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About the Reference

This reference gives you fast online access to the Hayes Standard AT command set and associated user features. The featured search options are superior to printed documentation for finding information. In addition to finding information quickly, online documentation is better for the environment.

The Hayes Standard AT command set is the industry standard for modem communications. Normally, these commands are used by your communication or terminal emulation software to control your modem. However, AT commands and S-registers can be issued directly to your modem for troubleshooting or for configuring your modem with certain equipment (such as a printer, plotter, or mainframe).

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem.

The Hayes Standard AT Command Set is divided into **AT commands**, that control and operate the modem, **S-registers**, that store various configuration values, and **result codes**, information the computer provides about the connection. This online reference describes each AT command, S-register, and result code, lists the defaults for your modem, and provides information on how to troubleshoot problems using AT commands.

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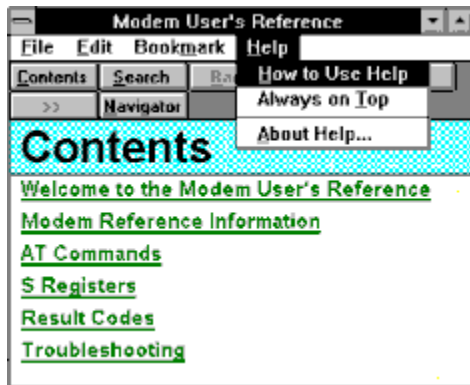
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Using the PC Version

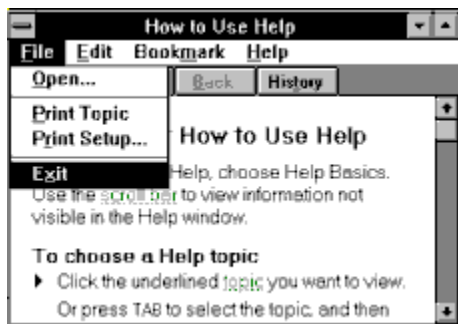Using the Macintosh Version

Using the PC Version

For instructions on using Windows help, Select **How to Use Help** from the **Modem User's Reference Help** menu.

Note: These menus may not apply to Windows 95.

To return to the Modem User's Reference, select **Exit** from the **How to Use Help File** menu.

Using the Macintosh Version

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Hypertext Links

Certain words or phrases in this document appear in underlined text. These are Hypertext Links. When you move the mouse over these areas, the cursor will change to a magnifying glass or a pointing hand. If you click on these areas, you will jump to a new topic linked to that text.

Popup Definitions

Some words appear in dotted-underlined text. If you move the mouse over these areas, the cursor will change to a pointing hand. These are popup definitions. If clicked, a window temporarily pops up giving you a definition of that term.

You can always get back to the beginning of the entire file by clicking on the Contents button in the toolbar.

Table of Contents

To get to the table of contents for a file, click on the Contents button in the toolbar. This is the quickest and easiest way to get back to the beginning or top level of a file.

Walking Through Related Topics

The online reference provides the ability to walk through a sequence of related topics. This functionality is provided with the Next Topic and Previous Topic buttons. (Open books).

Clicking on Next Topic will take you to the next related topic. Clicking on the Previous Topic button will take you to the previous related topic.

If either of the next or previous buttons are grayed (disabled), it means that there is not a related topic in that direction.

Going Back to the Previous Topic

To go back to the previous topic, click the Go Back button in the toolbar. This is similar in behavior to using the History button, but it only goes back one topic at a time.

Keyword Searching

The online reference has keyword searching capabilities allowing you to quickly search for special keywords in the file. The Look-Ahead feature enables you to begin typing the keyword you're searching for, and lets the online reference jump to the nearest keyword or key phrase in the index for you.

To use Keyword Searching in the Index dialog box, begin typing the keyword of interest. You'll notice that as you type the online reference jumped to that entry in the Index. To go to the keyword topic, press the RETURN key or double-click on the desired entry.

To find a given text string anywhere in the document, regardless of whether it's a keyword or not, use the Find command.

Finding All Occurrences of a Text String

Using the Find feature, you can find any text string that appears in the file, not just keywords.

To find a text string, select the Global Find command from the Find Menu and the Global Find Dialog will appear. Type the name of the text string you wish to find and press the Find button. If the word(s) is found, it will be highlighted. Select Global Find Again to continue the search.

Getting a History of Topics You've Read

Using the History Window, you can quickly go back to any of the topics that you've already viewed.

To use the History Window, click the History button in the toolbar. A window displays all of the topics you have visited. Select a topic in the list and click the View Topic button. This takes you back to that topic. Clicking the Clear button resets the contents of the History Window allowing you to start the history over, if it gets too large.

The History Window floats above the main window allowing access to the main window. The History Window can be closed by clicking on the Close box or by pressing the Escape key.

Using Bookmarks

You can place bookmarks anywhere in the online reference file to set a place holder for direct access or for helping you remember an important topic.

To use Bookmarks, click-and-hold over the Bookmark menu. A menu pops up displaying two choices initially, Set Bookmark… and Edit Bookmark… (once you've set bookmarks, they appear in the popup as well). Drag the mouse (with the button still down) to the appropriate menu item and release the mouse button.

Set a Bookmark

To set a Bookmark, choose Set Bookmark… from the Bookmark popup and a dialog will appear. In the Name edit control, type the name that you wish to give to the bookmark.

Go to a Bookmark

To go to one of the bookmarks that you've set, choose it from the Bookmark menu in the menu bar above. Optionally, you can use the keyboard shortcut to take you to that bookmark (assuming you chose one when you set the bookmark).

Edit a Bookmark

To edit an existing bookmark, choose Edit Bookmark… from the Bookmark popup and a dialog will appear with a list of all bookmarks on the right. First, choose the bookmark to edit. You can :

> Delete it using the Delete Bookmark button.

> Change its name by retyping it in the Name edit control.

> View the topic for the selected bookmark using the View Topic button.

You can also rearrange the order of bookmarks by dragging the bookmark in the list to the new location. The cursor changes to a hand while you're moving the bookmark.

Using Notes

You can place notes anywhere in the file annotating your own comments to the file. Notes are automatically saved with the file.

Add a Note

To add a note, click and hold the mouse over the notepad in the toolbar, drag it to the desired location in the topic, and release the mouse button. You'll notice the cursor changes to a hand when you're over the Notepad and to a Small note while it is dragged.

Once you release the note, you can begin typing your comment. The note paper automatically grows in width and length as you type. It does not automatically wrap text for you. For this reason, you'll need to press the return key to continue typing on a new line.

Once you've finished typing the note, click in the document off the note (but not on a hypertext link or popup) or in the Look-Ahead Keyword Search, and the note will adjust its size to fit the text.

Modify a Note

You can edit the contents of a note at any time just as you can with any editable text. This includes using Undo/Redo, Cut, Copy, Paste and Clear.

You can move a note to anywhere within the current topic by dragging it to the new location. To do this, move the cursor over the edge of the note (but not over the text in the note), the cursor will change to a hand and you can drag it away. The topic automatically scrolls as necessary within the document window.

You cannot drag the note to another topic, however, you can copy text in the note to the clipboard, add a note in the new topic, and paste text into the new note.

Delete a Note

You can delete a note in either of three ways. The simplest way is to just drag it back to the notepad. You'll notice that the cursor changes to Trash and the Notepad is highlighted as you drag the note over the Notepad.

The second way is to click in the note (to select it) and choose Delete Note from the Edit menu.

The last way is to select all the text in the note, press backspace to delete all the text and then click in the document off the note or in the Look-Ahead Keyword Search. The note will disappear.

Printing a Topic

To print a particular topic, first go to that topic.

Choose Page Setup… from the File menu if you need to change any of the print settings. Change any settings required in the dialog that appears, and click on OK.

Choose Print… from the File menu. The Print dialog will appear. Make any settings changes necessary and click on the Print button. The topic will be printed.

Printing All Topics

To print all topics:

Choose Page Setup… from the File menu if you need to change any of the print settings. Change any settings required in the dialog that appears, and click on OK.

Choose Print All Topics… from the File menu. The Print dialog will appear. Make any settings changes necessary and click on the Print button. All of the topics will be printed.

Quitting the Online Reference

To quit the online reference, choose Quit from the File menu. the online reference and all open files will be closed.

If you're running System 7 and the MultiFinder, you might want to leave the Modem User's Reference open whenever you're running a communications application. You can switch back and forth between the reference and the application by clicking on their respective document windows or by using the Application menu.

Undoing and Redoing

You can undo and redo any typing in a notepad note. Select Undo Typing from the Edit menu to undo the typing. Once undone, the typing can be redone by choosing Redo Typing from the Edit menu.

You can also undo and redo the deletion of an entire note. After you have deleted a note, select Undo Delete Note from the Edit menu. Of course redo works as expected, also.

Undo and redo can also be done for moving a note.

Clear, Copy, Cut, Paste Commands

You can use the Clear, Copy, Cut and Paste commands, as expected, in any of the edit controls and notes in   the online reference. You cannot, however, use them on the topic text itself.

Selecting All

You can use the Select All in the Edit menu to select all of the text in the current notepad note.

Deleting Notes

This command allows you to delete the currently selected notepad note. To delete a note, first select it, then choose Delete Note from the Edit menu.

Copy Topic as Text

You can copy the text portion of a topic, as unformatted text, to the clipboard. This is useful if you want to incorporate this text in another document and perform your own editing and formatting.

To copy a topic as text, go to the topic you wish to copy and choose Copy Topic as Text from the Edit menu. The Copy Topic Text dialog will be displayed which allows you to copy text to the clipboard.

Copy Topic as Picture

You can copy an entire topic, as a picture, to the clipboard. This is useful if you want to incorporate this picture in another document.

To copy a topic as a picture, go to the topic you wish to copy and choose Copy Topic as Picture from the Edit menu. A Picture (PICT) of the topic including graphics and formatted text will be placed on the clipboard for you to paste into another document.

Showing and Hiding Notes

You can show or hide all notepad notes that have been added to a file by selecting or unselecting Show Notes in the View menu, respectively. The _ indicates the notes will be shown, otherwise they will be hidden.

ACCURA™ 144

Your modem supports the following commands. All commands are preceded by **AT** followed by the command and then pressing the ENTER key. Clicking an underlined command opens a popup window explaining the command. Default settings appearing in popup windows are in **bold**.

A, A/, B, D, E, H, I, N, O, P, Sr?, Sr=n, T, Y,
Z, &A, &B, &C, &D, &F, &G, &K, &Q, &S,
&U, &V, &W, &Y, &Zn=x, $H, +FAE, +FCLASS

S-Registers are special memory locations in the modem for storing counting, timing, ASCII character, or feature negotiation values. S-registers can be changed by issuing the ATS=n command. Your modem supports the following S-Registers:

S0, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11,
S12, S25, S30, S36, S37, S38, S43, S46, S48,
S86, S95, S97, S108, S109, S110, S136

Click the following to display:

Call Result Codes

Negotiation Progress Result Codes

Note: If your screen is not capable of displaying the entire popup window, re-size your help window or select a topic from the Contents menu. Each topic selected from Contents appears in a scrollable window.

Related Topics:

Hayes Customer Service

Hayes Customer Service

If you are experiencing a problem with a Hayes product, try resolving it with the troubleshooting section of this document. This section saves you time by reviewing solutions to the most common communication problems. If necessary, you can contact Hayes Customer Service for guidance. **Before returning any product, please call Hayes Customer Service for a Return Authorization number and information concerning shipping and handling charges**.

For best service, please remember the following points before calling:

1. Use a phone located near the computer with the Hayes product.

2. Have the product serial number available.

3. Keep a record of all factors that are unique to the problem. (Software versions, etc.)

North America

World Headquarters (USA)

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Fax: 1-770-449-0087

BBS: 1-770-446-6336

Europe

Region Headquarters (UK)

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Fax: +44-1252-775511

BBS: +44-1252-775599

Asia Pacific

Region Headquarters (Hong Kong)

Tel: +852-2887-1037

Fax: +852-2887-7548

BBS: +852-2887-7590

Internet Contact Information

World Wide Web: http://www.hayes.com

Telnet: hayes.com

FTP: hayes.com

ACCURA™ 288 (United Kingdom)

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A, A/, B, D, E, H, I, N, O, P, Sr?, Sr=n, T, Y,
Z, &A, &B, &C, &D, &F, &G, &K, &Q, &S,
&U, &V, &W, &Y, &Zn=x, $H, +FAE, +FCLASS

S-Registers are special memory locations in the modem for storing counting, timing, ASCII character, or feature negotiation values. S-registers can be changed by issuing the ATS=n command. Your modem supports the following S-Registers:

S0, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11,
S12, S25, S30, S36, S37, S38, S43, S46, S48,
S86, S91, S95, S97, S108, S109, S110, S136

Click the following to display:

Call Result Codes

Negotiation Progress Result Codes

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ACCURA™ 288

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A, A/, B, D, E, H, I, N, O, P, Sr?, Sr=n, T, Y,
Z, &A, &B, &C, &D, &F, &G, &K, &Q, &S,
&U, &V, &W, &Y, &Zn=x, $H, +FAE, +FCLASS

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S12, S25, S30, S36, S37, S38, S43, S46, S48,
S86, S95, S97, S108, S109, S110, S136

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Telnet: hayes.com

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OPTIMA™ 144

Your modem is the brand of choice by serious business users for the following reasons:

- Supports up to 115, 200 bits/s throughput making it twice as fast as other 14.4K (V.32*bis*) modems.

- Remote Configuration, Caller ID and Distinctive Ring Service.

- Flash ROM provides fast and easy upgrades.

- Voice, Data, and FAX support.

- Security: Dial-Back and Password.

- 2-Wire Leased-Line support.

Your modem supports the following commands. All commands are preceded by **AT** followed by the command and then pressing the ENTER key. Clicking an underlined command opens a popup window explaining the command. Default settings appearing in popup windows are in **bold**.

A, A/, B, D, E, H, I, N, O, P, Sr?, Sr=n, T, Y, Z,
&A, &B, &C, &D, &F, &G, &K, &L, &Q, &R, &S, &T
&U, &V, &W, &X, &Y, &Zn=x, $H, +FAA, +FAE, +FCLASS,
%CCID, %CRID, %DUMB, !FLASH, $BRC, $GIVEBRC,
$GETBRC, -SUID, -SPWD, -SPRT, -SKEY, %SPRT,
 %SUID, %SPWD, %SCBR, %SKEY, %

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S12, S16, S18, S25, S30, S36, S37, S38, S43, S46, S48, S63
S70, S71, S73, S86, S95, S97, S101, S102, S108, S109,
S110, S136, S153

Click the following text to display OPTIMA 144:

Call Result Codes

Negotiation Progress Result Codes

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OPTIMA™ 288

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- Supports up to 230, 400 bits/s throughput making it twice as fast as other 28.8K (V.34) modems.

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- Flash ROM provides fast and easy upgrades.

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- Security: Dial-Back and Password.

- 2-Wire Leased-Line support.

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A, A/, B, D, E, H, I, N, O, P, Sr?, Sr=n, T, Y, Z,
&A, &B, &C, &D, &F, &G, &K, &L, &Q, &R, &S, &T
&U, &V, &W, &X, &Y, &Zn=x, $H, +FAA, +FAE, +FCLASS,
%CCID, %CRID, %DUMB, !FLASH, $BRC, $GIVEBRC,
$GETBRC, -SUID, -SPWD, -SPRT, -SKEY, %SPRT,
 %SUID, %SPWD, %SCBR, %SKEY, %

S-Registers are special memory locations in the modem for storing counting, timing, ASCII character, or feature negotiation values. S-registers can be changed by issuing the ATS=n command. Your modem supports the following S-Registers:

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S12, S16, S18, S25, S30, S36, S37, S38, S43, S46, S48, S63
S70, S71, S73, S86, S95, S97, S101, S102, S108, S109,
S110, S136, S153

Click the following text to display OPTIMA 288:

Call Result Codes

Negotiation Progress Result Codes

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Related Topics:

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Telnet: hayes.com

FTP: hayes.com

How to Send AT Commands

To send AT Commands to your modem, simply type AT followed by a command listed in this section and then press the ENTER key.

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem.

Related Topics:

Hayes Improved Escape Sequence with Guard Time

Hayes Improved Escape Sequence with Guard Time

The Hayes Improved Escape Sequence with Guard Time (U.S. Patent #4,549,302) is used when the modem is online and you need to enter commands to the modem without disconnecting. The Hayes Improved Escape Sequence with Guard Time protects you against losing the connection while you are sending commands to your modem.

A guard time must precede and follow the sequence of escape characters so that, should the same characters need to be transmitted in a message, the modem will not accidentally switch to command state. The default guard time is 1 second.

The escape sequence character and the guard time interval can be changed by assigning different values to registers S2 (Escape Sequence Character) and S12 (Escape Sequence Guard Time).

Using the Hayes Improved Escape Sequence with Guard Time:

Note: The modem must be online with another modem.

Step 1: Pause a little longer than the guard time (1 second).

Step 2: Type +++.

Step 3: Pause again a little longer than the guard time. (These pauses help the modem to distinguish the escape sequence from your message.) The modem responds with **OK**.

Step 4: Enter any necessary commands to the modem.

Step 5: When you are ready to resume your call to a remote system, type ATO (letter O) ENTER. The modem will return to the online state. If you want to disconnect and hang-up, type ATH ENTER.

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem.

AT Command Descriptions

A Answer Command

The A command allows the modem to enter answer mode, go off hook, attempt to answer an incoming call and go online with another modem.

A/ Re-execute previous command line

The A/ command re-executes the previous command line (this command is not preceded by **AT** nor followed by **Enter**).

B   Select Protocol Compatibility (ACCURA 144)

The B command is used to select the communication standard for data connections.

Command	Description
B0	ITU-T V.22 at 1200 bits/s.
B1	Industry Standard 212A at 1200 bits/s.
B15	ITU-T V.21 at 300 bits/s.
B16	Industry Standard 103 at 300 bits/s.

B   Select Protocol Compatibility (ACCURA 288)

The B command is used to select the communication standard for data connections.

Command	Description
B0	ITU-T V.22 at 1200 bits/s.
B1	Industry Standard 212A at 1200 bits/s.
B15	ITU-T V.21 at 300 bits/s.
B16	Industry Standard 103 at 300 bits/s.
B76	V.FC when handshake begins at 14400 bits/s.
B80	ITU-T V.34 when handshake begins at 14400 bits/s.
B81	V.FC when handshake begins at 16800-28800 bits/s.

B   Select Protocol Compatibility (ACCURA 288 UK)

The B command is used to select the communication standard for data connections.

Command	Description
B0	ITU-T V.22 at 1200 bits/s. (Default for 1200 bits/s).
B1	Industry Standard 212A at 1200 bits/s.
B2	If originating a call using ITU-T V.23, transmit at 75 bits/s and receive at 1200 bits/s. If answering and N0 selected, transmit at 1200 bits/s and receive at 75 bits/s.
B3	If originating a call using ITU-T V.23, transmit at 1200 bits/s and receive at 75 bits/s. If answering and N0 selected, transmit at 75 bits/s and receive at 1200 bits/s.
B15	ITU-T V.21 at 300 bits/s. (Default for 300 bits/s).
B16	Industry Standard 103 at 300 bits/s.
B76	V.FC when handshake begins at 14400 bits/s.
B80	ITU-T V.34 when handshake begins at 14400 bits/s.
B81	V.FC when handshake begins at 16800-28800 bits/s.

B   Select Protocol Compatibility (OPTIMA 144)

The B command is used to select the communication standard for data connections.

Command	Description

B0	ITU-T V.22 at 1200 bits/s. (Default for 1200 bits/s).
B1	Industry Standard 212A at 1200 bits/s.
B2	If originating a call using ITU-T V.23, transmit at 75 bits/s and receive at 1200 bits/s. If answering and N0 selected, transmit at 1200 bits/s and receive at 75 bits/s.
B3	If originating a call using ITU-T V.23, transmit at 1200 bits/s and receive at 75 bits/s. If answering and N0 selected, transmit at 75 bits/s and receive at 1200 bits/s.
B15	ITU-T V.21 at 300 bits/s. (Default for 300 bits/s).
B16	Industry Standard 103 at 300 bits/s.
B30	ITU-T V.22*bis* when line speed is 2400 bits/s.
B41	ITU-T V.32 when line speed is 4800.
B52	ITU-T V.32*bis* when line speed is 7200 bits/s.
B60	ITU-T V.32 (or V.32*bis*) when line speed is 9600 bps.
B70	ITU-T V.32*bis* when handshake begins at 12000 bits/s.
B75	ITU-T V.32*bis* when handshake begins at 14400 bits/s.

B   Select Protocol Compatibility (OPTIMA 288)

The B command is used to select the communication standard for data connections.

Command	Description
B0	ITU-T V.22 at 1200 bits/s. (Default for 1200 bits/s).
B1	Industry Standard 212A at 1200 bits/s.
B2	If originating a call using ITU-T V.23, transmit at 75 bits/s and receive at 1200 bits/s. If answering and N0 selected, transmit at 1200 bits/s and receive at 75 bits/s.
B3	If originating a call using ITU-T V.23, transmit at 1200 bits/s and receive at 75 bits/s. If answering and N0 selected, transmit at 75 bits/s and receive at 1200 bits/s.
B15	ITU-T V.21 at 300 bits/s. (Default for 300 bits/s).
B16	Industry Standard 103 at 300 bits/s.
B30	ITU-T V.22*bis* when line speed is 2400 bits/s.
B33	ITU-T V.34 when handshake begins at 2400 bits/s.
B41	ITU-T V.32 when line speed is 4800.
B44	ITU-T V.34 when handshake begins at 4800 bits/s.
B52	ITU-T V.32*bis* when line speed is 7200 bits/s.
B53	ITU-T V.34 when handshake begins at 7200 bits/s.
B60	ITU-T V.32 (or V.32*bis*) when line speed is 9600 bps.
B65	ITU-T V.34 when handshake begins at 9600 bits/s.
B70	ITU-T V.32*bis* when handshake begins at 12000 bits/s.
B72	ITU-T V.34 when handshake begins at 12000 bits/s.

B75	ITU-T V.32*bis* when handshake begins at 14400 bits/s.
B76	V.FC when handshake begins at 14400 bits/s.
B80	ITU-T V.34 when handshake begins at 14400 bits/s.
B81	V.FC when handshake begins at 16800-28800 bits/s.

D   Dial Telephone Number & Dial Modifiers (ACCURA)

The D command tells the modem to enter originate mode, go off-hook, and attempt to go online with another modem. The dial modifiers tell the modem what, when, and how to dial.

Dial Modifiers	Description
0-9 * #	Specifies numbers and symbols the modem will use when dialing.
T	Dials using Tone method.
P	Dials using Pulse method.
,	Pauses before continuing the dial string. (Should be used only within a dial string and following the D command).
W	Waits for second dial tone. (Should be used only within a dial string and following the D command).
@	Waits for quiet answer.
$	Waits for "bong" tone (for calling card number entry).
!	Issues hookflash.
R	Places call in reverse mode (to call an originate-only modem).
;	Returns to command state after dialing and maintains the connection.
S=n	Dials telephone number n (0-3) stored with the &Zn=x command.

D   Dial Telephone Number & Dial Modifiers (OPTIMA)

The D command tells the modem to enter originate mode, go off-hook, and attempt to go online with another modem. The dial modifiers tell the modem what, when, and how to dial.

Dial Modifiers	Description
0-9 * # A B C D	Specifies letters, numbers, and symbols the modem will use when dialing.
T	Dials using Tone method.
P	Dials using Pulse method.
,	Pauses before continuing the dial string. (Should be used only within a dial string and following the D command).
W	Waits for second dial tone. (Should be used only within a dial string and following the D command).
@	Waits for quiet answer.
$	Waits for "bong" tone (for calling card number entry).
!	Issues hookflash.
R	Places call in reverse mode (to call an originate-only modem).
;	Returns to command state after dialing and maintains the connection.
S=n	Dials telephone number n (0-3) stored with the &Zn=x command.

E   Echo Command Characters

The E command enables/disables command echo to your computer. If you do not see entered commands on your screen, enable command echo. If you see double characters, disable command echo.

Command	Description
E0	Do not echo characters from the keyboard to the screen in command state.
E1	Echo characters from the keyboard to the screen in command state.

H   Switch Hook Control

Command	Description
H0	Hang up and place modem in command state.
H1	Go off-hook and operate auxiliary relay.

I   Identification Request

Command	Description
I0	Appropriate product code for your modem.
I1	Verify ROM checksum (OK or ERROR).
I2	OK.
I3	Numeric product ID and Firmware checksum.
I4	Bitmap of modem features used by some software packages for identification purposes.

L   Speaker Volume

Command	Description
L0, L1	Set low speaker volume.
L2	Set medium speaker volume.
L3	Set high speaker volume.

M   Speaker Control

Command	Description
M0	Turn speaker off while off-hook.
M1	Turn speaker on until carrier detected.
M2	Turn speaker on while off-hook.
M3	Turn speaker on until carrier detected, except while dialing.

N   Modulation Fallback Options (ACCURA)

Command	Description
N0	When originating or answering, handshake only at speed specified by S37.
N1	When originating, begin negotiations at the highest DCE line speed specified in S37 and fall back to a lower speed if necessary. When answering, handshake at the highest speed allowed by S37 and fallback if necessary.

N   Modulation Fallback Options (OPTIMA)

Command	Description
N0	When originating or answering, handshake only at speed specified by S37.
N1, N2	When originating, begin negotiations at the highest DCE line speed specified in S37 and fall back to a lower speed if necessary. When answering, handshake at the highest speed allowed by S37 and fallback if necessary.

O   Return to Online mode

Command	Description
O0	Go to online state.
O1	Go to online state and initiate equalizer retrain sequence.

P   Set Pulse Dial Mode

Command	Description
P	Select Pulse dialing method.

P   Set Pulse Dial Mode (ACCURA UK)

Command	Description
P	Select Pulse dialing method. The make to break ratio is 33/67 with inter-digit pause at 750 milliseconds.

Q   Enable/Disable Result Codes

Command	Description
Q0	Return result codes.
Q1	Do not return result codes.
Q2	Return result codes in originate mode, do not return result codes in answer mode.

Sr?   Current Value of Register

Command	Description
Sr?	Read and respond with current value of register r (r is the register number; ? requests the value assigned to that register).

Sr=n   Writing to S-Registers

Command	Description
Sr=n	Set the value of register r to value n.

T   Set Tone Dial Mode

Command	Description
T	Select tone dialing method.

V Select Result Code Format

Command	Description
V0	Display result codes as numbers.
V1	Display result codes as words.

W Negotiation Progress Message Options

Command	Description
W0	Do not return negotiation progress messages.
W1	Return negotiation progress messages.
W2	Do not return negotiation progress messages and return **CONNECT** messages using modem-to-modem (DCE) speeds instead of modem-to-DTE speeds.

X Select Extended Result Code Function

Command	Description
X0	Provide basic call progress result codes: **CONNECT**, **NO CARRIER**, and **RING**.
X1	Provide basic call progress result codes and appropriate connection speed (e.g., **CONNECT 1200**, **CONNECT 2400**).
X2	Provide basic call progress result codes, connection speed, and **DIALTONE** detection.
X3	Provide basic call progress result codes, connection speed, and **BUSY** signal detection.
X4	Provide basic call progress result codes, connection speed, **BUSY** signal detection, and **DIALTONE** detection.

Y Select Long Space Disconnect Function

Command	Description
Y0	Do not respond to or send long space disconnect.
Y1	Respond to and send long space disconnect.

Z Modem Reset

Command	Description
Z0	Reset and recall stored user profile 0.
Z1	Reset and recall stored user profile 1.

&A Connect as Answering/Originating Modem

Command	Description
&A0	Connect as answering modem when auto-answering.
&A1	Connect as originating modem when auto-answering.

&B Disable Automatic Retrain

Command	Description
&B0	Disable V.32, V.32*bis*, V.34, and V.FC Auto-Retrain.
&B1	Enable V.32, V.32*bis*, V.34, and V.FC Auto-Retrain.

Note: See <u>S110 register</u>. V.34 and V.FC apply to 288 modems only.

&C   Data Carrier Detect

Command	Description
&C0	Assume presence of carrier detect signal.
&C1	Track presence of carrier detect signal.

&D   Data Terminal Ready

Command	Description
&D0	Ignore status of DTR signal.
&D1	Monitor DTR signal. When an on-to-off transition of DTR signal occurs, enter the command state. Return to the online state when the O command is issued (if the connection has not been broken).
&D2	Monitor DTR signal. When an on-to-off transition of DTR signal occurs, hang up and enter the command state.
&D3	Monitor DTR signal. When an on-to-off transition of DTR signal occurs, hang up and reset.

&F   Factory Defaults

Command	Description
&F	Recall factory configuration as active configuration.

&G   Guard Tone

Command	Description
&G0	Disable guard tones.
&G2	Use 1800 Hz guard tones.

&K   Flow Control

Command	Description
&K0	Disable local flow control.
&K1	Enable RTS/CTS local flow control.
&K2	Enable XON/XOFF local flow control.
&K3	Enable RTS/CTS local flow control.
&K4	Enable XON/XOFF local flow control.

Note: &K1 is a duplicate of &K3 and &K2 is a duplicate of &K4 for backward compatibility.

&L   Leased Line Operation (OPTIMA)

Command	Description
&L0	Configured for dial-up operation.
&L1	Configured for private speechband circuit (conditioned 2-wire leased line) operation.

&Q   Operational Mode Control (ACCURA)

Command	Description
&Q0	Communicate in asynchronous mode.
&Q5	Communicate in error-control mode.
&Q6	Communicate in asynchronous mode with automatic speed buffering (ASB) - for interfaces requiring constant speed between the DTE (computer/terminal) and the DCE (modem).
&Q8	Communicate in MNP error-control with 2:1 data compression. If an MNP error-control protocol is not established, the modem will fallback according to the current user setting in S36.
&Q9	Communicate in V.42 *bis*/MNP2-4 error-control. Attempts to negotiate a V.42 *bis* error-control link upon connection. If V.42 *bis* (or V.42) is not achieved, MNP2-4 will be attempted. If neither error-control protocol is established, the modem will fallback according to the current user setting in S36.

&Q   Operational Mode Control (OPTIMA)

Command	Description
&Q0	Communicate in asynchronous mode.
&Q1	Communicate in synchronous mode 1 - Async-to-Sync.
&Q2	Communicate in synchronous mode 2 - Stored number dial.
&Q3	Communicate in synchronous mode 3 - Voice/Data Switch.
&Q4	Communicate in synchronous mode 4 - Hayes AutoSync.
&Q5	Communicate in error-control mode.
&Q6	Communicate in asynchronous mode with automatic speed buffering (ASB) - for interfaces requiring constant speed between the DTE (computer/terminal) and the DCE (modem).
&Q8	Communicate in MNP error-control with 2:1 data compression. If an MNP error-control protocol is not established, the modem will fallback according to the current user setting in S36.
&Q9	Communicate in V.42 *bis*/MNP2-4 error-control. Attempts to negotiate a V.42 *bis* error-control link upon connection. If V.42 *bis* (or V.42) is not achieved, MNP2-4 will be attempted. If neither error-control protocol is established, the modem will fallback according to the current user setting in S36.

&R   Select RTS/CTS Option (OPTIMA)

Clear to send (CTS) functions in synchronous mode (&Q1, &Q2, and &Q3) are determined by the &R command.

Command	Description
&R0	CTS tracks Request to Send (RTS) while the modem is online.
&R1	CTS is on while the modem is online, RTS is ignored.

&S   Data Set Ready (ACCURA)

Command   Description

    &S0   Assert DSR signal always.

&S   Data Set Ready (OPTIMA)

Command   Description

    &S0   Assert DSR signal always.

    &S1   Assert DSR signal before handshake only.

    &S2   Assert DSR at end of handshake.

&T   Test (OPTIMA)

The &T commands must be entered when the modem is configured for &Q0 (unbuffered asynchronous mode). Also, for &T19 tests, your terminal software must support the function of &T19.

Command   Description

    &T0   Terminate any test in progress.

    &T1   Initiate local analog loopback.

    &T3   Initiate local digital loopback.

    &T4   Grant request from remote modem for remote digital loopback.

    &T5   Deny request from remote modem for remote digital loopback.

    &T6   Initiate remote digital loopback.

    &T7   Initiate remote digital loopback with self-test.

    &T8   Initiate local analog loopback with self-test.

    &T19   Determine whether RTS and CTS circuits are supported in the DTE cable.

For more information, click on Testing the Modem.

&U Trellis Coding

Command	Description
&U0	Enable trellis coding (ITU-T V.32 9600 bits/s only).
&U1	Disable trellis coding.

&V View Active Configuration

Command	Description
&V	View active configuration, user profiles, and stored telephone numbers.

&V View Active Configuration (OPTIMA)

Command	Description
&V	View active configuration, user profiles, and stored telephone numbers.
&V8	Reports details of the last data connection.

&W Store User Profile

Command	Description
&W0	Write storable parameters of current configuration in memory as profile 0.
&W1	Write storable parameters of current configuration in memory as profile 1.

&X Select Synchronous Transmit Clock Source (OPTIMA)

Command	Description
&X0	Modem generates transmit clock.
&X1	DTE generates transmit clock.
&X2	Modem derives transmit clock from receive carrier signal.

&Y Select Stored Profile on Power-Up

Command	Description
&Y0	Specify stored user profile 0 as power-up configuration.
&Y1	Specify stored user profile 1 as power-up configuration.

&Zn=x Store Telephone Numbers

Command	Description
&Zn=x	Store phone number x in location n (n=0-3).

$H Help Menu

Command	Description
$H	Provides a menu of help features for your modem. Enter the appropriate command for your area of interest. For example: **AT$H1**

(ENTER) provides basic result codes and modem commands 'A' to 'N.'

+FAA   Data/FAX Answer Procedure (OPTIMA)

The +FAA parameter determines whether the modem answers in FAX mode or determines the mode during handshake if +FCLASS=2.

+FCLASS	+FAA	Procedure
0	0	Answer as data modem.
0	1	Answer as data modem.
2	0	Answer as FAX modem.

If +FAA=1 and +FCLASS=2, the silent period after an answer modem goes off-hook is 4 seconds instead of the usual 2 seconds. This allows time to detect a FAX calling tone before sending the answer tone.

Note: The communications application should be set at a speed high enough to recognize a FAX class 2 call if answered.

If a FAX calling tone is detected, the modem sends the +FCO result code before sending any other result codes. If a calling data modem is detected, the modem changes +FCLASS value to 0 and sends the +FDM result code before any other result codes.

+FAE   Automatic Data/FAX Handshake

If configured for FAX operation (+FCLASS=1), the +FAE command automatically determines if incoming calls are data or FAX and controls data and FAX result codes.

Value	Description
+FAE=0	Incoming calls must be answered by DTE commands and the modem does not present FAX or DATA result codes.
+FAE=1	After answering a call the type of calling station is determined by detection of calling tone or by probing during the handshake. If it is determined that the calling station is a FAX machine or modem, then the answering modem sends a flag idle signal (V.21 modulation) and sends the FAX result code to the DTE. The DTE must then send the appropriate Class 1 commands to the modem to complete the call.
	If it is determined that the calling station is a data modem, the answering modem shall complete the handshake, set +FCLASS=0, send the DATA result code to the DTE, and then send the normal data call result codes to the DTE to complete the call setup.
	If +FAE=1, then the silent period after an answer modem goes off hook shall be 4 seconds instead of the usual 2 seconds. This allows time to detect a FAX calling tone before sending answer tone.
	+FAE resets to value 0 is a **Z** or **&F** command is issued.

+FClass   Select Class of FAX Operation

The **+FCLASS** parameter sets the mode of modem FAX operation. Entering AT+FCLASS? returns the setting value. Entering AT+FCLASS=? returns all values supported by the modem. Entering AT+FCLASS=n (where n is the value of operation) sets the modem for a particular class of operation.

Value	Description
0	Data mode
1	Fax Class 1

+FClass   Select Class of FAX Operation (OPTIMA)

The **+FCLASS** parameter sets the mode of modem FAX operation. Entering AT+FCLASS? returns the setting value. Entering AT+FCLASS=? returns all values supported by the modem. Entering AT+FCLASS=n (where n is the value of operation) sets the modem for a particular class of operation.

Value	Description
0	Data mode
1	Fax Class 1
2	Fax Class 2

%CCID   Caller ID (OPTIMA)

Your modem can decode and send information about a caller to your computer if you subscribe to your local telephone company's Caller ID service. The telephone company sends this information between the first and second ring.

Before using Caller ID, follow these steps:

Step 1: Clear the modem by typing AT%CCID=0   ENTER.

Step 2: Initiate Caller ID by typing AT%CCID=1   ENTER. Once initiated, any value can be used with the %CCID command from the following table:

Note: ^ indicates space.

Command	Description	ID Return Format
%CCID=0	Disable Caller ID Reporting.	
%CCID=1	Enable Formatted Reporting.	DATE^=^MMDD TIME^=^HHMM CALR^=^NNNNNNNNNN NAME^=^AAAAAAAAAAAAAA
%CCID=2	Enable Unformatted Reporting	MESG^=^HHHHHHHHHHH...HHH

%CRID   Repeat Last ID (OPTIMA)

Issuing **AT%CRID** instructs the modem to send the last reported call information to your computer. AT %CRID=0   RETURN presents formatted reporting. AT%CRID=1   RETURN presents unformatted reporting.

%DUMB Dumb Command (OPTIMA)

The commands %DUMB0 and %DUMB1 are used to disable or enable command recognition.

The %DUMB1 command is equivalent to setting a dumb switch to the dumb position. The command is valid in smart AT mode. If the command is given to the modem the modem returns an OK result code and does not act on the command until the next power-on reset.

The %DUMB0 command is equivalent to setting a dumb switch to the smart position. If a modem is in the dumb mode, the %DUMB0 command sent with any valid autobaud speed (and only that command) is valid during the first 20 seconds after power is applied to the modem. After that time, the normal dumb mode is in effect. If the command is given to the modem during the time window, the modem will not echo the command input and returns the OK result code and immediately enters the smart mode.

If ringing is detected during the 20-second window and the value of S0 is greater than 0, then the 20-second timer will be aborted and the modem will go into normal dumb mode. When the value of S1 reaches that of S0, the call will be answered.

Summary:

%DUMB0 turns off dumb mode and %DUMB1 turns on dumb mode.

%DUMB0 command has immediate effect; the %DUMB1 command takes effect after the next power on reset.

%DUMB0 and %DUMB1 commands are non volatile; they do not need to be stored by &Wn command.

Note: CTS will be low when the modem is in dumb mode. For this reason, the communications application or terminal must be configured for no flow-control when sending %DUMB1 to enable smart mode.

!FLASH   Load Flash Memory (OPTIMA)

The !FLASH command tells the modem to receive and store program code from the attached computer. The command is valid only while the computer's serial port speed is 19200 bps.

If an error occurs to one or more lines (checksum failure) the modem continues to accept the entire remaining file and then discards it. After the end of the file is detected, the modem sends the ERROR result code followed by the READY result code. The modem is now ready to receive the file again.

Note: While some communication programs can autotype files and wait for each character to be echoed before sending the next, many cannot. However, most communication programs support line pacing (waiting for a specified period of time before sending the next line of a file).

Steps for updating Flash memory:

WARNING: Do not update Flash Memory unless you have an updated program code to download from the BBS otherwise, you will delete all the program codes for your modem.

Step 1: Verify the communications program is set for 19200 bps.

Step 2: Type AT!FLASH   RETURN. The modem responds with "Ready" (information text).

Note: If the speed is not 19200 bps, the modem returns the "ERROR" result code and goes to the idle state.

Step 3: Send the file to the modem (using Autotype mode).

Note: Refer to your communications program documentation for instructions on sending files. Autotype mode refers to uploading a text file without using an error-detecting protocol.

The modem stores the file in RAM pending CRC checking. If the file CRC checks, then the modem writes the file to its designated location in flash memory. At the start of this process, the DCE sends "Programming" to the computer. When finished, the modem sends "Complete", initiates a soft reset, and goes to the idle state.

If the file CRC does not check or other error occurs before or during the programming phase, the modem sends an error message to the computer, initiates a   modem reset, and sends "Ready" to the computer.

$BRC   Enable/Disable Host Initiation of Basic Remote Configuration (BRC) (OPTIMA)

Note: This parameter is storable and not displayed by <u>&V</u>.

Command	Description
$BRC=0	Disable local initiation of BRC state. (Default)
$BRC=1	Enable local initiation of BRC state for one call only. Value is automatically changed from 1 to 0 at end of call.
$BRC=2	Enable local initiation of BRC state.

For more information, click on <u>About Basic Remote Configuration (BRC)</u>.

$GIVEBRC   Enter BRC State from Remote Online Command State (OPTIMA)

Typing AT$GIVEBRC   RETURN enters Basic Remote Configuration. This returns an OK result code when the command accepted and ENTERING BRC   when BRC state is entered. This is sent to both local DCE and remote DTE.

For more information, click on About Basic Remote Configuration (BRC).

$GETBRC   Enter BRC State from Local Online Command State (OPTIMA)

Typing AT$GETBRC   RETURN enters Basic Remote Configuration. This returns a ENTERING BRC result code to local DCE. The result code, BRC DISABLED is returned if BRC=0.

The modem executing the $GETBRC command performs the following:

1. Sends the remote escape sequence _+BRC+_

2. Waits for confirmation or no response.

Note: This command only operates if target modem supports Hayes BRC.

For more information, click on About Basic Remote Configuration (BRC).

-SUID   Program Unit ID (OPTIMA)

This security dial-back commands provide for storing a write-only single unit identification for incoming calls.

Example: AT [cmds] -SUID=<num>[,<gp>] [;cmds]   RETURN

The <num> field is a decimal number from the set (0 - 65535). The optional group <gp> field is a decimal number from the set (0 - 255) and has a default value of 0. Numbers in their valid respective ranges results in an OK result code; otherwise ERROR. The group field   permits a two-level unit ID scheme.

Note: Proper operation requires that both sides of the connection have Hayes modems with the same features. ATZ and AT&F do not affect the settings.

For more information, click on About Security Dial-back Commands or Using Security Dial-back with Smartcom for Windows.

-SPWD   Program Password (OPTIMA)

Security dial-back commands provide for storing a password for incoming calls. The default value is "PASSWORD"

Note: Proper operation requires that both sides of the connection have Hayes modems with the same features. ATZ and AT&F do not affect the settings.

For more information, click on About Security Dial-back Commands or Using Security Dial-back with Smartcom for Windows.

-SPRT   Set/Read Remote Mode (OPTIMA)

Security dial-back commands provide for selecting the mode of operation for incoming calls.

Note: Proper operation requires that both sides of the connection have Hayes modems with the same features. ATZ and AT&F do not affect the settings.

For more information, click on About Security Dial-back Commands or Using Security Dial-back with Smartcom for Windows.

-SKEY   Program Key (OPTIMA)

This command stores the non-violatile 8-byte key that is used to validate incoming calls and is the default key for outgoing calls. The key is 8 hex numbers, entered in ASCII format.

Example: AT [cmds] -SKEY=<key> [;cmds]   RETURN

Spaces between the hex numbers are ignored. For outgoing calls, this key may be over ridden using the %SKEY command or by including a key value in the dial string.

For more information, click on About Security Dial-back Commands or Using Security Dial-back with Smartcom for Windows.

%SPRT   Security Mode for Outgoing Calls (OPTIMA)

This security dial-back command sets the modem's outgoing security mode.

Example: AT [cmds] %SPRT=<mode> [;cmds]   RETURN

Entering a value selects the security mode to request or support during the next outgoing call. The following values are supported:

Value	Description
0	No Security (default)
1	Pass through
2	Dial back
3	Either Pass through or dial back.
4	Supervisory

For more information, click on <u>About Security Dial-back Commands</u> or <u>Using Security Dial-back with Smartcom for Windows</u>.

%SUID   Unit Identification for Outgoing Calls (OPTIMA)

This security dial-back command stores the modem's outgoing unit identification.

Example: AT [cmds] %SUID=<num>[,<gp>] [;cmds]   RETURN

The <num> field is a decimal number from 0 to 65535. The optional group <gp> field is entered as a decimal number from 0,1-255 (the value 0 indicates no <gp> number). Entered numbers in their respective ranges results in an OK result code; otherwise ERROR. The group field permits a two-level unit ID scheme. If <gp> is omitted, the value is set to 0. Factory Default: 0,0

For more information, click on <u>About Security Dial-back Commands</u> or <u>Using Security Dial-back with Smartcom for Windows</u>.

%SPWD   Password for Outgoing Calls (OPTIMA)

This security dial-back command stores the modem's password for the next outgoing call.

Example: AT [cmds] %SPWD="<password>" [;cmds]   RETURN

The string <password> must be at least 6 alphanumeric ASCII characters from the set ("A" to "Z", "a" to "z", "0" to "9") and is case insensitive. The modem returns OK if these criteria are satisfied; otherwise it returns ERROR.

Note: Lower case letters shall be stored as upper case letters.

For more information, click on About Security Dial-back Commands or Using Security Dial-back with Smartcom for Windows.

%SCBR   Call Back Reference for Outgoing Calls (OPTIMA)

This security dial-back command stores the modem's password for the next outgoing call.

Examples:　　　AT [cmds] %SCBR=<dialback> [;cmds]   RETURN

　　　　　　　　AT [cmds] %SCBR="<dialback>" [;cmds]   RETURN

The call back reference may be a decimal number from the sets (0, 1 - 65535) or a 4-character alphanumeric string; the value 0 indicates that the default call back number is desired. If a string is desired, then it shall be enclosed in double quotes as shown in the second command line format example. If a number is entered and it is in the specified range or if a string is entered and it consists of characters from the set ("A" - "Z","a" - "z",0-9) then the modem returns the OK result code; otherwise, ERROR. Factory Default: 0

For more information, click on <u>About Security Dial-back Commands</u> or <u>Using Security Dial-back with Smartcom for Windows</u>.

%SKEY   Store Authentication Key for Outgoing Call (OPTIMA)

This security dial-back command stores the 8-byte key that may be used with the next outgoing call. The key is 8 hex numbers, entered in ASCII format. The default value of this key is the value set by the -SKEY command. Factory Default: 0

Example: AT %SKEY = 0a cd ef 90 81 12 3e fc   RETURN

Note: Spaces between the hex numbers are ignored.

For more information, click on About Security Password and Dial back Commands or Using Security Dial-back with Smartcom for Windows.

%   Percent Dial Modifier (OPTIMA)

This dial modifier instructs the modem to end the number string and record the following security information. The security information shall be in the following format.

%<mode>[,[<num>][,[<gp>][,["<password>"][,[<dialback>][,<key>]]]]]

or

%<mode>[,[<num>][,[<gp>][,["<password>"][,["<dialback>"][,<key>]]]]]

Example: ATDT9,7296558%1,12,3,"secret12","HOME",432efd <CR>

Example: ATDT9,7296558%1,12,3,"secret12",122,432efd <CR>

<mode> = 0,1,2,3, or 4.   See %SPRT command.

<key> is the key to be used for the call. This is a volatile value. If not present the key stored with the -SKEY command is used.

<num> and <gp> constitute the unit id for the call. See the %SUID command.

<password> is the password for the call. See the %SPWD command.

<dialback> is the dial-back reference. See the %SCBR command.

For more information, click on <u>About Security Password and Dial back Commands</u> or <u>Using Security Dial-back with Smartcom for Windows</u>.

Voice (OPTIMA)

Voice features of OPTIMA comply with Rockwell ADPCM commands. Please refer to your communications program for support of voice features.

About S-Registers

S-Registers are special memory locations in the modem for storing counting, timing, ASCII character, or feature negotiation values. S-registers can be changed by issuing the ATS=n command. The Sr? command can be used to read the current value of an S-register, where r is the S-register to be read.

S-Register Descriptions

S0   Ring to Answer On

S0 sets the number of rings required before the modem picks up the telephone line to answer an incoming call (auto answer). The value can be any number between 0 and 255. **S0**=0 disable the auto-answer function. The **AA** lamp lights when S0 contains a number greater than zero.

Range/Units   **Default Setting**
0-255 rings   0

S1   Ring Count

S1 accumulates the number of rings sensed on the telephone line. **S1** resets to 0 if a ring is not sensed within any eight-second interval. When **S0** contains a non-zero value between 1 and 255 and the count in **S1** equals the value in S0, the modem goes off-hook to answer the call. S1? returns the value of the S1 register.

Range/Units
0-255 rings

S2   Escape Sequence Character

S2 holds the value of the ASCII character used as the modem escape character. The default is 43 (the "+" character). When the modem is online and receives the escape sequence, it switches to command mode. The escape character function is disabled if the value of **S2** is greater than 127.

Range/Units   **Default Setting**
0-127 ASCII   43

S3   Carriage Return Character

S3 contains the value of the ASCII character recognized as the command line terminator. S3 can be set to any value between 0 and 255, but any value between 127 and 255 is seen as 127 by the modem.

Range/Units   **Default Setting**
0-127 ASCII   13

S4   Linefeed Character

S4 defines the value of the ASCII character recognized by the modem as the linefeed.

Range/Units   **Default Setting**
0-127 ASCII   10

S5   Backspace Character

S5 defines the value of the ASCII character recognized by the modem as a backspace.

Range/Units   **Default Setting**
0-32 ASCII   8

S6   Wait Time before Blind Dialing

S6 specifies the amount of time the modem waits after going off-hook before dialing the first digit of the dial string. The <u>W</u> (wait for dial tone) modifier overrides the value contained in **S6** and dials the first digit as soon as a dial tone is detected. The <u>ATX2</u> and <u>ATX4</u> commands enable dial tone detection and disable blind dialing making the value contained in **S6** irrelevant.

Range/Units	Default Setting
2-255 seconds	2

S6   Wait Time before Blind Dialing (ACCURA UK)

S6 specifies the amount of time the modem waits after going off-hook before dialing the first digit of the dial string. The <u>W</u> (wait for dial tone) modifier overrides the value contained in **S6** and dials the first digit as soon as a dial tone is detected. The <u>ATX2</u> and <u>ATX4</u> commands enable dial tone detection and disable blind dialing making the value contained in **S6** irrelevant.

Range/Units	Default Setting
7 seconds	4

S7   Wait for Carrier After Dial

The value of **S7** specifies the number of seconds the originating modem waits for carrier from the answering modem. When using the extended result code option commands, <u>ATX3 or ATX4</u> (factory default), S7 sets the period the period the originating modem waits for dial tone, quiet, or bong (calling-card prompt tone) with the <u>W</u>, and <u>$</u> dial modifiers, respectively.

Range/Units	Default Setting
2-255 seconds	50

S8   Pause Time for Comma Dial Modifier

S8 specifies the number of seconds to pause for each comma (<u>,</u>) encountered in a dial string or command line.

Range/Units	Default Setting
0-255 seconds	2

S9   Carrier Detect Response Time

S9 specifies the time (in 0.1 second units) that a received carrier must be present on the line before the modem recognizes it as a valid carrier and asserts the Data Carrier Detect (DCD) signal. Setting this value prevents the modem from erroneously detecting a BUSY or RING signal as a carrier.

Range/Units	Default Setting
1-255 tenths of seconds	6

S10   Lost Carrier to Hang-Up Delay

Specifies the time the online modem waits after carrier loss before it hangs up the telephone line. Setting S10 to 255 disables the hang-up function. **S10** should always be greater than <u>S9</u> or the modem will hang up in response to a momentary loss of carrier signal.

Range/Units	Default Setting

1-255   1/10 seconds   14

S11   DTMF Dialing Speed (ACCURA UK)

S11 specifies the duration of the tones in Dual Tone Multi-Frequency (DTMF) dialing. The value of **S11** has no effect on Pulse dialing.

Range/Units   Default Setting
75-255   75
milliseconds

S11   DTMF Dialing Speed

S11 specifies the duration of the tones in Dual Tone Multi-Frequency (DTMF) dialing. The value of **S11** has no effect on Pulse dialing.

Range/Units   Default Setting
50-255   95
milliseconds

S12   Escape Character Guard Time

S12 specifies the delay time required (before and after the entry of the escape sequence) for the modem to recognize that the escape sequence is valid. This value also dictates the acceptable entry speed (inter-character time) for each escape character. The guard time is in units of 20 milliseconds (1/50th of a second).

Range/Units   Default Setting
0-255   1/50   50 (1 second)
seconds

S16   Test in Progress (OPTIMA)

This register indicates which test is in progress. The values are as follows:

Value   Description

Value	Description
0	Local analog loopback enabled.
2	Local digital loopback enabled.
3	Remote digital loopback (at this end) enabled.
4	Remote digital loopback enabled.
5	Remote digital loopback with self-test enabled.
6	Local analog loopback with self-test enabled.

For more information, click on <u>Testing the Modem</u>.

S18   Select Test Timer (OPTIMA)

This setting determines the length of time for a test and ranges from 0 to 255 seconds. The default is 0.

For more information, click on <u>Testing the Modem</u>.

S25   DTR Detection

The value of **S25** specifies the time (in hundredths of a second) that DTR must be false before the modem accepts a DTR transition as valid. The action taken in response to a DTR transition is determined by the setting of the AT&Dn command. When the modem is online, DTR changes for a period less than the value contained in **S25** are ignored.

Range/Units	Default Setting
0-255 1/100 seconds	5

S30   Inactivity Timer

S30 specifies the period of data inactivity while online after the modem hangs up the telephone line. This function is applicable to all buffered modes. It is not supported when the modem is configured with the AT&Q0 command. The default (0) disables this function.

Range/Units	Default Setting
0-255 10 seconds	0

S36   Protocol Negotiation Fallback

S36 specifies subsequent action for the modem to take if the initial error-control negotiation fails. The **S36** values and fallback actions are defined in the accompanying table. The default is **S36**=7.

The selected fallback option can be forced to take place immediately by setting S48 to disable negotiation. For example, you can force an immediate alternate protocol (MNP) connection by setting **S48**=128 with **S36**=5 or 7. Data compression selections are managed with S46.

Value	Description
S36=0	Modem hangs up.
S36=1	Attempt standard asynchronous (direct mode) connection (**AT&Q0**).
S36=3	Attempt standard asynchronous (normal mode) connection with automatic speed buffering (**AT&Q6**).
S36=4	Attempt V.42 alternate protocol (MNP 2-4 compatible). Hang up if negotiation fails.
S36=5	Attempt V.42 alternate protocol (MNP 2-4 compatible). Fall back to standard asynchronous (direct mode) connection.
S36=7	Attempt V.42 alternate protocol (MNP 2-4 compatible). Fall back to standard asynchronous (direct mode) connection with automatic speed buffering (ASB).

S37   Maximum DCE Speed (144 Modems)

S37 selects the speed that your modem attempts a connection with the remote modem. This is the data transmission speed across the telephone line from modem to modem. If the remote modem does not support the speed specified by **S37**, your modem attempts to connect at the next lower speed. This continues until a connection is made, the options are exhausted, or the remote modem times out. See the ATB and ATN commands for related information.

Value	Speed of last AT command
S37=0	Modem hangs up.

S37=3	300 bits/s
S37=5	1200 bits/s
S37=6	2400 bits/s
S37=7	4800 bits/s
S37=8	7200 bits/s
S37=9	9600 bits/s
S37=10	12,000 bits/s
S37=11	14,400 bits/s

S37   Maximum DCE Speed (288 Modems)

S37 selects the speed that your modem attempts a connection with the remote modem. This is the data transmission speed across the telephone line from modem to modem. If the remote modem does not support the speed specified by **S37**, your modem attempts to connect at the next lower speed. This continues until a connection is made, the options are exhausted, or the remote modem times out. See the ATB and ATN commands for related information.

Value	Speed of last AT command
S37=0	Modem hangs up.
S37=3	300 bits/s
S37=5	1200 bits/s
S37=6	2400 bits/s
S37=7	4800 bits/s
S37=8	7200 bits/s
S37=9	9600 bits/s
S37=10	12,000 bits/s
S37=11	14,400 bits/s
S37=26	16,800 bits/s
S37=12	19,200 bits/s
S37=33	21,600 bits/s
S37=29	24,000 bits/s
S37=34	26,400bits/s
S37=15	28,800 bits/s

S38   Delay Before Forced Hang-Up

S38 specifies the number of seconds a modem in error-control mode (AT&Q5) waits before disconnecting in response to either receiving a command to hang-up the line or detecting an on-to-off transition of DTR when AT&D2 is set. This delay ensures that all pending data packets are sent before disconnection occurs. If S38=255, the modem does not time-out but continues to attempt to deliver data until the connection is lost or all data is transferred.

Range/Units	Default Setting
0-255 seconds	20

S43   Current DCE Speed

S43 is a read-only S-Register containing a value representing the DCE speed of the current connection.

This register is read by certain communications programs for internal processing. This register is only active when the modem is online.

Value	Description
S43=0	No Connection
S43=3	300 bits/s
S43=5	1200 bits/s
S43=6	2400 bits/s
S43=7	4800 bits/s
S43=8	7200 bits/s
S43=9	9600 bits/s
S43=10	12,000 bits/s
S43=11	14,400 bits/s
S43=26	16,800 bits/s
S43=12	19,200 bits/s
S43=33	21,600 bits/s
S43=29	24,000 bits/s
S43=34	26,400 bits/s
S43=15	28,800 bits/s

S46   Data Compression Selection

S46 specifies the error-control protocol which the modem can use for subsequent connections.

Value	Description
0	LAPM only.
2	LAPM with data compression.

S48   Feature Negotiation Action

S48 determines the capabilities of the remote modem and selects the specific feature and nature of subsequent actions when negotiating the initial connection.

If the capabilities of the remote modem are known, **S48** can be used to either tailor the negotiation to suit or bypass the negotiation phase completely. The S48=7 default enables feature negotiation. Any invalid entry is interpreted by the modem as S48=128.

Value	Description
S48=0	Feature negotiation disabled. Bypass detection and negotiation and proceed with LAPM.
S48=7	Feature negotiation enabled (default).
S48=128	Feature negotiation disabled. Forces immediate fallback to options specified in S36. Can be used to force an MNP connection.

S63   Private Circuit Carrier Level (OPTIMA)

This register sets the carrier level for leased-line operation. Ranges are 0 to -15dBm. Default = -9dBm.

S70   Maximum Number of Retransmissions (OPTIMA)

S70 determines how many times the modem will retransmit a frame. The range is 0-255 retries with a default setting of 10.

S71 Link Layer Timeout (OPTIMA)

S71 sets the delay between retransmissions to the remote system. The range is 1-255   1/10 seconds, with a default setting of 2 (200 milliseconds).

S73   No Activity Timeout (OPTIMA)

S73 specifies the period of inactivity (no data, only good carrier and flag idle received) before the modem sends a query (an RR) to the remote modem to verify that it is operating properly. The range is 1-255 seconds with a default setting of 5.

S82   Break Signaling Technique

S82 defines the method used to send a BREAK to the remote system to get the attention of the remote modem. Expedited BREAKs are sent immediately, before transmission of any pending data. Destructive BREAKs are also sent immediately and any pending data is destroyed. Timed BREAKs preserve the time BREAK is pressed, rounding to the nearest 10 milliseconds. Sequenced BREAKs are sent in sequence with the pending data without destroying the data.

Value	Description
S82=3	Expedited timed BREAK signal. Data integrity is maintained before and after the BREAK signal.
S82=7	Destructive timed BREAK signal. Data in process is destroyed..
S82=128	In-sequence, timed BREAK signal. Data integrity is maintained before and after the BREAK signal.

S86   Connection Failure Cause Code

When the modem fails to make a connection and returns the NO CARRIER result code, a value is written in S86 defining the cause of the failed connection. S86 records the first event that causes a NO CARRIER message to occur. Issuing ATS86? ENTER reports one of the following values:

Note: Multiple occurrences may contribute to a NO CARRIER message; S86 records the first event that occurred.

Value	Description
S86=0	Normal connect termination. No error occurred (default).
S86=1	FAX hang up.
S86=4	Physical carrier loss.
S86=5	V.42 feature negotiation failed to detect an error-control modem at remote end.
S86=6	Remote error-control modem did not respond to negotiation message.
S86=7	Remote modem is a synchronous-only modem.
S86=8	Modems could not find a common framing technique.
S86=9	Modems could not find a common protocol.
S86=10	Incorrect feature negotiation message sent by remote modem.
S86=11	Synchronous information (data or flags) not received from the remote modem. Modem waited 30 seconds before hanging up.
S86=12	Normal disconnect initiated by remote modem.
S86=13	Remote modem did not respond to repeated message. After ten attempts, the local modem terminated the call.
S86=14	Protocol violation occurred.
S86=15	Compression failure.

S91   PSTN Transmit Level Adjustment (ACCURA UK)

The PSTN transmit level can be adjusted using register S91. This register specifies a carrier level value that is not to be exceeded. The range for register S91 is 0-9. The default value is 9.

S95   Negotiation Message

S95 enables a set of result codes that reports the sequence of events when establishing an error-control connection. **S95** does not affect the way the modem negotiates a connection; it merely enables message options.

The default setting of **S95** is **0**, no bits selected. To enable any combination of the bits, add the value(s) to the right of the bit number and set the register to this sum.

Note: The W command does not affect the value of **S95**.

Bit	Value	Description
0	1	Use DCE speed when reporting CONNECT result codes.
1	2	Append /ARQ to CONNECT result code (CONNECT /ARQ) when an error-control connection is established.
2	4	Enable CARRIER result codes.
3	8	Enable PROTOCOL result codes.
5	32	Enable COMPRESSION result codes..

S95   Negotiation Message (OPTIMA)

S95 enables a set of result codes that reports the sequence of events when establishing an error-control connection. **S95** does not affect the way the modem negotiates a connection; it merely enables message options.

The default setting of **S95** is **0**, no bits selected. To enable any combination of the bits, add the value(s) to the right of the bit number and set the register to this sum.

Note: The W command does not affect the value of **S95**.

Bit	Value	Description
0	1	Use DCE speed when reporting CONNECT result codes.
1	2	Append /ARQ to CONNECT result code (CONNECT /ARQ) when an error-control connection is established.
2	4	Enable CARRIER result codes.
3	8	Enable PROTOCOL result codes.
5	32	Enable COMPRESSION result codes.
8	256	Enable MODULATION result codes.

S97   V.32 Automode V.22/V.22 bis Probe Timing

S97 sets the duration of the signal used by the modem in the answer mode during a V.32 automode handshake to determine if the calling modem is a V.22 or V.22*bis* type modem.

The value of S97 also sets the time during which the modem will reject the V.22/V.22*bis* probe signal when executing the V.32 automode handshake in originate mode. The range of S97 values is 15 to 70, representing 1.5 to 7.0 seconds. The default value of **30** (3.0 seconds) provides the timing necessary to connect to most V.22*bis* compatible modem. When compatibility with V.32 "late connecting modems" is a primary requirement, S97 should be set to **15**. This value is also compatible with the timing specified in ITU-T recommendation V.22*bis*.

S101   Distinctive Ring Settings (OPTIMA)

Distinctive ring allows two telephone numbers to access one telephone line with differentiating rings. The following patterns are supported by your modem:

Type	Pattern
A	Standard ring.
B	Two rings.
C	Two short rings, one long ring.
D	One short ring, one long ring, one short ring.
U	Unidentified ring.

S-Register 101 determines how the modem reports the occurrence of distinctive ringing signals. A bit value of 0 enables conventional ringing detection and reporting.

Bit	S-Register Value	Description
0	1	Enable "Ring" <type>
1	2	Disable reporting of type A ringing.
2	4	Disable reporting of type B ringing.
3	8	Disable reporting of type C ringing.
4	16	Disable reporting of type D ringing.
5	32	Disable reporting of type U (unidentified) ringing.

Examples:

S101=0 commands the modem to detect all ringing cadences and report them with "RING" result code.

S101=1 enables the RING <type> result codes; all ringing types will be reported.

S101=58 tells the modem to report only ringing type B with the RING result code.

S101=59 tells the modem to report only ringing type B with the RING <type> result code.

S101=62 disables all ringing detection.

Distinctive Ring by Value

The following table describes S101 values for detection of all ring type combinations.

Note: Headings repeat for clarity.

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√	√	√	√	√	√	0
	√	√	√	√	√	1
√		√	√	√	√	2
		√	√	√	√	3
√	√		√	√	√	4
	√		√	√	√	5
√			√	√	√	6
			√	√	√	7

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√	√	√		√	√	8
	√	√		√	√	9

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√		√		√	√	10
		√		√	√	11
√	√			√	√	12
	√			√	√	13
√	√	√	√		√	16
	√	√	√		√	17
√	√	√	√		√	18
	√	√			√	19

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√	√		√		√	20
	√		√		√	21
√			√		√	22
			√		√	23
√	√	√			√	24
	√	√			√	25
√		√			√	26
		√			√	27
√	√				√	28
	√				√	29

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√					√	30
					√	31
√	√	√	√	√		32
	√	√	√	√		33
√		√	√	√		34
		√	√	√		35
√	√		√	√		36
	√		√	√		37
√			√	√		38
			√	√		39

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
√	√	√		√		40
	√	√		√		41
√		√		√		42
		√		√		43
√	√			√		44

Result Code Ring	Enable A	Enable B	Enable C	Enable D	Enable U	Set S101 =?
	√			√		45
√				√		46
				√		47
√	√	√	√			48
	√	√	√			49
√		√	√			50
		√	√			51
√	√		√			52
	√		√			53
√			√			54
			√			55
√	√	√				56
	√	√				57
√		√				58
		√				59
√	√					60
	√					61

Note: 0 = Answer all rings **RING**, 1 = Answer all rings with **RING X**, 62 = Disables all ring detection.

S102   Last Ring Type Detected (OPTIMA)

The value of S102 indicates the last reported ringing type. Since S101 selects which ringing types are reported, some ringing types may be detected but not reported.

If result codes are disabled by the Q1 or Q2 command, the value S102 indicates is the last ringing type allowed by S101 but not actually reported.

S102 Value	Ring Pattern
0	None
1	RING
2	RING A
3	RING B
4	RING C
5	RING D
6	RING U

The value 0 is used if no ringing was reported since the last reset.

S105   Frame Size

The value of **S105** indicates the maximum link layer frame information field size that shall be attempted with the V.42 protocol. The frame size will be the smaller of the size indicated by the value of S105 and any restrictions imposed by the particular link layer protocol in use.

Value	Size
4	16 bytes
5	32 bytes
6	64 bytes
7	128 bytes
8	256 bytes
9	512 bytes

S108   Signal Quality Selector

If the modem determines that the signal quality is less than that specified by the value assigned to **S108**, the modem attempts to connect at the next lower carrier speed specified by S109 unless the N0 command was selected. If the N0 command has been selected, then only the carrier speed specified by S37 is used.

Value	Description
0	No limit
1	Low quality
2	Medium quality
3	High quality

S109   Carrier Speed Selector

The **S109** register controls the speeds available for V.32*bis*, V.FC, and V.34 carrier handshakes. This permits disabling speeds lower than the highest selected carrier speed.

Register S37 selects the highest carrier speed. If the N0 command is selected, the carrier speed specified by S37 and one of the carrier speeds specified by S109 must match; the modem will connect only at that carrier speed.

The **S37** and **N0** command settings do not affect the modem speed during retrain or rate re-negotiation procedures.

CAUTION: If speed negotiation is disabled by the **N0** command and **S37** indicates a speed that is not enabled by **S109**, then the modem will not connect.

Decimal Value	Description
1	2400 bits/s
2	4800 bits/s
4	7200 bits/s
8	9600 bits/s
16	12000 bits/s
32	14400 bits/s
64	16800 bits/s
128	19200 bits/s

256	21600 bits/s
512	24000 bits/s
1024	26400 bits/s
2048	28800 bits/s

Note: The decimal values may be added to specify several speeds from which the modem can choose. For example, the factory default is 4094 which is the addition of all available decimal values. When viewed as an 8-bit number, this register is bit mapped. Values related to V.34 and V.FC speeds do not apply to 144 modems.

S110   Carrier Selector

The V.32 and V.32bis carrier handshake procedures are compatible. The rate sequence contains bit combinations that specify which procedure to use. Register S110 provides control of that selection to disable automatic rate re-negotiation or limit the carrier handshake procedure to that specified by V.32.

When the value of S110 is 0, rate re-negotiation is disabled and the &U command determines whether or not Trellis coding is enabled.

When the value of S110 is 1, the V.32bis handshake is enabled, but automatic rate re-negotiation is disabled. The modem responds to a rate re-negotiation request from the other end.

Value	Description
0	V.32 handshake procedure is followed, rate re-negotiation allowed by V.32bis disabled. The AT&Un command determines if trellis encoding is enabled.
1	V.32 handshake procedure is followed, but not automatic re-negotiation. The modem responds to a rate re-negotiate request from the remote end.
2	V.32 handshake and automatic rate re-negotiation are enabled.
3	V.FC handshake is enabled, but not automatic re-negotiation. The modem responds to a rate re-negotiate request from the remote end.
4	V.FC handshake and automatic rate re-negotiation are enabled.
5	V.34 handshake is enabled but not automatic re-negotiation. The modem responds to a rate re-negotiate request from the remote end.
6	V.34 handshake and automatic rate re-negotiation are enabled.

Note: S110 values 3, 4, 5, and 6 are not applicable to 144 modems.

S136   LAPM Packet Size

S136 controls the packet size sent during a LAPM connection. These options change the maximum packet size that LAPM attempts to negotiate with the remote modem. Better throughput may be achieved with the larger packet size.

Option	Bytes
0	128
1	256
2	512

S153   Remote Configuration Escape Guard Time (OPTIMA)

Note: This S-Register is storable and not displayed by &V.

Typing ATS153=n   RETURN sets the remote escape guard time in units of 20 milliseconds.

Default = S153=50 = 1 second (same as S12)

For more information, click on About Basic Remote Configuration.

About Result Codes

Two types of result codes exist. Call result codes report that you made a connection and the attempted connection speed. Negotiation result codes report the negotiated speed, compression, method, and error-control protocol.

Call Result Codes

Call Result Codes (ACCURA 144)

Call Result Codes (ACCURA 288)

Call Result Codes (OPTIMA 144)

Call Result Codes (OPTIMA 288)

Call Result Codes (ACCURA 144)

Call progress result codes report that a connection was made and the attempted connect data or FAX speed.

Numeric Result Code	Verbose Result Code	Description
0	OK	Command executed.
1	CONNECT	A connection has been established.
2	RING	Ring signal indicated.
3	NO CARRIER	Carrier signal not detected or lost.
4	ERROR	Invalid command or command line exceeds 255 characters.
6	NO DIALTONE	No dial tone detected.
7	BUSY	Dialed number busy.
8	NO ANSWER	Answer not detected.
16	TIMEOUT	Connection dropped because of inactivity.
5	CONNECT	Connection at 1200 bits/s.
22	CONNECT 1200/75	Connection at 1200 bits/s sending and 75 bits/s receiving.
23	CONNECT 75/1200	Connection at 75 bits/s sending and 1200 bits/s receiving.
10	CONNECT 2400	Connection at 2400 bits/s.
11	CONNECT 4800	Connection at 4800 bits/s.
24	CONNECT 7200	Connection at 7200 bits/s.
12	CONNECT 9600	Connection at 9600 bits/s.
13	CONNECT 14400	Connection at 14400 bits/s.
14	CONNECT 19200	Connection at 19200 bits/s.
15	CONNECT 28800	Connection at 28800 bits/s.
28	CONNECT 38400	Connection at 38400 bits/s.
18	CONNECT 57600	Connection at 57600 bits/s.
31	CONNECT 115200	Connection at 115200 bits/s.
33	FAX	FAX Connection
35	DATA	DATA Connection

Call Result Codes (ACCURA 288)

Call progress result codes report that a connection was made and the attempted connect data or FAX speed.

Numeric Result Code	Verbose Result Code	Description
0	OK	Command executed.
1	CONNECT	A connection has been established.
2	RING	Ring signal indicated.
3	NO CARRIER	Carrier signal not detected or lost.
4	ERROR	Invalid command or command line exceeds 255 characters.

6	NO DIALTONE	No dial tone detected.
7	BUSY	Dialed number busy.
8	NO ANSWER	Answer not detected.
16	TIMEOUT	Connection dropped because of inactivity.
5	CONNECT	Connection at 1200 bits/s.
22	CONNECT 1200/75	Connection at 1200 bits/s sending and 75 bits/s receiving.
23	CONNECT 75/1200	Connection at 75 bits/s sending and 1200 bits/s receiving.
10	CONNECT 2400	Connection at 2400 bits/s.
11	CONNECT 4800	Connection at 4800 bits/s.
24	CONNECT 7200	Connection at 7200 bits/s.
12	CONNECT 9600	Connection at 9600 bits/s.
13	CONNECT 14400	Connection at 14400 bits/s.
14	CONNECT 19200	Connection at 19200 bits/s.
15	CONNECT 28800	Connection at 28800 bits/s.
28	CONNECT 38400	Connection at 38400 bits/s.
18	CONNECT 57600	Connection at 57600 bits/s.
31	CONNECT 115200	Connection at 115200 bits/s.
33	FAX	FAX Connection
35	DATA	DATA Connection

Call Result Codes (OPTIMA 144)

Call progress result codes report that a connection was made and the attempted connect data or FAX speed.

Numeric Result Code	Verbose Result Code	Description
0	OK	Command executed.
1	CONNECT	A connection has been established.
2	RING	Ring signal indicated.
3	NO CARRIER	Carrier signal not detected or lost.
4	ERROR	Invalid command or command line exceeds 255 characters.
6	NO DIALTONE	No dial tone detected.
7	BUSY	Dialed number busy.
8	NO ANSWER	Answer not detected.
16	TIMEOUT	Connection dropped because of inactivity.
5	CONNECT	Connection at 1200 bits/s.
22	CONNECT 1200/75	Connection at 1200 bits/s sending and 75 bits/s receiving.
23	CONNECT 75/1200	Connection at 75 bits/s sending and 1200 bits/s receiving.
10	CONNECT 2400	Connection at 2400 bits/s.
11	CONNECT 4800	Connection at 4800 bits/s.
24	CONNECT 7200	Connection at 7200 bits/s.

12	CONNECT 9600	Connection at 9600 bits/s.
13	CONNECT 14400	Connection at 14400 bits/s.
14	CONNECT 19200	Connection at 19200 bits/s.
28	CONNECT 38400	Connection at 38400 bits/s.
18	CONNECT 57600	Connection at 57600 bits/s.
31	CONNECT 115200	Connection at 115200 bits/s.
33	FAX	FAX Connection
35	DATA	DATA Connection

Call Result Codes (OPTIMA 288)

Call progress result codes report that a connection was made and the attempted connect data or FAX speed.

Numeric Result Code	Verbose Result Code	Description
0	OK	Command executed.
1	CONNECT	A connection has been established.
2	RING	Ring signal indicated.
3	NO CARRIER	Carrier signal not detected or lost.
4	ERROR	Invalid command or command line exceeds 255 characters.
6	NO DIALTONE	No dial tone detected.
7	BUSY	Dialed number busy.
8	NO ANSWER	Answer not detected.
16	TIMEOUT	Connection dropped because of inactivity.
5	CONNECT	Connection at 1200 bits/s.
22	CONNECT 1200/75	Connection at 1200 bits/s sending and 75 bits/s receiving.
23	CONNECT 75/1200	Connection at 75 bits/s sending and 1200 bits/s receiving.
10	CONNECT 2400	Connection at 2400 bits/s.
11	CONNECT 4800	Connection at 4800 bits/s.
24	CONNECT 7200	Connection at 7200 bits/s.
12	CONNECT 9600	Connection at 9600 bits/s.
13	CONNECT 14400	Connection at 14400 bits/s.
14	CONNECT 19200	Connection at 19200 bits/s.
15	CONNECT 28800	Connection at 28800 bits/s.
28	CONNECT 38400	Connection at 38400 bits/s.
18	CONNECT 57600	Connection at 57600 bits/s.
31	CONNECT 115200	Connection at 115200 bits/s.
65	CONNECT 230400	Connection at 230400 bits/s.
33	FAX	FAX Connection
35	DATA	DATA Connection

Negotiation Progress Result Codes

Negotiation Progress Result Codes (ACCURA 144)

Negotiation Progress Result Codes (ACCURA 288)

Negotiation Progress Result Codes (OPTIMA 144)

Negotiation Progress Result Codes (OPTIMA 288)

Negotiation Progress Result Codes (ACCURA 144)

Negotiation progress result codes report the negotiated carrier speed, compression method, and error control protocol.

Numeric Result Code	Verbose Result Code	Description
40	CARRIER 300	Carrier detected at 300 bits/s.
46	CARRIER 1200	Carrier detected at 1200 bits/s.
44	CARRIER 1200/75	Carrier detected at 1200 bits/s sending, 75 bits/s receiving.
45	CARRIER 75/1200	Carrier detected at 75 bits/s sending, 1200 bits/s receiving.
47	CARRIER 2400	Carrier detected at 2400 bits/s.
48	CARRIER 4800	Carrier detected at 4800 bits/s.
50	CARRIER 9600	Carrier detected at 9600 bits/s.
49	CARRIER 7200	Carrier detected at 7200 bits/s.
51	CARRIER 12000	Carrier detected at 12000 bits/s.
52	CARRIER 14400	Carrier detected at 14400 bits/s.
66	COMPRESSION: CLASS 5	MNP5 compression negotiated.
67	COMPRESSION: V.42*bis*	V.42 compression negotiated.
69	COMPRESSION: NONE	No compression negotiated.
70	PROTOCOL: NONE	Asynchronous mode
77	PROTOCOL: LAPM	Error control using V.42 LAPM.
79	PROTOCOL: LAP-M/AFT	Asynchronous error-control using V.42 LAPM.
80	PROTOCOL: ALT	Alternative protocol (MNP compatible).
86	PROTOCOL: FAX	FAX connection established.

Negotiation Progress Result Codes (ACCURA 288)

Negotiation progress result codes report the negotiated carrier speed, compression method, and error control protocol.

Numeric Result Code	Verbose Result Code	Description
40	CARRIER 300	Carrier detected at 300 bits/s.
46	CARRIER 1200	Carrier detected at 1200 bits/s.
44	CARRIER 1200/75	Carrier detected at 1200 bits/s sending, 75 bits/s receiving.
45	CARRIER 75/1200	Carrier detected at 75 bits/s sending, 1200 bits/s receiving.
47	CARRIER 2400	Carrier detected at 2400 bits/s.
48	CARRIER 4800	Carrier detected at 4800 bits/s.
50	CARRIER 9600	Carrier detected at 9600 bits/s.
49	CARRIER 7200	Carrier detected at 7200 bits/s.
51	CARRIER 12000	Carrier detected at 12000 bits/s.

52	CARRIER 14400	Carrier detected at 14400 bits/s.
54	CARRIER 19200	Carrier detected at 19200 bits/s.
53	CARRIER 16800	Carrier detected at 16800 bits/s.
38	CARRIER 21600	Carrier detected at 21600 bits/s.
37	CARRIER 24000	Carrier detected at 24000 bits/s.
36	CARRIER 26400	Carrier detected at 26400 bits/s.
53	CARRIER 16800	Carrier detected at 16800 bits/s.
54	CARRIER 19200	Carrier detected at 19200 bits/s.
55	CARRIER 28800	Carrier detected at 28800 bits/s.
66	COMPRESSION: CLASS 5	MNP5 compression negotiated.
67	COMPRESSION: V.42*bis*	V.42 compression negotiated.
69	COMPRESSION: NONE	No compression negotiated.
70	PROTOCOL: NONE	Asynchronous mode
77	PROTOCOL: LAPM	Error control using V.42 LAPM.
79	PROTOCOL: LAP-M/AFT	Asynchronous error-control using V.42 LAPM.
80	PROTOCOL: ALT	Alternative protocol (MNP compatible).
86	PROTOCOL: FAX	FAX connection established.

Negotiation Progress Result Codes (OPTIMA 144)

Negotiation progress result codes report the negotiated carrier speed, compression method, and error control protocol.

Numeric Result Code	Verbose Result Code	Description
40	CARRIER 300	Carrier detected at 300 bits/s.
46	CARRIER 1200	Carrier detected at 1200 bits/s.
44	CARRIER 1200/75	Carrier detected at 1200 bits/s sending, 75 bits/s receiving.
45	CARRIER 75/1200	Carrier detected at 75 bits/s sending, 1200 bits/s receiving.
47	CARRIER 2400	Carrier detected at 2400 bits/s.
48	CARRIER 4800	Carrier detected at 4800 bits/s.
50	CARRIER 9600	Carrier detected at 9600 bits/s.
49	CARRIER 7200	Carrier detected at 7200 bits/s.
51	CARRIER 12000	Carrier detected at 12000 bits/s.
52	CARRIER 14400	Carrier detected at 14400 bits/s.
66	COMPRESSION: CLASS 5	MNP5 compression negotiated.
67	COMPRESSION: V.42*bis*	V.42 compression negotiated.
69	COMPRESSION: NONE	No compression negotiated.
70	PROTOCOL: NONE	Asynchronous mode
77	PROTOCOL: LAPM	Error control using V.42 LAPM.
79	PROTOCOL: LAP-M/AFT	Asynchronous error-control using V.42 LAPM.
80	PROTOCOL: ALT	Alternative protocol (MNP

		compatible).
86	PROTOCOL: FAX	FAX connection established.
120	MODULATION: Bell 103	
121	MODULATION: Bell 212	
122	MODULATION: V.21	
123	MODULATION: V.22	
124	MODULATION: V.22*bis*	
125	MODULATION: V.23	
126	MODULATION: V.32	
127	MODULATION: V.32*bis*	

Negotiation Progress Result Codes (OPTIMA 288)

Negotiation progress result codes report the negotiated carrier speed, compression method, and error control protocol.

Numeric Result Code	Verbose Result Code	Description
40	CARRIER 300	Carrier detected at 300 bits/s.
46	CARRIER 1200	Carrier detected at 1200 bits/s.
44	CARRIER 1200/75	Carrier detected at 1200 bits/s sending, 75 bits/s receiving.
45	CARRIER 75/1200	Carrier detected at 75 bits/s sending, 1200 bits/s receiving.
47	CARRIER 2400	Carrier detected at 2400 bits/s.
48	CARRIER 4800	Carrier detected at 4800 bits/s.
50	CARRIER 9600	Carrier detected at 9600 bits/s.
49	CARRIER 7200	Carrier detected at 7200 bits/s.
51	CARRIER 12000	Carrier detected at 12000 bits/s.
52	CARRIER 14400	Carrier detected at 14400 bits/s.
54	CARRIER 19200	Carrier detected at 19200 bits/s.
53	CARRIER 16800	Carrier detected at 16800 bits/s.
38	CARRIER 21600	Carrier detected at 21600 bits/s.
37	CARRIER 24000	Carrier detected at 24000 bits/s.
36	CARRIER 26400	Carrier detected at 26400 bits/s.
53	CARRIER 16800	Carrier detected at 16800 bits/s.
54	CARRIER 19200	Carrier detected at 19200 bits/s.
55	CARRIER 28800	Carrier detected at 28800 bits/s.
66	COMPRESSION: CLASS 5	MNP5 compression negotiated.
67	COMPRESSION: V.42*bis*	V.42 compression negotiated.
69	COMPRESSION: NONE	No compression negotiated.
70	PROTOCOL: NONE	Asynchronous mode
77	PROTOCOL: LAPM	Error control using V.42 LAPM.
79	PROTOCOL: LAP-M/AFT	Asynchronous error-control using V.42 LAPM.
80	PROTOCOL: ALT	Alternative protocol (MNP compatible).

86	PROTOCOL: FAX	FAX connection established.
120	MODULATION: Bell 103	
121	MODULATION: Bell 212	
122	MODULATION: V.21	
123	MODULATION: V.22	
124	MODULATION: V.22*bis*	
125	MODULATION: V.23	
126	MODULATION: V.32	
127	MODULATION: V.32*bis*	
128	MODULATION: V.FC	
129	MODULATION: V.34	

General Information

If the CD or OH light remains on...

Problems Connecting to Another Modem...

If the modem will not answer an incoming call...

If the modem connects with the remote modem but locks up...

If the modem disconnects while online...

If you lose data in an error-control connection...

Credit Card Dialing

Controlling Modem Speaker Sound...

Testing the Modem (OPTIMA)

About Basic Remote Configuration (OPTIMA)

About Security Password and Dial back Commands (OPTIMA)

Asynchronous Host Configuration (OPTIMA)

Configuring for Synchronous Communication (OPTIMA)

Leased Line Configuration (OPTIMA)

Adaptive Answer: Distinguishing Data vs FAX Calls

If the CD or OH light remains on...

If you have a standalone modem and the CD (Carrier Detect) or OH (Off-Hook) light stays on after you have disconnected from a connection, contact Hayes Customer Service. If you cannot communicate with the modem, be sure that you have properly installed and run your communications program.

Problems Connecting to Another Modem...

Check the connections between the modem and the telephone. Next, connect a phone to your telephone jack to check for a dial tone. If you are using the modem at home, check to make sure the telephone line is not in use at another extension.

The number you are dialing may not have a modem attached, or the remote modem may not be set up to answer.

Also check the connections between the modem and the computer. Be sure you have not plugged the modem into your computer's printer port or into a connector not intended for modem communications (check your computer's operating manual for information).

Also, the two modems may not support (or be configured to support) common communication standards. Verify that the user on the other end has properly installed the modem, has configured it appropriately, and is using software that supports the modems features.

If the modem will not answer an incoming call...

Auto-answer may not be enabled. If you are expecting a call from another modem, you must set up your modem for answer mode. Refer to the procedures for answering a modem call in your software users guide. The AT commands that control answering are: ATA to go off-hook and answer immediately and ATS0=n (where n is the number of rings to wait before answering).

The incoming call may not be from another modem. You may have a faulty phone jack or the phone cable may not be connected to the wall jack. To determine if a call is definitely coming in, connect a phone to the connector labeled PHONE. When the remote systems calls, the attached telephone will ring if the circuit is operating properly. After setting your modem to answer mode, you can also try calling your modem number from another telephone line to listen for the modem answer tone (a high-pitched whistle).

If the modem connects with the remote modem but locks up...

Make sure you are using the proper <u>flow-control</u> method for the communication standard and transmission mode selected. If not, data may have been interpreted as a flow control characters and stopped the flow of data.

If the modem disconnects while online...

Check for loose connections between the standalone modem and the computer or between the modem and the telephone connection. Line noise or interference may be interfering with modem signals. Retry the connection by dialing the number again.

Note: For best operation, disable call-waiting during modem use. Your service provider can provide information on temporarily disabling this feature.

If you lose data in an error-control connection...

S38 (Delay Before Forced Hang-Up) tells the modem how long it should continue trying to deliver data before hanging up. The range is 0 - 254 seconds from the time the H0 (hang-up) command is issued, and the factory default is 20 seconds. Setting S38 to 255 tells the modem to wait until all data is delivered before hanging up.

Note: Regardless of the setting, when the buffers are clear, the modem hangs-up.

Credit Card Dialing

Occasionally you may want to charge your modem call to a credit card. The following example describes how to make a credit card call using the modem's AT command set.

ATDT 1234567890 $ xxxxxxxxxxxxxx ENTER

Where:

String	Represents
ATDT	The tone dialing command.
1234567890	The number you are calling.
$	The wait for Bong command.
xxxxxxxxxxxxxx	Your credit card number.
ENTER	Pressing your Enter or Return key.

An alternate method for credit card dialing is to insert commas into the dial string. Commas allow the modem to wait for the return of the Bong without recognizing the Bong tone. Each comma represents a pause of 2 seconds (determined by the setting of the S8 register). The following example describes a wait of 8 seconds between the number dialed and the credit card number:

ATDT 1234567890 ,,,, xxxxxxxxxxxxxx ENTER

Note: The wait for Bong command **$** decreases the number of characters entered making it the preferred method to use with software that limits the number of entered characters.

Controlling Modem Speaker Sound...

The modem speaker is enabled or disabled by issuing the ATMn command. **ATM0** turns the speaker off at all times. **ATM1** (default) leaves the speaker on until the data carrier signal is detected. ATM2 leaves the speaker continually on. **ATM3** turns the speaker on after dialing and leaves it on until the data carrier signal is detected. This allows you to hear the modems negotiate the connection without hearing the dialing. This is desirable if you are repeatedly dialing a busy number.

Volume is controlled with the ATLn command where n is 0, 1, 2, or 3. **ATL0** and **ATL1** sets the volume to the lowest level. **ATL2** is medium volume level and **ATL3** is loud.

Testing the Modem (OPTIMA)

Typing AT   RETURN (return key) should cause the modem to respond with an OK result code. If the modem does not reply you may (for a PC) have a different COM port selected in your software than the port to which you have physically connected the modem. For a Macintosh, make sure the modem and software are configured for the same connector (phone or printer).

You can use the following commands to analyze the modem's performance, the line, and the remote modem's performance.

Name	Description	Command
Terminate Test	Terminates any test in progress.	&T0
Local Analog Loopback	Tests the local modem and DTE.	&T1
Local Analog Loopback with Self-Test	Tests the local modem with an internally-generated test pattern.	&T8
Local Digital Loopback*	Tests the local DTE, local modem, remote modem, and the telephone circuit.	&T6
Remote Digital Loopback with Self-Test*	Tests the local modem, the remote modem, and the telephone circuit with an internally-generated test pattern.	&T7
Grant Remote Digital Feedback Request	Grant request from remote modem for remote digital feedback.	&T4
Deny Remote Digital Feedback Request	Deny request from remote modem for remote digital feedback.	&T5
RTS/CTS Cable Test	Tests the cable to see if it supports RTS/CTS signaling.	&T19

*These tests require a connection to an ITU-T compatible modem with &T4 selected.

To perform a diagnostic test, follow these steps:

Step 1: Before beginning the test, use your software to set the modem's DTE speed to 2400 bits/s.

Step 2: Issue the &F command. This command recalls the modem's factory set configuration (enabling character echo in command state).

Step 3: Issue the &Q0 command. This command configures the modem for normal asynchronous mode.

Step 4: Issue the &T1 command. This command initiates local analog loopback (through the modem and DTE).

Step 5: Type a few sentences. If the modem and the DTE are operating properly, the text should be routed through the modem and appear on your screen.

Note: If you run a loopback with the self-test (&T8), when you terminate the test, the modem returns a three-digit number indicating the test results (e.g., 000=no errors; 012 =12 errors).

Step 6: Issue the &T0 command. This command terminates the test. You can also set a test timer that will automatically end the test when the value you written to S18 expires.

About Basic Remote Configuration (OPTIMA)

The Basic Remote Configuration (**BRC**) feature provides a simple way to remotely access the on-line command state of the target modem when it is connected in certain async DTE modes.

TERMINOLOGY

Remote. The remote unit and modem refer to the target end of the connection to be configured.

Local. The local unit and modem refer to the configuring end of the connection from which commands are issued, and to which result codes are returned when the remote modem is in BRC state. This modem is often at the "local" end of the connection.

BRC State. The remote modem is ready to interpret the data stream from the local modem as commands and to return result codes back to the local modem.

The following diagram illustrates concepts and terms of Basic Remote Configuration:
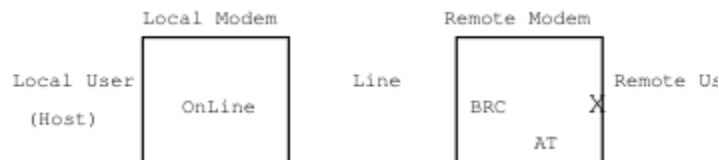
SYSTEM REQUIREMENTS

Only the remote modem needs to support the BRC feature if BRC is initiated by either the user of the remote modem or local modem via the BRC escape sequence.

Remote Escape into BRC state from local on-line data mode should be entered with the following syntax:

[Leading guard time] +BRC+ [Trailing guard time]

Note: Use remote's S153 register value as guard time.

This command returns the ENTERING BRC result code if successful and BRC DISABLED if BRC=0.

For more information, click on About Basic Remote Configuration (BRC).

If the local user initiates the BRC state, it is desirable that the BRC feature is supported in the local modem as well as the remote modem. If so, the local modem can semi-automate the remote initiation of BRC. If the local modem does not support BRC, then the local user (or script) must send the remote escape sequence including guard times.

MODE

The remote modem must be in buffered async mode (&Q6) or fallback to buffered async operation for the remote configuration session. If the remote modem is configured for &Q5, the local modem must be set for &Q6 or &Q0 when calling the remote modem to configure it.

Note: In Dumb Mode, BRC can only be initiated remotely since the DTE mode is "Dumb."

BRC STATE

When in BRC state, the remote modem ignores DTE input and accepts commands from the DCE.

When in BRC state, local modem's connection data path is disconnected from the remote unit and is reconnected to the remote modem's on-line command system.

REMOTE USER INTERFACE

Command Set

When in BRC state, the set of commands available to the local user is the same as for the remote user in the on-line command state. If they are blocked to the remote user while in the on-line state then they are blocked to the local user in BRC. If a command is accepted but takes effect at the next call, it works the same in BRC.

Command Prefix and Editing

In BRC state, the concept of AutoSpeed and AutoParity is suspended for two reasons:

1. The local user cannot change the speed of the link, which is in effect a fixed-speed interface.

2. It is not desirable to always override the remote unit's speed and parity defaults.

The commands given by the local unit do not affect the speed or parity of the remote modem automatically. The "Last AT" speed and parity entered by the remote unit is stored by the modem as a default until a new AT command is issued. These defaults are used during BRC.

In addition, the leading AT or at prefix is still required in BRC state. The A/ repeat is not supported. The BRC command process confirms a leading AT or at then begins in the editing state with an empty command line buffer. If the leading AT is missing, everything up to the next AT, at, or carriage return is discarded.

Command strings are entered (and edited with BS) and terminated with an ASCII "CR" character (dec 13, hex 0D).

As an implementation option Ctrl X may be used to abort a partially entered command line. If Ctrl X   is supported, and is detected, the command line is cleared, and the empty command line is "executed" as-if a "CR" had been entered. This results in an OK result code.

Result Codes

Result codes are formatted according to the current remote modem settings. Unsolicited result codes are permitted. (However, none of the existing unsolicited result codes seem to be generated at the same time as a BRC session anyway.)

FEATURE ID

In addition to the extended command syntax inquiry method, the DTE may use the I4 ID command to confirm support for the BRC feature.

For more information, click on the following commands: $BRC, $GIVEBRC, and $GETBRC

About Security Password and Dial back Commands (OPTIMA)

Security dial-back commands are provided for storing the password, and for selecting the mode of operation. A single Unit ID/Password pair is supported, with the Unit ID set to a default value of 0. Dial-back uses stored telephone numbers and references.

Note: Proper operation requires that both sides of the connection have Hayes modems with the same features.

For incoming calls:

Command	Description
AT-SUID	Program Unit ID
AT-SPWD	Program password - Non-volatile, default "PASSWORD"
AT-SPRT	Set/Read remote mode None (0)
	Passthru (1)
	Dialback (2)
	Either (3)

You may want to extend support to multiple Unit ID/Password pairs. Multiple Unit ID/Password pairs are supported with a common key for token encryption. If a unit specific data encryption key is supported, non-volatile storage provides for a default telephone number for each unit. The AT command to enter data includes references to the table of stored values.

Command	Description
AT ??	Read back Index, Unit ID, Password, Default Telephone Number

For more information, click on the following commands: -SUID, -SPWD, -SPRT, -SKEY, %SPRT, %SUID, %SPWD, %SCBR, %SKEY, %

Asynchronous Host Configuration (OPTIMA)

This configuration information is for OPTIMA modems for use in AS400, UNIX or VAX installations.

Before configuring, you must know the following information about the communications port of the host:

1) Speed of the port

2) Type of flow control used

After you obtain this information, you are ready to configure the modem using the following steps:

Step 1: Connect the modem to a serial port of a terminal or PC. If you are using a PC, use terminal software that provides a terminal (sometimes called direct) mode set to the port speed of the host.

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem and set port speeds. The speed of the last &W command sets the port speed of the modem. To avoid a speed mismatch, verify that the port speed of the PC to terminal used to configure the modem is the same as the host's port speed. The speed of the serial port is generally set higher than the maximum modem to modem speed. For example, modems with a maximum modem to modem (DCE) speed of 14.4K bps have a maximum port (DTE) speed of 115K allowing the modem to take advantage of compression

Step 2: Type the following commands:

AT &F   RETURN

AT &D2 &S2   RETURN

Note: Insert &K4 if X/on X/off flow-control is used. For example: AT&D2&S2&K4   RETURN.

AT &C1 S0=1 Q1 E0 &W   RETURN

Note: The modem returns an OK result code after pressing the RETURN key for the first two command lines. It is normal not to get an OK after entering the last line of commands. If the modem received the last command line properly, the AA status light will be on.

Configuring for Synchronous Communication (OPTIMA)

This topic explains how to configure an OPTIMA modem for synchronous communication with host systems such as IBM AS400's and mainframes.

Related Topics:

Configuring the Originating Modem for Synchronous Operation

Configuring the Answering Modem for Synchronous Operation

Disabling Command Recognition

Establishing Synchronous Connections

Configuring the Originating Modem for Synchronous Operation

This configuration procedure describes how to set-up an originating modem, configured for synchronous originate mode, to dial a stored number after commanded. This configuration procedure requires a dumb terminal or terminal emulation software to communicate to the modem.

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem and set port speeds.

Follow these steps to configure the originating modem:

Step 1: Attach the modem to a serial port on a PC or dumb terminal using a standard RS232 cable.

Step 2: Configure the port speed setting in the dumb terminal or the terminal emulation software to match the speed to be used on the synchronous port.

Step 3: Configure the software for direct connect or terminal mode and open the connection to the port.

Step 4: Type AT&F&W and press RETURN. The modem responds with an OK result code.

Note: If double characters appear, type ATE0 and press RETURN to disable local character echo.

Step 5: Type AT&Q2&S2&W and press RETURN. The modem responds with an OK result code.

Step 6: Type AT&Z0=T<phonenumber to store and press RETURN. The modem responds with an OK result code.

Step 7: Type AT&D2&W and press RETURN. The modem responds with an OK result code.

Step 8: Type AT&C1E0Q1&W and press RETURN.

Note: Step 8 disables character echo and result code reporting. For this reason, the modem will not respond with an OK result code.

Click <u>Disabling Command Recognition</u> to go to the next setup section.

Configuring the Answering Modem for Synchronous Operation

The answering modem is configured for synchronous answer mode. Although the answering modem is usually attached to the mainframe host system, this configuration procedure requires a dumb terminal or terminal emulation software to communicate to the modem.

Follow these steps to configure the answering modem:

Step 1: Attach the modem to a serial port on a PC or dumb terminal using a standard RS232 cable.

Step 2: Configure the port speed setting in the dumb terminal or the terminal emulation software to match the speed which will be used on the synchronous port.

Note: Please refer to your communications software documentation regarding information on how to communicate directly to the modem and set port speeds.

Step 3: Type AT and press RETURN. The modem responds with an OK result code.

Note: If double characters appear, type ATE0 and press RETURN to disable local character echo.

Step 4: Type AT&F&W and press RETURN. The modem responds with an OK result code.

Step 5: Type AT&Q1&S2&W and press RETURN. The modem responds with an OK result code.

Step 6: Type ATS0=1 (or the number of rings you want the modem to answer on) and press RETURN. The modem responds with an OK result code.

Step 7: Type AT&D2&W and press RETURN. The modem responds with an OK result code.

Step 8: Type AT&C1E0Q1&W and press RETURN.

Note: Step 8 disables character echo and result code reporting. For this reason, the modem will not respond with an OK result code.

Click Disabling Command Recognition to go to the next setup section.

Disabling Command Recognition

After each modem has been configured, command recognition should be disabled .

Step 1: Type AT%DUMB=1 RETURN.

Note: AT%DUMB=0   RETURN power off/on enables command recognition.

Step 2: Power the modems off and then on.

Click Establishing a Synchronous Connection to go to the next section.

Establishing Synchronous Connections

Originating: Attach the originating modem to the SDLC or synchronous port and turn the power on. When a connection is opened, the modem automatically dials the stored number and connects to the other modem.

Answering: Attach the answering modem to the synchronous port on the host system. The modem answers incoming calls in &Q1 synchronous mode.

Leased Line Configuration (OPTIMA)

Issue the following commands for 2-wire leased line operation:

Originator: AT&L1&W   RETURN

Answer: AT&L1 S0=1 &W   RETURN

AT%Dumb1   RETURN and then power off and then on.

Adaptive Answer: Distinguishing Data vs FAX Calls

Some communications applications include an adaptive answer feature allowing configured software to automatically detect incoming phone calls as data or FAX.

During adaptive answer operation, the following sequence takes place:

1. The communications application answers the line for an incoming call.
2. If a CNG tone is detected from an inbound FAX, the software accepts the FAX.
3. If silence is detected, a data connection is established.
4. If the data connection fails, the communication application sends a VOICE result code to the screen.

Note: For adaptive answer to operate properly, the modem must send a RING result code to the application software.

Command	Description
+FAE=1	Class 1 adaptive answer.
+FAA=1	Class 2 adaptive answer.

Note: The result code returned by the modem is FAX.

Macintosh Specific Information

Communications software does not load (Macintosh)...

Modem Cable Diagram (Macintosh)

Communications software does not load (Macintosh)...

If you are having trouble with your communications program, the problem may be related to an extension (init) or control panel conflict. Extensions and control panels are small programs that load at startup. An extension or control panel conflict can occur if two (or more) of these programs interfere with each other during startup or if they are incompatible.

Related Topics:

Identifying and Correcting Extension Conflicts

Identifying and Correcting Control Panel Conflicts

Identifying and Correcting Extension Conflicts

Step 1: Select New Folder from the Finder's Edit menu. Name the folder "Disable Extensions" and place it on the Desktop.

Step 2: Double-click the System folder.

Step 3: In the system folder, find and double-click the Extension folder.

Step 4: Drag all extensions except your communications program extensions into the new "Disabled Extensions" folder that you created.

Step 5: Select Restart under the Special menu to restart the computer.

Step 6: Try using your communications program to recreate the original problem. If the FAX software functions normally, the problem is with one of the extensions in the "Disabled Extensions" folder. If the FAX software still does not function, click <u>Identifying and Correcting Control Panel Conflicts</u> to jump to that section.

Step 7: Start adding extensions from the "Disabled Extensions" folder back to the Extensions folder (begin with half). Restart your computer and try your software. If your software functions properly, repeat this step of adding extensions until it fails. When it fails, you have identified the extension that caused the conflict.

Step 8: Inits load in alphabetical order and changing the name of the init may solve the problem. Place the letters "ZZ" in front of the name and return it to the extensions folder. Restart your computer to check the problem status. If problems continue, change "ZZ" to "AA" and restart the computer.

If the conflict can't be resolved by changing the name, you may want to make one of the following decisions:

Question	Decision
Is the extension needed?	If not, the problem is solved - don't load that extension.
Is the extension the most current version?	Contact the software vendor to identify and get the latest version.
Is there another extension with the same function that can be used instead?	Replace the extension with one that doesn't conflict if the extension is current and the function it adds is important.

If the conflict cannot be resolved and no replacement is available, try using a managing utility. These utilities allow extensions to be loaded in groups. Configure one group for use with your communications program and another group with the conflicting extension without the communications software.

Identifying and Correcting Control Panel Conflicts

Control panels allow you to adjust the settings for an extension. Follow these steps to identify and correct a control panel conflict:

Step 1: Place all the control panels except your communications software's in a separate folder on the desktop labeled "Disabled Control Panels."

Step 2: Test your communications software. If it does not function and you have already checked for an extension conflict, reinstall your communications software.

Step 3: Add half of the control panels back to the Control Panels folder.

Step 4: Test your communications software again.

Step 5: Continue replacing the control panels until you find the problem.

Step 6: Place the letters "ZZ" or "AA" in front of the conflicting control panel name.

If the conflict can't be resolved by changing the name, you may want to make one of the following decisions:

Question	Decision
Is the control panel needed?	If not, the problem is solved - don't use that control panel.
Is the control panel the most current version?	Contact the software vendor to identify and get the latest version.
Is there another control panel with the same function that can be used instead?	Replace the control panel with one that doesn't conflict if the control panel is current and the function it adds is important.

Modem Cable Diagram (Macintosh)

This illustration represents the Mini DIN-8 male connector on the end of the modem cable that plugs into the computer:

Pin	Name	Description
1	HSKo	Output Handshake (from 8530 DTR pin).
2	HSKi/Ext Clk	Input Handshake (CTS) or TRxC (depends on 8530 mode).
3	TxD-	Transmit Data line.
4	Ground	
5	RxD-	Receive Data line.
6	TxD+	Transmit Data line.
7	GPi/DCD	General Purpose Input (not all models)
8	RxD+	Receive Data line; ground this line to emulate RS232.

DIN-8 to Modem (Hardware Handshaking)

Computer (DIN-8) Pin		Modem (DB-25) Pin
1 (HSKout)	>	4 (RTS)
2 (HSKin)	<	5 (CTS)
3 (TxD-)	>	2 (TxD)
4 (GND)	< >	7 (Signal Gnd)
5 (RxD-)	<	3 (RxD)
6 (TxD+)		NONE
7 (Gpi)	<	8 (DCD) - not always used
8 ((RxD+)	<	7 (Gnd)

Note: Some hardware handshake cables have pin 20 (DTR) on the modem side connected to the computer side's pin 1 (in addition to pin 4 RTS). With this cable you must configure the modem to ignore DTR.

PC Specific Information

Installing an Internal Modem

An internal modem must be assigned to a unique COM port setting. You may experience COM port or interrupt conflicts if your modem is assigned to a COM port setting used by another device.

Standard COM Port Assignments

Selecting a COM port also specifies and address and interrupt (IRQ) setting. The address tells your computer where to find the modem and the IRQ allows the modem to get your computer's attention. The following table displays standard addresses and interrupt settings for each COM port:

COM Port	Address	Interrupt
COM1	03F8	IRQ4
COM2	02F8	IRQ3
COM3	03E8	IRQ4
COM4	02E8	IRQ3

Resolving Interrupt Conflicts

COM port or interrupt conflicts are resolved by selecting a unique COM port setting for the modem. To determine the unique COM port setting, you should begin by determining the number of serial ports on the PC before the modem is installed. Your computer's documentation is a good source for this information.

Most computers have one serial port configured as COM1 with COM2 unconfigured. This setup allows you to select COM2 for the internal modem because it is not used by the system.

Internal modems may operate unreliable or create conflicts if installed in computer systems with two serial ports (COM1 and COM2). Although setting the modem to COM3 or COM4 uses different addresses, a problem exists because the IRQ's are the same as COM1 and COM2.

Two solutions for solving address conflicts are as follows:

Solution 1: Disable an existing serial port. To do this, follow directions contained in your computer's documentation. If you disable COM2 in your system's configuration, you can select COM2 for the internal modem.

Solution 2: Select a non-standard interrupt setting for the modem. Some examples are: IRQ2, IRQ5, IRQ9, or IRQ15.

Note: Setting IRQs is described in the Installation Guide.

IRQ5 is suggested as a non-standard interrupt. However, some devices such as sound cards, tape backup interface cards, a second parallel port, CD-ROM interface cards, SCSI interface cards, and scanner interface cards may use IRQ5. If your computer has one of these cards, observe the IRQ setting of that card before selecting IRQ5 for the internal modem. If IRQ5 is used by another card, you can change the IRQ setting of the other card and select IRQ5 for the modem.

Configuring Windows Programs

Advanced settings for serial ports can be found in the Control Panel. Changes made in the Control Panel apply to all Windows-based communications programs. Once configured in the Control Panel, you can select the COM port in the communication application without having to change the IRQ level in the program.

Follow these steps to change the IRQ setting:

Step 1: Double-click the Control Panel icon to open.

Control Panel

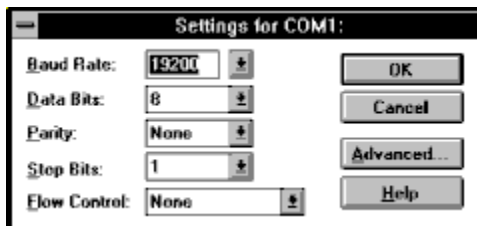**Step 2:** After the Control Panel opens, double-click ports to open.

Ports

Step 3: From Ports, select the modem's COM port and then click the **Settings...** button.
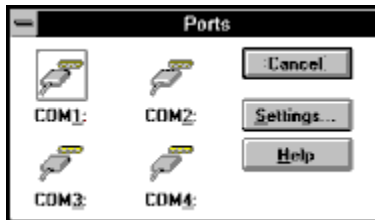
Step 4: Click **Advanced...** from the **Setting for COM**x**:** box.

Step 5: From the **Advanced Settings for COM**x**:**, select your IRQ and click **OK**.

This concludes the steps required for configuring Windows for a new interrupt.

Preventing Data Loss

Some modems are capable of throughput speeds up to 230,000 bits per second (bits/s). However, serial ports in most PCs were designed in the 1980s when 300 bits/s was the standard throughput speed. At speeds above 19,200 bits/s, these serial ports are inadequate and cause data loss.

Symptoms of data loss are:

1. Errors occurring during file transfers with error-control enabled.

2. Online text missing characters or improper formatting.

3. Online menus appearing jumbled.

The UART Chip

The main component in a PC's serial port is the universal Asynchronous Receiver/Transmitter (UART). The UART contains a buffer storing information until it is transferred to your PC. Most serial ports use a 8250 or 16450 UART providing a single byte buffer. If the UART can't send the data in the buffer to your PC before the next byte arrives, data will be lost. This occurs often if high-speed modems are used in multitasking environments such as Windows.

In a multitasking operating system, each task is given a small amount of time to run before the next task is given time. The communications program picks up a few characters from the serial port and then it is the next task's turn to have control of the microprocessor. While this occurs, data sent by the other computer continues to arrive and is stored in the buffer. If more data arrives than the buffer can store, data is lost.

A Partial Solution: 16550 UART-Based Serial Ports

A partial solution is to replace the 8250 or 16450 based serial port with a 16550 based serial port containing a 16-byte buffer. However, once the buffer is filled, data is lost.

A Temporary Solution: Reducing the Throughput Speed

Data loss can be prevented by lowering the transmission speed in the communications software. Of course, lowering the transmission speed does not allow you to take advantage of the capabilities of the modem, but it will allow modem use until the serial port is upgraded. In general, a 386, 486, or Pentium class PC supports transmission speeds up to 38, 400 bits/s with a 8250 or 16450 UART-based serial port. Slower machines may need settings as low as 19,200 bits/s before the data loss problem disappears.

The Complete Solution: Hayes ESP Communications Accelerator

Hayes ESP™ Communications Accelerator is an enhanced serial port for your PC. Hayes ESP solves problems of reduced throughput and data loss for high speed communications up to 230,400 bits/s and beyond. This cost-effective solution is fully compatible with applications written to support 16450 and 16550-based serial ports.

Hayes ESP features dual 1024-byte transmit and receive buffers. To eliminate data loss, Hayes ESP features automatic flow-control operating independently of the computer. As the 1024 byte receive buffer becomes full, Hayes ESP sends the appropriate "flow-off" signal to the modem. Received data remains buffered until your computer is ready to read it. Hayes ESP does not send the "flow-on" signal until the buffers are cleared.
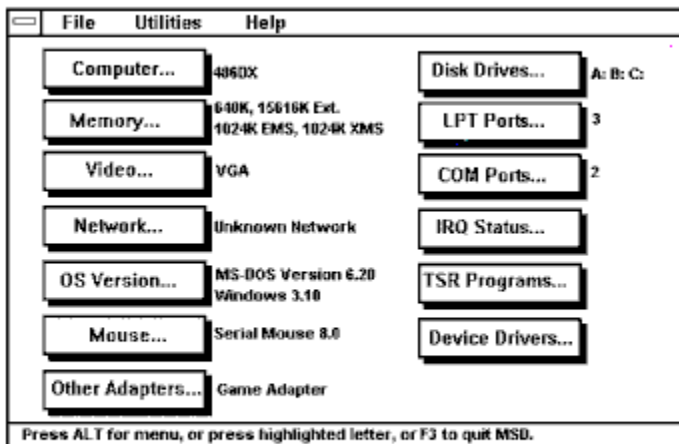
Determining the UART in Your PC

PCs with MS DOS version 5.0 or later or MS Windows version 3.1 or later have a utility named Microsoft Diagnostics (MSD). MSD provides useful information about a PC including the type of UART found in each of the installed ports.

Note: The MSD program must be run from a DOS prompt. It will not function properly if Windows is running.
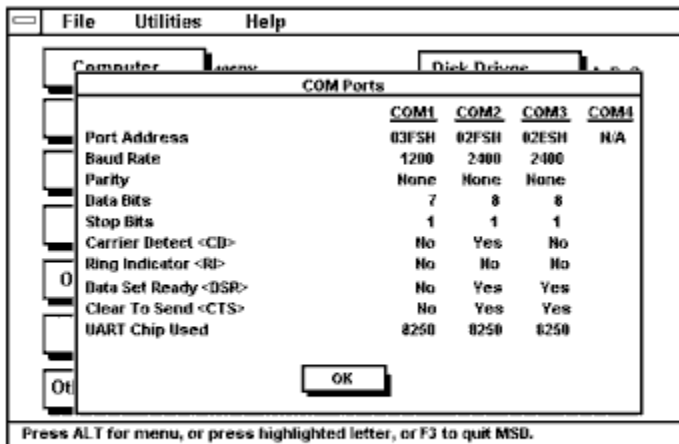
Follow these steps to use MSD:

**Step 1:** Type MSD and press ENTER from a DOS prompt. The MSD diagnostic screen appears:

```
 ┌──┬─────────────────────────────────────────────────────────────┐
 │ ─│  File     Utilities     Help                                 │
 ├──┴─────────────────────────────────────────────────────────────┤
 │                                                                 │
 │   │ Computer... │ 486DX            │ Disk Drives... │ A: B: C:  │
 │                                                                 │
 │   │ Memory...   │ 640K, 15616K Ext.│ LPT Ports...   │ 3         │
 │                  1024K EMS, 1024K XMS                           │
 │   │ Video...    │ VGA              │ COM Ports...   │ 2         │
 │                                                                 │
 │   │ Network...  │ Unknown Network  │ IRQ Status...  │           │
 │                                                                 │
 │   │ OS Version..│ MS-DOS Version 6.20 │ TSR Programs... │       │
 │                  Windows 3.10                                   │
 │   │ Mouse...    │ Serial Mouse 8.0 │ Device Drivers... │        │
 │                                                                 │
 │ │ Other Adapters...│ Game Adapter                              │
 ├─────────────────────────────────────────────────────────────────┤
 │ Press ALT for menu, or press highlighted letter, or F3 to quit MSD.│
 └─────────────────────────────────────────────────────────────────┘
```

Step 2: Press C. The COM port screen appears:

```
 ┌──┬─────────────────────────────────────────────────────────────┐
 │ ─│  File     Utilities     Help                                 │
 ├──┴─────────────────────────────────────────────────────────────┤
 │  Computer            Disk Drives                                │
 │        ┌──────────────COM Ports──────────────────┐              │
 │        │              COM1   COM2   COM3   COM4   │              │
 │        │ Port Address 03F8H  02F8H  02E8H  N/A    │              │
 │        │ Baud Rate    1200   2400   2400          │              │
 │        │ Parity       None   None   None          │              │
 │        │ Data Bits    7      8      8             │              │
 │        │ Stop Bits    1      1      1             │              │
 │        │ Carrier Detect <CD>  No    Yes    No     │              │
 │        │ Ring Indicator <RI>  No    No     No     │              │
 │  O     │ Data Set Ready <DSR> No    Yes    Yes    │              │
 │        │ Clear To Send <CTS>  No    Yes    Yes    │              │
 │        │ UART Chip Used  8250 8250   8250         │              │
 │        │                                          │              │
 │  Ot    │            │  OK  │                       │              │
 │        └──────────────────────────────────────────┘              │
 ├─────────────────────────────────────────────────────────────────┤
 │ Press ALT for menu, or press highlighted letter, or F3 to quit MSD.│
 └─────────────────────────────────────────────────────────────────┘
```

The last line in the dialog box displays the type of UART present in each serial port. In this example, the serial ports have 8250 UARTs.

This concludes the section on preventing data loss.

Modem Cable Diagram (25 pin to 9 pin)
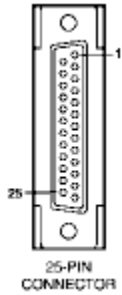
25-PIN
CONNECTOR

25 Pin Modem Connector (DCE)	Name	Description	9 Pin Computer Connector (DTE)
2	TXD	Transmit Data	3
3	RXD	Receive Data	2
4	RTS	Request To Send	7
5	CTS	Clear To Send	8
6	DSR	Data Set Ready	6
7	GND	Ground	5
8	DCD	Data Carrier Detect	1
20	DTR	Data Terminal Ready	4
22	RI	Ring Indicator	9

Modem Cable Diagram (25 pin to 25 pin)
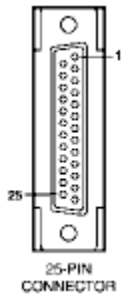
25-PIN
CONNECTOR

25 Pin Modem Connector (DCE)	Name	Description	25 Pin Computer Connector (DTE)
2	TXD	Transmit Data	2
3	RXD	Receive Data	3
4	RTS	Request To Send	4
5	CTS	Clear To Send	5
6	DSR	Data Set Ready	6
7	GND	Ground	7
8	DCD	Data Carrier Detect	8

20	DTR	Data Terminal Ready	20
22	RI	Ring Indicator	22

Using Security Dial-back with Smartcom for Windows

Background

Dialback security allows an OPTIMA modem to require security validation on incoming calls and perform a disconnect and dial-back to a predefined phone number. All of this happens transparently to the dialing and answering DTE's except that the modems must be initialized to perform the security connection using several AT commands or a complex phone number string.

Smartcom is a securityaware application making the security feature much easier to manage. Smartcom supports security settings and modem setup for calling and answering modes. The security setup for Smartcom will be largely the same as the answer modem setup except that it will be arranged for outbound call settings

Smartcom provides outgoing secure call setup prior to dialing as part of the application. Using a simple dialog to get and store the security information, Smartcom can require the password to be entered at dial time, if desired. The answering modem can be setup ahead of time regardless of the application used. An Answering Modem Security Setup Utility is provided for setting up the answering modem.

Answering Modem Security Setup Utility

The Answering Modem Security Setup Utility automates the setup process. You can have the computer choose a random key for better security, and all entered values are validated and rangechecked.

The utility is implemented as a Smartcom Document, with the icon appearing in the Smartcom Program Group. The utility is accessible from the Smartcom Calling Directory. After opening, a dialog asks for the user's COM port. The utility reads the Security Mode and phone number information from the modem. These will be the values displayed for you to change as needed.

The Security Utility's main dialog contains the following fields:

Caller Information	Description
Unit ID	Range 0 to 65535. Default = 0.
Group ID	Range 0 to 255. Default = 0.
Password	The default password is empty. The password must be between 6 and 31 characters long. The

	password is case insensitive, so the software will force it to all uppercase.
Encryption Key	**New Random Key** discourages administrators from selecting simple keys such as 0000000000000000 or FACEABADDEADBABE (Hexadecimal).
Call Back phone numbers	The dial-back phone numbers' default values are read from the modem's &Zn settings.

Only the Security Mode and phone numbers are readable from the modem, so all of the other fields will initially be empty. For security reasons the data will not be stored for later retrieval. It will only be stored in the modem itself.

IMPORTANT! The Encryption Key number must be entered prior to changing call-back numbers.

Hayes Customer Service

If you are experiencing a problem with a Hayes product, try resolving it with the troubleshooting section of this document. This section saves you time by reviewing solutions to the most common communication problems. If necessary, you can contact Hayes Customer Service for guidance. **Before returning any product, please call Hayes Customer Service for a Return Authorization number and information concerning shipping and handling charges**.

For best service, please remember the following points before calling:

1. Use a phone located near the computer with the Hayes product.
2. Have the product serial number available.
3. Keep a record of all factors that are unique to the problem. (Software versions, etc.)

North America

World Headquarters (USA)

Tel: 1-770-449-5616 (ACCURA)

Tel: 1-770-441-1617 (OPTIMA)

Fax: 1-770-449-0087

BBS: 1-770-446-6336

Europe

Region Headquarters (UK)

Tel: +44-1252-775544

Fax: +44-1252-775511

BBS: +44-1252-775599

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Region Headquarters (Hong Kong)

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