Contents:

User's Guide and Reference

Technical Reference

Front-of-the-Case Lights (External Serial Faxmodems)

Symbol	Meaning	Status
AA	Auto Answer mode	ON when register S0 is set to 1 or higher (Auto Answer), and when answering a call; OFF when modem originates a call. Light flashes when there is an incoming call.
CD	Carrier Detect	ON if modem receives a valid data signal (carrier) from a remote modem, indicating that data transmission is possible. Always ON if CD override is ON (&C0).
RD	Received Data	Flashes when modem sends result codes or passes received data bits from remote.
SD	Send Data	ON if modem receives a DTR signal from computer. Always ON (modem ignores DTR) if the DTR override is ON (&D0).
TR	Data Terminal Ready	ON if modem receives a DTR signal from computer. Always ON (modem ignores DTR) if the DTR override is ON (&D0).
CS	Clear to Send	ON until modem lowers CTS when Transmit Data hardware flow control is enabled (&H1, &H3).
ARQ/ Error Control/FAX	Fax Operations Data Mode	Error Control. ON if modem is set to &M4 or &M5 and successfully establishes an error control connection. Flashes when modem retransmits data to remote modem. Fax Mode: flashes to indicate fax mode.

Typing Commands

- Type commands in either upper or lower case, not a combination. Use the Backspace key to delete errors. (You cannot delete the original AT command.)
- If a command has numeric options and you don't include a number, zero is assumed. For example, if you type ATB, the command ATB0 is assumed.
- Every command except A/, +++, and A> must begin with the AT prefix and be entered by pressing ENTER.

*All defaults are based on the &F1*Hardware Flow Control template loaded in NVRAM when the modem is shipped. Defaults are listed in italics.*

Basic Data Commands

<control key>S	Stop or restart help screens.
<control key>C or **<control key>K**	Stop help screens.
$	Use in conjunction with D, S, or & commands (or just AT) to display a basic command list; online help.
A	Manual Answer: Goes offhook in answer mode. Pressing any key before connected aborts the operations.
A/	Re-executes the last issued command. Used mainly to redial. Does not require the AT prefix or a Carriage Return.
A>	Re-executes the last issued command continuously until the user intervenes or the command is executed forever. Does not require the AT prefix or a Carriage Return.
+++	Escapes to online-command mode.
Any key	Aborts offhook dial/answer operation and hangs up.
AT	Required command prefix, except with A/, +++, and A>. Use alone to test for OK result code.
Bn	**U.S./ITU-T answer sequence** *B0 ITU-T answer sequence.* B1 U.S. answer tone.
Dn	**Dials the specified phone number. Includes the following:** 0-9 Numeric digits. #, * Extended touch-tone pad tones. L Dials the last dialed number. P Pulse (rotary) dial. R Originates call using answer (reverse) frequencies. Sn Dials the phone number string stored in NVRAM at position *n* (*n* = 0*3). Phone numbers are stored with the &Zn=s command. T Tone dial , (Comma) Pause. Linked to S8 register. ; (Semicolon) Return to Command mode after dialing. " Dials the letters that follow (in an alphabetical phone number). ! (Exclamation point) Flashes the switch hook. / Delays for 125 ms. before proceeding with dial string. W Wait for second dial tone (X2 or X4); linked to S6 register.

@ Dials, waits for quiet answer, and continues (X3 or higher).

$ Displays a list of Dial commands.

En **Sets local echo.**

E0 Echo OFF.

E1 Modem displays keyboard commands.

Fn **Sets online local echo of transmitted data ON/OFF.**

F0 Local echo ON. Modem sends a copy of the data it sends to the remote system to your screen.

F1 Local echo OFF. Receiving system may send a remote echo of data it receives.

Hn **Controls ON/OFF hook.**

H0 Hangs up (goes onhook).

H1 Goes offhook.

In **Displays the following information.**

I0 Four-digit product code.

I1 Results of ROM checksum.

I2 Results of RAM checksum.

I3 Product type.

I4 Current modem settings.

I5 Nonvolatile memory (NVRAM) settings.

I6 Link diagnostics.

I7 Product configuration.

I9 Plug and Play information.

I11 Extended link diagnostics.

Ln **Controls speaker volume (internal modems only).**

L0 Low volume.

L1 Low volume.

L2 Medium volume.

L3 High volume.

Mn **Operates speaker.**

M0 Speaker always OFF.

M1 Speaker ON until CONNECT.

M2 Speaker always ON.

M3 Speaker ON after dial, until CONNECT.

On	**Returns online.**
	O0 Returns online.
	O1 Returns online and retrains.
P	**Sets pulse dial (for phone lines that don't support touch-tone dialing).**
Qn	**Displays/suppresses result codes.**
	Q0 Displays result codes.
	Q1 Quiet mode; no result codes.
Sr=n	**Sets register r to n.**
Sr?	**Displays contents of S-Register r.**
S$	**Displays a list of the S-Registers.**
T	**Sets tone dial.**
Vn	**Displays verbal/numeric result codes.**
	V0 Numeric codes.
	V1 Verbal codes.
Xn	**Sets result code displayed. Default is X4.**

Table 5-1

Result Codes	X0	X1	X2	X3	X4
0/OK	*	*	*	*	*
1/CONNECT	*	*	*	*	*
2/RING	*	*	*	*	*
3/NO CARRIER	*	*	*	*	*
4/ERROR	*	*	*	*	*
5/CONNECT 1200		*	*	*	*
6/NO DIAL TONE			*		*
7/BUSY				*	*
8/NO ANSWER				*	*
9/Reserved					
10/CONNECT 2400		*	*	*	*
13/CONNECT 9600		*	*	*	*
18/CONNECT 4800		*	*	*	*
20/CONNECT 7200		*	*	*	*
21/CONNECT 12000		*	*	*	*
25/CONNECT 14400		*	*	*	*
43/CONNECT 16800		*	*	*	*
85/CONNECT 19200		*	*	*	*

91/CONNECT 21600		*	*	*	*
99/CONNECT 24000		*	*	*	*
103/CONNECT 26400		*	*	*	*
107/CONNECT 28800		*	*	*	*
151/CONNECT 31200		*	*	*	*
155/CONNECT 33600		*	*	*	*
Adaptive Dialing			*	*	*
Wait for 2nd Dial Tone (W)			*		*
Wait for Answer (@)				*	*
Fast Dial			*		*

*Requires @ in dial string; replaces NO CARRIER.

Yn Selects power-on/reset default configuration.

Y0 Use profile 0 setting in NVRAM.

Y1 Use profile 1 setting in NVRAM.

Y2 Use factory configuration 0.

Y3 Use factory configuration 1.

Y4 Use factory configuration 2

Z Resets modem.

Z0 Resets modem to NVRAM profile selected by Y command or dip 7.

Z1 Resets modem to NVRAM profile 0.

Z2 Resets modem to NVRAM profile 1.

Z3 Resets modem to factory default profile 0 (&F0).

Z4 Resets modem to factory default profile 1 (&F1).

Z5 Resets modem to factory default profile 2 (&F2).

Extended Data Commands

&$ Displays a list of ampersand (&) commands.

&An Enables/disables added result code subsets (see Xn).

&A0 ARQ result codes disabled.

&A1 ARQ result codes enabled.

&A2 V.32 modulation indicator added.

&A3 Protocol indicators added LAPM/MNP/NONE (error control) and V42bis/MNP5 (data compression).

&Bn **Manages modem's serial port rate.**

&B0 Variable, follows connection rate.

&B1 Fixed serial port rate.

&B2 Fixed in ARQ mode, variable in non-ARQ mode.

&Cn **Controls Carrier Detect (CD) signal.**

&C0 CD override.

&C1 Normal CD operations.

&Dn **Controls Data Terminal Ready (DTR) operations.**

&D0 DTR override.

&D1 DTR toggle causes online Command mode.

&D2 Normal DTR operations.

&D3 Resets on receipt of DTR.

&Fn **Loads a read-only (non-programmable) factory configuration.**

&F0 Generic template.

&F1 Hardware flow control template.

&F2 Software flow control template.

&Gn **Sets Guard Tone.**

&G0 No guard tone, U.S. and Canada.

&G1 550 Hz guard tone, some European countries, requires B0 setting.

&G2 1800 Hz guard tone, U.K., requires B0 setting.

&Hn **Sets Transmit Data (TD) flow control (see also &Rn).**

&H0 Flow control disabled.

&H1 Hardware flow control, Clear to Send (CTS).

&H2 Software flow control, XON/XOFF.

&H3 Hardware and software flow control.

&In **Sets Receive Data (RD) software flow control (see also &Rn).**

&I0 Software flow control disabled.

&I1 XON/XOFF signals to your modem and remote system.

&I2 XON/XOFF signals to your modem only.

&Kn **Enables/disables data compression.**

&K0 Data compression disabled.

&K1 Auto enable/disable.

&K2 Data compression enabled.

&K3 MNP5 compression disabled.

&Mn **Sets Error Control (ARQ) for connections at 1200 bps and higher.**

&M0 Normal mode, error control disabled.

&M1 Reserved.

&M2 Reserved.

&M3 Reserved.

&M4 Normal/ARQ.

&M5 ARQ mode.

&Nn **Sets connect speed. If connection cannot be made at this speed, the modem will hang up.**

When used in conjunction with &Un and &Un is greater than 0, &Nn sets the ceiling connect speed. &Un sets the floor connect speed (see also the table in the &Un section).

&N0 Connection speed is determined by the remote modem.

&N1 300 bps.

&N2 1200 bps.

&N3 2400 bps.

&N4 4800 bps.

&N5 7200 bps .

&N6 9600 bps.

&N7 12,000 bps.

&N8 14,400 bps.

&N9 16,800 bps.

&N10 19,200 bps.

&N11 21,600 bps.

&N12 24,000 bps.

&N13 26,400 bps.

&N14 28,800 bps.

&N15 31,200 bps.

&N16 33,600 bps.

&Pn **Sets pulse (rotary) dial make/break ratio.**

&P0 U.S./Canada ratio, 39%/61%.

&P1 U.K. ratio, 33%/67%.

&Rn **Sets Receive Data (RD) hardware flow control, Request to Send (RTS) (see also &Hn).**

&R0 Reserved.

&R1 Modem ignores RTS.

&R2 Received Data to computer only on RTS.

&Sn **Controls Data Set Ready (DSR) operations.**

&S0 DSR override; always ON.

&S1 Modem controls DSR.

&Tn **Begins test modes.**

&T0 Ends testing.

&T1 Analog Loopback.

&T2 Reserved.

&T3 Local Digital Loopback.

&T4 Enables Remote Digital Loopback.

&T5 Prohibits Remote Digital Loopback.

&T6 Initiates Remote Digital Loopback.

&T7 Remote Digital with self-test and error detector.

&T8 Analog Loopback with self-test and error detector.

&Un **With n > 0, sets the floor connect speed (lowest acceptable connection speed).**

Note: If your modem cannot connect to the remote modem at or above the speed set with this command, it will hang up.

&N=0 &U=0 Connects at highest available speed.

Note: This default setting should be sufficient for most users.

&N>0 Connects at fixed speed.

&U>0 Connects at highest speed above &Un.

&N>0 &U>0 Connects at highest speed between &Nn and &Un.

&U0 No minimum connection speed.

&U1 300 bps.

&U2 1200 bps.

&U3 2400 bps.

&U4 4800 bps.

&U5 7200 bps.

&U6 9600 bps.

&U7 12,000 bps.

&U8 14,400 bps.

&U9 16,800 bps.

&U10 19,200 bps.

&U11 21,600 bps.

&U12 24,000 bps.

&U13 26,400 bps.

&U14 28,800 bps.

&U15 31,200 bps.

&U16 33,600 bps.

&Wn **Writes current configuration to NVRAM templates.**

&W0 Modifies the NVRAM 0 template (Y0).

&W1 Modifies the NVRAM 1 template (Y1).

&Yn **Sets break handling.**

&Y0 Destructive, but doesn't send break.

&Y1 Destructive, expedited.

&Y2 Nondestructive, expedited.

&Y3 Nondestructive, unexpedited.

&Zn=s Writes phone number string *s* to NVRAM at position *n* (*n* = 03).

&Zn=L Writes last executed dial string to NVRAM at position *n* (*n* = 03).

&Zn? Displays phone number stored at position *n* (*n* = 03).

&ZL? Displays the last executed dial string.

Table 5-2

Switch	Default	Function
1	OFF	Data Terminal Ready (DTR) Override. OFF Normal DTR operations: computer must provide DTR signal for the modem to accept commands; dropping DTR terminates a call. ON Modem ignores DTR (Override).
2	OFF	Verbal/Numeric Result Codes. OFF Verbal (word) results. ON Numeric results.
3	ON	Result Code Display. OFF Suppresses result codes. ON Enables result codes.
4	OFF	Command Mode Local Echo Suppression. OFF Displays keyboard commands. ON Suppresses echo.
5	ON	Auto Answer Suppression. OFF Modem answers on first ring, or higher if specified in NVRAM. ON Disables auto answer.
6	OFF	Carrier Detect (CD) Override. OFF Modem sends CD signal when it connects with another modem, drops CD on disconnect. ON CD always ON (Override).
7	OFF	Power-on and ATZ Reset Software Defaults. OFF Loads Y0-Y4 configuration from user-defined nonvolatile memory (NVRAM). ON Loads &F0 Generic template from Read Only Memory (ROM).
8	ON	AT Command Set Recognition. OFF Disables command recognition (dumb mode). ON Enables recognition (smart mode).

S Registers

Table 5-3

Register	Default	Function
S0	0	Sets number of rings on which to answer in Auto Answer mode. When set to 0, Auto Answer is disabled.
S1	0	Counts and stores number of rings from an incoming call. (S0 must be greater than 0.)
S2	43	Stores ASCII decimal code for the escape code character. Default character is +. A value of 128 - 255 disables escape code.
S3	13	Stores ASCII code for the Carriage Return character. Valid range is 0 - 127.
S4	10	Stores ASCII decimal code for the Line Feed character. Valid range is 0 - 127.
S5	8	Stores ASCII decimal code for the Backspace character. A value of 128-255 disables Backspace key's delete function.
S6	2	Sets number of seconds modem waits before dialing. If Xn is set to X2 or X4, this is time-out length if no dial tone.
S7	60	Sets number of seconds modem waits for a carrier. May be increased as needed, for example to allow modem time to establish an international connection.
S8	2	Sets duration, in seconds, for pause (,) option in the Dial command. Valid range is 0-32.
S9	6	Sets required duration, in tenths of a second, of remote modem's carrier signal before recognition by your USRobotics modem.
S10	7	Sets duration, in tenths of a second, that modem waits to hang up after loss of carrier. This guard time allows your modem to distinguish a line disturbance from a true disconnect (hang up) by the remote modem.
S11	55	Sets duration and spacing, in milliseconds, for tone dialing.
S12	50	Sets duration, in fiftieths of a second, of guard time for escape code sequence (+++).
S13	0	Bit-mapped register. Select the bit(s) you want on and set S13 to the total of the values in the Value column. For example, ATS13 = 17 enables bit 0 (value is 1) and bit 4 (value is 16). Refer to Table 5-4.
S14	0	Reserved.
S15	0	Bit-mapped register setup. Refer to Table 5-5.
S16	0	Reserved.
S17	0	Reserved.
S18	0	Test timer for &T loopback testing. Sets the time in seconds of testing before the modem automatically

		times out and terminates the test. When set to 0, the timer is disabled. Valid range is 1-255.
S19	0	Sets duration, in minutes, for inactivity timer. This timer activates when there is no data activity on the phone line; at time-out the modem hangs up. S19 = 0 disables the timer.
S20	0	Reserved.
S21	10	Sets length, in 10-millisecond units, of breaks sent from the modem to the computer; applies to MNP or V.42 mode only.
S22	17	Stores ASCII decimal code for the XON character.
S23	19	Stores ASCII decimal code for the XOFF character.
S24	0	Reserved.
S25	5	Sets duration, in hundredths of a second, of a true DTR drop. Prevents modem from interpreting random glitches as DTR loss. (Most users will use the default; this register is useful for compatibility with older systems and operating software.)
S26	0	Reserved.
S27	0	Bit-mapped register setup. Refer to Table 5-6.
S28	0	Eliminates the V.32 answer tones for a faster connection.
	8	Default item, all times are in tenths of seconds.
	255	Disables all connections except V.32 at 9600 bps.
S29	20	Sets the duration, in tenths of a second, of the V.21 answer mode fallback timer.
S30	0	Reserved.
S31	128	Reserved.
S32	2	Bit-mapped register setup. Refer to Table 5-7.
S33	0	Bit-mapped register setup. Refer to Table 5-8.
S34	0	
S35-S37	Reserved.	Reserved.
S38	0	Sets an optional delay, in seconds, before a forced hang-up and clearing of the Transmit buffer when DTR drops during an ARQ call. This allows time for a remote modem to acknowledge receipt of all transmitted data before it is disconnected. The modem immediately hangs up when DTR drops. This option only applies to connections terminated by dropping DTR. If the modem receives the ATH command, it ignores S38 and immediately hangs up.
S39-S40	Reserved.	Reserved.
S41	0	Bit-mapped register setup. Refer to Table 5-9.
S42	Reserved.	Reserved.

Bit-Mapped Registers

To set a bit-mapped register, select the bit(s) you want on and set the register (for example, S13) to the total of the values in the Value column. For example, ATS13 = 17 enables bit 0 (value is 1) and bit 4 (value is 16).

Table 5-4 Settings for S13

Bit	Value	Result
0	1	Reset when DTR drops.
1	2	Reset non-MNP transmit buffer from 1.5K to 128 bytes.
2	4	Set backspace key to delete.
3	8	On DTR signal, autodial the number stored in NVRAM at position 0.
4	16	At power on/reset, autodial the number stored in NVRAM at position 0.
5	32	Reserved.
6	64	Disable quick retrains.
7	128	Disconnect on escape code.

Table 5-5 Settings for S15

Bit	Value	Result
0	1	Disable ARQ/MNP for V.22.
1	2	Disable ARQ/MNP for V.22bis.
2	4	Disable ARQ/MNP V.32/V.32bis.
3	8	Disable MNP handshake.
4	16	Disable MNP level 4.
5	32	Disable MNP level 3.
6	64	MNP incompatibility.
7	128	Disable V.42 operation. Note: To disable V.42 detect phase, select sum of bits 3 and 7 (in other words S15 = 136 [8 + 128]).

Table 5-6 Settings for S27

Bit	Value	Result
0	1	Enables ITU-T V.21 modulation at 300 bps for overseas calls; in V.21 mode, the modem answers both overseas and domestic (U.S. and Canada) calls, but only originates V.21 calls (default Bell 103).
1	2	Enables unencoded (non-trellis coded) modulation in V.32 mode.

2	4	Disables V.32 modulation.
3	8	Disables 2100 Hz answer tone to allow two V.42 modems to connect faster.
4	16	Enables V.23 fallback mode.
5	32	Disables V.32bis mode.
6	64	Disable V.42 selective reject.
7	128	Software compatibility mode. This setting disables the codes and displays the 9600 code instead. The actual rate of the call can be viewed on the ATI6 screen. Used for unusual software incompatibilities. Some software may not accept 7200, 12,000, and 14,400 bps or greater result codes.

Table 5-7 Settings for S32

Bit	Value	Result
0	1	V.8 Call Indicate enabled.
1	2	Enables V.8 mode.
2	4	Reserved.
3	8	Disable V.34.
4	16	Disable V.34+ modulation.
5	32	Reserved.
6	64	Reserved.
7	128	Reserved.

Table 5-8 Settings for S33

Bit	Value	Result
0	1	Disable 2400 symbol rate.
1	2	Disable 2743 symbol rate.
2	4	Disable 2800 symbol rate.
3	8	Disable 3000 symbol rate.
4	16	Disable 3200 symbol rate.
5	32	Disable 3429 symbol rate.
6	64	Reserved.
7	128	Disable shaping.

Table 5-9 Settings for S41

Bit	Value	Result
0	1	Distinctive ring enabled.
1	2	Speakerphone connect message override (voice products only).

2	4	Reserved.
3	8	Message waiting (voice products only).
4	16	Reserved.
5	32	Reserved.
6	64	Reserved.
7	128	Reserved.