V.3400
Manual

For Sales or Service Contact:

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$n=pw

where *n* is the user number and *pw* is the users password.

If the password entry is incorrect, the password entry field will be cleared and the remote user will be allowed further entries until the number of invalid attempts matches the lockout threshold stored in S77. At this point the secure V.3400 drops the call.

If the password entry is correct the secure modem sends the PASS-WORD ACCEPTED message to the remote site. Depending on the assigned security level, the user is given

- immediate access to the DTE connected to the secure modem,
- a callback sequence will commence, or
- a callback with password reentry.

When the call is terminated from either end the secure V.3400 automatically resets itself to the secure mode for the next remote or local user.

While a remote caller is initiating a call to the secure V.3400, all status messages and control leads which would notify the local DTE of the incoming call are suppressed. The secure V.3400 uses the value stored in S0 to determine the number of rings on which to autoanswer. If S0 is set to 0 incoming calls will not be answered.

If a local user is logged on during an incoming call, a RING message is displayed but the call will not be answered until the local user logs off, issues an A command, or presses the TALK/DATA button.

If the local user logs off, the call will be answered and the remote user must follow the normal password procedure. If the local user enters A or presses TALK/DATA the call to the remote user connects normally.

Chapter 9
Fax Operation

GENERAL

The V.3400 can send and receive fax documents at speeds up to 14400 bps when used with the appropriate software. As a fax modem, the modem conforms to EIA-578 which defines a standard interface between the DTE (a PC with fax software) and the DCE as a fax modem.

When used with a Class 1 fax software package, V.3400 is CCITT Group 3 compatible and can send and receive documents at 2400, 4800, 7200, 9600, 12000, or 14400 bps with any Group 3 fax machine or PC with a fax modem.

Service Class selection configures the modem for Class 0 data mode or Class 1 fax mode. The LCD display indicates when fax mode is enabled. The V.3400 default configuration is for data mode; Service Class is normally only changed by the software as necessary.

Previous chapters in this manual contain information about the modem that should be understood prior to fax operation. Those chapters should be read before this chapter.

Users should understand the fax software manual before attempting fax communications.

FAX OPERATION

The user's manual for the Class 1 fax software package should provide most information necessary to configure the software and send and receive faxes.

The information in Chapter 2 of this manual should be considered as well, and also the next section of this chapter provides important infor-mation for proper fax communications.

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. Users must be aware that 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 by the user 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. The user 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 and indicates how they may affect fax operation. These commands can be incorporated by personal preference into the initialization command. The user should 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. The user must 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 V3400 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 V.24) 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 DC1/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 T30 Phase C data transfer using V.29 9600 bps, a serial port data rate of at least 19200 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, 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 modifier, 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 online 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.

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 later in this section.

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 online command state when an answer command is issued (e.g., a connection is already established), 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 later in this section. In accordance with T.30, to allow proper interaction with a manually originated fax call, 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	Description
+FTM=(MOD)	Transmit data with (MOD) carrier
+FRM=(MOD)	Receive data with (MOD) carrier
+FTH=(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. Modulation Values

Value	Modulation	Speed
3	V.21 channel 2	300 bps
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

Table 9-1. Modulation Values (Continued)

Value	Modulation	Speed
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.3400 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 additional information, refer 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 14400 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 Auto Answer +FAA=

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

Command	Description
+FAA=0	Disable fax auto answer
+FAA=1	Enable fax auto answer

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.

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 entering S-registers via ATS commands and directly altering the register value. 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 so they can interact with a software program under development or some other similar action.

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

Figure 10-1 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.

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 illustrates the difference between decimal calculation and hexadecimal calculation.

```
AT Command
Software Input
     or
AT Command
Software Input              S22
     or                     Bit  7 6 5 4  3 2  1 0
LCD                         Value 0 1 0 0  0 1  1 0
Input*
     or
ATS
Command Sel

ATM  →  0 0  →  66 dec / 42 hex
ATM1 →  0 1  →  70 dec / 46 hex
ATM2 →  1 0  →  74 dec / 4A hex
ATM3 →  1 1  →  78 dec / 4E hex

ATS22=74  ─ or ─  ATS22=4A
```
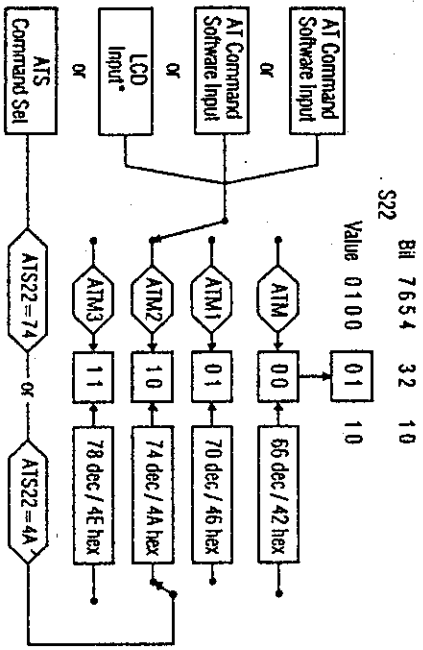
ATM   Speaker off
ATM1 Speaker on until carrier detect
ATM2 Speaker always on
ATM3 Speaker off while unit is dialing

* Liquid Crystal Display models only

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

	8	4	2	1		8	4	2	1	
Hexidecimal Value	8	4	2	1		8	4	2	1	
S22 Value	0	1	0	0	and	0	1	1	0	
Hexidecimal Total		4			and		4+ 2			=46 hex

Figure 10-2 Calculating S-Register Values

S-REGISTER OPERATION   Sn?, Sn?^

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

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. 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* section.

Enter ATSn=v to change a register value, where n = register number and v = decimal value; or 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 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&L 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 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 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 (0-255).

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

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 no ringback is 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 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 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 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 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

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 15 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
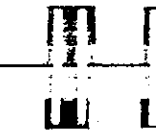
Bit Mapped   S14

Bit	Value	Command	Description
0	---	---	Reserved
1	0	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	Q2	Ignore *
4	1		Response messages in originate mode only
5	0	T	Tone dial *
5	1	P	Pulse dial
6	0	H2	Normal hang up *
6	1	--	Not used
7	0	*OR1	Forced answer
7	1	*OR	Normal originate *

* default

☞ **Note**

Registers that contain more than one option are called "bit mapped" registers.

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

The amount of time, in 1 second increments, that a diagnostic test will run 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
6,0	00	&S	DSR forced on *
	10	&S1	DSR on when online
	01	&S2	DSR off 5 seconds after disconnect
	11	&S3	DSR follows off hook (OH)
5,1	00	&C	DCD always on *
	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 *
4,3	00	&D	Modem ignores DTR *
	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 *

* 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
6-4	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 digital loop request denied
	1	&T4	Remote digital loop request granted *
5-1	---	---	Reserved
7,6	00	&G	No guard tones *
	01	&G1	550 Hz guard tone
	10	&G2	1800 Hz guard tone
	11	--	Not used

* default

S24

Not used

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 or *LC2	Line current disconnect = enable *
3	0	*DB	Dial backup = manual *
	1	*DB1	Dial backup = automatic
7-4	-	-	Reserved

* default

S33
Reserved

Bit Mapped S34

Bit	Value	Command	Description
0	0	*AN	Bilateral analog = disable *
	1	*AN1	Bilateral analog = enable
1	0	*DG	Bilateral digital = disable *
	1	*DG1	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

* default

S36-S38
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.

Bit Mapped S39

Bit	Value	Command	Description
0-4			Reserved
5	0	DCE	Connect MSG disabled *
	1	DCE	Connect MSG enabled
6-7			Reserved

* default

XON Character from DTE S44
Select the XON character (0-127) to be sent from the DTE. The default value is 17.

S40-S43
Reserved

XOFF Character from DTE S45
Select the XOFF character (0-127) to be sent from the DTE. The default value is 19.

XON Character to DTE S49
Select the XON character (0-127) to be sent to the DTE. The default value is 17.

S46-48
Reserved

XOFF Character to DTE S50
Select the XOFF character (0-127) to be sent to the DTE. The default value is 19.

S51
Reserved

Bit Mapped S52

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

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

*default

Automatic Rate Adaption Threshold S53

Bit	Value	Command	Description
1,0	--		Reserved
3,2	00	%R	Automatic rate adaption threshold disabled *
	01	%R1	Low BER
	10	%R2	Medium BER
	11	%R3	High BER
4	--		Reserved
5	0		Protocol Neg status disabled *
	1		Protocol Neg status enabled
6-7	--		Reserved

*default

Flow Control S54

The S54 register selects the flow control options.

Bit	Value	Command	Description
1,0	00	\Q	Disable DTE flow control
	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
6,5	00	\Q4	Disable flow control from DCE
	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

*default

S55

Reserved

V.42 Compression Control S56

Bit	Value	Command	Description
1,0	00	%C	Compression disabled
	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

*default

Bit Mapped S57

Bit	Value	Command	Description
0	0	*RC	Standard number codes *
			15 - 4800 bps
			18 - 9600 bps
	1	*RCI	Alternate number codes
			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)
7,6	-	--	Reserved

* default

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	\T (n=1-255)	Timer value in minutes

* default

Break Control S59

The S59 register determines the action taken when a break is encountered. Refer to Break Control section in Chapter 6 for further explanation.

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

* default

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
5-3	-	--	Reserved
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

* default

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, 4	00		Mark parity
	01		No parity
	10		Odd parity
	11		Even parity
7,6	-	--	Reserved

* default

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)

* *default*

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 *

* *default*

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

* *default*

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
7-5	--	--	Reserved

* *default*

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 14400 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	12000 bps
	01010	%B9	14400 bps
	01011	%B10	Reserved
	00010	%B11	16800 bps
	01100	%B12	19200 bps
	01101	%B13	21600 bps
	01110	%B14	24000 bps
	01111	%B15	26400 bps
	10000	%B16	28800 bps *
7-5	--	--	Reserved

* default

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 a 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

* default

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

* default

Bit Mapped S72

Bit	Value	Command	Description
0	0	V	Disable slaved DTE/DCE (constant speed DTE on) *
	1	U1	Disable slaved DTE/DCE (constant speed DTE on)
1	--	--	Reserved
2	--	--	Reserved
3	0	--	CTS does not follow DCD
	1	&R2	CTS follows DCD
6-4	--	--	Reserved
7	0	--	Disable autocallback *
	1	--	Enable autocallback

* default

Password Timeout S73

The length of time the remote user has to enter a password before the secure V.3400 drops the call.

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

* default

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. 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.

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. Default is 15 seconds.

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

Lockout Threshold S77

The number of incorrect remote user password attempts that can be made before the call is dropped.

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. Range from 1-255 in 20 ms increments. Default is 35 (700 ms).

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

Serial Port Speed S80

The S80 register indicates the serial port speed.

Bit	Value	Command	Description
4-0	00001		300 bps
	00010		600 bps
	00011		1200 bps
	00100		2400 bps
	00101		4800 bps
	00110		7200 bps *
	00111		9600 bps
	01000		12000 bps
	01001		14400 bps
	01010		16800 bps
	01011		19200 bps
	01100		21600 bps
	01101		24000 bps
	01110		26400 bps
	01111		28800 bps
	10000		38400 bps
	10001		57600 bps
	10010		115200 bps

* default

Minimum DCE Speed S81

Bit	Value	Command	Description
4-0	00000	%L	Disabled
	00001	%L1	Disabled *
	00010	%L2	1200 bps
	00011	%L3	2400 bps
	00100	%L4	4800 bps
	00101	%L5	9600 bps uncoded
	00111	%L6	9600 bps trellis
	01000	%L7	7200 bps
	00110	%L8	12000 bps
	01001	%L9	14400 bps
	01010	%L10	Reserved
	00010	%L11	16800 bps
	01011	%L12	19200 bps
	01100	%L13	21600 bps
	01101	%L14	24000 bps
	01110	%L15	26400 bps
	01111	%L16	28800 bps
7-3	--	--	Reserved

* default

S82-S87

Reserved

Modulation Type S88

Bit	Value	Command	Description
3-0	0000		Auto mode
	0001		V.21
	0010		B103
	0011		Reserved
	0100		B212A
	0101		V.22 bis
	0110		V.27 (lease line only)
	0111		Reserved
	1000		V.29 (lease line only)
	1001		Reserved
	1010		V.33 (lease line only)
	1011		V.32 bis
	1100		V.34
7-4			Reserved

S89-S90
Reserved

Current Modulation S91

Bit	Value	Command	Description
3-0	0000		Auto mode
	0001		V.21
	0010		B103
	0011		Reserved
	0100		B212A
	0101		V.22 bis
	0110		V.27 (lease line only)
	0111		Reserved
	1000		V.29 (lease line only)
	1001		Reserved
	1010		V.33 (lease line only)
	1011		V.32 bis
	1100		V.34
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		Precoding disabled
	1		Precoding enabled *

* default

V.34 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 *

* default

S97 - S100
Reserved