
IC+ 56K External Modem

User's Manual

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Chapter 1 Installation

Chapter 1 provides detailed instructions for installing your modem.

1.1 Checking your components

Unpack your components and make sure you have the following items:

- The modem.
- A modular telephone cable to connect your modem to the telephone line.
- This user's manual.
- Communication software and manual.

When you open your package, make sure all of the above items are included and not damaged. If you see that any components are damaged, please notify your dealer immediately.

1.2 Installing the modem

The following instructions explain how to install the modem in a IBM compatible type personal computer. If you will be installing the modem into a different computer, refer to the manual that accompanied your computer or contact your computer dealer for instructions on installing the modem in your personal computer.

Step 1

Connecting to a computer.

Plug the male DB-9 connector on your RS-232 cable into the RS-232 connector on the back the modem.

Step 2

Connecting to the telephone line

Step 3

Connecting to your telephone

Step 4

Connecting to an AC outlet

Step 5

Verifying your connection

If you connected the modem to a computer, place the computer into terminal mode and complete the configuration information required by the software.

Refer to your computer manual to find out the appropriate command to use.

Then use the following procedure to verify that your connections:

1. Type **AT** and press the Enter key. If your system is operating properly, your modem sends an **OK** response to your screen and wait for your next command.

If you did not receive a response, make sure your computer is sending commands to your modem. If this does not solve your problem, contact your computer dealer.

2. Use your communication software to prepare your computer to dial a call. Then type **AT D x phone number**, where **x** is either **T** for touch-tone dialing or **P** for pulse dialing and **phone number** is the telephone number that your modem is using.

For example, if your modem is connected to the telephone line 555-2121 and Touch-Tone dialing is supported in your calling area, type **ATDT 5552121**.

3. Press the Enter key. You should receive a **BUSY** response and you should hear the busy signal through the modem speaker because the modem is calling itself.

Your modem is now ready for operation. Refer to the manual that came with your communication software to begin communications. If you will be communicating directly with your modem, or if you want to find out more about the modem's operation, proceed to Chapter 2.

1.3 Windows 95/98/ME/2000 (PNP)

Window 95/98

1. Boot the system.
2. Now Windows will begin the "Add New Hardware Wizard" and Search for new drivers for "**IC+ 56k External Modem**". Click "Next".
3. Select "Search for the best driver for your device. Click "Next".
4. Than insert the driver installation CD into the CD-Rom. Click "Next".
5. Windows driver file search for the device "**IC+ 56k External Modem Pnp**". Click "Next".
6. Click "Finish".
7. After completed to copy the modem driver, the "New Hardware Found" will continue to complete the installation the "**Voice Modem Serial Wave Device**" for modem.

Window ME

1. Boot the system.
2. Now Windows will begin the "Add New Hardware Wizard" and Search for new drivers for "**IC+ 56k External Modem**". Click "Next".
3. Select "Search for the best driver for your device. Click "Next".
4. Than insert the driver installation CD into the CD-Rom. Click "Next".
5. Windows driver file search for the device "**IC+ 56k External Modem Pnp**". Click "Next".
6. Click "Finish".
7. After completed to copy the modem driver, the "New Hardware Found" will continue to complete the installation the "**Voice Modem Serial Wave Device**" for modem.

Window 2000

1. Boot the system.
2. Now Windows will begin the "Found New Hardware Wizard". Click "Next".
3. Select "Search for a suitable driver for my device (recommended). Click "Next" button.
4. Please select "Specify a location" item and put driver disk into the CD-ROM. Click "Next".
5. The wizard found a driver for the following device "**IC+ 56k External Modem**". Click "Next".
6. Windows finds your modem model "**IC+ 56k External Modem Pnp**". Click on the "Finish" button if the displayed modem model name fits yours.

1.4 Windows NT4.0

1. Boot the system.
2. Double-Click **Control Panel => Modems**.
3. Click "Next".
4. Click "**Change...**" then select "**Have Disk...**" button.
5. Select modem model "**IC+ 56k External Modem**" Click "Next".
6. Click "Finish".
7. Click "Close".
8. Setup "**RAS**" to continue.
9. Restart the system.
10. Now you've completed to install the drivers for the modem.

NOTE: Microsoft does not support plug and play in Windows NT 4.0.

Chaper 2 AT Commands Set

AT commands are issued to DTE to control the modem's operation. AT commands can only be entered while the modem is in command mode. Except for the A/ command and the +++ escape command, all commands must be prefixed with the attention code AT. For instance, the "A" command (below) would be entered as: "ATA<CR>". With out the AT prefix, the command line cannot be executed. For example: The format for entering AT commands is "ATXn" where X is the AT command, and n is the specific value for that command.

More than one command can be placed on a single line and (if desired) separated with spaces for readability. Once the carriage return (Enter) key is pressed, the command line is executed. A line with no carriage return is ignored. Any command issued is acknowledged with a response in either text or numeric values known as result codes. In the following, all commands, command-values and result code recognized by the modem are shown; any entries other than those shown cause the ERROR result code. The modem accepts either upper or lower case characters in the command line and ignores any spaces within or between commands. Typing errors can be corrected with the Backspace key. Exceptions are noted in the description of specific commands.

+++AT Escape Sequence

The escape sequence allows the modem to exit data mode and enter online command mode. While in online command mode, you may communicate directly to your modem using AT commands. You may return to data mode by issuing the ATO command.

2.1 Data Mode Command

A/ Executes Last Command

When modem receives this command, modem executes the last command string entered. Do not conclude it by pressing "Enter".

A Answer Command

This command instructs the modem to go off-hook and answer an incoming call.

Bn Communication Standard Setting

This command determines ITU-T vs. Bell standard.

B0 Selects ITU-T V.22 mode when the modem is at 1200 bits/s.

B1 Selects Bell 212A when the modem is at 1200 bits/s (default).

Result Codes:

OK : n = 0, 1, 15, 16

ERROR : Otherwise

Dn Dial

This command instructs the modem to begin the dialing sequence. A dial string can be up to 40 characters long. Any digit or symbol (0-9, *, #, A, B, C, D) could be dialed as touch-tone digits. The following may be used as dial string modifiers:

P Pulse dialing.

T Touch tone dialing (default).

W Wait for second dial tone.

@ Wait for quiet answer. Wait for five seconds of silence after dialing the number.

! Hook flash.

, Pause during dialing.

; Return to command mode.

^ Disable data calling tone transmission.

S = n Dial a telephone number previously stored using the **&Zn = x** command (see the **&Zn = x** command for further information). The range of n is 0?.

En Echo Command

ATEn command controls whether or not the characters entered from your computer keyboard are echoed back to your monitor while the modem is in command mode.

E0 Disables echo to the computer.

E1* Enables echo to the computer (default).

Result Codes:

OK: n = 0, 1

ERROR: Otherwise

Hn Hook Control

This command instructs the modem to go on-hook to disconnect a call, or off-hook to make the phone line busy.

H0 Modem goes on-hook (default).

H1 Modem goes off-hook.

Result Codes:

OK: n = 0, 1

ERROR: Otherwise

In Request Identification Information

This command displays specific product information about the modem.

I0 Returns product ID code.

I1 Display Firmware version and checksum on the DTE.

I2 Customer Used.

I3 Returns fix ID information for application software identification.

“TP560 Data/Fax/Voice 56K Modem”

I4 Returns firmware version for data pump.

I5 Returns country code.

I6 Return Local Phone Status (Loop Current Detection)

0: On-hook, 1: Off-hook

Result Codes:

n = 0, 1, 2, 3, 4, 5,6

ERROR: Otherwise

Ln Monitor Speaker Volume

This command sets speaker volume to low, medium, or high.

L0 Select low volume.

L1 Select low volume.

L2* Select medium volume.

L3 Select high volume.

Result Codes:

OK n = 0, 1, 2, 3

ERROR Otherwise

Mn Monitor Speaker Mode

This command turns the speaker on or off.

M0 The speaker is off.

M1* The speaker is on until the modem detects the carrier signal.

M2 The speaker is always on when modem is off-hook.

M3 The speaker is on until the carrier is detected, except while dialing.

Result Codes:

OK n = 0, 1, 2, 3

ERROR Otherwise

Nn Modulation Selection

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

N0 When originating or answering, this is for handshake only at the communication standard specified by AT*Nn.

N1* During handshake, Highest speed is specified by AT*Nn.

Depend on line quality fallback to a lower speed may occur.

Result Codes:

OK n = 0, 1

ERROR Otherwise

On Return Online to Data Mode

O0* Exit online command mode and return to data mode (see AT Escape Sequence, +++AT).

O1 This command issues a retrain before returning to online data mode.

O2 This command issues a rate re-negotiation before returning to online data mode.

Result Codes:

OK n = 0, 1, 3

ERROR Otherwise

P Select Pulse Dialing

This command configures the modem for pulse (non-touch-tone) dialing.

Qn Result Code Control

Result codes are informational messages sent from the modem and displayed on your monitor.

Q0* Enables modem to send result codes to the DTE.

Q1 Disables modem from sending result codes.

Result Codes:

OK n = 0, 1

ERROR Otherwise

T Select Tone Dialing

This command instructs the modem to send DTMF tones while dialing.

Vn DCE Response Format

This command controls whether result codes are displayed as words or their numeric equivalents.

V0 Displays result codes as numeric.

V1* Displays result codes as text.

Result Codes:

OK n = 0, 1

ERROR Otherwise

Wn Result Code Option

W0 Display "CONNECT DCE speed?without V42/MNP extended.

W1 Display "CONNECT DTE speed?without V42/MNP extended.

W2* Display "CONNECT DCE speed?with V42/MNP extended.

W3 Display "CONNECT DTE speed?with V42/MNP extended.

Result Codes:

OK n = 0, 1, 2

ERROR Otherwise

Xn Result Code Selection and Call Progress detection

This command enables tone detection options during dialing procedure. As these functions are chosen, the modem chip set result codes are also affected. Therefore, this command is frequently used to control the modem chip set responses and dial tone detection.

Result Codes:

OK n = 0, 1, 2, 3, 4, 5, 6, 7

ERROR Otherwise

Zn Recall Stored Profile

This command instructs the modem chip set to go on-hook and restore the profile

saved by the last &W command.

Z0 Reset modem and retrieve active configuration profile from stored profile 0.

Z1 Reset modem and retrieve active configuration profile from stored profile 1.

Result Codes:

OK n = 0, 1

ERROR Otherwise

&Cn Data Carrier Detect (DCD) Control

Data carrier detect is a signal from the modem to your computer indicating that the carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier signal.

&C0 The state of the carrier from the remote modem is ignored. DCD circuit is always on.

&C1* DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected.

Result Codes:

OK n = 0, 1

ERROR Otherwise

&Dn DTR Control (Data Terminal Ready)

This command interprets how the modem responds to the state of the DTR signal and changes to the DTR signal.

&D0 Ignore.

&D1 If the DTR signal is not detected while in online data mode, the modem enters command mode, issues OK result code, and remains connected.

&D2* If the DTR signal is not detected while in online data mode, the modem disconnects.

&D3 Monitor DTR signal when an on-to-off transition occurs, the modem performs a soft reset as if the ATZ command was received.

Result Codes:

OK n = 0, 1, 2, 3

ERROR Otherwise

&Fn Load Factory Settings

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

&Gn V.22bis Guard Tone Control

This command determines guard tone frequency and is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only.

&G0* Guard tone disabled.

&G1 Sets guard tone to 550 Hz.

&G2 Sets guard tone to 1800 Hz.

Result Codes:

OK n = 0, 1, 2

ERROR Otherwise

&Kn Local Flow Control Selection

&K0 Disable flow control.

&K1 Reserved.

&K2 Reserved.

&K3 Enable RTS/CTS flow control.

&K4 Enable XON/XOFF flow control.

&K5 Enable Transparent XON/XOFF flow control.

Result Codes:

OK n = 0,1,2, 3, 4

ERROR Otherwise

&Pn Pulse Dial Make-to-Break Ratio Selection

&P0* 39/61 make-to-break ratio (10 pps).

&P1 33/67 make-to-break ratio 10 pps).

&P2 39/61 make-to-break ratio (20 pps)

&P3 33/67 make-to-break ratio (20 pps)

Result Codes:

OK n = 0, 1

ERROR Otherwise

&Rn Clear To Send Signal Select

&R0 Modem turns on the Clear To Send signal when it detects the Request To Send (RTS) signal.

&R1* Modem turns on Clear To Send signal.

Result Codes:

OK n = 0, 1

ERROR Otherwise

&Sn Data Set Ready (DSR) Option

This command selects DSR action.

&S0* DSR always ON.

&S1 DSR comes on when establishing a connection and goes off when the connection ends.

Result Codes:

OK n = 0, 1

ERROR Otherwise

&Un Protocol Selection

&U0 Select V.PCM

&U1 Select V.34Bis/V.34

&U2 Select V.32Bis/V.22Bis

&U3 Select Bell 103 300bps

&U4 Select V21 300bps

&U5 Select V23

&V View Active Configuration and Stored Profile

This command is used to display the active profiles.

&Wn Store Current Configuration

This command stores certain command options and S-register values into the modem nonvolatile memory. The ATZ command or a power up reset of the modem restores this profile.

&W0* Stores active configuration profile in configuration profit 0.

&W1 Stores active configuration profile in configuration profit 1.

Result Codes:

OK n = 0

ERROR Otherwise

&Yn Select Stored Profile for Power On or Reset

This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command

&Y0 Select stored profile 0.

&Y1 Select stored profile 1.

Result Codes:

OK n = 0

ERROR Otherwise

&Zn = x Store Telephone Number

This command is used to store up to three dialing strings in the modem nonvolatile memory for later dialing. The format for the command is &Zn = stored number where n is the location 0? to which the number should be written. The dial string may contain up to 31 characters. The ATDS = n command dials using the string stored in location n.

Result Codes:

OK n = 0, 1, 2

ERROR Otherwise

***In Connect Speed Selection**

- *I0 Selects connect speed 1200bps
 - *I1 Selects connect speed 2400bps
 - *I2 Selects connect speed 4800bps
 - *I3 Selects connect speed 7200bps
 - *I4 Selects connect speed 9600bps
 - *I5 Selects connect speed 12000bps
 - *I6 Selects connect speed 14400bps
 - *I7 Selects connect speed 16800bps
 - *I8 Selects connect speed 19200bps
 - *I9 Selects connect speed 21600bps
 - *I10 Selects connect speed 24000bps
 - *I11 Selects connect speed 26400bps
 - *I12 Selects connect speed 28800bps
 - *I13 Selects connect speed 31200bps
 - *I14* Selects connect speed 33600bps
- select V.pcm
- *I1 Selects connect speed 28000bps
 - *I2 Selects connect speed 29333bps
 - *I3 Selects connect speed 30666bps
 - *I4 Selects connect speed 32000bps
 - *I5 Selects connect speed 33333bps
 - *I6 Selects connect speed 34666bps
 - *I7 Selects connect speed 36000bps
 - *I8 Selects connect speed 37333bps
 - *I9 Selects connect speed 38666bps
 - *I10 Selects connect speed 40000bps

-
- *I11 Selects connect speed 41333bps
 - *I12 Selects connect speed 42666bps
 - *I13 Selects connect speed 44000bps
 - *I14* Selects connect speed 45333bps
 - *I15 Selects connect speed 46666bps
 - *I16 Selects connect speed 48000bps
 - *I17 Selects connect speed 49333bps
 - *I18 Selects connect speed 50666bps
 - *I19 Selects connect speed 52000ps
 - *I20 Selects connect speed 53333bps
 - *I21 Selects connect speed 54666bps
 - *I22 Selects connect speed 56000bps

***Gn User Abort Selection**

- *G0* Enables user abort feature
- *G1 Disables user abort feature

***Hn Auto Retrain Selection**

- *H0 Disables auto retrain
- *H1* Enables auto retrain

***NCnn Country select**

This command provides customers chose the country for phone line regulation.

- *NC40 Australia
- *NC1 Austria
- *NC2 Belgium
- *NC3 Denmark
- *NC4 Finland
- *NC5 France
- *NC6 Germany
- *NC17 Greece
- *NC10 Netherlands
- *NC7 Ireland
- *NC8 Italy
- *NC43 Japan
- *NC26 Namibia
- *NC11 Norway
- *NC12 Portugal
- *NC27 South Africa

-
- *NC13 Spain
 - *NC14 Sweden
 - *NC15 Switzerland
 - *NC16 UK
 - *NC19 Czech Republic
 - *NC24 Poland
 - *NC25 Russia
 - *NC22 United States
 - *Tn Trellis Coding Selection**
 - *T0 Disables Trellis coding
 - *T1* Enables Trellis coding

***On Transmission Level Selection**

- *O0* Selects output level -11dBm
- *O1 Selects output level -12dBm
- *O2 Selects output level -13dBm
- *O3 Selects output level -14dBm
- *O4 Selects output level -15dBm
- *O5 Selects output level -16dBm
- *O6 Selects output level -17dBm
- *O7 Selects output level -18dBm
- *O8 Selects output level -19dBm
- *O9 Selects output level -20dBm
- *O10 Selects output level -21dBm
- *O11 Selects output level -22dBm
- *O12 Selects output level -23dBm
- *O13 Selects output level -24dBm
- *O14 Selects output level -25dBm
- *O15 Selects output level -26dBm

\Nn Error Control Mode Selection

This command determines the type of error control used by the modem when sending or receiving data.

- \N0 Normal mode.
- \N1 Direct mode.
- \N2 MNP or disconnect mode. The modem attempts to connect using MN 2-4 error control procedures. If this fails, the modem disconnects.
This is also known as MNP reliable mode.
- \N3 MNP, or buffer.

The modem attempts to connect using MNP 2-4 error control procedures. If this fails, the modem will connect in Normal modem

\N4 V.42 with ODP & ADP phase detection.

\N5* V.42 with ODP & ADP phase detection, MNP, or buffer (default).

The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/ MNP auto reliable mode.

\N6 V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.

\N7 V.42, MNP, or buffer (default).

Result Codes:

OK n = 0, 1, 2, 3, 4, 5, 6

ERROR Otherwise

\Vn Protocol Result Code

\V0* Disable protocol result code appended to DCE speed.

\V1 Enable protocol result code appended to DCE speed.

Result Codes:

OK n = 0, 1

ERROR Otherwise

%Cn Data Compression Control

This command determines the operation of V.42bis and MNP class 5 data compression. Online changes do not take effect until a disconnection occurs first.

%C0 V.42bis/ MNP 5 disabled. No data compression.

%C1 V.42bis/ MNP 5 enabled. Data compression enabled (default).

Result Codes:

OK n = 0, 1

ERROR Otherwise

2. 2 Result Code

<u>Long Form</u>	<u>Short Form</u>	<u>n value in ATXn</u>				
		0	1	2	3	4
OK	0	x	x	x	x	x
CONNECT	1	x	x	x	x	x
RING	2	x	x	x	x	x
NO CARRIER	3	x	x	x	x	x
ERROR	4	x	x	x	x	x
CONNECT 1200	5		x	x	x	x
NO DIALTONE	6			x		x
BUSY	7				x	x
NO ANSWER	8				x	x
CONNECT 300	9	x	x	x	x	x
CONNECT 2400	10		x	x	x	x
CONNECT 4800	11		x	x	x	x
CONNECT 9600	12		x	x	x	x
CONNECT 7200	13		x	x	x	x
CONNECT 12000	14		x	x	x	x
CONNECT 14400	20		x	x	x	x
CONNECT 19200	21		x	x	x	x
CONNECT 38400	22		x	x	x	x
CONNECT 57600	23		x	x	x	x
CONNECT 115200	24		x	x	x	x
CONNECT 1200TX/75RX	25		x	x	x	x
CONNECT 75TX/1200RX	26		x	x	x	x
RINGBACK	27		x	x	x	x
CONNECT BELL 300	28		x	x	x	x
CONNECT V21	29		x	x	x	x

(Display DCE speeds by ATW0 and ATW2)

CONNECT 16800	15	x	x	x	x
CONNECT 19200	16	x	x	x	x
CONNECT 21600	17	x	x	x	x
CONNECT 24000	21	x	x	x	x
CONNECT 26400	30	x	x	x	x
CONNECT 28800	31	x	x	x	x

CONNECT 31200	32	x	x	x	x
CONNECT 33600	33	x	x	x	x
(V.90 mode)					
CONNECT 28000	34	x	x	x	x
CONNECT 29333	35	x	x	x	x
CONNECT 30666	36	x	x	x	x
CONNECT 32000	37	x	x	x	x
CONNECT 33333	38	x	x	x	x
CONNECT 34666	39	x	x	x	x
CONNECT 36000	40	x	x	x	x
CONNECT 37333	41	x	x	x	x
CONNECT 38666	42	x	x	x	x
CONNECT 40000	43	x	x	x	x
CONNECT 41333	44	x	x	x	x
CONNECT 42666	45	x	x	x	x
CONNECT 44000	46	x	x	x	x
CONNECT 45333	47	x	x	x	x
CONNECT 46666	48	x	x	x	x
CONNECT 48000	49	x	x	x	x
CONNECT 49333	50	x	x	x	x
CONNECT 50666	51	x	x	x	x
CONNECT 52000	52	x	x	x	x
CONNECT 53333	53	x	x	x	x
CONNECT 54666	54	x	x	x	x
CONNECT 56000	55	x	x	x	x

2.3 S Registers Definitions

S registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in command mode. To display the value of an S register: TYPE: ATSn?, where n is the register number.

PRESS: Enter To modify the value of an S register:

TYPE: ATSn = r where n is the register number, and r is the new register value.

PRESS: Enter

S0 Auto Answer Ring Number

This register determines the number of rings the modem will count before automatically answering a call. 0 (zero) is that asks modem don't do automatically answer at all. When disabled, the modem can only answer with an ATA command.

Range: 0-55

Default: 0

Units: rings

S1 Ring Counter

This register, ring counter, is read only. The value of S1 is incremented with each ring. If no rings occur over a 6 second interval, this register is cleared.

Range: 0-55

Default: 0

Units: rings

S2 AT Escape Character (User Defined)

This register determines the ASCII valued used for an escape sequence. The default is the ??character. The escape sequence allows the modem to exit data mode and enter command mode. Values greater than 127 disable the escape sequence.

Range: 0-255

Default: 43

Units: ASCII

S3 Command Line Termination Character (User Defined)

This register determines the ASCII values as the carriage return character. This character is used to end command lines and result codes.

Range: 0-127, ASCII decimal

Default: 13 (carriage return)

Units: ASCII

S4 Response Formatting Character (User Defined)

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

Range: 0-127, ASCII decimal

Default: 10 (line feed)

Units: ASCII

S5 Command Line Editing Character (User Defined)

This register sets the character recognized as a backspace and pertains to asynchronous only.

Range: 0-127, ASCII decimal

Default: 8 (backspace)

Units: ASCII

S6 Wait Before Dialing

This register sets the length of time, in seconds, that the modem must wait (pause) after going off-hook before dialing the first digit. The modem always pauses for a minimum of two seconds, even if the value of S6 is less than two seconds. Waiting for dial tone call progress features (W dial modifier in the dial string) will override the value in register S6. This operation, however, may be affected by some ATX options according to country restrictions.

Range: 2-10

Default: 2

Units: seconds

S7 Connection Completion Timeout

This register sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected. The timer is started when the modem finishes dialing (originate), or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by country restriction. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

Range: 1-255

Default: 45

Units: seconds

S8 Comma Dial Modifier Time

This register sets the time, in seconds, that the modem must pause when it

encounters a comma (,) in the dial command string.

Range: 1-255

Default: 2

Units: seconds

S9 Carrier Detect Response Time

Register S9 sets the time the remote modem's carrier signal must be present for the local modem to recognize it. This feature ensures that your modem does not mistake a busy signal, ring, or voice for the carrier signal. The value of this register is in tenths of a second. The default value is 600 ms , although you can change it from 1 to 255. For example, entering a value 13 means that the remote modem's carrier signal must be present for 1.3 seconds for the local modem to recognize it. Setting this value higher increases the chances the modem will not mistakenly identify the carrier signal.

S10 Automatic Disconnect Delay after Carrier Loss

This register sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. The actual interval the modem waits before disconnecting is the value in register S10.

Range: 1-254

Default: 14

Units: 0.1 seconds

S11 DTMF Dialing Speed

This register determines the dialing speed which is prefixed for each country.

Range: 50-255

Default: 95

Units: 0.001 seconds

S12 Escape Guard Time

This register sets the value (in 20 ms increments) for the required pause after the escape sequence (default 1 s).

Range: 0-255

Default: 50

Units: 0.02 seconds

S14 Bit-mapped Register

Bit-mapped register S14 lets you control modem echo, responses, dialing method,

and the original or answer mode.

Bit Function

- 0=0 Do not echo command (E0)
 - 1 Echo command (E1) – default
- 1 Reserved
- 2 Mapping to ATQn
- 3=0 Numeric responses (V0)
 - 1 Verbose (Verbal) Responses (V1) – default
- 4,5= Mapping to AT&P
- 6=0 Use touch-tone dialing method (T) – default
 - 1 Use pulse dialing method (P)
- 7=0 Answer incoming calls (A)
 - 1 Originate calls (D) – default

S21 Bit-mapped Register

Bit-mapped register S21 lets you control certain data communication control signals.

Bit Function

- 0,1= x Undefined
- 2= Mapping to AT&R
- 3,4=0 Modem ignores the DTR signal (&D0)
 - 1 Modem enters command mode after ON-to-OFF DTR transition (&D1)
 - 2 Modem hangs up after ON-to-OFF DTR transition (&D2) – default
 - 3 Modem resets after ON-to-OFF DTR transition (&D3)
- 5=0 CD signal always on (&C0)
 - 1 CD signal on when a remote carrier signal is present (&C1) – default
- 6 =0 AT&S=0
 - 1 AT&S=1

S22 Bit mapped Register

Bit-mapped register S22 lets you control internal speaker and the modem responses.

Bit Function

- 0,1= 0 Speaker volume off (L0)
 - 1 Low speaker volume (L1)
 - 2 Medium speaker volume (L2) – default
 - 3 Loud speaker volume (L3)
- 2,3= 0 Speaker off (M0)
 - 1 Speaker on until carrier detected (M1) – default
 - 2 Speaker always on (M2)

- 3 Speaker on until carrier detected but off during dialing (M3)
- 4,5,6=0 Hayes Smart modem compatibility (X0)
 - 4 Include CONNECT XXX responses (X1)
 - 5 Same as 4 plus dial tone detection (X2)
 - 6 Same as 4 plus BUSY response and blind dialing (X3)
 - 7 Same as 6 plus dial tone detection (X4) – default
- 7 =0 Undefined

S23 Bit-mapped Register

<u>Bit</u>	<u>Function</u>
0,1,2,3= 0	0-300bps DTE data rate
1	1200bps DTE data rate
2	2400bps DTE data rate
3	4800bps DTE data rate
4	9600bps DTE data rate
5	14400bps DTE data rate
6	19200bps DTE data rate
7	34800bps DTE data rate
8	57600bps DTE data rate
9	115200bps DTE data rate
4,5= 0	Use even parity
1	Use none parity
2	Use odd parity
3	Use mark parity
6,7= 0	Mapping to AT&G

S25 Data Terminal Ready Delay

When Modem is on-line, it will ignore a Data Terminal Ready signal lasting less than the value of this register. In this mode, the values for this register are 0 to 255 in hundredths of a second, and the default value is 0.05 seconds. If you will be entering synchronous mode after dialing asynchronously, this register determines how long the modem waits before looking for the Data Terminal Ready signal. This lets you detach the asynchronous terminal and connect a synchronous terminal while remaining in the Data Mode. The default value is 5

Range: 0-255

Default: 5

Units: 0.01 seconds

S26 Request To Send-to-Clear To Send Delay

This register affects synchronous operation only and applies only when you are using the &R0 command. This register determines how long the modem waits to turn on the Clear To Send signal after a Request To Send OFF-to-ON transition in 10 ms increment. The default value is 1.

Range: 0-255

Default: 1

Units: 0.01 seconds

S29

Bit Value Function

0-4 Mapping to AT*I

5-7 Mapping to AT&U

S30 Inactivity Timer

S30 specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

Range: 0-255

Default: 0

Units: minutes

S45 Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

Note: If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 s. This is done for compatibility with previous products which allowed time-outs down to 1 s.

Range: 0, 5-255

Default: 10

S95

Bit Value Function

0,1 Mapping to ATWn

2 Mapping to ATV

3 Mapping to ATN

4 Mapping to AT*O

S96 Local Phone Status

This register tells the status of the Local Phone. It is read only.

0 = local phone on-hook

1 = local phone off-hook

S97

Bit Value Function

0-2 Mapping to AT\Nn

7 Mapping to AT%Cn

S98

Bit Value Function

0,1 Mapping to AT*H

2 Mapping to AT*G

3 Mapping to AT*T

4-6 Mapping to AT&K

S99 Energy detection threshold

This register can use in Call Progress Mode (CPM) mode, for dial tone detection threshold. The default value is 2. This register determines the detection threshold for Call Progress (CPM) tones. The default value is 2.

2.4 Class 1 FAX Commands

The modem chip set supports FAX commands conforming to EIA standard 578. These commands are given here with short descriptions; complete explanations are given in the standard, available from the Electronic Industry Association.

FAX Command Set Summary

+FCLASS?	Service class indication
+FCLASS = ?	Service class capabilities
+FCLASS = n	Service class selection
+FTM = <m>	Transmit FAX data
+FRM = <m>	Receive FAX data
+FTH = <m>	Transmit HDLC data
+FRH = <m>	Receive HDLC data
+FTM = ?	Check transmit FAX modulation
+FRM = ?	Check receive FAX modulation
+FTH = ?	Check transmit HDLC data modulation
+FRH = ?	Check receive HDLC data modulation
+FMI = ?	Check manufacturer identification
+FMM = ?	Check product identification
+FMR = ?	Check version/revision information
+FLO = ?	Select Flow Control specified
+FPR = ?	Select Serial Port Rate

+FCLASS? Service Class Indication

This command causes the modem to display the current setting. The modem can operate either as a class 0 data modem or a class 1 FAX modem.

Responses: 000 :data mode

001 if in FAX class 1

008 if in voice mode

+FCLASS = ? Service Class Capabilities

This command causes the modem to display the classes it supports.

Typical responses:

+FCLASS = ? 0, 1, 8

+FCLASS = n Service Class Selection

This command sets the modem for class n operation, where n is either a 0 or 1.

Parameters: 0, 1, 8

Default: 0

Command options:

-
- +FCLASS = 0 Select data mode.
 - +FCLASS = 1 Select facsimile class 1.
 - +FCLASS = 8 Select voice mode.
 - +FTS = <n> Stop transmission and pause

+FTM = <m> Transmit FAX Data

This command causes the modem to transmit data at the modulation specified by <m>. The following table shows the values you can enter for this command and the meaning of those values.

- +FTM = 3 V.21 Channel2 300
- +FTM = 24 V.27ter 2400
- +FTM = 48 V.27ter 4800
- +FTM = 72 V.29 7200
- +FTM = 96 V.29 9600
- +FTM = 73 V.17 7200
- +FTM = 74 V.17 (short train) 7200
- +FTM = 97 V.17 9600
- +FTM = 98 V.17 (short train) 9600
- +FTM = 121 V.17 12000
- +FTM = 122 V.17 (short train) 12000
- +FTM = 145 V.17 14400
- +FTM = 146 V.17 (short train) 14400

+FRM = <m> Receive FAX Data

This command causes the modem to receive data at the modulation specified by <m>.

- +FRM = 3 V.21 Channel2 300
- +FRM = 24 V.27ter 2400
- +FRM = 48 V.27ter 4800
- +FRM = 72 V.29 7200
- +FRM = 96 V.29 9600
- +FRM = 73 V.17 7200
- +FRM = 74 V.17 (short train) 7200
- +FRM = 97 V.17 9600
- +FRM = 98 V.17 (short train) 9600
- +FRM = 121 V.17 12000
- +FRM = 122 V.17 (short train) 12000
- +FRM = 145 V.17 14400
- +FRM = 146 V.17 (short train) 14400

+FTH = <m> Transmit HDLC Data

This command causes the modem to transmit data framed in the HDLC protocol at the modulation specified by <m>.

+FTH = 3 V.21 Channel2 300
+FTH = 24 V.27ter 2400
+FTH = 48 V.27ter 4800
+FTH = 72 V.29 7200
+FTH = 96 V.29 9600
+FTH = 73 V.17 7200
+FTH = 74 V.17 (short train) 7200
+FTH = 97 V.17 9600
+FTH = 98 V.17 (short train) 9600
+FTH = 121 V.17 12000
+FTH = 122 V.17 (short train) 12000
+FTH = 145 V.17 14400
+FTH = 146 V.17 (short train) 14400

+FRH = <m> Receive HDLC Data

This command causes the modem to receive data framed in the HDLC protocol at the modulation specified by <m>.

+FRH = 3 V.21 Channel2 300
+FRH = 24 V.27ter 2400
+FRH = 48 V.27ter 4800
+FRH = 72 V.29 7200
+FRH = 96 V.29 9600
+FRH = 73 V.17 7200
+FRH = 74 V.17 (short train) 7200
+FRH = 97 V.17 9600
+FRH = 98 V.17 (short train) 9600
+FRH = 121 V.17 12000
+FRH = 122 V.17 (short train) 12000
+FRH = 145 V.17 14400
+FRH = 146 V.17 (short train) 14400

+FLO = <V> Flow Control Select

+FLO=0 Xon/Xoff and RTS/CTS flow control Turned off
+FLO=1 Xon/Xoff flow control
+FLO=2 RTS/CTS flow control

+FPR = <V> Serial Port Rate

2.5 Voice Commands

- +VIP** Initial voice parameter
 - +VCID=<pmode>** Caller ID
 - pmode=0:Disable Caller ID
 - pmode=1: Enable ,formatted caller report
 - pmode=2:Enable ,unformatted caller report
 - +VCID?** Report current parameter
 - +VCID=?** Queries the range that DCE support
 - +VDR** Enable the distinctive ring feature
 - +VDR?** Report current parameter
 - +VDR=?** Queries the range that DCE support
 - +VGT** Setup playback gain
 - +VGT?** Report current parameter
 - +VGT=?** Queries the range that DCE support
 - +VGR** Setup record gain
 - +VGR?** Report current parameter
 - +VGR=?** Queries the range that DCE support
 - +FMI?** Report manufacturer ID
 - +FMM?** Report product information
 - +FMR?** Report product revision
 - +VIT** Enable inactive timer
 - +VIT?** Report current parameter
 - +VIT=?** Queries the range that DCE support
 - +VTD** Set the default duration for DTMF/tone generation in 10ms increments
 - +VTD?** Report current parameter
 - +VTD=?** Queries the range that DCE support
 - +VSD=<sds,sdi>**
 - sds=128 Normal level of sensitivity(-40dbm)
 - sds>= 128 More aggressive ;ex. sds=129 is -39dbm
 - sds<= 128 Less aggressive :ex sds=127 is -40dbm
 - sdi :Specify the amount of time the modem will report silence to DTE
 - +VSD?** Report current parameter
 - +VSD=?** Queries the range that DCE support
 - +VTS** DTMF and tone generation
 - +VTS=?** Queries the range that DCE support
- ex1: AT+VTS=1 play DTMF 1 with a duration by the +VTD command

ex2: AT+VTS=2 play DTMF 2 with a duration by the +VTD command
ex3: AT+VTS=[1000,1300,50] play tone pair 1000Hz and 1300hz with a duration of 50ms
ex4: AT+VTS={*,6} play DTMF * with a duration of 60ms
ex5: AT+VTS=9 play DTMF 9 with a duration by the +VTD command

+VTX Enter voice playback mode
+VRX Enter voice record mode
+VSM=<cml>,<vsr>
 cml=128 , select linear 8bit PCM
 cml=132 , select IMA ADPCM
 vsr =xx, Sample rate is always 8000

+VSM? Report current parameter
+VSM=? Queries the range that DCE support
+VPR=<rate> DTE/DCE rate will be equal $2400 \times \text{rate}$, but auto-baud if rate=0
+VPR? Report current parameter
+VPR=? Queries the range that DCE support
+VLS=<pmode>
 pmode=0: DCE on-hook, local phone connected to Telco.
 pmode=1: DCE off-hook, DCE connected to Telco
 pmode=2: DCE off-hook, local phone connected to DCE
 pmode=3: DCE off-hook, local phone connected to Telco, DCE to local phone
 pmode=4: Speaker connected to DCE,DCE on-hook(playback message)
 pmode=5: Speaker connected to DEC, DCE off-hook(call screening)
 pmode=6: Microphone connected to DCE, DCE on-hook(Record greeting)
 pmode=7: Microphone and speaker connected , DCE off-hook (speakerphone)

2.6 AT% TTn Commands

%tt0=0 erase %TT command

%tt1=n Tx v90 signal

%tt2=A,B,C,D Tx v34 signal parameter

A: Baud Rate

B: Data Rate

C: Min/Exp

D: Pre-emphasis

%tt3=0 : DTMF '0'

%tt3=1 : DTMF '1'

%tt3=2 : DTMF '2'

%tt3=3 : DTMF '3'

%tt3=4 : DTMF '4'

%tt3=5 : DTMF '5'

%tt3=6 : DTMF '6'

%tt3=7 : DTMF '7'

%tt3=8 : DTMF '8'

%tt3=9 : DTMF '9'

%tt3=10 : DTMF 'A'

%tt3=11 : DTMF 'B'

%tt3=12 : DTMF 'C'

%tt3=13 : DTMF 'D'

%tt3=14 : DTMF '*'

%tt3=15 : DTMF '#'

%tt3=16 : V32 9600

%tt3=17 : V32 14400

%tt3=18 : 2100HZ ANSWER TONE

%tt3=19 : 1300HZ CALLING TONE

%tt3=20 : 1100HZ CALLING TONE

%tt3=21 :

%tt3=22 : Silence

%tt4=0 : V21 Org tx mark

%tt4=1 : V21 Org tx space

%tt4=2 : V21 Ans tx mark

%tt4=3 : V21 Ans tx space

%tt4=4 : V23 Org tx mark
%tt4=5 : V23 Org tx space
%tt4=6 : V23 Ans tx mark
%tt4=7 : V23 Ans tx space
%tt4=8 : V22 org
%tt4=9 : V22bis org
%tt4=10 : V22 ans (tx guard tone if &g1 or &g2)
%tt4=11 : V22bis ans (tx guard tone if &g1 or &g2)
%tt5= 0 : V27ter 2400
%tt5= 1 : V27ter 4800
%tt5= 2 : V29 7200
%tt5= 3 : V29 9600
%tt5= 4 : V17 7200 short train
%tt5= 5 : V17 7200 long train
%tt5= 6 : V17 9600 short train
%tt5= 7 : V17 9600 long train
%tt5= 8 : V17 12000 short train
%tt5= 9 : V17 12000 long train
%tt5= 10 : V17 14400 short train
%tt5= 11 : V17 14400 long train

Appendix A Government compliance notices

D.1 FCC compliance

This Broadband Sharing Router has been tested and found to comply with the limits for a Class B personal computer and peripherals, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this unit does cause harmful interference to radio or television reception, which can be determined by turning the unit off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.