



ELSA MicroLink™ Office

AT Commands

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Control Commands

The AT command set (AT = command prefix for Attention) was not standardized until recently. The implementation was left to the discretion of the individual manufacturers. A standard now exists in the V.250 command set. Microsoft recommends the use of this command set for the 'PC98' specifications and prescribes its use for the 'PC99' specification.

With your *ELSA MicroLink Office*, you have purchased a state-of-the-art modem equipped with the AT command set in accordance with V.250. A terminal program is required to enter AT commands from the PC (e.g. *ELSA-Communicate! PRO*).

Entering and Executing AT Commands

After being switched on, the modem is in the command state. Commands can only be accepted, interpreted and executed in this phase. There are two groups of commands:

- Hayes-compatible command set
- Extended command set

All commands sent to the modem must begin with the ASCII characters **AT** or **at** (not valid: At or aT) and must be concluded with . The **A/** or **a/** command is not valid if entered after the configuration command (**a/** can be used to repeat a command line). A valid command line after an escape sequence is restricted to a maximum of 40 characters.

The command **AT&F** loads the firmware default parameter settings. The **AT\$IRES** command is used to restore the modem's factory defaults; all user settings, with the exception of the supervisor password and the access flag, will be reset. This command is not executed during existing connections.

Hayes-compatible Command Set

In the event that several commands are to be sent to the modem, these may be entered individually, each with an AT command prefix and a concluding . It is also possible, however, to enter these commands consecutively without separating characters in a single command line after an introductory **AT** and to conclude the line with an .

The individual commands may be separated by spaces to improve the overview. No further characters may be entered once the end of the command line buffer has been reached. The command line can then only be edited with (backspace) or executed with .

Extended Command Set

These commands must be started with **AT+** and ended with Enter. Elsa-specific **AT\$J** commands have been implemented as a supplement to this. If several commands of the extended command set are to be entered in a command line, they must be separated by a semicolon after the starting **AT** and be concluded with an Enter. The individual commands may consist of one or more parameters which must be separated by commas (e.g. **AT+IFC =<DCE-by-DTE>, <DTE-by-DCE>**).

The current parameter settings can be queried with **AT+<command designation>?** or **AT\$J<command designation>?** (e.g. **AT+IFC?**).

The range of valid parameters can be queried with **AT+<command designation>=?** or **AT\$J<command designation>=?** (e.g. **AT+IFC=?**). If no range of values can be output, the query of the range of values will be acknowledged with ERROR. The value of a parameter value can be left out if it is to remain unchanged.



Never use a comma to end a command.

*If a command of the extended command set is followed by a Hayes command in a command line, a semicolon must be used to separate them (e.g. **AT+IFC=0,0;L3**). No separating character is required if a command of the extended command set follows a Hayes command in a command line (**ATL3+IFC=0,0**).*

Escape Command

The characters Strg-X and Strg-C can be used to abort a command line or a screen output (e.g. **AT%R** in case of the display of the register contents).

Hayes commands that must be specified with a parameter may also be entered without a parameter. The absence of a parameter corresponds to the parameter 0 (e.g. **ATI = ATIO**).

Transfer Stage

After a successful connection with the other party, the modem changes from the command state to the online state.

Transfer phase means that a connection to a remote data station (i.e. to another modem) exists: The modem is online. This is the case with both a successful connection (outgoing call) and with the acceptance of an incoming call. The exchange of data between two data stations can take place during this phase.

A renewed transition to the command phase and back, also in the case of an existing connection, is possible with the escape command and the command **ATO**. The escape com-

mand consists of a series of three escape characters (default setting: +++) and a valid command line.

After the three escape characters have been entered, the modem is in the command state. Data transfer is not interrupted until a valid command line has been recognized.

The escape character has nothing in common with the character `[Esc]` of the ASCII character set. It can be redefined in register S2.

Bit-Oriented Registers

Bit-oriented registers are primarily used to provide status information. Please keep in mind that several functions are possible in bit-oriented registers by setting an individual register value. Therefore, bit-oriented registers should be changed with special care! We recommend the use of the AT commands to change the configuration of the modem.

Modifying Bit-Oriented Registers

The following example will illustrate the modification of the bit-oriented options of a register. To set the bit 6 of register S14, enter the command **ATS14.6=1**.

If you would like this value to be maintained after the modem is switched off, the new entry can be stored with the command **AT*W**.

Description of AT Command Set

Labeling of the Default Configuration

The *character marks the default AT command settings. The standard values of the individual register bits are marked in bold type.

A Answer Incoming Call

ATA

Incoming calls can be answered using this command. An incoming call is indicated by the line RI = ON and, unless the modem result codes are disabled, reported by the message RING (verbose form) or 2 (abbreviated form).

If the automatic call acceptance function is enabled, a call cannot be accepted manually (i.e. with the **ATA** command) as the line is disconnected upon the entry of any character except for line feed (see register S0, page 51). Call establishment is not aborted, however, if bit 6 of register S14 has been set to 1 (default = 0). This setting permits the attached computer to send characters to the modem during call establishment.

Furthermore, this command allows an existing telephone connection (voice) to be taken over by the modem (data). This requires that modem and telephone are connected to the same line (see also **ATD** command, page 11).

Example

A telephone connection is established. The parties agree on a transmission format, transmission protocol etc. The change to the online state takes place by entry of **ATA** by the one party and subsequent entry of **ATD** by the other party. The parties must also agree on which command is to be given on which side.

%A Fallback Character in the Negotiation Phase

AT%An (n = 0..62, 64..125, 127; default = 0)

This command defines the character that is regarded as fallback command during call acceptance. **ATC2** and **AT+ES=3,0** or **AT+ES=,,2** (refer to page 9 and 41), respectively, have to be set for this command.

If the modem receives this character in the negotiation phase while trying to establish an error-corrected connection (setting **AT+ES=3,0** or **AT+ES=,,2**), it falls back to normal mode immediately. The fallback character is not passed to the serial port. As soon as the modem receives a SYN character (22 decimal), the fallback character recognition is switched off. The default setting 0 disables the fallback character recognition entirely.

\$B Activate Password Protection and Automatic Callback

***AT\$B0 : No callback**

AT\$B1 : RING and CONNECT are displayed before the access procedure

AT\$B2 : RING and CONNECT are displayed after the access procedure

If your modem is used by several persons, you can use the password protection to restrict the access to your modem. Five so-called access flags can be used to define which modem functions may be used.

The automatic callback feature with password protection enables your modem to call another modem back automatically after it has been called.

The **AT\$B0** command disables the callback function.

The **AT\$B1** command (version 1) determines that the RING and CONNECT messages are displayed before the access procedure.

The **AT\$B2** command (version 2) determines that the RING and CONNECT messages are displayed after the access procedure. If a proper connection has been established, the input of an ATD command is followed by a CONNECT message. This setting, however, allows the best matching for call establishment without password protection.

After establishing the connection, the modem does not immediately enter the transparent mode, but activates its callback routine. This routine prompts the user at the remote modem to identify himself by entering his user password and (if configured accordingly) his phone number.

Example

ELSA MICROLINK OFFICE

password *****

PHONE NUMBER:*****

password OK

If the entries are correct, the message 'password OK' is displayed, and the called modem immediately terminates the connection. After the time set in register S43 (see page 58), the phone number stored along with the user password is called automatically. The modem will not enter the transparent mode before the remote user has entered his user password and (if configured accordingly) his phone number again. If the user does not enter a valid identification within the time defined in register S42, the called modem terminates the connection.

If the callback function is disabled, the modem immediately establishes a transparent connection.

\C No Data Buffering in the Negotiation Phase

***ATC0 : No data buffering in the negotiation phase**

ATC1 : Data buffering in the negotiation phase

ATC2 : No data buffering, fallback character recognition (AT%A)

During a call acceptance with the setting **AT+ES=3,0** or **AT+ES=,,2**, the **ATC** command determines how the modem treats characters that are neither an MNP nor an LAPM request.

If no MNP or LAPM request is recognized within three seconds, the modem falls back to normal mode. In the setting **ATC0**, no buffering and no early fallback takes place.

In the setting **ATC1**, up to 200 characters can be buffered additionally that are sent to the port after the fallback to normal mode. If 200 characters are received before the three seconds have elapsed, the modem falls back immediately.

In the setting **ATC2**, the fallback to normal mode can be triggered by the character defined with the **AT%A** command. No buffering takes place. This can be used to shorten the negotiation phase when the calling modem does not support error correction.

&C

Significance of DCD

AT&C0 : DCD is always active

***AT&C1** : DCD displays existing carrier

Communication programs usually evaluate the DCD line in order to check for an existing data connection. The modem supports this function with the setting **AT&C1**.

\$CS Query of the Current Modem Settings

AT\$CS=<command group>,<number of lines>

This command is used to query all current settings of the modem. The output is sorted according to command groups. You can set the number of lines to be output via the monitor. The following settings are valid:

Parameter	Value	Description
Command group	+A, +G, +M, +E, +I, +D, +F, +V	Display of the command group in question
Number of lines	1-40	Set number of numbers to be output

Example

If you enter the following command, the modem output will look like this:

at\$cs=+g,3

+GCI: 04

+GMI: "ELSA AG, Aachen (Germany)"

+GMM: "MicroLink Office"

Press any key to continue

+GMR: "xxxxxxxxx"

+GSN: "xxxxxxxxx"

OK

D Establishing a Connection

ATDn

Upon an **ATD** command, the modem attempts to establish a connection and dials the telephone number n. n can consist of the digits 0..9 and, in the case of tone dialing, may also contain the characters A..D, * and #. The maximum allowed length of the entire dial string is 64 characters.

The connection establishment can be aborted at any time during dialing by entering any character, except for Line Feed, XON and XOFF. In addition, entry of **ATD** without parameters allows an existing telephone connection (voice) to be taken over by the modem (da-

ta). This requires that modem and telephone are connected to the same line. The following special characters may be included:

Special characters	Description
P	Dialing method Pulse dialing from this point on
T	Tone dialing from this point on
! , & or	External call Press flash button (only for tone dialing)
W or :	Wait for dial tone Wait for (second) dial tone No wait for the dial tone before dialing the first number, regardless of the ATX setting.
@	The modem waits for silence of 6 seconds, but no longer than the period set in register S7 (10 seconds silence in Switzerland).
'	Dial pause Dial pause as defined in register S8
<	Dial pause 1 second
=	Dial pause 3 seconds
L	Dialing of stored telephone numbers Redial
S=m	Dial the number stored with AT+ASTO at location m
;	Remain in command mode after dial string (for the addition of further dialing commands in the event of excessively long dial strings)
.	Connection handover to post-connected telephone The modem hangs up if the post-connected telephone is answered and reports NO CARRIER.

Example

A modem is called up by telephone. As soon as the remote modem sends an answer tone, a modem connected to the same line as the telephone can take over the line with the **ATD** Enter command (see also **ATA** command, page 8).



*In general, special characters can be inserted at any point of the dial string and are effective beyond that point. The special characters for dialing stored numbers are an exception (see the **AT+ASTO** command, page 39.) These special characters must be entered directly after **ATD**. The **;** character for appending additional dial commands must be located at the end of a dial string.*

\$D Automatic Dialing with DTR

***AT\$D0 : Disables DTR dialing**

AT\$D1 : Enables DTR dialing

If DTR dialing is on (**AT\$D1**) and the status of the DTR control line changes from OFF to ON, the modem will establish a connection with the number stored on position 0.

&D Effect of DTR

AT&D0 : Ignore transition of DTR status

AT&D1 : Switch to command phase if DTR → OFF

***AT&D2** : Abort connection if DTR → OFF

AT&D3 : Abort connection and reinitialize if DTR → OFF

These commands determine how the modem reacts to a transition of the DTR interface line from ON to OFF.

When set to **AT&D0**, the modem ignores the state of the DTR line.

With **AT&D1**, the transition of the DTR control line from ON to OFF has the following effects: If the modem is in the command phase, the transition has no effect. During the establishment of a connection, the ON to OFF DTR transition aborts the connection. If the modem is in the transmission phase (i.e. with an existing connection), it will switch to the command phase.

With **AT&D2**, the transition of the DTR control line from ON to OFF has the following effects: If the modem is in the command phase, the transition has no effect. During the establishment of a connection, the ON to OFF DTR transition aborts the connection. Call acceptance is not possible again before DTR returns from OFF to ON.

With **AT&D3** the modem's response is the same as with **AT&D2**. In addition, the modem is reinitialized by the DTR transition from ON to OFF (see also **ATZ** and **AT&Y**).

The modem does not report a RING with **AT&D2** and **AT&D3** if DTR is set to OFF. Automatic call answering is not possible until after the DTR transition from OFF to ON. A RING message with subsequent call answering can be enabled despite DTR = OFF by setting bit 7 in register S28.

:D Manual Dialing

***AT:D0** : Modem does not go online if DTR OFF → ON

AT:D1 : Modem goes online if DTR OFF → ON

After a connection has been established manually (by telephone), the modem goes online with the setting **AT:D1** when the DTR interface line changes from OFF to ON. It does not do so with the standard setting **AT:D0**.

E No Command Echo to Host

ATE0 : Commands not echoed

***ATE1** : Commands echoed

This command selects whether your modem echoes entered commands on the local screen or not.



If the echo is switched on and all characters appear twice on your monitor, your communications program is in half-duplex mode, and you should switch to full duplex mode.

%E

Disable Automatic Retrain

AT%E0 : Automatic retrain Off

***AT%E1** : Enable automatic retrain

If the modem is set to **AT%E0** no retrain is performed even if the line quality is poor. With the default setting **AT%E1**, the modem automatically tries to adapt itself to changes of the line quality.

If the automatic retrain is disabled with **AT%E0**, a retrain can nevertheless be triggered manually by changing to the command state in an existing connection and entering **AT01** (see page 18).

***E**

Enable Remote Configuration

***AT%E0** : Remote configuration Off

AT%E1 : Remote configuration on

The remote configuration allows you to configure your modem from any location you are calling from and can be combined with the automatic callback function. Up to 19 different user passwords can be stored with the **AT\$P** command (see page 18).

Remote configuration is switched off with the **AT%E0** command and activated with the **AT%E1** command.

When a connection has been established, the modem is in the online state as usual. However, once the configuration command is entered, which consists of four characters (default setting: ****, see also register S34, page 57), followed by a valid command line, the modem enters the configuration mode. This allows the modem to temporarily leave the online transmission without aborting the connection.



The configuration command is only recognized in the online transmission command state. A valid command line must start with AT or at and ended with an Enter.

The user at the remote modem is prompted to identify himself by entering his user password. If his entries are correct, the message 'password OK' is displayed, and the remote configuration is active.

If the remote configuration is used in combination with the automatic callback function with password protection, the password is requested directly after the connection establishment, and therefore the remote configuration becomes active immediately after the valid configuration command.

Example

ELSA MICROLINK OFFICE

password: *****

password OK

REMOTE CONFIGURATION ENABLED

OK

>

The prompt (>) indicates that you are in configuration mode. Locked commands are answered with ERROR.



&F

Load Default Configuration

AT&F

This is used to load the firmware's default parameter settings. (Exception: S54, S64, S86, S87, S88, S89, S99, S130 and S229 are not changed). This command is not executed during existing connections.

&G

Set Calling Tone and Guard Tone

- *AT&G0** : Calling tone on, no guard tone
- AT&G1** : Calling tone on, guard tone 550 Hz
- AT&G2** : Calling tone on, guard tone 1800 Hz
- AT&G4** : Calling tone off, no guard tone
- AT&G5** : Calling tone off, guard tone 550 Hz
- AT&G6** : Calling tone off, guard tone 1800 Hz

The guard tone is an additional signal that can be sent over the telephone line in V.22bis mode. It is sent by the answering modem as long as the connection is active. This tone is not relevant in countries in which ELSA modems are approved by the national telecommunications service. The frequency of the guard tone cannot be modified in modem versions approved in Austria. It is either set to 1800 Hz or off.

The calling tone is a periodic tone that is transmitted in the time period between dialing and connection. As this tone can lead to disturbances in some foreign modems, it is possible to suppress the transmission of the calling tone.

H

Hang Up/Switch Modem On

- ATH0** : Hang up
- ATH1** : Go off-hook

The command **ATH0** is used to hang up an existing connection if the modem is in the command mode after an escape command or a DTR transition from ON to OFF with a preceding **AT&D1** (refer to page 12).

If the modem is offline, it can be told to go off-hook (pick up the phone) with the **ATH1** command. The modem holds the line for a maximum of 255 seconds before hanging up.

This command must be located in the last position of a command line (i.e. subsequent commands are not executed).

-H Dumb Mode

***AT-H0 : Normal operation**

AT-H1 : Dumb mode

The **AT-H1** command can be used to set the modem into the dumb mode. This means that an incoming call will always be answered as soon as the DTR line is active. The only commands accepted in this operating mode are **ATD** (dialing) and **AT-H**. Moreover, all echoes and feedback messages (such as OK, RING, CONNECT) will be suppressed (polling is possible during call establishment).

To restore the normal operation of the modem, enter the AT commands **AT-H0** and **AT&F** in two command lines.



Display Product Information

ATi0 : Report product code in nnn format

ATi1 : Report checksum

ATi2 : Display result of check sum

ATi3 : Display firmware version and date

ATi4 : Display the current parameters of the Hayes command set

ATi6 : Display product name

ATi9 : Display Plug and Play information

ATi11 : Report self-test result

ATi0 displays a three digit ASCII string type number (modem product code).

ATi1 displays the least significant byte of a 16 bit checksum of the firmware ROM as a three digit ASCII number.

ATi2 calculates the checksum of the ROM and compares it with the checksum stored in the ROM. If both values are identical, an OK is displayed. If they are not, ERROR is replied.

ATi3 displays the firmware version number and the firmware date. This command corresponds to the **AT%V** command (see page 26).

ATi4 is used to output the current modem configuration (only Hayes commands, also refer to **AT\$CS**, page 11).

ATi6 displays the product name of the modem.

ATi9 displays a string for Plug and Play recognition (e.g. for Windows 95).

ATi11 displays the result of the self-test the modem automatically performs after being switched on.

L **Speaker Volume**

ATL0 : Low speaker volume

ATL1 : Low speaker volume

***ATL2** : Medium speaker volume

ATL3 : High speaker volume

This command controls the volume of the modem speaker.

M **Speaker Control**

ATM0 : Speaker always off

***ATM1** : Speaker on during call establishment

ATM2 : Speaker always on

ATM3 : Speaker on while waiting for answer tone (outgoing call)

The speaker can be permanently on or off, or it can be switched on during the connection establishment phase (dialing and waiting for an answer tone **ATM1**), or it can be switched on only during the transition into the online state. This setting is used to influence also the signaling via S54 of a pending call by ringing.

-M **Plain Text CONNECT Messages**

***AT-M0** : Plain text **CONNECT** messages dependent on **ATV**

AT-M1 : Plain text **CONNECT** messages independent of **ATV**

This command influences the verbose **CONNECT** messages for error-corrected connections (connections with MNP, V.42, or V.42bis).

With the default setting **AT-M0**, the return of plain text **CONNECT** messages is dependent on the setting of the command **ATV**.

With **AT-M1** the following result codes are displayed upon successful connection, regardless of the setting of the **ATV** command and the transmission bit rate:

MNP1..4 connection: 'CONNECT MNP'
 MNP5 connection: 'CONNECT MNP5'
 V.42 connection: 'CONNECT LAPM'
 V.42bis connection: 'CONNECT LAPM/V42BIS'

O Return to Online State with Retrain

AT00 : Return to online state without retrain

AT01 : Return to online state with retrain

The command **AT00** can be used to switch back into the transfer mode to resume online data transmission if the modem is in the command mode after an escape command or a DTR transition from ON to OFF with a preceding **AT&D1**.

This command must be located in the last position of a command line (i.e. subsequent commands are not executed).

P Set Pulse Dialing

ATP

This command selects the pulse dialing (loop disconnect signaling) method.

\$P Enter and Save User Password and Callback Number

AT\$P0;prefix

AT\$Pposition;mode;password;number

The **AT\$P** command can be used to save up to 19 different user passwords in a list. The following parameters, separated by semicolons, can be used:

prefix A separate dialing prefix for the callback numbers is saved in position 0 of the non-volatile memory. When using special dialing characters (see **ATD** command), make sure that they follow immediately after the semicolon (e.g. **at\$P0;t0w**).

position This parameter, followed by at least one more parameter, defines the position (1..19) in the non-volatile memory, where the respective entry is to be stored. If, for example, an entry is to be stored in the fourth position, the number 4 must be entered (e.g. **at\$P4;1;kirk;1701**).

Existing entries can be modified by entering the respective parameter, thus overwriting the old setting. For example, if you want to change only the user password of an entry, enter only the position and the new password for the respective entry.

Example

To replace the password 'KIRK' in the entry **AT\$P4;1;KIRK;1701** by 'SPOCK' (**AT\$P4;1;SPOCK;1701**), enter the following:

at\$P4;;spock



mode

If the **AT\$Pposition** command is used without additional parameters, the respective entry (0..19) is entirely deleted from the list (e.g. **at&p4** deletes the entry in position four).

This parameter can be used to set different security levels (see the following table). The individual values of the parameter <mode> are calculated by adding the decimal values of the respective bits and have the following meaning.

Bit	Dec.	Description
0	0	Entry locked
	1	Entry active
1..2	0	Only password required for identification
	2	Password and phone number required for identification
	4	Prompt for password, then callback of the stored phone number
	6	prompt for password and phone number, then callback of the entered number
3	0	Reserved
4..5	0	Remote configuration locked
	16	Remote configuration, display mode
	32	Remote configuration, modification mode
6..7	0	Reserved

password

This parameter is used to set the user password. The password must have at least four, but no more than eight characters.

number

This parameter can be used to save a phone number of up to 32 characters along with the user password in the list.

Q Suppressing Messages

***ATQ0** : Enable modem result codes

ATQ1 : Disable modem result codes

ATQ2 : Messages off in answer mode

With this command, messages to the attached computer by the modem can be completely suppressed (**ATQ1**) or suppressed in the answer mode only (**ATQ2**).

*Q Message after Return to Transfer Phase

***AT*Q0** : CONNECT message after invalid escape sequence

AT*Q1 : No CONNECT message after invalid escape sequence

The return of the CONNECT message can be suppressed after an invalid escape sequence with this command.

%R Display Register Contents**AT%R**

This command displays the current contents of the S registers (0..99) in two columns, decimally and hexadecimally.

\$R Display User Password and Parameters**AT\$R**

The **AT\$R** command displays the stored user passwords, callback numbers and all other parameters on the screen.

Example

at\$r

00 – TOW

01 – 05;SPOCK;123456789

02 – 05;CLODWIG;333

03 –

04 – 01;KIRK;

05 –

06 – 33;EDUARD;333

07 – 35;SARAH;333

08 – 37;HANS;333

09 –

10–

11 –

12 –



*If the **AT\$P** or **AT\$R** command is used and the 'P' access flag is inactive, the user is prompted to enter the supervisor password. If a wrong password is entered, the commands are not executed, but answered with ERROR.*

S Set and Read the Internal Register

ATSn=x : Set register n to value x

ATSn? : Read the value of register n

ATSn : Sets pointer to register n

AT? : Display the value of the last referenced register (default register)

AT=x : Set the default register to value x

The register number *n* and the register value *x* (0..255) are entered and displayed as numerical ASCII strings. The valid values for *x* may be restricted (for example, see register S0, page 31). Please refer to in chapter 'Description of Registers' on page 51 for information about the S register and changing bit-oriented registers (see page 28). If a register is set to an invalid value the command is ignored and returns ERROR. If an invalid setting is made in a bit-oriented register, only that particular setting will be ignored; all other valid bits will be accepted.

\S Verbose Display of the Current Configuration**ATS: Display current configuration**

The **ATS** command displays the current configuration profile of the modem in verbose form.

\$\$ Set Access Flags**AT\$\$**

The **AT\$\$** command is used to set the access flags to define which modem functions can be used. After entering the command and the correct password, the current setting of the access flags (CONFIG) is displayed. After entering the new setting in the SET line, the new configuration (CONFIG) is displayed. Flags that have not been set are displayed as '-'.
Changes of the access flags always apply to the entire modem (not only to one of the configuration profiles) and are saved in the non-volatile memory.

Example

```
at$$  
password ****  
CONFIG: A-IO--P-  
SET: AIO  
CONFIG: A-IO---  
OK
```

Access flags can only be changed by authorized users who enter the correct supervisor password. Any combination of the following access flags can be used:

Value	Description
A	All commands that do not change the non-volatile memory may be used ('All')
W	The commands AT\$P , AT&W , AT*W , AT&Y and AT+ASTO may be used ('Write').
I	If 'I' has not been set, the modem is in the call protection mode. Calls cannot be answered with ATA , nor with ATS0 = 1 . The RING message is suppressed, only the RI interface line indicates an incoming call ('Indial')
O	Outgoing calls are allowed ('Outdial')
P	The password list may be displayed and changed ('Password')



Locked commands are answered with ERROR.

\$S?

Query of Current Access Flags

AT\$S?

The **AT\$S?** command can be used to check the current setting of the access flags. After entering the command, a list of the currently set flags is displayed on the screen.

Example

at\$S?

CONFIG:

AW-----

OK

T

Tone Dialing Method

ATT

This command selects the touch-tone dialing (multi-frequency dialing, DTMF signaling) method.

&T

Select Digital Loopback

AT&T0 : Normal operation

AT&T1 : Enable local digital loopback

AT&T3 : Enable remote digital loopback

***AT&T4** : Remote digital loopback accepted

AT&T5 : Remote digital loopback blocked

AT&T6 : Enable remote digital loopback

This command sets several testing loopbacks and can be used as a function test. All digital loopbacks, with the exception of the local digital loopback, can be enabled only during an existing connection without error proofing (**AT+ES=1,0** or **AT+ES=,,1**).

The testing modes can be terminated by changing to the command state and entering **AT&T0**.

AT&T1 enables the local digital loopback. Each character sent from the host to the modem is echoed. The **AT&T1** command can only be executed offline. The command is answered with CONNECT, and the DCD signal line is enabled.

The **AT&T3** command places the modem into a local digital loopback. The loopback is initiated by the remote modem. In this state, the characters sent by the remote modem are not transmitted to the host, but instead returned directly to the remote modem.

AT&T4 and **AT&T5** enable or disable, respectively, the activation of the digital loopback by the remote modem. The two commands can be used both online and offline. The current status is displayed with the **ATI4** command (**AT&T** can only assume the values 4 and 5).

The **AT&T6** command enables a remote digital loopback (if the remote modem is set to **AT&T4**). In this mode, the remote modem does not pass the received characters to its host computer, but instead returns them directly to the local modem. The remote modem remains connected to the phone line (off-hook LED is on), the DCD and CTS signal lines are switched off. In this state, the remote modem cannot be addressed by the connected computer system.

\T**Inactivity Timer****AT\Tn : (n = 0 to 255 * 10 seconds; default value = 0)**

This command can be used to modify the time after which the modem automatically breaks the connection if no data has been sent or received in the mean time. The value of **AT\T** is a multiple of 10 seconds. Valid values for n are 0..255. The default value 0 is used to switch the inactivity time off.

\$T**Trace Mode*****AT\$T0 : Trace mode OFF****AT\$T1 : Trace mode ON**

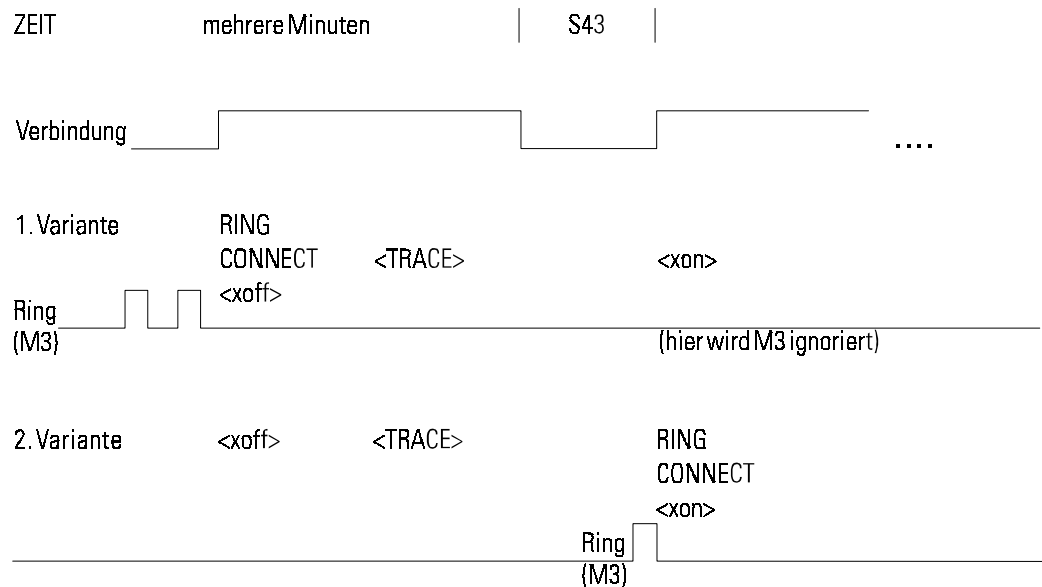
The **AT\$T** command enables or disables the trace mode. The trace mode can be used to monitor unsuccessful access attempts.

The **AT\$T0** command disables the trace mode, and feedback messages are not displayed.

The **AT\$T1** command enables the trace mode, and all feedback messages will be preceded by '+R'. Trace messages cannot be displayed in abbreviated form.

The current setting of the **AT\$B** and **AT\$T** commands can be displayed with the **ATI4** command.

The following illustration shows the methods 1 (**AT\$B1**) and 2 (**AT\$B2**) with enabled trace mode (**AT\$T1**):



If method 1 is used, the modem first displays the password and phone number of the remote modem after a RING. Then the messages +RNO CARRIER and +RCONNECT (at the time of <xon>) appear as trace text as well as the entries of the remote modem (user password and phone number).

If method 2 is used, the trace messages appear before the RING and CONNECT. After a +RRING and +RCONNECT, first the password and phone number of the remote modem are displayed. Then the messages +RNO CARRIER and +RCONNECT (at the time of <xoff>) appear as trace text as well as the entries of the remote modem (user password and phone number).

If the password protection or the automatic callback function is active, the following messages can be displayed at the remote modem:

- password** The entered password is echoed on the screen.
- PHONE NUMBER** The entered digits are echoed on the screen.
- password OK** This message appears if password-protected access is active without the callback function.
- CALLBACK IN n MIN** If the callback function is active, the value for n defined in the S43 register is displayed.
- NO CARRIER** This message appears after the third identification attempt has failed.

***U Take over Current Configuration**

AT*U: Save current configuration

Changes made in the remote configuration mode remain active after leaving the remote configuration mode. The **AT*U** command can be used to take over the current configuration in the remote configuration mode. Otherwise the settings are only valid within the current remote configuration session.

To keep the changes after the modem is switched off, the configuration profile must also be saved in the non-volatile memory with the **AT&W** or **AT*W** command.

V Messages in Short Form/Plain Text

ATV0 : Messages in short form as a digit

***ATV1 : Messages in plain text**

This command allows you to choose whether the messages sent by the modem to the connected computer are displayed as digits or words. The messages in short form and plain text are covered in the chapter "Description of Messages".

%V Display of Firmware Version

AT%V

This command displays the modem firmware version on the monitor. This command corresponds to the **AT13** command (see page 16).

&V Display Configuration Profiles

AT&V

This command displays the current configuration and the two stored configuration profiles 0 and 1 (see also the **AT&W** and **AT*W** commands) of the modem on the monitor.

\V CONNECT with Error Free Connections

ATV0 : No modified CONNECT messages

ATV1 : Identification of error-free connections

ATV2 : Identification of MNP and V.42bis connections

***ATV8 : Identification of MNP, V.42 and V.42bis connections**

This command controls the CONNECT messages for error-corrected connections (connections with MNP, V.42 or V.42bis).

With **ATV0** modified CONNECT messages are always suppressed. The CONNECT messages for error-corrected connections are identical to the CONNECT messages for physical connections.

With **ATV1** the type of error-corrected connection is not differentiated (**xxxx** = transmission bit rate):

CONNECTxxxx/REL

With **ATV2** error-corrected connections are differentiated into MNP and V.42 (bis) connections:

CONNECTxxxx/REL - MNP **with MNP connections**

CONNECTxxxx/REL - LAPM **with V.42(bis) connections**

All of the settings listed have the disadvantage of not including complete information concerning the type of connection. The **ATV8** command allows a complete evaluation:

CONNECT xxxx/MNP **with an MNP1..4 connection**

CONNECT xxxx/MNP5 **with an MNP5 connection**

CONNECT xxxx/LAPM **with a V.42 connection**

CONNECT xxxx/LAPM/V42BIS **with a V.42bis connection**

Furthermore, the **ATV8** setting can be used to display "extended CONNECT messages" that provide additional information about the transmission standard used (e.g. **CONNECT xxxx/ V32BIS/ LAPM/ V42BIS**). For extended CONNECT messages, bit 6 of register S96 (see page 66) must be set (**ATS96=64**). Possible values for the transmission mode string are:

B103, B212A, V21, V22BIS, V23, V32, V32BIS, V34, K56, V90

&W **Save Configuration Profile**

AT&W0 : **Store extended configuration profile 0**

AT&W1 : **Store extended configuration profile 1**

This command can be used to save the current modem configuration in the non-volatile memory of the modem. Two different configuration profiles (0 and 1) can be stored.

The values are retained when the modem is switched off and are automatically recalled the next time the modem is turned on.



*Registers whose current value cannot be stored with the **AT&W** command are stored with their default value (**AT&F**). Thus the **AT&W** command may overwrite those register values stored with **AT*W**.*

*W Save Complete Configuration Profile

AT*W0 : Save extended configuration profile 0

AT*W1 : Save extended configuration profile 1

This command can be used to store the values of the following register in the non-volatile memory of the modem in addition to the parameters and registers stored with AT&W. The values are retained when the modem is switched off and are automatically recalled the next time the modem is turned on.

X Handling of Dial Tone/Busy Tone

ATX0 : Ignore dial tone / ignore busy tone

ATX1 : Ignore dial tone / busy tone

ATX2 : Wait for dial tone / ignore busy tone

ATX3 : Ignore dial tone / evaluate busy tone

***ATX4 : Wait for dial tone / evaluate busy tone**

This command is used to determine the dialing behavior. With **ATX2** or **ATX4**, respectively, the modem waits for the dial tone before dialing. With **ATX0**, **ATX1** or **ATX3**, the modem does not wait for the dial tone, thus allowing "blind dialing" for call establishment between two extensions.

Furthermore, you can use this command to determine whether your modem recognizes a busy tone and outputs the feedback BUSY or if it ignores the busy tone and aborts the dialing attempt with NO CARRIER.

*With the setting **ATX0**, only the message 'CONNECT' or '1' is output, independently of the speed and the kind of connection (with/without error correction-data compression).*



*X End Remote Configuration

AT*X : End remote configuration

The **AT*X** command is used to end the remote configuration. A transition into the online phase takes place.

&Y Set Pointer to Configuration Profile

***AT&Y0 : Set pointer to configuration profile to 0**




AT&Y1 : Set pointer to configuration profile to 1


You can use this command to determine which of the two stored configuration profiles (0 or 1) is loaded and used when the modem is turned on. This setting is globally and permanently effective and is stored at once.

\$Y **Change Supervisor Password**

AT\$Y

The supervisor password can be changed with the **AT\$Y** command. An authorized modem user must identify himself by entering the supervisor password to access the modem functions. The factory default supervisor password is ELSA. This default password can be changed with the **AT\$Y** command.

The password must have at least four, but no more than eight characters. Valid characters are digits, upper case letters and special characters. Lower case letters are treated as upper case letters internally. Entered characters are always echoed with * and may be edited with  or . Every entered line must be terminated with .

When using **AT\$Y**, the new password must be entered twice and be terminated with . The repeated entry prevents a mistyped password from being stored as supervisor password.

If the two entries are identical, the new password is stored as supervisor password in the non-volatile memory and the **AT\$Y** command acknowledged with **OK**.

If the two entered passwords are not identical, the command is aborted with an **ERROR** message. Then the **AT\$Y** command must be used again in order to change the password.

Z **Load Configuration Profile**

ATZ0 : Load configuration profile 0

ATZ1 : Load configuration profile 1

The **ATZ** command loads a configuration profile, independently of the setting done with the **AT&Y** command. If a connection exists it will be aborted. Then the parameter settings (configuration profile 0 or 1) are loaded from the non-volatile memory of the modem.

This command must be located in the last position of a command line (i.e. subsequent commands are not executed): If you have not yet stored a configuration profile (**AT&W**, **AT*W**), the default configuration is loaded (**AT&F**).

. **Setting and Reading of a Bit in a Register**

AT.n=m : Sets the bit n to the value m (n = 0 to 7; m = 0 to 1)

AT.n? : Reads the value of bit n

Register values can be changed using this command. The value for bit n defined in the corresponding register can be set to the value m. If access is not permitted, the value of the S register remains unchanged, and the modem answers with ERROR.

Example

To set the bit 6 of register S14, enter the command **ATS14.6=1**.

Extended Command Set

AT\$ Commands

The **AT\$J** commands of the extended command set can be used to control selected answering machine and fax functions during automatic modem operation. So you can modify the voice quality, change date and time, list files in the modem storage and load data from the computer into the modem and vice versa.

\$JCFGF Automatic Fax Takeover

AT\$JCFGF=<fax switch>,<call acceptance>

This command allows you to determine whether incoming faxes are always recognized by the modem, no matter if you have already answered the phone. The modem recognizes automatically if the incoming call is a phone call or a fax.

If automatic call acceptance has been disabled, no further incoming calls will be answered. If call acceptance is active and the modem storage is full, only the outgoing message will be played.

The following settings are valid:

Parameter	Value	Description
Fax switch	0	Automatic fax takeover OFF
	1	Automatic fax takeover ON
Call acceptance	0	Automatic call acceptance OFF
	1	Automatic call acceptance ON

\$JCFGM Configuration of the Different Modem Outgoing Messages

AT\$JCFGM=<system message>,<phone number announcement>,<time>,<outgoing message text>

This command is used to enable or disable the different outgoing messages. Furthermore, you can select the desired outgoing message. The following settings are valid:

Parameter	Value	Description
System message	0	Announcement of system messages of the modem OFF
	1	Announcement of system messages of the modem ON
Phone number announcement	0	Announcement of the phone number of an incoming call OFF
	1	Announcement of the phone number of an incoming call ON
Time	0	Announcement of time OFF

Parameter	Value	Description
	1	Announcement of time ON
Outgoing message text	0-2	Selection of the outgoing message text (default value 0)
	255	Outgoing message text if the modem storage is full



These functions are supported from firmware version 1.10 on, which can be downloaded free of charge from our WWW server when it becomes available.

\$JCFGT

Switch Fax or Voice Operation On or Off

AT\$JCFGT=<fax operation>,<voice operation>,<voice recording>,<configuration access via taking the phone off-hook>,<configuration access via keyboard>,<control of the answering machine operation>

This command is used to enable or disable fax and voice operation. Furthermore, you can record voice messages and determine if you want to set the configuration access of your modem via DTMF tones of the post-connected handset or by briefly taking the phone off-hook. If another application is running in the background, keeping the DTR message line permanently ON so that no voice or fax messages can be accepted, the parameter <control of the answering machine operation> can be used to set the DTR message line to OFF. The following settings are valid:

Parameter	Value	Description
Fax operation	0	Automatic fax operation OFF
	1	Automatic fax operation ON
Voice operation	0	Automatic voice operation OFF
	1	Automatic voice operation ON
Voice recording	0	Leaving voice messages in answering machine mode OFF
	1	Leaving voice messages in answering machine mode ON
Configuration access	0	Configuration access via the post-connected telephone by briefly taking the phone off-hook OFF
Via taking the phone off-hook	1	Configuration access via the post-connected telephone by briefly taking the phone off-hook ON
Configuration access	0	Configuration access via the post-connected telephone by pressing a key OFF
Via keyboard	1	Configuration access via the post-connected telephone by pressing a key ON
Control of the answering machine operation	0	Control of the answering machine during autonomous fax operation via the message line of the computer OFF
	1	Control of the answering machine during autonomous fax operation via the message line of the computer ON

\$JCFGV Configuration of Voice Operation

AT\$JCFGV=<max. recording time>,<min. recording time>,<reserved>,<recording quality>,<speaker ON>,<monitoring>

You can use this command to make settings for voice recording and set the recording quality for voice files. The higher the quality, the more memory space is required. The factory default setting is medium recording quality. The following settings are valid:

Parameter	Value	Description
Max. recording time	1-30	Maximum recording time in units of 15 seconds Recording time restricted by the modem storage only
Min. recording time	0-15	Defines the minimum message length in seconds that a message must have in order to be stored
reserved		
Recording quality	ADPCM2-7 ADPCM4-7 PCM8L-7	Low recording quality (recording time of 18 minutes) Medium recording quality (recording time of 9 minutes) High recording quality (recording time of 4.5 minutes)
Speaker ON	0 1	Recording/speaker during a phone conversation OFF Recording/speaker during a phone conversation ON
Monitoring	0 1	Switches the speaker off during recording. Switches the speaker on during recording.

Example Enter the following command to increase the recording quality:

at\$jcfgv=,,,pcm8L-7

\$JDATE Change Date

AT\$JDATE=<YYYY>,<MM>,<DD>

This command is used to change the current date. The following settings are valid:

Parameter	Value	Description
YYYY	1991-2090	Year
MM	1-12	Month
DD	1-31	Day

Example If you want to replace the current date by June 2, 1998, make the following entry:

at\$jdate=1998,6,2

Invalid entries are answered with ERROR.



\$JDEL Delete Files in the Modem Storage

AT\$JDEL=<filename>,<type of file>,<attribute>,<attribute>

This command is used to delete files of the corresponding file type from the modem storage. If a filename is entered, the other parameters, with the exception of the file attribute S, will be ignored. If no filename is entered, one or more files to be deleted can be selected by entering the type of file. Enter either a filename or a type of file. If you enter only the type of file (e.g. voice files) all voice files are deleted, regardless of their names (e.g.: *.voice). The following settings are valid:

Parameter	Value	Description
Filename	32-127 ASCII	Output of the name of the file to be deleted.
Type of file	ADPCM2-7	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 7.2 kHz)
	ADPCM2-8	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 8 kHz)
	ADPCM4-7	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 7.2 kHz)
	ADPCM4-8	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 8 kHz)
	PCM8L-8	Rockwell 8-bit PCM, high voice quality (sampling rate of 8 kHz, linear characteristic)
	T4N	Fax file (normal resolution)
	T4F	Fax file (high resolution)
	ASCII	ASCII format
	BIN	Binary format
	VOICE	All voice files
FAX	All fax files	
Attribute	S	The file is a system file and can be deleted from the modem storage only by entering the file attribute S (system).
Attribute	0	The file attribute 0 can be entered in order to delete files that have already been listened to or that have been loaded into the computer. This attribute can only be used if no filename has been entered.

Example

Use the following command to delete the file 'NUMBERS.DAT':

at\$jdel="numbers.dat",BIN,S

The attribute S must be entered if the file is a system file.

\$JDIR List Files in the Modem Memory

AT\$JDIR=<type of file>,<attribute>,<attribute>,<attribute>

This command is used to list all files of the specified type and with the specified attribute. If no type of file is specified, all file types are displayed. The individual entries have to be separated by commas.



<Type of file> must always be preceded by a comma!

If no attribute is entered, all files of the specified type are displayed, with the exception of the hidden files (H) and system files (S). To display system or hidden files, enter the attribute **S** or **H**. The maximum storage capacity is 2 MB. The modem manages system and voice files, fax and voice messages as well as outgoing message texts. The following settings are valid:

Parameter	Value	Description
Type of file	ADPCM2-7	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 7.2 kHz)
	ADPCM2-8	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 8 kHz)
	ADPCM4-7	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 7.2 kHz)
	ADPCM4-8	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 8 kHz)
	PCM8L-7	Rockwell 8-bit PCM, high voice quality (sampling rate of 7,2 kHz, linear characteristic)
	T4N	Fax file (normal resolution)
	T4F	Fax file (high resolution)
	ASCII	ASCII format
	BIN	Binary format
	VOICE	All voice files
	FAX	All fax files
Attribute	N	The file has not yet been downloaded into the computer (New). In case of voice files, the file has not yet been downloaded into the computer; this can be used to display all new voice files. In case of fax files, the attribute N is always set.
Attribute	H	This is a hidden file; it can be displayed only by entering the file attribute H (Hidden).
Attribute	S	This is a system file; it can be displayed only by entering the file attribute S (System).

\$JDNL Download Files from the Modem Storage into the Computer

AT\$JDNL="<filename>",<attribute>

This command is used to download all files, regardless of their format, from the modem storage into the computer, using a terminal program (e.g. *ELSA-Communicate! PRO*).

This means that you can use the modem for file transfer as well. The following settings are valid:

Parameter	Value	Description
Filename	32-127 ASCII	Entry of the filename (maximum length: 20 characters)
Attribute	I	With the entry of the file attribute I , the 'info block' of the file stated in the parameter <filename> can be downloaded into the computer. If no attribute is entered, the file itself is downloaded into the computer.

Example

If you want to download the file 'NUMBERS.DAT' from the modem storage in your computer, you must at first enter a name under which the selected file is to be stored. To do so, enter the following command:

at\$jdnl="numbers.dat"

Then you can start the download procedure. Use the XModem-1K or the XModem protocol.

\$JFLI Change Fax ID

AT\$JFLI=<fax ID>

You can use this command to enter a phone number to be used as the fax ID in your outgoing faxes. The fax ID is stored in the non-volatile memory. The following settings are valid:

Parameter	Value	Description
Fax ID	32-127 ASCII	Output of the phone number (maximum length: 20 characters)

Example

If you want to use the phone number '+4924123456789' as the fax ID, enter the following command:

at\$jfli="+4924123456789"

\$JPWD Specify Password for Remote Query and Remote Configuration

AT\$JPWD=<remote query>,<remote configuration>,"<password>"

Use this command to enable the remote query or remote configuration of the answering machine. It also allows you to specify a password for remote query or remote configuration. The factory default for the password is 9999.

The password must have four digits. Valid characters are digits. The following settings are valid:

Parameter	Value	Description
Remote query	0	Remote query OFF
	1	Remote query ON
Remote configuration	0	Remote configuration OFF
	1	Remote configuration ON
Password	0..9	Change password

Example

Enter the following command to enable the remote configuration and to change the password:

at\$pwd=1,"1111"



If an invalid password is entered three times, the modem denies access for a period of time which is within the current interval of four hours. The first interval of four hours starts at 12:00 a.m., the next at 4:00 a.m. etc.

\$JRING Set Number of Rings

AT\$JRING=<Number of rings>

This command is used to set the number of rings required by the modem before answering.

If you enter an invalid value, the modem automatically uses the nearest allowed value (minimum or maximum) as the number of rings to be waited for. If, for example, in Germany the value 10 is entered, the modem automatically enters the value 9. For Germany, the default is 4. The following settings are valid:

Parameter	Value	Description
Number of rings	1-9	Number of rings for Germany (country-specific)

Example

If the value 2 is to be entered for Germany, enter the following:

at\$ring=2

\$JTIME Set Clock

AT\$JTIME=<hh>,<mm>,<ss>

This command allows you to set the internal clock of the modem. The following settings are valid:

Parameter	Value	Description
hh	0-24	Hours
mm	0-59	Minutes
ss	0-59	Seconds

Invalid entries are answered with ERROR.



\$JUPL

Download File from the Computer into the Modem Storage

AT\$JUPL=<filename>,<type of file>,<attribute>,<attribute>,<attribute>,<attribute>,<attribute>

This command is used to download all files, regardless of their format, from the modem storage into the computer, using a terminal program (e.g. *ELSA-Communicate!* PRO). The following settings are valid:

Parameter	Value	Description
Filename	32-127 ASCII	Output of the filename
Type of file	ADPCM2-7	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 7.2 kHz)
	ADPCM2-8	Rockwell 2-bit ADPCM, low voice quality (sampling rate of 8 kHz)
	ADPCM4-7	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 7.2 kHz)
	ADPCM4-8	Rockwell 4-bit ADPCM, medium voice quality (sampling rate of 8 kHz)
	PCM8L-8	Rockwell 8-bit PCM, high voice quality (sampling rate of 8 kHz, linear characteristic)
	T4N	Fax file (normal resolution)
	T4F	Fax file (high resolution)
	ASCII	ASCII format
	BIN	Binary format
Attribute	N	The file has not yet been downloaded into the computer (New).
Attribute	H	This is a hidden file; it can be displayed only by entering the file attribute H (Hidden).
Attribute	S	This is a system file; it can be displayed and deleted only by entering the file attribute S (System).
Attribute	I	The file attribute I is used to identify this file as a file with 'info block'. The 'info block' can include additional information on the file.
Attribute	G	This file attribute must be entered in order that the modem recognizes this file as an outgoing message text.

Example

If you want to upload the file 'NUMBERS.DAT' from your computer into the modem storage, you must at first specify a name under which the selected file is to be stored. To do so, enter the following command:

at\$jupl="numbers.dat",BIN,S

Then you can start the upload procedure. Use the XModem-1K or the XModem protocol. The attribute S must be entered, since the file is a system file.



If a file with the name <filename> already exists, the command will be answered with ERROR. If you want to replace the file with the filename <filename> by a file with the same name, you must at first delete the old file (AT\$JDEL).

AT+ Commands

The **AT+** commands of the extended command set can be used to control selected modem functions in accordance with the V.250 standard.

The current parameter settings can be queried with **AT+<command designation>?** (e.g. **AT+IFC?**). The valid range of parameter values is output through **AT+<command designation>=?** (e.g. **AT+IFC=?**). Commands for which no range of values can be output are answered with ERROR.

+A8E Control of the V.8 and V.8bis Negotiation

AT+A8E=<V8OriginatorKonf>,<V8AnswererKonf>,<V8CallFunction>,<V8bis>,<CallfunktionRange>,<ProtokollFunktionRange>

This command is used to control the V.8 and V.8bis negotiation. The following settings are valid:

Parameter	Value	Description
V8OriginatorKonf	0	V.8 negotiation as caller OFF
	1	Modem-controlled V.8 negotiation as caller ON
	6	Like 1 with additional output of a +A8X message to the computer
V8AnswererKonf	0	V.8 negotiation as remote station OFF
	1	Modem-controlled V.8 negotiation as caller ON
	5	Like 1 with additional output of a +A8X message to the computer
V8CallFunction	C1	Output of the hexadecimal value of the V.8 CI signals
V8bis	0	V.8bis negotiation OFF
	1	Modem-controlled V.8bis negotiation ON
CallfunktionRange		Refer to ITU-T-V.8 specifications
ProtokollFunktionRange		Refer to ITU-T-V.8 specifications

+ASTO Store Dspeed-Dial Numbers

AT+ASTO=<position>,<dial string>

This command is used to assign the speed-dial numbers 0-19 to a dial string. The parameter <position> designates the speed-dial number. The speed-dial numbers are executed by S=<position> (Special character for dialing stored phone numbers) in the dialing command.

AT+ASTO? can be used to enter the assigned speed-dial numbers. A speed-dial number is deleted by entering the command for setting the speed-dial number, by entering only the position and an empty dial string (refer to the **ATD** command, page 11).

The following settings are valid:

Parameter	Value	Description
Position	0-19	Valid speed-dial numbers
Dial string	36	Maximum length of the dial string

Example

If you want to change only the third speed-dial number, enter the following command:

AT+ASTO=3,""

+DR Output of the Data Compression Method

AT+DR=<parameter>

This command is used to control the output of the negotiated data compression method before the connect message. The following settings are valid:

Parameter	Value	Description
Parameter	0	Output OFF
	1	Output ON

The following are possible feedback messages by the modem before the output of the connect message:

+DR: NONE no data compression method selected

+DR: V42B V.42bis selected

+DR: ALT MNP5 selected

+DS Data Compression Method

AT+DS=<direction>,<compression_negotiation>,<max_dict>,<max_string

This command controls the data compression. The default setting is **AT+DS=3,0,2048,32**, so the modem automatically recognizes which compression method (depending on the capabilities or setting of the remote modem) to use.

direction Select data compression.

Compression_negotiation The connection is not interrupted if no data compression method has been negotiated.

max_dict States the maximum number of dictionary entries for V.42bis data compression to be negotiated (this can be used by the computer to restrict the length of the code word sent, based upon the knowledge of the kind of the user data to be sent).

max_string Maximum string length possible for V.42bis data compression.

The following settings are valid:

Parameter	Value	Description
Direction	0	No data compression.
	3	Bidirectional V.42bis/MNP5 data compression
Compression_negotiation	0	The connection is not interrupted if no data compression has been negotiated.
Max_dic	2048	Maximum number of dictionary entries.
Max_string	32	Maximum string length for V.42bis data compression.

+EFCS FCS Mode of Operation in the V.42 Mode

AT+EFCS=<parameter value>

This command is used to control the application of the 16-bit frame check sequence (FCS) in the V.42 mode. The following settings are valid:

Parameter	Value	Description
Parameter value	0	16-bit FCS

+ER Display of the Error Correction Method

AT+ER=<parameter value>

This command is used to switch the output of the negotiated error correction method on. The output takes place prior to the connect message. The following settings are valid:

Parameter	Value	Description
Parameter value	0	Disable modem result codes
	1	Enable modem result codes

The following messages can occur:

+ER: None No error correction method
 +ER: LAPM Error correction method according to LAPM selected
 +ER: ALT Error correction method according to MNP4 selected

+ES Selection of the Error Correction Method

AT+ES=<orig_rqst>,<orig_fbk>,<ans_fbk>

This command is used to select the error correction method the modem offers to the remote station during the negotiation of the data protocol.

orig_rqst States the data protocol the calling modem (originate) attempts to negotiate at first. If the remote station does not support this protocol, the modem will fall back to the data protocols stated in <orig_fbk> .

orig_fbk States possible data protocols offered by the modem of the remote side, if the data protocol cannot be negotiated in the <orig_rqst>.

ans_fbk States the data protocols offered by the modem (answer) of the remote side.

The following settings are valid:

Parameter	Value	Description
orig_rqst	1	Connection only in the buffered mode.
	2	Negotiate error correction in accordance with V.42 without detect phase.
	3	Negotiate error correction in accordance with V.42 with detect phase.
	4	Negotiate MNP.
	6	Negotiate V.80 synchronous-access mode (originate).
	orig_fbk	0
2		LAPM or MNP are accepted as error correction methods. If no error correction method can be negotiated, the modem hangs up.
3		Only LAPM is accepted as error correction method. If no error LAPM can be negotiated, the modem hangs up.
4		Only MNP is accepted as error correction method. If no MNP can be negotiated, the modem hangs up.
ans_fbk	1	Only buffered operation possible.
	2	LAPM or MNP are possible as error correction methods. If no error correction method is negotiated, a buffered connection is set up.
	4	LAPM or MNP are possible as error correction methods. If no error correction method is negotiated, the modem hangs up.
	5	Only LAPM is possible as error correction method. If no LAPM is negotiated, the modem hangs up.
	6	Only MNP is possible as error correction method. If no MNP is negotiated, the modem hangs up.
	8	V.80 synchronous-access mode ON (answer).

The following two tables provide an overview of the interaction of the parameters **orig_rqst** and **orig_fbk** of the **AT+ES** command.

Example

The modem is set to AT+ES=3,0 by default. In the upper table this configuration is described as case 6. Column 6 of the lower table shows the error correction methods possible for this setting (connection with V.42, MNP4 or without protocol).

The arrows pointing down in the lower table denote a fallback if the respective mode is not supported by the remote modem.

Tables for the representation of the error correction method:

orig_fbk	orig_rqst				
	1	2	3	4	6
0	4	5	6	7	0
2	4	1	8	–	0
3	4	1	2	–	0
4	4	–	–	3	0

	0	1	2	3	4	5	6	7	8
V.80	■	–	–	–	–	–	–	–	–
V.42 ^a	–	■	–	–	–	↓	–	–	–
V.42 ^b	–	–	■	–	–	–	↓	–	↓
MNP	–	–	–	■	–	–	↓	↓	■
Buffered	–	–	–	–	■	■	■	■	–

a. without detect phase

b. with detect phase

+ESR Control of the Selective-reject Function in the V.42 Mode

AT+ESR=<parameter value>

This command controls the repetition of faulty data packets (SREJ) in the V.42 mode.

In the default setting, the modem attempts to use the selective-reject function, if supported by the remote station. If the remote station does not support selective reject, this function is switched off. The following settings are valid:

Parameter	Value	Description
Parameter value	0	Selective Reject OFF
	1	Selective Reject ON

+ETBM Buffer handling after connection abort

AT+ETBM=<sending buffer>,<receiving buffer>,<timer>

This command controls the data management in the modem buffer after the termination of a connection.

Sending buffer Handling of the data in the sending buffer, if the local computer terminates the connection.

Receiving buffer Handling of the data in the receiving buffer, if the remote station terminates the connection.

The following settings are valid:

Parameter	Value	Description
Sending buffer	0	Delete data in the sending buffer in case of connection abort
Receiving buffer	0	Delete data in the receiving buffer in case of connection abort

+IFC Flow Control at the Serial Interface

AT+IFC=<DCE_by_DTE>,<DTE_by_DCE>

This command is used to set the flow control at the serial interface.

DCE_by_DTE This parameter is used to control the method for the monitoring of the data flow in the direction of the remote modem, the method preset **by the computer**.

DTE_by_DCE This parameter specifies the method preset **by the modem** for the control of the data flow in the direction of the remote computer. The following settings are valid:

Parameter	Value	Description
DCE_by_DTE	0	No flow control
	1	XON/XOFF flow control
	2	RTS flow control
	3	XON/XOFF flow control, XON/XOFF characters are passed on to the remote modem transparently
DTE_by_DCE	0	No flow control
	1	XON/XOFF flow control
	2	CTS flow control

+ILRR Output of the Data Rate of the Serial Interface

AT+ILRR=<parameter value>

This command is used to switch the output of the bit rate of the computer on. The feedback message has the following format: '+ILRR: <bit rate of the computer>'. The following settings are valid:

Parameter	Value	Description
Parameter value	0	Output OFF
	1	Output ON

+IPR Set Bit Rate of the Computer

AT+IPR="<bit rate>"

This command is used to set the bit rate identification. The bit rate of the computer is identified automatically. The following bit rates are supported: 300, 600, 1200, 2400, 4800, 7200, 9600, 19,200, 38,400, 57,600, 115,200, 230,400 bps.

Parameter	Value	Description
Bit rate	0	Automatic bit rate identification

+MR Output of the Modulation Method and of the Line Bit Rate

AT+MR=<parameter value>

This command is used to control the output of the negotiated modulation method and of the line bit rate before the connect message. The receiving bit rate is output only if the sending and receiving bit rate are different.

The following settings are valid:

Parameter	Value	Description
Parameter value	0	Output OFF
	1	Output ON

The feedback messages have the following format (also refer to the commands **AT+MS**, page 45):

+MCR: <carrier>

+MRR: <bit rate>,<receiving bit rate>

+MS Select Modulation Method

AT+MS=<carrier>,<automode>,<min_(tx_)rate>,<max_(tx_)rate>,<min_rx_rate>,<max_rx_rate>

This command is used to select the desired modulation method.

carrier Modulation method used for calling attempts.

automode If call establishment with the selected type of modulation fails, the modem uses another modulation type to set up a connection.

min_(tx_)rate Optional numeric parameter that states the minimum data rate to be used by the modem to set up a connection.

If the value 0 (zero) is entered, the minimum bit rate is determined by the setting of the parameters <carrier> and <automode>. The lowest bit rate possible within the respective modulation type is selected.

A value higher than 0 (zero) states the minimum bit rate in bps used for calling attempts.

max_(tx_)rate Optional numeric parameter that states the maximum data rate to be used by the modem to set up a connection.

If the value 0 (zero) is entered, the maximum bit rate is determined by the setting of the parameters <carrier> and <automode>. The highest bit rate possible in the respective modulation type is set, the maximum modulation type being additionally restricted by the bit rate set at the computer.

A value higher than 0 (zero) states the maximum bit rate in bps used for calling attempts.

min_rx_rate
max_rx_rate

These optional parameters can be used to set other data rates for the receiving direction than for the sending direction.

The following settings are valid:

Parameter	Value	Description
Carrier	B103	Bell 103 selected
	B212A	Bell 212A selected
	V21	V.21 selected
	V22	V.22 selected
	V23C	V.23 selected
	V23S	V.23 half-duplex
	V32	V.32 selected
	V32B	V.32bis selected
	V34	V.34 selected
	K56	56Kflex selected
		V90
Automode	0	Automode function OFF
	1	Automode function ON
min_(tx_)rate	0	Automatic bit rate selection
	75	Minimum send bit rate 75 bps
	300	Minimum send bit rate 300 bps
	600	Minimum send bit rate 600 bps
	1200	Minimum send bit rate 1200 bps
	2400	Minimum send bit rate 2400 bps
	4800	Minimum send bit rate 4800 bps
	7200	Minimum send bit rate 7200 bps
	9600	Minimum send bit rate 9600 bps
	12000	Minimum send bit rate 12,000 bps
	14400	Minimum send bit rate 14,400 bps
	16800	Minimum send bit rate 16,800 bps
	19200	Minimum send bit rate 19,200 bps
	21600	Minimum send bit rate 21,600 bps
	24000	Minimum send bit rate 24,000 bps
	26400	Minimum send bit rate 26,400 bps
28000	Minimum send bit rate 28,000 bps	

Parameter	Value	Description
	28800	Minimum send bit rate 28,800 bps
	29333	Minimum send bit rate 29,333 bps
	30667	Minimum send bit rate 30,667 bps
	31200	Minimum send bit rate 31,200 bps
	32000	Minimum send bit rate 32,000 bps
	33600	Minimum send bit rate 33,600 bps
max_(tx_)rate	see above	The range of values of the maximum send bit rate corresponds to the range of values of the minimum send bit rate
min_rx_rate	0	Automatic bit rate selection
	75	Minimum receive bit rate 75 bps
	300	Minimum receive bit rate 300 bps
	600	Minimum receive bit rate 600 bps
	1200	Minimum receive bit rate 1200 bps
	2400	Minimum receive bit rate 2400 bps
	4800	Minimum receive bit rate 4800 bps
	7200	Minimum receive bit rate 7200 bps
	9600	Minimum receive bit rate 9600 bps
	12000	Minimum receive bit rate 12,000 bps
	14400	Minimum receive bit rate 14,400 bps
	16800	Minimum receive bit rate 16,800 bps
	19200	Minimum receive bit rate 19,200 bps
	21600	Minimum receive bit rate 21,600 bps
	24000	Minimum receive bit rate 24,000 bps
	26400	Minimum receive bit rate 26,400 bps
	28000	Minimum receive bit rate 28,000 bps
	28800	Minimum receive bit rate 28,800 bps
	29333	Minimum receive bit rate 29,333 bps
	30667	Minimum receive bit rate 30,667 bps
	31200	Minimum receive bit rate 31,200 bps
	32000	Minimum receive bit rate 32,000 bps
	33333	Minimum receive bit rate 33,333 bps
	33600	Minimum receive bit rate 33,600 bps
	34000	Minimum receive bit rate 34,000 bps
	34667	Minimum receive bit rate 34,667 bps
	36000	Minimum receive bit rate 36,000 bps
	37333	Minimum receive bit rate 37,333 bps
	38000	Minimum receive bit rate 38,800 bps
	38667	Minimum receive bit rate 38,667 bps
	40000	Minimum receive bit rate 40,000 bps

Parameter	Value	Description
	41333	Minimum receive bit rate 41,333 bps
	42000	Minimum receive bit rate 42,200 bps
	42667	Minimum receive bit rate 42,667 bps
	44000	Minimum receive bit rate 44,000 bps
	45333	Minimum receive bit rate 45,333 bps
	46000	Minimum receive bit rate 46,000 bps
	46667	Minimum receive bit rate 46,667 bps
	48000	Minimum receive bit rate 48,000 bps
	49333	Minimum receive bit rate 49,333 bps
	50000	Minimum receive bit rate 50,000 bps
	50667	Minimum receive bit rate 50,667 bps
	52000	Minimum receive bit rate 52,000 bps
	53333	Minimum receive bit rate 53,333 bps
	54000	Minimum receive bit rate 54,000 bps
	54667	Minimum receive bit rate 54,667 bps
	56000	Minimum receive bit rate 56,000 bps
max_rx_rate	see above	The range of values of the maximum receive bit rate corresponds to the range of values of the minimum receive bit rate

Example

If you want your modem, in case of V.34 with a sending bit rate of 28,800 bps, to set up a connection with automatic speed selection disabled, enter the following command:

AT+MS=V34,0,28800,28800



With all modulation rates with the exception of V.90 and K56Flex, only the first two parameters (min_(tx_)rate, max_(tx_)rate) will be taken into account. Please also refer to the following tables listing the bit defined after modulation types.

V.90	Receiving direction:
	28000
	29333
	30667
	32000
	33333
	34667
	36000
	37333
	38667
	40000
	41333
	42667

	44000
	45333
	46667
	48000
	49333
	50667
	52000
	53333
	54667
	56000
	Sending direction:
	28000
	29333
	30667
	32000
K56flex	Receiving direction:
	32000
	34000
	3600
	3800
	40000
	42000
	44000
	46000
	48000
	50000
	52000
	54000
	56000
	Sending direction:
	32000
V.34	Sending and receiving direction
	2400
	4800
	7200
	9600
	12000
	14400

	16800
	19200
	21600
	24000
	26400
	28800
	31200
	33600
V.32bis	Sending and receiving direction
	4800
	7200
	9600
	12000
	14400
V.32	Sending and receiving direction
	4800
	9600
V.23C	Receiving direction/ sending direction
	75/1200
	1200/75
V.23S	Sending and receiving direction
	1200 bps (half-duplex)
V.22bis	Sending and receiving direction
	1200
	2400
V.21	Sending and receiving direction
	300
BELL103	Sending and receiving direction
	300
Bell212A	Sending and receiving direction
	1200

Description of Registers

The modem has internal registers with which you can control the configuration (see also command **ATSn**). Please refer to the following description for the significance of the registers.

S0 Automatic Call Answering

Valid parameters for Germany	0..9 rings
Valid parameters for Austria	0..5 rings
Valid parameters for Switzerland	0, 2..10 rings
Default value	0
Store in non-volatile memory	AT&W or AT*W

The automatic answering of calls can be set in the register S0. If $S0 > 0$, every incoming call will be automatically answered. The S0 value determines the number of ring pulses to wait before the call is answered.

If you enter an invalid value, the modem automatically uses the nearest allowed value (minimum or maximum) as the number of rings to be waited for. If, for example, in Germany the value 10 is entered, the modem automatically enters the value 9. If in Switzerland the value 1 is entered, the modem automatically enters the value 2.

With $S0 > 0$ the connection establishment can be aborted by any character (except for <LF>). Call establishment is not aborted, however, if bit 6 of register S14 has been set to 1 (default = 0). With this setting it is possible for the computer to transmit characters to the modem while the connection is being established (see page 34).

S1 Ring Counter

Valid values	0..255 ring pulses
Default value	0
Store in non-volatile memory	no

Register S1 contains the number of rings of an incoming call. The S1 value is reset to zero, if after an interval defined in register S99 (see page 66) no more pulses are received from the line (5 seconds by default). During this interval, no new calls can be identified and dialing is disabled.

S2 Escape Code Characters

Valid values	0 to 255 decimal
Default value	43 (+)
Store in non-volatile memory	AT*W

The escape command '+++' that is used to switch from the transfer phase to the command phase can be changed in register S2.



The transition to the command phase is blocked by values 0 and >128.

S3 Carriage Return Characters

Valid values	0 to 127 decimal
Default value	13 (carriage return)
Store in non-volatile memory	AT*W

The character for Return can be redefined in register S3.

S4 Line Feed Character

Valid values	0 to 127 decimal
Default value	10 (line feed)
Store in non-volatile memory	AT*W

The line feed character can be redefined in register S4.

S5 Backspace Character

Valid values	0 to 32, 127 decimal
Default value	8 (backspace)
Store in non-volatile memory	AT*W

The backspace character can be redefined in register S5.

S6 Wait before Blind Dialing

Valid values	3..6 seconds
Default value	3 seconds
Store in non-volatile memory	AT*W

The time to elapse before the modem performs blind dialing (see also **ATX**, **ATX1** or **ATX3**, page 27) can be set in register S6.

S7 Wait for Carrier

Valid parameters for Germany	10..100 seconds :
Default value for Germany	90 seconds
Valid parameters for Austria	10..60 seconds
Default value for Austria	60 seconds
Valid parameters for Switzerland	10..100 seconds :
Default value for Switzerland	90 seconds
Store in non-volatile memory	AT*W

The amount of time that the modem waits for the carrier after dialing is set in register S7.

S8 Pause Length of ','

Valid values	0..8 seconds
Default value	2 seconds
Store in non-volatile memory	AT*W

The length of a dialing pause ',' is determined in register S8.

S10 Delay for Hang Up after Carrier Loss

Valid values	1..255 1/10 seconds
Default value	10 (0.3 seconds)
Store in non-volatile memory	AT*W

Register S10 determines the period of time after which the modem terminates the connection if no carrier signal is detected. This setting is relevant only for the transmission methods V.21, V.22bis and V.23.

S11 Dialing Speed for Tone Dialing

Valid parameters for Germany	85 to 95 (1/1000 sec.)
Default value for Germany	90 (90 ms)
Valid parameters for Austria	75 to 145 (1/1000 sec.)
Default value for Austria	80 (80 ms)
Valid parameters for Switzerland	70 to 105 (1/1000 sec.)
Default value for Switzerland	80 (80 ms)
Store in non-volatile memory	AT*W

The speed of the tone dialing process (i.e. the duration of each dialing tone) can be changed in register S11.

S12 Escape Prompt Delay

Valid values	0 to 255 (1/50 sec.)
Default value	50 (1 sec.)
Store in non-volatile memory	AT*W

The length of the escape prompt delay is established in register S12.

S14 Bit-Oriented Option

The contents of register S14 is stored in the non-volatile memory with the commands **AT&W** or **AT*W**. The individual bits have the following significance:

Bit	Dec.	Description
0..5	0	0 Reserved
6	0	0 Polling not possible during call establishment ^a
	64	1 Polling possible during call establishment ^b
7	0	0 Modem in the answer mode
	128	1 Modem in the originate mode

- Polling not possible during call establishment (the call establishment is aborted by any character other than LF, XON and XOFF).
- Polling is always possible in the dumb mode.

S16 Bit-Mapped Options

This register can be read only. It contains information about the status of an active loop-back:

Bit	Dec.	Description
0	0	0 Local analog loop disabled
	1	1 Local analog loop enabled
1	0	0 Reserved
	4	1 Local digital loop enabled
2	0	0 Local digital loop disabled
	8	1 Initiated remote digital loop
3	0	0 No initiated remote digital loop
	16	1 Remote digital loop enabled
4	0	0 Remote digital loop disabled
	16	1 Remote digital loop enabled
5..7	0	0 Reserved

S23 Bit-Oriented Option

The contents of register S23 is stored in the non-volatile memory with the commands **AT&W** or **AT*W**. The individual bits have the following significance:

Bit	Dec.	Description
0..3	0	0 Reserved
4..5	0	0 7E1
	16	1 8N1
	32	2 7O1
6..7	48	3 7N2
	0	0 Reserved



The value of bit 1 to 3 of register S23 is overwritten after every AT.

S25 DTR Delay

Valid values	0..255(1/100 seconds)
Default value	5 (0.05 seconds)
Store in non-volatile memory	AT&W or AT*W

Register S25 can be used to set the minimum duration of a DTR change to have any effect. This affects those features that are set with the **AT&Dn** and **AT\$Dn** commands.

S27 Bit-Mapped Options

The contents of register S27 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following significance:

Bit	Dec.	Description
0..6	0	0 Reserved
7	0	0 Duplex
	128	1 Half-duplex

S28 Bit-Mapped Options

The contents of register S28 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following significance:

Bit	Dec.	Description
0..4	0	0 Reserved
5	0	0 Bit rate tolerance: -2,5% + 1,0%
	32	1 Bit rate tolerance: -2.5% + 2.3%
6	0	0 Reserved
7	0	0 Ring message and call acceptance not possible if DTR = OFF
	128	1 Ring message and call acceptance possible if DTR = OFF

S29 Bit-Mapped Options

The contents of register S29 can be stored in the non-volatile memory using the **AT*W** command. The individual bits have the following significance:

Bit	Dec.	Description
0	0	0 Automatic fallback to V.23 allowed
	1	1 =Automatic fallback to V.23 not allowed
1	0	0 Asymmetric bit rates OFF
	2	1 Asymmetric bit rates ON
2..3	9	0 Reserved
4	0	0 Rate renegotiation with V34, V.90, K56flex, V.34 and V.32bis ON
	16	1 Rate renegotiation with V34, V.90, K56flex, V.34 and V.32bis OFF
5	0	0 Disable V.32 clear down sequence
	32	1 Enable V.32 clear down sequence
6	0	0 V.32: 9600 bps uncoded
	64	1 V.32: 9600 bps Trellis coded

S30 Inactivity Timer

Valid parameters	0 to 255 (10 sec.)
Default value	0 (timer off)
Store in non-volatile memory	AT&W or AT*W

Register S30 can be used to set the time after which the modem automatically breaks the connection if no data has been sent or received in the mean time. A value of zero disables the inactivity timer.

S31 Bit-Oriented Option

The contents of register S31 is stored in the non-volatile memory with the commands **AT&W** or **AT*W**. The individual bits have the following significance:

Bit	Dec.	Description
0..2	0	0 Reserved
3	0	0 Calling tone according to ITU-T V.25
	8	1 Calling tone according to ITU-T V.8
4..6	0	0 Reserved
7	0	0 Dial lock of two hours after the 12th unsuccessful dialing attempt^a
	128	1 Dialing pause of 30 seconds after every unsuccessful dialing attempt

a. Bit 7 of register S31 is valid for Germany only. In Austria and Switzerland, bit 7. is reserved.

S34 Configuration Command

Valid values	0 to 127 decimal
Default value	42 (*)
Store in non-volatile memory	AT*W

Register S34 can be used to change the configuration command ********, which is used to change from the online stateto the remote configuration state.

S35 Number of Callback Attempts

Valid values	1..99
Default value	3
Store in non-volatile memory	AT*W

In Register S35, the number of times your modem attempts to call back can be defined.

S42 Wait for User Password

Valid values	20..120 seconds
Default value	30 seconds
Store in non-volatile memory	AT*W

The amount of time that the modem waits for the password entry after successful call establishment is set in register S7.

S43 Callback Delay

Valid values	1..12 minutes
Default value	1 minute
Store in non-volatile memory	AT*W

The value for the call delay of the modem is defined in register S43.

S47 Fallback Character

Valid values	0..62, 64..125, 127 (decimal)
Default value	0
Store in non-volatile memory	AT&W or AT*W

In register S47, the ASCII character ($n = 1..127$) that is evaluated as fallback character when the call is accepted (see also command **AT%A**, page 8) can be defined. For this purpose, the command **ATC2** (see page 9) must be set. The default setting 0 disables the fallback character recognition entirely.

S53 Bit-Oriented Option

The contents of register S53 is stored in the non-volatile memory with the commands **AT&W** or **AT*W**. The setting of the bits 0 to 1 is only effective for the file format between the modem and the computer. The setting is only effective in the transfer phase. The telephone-side data format is always 8N1, regardless of this setting. In the default setting, the data format from register S23 is used. The individual bits have the following significance:

Bit	Dec.	Description
0..1	0	0 10-bit data format in the transfer phase (8N1, 7E1, 7O1 or 7N2)
	1	1 11-bit data format in the transfer phase: 8E1
	2	2 11-bit data format in the transfer phase: 8O1
	3	3 11-bit data format in the transfer phase: 8N2
2..7	0	0 Reserved

S54 Bit-Oriented Option

Register S54 controls the modem's option to emit an acoustic signal as notification of an incoming call. By default, this ringing is enabled. This register is independent of the command **AT&F** but dependent of the command **ATMn**. The settings for this register can be stored to non-volatile memory with the command **AT*W**.

Bit	Dec.	Description
0	0	0 An incoming call is not indicated by an acoustic signal
	1	1 An incoming call is indicated by an acoustic signal
1	0	0 The serial speed is loaded from profile by new initialization
	2	1 The serial speed is not changed in case of new initialization
2	0	0 XOFF (software handshake) remains unchanged in case of new initialization
	4	1 XOFF (software handshake) is reset in case of new initialization

S64 Setting of the Sent Signal Level in Dial-Line Operation

Valid values	10..15 (-x.5 dBm)
Default value	10 (-10.5 dBm)
Store in non-volatile memory	AT*W

In register S64, the telephone line transmission signal level of the modem can be changed. A value of 10 corresponds to a transmission level of -10.5 dBm.

S65 Output of the Received Signal Level

In register S65, the received signal level can be output (in -dBm). Register S65 can be read only.

S66 Bit-Mapped Options

In register S66, the symbol rate offered in V.34 operation is defined. With this option, certain symbol rates can be suppressed. The settings for this register can be stored to non-volatile memory with the commands **AT&W** or **AT*W**. The individual bits have the following significance:

Bit	Dec.	Description
0	0	0 Symbol rate 2400 bps OFF
	1	1 Symbol rate 2400 bps ON (max. 21,600 bps)
1	0	Reserved
2	0	0 Symbol rate 2800 bps OFF
	4	1 Symbol rate 2800 bps ON (max. 24,000 bps)

Bit	Dec.	Description
3	0	0 Symbol rate 3000 bps OFF
	8	1 Symbol rate 3000 bps ON (max. 26,400 bps)
4	0	0 Symbol rate 3200 bps OFF
	16	1 Symbol rate 3200 bps ON (max. 31,200 bps)
5	0	0 Symbol rate 3429 bps OFF
	32	1 Symbol rate 3429 bps ON (max. 33,600 bps)
6..7	0	0 Reserved

S84 Bit-Mapped Options

Register S84 stores the symbol rate established during a V.90, K56flex or V.34 connection. This register is read-only. The individual bits have the following significance:

Bit	Dec.	Description
0..2	0	0 2400 bps
	1	1 Reserved
	2	2 2800 bps
	3	3 3000 bps
	4	4 3200 bps
	5	5 3429 bps

S86 Call Failure Reason Code

Register S86 can be read only. The value of S86 indicates the reason for the last connection failure:

Dec.	Description
0	Normal disconnection, no error occurred
4	Loss of carrier
5	Negotiation phase failed; modem at remote station has no error correction
6	Remote modem is not answering protocol requests
7	Remote modem is only functioning synchronously
8	Modems could not find a common framing
9	Modems could not find a common protocol
10	Remote modem is sending wrong protocol requests
11	Synchronous information (data or flags) missing; connection termination after 30 seconds
12	Normal disconnect, initiated by the remote modem
13	Remote modem is no longer answering; disconnect after 10 re-transmissions
14	Protocol violation
15	Compression error
16	Inactivity time has elapsed

Dec.	Description
17	No loop current
20	Busy tone detected
21	No dial tone detected
22	No answer tone detected (time-out S7)
23	No connection reached (time-out) or wrong modulation type
24	No common type of modulation
25	No modem or fax is answering at the number called
26	Invalid login attempt or invalid password
27	Automatic dialing
30	ATH (online)
31	ATZ (online)
32	AT&T0 (in analog loopback)
33	Termination via keystroke
32	Termination via DTR
41	Termination by level change
42	Termination by synchronization loss
43	Termination by clear down sequence
68	No answer to automatic retrain

S87 Bit-Mapped Options

Register S87 can be read only. It contains information about the current connection:

Bit	Dec.	Description
0..4	1	1 Minimum send bit rate 75 bps
	2	2 Minimum send bit rate 1200 bps
	3	3 Minimum send bit rate 300 bps
	4	4 Reserved
	5	5 Minimum send bit rate 1200 bps
	6	6 Minimum send bit rate 2400 bps
	7	7 Minimum send bit rate 4800 bps
	8	8 Minimum send bit rate 7200 bps
	9	9 Minimum send bit rate 9600 bps
	10	10 Minimum send bit rate 12,000 bps
	11	11 Minimum send bit rate 14,400 bps
	12	12 Minimum send bit rate 16,800 bps
	13	13 Minimum send bit rate 19,200 bps
	14	14 Minimum send bit rate 21,600 bps
	15	15 Minimum send bit rate 24,000 bps
	16	16 Minimum send bit rate 26,400 bps

Bit	Dec.	Description
	17	17 Minimum send bit rate 28,000 bps
	18	18 Minimum send bit rate 28,800 bps
	19	19 Minimum send bit rate 29,333 bps
	20	20 Minimum send bit rate 30,667 bps
	21	21 Minimum send bit rate 31,200 bps
	22	22 Minimum send bit rate 32,000 bps
	23	23 Minimum send bit rate 33,600 bps
5..7	0	0 Reserved

S88 Bit-Mapped Options

Register S88 can be read only. It contains information about the current connection:

Bit	Dec.	Description
0	0	0 No connection with MNP1..4
	1	1 Connection with MNP1..4
1	0	0 No connection with MNP5
	2	1 Connection with MNP5
2	0	0 No connection with V.42
	4	1 Connection with V.42
3	0	0 No connection with V.42bis
	8	1 Connection with V.42bis
4..7	0	0 Reserved

S89 Bit-Mapped Options

Register S89 can be read only. It contains information about the current connection:

Bit	Dec.	Description
0..4	1	1 DCE line receive bit rate 75 bps (V.23)
	2	2 DCE line receive bit rate 1200 bps (V.23)
	3	3 DCE line receive bit rate 300 bps
	4	4 DCE line receive bit rate 600 bps
	5	5 DCE line send bit rate 1200 bps
	6	6 DCE line receive bit rate 2400 bps
	7	7 DCE line receive bit rate 4800 bps
	8	8 DCE line receive bit rate 7200 bps
	9	9 DCE line receive bit rate 9600 bps
	10	10 DCE line receive bit rate 12,000 bps
	11	11 DCE line receive bit rate 14,400 bps

Bit	Dec.	Description
	12	12 DCE line receive bit rate 16,800 bps
	13	13 DCE line receive bit rate 19,200 bps
	14	14 DCE line receive bit rate 21,600 bps
	15	15 DCE line receive bit rate 24,000 bps
	16	16 DCE line receive bit rate 26,400 bps
	17	17 DCE line receive bit rate 28,800 bps
	18	18 DCE line receive bit rate 31,200 bps (only V.34)
	19	19 DCE line receive bit rate 33,600 bps (only V.34)
	20	20 DCE line receive bit rate 28,800 bps (only V.90)
	21	21 DCE line receive bit rate 29,333 bps (only V.90)
	22	22 DCE line receive bit rate 30,667 bps (only V.90)
	23	23 DCE line receive bit rate 32,000 bps (K56FLEX and V.90)
	24	24 DCE line receive bit rate 33,333 bps (only V.90)
	25	25 DCE line receive bit rate 34,000 bps (only K56FLEX)
	26	26 DCE line receive bit rate 34,667 bps (only V.90)
	27	27 DCE line receive bit rate 36,000 bps (K56FLEX and V.90)
	28	28 DCE line receive bit rate 37,333 bps (only V.90)
	29	29 DCE line receive bit rate 38,000 bps (only K56FLEX)
	30	30 DCE line receive bit rate 38,667 bps (only V.90)
	31	31 DCE line receive bit rate 40,000 bps (K56FLEX and V.90)
	32	32 DCE line receive bit rate 41,333 bps (only V.90)
	33	33 DCE line receive bit rate 42,000 bps (only K56FLEX)
	34	34 DCE line receive bit rate 42,667 bps (only V.90)
	35	35 DCE line receive bit rate 44,000 bps (K56FLEX and V.90)
	36	36 DCE line receive bit rate 45,333 bps (only V.90)
	37	37 DCE line receive bit rate 46,000 bps (only K56FLEX)
	38	38 DCE line receive bit rate 46,667 bps (only V.90)
	39	39 DCE line receive bit rate 48,000 bps (K56FLEX and V.90)
	40	40 DCE line receive bit rate 49,333 bps (only V.90)
	41	41 DCE line receive bit rate 50,000 bps (only K56FLEX)
	42	42 DCE line receive bit rate 50,667 bps (only V.90)
	43	43 DCE line receive bit rate 52,000 bps (K56FLEX and V.90)
	44	44 DCE line receive bit rate 53,333 bps (only V.90)
	45	45 DCE line receive bit rate 54,000 bps (only K56FLEX)
	46	46 DCE line receive bit rate 54,667 bps (only V.90)
	47	47 DCE line receive bit rate 56,000 bps (K56FLEX and V.90)

S90 Current Type of Modulation

Register S90 can be read only. It contains information about the current type of modulation:

Bit	Dec.	Description
0..3	0	0 BELL103
	1	1 Bell 212A
	2	2 V.23
	3	3 V.21
	4	4 V.22
	5	5 V.22bis
	6	6 V.32
	7	7 V.32bis
	8	8 Reserved
	9	9 V.34
	10	10 K56FLEX
4	0	0 Reserved
		1 Half-duplex Operation
5	32	0 Full-duplex Operation
		1 Half-duplex Operation
6	64	0 Modem Operation"
		1 Fax operation
7	128	0 Symmetrical connection (receive bit rate = send bit rate)
		1 Asymmetrical connection (receive bit rate = send bit rate)

S93 Bit-Oriented Option

The contents of register S93 is stored in the non-volatile memory with the commands **AT&W** or **AT*W**. The individual bits (0 to 16 decimal) have the following significance:

Bit	Dec.	Description
0..4	0	0 Computer-side bit rate 300 bps
	1	1 Computer-side bit rate 300 bps
	2	2 Computer-side bit rate 300 bps
	3	3 Computer-side bit rate 300 bps
	4	4 Computer-side bit rate 600 bps
	5	5 Computer-side bit rate 1200 bps
	6	6 Computer-side bit rate 2400 bps
	7	7 Computer-side bit rate 4800 bps
	8	8 Computer-side bit rate 7200 bps
	9	9 Computer-side bit rate 9600 bps

Bit	Dec.	Description
	10	10 Computer-side bit rate 12,000 bps
	11	11 Computer-side bit rate 14,400 bps
	12	12 Computer-side bit rate 19,200 bps
	13	13 Computer-side bit rate 38,400 bps
	14	14 Computer-side bit rate 57,600 bps
	15	0 Reserved
	16	16 Computer-side bit rate 115,200 bps
5..7	0	0 Reserved



The S93 value is overwritten after every **AT**

S96

Bit-Oriented Option

The contents of register S96 is stored in the non-volatile memory with the command **AT*W**. The individual bits have the following significance:

Bit	Dec.	Description
0..1	0	0 Decimal display of S registers
	1	1 Hexadecimal display of S registers
	2	2 Binary display of S registers
2	0	0 Message 'Continue with any character...' yes
	4	1 Message 'Continue with any character...' no
3	0	0 Display of messages in plain text (German)
	8	1 Display of messages in plain text (English)
4	0	0 Reserved
	0	0 The receive bit rate is output in the CONNECT message
5	32	1 The send and receive bit rates are output in the CONNECT message
	0	0 No output of the modulation method with extended CONNECT message
6	64	1 Output of the modulation method with extended CONNECT message
	0	0 Reserved
7	0	0 Reserved

S99 Time Difference Between Ring Pulses

Valid values	10..255 (1/10 seconds)
Default value for Germany	75 (5 seconds)
Default value for Austria	60 (6 seconds)
Default value for Switzerland	50 (5 seconds)
Store in non-volatile memory	AT&W or AT*W

The maximum allowed delay between received ring tones is set in register S99. Usually the standard value of 7.5 seconds need not be changed. If, however, ring pulses are sent at longer intervals in a telecommunications service network, increasing the maximum delay in register S99 prevents the ring counter (see register S1) from being reset to zero after each ring.

S130 Bit-Oriented Option

In register S130, options for fax operation can be defined. The contents of register S130 can be stored in the non-volatile memory using the **AT*W** command. The individual bits have the following significance:

Bit	Dec.	Description
0..1	0	0 Reserved
2	0	0 Reverse bit order of T.4 data (Class 2 '89, receive)
	4	1 Normal bit order for T.4 data (Class 2 '89, receive)
3	0	0 Operation with conventional fax software
	8	1 Special settings for fax operation
4	0	0 Fillbits are removed from T.4 data
	16	1 Fillbits are not removed from T.4 data
5	0	0 Reserved
6	0	0 CTS and XON/XOFF handshake, if no AT+IFC (only Class 1/2)
	64	1 CTS and XON/XOFF handshake after AT+IFC command (only Class 1/2)
7	0	0 Fax operation according to V.33, V.17, V.29 and V.27ter possible
	128	1 Fax operation according to V.33, V.29 and V.27ter possible

Voice Operation

The modem is equipped with a voice function. The voice software that comes with the modem allows you to also use the modem as an answering machine.



When locally checking the answering machine with a post-connected telephone, the modem gets the line, so that a caller gets a busy signal.

If you play old voice files with your modem and you find that these files sound distorted, this may be due to an older recording method where the byte order of the voice data is reversed. You can select both methods via register S229 as described below.

S229 Byte Order for Saved Voice Data

Valid values	0 to 1, 64 decimal
Default value	0 (new method)
Store in non-volatile memory	AT*W

Register S229 controls the order in which bytes of recorded voice data are saved (and read for playback). By default the new method (default value = 0) is used. By entering **ATS229=1** you can switch to the older method with reversed byte order. By entering **ATS229=64**, the modem automatically switches to surveillance. You may save this setting with **AT*W** or include the command in the initialization of your voice program.

The value of register S229 is not reset to the factory default by the **AT&F** command.

Description of Messages

Commands with Effect on Messages

Insofar as the command **ATQ1** is not active (messages off), the modem will acknowledge input commands and provide messages regarding incoming calls or the establishment of a connection, for example.

With the default setting **ATV1**, the modem returns messages in plain text (followed by `[Enter]` and a line feed character). With the command **ATV0**, the messages are returned in short form as a digit (with a leading or concluding `[Enter]`).

V1	V0	Description
OK	0	Command line executed
RING	2	Incoming call
NO CARRIER	3	No connection established or inactivity timer expired
ERROR	4	Error during command input
NO DIALTONE	6	No dial tone detected
BUSY	7	Called station busy
DIAL LOCKED	8	Dial function locked
NO ANSWER	10	After special dialing character @ no silence identified
DELAYED		Dialing delay with alternative dial lock

CONNECT Messages

The CONNECT messages, i.e. the messages regarding a successful connection, are controlled by the **AT-M**, **ATV** and **ATX** commands. The following table provides an overview of possible CONNECT messages.

Short form	Plain text
1	CONNECT 300
5	CONNECT 1200
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 7200
13	CONNECT 9600
14	CONNECT 12000
16	CONNECT 14400
21	CONNECT 300/REL
22	CONNECT 1200/REL
23	CONNECT 2400/REL
24	CONNECT 4800/REL

Short form	Plain text
25	CONNECT 7200/REL
26	CONNECT 9600/REL
27	CONNECT 12000/REL
28	CONNECT 14400/REL
51	CONNECT 1200/HX
52	CONNECT 75/1200
53	CONNECT 1200/75
110	CONNECT 16800
111	CONNECT 19200
112	CONNECT 21600
113	CONNECT 24000
114	CONNECT 26400
115	CONNECT 28800
116	CONNECT 31200
117	CONNECT 33600
120	CONNECT 16800/REL
121	CONNECT 19200/REL
122	CONNECT 21600/REL
123	CONNECT 24000/REL
124	CONNECT 26400/REL
125	CONNECT 28800/REL
126	CONNECT 31200/REL
127	CONNECT 33600/REL
150	CONNECT 32000
151	CONNECT 34000
152	CONNECT 36000
153	CONNECT 38000
154	CONNECT 40000
155	CONNECT 42000
156	CONNECT 44000
157	CONNECT 46000
158	CONNECT 48000
159	CONNECT 50000
160	CONNECT 52000
161	CONNECT 54000
162	CONNECT 56000
170	CONNECT 32000/REL
171	CONNECT 34000/REL
172	CONNECT 36000/REL

Short form	Plain text
173	CONNECT 38000/REL
174	CONNECT 40000/REL
175	CONNECT 42000/REL
176	CONNECT 44000/REL
177	CONNECT 46000/REL
178	CONNECT 48000/REL
179	CONNECT 5000/REL
180	CONNECT 52000/REL
181	CONNECT 54000/REL
182	CONNECT 56000/REL

V.24 Interface

The interface between the modem and the computer consists of a variety of data, control and signaling lines. The condition of most of the interface lines is displayed by LEDs on the front of the unit.

The pin assignment of the V.24 interface for 9-pin or 25-pin connectors is as follows:

9-pin	25-pin	DIN	ITU-T	USA	Designation (USA)	Designation (D)	direction
U ^a	1	E1	101	GND	Protective Ground	Protective Ground	–
5	7	E2	102	GND	Signal Ground	Operating Ground	–
3	2	D1	103	TxD	Transmit Data	Send data	→ modem
2	3	D2	104	RxD	Receive Data	Receive data	← modem
6	6	M1	107	DSR	Data Set Ready	Modem Ready	← modem
8	5	M2	106	CTS	Clear to Send	Ready to send	← modem
9	22	M3	125	RI	Ring Indicator	Incoming call	← modem
1	8	M5	109	DCD	Data Carrier Detect	Receive signal level	← modem
47	20	S1	108	DTR	Data Terminal Ready	DEE Ready	→ modem
	4	S2	105	RTS	Request to Send	Switch sending on	→ modem

a. Housing/shield



The designations in the table name the functions of the lines (e.g. transmission data) as related to the data terminal (computer).

The Interface Lines Have the Following Significance:

- **Computer/terminal operational – DTR = Data Terminal Ready**
 - The effect of this control line on the modem is determined by the command **AT&D**.
- **Switch on transmission – RTS = Request To Send**

- **Operational – DSR = Data Set Ready**
 - This signal line is normally always active (ON), but is controlled by the commands **ATD** and **AT&S**.
- **Clear to send – CTS = Clear To Send**
 - This output is normally always active (ON), but is controlled by the commands **ATD**, **ATNFC** and **AT&R**.
- **Incoming call – RI = Ring Indicator**
 - This modem output becomes active (ON), as soon as the modem recognizes an incoming call (also refer to the **ATA command**). Incoming calls are detected only if the DTR control line is active (ON) or the command **AT&D0** has been issued.
- **Connection – DCD = Data Carrier Detect**
 - This modem output normally becomes active (ON) when the modem has established a valid connection.

Fax Operation

In addition to the modem operating modes, the modem supports fax sending and receiving at speeds between 14,400..2400 bps. The fax command sets Class 1 and Class 2 of the modem allow the use of any standard fax software, such as Delrina WinFax, Exchange in Windows 95 or the EMail function of Windows for Workgroups.

Fax Command Sets

Class 2/Class 2.0

The fax command set TR-29.2 Class 2 (SP-2388) and TR-29.2 Class 2.0 (TIA/EIA-592) allows the use of any standard fax software (such as WinFax or Bitfax) .

Class 1

The support of the fax command set Class 1 (TIA/EIA-578) allows you to use your modem with the EMail function of Windows for Workgroups and the data transfer function of WinFax PRO 4.0.



A brief description of the TR-29.2 Class 2, Class 2.0 and Class 1 fax commands supported by the ELSA MicroLink modems is available in our online media.

Flow Control During Fax Operation

By default the modem is capable of using both hardware and software handshake simultaneously in fax Class 1 and Class 2, as long as the **AT+IFC** command is not used. As soon as a certain handshake method is selected with **AT+IFC**, only the selected method is used. The option of using both handshake methods simultaneously is controlled by bit 6 of register S130 (see page 66).

Adaptive Answer Function

ELSA modems are capable of automatically distinguishing fax and data calls. This feature, called adaptive answer function, requires a special initialization that is usually performed by the communication software.