

V.3600 Manual

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Modem Initialization

For fax operation, most fax software packages are equipped with a fax initialization command string. Entering this command sets the active profile for fax operation. In some cases certain options should be modified for particular requirements. The fax software manual provides information about requirements.

Fax Defaults

Factory defaults, along with the initialization command, support fax operation. Some initialization commands include the default command &F and will reissue it for each fax operation. Some fax software packages do not include the default command, or only issue the default command when the fax software is first loaded. Subsequent fax operations may not reset the fax profile and, if a fax required option has been changed, fax operation will not work.

An example of a fax initialization command is

```
AT&F V E S0=0
```

This can be interpreted as:

AT&F	Reset the active profile to the factory default.
V	Set response messages to digit code.
E	Disable local echo (off).
S0=0	Disable autoanswer (off).

Fax Autoanswer

Some fax software takes control of autoanswer, disables autoanswer for the modem, and answers the phone as internally programmed. Other programs do not control autoanswer at all and require the modem to have autoanswer enabled. You must check the software manual for the particular requirements and refer to Chapter 4 for manual/autoanswer and TALK/DATA selection. Select the necessary options for fax operation.

Fax Associated Options

A number of options can be changed without any effect on fax operation. These include items like speaker volume and pause for carrier. Appendix E lists the AT commands. These commands can be incorporated by personal preference into the initialization command. Compare fax operation requirements with Appendix A and if necessary generate an initialization command string compatible with the software and the modem.

Stored Fax Profile

Another alternative is to develop a fax initialization command and store it in one of the user defined profiles. Fax initialization would include the command that recalls that profile for fax operation. Keep track of option changes between fax transmissions and if required reset the fax profile for the next fax transmission.

Class 1 Details

Operation as a fax modem complies with EIA-578; details of Class 1 operation and compatibility are found in that standard. There is no need to be familiar with these details since they are handled by the Class 1 software package, but this section briefly summarizes some of them.

As a Service Class 1 facsimile DCE, the V.3600 provides the basic services required to support Group 3 facsimile operation. Support from a Class 1 facsimile DTE is required to implement the CCITT T.30 recommendations for fax document transmission and the CCITT T.4 recommendations for encoding fax images. Using software control, the modem can:

- Connect calls
- Generate messages
- Detect waiting and silence
- Transmit and receive data
- Provide HDLC data framing, transparency, and error detection

The modem also filters data streams to and from the DTE in accordance with the Class 1 specification.

The Class 1 standard assumes a serial asynchronous DTE-DCE connection using EIA-232D (or CCITT V24) circuits. EIA-232D circuits AB (signal ground), BA (transmitted data), and BB (received data) are required for fax operation, while additional circuits are optional. Refer to Chapter 2 for hardware installation and EIA-232D data interface information.

The modem uses inband unidirectional DCI/DC3 (XON/XOFF) flow control to match the DTE-DCE data rate to the line signaling rate (hardware RTS/CTS is optional). Since 1200 bps is the minimum rate needed to support T.30 Phase C data transfer using V.29 9600 bps, a serial port data rate of at least 19,200 bps should be used with the modem. Since flow control is used, this rate should not be changed during fax operation. The modem detects the DTE-DCE data rate from the AT command prefix as described in Chapter 5.

Class 1 Commands

The commands in this section are normally issued by the fax software and not by the user. They are provided here for reference. While only the lower order 7 bits of each character are used for commands and parameters, T.30 Phase C data transmission or reception requires all 8 data bits. Therefore, a data format which uses 8 data bits should be used for fax mode.

Dial Command — D

The dial command D, described in Chapter 5, tells the modem to go off hook, dial, and begin call origination. For fax operation, set the modem for Service Class 1 operation before the dial command is issued; use the +FCLASS=1 command.

The dial modifiers, except R, can also be used in fax mode. Depending on the X option selected, the modem will return the BUSY and NO DIALTONE result codes as appropriate. If the modem is in the on-line command state when a dial command is issued (e.g., a connection has already been established), the modem returns an ERROR result code.

The NO CARRIER result code indicates that a connection could not be established (no carrier detected) within the number of seconds specified in status register S7, or the dial command has been aborted due to a character sent from the DTE.

AT Responses to the ATD Command

The function of this command is country-specific. The AT responses to the ATD command are as follows:

NUMBER LIST FULL

Call failure; the delayed number list cannot store any more numbers.

DELAYED NUMBER WAIT xx MINUTES

Call failure; the number is on the delayed list and the call is delayed xx minutes.

After dialing the specified number in fax mode, the modem generates 1100 Hz CNG tones in accordance with T.30 while trying to detect either CED (answer back tone) or the HDLC preamble of the first T.30 frame. The CNG tones cease after detecting either of these two signals. To allow proper interaction with manually answered fax stations, detection of CED is not required. After detecting 1650 Hz (i.e., the HDLC preamble of the first frame), the modem enters V.21 Channel 2 receive state with HDLC framing and returns a CONNECT result code. This is because dialing in fax mode (+FCLASS=1) implies an initial +FRH=3 command described in the "Fax Transmit and Receive Modes" section on page 9-7.

Answer Command — A

The A command instructs the modem to answer the call. For fax operation, set the modem for Service Class 1 operation before the A command is issued; use the +FCLASS=1 command.

If the modem is in the on-line command state when an answer command is issued (e.g., a connection is already established), the modem returns an ERROR result code. Otherwise, it answers the call and generates a 2100 Hz CED (answer back) tone in accordance with T.30. The modem then enters V.21 Channel 2 transmit state with HDLC framing and returns a CONNECT result code. This is because answering a call in fax mode (+FCLASS=1) implies an initial +FTH=3 command described in the "Fax Transmit and Receive Modes" section on page 9-7. To allow proper interaction with a manually originated fax call (in accordance with T.30), the modem does not require detection of CNG before generating CED or entering HDLC transmit mode.

If the DTE sends a character while executing the answer command and before CED is completed, the call is released and the modem will send the NO CARRIER result code.

On Hook — H

In fax mode, the H command instructs the modem to stop any transmission and terminate the call by going on hook.

Off Hook — H1

The H1 command instructs the modem to go off hook. In fax mode, this might be used when the user has used manual dialing to place a fax call. In this case, no CNG tones are generated and the initial +FRH=3 is not implied; it must be explicitly issued by the software.

Class 0 Operation — +FCLASS=0

Setting the Service Class to 0 with the +FCLASS=0 command sets the modem in data mode. This default setting is normally only changed by software if needed.

Class 1 Operation — +FCLASS=1

Setting the Service Class to 1 with the +FCLASS=1 command configures the modem as a Class 1 fax modem. This command is normally only issued by the fax software if needed. When set, the LCD displays FAX CLASS 1 MODE.

Service Class Indication — +FCLASS?

The current Service Class setting can be determined with the +FCLASS? command. A 0 response indicates the modem is configured for data mode while a 1 indicates it is set for fax mode. This information text is preceded and followed by <CR><LF> in addition to being followed by an appropriate result code response.

Service Class Capabilities — +FCLASS=?

The available Service Classes can be revealed by the +FCLASS=? command. The modem responds with the information text 0, 1 (preceded and followed by <CR><LF>), indicating that the modem supports both data communication and Class 1 fax operation.

Transmit Silence — +FTS=(Time)

The command +FTS=(Time) causes the modem to wait in silence for the specified amount of time and then send the OK result code to the DTE. The (Time) value is in 10 ms increments from 0 to 2.55 seconds. The modem aborts the command and sends an OK result code if the DTE sends an additional character, which is discarded, during the command execution. This command returns an ERROR result code if issued while the modem is on hook.

Receive Silence — +FRS=(Time)

The command +FRS= causes the modem to listen for silence and report back an OK result code when the line has been silent for the specified amount of time. The (Time) value is in 10 ms increments from 0 to 2.55 seconds.

The modem aborts the command and sends an OK result code if the DTE sends an additional character, which is discarded, during the command execution. This command returns an ERROR result code if issued while the modem is on hook.

Fax Transmit and Receive Modes

The following commands instruct the modem to transmit or receive facsimile data with the designated modulation. Flow control, data buffering, and data filtering are used as appropriate, in accordance with the Class 1 specification. Each of these commands must be the last command on the command line.

Command	Operation
+FTM=(MOD)	Transmit data with (MOD) carrier
+FRM=(MOD)	Receive data with (MOD) carrier
+PTH=(MOD)	Transmit HDLC data with (MOD) carrier
+FRH=(MOD)	Receive HDLC data with (MOD) carrier

The modem accepts one of the values listed in Table 9-1.

Table 9-1. Values for Fax Modulation

Value	Modulation	Speed
3	V.21 channel 2	300 bps
<i>*with short train</i>		

Table 9-1. Values for Fax Modulation (Continued)

Value	Modulation	Speed
24	V.27 ter	2400 bps
48	V.27 ter	4800 bps
72	V.29	7200 bps
73	V.17	7200 bps
74	V.17	7200 bps *
96	V.29	9600 bps
97	V.17	9600 bps
98	V.17	9600 bps *
121	V.17	12000 bps
122	V.17	12000 bps *
145	V.17	14400 bps
146	V.17	14400 bps*

*with short train

The V.3600 returns an ERROR result code if any of the above commands are issued while the modem is on hook.

Facsimile Transmit — +FTM=(Mod)

+FTM=(Mod) causes the modem to transmit data using the modulation and speed selected with the (Mod) parameter. For V.27 ter, V.29, and V.17 modulations, the modem first transmits the required training sequence (with echo protector tone). After it is appropriately configured for transmission, the modem returns the CONNECT result code and transmits constant 1 bits until data is received from the DTE. For additional information, consult the Class 1 specification.

Facsimile Receive — +FRM=(Mod)

+FRM=(Mod) causes the modem to receive data using the modulation and speed selected with the (Mod) parameter. If the selected carrier is detected, a CONNECT result code is sent to the DTE; if a different signal is detected, the modem sends a FCERROR (CONNECT ERROR) result code and returns to command mode. This command is aborted if the DTE sends any character to the modem other than DC1 or DC3 during this mode. For additional information, consult the Class 1 specification.

HDLC Transmit — +FTH=(Mod)

+FTH=(Mod) causes the modem to transmit HDLC framed data using the modulation and speed selected with the (Mod) parameter. For V.27 ter, V.29, and V.17 modulations, the modem will first transmit the required training sequence (with echo protector tone). Configured for HDLC transmission, the modem transmits HDLC flags and returns the CONNECT result code. HDLC flags will continue to be sent until the first byte of data is received from the DTE or until 5 seconds elapses with no data. For more information, refer to the Class 1 specification.

HDLC Receive — +FRH=(Mod)

The command +FRH=(Mod) causes the modem to receive HDLC framed data using the modulation and speed selected with the (Mod) parameter. If the selected carrier is detected, a CONNECT result code is sent to the DTE; if a different signal is detected, the modem sends a FCERROR (CONNECT ERROR) result code and returns to command mode. This command will be aborted if the DTE sends any character to the modem other than DC1 or DC3 during this mode. For additional information, consult the Class 1 specification.

Test Supported Range of Values — +FTx=?, +FRx=?

The supported range of values for any of the fax transmit or receive commands can be determined with the +FTx=? or +FRx=? command where x is M, H, or S. The normal transmit and receive capabilities are interrogated with +FTM=? and +FRM=?, while the HDLC transmit and receive capabilities are interrogated with +FTH=? and +FRH=?. Since the modem can send and receive normal data or HDLC data at all valid speeds up to 14,400 bps, the modem returns the information text 3, 24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146 for any of these four commands if x is M or H. For the commands +FTS=? or +FRS=? the modem returns the information text 0-255, indicating an allowed time interval from 0 to 2.55 seconds. The appropriate information text is always preceded and followed by <CR><LF> and followed by an appropriate result code response.

Class 1 Result Code — +FCERROR

If the modem detects any carrier or tone that differs from that specified in a +FRM or +FRH command, it sends the +FCERROR result code and returns to command state, allowing the DTE to attempt a recovery. The numeric form of this response is +F4.

Fax Autoanswer — +FAA=

The modem can be set up to automatically detect if a fax or data call is being answered. The command +FAA=1 enables this function and +FAA=0 disables it. This feature requires special support by the fax software package.

Command	Description
+FAA=0	Disable fax autoanswer
+FAA=1	Enable fax autoanswer

DTE Autobaud for Fax Autoanswer — *FR

Set the fax autoanswer feature to autobaud at 19.2 kbps or greater, if desired.

Command	Description
*FR	Forced to > = 19,200 bps
*FR1	Forced to = 19,200 bps
*FR?	Display this option's current status

Binary File Transfer

Some Class 1 software packages may provide an option for transferring files between computers with fax modems, using a Binary File Transfer (BFT) standard. Although the received file is not a fax image, transmitting the file is similar to sending a fax. Since the modem allows T.30 error correction mode (with HDLC framing up to 9600 bps), fax mode can also be used for BFT if supported by the Class 1 software package. The Binary File Transfer is an option in the fax software package, not a separate mode of operation.

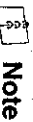
Chapter 10 Status Registers

S-Registers

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.

Information stored in 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 S-registers by the AT command set, but this action is transparent to the user. The command indicates which memory bit(s) to alter to select an option or to perform a function. The S-register values comprise the configuration profile.

Generally, the user should not directly alter S-register values. However, the user has the option of entering S-registers via AT commands and directly altering the register value. This is called "writing" to an S-register.



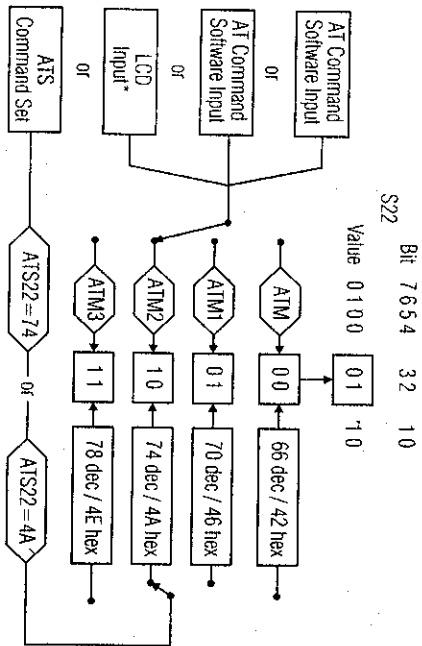
Note

Writing to an S-register is not a preferred method and should only be used by programmers who need to manipulate S-registers so they can interact with a software program under development or a similar activity.

Some S-registers cannot be altered by the AT command series. These are called "read only" S-registers. In addition to the definitions in this chapter, Appendix E contains a quick list of S-registers and indicates if they are read only or read and write.

Figure 10-1 shows how the inputs to an S-register (S22 in this example) 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.

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 10-2 shows the difference between decimal calculation and hexadecimal calculation.



* Liquid Crystal Display models only

ATM Speaker off
 ATM1 Speaker on until carrier detect
 ATM2 Speaker always on
 ATM3 Speaker off while unit is dialing

Figure 10-1. Changing S-Register Values

Bit	7	6	5	4	3	2	1	0
Decimal Value	128	64	32	16	8	4	2	1
S22 Value	0	1	0	0	0	1	1	0
Decimal Total		64				4 + 2		= 70 dec
Hexidecimal Value	8	4	2	1	8	4	2	1
S22 Value	0	1	0	0	0	1	1	0
Hexidecimal Total		4				4 + 2		= 46 hex

Figure 10-2. Calculating S-Register Values

S-Register Operation — Sn?, Sn?v

Enter ATSn? to read a register value, where n=register number for a decimal value or ATSn?v for a hexadecimal value.

For example, to determine the current backspace character enter

ATSS5?

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

Changing Register Values — Sn=v, Sn=^v

To change an option using ATS commands requires the operator to precalculate the revised decimal (or hexadecimal) total.

Note

Because of the chance of miscalculating the bit sum, causing unplanned option changes, writing to an S-register is discouraged. For operators who prefer this method of option selection a much simplified command that eliminates the decimal calculation is explained in the "Individual Bit Command — Sn.#=v" section on page 10-4.

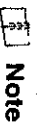
To change a register value, enter

ATSn=v

where n = register number and v = decimal value, or enter

ATSn=^v

where ^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 . # =v

Some 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, the 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 . # =v

where n = register number, # = bit position 0 through 7, and v = bit value 1 or 0.

For example, S-register 27, bit 2, selects between dial-up or leased line operation:

AT command method:

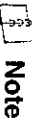
AT&L selects dial-up operation (sets S27 bit 2 to 0).

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 way of selecting options can be used on all S-registers except read only registers.

Autoanswer — S0

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

Set the register to any value other than zero (1-255) 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

This register contains the ring count for a current incoming call and should not be changed. If you are developing communications software, the program can read the register to determine the ring total.

Escape Character — S2

The standard escape character is a + sign (ASCII value of 43). To change the character, set S2 to the desired ASCII value (0-127). To disable the escape command, set S2 to any value greater than 127 (128-255).

End-of-Line Character — S3

The standard end-of-line 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

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

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

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 Ringback and Carrier Detection /
Wait for 2nd Dial Tone — S7**

If ringback is not detected in the number of seconds in S7 (1-255), the modem disconnects and sends the NO CARRIER message or code. If ringback is detected, the modem begins to look for a carrier.

If carrier is not detected within the number of seconds in S7, the modem hangs up and sends the NO CARRIER message or code.

Values between 1 and 255 may be used. The default value is 30 (seconds).

Pause Interval for Comma — S8

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

S9 contains the amount of time (0-255) in 0.1 second increments that the carrier must be present to be recognized. The default value is 6 (0.6 second). This timer can be extended to lessen the likelihood of false detection of carrier.

Lost Carrier Detect Time — S10

S10 contains the amount of time (0-255) in 0.1 second increments that the carrier must be absent to be recognized as a loss of carrier. The default value is 14 (1.4 seconds).

DTMF Tone Duration — S11

S11 determines the length of DTMF tones. 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 — S12

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, 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 15 and 255 may be used for S12.

S13

Not used

Bit Mapped — S14

Note
In the tables for bit mapped S-registers, **bold text** indicates bit value defaults.

Note
When bit-mapped S-registers have parallel AT commands, the commands are listed in the register tables as a cross reference. If a command does not exist for the option, the column is left blank.

Bit	Value	Command	Description
0	--	--	Reserved
1	0	E	Local character echo off
1	1	E1	Local character echo on
2	0	Q	Response messages on
2	1	Q1	Response messages off
3	0	V	Response messages as digit codes
3	1	V1	Response messages as words
4	0		Ignore
4	1	Q2	Response messages in originate mode only
5	0	T	Tone dial
5	1	P	Pulse dial
6	0	H2	Allow cleardown
6	1	H3	Disallow cleardown
7	0	*OR1	Forced answer
7	1	*OR	Normal originate

S15

Reserved

System Tests — S16

This register contains the status of system test options.

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

S17

Not used

Test Timeout — S18

Test timeout is the amount of time, in 1 second increments, that a diagnostic test will run and is determined by the value assigned to S18 (0-255). A value of 0 disables the timer allowing a test to run indefinitely. The default value is 0.

S19, 20

Not used

Bit Mapped — S21

Bit	Value	Command	Description
6,	00	&S	DSR forced on
0,	10	&S1	DSR on when online
	01	&S2	DSR off 5 seconds after disconnect
	11	&S3	DSR follows off hook (OH)
5,	00	&C	DCD always on
1	10	&C1	DCD on while carrier present
	01	&C2	DCD on except for 5 seconds after disconnect
	11	&C3	DCD follows RTS on remote modem; not valid in reliable mode
2	0	&R	CTS follows RTS by S26 delay
	1	&R1	CTS always on
4,	00	&D	Modem ignores DTR
3	01	&D1	Modem assumes command mode when DTR turns off
	10	&D2	Modem hangs up when DTR turns off
	11	&D3	Modem resets when DTR turns off
7	0	Y	Long space disconnect disabled
	1	Y1	Long space disconnect enabled

Bit Mapped — S22

Bit	Value	Command	Description
1,	00	L	Speaker volume low
0	01	L1	Speaker volume low
	10	L2	Speaker volume low
	11	L3	Speaker volume high
3,	00	M	Speaker off
2	01	M1	Speaker on until carrier detect
	10	M2	Speaker always on
	11	M3	Speaker off when modem is dialing
6-4	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

Bit	Value	Command	Description
7	0	&P	Make / break ratio (US) 39/61
	1	&P1	Make / break ratio (UK) 33/67

Bit Mapped — S23

Bit	Value	Command	Description
0	0	&T5	Remote digital loop request denied
	1	&T4	Remote digital loop request granted
5-1	---	---	Reserved
7,	00	&G	No guard tones
6	01	&G1	550 Hz guard tone
	10	&G2	1800 Hz guard tone
	11	--	Not used

S24

Not used

DTR State Recognition — 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,	00	&M	Async
0	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,	00	&X	Internal clock
4	01	&X1	External clock
	10	&X2	Receive clock
	11	--	Not used
6	1	--	Enable async DTR dialer
	0	--	Disable async DTR dialer
7	--	--	Reserved

Lookback Timer — S28

The S28 register specifies the amount of time in 1.0 minute increments that the modem will remain in dial backup mode before retrying leased line mode. A zero will disable automatic lookback to leased line. The default value is 15 minutes.

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

Bit Mapped — S29

Bit	Value	Command	Description
0	0	*NPT1	Enable AT command set
	1	*NPT	Disable AT command set
1	0	*RO	Options retained at disconnect
	1	*RO1	Options restored at disconnect
2	0	*FTP	Disable V.32 fast train
	1	*FT1	Enable V.32 fast train

Bit	Value	Command	Description
6,	--	--	Reserved
3			
7	0	*FB	DTE fallback disabled
	1	*FB1	DTE fallback enabled

Bit Mapped — S30

Bit	Value	Command	Description
0	--	--	Reserved
1	0	--	V25 ASCII
	1	--	V25 EBCDIC
2	0	--	V25 VAL enabled
	1	--	V25 VAL disabled
4,	--	--	Reserved
3			
5	0	--	NRZ V25
	1	--	NRZI V25
7,	00	&M	V25 disabled
6	01	&M4	V25 bisync enabled
	10	&M5	V25 SDLC enabled
	11	&M6	V25 Async enabled

S31

Reserved

Bit Mapped — S32

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

S33

Reserved

Bit Mapped — S34

Bit	Value	Command	Description
0	--	--	Reserved
1	0	*DG	Bilateral digital = disable
	1	*LX1	Bilateral digital = enable
2	0	*LA	DTE commanded LAL = disable
	1	*LA1	DTE commanded LAL = enable
3	0	*RD	DTE commanded RDL = disable
	1	*RD1	DTE commanded RDL = enable
7-4	--	--	Reserved

DTR / Dial Backup Number to Dial — S35

Select the number to automatically dial (1-9 of stored numbers) for the modem to dial in DTR dialing or autodial backup.

S36-S40

Reserved

Remote Configuration Escape Character — S41

Select the remote configuration escape character (1-255). The default is ASCII 61 (=).

Remote Configuration Guard Time — S42

Select the remote configuration guard time (0-255) in 20 ms intervals. The default is 50 (1 sec).

S43

Reserved

XON Character from DTE — S44

Select the XON character (0-127) to be sent from the DTE. The default value is ASCII 17.

XOFF Character from DTE — S45

Select the XOFF character (0-127) to be sent from the DTE. The default value is ASCII 19.

S46-48

Reserved

XON Character to DTE — S49

Select the XON character (0-127) to be sent to the DTE. The default value is ASCII 17.

XOFF Character to DTE — S50

Select the XOFF character (0-127) to be sent to the DTE. The default value is ASCII 19.

Dial Line Transmit Level — S51

The S51 register selects dial line transmit level from -9 to -30 dBm in 1 dBm increments. The default value is 10.

Bit	Value	Command	Description
4-0	0 to 30	*TDn (n=9 to 30)	Transmit level in dBm (-9 through -30 dBm)
7-5	--	--	Reserved

Leased Line Transmit Level — S52

The S52 register selects leased line transmit level from 0 to -30 dBm in 1 dBm increments. The default value is 0.

Bit	Value	Command	Description
4-0	0 to 30	*TLn (n=0-30)	Transmit level in dBm (0 through -30 dBm).
7-5	--	--	Reserved

Automatic Rate Adaption Threshold — S53

Bit	Value	Command	Description
0	0	--	Disable rate renegotiation above initial connect
	1		Enable rate renegotiation above initial connect
1	--	--	Reserved
3,	00	%R	Automatic rate adaption threshold disabled
2	01	%R1	Low BER
	10	%R2	Medium BER
	11	%R3	High BER
4	--	--	Reserved
5	0		Protocol negotiation status disabled
	1		Protocol negotiation status enabled
6	--	--	Reserved
7	0	*DR	Disable distinctive ring detection
	1	*DR=1	Enable distinctive ring detection

Flow Control — S54

The S54 register selects the flow control options.

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

6,	00	\Q4	Disable flow control from DCE
5	01	\Q5	Enable XON/XOFF flow control
	10	\Q6	Enable CTS flow control to the DTE
	11	\Q7	Enable CTS flow control to the DTE
7	--	--	Reserved

S55

Reserved

V.42 Compression Control — S56

Bit	Value	Command	Description
1,	00	%C	Compression disabled
0	01	%C2	Compression enabled on transmit data only
	10	%C3	Compression enabled on receive data only
	11	%C1	Compression enabled on transmit and receive data
7-2	--	--	Reserved

Bit Mapped — S57

Bit	Value	Command	Description
0	0	*RC	Standard number codes
			— 15 - 4800 bps
	1	*RC1	Alternate number codes
			— 18 - 9600 bps
			— 11 - 4800 bps
			— 12 - 9600 bps
4-1	--	--	Reserved
5	0		Busy out disabled
	1		Busy out enabled during LAL test mode (for private PBX use only)
7,	--	--	Reserved
6			

Inactivity Timer — S58

The S58 register specifies the number of minutes the modem waits before terminating a call when no data is sent or received. This register is active when in error control mode. 0 disables timer. Issue the \Tn command to load inactivity timer, n=0-255 minutes.

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

Break Control — S59

The S59 register determines the action taken when a break is encountered. Refer to the "Break Control — \Kn" section on page 6-9 for further information.

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

Bit Mapped — S60

Bit	Value	Command	Description
0	0	%E	Disable auto retrain
	1	%E1	Enable auto retrain
1	0		MNP compression disabled
	1		MNP compression enabled
2	0	\C	Disable auto-reliable data buffer
	1	\C1	Buffer data for 4 seconds or 200 characters
5-	--	--	Reserved
3			

6	0	\R	RI blinks for ring and remains on for duration of call
	1	\R1	RI blinks for ring and turns off when call is answered
7	0	\V	Disable protocol response messages
	1	\V1	Enable protocol response messages

DTE Options — S61

The S61 register indicates the character size and parity. This register is for reference only.

Bit	Value	Command	Description
2-0	--	--	Reserved
3	0	--	7 bit word length
	1		8 bit word length
5,	00	--	Mark parity
	01		No parity
	10		Odd parity
	11		Even parity
7,	--	--	Reserved
6			

Disconnect Buffer Delay — S62

The S62 register determines the delay before disconnect, to allow buffers to empty, when disconnect conditions exist.

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

Maximum Transmit Block Size — S63

The S63 register sets the maximum transmit block size.

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

Auto-Reliable Fallback Character — S64

The S64 register stores the selected ASCII value of the auto-reliable fallback character.

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

S65-66 Reserved

Link Speed Status — S67

The S67 register indicates the true data link (DCE) speed. This register is for reference only.

Bit	Value	Command	Description
4-0	00000	--	N/A
	00001		300 bps
	00010		Reserved
	00011		1200 bps
	00100		2400 bps
	00101		4800 bps
	00110		7200 bps
	00111		9600 bps uncoded
	01000		9600 bps trellis
	01001		12000 bps
	01010		14400 bps
	01011		16800 bps
	01100		19200 bps
	01101		21600 bps
	01110		24000 bps
	01111		26400 bps
	10000		28800 bps
	10001		31200 bps
	10010		33600 bps
7-5	--	--	Reserved

S68 Reserved

DCE Independent Speed — S69

The S69 register selects the DCE independent rate operation. When S69 is 0, DTE and DCE rates are equal and the maximum originate connect rate up to 14,400 bps is determined by S80. When S69 is non-zero, the maximum originate connect rate is determined by S69.

Bit	Value	Command	Description
4-0	00000	%B	Use rate indicated by S80
	00001	%B1	300 bps
	00011	%B2	1200 bps
	00100	%B3	2400 bps
	00101	%B4	4800 bps
	00111	%B5	9600 bps uncoded
	01000	%B6	9600 bps trellis
	00110	%B7	7200 bps
	01001	%B8	12,000 bps
	01010	%B9	14,400 bps
	00010	%B10	Reserved
	01011	%B11	16,800 bps
	01100	%B12	19,200 bps
	01101	%B13	21,600 bps
	01110	%B14	24,000 bps
	01111	%B15	26,400 bps
	10000	%B16	28,800 bps
	10001	%B17	31,200 bps
	10010	%B18	33,600 bps
7-5	--	--	Reserved

Operating Mode — S70

The S70 register determines the protocol operating mode and action taken on an MNP link attempt failure. LAPM is assigned highest priority.

Example: With \N7 selected the modem tries an LAPM connection first; if unsuccessful the modem tries an MNP connection; if also unsuccessful, the modem connects in normal mode. Modes allowing protocol fallback are referred to as auto-reliable.

Bit	Value	Command	Description
2-0	000	\N	Normal
	001	\N1	Direct
	010	\N2	MNP only (reliable)
	011	\N3	MNP or normal (auto-reliable)
	100	\N4	LAPM only (reliable)
	101	\N5	LAPM or normal (auto-reliable)
	110	\N6	LAPM or MNP only (auto-reliable)
	111	\N7	LAPM or MNP or native (auto-reliable)
3	0	\M	Disable V.42 fast detect
	1	\M1	Enable V.42 fast detect
7-4	--	--	Reserved

Operating Mode Status — S71

The S71 register indicates the level of error controlling protocol. This register is for reference only.

Bit	Value	Command	Description
2-0	000	--	Protocol not active
	001	--	Protocol negotiation in progress
	010	--	MNP level 2 active
	011	--	MNP level 3 active
	100	--	MNP level 4 active
	101	--	MNP level 5 active
	110	--	LAPM active
	111	--	LAPM with data compression active
7-3	--	--	Reserved

Bit Mapped — S72

Bit	Value	Command	Description
0	0	\J	Disable slaved DTE/DCE (constant speed DTE on)
	1	\J1	Disable slaved DTE/DCE (constant speed DTE on)
2,	--	--	Reserved
	1	--	Reserved
3	0	&R9	CTS does not follow DCD
	1	&R2	CTS follows DCD
6-4	--	--	Reserved
	0	--	Disable autocallback
7	0	--	Enable autocallback
	1	--	Enable autocallback

Password Timeout — S73

S73 sets the length of time the remote user has to enter a password before the secure V.3600 drops the call. The default is 0.

Bit	Value	Command	Description
7-0	0-255	--	Time in seconds (0 = disable)

Callback Delay — S74

The length of time the secure modem waits to place the callback call after the remote user correctly enters a password and the call is dropped. The default is 15 seconds.

Bit	Value	Command	Description
7-0	0-255	--	Time in seconds (0 = disable)

Callback Retry — S75

The number of times the modem will attempt to place the callback call to a remote user if the first attempt is unsuccessful. The default is 0.

Bit	Value	Command	Description
7-0	0-255	--	Number of attempts to place the call

Callback Retry Delay — S76

The length of time that the modem waits, after an unsuccessful attempt to connect to the remote unit at the programmed callback number, before trying to place the call again. The default is 15 seconds.

Bit	Value	Command	Description
7-0	0-255	--	Time in seconds (0 = disable)

Lockout Threshold — S77

Set the number of incorrect remote user password attempts that can be made before the call is dropped. The default is 0. When remote configuration is active, the lockout occurs after seven attempts.

Bit	Value	Command	Description
7-0	0-255	--	Number of incorrect password attempts (0 = disable)

Autocallback Timer — S78

The S78 register specifies the time in seconds that the modem waits before initiating autocallback. The default is 30 seconds.

Bit	Value	Command	Description
7-0	0-255	--	Time in seconds before autocallback

Break Length — S79

The S79 register sets the length of the break sent to the DTE when a break signal is received. The range is from 1-255 in 20 ms increments. The default is 35 (700 ms).

Bit	Value	Command	Description
7-0	0-255	lB lBn	Send break Set break length (n=1-255)

Serial Port or DTE Speed — S80

The S80 register indicates the serial port speed.

Bit	Value	Command	Description
4-0	00001 00010 00011 00100 00101 00110 00111 01000 01001 01010 01011 01100 01101 01110 01111 10000 10001 10010 10011 10100	--	300 bps 600 bps 1200 bps 2400 bps 4800 bps 7200 bps 9600 bps 12,000 bps 14,400 bps 16,800 bps 19,200 bps 21,600 bps 24,000 bps 26,400 bps 28,800 bps 31,200 bps 33,600 bps 38,400 bps 57,600 bps 11,5200 bps

Minimum DCE Speed — S81

Bit	Value	Command	Description
4-0	00000	%L	Disabled
	00001	%L1	Disabled
	00011	%L2	1200 bps
	00100	%L3	2400 bps
	00101	%L4	4800 bps
	00111	%L5	9600 bps uncoded
	01000	%L6	9600 bps trellis
	00110	%L7	7200 bps
	01001	%L8	12,000 bps
	01010	%L9	14,400 bps
	00010	%L10	600 bps
	01011	%L11	16,800 bps
	01100	%L12	19,200 bps
	01101	%L13	21,600 bps
	01110	%L14	24,000 bps
	01111	%L15	26,400 bps
	10000	%L16	28,800 bps
	10001	%L17	31,200 bps
	10010	%L18	33,600 bps
7-3	--	--	Reserved

Negotiation Status — S82

Bit	Value	Command	Description
1-0	--	--	Reserved
3-2	00	W	Disable negotiation status
	01	W1	Enable negotiation status
	10	W2	No negotiation status; indicates DCE link rates
7-4	--	--	Reserved

S83

Reserved

Bit Mapped — S84

Bit	Value	Command	Description
0	0	--	Enable any key abort
	1	--	Disable any key abort
7-1	--	--	Reserved

S85-S87

Reserved

Modulation Type S88

Bit	Value	Command	Description
3-0	0000	--	Auto mode
	0001	--	V21
	0010	--	B103
	0011	--	Reserved
	0100	--	B212A
	0101	--	V22 bis
	0110	--	V27 (lease line only)
	0111	--	Reserved
	1000	--	V29 (lease line only)
	1001	--	Reserved
	1010	--	V33 (lease line only)
	1011	--	V32 bis
	1100	--	V34
7-4	--	--	Reserved

S89-S90

Reserved

Current Modulation S91

The S91 register is for reference only.

Bit	Value	Command	Description
3-0	0000	--	Auto mode
	0001	--	V21
	0010	--	B103
	0011	--	Reserved
	0100	--	B212A
	0101	--	V22 bis
	0110	--	V27 (lease line only)
	0111	--	Reserved
	1000	--	V29 (lease line only)
	1001	--	Reserved
	1010	--	V33 (lease line only)
	1011	--	V32 bis
	1100	--	V34
7-4	--	--	Reserved

S92 - S94
Reserved

V.34 Settings — S95

Bit	Value	Command	Description
0	0	--	Disable V.8 for non-V.34 answer
	1	--	Enable V.8 for non-V.34 answer
3-1	--	--	Reserved
4	0	--	Disable non-linear encoding
	1	--	Enable non-linear encoding
5	0	--	Disable pre-emphasis
	1	--	Enable pre-emphasis
6	0	--	Disable constellation shaping
	1	--	Enable constellation shaping
7	0	--	Preceding disabled
	1	--	Preceding enabled

V.34 Asymmetric Settings — S96

Bit	Value	Command	Description
4-0	--	--	Reserved
5	0	--	Disable asymmetric bit rates
	1	--	Enable asymmetric bit rates
6	--	--	Reserved
7	0	--	Disable TX power control
	1	--	Enable TX power control

Bit Mapped — S97

Bit	Value	Command	Description
1-0	00	*TH	V.34 rate threshold low (10^{-6} BER)
	01	*TH1	Medium V.34 threshold (10^{-4} BER)
	10	*TH2	High V.34 threshold (10^{-2} BER)
7-2	--	--	Reserved

S98-S100
Reserved

Chapter 11

V.25 bis Autodialer

V.25 bis is an option that allows dialing functions to be controlled using synchronous data.

Select V.25 bis through the appropriate &M command in the AT command set (refer to the "Asynchronous / Synchronous Mode Selection — &M" section on page 5-25).

If using the LCD,

- 1) Scroll through the menu to Main Menu 5, MODIFY CONFIGURATION.
- 2) Advance to and enter the DTE PARAMETERS submenu.
- 3) Select SYNC DATA.
- 4) Advance to DIAL METHOD.
- 5) Select one of V.25 BISYNC DIALER, V.25 SDLC DIALER, or V.25 ASYNC DIALER, and then select either ASCII or EBCDIC character format.



Note

The modem must be configured as V.25 SDLC ASCII NRZ for use with an AS400 IBM computer.