	0, 1, 8, 80
+FTM=?	3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146
+FRM=?	3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146
+FTH=?	3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146
+FRH=?	3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146

Receive Data

AT+FRM causes the modem to enter the receiver mode using the modulation defined below.

Parameters: 3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146

n = 3	V.21 channel 2 (300 bps)	n = 97	V.17 (9600 bps) Long Train
n = 24	V.27ter (2400 bps)	n = 98	V.17 (9600 bps) Short Train
n = 48	V.27ter (4800 bps)	n = 121	V.17 (12000 bps) Long Train
n = 72	V.29 (7200 bps)	n = 122	V.17 (12000 bps) Short Train
n = 73	V.17 (7200 bps)	n = 145	V.17 (14400 bps) Long Train
n = 74	V.29 (9600 bps) Long Train	n = 146	V.17 (14400 bps) Short Train
n = 96	V.29 (9600 bps)		

An ERROR response code results if this command is issued while the modem is on-hook.

Receive HDLC Data

AT+FRH causes the modem to receive HDLC framed data using the modulation defined below:

Parameters: 3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146

n = 3	V.21 channel 2 (300 bps)	n = 97	V.17 (9600 bps) Long Train
n = 24	V.27ter (2400 bps)	n = 98	V.17 (9600 bps) Short Train
n = 48	V.27ter (4800 bps)	n = 121	V.17 (1200 bps) Long Train
n = 72	V.29 (7200 bps)	n = 122	V.17 (1200 bps) Short Train
n = 73	V.17 (7200 bps)	n = 145	V.17 (14400 bps) Long Train

n = 74	V.29 (9600 bps) Long Train	n = 146	V.17 (14400 bps) Short Train
n = 96	V.29 (9600 bps)		

An ERROR response code results if this command is issued while the modem is on-hook.

Service Class Selection

AT+FCLASS= selects the class (kind) of service desired.

Parameters: 0, 1, 8, 80

n = 0	Data mode **(Default)**
n = 1	Fax Class 1
n = 8	Voice mode
n = 80	Enter VoiceView mode

Stop Transmission and Wait

AT+FTS causes the modem to terminate a transmission. The transmission is terminated and the modem waits for a specified time (n) in 10-millisecond intervals before responding with the OK result code.

Parameters: n = 0 **(Default)**

An ERROR response code results if this command is issued while the modem is on-hook.

Transmit Data

AT+FTM causes the modem to transmit data using the modulation defined below:

Parameters: 3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146

n = 3	V.21 channel 2 (300 bps)	n = 97	V.17 (9600 bps) Long Train
n = 24	V.27ter (2400 bps)	n = 98	V.17 (9600 bps) Short Train
n = 48	V.27ter (4800 bps)	n = 121	V.17 (12000 bps) Long Train
n = 72	V.29 (7200 bps)	n = 122	V.17 (12000 bps) Short Train
n = 73	V.17 (7200 bps)	n = 145	V.17 (14400 bps) Long Train
n = 74	V.29 (9600 bps) Long Train	n = 146	V.17 (14400 bps) Short Train
n = 96	V.29 (9600 bps)		

An ERROR response code results if this command is issued while the modem is on-hook.

Transmit HDLC Data

AT+FTH causes the modem to transmit data framed in HDLC protocol using the modulation defined below.

Parameters: 3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146

n = 3	V.21 channel 2 (300 bps)	n = 97	V.17 (9600 bps) Long Train
n = 24	V.27ter (2400 bps)	n = 98	V.17 (9600 bps) Short Train
n = 48	V.27ter (4800 bps)	n = 121	V.17 (12000 bps) Long Train
n = 72	V.29 (7200 bps)	n = 122	V.17 (12000 bps) Short Train
n = 73	V.17 (7200 bps)	n = 145	V.17 (14400 bps) Long Train
n = 74	V.29 (9600 bps) Long Train	n = 146	V.17 (14400 bps) Short Train
n = 96	V.29 (9600 bps)		

An ERROR response code results if this command is issued while the modem is on-hook.

Wait for Quiet

AT+FRS causes the modem to report back to the DTE with an OK result code after 10-millisecond intervals of silence have been detected on the line.

Parameters: 0,1

n = 0	Reset parameters to defaults.
n = 1	Reset parameters to defaults and audit message storage.

This command is aborted if any character is received. The modem discards the aborting character and issues an OK result code.

An ERROR response code results if this command is issued while the modem is on-hook.

VoiceView Commands

Initialize VoiceView Parameters (-SIPn)

This command sets VoiceView parameters.

Parameter: n = 0

n = 0	Reset parameters to defaults.

Reset Capabilities Data to Default Setting (-SIC)

This command resets the capabilities data structure to the default capabilities.

Start Modem Data Mode (-SDA)

This command initiates the transmission of the modem data mode start sequence and causes the DCE to switch to modem data mode.

Start Facsimile Data Mode (-SFX)

This command initiates the transmission of the fax data mode start sequence and causes the DCE to switch to fax data mode.

Capabilities Query Response Control (-SQR=n)

This command controls the response to a capabilities query.

Parameters: 0,1

n = 0	One-way response.
n = 1	Two-way response.

Set Capabilities Data (-SCD=n)

This command is used to read, add to, or establish the contents of the DCE's capabilities data structure. The capabilities elements (n) consist of pairs of hexadecimal numbers and specify the capabilities information.

AT-SCD? Reads the current capabilities.

Error Reporting (-SER?)

This command asks the DCE for an error report. The DCE responds with either 0 (no error found) or a pair of hexadecimal digits representing the error byte.

Set VoiceView Transmission Speeds (-SSp=x, y, z)

This command specifies the data modulation schemes that are associated with the VoiceView mode tones. The digits of the compound value represent burst speed (x), recovery speed (y), and priority speed (z).

Parameters: 1-7

Default : (0, 1, 2)

n = 0	V.21 300 bps FSK
n = 1	V.27ter 4800 bps DPSK
n = 2	V.29 9600 bps QAM
n = 3	V.29 4800 bps QAM
n = 4	V.17 7200 bps TCM
n = 5	V.17 9600 bps TCM
n = 6	V.17 12000 bps TCM
n = 7	V.17 14400 bps TCM

Start Sequence Response Control (-SSR=n)

This command enables or disables a response to all VoiceView data start sequences.

Parameters: 0, 1

n = 0	Disable response.
n = 1	Enable response **(Default)**.

Start VoiceView Data Mode (-SVV)

This command initiates the transmission of the VoiceView data.

Accept Data Mode Request (-SAC)

This command instructs the modem to accept the incoming VoiceView data mode start sequence and proceed with establishing a data transaction.

Start Capabilities Query (-SSQ)

This command initiates the transmission of the VoiceView capabilities query.

DSVD Command

DSVD Enable/Disable (-SSE=n)

Parameters: 0, 1

n = 0	Disable DSVD **(Default).**
n = 1	Enable DSVD.

CHAPTER 5— S REGISTERS

S Registers Summary

Ring to Answer On (S0)

This register sets the number of rings required before the modem automatically answers a call. Setting this register to zero disables auto-answer mode.

Range: 0-255 rings

(Default): 0 (disable)

Ring Count (S1)

This register counts the number of rings received. If no rings occur over an eight-second interval, this register is cleared.

Range: 0-255 rings

(Default): 0

Escape Code Character (S2)

This register holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII + (the "plus" character). A value over 127 disables the escape process.

Range: 0-127, ASCII decimal

(Default): 43 (the + character)

Carriage Return Character (S3)

This register holds the decimal value of the ASCII character used as the carriage return character. The default value corresponds to an ASCII carriage return.

Range: 0-127, ASCII decimal

(Default): 13 (carriage return)

Line Feed Character (S4)

This register sets the character recognized as a line feed. Pertains to asynchronous operation only. The line feed control character is output after the carriage return control character if word result codes are used.

Range: 0-127 ASCII decimal

(Default): 10 (Line Feed)

Backspace Character (S5)

This register sets the character recognized as a backspace. The modem will not recognize the backspace character if it is set to a value that is greater than 32 and less than 127. This character can be used to edit a command line.

When the echo command is enabled, the modem echoes back to the local DTE Backspace character, an ASCII space character, and a second backspace character; this means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0-32, 127 ASCII decimal

(Default): 8 (Backspace)

Wait for Blind Dial (S6)

This register denotes the wait time, in seconds, before a blind dial.

The value of S6 is used when the X0, X1, or X3 commands are in effect. X2, X4, and X9 enable dial tone detection and disable blind dialing. Therefore, when X2, X4, and X9 are in effect, the value of S6 is irrelevant.

Range: 2-255 seconds

(Default): 2

Wait Time for Carrier (S7)

This register denotes the wait time, in seconds, for a carrier after dialing or answering. If the modem does not detect a carrier after the specified wait time, it hangs up.

Range: 1-255 seconds

(Default): 50

Pause Time for Comma (S8)

This register sets the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string.

Range: 0-255 seconds

(Default): 2

Carrier Detect Response Time (S9)

This register sets the time, in tenths of a second, that the carrier must be present before the modem considers it valid and turns on carrier detect (CD) if applicable.

Range: 1-255 tenths of a second

(Default): 6 (0.6 second)

Lost Carrier to Hang-Up Delay (S10)

This register sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect.

Range: 1-255 tenths of a second

(Default): 14 (1.4 seconds)

DTMF Tone Duration (S11)

This register sets the duration of tones and spacing in DTMF dialing.

Range: 50-255 milliseconds

(Default): 95 (95 milliseconds)

Escape Code Guard Time (S12)

This register determines the minimum idle period before and after the entry of the escape code sequence. Also, it defines the maximum period, in fiftieths of a second, allowed between consecutive asynchronous escape characters S2 for the escape sequence to be considered valid. If this register is set to 0, the guard time of the escape sequence is disabled.

Range: 0 or 20-255 (1/50 of a second or 0.02 seconds)

(Default): 50 (1 second)

Test Timer (S18)

This register sets the length of time, in seconds, that the modem conducts a test (commanded by &Tn) before returning to the command mode. When this register value is zero, the test will not automatically terminate. The test must be terminated from the command mode by issuing the &T0 or H command.

Range: 0-255 seconds

(Default): 0

Response to DTR Change (S25)

This register responds to changes to the DTR. The increment is 10 milliseconds. If &D1 or &D2 is selected, a change in DTR shorter than the S25 time is ignored. If &D3 is selected, any on-to-off transition of DTR causes a hard reset.

Range: 0-255

(Default): 5 (50 milliseconds)

Disconnect Inactivity Timer (S30)

This register sets the length of time, in minutes, that the modem will stay online before disconnecting when no data is sent or received. If this register is set to 0, the disconnect inactivity timer is disabled.

Range: 0-90 minutes

(Default): 0 (disable)

Negotiation Failure (S36)

This register determines the action to be taken when V.42 feature negotiation fails or is not selected.

(Default):	7
0	Modem disconnects.
1	Modem stays online and a direct mode connection is established (no speed buffering).
2	Reserved.
3	Modem stays online and an asynchronous connection with speed buffering is established.
4	An MNP connection is attempted and if it fails, the modem disconnects.
5	An MNP connection is attempted and if it fails, a direct mode connection is established.
6	Reserved.
7	An MNP connection is attempted and if it fails, an asynchronous connection with speed buffering is established (Default).

Desired Carrier Speed (S37)

This register specifies the speed at which the modem should attempt a connection.

0	Use speed of last command issued **(Default)**.	11	Attempt a connection at 12000 bps.
1-2	Reserved.	12	Attempt a connection at 14400 bps.
3	Attempt a connection at 300 bps.	13	Attempt a connection at 19200 bps.
4	Reserved.	14	Attempt a connection at 21600 bps.
5	Attempt a connection at 1200 bps.	15	Attempt a connection at 24000 bps.
6	Attempt a connection at 2400 bps.	16	Attempt a connection at 26400 bps.
7	Attempt a connection at 4800 bps.	17	Attempt a connection at 28800 bps.
8	Attempt a connection at 7200 bps.	18	Attempt a connection at 31200 bps.
9	Attempt a connection at 9600 bps.	19	Attempt a connection at 33600 bps.
10	Attempt a connection at 12000 bps.		

NOTE:
Maximum DTE speed supported by this modem is 115,200 bps.

Delay Before Forced Modem Hang-Up (S38)

This register specifies the delay between the modem's receipt of the H command disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation.

The modem will wait for the number of seconds specified in S38 for the remote modem to acknowledge all data in the modem buffer before disconnecting.

Range: 0-255 seconds

(Default): 20

Current DTE Flow Control Setting (S39)

This register indicates the flow control method currently selected by the &K command. This register is read only.

n = 0	No flow control.
n = 3	RTS/CTS flow control **(Default)**.
n = 4	Xon/Xoff flow control.
n = 5	Transparent Xon/Xoff flow control. (For a description of transparent Xon/Xoff, choose the &K command.)

Receive DCE Speed (S42)

This register indicated the receive DCE speed and is read only. Value ranges (except 0) correspond to those of register S37.

0 =	No connection	10 =	12000 bps
1 =	Reserved	11 =	14400 bps
2 =	Reserved	12 =	16800 bps
3 =	300 bps	13 =	19200 bps
4 =	Reserved	14 =	21600 bps
5 =	1200 bps	15 =	24000 bps
6 =	2400 bps	16 =	26400 bps
7 =	4800 bps	17 =	28800 bps
8 =	7200 bps	18 =	31200 bps
9 =	9600 bps	19 =	33600 bps

Current Transmit DCE Speed (S43)

This register indicates the transmit DCE speed and is read only. Value ranges (except 0) correspond to those of register S37.

0 =	No connection	10 =	12000 bps
1 =	Reserved	11 =	14400 bps
2 =	Reserved	12 =	16800 bps

3 =	300 bps	13 =	19200 bps
4 =	Reserved	14 =	21600 bps
5 =	1200 bps	15 =	24000 bps
6 =	2400 bps	16 =	26400 bps
7 =	4800 bps	17 =	28800 bps
8 =	7200 bps	18 =	31200 bps
9 =	9600 bps	19 =	33600 bps

Data Compression Control (S46)

This register controls the selection of compression. The following actions are executed for the given values:

Range: 0, 2, 136, or 138

(Default): 2

0 or 136 execute error correction protocol with no compression.

2 or 138 execute error correction protocol with compression.

Reports Compression in Use (S47)

This register reports current data compression protocol status. This register is read only.

0 or 136	No data compression.
2 or 138	Data compression.

V.42 Feature Negotiation Control (S48)

This register determines the capabilities of the remote modem in V.42 negotiation control.

Range:	7 or 128
(Default):	7
7	Enable feature negotiation and LAPM **(Default)**.
128	Disable feature negotiation, bypass the detection phase, and proceed at once with the fallback action specified in S36. Can be used to force MNP.

NOTE:
S49 should always be lower than the value stored in S50.

Specifies Data Buffer Lower Limit (S49)

This register signals the local computer to resume transmission (if transmission was interrupted) when the number of bytes in the data buffer drops to this number.

Range: 1-254

(Default): 8

Specifies Data Buffer Upper Limit (S50)

This register stops the transmission temporarily when the number of bytes in the data buffer reaches n and the modem signals the local computer.

Range: 2-255

(Default): 16

The value set in S50 should always be greater than the value stored in S49.

V.34 Transmit Rate Selection (S51)

This register enables/disables the V.34 transmitter optional symbol rate/carrier frequency control. If bits 0 and 1 are selected, automatic frequency selection is enabled. If bits 0 and 1 are set to 0, the low carrier frequency is selected.

(Default):	31
Bit 0 =	Select high carrier frequency
Bit 1 =	Select low carrier frequency
Bit 2 =	2743 sym/s
Bit 3 =	2800 sym/s
Bit 4 =	3429 sym/s
Bit 5 =	Reserved
Bit 6 =	Reserved
Bit 7 =	Reserved

V.34 Receive Rate Selection (S52)

This register enables/disables the V.34 receiver optional symbol rate/carrier frequency control. If bits 0 and 1 are selected, automatic frequency selection is enabled. If bits 0 and 1 are set to 0, the low carrier frequency is selected.

(Default):	31
Bit 0 =	Select high carrier frequency
Bit 1 =	Select low carrier frequency
Bit 2 =	2743 sym/s
Bit 3 =	2800 sym/s
Bit 4 =	3429 sym/s
Bit 5 =	Reserved
Bit 6 =	Reserved
Bit 7 =	Reserved

V.34 Low Speed Transmit Rate Selection (S53)

This register allows the bit rates of V.34 to be independently enabled and disabled. To turn off V.34, set S53 and S54 to 0.

(Default):	255
Bit 0 =	2400 bps
Bit 1 =	4800 bps
Bit 2 =	7200 bps
Bit 3 =	9600 bps
Bit 4 =	12000 bps
Bit 5 =	14400 bps
Bit 6 =	16800 bps
Bit 7 =	19200 bps

V.34 High Speed Transmit Rate Selection (S54)

This register is an extension of register S53. If the bit corresponding to a certain line speed is set in this register, then that speed may be used for connections with V.34 modems. The actual transmit speed negotiated is the highest of the selected speeds that both modems can support under current line conditions. The speeds selected in this register will be attempted first.

(Default):	63
Bit 0 =	21600 bps
Bit 1 =	24000 bps
Bit 2 =	26400 bps
Bit 3 =	28800 bps
Bit 4 =	31200 bps
Bit 5 =	33600 bps
Bit 6 =	Reserved
Bit 7 =	Reserved

V.8 Status Register (S56)

Bit 0 =	Voice
Bit 1 =	Fax
Bit 2 =	Data
Bit 3 =	Reserved
Bit 4 =	Reserved
Bit 5 =	Reserved

Bit 6 = Reserved

Bit 7 = Reserved

Link Layer Window Size (S69)

This register sets the number of outstanding unacknowledged packets. Allowing a larger number of outstanding packets may increase throughput on good quality communications channels. Allowing a smaller number of outstanding packets may increase throughput on poor quality communications channels such as cellular channels.

Range: 1-15

(Default): 15

Maximum Retransmission s (N400) (S70)

This register limits the number of times the modem will retransmit a frame. When the limit is reached, the modem will hang up. Allowing a higher number of retransmissions may improve cellular communications, but may cause a longer delay before hanging up on good quality communication channels.

Range: 0-255

(Default): 12

LAPM Break Control (S82)

This register provides a way for the user to get the attention of the remote modem. The break type depends on the specific application. LAPM specifies three methods of break signal handling: in sequence, expedited, and destructive. If an invalid number is entered, it is accepted into the S register, but S82 will act as if the default value has been entered.

Range: 1, 2, 3, 4, 7, 8, 128

(Default): 128

3 or 4	Expedited: Modem sends a break immediately; data integrity is maintained both ahead of and after the break.
7, 8	Destructive: Modem sends a break immediately; data being processed by each modem at the time of the break is destroyed.
1, 2, or 128	In sequence: Modem sends a break in sequence with any transmitted data; data integrity is maintained both ahead of and after the break.

Call Failure Reason Code (S86)

When the modem issues a NO CARRIER result code if a value is written to S86 to help determine the reason for the failed connection. S86 records the first event that contributed to a NO CARRIER message. The cause codes are:

0	Normal disconnect, no error occurred.
4	Loss of carrier.
5	V.42 negotiation failed to detect an error-correction modem at the other end.
6	No response to feature negotiation.
7	This modem is asynchronous only; the other modem is synchronous only.
8	No framing technique in common.
9	This modem could not find a common protocol.
10	Bad response to feature negotiation.
11	No sync information from remote modem.
12	Normal disconnect initiated by the remote modem.
13	Remote modem does not respond after many retransmissions.
14	Protocol violation.
15	Data compression failure occurred.
99	Connection dropped because of inactivity timeout of the local modem.

Idle Time Before Suspend (S89)

This register specifies the amount of time, in seconds, the modem can be idle before it goes into Suspend (low power) mode.

Range: 0, 5-255

(Default): 10

You may indicate a value of 0 to disable the suspend mode, meaning the modem will never go into suspend, and will end when a character is typed or a ring signal is detected.

V.42 bis Maximum String Length (S90)

This register selects the number of characters that can be compressed into one code word.

Range: 6-250

(Default): 16

Result Code Message Control (S95)

This register can be set to override some of the Wn command options.

(Default): 0

Bit 0 = CONNECT result code indicates DCE speed instead of DTE speed.

Bit 1 = Append/ARQ to CONNECT XXXX result code in error-correction mode.

Bit 2 = Enable CARRIER XXXX result code.

Bit 3 = Enable PROTOCOL XXXX result code.

Bit 4 = Reserved.

Bit 5 = Enable COMPRESSION result code.

Bit 6 = Enable PROTOCOL result codes 81-84 for MNP connections in place of result code 80.

Bit 7 = Reserved.

ETC Control Selection (S96)

This register is used to enable/disable ETC features. This register is bit mapped.

Bit 0 = 1200 Fallback. Enables the modem to attempt to fall back to a V.22 1200 bps connection if the link is determined to be incapable of supporting a higher data rate **(Default)**.

Bit 1 = Landline like cellular. Instructs the modem to enable cellular network compensations. These compensations are automatically enabled when directly connected to a cellular phone.

Bit 2 = ETC calling tone. Instructs the modem to emit the ETC calling tone when making data calls. This tone is used by the answering modem to detect an ETC call being made.

Bit 3 = ETC answer. Indicates the modem should infer the presence of a cellular link if the ETC calling tone is detected.

Bit 4 = This bit will be set and /ETC will be added to the connect message if bits 0 - 3 of S96 are set, either &F5, &F6, &F15, or &F16 is in the initialization string, and a LAPM connection is established.

NOTE:
To turn off the /ETC CONNECT message, set S96=15 if &F5 or &F15 is in the initialization string. Set S96=13 if &F6 or &F16 is in the initialization string.

Flash Hook Time (S100)

This register holds the flash hook time in 10-millisecond (ms) increments.

Range: 1-255

(Default): 50

V.42 bis Compression Control (S101)

This register enables or disables V.42bis if the setting of register S46 permits data compression. The default for S101 is 35.

Bits	1/0 00	V.42bis compression options; disable V.42bis compression.
	01	Enable V.42bis encode only.
	10	Enable V.42bis decode only.
	11	Enable V.42bis encode and decode **(Default)**.
Bit	2	Reserved.
Bit	3	Reserved.
Bits	5/4	Dictionary size options.
	00	512 entries.
	01	1024 (1K) entries.
	10	1536 (1.5K) entries **(Default)**.
	11	Reserved.
Bits	6-7	Reserved.

Selective Reject (SREJ) Command (S105)

This register allows the implementation of the selective reject frame. When enabled, this allows error-control modems to request a retransmission of a single data frame during both MNP and LAPM connections.

1	Multiple frame reject only.
2	Selective frame reject. Permits fallback (during negotiation handshake) to multiple frame reject only **(Default)**.

LAPM Frame Size (S106)

This register controls the maximum frame length for LAPM connections. Allowing larger frames may increase throughput on good quality communications channels, but may decrease throughput on poor quality communications channels such as cellular channels.

Range: 6-128

(Default): 128

Signal Quality Selection (S108)

This register selects the level of the EQM at which actions specified in the &B command will be taken, as conditions worsen.

Range: 0-3

0	**No limit**. When using this setting, loss of data may occur and loss of carrier will not cause a V.32 or V.32bis call to be dropped.
1	**Low quality**. Very poor line conditions will cause the &B action to be taken **(Default)**.
2	**Medium quality**. Significantly degraded line conditions will cause the &B action to be taken.
3	**High quality**. Degraded line conditions will cause the &B action to be taken.

V.32 bis Carrier Speed Selector (S109)

This register allows carrier speeds to be independently enabled and disabled.

If the bit corresponding to a certain line speed is set in this register, then that speed is allowed to be used in connections with other high-speed modems. The actual speed negotiated is the highest speed that both modems can support under current line conditions. This register does not affect connections at DCE speeds below 4800 bps.

Bit 0	Reserved
Bit 1	4800 bps
Bit 2	7200 bps
Bit 3	9600 bps
Bit 4	12000 bps
Bit 5	14400 bps
Bit 6	16800 bps
Bit 7	19200 bps

V.32 bis Selector (S110)

This register may be used to disable V.32bis and/or automatic rate renegotiation.

Range: 0-2

0	V.32bis and automatic rate renegotiation disabled.
1	V.32bis enabled, automatic rate renegotiation disabled.
2	V.32bis and automatic rate renegotiation enabled **(Default)**.

Cellular S Registers

NOTE:
This $S8 register is not supported on all manufacturers' phone models.

Battery Level ($S8)

This command is read-only and indicates a number received from the cellular telephone indicating the relative battery level.

Range: 0 to 255

NOTE:
The value returned is a relative signal strength. The range may vary from phone to phone.

Cellular Signal Strength ($S1)

This command is read-only and is usually an 8-bit number received from the cellular phone to indicate the relative received signal strength.

Cellular Signal Strength Threshold ($S2)

This command specifies a threshold for dialing calls. If the cellular signal strength ($S1) is below this value, the connection attempt is terminated with NO CARRIER result code and no connection will be established. To disable this feature, set the value to zero. This affects cellular calls only.

Range: 0 to 255

Default: 0

Cellular Status Request ($S0)

This is a read-only, bit-mapped register. The following information is reported by the indicated bits being set in the return value:

NOTE:
If any bit = 1, corresponding status is active.

Bit	Status
0	Reserved
1	Cellular phone in use
2	Cellular phone locked
3	No service
4	Roam
5	Reserved
6	Reserved
7	Reserved

CHAPTER 6— DIAL MODIFIERS

Dial Modifiers Summary

Credit Card Dialing (&)

NOTE:
This modem supports credit card dialing for Sprint, AT&T, and MCI carriers.

This command is used for credit card dialing. For example:

ATDT XXXXXXXXXX & XXXX for AT&T and MCI

ATDT XXXXXXXXXX & XXXXXXXXXX & XXXX for Sprint

The first **&** instructs the modem to wait until the credit card dialing tone is received. The second **& (if needed)** is placed between the number dialed and the credit card access tone.

Dial Digits Characters (0-9, A-D, #, *)

- Valid characters for tone dialing: 0 - 9, A - D, #, *
- Valid characters for pulse dialing: 0 - 9

Dial Stored Number (S)

This command dials the telephone number stored in dial string location "n" with the AT&Zn command. If = n is omitted the modem will dial the number stored in location 0.

n = 0 to 3

Dial Stored Number in Cellular Phone ($S)

This command dials the telephone number stored in dial string "n" with the AT$Zn command. If no cellular phone is present, the modem responds with an ERROR result code.

Flash Hook Command (!)

This command causes the modem to go on-hook momentarily. Used by some PBX systems to access special features such as call forwarding and call transfer. Register S100 controls the length of time the modem goes on-hook.

Force V.22 for One Call Only (J)

This command forces the line protocol to V.22 for the initial connection of the current call.

Format Dial String [( ), - , <space>]

These commands may be used to format a dial string. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces ignored.

Originate Call in Answer Mode (R)

This command dials normally, but the handshake is in answer mode.

Pause Command (,)

This command causes the modem to pause for a specified time during dialing. The duration is set by register S8.

Pulse Dial (P)

This command sets the dialing mode to pulse. All calls will remain pulse until tone dialing is selected.

Parameters: none

Return to Command State (;)

This command forces the modem to remain in the command state without disconnecting after dialing a number. The semicolon must be placed at the end of the dial command.

Tone Dial (T)

This command sets the dialing mode to tone. All calls will remain tone until pulse dialing is selected.

Parameters: none

Wait for Dial Tone (W)

This command causes the modem to wait up to a specified time for the dial tone to occur. The telephone number is dialed immediately upon dial tone detection. This may be helpful when dialing through a PBX or for some long distance services. The maximum wait period is set in register S7.

Wait for Quiet Answer Command (@)

The modem will wait for at least 210 milliseconds of noise, then 5 seconds of silence in the call-progress frequency band before continuing with the next dial-string parameter. If the modem does not detect the 210 milliseconds of noise and the 5 seconds of silence before the expiration of the call-abort time (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If the answer tone arrives during execution of this parameter, the modem handshakes.

CHAPTER 7— HEXADECIMAL TO ASCII CONVERSION TABLE

Decimal	Hex	ASCII
00	00	NUL (Null)
01	01	SOH (Start of heading)
02	02	STX (Start of text)
03	03	ETX (End of text)
04	04	EOT (End of transmission)
05	05	ENQ (Enquiry)
06	06	ACK (Acknowledge)
07	07	BEL (Bell)
08	08	BS (Backspace)
09	09	HT (Horizontal tab)
10	0A	LF (Linefeed)
11	0B	VT (Vertical tab)
12	0C	FF (Formfeed)
13	0D	CR (Carriage return)
14	0E	SO (Shift out)
15	0F	SI (Shift in)
16	10	DLE (Data link escape)
17	11	DC1 (Device control 1)
18	12	DC2 (Device control 2)
19	13	DC3 (Device control 3)
20	14	DC4 (Device control 4)
21	15	NAK (Negative acknowledge)
22	16	SYN (Synchronous idle)
23	17	ETB (End transmission block)
24	18	CAN (Cancel)
25	19	EM (End of medium)
26	1A	SUB (Substitute)
27	1B	ESC (Escape)
28	1C	FS (File separator)
29	1D	GS (Group separator)
30	1E	RS (Record separator)
31	1F	US (Unit separator)
32	20	space
33	21	!
34	22	"

35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	_
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H

73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	(↑)
95	5F	-
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n

111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	DEL (Delete)