

Maestro
AUSTRALIA

Executive Series

96M

144M

144FM

**Technical Reference
Manual**



Maestro Executive Series Modem

Thank you for choosing this Australian designed and manufactured modem. Your MAESTRO Executive Series modem has been developed for simplicity of use and contains state-of-the-art Digital Signal Processing circuitry.

WARNING

UNDER NO CIRCUMSTANCES SHOULD YOU ALLOW YOUR MODEM TO REMAIN CONNECTED TO THE TELEPHONE LINE WHEN NOT IN USE.

DAMAGE CAUSED TO THE MODEM BY LIGHTNING STRIKES OR OVERVOLTAGE SURGE WILL NOT BE COVERED UNDER THE TERMS AND CONDITIONS OF YOUR WARRANTY.

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P.O. BOX 136, MITCHELL, A.C.T. 2911
Tel: (06) 242 9755 Fax: (06) 242 9756

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1. INTRODUCTION

1.1 Summary

The **Maestro Executive Series** modems operate over dial-up or leased lines at communication speeds up to 14400 bps, and with data compression enabled can deliver effective throughputs of up to 57600 bps. The Executive Series is fully compatible with CCITT V.32 *bis*, V.32, V.22 *bis*, V.22 and V.21 recommendations, and Bell 212A and 103 modes.

The Executive Series supports V.42 error-correction and V.42 *bis* data compression protocols. The modem also supports MNP classes 2, 3 and 4 error correction and MNP class 5 data compression. It can also operate in non-error-correcting modes.

A Hayes-compatible industry standard "AT" command set is implemented, which ensures operation with all popular communications software packages. "AT" command extensions simplify the use of V.42, V.42 *bis* and MNP capabilities. The Executive Series modems provide auto-dial, auto-redial and auto-answer functions, and can operate in both synchronous and asynchronous modes.

1.2 Features

- CCITT V.32, V.22 *bis*, V.22 and V.21 operating modes with auto-mode detection
- CCITT V.32 *bis* 14400 bps (144M and 144FM)
- V.17 14400 bps Group III send/receive fax capabilities (144FM)
- Bell 212A and 103 operating modes
- V.42 compliant error correction (LAP-M and MNP)
- V.42 *bis* and MNP 5 data compression
- Automatic V.42/MNP 4, V.42 *bis*/MNP 5 negotiation
- Asynchronous/synchronous modes
- Enhanced Hayes "AT" command set
- Extended MNP commands
- Speed buffering/flow control/constant speed interface
- Direct mode option (passthrough data path)
- Line quality monitor and retrain capability
- Programmable speaker volume control
- Diagnostics:
 - Remote digital loop and remote digital loop self test
 - Analogue loop and analogue loop self test
 - Digital loop test
 - Power-on self test
- 144-digit telephone number directory, allowing four telephone numbers (each a maximum length of 36 digits) to be stored in NVRAM
- Internal card (IBM) and external model options available

1.3 Front Panel LED Indicators

AA	Auto-Answer: On when S0 > 0 else flashes in unison with the incoming RING signal from the telephone line.
HS	High Speed: This light is on when in Command Mode and the Data Terminal Equipment (DTE) speed is 4800 bps or higher. When in Data Mode (online), it indicates that the carrier being received from the distant modem is 4800 bps or greater.
OH	Off-Hook: Indicates that the modem is connected to the telephone line.
DTR	Data Terminal Ready: When lit, indicates the DTR line is in the active state.
RTS	Request To Send: Used in flow control. When lit, indicates the DTE is ready to receive data from the modem.
TxD	Transmit Data: Lights when data is being sent from the DTE.
RxD	Receive Data: Lights when data is being sent from the modem to the DTE.
DCD	Data Carrier Detect: Lights when a valid carrier signal is being received from the distant modem.
CTS	Clear To Send: Indicates the modem is ready to receive data from the DTE. Used in flow control modes.
DSR	Data Set Ready: Indicates to the DTE that the modem (the data set) is ready for operation.
RI	Ring Indicator: Indicates that the modem is receiving a RING signal from the telephone line side.
TM	Test Mode: Indicates that the modem is performing an internal self test, usually as a result of power being applied or after an ATZ command being received. If flashing, indicates that there was an error detected during the self test.
E1	Expansion One: Not operational.
E2	Expansion Two: Not operational.
E3	Expansion Three: Not operational.
PWR	Power: Indicates that power is being applied to the modem.

2. FUNCTIONAL DESCRIPTION

2.1 Automatic Speed And Format Sensing

The Executive Series modem can automatically determine the speed and format of the data being sent from the DTE. This is done by a "wake-up" string of known characters sent from the DTE to the modem before every command line. The wake-up sequence is "AT" in upper or lower case followed by any legal command, and ending in a carriage return. Both the 'A' and the 'T' character must be entered in the same case, upper or lower.

It is not necessary that commands be entered after the "AT" sequence, but a carriage return must always be entered at the end of a line.

The speed is determined by the letter 'A' or 'a', whilst the format is finalised upon input of the letter 'T' or 't', which is performed at every command line. The modem senses 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 and 57600 bps and the following data formats:

Parity	Data Length (No. of bits)	No. Of Stop Bits	Char. Length (No. of Bits)
None	7	2	10
Odd	7	1	10
Even	7	1	10
None	8	1	10
Odd	8	1	11*
Even	8	1	11*

* 11-bit characters are sensed, but the parity bits are stripped off during data transmission in Normal and Error Correction modes. Direct mode does not strip off the parity bits.

The modem speed senses data with mark or space parity. However, the unit self-configures to different parity settings as follows:

DTE Configuration	Modem Configuration
7 mark	7 none
7 space	8 none
8 mark	8 none
8 space	8 even

2.2 Establishing Modem Connections

2.2.1 Connection Speeds

The possible modem-to-modem connection modes/speeds are V.32 *bis* 14400 bps, V.32 9600 bps, V.32 4800 bps, V.22 *bis* 2400 bps, V.22 1200 bps, Bell 212A 1200 bps, V.21 300 bps and Bell 103 300 bps.

The ATNx command and the value held in the S37 register determine whether the Executive Series will allow only particular connections, or automatically detect a remote modem's desired connection. See the detailed section on "AT" commands for further information.

2.2.2 Automode Detect

Automode detection is enabled by the ATN1 command, and allows the Executive Series to connect with another modem that is configured for differing connection modes.

The originating Executive Series modem waits for the answering modem to generate an answer tone. Depending on the type and length of tones generated by the remote, answering modem, the Executive Series will automatically determine whether to attempt a V.32 *bis* 14400 connection, or to fall back immediately to V.32 9600. From V.32 9600, the modem attempts a V.22 *bis* 2400 connection. If a valid V.22 *bis* or V.22 1200 carrier is not detected, the Executive Series then automatically falls back to V.21 mode. If carrier is still not detected, the modem hangs up.

An answering Executive Series modem generates a V.32 *bis* answer tone and attempts a 14400 bps connection. If a 14400 connection is not achieved, the modem will train down through 12000, 9600, 7200, 4800, 2400 and 1200 bps. If a valid carrier is not detected, the modem will then attempt a V.21 300 connection as a last resort after which, if carrier is still not detected within the remainder of S7 seconds, it hangs up.

2.2.3 Modem Handshaking Protocol

An abort call timer is initiated when the last digit is dialled and is reset when the Executive Series detects either answer tone or busy. If neither tone is detected during the time specified in the S7 register (default is 50 seconds), the call attempt is aborted. If the abort timer expires before the number of rings specified in the S1 register (default is 0 rings) has occurred, the call is also aborted.

2.2.4 Phone Number Directory

The Executive Series modems contain four telephone number entries in a directory that is saved in the Non-Volatile RAM (NVRAM). Each entry has one field for the dial string which can be up to 36 characters in length. The four entries are accessed using the AT&Zn=x and ATDS=n commands.

2.3 Data Mode

Data mode exists when a telephone-line connection has been established between two compatible modems.

2.3.1 Constant Speed Interface (Normal Mode)

Constant speed mode allows the Data Terminal Equipment (DTE) to send and receive data from the modem at a speed that differs from that of the speed of the physical, or modem-to-modem connection.

Constant speed is implemented by using buffers to hold data within the modem until the DTE or the distant modem is able to accept data. The data is stored in two buffers; the terminal buffer which holds data received from the DTE, and the modem buffer which holds data from the distant modem for transmission to the DTE.

Constant speed in the Executive Series allows telco speeds of 14400, 12000, 9600, 4800, 2400, 1200 or 300 bps with DTE speeds from 300 bps through to 57600 bps.

2.3.2 Flow Control

Flow control is the process by which the DTE and modem interact with each other such that the respective buffers do not overflow. There are two data paths which require flow control and each path has flow control options that can be selected. The Executive Series supports both hardware (RTS/CTS) and software (XON/XOFF) flow control.

DTE To Modem Flow Control

The first path is between the DTE and the modem. If the speed of the connection differs from that of the DTE, then flow control must be used to ensure data integrity.

1. XON/XOFF Flow Control. When receiving data from the DTE, the Executive Series sends the XOFF character (13H) to the DTE when the terminal buffer is nearly full. This point is known as the "high water mark". When the terminal buffer empties to a point called the "low water mark", the modem sends the XON character (11H) to the DTE to allow the buffer to fill.

When transmitting data to the DTE, the modem reacts to flow control characters from the DTE by stopping transmission if an XOFF is received, or restarting transmission if an XON is received.

XON/XOFF flow control is enabled with the AT&K4 command, or for transparent flow control with the AT&K5 command.

Note: XON and XOFF characters are transmitted and detected according to the format that was sensed during speed and format detection.

2. RTS/CTS Flow Control. The Executive Series modem controls the CTS output. When CTS is OFF, the DTE is prevented from sending data to the modem. When CTS is ON, the DTE can send data. When RTS is OFF, the Executive Series will not send data to the DTE. When RTS is ON, the modem is permitted to send data to the DTE. RTS/CTS flow control is enabled by the AT&K3 (factory default) command.

Modem To Modem Flow Control

The second data path is between local and remote modems over the telephone line. When receiving data from the remote modem, the Executive Series modem sends the XOFF character to the remote modem when its buffer reaches the high water mark. When the modem buffer empties to the low water mark, the Executive Series sends the XON character allowing the buffer to commence filling once again.

When transmitting data to the remote modem, the Executive Series reacts to these flow control characters from the remote modem by stopping transmission if an XOFF is received, or by continuing transmission upon receipt of an XON character.

XON/XOFF flow control cannot be used between modems during MNP sessions. In this case, flow control is accomplished by credit allocation internal to MNP.

Buffers

The terminal and modem buffers each contain 1250 bytes. The high water mark is reached when the buffer is 70% full (875 characters) and the low water mark is reached when the buffer is 8% full (100 characters).

2.3.3 Escape Sequence Detection

The S2 register holds the decimal value of the ASCII code used by the modem for the escape character. The factory default character is a "+" (S2=43). Detection of the escape sequence can be disabled by setting the S2 register to a value greater than 127.

When the escape sequence is executed, the escape characters are also transmitted to the telephone line in all modes. The escape sequence (+++) is only applicable in online data mode.

2.3.4 Break Detection

The Executive Series can detect a BREAK signal from either the DTE or the remote modem. The AT\Kn command determines the modem response to a received BREAK signal. A BREAK is caused by a string of continuous start bits approximately 300 milliseconds long, or by the Link Attention PDU in MNP.

2.3.5 Direct Mode

The Direct mode allows data to be transmitted and received directly from either the DTE or the remote modem. Direct mode is selected with the **AT&Q0** or **AT\N1** command.

When operating in Direct mode, no flow control characters are recognised or transmitted, and the Executive Series cannot execute MNP sessions. The purpose of the Direct mode is to make the modem "dumb" for compatibility with other older style modems.

2.3.6 Telephone Line Monitoring

The Executive Series modems monitor the telephone line and take the described actions when the indicated conditions occur.

- | | |
|----------------------------|--|
| Loss Of Carrier - | If carrier is not detected for the period of time specified in the S10 register, the modem disconnects from the line. |
| Receive Space Disconnect - | If optioned by the ATY0 command, the modem disconnects after receiving 1.6 +/- 10% seconds of continuous SPACE. |
| Send Space On Disconnect - | If optioned by the ATY0 command, the modem sends 4 +/- 10% seconds of continuous SPACE if the DTR goes OFF or if ATH is received from the DTE.. |

2.3.7 Retrain

At 2400 bps or greater when the automatic adaptive equaliser cannot compensate for line changes, a modem can lose synchronisation with the received line signal. If this occurs retraining may be necessary to recover from the condition. The need for a retrain depends on the type of connection.

Error-Correction Connection (MNP, V.42). The Executive Series initiates a retrain if any individual frame is retransmitted 3, 6 or 9 times. The modem initiates a retrain before attempting the fourth, seventh or tenth re-transmission.

Normal or Direct Connection. When error-correction is not being employed, the Executive Series continuously monitors the line quality. If the quality becomes unacceptable, the modem initiates a retrain. It continues to try to retrain until an acceptable connection is achieved; an event that causes telephone line disconnection occurs (carrier detect loss timer intervention, inactivity timer, DTR drop, or commanded disconnect); or if three consecutive unsuccessful retrain attempts occur.

2.3.8 Synchronous Data Mode

The Executive Series can establish a synchronous connection by following one of the methods described in the **AT&Mn** or **AT&Qn** command. Once the modem completes the physical handshake, it enters the synchronous data mode. During synchronous data mode, the inactivity timer is inoperative.

2.4 V.42 / V.42 bis

V.42 supports two methods of error correction: LAP-M and as a fallback option, MNP 4 (see Section 2.5). The Executive Series uses negotiation techniques to determine and establish the error correction protocol to be used between the modems. This technique involves two phases: detection and negotiation. In the detection phase, which occurs immediately after the establishment of the modem handshake, the communicating modems exchange a sequence of detection patterns to verify that both sides support the error-correction technique. In the negotiation phase, which follows the detection phase, the communicating modems exchange configuration information regarding data compression methods to be used.

If the detection phase fails, or negotiation does not achieve the desired connection type, the Executive Series can hang up, fallback to MNP, or fallback to a standard non-error-correcting asynchronous mode. The desired action is determined from the information held in the **S36** register. Since MNP does not support a detection phase, the selection of MNP 4 must be made as a forced fallback with registers **S48** and **S36**.

The following S registers are used for V.42 LAP-M operation:

- S36** -- V.42 Negotiation Fallback
- S46** -- Protocol Selection
- S48** -- V.42 Negotiation Action
- S82** -- Break Handling
- S86** -- Connection Failure Cause Code

Three additional "AT" commands allow selection of V.42 bis (BTLZ) negotiation parameters, *i.e.*, maximum string length, dictionary size, and compression direction:

- %Sn** -- Maximum String Length
- %Dn** -- Dictionary Size
- %Mn** -- One/Two-Way Compression Mode

These commands are described in more detail in later sections.

2.4.1 S Registers

S36 - V.42 Negotiation Fallback

Register S36 specifies the action to take when the desired connection cannot be made. The options are:

S36=0	Modem hangs up.
S36=1	Modem stays on-line and a Direct mode connection is established.
S36=2	Reserved.
S36=3	Modem stays on-line and a Normal mode connection is established.
S36=4	If S48 is 128, then an MNP connection is attempted; if it fails, the modem disconnects.
S36=5	If S48 is 128, then an MNP connection is attempted; if it fails, a Direct mode connection is established.
S36=6	Reserved.
S36=7	If S48 is 128, then an MNP connection is attempted; if it fails, a Normal mode connection is established.

These fallback options are initiated immediately on connection if register S48=128.

S36 can be used in conjunction with S48=128 to force an MNP connection. For example, if S36=5 or 7 and S48=128, an MNP connection will be negotiated.

S46 - Protocol Selection

The following actions can be selected with the S46 register:

S46=136	Execute LAP-M protocol with no BTLZ compression.
S46=138	Execute LAP-M protocol with BTLZ compression.

In addition to BTLZ (V.42 *bis*), the Executive Series also implements MNP 5 data compression. BTLZ is used only with LAP-M; MNP 5 is used only with MNP 4. This method is by far the most preferred and compatible implementation of V.42 *bis* and V.42 protocols.

S48 - V.42 Negotiation Action

The negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if desired. The following options are selectable using register S48:

S48=0	Disable negotiation; by-pass the detection and negotiation phases; and proceed with LAP-M.
S48=7	Enable negotiation.
S48=128	Disable negotiation; by-pass the detection and negotiation phases; and proceed at once with the fallback actions specified in S36. This option can be used to force MNP.

S82 - Break Handling Options

LAP-M specifies three methods of break signal handling: "in sequence", "expedited", and "destructive". The break handling options for LAP-M are selected with register S82.

S82=3	Expedited: Modem sends a break immediately; data integrity is maintained both ahead of and after the break.
S82=7	Destructive: Modem sends a break immediately; data being processed by each modem at the time of the break is destroyed.
S82=128	In sequence: Modem sends a break in sequence with any transmitted data; data integrity is maintained both ahead of and after the break.

S86 - Connection Failure Cause Code

When the modem issues a NO CARRIER response message, a failure code is written to register S86. S86 records the first event that contributes to a NO CARRIER message. The result codes stored in S86 are:

S86=0	Normal disconnect, no error occurred.
S86=4	Loss of carrier.
S86=5	V.42 negotiation failed to detect an error-correction modem at the other end.
S86=6	Other error correcting modem did not respond to feature negotiation message sent by Executive Series.
S86=9	The modems could not locate a common protocol.
S86=12	Normal disconnect initiated by the remote modem.
S86=13	Remote modem does not respond after 10 re-transmissions of the same message.
S86=14	Protocol violation.

2.4.2 AT Commands

ATWn - Negotiation Progress Reporting

The ATW1 command enables the following additional negotiation progress messages:

Number	Verbose	Connection Indicated
77	PROTOCOL: LAP-M	V.42 LAP-M
81	PROTOCOL: V.42BIS	V.42 LAP-M with BTLZ

The ATW0 command disables these messages.

AT%Sn - Set Maximum String Length (BTLZ)

Sets the maximum number of characters that can be compressed into one token. The default is 32 characters.

AT%Dn - Set Dictionary Size (BTLZ)

Sets the BTLZ dictionary size.

Command	Dictionary Size
%D0	512
%D1	1024
%D2	2048
%D3	4096

When one-way compression mode is selected (AT%M1 or AT%M2), the local and remote modems must be co-operatively configured, *i.e.*, one must be set for one-way encode and the other for one-way decode. Even though only four options of dictionary size can be selected by the host, the modem can negotiate for any dictionary size including non-power-of-two values from 512 to 4096 entries. Dictionary size up to 2048 entries is allowed for both one- and two-way compression. A dictionary size larger than 2048 entries is allowed for one-way compression only.

AT%Mn - Set One/Two-Way Compression Mode

Selects the one/two-way compression mode when using BTLZ compression.

AT%P - Clear BTLZ Dictionary

This command resets the BTLZ encoder dictionary and simultaneously sends a command code to the remote modem to reset its BTLZ decoder dictionary.

2.5 Microcom Networking Protocol (MNP)

MNP is a data link protocol that uses error detection algorithms to ensure data integrity.

2.5.1 Compatibility

The Executive Series supports MNP classes 2 through 5. Class 5 uses a data compression algorithm to increase data throughput and is enabled by the AT%CI command.

The AT commands and S registers applicable to MNP are:

Command	Function
AT%Cn	Compression Control
AT&Qn	Enable Error Correction Mode
ATWn	Negotiation Progress Reporting
AT\An	Maximum MNP Block Size
AT\Kn	Break Control
AT\Ln	MNP Block Transfer Control
AT\Nn	Operation Mode Control
AT\O	Originate Reliable Link Control
AT\Tn	Inactivity Timer Control
AT\U	Accept Reliable Mode Control
AT\Y	Switch To Reliable Mode
AT\Z	Switch To Normal Mode
S36	Negotiation Failure Treatment
S38	Delay Before Forced Hang Up
S40	MNP Bit-Mapped Options
S41	MNP Bit-Mapped Options

2.5.2 MNP 3-Way Handshake

When establishing the MNP 3-way handshake, the originating modem sends the first Link Request Protocol Data Unit (PDU). The answering modem responds by sending a Link Request PDU back. The originator then responds with a Link Acknowledge frame to complete the MNP handshake.

Establishing MNP Connections

The Executive Series may be configured to execute the MNP handshake before or after a telephone-based connection has been established. The `AT&Q5`, `AT\N2`, or `AT\N3` command may be used to configure the modem before the connection.

To enter MNP after a telephone connection in either Direct or Normal mode, use the `AT\O`, `AT\Y`, or `AT\U` command. These three commands have no effect once the 3-way handshake has been completed.

At completion of the MNP 3-way handshake, the Executive Series returns a connect message according to the `ATWn` command setting. MNP can only operate at connection speeds of 1200 bps or greater.

2.5.3 MNP Data Mode

After establishing the MNP connection, the Executive Series performs all of the functions required during the Normal data mode with the following differences:

1. Retransmits are performed as a result of retransmission rates (See Section 2.3.7).
2. When in command mode during an MNP connection as a result of the escape sequence (+++), the Executive Series continues to accept data and acknowledge frames. The data is stored until the modem enters the data mode and is then delivered to the DTE. In non-MNP mode, any data received while the modem is in command mode is lost.

MNP Class 5 Data Compression

This MNP mode may be enabled or disabled by using the `AT%Cn` command. If the Executive Series establishes a Class 5 connection, it automatically increases its throughput by compressing data into tokens before transmitting to the remote modem, and decompressing encoded received data before passing it on to the DTE. The `AT%C1` command has no effect if an MNP connection has already been established, except to configure the modem for a future MNP Class 5 handshake attempt.

Programmable Inactivity Timer

The Executive Series can determine the length of time it will wait prior to disconnecting when no data is sent or received. In MNP mode, this activity timer is reset when data is either received from the DTE or is received from the distant modem in the form of a Link Transfer PDU. This timer can be set using the `AT\Tn` command where `n` represents a value between 0 and 90 minutes.

Data Transfer

MNP may be operated in either block or stream mode. In stream mode, MNP sends data frames in varying lengths depending on the amount of time between characters coming from the DTE. The mode is selected by the `AT\Ln` command.

In block mode, MNP sends data frames of 256 characters in length. Special communication software must be used when using block mode.

When a Link Disconnect PDU is received, the Executive Series reads the current status of the S36 register and either falls back to a normal connection, or disconnects the modem from the telephone line and goes on-hook.

2.6 Diagnostics

The Executive Series' diagnostics comply with EIA recommendation TR30.2 and are implemented as follows.

2.6.1 Analogue Loopback

Description

Data from the local DTE is sent to the Executive Series, which then loops the data back to the local DTE. This test verifies the working condition of the path between the modem and the DTE.

Initiation/Termination

Analogue loopback is initiated by issuing the AT&T1 command and terminates when the Executive Series receives the test termination command (AT&T0) or when the "test-timer" (set using the S18 register) expires.

Please note: This test will always drop a connection if one exists.

Results

The DTE is responsible for comparing the data received with the data sent for test analysis.

2.6.2 Analogue Loopback with Self Test

Description

An internally-generated test pattern of alternating 1s and 0s (reversals) is sent to the Executive Series. An error detector within the modem checks for errors in the string of reversals. This test verifies the working condition of the modem.

Initiation/Termination

Analogue Loopback Self Test is initiated by issuing the AT&T8 command. Analogue loopback is terminated when the Executive Series receives the test termination command (AT&T0) or when the test timer (set using register S18) expires.

Please note: This test will always drop a connection if one exists.

Results

The Executive Series checks for errors internally. Upon termination of the test, the modem sends a 3-digit error count to the DTE.

2.6.3 Remote Digital Loopback (RDL)

Description

Data from the local DTE is sent to the remote modem which loops the data back to the local DTE. This test verifies the working condition of the telephone line and the remote modem.

Initiation/Termination

Remote digital loopback (RDL) is initiated by issuing the AT&T6 command. The remote modem must have RDL response enabled (AT&T4). Remote digital loopback testing is terminated when the Executive Series receives the test termination command (AT&T0) or when the test timer (set using register S18) expires.

RDL can only be initiated if a connection exists at 1200 or 2400 bits per second.

Results

The DTE is responsible for comparing the data received with the data sent for analysis.

2.6.4 Remote Digital Loopback with Self Test

Description

An internally-generated pattern is sent from the local modem to the remote modem which loops the data back to the local modem again. This test verifies the working condition of the telephone line and the remote modem.

Initiation/Termination

Remote digital loopback with self test is initiated by issuing a remote digital loopback with self test command (AT&T7). The test is terminated when the Executive Series modem receives the test termination command (AT&T0) or when the test timer (set using register S18) expires.

Remote digital loopback with self test (RDLST) can only be initiated if a connection exists at 1200 or 2400 bits per second.

Results

The Executive Series checks for errors internally. Upon termination of the test, the modem sends a 3-digit error count to the DTE.

2.6.5 Digital Loopback

Description

Digital loopback can be used to test the entire link. When digital loop is requested from the local DTE, two data paths are set up in the local modem. Data from the local DTE is looped back to the local DTE (Path 1) and data received from the distant modem is looped back to the distant modem (Path 2).

Initiation/Termination

Digital loopback is initiated by issuing the **AT&T3** command. The test is terminated when the Executive Series receives the test termination command (**AT&T0**) or when the test timer (set using register **S18**) expires.

Digital loopback can only be initiated if a connection exists at 1200 or 2400bps.

Results

Both the local DTE and the distant DTE are responsible for comparing the data received with the data sent for test analysis.

2.6.6 Asynchronous Diagnostic Commands

- AT&T0:** Ends the test in progress. If the test in progress is **AT&T1** (analogue loopback), **AT&T3** (digital loopback), or **AT&T6** (remote digital loopback), then an escape sequence must be issued prior to **AT&T0**. Note also that **ATH** or the expiration of the "test timer" **S18** register will also terminate a test.
- AT&T1:** Initiates Analogue Loopback.
- AT&T3:** Initiates Digital Loopback.
- AT&T4:** Allows the Executive Series to respond to a distant modem's request for a remote digital loopback test.
- AT&T5:** Prohibits the Executive Series from honouring a distant modem's request for remote digital loopback test.
- AT&T6:** Initiates Remote Digital Loopback.
- AT&T7:** Initiates Remote Digital Loopback with Self Test.
- AT&T8:** Initiates Analogue Loopback with Self Test.

3. "AT" COMMANDS

Table 3-1 summarises the "AT" command set. The commands are described in greater detail in Tables 3-2 through 3-5.

3.1 Command Guidelines

Each "AT" command has a list of possible parameters with its default value. The default value is loaded at initialisation, i.e., power-on or **ATZ** command. If a command requires a parameter but none is supplied, the Executive Series assumes that the parameter is zero. Invalid commands or parameters result in the **ERROR** message being sent to the DTE.

The command line may contain a single command or a series of commands. They may be separated by a space for readability. The command line may be up to 256 characters in length and is executed after a terminating character is entered. The default terminating character is a carriage return (Decimal 13), but this can be changed by writing a different value to register **S3**.

The command line may be edited using the backspace character (Decimal 8). This value may be set using the **S5** register. However, the backspace will not work for values of 0 and greater than 127, or for the current value of the terminating character.

All command lines must begin with an "AT" entered in capital or lower case letters. A command line can be terminated at any time by issuing **CTRL-X** (Decimal 18) after entering the "AT" attention code. The command line will be ignored and an **OK** result message will be sent to the DTE. The **A/** command may be used to repeat the last command line. The **A/** does not require a terminating character or the "AT" attention code.

The escape code sequence (**+++**) returns the Executive Series to command mode from the data mode. A time delay must occur between the last character transmitted by the DTE and the first character of the escape code sequence. The guard time delay can be changed by altering the value held in register **S12**; (default 1 second). The escape code character (default is **ESC**, Decimal 27) must occur three times in succession for the Executive Series to recognise it as a valid escape command.

Table 3-1. "AT" Command Summary

COMMAND	TITLE	DEFAULT
A/	Re-Execute Command	none
ATA	Answer	none
ATBn	Set CCITT or Bell Mode	0 *
ATCn	Carrier Control	1
ATDn	Dial	P
ATE	Command Echo	1 *
ATFn	On-Line State Character Echo	1 *
ATHn	Switch-Hook Control	none
ATIn	Identification	none
ATLn	Speaker Volume	2 *
ATMn	Speaker Control	1 *
ATNn	Modulation Handshake	1 *
ATOn	Return To The On-Line State	none
ATP	Set Pulse Dial as Default	none *
ATQn	Result Code Display	0 *
ATSn?	Reading S-Registers	none
ATSn=x	Writing To S-Registers	none
ATT	Set Tone Dial as Default	none *
ATVn	Result Code Form (Message Control)	1 *
ATWn	Negotiation Progress Reporting	0 *
ATXn	Extended Result Codes	4 *
ATYn	Control Long Space Disconnect	0 *
ATZn	Reset	none
AT&Cn	DCD Option	0 *
AT&Dn	DTR Option	0 *
AT&F	Restore Factory Configuration	none
AT&Gn	Set Guard Tone	0 *
AT&Jn	Telephone Jack Selection	0 *
AT&Kn	DTE/Modem Flow Control	3 *
AT&Ln	Line Type	0 *
AT&Mn	Communication Mode	(&Qn) *
AT&Pn	Dial Pulse Ratio	0 *
AT&Qn	Communication Mode	5 *
AT&Rn	RTS/CTS Option	0 *
AT&Sn	DSR Option	0 *
AT&Tn	Test And Diagnostic	4 *
AT&V	View Current Configuration And Profile	none
AT&Wn	Store User Profile	none
AT&Xn	Clock Source Selection	0 *
AT&Yn	Designate Default User Profile	0 *
AT&Zn=x	Store Phone Number	none

Table 3-1. "AT" Command Summary (Cont'd)

COMMAND	TITLE	DEFAULT
AT\An	Maximum MNP Block Size	3
AT\Bn	Transmit Break	3
AT\Gn	Modem-To-Modem Flow Control	0
AT\Kn	Break Control	5
AT\Ln	MNP Block Transfer Control	0
AT\Nn	Operation Mode Control	none *
AT\O	Originate Reliable Link Control	none
AT\Tn	Inactivity Timer Control	0 *
ATU	Accept Reliable Mode Control	none
ATY	Switch To Reliable Mode	none
ATZ	Switch To Normal Mode	none
AT%Cn	Compression Control	1 *
AT%Dn	Set Dictionary Size (BTLZ)	2
AT%En	Enable/Disable Auto-Retrain	0
AT%L	Report Received Signal Level	none
AT%Mn	Set One/Two-Way Mode (BTLZ)	3
AT%P	Clear BTLZ Encoder Dictionary	none
AT%Q	Report Line Signal Quality	none
AT%Sn	Set Maximum String Length (BTLZ)	32
		* Command is saved in NVRAM.

Parameters entered for the AT and AT& commands are limited in value to 255, where the parameter is "MOD"ed with 256. The result must be within the specified range; if it is not, the ERROR message is sent to the DTE.

Parameters entered for S registers are also "MOD"ed with 256 and the result is stored in the S register. Parameters that are out of range are stored in the S register, however, no ERROR message is sent to the DTE. Functionally however, the lower or higher limit is observed.

Parameters entered for the AT\ and AT% commands follow the same method, except that should the parameter be out of range, the upper limit is stored and no ERROR message is sent to the DTE.

Table 3-2. "AT" Command Definitions

COMMAND	DESCRIPTION						
A/	<p>Re-Execute Command. Re-executes the most recent AT command string. The principle application of this command is to place another call (e.g. Dial command) that failed to connect due to a busy line or no answer. This command must appear alone on a command line and must be terminated by the '/' character. (A <CR> should not be entered to terminate the command.)</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p>						
ATA	<p>Answer. This must be the last command entered into the command line. The Executive Series proceeds with the connect sequence in answer mode. It will enter the connect state after exchanging carrier with the remote modem. If no carrier is detected within a wait period specified in register S7 (default is 30 seconds), the modem will disconnect. Any character may be entered via the DTE during the connect sequence to abort the command.</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p> <p><i>Result Codes:</i></p> <table border="0"> <tr> <td>CONNECT XXXX</td> <td>if a connection is established (XXXX = telephone line speed, e.g., 9600).</td> </tr> <tr> <td>NO CARRIER</td> <td>if a connection cannot be established, the abort timer (register S7) expires or if the command is aborted.</td> </tr> <tr> <td>ERROR</td> <td>if in data mode.</td> </tr> </table>	CONNECT XXXX	if a connection is established (XXXX = telephone line speed, e.g., 9600).	NO CARRIER	if a connection cannot be established, the abort timer (register S7) expires or if the command is aborted.	ERROR	if in data mode.
CONNECT XXXX	if a connection is established (XXXX = telephone line speed, e.g., 9600).						
NO CARRIER	if a connection cannot be established, the abort timer (register S7) expires or if the command is aborted.						
ERROR	if in data mode.						
ATBn	<p>Set CCITT or Bell Mode. Selects between CCITT and Bell modes for 2400, 1200 and 300 bps. This command is not valid when the ATNI command (automode detection enabled) is in effect.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 0</p> <p><i>Result Codes:</i> OK for all valid parameters. ERROR otherwise.</p> <p><i>Command Options:</i></p> <table border="0"> <tr> <td>ATB0</td> <td>Selects CCITT V.32 bis, V.32, V.22 bis, V.22 and V.21 standards for communication at 14400, 9600, 2400, 1200 and 300 bps.</td> </tr> <tr> <td>ATB1</td> <td>Selects Bell 212A and 103 standards for communication at 1200 and 300 bps.</td> </tr> </table>	ATB0	Selects CCITT V.32 bis, V.32, V.22 bis, V.22 and V.21 standards for communication at 14400, 9600, 2400, 1200 and 300 bps.	ATB1	Selects Bell 212A and 103 standards for communication at 1200 and 300 bps.		
ATB0	Selects CCITT V.32 bis, V.32, V.22 bis, V.22 and V.21 standards for communication at 14400, 9600, 2400, 1200 and 300 bps.						
ATB1	Selects Bell 212A and 103 standards for communication at 1200 and 300 bps.						
ATCn	<p>Carrier Control. Controls the transmit carrier. The Executive Series is preset to turn carrier on and off as necessary (the C1 option). The signal is on when the modem is calling, answering, or connected to a remote modem, and is off when it is not. The C0 option is NOT valid.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 1</p> <p><i>Result Codes:</i> OK for 1. ERROR otherwise.</p> <p><i>Command Options:</i></p> <table border="0"> <tr> <td>ATC0</td> <td>Not permitted; returns ERROR result.</td> </tr> <tr> <td>ATC1</td> <td>Normal transmit carrier switching.</td> </tr> </table>	ATC0	Not permitted; returns ERROR result.	ATC1	Normal transmit carrier switching.		
ATC0	Not permitted; returns ERROR result.						
ATC1	Normal transmit carrier switching.						

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION																																
ATDn	<p>Dial. This must be the last command on a command line. ATD causes the modem to go off-hook, dial according to the parameters entered, and attempt to establish a connection. If there are no parameters, then the modem goes off-hook in originate mode without dialling a number. Punctuation may be used for clarity. Parentheses, hyphens and spaces are ignored. If an invalid character is entered, that character and all subsequent characters in the dial string are ignored.</p> <p><i>Parameters:</i> 0-9 A B C D * # L P T R ! @ W , ; ^ S = n <i>Default:</i> P</p> <p><i>Result Codes:</i></p> <table border="0"> <tr> <td>OK</td> <td>if ";" dial modifier is used.</td> </tr> <tr> <td>OK</td> <td>if key press abort during dialling.</td> </tr> <tr> <td>NO DIALTONE</td> <td>if ATX2 or ATX4 is selected and 1 second of dialtone is not detected within 5 seconds; or if W dial modifier is used and 3 seconds of dialtone is not detected within the time specified by S7.</td> </tr> <tr> <td>BUSY</td> <td>if busy is detected, and ATX3 or ATX4 is selected or if W dial modifier is used.</td> </tr> <tr> <td>NO ANSWER</td> <td>if "@" dial modifier is used and 5 seconds of silence is not detected within the time specified within the time specified by S7.</td> </tr> <tr> <td>CONNECT XXXX</td> <td>if a connection is established.</td> </tr> <tr> <td>NO CARRIER</td> <td>if a connection cannot be established, the abort timer (S7) expires, or a character is entered during the handshake process.</td> </tr> <tr> <td>ERROR</td> <td>if in data mode.</td> </tr> </table> <p>The ATD parameters are:</p> <table border="0"> <tr> <td>L</td> <td>Dials the Last dial string that was dialled.</td> </tr> <tr> <td>P</td> <td>Use Pulse dialling. Placed at the end of the command string and before the dial string. Causes the modem to pulse dial the numbers.</td> </tr> <tr> <td>T</td> <td>Use DTMF dialling. Placed at the end of the command string and before the dial string. Causes the modem to use DTMF tones to dial.</td> </tr> <tr> <td>R</td> <td>Reverse Mode. Allows the Executive Series to call an originate-only modem by forcing the call into "answer mode". Must be entered as the last character of the command string (just before the <CR>).</td> </tr> <tr> <td>!</td> <td>Hookflash. Causes the modem to go on-hook for 700 milliseconds and then off-hook..</td> </tr> <tr> <td>@</td> <td>Causes the modem to listen for 5 seconds of silence. If a 5 second silence has not been detected within the period specified in S7 (default = 30 seconds), the modem disconnects and returns the 'NO ANSWER' result code. If it detects a busy signal, it returns a 'BUSY' result code. If the 5 seconds of silence is detected, the modem continues dialling the dial string.</td> </tr> <tr> <td>W</td> <td>Wait For Dialtone Before Dialling. Causes the Executive Series to wait for a dialtone up to the period of time specified in register S7 before dialling the numbers that follow. If the modem detects a dialtone before the given time delay, it continues to dial. Otherwise, it goes on-hook.</td> </tr> <tr> <td>,</td> <td>Pause During Dial. Inserted between digits in a dial string. Causes the modem to pause for the value given by register S8 (default is 2 seconds), before dialling the next digit. This delay can be used in place of the "Wait For Dialtone Before Dialling".</td> </tr> </table>	OK	if ";" dial modifier is used.	OK	if key press abort during dialling.	NO DIALTONE	if ATX2 or ATX4 is selected and 1 second of dialtone is not detected within 5 seconds; or if W dial modifier is used and 3 seconds of dialtone is not detected within the time specified by S7.	BUSY	if busy is detected, and ATX3 or ATX4 is selected or if W dial modifier is used.	NO ANSWER	if "@" dial modifier is used and 5 seconds of silence is not detected within the time specified within the time specified by S7.	CONNECT XXXX	if a connection is established.	NO CARRIER	if a connection cannot be established, the abort timer (S7) expires, or a character is entered during the handshake process.	ERROR	if in data mode.	L	Dials the Last dial string that was dialled.	P	Use Pulse dialling. Placed at the end of the command string and before the dial string. Causes the modem to pulse dial the numbers.	T	Use DTMF dialling. Placed at the end of the command string and before the dial string. Causes the modem to use DTMF tones to dial.	R	Reverse Mode. Allows the Executive Series to call an originate-only modem by forcing the call into "answer mode". Must be entered as the last character of the command string (just before the <CR>).	!	Hookflash. 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Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION
ATDn (cont'd)	<p>; Return To Command Mode After Dialling. Added to the end of a dial string. Causes the modem to remain in the command mode after it dials the digits preceding the command. This allows the user to issue additional dial commands or dial strings without overflowing the command buffer. The modem looks for carrier after the final dial command is issued. "ATHn" aborts this command.</p> <p>^ Turn On Calling Tone. Turns on a periodic 1300 Hz calling tone if originating the call. Calling tone is enabled only on a call-by-call basis.</p> <p>S=n Dial Stored Number. Follows the dial command string. Causes the Executive Series to dial a telephone number previously stored in directory location n using the AT&Zn command.</p> <p>If "ATD" is entered without parameters, the Executive Series goes off-hook and waits for carrier; if the handshake is not completed within the time specified by register S7 (default = 30 seconds) the modem goes on-hook. The ATD command will be aborted in progress upon receipt of any character from the DTE before the completion of the handshake.</p>
ATEN	<p>Command Echo. Controls the echo of characters received by the Executive Series from the local DTE while the modem is in the command mode.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 1 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> ATE0 Inhibits the echoing of commands. ATE1 Enables the echoing of commands.</p>
ATFn	<p>On-Line State Character Echo. Determines if the Executive Series will echo data from the DTE. The modem does not support the ATF0 command. However, ATF1 is accepted, which may be issued by some communication software packages.</p> <p><i>Parameters:</i> n = 0, 1 <i>Default:</i> 1 <i>Result Codes:</i> OK for 1. ERROR otherwise. <i>Command Options:</i> ATF0 Error. ATF1 Disables on-line echo.</p>
ATHn	<p>Switch-Hook Control. Applies to asynchronous operation only. If the user enters the command mode from the data mode by issuing the escape sequence (+++), or as a result of an ON-to-OFF transition of DTR with the AT&D1 option in effect, the user may cause the modem to go on-hook (disconnect) by issuing the ATH command.</p> <p><i>Parameters:</i> n = 0, 1 <i>Default:</i> None. <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> ATH0 Causes modem to go on-hook (hang up). ATH1 If modem is on-hook, modem goes off-hook, returns an OK response, and awaits further commands.</p>

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION
ATIn	<p>Identification. Returns the product code, returns the checksum of the firmware ROM, or computes the checksum of the firmware ROM and reports its error status. The product code contains 3 digits. The checksum result consists of three ASCII numeric characters followed by a carriage return and a line feed. The error status is either OK or ERROR.</p> <p><i>Parameters:</i> n = 0 - 4 <i>Default:</i> None. <i>Result Codes:</i> OK <i>Command Options:</i> ATi0 Reports the product code. ATi1 Reports the checksum computed on the firmware ROM in 3-digit decimal notation. ATi2 Performs a checksum on the firmware ROM and indicates OK or ERROR. ATi3 Firmware (ROM) revision number. ATi4 Identifies product features found in the Executive Series modem.</p>
ATLn	<p>Speaker Volume. This command is included for compatibility purposes only - speaker volume in the Executive Series is adjustable via a small potentiometer inside the unit.</p> <p><i>Parameters:</i> n = 0 - 3 <i>Default:</i> 2 <i>Result Codes:</i> OK for 0 to 3. ERROR otherwise. <i>Command Options:</i> ATL0 Selects low speaker volume. ATL1 Selects low speaker volume. ATL2 Selects medium speaker volume. ATL3 Selects high speaker volume.</p>
ATMn	<p>Speaker Control. Controls the internal speaker while the Executive Series is receiving a carrier signal or dialling. This command also enables or disables the speaker.</p> <p><i>Parameters:</i> n = 0 - 3 <i>Default:</i> 1 <i>Result Codes:</i> OK for 0 to 3. ERROR otherwise. <i>Command Options:</i> ATM0 Speaker is always off. ATM1 Speaker is on whilst dialling, then goes off while the Executive Series is receiving a carrier from a remote modem. ATM2 Speaker is always on. ATM3 Speaker goes off while the modem is receiving a carrier signal from a remote modem and while the modem is dialling.</p>

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION
ATNn	<p>Modulation Handshake. This command can be used to assure that a connection is made only at the specified speed. If leased line is selected, this command is ignored and the Executive Series operates as if ATN0 were selected.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 1 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise.</p> <p><i>Command Options:</i> ATN0 Requires that the speed of the connection be that specified by the value held in S37; if S37 = 0, the speed of the connection must match that at which the last AT command was issued. If the selected speed can be achieved using more than one communication standard (e.g., Bell 212A or CCITT V.22 at 1200 bps), the modem also references the selection made with the ATB command.</p> <p>ATN1 Enables automode detection. Permits handshaking to occur at any speed supported by both modems. The ATB command is ignored in this mode and the modem attempts only CCITT mode connections.</p>
ATOn	<p>Return To The On-Line State. Applies to asynchronous operation only. If the user enters the command mode from the data mode by issuing the escape sequence, or as a result of an ON-to-OFF transition of DTR with the AT&D1 option in effect, the user may return to the data mode without terminating a call by issuing the ATO command. This command may also be used to force a retrain. If the Executive Series is on-hook, then it behaves as if it went off-hook to originate without actually taking the relay off-hook.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> None. <i>Result Codes:</i> ERROR if &T1, &T3, or &T6 - &T8 is active. CONNECT XXXX if a connection is established. NO CARRIER if retrain is not successful in the time specified by S7.</p> <p><i>Command Options:</i> ATO0 Causes the modem to return to data mode. ATO1 Causes the modem to return to the data mode and to initiate a retrain.</p>
ATP	<p>Set Pulse Dial As Default. Causes the Executive Series to assume that all subsequent dial commands are pulse dialed. The user may subsequently omit the "P" from the dial strings.</p> <p><i>Parameters:</i> None. <i>Default:</i> None. <i>Result Codes:</i> OK if issued outside dial string.</p>

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION
ATQn	<p>Result Code Display. Determines whether or not the Executive Series sends the result codes to the DTE. (See the ATXn command.)</p> <p><i>Parameters:</i> n = 0, 1, 2 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 2. None. for 1. ERROR otherwise.</p> <p><i>Command Options:</i> ATQ0 Allows the modem to send result codes to the DTE. ATQ1 Prohibits the modem from sending result codes to the DTE. ATQ2 Modem returns result codes to the DTE when originating a call; does not return result codes when answering a call.</p>
ATSn?	<p>Reading S Registers. Reads the contents of the S register. All S registers may be read.</p> <p><i>Parameters:</i> n = 0 - 95 <i>Default:</i> None. <i>Result Codes:</i> OK for all valid parameters.</p>
ATSn=x	<p>Writing To S Registers. Writes the value of x to the specified S register. All registers will return the OK response if x is a legal value, however some registers will not actually write the value anywhere. These registers are S1, S13-S15, S17, S20-S24 and S27.</p> <p><i>Parameters:</i> n = 0 - 95, x = 0 - 255 <i>Default:</i> None. <i>Result Codes:</i> OK for parameters n = 0 - 95. OK for no argument. ERROR otherwise.</p>
ATT	<p>Set Tone Dial As Default. Causes the Executive Series to assume that all subsequent dial commands are tone dialed. The user may subsequently omit the "T" from the dial string.</p> <p><i>Parameters:</i> None. <i>Default:</i> None. <i>Result Codes:</i> OK if issued outside dial string.</p>
ATVn	<p>Result Code Form (Message Control). Selects whether the Executive Series sends long form or short form result codes to the local DTE. All responses are ASCII values. Long-form (verbose) responses are preceded and terminated with both carriage return and line feed control characters. Short-form (numeric) responses are only terminated with a carriage return control character. (See ATXn command.)</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 1 <i>Result Codes:</i> 0 for 0. OK for 1. ERROR otherwise.</p> <p><i>Command Options:</i> ATV0 Allows short-form (numeric) result codes to be sent. ATV1 Allows long-form (verbose) result codes to be sent.</p>

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION
ATWn	<p>Negotiation Progress Reporting. An additional set of result codes can be enabled with the W command to report progress of the negotiation phase of error-correction mode. These codes report the carrier speed (300 bps - 14400 bps) and the error-correction protocol. These messages can also be reported in either numeric or verbose form. For example, both 77 and PROTOCOL:LAP-M indicate that the error correction protocol is LAP-M. (See also the ATXn and S95 commands.)</p> <p>If the error-correction link is negotiated and a connection is made, the appropriate CONNECT XXXX message is reported.</p> <p>When in error-correction mode, the CARRIER XXXX message may indicate one speed, whilst the CONNECT XXXX message reports another.</p> <p><i>Parameters:</i> 0 - 2 <i>Default:</i> 0 <i>Result Codes:</i> OK for parameters 0 - 2. ERROR otherwise. <i>Command Options:</i> ATW0 Error-correction call progress not reported. ATW1 Error-correction call progress reported. ATW2 Error-correction call progress not reported. CONNECT XXXX message reports DCE speed.</p>
ATXn	<p>Extended Result Codes. Determines whether the Executive Series responds to dialtone and busy signals, and how it displays result codes for CONNECT messages. When the modem ignores dialtone, it waits for a time delay given by register S6 (default is 2 seconds) and then dials regardless of presence or absence of dialtone; this is called blind dialling.</p> <p><i>Parameters:</i> 0 - 4 <i>Default:</i> 4 <i>Result Codes:</i> OK for parameters 0 - 4. ERROR otherwise. <i>Command Options:</i> ATX0 Executive Series ignores dialtone and busy signal. Sends CONNECT message when a connection is established by blind dialling. ATX1 Modem ignores dialtone and busy signal. Sends CONNECT XXXX message reflecting bit rate when a connection is established by blind dialling. ATX2 Modem ignores busy signal but waits for dialtone before dialling. If dialtone is not detected within 5 seconds, the NO DIALTONE message is sent. Sends CONNECT XXXX message reflecting bit rate when a connection is established. ATX3 Modem ignores dialtone. Sends BUSY message if a busy signal is detected. Sends CONNECT XXXX message reflecting bit rate when a connection is established by blind dialling. ATX4 If dialtone is not detected within 5 seconds, sends NO DIALTONE message. If busy signal is detected, sends BUSY message. CONNECT XXXX message reflecting bit rate when a connection is established.</p>

Table 3-2. "AT" Command Definitions (Cont'd)

COMMAND	DESCRIPTION																																																																				
ATXn (cont'd)	<p>Result codes - Q, V, W, X, S95</p> <table border="1"> <thead> <tr> <th>Numeric</th> <th>Verbal</th> </tr> </thead> <tbody> <tr><td>0</td><td>OK</td></tr> <tr><td>1</td><td>CONNECT</td></tr> <tr><td>2</td><td>RING</td></tr> <tr><td>3</td><td>NO CARRIER</td></tr> <tr><td>4</td><td>ERROR</td></tr> <tr><td>5</td><td>CONNECT 1200</td></tr> <tr><td>6</td><td>NO DIALTONE</td></tr> <tr><td>7</td><td>BUSY</td></tr> <tr><td>8</td><td>NO ANSWER</td></tr> <tr><td>9</td><td>CONNECT 0600</td></tr> <tr><td>10</td><td>CONNECT 2400</td></tr> <tr><td>11</td><td>CONNECT 4800</td></tr> <tr><td>12</td><td>CONNECT 9600</td></tr> <tr><td>13</td><td>CONNECT 7200</td></tr> <tr><td>14</td><td>CONNECT 12000</td></tr> <tr><td>15</td><td>CONNECT 14400</td></tr> <tr><td>16</td><td>CONNECT 19200</td></tr> <tr><td>17</td><td>CONNECT 38400</td></tr> <tr><td>18</td><td>CONNECT 57600</td></tr> <tr><td>40</td><td>CARRIER 300</td></tr> <tr><td>46</td><td>CARRIER 1200</td></tr> <tr><td>47</td><td>CARRIER 2400</td></tr> <tr><td>48</td><td>CARRIER 4800</td></tr> <tr><td>49</td><td>CARRIER 7200</td></tr> <tr><td>50</td><td>CARRIER 9600</td></tr> <tr><td>51</td><td>CARRIER 12000</td></tr> <tr><td>52</td><td>CARRIER 14400</td></tr> <tr><td>66</td><td>COMPRESSION: CLASS 5</td></tr> <tr><td>67</td><td>COMPRESSION: V.42BIS</td></tr> <tr><td>69</td><td>COMPRESSION: NONE</td></tr> <tr><td>70</td><td>PROTOCOL: NONE</td></tr> <tr><td>77</td><td>PROTOCOL: LAP-M</td></tr> <tr><td>80</td><td>PROTOCOL: ALT</td></tr> </tbody> </table>	Numeric	Verbal	0	OK	1	CONNECT	2	RING	3	NO CARRIER	4	ERROR	5	CONNECT 1200	6	NO DIALTONE	7	BUSY	8	NO ANSWER	9	CONNECT 0600	10	CONNECT 2400	11	CONNECT 4800	12	CONNECT 9600	13	CONNECT 7200	14	CONNECT 12000	15	CONNECT 14400	16	CONNECT 19200	17	CONNECT 38400	18	CONNECT 57600	40	CARRIER 300	46	CARRIER 1200	47	CARRIER 2400	48	CARRIER 4800	49	CARRIER 7200	50	CARRIER 9600	51	CARRIER 12000	52	CARRIER 14400	66	COMPRESSION: CLASS 5	67	COMPRESSION: V.42BIS	69	COMPRESSION: NONE	70	PROTOCOL: NONE	77	PROTOCOL: LAP-M	80	PROTOCOL: ALT
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ATYn	<p>Control Long Space Disconnect. Determines whether the Executive Series disconnects when it receives a continuous break from a remote modem for a period equal to, or greater than, 1.6 seconds, and sends a break for 4 seconds before disconnecting due to an ON-to-OFF transition of DTR if an AT&D2 option is in effect, or upon receipt of an ATH command.</p> <p><i>Parameters:</i> 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> ATY0 Disable long space disconnect. ATY1 Enable long space disconnect.</p>																																																																				
ATZn	<p>Reset. Causes the Executive Series to disconnect and performs a warm start. This command must be the last command on the command line. The reset actions are:</p> <ul style="list-style-type: none"> • Clear serial port buffers. • Set the baud rate and parity to match the local DTE when any AT command is issued. • Restore the active configuration with the user profile denoted by the parameter. <p><i>Parameters:</i> 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise.</p>																																																																				

Table 3-3. AT& Command Definitions

COMMAND	DESCRIPTION																														
AT&Cn	<p>DCD Option. Controls the Received Line Signal Detected (RLSD) [Carrier Detect (DCD)] signal of the serial port. If synchronous mode is selected, this command is ignored and the Executive Series functions as if the AT&C1 command has been entered.</p> <p><i>Parameters:</i> n = 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> AT&C0 RLSD is ON regardless of the state of the data carrier from the remote modem. AT&C1 RLSD follows the state of the data carrier from the remote modem.</p>																														
AT&Dn	<p>DTR Option. Determines actions taken by the Executive Series in relation to the Data Terminal Ready (DTR) signal of the serial port. The effect of DTR loss depends upon the AT&D and AT&Q (AT&M) commands.</p> <p><i>Parameters:</i> n = 0 - 3 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 to 3. ERROR otherwise.</p> <p>The action for the event that follows DTR loss is indicated in the following table:</p> <table border="1"> <thead> <tr> <th></th> <th>&D0</th> <th>&D1</th> <th>&D2</th> <th>&D3</th> </tr> </thead> <tbody> <tr> <td>&Q0</td> <td>NONE</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>&Q1</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>&Q2</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>&Q3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>&Q4</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </tbody> </table> <p>The DTR going-off events corresponding to the action numbers in the table above are:</p> <ol style="list-style-type: none"> 1. Modem disconnects and sends OK result code. 2. Modem goes into command mode if in data mode and sends OK result code. 3. Modem disconnects after the delay specified in register S38, sends the OK result code, and disables auto answer while DTR is off. 4. Modem performs a warm start (i.e., same as ATZ command). This is the DTE/AT&D3 abort. 		&D0	&D1	&D2	&D3	&Q0	NONE	2	3	4	&Q1	1	2	3	4	&Q2	3	3	3	3	&Q3	3	3	3	3	&Q4	1	2	3	4
	&D0	&D1	&D2	&D3																											
&Q0	NONE	2	3	4																											
&Q1	1	2	3	4																											
&Q2	3	3	3	3																											
&Q3	3	3	3	3																											
&Q4	1	2	3	4																											
AT&F	<p>Restore Factory Configuration. Loads the Executive Series' active configuration area with the factory default values.</p> <p><i>Parameters:</i> None. <i>Default:</i> None. <i>Result Codes:</i> OK</p>																														
AT&Gn	<p>Set Guard Tone. Normally controls the generation of guard tones. This command is not implemented, however the command structure is provided for application compatibility.</p> <p><i>Parameters:</i> n = 0 - 2 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 to 2. ERROR otherwise.</p>																														

Table 3-3. AT& Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT&Jn	<p>Telephone Jack Selection. Determines how the auxiliary relay is controlled. This command is not implemented, however the command structure is provided for application compatibility.</p> <p><i>Parameters:</i> n = 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> AT&J0 Suitable for RJ-11, RJ-41S or RJ-45S type phone jack. The auxiliary relay is never operated. AT&J1 Suitable for RJ-12 or RJ-13 type jack.</p>
AT&Kn	<p>DTE/Modem Flow Control. Determines how the Executive Series controls the flow of data between the local DTE and the modem. When the modem's terminal buffer is nearly full, it will either send an XOFF or drop CTS to stop the data flow. When the buffer is nearly empty, the modem will either send an XON or raise CTS to start the data flow again.</p> <p>The Executive Series also responds to XON/XOFF characters or RTS stimulus from the DTE by suspending or resuming transmission accordingly. The modem responds to DTE XON/XOFF characters and also passes the XON/XOFF characters to the remote modem as data if transparent flow control is selected.</p> <p>When in Direct mode (AT&Q0), flow control is not used and the modem ignores the setting of this command.</p> <p><i>Parameters:</i> n = 0, 3, 4 or 5 <i>Default:</i> 3 <i>Result Codes:</i> OK for 0, 3, 4 or 5. ERROR otherwise. <i>Command Options:</i> AT&K0 Disables flow control. AT&K3 Enables RTS/CTS flow control. AT&K4 Enables XON/XOFF flow control. AT&K5 Enables transparent XON/XOFF flow control.</p>
AT&Ln	<p>Line Type. Controls selection of leased line or dial-up line. Although the Executive Series modem has only a single line connection, the power level is changed when setting leased line operation. (See S91 register.)</p> <p><i>Parameters:</i> n = 0 or 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. <i>Command Options:</i> AT&L0 Dial-up line. AT&L1 Leased line.</p>
AT&Mn	<p>Communication Mode. Same as AT&Q0 - AT&Q3.</p> <p><i>Parameters:</i> n = 0 - 3 <i>Default:</i> &Qn <i>Result Codes:</i> OK for 0 - 3. ERROR otherwise.</p>
AT&Pn	<p>Dial Pulse Ratio. Selects the ratio of the off-hook (make) to on-hook (break) interval used when pulse dialing.</p> <p><i>Parameters:</i> n = 0, 1 or 2 <i>Default:</i> 1 <i>Result Codes:</i> OK for n = 0 - 2 in U.S.; for n = 1 - 2 in Japan. ERROR otherwise. <i>Command Options:</i> AT&P0 39%/61% make/break ratio @ 10 pps. AT&P1 33%/67% make/break ratio @ 10 pps. AT&P2 33%/67% make/break ratio @ 20 pps.</p>

Table 3-3. AT& Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT&Qn	Communication Mode. The Executive Series supports three basic communication modes: asynchronous, synchronous, and error correction. <i>Parameters:</i> n = 0 - 6 <i>Default:</i> 5 <i>Result Codes:</i> OK for 0 - 6 ERROR otherwise.
	Command Options: AT&Q0 Selects asynchronous operation in the Direct Mode. DTE speed must match the telephone line speed.
	AT&Q1 Selects synchronous mode 1 operation. Supports terminals that are able to communicate in both asynchronous and synchronous protocols. Uses the dial command to place a call in asynchronous mode then switches to synchronous mode once the connection is made. The modem goes on-hook and switches back to asynchronous mode when it detects an ON-to-OFF transition on DTR or a loss of carrier from the remote modem exceeding the time interval given by register S10.
	AT&Q2 Selects synchronous mode 2 operation. Supports synchronous terminals with stored number dialling. The modem automatically dials a stored number when it detects an OFF-to-ON transition on DTR. An asynchronous terminal is still needed to save or change the phone number stored in the NVRAM; the number is saved using the "AT&Z0=x" command. The modem dials the number stored in the first entry. The modem goes on-hook and switches back to the asynchronous mode when an ON-to-OFF transition on DTR is detected or a loss of carrier occurs from the remote modem exceeding the time interval given by register S10.
	AT&Q3 Selects synchronous mode 3 operation. This mode allows DTR to act as a Talk/Data switch. The operator manually initiates a call with DTR OFF, implying the modem is in Talk mode. To complete the call, the operator switches the modem to Data mode by turning DTR ON after the last number is dialled. The modem goes on-hook and switches to the asynchronous mode when an ON-to-OFF transition on DTR is detected or a loss of carrier occurs from the remote modem exceeding the time interval given by register S10.
	AT&Q4 This command causes the Executive Series to issue OK result code but has no effect on operation.
	AT&Q5 Selects error correction mode. Modem negotiates an error-correction link. The modem can be configured to either disconnect or fallback to a normal asynchronous connect if a link cannot be negotiated (refer register S36). AT&Q5 and S36 = 0: same as ATVN2 (no fallback). AT&Q5 and S36 = 1: same as ATVN3 (fallback) (see ATN command).
	AT&Q6 Selects asynchronous operation in Normal mode (Constant Speed Interface). In this mode, DTE speed can differ from telephone line speed.
	AT&Q7 This command causes the modem to issue the OK result code, but has no effect on operation.
	AT&Q8 This command forces the modem to behave as if S48=128, i.e., fallback to MNP. If Bit 1 of S36=1, the modem acts as if S36=7. Otherwise, it acts as if S36=5.
	AT&Q9 This command causes the modem to behave as if AT&Q5 was set with S48=7 and S46=138. The modem will attempt V.42 bis, fallback to V.42 (LAP-M) then fallback to normal mode.

Table 3-3. AT& Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT&Rn	RTS/CTS Option. Controls the state of the CTS signal in the synchronous mode. CTS is always ON in the asynchronous mode. <i>Parameters:</i> n = 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. Command Options: AT&R0 CTS tracks RTS. CTS is turned ON in response to an OFF-to-ON transition of RTS from the local DTE after a delay period specified by register S26 in increments of 10 milliseconds (default is 0). AT&R1 The modem ignores RTS. CTS is held ON.
AT&Sn	DSR Option. Determines whether DSR operates in accordance with EIA-232-D specification or remains ON. <i>Parameters:</i> n = 0, 1 <i>Default:</i> 0 <i>Result Codes:</i> OK for 0 and 1. ERROR otherwise. Command Options: AT&S0 DSR is always ON. AT&S1 DSR is turned ON at start of handshaking and OFF when in a test mode or idle state. DSR is turned OFF when carrier is lost.
AT&Tn	Test And Diagnostic. Selects the test command. Test commands must be initiated in the command mode with asynchronous operation in the Direct mode selected (AT&Q0) at a speed of 1200 bps or faster. A telephone line connection must be established prior to initiating digital loopback tests. If these conditions are not met, the Executive Series issues the ERROR result code. If local analogue loopback is initiated while the modem is connected, it will disconnect before performing the test. <i>Parameters:</i> 0, 1, 3 - 8 <i>Default:</i> 4 Command Options: AT&T0 End test in progress. The escape sequence must be issued to return the Executive Series to the command mode prior to sending this command. Subsequent issuing of the ATO command while in the command mode will cause the local and remote modems to return to normal data mode operation if the interrupted test was digital loopback.
	AT&T1 Initiates local analogue loopback. This test verifies the working condition of the path between the local DTE and the local modem. The characters received from the DTE are looped back to the DTE by the modem.
	AT&T3 Initiates remote digital loopback locally. The characters received from the remote modem are looped back to the remote modem by the local modem. This test verifies the working condition of the path from a remote modem, through a local modem, and back to the remote modem.
	AT&T4 Allows the Executive Series to respond to a request from a remote modem for a remote digital loopback test.
	AT&T5 Prohibits the modem from granting a request from a remote modem for a remote digital loopback test.

Table 3-3. AT& Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT&Tn (cont'd)	<p>AT&T6 Initiates remote digital loopback. The characters received from the local DTE are transmitted to the remote modem and looped back from the remote modem to the local modem and DTE. This test verifies the working condition of the path between the local DTE and the remote modem.</p> <p>AT&T7 Initiates remote digital loopback with self test. This test works similarly to AT&T6 except that the Executive Series sends an alternating zeros and ones (0101) test pattern to the remote modem and continuously examines the validity of the returned data. The modem increments an internal error counter each time an error is detected. At the end of the test, the Executive Series returns a 3-digit error count to the DTE.</p> <p>AT&T8 Initiates local analogue loopback with self test. This test works similarly to AT&T7 except that the test pattern is checked in the local analogue loopback mode (as in AT&T1). This allows a thorough testing of the local modem transmit and receive functions without an actual telephone line connection.</p>
	<p>View Current Configuration And User Profiles. Displays the active configuration and user profiles.</p> <p><i>Parameters:</i> None.</p> <p><i>Default:</i> None.</p> <p><i>Result Codes:</i> OK</p> <p><i>Example:</i></p> <p>AT&V</p> <p>ACTIVE PROFILE: B0 E1 L2 MI N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5 &R0 &S0 &T4 &X0 &Y0 S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:005 S37:000 S38:020 S44:003 S46:138 S48:007 S49:008 S50:255</p> <p>STORED PROFILE 0: B1 E1 L2 MI N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5 &R0 &S0 &T4 &X0 S00:000 S02:043 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:005 S37:000 S38:020 S44:003 S46:138 S48:007 S49:008 S50:255</p> <p>STORED PROFILE 1: B1 E1 L2 MI N1 P Q0 V1 W0 X4 Y0 &C0 &D0 &G0 &J0 &K3 &Q5 &R0 &S0 &T4 &X0 S00:000 S02:043 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:005 S37:000 S38:020 S44:003 S46:138 S48:007 S49:008 S50:255</p> <p>TELEPHONE NUMBERS: 0 = 1 = 2 = 4 =</p> <p>OK</p>

Table 3-3. AT& Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT&Wn	<p>Store User Profile. Saves the current configuration into NVRAM as one of two user profiles. The current configuration is comprised of a list of storable parameters illustrated in the AT&V command. These settings are restored to the active configuration upon receiving an ATZn command or at power up (see AT&Y command). The user profile saved is denoted by the parameter value.</p> <p><i>Parameters:</i> n = 0, 1</p> <p><i>Default:</i> 0</p> <p><i>Result Codes:</i> OK for 0 and 1. ERROR otherwise.</p> <p><i>Command Options:</i> AT&W0 Save as user profile 0. AT&W1 Save as user profile 1.</p>
AT&Xn	<p>Clock Source Selection. Selects the source of the synchronous transmit clock for the Executive Series during synchronous operation. In asynchronous mode, the transmit and receive clocks are turned OFF. In synchronous mode, the clocks are turned ON with the frequency of 2400 Hz or 1200 Hz corresponding to the speed that is selected for modem operation.</p> <p><i>Parameters:</i> n = 0 - 2</p> <p><i>Default:</i> 0</p> <p><i>Result Codes:</i> OK for 0 to 2. ERROR otherwise.</p> <p><i>Command Options:</i> AT&X0 Internal timing. The modem generates the transmit clock signal and applies it to the EIATXCLK output at the serial interface.</p> <p>AT&X1 External timing. The local DTE sources the transmit clock signal on the SPXEXTCLK input of the serial interface. The modem applies this clock to the EIATXCLK output at the serial interface.</p> <p>AT&X2 Slave receive timing. The modem derives the transmit clock signal from the incoming carrier and applies it to the EIATXCLK output at the serial interface.</p>
AT&Yn	<p>Designate Default User Profile. Designates which of two user profiles will be loaded into the active configuration at power up. The user profile is denoted by the parameter value.</p> <p><i>Parameters:</i> 0, 1</p> <p><i>Default:</i> 0</p> <p><i>Result Codes:</i> OK for 0 and 1. ERROR otherwise.</p> <p><i>Command Options:</i> AT&Y0 Selects user profile 0. AT&Y1 Selects user profile 1.</p>
AT&Zn	<p>Store Phone Number. Stores a 36-digit dial string (x) in the specified entry (n) for later dialling. (See ATDS=n command.)</p> <p><i>Parameters:</i> n = 0 - 3, x = dial string</p> <p><i>Default:</i> None.</p> <p><i>Result Codes:</i> OK for all parameters. ERROR if storage number (n) is outside allowable range.</p>

Table 3-4. AT\ Command Definitions

COMMAND	DESCRIPTION								
AT\An	<p>Maximum MNP Block Size. Sets maximum block size for MNP stream link connections. Use this command to transmit smaller blocks of data in a reliable link connection.</p> <p><i>Parameters:</i> n = 0 - 3 (If n is greater than 3, 3 is used.)</p> <p><i>Default:</i> 3</p> <p><i>Result Codes:</i> OK</p> <p><i>Command Options:</i></p> <table> <tr> <td>AT\A0</td> <td>Sets maximum block size to 64 characters.</td> </tr> <tr> <td>AT\A1</td> <td>Sets maximum block size to 128 characters.</td> </tr> <tr> <td>AT\A2</td> <td>Sets maximum block size to 192 characters.</td> </tr> <tr> <td>AT\A3</td> <td>Sets maximum block size to 256 characters.</td> </tr> </table>	AT\A0	Sets maximum block size to 64 characters.	AT\A1	Sets maximum block size to 128 characters.	AT\A2	Sets maximum block size to 192 characters.	AT\A3	Sets maximum block size to 256 characters.
AT\A0	Sets maximum block size to 64 characters.								
AT\A1	Sets maximum block size to 128 characters.								
AT\A2	Sets maximum block size to 192 characters.								
AT\A3	Sets maximum block size to 256 characters.								
AT\Bn	<p>Transmit Break. When this command is entered during a non-MNP connection, the Executive Series sends a break signal to the remote modem. The length of the break is 100 times the n parameter value in milliseconds. If this command is entered in MNP mode, the Executive Series sends a Link Attention PDU to the remote modem.</p> <p><i>Parameters:</i> n = 1 to 9 (If n = 0, the default value 3 is used; if n is greater than 9, 9 is used.)</p> <p><i>Default:</i> 3</p> <p><i>Result Codes:</i> OK if connected. NO CARRIER if not connected.</p>								
AT\Gn	<p>Modem-To-Modem Flow Control. Enables or disables modem-to-modem flow control during a Normal mode connection. Since the reliable link (error correction) has its own method of flow control, the AT\Gn command is ignored when error correction is selected (AT&Q5). However, the DTE-to-modem flow control remains active during a reliable link.</p> <p><i>Parameters:</i> n = 0, 1 (If n is greater than 1, 1 is used.)</p> <p><i>Default:</i> 0</p> <p><i>Result Codes:</i> OK</p> <p><i>Command Options:</i></p> <table> <tr> <td>AT\G0</td> <td>Disables flow control (XON/XOFF).</td> </tr> <tr> <td>AT\G1</td> <td>Enables flow control (XON/XOFF).</td> </tr> </table>	AT\G0	Disables flow control (XON/XOFF).	AT\G1	Enables flow control (XON/XOFF).				
AT\G0	Disables flow control (XON/XOFF).								
AT\G1	Enables flow control (XON/XOFF).								
AT\Kn	<p>Break Control. Determines what the Executive Series will do when a BREAK is received from the DTE or the remote modem. During MNP mode, the remote modem's BREAK control setting determines how the local modem will handle the BREAK.</p> <p><i>Parameters:</i> n = 0 - 5 (If n is greater than 5, 5 is used.)</p> <p><i>Default:</i> 5</p> <p><i>Result Codes:</i> OK</p> <p><i>Command Options:</i></p> <p>When a BREAK is received from the DTE during Normal or MNP mode, the Executive Series takes the following action:</p> <table> <tr> <td>AT\K0, 2, 4</td> <td>Modem enters the command mode (waiting for AT) without sending a BREAK to the remote modem.</td> </tr> <tr> <td>AT\K1</td> <td>Modem clears the terminal and modem buffers and sends a BREAK to the remote modem.</td> </tr> <tr> <td>AT\K3</td> <td>Modem does not clear the buffers but sends a BREAK to the remote modem.</td> </tr> <tr> <td>AT\K5</td> <td>Modem sends a BREAK to the remote modem in sequence with any transmitted data.</td> </tr> </table>	AT\K0, 2, 4	Modem enters the command mode (waiting for AT) without sending a BREAK to the remote modem.	AT\K1	Modem clears the terminal and modem buffers and sends a BREAK to the remote modem.	AT\K3	Modem does not clear the buffers but sends a BREAK to the remote modem.	AT\K5	Modem sends a BREAK to the remote modem in sequence with any transmitted data.
AT\K0, 2, 4	Modem enters the command mode (waiting for AT) without sending a BREAK to the remote modem.								
AT\K1	Modem clears the terminal and modem buffers and sends a BREAK to the remote modem.								
AT\K3	Modem does not clear the buffers but sends a BREAK to the remote modem.								
AT\K5	Modem sends a BREAK to the remote modem in sequence with any transmitted data.								

Table 3-4. AT\ Command Definitions (Cont'd)

COMMAND	DESCRIPTION										
AT\Kn (cont'd)	<p>When a BREAK is received from the remote modem during Normal mode, the Executive Series takes the following action:</p> <table> <tr> <td>AT\K0, 1</td> <td>Modem clears the terminal and modem buffers and sends a BREAK to the local DTE.</td> </tr> <tr> <td>AT\K2, 3</td> <td>Modem does not clear buffers but sends a BREAK to the local DTE.</td> </tr> <tr> <td>AT\K4, 5</td> <td>Modem sends a BREAK in sequence with any data being buffered.</td> </tr> </table> <p>When a BREAK is received from the DTE during Direct mode, the Executive Series takes the following action:</p> <table> <tr> <td>AT\K0, 2, 4</td> <td>Modem sends a BREAK to the remote modem and enters command mode (waiting for AT).</td> </tr> <tr> <td>AT\K1, 3, 5</td> <td>Modem sends a BREAK to remote modem.</td> </tr> </table> <p>Note: In LAP-M, breaks are "timed", meaning the Executive Series attempts to preserve the duration of the break when transmitting it to the remote modem. In MNP4, breaks are not "timed", as MNP4 has no facility for maintaining the duration of the signal; a long break is the same as a short break.</p>	AT\K0, 1	Modem clears the terminal and modem buffers and sends a BREAK to the local DTE.	AT\K2, 3	Modem does not clear buffers but sends a BREAK to the local DTE.	AT\K4, 5	Modem sends a BREAK in sequence with any data being buffered.	AT\K0, 2, 4	Modem sends a BREAK to the remote modem and enters command mode (waiting for AT).	AT\K1, 3, 5	Modem sends a BREAK to remote modem.
AT\K0, 1	Modem clears the terminal and modem buffers and sends a BREAK to the local DTE.										
AT\K2, 3	Modem does not clear buffers but sends a BREAK to the local DTE.										
AT\K4, 5	Modem sends a BREAK in sequence with any data being buffered.										
AT\K0, 2, 4	Modem sends a BREAK to the remote modem and enters command mode (waiting for AT).										
AT\K1, 3, 5	Modem sends a BREAK to remote modem.										
AT\Ln	<p>MNP Block Transfer Control. Determines whether the modem will use Block or Stream mode for MNP link.</p> <p><i>Parameters:</i> n = 0, 1 (If n is greater than 1, 1 is used.)</p> <p><i>Default:</i> 0</p> <p><i>Result Codes:</i> OK</p> <p><i>Command Options:</i></p> <table> <tr> <td>AT\L0</td> <td>Uses Stream mode for MNP link connections</td> </tr> <tr> <td>AT\L1</td> <td>Uses Block mode for MNP link connections.</td> </tr> </table>	AT\L0	Uses Stream mode for MNP link connections	AT\L1	Uses Block mode for MNP link connections.						
AT\L0	Uses Stream mode for MNP link connections										
AT\L1	Uses Block mode for MNP link connections.										
AT\Nn	<p>Operation Mode Control. Selects the operating mode the modem uses while connected (see AT&Qn).</p> <p><i>Parameters:</i> n = 0 - 3 (If n is greater than 3, 3 is used.)</p> <p><i>Default:</i> 3</p> <p><i>Result Codes:</i> OK</p> <p><i>Command Options:</i></p> <table> <tr> <td>AT\N0</td> <td>Selects Normal (speed buffering) mode. This option takes effect at physical connection time.</td> </tr> <tr> <td>AT\N1</td> <td>Selects Direct (pass through) mode. This option takes effect at physical connection time.</td> </tr> <tr> <td>AT\N2</td> <td>Selects reliable link mode. This defines the modem-to-modem connection to require error correction. If an attempt to establish the reliable link fails, the modem disconnects. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.</td> </tr> <tr> <td>AT\N3</td> <td>Selects auto-reliable link mode. The modem will attempt an error-correction connection but will fallback to Normal mode if unable to establish an MNP link. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.</td> </tr> </table>	AT\N0	Selects Normal (speed buffering) mode. This option takes effect at physical connection time.	AT\N1	Selects Direct (pass through) mode. This option takes effect at physical connection time.	AT\N2	Selects reliable link mode. This defines the modem-to-modem connection to require error correction. If an attempt to establish the reliable link fails, the modem disconnects. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.	AT\N3	Selects auto-reliable link mode. The modem will attempt an error-correction connection but will fallback to Normal mode if unable to establish an MNP link. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.		
AT\N0	Selects Normal (speed buffering) mode. This option takes effect at physical connection time.										
AT\N1	Selects Direct (pass through) mode. This option takes effect at physical connection time.										
AT\N2	Selects reliable link mode. This defines the modem-to-modem connection to require error correction. If an attempt to establish the reliable link fails, the modem disconnects. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.										
AT\N3	Selects auto-reliable link mode. The modem will attempt an error-correction connection but will fallback to Normal mode if unable to establish an MNP link. This command takes effect at physical connection time only. To establish MNP after a physical connection, use the AT\O, AT\U, or AT\Y command.										

Table 3-4. AT\ Command Definitions (Cont'd)

COMMAND	DESCRIPTION
AT\O	<p>Originate Reliable Link Control. Forces the Executive Series to originate an MNP connection regardless of whether it is in originate or answer mode. The modem will send up to two link requests. If the remote modem does not respond after the second request, the Executive Series returns to its previous state.</p> <p>This command can be executed only if a physical connection exists, and will return a NO CARRIER message if there is no connection, or an appropriate connect message if a reliable link connection already exists. This command must be the last command on a command line.</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p>
AT\Tn	<p>Inactivity Timer Control. Determines the length in 1-minute intervals that the Executive Series will wait before disconnecting when no data is sent or received. In MNP mode, any data transmitted or received by the modem will reset the timer. In non-MNP mode, any data transmitted will reset the timer. The inactivity timer is inoperative in synchronous mode and in direct mode.</p> <p><i>Parameters:</i> n = 0 - 42 (If n is greater than 42, 42 is used.) <i>Default:</i> 0 <i>Result Codes:</i> OK</p>
AT\U	<p>Accept Reliable Mode Control. Causes the Executive Series to wait up to 12 seconds for a link request from the remote modem to establish an MNP link, regardless of whether the modem is in originate or answer mode. If the Link Request is not received within this time period, the modem returns to its previous state.</p> <p>This command can be executed only if a physical connection exists, and will return the NO CARRIER message if there is no connection, or an appropriate connect message if a reliable link connection already exists. This command must be the last command on a command line.</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p>
AT\Y	<p>Switch To Reliable Mode. Causes the Executive Series to try to establish a reliable link. Depending on whether it is in originate or answer mode, the modem either accepts a link request from the remote modem or sends a link request, respectively. If the MNP connection attempt fails, the Executive Series returns to its previous state.</p> <p>This command can be executed only if a physical connection exists, and will return the NO CARRIER message if there is no connection, or an appropriate connect message if a reliable link connection already exists. This command must be the last command on a command line.</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p>
AT\Z	<p>Switch To Normal Mode. Causes the Executive Series to switch to normal mode after a reliable link is established. Switching the normal mode erases any data that may be in the terminal and modem buffers.</p> <p>This command can be executed only if an MNP connection exists, and will return the NO CARRIER message if there is no connection, or an appropriate connect message if a reliable link connection previously existed.</p> <p>This command must be the last command on a command line.</p> <p><i>Parameters:</i> None. <i>Default:</i> None.</p>

Table 3-5. AT% Command Descriptions

COMMAND	DESCRIPTION
AT%Cn	<p>Compression Control. Determines whether or not the modem will use data compression.</p> <p><i>Parameters:</i> 0, 1 (If n is greater than 1, 1 is used.) <i>Default:</i> 1 <i>Result Codes:</i> OK <i>Command Options:</i> AT%C0 Disables data compression. AT%C1 Enables data compression.</p>
AT%Dn	<p>Set Dictionary Size (BTLZ). Sets the BTLZ dictionary size.</p> <p><i>Parameters:</i> 0 - 3 <i>Default:</i> 2 <i>Result Codes:</i> OK <i>Command Options:</i> AT%D0 512. AT%D1 1024. AT%D2 2048. AT%D3 4096 (one-way compression only). *</p> <p>* For two-way compression (AT%M3), the dictionary size is set to 2048 if AT%D3 is issued.</p>
AT%En	<p>Enable/Disable Auto-Retrain. Determines whether or not the Executive Series automatically monitors the line quality and requests a retrain when necessary during a 2400 bps or faster connection.</p> <p><i>Parameters:</i> n = 0, 1 (If n is greater than 1, 1 is used.) <i>Default:</i> 0 <i>Result Codes:</i> OK <i>Command Options:</i> AT%E0 Disables auto-retrain. AT%E1 Enables auto-retrain.</p>
AT%L	<p>Report Received Signal Level. Returns a value identifying the received signal level. The possible values are:</p> <p>009 = Received level of -9 dBm. 010 = Received level of -10 dBm. 011 = Received level of -11 dBm.</p> <p>043 = Received level of -43 dBm.</p> <p>If the received level is greater than -9 dBm, 009 will be reported. If the received level is less than -43 dBm, 043 will be reported.</p> <p><i>Parameters:</i> None. <i>Default:</i> None. <i>Result Codes:</i> OK</p>
AT%Mn	<p>Set One/Two-Way Compression Mode (BTLZ). Selects the one/two-way compression mode when using BTLZ compression.</p> <p><i>Parameters:</i> 0 - 3 <i>Default:</i> 3 <i>Command Options:</i> AT%M0 Compression disabled. AT%M1 Transmit compression only. AT%M2 Receive compression only. AT%M3 Two-way compression.</p>

Table 3-5. AT% Command Descriptions (Cont'd)

COMMAND	DESCRIPTION
AT%P	<p>Clear BTLZ Encoder Dictionary. Resets the local modem BTLZ encoder dictionary and sends a command code to the remote modem to reset the remote BTLZ dictionary.</p> <p><i>Parameters:</i> None.</p> <p><i>Default:</i> None.</p> <p><i>Result Codes:</i> OK if encoder dictionary is in use. ERROR if encoder dictionary is not in use.</p>
AT%Q	<p>Report Line Signal Quality. Returns the high-order byte of the calculated Eye Quality Monitor (EQM) value. The high-order byte can range from 0 to 255. However, when the value is 8 or greater, the Executive Series will automatically retrain if enabled by the AT%E1 command. The value for a normal connection ranges from about 0 to 2 and approaches 8 for a progressively poorer connection.</p> <p><i>Parameters:</i> None.</p> <p><i>Default:</i> None.</p> <p><i>Result Codes:</i> OK</p>
AT%Sn	<p>Set Maximum String Length (BTLZ). Sets the maximum number of characters that can be compressed into one word.</p> <p><i>Parameters:</i> 6 - 250</p> <p><i>Default:</i> 32 characters.</p>

4. S REGISTERS

The S registers are summarised in Table 4-1 along with their default values. Registers denoted with an "*" in Table 4-1 may be stored in one of the two user profiles by entering the AT&Wn command. One of these profiles may be loaded at any time by using the ATZn command. The S registers are described in detail in Table 4-2.

4.1 Factory Defaults

The factory default values are stored in the EPROM and are loaded into the active configuration at power-up or by the ATZn command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by the AT&Yn command where n can be one of two possible user profiles (0 or 1).

All of the original factory default register values may be loaded at any time whilst in command mode by entering the AT&F command.

4.2 S Register Determination

Throughout this manual the values for S registers are listed in decimal notation. To determine the contents of some S registers, it is necessary to convert from decimal to binary or vice versa. To convert an S Register to its binary representation, see the Decimal-To-Binary Conversion Table at the rear of this manual.

Table 4-1. S Register Summary

REGISTER	TITLE	DEFAULT
S0	Number Of Rings Till Auto-Answer	0 *
S1	Ring Counter	0
S2	Escape Character	43 *
S3	Carriage Return Character	13
S4	Line Feed Character	10
S5	Backspace Character	8
S6	Wait For Blind Dialling	2 *
S7	Wait For Carrier After Dial	50 *
S8	Pause Time For Dial Delay	2 *
S9	Carrier Detect Response Time	6 *
S10	Lost Carrier To Hang-Up Delay	14 *
S11	DTMF Tone Duration	95 *
S12	Escape Code Guard Time	50 *
S13	Reserved	None
S14	Bit-Mapped Options	None *
S15	Reserved	None
S16	Bit-Mapped Test Options	None
S17	Reserved	None
S18	Test Timer	0 *
S19	Reserved	0
S20	Reserved	None
S21	Bit-Mapped Options	None *
S22	Bit-Mapped Options	None *
S23	Bit-Mapped Options	None *
S24	Reserved	None
S25	Delay To DTR	5 *
S26	RTS To CTS Delay Interval	1 *
S27	Bit-Mapped Options	None *
S28 - 29	Reserved	None
S30	Inactivity Timer	0 *
S31 - 35	Reserved	None
S36	Negotiation Failure Treatment	7 *
S37	Desired Telephone Line Speed	0 *
S38	Delay Before Forced Disconnect	20 *
S39	Reserved	None *
S40	Bit-Mapped Options (MNP)	77
S41	Bit-Mapped Options (MNP)	1
S44	Unused	3 *
S46	Protocol Selection	None *
S48	V.42 Negotiation Action	None *
S49	Speed Buffer Lower Limit	8 *
S50	Speed Buffer Upper Limit	255 *
S82	Break Handling	None
S86	Connection Failure Cause Code	None
S91	Programmable Transmit Level	0 *
S95	Extended Result Codes	0 *

* Register value may be stored in one of two user profiles with the AT&Wn command.

Table 4-2. S Register Definitions

REGISTER	DESCRIPTION
S0	Number Of Rings Till Auto-Answer. Establishes the number of ring signals required before the Executive Series answers incoming calls. Setting this register to zero (0) disables auto-answer mode. If S0 is set to 1, the modem will answer after 2 rings; if set to a value greater than 5, 5 is used. <i>Range:</i> 0, 2 - 5 rings <i>Default:</i> 0
S1	Ring Counter. Number of rings that the Executive Series detects before it answers a call. If no rings occur over an eight second interval, this register is cleared. <i>Range:</i> 0 - 255 rings <i>Default:</i> 0
S2	Escape Character. S2 holds the decimal value of the ASCII character used for the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e., no escape character will be recognised. <i>Range:</i> 0 - 255, ASCII decimal <i>Default:</i> 43
S3	Carriage Return Character. Sets the command line and result code terminator character. Pertains to asynchronous operation only. <i>Range:</i> 0 - 127, ASCII decimal <i>Default:</i> 13 (Carriage Return)
S4	Line Feed Character. Sets the character recognised as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used. <i>Range:</i> 0 - 127, ASCII decimal <i>Default:</i> 10 (Line Feed)
S5	Backspace Character. Sets the character recognised as a backspace. Pertains to asynchronous operation only. The Executive Series will not recognise 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; this means a total of three characters are transmitted each time the Executive Series processes the Backspace character. <i>Range:</i> 0 - 32, ASCII decimal <i>Default:</i> 8 (Backspace)
S6	Wait Time For Blind Dialling. Sets the length of time to pause after the Executive Series goes off-hook and before it dials the first digit of the telephone number. The modem always pauses for a minimum of 2 seconds even if the S6 register is set to a value less than 2 seconds. The "Wait For Dialtone" call progress feature (W in the dial string) will override the value in register S6. If option ATX2 or ATX4 is in effect, this register is ignored. <i>Range:</i> 2 - 255 seconds <i>Default:</i> 2

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S7	<p>Wait For Carrier After Dial. Defines two delay times:</p> <ol style="list-style-type: none"> 1. During call establishment, this register establishes the time that the Executive Series waits for carrier from the remote modem before hanging up. 2. Sets the length of time that the Executive Series waits when the "Wait For Dialtone" call progress feature (W in the dial string) is in effect. <p><i>Range:</i> 20 - 255 seconds <i>Default:</i> 50</p>
S8	<p>Pause Time For Dial Delay. Sets the length of time to pause when the Executive Series encounters the "Pause During Dial" call progress feature, i.e., the comma (,).</p> <p><i>Range:</i> 0 - 255 <i>Default:</i> 2</p>
S9	<p>Carrier Detect Response Time. Determines how long a carrier signal must be present before the Executive Series recognises it as a carrier and turns on DCD. As this value is increased, there is less chance of detecting a false carrier due to noise from the telephone line.</p> <p><i>Range:</i> 1 - 255 tenths of a second <i>Default:</i> 6 (0.6 second)</p>
S10	<p>Lost Carrier To Hang-Up Delay. Sets the length of time the Executive Series waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if carrier is always present.</p> <p>The actual interval the Executive Series waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognises the carrier.</p> <p><i>Range:</i> 1 - 255 tenths of a second <i>Default:</i> 14 (1.4 seconds)</p>
S11	<p>DTMF Tone Duration. Sets the duration of tones in Dual Tone Multi-Frequency (DTMF) dialling. This value has no effect on pulse dialling.</p> <p><i>Range:</i> 65 - 255 milliseconds <i>Default:</i> 95 milliseconds</p>
S12	<p>Escape Code Guard Time. Sets the time delay required immediately before and after entering the escape code. The time interval between the sending of the first and second, or the second and third escape code character must be less than the value of the guard time.</p> <p><i>Range:</i> 0 - 255 fiftieths of a second <i>Default:</i> 50 (1 second)</p>
S13	Reserved.

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S14	<p>Bit-Mapped Options. Indicates the status of command options.</p> <ul style="list-style-type: none"> Bit 0 = ATF 0 - Disabled 1 - Enabled Bit 1 = ATE 0 - Disabled 1 - Enabled Bit 2 = ATQ 0 - Disabled 1 - Enabled Bit 3 = ATV 0 - Numeric 1 - Verbose Bit 4 = Reserved Bit 5 = ATP or ATT 0 - ATT 1 - ATP Bit 6 = Part of ATQ 0 - ATQ0, 1 1 - ATQ2 Bit 7 = Originate/Answer 0 - Answer 1 - Originate
S15	Reserved.
S16	<p>Bit-Mapped Test Options. Indicates the test in progress. The AT&T0 command terminates any test and sets S16 to zero.</p> <p><i>Default:</i> 0</p> <ul style="list-style-type: none"> Bit 0 = Local analogue loopback (AT&T1) 0 - Disabled (default) 1 - Enabled Bit 1 = Not used Bit 2 = Local digital loopback (AT&T3) 0 - Disabled (default) 1 - Enabled Bit 3 = Remote digital loopback status (AT&T4 and T5) 0 - Loopback off 1 - Loopback in progress Bit 4 = Remote digital loopback (AT&T6) 0 - Disabled (default) 1 - Enabled Bit 5 = Remote digital loopback with self test (AT&T7) 0 - Disabled (default) 1 - Enabled Bit 6 = Local analogue loopback with self test (AT&T8) 0 - Disabled (default) 1 - Enabled Bit 7 = Not used
S17	Reserved.
S18	<p>Test Timer. Sets the length of time the Executive Series conducts a test before returning to the command mode. If this register is zero, the test will not automatically terminate; the test must be terminated from the command mode by issuing an AT&T0 or ATH command.</p> <p><i>Range:</i> 0 - 255 seconds <i>Default:</i> 0</p>
S19	Reserved.
S20	Reserved.

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S21	<p>Bit-Mapped Options. Indicates the status of command options.</p> <p>Bit 0 0 = AT&J0 1 = AT&J1</p> <p>Bit 1 0 = AT&Y0 1 = AT&Y1</p> <p>Bit 2 0 = AT&R0 1 = AT&R1</p> <p>Bit 3, 4 0 = AT&D0 1 = AT&D1 2 = AT&D2 3 = AT&D3</p> <p>Bit 5 0 = AT&C0 1 = AT&C1</p> <p>Bit 6 0 = AT&S0 1 = AT&S1</p> <p>Bit 7 0 = ATY0 1 = ATY1</p>
S22	<p>Bit-Mapped Options. Indicates the status of command options.</p> <p>Bit 0, 1 0 = ATL0 1 = ATL1 2 = ATL2 3 = ATL3</p> <p>Bit 2,3 0 = ATM0 1 = ATM1 2 = ATM2 3 = ATM3</p> <p>Bit 4, 5, 6 0 = ATX0 1 = ATX1 2 = ATX2 3 = ATX3 4 = ATX4</p> <p>Bit 7 0 = AT&P0 1 = AT&P1</p>

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S23	<p>Bit-Mapped Options. Indicates the status of command options.</p> <p>Bit 0 0 = AT&T5 1 = AT&T4</p> <p>Bit 1, 2, 3 - Local DTE rate 0 = 0 - 300 bps 1 = 600 bps 2 = 1200 bps 3 = 2400 bps 4 = 4800 bps 5 = 9600 bps 6 = 19200 bps 7 = 38400 bps and above</p> <p>Bit 4, 5 - Parity option 0 = even 1 = not used 2 = odd 3 = none</p> <p>Bit 6, 7 0 = AT&G0 1 = AT&G1 2 = AT&G2</p>
S24	Reserved.
S25	<p>Delay To DTR. Register S25 serves two purposes. When the Executive Series is operating in synchronous mode 1 or 4, the value assigned to S25 specifies the length of time the modem waits after a connection has been made before examining DTR. This allows the modem to ignore an ON-to-OFF transition of DTR, giving the user sufficient time to disconnect the modem from the asynchronous terminal and attach it to a synchronous terminal without forcing the modem back to the asynchronous command mode. During this time, the value for S25 is read in seconds (e.g. the factory-set value of 5 equals 5 seconds, instead of 0.05 seconds).</p> <p>In all other modes, and after call establishment in synchronous modes 1 and 4, the value is read in 1/100 seconds. In any mode, a change in DTR (ON or OFF) that persists for a period shorter than the value held in S25 is ignored by the modem while it is in data mode.</p> <p><i>Range:</i> 0 - 255 (0.01 second if mode 1 or 4 when in data mode, 1 second otherwise) <i>Default:</i> 5</p>
S26	<p>RTS To CTS Delay Interval. Pertains to synchronous operation only. When CTS tracks RTS (AT&R0) and the Executive Series detects and ON-to-OFF transition on RTS, this register sets the time delay before the modem turns CTS ON.</p> <p><i>Range:</i> 0 - 255 hundredths of a second <i>Default:</i> 1</p>

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S27	<p>Bit-Mapped Option. Indicates the status of command options.</p> <p>Bit 0, 1, 3 and 7</p> <p>0 = AT&Q0 1 = AT&Q1 2 = AT&Q2 3 = AT&Q3 4 = AT&Q4 5 = AT&Q5 6 = AT&Q6 7 = AT&Q7 8 = AT&Q8 9 = AT&Q9</p> <p>Bit 2</p> <p>0 = AT&L0 1 = AT&L1</p> <p>Bit 4, 5</p> <p>0 = AT&X0 1 = AT&X1 2 = AT&X2</p> <p>Bit 6</p> <p>0 = ATB0 1 = ATB1</p>
S28 - 29	Reserved.
S30	<p>Inactivity Timer. Determines the length of time, in tenth of a second intervals, that the Executive Series will wait before disconnecting when no data is sent or received. In MNP or V.42 mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The inactivity timer is inoperative in synchronous mode.</p> <p><i>Range:</i> 0 - 255 <i>Default:</i> 0 (disabled)</p>
S31 - 35	Reserved.
S36	<p>Negotiation Failure Treatment. This register is read when the S48 register contains the value 128 or if an attempted error correction link fails. These fallback options are initiated immediately upon connection if S48 = 128.</p> <p><i>Range:</i> 0 - 7 If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value is entered.</p> <p><i>Default:</i> 7</p> <p>The S36 actions are:</p> <p>S36 = 0 Modem disconnects. S36 = 1 Modem stays on-line and a Direct mode connection is established. S36 = 2 Reserved. S36 = 3 Modem stays on-line and a Normal mode connection is established. S36 = 4 An MNP connection is attempted and if it fails, the modem disconnects. S36 = 5 An MNP connection is attempted and if it fails, a Direct mode connection is established. S36 = 7 An MNP connection is attempted and if it fails, a Normal mode connection is established.</p>

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S37	<p>Desired Telephone Line Speed.</p> <p><i>Range:</i> 0 - 9 If an invalid number is entered, the number is accepted into the register, but S37 will act as if the default value is entered.</p> <p><i>Default:</i> 0</p> <p>S37 = 0 Attempt to connect at speed of last AT command issued. For DTE speeds greater than 2400 bps, the Executive Series will attempt to connect at 2400 bps. S37 = 1-3 Attempt to connect at 300 bps. S37 = 4 Reserved. S37 = 5 Attempt to connect at 1200 bps. S37 = 6 Attempt to connect at 2400 bps. S37 = 8 Attempt to connect at 4800 bps. S37 = 9 Attempt to connect at 9600 bps. S37 = 10 Attempt to connect at 12000 bps. S37 = 11 Attempt to connect at 14400 bps. S37 = 12 Attempt to connect at 7200 bps.</p>
S38	<p>Delay Before Forced Disconnect (Error-correction mode only). This register specifies the delay between the Executive Series's receipt of the ATH command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal) and the disconnect operation. For an error-correction connection, this register can be used to ensure that data in the modem buffer is sent before it disconnects. If S38 is set between 0 and 254, the Executive Series will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to timeout, the response to the ATH0 command will be OK. If S38 is set to 255, the Executive Series does not timeout, and continues to attempt to deliver data in the buffer until the connection is lost, or the data is delivered.</p> <p><i>Range:</i> 0 - 255 seconds <i>Default:</i> 20</p>
S39	Reserved.
S40	<p>Bit-Mapped Options (MNP). Indicates the status of command options.</p> <p><i>Range:</i> None <i>Default:</i> 0111 0001</p> <p>Bit 0, 1 AT&N3 Bit 2, -4 AT&K3 Bit 5, 6 AT&A3 Bit 7 AT&G0</p>
S41	<p>Bit-Mapped Options (MNP). Indicates the status of command options.</p> <p><i>Range:</i> None <i>Default:</i> 0000 0001</p> <p>Bit 0 AT%C1 Bit 1 AT%E0 Bit 2 AT%L0 Bit 3 - 7 Not used</p>
S46	<p>Protocol Selection. Controls selection of compression. The following actions are executed for the given values:</p> <p>S46 = 136 Execute error correction protocol with no compression. S46 = 138 Execute error correction protocol with compression.</p> <p>In addition to BTLZ (V.42 bis), the Executive Series also implements MNP5 data compression. BTLZ is used only with LAP-M, and MNP5 only with MNP4 as per the CCITT recommendations.</p>

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S48	<p>V.42 Negotiation Action. The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be by-passed if desired.</p> <p><i>Range:</i> 0, 7, or 128 If an invalid number is entered, it is accepted into the S register, but S48 will act as if 128 is entered.</p> <p><i>Default:</i> 7</p> <p>S48 = 0 Disable negotiation; by-pass the detection and negotiation phases; and proceed with LAP-M.</p> <p>S48 = 7 Enable negotiation.</p> <p>S48 = 128 Disable negotiation; by-pass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.</p>
S82	<p>Break Handling Options. Break signals provide a way for the user to get the attention of the remote modem. The break type depends on the specific application. LAP-M specifies three methods of break signal handling: in sequence, expedited, and destructive.</p> <p><i>Range:</i> 3, 7, or 128 If an invalid number is entered, it is accepted into the S register, but S82 will act as if the default value is entered.</p> <p><i>Default:</i> 128</p> <p>S82 = 3 Expedited: Modem sends a break immediately; data integrity is maintained both ahead of and after the break.</p> <p>S82 = 7 Destructive: Modem sends a break immediately; data being processed by each modem at the time of the break is destroyed.</p> <p>S82 = 128 In sequence: Modem sends a break in sequence with any transmitted data; data integrity is maintained both ahead of and after the break. (Factory default).</p>
S86	<p>Connection Failure Cause Code. When the Executive Series issues a NO CARRIER result code, a value is written to this S register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. The cause codes are:</p> <p>S86 = 0 Normal disconnect, no error occurred.</p> <p>S86 = 4 Loss of carrier.</p> <p>S86 = 5 V.42 negotiation failed to detect an error-correction modem at the other end.</p> <p>S86 = 6 Other error correcting modem did not respond to feature negotiation message sent by Executive Series.</p> <p>S86 = 9 The modems could not find a common protocol.</p> <p>S86 = 12 Normal disconnect initiated by the remote modem.</p> <p>S86 = 13 remote modem does not respond after 10 re-transmissions of the same message.</p> <p>S86 = 14 Protocol violation.</p>

Table 4-2. S Register Definitions (Cont'd)

REGISTER	DESCRIPTION
S91	<p>Programmable Transmit Levels. The transmit level is adjustable in S91 from 0 dBm (default value) to -15 dBm in 1 dB increments for data transmission in both synchronous and asynchronous operation. This S register takes effect only when a leased line is selected via the AT&L1 command.</p> <p>S91 = 0 0 dBm</p> <p>S91 = 1 -1 dBm</p> <p>S91 = 2 -2 dBm</p> <p>...</p> <p>...</p> <p>...</p> <p>S91 = 14 -14 dBm</p> <p>S91 = 15 -15 dBm</p> <p>The transmit level may not be altered once a connection exists.</p>
S95	<p>Extended Result Codes. The bits in this register can be set to override some of the ATWn command options. A bit set to a 1 in this register will enable the corresponding result code regardless of the ATWn setting.</p> <p>Bit 0 CONNECT result code indicates DCE speed instead of DTE speed.</p> <p>Bit 1 Append /ARQ to verbose CONNECT XXXX result code if protocol is not NONE.</p> <p>Bit 2 Enable CARRIER XXXX result code.</p> <p>Bit 3 Enable PROTOCOL XXXX result code.</p> <p>Bit 4 Reserved.</p> <p>Bit 5 Enable COMPRESSION result code.</p> <p>Bit 6 Reserved.</p> <p>Bit 7 Reserved.</p>

Executive Series Sample Connect Strings

ATW0S95=0 (Default) CONNECT xxxx (where xxxx represents DTE speed)

Connect with distant modem at V.32 *bis* supporting V.42 *bis*.

ATW1S95=45 CARRIER 14400
 PROTOCOL: LAP-M
 COMPRESSION: V.42BIS
 CONNECT 14400

Connect with distant modem only supporting V.32 with MNP levels 4 and 5.

ATW1S95=45 CARRIER 9600
 PROTOCOL: ALT
 COMPRESSION: CLASS 5
 CONNECT 9600

Connect with distant modem only supporting V.22 *bis* (2400 bps).

ATW0S95=45 CARRIER 2400
 PROTOCOL: NONE
 CONNECT 2400

ATW2S95=2 CONNECT xxxx/ARQ (where xxxx represents DCE speed)

Executive Series Notes

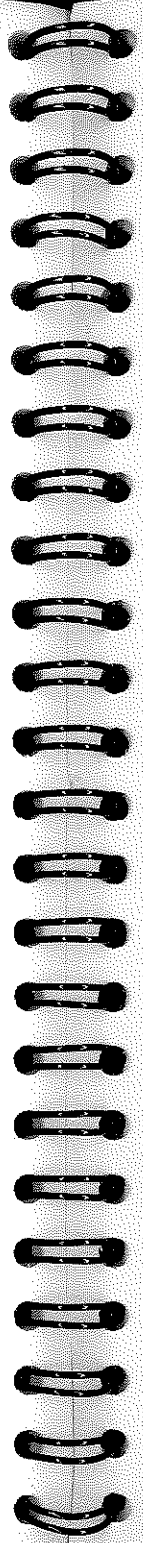
Decimal-To-Binary Conversion Table

Bit Position	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Decimal Weighting	128	64	32	16	8	4	2	1
Examples								
11	0	0	0	0	1	0	1	1
45	0	0	1	0	1	1	0	1
217	1	1	0	1	1	0	0	1
255	1	1	1	1	1	1	1	1

Sample Initialisation Strings

- AT&F&C1&D2<CR> Sets modem to factory defaults, DCD to follow carrier signal and causes a disconnection upon lowering of DTR.
- ATW1S95=45<CR> Sets the modem for verbose reporting of connect strings (see previous page).
- AT&W&W1<CR> Writes current active configuration profile to stored NVRAM profiles 0 and 1.

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MAESTRO WARRANTY

1. OTHER RIGHTS

The rights (including implied rights) and remedies which the owner has under the Trade Practices Act and other consumer laws are additional to the benefits conferred by this Maestro Warranty.

2. MAESTRO WARRANTY

Except for the clauses below, Maestro warrants that it will repair (or at its option replace) any part of the product which in the opinion of Maestro or its authorized service dealer, is defective by reason of faulty workmanship or materials during the period for parts and/or labour specified in the following table commencing from the date of original purchase of the product.

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This Maestro Warranty only applies if the product has been installed and used in accordance with instructions on the product or in the operating manual. Proof of purchase date must be presented when requesting Maestro Warranty service.

4. Maestro Pty. Ltd. Australia warrants this product to be free from defects in materials and workmanship for a period of twelve (12) months from the date of purchase.

5. This warranty applies only to the original purchaser of the Maestro product from an authorised dealer. It does not apply where defects or damage have been caused by alteration, abuse, misuse or use otherwise than in accordance with the manufacturer's instructions (such as environments outside recommended temperature and humidity ranges), fair wear and tear resulting from normal usage, or if repair has been attempted by unauthorised persons.

6. This warranty will become effective only if you complete the attached warranty card and if it is received by Maestro Pty. Ltd. within fourteen (14) days of the purchase.

7. Any service or repair provided under this warranty shall include, free of charge, all labour and replacement parts necessary to meet the repairs covered under the terms of this warranty.

8. When the product is returned to Maestro Pty. Ltd. for repair, all charges for transportation to and from the Service Centre shall be borne by the holder of the warranty.