



Ctek Inc.
350 S. Center St
Reno NV 89501

Wireline Modem Manual

Series 2000 Security Modem



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Getting Started

PACKAGE CONTENTS

Ctek wireline modems are shipped from the factory with the following accessories:

- Wall Power Adapter (14VDC) – converts local AC power to 14VDC for modem power
- Barrel Connector with tinned leads – For Direct DC Power Connection
- 7-foot RJ11 phone Line cable
- Two wall mount brackets (stand alone)

BEFORE YOU START INSTALLATION

- **Warning** - If you are configuring a Series 2000 Security modem verify database standby power jumper configuration – see Connectors, Jumpers, Indicators, and Switches section. If standby power is not connected the database will lose configuration settings when the unit is powered off.
- **Note** – If you are planning to remotely configure the modem without having DTE connected, the following settings must be initially made or verified in a local environment. See Configuration Section for more information on performing these settings

Setting	Function	Implications
AT&D0	Ignore DTR – Assume to be active	Allows unit to be remotely programmed without having DTE connected. If this setting remains after installation is complete DTR transitions from active DTE will be ignored.
AT&K0	Disable all flow control	Allows unit to be remotely programmed without having DTE connected. If this setting remains after installation is complete certain types of DTE may overrun communications capabilities at the DCE.
AT\R1	Enable Remote Configuration	Allows unit to be remotely programmed and administered. This setting should be left on after installation is complete.

Introduction

This manual covers configuration and operation of Ctek Series 2000 wireline security modems (V.34) external and rack mount modems. Series 2000 modems offer a unique set of security features designed to protect your remote operating environment. Series 2000 models are available packaged for rack mount or standalone operation.

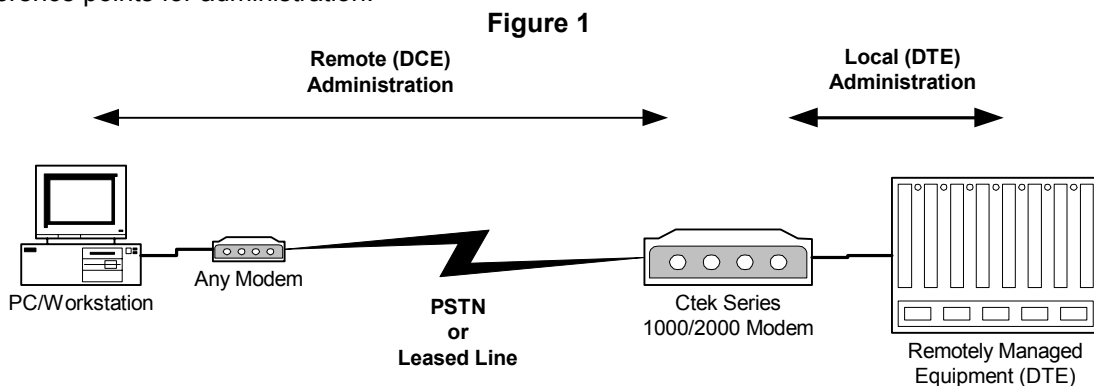
Since many features discussed in this manual are optional, it is important to verify the specific configuration of your device before proceeding with installation and configuration. It is suggested that you use the **AT&V** command to verify the capabilities of your device. If the commands associated with an optional feature are displayed on the last line of your active profile, that feature exists in your device.

MODELS COVERED IN THIS DOCUMENT

Series	Model	Model Numbers Covered	Characteristics
2000	2000SE	V.34/V.32bis modem with SecureConnect security features	Stand alone - Power: 14 – 54VDC
	2000R		Rack mount - Installs in Series 19XX racks

THEORY OF OPERATION

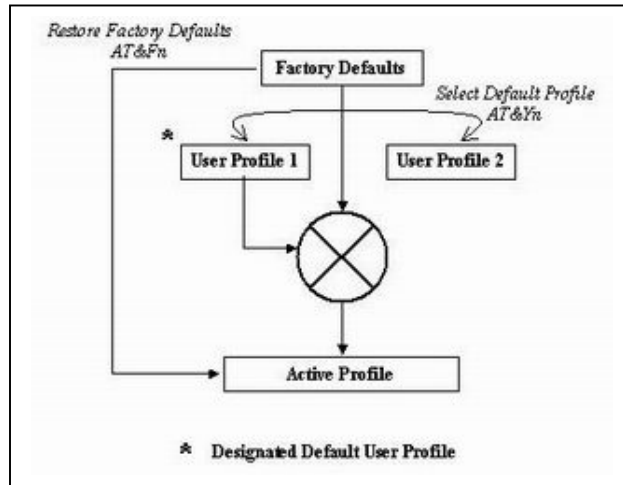
Ctek's Series 2000 modems are programmable intelligent modems that support the CCITT (now ITU-T) V.34 standards for data signaling along with all other popular standards such as V.32bis, V.32, V.22bis, V.22, V.21, Bell 212 and Bell 103. Programming is accomplished using the AT command set as described in this manual. To understand the full capabilities of the programmable feature set it is important to establish points of reference for remote and local command modes. By convention these points of reference are referred to as Data Communications Equipment (DCE) and Data Terminal Equipment (DTE). Figure 1 depicts these reference points for administration.



The Series 2000 modems are easily configured with a terminal emulation program such as Microsoft's HyperTerminal or an equivalent. Remote configuration command mode is invoked with a tilde '~' escape sequence (~~~) and exited with the AT command Enter Online Data Mode ATO0 or ATO1. Local configuration command mode is entered with a sequence of escape character set in S Register S2. The default for S2 is the plus '+' character.

Each Ctek modem has a set of factory default settings and two user profiles, either of which may be designated as the default profile. When the modem is powered up the factory default settings are loaded into the active profile and then overwritten by any differences found in the designated user profile. Figure 2 illustrates this sequence.

Figure 2



Connections, Indicators, and Jumpers

CONNECTORS

Figure 3 illustrates the connectors on Series 2000 Stand-alone modem. Rack mount models utilize similar connectors on the rack assembly.

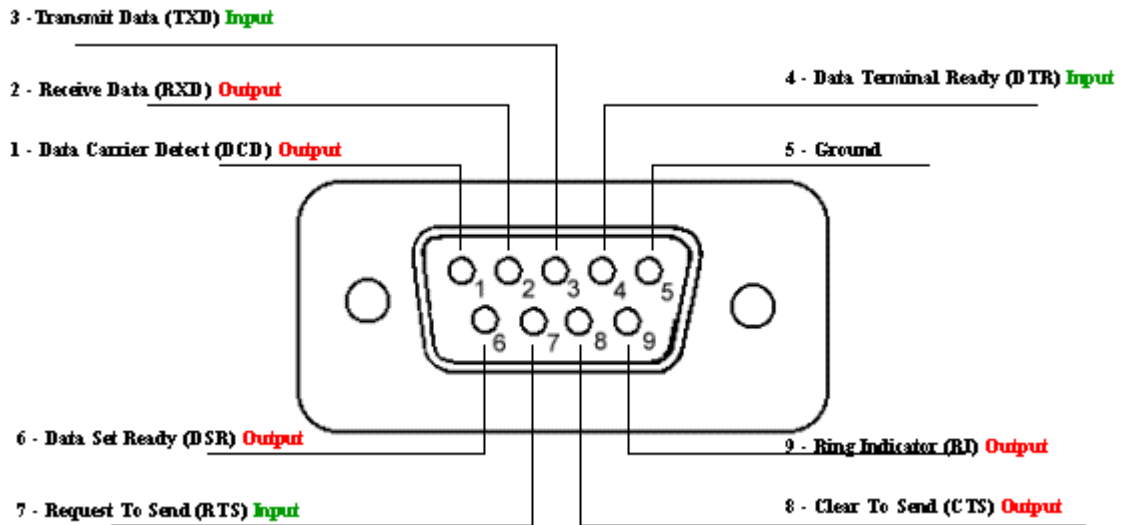
Figure 3



DB9 Pin Out Explanation

The DB9 data connector on the Ctek wireline modem is configured as a DCE connector in accordance with the RS 232 standard. The pin out and signal assignment for this connector is given below. **Important** – The RS 232 standard defines the direction of signals from the perspective of the Data Terminal Equipment (DTE). As previously noted, the data connector on a Ctek modem is a DCE connector. What this means is that the direction of data and control signals is reversed. For example, Transmit Data (TXD) is an output from your laptop serial port (DTE). However, TXD is an input into the Series 2000 data connector since, according to the standard, it must present a DCE appearance to downstream equipment. Figure 4 below shows the DB9 pin-out, signal assignment, and signal direction.

Figure 4



RJ11 – Line Connector

This RJ-11 connector should be used to connect the modem to a normal PSTN dial circuit or a dedicated 2-wire leased circuit. For those models with the optional 4-wire leased circuit interface, please refer to the following diagram:

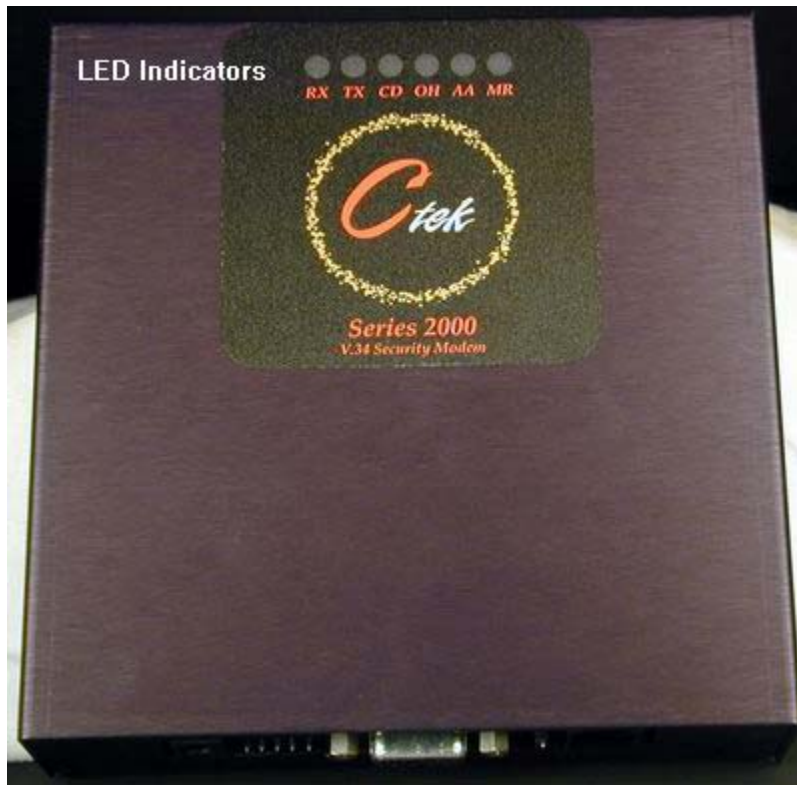
Pin Number	2-wire	4-wire
2	NC	RX1
3	Tip	TX1
4	Ring	TX2
5	NC	RX2

INDICATORS

Ctek's Series 2000 modems provide the following indicators. Indicators for stand-alone models are on top of the unit's case. Rack mount models provide indicators on the rack's front panel. Figure 5 shows the placement of indicators on a stand-alone model.

Indicator	Function	Description
MR	Modem Ready	Modem powered on
AA	Auto Answer	Modem will automatically answer an incoming call
OH	Off Hook	Modem has seized phone line and is ready to answer or dial
CD	Carrier Detect	Modem has negotiated a connection with remote modem
TX	Transmit Data	Blinks when DTE is delivering data to modem (DCE)
RX	Receive Data	Blinks when modem (DCE) is delivering data to DTE

Figure 5
Indicator Lights



JUMPERS

There are three user configurable jumpers on Series 2000 modems. JP1, located next to the DB9 connector options the dumb mode of operation. The other two are on the bottom of the modem:

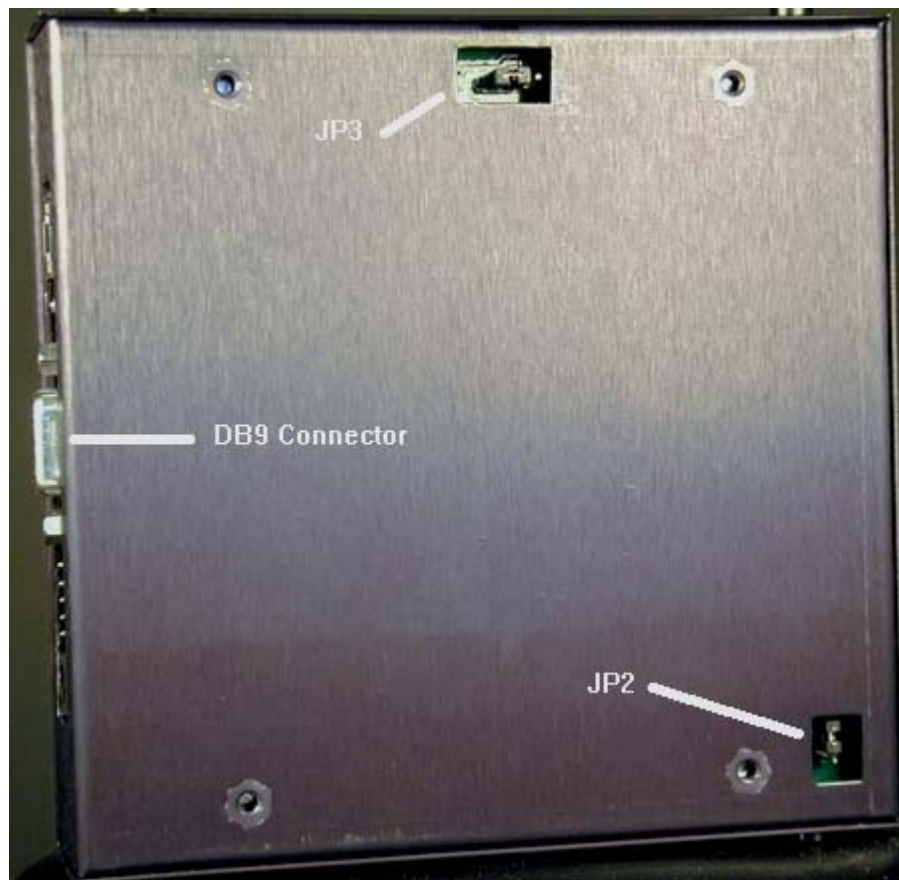
- JP3 – Used to control 2 wire vs. 4 wire operation
- JP2 – Battery backup power for user ID database and audit trail.

The dumb mode jumper is discussed in greater detail in the configuration section of this manual. The remainder of this section addresses the battery and 2 wire / 4 wire jumpers.

To access the two jumpers located on the bottom of the modem the two mounting brackets, which are held to the bottom of the modem case with four screws, must be removed. When you hold the modem case upside down, JP2 will be located on the right and JP3 will be located on the left.

Figure 6 shows the location of jumper blocks JP2 and JP3.

Figure 6



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CAUTION: Before operating any Series 2000 security modem, JP2 must be configured to enable battery backup. Without battery backup, user ids, passwords and audit trail records will not be saved in the event of a power failure. The on-board battery should be replaced when the total power-off cycle exceeds 18 months. The replacement can be either the coin type battery CR2032 or an external battery (3.0 ~ 3.6 Vdc) with two pins connector.

For more information regarding JP3, please review the Leased Line Configuration section of this manual.

Jumper Block	Connection	Function
JP2	1 & 2	On board Battery Enable
JP2	2 (V+) & 3 (V-)	External Battery (3.6Vdc)
JP3	1 & 2	4-wire lease
JP3	2 & 3	2-wire PSTN

Configuration

SET UP

Factory Default Settings

The factory default values are stored in ROM and are loaded into the active configuration at power up or by the ATZn command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the &Yn command where n is one of the two possible use profiles. The factory default values may be loaded at any time by entering the &Fn command.

LEASED LINE OPERATION (Security Features Disabled)

All modems are factory configured to operate on 2-wire dial and 2-wire leased circuits. If you are configuring a modem for 2-wire leased line operation, please disregard the following paragraph on setting jumpers for 4-wire operation and proceed to the standard setup paragraph.

SETTING JUMPERS FOR 4-WIRE OPERATION – To configure your modem for operation on 4-wire circuits, you must change one jumper on the bottom of the modem. Turn the modem so that the bottom is facing up toward you and make sure that the end of the modem with the connectors is facing toward you. On the left side, under the mounting bracket, which do 2 screws hold on, you will find JP3. You should find pins 2 and 3 connected together, which is the standard configuration for 2-wire operation. Move the jumper so that pins 1 and 2 are connected together. Once this jumper has been changed, the modem will not operate on 2-wire dial or leased circuits. The modem is now in 4-wire mode and you may proceed to the standard setup paragraph that follows.

STANDARD SETUP FOR 2 AND 4-WIRE LEASED LINE OPERATION – In order to configure the modem for leased line operation, it is necessary to use the following commands in your configuration string:

Originate End: &L1\H1\F1s7=200[*user specific parameters*]&W
Answer End: &L1\H1\F0s7=25[*user specific parameters*]&W

In the user specific section of each command string, commands may be entered to match the modem to the specific requirements of the attached DTE. Parameters such as error correction, compression and flow control may be defined here. Once the modems have been configured, they must be placed in dumb mode and power must then be cycled.

ADJUSTING TRANSMIT POWER FOR LEASED LINE OPERATION – It is possible to adjust transmit power on all leased line models; however, improper adjustment could result in extremely poor performance. Please contact our technical support group if you feel adjustments are necessary for your application.

DUMB MODE OF OPERATION

Dumb mode disables the “AT” command interpreter on the DTE interface and is intended to protect the modem from accidental or intentional changes to its settings from the DTE end of the circuit. Dumb mode also makes the modem impervious to data transmitted by the DTE during call setup. Without dumb mode the modem will disconnect if it received data from the DTE while answering an incoming call.

Equally important are the things that dumb mode doesn't do. It does not disable the “AT” command interpreter, any of the modems security features or in any way impair the ability of authorized personnel to make programming changes to the modem over the remote (PSTN) connection. It does not impair in any way the normal operation of the modem other than to isolate the modem from DTE initiated changes. Dumb mode is strictly a DTE restriction; it has no implications for remote operation.

On the back of the modem, there is a two-pin jumper located next to the V.24 (RS-232-F) DB-9 connector. When the two pins on that jumper are connected together, the modem will then operate in dumb mode. Figure 6 shows the location of the dumb mode jumper.

Figure 6



In dumb mode, the modem will operate as though it has no DTE originated command mode. When the modem is powered on or reset, it will go directly into the mode of operation that it has been configured for. The dumb mode of operation is necessary for leased line and a range of special dial applications where the DTE expects the modem to have no command mode.

To place the modem in dumb mode, it is necessary to first configure the modem to the specific requirements of a particular application. Next, the configuration must be saved. Once the configuration has been saved, install the dumb mode jumper and then cycle power on the modem. It will then be in dumb mode. If it becomes necessary to reconfigure the modem from the DTE, remove the dumb mode jumper and cycle power on the modem. It will then be in command mode.

REMOTE CONFIGURATION

Remote configuration offers several commands that enable a remote user to completely manage and configure the modem. You may dial into a modem that has remote configuration enabled and enter online command mode on that device by typing a unique 3-character escape

sequence. Once the remote modem enters online command mode, any valid AT command may be used to review or change the configuration of the remote device.

The remote configuration escape sequence must always use a character, which is different from the character used in local escape sequence. Otherwise, the local modem and remote modem will both enter online command mode when the escape sequence is entered. For this reason, all modems with the remote configuration option recognize the ASCII character tilde (~), decimal value of 126, as the remote escape character. This value may not be changed. As with all standard modems, the local escape character may still be defined through S register 2.

The remote configuration option also provides several commands to set DTE speed and character format. These commands are extremely useful when installing modems on remote equipment that cannot issue the AT commands necessary for autobaud to occur. In such cases, it is possible to dial into the modem and remotely configure all parameters, including character format and DTE bit rate.

See the AT Command section of this manual for specific set up parameters that can be remotely modified. A few of the AT commands that are of special importance are:

\Rn - Enable/Disable Remote Configuration
\Cn - Select DTE Character Format
\Dn - Select DTE Data Rate

CONFIGURING SECURITY FEATURES

Series 2000 modems offer the full range of SecureConnect access control features. With these capabilities your remote access ports can be protected against malicious or opportunistic access violations. SecureConnect also supports an extensive set of audit trail capabilities to monitor the security well being of your connections.

Users having medium to large networks of access points will find additional value in Ctek's Windows compatible Access Management application. With this application your personnel can remotely administer a large number of Ctek security modems in an efficient and effective manner.

NOTE - All security features described in this section use a specialized set of AT\ commands found in the AT command section of this manual.

PASSWORD AND CALLER ID SECURITY

PROTECTION OPTIONS

User ID/Password protection, Caller ID protection and a combination of both protection methods are available as options in certain models. Both security methods have been implemented for controlling access to the modem and the modem's remote configuration facility.

ACCESS CONTROL

When User ID/Password protection is enabled, the caller is required to enter a both a User ID and a password before the modem will allow communications to occur. If the User ID/Password combination exists in the modem's database, the caller will be granted access. If Caller ID

protection is enabled, the modem will only answer calls from telephone numbers that have been registered in the modem's database. If both protection methods are enabled, the caller must dial from a registered number and have a valid User ID/Password.

PASSWORD EXPIRATION

The modem may be configured to enforce user selection of new passwords on a scheduled basis. Callers attempting to gain access with expired passwords will be prompted for a new password.

CALL BACK FACILITIES

Any or all User ID/Password combinations in the modem's database may be configured to generate a call back. When a caller enters a User ID/Password combination that is configured for Call Back, the modem will hang up and dial back to the telephone number that is associated with that User ID/Password in the modem database.

ACCESS LEVEL DEFINITION

Both valid User ID/Password combinations and/or registered Caller IDs may be stored in the modem's database. Each User ID and each Password may contain up to ten alphanumeric characters and each Caller ID must contain ten numeric characters. With each User ID/Password or Caller ID, there is an associated Access Level:

Level One User ID/Passwords or Caller IDs may only access the DTE attached to the modem. They are not allowed access to remote configuration and password maintenance.

Level Two User ID/Passwords or Caller IDs may access the DTE attached to the modem and may also perform remote configuration of the modem and modem security database maintenance.

Level Three User ID/Passwords or Caller IDs are reserved for use by the Ctek Access Manager management software. They place the modem in a protocol mode that is required by the device management software. All modems that will be managed by Access Manager must contain a Level Three User ID/Password or Caller ID.

Level Four Passwords – Level four User ID/Passwords provide call back features. This level is specific to User ID/Passwords and cannot be assigned to a Caller ID. However, Caller ID protection can be enabled as a first level of security access in conjunction with Level four User ID/Passwords. When a user dials in and enters a level four User ID/Password, the modem will validate the password, hang up and then dial back to the user, as directed by the call back string associated with the caller's password.

Please note that in cases where both Caller ID protection and User ID/Password protection are enabled, Caller ID Access Levels are subordinate to User ID/Password Access Levels. Therefore, if a user calls in and is granted access through a Level Two Caller ID but proceeds to log on with a Level One User ID/Password, the user will be granted access at Level One. Alternatively, if a

user calls in and is granted access through a Level One Caller ID but proceeds to log on with a Level Two User ID/Password, the user will be granted access at Level Two.

PROMPTED OR BLIND ACCESS

You may configure User ID/Password protection to operate either with or without prompting. Operating without a prompting makes it more difficult for intruders to understand system operation and access requirements.

AUDIT TRAIL CAPABILITIES

Models equipped with User ID/Password protection or Caller ID protection, also include facilities for a nonvolatile audit trail with precision date and time recording. When Password protection is enabled, all successful and unsuccessful attempts to access the modem will be recorded. When Caller ID protection is enabled, all successful attempts to access the modem will be recorded. As an option, the telephone number of all unregistered callers may also be recorded. When the audit trail becomes full, it will automatically wrap around and begin overwriting the oldest entries.

AT COMMAND SET

Command Guidelines

The basic AT commands used to control modem operation are defined in this section. Under AT operation, the modem performs autobaud, autoparity and autolenhth functions on each header entered. The autoparity and autolenhth facilities can detect 7 or 8-bit characters of even, odd, or no parity with one stop bit.

Command Format

A command line is a string of characters sent from a DTE to the modem (DCE) while the modem is in a command state. A command line has a prefix, a body, and a terminator. Each command line (with the exception of the A/command) must begin with the character sequence AT and must be terminated by a carriage return.

Characters within the command line are parsed as commands with associated parameter values. The basic commands consist of single ASCII characters, or single characters preceded by a prefix character (e.g., "&"), followed by a decimal parameter. Missing decimal parameters are evaluated as 0.

The AT sequence may be followed by any number of commands in sequence, except for commands such as Z, D, or A. Commands following commands Z, D, or A on the same command line will be ignored. The maximum number of characters on any command line is 39 (including "A" and "T"). If a syntax error is found anywhere in a command line command, the remainder of the line will be ignored and the ERROR result code will be returned.

Escape Code Sequence

When the modem has established a connection and has entered on-line data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an on-line command mode. This is achieved by sending to the modem a sequence of three ASCII characters specified by register S2. The default character is '+'. The timing of the three characters must comply with specific time constraints. There is a guard time before the first character (the pre-sequence time), a guard time following the third character (the post-sequence time), and a guard time-out between the first and second characters and between the second and third characters (the inter-character time). These times are controlled by the value recorded in register S12.

Command Set Detail

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown for each configuration command are those used in factory profile 0.

AT Commands:

AT Commands			
Format AT<command>[value]			
Example: ATF0 – Selects auto detect mode			
Name	Com mand	Values	Description
Re-execute	A/	None	The modem behaves as though the last command line had been re-sent by the DTE. "A/" will repeat all the commands in the command buffer.
Write to Selected S-Register	AT=x	See text	This command writes the value x to the currently selected S-Register. An S-Register can be selected by using the ATSn command.
Read Selected S-Register	AT?	None	This command reads and displays the selected S-Register.
Answer	ATA		The modem will go off-hook and attempt to answer an incoming call if correct conditions are met.
CCITT or Bell	Bn		When the modem is configured to allow either option, the modem will select Bell or CCITT modulation for a line speed connection of 300 or 1200 bps according to the parameter supplied. Any other line speed will use a CCITT modulation standard.
		B0	Selects CCITT operation at 300 or 1200 bps.
		B1	Selects BELL operation at 300 or 1200 bps. (Default)

Carrier Control	Cn	N=1	This command is included for compatibility only, and has no effect other than returning a result code. The only valid parameter is 1.
Dial	Dn		This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode. NOTE: If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code. The valid dial string parameters are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces being ignored.
		0-9	DTMF digits 0 to 9
		*	The "Star" digit (tone dialing only)
		#	The octothorpe character (tone dialing only).
		A-D	DTMF digits A,B,C, and D
		J	Perform MNP10 link negotiation at 1200 bps
		K	Enable power level adjustment during MNP10 link negotiation
		L	Re-dial last number
		P	Select pulse dialing
		R	Ignored
		S=n	Dial the number stored in the directory
		T	Select tone dialing
		!	Flash: the modem will go on-hook for a time defined by the value of S29
		W	Wait for dial tone: the modem will wait for dial tone before dialing the digits following "W". If dial tone is not detected within the time specified by S7, the modem will abort the rest of the sequence
		@	Wait for silence: the modem will wait for at least 5 seconds of silence in the call process frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (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 answer tone arrives during execution of this parameter, the modem handshakes
		&	Wait for credit card dialing tone before continuing with the dial string. If bong is not detected within the time specified by S7, the modem will abort the rest of the sequence
		;	Return to command state: added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ";"

		^	Toggles calling tone enable/disable: applicable to current dial attempt only
		()	Ignored: may be used to format the dial string
		-	Ignored: may be used to format the dial string
		<i>	Invalid character: will be ignored
Command Echo	En		The modem enables or disables the echo of characters to the DTE according to the parameter supplied
			Enables command echo. (Default)
		E0	Disables command echo
		E1	Enables command echo. (Default)
			This command provided for compatibility. Please use the +MS command for all new applications.
Disconnect (Hang-Up)	Hn		This command initiates a hang up sequence
		HO	The modem will release the line if the modem is currently on-line, and will terminate any test that is in progress
		H1	If on-hook, the modem will go off-hook and enter command mode
Identification	In		The modem reports to the DTE the requested result according to the command parameter
		I0	Reports product code
		I1	Reports a pre-computed checksum
		I2	Reports "OK".
		I3	Reports firmware revision (VX.XXX) model code
		I4	Reports OEM defined identifier string in Hayes compatible binary format
		I5	Reports Country Code parameter
		I6	Reports modem data pump model and internal code revision
		I7	Reports the DAA code resulting from MCU interrogation of the DAA for auto DAA recognition
Speaker Volume	Ln		The modem sets the speaker volume control according to the parameter supplied
		L0	Low volume
		L1	Low volume. (Default)
		L2	Medium volume
		L3	High volume
Speaker Control	Mn		Controls speaker On/Off settings
		M0	Speaker is always off
		M1	Speaker is on during call establishment, but off when receiving carrier. (Default)
		M2	Speaker is always on
		M3	Speaker is off when receiving carrier and during dialing, but on during answering
AUTOMODE	Nn		This command provided for compatibility. Please use the +MS command for all new applications.

ENABLE			
		N0	
		N1	
RETURN TO ON-LINE DATA MODE	On		This command determines how the modem will enter the on-line data mode
		O0	Enters on-line data mode, without a retrain
		O1	Enters on-line data mode with a retrain
SET PULSE DIAL DEFAULT	P	None	This command forces pulse dialing until the next T dial modifier or T command is received
QUIET RESULTS CODES CONTROL	Qn		The command enables or disables the sending of result codes to the DTE according to the parameter supplied
		Q0	Enables result codes to the DTE. (Default)
		Q1	Disables result codes to the DTE
READ/WRITE S-REGISTER	Sn		The modem selects an S-Register, performs an S-Register read or write function, or reports the value of an S-Register Note – See S-Register section of this manual
		n	Establishes S-Register n as the last register accessed
		n=v	Sets S-Register n to the value v
		n?	Reports the value of S-Register n
SET TONE DIAL DEFAULT	T	None	This command forces DTMF dialing until the next P dial modifier or P command is received
RESULT CODE FORM	Vn		This command selects the sending of short-form or long-form result codes to the DTE
		V0	Enables short-form (terse) result codes
		V1	Enables long-form (verbose) result codes. (Default)
CONNECT MESSAGE CONTROL	Wn		This command controls the format of CONNECT messages
		W0	Modem reports DTE speed. (Default)
		W1	Modem reports line speed error correction protocol and DTE speed
		W2	Modem reports the DCE speed
EXTENDED RESULT CODES	Xn		This command selects which subset of the result messages will be used by the modem to inform the DTE of the results of commands

		X0	Disables monitoring of busy tones, sends only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. Blind dialing is enabled
		X1	Disables monitoring of busy tones, sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX(XXXX=rate). Blind dialing is enabled
		X2	Disables monitoring of busy tones, sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONNECT XXXX
		X3	Enables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX. Blind dialing is enabled
		X4	Enables monitoring of busy tones, sends all messages. (Default)
LONG SPACE DISCONNECT	Yn		This command enables/disables the generation and response to long space disconnect
		Y0	Disables long space disconnect. (Default)
		Y1	Enables long space disconnect
SOFT RESET AND RESTORE PROFILE	Zn		The modem performs a soft reset and restores (recalls) the configuration profile according to the parameter supplied. If no parameter is specified, zero is assumed
		Z0	Soft reset and restore stored in profile 0
		Z1	Soft reset and restore stored profile 1

AT& Commands:

AT& Commands			
Format AT<command>[value]			
Example: AT&CO RLSD remains ON at all times			
Name	Com mand	Values	Description
RLSD (DCD) Option	&Cn		This command controls the RLSD output in accordance with the parameter supplied
		&CO	RLSD remains ON at all times
		&C1	RLSD follows the state of the carrier. (Default)
DTR Option	&Dn		This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied
		&DO	DTR is ignored and assumed on
		&D1	DTR drop forces modem to command state without disconnecting
		&D2	DTR drop forces hang up, auto-dial is inhibited. (Default)

		&D3	DTR drop forces modem to soft reset
RESTORE FACTORY CONFIGURATION (PROFILE)	&Fn		This command loads the factory default configuration (profile)
		&F0	Restore factory configuration 0
		&F1	Restore factory configuration 1
SELECT GUARD TONE	&Gn		This command controls the generation of guard tone
		&G0	Disables guard tone
		&G1	Disables guard tone
		&G2	Selects 1800 Hz guard tone
TELEPHONE JACK CONTROL	&Jn		This command is only included for compatibility and performs no function except to load the S-Register
		&J0	&J0 command. (Default)
		&J1	&J1 command
Flow Control	&Kn		This command defines the DTE/DCE (terminal/modem) flow control mechanism
		&K0	Disables flow control
		&K3	Enables RTS/CTS flow control. (Default)
		&K4	Enables XON/XOFF flow control
		&K5	Enables transparent XON/XOFF flow control
		&K6	Enables both RTS/CTS and XON/XOFF flow control
Leased Line Operation	&Ln		This command selects dial up or leased line operation
		&L0	Selects dial up operation
		&L1	Selects leased line operation
			This command provided for compatibility. Please use the /N command for all new applications.
Select Pulse Dial Make/Break Ratio	&Pn		This command determines the make/break ratio used during pulse dialing
		&P0	Selects 39%-61% make/break ratio at 10 pulses per second. (Default)
		&P1	Selects 33%-67% make/break ratio at 10 pulses per second
		&P2	Selects 39%-61% make/break ratio at 20 pulses per second
		&P3	Selects 33%-67% make/break ratio at 20 pulses per second
Sync/Async Mode			This command provided for compatibility. Please use the /N command for all new applications.
RTS/CTS Option	&Rn		This selects how the modem controls CTS. CTS operation is modified if the hardware flow control is

			selected. The Series 2000 supports asynchronous operation only.
		&R0	In sync mode, CTS tracks the state of RTS; the RTS to CTS delay is defined by S26. In async mode, CTS acts according to V.25bis handshake.
		&R1	In sync mode, CTS is always ON. In async mode, CTS will only drop if required by flow control. (Default)
DSR Override	&Sn		This command selects how the modem will control DSR
		&S0	DSR will remain ON at all times
		&S1	DSR will become active after answer tone has been detected and inactive after the carrier has been lost. (Default)
Display Current Configuration And Stored Profiles	&V	None	Reports the current (active) configuration, the stored (user) profiles, and the first four stored telephone numbers.
Display Status of Last Call	&V1	None	Presents an analysis of modem performance and telephone circuit quality during the last call
Store Current Configuration	&Wn	None	Saves the current configuration and S-Registers in one of the two user profiles which are kept in non-volatile memory (NVRAM
		&W0	Store as profile 0
		&W1	Store as profile 1.
Designate a Default Profile	&Yn		Selects the user profile that will be used after a reset
		&Y0	Profile 0
		&Y1	Profile 1
Store Telephone Number	&Zn		The modem can store up to four telephone numbers
		&Zn=x	Where n = 0 to 3 and x = dial string

AT% Commands:

AT% Commands			
Format AT%<command>[value]			
Example: AT%C0 - Disable Data Compression			
Name	Com mand	Values	Description
Enable/Disable Data Compression	%C		Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link
		%C0	Disables data compression
		%C1	Enables MNP5 data compression negotiation
		%C2	Enables V.42 bis data compression
		%C3	Enables both V.42 bis and MNP5 data compression. (Default)
ENABLE/DISABLE LINE QUALITY MONITOR AND AUTO-RETRAIN OR FALLBACK/FALL FORWARD	%En		Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back when line quality is insufficient or fall forward when line quality is sufficient (%E2)
		%E0	Disable line quality monitor and auto-retrain
		%E1	Enable line quality monitor and auto-retrain
		%E2	Enable line quality monitor and fallback/fall forward. (Default)
Line Signal Level	%L	None	Returns a value which indicates the received signal level
Line Signal Quality	%Q		Reports line signal quality

AT\ Commands:

AT\ Commands			
Format AT\<command>[value]			
Example: AT\A0 - Select Maximum MNP Block Size=64 characters			
Name	Com mand	Values	Description
Select Maximum MNP Block Size	\An		The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied
		\A0	64 characters
		\A1	128 characters. (Default)
		\A2	192 characters
		\A3	256 characters
Transmit Break to Remote	\BN		In non-error-correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used
Select DTE Character Format	\Cn		This command forces the modem to operate with a fixed character format.
		\C0	8 Data bits, No parity, 1 Stop bit
		\C1	7 Data bits, Odd parity, 1 Stop bit
		\C2	7 Data bits, Even parity, 1 Stop bit
Select DTE Data Rate	\Dn		This command allows the user to enable autobaud or set a fixed DTE bit rate
		\D0	Autobaud to DTE (default)
		\D1	300 bps
		\D2	1200 bps
		\D3	2400 bps
		\D4	4800 bps
		\D5	9600 bps
		\D6	19.2 kbps
		\D7	38.4 kbps
		\D8	57.6 kbps
\D9	115.2 kbps		
Set Answer or Originate Mode	\Fn		In dial operation the answering modem typically assumes answer responsibility and the calling modem assumes originate responsibility. In leased line operation where there is no implied calling or answering modem, the relationship must be established with this command. Please note that setting the modem to answer mode is not the same as setting the modem to auto-answer mode. S register 0 must still be set for auto-answer dial operation

		\F0	Sets modem to answer mode
		\F1	Sets modem to originate mode
MODEM TO MODEM FLOW CONTROL (XON/XOFF)	\Gn		In non-error-correction mode, the modem enables or disables the generation or recognition of modem to modem XON/XOFF flow control according to the parameter supplied. In error correction mode, the setting of modem to modem XON/XOFF flow control is ignored. However, the serial port flow control settings (AT&K) remain active during a reliable link
		\G0	Disables modem to modem flow control. (Default)
		\G1	Enables modem to modem XON/XOFF flow control
Auto-Connect	\HN		In many cases where the dumb mode of operation is required, it is necessary for the modem to be configured so that it constantly attempts to go off hook and connect as configured. This is necessary for leased line operation or for operation with an external manual dialer. This command allows that to occur
		\H0	Normal dial/answer operation under AT command control. (Default)
		\H1	Modem constantly attempts to go off hook and connect as configured
Operating Mode	\Nn		This command controls the preferred error correcting mode to be negotiated in a subsequent data connection
		\N0	Normal speed buffered mode (disables error correction)
		\N1	Direct mode
		\N2	MNP only
		\N3	MNP with fallback to normal mode (auto reliable mode)
		\N4	V.42 only
		\N5	V.42 with fallback to MNP only
		\N6	V.42 with fallback to MNP with fallback to normal. (Default)
Enable/Disable Remote Configuration	\RN		When remote configuration is enabled, the modem will respond to a standard 3-character escape sequence from the calling modem. When the escape sequence is recognized, the modem will go into online command mode and allow the caller to issue any valid AT command. Please note that modems equipped with remote configuration, set S register 2 (the escape character) to a default value of 126, which is the ASCII character tilde (~).
		\R0	Disable remote configuration
		\R1	Enable remote configuration
Enhanced Connect Message	\V1	None	Presents a comprehensive, single line connect message, showing DTE speed, DCE speed, protocol and compression

AT\ Commands Specific to Security Features

Special Note – All AT\ commands in this section that perform any type of delete operation use the minus '-' character in their command strings. This character can be easily missed in the documentation.

AT\E - Erase Audit Trail

This command will erase the current contents of the audit trail and initialize it to an empty state.

AT\+ccccccccc,I - Add Caller ID and Level

ccccccccc = Caller ID (10 numeric characters) – If this field contains less than 10 characters or contains characters that are not numeric, an error message will be generated and the Caller ID will be rejected.

I = Level

1 = normal, logon only

2 = special. Logon + remote configuration

3 = for use by Device Management Software

AT\-ccccccccc - Delete Specific Caller ID

AT\-* - Delete All Caller Ids

AT\? - Display All Caller IDs

Provides a report of all Caller IDs and levels in the following format:

CALLER ID	LEVEL
ccccccccc	1
ccccccccc	2
ccccccccc	1

AT\O - Output Audit Trail Report to DTE

When this command is entered, the audit trail of Caller IDs and User IDs will be presented as formatted ASCII output. The format will contain standard carriage return/line feed control for display on any standard ASCII terminal or terminal emulator package. Since this command does not erase the contents of the audit trail, it may be executed repetitively. The report format is as follows:

<u>DATE</u>	<u>TIME</u>	<u>USER ID</u>	<u>STATUS</u>
mm/dd/yy	hh:mm:ss	ccccccccc	APPROVED
mm/dd/yy	hh:mm:ss	uuuuuuuuuu	DENIED
mm/dd/yy	hh:mm:ss	ccccccccc	APPROVED
mm/dd/yy	hh:mm:ss	uuuuuuuuuu	APPROVED
mm/dd/yy	hh:mm:ss	ccccccccc	DENIED

<MORE - press ENTER to continue - >

AT\P+uuuuuuuuuu,pppppppppp,l,dddddddddddddd - Add User ID/Password
 This command allows an administrator to establish user accounts defined by a User ID/Password combination. When a new User ID/Password is defined, the modem sets the Password to an expired state. This forces the modem to prompt the owner of the User ID/Password for a new Password at the time of first use.

uuuuuuuuuu	User ID – This field must contain a minimum of 6 characters and a maximum of 10. The field must include at least one numeric character, one alpha character and one of the following printable control characters: ~ ! ` @ # \$ % ^ & * () _ - + = < > ? / { } [] : " ; ' ,
l	Level (1 = normal, logon only) (2 = special. Logon + remote configuration) (3 = for use by Device Management Software) (4 = call back password)
Ddddddddddddddd	Call back string (1 – 17 alphanumeric characters) – All characters accepted as parameters to the ATDn command may be used in this field. Please note that this field is only accepted when l=4 . Including this field when l is not equal to 4 will cause an error and the user ID will be rejected.

AT\P-uuuuuuuuuu – Delete Specific User ID/Passwords

AT\P-* - Delete All User ID/Passwords

AT\P? - Display All User ID/ Passwords

Provides a report of all User ID and levels in the following format

<u>USER ID</u>	<u>LEVEL</u>	<u>CALL BACK STRING</u>
uuuuuuuuuu	1	
uuuuuuuuuu	2	
uuuuuuuuuu	4	T9,8005551212

AT\Sn – Enable/Disable Password and Caller ID Protection Options

	Password Security	Password Prompt	Caller ID Security	Log Telephone Numbers of All Unregistered Callers
\S0	OFF	N/A	OFF	N/A
\S1	ON	No Prompt	OFF	N/A
\S2	ON	Prompt	OFF	N/A (default settings)
\S3	OFF	N/A	ON	Yes
\S4	ON	No Prompt	ON	Yes
\S5	ON	Prompt	ON	Yes
\S6	OFF	N/A	ON	No
\S7	ON	No Prompt	ON	No
\S8	ON	Prompt	ON	No

AT\T=mm/dd/yy hh:mm - Set Time and Date

AT\T? - Display Time and Date

AT\W=nn - Set Password Expiration Windows

Through this command, Passwords on all User Ids may be set to expire at the beginning of specific months. The modem allows for a maximum of 12 defined expiration windows.

CAUTION: Please ensure that the date and time (AT\T command) have been properly set before setting Password expiration windows. When a user logs into the modem with a User ID that has an expired Password, the modem will prompt the user for a new Password. Please note that the new Password will be subject to that same formatting rules defined in the AT\P+ command.
 nn = A numeric value between 1 and 12 representing the month. Numbering starts with January as 1.

To set all Passwords to expire on the first day of January, enter:

AT\W=1

To set all Passwords to expire on the first day of January and on the first day of June, enter:

AT\W=1

AT\W=6

The modem will check its calendar for a change in month every thirty minutes. Therefore, Passwords will not expire exactly at midnight on the last day of a month.

AT\W- - Disable And Delete All Password Expiration Windows

AT\W? - Display Password Expiration Windows

Provides a report of all active Expiration Windows in the following format:

At\W?

1
 4
 7
 10

AT+ Commands:

+MS - Select Modulation

This extended format command selects the modulation, optionally enables or disables automode, and optionally specifies the lowest and highest connection rates using one to four sub parameters. The command format is:

```
+MS=<mod>[, [<automode>][, [<min_rate>][, [<max_rate>]]]]<CR>
```

Notes:

1. For 14400 bps and lower speeds, the Nn command and S37 register can alternatively be used in which case the +MS sub parameters will be modified to reflect the Nn and S37=x settings. Use of the Nn and S37=x commands is not recommended but is provided for compatibility with existing communication software. (S37 is not updated by the +MS command).
2. Sub parameters not entered (enter a comma only or <CR> to skip the last sub parameter) remain at their current values.

Reporting Selected Options

The modem can send a string of information to the DTE consisting of selected options using the following command:

```
+MS?
```

The response is:

```
+MS:<mod>,<automode>,<min_rate>,<max_rate>
```

For example,

```
+MS: 11,1,300,33600 (shows default values)
```

Reporting Supported Options

The modem can send a string of information to the DTE consisting of supported options using the following command:

```
+MS=?
```

The response is:

```
+MS:(list of supported <mod> values),(list of supported <automode> values)(list of supported <min_rate> values),(list of supported <max_rate> values)
```

For example,

+MS:(0,1,2,3,8,9,10,13,64,69,74),(0,1),(300-33600),(300-33600)

Subparameter Definitions

Note 1 - <mod>=A decimal number which specifies the preferred modulation (automode disabled) to use in originating or answering a connection. The options are:

<mod>	Modulation	Possible Rates
0	V.21	300
1	V.22	1200
2	V.22bis	2400 or 1200
3	V.23	1200 (See note 2)
9	V.32	9600 or 4800
10	V.32bis	14400,12000,9600,7200,4800
11	V.34	33600,31200,28800,26400,24000,21600,19200,16800,14400,12000,9600,7200,4800,2400
64	Bell 103	300
69	Bell 212	1200
74	V.FC	33600,31200,28800,26400,24000,21600,19200,16800,14400

Note 2 - <automode> is an optional numeric value which enables or disables automatic modulation negotiation using V.8 or V.32bis Annex A. The options are:

<automode>	Option Selected
0	Automode disabled
1	Automode enabled using V.8 or V.32 Annex A (Default)

Note 3 - <min_rate> is an optional number which specifies the lowest rate at which the modem may establish a connection. The value is decimal coded in units of bps, e.g. 2400 specifies the lowest rate to be 2400 bps. The default is 300 for 300 bps.

Note 4 - <max_rate> is an optional number, which specifies the highest rate at which the modem may establish a connection. The value is decimal coded, in units of bps, e.g. 14400 specifies the highest rate to be 14400 bps. The default is 33600 for 33600 bps.

AT Command Result Codes

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes. The result codes that the modem can send are described below.

0	OK	46	CARRIER 1200
1	CONNECT	47	CARRIER 2400
2	RING	48	CARRIER 4800
3	NO CARRIER	49	CARRIER 7200
4	ERROR	50	CARRIER 9600
5	CONNECT 1200	51	CARRIER 12000
6	NO DIALTONE	52	CARRIER 14400
7	BUSY	53	CARRIER 16800
8	NO ANSWER	54	CARRIER 19200
9	CONNECT 0600	55	CARRIER 21600
10	CONNECT 2400	56	CARRIER 24000
11	CONNECT 4800	57	CARRIER 26400
12	CONNECT 9600	58	CARRIER 28800
13	CONNECT 7200	59	CONNECT 16800
14	CONNECT 12000	61	CONNECT 21600
15	CONNECT 14400	62	CONNECT 24000
16	CONNECT 19200	63	CONNECT 26400
17	CONNECT 38400	64	CONNECT 28800
18	CONNECT 57600	66	COMPRESSION: CLASS 5
19	CONNECT 115200	67	COMPRESSION: V.42 bis
22	CONNECT 75TX/1200RX	69	COMPRESSION: NONE
23	CONNECT 1200TX/75RX	70	PROTOCOL: NONE
24	DELAYED	77	PROTOCOL: LAPM
32	BLACKLISTED	78	CARRIER 31200
33	FAX	79	CARRIER 33600
35	DATA	80	PROTOCOL: ALT
40	CARRIER 300	81	PROTOCOL: ALT-CELLULAR
44	CARRIER 1200/75	84	CONNECT 33600
45	CARRIER 75/1200	91	CONNECT 31200

S - Registers

The table in this section summarizes the S-Registers and their default values. Registers denoted with (*) may be stored in one of the two user profiles by entering the &Wn command. One of these profiles may be loaded at any time by using the Zn command. Registers or register fields quoted as "reserved" are reserved for current or future use. All bit-mapped registers are read-only. The appropriate AT command, which controls the relevant bits in the S-Register, should be used to change the value.

A more in-depth treatment of many of the S-register settings follows the summary table.

S-REGISTER SUMMARY					
Command Atn (read S register n Atn=v set S register 'n' equal to value 'v')					
Example ATS0=1 sets auto answer ring count to 1					
Register	Function	Range	Units	Saved	Default
S0	Rings to Auto-Answer	0-255	Rings	*	0
S1	Ring Counter	0-255	Rings		0
S2	Escape Character	0-255	ASCII	*	43
S3	Carriage Return Character	0-127	ASCII		13
S4	Line Feed Character	0-127	ASCII		10
S5	Backspace Character	0-255	ASCII		8
S6	Wait Time for Dial Tone	2-255	sec	*	2
S7	Wait Time for Carrier	1-255	sec	*	50
S8	Pause Time for Dial Delay	0-255	sec	*	2
S9	Carrier Detect Response time	1-255	0.1s	*	6
S10	Carrier Loss Disconnect time	1-255	0.1s	*	14
S11	DTMF Tone Duration	50-255	0.001s	*	95
S12	Escape Prompt Delay	0-255	0.02s	*	50
S18	Test Timer	0-255	Sec	*	0
S24	Sleep Inactivity Timer	0-255	S	*	0
S25	Delay to DTR Off	0-255	s or 0.01s		5
S26	RTS-to-CTS Delay	0-255	0.01s		1
S30	Disconnect Timer	0-255	10 s		0
S38	Delay Before Hang up	0-255	Sec		20
S86	Call Failure Reason	0-255			
* Register value may be stored in either user profile with the &W command.					

S – Register Definition Details

S- Register Details			
Name	S Reg	Values	Description
Number of Rings to Auto Answer	S0		Sets the number of the rings required before the modem automatically answers a call. Setting this register to zero disables auto-answer mode. Range:0-255 rings Default:0
Ring Counter	S1		S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval. Range: 0-255 rings Default:0
Escape Character	S2		S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII "+". A value over 127 disables the escape process, i.e., no escape character will be recognized. Range: 0-255, decimal Default: 43(+)
Carriage Return Character	S3		Sets the command line and result code terminator character. Range: 0-127, decimal Default: 13 (Carriage Return)
Line Feed Character	S4		Sets the character recognized as a line feed. Range: 0-127, decimal Default: 10(line feed)
Backspace Character	S5		Sets the character recognized as a backspace. Range: 0-255, decimal Default: 8 (Backspace)
Wait Time for Dial Tone Before Blind Dialing	S6		Sets the length of time in seconds that the modem will wait before starting to dial after going off-hook when blind dialing. The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than two seconds. Range: 2-255 seconds Default: 2
Wait Time for Carrier After Dial, For Silence, or For Dial Tone After "W" Dial Modifier	S7		1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone. 2. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter. 3. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before continuing with the next dial string parameter. Range: 1-255 seconds Default: 50
Pause Time for Dial Delay	S8		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		Sets the time, in tenths of a second, that the carrier must be present before the modem considers it valid and turns on RLSD. Range: 1-255 tenths of a second Default:6 (0.6 second)
Lost Carrier to Hang Up Delay	S10		Sets the length of time, in tenths of a second that the modem waits before hanging up after a loss of carrier. When register S10 is set to 255, the modem functions as if a carrier is always present. The actual interval the modem waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier. Range: 1-255 tenths of a second Default:14 (1.4 seconds)
DTMF Tone Duration	S11		Sets the duration of tones in DTMF dialing. This value has no effect on pulse dialing. Range: 50-255 milliseconds Default: 95 (95 milliseconds)
Escape Prompt Delay	S12		Defines the maximum period in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and the sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Range: 0-255 1/50 of a second Default: 50 (1 second)
Test Timer	S18		Sets the length of time, in seconds, that the modem conducts a test (commanded by &Tn) before returning to the command mode. If this register value is zero, the test will not automatically terminate; the test must be terminated from the command mode by issuing a &T0 or H command. When S18 is non-zero, the modem returns the OK message upon test termination. Range: 0-255 seconds Default: 0
Sleep Inactivity Timer	S24		Sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode. Range: 0-255 seconds Default: 0
Delay to DTR	S25		Set the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are seconds for synchronous modes and one hundredths of a second for other modes. Range: 0-255 Default: 5
RTS to CTS Delay	S26		Sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Range: 0-255 hundredths of a second Default: 1
Disconnect	S30		Sets the length of time in tens of seconds, that the modem

Important Information

AGENCY APPROVALS

FCC Part 68

This equipment complies with U.S. Code of Federal Regulations, Title 47, FCC Rules and Regulations Part 68. Located on the equipment is the FCC Registration Number and Ringer Equivalence Number (REN). You must provide this information to the telephone company if requested.

The Registration Number and REN will be on a label attached to the unit. The FCC requires these numbers be prominently displayed on an outside surface of the equipment.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area. The telephone company may change technical operations or procedures affecting your equipment. You will be notified of changes in advance to give you ample time to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact Ctek, Inc. at (775) 284-3700 for information on obtaining service or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been resolved. If your equipment continues to disrupt the network, the telephone company may temporarily disconnect service. If this occurs you will be informed of your right to file a complaint with the FCC.

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

FCC Part 15

This equipment has been tested and complies with the limits for a Class A computing device according to U.S. Code of Federal Regulations, Title 47, FCC Rules and Regulations Part 15. Operation is subject to the following two conditions:

- (1) This device may cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Ctek Inc.
350 S. Center St.
Reno NV. 89501

WARRANTY INFORMATION

Ctek warrants that all products shall be free of defects in workmanship and material for a period of 5 years, from ship date of product by Ctek. Ctek's sole obligation to Customer shall be to repair or replace product proved to be defective as soon as reasonably practicable. Ctek's sole obligation to repair or replace defective product is further limited to those products which have not been modified, abused or exposed to environmental conditions outside the specifications published by Ctek. Product damage due to static, lightning and improper grounding is specifically excluded from Ctek's sole obligation to repair or replace defective product. In no event will Ctek be responsible for special, indirect, consequential or incidental damages. In the event Ctek has liability from any and all causes, its liability shall in no case exceed an amount equal to the money actually received by Ctek for products furnished by Ctek. Ctek shall not be liable for any claims by a third party or losses suffered by a third party.

TECHNICAL SUPPORT INFORMATION

For technical support contact Ctek at 775.284.3700 ext 1814 or service@ctekproducts.com.