



The Performance Champions

USER GUIDE

The HA2400LP is designed for those applications where no external source of power is available. The HideAway derives its power from two isolated sources: Power from the RS232 interface (TXD, RTS & DTR) activates the HideAway's RS232 drivers, the AT Command set controller and the optical relay that picks up the telephone line; Power from the telephone line then activates the data pump and ancillary telephone line components

It is essential, therefore, that the RS232 connection to your HA2400LP provides TED, RTS & DTR signals from which the HA2400 can draw its initial operating power, and that the unit is connected to a dial-up, not leased, telephone line.

Technical Specifications...

Data Rates:	300/75,1200, 2400bps Asynchronous
Compatibility:	Bell103/212 - CCITT V.22, V.22bis
Modulation:	QUAM in 2400bps, DPSK in 1200bps, FSK in 0-300bps
Operation:	Full or half-duplex
Command Set:	Hayes AT; 40 character buffer
Transmit Level:	-12dBm
Receive Sensitivity	43dBm
Dropout Level:	48dBm
Non-Volatile Memory:	Two stored user profiles Four stored phone numbers
Power:	Pin & Line Powered; No battery or AC adapter required
Size:	2.2"x3"x0.83"
Weight:	2.3 ounces
Environment:	0 to 40°C Operating -40 to 100°C Storage 0 to 95% (Non-condensing)
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Installation, Operation and LED Indications...

1. Connect the DB25 connector to the RS232 interface on your data terminal equipment ie, computer, RTU, Energy Management Device, PBX, etc.) If *the RS232 port is enabled, LED2 will be BLINKING.*
2. *The Data equipment must have pins 2, 4, 20, high (at least 3 to 5 volts) for unit to answer the phone line*
2. Connect the RJ11 jack to a dial up telephone line.
3. Type AT <CR> from within your communications package - The modem should send back ~OK".

4. Using the HA2400LP to send a call...

Dial out to a bulletin board or another modem by entering the command ATDT <phone number><CR>, where <phone number> is the telephone number you want to call.

LED2 will turn OFF and LED1 will start BLINKING while the call is initiated;

LED2 will remain OFF and LED1 will turn OFF during handshake;

LED1 will LIGHT CONTINUOUSLY and LED2 will remain OFF when connection is made.

NOTE: For pulse phones, use ATDP<phone number><CR>. Or if you prefer you can use the auto-dialer feature of your software program to dial out.

5. Using the HA2400LP as a host...

To automatically receive calls from another modem, type ATSO=1 <CR>. This command tells the modem to answer the phone line on the first ring. To manually answer an incoming modem call, type ATA ACT> aft, the modem types "Ring" on the screen.

When modem receives a ring, LED2 will LIGHT CONTINUOUSLY for a few seconds, then turn OFF. LED1 will remain OFF;

LED1 and LED2 will remain OFF during handshake;

LED1 will LIGHT CONTINUOUSLY and LED2 will remain OFF when connection is made.

6. To manually hang up your modem, type +++ and when the modem responds "OK", enter the command ATH <CR>.

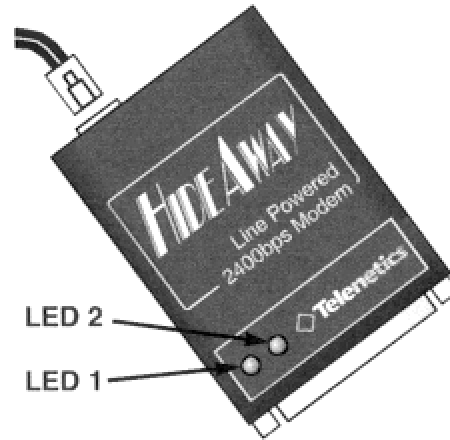
IMPORTANT NOTES...

The HA2400LP may *not be* set up for Auto Answer. User can use the AT command ATSO=<number>(1 or 0) to set up the answer sequence. ATSO=1 means answer after the first ring. ATSO=1&W will save the configuration in the modem's nonvolatile memory.

The HA2400LP is a line powered device and configurations are stored in non-volatile memory. Any command configuration not ending in "&W" will be lost if the comm port is turned off. To set the modem to factory default use AT command AT&F&W but you will lose or the settings you stored under AT&W.

If the RS232 port is enabled,
LED2 will be BLINKING

The Data equipment must have pins 2, 4, 20, high - in the idle (at least 3 to 5 volts) for unit to answer the phone line



NOTE 1 - It is essential, that the RS232 connection to your HA2400LP provides TD, RTS & DTR signals from which the HA2400 can draw its initial operating power, and that the unit is connected to a dial-up, not leased, telephone line.

Electronic data communications between elements will generally fall into two broad categories: single-ended and differential. RS232 (single-ended) was introduced in 1962, and despite rumors for its early demise, has remained widely used through the industry.

Independent channels are established for two-way (full-duplex) communications. The RS232 signals are represented by voltage levels with respect to a system common (power / logic ground). The "idle" state (MARK) has the signal level negative with respect to common, and the "active" state (SPACE) has the signal level positive with respect to common. RS232 has numerous handshaking lines (primarily used with modems), and also specifies a communications protocol.

The RS-232 interface presupposes a common ground between the DTE and DCE. This is a reasonable assumption when a short cable connects the DTE to the DCE, but with longer lines and connections between devices that may be on different electrical busses with different grounds, this may not be true.

RS232 data is bi-polar.... +3 TO +12 volts indicates an "ON or 0-state (SPACE) condition" while A -3 to -12 volts indicates an "OFF" 1-state (MARK) condition.... Modern computer equipment ignores the negative level and accepts a zero voltage level as the "OFF" state. In fact, the "ON" state may be achieved with lesser positive potential. This means circuits powered by 5 VDC are capable of driving RS232 circuits directly, however, the overall range that the RS232 signal may be transmitted/received may be dramatically reduced.

The output signal level usually swings between +12V and -12V. The "dead area" between +3v and -3v is designed to absorb line noise. In the various RS-232-like definitions this dead area may vary. For instance, the definition

for V.10 has a dead area from +0.3v to -0.3v. Many receivers designed for RS-232 are sensitive to differentials of 1v or less.

This can cause problems when using pin powered widgets - line drivers, converters, modems etc. These type of units need enough voltage & current to power them self's up. Typical UART (the RS-232 I/O chip) allows up to 50ma per output pin - so if the device needs 70ma to run we would need to use at least 2 pins for power. Some devices are very efficient and only require one pin (some times the Transmit or DTR pin) to be high - in the "SPACE" state while idle.

An RS-232 port can supply only limited power to another device. The number of output lines, the type of interface driver IC, and the state of the output lines are important considerations.



The types of driver ICs used in serial ports can be divided into three general categories:

- Drivers which require plus (+) and minus (-) voltage power supplies such as the 1488 series of interface integrated circuits. (Most desktop and tower PCs use this type of driver.)
- Low power drivers which require one +5 volt power supply. This type of driver has an internal charge pump for voltage conversion. (Many industrial microprocessor controls use this type of driver.)
- Low voltage (3.3 v) and low power drivers which meet the EIA-562 Standard. (Used on notebooks and laptops.)

Installation, Operation and LED Indicators

1. Connect the DB25 connector to the RS232 interface on your data terminal equipment (eg: computer, RTU, Energy Management Device, PBX, etc.)

If the RS232 port is enabled, LED2 will be blinking.

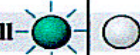
LED 1	LED 2
	

2. Connect the RJ11 jack to a dial up telephone line.
3. Type AT <CR> from within your communications software (ProComm, Windows Terminal, etc.). The modem should send back "OK."
4. Using the HA2400LP to send a call...

Dial out to another modem by entering the command ATDT <phone number><CR>, where <phone number> is the telephone number you want to call.

LED2 will turn OFF and LED1 will start BLINKING while the call is initiated;

Initiate Call



LED2 will remain OFF and LED1 will turn OFF during handshake;

Handshake



LED1 will LIGHT CONTINUOUSLY and LED2 will remain OFF when connection is made.

Connected



5. Using the HA2400LP to receive calls...

To automatically receive calls from another modem, type ATSO=1 <CR>.

This command tells the modem to answer the phone line on the first ring.

To manually answer an incoming modem call, type ATA <CR> after the message.

"RING" is displayed on the screen.

When the modem receives a ring, LED2 will LIGHT continuously for a few seconds, then turn off. LED1 will remain off;

Initiate Call



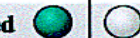
LED1 and LED2 will remain off during handshake;

Handshake



LED1 will light continuously and LED2 will remain off when connection is made.

Connected



IMPORTANT NOTES...

- To manually hang up your modem, type +++ and when the modem responds "OK," enter the command ATH <CR>.
- The HA2400LP is not set up for Auto Answer. User must use the AT command ATSO=<number> to set up the answer sequence. Eg: ATSO=1 means answer after the first ring. ATSO=1&W will save the configuration in the modem's non-volatile memory.
- The HA2400LP is a self powered device and configurations are stored in non-volatile memory. Any command configuration not ending in "&W" will be lost if the comm port is turned off. To set the modem to factory default use the AT command AT&F&W.

SUMMARY OF THE ROCKWELL "AT" COMMAND SET

To communicate using the modem, use an asynchronous communication program. The command set for the modems is compatible with the Hayes command set.

The modem is controlled and configured by the AT (attention command). Each command consists of the following elements (with the exception of the A/and the +++ command that will be discussed later). A command is not entered until a carriage return <ENTER> is entered. Spaces entered are ignored. For example, to enter the command `Answer', type ATA and <ENTER>.

When a carriage return is received, the commands are performed in the order in which they are sent to the modem. If more than 40 characters are sent to the modem, an error occurs and all commands must be re-entered.

A common configuration for a remote modem is to answer the call and hang up on loss of carrier. To do this the RS232 interface has to be set for the correct configuration.

Option if the Computer uses pins 2, 3, & 7 only - Set the AT commands as follows

ATSO=1 (modem will answer on the first ring)

AT&DO (modem will ignore DTR)

factory default is AT&D1 which allows the modem to answer only if DTR is high.

AT&V to check the state of the "S" registers use AT&V

AT&WO Don't forget to burn the new codes into E-PROM by

AT&WO or W1

To see your typing you made need to turn on E1 for the modem to echo back responses. Some software does not like it's data echoed back so don't forget to check E1/E0 if your software is acting strange.

Note: you may want to put the modem into a quiet mode - ATQ1 (ATQ0 is the default) modem does not send result codes - which can confuse the computer.

A good configuration for a dumb mode operation is

AT&F&C1&DOEQ1SO=1&WO or W1

BASIC AT COMMANDS for the 2,400 modem

Command and Data Modes

When you first start up your communications software, you will be in COMMAND mode. In other words, you have not dialed out and linked up to a remote modem. In COMMAND mode, local commands (called AT Commands) are active. After dialing out and successfully linking-up, you are in DATA mode and AT Commands are no longer active. In DATA mode, you must use the ESCAPE code (.) to temporarily suspend transmission to the remote modem and re-enter COMMAND mode. The ATO<CR> command (see below) reenters DATA mode.

AT Command Summary

All of the following commands must be preceded with the characters AT and followed by a carriage return (the <CR>, < <enter> >, or < <return> > key). For example, typing AT<CR> will cause the modem to print "OK" on the screen, and typing

AT&V<CR> will print the current configuration profile on the screen. The one notable exception is the A/ command, which will execute the previous AT Command without a <CR>. Throughout the rest of the manual, we will use the <CR> symbol to represent the enter key.

Be sure to do a AT&W0 that will write the changes you may have made to the 0 register so the modem will not lose it's settings after a power outage

You may want to set the modem up so it will echo your key strokes with the E1 command -

NOTE some software will have problems with an echo so you may need to set it to E1.

If your RS232 interface doesn't supply DTR you will need to set the &D to

Basic Commands

AT-Command prefix required before all
commands except A/ and ESCAPE sequences

<CR>-Terminates command line

A/-Repeat last command (does not use
<CR>)

+ + + Escape code sequence (returns to
COMMAND mode from DATA mode)

A-Answers a telephone call

Bn-Select Bell or CCITT for 1200 bps
connection

B0-CCITT V.22 FOR 1200 bps
communication

B1-Bell 212A for 1200 bps communication

Cn-Carrier Control

C0-ERROR

C1-OK

D-Dial the number which follows (see DIAL commands)

En-Command set echo control

E0-Echo off

E1-Echo on

Fn-On-line echo

F0-ERROR

F1-OK

Hn-Off-hook control

H0-Hangup phone line

H1-Pickup phone line

In-Identify the modem type

I0-Report the product code

I1-Calculate the firmware ROM checksum

I2-Verify the firmware ROM checksum

I3-Report the firmware and revision levels

I4-Report modem capabilities and features

Ln-Speaker volume control Acknowledged

Mn-Speaker control Acknowledged

O-Go back to DATA mode

P-Use pulse dialing

Qn-Disables (quiets) command responses

Q0-Enable results

Q1-Disable results

Sn-Select a S register

Sn=-Set S register to new value

Sn?-Show value of S register

T-Use tone dialing

Vn-Use verbose result codes

V0-Result codes are numeric

V1-Result codes are verbose

Xn-Extended dialing result codes

X0-Send result codes 0 through 4; BUSY and DIAL TONE detect disabled

X1-Send result codes 0 through 5, 10; BUSY and DIAL TONE detect disabled

X2-Result codes 0 through 6, 10 enabled; BUSY detect disabled, DIAL TONE detect enabled

X3-Result codes 0 through 5, 7, 10 enabled;

BUSY detect enabled, DIAL TONE detect disabled

X4-Result codes 0 through 8, 10 enabled;

BUSY and DIAL TONE detect enabled

Yn-Enable long space disconnect

Y0-Disable long space disconnect

Y1-Enable long space disconnect

Zn-Reset the modem

Z0-Reset and use stored profile 0

Z1-Reset and use stored profile 1

, -Pause for the value (in seconds) stored in register S8

Dial Commands

DP-Pulse dial the telephone number

DS=n-Dial with previously stored number

DT-Tone dial the telephone number

DW-Wait for dial tone

D; - Stop dialing and wait for more commands

D@ - Wait for 5 seconds of silence

D! - Hang up for 1/2 of a second (Flash)

D,-Pause for seconds as determined by register S8

0 through 9, A, B, C, D, #, *- Dial Digits/Characters

When the modem is dialing a phone number, any key will abort the current dialing command.

Extended Commands

&Cn-EIA RS-232 DCD control

&C0-Always on

&C1-On only when carrier detected

&Dn-EIA RS-232 DTR control Acknowledged

&En-Dialing echo control

&E0-Disable dialing echo

&E1-Enable dialing echo

&F-Accept factory settings

&Gn-Guard tone control

&G0-Guard tones disabled

&G1-Guard tone disabled

&G2-1800-Hz Guard tone enabled

&Ln-Leased-line control Acknowledged

&Pn-Select pulse dial make/break ratio

&P1-39 through 61 make/break at 10 pps

&P2-33 through 67 make/break at 10 pps

&Sn-EIA RS-232 DSR control Acknowledged

&V-VIEW current configuration profile

&Wn-Write to stored profile

&W0-Write settings to stored profile 0

&W1-Write settings to stored profile I

&Yn-Select stored profile for power up

&Y0-Use profile 0 on power up

&Y1-Use profile I on power up

&Zn=val-Store dial string (up to 36 characters)
in nonvolatile memory location numbers 0 through 3

Register Commands

* means value is stored by **&Wn (0 or 1)** command.

- S0*-Number rings until auto answer
S0=1 will answer one the first ring
- S1-Number of rings received
- S2-Escape Character
- S3-Carriage-return character
- S4-Line-feed character
- S5-Backspace character
- S6-Time for dial tone
- S7-Time to wait for connection
- S8-Pause time for comma
- S9-Carrier detect time
- S10-Carrier lost detect time
- S11-Tone dialing speed
- S12-Escape-code guard time
- S14*-bit-mapped options register
- S21*-bit-mapped options register
- S22*-bit-mapped options register
- S23*-bit-mapped options register
- S27*-bit-mapped options register

Result Code Summary

- * OK-Command was executed without error
- * 1 CONNECT-Modem has detected carrier and has gone DATA
- * 2 RING-Modem has detected ringing

- * 3 NO CARRIER-Carrier has been lost and call has been hung up
- * 4 ERROR-Error in command line
- * 5 CONNECT 1200-Modem has connected at 1200 bps; Bell 212 or V.22 connection
- * 6 NO DIALTONE-has been detected
- * 7 BUSY-A busy signal has been detected
- * 8 NO ANSWER-Silence was not found
- * 10 CONNECT 2400-Modem has connected at 2400 bps; V-22 connection

Error Diagnostics

Is the computer talking with the modem?

When you type AT<CR>, "OK" should be displayed. If the modem does not respond:

1. Make sure the modem is firmly connected to the computer.
2. Verify the communication program is configured to the correct communications port (COM L, COM2:, COM3:, or COM4:).
3. Verify the baud rate (2400, 1200, or 300) and check parity (even, odd, none).
4. If the modem still does not respond, type AT&F<CR>. This will reset the modem to the original factory settings.
5. Try unplugging the modem and plugging it back in to ensure clean contact connections.

If the modem responds, but...

---characters are not displayed, type ATEI <CR>. This tells the modem to echo commands to the screen.

...characters are displayed double, type

ATE<CR>. This turns the echo feature off.

Modem does not answer.

If the modem does not answer an incoming call, type
ATSO = I < CR>.

Modem will not dial a telephone number.

If the computer displays **NO DIALTONE**, the modem is not receiving a dial tone. Connect a standard telephone to the telephone line to verify a dial tone. If you do not hear dial tone, something is wrong with either your telephone cable or telephone line. Try another cable or line.

On some telephone lines connected to internal telephone systems, the telephone lines are not standard and will not work with standard telephones. Such lines will not work with this modem. Adapters are available to convert these lines so they may work with standard telephone equipment.

Modem can dial but can't communicate.

If you cannot communicate properly, something may be wrong with the other system. Try calling a different modem.

Unusual characters appear on the screen.

If you can dial, but unusual characters appear on the screen while communicating, check the communications settings of your communications software. The most common settings are 7E1 (7 bits, even parity, 1 stop bit) and 8N 1 (8 bits, no parity, 1 stop bit).

Modem connects but cannot communicate.

Another possibility is that your modem and software are set for different speeds. In other words, you will be unable to communicate at 2400 bps with modems linked at 1200 bps. Check your speed settings.

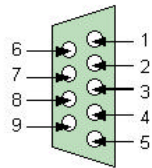
Your modem disconnects.

During communications the modem may disconnect from the phone line if-

1. It fails to connect to the remote modem.
2. It detects a loss of carrier from the remote modem.
3. You enter the escape and Hook command.
4. Turn off power to the computer.

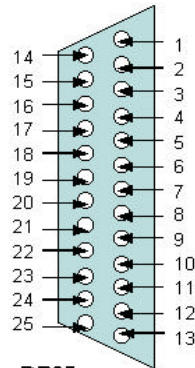
RS232C is the most commonly used serial data interface and defines the Physical, Functional and Electrical boundaries between two or more communicating devices

~ D-SHAPED SERIAL PORT CONNECTORS ~
are usually used to interconnect DTEs (computers, controllers, etc.) and DCEs (modems, converters, etc.)



DB9

Pin	Signal	Pin	Source
1	CD - Carrier Detect	8	MODEM
2	RXD - Receive Data	3	MODEM
3	TXD - Transmit Data	2	TERMINAL
4	DTR - Data Term'I Ready	20	TERMINAL
5	Signal Ground	7	N/A
6	DSR - Data Set Ready	6	MODEM
7	RTS - Ready to Send	4	TERMINAL
8	CTS - Clear to Send	5	MODEM
9	RI - Ring Indication (Dial Modems Only)	22	MODEM



DB25