Configuring the 4-Port Analog 56K Modem CPCI Adapter

This adapter is designed to be connected to the Public Switched Telephone Network (PSTN). The *country* parameter sets the adapter so that it will operate in the telephone network of the specified country. The default country is Japan.

Note: For proper operation of this modem adapter, the box software must be at level AIS V3.3, PTF 01 or later. If the modem was already installed before this PTF is loaded, the user must reconfigure the modem to manually select the country of operation.

To configure this adapter using the CONFIG (talk 6) command line, you should add it to the 2212 as a device and specify the interface port and the country. To enable it using the Configuration Program, you should configure it as a switched modem adapter and select the country.

Important:

1. The 4-Port Analog Modem adapter supports switched mode only. You should not select the leased mode option in the Configuration Program. If you do this, the adapter will not be enabled.
2. The 4-Port Analog Modem Adapter supports DTMF dialing only. Pulse dialing is not supported.
3. The 2212 provides the default value for the modem initialization string. You can make manual changes to this initialization string, using either the command line interface or the Configuration Program. However, the country code cannot be changed by modifying the modem initialization string using the command: `%T19,0,`*`country_code`*. If this command is added to the modem initialization string, the entire initialization string will be ignored and the modem will not be enabled.

Configuring the Adapter Using the Command Line Interface

First, from the talk 6 prompt (`Config>`), list the devices currently configured on the 2212. One device can be configured for each of the ports. Then, add the next device. Note that you are prompted to specify the country.

Example 1:

```
Config>
Config>list devices
Ifc 0     2-port 10/100 Ethernet            Slot: 1      Port: 1
Ifc 1     4-port Modem Adapter              Slot: 2      Port: 1
Ifc 2     4-port Modem Adapter              Slot: 2      Port: 2
Ifc 3     4-port Modem Adapter              Slot: 2      Port: 3
Config>add device analog-modem
Device Slot #(1-4) [1]? 2
Device Port #(1-4) [4]? 4
Enter a country code : [Japan]? United States
Adding 4-port Modem Adapter device in slot 2  port 4 as interface #4
Use "net 4" to configure 4-port Modem Adapter parameters
```

If you do not know the country or make an incorrect entry for the country, the command line provides you with a list of the countries that the modem supports, as shown in this example:

Example 2:

```
Config>add device analog-modem
Device Slot #(1-4) [1]? 2
Device Port #(1-4) [4]? 4
Enter a country code : [Japan]? Nigeria

Available options are :     Japan, United States, Spain, Australia, Belgium, Denmark,
                            Finland, France, Germany, Netherlands, Italy, New Zealand,
                            Norway, Sweden, Switzerland, United Kingdom, Austria, China,
                            Korea, Malaysia, Singapore, Taiwan, Thailand, Indonesia, Portugal,
                            Ireland, Hong Kong, Canada, Mexico, India, Vietnam, Philippines
                            Greece, Iceland, Luxemburg.

Enter a country code : [Japan]? Belgium
Adding 4-port Modem Adapter device in slot 2  port 4 as interface #4
Use "net 4" to configure 4-port Modem Adapter parameters
```

The statement: `Use "net 4" to configure 4-port Modem Adapter parameters` informs you that the router has assigned the new device to interface #4. Because **Belgium** has now been specified as the country, the adapter is now configured with the country code for Belgium. As shown in the next example, the command **network 4** or **net 4** from the `Config>` prompt now brings up the configuration prompt that is specific to port 4 of the 4-Port Analog Modem adapter. Because this adapter is a 4-Port Analog Modem in function, the router has configured the interface as a V.34 interface, as indicated by the new prompt: `V.34 4-Port Modem Config 4>` The **list** command shows that so far the default V.34 parameter values have been configured. For information about changing the V.34 parameters, refer to the *Access Integration Services Software User's Guide*.

Example 3:

```
Config>network 4
V.34 Data Link Configuration
V.34 4-Port Modem Config   4>list

         V.34 System Net Configuration:

Local Network Address Name    = default_address
Local Network Address         = 9999999

Non-Responding addresses:
Retries                       = 1
Timeout                       = 0 seconds

Mode                          = Switched

Call timeouts:
Command Delay                 = 0 ms
Connect                       = 60 seconds
Disconnect                    = 2 seconds

Modem strings:
Initialization string         = AT&S1L1&D2&C1X3
Residing country              = Belgium

Speed (bps)                   = 115200
```

To change the country after the interface has been configured, use the **set country** *country-name* command at the `V.34 4-Port Modem Config 4>` prompt. The variable *country-name* is the name of one of the supported countries, as shown in "Example 2" on page 1. Use the **list** command at the same prompt to verify that the country has been changed.

Configuring the Adapter Using the Configuration Program

The Configuration Program gives you the option of selecting switched or leased mode. Be sure to select switched mode because leased mode is not supported. The other parameters are the local network address name, the modem initialization string, the clock speed, and the country. The local network address name must be selected from among local network address names that have been configured when configuring V.34. If you change the local network address name, you are required to select a V.34 address that has previously been configured.

The modem initialization string that is provided is the default. You can change it manually by typing the changes in the space provided in the Modem initialization field on the panel. Keep in mind that you cannot modify the country code by manually changing the command for the country code in the initialization string.

A pull-down menu shows you all the countries that you can select.

4-Port Analog Modem AT Command Set and Register Definitions

This modem adapter must be configured to set the country of operation before use.

Functional Description

For data communications the Analog Modem Supports:

- V.90 for rates up to 56 kbits/s
- V.34 extended rates: 33.6 kbits/s to 2400 bits/s in 2400 bits/s increments
- V.32terbo: 19.2 kbits/s and 16.8 kbits/s
- V.32bis: 14,400 bits/s, 12,000 bits/s, 9600 bits/s, 7200 bits/s, 4800 bits/s
- V.22bis: 2400 bits/s and 1200 bits/s
- V.23: 1200/75 bits/s
- Bell 212A: 7200 bits/s
- Bell 103J: 0-300 bits/s
- V.21: 0-300 bits/s

AT Commands

AT commands can be sent to the modem in the modem initialization string that is defined during configuration, or by software that provides direct access to the modem. A summary of the commands implemented by the modem are shown in Table 1 on page 4. Commands can be executed when the modem is in COMMAND mode. COMMAND mode is entered upon one of the following conditions:

- After powerup
- At the termination of a connection
- After the execution of a command other than dial or answer commands (ATO or AT&T)
- Upon the receipt of the ESCAPE SEQUENCE (three consecutive characters matching the contents of S register 2) while in on-line mode
- Upon the on-to-off transition of DTR if &D1, &D2, or &D3 has been set

Table 1. AT Command Set Summary

Command	Command Description
A/	Repeat last command
A	Answer command
B	Communication standard setting
C	Carrier control
D	Dial command
E	Echo command
F	On-line data character echo command
H	Hook control
I	Request ID information
L	Monitor speaker volume
M	Monitor speaker mode
N	Modulation handshake
O	Return on-line to data mode
Q	Result code control
T	Select tone dialing (Note: Pulse dialing is not supported.)
V	DCE response format
W	Result code option
X	Result code selection and call progress monitoring
Y	Long-space disconnect
Z	Recall stored profile
&B	V.32 auto retrain
&C	Data carrier detect (DCD) control
&D	DTR control
&F	Local factory settings
&G	V.22bis guard tone control
&K	Local flow control selection
&M	Asynchronous communications mode
&Q	Asynchronous communications mode
&S	Data set ready (DSR) option
&T	Self-test commands
&V	View active configuration and stored profile
&W	Store current configuration
&Y	Select stored profile for hard reset
&Zn=x	Store telephone number
\A	Select maximum MNP block size
\B	Transmit Break Remote
\G	Modem port flow control
\J	Adjust bits/s rate control
\K	Break control
\N	Error control mode selection

Table 1. AT Command Set Summary (continued)

Command	Command Description
\Q	Local flow control selection
\R	Ring indicator signal off after the telephone call is answered.
\T	Inactivity timer
\V	Protocol result code
\X	XON/XOFF pass through
-C	Data calling tone
%B	View numbers in blacklist
%C	Data compression control
%E	Enable/Disable auto-retrain and fallback/fall forward

Table 2. The S-Register Summary

Register	North American Default	Description
S0	0	Automatic answer ring number
S1	0	Ring counter
S2	43	AT escape character
S3	13	Command line termination character (user defined)
S4	10	Response formatting character
S8	2	Comma dial modifier time
S12	50	Escape guard time
S24	48	Timer to control sleep mode
S37	0	Dial line rate
S38	1	56K dial line rate
S109	1	V.90 activation

Table 3. V.34 Result Code Summary

Result Code	Numeric	Description
OK	0	Command executed
CONNECT	1	Modem connected to line
RING	2	A ring signal has been detected
NO CARRIER	3	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone
ERROR	4	Invalid command
CONNECT 1200 EC*	5	Connection at 1200 bits/s
NO DIAL TONE	6	No dial tone detected
BUSY	7	Busy signal detected
NO ANSWER	8	No quiet answer
CONNECT 2400 EC*	10	Connection at 2400 bits/s
CONNECT 4800 EC*	11	Connection at 4800 bits/s
CONNECT 9600 EC*	12	Connection at 9600 bits/s
CONNECT 14400 EC*	13	Connection at 14400 bits/s

Table 3. V.34 Result Code Summary (continued)

Result Code	Numeric	Description
CONNECT 19200 EC*	14	Connection at 19200 bits/s
CONNECT 7200 EC*	24	Connection at 7200 bits/s
CONNECT 12000 EC*	25	Connection at 12000 bits/s
CONNECT 16800 EC*	86	Connection at 16800 bits/s
CONNECT 300 EC*	40	Connection at 300 bits/s
CONNECT 21600 EC*	55	Connection at 21600 bits/s
CONNECT 24000 EC*	56	Connection at 24000 bits/s
CONNECT 26400 EC*	57	Connection at 26400 bits/s
CONNECT 28800 EC*	58	Connection at 28800 bits/s
CONNECT 31200 EC*	59	Connection at 31200 bits/s
CONNECT 33600 EC*	60	Connection at 33600 bits/s
CONNECT 38400 EC*	28	Connection at 38400 bits/s
CONNECT 57600 EC*	18	Connection at 57600 bits/s
CONNECT 115200 EC*	87	Connection at 115200 bits/s
DELAYED	88	Delay is in effect for the dialed number
BLACKLISTED	89	Dialed number is blacklisted
BLACKLIST FULL	90	Blacklist is full

* *EC* only appears when the Extended Result Codes configuration option is enabled. *EC* is replaced by one of the following symbols, depending upon the error control method used:
- *V42bis*-V.42 error control and V.42bis data compression.
- *V42*-V.42 error control only.
- *MNP 5*-MNP class 4 error control and MNP class 5 data compression.
- *MNP 4*-MNP class 4 error control only.
- *NoEC*-No error control protocol.

Table 4. Result Code for 56K Mode. This table lists all the 56K CONNECT result codes.

Result Code	Numeric	Description
CONNECT 32000 EC*	70	Connection at 32000 bits/s, 56K rate
CONNECT 34000 EC*	71	Connection at 34000 bits/s, 56K rate
CONNECT 36000 EC*	72	Connection at 36000 bits/s, 56K rate
CONNECT 38000 EC*	73	Connection at 38000 bits/s, 56K rate
CONNECT 40000 EC*	74	Connection at 40000 bits/s, 56K rate
CONNECT 42000 EC*	75	Connection at 42000 bits/s, 56K rate
CONNECT 44000 EC*	76	Connection at 44000 bits/s, 56K rate
CONNECT 46000 EC*	77	Connection at 46000 bits/s, 56K rate
CONNECT 48000 EC*	78	Connection at 48000 bits/s, 56K rate
CONNECT 50000 EC*	79	Connection at 50000 bits/s, 56K rate
CONNECT 52000 EC*	80	Connection at 52000 bits/s, 56K rate
CONNECT 54000 EC*	81	Connection at 54000 bits/s, 56K rate
CONNECT 56000 EC*	82	Connection at 56000 bits/s, 56K rate
CONNECT 58000 EC*	83	Connection at 58000 bits/s, 56K rate
CONNECT 60000 EC*	84	Connection at 60000 bits/s, 56K rate

Table 4. Result Code for 56K Mode (continued). This table lists all the 56K CONNECT result codes.

Result Code	Numeric	Description
* *EC* only appears when the Extended Result Codes configuration option is enabled. *EC* is replaced by one of the following symbols, depending upon the error control method used: • *V42bis*-V.42 error control and V.42bis data compression. • *V42*-V.42 error control only. • *MNP 5*-MNP class 4 error control and MNP class 5 data compression. • *MNP 4*-MNP class 4 error control only. • *NoEC*-No error control protocol.		

AT Commands Reference

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in COMMAND mode. The format for entering AT commands is:

- Type: **ATXn** where *X* is the AT command, and *n* is the specific value for that command.
- Press: **Enter**

Table 3 on page 5 and Table 4 on page 6 list all the valid result codes.

In the following listing, all commands and command values accepted by the modem are shown; any entries other than those shown cause the ERROR result code.

+++ Escape Sequence

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you may communicate directly to your modem using AT commands. Once you are finished, you may return to data mode using the ATO command. For more information, see the **O** command in this list.

A pause, the length of which is set by the escape guard time (S12), must be used after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data. The value of the escape sequence character may be changed using register S2.

A/ Repeat Last Command

This command repeats the last command string entered. Do not precede this command with an AT prefix or conclude it by pressing Enter.

A Answer Command

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

Bn Communication Standard Setting

This command determines ITU-T vs. Bell standard.

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

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

B2: Unselects V.23 reverse channel (same as B3).

B3: Unselects V.23 reverse channel (same as B2).

B15: Selects V.21 when the modem is at 300 bits/s.

B16: Selects Bell 103J when the modem is at 300 bits/s (default).

- Result Codes:
  - OK n = 0, 1, 15, 16
  - ERROR Otherwise

Cn Carrier Control

The modem will accept the C1 command without error in order to ensure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some other modems not to send carrier (that is, it puts them in a receive-only mode).

C0: Transmit carrier always off.

C1: Normal transmit carrier switching.

- Result Codes:
  - OK n = 1
  - ERROR Otherwise

Dn Dial

This command instructs the modem to begin the dialing sequence. The dial string (*n*, including modifiers and the telephone number) is entered after the **ATD** command. A dial string can be up to 40 characters long. Any digit or symbol (0-9, *, #, A, B, C, D) can be dialed as touch-tone digits. Characters such as spaces, hyphens, and parentheses do not count they are ignored by the modem and may be included in the dial string to enhance readability.

The following can be used as dial string modifiers:

L Redials last number. Should be the first character following **ATD**, ignored otherwise.

T Touch-tone dialing (default). Note that pulse dialing is not supported.

, Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string.

W Wait for dial tone. Modem waits for a second dial tone before processing the dial string.

@ Wait for quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user.

! Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.

; Return to command mode. Causes the modem to return to command mode after dialing the number, without disconnecting the call.

^ Disable data calling tone transmission.

S = n Dial a telephone number previously stored using the **&Zn = x** command (see the **&Zn = x** command for further information). The range of *n* is 0-3.

$ Bong tone detection.

En Echo Command

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

E0: Disables echo to the computer.

E1: Enables echo to the computer (default).

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

Fn On-line Data Character Echo Command

This command determines if the modem will echo data from the DTE. This modem does not support the F0 version of the command. However, the modem will accept F1, which may be issued by older communication software, to ensure backward compatibility.

F0: On-line data character echo enabled (NOT SUPPORTED, ERROR).

F1: On-line character echo disabled.

- Result Codes:
  - OK n = 1
  - ERROR Otherwise

Hn Hook Control

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

H0: Modem goes on-hook (default).

H1: Modem goes off-hook.

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

In Request ID Information

This command displays specific product information about the modem.

I0: Returns default speed and controller firmware version (same as I3).

I1: Calculates ROM check sum and displays it on the DTE (for example, 12AB).

I2: Performs a ROM check and calculates and verifies the check sum displaying OK or ERROR.

I3: Returns the default speed and the controller firmware version (same as I0).

I4: Returns firmware version for data pump (for example, 94).

I5: Returns the board ID: software version, hardware version, and country ID.

I6: Response OK

I7: Response OK

I8: Response OK

I9: Returns country code

- Result Codes:
  - OK n = 0-9
  - ERROR Otherwise

Ln Monitor Speaker Volume

This command has no effect since there is no modem speaker.

L0: Selects low volume.

L1: Selects low volume.

L2: Selects medium volume (default).

L3: Selects high volume.

- Result Codes:
  - OK n = 0, 1, 2, 3
  - ERROR Otherwise

Mn Monitor Speaker Mode

This command has no effect since there is no modem speaker.

M0: The speaker is off.

M1: The speaker is on until the modem detects the carrier signal (default).

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

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

- Result Codes:
  - OK n = 0, 1, 2, 3
  - ERROR Otherwise

Nn Modulation Handshake

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

N0: When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command.

N1: When originating or answering, begin the handshake only at the communication standard specified by S37 and the ATB command. During handshake, fallback to a lower speed may occur (default).

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

On Return On-line to Data Mode

O0: Instructs the modem to exit on-line command mode and return to data mode (see AT Escape Sequence, **+++** at 7).

O1: This command issues a retrain before returning to on-line data mode.

O3: This command issues a rate renegotiation before returning to on-line data mode.

- Result Codes:
  - OK n = 0, 1, 3
  - ERROR Otherwise

Qn Result Code Control

Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are OK, CONNECT, RING, NO CARRIER, and ERROR. The **ATQ** command allows the user to turn result codes on or off.

Q0: Enables modem to send result codes to the computer (default).

Q1: Disables modem from sending result codes to the computer.

- Result Codes:
  - OK n = 0, 1

– ERROR Otherwise

T Select Tone Dialing

This command instructs the modem to send DTMF tones while dialing. Dialed digits are tone dialed until a P command or dial modifier is received. This is the default setting.

Vn DCE Response Format

This command controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents.

V0: Displays result codes as digits.

V1: Displays result codes as text (default).

- Result Codes:
  – OK n = 0, 1
  – ERROR Otherwise

Wn Result Code Option

W0: CONNECT result code reports DTE speed. Disable protocol result codes.

W1: CONNECT result code reports DTE speed. Enable protocol result codes.

W2: CONNECT result code reports DCE speed. Enable protocol result codes (default).

- Result Codes:
  – OK n = 0, 1, 2
  – ERROR Otherwise

Xn Result Code Selection and Call Progress Monitoring

This command enables tone detection options used in the dialing process. As these functions are chosen, the modem chip set's result codes are also affected. Therefore, this command is frequently used to control the modem chip set's responses. The primary function of this control is to control the modem chip set's call response capabilities.

Table 5. Result Code Selection and Call Progress Monitoring

Xn	Ext. Result Code	Dial Tone Detect	Busy Tone Detect
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4	Enable	Enable	Enable (default)
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

Extended Result Codes

Disabled:

Displays only the basic result codes OK, CONNECT, RING, NO CARRIER, and ERROR.

Enabled:

Displays basic result codes, along with the connect message and

the modem's date rate, and an indication of the modem's error correction and data compression operation.

Dial Tone Detect

Disabled:
The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.

Enabled:
The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.

Busy Tone Detect

Disabled:
The modem ignores any busy tones it receives.

Enabled:
The modem monitors for busy tones.

- Result Codes:
  - OK n = 0, 1, 2, 3, 4, 5, 6, 7
  - ERROR Otherwise

Yn Long Space Disconnect

Long space disconnect is always disabled.

Y0: Disable long space disconnect (default).

Y1: Enable long space disconnect. NOT SUPPORTED.

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

Zn Recall Stored Profile

This command instructs the modem chip set to go on-hook and restore the profile saved by the last **&W** command. Either **Z0** or **Z1** restores the same single profile.

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

&Bn V.32 Auto Retrain

This modem always auto retrains.

&B0: Disable V.32 auto retrain. NOT SUPPORTED.

&B1: Enable V.32 auto retrain (default).

- Result Codes:
  - OK n = 1
  - ERROR Otherwise

&Cn Data Carrier Detect (DCD) Control

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

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

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

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

&Dn DTR Control

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

&D0: Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your computer does not provide DTR to the modem.

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

&D2: If the DTR signal is not detected while in on-line data mode, the modem disconnects (default). If this signal is not present, the modem will not answer or dial.

&D3: Reset on the on-to-off DTR transition.

- Result Codes:
  - OK n = 0, 1, 2.3
  - ERROR Otherwise

&F Load Factory Settings

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

&Gn V22bis Guard Tone Control

This command determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only.

&G0: Guard tone disabled (default).

&G1: Sets guard tone to 550 Hz.

&G2: Sets guard tone to 1800 Hz.

- Result Codes:
  - OK n = 0, 1, 2
  - ERROR Otherwise

&Kn Local Flow Control Selection

&K0: Disable flow control.

&K1: Reserved.

&K2: Reserved.

&K3: Enable RTS/CTS flow control (default).

&K4: Enable XON/XOFF flow control.

- Result Codes:
  - OK n = 0, 3, 4
  - ERROR Otherwise

&Mn Asynchronous Communications Mode

&M0: Asynchronous mode (default).

&M1: Reserved.

&M2: Reserved.

&M3: Reserved.

&M4: Reserved.

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

&Qn Asynchronous Communications Mode

&Q0: Asynchronous mode, buffered. Same as \N0.

&Q1: Reserved.

&Q2: Reserved.

&Q3: Reserved.

&Q4: Reserved.

&Q5: Error control mode, buffered (default). Same as \N3

&Q6: Asynchronous mode, buffered. Same as \N0.

&Q7: Reserved.

&Q8: MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current user setting in S36.

&Q9: V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current user setting in S36.

- Result Codes:
  - OK n = 0, 5, 6, 8, 9
  - ERROR Otherwise

&Sn Data Set Ready (DSR) Option

This command selects DSR action.

&S0: DSR always ON (default).

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

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

&Tn Self-Test Commands

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

&T0: Abort. Stops any test in progress.

&T1: Local analog loop. This test verifies modem operation, as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be off-line.

&T3: Local digital loopback test.

&T6: Remote digital loopback test. This test can verify the integrity of

the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to, and returned from, the remote modem. To work properly, the modems must be on-line with error control disabled.

- Result Codes:
  - OK n = 0
  - CONNECT n = 1, 3, 6
  - ERROR Otherwise

&V0 View Active Configuration and Stored Profile

This command is used to display the active profiles.

&Wn Store Current Configuration

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

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

&Yn Select Stored Profile for Hard Reset

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

&Y0: Select stored profile 0 on power up.

&Y1: ERROR.

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

&Zn=x Store Telephone Number

This command is used to store up to four dialing strings in the modem's nonvolatile memory for later dialing. The format for the command is **&Zn =** *stored number* where *n* is the location 0-3 to which the number should be written. The dial string may contain up to 40 characters. The **ATDS = n** command dials using the string stored in location *n*.

- Result Codes:
  - OK n = 0, 1, 2, 3
  - ERROR Otherwise

\An Select Maximum MNP Block Size

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied.

\A0: 64 characters.

\A1: 128 characters.

\A2: 192 characters.

\A3: 256 characters (DEFAULT).

- Result Codes:
  - OK n = 0, 1, 2, 3
  - ERROR Otherwise

\Bn Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100ms according to parameter specified. The command works in conjunction with the \K command.

\B1-\B9:
Break length in 100ms units. (Default = 3.) (Non-error corrected mode only.)

- Result Codes:
  - OK If connected in data modem mode
  - NO CARRIER If not connected or connected in fax modem mode.

\G Modem Port Flow Control

\G0: Returns an "OK" for compatibility (default).

\G1: NOT SUPPORTED, responds ERROR.

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

\J Adjust Bits/s Rate Control

When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed.

\J0: Turn off feature (default).

\J1: Turn on feature.

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

\Kn Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The response is different in three separate states.

The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

\K0: Enter on-line command mode, no break sent to the remote modem.

\K1: Clear data buffers and send break to remote modem.

\K2: Same as 0.

\K3: Send break to remote modem immediately.

\K4: Same as 0.

\K5: Send break to remote modem in sequence with transmitted data. (Default.)

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

The second case is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

\K0: Clear data buffers and send break to remote modem.

\K1: Clear data buffers and send break to remote modem. (Same as 0.)

\K2: Send break to remote modem immediately.

\K3: Send break to remote modem immediately. (Same as 2.)

\K4: Send break to remote modem in sequence with data.

\K5: Send break to remote modem in sequence with data. (Same as 4.) (Default.)

The third case is when a break is received from a remote modem during a connection:

\K0: Clear data buffers and send break to the DTE.

\K1: Clear data buffers and send break to the DTE. (Same as 0.)

\K2: Send a break immediately to DTE.

\K3: Send a break immediately to DTE. (Same as 2.)

\K4: Send a break in sequence with received data to DTE.

\K5: Send a break in sequence with received data to DTE. (Same as 4.) (Default.)

Result Codes:
- OK n = 0, 1, 2, 3, 4, 5
- ERROR Otherwise

\Nn Error Control Mode Selection

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

\N0: Buffer mode. No error control (same as **&Q6**).

\N1: Direct mode.

\N2: MNP or disconnect mode. The modem attempts to connect in MNP 2-4 error control procedure. If this fails, the modem disconnects. This is also known as MNP reliable mode.

\N3: V.42, MNP, or buffer (default). The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/MNP auto reliable mode (same as **&Q5**).

\N4: V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.

\N5: V.42 MNP or buffer (same as \N3).

\N7: V.42. MNP or buffer (same as \N3).
- Result Codes:
  - OK n = 0, 1, 2, 3, 4, 5, 7

\Q Local Flow Control Selection

\Q0: Disable flow control. Same as **&K0**.

\Q1: XON/XOFF software flow control. Same as **&K4**.

\Q2: CTS-only flow control. This is not supported and the response is ERROR.

\Q3: RTS/CTS to DTE (default). Same as **&K3**
- Result Codes:
  - OK n = 0, 1, 3
  - ERROR Otherwise

\Rn Ring indicator signal off after the telephone call is answered (Compatibility command)

\R0: Ring indicator signal is off after the telephone call is answered.

- Result Codes:
  - OK n = 0
  - ERROR Otherwise

\Tn Inactivity Timer

This command specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable to buffer mode.

- Result Codes:
  - OK n = 0-255
  - ERROR Otherwise

\Vn Protocol Result Code

\V0: Disable protocol result code.

\V1: Enable protocol result code.

\V2: Enable protocol result code.

- Result Codes:
  - OK n = 0, 1, 2
  - ERROR Otherwise

-Cn Data Calling Tone

Data calling tone is a tone of certain frequency and cadence as specified in V.25 that allows remote data/FAX/voice discrimination. The frequency is 1300 Hz with a cadence of 0.5 s on and 2 s off.

-C0: Disabled (default).

-C1: Enabled.

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

\Xn XON/XOFF Pass Through

\X0: Modem processes XON/XOFF flow control characters locally (DEFAULT).

\X1: Modem processes and passes XON/XOFF flow control characters.

- Result Codes:
  - OK n = 0, 1
  - ERROR Otherwise

%B View Numbers in Blacklist

If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

%Cn Enable/Disable Data Compression

Enables or disables data compression negotiation on an error corrected link.

The initial release of the 4-Port Analog Modem (Part number 35L2337) has the following parameters:

%C0: Disables data compression.

%C1: Enables both V.42 bis and MNP 5 data compression.

- Result Codes:
  - OK n = 0, 1

– ERROR Otherwise

Subsequent releases of the 4-Port Analog Modem have the following parameters:

%C0: Disables data compression.

%C1: Enables MNP 5 data compression.

%C2: Enables V.42 bis data compression.

%C3: Enables both V.42 bis and MNP 5 data compression.

- Result Codes:
  – OK n = 0, 1, 2, 3
  – ERROR Otherwise

%En Enable/Disable Auto-Retrain and Fallback/Fall Forward

Provides option for the modem to automatically monitor line quality to fall back when line quality is insufficient and to fall forward when line quality is sufficient.

%E0: Disable fallback/fall forward.

%E1: Disable fallback/fall forward.

%E2: Enable fallback/fall forward.

- Result Codes:
  – OK n = 0, 1, 2
  – ERROR Otherwise

%Xn Enable/Disable re-dialing

Enables or disables re-dialing.

%X0: Disables re-dialing suppression. (Default)

%X1: Enables re-dialing suppression. Displays "No Carrier" when re-dialing.

- Result Codes:
  – OK n = 0, 1
  – ERROR Otherwise

S-Registers Reference

S-registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in COMMAND mode.

To display the value of an S-register:

1. Type: **ATSn?** where *n* is the register number.
2. Press: **Enter**

To modify the value of an S-register:

1. Type: **ATSn = r** where *n* is the register number, and *r* is the new register value.
2. Press: **Enter**

Only the registers listed in this document are supported. Any attempt to write to an undefined register can cause erratic operation of the modem, which may cause the modem to operate beyond the allowable limits.

S-Registers Definitions

S0 Auto Answer Ring Number

This register determines the number of rings the modem will count before automatically answering a call. Enter 0 (zero) if you do not want the modem to automatically answer at all. When disabled, the modem can only answer with an **ATA** command.

- Range: 0-255
- Default: 0
- Units: rings

S1 Ring Counter

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

- Range: 0-255
- Default: 0
- Units: rings

S2 AT Escape Character (User Defined)

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

- Range: 0-255
- Default: 43
- Units: ASCII

S3 Command Line Termination Character (User Defined)

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

- Range: 0-127, ASCII decimal
- Default: 13 (carriage return)
- Units: ASCII

S4 Response Formatting Character (User Defined)

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

- Range: 0-127, ASCII decimal
- Default: 10 (line feed)
- Units: ASCII

S8 Comma Dial Modifier Time

This register sets the time, in seconds, that the modem must pause when it encounters a comma (,) in the dial command string.

- Range: 0-65
- Default: 2
- Units: seconds

S12 Escape Guard Time

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

- Range: 0-255
- Default: 50
- Units: 0.02 seconds

S24 Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters

sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

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

- Range: 0, 5-255
- Default: 10

S37 Dial Line Rate (Default 0)

- S37 = 0 maximum modem speed
- S37 = 1 reserved
- S37 = 2 1200/75 bits/s
- S37 = 3 300 bits/s
- S37 =4 reserved
- 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 12000 bits/s
- S37 = 11 14400 bits/s
- S37 = 12 16800 bits/s
- S37 = 13 19200 bits/s
- S37 = 14 21600 bits/s
- S37 = 15 24000 bits/s
- S37 = 16 26400 bits/s
- S37 = 17 28800 bits/s
- S37 = 18 31200 bits/s
- S37 = 19 33600 bits/s

S38 56K Dial Line Rate (Default 1)

There are two S-registers for 56K. S38 sets the maximum 56K downstream speed that the modem attempts to connect. To disable 56K, set S38 to 0. S37 register is used to control the upstream V.34 rate.

- S38 = 0 56K disabled
- S38 = 1 56K enabled - automatic speed selection - maximum modem speed
- S38 = 2 32000 bits/s
- S38 = 3 34000 bits/s
- S38 = 4 36000 bits/s
- S38 = 5 38000 bits/s
- S38 = 6 40000 bits/s
- S38 = 7 42000 bits/s
- S38 = 8 44000 bits/s
- S38 = 9 46000 bits/s
- S38 = 10 48000 bits/s
- S38 = 11 50000 bits/s
- S38 = 12 52000 bits/s
- S38 = 13 54000 bits/s
- S38 = 14 56000 bits/s
- S38 = 15 58000 bits/s
- S38 = 16 60000 bits/s

S109 V.90 Activation Mode

This register determines the V.90 mode, either auto or deactivated.

- S109 = 0 V.90 Deactivated
- S109 = 1 V.90 Auto Mode (default)