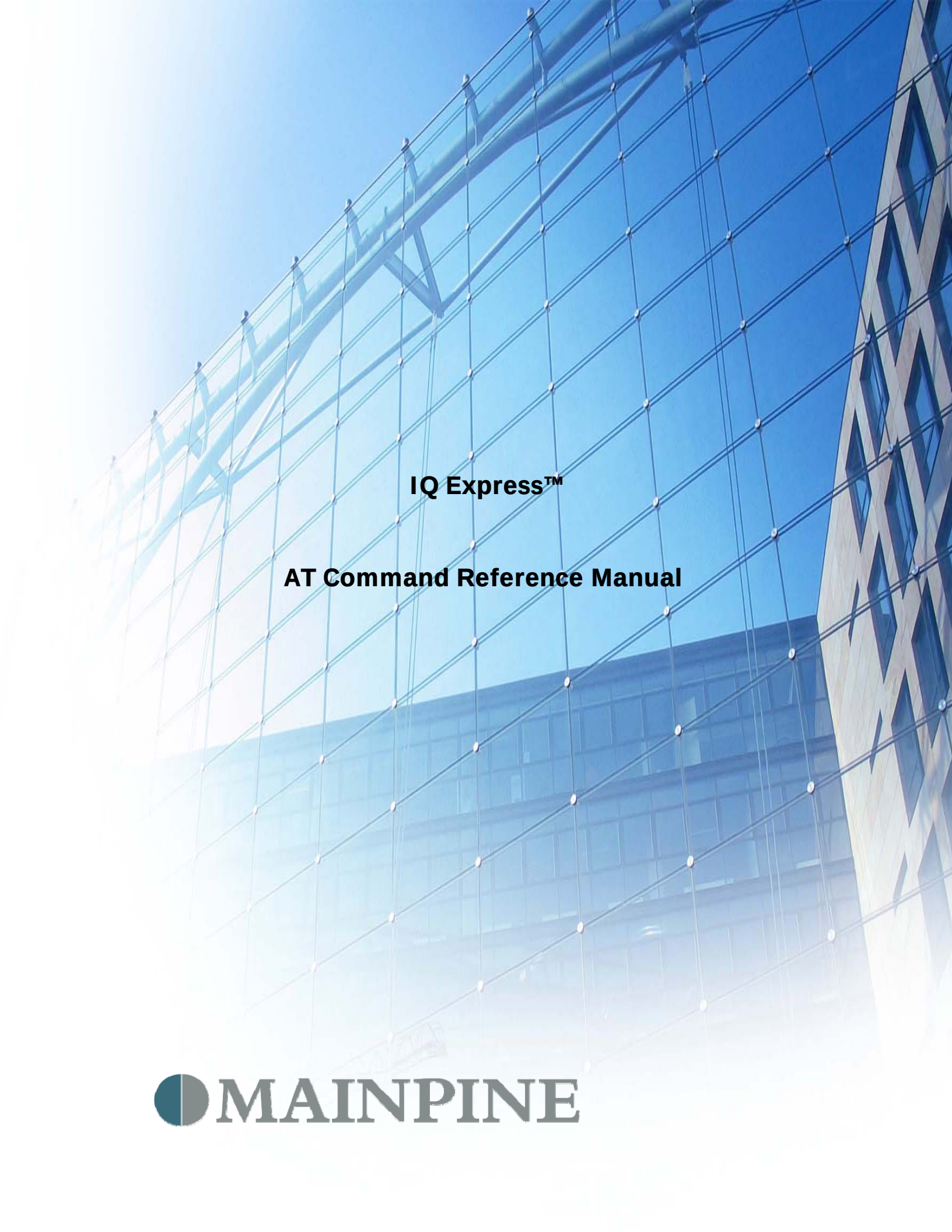

IQ Express™

AT Command Reference Manual

MAINPINE

The following document describes the IQ Express AT Command Set

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Introduction

The following reference manual specifies the Mainpine AT command set for IQ Express Fax Boards.

Mainpine's IQ Express Fax boards support a broad base of commands for FAX communications. The command set includes support for the basic commands standardized by ITU-T recommendation V.250 (05/99)*, class 1.0 FAX commands standardized by ITU-T recommendation T.31 (08/95)†, and class 2.0/2.1 FAX commands standardized by ITU-T recommendation T.32 (08/95)‡.

Additional support is included for many nonstandard commands. Most of the nonstandard commands are designed to support product development and customer debugging efforts.

This document contains an overview of the supported commands, responses, and registers used by Mainpine's IQ Express Fax boards. However, a particular product version may not support the entire AT command set. Some features are dependent on product application, licensing, and other contractual agreements.

† Mainpine IQ Express products support amendment 1 to T.31 which defines command modifications for V.34 FAX.
‡ Mainpine IQ Express products support amendment 1 to T.32 which defines command modifications for V.34 FAX.

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How to Use This Manual

The AT command set for the IQ Express Fax Boards consists of commands based on FAX communications. The commands, presented in this manual, follow the conventions set by ITU-T recommendation V.250 (05/99) which standardized many of the common AT extensions.

This section identifies the relevant standards from V.250, and any modifications to presentation which have been made for clarity and ease of use.

The IQ Express command set also includes commands which have not been standardized by a specific ITU recommendation. Some of these commands support legacy systems; other commands support test and debug efforts; and still others support features which are specific to Mainpine products.

AT Command Conventions

This document describes the AT commands and S registers associated with the IQ Express. Each command has a standard layout consisting of:

- A command title.
- A general command description.
- Result codes including the conditions for obtaining the result.
- A detailed command description.

The command title is formatted in large bold letters and contains the command, its parameters, and a descriptive command name. The general command description identifies in broad terms the function of the command and when to use it. The detailed command description breaks down the effect of each of the parameters values. This section may also contain supplementary information needed for proper usage of the command.

The modem or data circuit terminating equipment (DCE) returns at least one result code for each command submitted to it by the host system or data terminal equipment (DTE). The most common result codes returned by the DCE are *OK* and *ERROR*. Conditions for receiving the result code follow the listed result code.

Sample Command

E<value>—Command Echo

Use this command to instruct the modem to echo characters sent to it. When the echo feature is selected, characters sent to the modem are sent back to the host and displayed on the monitor.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ?? 0—1.

Table 1. E<value> Commands

Command	Function
E0	Disables echo command.
E1	Enables echo command (default).

Basic Syntax Commands

Basic syntax commands use the following format:

- <command>[<parameter>]

where <command> is a single character or a group of characters that represent the command and <parameter> is an optional decimal number. There are some exceptions to these rules and they are noted for each command as needed. The echo command in the previous example follows the basic commands syntax structure.

Extended Syntax Commands

Extended syntax commands* have three different command formats:

- No parameters: +<name>
- Single parameter: +<name>[=<parameter>]
- Multiple parameters: +<name>[=<parameter1>][,<parameterX>]

where <name> is the name of the command and begins with an alphanumeric character and <parameterX> is an optional decimal number. There are some exceptions to these rules and they are noted for each command as needed.

In addition to the standard command format, extended commands have a read and test syntax. The host system uses the read syntax to pole the modem and determine the current setting for the command parameters. Read syntax has the following format:

- Read syntax: +<name>?

The host system uses the test syntax to pole the modem and determine the supported parameter values for the command. Test syntax has the following format:

- Test syntax: +<name>=?

The modem responds to this command with a list of the supported parameter ranges.

* The description of extended syntax commands presented here is a simplified version of the information presented in ITU-T Recommendation V.250 (05/99). For further details, refer to section 5.4 of Recommendation V.250.

S Register Conventions

S registers contain parameters used by the modem. The presentation format for an S register is very similar to the format used for an AT command. Each S register has a standard layout consisting of:

- S register title.
- S register description.
- Parameter description.

The S register title is formatted in large bold letters and begins with a capital S followed by the register number. The title also includes a descriptive name for the register. The S register description defines the parameter the S register represents.

S register parameters can have a variety of effects on the functionality of the modem. As a result the parameter description can have several forms. The most common form includes the parameter range, the parameter default, and the units used by the parameter.

S register sample

S2—Escape Character (User-Defined)

S2 contains the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII +. The escape sequence allows the modem to exit data mode and enter command mode when on-line. A value over 127 disables the escape process, i.e., no escape character will be recognized.

- Range: 0—255
- Default: 43 (+)
- Units: ASCII

Other Document Conventions

For the sake of clarity, the following conventions have been adopted and used throughout this document.

Item	Example	Conventions Description
AT Command	**&C <value>**	AT commands are all capitals followed by its parameter values in bold print. This document does not explicitly use the AT prefix when presenting commands. However, the AT prefix is used for all examples.
S Registers	S <value>	S registers have a capital S followed by the register number.
Parameters	<value>	Parameters or variables always use lower case lettering enclosed in brackets, <>.
Results Codes	*OK*	Result codes are all capitals and italics.
Examples	—	Examples use the Courier font and are shown exactly as they appear when the commands are entered into a terminal program such as *Windows** Hyperterminal.

* *Windows* is a register trademark of Microsoft Corporation.

Synchronous Mode and V.80 AT Commands

Mainpine's AT command set supports synchronous command mode and most of the commands defined in ITU-T recommendation V.80, which defines in-band modem control and synchronous data modes for asynchronous host systems. Recommendation V.80 addresses two types of commands:

- AT commands issued in command mode.
- In-band commands transmitted in the data stream.

The in-band commands are delimited by the hexadecimal characters EM (or numerically, 19h.) the commands set support the most common AT commands identified in recommendation V.80:

- **+ES**.
- **+ESA**.
- **+IFC**.

AT Command Set

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 basic command syntax is as follows:

- <command><parameter>.

The <command> is a combination of the attention prefix (AT) followed by the AT command. The <parameter> is a string which represents a numeric decimal value.

Any command issued is acknowledged with a response in either text or numeric values. These responses are known as result codes. The result codes are listed in Table 230, on page 54.

Commands may be executed while in command mode, which is entered under one of the following conditions:

- After powerup, at the termination of a connection, or after the execution of a command other than dial or answer.
- Upon the receipt of the escape sequence (three consecutive character matching the contents of resister S2) while in on-line mode.
- Upon the on-to-off transition of DTR if **&D1**, **&D2**, or **&D3** has been set.

Data and General Commands

+++ Escape Sequence

An escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, AT commands are sent directly to the modem. Use the return to on-line data mode command (O<value>) to return to data mode.

Place a pause before and after the escape sequence to prevent the modem from interpreting the escape sequence as data. The length of the pause is set by register S12 (S12—Escape Guard Time), the escape guard time. Register S2 (S2—Escape Character (User-Defined)) identifies the escape sequence character.

A/—Repeat Last Command

Use this command to repeat the last AT command. The modem repeats the command currently in the command buffer. Do not use the AT prefix with this command. Do not conclude the command with a terminating character, such as enter.

A—Answer

Use this command to instruct the modem to connect to the line and establish a connection with the remote modem or DCE. This command can be canceled if the modem receives a new command or character from the host system before handshaking has begun.

Result codes:

- *CONNECT* if a connection is established and the extended result code parameter (X<value>) is equal to 0.
- *CONNECT <rate>* if a connection is established and the extended result code parameter is not equal to 0.
- *NO CARRIER* if a connection cannot be established or the modem aborts the connection on request of the host system.
- *OK* if the command is aborted or DTR is turned off by the host system when the data terminal ready control (&D<value>) is not set to 0.

- *ERROR* if the modem is in on-line command mode when receiving the A command.

B<value>—Communication Standard Setting

Use this command to select the communication standard used by the modem.

Result codes:

- *OK* if <value> = 0—3, 15, 16.
- *ERROR* if <value> ??0—3, 15, 16.

Table 2. B<value> Commands

Command	Function
B0	Selects CCITT 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	Deselects V.23 reverse channel (same as **B3**).
B3	Deselects 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).

C<value>—Carrier Control

Mainpine's IQ Express boards support this command to ensure backwards compatability with software that issues the **C1** command. However they do not support the **C0** command. The **C0** command may instruct some other modems not to send carrier (i.e., it puts them in receive-only mode).

Result codes:

- *OK* if <value> = 1.
- *ERROR* if <value> ??1.

Table 3. C<value> Commands

Command	Function
C1	Normal transmit carrier switching (default).

D<dial_string>—Dial

Use this command to instruct the modem to begin the dialing sequence. The dial string which is made up of the telephone number and dial modifiers is entered after the **D** command.

A dial string can be up to sixty characters long. Any digit or symbol may be dialed as touchtone digits. Characters such as spaces, hyphens, and parentheses are ignored by the modem and may be included in the dial string to enhance readability.

Result codes:

- *CONNECT* if a connection is established and the extended result code parameter (X<value>) is equal to 0.

- *CONNECT <rate>* if a connection is established and the extended result code parameter is not equal to 0.
- *NO CARRIER* if a connection can not be established or the modem aborts the connection on request of the host system.
- *BUSY* if the W or @ modifiers are used and a busy signal is detected.
- *NO ANSWER* if the @ modifier is used and the remote ring followed by 5 seconds of silence is not detected before expiration of the connection timer (S7—Connection Completion Time-Out).
- *NO DIALTONE* if tone detection is enabled or the W modifier is used and no dial tone is detected.
- *OK* if the command is aborted or DTR is turned off by the host system when the data terminal ready control (&D<value>) is not set to 0.
- *ERROR* if the modem is in on-line command mode when receiving the dial command.

Table 4. Dial Modifiers

Modifier	Function Name	Description
L	Dial the last number	Instructs the modem to dial the last number dialed. This modifier is valid only if it is the first symbol of the dial string. All consecutive characters are discarded.
P	Select pulse dialing	—
T	Select tone dialing (default)	—
W	Wait for dial tone	Instructs the modem to wait for a second dial tone before processing the dial string.
,	Dial pause	Instructs the modem to pause before processing the next character in the dial string. Register S8 (S8—Pause Time for Comma Dial Modifier) determines the length of the pause.
!	Hook flash	Instructs the modem to go on-hook for 0.5 seconds and then return to off-hook.
@	Wait for quiet answer	Instructs the modem to 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.
;	Return to command mode	Instructs the modem to return to command mode after it has finished dialing without disconnecting the call. This modifier must be the last character in the dial string.
$	Bong tone detection	—
S=<location>	Dial from register	Instructs the modem to dial a telephone number previously stored using the **&Z<location>=<dial_string>** command. Valid storage locations are 0—2.
^	Disable data calling tone transmission	—
V	Dial using speakerphone	Instructs the modem to switch to speakerphone mode and dial the number. Use the **ATH** command to disconnect the voice call.

E<value>—Echo Command

Use this command to enable or disable the modems echo feature. When the echo feature is selected and the modem is in command mode, characters sent to the modem are sent back to the host and displayed on the monitor.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ? 0—1.

Table 5. E<value> Commands

Command	Function
E0	Disables echo command.
E1	Enables echo command (default).

F<value>—On-Line Data Character Echo Command

Controller-based products support this command to ensure backward compatibility with communications software that issues the **F1** command. The **F0** version of this command is not supported. This command was originally used to set echo features for the DTE.

Result codes:

- *OK* if <value> = 1.
- *ERROR* if <value> ? 1.

Table 6. F<value> Commands

Command	Function
F1	On-line data character echo disabled.

H<value>—Hook Control

Instructs the modem to go on-hook to disconnect a call or go off-hook to make the telephone line busy.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ? 0—1.

Table 7. H<value>* Commands

Command	Function
H0	The modem goes on-hook (default).
H1	The modem goes off-hook.

* ITU-T Recommendation V.250 (05/99) standardized this command. However, the standard does not include the additional functionality added with the H1 command.

I<value>—Request ID Information

Use this command to display product information about the modem. In each case the information is transmitted to the host system followed by a final result code.

Result codes:

- As described in I<value> if <value> = 0—9, 11.
- *ERROR* if <value> ?? 0—9, 11.

Table 8. I<value> Commands

Command	Function
I0	Returns the identity string - "Mainpine CFAX34".
I1	Calculates the Flash ROM checksum.
I2	Performs a Flash ROM check, calculates the checksum, and then verifies the checksum by displaying *OK* or *ERROR.*
I3	Returns the identity string, Flash ROM version, DAA type, and Data Pump type.
I4	Returns the DSP version.
I5	Returns the identity string, hardware build version, and country ID.
I6, I7, I8	Returns OK for compatibility.
I9	Returns the country ID and PNP string.
I11	Displays connection information as described below.

The **ATI11** results are listed on two screens. To get to the second screen, the user must hit any key. The following is an example of the **ATI11** results.

```
   Description                                    Status
   -------------                                  ------------------
1  Last Connection                                V.90
2  Initial Transmit Carrier Rate                  28800
3  Initial Receive Carrier Rate                   49333
4  Final Transmit Carrier Rate                    28800
5  Final Receive Carrier Rate                     49333
6  Protocol Negotiation Result                    LAPM
7  Data Compression Result                        V42bis
8  Estimated Noise Level                          152
9  Receive Signal Poser Level (-dBm)              25
10 Transmit Signal Power Level (-dBm)             16
11 Round Trip Delay (msec)                        4
Press any key to continue; ESC to quit

   Description                                    Status
   -------------                                  ------------------
12 Near Echo Level (-dBm)                         NA
13 Far Echo Level (-dBm)                          NA
14 Transmit Frame Count                           3
```

```
15 Transmit Frame Error Count                    0
16 Receive Frame Count                           0
17 Receive Frame Error Count                     0
18 Retrain by Local Modem                        0
19 Retrain by Remote Modem                       0
20 Rate Renegotiation by Local Modem             0
21 Rate Renegotiation by Remote Modem            0
22 Call Termination Cause                        0
23 Robbed-Bit Signalling                         00
24 Digital Loss (dB)                             6
25 Remote Server ID                              NA
26 Last PCM S PTR
27 Connection Time (msec)
OK
```

The **ATI11** command may be issued from on-line command mode or after the end of a call. After a call, some of the values are no longer valid. The following table describes each of the results listed for the **ATI11** command.

Table 9. ATI11 Command Results

Result	Description
Last Connection	V92 PCM, V.92, V.90, V.34, or V.32, depending on the type of connection negotiated.
Initial Transmit Carrier Rate	Initial upstream rate.
Initial Receive Carrier Rate	Initial downstream rate.
Final Transmit Carrier Rate	Current or final upstream rate.
Final Receive Carrier Rate	Current or final downstream rate.
Protocol Negotiation Result	LAPM/SREC, LAPM, *MNP*, or none, depending on V.42 negotiation.
Data Compression Result	LAPM, *MNP*, V.42bis, V.44, or none, depending on V.42 and V.44 negotiation.
Estimated Noise Level	Mean-square error of received downstream signal. Difference between received constellation point and reference decision point. This is a dimensionless decimal number that is only valid during a call. Higher numbers are worse. There is no absolute threshold of goodness; it depends on the downstream data rate. The number varies during a call, so it is useful to sample it a few times.
Receive Signal Power Level (–dBm)	The received signal power, although labeled with units of -dBm, is only a relative measure for comparing calls to/from different locations. This value is valid only during a call.
Transmit Signal Power Level (–dBm)	Upstream transmit signal power.
Round Trip Delay (ms)	Round trip delay in milliseconds.
Near Echo Level (–dBm)	Echo levels are valid for V.34 only.
Far Echo Level (–dBm)	Echo levels are valid for V.34 only.
Transmit Frame Count	Number of LAPM frames sent upstream during this call. Count wraps around at 65535.
Transmit Frame Error Count	Number of REJ frames received at the analog client modem.
Receive Frame Count	Number of LAPM frames received by the client during this call. Count wraps around at 65535.

Receive Frame Error Count	Number of frames received in error by the client.
Retrain by Local Modem	Number of retrains or rate renegotiations requested by the modem.
Retrain by Remote Modem	Number of retrains or rate renegotiations requested by remote modem.
Rate Renegotiation by Local Modem	Number of rate renegotiations requested by the local modem.
Rate Renegotiation by Remote Modem	Number of rate renegotiations requested by the remote modem.
Call Termination Cause	Reason for call ending. Only valid after call ends. Result codes: ✍ 0 = local modem command: ATH, DTR drop. ✍ 1 = remote modem: cleardown, loss of signal. ✍ 2 = no answer, busy, etc. ✍ 3 = training failure V.92, V.90, or V.34. ✍ 4 = protocol failure if required by \N4, for example.
Robbed-Bit Signaling	For PCM connection only, a hexadecimal 6-bit pattern of T1 frames with robbed-bit signaling.
Digital Loss (dB)	For PCM connection only, the downstream digital loss.
Last PCM S PTR	Shows the last S pointer when the modem is expected to go to PCM mode.

L<value>—Speaker Volume

Use this command to set the speaker volume setting when the speaker is on.

Result codes:

✍*OK* if <value> = 0—3.

✍*ERROR* if <value> ??0—3.

Table 10. L<value> Commands

Command	Function
L0	Low volume.
L1	Low volume.
L2	Medium volume (default).
L3	High volume.

M<value>—Speaker Control

Use this command to turn the speaker on and off.

Result codes:

✍*OK* if <value> = 0—3.

✍*ERROR* if <value> ??0—3.

Table 11. M<value> Commands

Command	Function
M0	Speaker is off.
M1	Speaker is on until the modem detects the carrier signal (default).
M2	Speaker is always on when the modem is off-hook.
M3	Speaker is on until the carrier is detected, except when dialing.

* ITU-T Recommendation V.250 (05/99) standardized this command. However, the standard does not include the additional functionality added with the M3 command.

N<value>—Modulation Handshake

Use this command to set the modem protocol for handling handshake negotiation at connection time if the communication speed of the remote modem is different from the speed of the local modem.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ? 0—1.

Table 12. N<value> Commands

Command	Function
N0	When originating or answering, this is for handshake only at the communication standard specified by register **S37** and the **B <value>** command.
N1	When originating or answering, begin the handshake only at the communication standard specified by **S37** and the **B <value>** command. During handshake, fallback to a lower speed may occur (default).

O<value>—Return to On-Line Data Mode

Use this command to exit on-line command mode and reenter on-line data mode. If the modem is not in on-line command mode when this command is received the modem generates an *ERROR* result code.

Result codes:

- *CONNECT* if <value> = 0, 1, 3 and the result code and call progress monitor is set to 0 (**X0**).
- *CONNECT* <*rate*> if <value> = 0, 1, 3 and the result code and call progress monitor is not set to 0 (**X<value>** where n = 1—7).
- *NO CARRIER* if the connection is not successfully resumed.
- *ERROR* if <value> ? 0—1, 3.

Table 13. O<value> Commands

Command	Function
O0	Instructs the modem to exit on-line command mode and return to data mode (default).*
O1	Issues a retrain before returning to on-line data mode.
O3	Issues a rate renegotiation before returning to on-line data mode.

* See +++ section on +++.

P—Select Pulse Dialing

Use this command to configure the modem for pulse dialing. All subsequent **D<dial_string>** commands use pulse dialing until either the **T** command or a tone dial modifier is received by the modem. Tone dialing is the default setting. This command does not use parameters and generates an *ERROR* result code when parameters are attached to the command.

Q<value>—Result Code Control

Result codes are informational messages sent from the modem and displayed on the monitor. Basic result codes include *OK*, *CONNECT*, *RING*, *NO CARRIER*, and *ERROR*. Use the **Q<value>** command to enable or disable result code generation by the modem. If result codes are disabled and an invalid parameter value is entered, the modem does not generate an *ERROR* result code because result codes are turn off.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ? 0—1.

Table 14. Q<value> Commands

Command	Function
Q0	Enables result codes (default).
Q1	Disables result codes.

S<register number>=<value>—S Register Control

Result codes:Use this command to view or change an S-register. S-registers contain parameters used by the modem. This command has two forms, one to show the contents of the register and the other to change the contents of the register. Some registers are read only and are not affected by the S<register number>=<value> command. Each register has a specific function (see Table 217 on page 54

- *OK* if <register number> is a valid register
- *ERROR* if <register number> is not a valid register.

Table 15. S<register number> Extended Syntax Commands

Syntax	Function
S<register number>?	Displays register contents.
S<register number>=<value>	Sets the contents of the register to <value> if the register is not read only.

T—Select Tone Dialing

Use this command to configure the modem for DTMF tone dialing. All subsequent **D<dial string>** commands use tone dialing until either the **P** command or a pulse dial modifier is received by the modem. Tone dialing is the default setting. This command does not use parameters and generates an *ERROR* result code when parameters are attached to the command.

V<value>—DCE Response Format

IQ Express boards generate result codes using one of two formats. Verbose mode generates result codes in the familiar text formats using words. Numerical mode generates result codes as a number. Each result codes has a number assigned to it (page 54). Use this command to switch between numerical and verbose modes. Call progress and negotiation progress messages are affected by this command.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ??0—1.

Table 16. V<value> Commands

Command	Function
V0	Displays result codes as digits.
V1	Displays result codes as text (default).

Table 17. V<value> Result Code Formats

Command	Result Code Format
V0	*<numeric code><CR>*
V1	*<CR><LF><verbose code><CR><LF>*

W<value>—Result Code Option

Use this command to select the modems *CONNECT* message options.

Result codes:

- *OK* if <value> = 0—2.
- *ERROR* if <value> ??0—2.

Table 18. W<value> Commands

Command	Function
W0	*CONNECT* result code reports DTE receive speed. Disables protocol result codes.
W1	*CONNECT* result code reports DTE receive speed. Enables protocol result codes.
W2	*CONNECT* result code reports DCE receive speed. Enables protocol result codes (default).

X<value>—Select Result Code and Monitor Call Progress

Use this command to enable tone detection options used in the dialing process. As each function is chosen, the modem's result codes are also affected. Therefore, this command is frequently used to control the modem's responses. The primary function of this command is to control call response capabilities.

Result codes:

- *OK* if <value> = 0—7.
- *ERROR* if <value> ? 0—7.

Table 19. X<value> Commands

Command	Extended Result Codes	Dial Tone Detect	Busy Tone Detect
X0	Disabled	Disabled	Disabled
X1	Enabled	Disabled	Disabled
X2	Enabled	Enabled	Disabled
X3	Enabled	Disabled	Enabled
X4 (default)	Enabled	Enabled	Enabled
X5, X6	Enabled	Enabled	Enabled
X7	Disabled	Enabled	Enabled

Table 20. X<value> Option Description

Function	Enabled	Disabled
Ext Result Codes	Modem displays basic result codes, connect messages with data rate, and an indication of the modems error correction and data compression operations.	Modem displays the basic result codes.
Dial Tone Detect	Modem dials upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.	Modem dials a call regardless of whether it detects a dial tone. Register S6 (S6—Wait Time Before Dialing) contains the dial delay.
Busy Tone Detect	Modem monitors for busy tones.	Modem ignores any busy tones it receives.

Table 21. X<value> Option Result Codes

Command	Result Codes		
X0	*OK*	*RING*	*ERROR*
	CONNECT	*NO CARRIER*	
X1	*OK*	*RING*	*ERROR*
	CONNECT <RATE>	*NO CARRIER*	
X2	*OK*	*RING*	*ERROR*
	CONNECT <RATE>	*NO CARRIER*	*NO DIALTONE*
X3	*OK*	*RING*	*ERROR*
	CONNECT <RATE>	*NO CARRIER*	*BUSY*
	BLACKLISTED		
X4	*OK*	*RING*	*ERROR*
	CONNECT <RATE>	*NO CARRIER*	*BUSY*
	BLACKLISTED	*DELAYED*	*NO DIALTONE*
	CALL WAITING DETECTED		
X5, X6	*OK*	*RING*	*ERROR*
	CONNECT <RATE>	*NO CARRIER*	*BUSY*
	BLACKLISTED	*DELAYED*	*NO DIALTONE*
	CALL WAITING DETECTED		
X7	*OK*	*RING*	*ERROR*
	CONNECT	*NO CARRIER*	

Y<value>—Long-Space Disconnect

Use this command to disconnect the modem from a call upon receiving a long-space signal from the distant end. This command is only valid in 1200 bits/s and 2400 bits/s modes.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ? 0—1.

Table 22. Y<value> Commands

Command	Function
Y0	Disables long-space disconnect (default).
Y1	Enables long-space disconnect.

Z<value>—Reset and Recall Stored Profile

Use this command to make the modem go on-hook and restore the profile saved by the last **&W** command.

Note: Both **Z0** or **Z1** restore the same profile (&W<value>). Mainpine's IQ Express boards only have one stored profile.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ??0—1.

Table 23. Z<value> Commands

Command	Function
Z0	Reset and restore stored profile.
Z1	Reset and restore stored profile.

&B<value>—V.32 Auto Retrain

This command is supported to ensure backward compatibility with communications software that issues the **B1** command. The **B0** version of this command is not supported. Mainpine's IQ Express boards always retrain.

Result codes:

OK if <value> = 1.

ERROR if <value> ??1.

Table 24. &B<value> Commands

Command	Function
&B1	Enable V.32 auto retrain (default).

&C<value>—Data Carrier Detect (DCD) Control

Use this command to control the modem's response to receiving a remote modems carrier signal. Data carrier detect (DCD) is a signal from the modem to the computer indicating that the carrier signal is being received from a remote modem. The modem typically turns off DCD when it no longer detects the remote modems carrier signal.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ??0—1.

Table 25. &C<value> Commands

Command	Function
&C0	The state of the carrier from the remote modem is ignored. DCD remains on at all times.
&C1	DCD turns on when the remote modem's carrier signal is detected and off when the carrier signal is not detected (default).

&D<value>—Data Terminal Ready (DTR) Control

Use this command to select the modem's response to the data terminal ready (DTR) signal. The host system generates the DTR signal and supplies it to the modem.

Result codes:

OK if <value> = 0—3.

ERROR if <value> ??0—3.

Table 26. &D<value> Commands

Command	Function
&D0	Modem ignores the true status of DTR and treats it as always on. Use this command if the 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 the OK result code, and remains connected.
&D2	If the DTR signal is not detected while in on-line data mode, the modem disconnects (default).
&D3	Reset modem on the on-to-off DTR transition.

* ITU-T Recommendation V.250 (05/99) standardized this command. However, the standard does not include the additional functionality added with the **D3** command.

&F<value>—Restore Factory Default Configuration

Use this command to reset the modem to the configuration programmed at the factory. This operation replaces all of the command options* and S-register settings in the active configuration with factory default values.

Note: In voice mode, the command line is ignored if the **AT&F** command is placed on the same line as the other commands. To load factory settings in voice mode, issue the **&F<value>** command by itself.

* There are several noted exceptions to this command and caution should be used when determining the state of the command options once this command has been executed.

Result codes:

OK if <value> = 0.

ERROR if <value> ??0.

Table 27. &F<value> Commands

Command	Function
&F0	Loads the configuration stored and programmed at the factory (default).

&G<value>—V.22 *bis* Guard Tone Control

Use this command to select which guard tone, if any, the modem will send while transmitting in the high band (answer mode). This command is only used in V.22 and V.22 *bis* mode. This option is not used in North America; it is for international use only.

Result codes:

- *OK* if <value> = 0—2.
- *ERROR* if <value> ? 0—2.

Table 28. &G<value> Commands

Command	Function
&G0	Disables guard tone (default).
&G1	Selects 550 Hz guard tone.
&G2	Selects 1800 Hz guard tone.

&J<value>—Auxiliary Relay Option

This command is supported to ensure backward compatibility with communications software that issues the **J0** command. The **J1** version of this command is not supported. The auxiliary relay is never closed.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ? 0.

Table 29. &J<value> Commands

Command	Function
&J0	The auxiliary relay is never closed (default).

&K<value>—Local Flow Control Selection

Use this command to select a flow control method.

Result codes:

OK if <value> = 0, 3, or 4.

ERROR if <value> ? 0, 3, or 4.

Table 30. &K<value> Commands

Command	Function
&K0	Disables flow control.
&K3	Enables RTS/CTS (hardware) flow control (default).
&K4	Enables XON/XOFF software flow control.

&M<value>—Asynchronous Communications Mode

This command is supported to ensure backward compatibility with communication software that issues the **&M0** command. The preferred method for changing the asynchronous communication mode is to use the **\N<error control mode>** command.

Result codes:

OK if <value> = 0.

ERROR if <value> ? 0.

Table 31. &M<value> Commands

Command	Function
&M0	Asynchronous mode (default).

&P<value>—Pulse Dial Make-to-Break Ratio Selection

Use this command to select the make-to-break ratio. This command is effective only for Japan.

Result codes:

OK if <value> = 0—2.

ERROR if <value>n ? 0—2.

Table 32. &P<value> Commands for Domestic Versions

Command	Function
&P0	Selects 39%—61% make/break ratio at 10 pulses per second.
&P1	Selects 33%—67% make/break ratio at 10 pulses per second (default).
&P2	Selects 33%—67% make/break ratio at 20 pulses per second.

&Q<value>—Asynchronous Communications Mode

This command is supported to ensure backward compatibility with communication software that issues the **&Q<value>** command. The preferred method for changing the asynchronous communication mode is to use the **\N<error control mode>** command.

Result codes:

- *OK* if <value> = 0, 5, 6, 8, or 9.
- *ERROR* if <value> ?? 0, 5, 6, 8, or 9.

Table 33. &Q<value> Commands

Command	Function
&Q0	Asynchronous mode, buffered. Same as **\N0**.
&Q5	Error control mode, buffered (default). Same as **\N3**.
&Q6	Asynchronous mode, buffered. Same as **\N0**.
&Q8	*MNP* error control mode. If an *MNP* error control protocol is not established, the modem will fall back according to the current user setting in register **S36**.
&Q9	V.42 or *MNP* error control mode. If neither error control protocol is established, the modem will fall back according to the current user setting in register **S36**.

&S<value>—Data Set Ready (DSR) Option

Use this command to controls DSR action.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ?? 0—1.

Table 34. &S<value> Commands

Command	Function
&S0	DSR is always on (default).
&S1	DSR comes on after establishing a connection and goes off when the connection ends.

&T<value>—Self-Test Commands

Use this command to perform diagnostic tests on the modem. Each test is designed to isolate a problem location when experiencing periodic data loss or random errors.

Result codes:

- *OK* if <value> = 0.
- *CONNECT* if <value> = 1 or 3.
- *ERROR* if <value> ??0—1 or 3.

Table 35. &T<value> Commands

Command	Function
&T0	Abort. Terminates the 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, demodulated, and then returned to the local DTE. To work properly, the modem must be off-line.
&T3	Local digital loopback test.

&V<value>—View Active Configuration

Use this command to view the active modem profile.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ??0.

An example of the results of the command are shown below:

```
      Option                          Selection           AT Cmd

      Comm Standard                   Bell                B
      CommandCharEcho                 Enabled             E
      Speaker Volume                  Medium              L
      Speaker Control                 OnUntilCarrier      M
      Result Codes                    Enabled             Q
      Dialer Type                     Tone                T/P
      ResultCode Form                 Text                V
      ExtendResultCode                Enabled             X
      DialToneDetect                  Enabled             X
      Busy Tone Detect                Enabled             X
      LSD Action                      Standard RS232      &C
      DTR Action                      Standard RS232      &D
Press any key to continue; ESC to quit.

      Option                          Selection           AT Cmd

      V22b Guard Tone                 Disabled            &G
      Flow Control                    Hardware            &K
      Error Control Mode              V42, MNP, Buffer    \N
      Data Compression                V44 V42bis MNP5     %C
      AutoAnswerRing#                 0                   S0
      AT Escape Char                  43                  S2
      CarriageReturnChar              13                  S3
      Linefeed Char                   10                  S4
```

```
      Backspace Char                  8                   S5
      Blind Dial Pause                2 sec               S6
      NoAnswer Timeout                50 sec              S7
      "," Pause Time                  2 sec               S8
Press any key to continue; ESC to quit.

      Option                          Selection           AT Cmd

      No Carrier Disc                 2000 msec           S10
      DTMF Dial Speed                 95 msec             S11
      Escape GuardTime                1000 msec           S12
      Data Calling Tone               Disabled            S35
      LineRate                        33600               S37
Press any key to continue; ESC to quit.

      Stored Phone Numbers
      &Z0=9725551356
      &Z1=6095553367
      &Z2=6105558625
OK
```

&W<value>—Store Current Configuration

Use this command to store the modems command options and all S registers except S3, S4, and S5. The **Z0** command or a power-up reset of the modem restores this profiles.

Note: This command is not valid during a cellular call.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ? 0.

Table 36. &W<value> Commands

Command	Function
&W0	Stores the current configuration as profile 0.

&Y<value>—Select Stored Profile for Hard Reset

This command is supported to assure backward compatibility with communications software that issues the **&Y0** command. The **&Y1** version of this command is not supported. There is only one stored profile.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ? 0.

Table 37. &Y<value> Commands

Command	Function
&Y0	Select stored profile 0 on power-up.

&Z<location>=<stored_number>—Store Telephone Number

Use this command to store a dialing string. Mainpine's IQ Express boards can save four dialing sting. The format for the command is **&Z<storage_location> = <dialing_string>**. The dial string may contain up to 40 characters. The **ATDS=<storage_location>** command (D<dial_string>—Dial) dials using the stored string.

OK if <value>= 0—2.

ERROR if <value> ??0—2.

\A<value>—Select Maximum *MNP* Block Size

Use this command to select a *MNP* error corrected link with a maximum block size controlled by the parameter <block size>.

Result codes:

OK if <value> = 0—3.

ERROR if <value> ??0—3.

Table 38. \A<value> Commands

Command	Function
\A0	64 characters.
\A1	128 characters.
\A2	192 characters.
\A3	256 characters (default).

\B<break_time>—Send Break

Use this command in non-error-controlled mode. The command causes the modem to transmit a break signal to the remote modem. The minimum break length is 100 ms and the maximum break length is 900 ms. The <break_time> parameter has values between one and nine with each increment representing 100 ms. The default of <value> = 3 corresponds to a length of 300 ms.

The command works in conjunction with the **\K** (\K<value>) command.

Result codes:

OK if connected in data modem mode.

NO CARRIER if not connected or if connected in FAX modem mode.

ERROR if <break_time> ??1—9.

\G<value>—Modem Port Flow Control

Use this command to process XON/XOFF flow control locally or pass XON/OFF flow control to the remote DCE.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ? 0—1.

Table 39. \G<value> Commands

Command	Function
\G0	The modem processes XON/XOFF flow control characters locally (default).
\G1	The modem passes XON/XOFF flow control characters.

\J<value>—Adjust Bits/s Rate Control

Use this command to specify whether or not the negotiated connect speed of the modem forces the adjustment of the speed of the DTE to the modem's speed.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ? 0—1.

Table 40. \J<value> Commands

Command	Function
\J0	Buffer mode. Error control is set or disabled with the **\N <value>** command (default).
\J1	Forces the maximum DCE rate to the DTE rate.

\K<value>—Set Break Control

Use this command to control the response of the modem to a break received from the DTE, remote modem, or the **\B<value>** command.

Result codes:

OK if <value> = 0—5.

ERROR if <value> ? 0—5.

The response is different in three separate cases. In the first case the modem receives a break from the DTE when it is operating in data transfer mode. See \K<value>.

Table 41. \K<value> Commands When Modem Is Operating in Data Transfer Mode

Command	Function
\K0, **\K2**, **\K4**	Enter on-line command mode. No break is sent to the remote modem.
\K1	Clear data buffers and send a break to the remote modem.
\K3	Send a break to the remote modem immediately.
\K5	Send a nondestructive, nonexpedited break to the remote modem (default).

In the second case, shown in \K<value>, the modem is in the on-line command state (waiting for AT commands) during a data connection, and the **\B<value>** command is received in order to send a break to the remote modem.

Table 42. \K<value> Commands When Modem Is On-Line Command State During Data Connection

Command	Function
\K0, **\K1**	Clear data buffers and send a break to the remote modem.
\K2, **\K3**	Send a break to the remote modem immediately.
\K4, **\K5**	Send a break to the remote modem in sequence with data (default).

In the third case, the modem receives a break from a remote modem during a connection. These commands are shown in \K<value>.

Table 43. \K<value> Commands When Break Is Received During Connection

Command	Function
\K0, **\K1**	Clear data buffers and send a break to the DTE.
\K2, **\K3**	Send a break to the DTE immediately.
\K4, **\K5**	Send a break to the DTE in sequence with received data (default).

\N<value>—Select Error Control Mode

Use this command to select the type of error control used by the modem when sending or receiving data.

Result codes:

- *OK* if <value> = 0—5, or 7.
- *ERROR* if <value> ??0—5, or 7.

Table 44. \N<value> Commands

Command	Function
\N0	Buffer mode. No error control (same as **&Q6**).
\N1	Direct mode.
\N2	*MNP* or disconnect mode. The modem attempts to connect using *MNP* 2—4 error control procedures. If this fails, the modem disconnects. This is also known as *MNP* reliable mode.

\N3	V.42, MNP, or buffered (default). The modem attempts to connect in V.42 error control mode. If this fails, it will attempt to connect in *MNP* mode. If this also 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 modem disconnects.
\N5	V.42, *MNP*, or buffered (same as **\N3**).
\N6	SDLC, a full duplex protocol.. To be used in conjunction with fast connect commands (\F<value>
\N7	V.42, *MNP*, or buffered (same as **\N3**).

\Q<value>—Local Flow Control Selection

Use this command to set the local flow control method.

Result codes:

OK if <value> = 0—1, or 3.

ERROR if <value> ??0—1, or 3.

Table 45. \Q<value> Commands

Command	Function
\Q0	Disable flow control (same as **&K0**).
\Q1	XON/XOFF software flow control (same as **&K4**).
\Q3	RTS/CTS to DTE (same as **&K3**) (default).

\R<value>—Ring Indicator Signal Off After Answer

This command is supported to ensure backward compatibility with communications software that issues the **\R0** command. The **\R1** version of this command is not supported.

Result codes:

OK if <value> = 0.

ERROR if <value> ??0.

Table 46. \R<value> Commands

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

\T<value>—Inactivity Timer

Use this command to specify the delay time used by the inactivity timer. The delay time is the length of time in minutes that the modem waits during periods of inactivity before disconnecting. Periods of inactivity are defined by no data being sent or received by the DCE. To disable the inactivity timer us the **T0** command. The delay time may also be specified in register S30 (S30—Inactivity Timer).

Result codes:

OK if <value> = 0—255.

ERROR if <value> ? 0—255.

Table 47. \T<value> Commands

Command	Function
\T0	Inactivity timer disabled (default).
\T1—\T255	Specifies the length of time in minutes that the modem will wait before disconnecting when no data is sent or received.

\V<value>—Protocol Result Code

Use this command to enable or disable protocol result codes (see Table 230).

Result codes:

OK if <value> = 0—2.

ERROR if <value> ? 0—2.

Table 48. \V<value> Commands

Command	Function
\V0	Disables protocol result code appended to DCE speed.
\V1	Enables protocol result code appended to DCE speed (default).
\V2	Enables protocol result code appended to DCE speed (same as **\V1**).

\X<value>—XON/XOFF Pass Through

Use this command to restrict the XON/XOFF flow control to the local DCE for processing or have the local DCE send the flow control characters to the remote DCE.

Result codes:

OK if <value> = 0—1.

ERROR if <value> ? 0—1.

Table 49. \X<value> Commands

Command	Function
\X0	The modem processes XON/XOFF flow control characters locally (default).
\X1	The modem passes XON/XOFF flow control characters.

-C<value>—Enable Direct Connect

Use this command to enable direct connect operation. After a phone is enabled, the modem will operate in cellular mode whenever the phone is detected. Otherwise, it will automatically switch to landline. *ETC* is automatically set when operating in cellular mode.

Result codes:

- *OK* if <value> = 0—3.
- *ERROR* if <value> ? 0—3.

Table 50. -C<value> Commands

Command	Function
-C0	Select landline.
-C1	Select OKI/AT&T type phones.
-C2	Select Motorola phones.
-C3	Select NEC type phones.

-V90=<rate>—V.90 Downstream Rate Control

Use this command to control the V.90 downstream rate. This command has three forms and is used to view the current settings, view the range of input values, enable or disable V.90, or set the downstream V.90 rate to a specific value.

Result codes:

- *OK* if <rate> = 0—21.
- *ERROR* if <rate> ? 0—21.

Table 51. -V90 Extended Syntax Commands

Syntax	Function
-V90=<rate>	Disables or selects the V.90 downstream rate.
-V90?	Displays the current value.
-V90=?	Displays the range of values for the variable <rate>.

Table 52. -V90=<value> commands

Command	Function
-V90=0	Disables V.90.
-V90=1	Selects auto rate (default).
-V90=2	Selects 28000 bits/s.
-V90=3	Selects 29333 bits/s.
-V90=4	Selects 30666 bits/s.
-V90=5	Selects 32000 bits/s.
-V90=6	Selects 33333 bits/s.
-V90=7	Selects 34666 bits/s.
-V90=8	Selects 36000 bits/s.
-V90=9	Selects 37333 bits/s.
-V90=10	Selects 38666 bits/s.
-V90=11	Selects 40000 bits/s.
-V90=12	Selects 41333 bits/s.
-V90=13	Selects 42666 bits/s.
-V90=14	Selects 44000 bits/s.
-V90=15	Selects 45333 bits/s.
-V90=16	Selects 46666 bits/s.
-V90=17	Selects 48000 bits/s.
-V90=18	Selects 49333 bits/s.
-V90=19	Selects 50666 bits/s.
-V90=20	Selects 52000 bits/s.
-V90=21	Selects 53333 bits/s.

%B—View Numbers in Blacklist

When the blacklisting option is active, use this command to display the telephone numbers and status of any failed or troubled calls. The blacklisting option is associated with the country selection. Some countries have national requirements which prohibit repeat calls to the same number through automatic dialing. Blacklisting* is a method of handling failed or troubled calls encountered during automatic dialing.

Result codes:

- *<list of phone numbers and their status>* if country supports blacklisting.
- *OK* if no failed calls occur.
- *ERROR* if country selection does not support blacklisting.

* This command is only used to display the contents of the blacklist when blacklisting is active. It does not affect the functionality associated with blacklisting. For more information on how blacklisting works see the Controller-Based Homologation Reference Manual.

%C<value>—Data Compression Control

Use this command to enable or disable data compression. This command enables or disables V.44, V.42 *bis,* and *MNP* class 5 data compression. The command overwrites the current status of the **+DCS** command. The command is also overwritten by changes made by the **+DCS** command. On-line changes do not take effect until a disconnect occurs.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ??0, 1.

Table 53. %C<value> Commands

Command	Function
%C0	V.44/V.42 *bis*/*MNP* 5 disabled. No data compression.
%C1	V.44/V.42 *bis*/*MNP* 5 enabled. Data compression enabled (default).

%E<value>—Auto Fallback/Fallforward Control

This command provides the 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.

Result codes:

- *OK* if <value> = 0—2.
- *ERROR* if <value> ??0—2.

Table 54. %E<value> Commands

Command	Function
%E0	Disable fallback/fallforward.
%E1	Enable fallback and disable fallforward.
%E2	Enable fallback/fallforward (default).

+A8E=<v8o>,<v8a>,<v8cf>,<v8b>—V.8 and V.8 *bis* Operation Controls

Use this command to set the control parameters for early call negotiation through V.8 and V.8 *bis*. **+A8E*** may also be used as an action command to reinitiate V.8 or V.8 *bis* if an earlier attempt to use either protocol has failed.

<v8o> enables or disables DCE-controlled V.8 origination negotiation; <v8a> enables or disables DCE-controlled V.8 answer negotiation; <v8b> disables V.8 negotiation or sets it to DCE controlled or DTE controlled negotiation. The <v8cf> parameter contains the V.8 CI signal call function octet (refer to V8 document for details). Call function octet <v8cf> will accept value in range 0—FF. The default values are <v8o>=1, <v8a>=1, and <v8cf>=C1.

Result codes:

- *OK* if <v8o> = 1, 6 and <v8a> = 1, 5 and <v8cf> = 0—FF and <v8b> = 0—2.
- *ERROR* if <v8o> ? 1, 6 or <v8a> ? 1, 5 or <v8cf> ? 0—FF or <v8b> ? 0—2.

* ITU-T Recommendation V.251 (02/98) standardized this command. However, the controller-based command set only includes partial support for the standard. For complete detail of the standard form of this command refer to recommendation V.251.

The following parameter values are supported when V.80 is enabled.

Table 55. Valid <v8o> Values

Value	Meaning
1	Enable DCE-controlled V.8 origination negotiation (default).
6	Enable DCE-controlled V.8 origination negotiation, issue **+A8x** indications.

Table 56. Valid <v8a> Values

Value	Meaning
1	Enable DCE-controlled V.8 answer negotiation (default).
5	Enable DCE-controlled V.8 answer negotiation, issue **+A8x** indications.

Table 57. Valid <v8cf> Values

Value	Meaning
1	Enable DCE-controlled V.8 origination negotiation.
6	Enable DCE-controlled V.8 origination negotiation, issue +A8x indications.

Table 58. Valid <v8b> Values

Value	Meaning
0	Disable V.8 negotiation.
1	Enable DCE-controlled V8 *bis* negotiation (default).
2	Enable DTE-controlled V.8 negotiation.

Table 59. +A8E Extended Syntax Commands

Command	Description
+A8E=<v8o>,<v8a>,<v8cf>,<v8b>	Set the parameters used by the modem during V.8 negotiation.
+A8E?	Display the current settings for V.8 or V.8 *bis* negotiation.
+A8E=?	Display the supported parameter values for the **A8E** commands.

+A8T=<signal>,<1st message>,<2nd message>,<sig en>,<msg en>,<supp delay>—Send V.8 *bis* Signal and/or Message

Use this command to send a V.8 *bis* signal or message from the local DCE. This command is only supported when V.80 is enabled.

Result codes:

- *OK* if <signal> = 0—10 and <sig en> = 0, 1 and <msg en> = 0, 1 and <supp delay> = 0,1.
- *ERROR* if <signal> ? 0—10 or <sig en> ? 0, 1 or <msg en> ? 0, 1 or <supp delay> ? 0,1.

Table 60. Valid <signal> Values

Value	Meaning
0	None.
1	Initiating Mre.
2	Initiating MRd.
3	Initiating CRe, low power.
4	Initiating CRe, high power.
5	Initiating CRd.
6	Initiating Esi.
7	Responding MRd, low power.
8	Responding MRd, high power.
9	Responding CRd.
10	Responding Esr.

Table 61. Valid <sig_en> Values

Value	Meaning
0	Enable detection of initiation signals (default).
1	Enable detection or responding signals.

Table 62. Valid <msg_en> Values

Value	Meaning
0	Disable detection of messages (default).
1	Enable detection of V.8 *bis* messages.

Table 63. Valid <supp_delay> Values

Value	Meaning
0	No delay inserted (default).
1	Insert 1.5 second delay between transmitted V.8 *bis* signal and the subsequent V.8 *bis* message.

Table 64. +A8T Extended Syntax Commands

Command	Description
+A8T=<signal>,<1st message>,<2nd message>,<sig_en>,<msg_en>,<supp_delay>	Send a V.8 *bis* command or message.
+A8T?	Display the current configuration for sending a V.8 *bis* message or command.
+A8T=?	Display the supported configuration parameters.

+DCS=<v42bis>,<v44>—Select Data Compression Algorithm

Use this command to configure the available compression algorithms. The <v42bis> parameter enables or disables the V.42 bis and the <v44> parameter enables or disables V.44. This command works in conjunction with the **%C** command and the result of either the **%C** command or the **+DCS** command replaces the current data compression configuration.

Result codes:

- *OK* if <v42bis> = 0, 1 and <v44> = 0—2.

- *ERROR* if <v42bis> ? 0, 1 or <v44> ? 0—2.

Table 65. Valid <v42bis> Values

Value	Meaning
0	Disable V.42 bis.
1	Enable V.42 bis (default).

Table 66. Valid <v44> Values

Value	Meaning
0	Disable V.44.
1	Enable V.44 (default).
2	Enable V.44 for V.92 servers only.

Table 67. +DCS Extended Syntax Commands

Command	Description
+DCS=<v42bis>,<v44>	Configures compression algorithms.
+DCS?	Displays the current data compression configuration.
+DCS=?	Displays the valid **+DCS** parameter values.

+DR<value>—Data Compression Reporting

Use this command to enable or disable the compression report. If the compression report is enabled, the *+DR:<type>* intermediate result code reports the current DCE-DCE data compression type. It is issued after the error control report (+ER) and before the final result code (e.g., *CONNECT*).

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

Table 68. +DR Data Compression Report Value

Command	Function
+DR=0	Disables the compression report.
+DR=1	Enables the compression report.

Table 69. +DR Data Compression Reporting Intermediate Result Codes

Result Code	Description
+DR: NONE	Data compression is not in use.
+DR: V42B	V.42 *bis* is in use in both directions.
+DR: V44	V.44 is in use in both directions.

Table 70. +DR Extended Syntax Commands

Command	Description
+DR=<value>	Turns the data compression report result code on or off.
+DR?	Displays the current status of the data compression report result code.
+DR=?	Displays all of the supported values for the <value> parameter.

+DS=<direction>,<compression_negotiation>,<max_dict>,<max_string>—V.42 *bis* Data Compression

Use the **+DS** command to configure the V.42 bis data compression method used by the modem. The settings of this command overwrite the setting of a **%C<value>** command. However, it can also be overwritten by the **%C<value>** command.

Result codes:

- *OK* if <direction> = 0, 3 and <compression negotiation> = 0, <max_dict> = 1024, <max_string> = 32.
- *ERROR* if <direction> ? 0, 3 or <compression negotiation> ? 0, <max_dict> ? 1024, <max_string> ? 32.

The <direction> parameter sets which directions use the compression method. The IQ Express products use compression in both directions or no compression at all.

Table 71. Valid <direction> Values*

Value	Meaning
0	Do not negotiate V.42 bis compression.
3	Modem accepts V.42 bis compression in both direction (default).

* ITU-T Recommendation V.250 (05/99) standardized this command. The standard command includes two additional parameter values (1 and 2) which are not supported by the controller-based AT command set. For additional information on the functionality of the <direction parameter, refer to ITU-T Recommendation V.250 (05/99).

The <compression_negotiation> parameter tells the modem whether it should disconnect if V.42 negotiations fail. The controller-based AT command set does not support the disconnect feature when V.42 negotiation fails and the <compression_negotiation> parameter is always set to 0. The default dictionary, <max_dict> size is always 1024 and the default string length, <max_string> is always 32.

Table 72. +DS Extended Syntax Commands

Command	Description
+DS=<direction>,0,1024,32	Configures modem V.42 compression method.
+DS?	Displays the current V.42 compression configuration.
+DS=?	Displays the supported V.42 compression setting.

+DS44=<direction>,<compression_negotiation>,<capability>,<max_codewords_tx>, <max_codewords_rx>, <max_string_tx>,<max_string_rx>,<max_history_tx>,<max_history_rx>—V.44 Data Compression

Use this command to configure the V.44 data compression method used by the modem. Mainpine's IQ Express boards only support stream method for capability and modem never disconnect if V.44 is not negotiated (for compression negotiation). As a result both parameter, <compression_negotiation>, and <capability> are always 0.

Result codes:

- *OK* if <direction> = 0, 3 and <compression_negotiation> = 0 and <compatibility> = 0 and <max_codewords_tx> = 256—2048 and <max_codewords_rx> = 256—2048 and <max_string_tx> = 31—255 and <max_string_rx> = 31—255 and <max_history_tx> = 512—11008 and <max_history_rx> = 512—11008.
- *ERROR* if <direction> ? 0, 3 or <compression_negotiation> ? 0 or <compatibility> ? 0 or <max_codewords_tx> ? 256—2048 or <max_codewords_rx> ? 256—2048 or <max_string_tx> ? 31—255 or <max_string_rx> ? 31—255 or <max_history_tx> ? 512—11008 or <max_history_rx> ? 512—11008.

The <direction> parameter sets which directions use the compression method. The IQ Express products use compression in one or both directions.

Table 73. Valid <direction> Values

Value	Meaning
0	Do not negotiate V.44 compression.
3	Modem accepts V.44 compression in both direction (default).

The <max_codewords_tx> parameter specifies the maximum number of code words to negotiate in the transmit direction. The <max_codewords_rx> parameter specifies the maximum number of code words to negotiate in the receive direction.

Table 74. Valid <max_codewords_tx> and <max_codewords_rx> Values

Value	Meaning
1024	Default <max_codewords_tx> and <max_codewords_rx> value.
256—2048	Valid transmit and receive code word settings.

The <max_string_tx> parameter specifies the maximum string length to negotiate in the transmit direction. The <max_string_rx> parameter specifies the maximum string length to negotiate in the receive direction.

Table 75. Valid <max_string_tx> and <max_string_rx> Values

Value	Meaning
255	Default <max_string_tx> and <max_string_rx> value.
31—255	Valid transmit and receive string lengths.

The <max_history_tx> parameter specifies the maximum length of the history buffer to negotiate in the transmit direction. The <max_history_rx> parameter specifies the maximum length of the history buffer to negotiate in the receive direction.

Table 76. Valid <max_history_tx> and <max_history_rx> Values

Value	Meaning
5120	Default <max_history_tx> value.
4096	Default <max_history_rx> value.
512—11008	Valid maximum transmit and receive history buffer sizes.

Table 77. +DS44 Extended Syntax Commands

Command	Description
+DS44=<direction>,0,0, <max_codewords_tx>,<max_codewords_rx>, <max_string_tx>,<max_string_rx>, <max_history_tx>,<max_history_rx>	Configures modem V.44 compression method.
+DS44?	Displays the current V.44 compression configuration.
+DS44=?	Displays the supported V.44 compression setting.

+EB=<break_selection>,<timed>,<default_length>—Break Handling In Error Control Operation

Use this command to set the modem behavior when a BREAK is received. Table 78. lists the valid break selection values. The valid values for default length are 10—90 in steps of 10, with a default for this field of 30. Each increment of the <default_length> parameter indicates 10 ms of time.

Command usage example, both are valid: AT+EB=1,0,10 or AT+EB=1,,10.

Result codes:

- *OK* if <break_selection> = 0—3 and <timed>* = 0 and <default_length>† = 10—90 in increments of 10.

✍ *ERROR* if <break_selection> ? 0—3 or <timed> ? 0 or <default_length> ? 10—90 in increments of 10.

Table 78. Valid break_selection Values

Value	Meaning
0	Ignore break (default).
1	Nonexpedited, nondestructive.
2	Expedited, nondestructive.
3	Expedited, destructive.

* ITU-T Recommendation V.250 (05/98) standardized this command. The <timed> parameter in the recommendation allows for V.42 L-SIGNALs to indicate a break length. The controller-based AT command set does not support this option. For more information on the standardized version of this command, refer to ITU-T recommendation V.250.

† ITU-T Recommendation V.250 (05/98) standardized this command. The <default length> parameter in the recommendation allows for break length from 10 ms to 2.54 s. The controller-based AT commands set only supports break lengths between 10 ms and 90 ms. For more information on the standardized version of this command, refer to ITU-T recommendation V.250.

Table 79. +EB Extended Syntax Commands

Command	Description
+EB=<break selection>,<timed>, <default length>	Sets the modem behavior when a break is received.
+EB?	Displays the current break selection settings.
+EB=?	Displays the supported break selection settings.

+EFCS=<value>—32-bit Frame Check Sequence

Use this command to control the 32-bit frame check sequence option in V.42. The only valid combination is +EFCS=0, 16 bit frame check sequence.

Result codes:

✍ OK if <value> = 0.

✍ ERROR if <value> ? 0.

Table 80. +EFCS Extended Syntax Commands

Command	Description
+EFCS=0	Sets the 32-bit frame check sequence to a 16 bit frame check sequence.
+EFCS?	Displays the current 32-bit frame check sequence.
+EFCS=?	Displays the support parameters for the 32-bit frame check sequence.

+ER=<value>—Error Control Reporting

Use this command to enable or disable the error control report. If the compression report is enabled, the *+ER:<type>* intermediate result code reports the current DCE-DCE error control type. It is issued after the determination of the error control protocol and before the final result code (e.g., *CONNECT*). Specifically, the *+ER* intermediate result code is issued after the modulation report (*+MCR* and *+MRR*) and before the data compression report (*+DR*).

The compression report format is shown in +ER.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

Table 81. +ER Control Reporting Commands

Command	Function
+ER=0	Disables the error control report (default).
+ER=1	Enables the error control report.

Table 82. +ER Error Control Reporting Intermediate Result Codes

Command	Function
+ER: NONE	Data compression not in use.
+ER: LAPM	V.42 LAPM protocol is in use.
+ER: ALT	V.42 alternative protocol is in use.

Table 83. +ER Extended Syntax Commands

Command	Description
+ER=<value>	Enable or disable error control reporting.
+ER?	Display the current setting for error control reporting.
+ER=?	Display the supported error control reporting settings (0, 1).

+ES=<orig_rqst>,<orig_fbk>,<ans_fbk>—Error Control Selection

Use this command to select the error correction mode. If the modem is operated in V.80 mode (synchronous buffered mode), and **+ES=,,8,** the **+ES?** will always return **+ES: 6,,8**. The setting of this command overwrites the **\N** command. However, the **+ES** command is overwritten by the setting on a **\N** command.

Result codes:

- *OK* if one of the combinations is shown in Table 84. .
- *ERROR* all other parameter combinations.

Mainpine's IQ Express boards support the following parameter combinations.

Table 84. +ES Combinations

Combination	Mode
+ES=1,0,1	Buffered mode.
+ES=0,1,0	Direct mode.
+ES=4,4,6	*MNP* or disconnect mode.
+ES=3,3,5	LAPM or disconnect mode.
+ES=4,0,6	*MNP* or buffered mode.
+ES=3,0,2	LAPM, *MNP*, or buffered mode (default).
+ES=2,0,2	LAPM or buffered mode.
+ES=3,2,4	LAPM, *MNP*, or disconnect mode.
+ES=,,8	V.42 sync buffer mode (V.80 enabled).
+ES=6,,8	V.42 sync buffer mode (V.80 enabled).

Table 85. +ES Extended Syntax Commands

Command	Description
+ES=<value>	Selects the modem error control method.
+ES?	Displays the current error control settings.
+ES=?	Displays the supported error control settings.

+ESA=<trans_idle>,<frame_idle>,<framed_un_ov>,<hd_auto>,<crc_type>,<nrzi_en>,<syn1>—Set Up Error Control Parameters

Use this command to set the control parameters for the DCE in Synchronous Access Mode (See page 8). The IQ Express does not use the <framed_un_ov>, the <hd_auto> and <syn1> parameters.

Result codes:

- *OK* if <trans_idle> = 0 and <frame_idle> = 0 and <crc_type> = 0, 1 and <nrzi_en> = 0.
- *ERROR* if <trans_idle> = 0 or <frame_idle> = 0 or <crc_type> = 0, 1 or <nrzi_en> = 0.

Table 86. +ESA Commands

Command	Meaning
+ESA=0,,,,0,0,,	Disables CRC generation and checking.
+ESA=0,,,,1,0,,	Causes the DCE to generate a 16-bit CRC in the transmit direction in framed sub-Mode and check the CRC in the receive direction.

Table 87. Valid <crc_type> Values

Value	Meaning
0	Disable CRC generation and checking.
1	In framed submode, the 16-bit CRC specified in V.42 is generated by the DCE in the transmit direction and checked by the DCE in the receive direction.

+ESR=<value>—Selective Repeat

Mainpine's IQ Express boards do not use the selective reject mode. This command initiates the selective reject mode and only the **+ESR=0*** form of this command is supported.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ? 0.

Table 88. +ESR Extended Syntax Commands

Command	Description
+ESR=<value>	Enables or disables the selective reject mode.
+ESR?	Displays the current settings for the selective reject mode.
+ESR=?	Displays the supported settings for the selective reject mode.

* ITU-T Recommendation V.250 (05/98) standardized this command. For further detail on the standard version of this command, see recommendation V.250.

+ETBM=<pending_TD>,<pending_RD>,<timer>—Call Termination Buffer Management

Use this command to set the behavior of the modem upon call termination. Only **+ETBM=0,0,0**† is a valid combination. This means that the modem will discard all the buffered data when the call is terminated.

Result codes:

- *OK* if <pending TD> = 0 and <pending RD> = 0 and <timer> = 0.
- *ERROR* if <pending TD> ? 0 or <pending RD> ? 0 or <timer> ? 0.

Table 89. +ETBM Extended Syntax Commands

Command	Description
+ETBM=<value>	Sets the modem behavior upon call termination.
+ETBM?	Displays the current settings for call termination behavior.
+ETBM=?	Displays the supported settings for call termination behavior.

† ITU-T Recommendation V.250 (05/98) standardized this command. For further detail on the standard version of this command, see recommendation V.250.

+FCLASS=<value>—Service Class Indication

Use this command to set the modem service class. The service class determines if the modem is in data, FAX, or voice mode. The **+FCLASS** command is an extended syntax command.

Result codes:

- *OK* if <value> = 0, 1.0, 2.0, 2.1, 8.
- *ERROR* <value> 0, 1.0, 2.0, 2.1, 8.

Table 90. +FCLASS Values

Commands	Description
+FCLASS=0	Selects the modems data mode.
+FCLASS=1.0	Selects the modems class 1.0 FAX mode.
+FCLASS=2.0	Selects the modems class 2.0 FAX mode.
+FCLASS=2.1	Selects the modems class 2.1 FAX mode.
+FCLASS=8	Selects the modems voice mode.

Table 91. +FCLASS Extended Syntax Commands

Command	Description
+FCLASS=<value>	Selects the class or mode of the modem.
+FCLASS?	Displays the current class or mode.
+FCLASS=?	Displays the available parameter values for the +FCLASS command.

+GCAP—Request Complete Capabilities List

Use this command to display the modems supported capabilities. The +GCAP command is action command which always generates an *OK* result code and does not have extended syntax. The valid responses are shown in Table 92. .

Result codes:

- This command always yields an *OK* result code.
- *ERROR* if a parameter is supplied.

Table 92. Valid +GCAP Responses

Commands	Description
+FCLASS	Class 1 or class 2 facsimile DCE control.
+MS	Modulation control: +MS, +MR commands.
+ES	Error control: +ES, +EB, +ER, +EFCS, +ETBM commands.
+DS	Data compression: +DS, +DR commands.

+GCI=<T.35 country code>—Country of Installation

Use this command to set the modem country code. ITU-T Recommendation T.35 defines the country codes and the country names (see page 54.

Result codes:

Table 236. *OK* if <T.35 country code> = valid country code as defined by **T.35 Country Code Table**

✍ *on page* **54**

✍ *ERROR* if <T.35 country code> ? valid country code as defined by T.35 Country Code Table

Table 93. +GCI Extended Syntax Commands

Command	Description
+GCI=<T.35 country code>	Set the country code.
+GCI?	Display the current country code setting.
+GCI=?	Display all supported country code settings.

+GMI—Manufacturer Identification

+GMI is an extended syntax command. It returns the modem manufacturer and either the *OK* or *ERROR* result code. The **+GMI=?** syntax returns an *ERROR* result code. The other two forms return an *OK* result code.

Result codes:

✍ *OK* when using the **+GMI** or **+GMI?** syntax.

✍ *ERROR* when using the **+GMI=?** syntax.

Table 94. +GMI Extended Syntax Commands

Command	Description
+GMI, **+GMI?**	Display modem manufacturer and generates an *OK* result code.
+GMI=?	Display modem manufacturer and generates an *ERROR* result code.

+GMM—Modem Identification

Use this command to display the modem identity string and driver version number. The modem returns the same result codes as those generated by the I3 commands.

Result codes:

✍ *OK* for all extended syntax forms of this command.

✍ This command does not generate an *ERROR* result code.

Table 95. +GMM Extended Syntax Commands

Command	Description
+GMM, **+GMM?, +GMM=?**	Displays the modem identity string and driver version followed by the *OK* result code.

* ITU-T recommendation V.250 standardized this command. The standard version did not include the extended syntax commands included with the controller-based version of the +GMM commands. For more information see recommendation V.250.

+GMR—Request Revision Information

Use this command to display the version of the modem code.

Result codes:

- *OK* for all extended syntax forms of this command.
- This command does not generate an *ERROR* result code.

Table 96. +GMM Extended Syntax Commands

Command	Description
+GMR, **+GMR?, +GMR=?**	Display the version and revision information followed by the *OK* result code.

+IFC=<DCE_by_DTE>,<DTE_by_DCE>—DTE-DCE Local Flow Control

Use this command to select the local flow control method. The input parameters of the **+IFC** command overwrite the settings of the **\Q** and **\X<value>** commands. The reverse is also true. By modifying the settings of the **\Q** and **\X<value>** commands, the **+IFC** command parameters are overwritten.

Result codes:

- *OK* if <DCE by DTE> = 0—2 and <DTE by DCE> = 0—2.
- *ERROR* if <DCE by DTE> ? 0—2 or <DTE by DCE> ? 0—2.

The following combinations are accepted by the modem.

Table 97. +IFC Commands

Command	Data Format
+IFC=0,0	No flow control.
+IFC=1,1	Software flow control.
+IFC=2,2	Hardware flow control (default).

Table 98. +IFC Extended Syntax Commands

Command	Description
+IFC=<DCE by DTE>,<DTE by DCE>	Set the local flow control method.
+IFC?	Display the current local flow control settings.
+IFC=?	Display the supported local flow control parameter settings.

+ILRR=<value>—DTE-DCE Local Rate Reporting

Use this command to display or hide the local rate report result code. If the rate report is enabled, the reported <rate> is the current DTE-DCE rate. The rate report is an intermediate result code. It is transmitted after any modulation, error control, or data compression reports, and before the final result code (e.g., *CONNECT*).

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

Table 99. +ILRR Commands

Command	Function
+ILRR=0	Disables the local rate report (default).
+ILRR=1	Enables the local rate report.

Table 100. +ILRR Extended Syntax Commands

Command	Description
+ILRR=<value>	Select or deselect transmission of the rate report result code.
+ILRR?	Display the current status of the rate report result code.
+ILRR=?	Display the supported parameter values for DTE-DCE local rate reporting.

+IPR=<DTE rate>—Fixed DTE Rate

Use this command to set the DTE to DCE transmission rate. There are twelve fixed transmission rates used by the DTE to communicate with the DCE. This commands select one of the predefined transmission rates. If a rate is entered which is not supported, the transmission rate defaults to the next lower rate.

Result codes:

- *OK* for all values of <DTE rate>

.

Table 101. +IPR Commands

Command	DTE Rate
+IPR=0	Automatic rate detection (default).
+IPR=110	100 bits/s.
+IPR=300	300 bits/s.
+IPR=600	600 bits/s.
+IPR=1200	1200bits/s.
+IPR=2400	2400 bits/s.
+IPR=4800	4800 bits/s.
+IPR=9600	9600 bits/s.
+IPR=14400	14400 bits/s.
+IPR=19200	19200 bits/s
+IPR=38400	38400 bits/s.
+IPR=57600	57600 bits/s.
+IPR=115200	115200 bits/s.

Table 102. +IPR Extended Syntax Commands

Command	Description
+IPR=<DTE rate>	Set the DTE to DCE transmission rate.
+IPR?	Display the current DTE to DCE transmission rate.
+IPR=?	Display all supported transmission rates.

+ITF=<off>,<on>—Transmit Flow Control Threshold

Use this command to set the flow control thresholds. The <off> parameter represent the off signal threshold in octets. When this threshold is reached the DCE generates a flow off signal. The <on> parameter represents the on signal threshold in octets. When the volume of data resident on the DCE goes below this value the DCE generates a flow on signal.

ITU-T recommendation V.80 defines an additional parameter (<report period>) for the **+ITF** command. This parameter is only used in synchronous mode and is not supported in the controller-based set.

Result codes:

- *OK* if <off> = 0—3 and <on> = 0—2.
- *ERROR* if <off> ? 0—3 or <on> ? 0—2.

Table 103. +ITF Extended Syntax Commands

Command	Description
+ITF=<off>,<on>	Sets the flow control thresholds.
+ITF?	Display the current value of the flow control thresholds.
+ITF=?	Display the supported values of the flow control thresholds.

+MR=<value>— Modulation Reporting Control

Use this command to hide or display the modulation report. When the modulation report is enabled, the DCE transmits the *+MRR: <rate>, <rx_rate>* and the *+MCR:<carrier>* intermediate result codes to the DTE. The <carrier> reported is the current modulation, for example, V.34. The <rate> reported is the transmit rate in bits per second or is zero if negotiation fails. The <rx_rate> is the receive channel rate and is only reported when different receive and transmit rates have negotiated.

The intermediate result codes are transmitted after the modulation and the rate have been determined and before any error control or data compression reports or the final result code (e.g., *CONNECT*) is transmitted.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

Table 104. +MR Commands

Command	Function
+MR=0	This command turns off the modulation report.
+MR=1	This command turns on the modulation report.

Table 105. +MR Extended Syntax Commands

Command	Description
+MR=<value>	Select or deselect transmission of the modulation result codes.
+MR?	Display the current status of the modulation report result code.
+MR=?	Display the supported parameter values for modulation rate reporting.

+MS=<carrier>,<automode>,<min_rate>,<max_rate>,<min_rx_rate>,<max_rx_rate>—Modulation Selection

Use this command to set the modem's modulation, the modulations minimum and maximum transmission rates, and the status of automatic modulation negotiation (automode). The <carrier>, <min_rate>, and <max_rate> parameters define the modulation and its minimum and maximum transmission rates. <min_rx_rate> and <max_rx_rate> define the minimum and maximum reception rates. The minimum transmission and reception rates are always set to 0.

The <automode> parameter enables or disables automatic modulation negotiation. If a subsequent **+MA** command is not provided, the automode parameters are constrained by the modulation set by the <carrier> parameter. The **+MA** command can further restrict the automatic modulation negotiation settings but it cannot set a modulation that is higher than the modulation set by the **+MS** command.

Result codes:

- *OK* if <automode> = 0, 1 and <min_rate> = <min_rx_rate> = 0 and <max_rate> = 0, 300—33600 and <max_rx_rate> = 0, 300—56000 and carrier is equal to one of the entries in Valid <carrier> Value
- *ERROR* if <automode> ? 0, 1 or <min_rate> ? <min_rx_rate> ? 0 or <max_rate> ? 0, 300—33600 or <max_rx_rate> ? 0, 300—56000 or carrier is not equal to one of the entries in Valid <carrier> Value

Table 106. Valid <carrier> Values

Value	Meaning
V92	V.92 (default)
V90	V.90
V34	V.34
V32B	V.32bis
V32	V.32
V22B	V.22bis
V.22	V.22
Bell212A	Bell 212A*
V23C	V.23, constant carrier, asymmetric FDM
V21	V21
Bell103	Bell 103*

* The +MS command was standardized by ITU-T recommendation V.250. However, the standard command does not include the additional functionality provided by the Bell212A and Bell103 values of the <carrier> parameter.

Automatic modulation negotiation is enabled or disabled by <automode>. However, if a value is specified for the <max_rate> then, automatic rate selection is disabled and the modem will attempt to connect at the specified rate.

Table 107. Valid <automode> Values

Value	Meaning
0	Disables.
1	Enabled (default).

The <max_rate> specifies the highest connections rate for the DCE.

Table 108. Valid <max_rate> Range

Value	Meaning
31200	Determined by modulation selected in <carrier> (default).
300—56000	Value limited by modulation selected in <carrier>.

Table 109. Valid <max_rate> for each <carrier>

Value	Meaning
V34	2400 bits/s—33600 bits/s in steps of 2400 bits/s.
V32bis	4800 bits/s—19200 bits/s in steps of 2400 bits/s.
V32	4800 bits/s—14400 bits/s in steps of 2400 bits/s.
V22bis	2400 bits/s.
V22	2200 bits/s.
V23C, Bell212A	1200 bits/s.
V.21, Bell103	300 bits/s.

The <max_rx_rate> specifies the highest receive rate the modem will negotiate.

Table 110. Valid <max_rate> Range

Value	Meaning
56000	Determined by modulation selected in <carrier> (default).
300—56000	Value limited by modulation selected in <carrier>.

Table 111. Valid <max_rx_rate> Value for each <carrier>

Value	Meaning
V92	28000 bits/s—56000 bits/s in steps of 1333 bits/s
V90	28000 bits/s—56000 bits/s in steps of 1333 bits/s
V34	2400 bits/s—33600 bits/s in steps of 2400 bits/s.
V32bis	4800 bits/s—19200 bits/s in steps of 2400 bits/s.
V32	4800 bits/s—14400 bits/s in steps of 2400 bits/s.
V22bis	2400 bits/s.
V22	2200 bits/s.
V23C, Bell212A	1200 bits/s.
V.21, Bell103	300 bits/s.

Table 112. +MS Extended Syntax Commands

Command	Description
+MS=<carrier>,<automode>,0, <max_rate>,0,<max_rx_rate>	Selects the modems default modulation selection parameters.
+MS?	Display the current default modulation selection parameters.
+MS=?	Display the range of values accepted by the **+MS** command.

Once a modulation is selected by the **+MS** command, the autorate in both directions and the automode will be activated unless <max_rate> is specified by the same command.

The settings of this command overwrite the settings of S28 and S37. Likewise, changes to these registers overwrite the settings of the **+MS** command.

+PCW=<call_waiting>—Call Waiting Enable

Use this command to select how the modem responds to a call waiting signal. The controller-based response is also dependent on the current setting of the caller ID command, **+VCID** (+VCID=<pmode).

Result codes:

- *OK* if <call_waiting> = 0—2.
- *ERROR* if <call_waiting> ? 0—2.

Table 113. Valid <call_waiting> Values

Value	Meaning
0	Enable the call waiting detector. When a call waiting signal is detected, toggle V.24 circuit 125 and collect caller ID as set by **+VCID** (default).
1	Enable the call waiting detector. When a call waiting signal is detected, hang up the current call.
2	Disable call waiting detector.

Table 114. +PCW Extended Syntax Commands

Command	Meaning
+PCW=<call_waiting>	Enable or disable call waiting.
+PCW?	Display the current call waiting configuration.
+PCW=?	Display the supported <call_waiting> parameter values.

+PIG=<value>—PCM Upstream Ignore

Use this command to enable or disable PCM upstream in a V.92 connection.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ?0, 1.

Table 115. Valid +PIG Commands

Command	Meaning
+PIG=0	Enable PCM upstream.
+PIG=1	Disable PCM upstream (default).

Table 116. +PIG Extended Syntax Commands

Value	Meaning
+PIG= <value>	Enable or disable PCM upstream.
+PIG?	Display the current state of the **+PIG** command.
+PIG=?	Display the supported **+PIG** parameter values.

+PMH=<value>—Modem On Hold Enable

Use this command to enable or disable modem on hold. Note, the **+PMH** command does not affect the parameters of the **+PMHT** (+PMHT=<value>) command. The **+PMH** command only enables or disables modem on hold. The **+PMHT** command configures the modem to deny a modem on hold request or grant a modem on hold request with the selected hold time.

Result codes:

- *OK* if <value> = 0, 1
- *ERROR* if <value> ? 0, 1

Table 117. Valid +PMH parameter values

Value	Meaning
+PMH=0	Enables modem on hold.
+PMH=1	Disables modem on hold (default).

Table 118. +PMH Extended Syntax Commands

Value	Meaning
+PMH= <value>	Enable or disable modem on hold.
+PMH?	Display the current state of the **+PMH** command.
+PMH=?	Display the supported **+PMH** parameter values.

+PMHD<dialing_string>—Modem On Hold DTMF Dialing

Use this command to switch the line while modem on hold is active. Execution of the +PMHD <dial_string> command causes the modem to use DTMF dialing to dial the characters in the <dial_string>. Valid <dial_string> characters are 0—9, #, and * .This operation is not support in all countries.

Result codes:

- *OK* if <dial_string> is valid and modem on hold has been requested and granted.
- *ERROR* if <dial_string> is invalid or the modem is not on hold when the command is executed.

+PMHF—Modem On Hold Hook Flash

Use this command to generate a hook flash during modem on hold operations. The command causes the modem to go on-hook for a period of time set by homologation parameter 26. Then the modem returns to the off-hook state for an equivalent amount of time.

Result codes:

- *ERROR* if the modem is not on hold when the command is executed.

+PMHR—Initiate Modem On Hold

Use this command to initiate a modem on hold request. Once the local modem receives this request from the user or controlling application, the IQ Express board requests that the remote modem go on hold. The remote modem either denies the request, grants the request, or generates and error if modem on hold is not enabled. If the request is granted the remote modem initializes the modem on hold timer and transmits the request index. If the request is denied the remote modem only transmits the request index. The request index either identifies the maximum hold time when the requests is granted or it identifies a problem code when the request is denied.

The request index is encoded in a MH sequence. MH* sequences are used to exchange information during a modem on hold procedure. In particular bits 16—19 of the sequence define hold time.

The **+PMHR** command does not have any extended syntax command forms.

Result codes:

- *OK* if the modem on hold request is granted.
- *ERROR* if modem on hold is not enabled.

Table 119. Request Index

Bits 16:19	T1
0000	Reserved for the ITU
0001	10 s
0010	20 s
0011	30 s
0100	40 s
0101	1 minute
0110	2 minutes
0111	3 minutes
1000	4 minutes
1001	6 minutes
1010	8 minutes
1011	12 minutes
1100	16 minutes
1101	no limit
1110	Reserved for the ITU
1111	Reserved for the ITU

* For additional information on modem on hold and MH sequences reference ITU-T recommendation V.92 section 8.9 for modem on hold and section 8.9.2 for MH sequences.

+PMHT=<value>—Modem On Hold Timer

Use this command to configure the IQ Express board to grant or reject a modem on hold request. This command configures the modem so it can respond to a modem on hold request. The command must be executed prior to reception of a modem on hold request. If a modem on hold request is made prior to execution of the **+PMHT** command, by default, the modem on hold request is denied.

This command also sets the modem on hold timer. The modem on hold timer sets the amount of time the modem will remain on hold waiting for the requesting modem to return to the line. If the timer expires, the IQ Express will hang up the call.

Result codes:

- *OK* if <value> = 0—13.
- *ERROR* if <value> ? 0—13.

Table 120. Valid +PMHT Commands

Command	Meaning
+PMHT=0	Deny modem on hold request (default).
+PMHT=1	Grant modem on hold request with a 10 s time-out.
+PMHT=2	Grant modem on hold request with a 20 s time-out.
+PMHT=3	Grant modem on hold request with a 30 s time-out.

+PMHT=4	Grant modem on hold request with a 40 s time-out.
+PMHT=5	Grant modem on hold request with a 1 min. time-out.
+PMHT=6	Grant modem on hold request with a 2 min. time-out.
+PMHT=7	Grant modem on hold request with a 3 min. time-out.
+PMHT=8	Grant modem on hold request with a 4 min. time-out.
+PMHT=9	Grant modem on hold request with a 6 min. time-out.
+PMHT=10	Grant modem on hold request with a 8 min. time-out.
+PMHT=11	Grant modem on hold request with a 12 min. time-out.
+PMHT=12	Grant modem on hold request with a 16 min. time-out.
+PMHT=13	Grant modem on hold request with an indefinite time-out.

Table 121. +PMHT Extended Syntax Commands

Value	Meaning
+PMHT= <value>	Configure the controller-based response to a modem on hold request.
+PMHT?	Display the current modem on hold settings.
+PMHT=?	Display the valid **+PMHT** parameter values.

+PQC=<value>—V.92 Phase 1 and Phase 2 Control

Use this command to configure the V.92 short training sequence. This command selects which short phases are used during initiation of a connection. Once the modem is configured, use the **+PSS** (+PSS=<value>) command to enable or disable the short training sequence.

Result codes:

- *OK* if <value> = 0—3.
- *ERROR* if <value> ? 0—3.

Table 122. Valid +PQC Commands

Command	Meaning
+PQC=0	Enable short phase 1 and short phase 2.
+PQC=1	Enable short phase 1 only.
+PQC=2, 3	Disable short phase 1 and short phase 2 (default).

Table 123. +PQC Extended Syntax Commands

Value	Meaning
+PQC= <value>	Configure the controller-based V.92 short training sequence.
+PQC?	Display the current short training sequence settings.
+PQC=?	Display the valid **+PQC** parameter values.

+PSS=<value>—Use Short Sequence

Use this command to enable or disable the V.92 short training sequence.

Result codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ? 0.

Table 124. Valid +PSS Commands

Command	Meaning
+PSS=0	Use training sequence set in by the +PQC command.

Table 125. +PSS Extended Syntax Commands

Value	Meaning
+PSS= <value>	Select whether the modem determines if the short sequence is used.
+PSS?	Display the current short training sequence settings.
+PSS=?	Display the valid **+PSS** parameter values.

FAX Commands

Mainpine's IQ Express board support FAX commands conforming to ITU-T recommendation T.31 (08/95) which outlines service class 1 asynchronous facsimile under DCE control, ITU-T recommendation T.32 (08/95) which outlines service class 2 asynchronous facsimile under DCE control, and amendment 1 to both T.31 and T.32 which defines command modifications for V.34 FAX*.

The nature of FAX communication is for a facsimile machine to transmit a graphic image to a receiving facsimile machine. As a result most of the commands in this section are not designed for interaction with an end user.

The commands still generate a result code to acknowledge reception and the action taken on a command. However in many cases the command will generate an *ERROR* result code if it is not connected to a sending or receiving facsimile device.

+FAA=<value>—Adaptive Answer

A service class 2 or class 1 FAX DCE may have the ability to answer as a data modem DCE or as a FAX DCE. It may also be able to change from class 2 or class 1 FAX mode to data modem operation in response to an incoming call.

Note: This command controls automatic switching from class 2 or class 11 to class 0 for call answering only. It does not affect call origination, switching to class 2 or class 1 from other classes, or switching to classes other than class 0.

Result Codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ?0, 1.

Table 126. +FAA Commands

Command	Function
+FAA=0	The DCE will answer only as a class 1 FAX device. No automatic switching of service class will occur based on the calling device type (default).
+FAA=1	The DCE can answer and automatically determine whether to answer as a facsimile DCE or as a data modem.

Table 127. +FAA Extended Syntax Commands

Command	Description
+FAA=<value>	Enables or disables adaptive answer.
+FAA?	Display the current setting for adaptive answer.
+FAA=?	Display the available parameter values for the **+FAA** command.

+FAP=<sub>,<sep>,<pwd>—Address and polling capabilities

+FAP=<sub>,<sep>,<pwd> is used by DTE to indicate its capability regarding sub-addressing, selective polling

and passwords. Also used by DTE to indicate its willingness to accept this information. The remote station is notified of these capabilities in the DIS or DTC frames: bit 47 for SEP, bit 49 for SUB and bit 50 for PWD.

A value of 0 indicates capability is disabled and 1 enabled, the default value is 0,0,0. The DCE receiving this information will ignore disabled sub-parameter frames. If a sub-parameter is enabled then the DCE reports the received frame using the +FPA: report command.

Result Codes:

- *OK* if <sub> = 0,1 and <sep> = 0,1 and <pwd> = 0, 1.
- *ERROR* if <sub> ??0, 1 and <sep> ??0, 1 and <pwd> ??0, 1.

+FBS?—DCE buffer size reporting (read only)

This command allows the DCE to report its transmit and receive data buffer size: The buffer size is reported in hexadecimal and represented in octets. The first value represents the transmit buffer size (tbs), followed by the receive buffer size (rbs). Default value is 0800,0800. The range for tbs and rbs is 0000-FFFF.

Result codes:

- <tbs>,<rbs>
- This command always yields an *OK* result code.

Table 128. +FBS Extended Syntax

Command	Description
+FBS?	Display the DCE transmit and receive buffer size followed by the OK result code.

+FBO=<value>—Phase C data bit order and Phase B and D data bit order

This command is used to by DCE to offer service to convert Phase C and Phase B/D data bit order transparently to the DTE and remote facsimile. A direct mapping means the first bit transferred of each octet on the DTE-DCE link is the first bit transferred on the PSTN line. A reversed mapping means the last bit transferred of each octet on the DTE-DCE link it the first bit transferred on the PSTN line.

Results Code:

- *OK* if <value> = 0, 3.
- *ERROR* if <value> ??0, 3.

Table 129. +FBO Commands

Command	Function
+FBO=0	Selects direct bit order for Phase C and for Phase B/D (default).
+FBO=1	Selects reversed bit order for Phase C. Selects direct bit order for Phase B/D.

+FBO=2	Selects direct bit order for Phase C. Selects reversed bit order for Phase B/D.
+FBO=3	Selects reversed bit order for Phase C and for Phase B/D.

Table 130. +FBO Extended Syntax Commands

Command	Description
+FBO=<value>	Selects direct or reversed Phase C and Phase B/D bit order.
+FBO?	Display the current setting for Phase C and Phase B/D bit order.
+FBO=?	Display the available parameter values for the **+FBO** command.

+FBU=<enable>—HDLC frame reporting control

Use this command to enable the DCE to report the contents of Phase B and Phase D HDLC frames to the DTE as they are sent and received, and also to disable this function.

- *OK* if <enable> = 0, 1.
- *ERROR* if <enable> ? 0, 1.

Table 131. +FBU Commands

<enable>	Function
0	Disables HDLC frame reporting (default).
1	Enables HDLC frame reporting.

Table 132. +FBU Extended Syntax Commands

Command	Function
+FBU=<enable>	Enables or disables HDLC frame reporting.
+FBU?	Returns the current value of <enable>.
+FBU=?	Displays all available parameter values. The DCE returns (00,01).

+FCC—Establish DCE capabilities

+FCC=<vr>,
,<wd>,<ln>,<df>,<ec>,<bf>,<st>,<jp> is used by DTE to sense DCE capabilities and constrain if necessary. The controllable capabilities are resolution (vr), bit rate (br), page width in pixels (wd), page length (ln), data compression format (df), error correction (ec), file transfer mode (bf), scan time/line (ST) and JPEG for color and black and white (jp).

Result Codes:

- *OK* if <vr> = 00-FF,
 = 00-0D,<wd> = 00-02, <ln> = 00-02, <df> = 00-03, <ec> = 00-01, <bf> = 00, <st> = 00-07, <jp> = 00-7F.
- *ERROR* if <vr> ? 00-FF,
 ? 00-0D,<wd> ? 00-02, <ln> ? 00-02, <df> ? 00-03, <ec> ? 00-01, <bf> ? 00, <st> ? 00-07, <jp> ? 00-7F.

Table 133. +FCC Valid Parameter Values

Label	Values	Description
VR	00 01 02 04 08 10 20 40 80	R8 ? 3.85 l/mm, Normal R8 ? 7.7 l/mm, Fine (default) R8 ? 15.4 l/mm R16 ? 15.4 l/mm 200 dpi ? 100 (cross select R8x3.85) 200 dpi ? 200 (cross select R8x7.7) 200 dpi ? 400 (cross select R8x15.4) 300 dpi ? 300 (no cross select) 400 dpi ? 400 (cross select R16x15.4)
BR	0 1 2 3 4 5 6 7 8 9 A B C D	2 400 bit/s 4 800 bit/s 7 200 bit/s 9 600 bit/s 12 000 bit/s 14 400 bit/s (default) 16 800 bit/s 19 200 bit/s 21 600 bit/s 24 000 bit/s 26 400 bit/s 28 800 bit/s 31 200 bit/s 33 600 bit/s
WD	 0 1 2	R8 R16 200 300 400 d/mm d/mm dpi dpi dpi 1728 3456 1728 2592 3456 (default) 2048 4096 2048 2432 4864 2432
LN	0 1 2	A4, 297 mm B4, 364 mm Unlimited length (default)
DF	0 1 2 3	1-D Modified Huffman (Rec. T.4) (default) 2-D Modified read (Rec. T.4) 2-D Uncompressed mode (Rec. T.4) 2-D Modified modified read (Rec. T.6)
EC	0 1	Disable ECM Enable Annex A/T.30, ECM (default)
BF	00	Disable file transfer modes (default)

ST		VR ? 0 VR > 0
	0	0 ms 0 ms (default)
	1	5 ms 5 ms
	2	10 ms 5 ms
	3	10 ms 10 ms
	4	20 ms 10 ms
	5	20 ms 20 ms
	6	40 ms 20 ms
	7	40 ms 40 ms
JT	00	Disable JPEG coding
	01	Enable JPEG coding (Rec. T.81)
	02	Full colour mode
	04	Enable preferred Huffman tables (Note 5)
	08	12 bits/pel/component
	10	No subsampling (1:1:1)
	20	Custom illuminant
	40	Custom gamut range

+FCI—DCE reports received remote ID. CSI

A +FCI response from DCE to DTE reports the identification of the called station. The syntax of the response is as follows:

+FCI:"<CSI ID string>", where CSI ID string is the remote facsimile's identification.

Result codes:

- N/A

+FCLASS=<value>—Enter Class 1, Class1.0, Class 2, Class2.0 or Class 2.1 FAX Mode

The +FCLASS=1 **command (**

+FCLASS=<value) puts the modem in FAX mode class entered in value. The **+FCLASS=1.0** command puts the modem in class 1.0 FAX mode. The **+FCLASS=2** command puts the modem in class 2 FAX mode. The **+FCLASS=2.0** command puts the modem in class 2.0 FAX mode. The **+FCLASS=2.1** command puts the modem in class 2.1 FAX mode.

Result codes:

- *OK* if <value> = 0, 1, 1.0, 2, 2.0, 2.1, 8.
- *ERROR* <value> ?? 0, 1, 1.0, 2, 2.0, 2.1, 8.

Table 134. +FCLASS Values

Commands	Description
+FCLASS=0	Selects the modems data mode.
+FCLASS=1	Selects the modems class 1 FAX mode.
+FCLASS=1.0	Selects the modems class 1.0 FAX mode.
+FCLASS=2	Selects the modems class 2 FAX mode.
+FCLASS=2.0	Selects the modems class 2.0 FAX mode.

+FCLASS=2.1	Selects the modems class 2.1 FAX mode.
+FCLASS=8	Selects the modems voice mode.

Table 135. +FCLASS Extended Syntax Commands

Command	Description
+FCLASS=<value>	Selects the class or mode of the modem.
+FCLASS?	Displays the current class or mode.
+FCLASS=?	Displays the available parameter values for the +FCLASS command.

+FCO—Facsimile connection

A +FCO response from DCE to DTE indicates a connection with a facsimile station. DCE makes this determination based on detection of HDLC flags in the first received frame, in execution of originate command or answer command.

The syntax of the response is as follows:

+FCO:

Result codes:

- N/A

+FCQ=<rq>,<tq>—Copy quality checking

The DCE is responsible for receive copy quality checking, thou a DTE may do its own receive copy quality checking. The +FCQ command is used to enable or disable the DCE's copy quality checking. The rq parameter controls copy quality of data received from the remote facsimile. The tq parameter controls copy quality of data received from the local DTE (not supported by the IQ Express).

A value of 0 indicates capability is disabled and 1 enabled, the default value is 1,0.

Result Codes:

- *OK* if <rq> = 0,1 and <tq> = 0.
- *ERROR* if <rq> ??0, 1 and <tq> ??0.

+FCR=<value>—Capability to receive message data

The +FCR command indicates to the DCE whether the DTE is capable or not of receiving message data.

A +FCR=1

Result Codes:

- *OK* if <value> = 0,1.
- *ERROR* if <value> ?0, 1.

Table 136. +FCR Commands

Command	Function
+FCR=0	Indicates the DCE will not receive message data..
+FCR=1	Indicates the DCE is capable of receiving message data (default).

Table 137. +FCR Extended Syntax Commands

Command	Description
+FCR=<value>	Controls capability to receive message data..
+FCR?	Display the current receive message data capability.
+FCR=?	Displays all available parameter values. The DCE returns (00,01)

+FCS—DCE reports the DCS frame information

A +FCS response from DCE to DTE reports the digital command signal (DCS) frame information. The syntax of the response is as follows:

?FCS:"<VR>,
,<WD>,<LN>,<DF>,<EC>,<BF>,<ST>,<JP>", (see +FCC valid parameter value table for valid value of each parameter).

Result codes:

- N/A

+FCT=<value>—Phase C timeout control

The +FCT command informs the DCE how long to wait for a command after having transmitted all available phase C data. The default value is 1E.

Result codes:

- *OK* if <value> = 00—FF.
- *ERROR* if <value> ? 00—FF.

Table 138. +FCT Extended Syntax Commands

Command	Description
+FCT=<value>	Sets the phase C timeout.
+FCT?	Display the current phase C timeout setting.
+FCT=?	Reports the supported phase C timeout values.

+FDR—Data reception transition command

A +FDR command initiates transition to phase C data reception. In addition the DCE may report the negotiated T.30 parameters, with the remote ID and NSS frame information if available.

from DCE to DTE reports the digital command signal (DCS) frame information. The syntax of the response is as follows:

?FDR<CR>

Result codes:

- *NA*

+FDT—Data transmission request

A +FDT command from DTE requests the DCE to transmit a phase C page. This command is issued at the beginning of every page. If DCE receives command during phase B it is to proceed with negotiation and release the DCS message to the remote facsimile.

?

?FDT<CR>

Result codes:

- *ERROR* if DCE is onhook.

+FET—Post page message (ppm) response

The +FET:<ppm> response is sent by a receiving facsimile DCE once it receives the post page message from the transmitting facsimile. The post page message codes are shown below.

Result codes:

- *NA*

Table 139. PPM codes

PPM code	Description (T.30 mnemonic in parentheses)
0	Another page next, same document (MPS).
1	Another document next (EOM).
2	No more pages or documents (EOP).
3	Another page next, same document, procedure interrupt requested (PRI-MPS)
4	Another document next, procedure interrupt requested (PRI-EOM)
5	No more pages or documents, procedure interrupt requested (PRI-EOP)

+FHS—Call termination status indicator

+FHS:"<hsc>" indicates that the call has been terminated and the hangup status cause (hsc) is reported and saved. Table below shows valid hsc codes. HSC codes ar two-digit hexadecimal values

Result codes:

- *NA*

Table 140. HSC codes

HSC code	Hangup cause description
00-0F	Call placement and termination
00 01 02 03 04 05	Normal and proper end of connection Ring detect without successful handshake Call aborted, from ?FKS or <CAN> No loop current Ringback detected, no answer (timeout) Ringback detected, answer without CED
10-1F	Transmit Phase A and miscellaneous errors
10 11	Unspecified Phase A error No answer (T.30 T1 timeout)
20-3F	Transmit Phase B hangup codes
20 21 22 23 24 25 26 27 28	Unspecified transmit Phase B error Remote cannot receive or send COMREC error in transmit Phase B COMREC invalid command received RSPREC error DCS sent three times without response DIS/DTC received 3 times; DCS not recognized Failure to train at 2400 bit/s or ?FMS value RSPREC invalid response received

Hangup status codes

HSC code	Hangup cause description
40-4F	Transmit Phase C hangup codes
40 41 42 43 44 45 46 47	Unspecified transmit Phase C error Unspecified image format error Image conversion error DTE to DCE data underflow Unrecognized transparent data command Image error, line length wrong Image error, page length wrong Image error, wrong compression code
50-6F	Transmit Phase D hangup codes
Values	Hangup cause description
50 51 52 53 54 55 56 57 58	Unspecified transmit Phase D error RSPREC error No response to MPS repeated 3 times Invalid response to MPS No response to EOP repeated 3 times Invalid response to EOP No response to EOM repeated 3 times Invalid response to EOM Unable to continue after PIN or PIP
70-8F	Receive Phase B hangup codes
70 71 72 73 74	Unspecified receive Phase B error RSPREC error COMREC error T.30 T2 timeout, expected page not received T.30 T1 timeout after EOM received
90-9F	Receive Phase C hangup codes
90 91 92 93	Unspecified receive Phase C error Missing EOL after 5 seconds (3.2/T.4) Bad CRC or frame (ECM mode) DCE to DTE buffer overflow
A0-BF	Receive Phase D hangup codes
A0 A1 A2 A3	Unspecified receive Phase D errors RSPREC invalid response received COMREC invalid response received Unable to continue after PIN or PIP
C0-DF	Reserved for future standardization
E0-FF	Reserved for manufacturer-specific use

+FHR—Report received HDLC frame

+FHR:"<received HDLC frame octets>" reports the HDLC data that was sent by the DCE.

Result codes:

NA

+FHT—Report transmitted HDLC frame

+FHT:"<transmitted HDLC frame octets>" reports the HDLC data that was received by the DCE.

Result codes:

NA

+FIP—Initialize facsimile parameters

The +FIP command causes the DCE to initialize all Service Class 2.0 facsimile parameters to the manufacturers determined default settings.

Result codes:

NA

+FIS—Report remote capabilities

+FIS=<vr>,
,<wd>,<ln>,<df>,<ec>,<bf>,<st>,<jp> is used by DTE to sense DCE capabilities and constrain if necessary (see +FCC valid parameter value table for valid value of each parameter).

Result Codes:

- *OK* if <vr> = 00-FF,
 = 00-0D,<wd> = 00-02, <ln> = 00-02, <df> = 00-03, <ec> = 00-01, <bf> = 00, <st> = 00-07, <jp> = 00-7F.
- *ERROR* if <vr> ? 00-FF,
 ? 00-0D,<wd> ? 00-02, <ln> ? 00-02, <df> ? 00-03, <ec> ? 00-01, <bf> ? 00, <st> ? 00-07, <jp> ? 00-7F.

+FKS—Session termination command

The +FKS command causes the DCE to terminate the session in an orderly manner.

Result codes:

NA

+FLO=<value>—Flow Control Selection

Use this command to set the type of flow control used to transmit data between the host and the modem. This command can enable hardware or software flow control. It can also disable all flow control.

Result codes:

- *OK* if <value> = 0—2.
- *ERROR* if <value> ? 0—2.

+FLI—DCE transmits local ID string, for TSI or CSI

The DTE sends the local ID string to the DCE using +FLI="<local ID string>". The DCE sends the ID string to the remote station using the CSI or TSI frame.

+FLI:"<local ID string>",.

Result codes:

- *OK* if < local ID string > has between 0 and 20 characters.
- *ERROR* if < local ID string > has more than 20 characters.

Table 129. +FLI Extended Syntax Commands

Command	Description
+FLI=<local ID string>	Local ID string.
+FLI?	Display the range of character values supported.
+FLI=?	Display the range of character values supported.

+FLO=<value>—Flow Control Selection

Use this command to set the type of flow control used to transmit data between the host and the modem. This command can enable hardware or software flow control. It can also disable all flow control.

Result codes:

- *OK* if <value> = 0—2.
- *ERROR* if <value> ? 0—2.

Table 141. +FLO Commands

Command	Function
+FLO=0	Disables flow control.
+FLO=1	Enables software flow control.
+FLO=2	Enables hardware flow control (default).

Table 142. +FLO Extended Syntax Commands

Command	Description
+FLO=<value>	Sets the flow control mode of operation.
+FLO?	Display the current flow control mode.
+FLO=?	Reports the supported flow control values.

+FLP=<value>—Indicates document to poll

The DTE uses this command to indicate if it has a document to poll.

Result codes:

- *OK* if <value> = 0—1.
- *ERROR* if <value> ? 0—1.

Table 143. +FLP Commands

Command	Function
+FLP=0	Indicates that the DTE has no documents to poll(default).
+FLP=1	Indicates that the DTE has a document ready for polling. The DCE resets this parameter to 0 after a polled document is sent.

+FMI?—Manufacturer Identification

This command returns:

- Mainpine

Result codes:

- This command always yields an *OK* result code.

Table 144. +FMI Extended Syntax

Command	Description
+FMI, **+FMI?**	Displays the modem manufacturer identification.

+FMM?—Product Identification

This command returns the product identification, depending on the product. The following example show the kind of information generated by the modem.

- Mainpine CFAX34 7.0.0.4 (Jun 19 2007) Polaris DP3SH

Result codes:

- This command always yields an *OK* result code.

Table 145. +FMM Extended Syntax

Command	Description
+FMM, **+FMM?**	Displays the modem product identification.

+FMR?—Version/Revision Information

This command returns the firmware version code. For example, 7.0.0.4 is the version code from the board used to test this document.

Result codes:

- This command always yields an *OK* result code.

Table 146. +FMR Extended Syntax

Command	Description
+FMR, **+FMR?**	Displays the modem version code.

Table 147. +FMR Interface Specifications

Version Code	Interface
S	Serial
I	ISA
P	PCMCIA card
U	USB

+FMS=<value>—Minimum phase C speed control

Use this command to limit the lowest negotiable speed for a session. The value is the same as the BR parameter in the +FCC valid parameter table.

Result codes:

- *OK* if <value> = 0—5.
- *ERROR* if <value> ? 0—5.

Table 148. +FMS Commands

Command	Function
+FMS=0	2 400 bit/s (default)
+FMS=1	4 800 bit/s
+FMS=2	7 200 bit/s
+FMS=3	9 600 bit/s
+FMS=4	12 000 bit/s
+FMS=5	14 400 bit/s

+FNC—Report non-standard command (NSC) frames

The +FNC:<NSC FIF string> response report any received non-standard command frame, one response per frame. FIF is the facsimile information field.

Result codes:

NA

+FND=<value>—Non-standard message data indication

If the DTE has negotiated to exchange a non-standard message type with the remote facsimile, the DTE must indicate this to the DCE prior to issuing the +FDT or +FDR command for the message data.

+FND=0, the message type is specified in DCS.

+FND=1, the message type is non-standard. The DCE will not modify data on transmission or reception. The DCE copy quality checking is disabled.

Result Codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

+FNF—Report non-standard facilities (NSF) frames

The +FNF:<NSF FIF string> response report any received non-standard facilities frame, one response per frame. FIF is the facsimile information field.

Result codes:

NA

+FNR—Negotiation message reporting control parameter

+FNR=<rpr>,<tpr>,<idr>,<nsr> is used to control the reporting of messages generated during phase B

negotiations. Description of controls is shown in table below.

Result Codes:

- *OK* if <rpr> = 0-1, <tpr> = 0-1,<idr> = 0-1, <nsr> = 0-1.
- *ERROR* if <rpr> ? 0-1, <tpr> ? 0-1,<idr> ? 0-1, <nsr> ? 0-1.

Table 149. +FNR Valid Parameter Values

Label	Values	Description
RPR	00	Receiver parameter are not reported. +FIS: and +FTC: reports are suppressed.
	01	Receiver parameter are reported. +FIS: and +FTC: reports are generated.
TPR	0	Transmitter parameter are not reported. +FCS: reports are suppressed.
	1	Transmitter parameter are reported. +FCS: reports are generated.
IDR	0	ID strings are not reported. +FTI:, +FCI:, and +FPI: reports are suppressed.
	1	ID strings are reported. +FTI:, +FCI:, and +FPI: reports are generated.
NSR	0	Non-standard frames are not reported. +FNF:, +FNS: and +FNC: reports are suppressed.
	1	Non-standard frames are reported. +FNF:, +FNS: and +FNC: reports are generated.

+FNS—Report non-standard setup (NSS) frames

The +FNS:<NSS FIF string> response report any received non-standard setup frame, one response per frame. FIF is the facsimile information field. The string is limited to 20 bytes.

Result codes:

NA

+FPA—Selective polling address

The +FPA:"<selective polling address string>" is a 20 digit ascii string in the range from 0x20-0x7E. This string is sent by the DCE at the time specified by the T.30 recommendation, as long as parameter is not null.

Result codes:

- ERROR if string is greater than 20 characters.

Table 150. +FPA Extended Syntax Commands

Command	Description
+FPA=<Selective Polling Address String>	The ?FPA parameter is used to report the received addressing string
+FPA=?	Report the corresponding ranges of character values supported. (0x20-0x7E)

+FPI—Report remote ID, CIG

The +FPI:"<CIG ID string>" is a 20 digit ascii string in the range from 0x20-0x7E. This response reports the received remote ID string, as long as parameter is not null. CIG is the calling subscriber identification.

Result codes:

- ERROR if string is greater than 20 characters.

Table 151. +FPI Extended Syntax Commands

Command	Description
+FPI=<CIG ID String>	The ?FPI parameter is used to report the received remote identification.
+FPI=?	Report the corresponding ranges of character values supported. (0x20-0x7E)

+FPO—Remote polling indication

The +FPO response indicates that the remote station has a document to poll and invites the DTE to poll it.

Result codes:

- NA

+FPP—Packet protocol control

The +FPP=<value> command controls DCE to DTE packet protocol. The IQ Express only supports the disable command (+FPP=0).

Result Codes:

- *OK* if <value> = 0.
- *ERROR* if <value> ?0.

Table 152. +FPP Commands

Command	Function
+FPP=0	DCE to DTE packet protocol is disabled (default).

Table 153. +FPP Extended Syntax Commands

Command	Description
+FPP=<value>	DCE to DTE packet protocol setting. Disabled only setting supported.
+FPP?	Display the current setting for packet protocol.
+FPP=?	Display the available parameter values for the +FPP command.

+FPR=<value>—Select FAX Port Rate

This command sets the DTE to DCE FAX port rate. The FAX port rate specifies the rate used by the modem and the host system to transmit data between the two devices. In general this rate only applies to modems which are connected via an RS232C serial interface. If the modem is connected to the host system via a USB,

Result codes:

- This command always yields and *OK* result code.

Table 154. +FPR Commands

DTE Command*	Description
+FPR=0	Select automatic rate detection.
+FPR=1	Set DTE-DCE to 2400 bits/s.
+FPR=2	Set DTE-DCE to 4800 bits/s.
+FPR=4	Set DTE-DCE to 9600 bits/s.
+FPR=8	Set DTE-DCE to 19200 bits/s.
+FPR=10	Set DTE-DCE to 38400 bits/s.
+FPR=18	Set DTE-DCE to 57600 bits/s.

Table 155. +FPR Extended Syntax

DTE Command	Description
+FPR=<value>	Does not perform any particular action in controller-based systems.
+FPR? *	Does not perform any particular action in controller-based systems.

+FPS—Phase C page reception response

The +FPS:<ppr> is generated by the DCE at the end of phase C data reception, in execution of a +FDR command. The receiving DCE may count lines (lc), bad lines (blc), maximum consecutive bad lines (cblc), and octets lost due to DCE buffer overflow (lbc), and report them [+FPS:<ppr>,<lc>,<blc>,<cblc>,<lbc>].

The post page response (ppr) message codes are shown below. The IQ Express only supports ppr message codes 1-3.

Result codes:

- *see table below.*

Table 156. PPR message codes

PPR code	Result Code	Description (T.30 label in parentheses)
1	OK	Page good (MCF).
2	ERROR	Page bad; retrain requested (RTN).
3	OK	Page good; retrain requested

+FPW—Sending or polling password

The +FPW:"<PassWord string>" is a 20 digit ascii string in the range from 0x20-0x7E. This string is sent by the DCE at the time specified by the T.30 recommendation, as long as parameter is not null.

Result codes:

- ERROR if string is greater than 20 characters.

Table 157. +FPW Extended Syntax Commands

Command	Description
+FPW=<PassWord String>	The ?FPW parameter is used to report the received password string.
+FPW=?	Report the corresponding ranges of character values supported. (0x20-0x7E)

+FRH=<mod>—Receive HDLC Data with <mod> Carrier

Use the **+FRH** command to instruct the modem to receive data framed in the HDLC protocol at the modulation defined by +FRH.

Result codes:

- *CONNECT* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is an intermediate result code.
- *OK* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is a final result code.
- *ERROR* if <mod> ??3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 or the connection is not established. This is a final result code.

Table 158. +FRH Commands

Command	Modulation	Speed
+FRH=3	V.21 channel 2.	300 bits/s.
+FRH=24	V.27ter.	2400 bits/s.
+FRH=48	V.27ter.	4800 bits/s.
+FRH=72	V.29.	7200 bits/s.
+FRH=96	V.29.	9600 bits/s.
+FRH=73	V.17.	7200 bits/s.
+FRH=74	V.17 (short train).	7200 bits/s.
+FRH=97	V.17.	9600 bits/s.
+FRH=98	V.17 (short train).	9600 bits/s.
+FRH=121	V.17.	12000 bits/s.
+FRH=122	V.17 (short train).	12000 bits/s.
+FRH=145	V.17.	14400 bits/s.
+FRH=146	V.17 (short train).	14400 bits/s.

Table 159. +FRH Extended Syntax Commands

Command	Description
+FRH=<mod>	Sets the FAX receive rate and frames the data using HDLC protocol.
+FRH=?	Display all available parameter values for the **+FRH** command.

+FRM=<mod>—Receive Data

Use the **+FRM** command to instruct the modem to received data using the modulation defined by +FRM.

Result codes:

- *CONNECT* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is an intermediate result code.
- *OK* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is a final result code.
- *ERROR* if <mod> ?3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 or the connection is not established. This is a final result code.

Table 160. +FRM Commands

Command	Modulation	Speed
+FRM=3	V.21 channel 2.	300 bits/s.
+FRM=24	V.27ter.	2400 bits/s.
+FRM=48	V.27ter.	4800 bits/s.
+FRM=72	V.29.	7200 bits/s.
+FRM=96	V.29.	9600 bits/s.
+FRM=73	V.17.	7200 bits/s.
+FRM=74	V.17 (short train).	7200 bits/s.
+FRM=97	V.17.	9600 bits/s.
+FRM=98	V.17 (short train).	9600 bits/s.
+FRM=121	V.17.	12000 bits/s.
+FRM=122	V.17 (short train).	12000 bits/s.
+FRM=145	V.17.	14400 bits/s.
+FRM=146	V.17 (short train).	14400 bits/s.

Table 161. +FRM Extended Syntax Commands

Command	Description
+FRM=<mod>	Sets the FAX receive rate.
+FRM=?	Display all available parameter values for the **+FRM** command.

+FRQ—Receive quality threshold

This +FRQ=<pgl>,<cbl> command is used to make decision if copy quality is “OK”. This decision is made based on the percentage of good lines (pgl) and the consecutive bad line count (cbl). The IQ Express supports this command only for MH encoding.

Result Codes:

- *OK* if <pql> = 00-64, <cbl> = 00-FF.
- *ERROR* if <pql> ? 00-64, <cbl> ? 00-FF.

Table 162. +FRQ Extended Syntax Commands

Command	Description
+FRQ=<pql>,<cbl>	Set pql and cbl threshold used to determine copy quality.
+FRQ?	Display the current setting for receive quality threshold.
+FRQ=?	Display the available parameter values for the +FRQ command.

+FRS=<value>—Receive Silence

+FRS=<value> causes the modem to listen and wait for <value> ? 10 ms of silence to be detected on the line. For example, <value> = 5 results in a 50 ms interval. At the end of this period the modem responds with the *OK* result code. <value> has a range of 0—255.

Result codes:

- *OK* if <value> = 0—255.
- *ERROR* if <value> ? ?0—255??

+FRY<value>—ECM retry count

In error correcting mode the transmitting DCE tries to send a partial page four times. These four attempts are called an “attempt block”. The +FRY<value> command controls how many “attempt block” the DCE must try at a given signaling rate before giving up on transmitting the partial page

Result Codes:

- *OK* if <value> = 00-FF.
- *ERROR* if <value> ? 00-FF.

Table 163. +FRY Extended Syntax Commands

Command	Description
+FRY=<value>	Set number of “attempt blocks” that DCE must try when trying to successfully send a partial page.
+FRY?	Display the current setting for ECM retry count.
+FRY=?	Display the available parameter values for the +FRY command.

+FSA—Destination SubAddress

The +FSA:"<destination subaddress string>" is a 20 digit ascii string in the range from 0x20-0x7E. This string is sent by the DCE at the time specified by the T.30 recommendation, as long as parameter is not null.

Result codes:

- ERROR if string is greater than 20 characters.

Table 164. +FSA Extended Syntax Commands

Command	Description
+FSA=<Selective Polling Address String>	The ?FSA parameter is used to report the received subaddressing string
+FSA=?	Report the corresponding ranges of character values supported. (0x20-0x7E)

+FSP<value>—Request to poll

The DTE uses the +FSP=<value> command to indicate it can receive a poll document or not.

Result Codes:

- *OK* if <value> = 0-1.
- *ERROR* if <value> ??0-1.

Table 165. +FSP Commands

Command	Function
+FSP=0	Indicates that the DTE does not want to poll.
+FSP=1	Indicates that the DTE can receive a polled document.

Table 166. +FSP Extended Syntax Commands

Command	Description
+FSP=<value>	Request to poll setting.
+FSP?	Display the current request to poll setting.
+FSP=?	Display the available parameter values for the +FSP command.

+FTC—Response reports remote capabilities and intentions

+FTC=<vr>,
,<wd>,<ln>,<df>,<ec>,<bf>,<st>,<jp> is used by DTE to sense DCE capabilities and constrain if necessary (see +FCC valid parameter value table for valid value of each parameter).

Result Codes:

- *OK* if <vr> = 00-FF,
 = 00-0D,<wd> = 00-02, <ln> = 00-02, <df> = 00-03, <ec> = 00-01, <bf> = 00, <st> = 00-07, <jp> = 00-7F.
- *ERROR* if <vr> ? 00-FF,
 ? 00-0D,<wd> ? 00-02, <ln> ? 00-02, <df> ? 00-03, <ec> ? 00-01, <bf> ? 00, <st> ? 00-07, <jp> ? 00-7F.

+FTI—DCE reports received transmit station ID (TSI).

A +FTI response from DCE to DTE reports the identification of the transmitting facsimile. The syntax of the response is as follows:

+FTI:"<TSI ID string>", where TSI ID string is the remote facsimile's identification. The string is limited to 20 characters in range from 0x20-0x7E

Result codes:

- N/A

+FTH=<mod>—Transmit HDLC Data with <mod> Carrier

The **+FTH=<mod>** command causes the modem to transmit data framed in the HDLC protocol at the modulation defined by +FTH Commands.

Result codes:

- *CONNECT* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is an intermediate result code.
- *OK* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is a final result code.
- *ERROR* if <mod> ?3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 or the connection is not established. This is a final result code.

Table 167. +FTH Commands

Command	Modulation	Speed
+FTH=3	V.21 channel 2.	300 bits/s.
+FTH=24	V.27ter.	2400 bits/s.
+FTH=48	V.27ter.	4800 bits/s.
+FTH=72	V.29.	7200 bits/s.
+FTH=96	V.29.	9600 bits/s.
+FTH=73	V.17.	7200 bits/s.
+FTH=74	V.17 (short train).	7200 bits/s.

+FTH=97	V.17.	9600 bits/s.
+FTH=98	V.17 (short train).	9600 bits/s.
+FTH=121	V.17.	12000 bits/s.
+FTH=122	V.17 (short train).	12000 bits/s.
+FTH=145	V.17.	14400 bits/s.
+FTH=146	V.17 (short train).	14400 bits/s.

Table 168. +FTH Extended Syntax Commands

Command	Description
+FTH=<mod>	Sets the FAX transmit rate and frames the data using HDLC protocol.
+FTH=?	Display all available parameter values for the **+FTH** command.

+FTM=<mod>—Transmit FAX Data with <mod> Carrier

+FTM=<mod> command causes the modem to transmit data using the modulation defined by +FTM.

Result codes:

- *CONNECT* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is an intermediate result code.
- *OK* if <mod> = 3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 and the connection is established. This is a final result code.
- *ERROR* if <mod> ??3, 24, 48, 72—74, 96—98, 121, 122, 145, 146 or the connection is not established. This is a final result code.

Table 169. +FTM Commands

Command	Modulation	Speed
+FTM=3	V.21 channel 2.	300 bits/s.
+FTM=24	V.27ter.	2400 bits/s.
+FTM=48	V.27ter.	4800 bits/s.
+FTM=72	V.29.	7200 bits/s.
+FTM=96	V.29.	9600 bits/s.
+FTM=73	V.17.	7200 bits/s.
+FTM=74	V.17 (short train).	7200 bits/s.
+FTM=97	V.17.	9600 bits/s.
+FTM=98	V.17 (short train).	9600 bits/s.
+FTM=121	V.17.	12000 bits/s.

+FTM=122	V.17 (short train).	12000 bits/s.
+FTM=145	V.17.	14400 bits/s.
+FTM=146	V.17 (short train).	14400 bits/s.

Table 170. +FTM Extended Syntax Commands

Command	Description
+FTM=<mod>	Set FAX transmit rate.
+FTM=?	Display all available parameter values for the +FTM command.

+FTS=<value>—Transmission Silence

+FTS=<value> causes the modem to terminate a transmission and wait for <value> x 10 ms before responding with the *OK* result code. For example, <value> = 5 results in a 50 ms interval. <value> has a range of 0—255.

Result codes:

- *OK* if <value> = 0—255.
- *ERROR* if <value> ??0—255??

Voice Commands

The AT voice command set follows ITU-T recommendation V.253. The commands are sent through the com port, but the data path is sent either through the com port or through a DMA channel using the wave driver.
AT Voice Commands Summary shows a summary of the AT voice command set.

S32=<value>—Synthetic Ring Volume

See S32—Synthetic Ring Volume on S32—Synthetic Ring Volume.

S33=<value>—Synthesized Ring Frequency

See S33—Synthetic Ring Frequency on S33—Synthetic Ring Frequency.

+FCLASS=8—Enter Voice Mode

The command +FCLASS=8 (

+FCLASS=<value) puts the modem in voice mode. Speakerphone and TAD modes are subsumed under the more general heading of voice mode and use a particular subset of voice mode commands to implement their respective features and functions.

The modem controller will maintain the overall state of the system so as to know when voice commands are issued in the context of using the speakerphone versus TAD or other voice contexts.

+VCID=<pmode>—Caller-ID

Use this command to enable or to disable caller-ID.

Result codes:

- *OK* if <pmode> = 0—2.
- *ERROR* if <pmode> ? 0—2.

Table 171. +VCID Commands

Command	Function
+VCID=0	Disable caller-ID (default).
+VCID=1	Enable formatted caller report.
+VCID=2	Enable unformatted caller report.

Table 172. +VCID Extended Syntax Commands

Command	Function
+VCID=<pmode>	Sets the status of caller-ID.
+VCID?	Returns the current caller-ID pmode.
+VCID=?	Queries the DCE for the range of supported caller-ID report formats. The DCE returns 0, 1, 2.

+VDR=<enable>,<report>—Distinctive Ringing and Cadence Report

Use this command to enable or disable the distinctive ringing feature. Distinctive ringing features are identified by the *DROF=<length of ring in 0.1 s increments>* and *DRON=<length of silence in 0.1 s increments>* result codes. The default value assigned to the <enable> and <report> parameters is zero.

Result codes:

- *OK* in <enable> = 0, 1 and <report> = 0—255.
- *ERROR* if <enable> ? 0, 1 and <report> ? 0—255.

Table 173. +VDR Commands

<enable>	<report>	Function
0	0—255	Disables the ring report result code.
1	0—255	Enables the ring report result code and sets the report delay to <report>/10. The result is evaluated in seconds.

Table 174. +VDR Extended Syntax Commands

Command	Function
+VDR=<enable>,<report>	Enables or disables distinctive ringing features.
+VDR?	Returns the current values of <enable> and <report>.
+VDR=?	Queries the DCE for the range of supported distinctive ring configurations. The DCE returns (0, 1), (0—255).

+VEM=<mask>—Event Reporting and Masking

The DTE can use this command to disable an event report regardless of the DCE state or of the analog signal

source or destination configuration. <mask> is bits 0—33 (i.e., FFFFFFFFC). See the IS-101 specification for defined bit values.

Table 175. +VEM Extended Syntax Commands

Command	Function
+VEM=<mask>	Sets event reporting mask.
+VEM?	Returns the current values of the <mask>.
+VEM=?	Queries the DCE for the range of supported service level events.

+VGM=<gain>—Microphone Gain

Use this command to set the microphone gain of the speakerphone function. <gain> is an unsigned octet where values greater than 128 indicate a gain larger than nominal, and values smaller than 128 indicate a gain smaller than nominal. The gain control has a range between 0 and 255.

Result codes:

- Default: manufacturer-specific.
- *OK* if <gain> = 0—255.
- *ERROR* if <gain> ? 0—255.

Table 176. +VGM Extended Syntax Commands

Command	Function
+VGM=<gain>	Set the microphone gain level.
+VGM?	Displays the current gain level.
+VGM=?	Displays the supported speaker gain levels for the product.

+VGR=<gain>—Receive Gain Selection

Use this command to set the receive microphone gain control. The receive gain has a range of 0—255. However the values are only significant between 121 and 134. Any value set below 121 uses the same gain as 121. And any value set above 134 uses the same gain as 134.

Note: While in TAD mode, this command may be used in TAD local recording to control the recording level from the microphone. While in speakerphone mode, this command controls the gain to the remote caller.

Result codes:

- Default: manufacturer-specific.
- *OK* if <gain> = 0—255.
- *ERROR* if <gain> ? 0—255.

Table 177. <gain> Values

Command	Function
<gain> = 128	Nominal level for receive gain from microphone (default).
<gain> = a value greater than 128	Increase gain above nominal level.
<gain> = a value less than 128	Decrease gain below nominal level.

Table 178. +VGR Extended Syntax Commands

Command	Function
+VGR = <level>	Sets the microphone receive gain.
+VGR?	Displays the current value of receive gain.
+VGR=?	Displays the range of supported gain values.

+VGS=<gain>—Speaker Gain

Use this command to set the speaker gain of the speakerphone function. <gain> is an unsigned octet where values greater than 128 indicate a gain larger than nominal, and values smaller than 128 indicate a gain smaller than nominal. The speaker gain control has a range from 0 to 255.

Result codes:

- Default: 128.
- *OK* if <gain> = 0—255.
- *ERROR* if <gain>⁇ 0—255.

Table 179. +VGS Command <gain> Values

Command	Function
<gain> = 128	Nominal level for speaker gain (default).
<gain> = a value greater than 128	Increase gain above nominal level.
<gain> = a value less than 128	Decrease gain below nominal level.

Table 180. +VGS Extended Syntax Commands

Command	Function

+VGS = <level>	Sets the speaker gain.
+VGS?	Displays the current value of the speaker gain.
+VGS=?	Displays the range of supported gain values.

+VGT=<level>—Speaker Volume Control

Use this command to set the speaker volume control.

Result codes:

- *OK* if <level> = 0—255.
- *ERROR* if <level> ? 0—255.

Table 181. <level> Values

Command	Function
<level>=128	Nominal volume level for sending to speaker (default).
<level> = a value > 128	Increase volume above nominal level.
<level> = a value < 128	Decrease volume below nominal level.

Table 182. +VGT Extended Syntax Commands

Command	Function
+VGT=<level>	Sets the speaker volume level.
+VGT?	Displays the current setting for the speaker volume level.
+VGT=?	Displays the support speaker volume level values.

+VIP—Initialize Voice Parameters

Use the **+VIP** command to reset all the voice parameters to their default values. The command has no effect on the **+FCLASS** setting.

+VIT=<timer>—DTE/DCE Inactivity Timer

Use this command to set the DTE/DCE inactivity timer. The DTE/DCE inactivity timer is activated when the DTE or host system selects voice fixed-rate mode. If the timer lapses, the DCE drops the connection. Inactivity in either the voice command mode or the voice data mode will start the count down. The units are in one second intervals.

Result codes:

- *OK* if <timer> = 0—255.
- *ERROR* if <timer> ? 0—255.

Table 183. +VIT Extended Syntax Commands

Command	Function
+VIT=<timer>	Sets the DTE/DCE inactivity timer.
+VIT?	Displays the current value of the timer.
+VIT=?	Displays the range of supported delay times in seconds.

+VNH=<Hook>—Automatic Hang-Up Control

Use this command to enable or disable automatic DCE hang-ups in the data and facsimile modes. The **+VNH** command is part of a group of commands used for call discrimination. Call discrimination is a means for the modem to supply the DTE or host system with the information and means to discriminate between data, FAX, and voice calls. The automatic hang-up control is just one of the controls used to manage call discrimination. Refer to section 5.3.1 of ITU-T recommendation V.253 (02/98) for a full description of call discrimination and how the **+VNH** command is used.

Result codes:

- *OK* if <hook> = 0, 2.
- *ERROR* if <hook> ? 0, 2.

Table 184. +VNH Commands

Command	Function
+VNH = 0	The DCE retains automatic hang-ups (as in the other nonvoice modes).
+VNH = 2	The DCE disables automatic hang-ups in the other nonvoice modes. The DTE only performs a logical hang-up (returns the *OK* result code).

Table 185. +VNH Extended Syntax Commands

Command	Function
+VNH=<hook>	Enables or disables automatic DCE hang-ups.
+VNH?	Displays the current parameter value.
+VNH=?	Displays the range of supported parameter values.

Voice Commands: Speakerphone Operation

+VLS=<label>—Analog Source/Destination Selection

Use this general-purpose analog source/destination command to attach various analog devices to the system in voice mode.

Table 186. +VLS Commands

Command	Function
+VLS=0	Speakerphone off.
+VLS=5	Disables/detaches microphone analog source (leaving speaker only) when speakerphone is in operation (phone mute feature).
+VLS=7	Speakerphone on. Attach internal speaker and internal microphone, DCE off-hook. Restores/attaches microphone along with speaker (normal speakerphone operation).

Table 187. +VLS Extended Syntax Commands

Command	Function
+VLS=<value>	Attaches or detaches an analog source or destination to the system in voice mode.
+VLS?	Reports the current analog source/destination configuration, along with a listing of all event codes reported from the modem to the DTE under that configuration.
+VLS=?	Queries the DCE for the range of supported configurations and the list of unsolicited event codes that the modem will report to the DTE under each configuration. For speakerphone, the configurations supported are 0, 5, and 7 (as explained above).

Voice Commands: Telephone Answering Device (TAD)

+VLS=?—Analog Source/Destination Selection and DTMF/Tone Reporting

Requests for the modem's DTMF/tone reporting capabilities are made using this command. For each system configuration in voice mode (i.e., speakerphone and answering machine), the modem reports the capabilities that are enabled for the configuration.

For each configuration, the modem indicates tone-reporting capabilities for each of the three different voice states: voice transmit data, voice receive data, and voice command state (voice idle).

TAD supports each of the following ITU-T recommendation V.253 analog source/destination configurations.

Table 188. Analog Source/Destination Configurations

Label #	Description
0	DCE on-hook, local phone connected to the telephone company.
1	DCE off-hook, DCE connected to telephone company.
2	DCE off-hook, local phone connected to DCE.
3	DCE off-hook, local phone connected to telephone company, DCE to local phone.
4	Speaker connected to DCE, DCE on-hook (playback messages).
5	Speaker connected to DCE, DCE off-hook (call screening).
6	Microphone connected to DCE, DCE on-hook (record greeting).
7	Microphone and speaker connected, DCE off-hook (speakerphone).

+VPR=<rate>—Select DTE/DCE Interface Rate

The **+VPR** command returns an *OK* result code for any rate but has no action.

Events Reported to the DTE

The modem will return *OK* when going off-hook in voice mode (**+FCLASS=8**). After answering in voice mode, the modem may send any of the following <DLE> shielded event codes to the DTE, as appropriate.

Table 189. <DLE> Shielded Codes Sent from DCE to DTE

Code Character	Description
0—9, A—D, #, *	DTMF tones.
a	Answer tone.
b	Busy tone.
c	FAX calling tone.

d	Dial tone.
e	Data calling tone.
h	Local phone on-hook.
H	Local phone off-hook.
R	Ring.
s	Silence timer has expired.
<ETX>	End of voice data transmission.
@	CAS tone detected.

<DLE> Codes Sent to DCE

For simple actions in voice mode, the modem may send any of the following <DLE> shielded event codes (in ASCII) to the DTE, as appropriate.

Table 190. <DLE> Shielded Codes Sent from DTE to DCE

Code Character	Description
u	Raise the volume by 1 dB.
d	Lower the volume by 1 dB.
<ETX>	End of voice data transmission.
!	End receive data state.

* The information supplied for this command does not affect host-based controller modems. The dialogue included with this command applies to controller based modems only.

+VRA=<interval>—Ringing Tone Goes Away Timer

Use this command to set the ringing tone goes away timer before originating a call. The ringing tone goes away timer defines the amount of time the modem will wait between ringing tones before assuming that the remote station has gone off-hook. The default is 50 and each value represents a 0.1 second increment.

Result codes:

- *OK* if <interval> = 0—255.
- *ERROR* if <interval> ? 0—255.

Table 191. +VRA Extended Syntax Commands

Command	Function
+VRA=<interval>	Sets the ringing tone goes away timer.
+VRA?	Displays the current value.
+VRA=?	Displays the range of supported timer values.

+VRN=<interval>—Ringing Tone Never Appeared Timer

Use this command to set the ringing tone never appeared timer before originating a call. The ringing tone never appeared timer defines the amount of time that the modem will wait for an initial ringing tone. If a ringing tone is not detected within this interval, the modem will assume that the remote station has gone off-hook. The default is 10 and each value represent a one second increment.

Result codes:

- *OK* if <interval> = 0—255.
- *ERROR* if <interval> ? 0—255.

Table 192. +VRN Extended Syntax Commands

Command	Function
+VRN=<interval>	Sets the ringing tone never appeared timer.
+VRN?	Displays the current value.
+VRN=?	Display the range of supported timer values.

+VRX—Enter Voice Receive Data State

Use this command to initiate the voice receive state with the voice stream received through the comm port. Applications using the wave interface do not use the **+VRX** command. The modem returns the *CONNECT* result code to the DTE.

There are two ways for the DCE to leave the voice receive state:

1. Modem receives <DLE>-! from the DTE.
2. Upon expiration of the silence detection timer, the modem passes <DLE> shielded event codes indicating a presumed hang-up (<DLE>-s) or presumed end-of-message (<DLE-q>).

+VSD=<sds>,<sdi>—Silence Detection (QUIET and SILENCE)

Use this command to set the silence detection sensitivity (<sds>) and silence detection interval (<sdi>). The <sds> parameter defines the line noise sensitivity level in decibels.

The <sdi> parameter specifies the amount of time the modem waits before reporting silence to the DTE. It is used for determining the presumed hang-up (SILENCE), after which the modem sends <DLE>-s to the DTE. The default is 50 (5 seconds).

Result codes:

- *OK* if <sds> = 0—255 and <sdi> = 0—255.
- *ERROR* if <sds> ? 0—255 or <sdi> ? 0—255.

Larger values of <sds> indicate that the modem is to treat noisier line conditions as silence (see <sds> Values).

Table 193. <sds> Values

Value	Function
<sds> = 128	Nominal level of sensitivity; –40 dBm (default).
<sds> > 128	More aggressive; <sds> = 129 is –39 dBm.
<sds> < 128	Less aggressive; <sds> = 127 is –41 dBm.

Table 194. +VSD Extended Syntax Commands

Value	Function
+VSD=<sds>,<sdi>	Sets the silence sensitivity level and the silence detection interval.
+VSD?	Displays the current silence detection sensitivity and silence detection interval.
+VSD=?	Displays the range of supported values for the silence detection sensitivity and silence detection interval.

+VSM=<cml>,<vsr>—Compression Method and Sampling Rate Specifications

Use the **+VSM*** command to set the voice compression method and the sampling specification. The <cml> parameter identifies the compression method and the <vsr> parameter identifies the sampling rate.

Result codes:

- *OK* if <cml> = 128—133 and <vsr> = 7200, 8000, 11025.
- *ERROR* if <cml> ? 128—133 or <vsr> ? 7200, 8000, 11025.

* ITU-T recommendation V.253 standardized this command. The standard version contains two additional parameters which are not supported by the IQ Express AT command set. For additional information on these parameters, see ITU-T recommendation V.253.

Table 195. Compression Method

<cml>	Compression Method	Available Sampling Rates
128	8-bit linear.	7200, 8000, 11025
129	16 bit linear (default).	7200, 8000 (default), 11025
130	8-bit A-law.	8000
131	8-bit ?-law.	8000
132	IMA ADPCM.	8000
133	G.729.	8000

Table 196. +VSM Extended Syntax Commands

Command	Function
+VSM=<cml>,<vsr>	Sets the compression method and the sampling rate.
+VSM?	Returns the numeric and string labels of the compression method currently in use, and the sampling rate currently in use.
AT+VSM=?	Reports the voice compression methods supported by the DCE and the voice sampling rates at which they are supported. The default is 129,800 (16-bit linear, 8.0 kHz).

+VSP=<value>—Speakerphone On/Off

Use this command to turn the speakerphone function on and off.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ? 0, 1.

Table 197. +VSP Commands

Command	Function
+VSP=0	Speakerphone function off (default).
+VSP=1	Speakerphone function on.

Table 198. +VSP Extended Syntax Commands

Command	Function
+VSP=<value>	Turns the speakerphone on or off.
+VSP?	Displays the current status of the speaker phone.
+**VSP=?**	Displays the range of supported values.

+VTD=<dur>—Beep Tone Duration Timer

Use this command to set the default duration for DTMF/tone generation in 0.01 s increments. For DTMF digits, beep tone duration is the interdigit time. For tone generation, this number is the actual tone duration. The default tone duration is 100 or 1 s.

Result codes:

- *OK* if <dur> = 0—400.
- *ERROR* if <dur>? 0—400.

Table 199. +VTD Commands

Command	Function
+VTD=<dur>	Sets the duration for DTMF/tone generation.
+VTD?	Displays the current beep tone duration timer.
+VTD=?	Displays the range of supported values.

+VTR—Start Voice Transmission and Reception Process

Use this command to initiate full-duplex voice mode* in the DCE. In this mode, the DTE selects the analog source and sink through the **+VLS** command; the selections can be microphone and speaker or GSTN. The DCE is not required to perform any acoustic echo cancellation or line echo cancellation.

Result codes:

- *CONNECT* if full duplex voice mode is initiated.
- *ERROR* if the DCE is not connected to at least one off-hook duplex PSTN line or one duplex non-PSTN device.

* See ITU-T Recommendation V.253 section 4.1.1 for further details on the voice states.

+VTS=<string>—DTMF and Tone Generation in Voice Mode

Use this command to produce a sequence of DTMF tones (or other tones, such as dial tone, busy, silence, etc.) as specified in the string parameter. String parameters are made up of a sequence of elements separated by commas. If the string does not supply a duration for a particular tone then the DCE uses the duration designated by the **+VTD** command. The command can also generate a hook flash, **+VTS=!**.

Result codes:

- *OK* if <string> is valid (see String Elements).
- *ERROR* if <sting> is not valid.

Table 200. +VTS Extended Syntax Commands

Command	Function
+VTS=<string>	Generates DTMF tones according to the <string> parameter.
+VTD=?	Displays the range of supported tones and duration.

Table 201. String Elements

String Elements[1]	Description
A single character	The valid single characters are: 0—9, #, *, !, and A—D. This element always uses the default duration specified by the +VTD command.

A bracketed group []	A bracketed group has three components. It is used to generate a dual tone. The first component is the first tone[2] in the dual tone. The second component is the second tone[2] in the dual tone. The third component is the duration of the tones. The duration is specified in 0.01 s intervals. If one of the tone parameters is missing, its value is defaulted to 0 and that tone is not generated.
A curly bracketed group {}	A curly bracketed group has two components. The first component is a DTMF tone or hookflash character(!). The second component is the tone duration. The duration of the tone is specified in 0.01 s intervals.

1.The string definition provided in this text is a excerpt from the detailed definition provided in ITU-T recommendation V.253 (02/98). Refer to Section 10.1.5.1.1 for a full description of the <string> parsing.
2.The tone specified in the bracketed group in a numerical value between 300 and 3300.

+VTX—Enter Voice Transmit Data State

Use this command to initiate the voice transmission process with the voice stream sent through the comm port. Applications using the wave interface do not use the **+VTX** command.

There are two ways for the DCE to leave the voice transmit state:

- Modem receives <DLE>-<EXT>in voice stream.
- DTE/DCE inactivity timer expires.

Result codes:

- *CONNECT* if the DCE is connected to another off-hook DCE.
- *ERROR* if the DCE is not connected to at least one other off-hook DCE.

Fast Connect and V23 Reverse Channel Commands

The AT fast connect command set is not covered by any ITU Recommendation. This set of commands allow Point-of-Sale (POS), Set-top-boxes (STB) and other applications to quickly connect to a host and transfer small amount of data per connection..

Use this command to select the fast connect modulation or to disable fast connect. The data transfer modes supported for V.22 fast connect are Asynchronous (\N0), SDLC (\N6) and V.80 HDLC (+ES, +ESA) command. The data transfer mode supported for V.29 is +FCLASS =1.0.

Result codes:

- *OK* if <value> = 0—8.
- *ERROR* if <value> ??0—8.

Table 203. \F<value> Commands

Command	Description
\F0	Fast Connect is disabled (default).
\F1	V.22 Fast Connect is enabled.
\F2	V.29 Fast Connect is enabled.
\F3 and \F4	Reserved
\F5	RTS used to reverse V.23 channel

\F6	DTR used to reverse V.23 channel
\F7 thru \F8	Reserved.

Modem Line Sense AT Commands Set

The AT commands allows a host to sense the phone line for various conditions, such as a phone on the same line being off-hook. Additionally the threshold of the parameters being monitored can be controlled using the AT%T87 command (**Line Sense Commands**).

Result codes:

- *OK* if <value> = 0,3,4
- *Line voltage value in Volts if <value>=1*.
- *Line not in use if <value>=2 or*
- Line in use if <value>=2
- Loop current value in milliamps if <value>=5 and modem is off-hook. Value has no meaning if modem is on-hook.
- *ERROR* if <value> ?? 0—5.

Table 203. Line Sense Commands

Command	Description
LS0	Disable Line Sense
LS1	Display Line Voltage (V).
LS2	Display line status (“Line not in use” or “Line in use”.
LS3	Modem disconnects (hangs up) when extension goes off-hook. Nothing is reported to host.
LS4	Report extension pick up has taken place, but do not hangup when modem is in voice mode (AT+FCLASS=8) and off-hook. Host will get a <DLE> shielded event code indicating extension pick-up (<DLE>-P), or extension on-hook (<DLE>-p).
LS5	Display loop current in (mA). This command is only valid when modem is off-hook. Value has no meaning when modem is on-hook.
AT%T87	Display on hook threshold, off hook threshold, off hook loop current reference. The default values are
AT%T87,1,<value>	Change on hook threshold value, value (hex). Default value is 14 (20 volts).
AT%T87,2,<value>	Change off hook threshold value(hex). Default value is 03 (3 volts).
AT%T87,3,value	Change off hook threshold value(hex). Default value is 00 (0 volts).

Testing and Debugging AT Commands Set

The following AT commands are used to test and debug designs. These commands are not intended for general use. Rather, they are tools to help validate and verify the functionality of Mainpine boards.

Table 204. Test and Debugging AT Command Set Summary

Command	Description	Command	Description
&&C	Write to/read from host interface register	**%T88**	Write to non-volatile RAM
&&L	Line-to-line loopback	**%T89**	Read from non-voilatile RAM
&&R	Write to/read from DSP RAM location	**%T112**	Debug enable/disable
&&S	Speaker codec loopback	**#UD**	Unimodem diagnostics

&&C<location>,<data>—Write To/Read From DSP Register

Use this command to write data to or read data from a DSP register. DSP registers are not the same as S registers. DSP registers* are used by the DSP to process data sent to the DSP. Each register is eight bits. Data supplied for the register must be in hex format.

Result codes:

- *OK* if <location> is a valid hex register and <data> is a valid four digit hex number.
- *ERROR* if <location> is a valid hex register or <data> is a valid four digit hex number.

Table 205. &&C Command Extended Syntax

Command	Function
&&C<location>, <data>	Instructs the modem to store <data> in DSP register <location>.
&&C<location>	Instructs the modem to read from DSP register <location>.

* Refer to the programmers reference guide for your contoller-based modem to identify the valid registers for your product.

&&L—Line-to-Line Loopback

Use this command to create a loopback for a line-to-line test of a local and remote modem. This command does not take parameters. Do not supply a parameter with this command.

Result codes:

- *OK* if no parameter is provided.
- *ERROR* if a parameter is entered.

&&R—Write to/Read from DSP RAM Location

Use this command to write data to or read data from a location in the DSP RAM. DSP RAM locations consist of two eight-bit words or 16 bits. Data supplied for DSP RAM locations must be in hex format.

Result codes:

- *OK* if <location> is a valid four digit hex RAM location and <data> is a valid four digit hex number.
- *ERROR* if <location> is a valid four digit hex RAM location or <data> is a valid four digit hex number.

Table 206. &&R Command Forms

Command	Function
&&R<location>,<data>	Instructs the modem to store <data> in DSP RAM <location>.
&&R<location>	Instructs the modem to read from DSP RAM <location>.

&&S—Speaker Codec Loopback

Use this command to create a loopback from the microphone to the speaker.

Result codes:

- *OK* if voice is supported.
- *ERROR* if voice is not supported

%T88 <loc>,<val>—Write to NVRAM

Use this command to write the value <val> to the non-volatile RAM location specified by <loc>.

Result codes:

- *OK* if <loc>, is valid .
- *ERROR* if <loc> is not valid.

%T89—Read from NVRAM

Use this command to write the value <val> to the non-volatile RAM location specified by <loc>.

Result codes:

- *OK* if <loc>, is valid .
- *ERROR* if <loc> is not valid.

%T112—Debug Enable/Disable

Use this command to enable or disable the debug mode.

Result codes:

- *OK* if <value> = 0, 1.
- *ERROR* if <value> ?0, 1.

Table 207. %T112 Commands

Command	Function
%T112, 0	Disable debug.
%T112, 1	Enable debug.

S109—V.PCM Connection Options

Use this register for testing only. S109 is a guide for the connection type. Each bit of the register enables or disbles a different protocal or function of the modem.

Note: The downstream connection rate is determined by the S38.

- Range: 0—2
- Default: 1

Table 208. Register S109

Bit	Description
S109[1:0]=00	V34
S109[1:0]=01, 10, 11	V90
S109[2] = 1	Fast connect phase 1 enable
S109[3] = 1	PCM upstream enable
S109[4] = 1	V.92 enable
S109[5] = 1	Fast connect phase 2 enable
S109[6] = 1	Reserved
S109[7] = 1	Reserved

#UD—Unimodem Diagnostics

This command is defined by *Microsoft*'s* unimodem diagnostics command specification. The modem implements a subset of the parameters in that specification.

#UD is an action command. It does not take parameters. It should be the last command in the command line. The modem logs aspects of its operation for each call and saves these results in volatile memory until cleared by one of the following events. These results are not cleared by changing DTR, V.24 circuit 108.2, &D0, &D1, or &D2.

- Power off (or D1 or D3 state entered).
- Hard reset (e.g., negate DTR with &D3 set, reset button).
- Soft reset = ATZ or AT&F.
- ATD or ATA command issued.
- Automatic answer (e.g., set register S0 > 0 and ring detected).

In response to this command, the modem reports one or more lines of information text. Information text format is defined in ITU V.25ter. Each line is both preceded and terminated by a <CR><LF> pair. Note that, as per V.25ter, CR and LF characters may be changed by writing new values to the contents of registers S2 and S3 respectively.

DIAG <token key=value [[key=value [key=value]]. . .>

where

DIAG = 5 characters, hexadecimal 44, 49, 41, 47, 20.

'<' = left angle bracket, hexadecimal 3C.

'=' = equal sign, hexadecimal 3D.

'>' = right angle bracket, hexadecimal 3E.

token = unique 32-bit hexadecimal string, i.e., 2A4D3263.

key = one or two digit hexadecimal number. See #UD Last Call Status Report Format.

value = any string.

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multidigit values are reported MSD first. Leading zeros may be deleted.

The following table includes all items listed in *Microsoft*'s specification for the #UD command. The items that have an X in the Implemented column have been implemented in this release.

Please refer to *Microsoft*'s unimodem diagnostics command specification for more information.

* *Microsoft* is a registered trademark of Microsoft Corporation.

Table 209. #UD Last Call Status Report Format

Note: Refer to Table 1 in the *Microsoft* specification.

Key	Value(s)	Required	Definition	Implemented
0	2 digits	Yes	Diagnostic command specification revision number, digit.digit.	X
1	See Call Setup Result Codes	0—A	Call setup result code.	X
2	See Table 3*	0—1	Multimedia mode.	—
3	See Table 4*	0	DTE-DCE interface mode.	—
4	String	Yes	V.8 CM octet string. Same format as V.25ter Annex A, in quotes.	—
5	String	Yes	V.8 JM octet string. Same format as V.25ter Annex A in quotes.	—
6—F	—	—	Reserved for call negotiation reports.	—
10	2 digits	Note 4*	Received signal power level in –dBm (0—43).	X
11	2 digits	Note 4*	Transmit signal power level in –dBm (0—17).	X
12	2 digits	Note 4*	Estimated noise level in –dBm (10—90).	X
13	2 digits	Note 4*	Normalized mean squared error. 100 (0x64) = minimum intersymbol distance.	—
14	2 digits	Note 4*	Near echo loss in dB.	X
15	2 digits	Note 4*	Far echo loss in dB.	X
16	4 digits	Note 4*	Far echo delay in ms.	—

17	—	Note 4*	—	X
18	—	Note 4*	—	—
19—1F	—	—	Reserved for modulation setup and training reports (see note 5*).	—
20	See gstnModulationSchemeActive from 3.7.2/V.58	Note 6*	Transmit carrier negotiation result.	X
21	See gstnModulationSchemeActive from 3.7.2/V.58	Note 6*	Receive carrier negotiation result.	X
22	4 digits	0—1F40	Transmit carrier symbol rate (0—8000).	X
23	4 digits	0—1F40	Receive carrier symbol rate (0—8000).	X
24	4 digits	0—FA0	Transmit carrier frequency (0—4000).	—
25	4 digits	0—FA0	Receive carrier frequency (0—4000).	—
26	4 digits	0—FA00	Initial transmit carrier data rate (0—64000).	X
27	4 digits	0—FA00	Initial receive carrier data rate (0—64000).	X
28—2F	—	—	Reserved.	—
30	2 digits	0—FF	Temporary carrier loss event count.	—
31	2 digits	0—FF	Carrier rate renegotiation event count.	—
32	2 digits	0—FF	Carrier retrains requested.	X
33	2 digits	0—FF	Carrier retrain requests granted.	X
34	4 digits	0—FA00	Final transmit carrier rate.	X

* Refers to notes or tables in the *Microsoft* specification.

Table 209. #UD Last Call Status Report Format (continued)

Note: Refer to Table 1 in the *Microsoft* specification.

Key	Value(s)	Required	Definition	Implemented
35	4 digits	0-FA00	Final receive carrier rate.	X
36—3F	—	—	Reserved.	—
40	See errorControlActive from 3.5.2/V.58	0-2	Protocol negotiation result (see note 7*).	X
41	3 digits	0-400	Error control frame size.	—
42	2 digits	0-FF	Error control link time-outs.	X
43	2 digits	0-FF	Error control link NAKs.	—
44	See compression	0-1	Compression negotiation result (see note 7*).	X

	Active from 3.2.2/V.58			
45	4 digits	0-200	Compression dictionary size (see note 7*).	—
46—4F	—	—	Reserved.	—
50	1 digit	0-2	Transmit flow control. ✍ 0 = off. ✍ 1 = DC1/DC3. ✍ 2 = V.24 ckt 106/133.	—
51	1 digit	0—2	Receive flow control. ✍ 0 = off. ✍ 1 = DC1/DC3. ✍ 2 = V.24 ckt 106/133.	—
52	8 digits	0—FFFFFFFF	Transmit characters sent from DTE (see note 8*).	—
53	8 digits	0—FFFFFFFF	Receive characters sent to DTE (see note 8*).	—
54	8 digits	0—FFFF	Transmit characters lost (data overrun errors from DTE) (see note 9*).	—
55	8 digits	0—FFFF	Receive characters lost (data overrun errors from DTE) (see note 9*).	—
56	8 digits	0—FFFFFFFF	Transmit frame count, if error control protocol running (see note 9*).	X
57	8 digits	0—FFFFFFFF	Receive frame count, if error control protocol running (see note 9*).	X
58	8 digits	0—FFFF	Transmit frame error count, if error control protocol running (see note 9*).	X
59	8 digits	0—FFFF	Receive frame error count, if error control protocol running (see note 9*).	X
5A—5F	—	—	Reserved.	—
60	See Additional callCleared Codes (3.6.4/V.58) and callCleared Codes from 3.6.4/V.58-1994	Note 10*	Termination cause.	X
61	2 digits	0—FF	Call waiting event count.	—
62—7F	—	—	Reserved for future versions of the specification.	—
80—FF	—	—	Reserved for manufacturer proprietary keys.	—

* Refers to notes or tables in the *Microsoft* specification.

Table 210. Call Setup Result Codes

Note: Refer to Table 2 in the *Microsoft* specification.

Code	Definition	Implemented
0	No previous call (modem log has been cleared since any previous call).	X
1	No dial tone detected.	X
2	Reorder signal detected. Network busy.	—
3	Busy signal detected.	X
4	No recognized signal detected.	X
5	Voice detected.	—
6	Text telephone signal detected (see V.18).	—
7	Data answering signal detected (e.g., V.25 ANS, V.8ANSam).	X
8	Data calling signal detected (e.g., V.25 CT, V.8 CI).	—
9	FAX answering signal detected (e.g., T.30 CED, DIS).	—
A	FAX calling signal detected (e.g., T.30 CNG).	—
B	V.8bis signal detected.	—
C—F	Reserved.	—

Table 211. gstnModulationSchemeActive from 3.7.2/V.58

Note: Refer to Table 6 in the *Microsoft* specification.

Value (hexadecimal)	Description	Implemented
0	V.17.	—
1	V.21.	—
2	V.22.	—
3	V.22bis.	—
4	V.23 constant carrier (1200/75).	—
5	V.23 switched carrier (half duplex).	—
6	V.26bis.	—
7	V.26ter.	—
8	V.27ter.	—
9	V.29 HD.	—
A	V.32.	X
B	V.32bis.	—
C	V.34.	X
D	V.34 HD.	—
E	V.pcm (asymmetric).	—
F	V.pcm (symmetric).	—
E—7F	Reserved (V.58).	—

80	X2.	—
81	K56flex.	X
82	V.FC.	—
83	V.32terbo.	—
80—FF	Reserved for mfgs.	—

Table 212. errorControl Active from 3.5.2/V.58

Note: Refer to Table 7 in the *Microsoft* specification.

Value	Description	Implemented
0	Disable/none.	X
1	V.42 LAPM.	X
2	V.42 alternative protocol (*MNP*).	X
3—7F	Reserved (V.58).	—
80	*MNP* Class 10.	—
81	Enhanced cellular protocol.	—
82	*ETC*.*	—
82—FF	Reserved for mfgs.	—

* *ETC* is a registered trademark of Paradyne Corporation.

Table 213. compressionActive from 3.2.2/V.58

Note: Refer to Table 8 in the *Microsoft* specification.

Value	Description	Implemented
0	None.	X
1	V.42bis.	X
2—7F	Reserved (V.58).	—
80	*MNP* Class 5.	X
81—FF	Reserved for mfgs.	—

Table 214. Additional callCleared Codes (3.6.4/V.58)

Code	Definition	Implemented
1	No previous call.	X
2	Call is still in progress.	X
3	Call waiting signal detected.	—
4	Delayed (see ETS 300 001).	X

Note: Refer to Table 9 in the *Microsoft* specification.

Table 215. callCleared Codes from 3.6.4/V.58-1994

Note: callCleared indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These values are hexadecimal, converted from decimal in V.58. Refer to Table 10 in the *Microsoft* specification.

Value	Description	Notes	Implemented
0	CauseUnidentified.	Call setup issues.	X
1—3	See Additional callCleared Codes (3.6.4/V.58).	—	X
A	NMSinitiatedDialCall.	Network management system.	—
B	NMSinitiatedLeasedLineRestoral.	Network management system.	—
C	NMSinitiatedRedial.	Network management system.	—
D	NMSinitiatedDialDisconnect.	Network management system.	—
14	PowerLoss.	DCE.	—
15	EquipmentFailure.	—	—
16	FrontPanelDisconnectRequested.	—	—
17	FrontPanelLeasedLineRestoral.	—	—
18	AutomaticLeasedLineRestoral.	—	—
19	InactivityTimerExpired.	—	X
1E	cct116RestoralRequest.	DTE interface.	—
1F	cct108isOffInhibitsDial.	—	—
20	cct108turnedOff.	—	—
28	NoNumberProvided.	Line interface.	—
29	BlacklistedNumber.	—	X
2A	CallAttemptsLimitExceeded.	—	X
2B	ExtensionPhoneOffhook.	—	—
2C	CallSetupFailTimerExpired.	—	X
2D	IncomingCallDetected.	—	X
2E	LoopCurrentInterrupted.	—	—
2F	NoDialTone.	—	X
30	VoiceDetected.	—	—
31	ReorderTone.	—	—
32	SitTone.	—	—
33	EngagedTone.	—	—
34	LongSpaceDisconnect.	—	—
3C	CarrierLost.	Signal converter.	X
3D	TrainingFailed.	—	X
3E	NoModulationinCommon.	—	—
3F	RetrainFailed.	—	X
40	RetrainAttemptCountExceeded.	—	—

41	GstnCleardownReceived.	—	—

Table 215. callCleared Codes from 3.6.4/V.58-1994 (continued)

Note: callCleared indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These values are hexadecimal, converted from decimal in V.58. Refer to Table 10 in the *Microsoft* specification.

Value	Description	Notes	Implemented
42	FaxDetected.	—	—
46	InTestMode.	Test.	—
47	IntrusiveSelfTestInitiated.	—	—
50	AnyKeyAbort.	Call control.	X
51	DteHangupCommand.	—	X
52	DteResetCommand.	—	—
5A	FrameReject.	Error control.	—
5B	NoErrorControlEstablished.	—	X
5C	ProtocolViolation.	—	—
5D	n400exceeded.	—	X
5E	NegotiationFailed.	—	—
5F	DisconnectFrameReceived.	—	—
60	SabmeFrameReceived.	—	—
64	LossOfSynchronization.	Data compression.	—

S-Registers

The current setting of each S-register may be displayed by the command (**S<register number>?**). There are two forms for this command.

Table 216. S<register number> Extended Syntax

Syntax	Function
S<register number>?	Displays register contents.
S<register number>=<value>*	Sets the contents of the register to <value>.

***** Some registers are read only and are not affected by the **S<register number>=<value>** command.

The following table summarizes the S-registers used by Mainpine's IQ Express board.

Table 217. S-Register Summary

Register	Description	Range	Unit	Default
S0	Auto-answer ring number.	0—255	Rings	0
S1	Ring counter.	0—255	Rings	0
S2	AT escape character (user defined).	0—255	ASCII	43
S3	Command line termination character (user defined).	0—127	ASCII	13
S4	Response formatting character.	0—127	ASCII	10
S5	Command line editing character.	0—8	ASCII	8
S6	Wait before dialing.	2—255	s	2
S7	Connection completion time-out.	1—255	s	50
S8	Pause time for comma (,) modifier.	0—65	s	2
S9	DTMF off time duration	50-200	ms	95
S10	Automatic disconnect delay.	1—255	100 ms	20
S11	DTMF tone duration.	50—150	ms	95
S12	Escape guard time.	0—255	20 ms	50
S14	General bit-mapped options status.	—	—	8
S18	Dial Pulse Interdigit Period	0-255	5 ms	
S21	V.24/general bit-mapped options status.	—	—	48
S22	Results bit-mapped options status.	—	—	112
S24	Timer to sleep control mode.	0, 5—65	s	60
S28	V.34 modulation enable/disable.	0—1	—	1
S29	V17 Disable	0-1	On/Off	0
S30	Inactivity timer.	0—255	Minutes	0
S32	Synthetic ring volume.	0—255	dB	10
S33	Synthetic ring frequency.	0—5	—	0
S35	Data calling tone.	0—1	—	0

S36	Negotiation fallback.	—	—	7
S37	Dial line rate.	0, 2—19	—	0
S38	56K downstream rate.	0—23	—	1
S42	Auto rate.	0—1	—	1
S43	Auto mode.	0—1	—	1
S48	LAPM error control and feature negotiation.	7, 128	—	7
S71	Silence Sensitivity	0-255	dB	128
S72	Silence Detect Timer	0-255	Ms	50
S82	Enable Distinctive Ring reporting in milliseconds,	0-1	On/Off	0 (off)
S86	Fax TCF Error Tolerance	0-255	# error bytes	--
S89	Timer to control sleep mode.	0, 5—65	s	60
S90	Read-only local phone.	0—1	—	0
S91	Line transmit level.	6—25	dB	10
S109	V.PCM connection options.	0—2	—	1
S127	Caller ID impedance activation	0-3	--	0

S-Register Definitions

S0—Auto-Answer Ring Number

This register sets the number of rings the modem will count before automatically answering a call. Enter zero to disable auto-answer. When auto-answer is disabled, the modem requires an **A** command to answer an incoming call.

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

S1—Ring Counter

The modem increments the S1 register each time it detects a ring signal on the telephone line. The modem clears S1 if no rings occur over a six second interval. This register is read-only.

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

S2—Escape Character (User-Defined)

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII +. The escape sequence allows the modem to exit data mode and enter command mode when on-line. A value over 127 disables the escape process, i.e., no escape character will be recognized.

- Range: 0—255.

- Default: 43 (+).
- Units: ASCII.

S3—Command Line Termination Character (User-Defined)

S3 sets the character used to terminate command line and result codes.

Note: This register value is not stored with the **&W** command.

- Range: 0—127.
- 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.

Note: This register value is not stored with the **&W** command.

- Range: 0—127.
- Default: 10 (line feed).
- Units: ASCII.

S5—Command Line Editing Character (User-Defined)

S5 sets the character recognized as a backspace (pertains to asynchronous operation only). The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character. Therefore, a total of three characters are transmitted each time the modem processes the backspace character.

Note: This register value is not stored with the **&W** command.

- Range: 0—32.
- Default: 8 (backspace).
- Units: ASCII.

S6—Wait Time Before Dialing

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

Note: This register default value may vary based on country selection.

- Range: 2—255.
- Default: 2.
- Units: seconds.

S7—Connection Completion Time-Out

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

Note: This register default value may vary based on country selection.

- Range: 1—255.
- Default: 50.
- Units: seconds.

S8—Pause Time for Comma Dial Modifier

S8 sets the time, in seconds, that the modem will pause when the comma (,) dial modifier is encountered in the dial string.

Note: This register default value may vary based on country selection.

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

S9—DTMF Tone Off Duration

This register determines the number of ms that the DTMF tone is off. Refer to *Mainpine Homologation Manual* for specific country defaults.

Note: This register default will be set to the same as S11 register upon reset.

Range: 50—200.

- Default: 95*.
- Units: milliseconds.

* The register default shown here is for North America.

S10— Automatic Disconnect Delay

S10 sets the length of time the IQ Express waits before hanging up after loss of carrier. Register values are given in tenths of a second and range from 0.1 to 25.5 seconds. This allows for a temporary carrier loss without causing the local modem to disconnect.

Note: This register default value may vary based on country selection.

- Range: 1—255.
- Default: 20*.
- Units: 0.1 s.

* The register default shown here is for North America.

S11—DTMF Dialing Speed

This register determines the dialing speed. Refer to *Mainpine Homologation Manual* for specific country

defaults.

Note: This register default value may vary based on country selection.

- Range: 50—150.
- Default: 95*.
- Units: milliseconds.

* The register default shown here is for North America.

S12—Escape Guard Time

This register sets the escape guard time. An escape character is framed with silence to ensure that it is not confused as data. This register sets the duration of the silence which must come before and after an escape sequence.

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

S14—General Bit-Mapped Options Status

S14 indicates the status of command options. Only bits 3 and 6 are used; they are read-only.

- Default: 8 (00001000b).

Table 218. Register S14 Bits

Bit	Description	Value
3	Result codes (**V <value>**).	0 = Numeric (**V0**). 1 = Verbose (**V1**) (default).
6	Pulse dial pulses/s selection (**&Pn**).	0 = 10 pulses/s (**&P0** and **&P1**) (default). 1 = 20 pulses/s (**&P2**).

S18—Dial Pulse Interdigit Period

This register sets the delay between dial pulses.

Range: 0—255. in 5ms increments.

- Default:
- Units: 0.05 seconds.

S21—V.24/General Bit-Mapped Options Status

S21 indicates the status of command options. Only bits 3, 4, and 5 are used; they are read only.

- Default: 48 (00110000b).

Table 219. Register S21 Bits

Bit	Description	Value
3—4	DTR behavior (&Dn).	0 = **&D0**. 1= **&D1**. 2= **&D2** (default). 3= **&D3**.
5	DCD behavior (&Cn).	0 = **&C0**. 1 = **&C1** (default).

S22—Results Bit-Mapped Options Status

S22 indicates the status of command options. Only bits 4, 5, 6, and 7 are used; they are read-only.

- Default: 112 (01110000b).

Table 220. Register S22 Bits

Bit	Description	Value
4—6	Result codes (**X <value>**).	0 = **X0**. 4 = **X1**. 5 = **X2**. 6 = **X3**. 7 = **X4** (default).
7	Pulse dial make/break ration (**&P <value>**).	0 = 33/67 make/break ratio (**&P1** and **&P2**) (default). 1 = 39/61 make/break ratio.

S24—Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from the DTE or no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode. S24 is an alias for S89.

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

- Range: 0, 5—65.
- Default: 60.
- Units: seconds.

S28—V.34 Modulation Enable/Disable

This register enables/disables V.34 modulation.

- Range: 0—1.
- Default: 1.

Table 221. S28 Values

Value	Function
0	Disable V.34 modulation.
1	Enable V.34 modulation.

S30—Inactivity Timer

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

Note: This register's default value may vary based on country selection.

- Range: 0—255.
- Default: 0 (disabled)*.
- Units: minutes.

* The register default shown here is for North America.

S32—Synthetic Ring Volume

S32 specifies the synthetic ring volume. It provides a synthetic ring volume in dB with an implied minus sign. The default is 10.

- Range: 0—255.
- Default: 10.
- Units: dB.

S33—Synthetic Ring Frequency

This register specifies a synthetic ring frequency. Register values from one to five select a unique ring frequency.

- Range: 0—5.
- Default: 0 (disabled).

S35—Data Calling Tone

Data calling tone is a tone of a certain frequency and cadence as specified in V.25 which allows remote data/FAX/voice discrimination. The frequency is 1300 Hz with a cadence of 0.5 s on and 2.0 s off. The setting of the homologation parameter 1f, calling tone flag, determines if S35 is enabled. If the calling tone flag is set to 1, this register is valid. Otherwise, this register has no effect.

Note: This register's default value may vary based on country selection.

- Range: 0—1.
- Default: 0.

S36—Negotiation Fallback

S36 specifies the action to take in the event of negotiation failure when error control is selected.

S36 is used in conjunction with S48, LAPM error control and feature negotiation, to negotiate certain connection types. Refer to Register S36 and S48 Configuration Settings for the settings of each connection type.

- Range: 0—7.
- Default: 7.

Table 222. Register S36 Values

Values	Description
0, 2	Hang up.
1, 3	Fall back to an asynchronous connection.
4, 6	Attempt *MNP*. If *MNP* fails, hang up.
5, 7	Attempt *MNP*. If *MNP* fails, fall back to asynchronous connection.

S37—Dial Line Rate

This register sets the maximum line data rate. In V.90 mode, S37 controls the upstream V.34 rate.

- Range: 0—19.
- Default: 0.

Table 223. Register S37 Values

Value	Rate		Value	Rate
0	Auto rate (default).		10	12000 bits/s.
1	Reserved.		11	14400 bits/s.
2	1200/75 bits/s (V.23).		12	16800 bits/s.
3	300 bits/s.		13	19200 bits/s.
4	Reserved.		14	21600 bits/s.
5	1200 bits/s.		15	24000 bits/s.
6	2400 bits/s.		16	26400 bits/s.
7	4800 bits/s.		17	28800 bits/s.
8	7200 bits/s.		18	31200 bits/s.
9	9600 bits/s.		19	33600 bits/s.

S38—56K Downstream Rate

Once a connections type* (V.90) is determined, use register S38 to force a particular downstream rate. A value of zero disables both connection types and allows a more reliable V.34 connection. The default value of one allows the modem to select the downstream rate automatically. Other values of S38 force the downstream rate, with fallback to V.34 if unsuccessful at the configured rate.

- Range: 0—23.
- Default: 1.

Table 224. Register S38 Values

Value	INF File's HKR Value	V.90 Downstream Rate
0	—	V.90 disabled
1	—	Automatic rate selection (default)
2	60,6d,00,00	28 kbits/s
3	95,72,00,00	29.333 kbits/s
4	CA,77,00,00	30.666 kbits/s
5	—	32 kbits/s
6	35,82,00,00	33.333 kbits/s
7	6A,87,00,00	34.666 kbits/s
8	—	36 kbits/s
9	D5,91,00,00	37.333 kbits/s
10	0A,97,00,00	38.666 kbits/s
11	—	40 kbits/s
12	75,A1,00,00	41.333 kbits/s
13	AA,A6,00,00	42.666 kbits/s
14	—	44 kbits/s
15	15,B1,00,00	45.333 kbits/s
16	4A,B6,00,00	46.666 kbits/s
17	—	48 kbits/s
18	B5,C0,00,00	49.333 kbits/s
19	EA,C5,00,00	50.666 kbits/s
20	—	52 kbits/s
21	55,D0,00,00	53.333 kbits/s
22	8A,D5,00,00	54.666 kbits/s
23	—	56 kbits/s

* Refer to register S109 to determine connection type.

The number of robbed-bit signaling (RBS) frames detected decreases the true DCE rate as shown in RBS Frames Detected.

Table 225. RBS Frames Detected

RBS Links	Rate Hit	RBS Links	Rate Hit
0	0 kbits/s	4	6 kbits/s
1	2 kbits/s	5	8 kbits/s
2	4 kbits/s	6	8 kbits/s

3	4 kbits/s	—	—

For example, if S38 = 10 and there are three RBS links, the K56flex downstream rate will be 44 kbits/s (48 kbits/s – 4 kbits/s). The exception to this is for 32 kbits/s and 34 kbits/s rates, which are the true rates regardless of the number of RBS frames detected.

S42—Auto Rate

This command is used for testing and debugging only.

V.32bis and V.22 *bis* auto rates are disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode. In K56 flex mode, S42 = 0 forces connection at the rate specified by S38, even if the rate cannot be sustained, without fallback to V.34.

- Range: 0—1
- Default: 1

Table 226. Register S42

Value	Function
S42 = 0	Auto rate disabled.
S42 = 1	Auto rate enabled (default).

S43—Auto Mode

This command is used for testing and debugging only.

V.32bis start-up auto mode operation is disabled.

- Range: 0—1
- Default: 1

Table 227. Register S43

Value	Function
S43 = 0	Auto mode disabled.
S43 = 1	Auto mode enabled (default).

S48—LAPM Error Control and Feature Negotiation

S48 enables or disables error control and feature negotiation. It works in conjunction with S36 to determine the type of error correction method to use. Register S36 and S48 Configuration Settings show how the values of S48 and S36 interact to select the error control method.

- Range: 7, 128.
- Default: 7.

Table 228. Register S48

Value	Description
S48 = 7	Enable negotiation (default).

S48 = 128	Disable negotiation. Forces immediate fallback options specified in S36.

The following table lists the S36 and S48 configuration settings necessary to negotiate certain types of connections.

Table 229. Register S36 and S48 Configuration Settings

Register S36 Settings	S48 = 7	S48 = 128
S36 = 0, 2	LAPM or hang-up.	Do not use.
S36 = 1, 3	LAPM or asynchronous.	Asynchronous.
S36 = 4, 6	LAPM, *MNP*, or hang-up.	*MNP* or hang-up.
S36 = 5, 7	LAPM, *MNP*, or asynchronous.	*MNP* or asynchronous.

S71—Silence Sensivity

This S-Register sets the sensivity for detecting silence over the modem.

- Range: 0—255
- Default: 128
- Units: dB

S72—Silence Detect Timer

This register defines length of time that silence (based on the sensitivity setting) will wait before reporting silence to the application (in the form of a callback function).

- Range: 0—255
- Default: 50 (5 sec).
- Units: 1/10th sec.

S82—Enable Millisecond Distinctive Ring

This register determines the granularity of the duration set for a distinctive ring. If this register is set to on (1), the duration unit for distinctive ring will be in milliseconds (msec). If this register is set to off (0), the duration unit for distinctive ring will be in 1/10th sec.

- Range: 0=off, 1=on
- Default: 0 (off)

S86—Fax TCF Error Tolerance

This register determines the maximum number of error bytes detected in a Class 2 TCF training check before the TCF check is failed.

- Range: 0--255

- Default: 0

S89—Timer to Control Sleep Mode

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

If a number between 1 and 4 is entered for this register, the value will be set to 5, and 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—65
- Default: 60
- Unit: seconds

S90—Read-Only Local Phone

This register tells the status of the local phone. The register is read-only.

- 0 = on-hook.
- 1 = off-hook.

S91—Line Transmit Level

Register S91 is effective only for Japan. It specifies the line transmit level in dBm with an implied minus sign.

- Range: 6—25 (corresponding to –6 dBm to –25 dBm transmit level)
- Default: 10 (–10 dBm transmit level)
- Units: –dBm

S127—Caller ID Impedance Activation

Register S127 invokes the Caller ID impedance specifications for a particular country.

Range: 0=North America; 1=Japan; 2=UK; 4=France; 7=Taiwan (FSK+DTMF); 8=DTMF

- Default: Set according to Country Code.
- Units: N/A

Result Codes

The modem's AT command handler responds to commands from the caller and to activity on the line via result codes. Result Code Summary presents a summary of these result codes.

Two forms of each result code are available. The long-form, or verbose, response is given when **V1** is selected, and the short-form, data-like numeric response is given when **V0** is selected. The long-form code is preceded and terminated by the sequence <CR> <LF>. The short-form is also terminated by <CR>, but it has no preceding sequence. If result codes are suppressed, nothing is returned to the caller.

Table 230. Result Code Summary

Result Code	Numeric Code	Description
OK	0	Acknowledges the execution of a command line.
CONNECT	1	Modem connected to line.
RING	2	Incoming ring signal has been detected.
NO CARRIER	3	Modem lost carrier signal, 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 DIALTONE	6	No dial tone detected.
BUSY	7	Busy signal detected.
NO ANSWER	8	Remote end never answered.
*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.
*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 (DTE rate).
*CONNECT 57600 EC**	18	Connection at 57600 bits/s (DTE rate).
*CONNECT 115200 EC**	87	Connection at 115200 bits/s (DTE rate).

* EC only appears when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending on the error control method used:
V.44—V.44 data compression
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 230. Result Code Summary(continued)

Result Code	Numeric Code	Description
DELAYED	88	Delay is in effect for the dialed number.
BLACKLISTED	89	Dialed number is blacklisted.
BLACKLIST FULL	90	Blacklist is full.
*CONNECT 32000 EC**	70	Connection at 32000 bits/s.
*CONNECT 34000 EC**	71	Connection at 34000 bits/s.
*CONNECT 36000 EC**	72	Connection at 36000 bits/s.
*CONNECT 38000 EC**	73	Connection at 38000 bits/s.
*CONNECT 40000 EC**	74	Connection at 40000 bits/s.
*CONNECT 42000 EC**	75	Connection at 42000 bits/s.
*CONNECT 44000 EC**	76	Connection at 44000 bits/s.
*CONNECT 46000 EC**	77	Connection at 46000 bits/s.
*CONNECT 48000 EC**	78	Connection at 48000 bits/s.
*CONNECT 50000 EC**	79	Connection at 50000 bits/s.
*CONNECT 52000 EC**	80	Connection at 52000 bits/s.
*CONNECT 54000 EC**	81	Connection at 54000 bits/s.
*CONNECT 56000 EC**	82	Connection at 56000 bits/s.

*CONNECT 28000 EC**	100	Connection at 28000 bits/s.
*CONNECT 29333 EC**	101	Connection at 29333 bits/s.
*CONNECT 30666 EC**	102	Connection at 30666 bits/s.
*CONNECT 33333 EC**	103	Connection at 33333 bits/s.
*CONNECT 34666 EC**	104	Connection at 34666 bits/s.
*CONNECT 37333 EC**	105	Connection at 37333 bits/s.
*CONNECT 38666 EC**	106	Connection at 38666 bits/s.
*CONNECT 41333 EC**	107	Connection at 41333 bits/s.
*CONNECT 42666 EC**	108	Connection at 42666 bits/s.
*CONNECT 45333 EC**	109	Connection at 45333 bits/s.
*CONNECT 46666 EC**	110	Connection at 46666 bits/s.
*CONNECT 49333 EC**	111	Connection at 49333 bits/s.
*CONNECT 50666 EC**	112	Connection at 50666 bits/s.
*CONNECT 53333 EC**	113	Connection at 53333 bits/s.
*CONNECT 54666 EC**	114	Connection at 54666 bits/s.

* EC only appears when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending on the error control method used:

V.44—V.44 data compression
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.

Voice Modem Command Examples

The application issues AT commands to request actions by the modem, and the modem responds with standard TIA-602 result codes to tell the application that the requested action has been completed.

Notes for Speakerphone Examples

1 . If the user decides to pick up his local (parallel) phone while in the middle of a speakerphone call, the DCE will sense the transition and send the application a <DLE>-H sequence. The application, which should always be screening for DLE-shielded codes in the background when the modem is in the voice mode, can then respond to the <DLE>-H (for example, by resetting speakerphone buttons or doing whatever else needs to be done with the speakerphone interface).

2. DLE-shielded codes that the modem will send to the application while in speakerphone mode are as follows.

Table 231. DLE-Shielded Codes

Command	Description
DLE - c	FAX calling tone detect.
DLE - e	Data calling tone detect.
DLE - h	Local phone went on-hook (hung up).
DLE - H	Local phone went off-hook (picked up).

3. When the user is in the middle of a speakerphone call, call waiting (hold operation) can be initiated when the user hears the call-waiting signal through the speaker. Call waiting entails the following communication between the application and the modem.

Command/Response	Description
ATD!	Put the current call on hold, and answer the new incoming call.
0K	DCE responds. Original call is on hold, and the speakerphone user is connected to the second call.

To terminate the second call and return to the first, the application should again send the modem the ATD! command.

Command/Response	Description
ATD!	Terminate the second call and return to the original call.
0K	DCE responds. Second call is terminated and the user is again connected to the original call.

Example #1: Initiating a Speakerphone Call (with Phone Muting During Conversation)

The speakerphone application is loaded. The modem is initially idle in data mode. The user then decides to pick up the phone to place a speakerphone call. Picking up the phone should initiate the following chain of events.

Command/Response	Description
AT+FCLASS=8	The modem enters voice mode.
0K	DCE responds. Now in voice mode.
AT+VGT=128	Set speaker volume to normal level.

OK	DCE responds. Volume level is set.
AT+VLS=7	Attach internal speaker and microphone, DCE off-hook.
OK	DCE responds. Now in speakerphone mode. Phone off hook, dial tone audible, speaker and microphone ready to use.
ATD5551234	Provide dial string for DCE to place the call.
OK	DCE responds. Number is dialed.

The call is placed through the phone network. The caller can hear ringback or busy signal from the phone being called. If the person at the other end picks up the phone, the caller and the person at the other end converse. If the speakerphone user decides to mute his speakerphone, the application sends the following to mute the speakerphone.

Command/Response	Description
AT+VLS=5	Enter mute mode. Microphone is disconnected from the line, leaving the speaker only.
OK	DCE responds. The microphone is no longer connected to the line, and the speakerphone is mute.

After a while, the speakerphone user decides to turn the microphone back on (mute off). This is done when the application issues the following command.

Command/Response	Description
AT+VLS=7	No mute. Microphone is reattached to system along with speaker.
OK	DCE responds. Speakerphone with both microphone and speaker is operational.

The conversation ends, and the user hangs up.

Command/Response	Description
ATH	Application tells the modem to terminate the call with standard AT command.
OK	DCE responds.

The speakerphone is now on-hook. The speaker and microphone have been detached from the system, and the modem is now in data mode (+FCLASS=0).

Example #2: Initiating a Stored Number Speakerphone Call

The speakerphone application is loaded. The modem is initially idle in data mode. The user then decides to place a speakerphone call either by entering the number without going off-hook first or by selecting a number previously stored in the application. When the user tells the application to dial, the following events occur:

Command/Response	Description
ATD5551234;	Provide a dial string appended with a semicolon (;) for the DCE to place the call and go to command mode.
OK	The DCE responds, and the number is dialed.

The call is placed through the phone network in data mode. The modem stays in command mode, and the application should wait for the OK before sending next command.

Command/Response	Description
AT+FCLASS=8	Put the modem into voice mode.
OK	DCE responds: The modem is now in voice mode.
AT+VGT=128	Set the speaker volume to normal level.
OK	DCE responds: The volume level is set.
AT+VLS=7	Start the speakerphone by attaching the internal speaker and microphone to the line; DCE off-hook.
OK	DCE responds: Speakerphone mode is active. The phone is off hook; dial tone is audible, and the speaker and microphone are ready to use.

The caller can hear ringback or busy signal from the phone being called. If the person at the other end picks up, the caller and the person on the other end converse. The conversation then ends, and the speakerphone user hangs up.

Command/Response	Description
ATH	The application tells the modem to terminate the call with a standard AT command.
OK	DCE responds: The speakerphone is now on-hook. The speaker and microphone have been detached from the system, and the modem is now in data mode (+FCLASS = 0).

Example #3: Answering a Speakerphone Call

The speakerphone application is loaded. The modem is initially idle in data mode. In this mode, the modem is always screening for incoming calls.

Command/Response	Description
RING	DCE reports ringing from remote station. The user decides to pick-up the phone, which should initiate the following:
AT+FCLASS=8	Modem enters voice mode.
OK	DCE responds. Now in voice mode.
AT+VGT=128	Speaker volume set to normal.
OK	DCE responds. Volume level is set.
AT+VLS=7	Call is answered. Attach internal speaker and microphone to the line, DCE off-hook.
OK	DCE responds. Now in speakerphone mode, connected to the line (call is answered).

The speakerphone user picks up the phone and hears the caller from the other end. Conversation continues for awhile. When it ends, the speakerphone user hangs up.

Command/Response	Description
ATH	DTE issues standard command to terminate call.

OK	DCE responds. Speakerphone goes on-hook. Speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).

Note: When the local phone goes off-hook in the middle of a speakerphone call, the speakerphone disconnects, and the DCE returns <DLE>-H to the DTE.

When the speakerphone is on, call waiting (hold operation) is initiated by the following:

Command/Response	Description
ATD!	DTE sends hold command to DCE.
OK	DCE responds.

Example #4: Receiving an Incoming FAX Call in Speakerphone or TAD Mode and Switching to FAX Mode

In this example, the sequence begins at the point of the user or telephone answering device (TAD) taking the speakerphone off-hook and detecting a FAX calling tone from the other end.

Command/Response	Description
<DLE>-c	DCE detects FAX calling tone from the remote FAX and informs the application by sending DLE-c sequence.
AT+FCLASS=1	Application switches modem out of voice mode and into FAX mode.
OK	DCE responds. Now in FAX mode, still off-hook and connected to incoming call.
ATA	Application instructs modem to answer FAX call using standard AT commands.
OK	DCE responds. The call is answered, and modem continues with procedures to establish connection and receive FAX transmission. The application software will then take care of disconnecting the call when the FAX is done, and returns to data mode (+FCLASS=0).

Example #5: Receiving an Incoming Data Call in Speakerphone or TAD Mode and Switching to Data Mode

In this example, the sequence begins at the point of the user or telephone answering device (TAD) taking the speakerphone off-hook and detecting a data calling tone from the other end.

Command/Response	Description
<DLE>-e	DCE detects data calling tone from the remote modem and informs the application by sending DLE-e sequence.
AT+FCLASS=0	Application switches modem out of voice mode and into data mode.
OK	DCE responds. Now in data mode, still off-hook and connected to incoming call.
ATA	Application instructs modem to answer data call using standard AT commands.
CONNECT	DCE responds. The call is answered, and modem continues with procedures to establish connection.

Example #6: Switching from Speakerphone Mode to TAD Mode

In this example, the sequence begins at the point of the user in speakerphone mode and at some point in time wants to put the other end in hold. The application may switch to TAD mode in hold state and play some music

wave file to the line.

Command/Response	Description
AT+VLS=1	Applications switches modem out of speakerphone mode and into TAD mode.
OK	DCE responds. Now in TAD mode.
AT+VTX	DTE selects voice transmit mode.
CONNECT	DCE responds.
<Data>	DTE plays music through modem to remote caller.
<DLE><ETX>	DTE indicates end of voice transmit data.
OK	DCE acknowledges switch back to voice command state.

The application may switch back to speakerphone mode by following the example to switch from TAD mode to speakerphone mode.

Example #7: Call Screening and Recording a Message using TAD—IS101 <dle> Shielded Method

The TAD application is loaded. The modem is initially idle in data mode (+FCLASS=0).

Command/Response	Description
RING	DCE reports ringing from remote station.
AT+FCLASS=8	The modem enters voice mode.
OK	DCE responds.
AT+VGT=128	Set speaker volume to normal.
OK	DCE responds.
AT+VSM=132,8000	DTE selects IMA ADPCM with 8.0 kHz sampling rate.
OK	DCE responds.
AT+VSD=128,0	DTE selects normal silence detection sensitivity, and a silence detection interval of 0 seconds. Disable silence detection.
OK	DCE responds.
<DLE>-R	DCE detects another ring and notifies DTE.
AT+VLS=1	The modem answers the call.
OK	DCE is off-hook.

The TAD next plays its greeting message, issues a beep, and records the caller's message.

Command/Response	Description
AT+VTX	DTE selects voice transmit mode.
CONNECT	DCE responds.
<Data>	DTE plays greeting through modem to remote caller.
<DLE><ETX>	DTE indicates end of voice transmit data.
OK	DCE acknowledges switch back to voice command state.

AT+VTS=[933,0,120]	DTE annotates greeting message with a 1.2 second beep.
OK	DCE responds.
AT+VSD=128,50	DTE selects normal silence detection sensitivity and a silence detection interval of 5 seconds. Enable silence detection.
OK	DEC responds.
AT+VLS=5	The speaker is attached to the system, and the modem is off-hook.
OK	DCE is off-hook.
AT+VRX	DTE selects voice receive mode.
CONNECT	DCE agrees.
<Data>	DCE delivers <DLE> shielded voice message to DTE.

The caller leaves a message and hangs up. The modem detects silence for a specified period of time, and then notifies the DTE that the message being recorded has ended.

Command/Response	Description
<DLE>-s	DCE issues presumed end of message after silence detection interval has elapsed.
<DLE>-!	DTE signals end of voice receive state.
<DLE><ETX>	DCE ends voice transmission to DTR, with this code, and returns back to voice command state.
ATH	DTE issues standard command to terminate call. Speakerphone goes on-hook, speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).
OK	DCE responds.

Example #8: Call Screening and Recording a Message with TAD Using the Wave Driver to Transmit and Receive Voice Samples

The TAD application is loaded. The modem is initially idle in data mode (+FCLASS=0).

Command/Response	Description
RING	DCE reports ringing from remote station.
AT+FCLASS=8	The modem enters voice mode.
OK	DCE responds.
AT+VGT=128	Set speaker volume to normal.
OK	DCE responds.
AT+VSD=128,0	DTE selects normal silence detection sensitivity and a silence detection interval of 0 seconds. Disable silence detection.
OK	DCE responds.
AT+VSM=129,8000	DTE selects 16-bit linear voice compression with 8.0 kHz sampling rate.
OK	DCE responds.
<DLE>-R	DCE detects another ring and notifies DTE.

AT+VLS=1	The modem answers call.
OK	DCE is off-hook.

The TAD next plays its greeting message, issues a beep, and records the caller's message. The application may transmit voice samples using the wave driver. The application may issue WAVE_OUT_OPEN and WAVE_OUT_WRITE messages to the wave driver. At the end of the greeting message, the application may issue the WAVE_OUT_STOP message to the wave driver.

Command/Response	Description
AT+VTS=[933,0,120]	DTE annotates greeting message with a 1.2 second beep.
OK	DCE responds.

The application may receive voice samples using the wave driver. The application may issue WAVE_IN_OPEN and WAVE_IN_START messages to the wave driver.

Command/Response	Description
AT+VSD=128,50	DTE selects normal silence detection sensitivity and a silence detection interval of 5 seconds. Enable silence detection.
OK	DCE responds.
AT+VLS=5	Speaker is attached to system, and modem is off-hook.
OK	DCE is off-hook.

The caller leaves a message and hangs up. The modem detects silence for a specified period of time, and then notifies the DTE.

Command/Response	Description
<DLE>-s	DCE issues presumed end of message after silence detection interval has elapsed.

At the end of the message, the application may issue the WAVE_IN_STOP message to the wave driver.

Command/Response	Description
ATH	DTE issues standard command to terminate call. DCE goes on-hook, speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).
OK	DCE response.

Voice Modem Command Examples

Example #8: Call Screening and Recording a Message with TAD Using the Wave Driver to Tr

When POS server supports V.22 Fast-Connect in V.80 HDLC frame, modem needs to be issued the following AT command:

Command/Response	Description

```
AT+MS = V22           Set modem modulation to V.22.
OK
AT+ES = 6,,8          V.42 sync buffer mode (V.80 enabled).
OK
AT+ESA = 0,,,,1,0,,         Causes the DCE to generate a 16-bit CRC in the
transmit direction in framed f                              sub-Mode and check the
CRC in the receive direction.
OK
AT\F1                 Enable V.22 Fast Connect
OK
ATDT<Host Tel Number> Dial Host telephone number
CONNECT 1200NoEC
<0x19> <0xBE> <0x20> <0x20> <0x19> <0xB1> …
```

The first <EM><rate> indicator shows that the modem connected with a TX rate of 1200 bps and an RX rate of 1200 bps. The <EM><flag> that occurs immediately after the <EM><rate> indicates that a non-flag to flag transition has occurred and that the receiver has now been synchronized.

AT Command Cross Reference Tables

Table 232. Data and General Commands

Command	Description	Reference*
A/	Repeat last command.	—
A	Answer.	V.250 (05/99)
B	Communication standard setting.	—
C	Carrier control.	—
D	Dial.	V.250 (05/99)
E	Echo command.	V.250 (05/99)
F	On-line data character echo command.	—
H	Hook control.	V.250 (05/99)
I	Request ID information.	V.250 (05/99)
L	Speaker volume.	V.250 (05/99)
M	Speaker control.	V.250 (05/99)
N	Modulation handshake.	—
O	Return to on-line data mode.	V.250 (05/99)
P	Select pulse dialing.	V.250 (05/99)
Q	Result code control.	V.250 (05/99)
T	Select tone dialing.	V.250 (05/99)
S	S register control.	V.250 (05/99)
V	DCE response format.	V.250 (05/99)
W	Result code option.	—
X	Extended result code control.	V.250 (05/99)
Y	Long-space disconnect.	—
Z	Reset and recall stored profile.	V.250 (05/99)
&B	V.32 auto retrain.	—
&C	Data carrier detect (DCD) control.	V.250 (05/99)
&D	Data terminal ready (DTR) control.	V.250 (05/99)
&F	Restore factory default configuration.	V.250 (05/99)
&G	V.22 *bis* guard tone control.	—
&J	Auxiliary relay options.	—
&K	Local flow control selection.	—
&M	Asynchronous communications mode.	—
&P	Pulse dial make-to-break ratio selection.	—
&Q	Asynchronous communications mode.	—
&S	Data set ready (DSR) option.	—

&T	Self-test commands.	—
&V	Display active configuration.	—
&W	Store current configuration.	—
&Y	Select stored profile for hard reset.	—
&Z	Store telephone number.	—
\A	Select maximum *MNP** block size.	—
\B	Send break.	—
\G	Modem port flow control.	—
\J	Adjust bits/s rate control.	—

* All references are ITU-T Recommendations unless otherwise noted.

Table 232. Data and General Commands (continued)

Command	Description	Reference*
\J	Adjust bits/s rate control.	—
\K	Set break control.	—
\N	Select error control mode.	—
\Q	Local flow control selection.	—
\R	Ring indicator off after answer.	—
\T	Inactivity timer.	—
\V	Protocol result code.	—
\X	XON/XOFF pass through	—
%B	View numbers in blacklist.	—
%C	Data compression control.	—
%E	Auto fallback/fallforward control.	—
-C	Data calling tone.	—
-V90	Enable/disable V.90 settings.	—
#UD	Unimodem diagnostics.	—
+A8E	V.8 and V.8 *bis* operation control.	—
+A8T	Send V.8 *bis* signal and/or message.	—
+DR	Data compression reporting.	V.250 (05/99)
+DS	Data compression.	V.250 (05/99)
+EB	Brake handling in error control operations.	V.250 (05/99)
+EFCS	32-Bit frame check sequence	V.250 (05/99)
+ER	Error control reporting.	—
+ES	Error control selection.	V.250 (05/99)
+ESA	Set up error control parameters.	—
+ESR	Selective repeat.	V.250 (05/99)
+ETBM	Call termination buffer management.	V.250 (05/99)

+FCLASS	Service class indicator.	V.253 (02/98)
+GCAP	Request complete capabilities list	V.250 (05/99)
+GCI	Country of installation.	V.250 (05/99)
+GMI	Manufacturer identification.	V.250 (05/99)
+GMM	Modem identification.	V.250 (05/99)
+GMR	Request revision information.	V.250 (05/99)
+IFC	DTE-DCE local flow control.	V.250 (05/99)
+ILRR	DTE-DCE local rate reporting.	V.250 (05/99)
+IPR	Fixed DTE rate.	V.250 (05/99)
+ITF	Transmit flow control threshold	—
+MR	Modulation reporting control	V.250 (05/99)
+MS	Modulation selection	V.250 (05/99)

* All references are ITU-T Recommendations unless otherwise noted.

Table 233. V.92 and V.44 Commands

Command	Function	Reference*
+DCS	Select Data Compression Algorithm	V.250
+DS44	V.44 data compression	V.250
+PCW	Call waiting enable	V.250
+PIG	PCM upstream ignore	V.250
+PMH	Modem on hold enable	V.250
+PMHD	Modem on hold DTMF dialing	V.250
+PMHF	V.92 modem on hold flash hook	V.250
+PMHR	Initiate modem on hold	V.250
+PMHT	Modem on hod timer	V.250
+PQC	V.92 phase 1 and phase 2 control	V.250
+PSS	Use short sequence	V.250

Table 234. FAX Class 1.0 / Class 2.0 / 2.1 Commands Summary

Command	Function	Reference†
+FAA	Set DCE adaptive answer mode.	T.32 (08/95)
+FAP	Set DCE addressing & polling capabilities	T.32 (08/95)
+FBS	DCE Buffer size reporting (read only)	T.32 (08/95)
+FBO	Phase C data bit order conversion services offered by DCE	T.32 (08/95)
+FBU	DCE to DTE HDLC frame reporting control	T.32 (08/95)
+FCC	Allows DTE to set DCE capabilities	T.32 (08/95)

+FCI	DCE reports received remote ID, CSI	T.32 (08/95)
+FCLASS	Service class identification and control.	T.32 (08/95)
+FCO	Facsimile connection report to DTE	T.32 (08/95)
+FCQ	Copy quality checking and correction control	T.32 (08/95)
+FCR	Indicates DCE's ability to receive message data	T.32 (08/95)
+FCS	DCE reports negotiated session parameters, DCS	T.32 (08/95)
+FCT	DTE Phase C timeout control	T.32 (08/95)
+FDM	Transition to data mode (not supported)	T.32 (08/95)
+FDR	Data reception transition command	T.32 (08/95)
+FDT	Data transmission request	T.32 (08/95)
+FEA	Phase C Received EOL alignment (not implemented)	T.32 (08/95)
+FET	DCE post page message response	T.32 (08/95)
+FFC	Image format conversion setting	T.32 (08/95)
+FFD	Report received diagnostic message frame – (not supported)	T.32 (08/95)
+FHS	Call termination status indicator	T.32 (08/95)
+FHR	Report received HDLC frame	T.32 (08/95)
+FHT	Report transmitted HDLC frame	T.32 (08/95)
+FIE	Procedure interrupt – (not implemented)	T.32 (08/95)
+FIP	Initialize facsimile parameters	T.32 (08/95)
+FIS	Report remote capabilities, DIS	T.32 (08/95)
+FIT	DTE inactivity timer (not supported	T.32 (08/95)
+FKS	Session termination command	T.32 (08/95)
+FLI	DCE transmits local ID string, TSI or CSI	
+FLO	Set DTE-DCE flow control	T.31 (08/95)
+FLP	DTE document to poll indicator	T.32 (08/95)
+FMI	Manufacturer identification.	T.31 (08/95)
+FMM	Product identification.	T.31 (08/95)
+FMR	Version/revision information.	T.31 (08/95)
+FMS	Minimum Phase C speed control	T.32 (08/95)
+FNC	Response reporting non-standard command (NSC)	T.32 (08/95)
+FNF	Response reporting non-standard facilities (NSF)	T.32 (08/95)
+FNR	Negotiation message reporting control parameters	T.32 (08/95)
+FND	Non-standard message data indication	T.32 (08/95)
+FNS	Response reporting non-standard setup (NSS)	T.32 (08/95)
+FPA	Selective polling address	T.32 (08/95)
+FPI	Report remote ID, CIG	T.32 (08/95)
+FPO	Remote document available for polling indicator	T.32 (08/95)

+FPP	DCE-DTE packet protocol control	T.32 (08/95)
+FPR	Set DTE-DCE FAX port rate.	T.31 (08/95)
+FPS	T.30 Phase C page reception	T.32 (08/95)
+FPW	PassWord (sending or polling)	T.32 (08/95)
+FRH	Receive HDLC data with n carrier.	T.31 (08/95)
+FRM	Receive FAX data with n carrier.	T.31 (08/95)
+FRQ	Receive quality thresholds	T.32 (08/95)
+FRS	Receive Silence	T.31 (08/95)
+FRY	ECM Retry count	T.32 (08/95)
+FSA	Destination SubAddress	T.32 (08/95)
+FSP	Request to poll	T.32 (08/95)
+FTC	Response reports remote capabilities and intentions	T.32 (08/95)
+FTI	Response reports remote ID	T.32 (08/95)
+FTH	Transmit HDLC data with n carrier.	T.31 (08/95)
+FTM	Transmit FAX data with n carrier.	T.31 (08/95)
+FTS	Transmission silence.	T.31 (08/95)
+FVO	Transition to voice (Not supported)	T.32 (08/95)

* The desciption of the V.92 and V.44 commands is based on Mainpine's implementation of the commands specified in ITU-T recommendation V.250 prerelease for V.92 and V.44.
†All references are ITU-T Recommendations unless otherwise noted.

Table 235. AT Voice Commands Summary

Command	Description	Reference*
+FCLASS=8	Enter voice mode.	V.253 (02/98)
+VCID	Caller-ID.	V.253 (02/98)
+VDR	Distinctive ring.	V.253 (02/98)
+VEM	Event reporting and masking.	IS-101
+VGM	Microphone gain.	—
+VGR	Receive gain selection.	V.253 (02/98)
+VGS	Speaker gain.	—
+VGT	Speaker volume control.	V.253 (02/98)
+VIP	Initialize voice parameters.	—
+VIT	DTE/DCE inactivity timer.	V.253 (02/98)
+VNH	Automatic hang-up control.	V.253 (02/98)
+VLS	Analog source/destination selection and DTMF/tone reporting.	V.253 (02/98)
+VPR	Select DTE/DCE interface rate.	—
+VRA	Set ringback goes away timer.	V.253 (02/98)
+VRN	Set ringback never came timer.	V.253 (02/98)

+VRX	Enter voice receive state.	V.253 (02/98)
+VSD	Set silence detection timer.	V.253 (02/98)
+VSM	Voice compression method.	V.253 (02/98)
+VSP	Speakerphone on/off.	—
+VTD	Set beep tone duration timer.	V.253 (02/98)
+VTR	Start full-duplex voice transmission and reception process.	—
+VTS	DTMF/tone generation.	V.253 (02/98)
+VTX	Enter voice transmit state.	V.253 (02/98)

* All references are ITU-T Recommendations unless otherwise noted.

Table 236. T.35 Country Code Table

TAPI Code (decimal)	Country	T.35 code used in +GCI (hex)	Modem internal CountryID (hex)
0	Europe (TBR21 Countries)	FB	2A
213	Algeria		68
376	Andorra		5D
244	Angola		69
54	Argentina	07	33
61	Australia	09	01
43	Austria	0A	0F
973	Bahrain		62
880	Bangladesh	0D	4C
104	Barbados	0E	46
501	Belize		58
55	Brazil	16	2B
375	Belarus	F4	4E
32	Belgium	0F	02
591	Bolivia	14	34
387	Bosnia		5F
673	Brunei		7B
359	Bulgaria	1B	2C
238	Cabo Verde (Cape Verde)		6A
855	Cambodia		7C
107	Canada	20	1C
	Canary Island		6B
	Caribbean		7F
56	Chile	25	35
57	Colombia	27	36
242	Congo		6C

506	Costa Rica	2B	40
385	Croatia	F5	4F
53	Cuba		59
357	Cyprus	2D	2D
420	Czech	2E	28
45	Denmark	31	03
593	Ecuador	35	37
20	Egypt	36	45
503	El Salvador		57
291	Eritrea		6D
372	Estonia	FA	51
251	Ethiopia		6E
500	Falkland		5A
358	Finland	3C	04
33	France	3D	05
220	Gambia		6F
49	Germany	04* or 42	06
233	Ghana		70
350	Gibraltar		5E
30	Greece	46	21
124	Guam	48	47
502	Guatemala	49	3F
245	Guinea-Bissau		71
592	Guyana		5B
504	Honduras		56
852	Hong Kong	30	1B
36	Hungary	51	22
354	Iceland	52	2E
91	India	53	1E
62	Indonesia	54	17
98	Iran		63
353	Ireland	57	1A
972	Israel	58	30
39	Italy	59	08
81	Japan	00	10
962	Jordan		64
254	Kenya		72
82	Korea	61	12

965	Kuwait	62	48
371	Latvia	F8	52
961	Lebanon	64	4D
423	Liechtenstein	68	42
370	Lithuania	F9	50
352	Luxembourg	69	29
389	Macedonia		61
265	Malawi		73
60	Malaysia	6C	13
356	Malta	70	53
230	Mauritius		74
52	Mexico	73	1D
212	Morocco	77	54
258	Mozambique		75
95	Myanmar		7D
977	Nepal		7E
31	Netherlands	7B	07
64	New Zealand	7E	09
505	Nicaragua	7F	41
234	Nigeria		76
47	Norway	82	0A
968	Oman	83	4B
92	Pakistan	84	32
507	Panama	85	38
595	Paraguay	87	3B
86	People's Republic of China	26	11
51	Peru	88	39
63	Philippines	89	20
48	Poland	8A	25
351	Portugal	8B	18
121	Puerto Rico	8C	3D
974	Qatar		65
40	Romania	8E	49
7	Russia	B8	2F
966	Saudi Arabia	98	31
	Serbia		60
248	Seychelles		77
65	Singapore	9C	14

421	Slovakia	FC	27
386	Slovenia	FD	26
27	South Africa	9F	24
34	Spain	A0	0B
94	Sri Lanka	A1	4A
597	Suriname		5C
46	Sweden	A5	0C
41	Switzerland	A6	0D
963	Syria		66
886	Taiwan	26	15
255	Tanzania		78
66	Thailand	A9	16
216	Tunisia		55
90	Turkey	AE	23
256	Uganda		79
380	Ukraine	B2	44
971	United Arab Emirates (UAE)	B3	43
44	United Kingdom	B4	0E
1	United States of America	B5	19
598	Uruguay	B7	3C
58	Venezuela	BB	3A
84	Vietnam	BC	1F
123	Virgin Islands (British)	19	3E
967	Yemen		67
260	Zambia		7A

* Country code formerly associated with the German Democratic Republic.