V.3225 and V.3225L Manual

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Chapter 6
Status Registers

STATUS REGISTERS TUTORIAL

Most modem configuration information is stored in a part of memory called status (S) registers. During operation this information is used to determine modem functions.

The information stored in the S-registers can be changed by the AT or V.25 command sets and by pushbuttons in response to the LCD prompt. These are the preferred methods. Some software programs also access the S-registers via the AT command set, but this action is transparent to the user. The command indicates which memory bit(s) to alter to select a particular option or to perform a certain function. The S-register values comprise the configuration profile.

> ***Caution:*** *The purpose of this tutorial is to show the versatility of option selection and register function. It is strongly recommended that the preferred methods of option selection be used. This tutorial uses S22 as the example register. Certain modems may use S22 differently or may not have an S22.*

Generally the user should not directly alter S-register values. However, the user has the option of changing S-register values via ATS commands. This is called "writing" to the S-register. Writing to an S-register is not a preferred method and should only be used by programmers who need to manipulate S-registers for custom purposes.

Certain S-registers cannot be changed by the ATS command series. These are called "read only" S-registers. Appendix D contains a listing of S-registers and indicates if they are read only or read and write.

Figure 6-1 illustrates how the different inputs to an S-register (S22 in this case) are used to select a particular option. Bits 3 and 2 of S22 control speaker options. Some communication software packages may use the AT command set. For example purposes bit values are arbitrary.

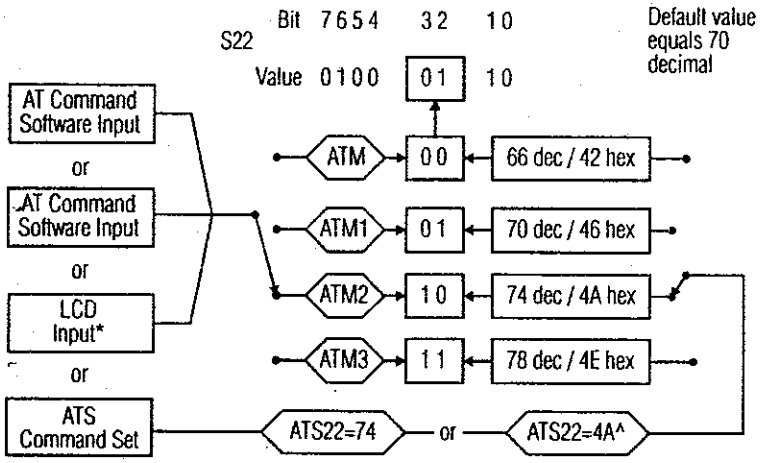

Figure 6-1
Changing S-Register Values

Bit values for S-registers must not be confused with the total register value. Bit values are counted separately for each option group, called bit mapping, while the register value is the cumulative decimal or hexadecimal total. The decimal value counts all eight bits as a single group. Hexadecimal values split the bits into two groups of four each. Writing to an S-register changes the total value.

Figure 6-2 illustrates the difference between decimal calculation and hexadecimal calculation.

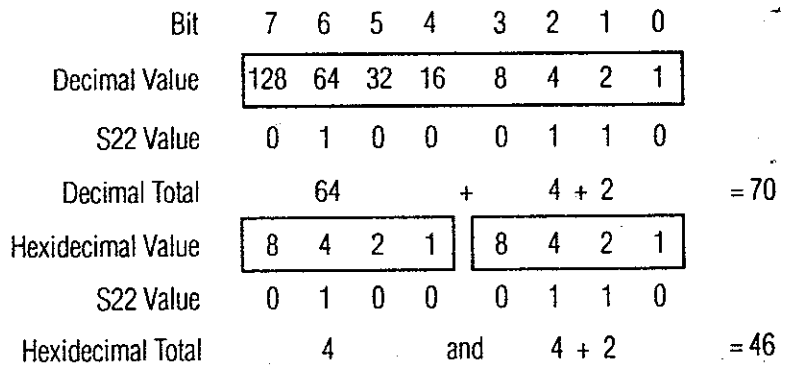

Figure 6-2
Calculating S-Register Values

> ***Note:*** *Refer to Appendix G for decimal/ hexadecimal values.*

S-REGISTER OPERATION

To Read a register value

Enter ATSn? (n=register number) for decimal value
or ATSn?^ for hexadecimal value

For example, to determine the current backspace character

Enter ATS5?

The screen will show the ASCII value of the backspace character stored in register S5.

To Change (write to) a register value

Enter ATSn=v (n=register number, v=decimal value)
or ATSn=^v (^v=hexadecimal value)

> *Note: Not all registers can be set by the ATSn=v (or ^v) command. Some registers are for reference only.*

To Change the escape character from + to the ESC key (ASCII value of 27)

Enter ATS2=27

To return the modem to the command mode press the ESC key three times:

(pause) ESC ESC ESC (pause)

Individual Bit Command Sn .(bit#) = v

Most operators use AT commands as the primary method of changing S-register options. However, some options stored in registers do not have an associated AT command. For these options, an individual

bit AT command can be used to change the setting of the bit controlling the option.

To Change a single bit value within a register

Enter ATSn . (bit#) = v where
n= register number
v= bit value 1 or 0

Example:

S-register 27, bit 2 selects between dial-up or leased line operation.

- AT command method:

  AT&L selects dial-up operation (sets S27 bit 2 to 0)

  AT&L1 selects leased line operation (sets S27 bit 2 to 1)

- Individual bit method:

  ATS27.2=0 selects dial-up operation (sets S27 bit 2 to 0)

  ATS27.2=1 selects leased line operation (sets S27 bit 2 to 1)

> *Note: This method of option selection can be used on all S-registers except read only registers.*

Autoanswer
S0 = 0-255

This register turns the option on or off. Set the register to 0 to turn autoanswer off.

Set the register to any nonzero (1-255) value to turn autoanswer on. The number selected is the ring count the modem answers on. For example, if S0 equals 4, the modem answers the call on the fourth ring. The default value is 1.

Ring Count
S1 = 0-255

This register contains the ring count for each incoming call. There is no need to change its value since it is reset by each call or if no rings occur after 8 seconds. If developing communications software, the program can read the register to determine the ring total.

Escape Character
S2 = 0-255

The standard escape character is a + sign (ASCII value of 43). To change the character, set S2 to the desired ASCII value.

To disable the escape command, set S2 to any value greater than 127.

End-of-Line Character
S3 = 0-127

The standard character is the carriage return (ASCII value of 13). This character ends each command as it is sent to the modem. It is also sent by the modem after each status message or number code.

To change the character, set S3 to the desired ASCII value (0-127).

Line Feed Character
S4 = 0-127

The standard character is the line feed (ASCII value of 10). This character is sent by the modem after each status message. To change it, set S4 as desired (0-127).

Backspace Character
S5 = 0-127

The standard character is the backspace (ASCII value of 8). To change it, set S5 to the desired value (0-127).

Pause Before Dialing
S6 = 0-255

When dial tone detection is disabled (command X, X1, or X3 in effect), the modem waits the number of seconds (0-255) stored in this register before dialing. The default value is 2 (seconds).

Pause for Ring Back Detection/ Pause for Carrier Detection
S7 = 1-30

If no ring back is detected in the number of seconds in S7 (1-30), the modem disconnects and sends the NO CARRIER message or code. If ring back is detected, the modem begins to look for a carrier.

If no carrier is detected within the number of seconds in S7, the modem hangs up and sends the NO CARRIER message or code.

Values between 1 and 30 may be used. The default value is 30 (seconds).

Pause Interval for Comma
S8 = 0-255

When a dial command contains a comma, the modem pauses the number of seconds in S8. Change S8 to change the basic pause interval (0-255), or use several commas in a row for greater delay during dialing.

The default value is 2 (seconds).

Carrier Detect Time
S9 = 0-255

Amount of time (0-255) in 0.1 second increments the carrier must be present to be recognized. The default value is 6 (0.6 second). Data Carrier Detect (DCD) will be raised when carrier is recognized. This timer can be extended to lessen the likelihood of false detection of carrier.

Lost Carrier Detect Time
S10 = 0-255

Amount of time (0-255) in 0.1 second increments needed to recognize the loss of carrier. Data carrier detect (DCD) will be dropped when the loss of carrier is recognized and the modem disconnects. The default value is 14 (1.4 seconds).

Note: If S10 is less than S9, any loss of carrier results in a disconnect. When S10 is larger than S9, the length of time that a carrier loss can be tolerated is the difference between S10 and S9.

DTMF Tone Duration S11

Determines the length of DTMF tones in 1 ms increment. The period of silence is equal to the duration of the tone. The value of this register must be entered in multiples of 10. Default value is 80 (80 ms).

Escape Sequence Pause Interval S12 = 0-255

Using the escape sequence to return to command mode from data mode requires two pauses, one before and one after the escape characters.

The pauses prevent the modem from responding to a character sequence which might contain the escape sequence as part of its normal data transmission.

S12 contains the pause interval in 0.02 second increments. The factory setting is 50, equivalent to 1 second (50 x 0.02 sec). When S12 is 0 then timing is not a factor.

The timing between the 3 escape characters must be less than the pause interval or the escape sequence will not be detected. The data rate also affects the timing and must be taken into account when changing the pause interval.

To disable the escape command, set S2 to a value greater than 127 instead of changing S12. Values between 0 and 255 may be used for S12.

Note: When S-registers have parallel AT commands, the commands are listed in the register tables as a cross reference. If no command exists for the option the column is left blank.

S13 Not used

Bit Mapped S14

Bit	Value	Command	Description
0	--	--	Reserved
1	0 *1	E E1	Local character echo off Local character echo on
2	*0 1	Q Q1	Response displays on Response displays off
3	0 *1	V V1	Response digit messages Response word message
4	*0 1	 Q2	Ignore Response display on in originate mode only
5	*0 1	T P	Tone dial Pulse dial
6	0 *1	H2 H3	V.32 cleardown enabled V.32 cleardown disabled
7	0 *1	*OR1 *OR	Forced answer Normal originate

** default*

Note: If status bits are of interest, read the register value to find which bits are set.

S15 Not used

System Tests S16 Contains the status of system test option settings.

Bit	Value	Command	Description
0	0 1		Analog loopback inactive Analog loopback in progress
1	--	--	Reserved
2	0 1		Digital loopback inactive Digital loopback in progress
3	0 1		Slaved digital loopback inactive Slaved digital loopback in progress
4	0 1		Remote digital loopback inactive Remote digital loopback in progress
5	0 1		Self test remote digital loopback inactive Self test remote digital loopback in progress
6	0 1		Self test analog loopback inactive Self test analog loopback in progress
7	--	--	Reserved

S17 Not used

Test Timeout S18 Amount of time (0-255) in 1 second increments, that a diagnostic test will run. A value of 0 disables the timer. The default value is 0.

S19, 20 Not used

Bit Mapped S21

Bit	Value	Command	Description
6, 0	*00 10 01 11	&S &S1 &S2 &S3	DSR always on DSR on when off hook in data mode DSR off 5 seconds after disconnect DSR follows off hook (OH)
5, 1	*00 10 01 11	&C &C1 &C2 &C3	DCD always on DCD follows carrier from remote modem DCD on except for 5 seconds after disconnect DCD follows RTS on remote modem; in reliable mode follows carrier only
2	0 *1	&R &R1	CTS follows RTS by S26 delay CTS always on
4, 3	*00 01 10 11	&D &D1 &D2 &D3	DTR ignored DTR on/off transition recalls asynchronous command state DTR on/off transition causes disconnect DTR on-to-off transition disconnects and resets modem to current stored configuration
7	0 *1	Y Y1	Long space disconnect disabled Long space disconnect enabled

** default*

Bit Mapped S22

Bit	Value	Command	Description
1, 0	00	L	Speaker volume low
	01	L1	Speaker volume low
	*10	L2	Speaker volume medium
	11	L3	Speaker volume high
3, 2	00	M	Speaker off
	*01	M1	Speaker on until carrier detect
	10	M2	Speaker always on
	11	M3	Speaker off when modem is dialing
6, 5, 4	000	X	CONNECT message only, blind dials, no busy detect
	001	X1	CONNECT/appropriate code for rate, blind dials, no busy detect
	010	X2	CONNECT/appropriate code for rate, waits for dial tone, no busy detect
	011	X3	CONNECT/appropriate code for rate, blind dials, reports BUSY
	*100	X4	CONNECT/ appropriate code for rate, waits for dial tone, reports BUSY
7	*0	&P	Make/break ratio (US) 39/61
	1	&P1	Make/break ratio (UK) 33/67

** default*

Bit Mapped S23

Bit	Value	Command	Description
0	0	&T5	Remote commanded digital loopback disabled
	*1	&T4	Remote commanded digital loopback enabled
5-1	--	--	Reserved
7, 6	*00	&G	No guard tone
	01	&G1	550 Hz guard tone
	10	&G2	1800 Hz guard tone
	11	--	Not used

** default*

S24

Not used

DTR State Recognition Time S25

The S25 register specifies the amount of time (0-255) in 0.01 second (10 ms) increments that DTR must stay high or low in order to be recognized as such. The default value is 5 (0.05 second).

RTS/CTS Delay S26

The S26 register specifies the amount of time (0-255) in 0.01 second (10 ms) increments between the RTS signal and the CTS signal. The default value is 0.

Bit Mapped S27

Bit	Value	Command	Description
1, 0	*00	&M	Async
	01	&M1	Sync data / async dial
	10	&M2	Sync data / dial through DTR
	11	&M3	Sync data / manual dial
2	*0	&L	Dial up line
	1	&L1 and &L2	Leased line
3	--	--	Reserved
5, 4	*00	&X	Internal clock
	01	&X1	External clock
	10	&X2	Receive clock
	11	--	Not used
6	1		Enable async DTR dialer
	0		Disable async DTR dialer
7	--	--	Reserved

** default*

Lookback Timer S28

Amount of time in 1.0 minute increments that the modem will remain in dial backup mode before re-trying leased line mode. This is only used if automatic dial backup is enabled. A zero will disable automatic lookback to leased line mode. The default value is 15 minutes.

Bit	Value	Command	Description
7-0	0-255		Time in 1 minute increments (0 = disabled)

Bit Mapped S29

Bit	Value	Command	Description
0	*0 1	*NT	Enable AT command set Disable AT command set
1	*0 1	*RO *RO1	Options retained at disconnect Options restored at disconnect
2	*0 1	*FT *FT1	Disable V.32 fast train Enable V.32 fast train
6-3	--	--	Reserved
7	*0 1	*FB *FB1	DTE fallback disabled DTE fallback enabled

** default*

Bit Mapped S30

Bit	Value	Command	Description
0	--	--	Reserved
1	*0 1		V.25 ASCII V.25 EBCDIC
4-2	--	--	Reserved
5	*0 1		NRZ NRZI
7, 6	00 01 *10 11	 &M4 &M5 --	V.25 disabled V.25 Bisync V.25 SDLC Reserved

** default*

S31

Reserved

Bit Mapped S32

Bit	Value	Command	Description
0	0 1	&L1 &L2	2-wire (leased line only) 4-wire (leased line only)
1	0 *1	*LC1 *LC2	Line current disconnect = short Line current disconnect = long
2	0 *1	*LC *LC1 or *LC2	Line current disconnect = disable Line current disconnect = enable
3	*0 1	*DB *DB1	Dial backup = manual Dial backup = automatic
7-4	--	--	Reserved

** default*

S33

Reserved

Bit Mapped S34

Bit	Value	Command	Description
0	*0 1	*AN *AN1	Bilateral analog = disable Bilateral analog = enable
1	*0 1	*DG *DG1	Bilateral digital = disable Bilateral digital = enable
2	*0 1	*LA *LA1	DTE commanded LAL = disable DTE commanded LAL = enable
3	0 1	*RD *RD1	DTE commanded RDL = disable DTE commanded RDL = enable
7-4	--	--	Reserved

** default*

S35-38

Reserved

Bit Mapped
S39

Bit	Value	Command	Description
0-4	--	--	Reserved
5	*0 1		DTE rate is sent with CONNECT message DCE rate is sent with CONNECT message
6-7	--	--	Reserved

** default*

S40-51 Reserved

Bit Mapped
S52 Selects leased line transmit level from 0 to -15 dBm in 1 dB increments.

Bit	Value	Command	Description
3-0	*0 to 15	*TLn (n = 0-15)	Transmit level in dB (0 dB through -15 dB)
7-4	--	--	Reserved

** default*

801 V.32 Timeout
S53 Selects 801 (ACU) V.32 timeout.

Bit	Value	Command	Description
0	*0 1		801 V.32 timout long 80 V.32 timeout short
7-1	--	--	Reserved

** default*

Flow Control
S54 Selects flow control options.

Bit	Value	Command	Description
1,0	00 *01 10 11	\Q \Q1 \Q2 \Q3	Disable DTE flow control Enable DTE XON/XOFF flow control Enable DTE CTS flow control Enable bilateral CTS/RTS flow control
2	--	--	Reserved
3	*0 1	\G \G1	Disable modem port flow control Enable modem port XON/XOFF flow control
4	*0 1	\X \X1	No XON/XOFF characters to remote Pass XON/XOFF characters to remote
7-5	--	--	Reserved

** default*

S55, 56 Reserved

Number Code Application
S57

Bit	Value	Command	Description
0	*0 1	*RC *RC1	Standard number codes 15 - 4800 bps 18 - 9600 bps Alternate number codes 11 - 4800 bps 12 - 9600 bps
7-1	--		Reserved

** default*

MNP Inactivity Timer S58

Specifies the number of minutes the modem waits before terminating a call when no data is sent or received. 0 disables timer.

ATYTn load inactivity timer, n=0-255 minutes.

Bit	Value	Command	Description
7-0	*0 1-255	\T \Tn (n = 1-255)	Disable Timer value in minutes

** default*

MNP Break Control S59

Determines action taken when a break is encountered. Refer to the Break Control section in Chapter 5 for further explanation.

Bit	Value	Command	Description
2, 1, 0	000 001 010 011 100 *101	\K \K1 \K2 \K3 \K4 \K5	MNP break option 0 MNP break option 1 MNP break option 2 MNP break option 3 MNP break option 4 MNP break option 5
7-3	--	--	Reserved

** default*

Bit Mapped S60

Bit	Value	Command	Description
0	0 *1	%E %E1	Disable auto retrain Enable auto retrain
1	0 *1	%C %C1	Disable data compression Enable data compression
2	*0 1	\C \C1	Disable auto reliable data buffer Buffer data for 4 seconds or 200 characters
5, 4, 3	111 110 101 100 *001-000	\O \U \Y \Z	Originate a MNP link Accept a MNP link Switch to MNP from normal Switch to normal from MNP Normal mode selected from S70
6	0 *1	\R \R1	RI blinks for ring and remains on for duration of call RI blinks for ring and turns off when call is answered
7	*0 1	\V \V1	Disable protocol result codes Enable protocol result codes

** default*

DTE Speed S61

Indicates DTE rate. Works in conjunction with the DCE rate in S69.

This register is for reference only.

Bit	Value	Command	Description
2, 1, 0	001 010 011 100 --- *110 111 --	 -- --	0-300 1200 2400 4800 Not used 9600 19200 Not used
3	0 1		7 bit word length 8 bit word length
5,4	01 10 11		No parity Odd parity Even parity
7,6	--	--	Reserved

** default*

Disconnect Buffer Delay S62 Determines delay to allow buffers to empty before disconnect when disconnect conditions exist.

Bit	Value	Command	Description
7-0	*0 1-255	%D %Dn	Buffer disabled Disconnect buffer delay value (seconds)

** default*

Maximum MNP Block Size S63 Sets maximum transmit block size.

Bit	Value	Command	Description
7-0	63 127 191 *255	\A \A1 \A2 \A3	Maximum block size = 64 Maximum block size = 128 Maximum block size = 192 Maximum block size = 256

** default*

Auto-Reliable Fallback Character S64 Stores the selected ASCII value of the auto-reliable fallback character.

Bit	Value	Command	Description
6-0	*0 1-127	%A %An	Disable auto-reliable fallback character ASCII value 1-127
7	--	--	Reserved

S65-66 Reserved

Link Speed Status S67 Indicates the true data link speed. This register is for reference only.

Bit	Value	Command	Description
2, 1, 0	001 010 011 100 101		300 bps 1200 bps 2400 bps 4800 bps 9600 bps
7-3	--	--	Reserved

S68 Reserved

DCE Independent Speed S69 Selects DCE independent rate operation. When S69 is 0, DTE and DCE rates are equal and the maximum originate connect rate is determined by S61. When S69 is non-zero, the maximum originate connect rate is determined by S69.

Bit	Value	Command	Description
2, 1, 0	000 001 010 011 100 101 *110	%B %B1 %B2 %B3 %B4 %B5 %B6	Use rate indicated by S61 0-300 bps 1200 bps 2400 bps 4800 bps 9600 bps uncoded 9600 bps trellis
7-3	--	--	Reserved

** default*

Operating Mode S70

Bit	Value	Command	Description
1, 0	00 01 10 *11	\N \N1 \N2 \N3	Normal mode (no error control, data is buffered) Direct mode (no error control, no buffering) MNP mode (reliable only) Auto reliable mode (try MNP, fall back to normal)
7-2	--	--	Reserved

** default*

Operating Mode Status S71

Indicates level of MNP error controlling protocol. This register is for reference only.

Bit	Value	Command	Description
2, 1, 0	000 001 010 011 100 *101		No MNP Negotiating MNP MNP level 2 MNP level 3 MNP level 4 MNP level 5
7-3	--	--	Reserved

** default*

Bit Mapped S72

Bit	Value	Command	Description
0	0* 1	\J \J1	Disable slaved DTE/DCE (constant speed DTE on) Enable slaved DTE/DCE (constant speed DTE off)
1	0* 1		Link parity option disabled Link parity option enabled
2	0* 1		No link parity error Link parity error received (cleared on read)
3	0* 1	 &R2	CTS does not follow DCD CTS follows DCD
4	0* 1	 &R9	CTS does not equal RTS CTS equals RTS
6-5	--	--	Reserved
7	0* 1		Disable autocallback Enable autocallback

** default*

S73-77 Reserved

Autocallback Timer S78

Specifies the time in seconds that the modem waits for autocallback. Default is 30 seconds.

Bit	Value	Command	Description
7-0	0-255		Time in seconds to wait for autocallback

Break Length S79

Sets length of the break sent to the DTE when a break signal is received. Range from 1-255 in 20 ms increments. Default is 35 (700 ms).

Bit	Value	Command	Description
7-0	1-255	\B \Bn	Send break Set break length (n = 1-255)

S80-83 Reserved

Bit Mapped S84

Bit	Value	Command	Description
0	0* 1		Any key abort enabled Any key abort disabled
1	0* 1		Remote DCD goes low in RDL and remote configuration Remote DCD stays high in RDL and remote configuration
2	0* 1		Fallback to V.22 rates normally Reduced time to fallback to V.22 rates
3	0* 1		Answerback normally Reduces answerback time
4	0* 1		With DTR disconnects, 4 DTR transitions initiate autodial backup With DTR disconnects, 1 DTR transition initiates autodial backup
5	--	--	Reserved
6	0* 1		Allow switch hook capability while in leased line Disallow switch hook capability while in leased line
7	0* 1		Pin 25 of DTE used for test mode status Pin 25 of DTE used for in dial backup status

** default*

S85-90 Reserved