

MicroLink 33.6TS

User's Manual



Data Communications
Computer Graphics

Copyright © 1997 ELSA GmbH, Aachen (Germany)

All the information contained in this manual has been carefully checked. It does not, however, provide any assurances about specific product features. ELSA assumes liability only in the scope covered in its General Terms and Conditions.

No part of this manual or the software supplied with the product may be reproduced or passed on in any form without the written permission of ELSA. ELSA reserves the right to make appropriate changes to any of its products at any time.

ELSA GmbH is a DIN EN ISO 9001 certified company. With the certificate of May 16, 1995, the authorized certification institute TÜV CERT has confirmed the conformity of ELSA GmbH with the worldwide quality standard DIN EN ISO 9001. The certificate number of ELSA GmbH is 09 100 5069.

Trademarks

ELSA *MicroLink* is a registered trademark of ELSA.

IBM is a registered trademark of International Business Machines.

MNP is a registered trademark of Microcom.

All other brand and product names are trademarks of their respective owners.

Aachen, March 1997

Contents

| | | |
|----------|--|------------|
| 1 | Introduction..... | 5 |
| 2 | Brief Description..... | 7 |
| 2.1 | CE Approval | 9 |
| 3 | National Regulations | 11 |
| 3.1 | BABT Approval (United Kingdom) | 11 |
| 3.2 | HDTP Approval (the Netherlands) | 13 |
| 3.2.1 | Voor Uw Veiligheid..... | 13 |
| 3.3 | Consumer Information and FCC Requirements (USA)..... | 14 |
| 4 | Setting up the Modem..... | 17 |
| 4.1 | For Your Safety..... | 17 |
| 4.2 | Setting up <i>MicroLink 33.6TS</i> | 18 |
| 4.2.1 | Connection..... | 19 |
| 4.3 | Installation under Windows 95..... | 21 |
| 4.4 | Establishing a Connection..... | 22 |
| 5 | Operation..... | 23 |
| 5.1 | General Information | 23 |
| 5.2 | The Escape Command | 24 |
| 5.3 | The AT Command Prefix..... | 25 |
| 5.4 | The Command Line Buffer | 26 |
| 5.5 | Thematic summary of modem commands and registers | 27 |
| 5.6 | Description of AT Commands..... | 28 |
| 5.7 | Registers..... | 58 |
| 5.8 | Using the Speakerphone | 77 |
| 5.8.1 | Room Monitoring..... | 78 |
| 5.9 | The <i>MicroLink 33.6TS</i> Voice Function..... | 79 |
| | Appendix | 80 |
| A | Result Codes..... | 80 |
| B | Fax Operation | 81 |
| C | Error Correction | 82 |
| D | Technical Specifications | 83 |
| E | The RS-232C Interface | 85 |
| F | Answers to Frequently Asked Questions | 86 |
| G | Product Support..... | 89 |
| H | Warranty Conditions | 93 |
| I | Glossary..... | 95 |
| J | Index | 101 |
| | British Telecom Application Form..... | 105 |

1 Introduction

| | |
|-------------------------|---|
| About this manual | <p>This manual describes the installation, the features and the operation of the ELSA high-speed modem</p> <p><i>MicroLink 33.6TS</i></p> |
| Symbols and conventions | <p>For faster orientation, symbols and icons are used next to sections of text which are of special interest:</p> <p>◇ NOTE ◇ denotes important information.</p> <p>A bullet symbol indicates a list of items:</p> <p>■ ...</p> <p>Procedures consist of numbered steps:</p> <p>1. ...</p> <p>Bold text denotes the default values for AT commands and S registers.</p> <p>Brackets (< >) indicate ASCII characters and characters on a keyboard. For example, <CR> means carriage return and <BS> means backspace.</p> |
| Changes to this manual | <p>ELSA <i>MicroLink</i>® modems are subject to continual further development. It is therefore possible that the printed documentation does not correspond to the latest release. However, you will always find the latest information on the Web server http://www.elsa.de or in the <i>ELSA ONLINE</i> Support BBS (see the appendix "Product Support" for phone numbers).</p> |
| Package contents | <p>Before you start installing your ELSA <i>MicroLink</i>® modem, please make sure that your package is complete:</p> <ul style="list-style-type: none">■ ELSA <i>MicroLink</i>® modem■ External power supply (AC adapter)■ Telephone line connection cable■ Modem connection cable (RS-232C) with adapter 9 on 25 D-Sub■ <i>MicroLink</i> CD and/or software floppy disks■ Printed manuals■ Microphone |
| ◇ NOTE ◇ | <p>If any parts are missing, please contact your dealer.</p> <p>ELSA reserves the right to make changes to the package contents without prior notice.</p> |

Notes:

2 Brief Description

Design *MicroLink 33.6TS* is a desktop modem in a flat, robust metal housing.

Transmission types *MicroLink 33.6TS* supports the following transmission types and bit rates:

| | |
|---------------------|--|
| Bell 103 | 300 bps duplex (not in the United Kingdom) |
| V.21 | 300 bps duplex |
| Bell 212A | 1200 bps duplex (not in the United Kingdom) |
| V.22bis | 1200 bps duplex 2400 bps duplex |
| V.23 | 1200 bps half-duplex 75/1200 bps duplex 1200/75 bps duplex |
| V.32 | 4800 bps duplex 9600 bps duplex |
| V.32bis | 4800 bps duplex 7200 bps duplex 9600 bps duplex 12,000 bps duplex 14,400 bps duplex |
| V.Fast Class | 16,800 bps duplex 19,200 bps duplex 21,600 bps duplex 24,000 bps duplex 26,400 bps duplex 28,800 bps duplex |
| V.34 | 2400 bps duplex 4800 bps duplex 7200 bps duplex 9600 bps duplex 12,000 bps duplex 14,400 bps duplex 16,800 bps duplex 19,200 bps duplex 21,600 bps duplex 24,000 bps duplex 26,400 bps duplex 28,800 bps duplex |
| V.34 | 31,200 bps duplex 33,600 bps duplex |

| | |
|------------------------|--|
| Fax mode | In addition to the modem modes, <i>MicroLink 33.6TS</i> can send and receive faxes at rates between 14,400 and 2400 bps. The implementation of fax command sets Class1 and Class 2 make it possible to use any standard fax software (e.g. Delrina WINFAX) and also the E-mail functions within Windows 95 and Windows for Workgroups. |
| Polling operation | ELSA <i>MicroLink</i> modems support the fax polling mode which, together with suitable fax software, allows the polling of fax documents and the operation of a polling system. |
| Bit rate adaptation | The ITU-T V.100 and ITU-T V.8 procedures are used for determining the bit rate used by the remote modem. This means that <i>MicroLink</i> modems adapt to the highest possible bit rate common to both devices. The bit rate adaptation can be disabled. |
| MNP4 and V.42 | The error correction protocols implemented in the <i>MicroLink</i> modems (MNP4 and V.42) allow 100% error-corrected data transmission even with poor quality telephone connections. ELSA <i>MicroLink</i> ® modems with MNP4 or V.42 can establish reliable, error-corrected connections with other similarly equipped modems. |
| MNP5 and V.42bis | The <i>MicroLink 33.6TS</i> also uses the data compression methods MNP5 and V.42bis. Transfer rates can be doubled by using MNP5, and even quadrupled with V.42bis. Under optimal conditions, the <i>MicroLink 33.6TS</i> can achieve effective transfer rates up to 115,200 bps! |
| AT command set | Communications between computer and <i>MicroLink</i> ® modems take place with the "AT command set", which has become the de-facto standard for dial modems (see Chapter "The AT Command Prefix", page 25). |
| Voice function | <i>MicroLink 33.6TS</i> is equipped with a voice function, allowing you to use your modem as an answering machine in connection with the supplied voice software (see section 5.9, page 78). |
| Speakerphone operation | The Speakerphone feature of the <i>MicroLink 33.6TS</i> makes it possible to telephone using a microphone and loudspeakers connected to the modem. |
| Password protection | The password protection serves to protect your modem from being used or configured by unauthorized persons. By means of a password (the so-called supervisor password) certain modem functions can be locked. Up to five access flags can be used to define which functions are locked. |
| Automatic callback | This feature can be used to make your modem call back automatically if it is called by another modem. Up to 19 callback numbers with corresponding passwords can be stored using the AT\$P command. |
| Remote configuration | The remote configuration allows you to configure your modem from any location you can call from. This feature can be used directly or in combination with the automatic callback function. Up to 19 different user passwords can be stored using the AT\$P command. |

2.1 CE Approval



The CE seal indicates the compliance with rules laid down by the European Community on April 29, 1991 for the alignment and mutual recognition of the member states' laws concerning telecommunications devices.

The modem described in this document is marked with the Celogo and thus guarantees:

- Immunity to interference according to EN 50082,
Electromagnetic compatibility; Generic immunity standard; Part 1:
Residential, commercial and light industry
- Low radio emission according to EN 55022,
Electromagnetic compatibility of information technology and
telecommunications equipment
- Electrical safety according to EN 60950,
Safety of information technology equipment including electrical
business equipment

Notes

3 National Regulations

National regulations This chapter contains information concerning national regulations for different countries. **Please read the section on your country carefully!** Slight differences in command parameters, register values etc. are indicated in their respective chapters later in this manual, and are not covered here. The following countries are considered here:

United Kingdom

The Netherlands

USA

National Information Sheet If your country is not listed here, you will find a National Information Sheet included with this manual containing all necessary information for your country.

3.1 BABT Approval (United Kingdom)

This section applies only to the BABT approved British versions of the ELSA *MicroLink*® 33.6TS modem.

This apparatus has been approved by the BABT for the use of the following facilities:

- Modem facility
- Fax facility
- Auto calling
- Auto Answer
- Hands-free telephone facility

◇ **ATTENTION** ◇ **Any other usage will invalidate the approval of the apparatus if as a result it then ceases to comply with the standards against which approval was gained.**

In addition, as the owner and/or operator of this apparatus you should regard the following points:

- If you want to connect your modem to the British Telecom PSTN, you are required to fill in the form found on the last page of this manual and send it to your local BT agency in order to have the appropriate connection socket installed. Please don't forget to enter the approval Number of your modem. You will find the Approval Number printed on the label placed on the modem housing.
- The modem can only be connected to direct exchange lines. It cannot be operated in shared service or 1 + 1 carrier systems. Further, the modem cannot be used as an extension to a payphone.

- This modem has a Ringer Equivalence Number (REN) of 1, which is the same as the REN of a standard BT telephone. The REN is used to determine how many devices can be connected to your telephone line. The sum of the RENs of all devices on any line must not exceed four (4.0). Attaching too many devices may mean that they do not ring properly. The REN of your modem can also be found on the label placed on the modem housing.
 - Before operating the modem, make sure that it is properly connected to the power supply and switched on. Refer to chapter 4 "Setting up the Modem" for installation instructions.
 - The telephone line the modem is connected to must provide loop disconnect signaling (pulse dialing) or DTMF signaling (tone dialing). The modem supports both dialing methods. Selecting the appropriate method is described in section 5.6 of this manual, "Description of AT Commands".
- ◇ **NOTE** ◇ Although this equipment can use either loop disconnect signaling (pulse dialing) or DTMF signaling (tone dialing), only the performance of the DTMF signaling is subject to regulatory requirements for correct operation. It is therefore strongly recommended that the equipment is set to use DTMF signaling for access to public or private emergency services. DTMF signaling also provides a faster dialing process.
- Within private branch exchange (PABX), dialling an external number may require the user to insert a PSTN access digit, e.g. a digit 9 (external access code). See section 5.6 of this manual for details about connection establishment.
 - This modem is capable of storing several phone numbers which can be dialed automatically. Check that all stored numbers are correctly programmed before using the auto-dialing function.
- ◇ **NOTE** ◇ The V.24/RS-232C interface on the rear side of the modem housing is a connector to a SELV circuit (Safety Extra-Low Voltage), complying with EN 41003 Clause 4.1.3. Any part of this connector can be touched without the risk of electric shock.

3.2 HDTP Approval (the Netherlands)

This section applies only to the Netherlands versions of the ELSA *MicroLink*® 33.6TS modem approved by the Hoofddirectie Telecommunicatie en Post (HDTP). This modem model may not yet be HDTP approved at this time.

- The Connection Factor (aansluitfactor), which can be found on the HDTP approval label on the housing of your modem, provides a guide as to the maximum number of pieces of equipment (both in the idle state and for call detection) that can be connected in parallel to a single telephone line. The sum of the connection factors for all the devices connected to the telephone line must be less than five (5.0).
- Some telephone exchanges in the Netherlands still provide a dial tone in the frequency range between 100 and 200 Hz which will not be recognized by *MicroLink* 33.6TS. It is therefore possible that the modem will not function properly at all public telephone exchanges. Dial tones in the frequency range between 340 and 550 Hz are properly recognized. Information concerning the different types of exchanges can be obtained from the PTT-Netwerkbedrijf.

3.2.1 Voor Uw Veiligheid

Met betrekking tot uw veiligheid, het goede functioneren van uw nieuwe ELSA *MicroLink*® modem en uw computer, dient u de volgende regels in acht te nemen.

- Om contact met gevaarlijke spanning van de telefoonlijn en/of schade aan het modem te vermijden, dient het telefoonsnoer en de voedingskabel van het modem te worden verwijderd voordat u de behuizing van het modem opent. Normaliter dient de modem behuizing overigens niet geopend te worden.
- Een telefoon verbinding maakt gebruik van gelijk- en wisselstromen om bel-signalen te kunnen genereren. Het telefoonlijn circuit (TNV) kan onder gevaarlijke spanning staan. Elk lichamelijk contact dient hiermee te worden vermeden.
- Om veiligheidsredenen dient uitsluitend de originele externe voeding, welke bij uw modem wordt geleverd, te worden gebruikt. Een geopende voeding of een mechanisch beschadigde voeding mag niet langer gebruikt worden want als de primaire wisselspanning (230 volt) met de hand of metalen delen wordt aangeraakt kan dit leiden tot een elektrische schok welke dodelijk kan zijn.
- De V.24/RS-232C verbinding op de achterzijde van uw ELSA *MicroLink*® modem, is de verbinding met een z.g. VELV circuit (Veiligheids Extra Lage Spanning) welke overeenkomt met de norm EN 41003, clause 4.1.3. Elk gedeelte van deze connector kan worden aangeraakt zonder risico van een elektrische schok.
- Raak de pennen van de modem connector niet aan, want de kleinste hoeveelheid vuil of electrostatische ontlading, kan leiden tot slecht functioneren of zelfs defect raken van uw modem.

3.3 Consumer Information and FCC Requirements (USA)

This section applies only to the US versions of the ELSA *MicroLink*® 33.6TS modem bearing an FCC registration. This model may not yet be FCC approved at this time.

This equipment has been tested and found to comply with limits for a Class B computing device according to the specifications in FCC (Federal Communications Commission) rules Part 15 and Part 68. As an owner and/or operator of a registered modem like this modem, you must comply with these rules:

- Before installing your modem, you must notify your telephone company that you are going to install an FCC registered device. When you contact them, you must provide the FCC registration number and Ringer Equivalence Number (REN) for your modem; these numbers are found on the FCC label on the modem housing.
- You cannot connect your modem to a party line or to a coin telephone line.
- You must only connect your modem to a standard modular telephone jack, type RJ11.
- If your modem needs repairs, you must arrange for ELSA to make them if you are to keep the FCC registration of your modem valid.
- You must use a shielded RS-232C cable to connect your external modem to your terminal or computer.

This equipment, like other electronic equipment, generates and uses radio frequency energy. If not installed and used according to the instructions in this manual, this equipment may cause interference with your radio and television reception.

If you believe that this equipment is causing interference with your radio or television reception, try turning the equipment off and on. If the interference problems stop when the equipment is switched off, then the equipment is probably causing the interference. You may be able to correct the problem by doing one or more of the following:

- Adjust the position of the radio or TV antenna.
- Move the modem away from the radio or TV.
- Plug the modem into a different outlet than the radio or TV uses.
- Consult the dealer or an experienced radio/TV technician for help.

If this device is malfunctioning, it may also be causing harm to the telephone network. This device should be disconnected until the source of the problem can be determined and until repair has been made. If this is not done, the telephone company may temporarily disconnect service.

The telephone company may make changes in its technical operations and procedures. If such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.

If the telephone company requests information on what equipment is connected to their lines, inform them of:

- the telephone number of the line that the modem is connected to,
- the Ringer Equivalence Number (REN),
- the USOC jack required, and
- the FCC registration number.

The Ringer Equivalence Number (REN) is used to determine how many devices can be connected to your telephone line. In most areas the sum of the RENs of all devices on any line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

◇ **ATTENTION** ◇ **Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

Notes:

4 Setting up the Modem

4.1 For Your Safety

In the interests of your safety and the correct operation of your new ELSA *MicroLink*® modem with your computer system, please regard the guidelines listed below.

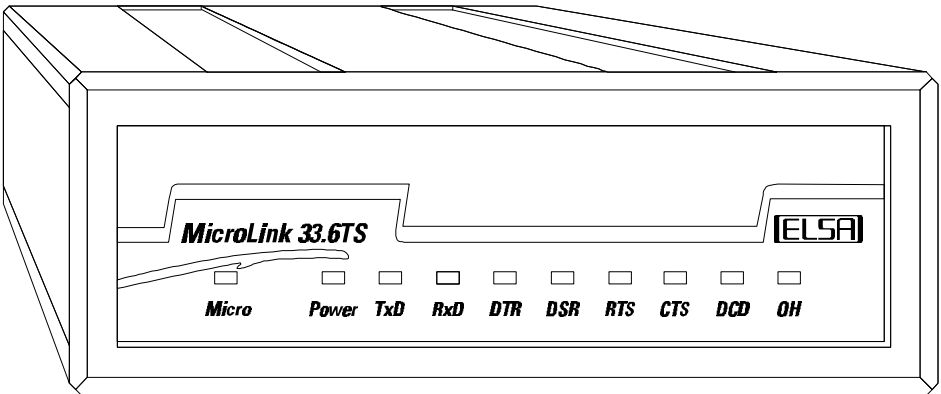
◇ **IMPORTANT** ◇ **See chapter 3 ("National Regulations") for specific safety instructions!**

- In order to avoid contact with hazardous voltage of the telephone line circuit or damage of the modem, be sure that you have unplugged both the power supply and the telephone line from the modem before opening the housing! It is not normally necessary to open your modem at all.
- A telephone line uses direct current and alternating current for ring signals. The telephone line circuit (TNV) can have hazardous voltage and must not be touched.
- For reasons of safety, use only the original external power supply shipped with your modem.
A power supply that has been opened or mechanically damaged should no longer be operated; touching the primary voltage (Europe: 230 V, USA: 120 V) with the hand or with metal parts results in an electric shock which can be deadly.
- The 9 V_{AC} power input of the modem is a low voltage circuit; touching this circuit with the hand or with metal parts does not normally cause an electric shock.
The V.24/RS-232C interface on the rear side of the modem housing is a connector to a SELV circuit (Safety Extra-Low Voltage), complying with EN 41003 Clause 4.1.3. Any part of this connector can be touched without the risk of electric shock.
- Please do not touch the metal pins of the modem connectors. Even slight dirt or electrostatic discharge may cause malfunctions or, in extreme cases, damage to the modem.

4.2 Setting up *MicroLink 33.6TS*

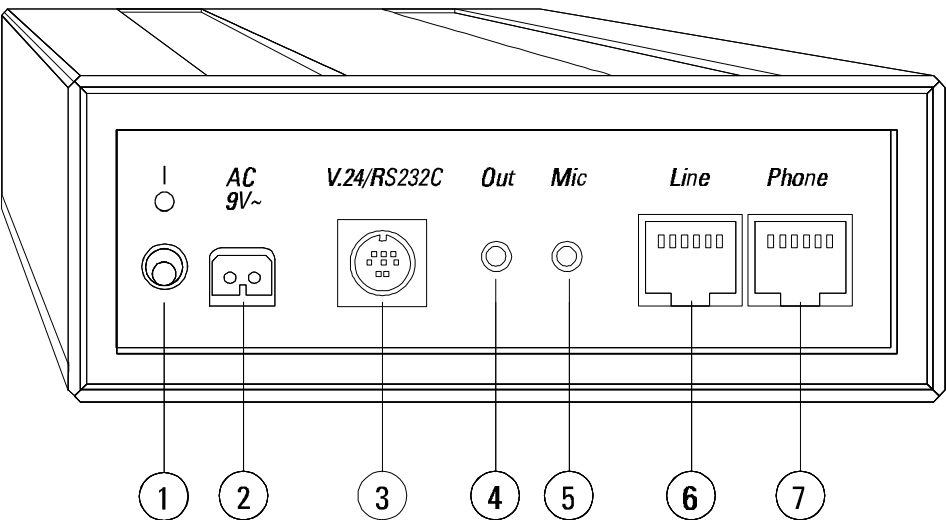
The following illustrations show the front and rear panels of the ELSA *MicroLink 33.6TS*:

**Front panel of the
*MicroLink 33.6TS***



The LEDs provide a status display and indicate the status of the interface lines (see also appendix "The RS-232 interface" on page 85). "Micro" indicates the location of the microphone with which you can record messages to be used with the voice function.

**Rear panel
*MicroLink 33.6TS***



| No. | Description |
|-----|--|
| 1 | On/Off switch |
| 2 | Power input |
| 3 | Serial port (V.24/RS-232C interface) |
| 4 | Port for an external active loudspeaker, a sound card or a headset |
| 5 | Microphone port |
| 6 | Line connector |
| 7 | Telephone connector for additional telephone |

4.2.1 Connection

Make sure that your computer and your modem are switched off before performing the following steps:

The installation of your modem is performed as follows:

- 1. Power connection** Make sure that the voltage of the power line matches the voltage of the supplied AC adapter. Then connect the modem to the power line using the AC adapter.

◇ **ATTENTION** ◇ For your safety, use only the original power supply shipped with your modem!

- 2. Connection to telephone network** Connect your modem to the telephone network by connecting one end of the supplied connection cable (RJ11 plug) to the line connector on the rear panel of the modem (see illustration on page 18) and the other end to the appropriate connection socket installed by the respective national telecommunications service

- 3. Connecting to the computer** Select the appropriate serial asynchronous communication interface (COM port) by referring to the operating instructions of your computer or terminal and connect the modem to this interface using the supplied RS-232C cable and the adapter (if required).

If your computer has a 25-pin-connector you will need a 9-to-25-pin adapter, as supplied with your ELSA modem.

It is highly recommended the serial port should be equipped with a UART chip (Universal Asynchronous Receiver/Transmitter) with a FIFO buffer (type 16550). Without such a UART, error-free transmission across the serial interface at rates above 9600 bps cannot be guaranteed.

When selecting the serial interface, be aware of the corresponding IRQ settings, especially for COM3 and COM4. Make sure that each IRQ is only used by one device only, otherwise hardware conflicts and PC malfunctions may occur. For example, with a standard PC setup it is common for COM3 to share IRQ4 with COM1, and for COM4 to share IRQ3 with COM2, which would cause a conflict.

Changing an interrupt is normally performed by changing a DIP switch or a jumper on the serial interface board. Please refer to the manual for your serial interface board for instructions.

◇ **NOTE** ◇ If your computer only has a 9-pin connection socket, you will need an appropriate adapter which has all nine lines connected. If some of the lines are not connected, malfunctions (e.g. transmission errors) may arise.

- 4. Microphone/active speakers** For voice transmission in speakerphone operation you can
 - use a telephone connected to the modem, or
 - use a headset (earphone/microphone combination) with separate microphone/headphone connectors plugged into appropriate modem

sockets, or

- connect the enclosed microphone to the microphone (Mic) socket and an amplifier (soundcard or active speakers) to the speaker (Out) socket.

- 5. Switch on the PC** You can switch your PC on again. The hardware installation is now complete, and you can start your communications software.
- 4. Switching the modem on** Switch the modem on using the switch on the rear panel of the modem. After being switched on, the modem performs a short self-test.
- 5. Starting the communications program** You need a suitable communications software (e.g. Telix) which provides a user interface for operating your modem.
- Start your communications program and set up the COM port to which your modem is connected. With your communications program in terminal mode, type **AT** at the keyboard and press Return. If this series of characters is echoed by the modem (i.e. displayed on the monitor) and answered with **OK**, the modem is ready for operation.

4.3 Installation under Windows 95

Depending on the version which you are using, Windows 95 presents with one of two possible procedures for the installation. Exactly which version you have will become clear after your computer has been restarted and the modem has been detected.

Procedure 1:

- Start Windows 95** After connecting your modem to it, the computer must be restarted. Windows 95 displays the "New Hardware Found" window and recognizes the modem as ELSA *MicroLink 33.6TS*. Select the **Driver from disk provided by hardware manufacturer** option and click on **OK**.
- The window "Install from Disk" is displayed.
- Install software** Insert the supplied *ELSAsuite* CD into the CD-ROM drive and click on **Browse**. The "Open" window will be displayed.
- Select the CD-ROM drive (e.g. d:) and click on **OK**. In the following "Install from Disk" window click on **OK**. The files required files will now be copied onto hard disk.
- Select modem** In the "Select Device" window, select the ELSA *MicroLink 33.6TS* and click on **OK**. Your ELSA *MicroLink 33.6TS* is now installed under Windows 95.
- Check** In the "Properties for Modems" window you should see that the correct name for your modem has been entered. You can also check the entries under **Control Panel, System** by selecting the "Device Manager". The modem has been correctly installed if the appropriate symbol is displayed.

Procedure 2 (Windows 95 service release 2):

- Start Windows 95** After connecting your modem to it, the computer must be restarted. Windows 95 displays the "New Hardware Found" window followed by the "Update Device Driver Wizard". Insert the supplied *ELSAsuite* CD into the CD-ROM drive and click on **Continue**. Click on **Other Locations....** The "Select other location" window will be displayed.
- Install software** Click on **Browse**, select the CD-ROM drive (e.g. d) and then click on **OK**.
- End Installation** In the " Update Device Driver Wizard " your modem will be recognized as the ELSA *MicroLink 33.6TS*. Confirm the installation with **Continue**. Your ELSA *MicroLink 33.6TS* is now installed under Windows 95.
- Check** In the "Properties for Modems" window you should see that the correct name for your modem has been entered. You can also check the entries under **Control Panel, System** by selecting the "Device Manager". The modem has been correctly installed if the appropriate symbol is displayed.

4.4 Establishing a Connection

| | |
|---|--|
| Main line or extension | In order to establish a connection with another modem you must know whether your modem is connected to a main line or to an extension in a private telephone system (private automatic branch exchange, PABX). |
| Dial tone | Private telephone exchanges use different methods of getting a dial tone: Pressing the Flash key or dialing an escape digit (e.g. 0 or 9). |
| Pulse or tone dialing | In addition, you must know whether your telephone uses pulse or tone dialing. This can normally be determined by listening to the dialing sound. If you hear a rattling sound after each dialed number, you have pulse dialing. If you hear the touch-tone beeps when dialing, then you have tone dialing. |
| 1. Dialing on the main line | If you wish to call the telephone number 123456 on the main line, enter: ATDP123456 for P ulse dialing or ATDT123456 for T one dialing |
| 2. Dialing on an extension | The dial command from an extension of a private telephone exchange is as follows: for pulse dialing: ATDP 0W 123456 for dial tone via escape digit 0 for tone dialing: ATDT &W 123456 for dial tone via flash button ATDT 0W 123456 for dial tone via escape digit 0 |
| 3. Dialing from extension to extension | Note that when setting up a connection from extension to extension, a dial tone is not heard. The command to dial the extension number 123 is: ATX 3 DP123 for pulse dialing or ATX 3 DT123 for tone dialing. (see also the ATX command, page 55) |
| ◇ NOTE ◇ | This does not apply to the Netherlands , where a dial tone is always provided and the ATX3 command has no effect. |
| Special dialing characters | Details concerning special dialing characters which can be included in the dialing string (e.g. for the dial tone), are found in the description of the ATD dial command, page 32). |

5 Operation

5.1 General Information

| | |
|--------------------------|---|
| AT command set | <p>The AT command set has established itself as the world-wide standard for the syntax of modem control commands (AT = command ATtention prefix; see section 5.3, page 25).</p> <p>To send AT commands to the modem from a PC, you need a suitable communications software, also called "terminal program". All ELSA <i>MicroLink</i>® modems are shipped with the famous communications program Telix.</p> |
| Two operating states | <p>The two general operating states of a modem are the command state and the online state (transmission state).</p> |
| Command input, execution | <p>After being switched on, the modem is in the command state. Commands can be accepted, interpreted and executed in this state only. After a successful connection with the other party, the modem changes from the command state to the online state. Returning to the command state and changing back again is possible even within an existing connection (see Escape command, section 5.2, page 24, and ATO command, page 44).</p> |
| Data transmission | <p>Online state signifies that a telephone connection to another party exists: The modem is "online". This is the case with both a successful connection (outgoing call) and with the acceptance of an incoming call. In this state data exchange (data transmission) can take place between two connected data stations.</p> |

5.2 The Escape Command

| | |
|-------------------------------|---|
| Changing to the command state | <p>The Escape command can only be recognized in the online state. It permits you to change to the command state and thus allows a temporary escape from the online data transmission without disconnecting the line.</p> <p>In order to make sure that this command can be distinguished from the normal data flow, the following rules are in effect:</p> |
| Escape sequence | <p>The Escape command consists of a sequence of three Escape characters (default setting: + + +) and a valid command line.</p> <p>After the three Escape characters have been entered, the modem is in the command state. However, data transmission is interrupted only after the recognition of a valid command line.</p> <p>The Escape character should not be confused with the character <ESC> of the ASCII character set. The Escape character can be redefined via the register S2 (see page 59).</p> |
| Valid command line | <p>A valid command line begins with an AT or at and must be terminated with a Carriage Return (<CR>, see also section 5.5, page 27). The command A/ or a/ is not valid after the three Escape characters. Also, a valid command line in an Escape sequence is restricted to a maximum of 40 characters.</p> |
| Valid Escape sequence | <p>Upon the entry of the Escape sequence, the data transmission is interrupted and the command line is processed. If no further character follows the three Escape characters within one second (= Escape Prompt Delay = EPD), the modem replies with OK in advance and awaits a valid command line.</p> |
| Return to online state | <p>The ATO command (see page 44) returns you to the online data transmission (unless the line was disconnected).</p> |
| Invalid Escape sequence | <p>If characters not representing a valid command line follow the OK after the EPD, the modem changes back to the online state with a CONNECT message. The CONNECT message can be suppressed with the AT*Q1 command (see page 46).</p> |
| Escape Prompt Delay | <p>The delay of one second can be altered in the register S12 (see page 61).</p> |

5.3 The AT Command Prefix

| | |
|---|--|
| Automatic recognition of bit rate and data format | All commands to be given to the modem in the AT command language must begin with an AT (for A ttention) command prefix, except for the A/ command, see page 28. The modem can determine the data format and the transmission bit rate between modem and computer from the data stream used to transmit the AT prefix. |
| DTE and DCE rate | <p>The bit rate your computer or terminal uses to communicate with the modem is called the DTE rate (DTE = Data Terminal Equipment), or serial port bit rate, whereas the speed the modem uses for the transmission of data across the telephone line is called the DCE rate (DCE = Data Communications Equipment) or DCE line speed.</p> <p>The DTE rate is set either by the AT transmission or is set to match the DEC rate from the telephone line, apart from when an independant DCE rate has been set manually (see AT%G1 command, page 38).</p> <p>If, for example, the modem receives an AT command at a DTE rate of 19,200 bps (bits per second) from the computer, the modem uses a DCE rate of 19,200 bps full duplex over the telephone line as well.</p> <p>If you have setup your terminal program to use a bit rate which is not supported by your modem on the telephone side (e.g. 115,200 bps), an attempt is made to establish a connection at the next lowest transmission speed of which the modem is capable. This process is bit rate adaptation.</p> |
| Bit rate adaptation | ELSA <i>MicroLink</i> modems are equipped with an adaptive transmission bit rate in accordance with the ITU-T standard V.100 and ITU-T V.8. This means that the modem automatically switches to the highest bit rate common to both the local and the remote modems. |
| Supported bit rates | <p><i>MicroLink 33.6TS</i> supports DTE rates up to 115,200 bps. Default values for the data format are 8 data bits, no parity, 1 stop bit (8N1). The following data formats are recognized automatically:</p> <ul style="list-style-type: none"> 1 start bit, 7 data bits, no parity, 2 stop bits 1 start bit, 7 data bits, even parity, 1 or 2 stop bits *) 1 start bit, 7 data bits, uneven parity, 1 or 2 stop bits *) 1 start bit, 8 data bits, no parity, 1 or 2 stop bits *) <p>*) The modem automatically uses '1 stop bit'.</p> |

5.4 The Command Line Buffer

AT command buffer The modem contains a command line buffer which can store up to 80 characters (including blanks) of a command line with exception of the **AT** prefix and the terminating <CR> (Carriage Return). Line feed characters <LF> are always ignored in the command state.

If the modem is to be given several commands (e.g. speaker control, volume regulation, selection of verbose result codes in the case of error-corrected connections, and reading of the value of register S0), these can be entered individually with one **AT** command prefix **each** and one terminating <CR> **each**:

Command input in
several command lines

```
atm1
OK
at13
OK
at\v8
OK
ats0?
000

OK
```

However, it is also possible to enter these commands successively after a **single** introductory **AT** in a single command line and to terminate with a **single** <CR>:

Command input in
one command line

```
at m1 13 \v8 s0?
000

OK
```

For better legibility, the individual commands can be separated by blank spaces.

Upon reaching the end of the command line buffer no further commands can be entered. The command line can only be edited with backspace <BS> or executed with <CR>.

Exceptions

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

ATD (dial command),
ATA (call acceptance),
ATZ (initialization command),
ATO (return to online state),
ATH (disconnect) if this command was entered online,
ATP and **AT&Z** (store telephone numbers),
AT&T (testing loopbacks).

5.5 Thematic summary of modem commands and registers

This thematically-structured overview lists all frequently-used commands and registers which are required for configuring the modem. The modem can be configured for most common applications with the commands listed here.

Under the heading "Commands and registers", the commands and registers for configuring the basic properties are listed. Under the heading "Further commands and registers" are commands and registers which also influence the processes in question, but which are not essential for configuration.

◇ **NOTE** ◇ The list does not include commands for fax or voice operation, as these functions are exclusively controlled by applications programs.

Basic command options

| Configuration | Commands and registers | Further commands and registers |
|--|------------------------|--------------------------------|
| Basic modem initialization | &F | |
| Control of connection setup (dialing) | D, P, T, X | \$D, :D, S6, S7, S8, S14.6 |
| Accepting incoming calls, accepting a line, hanging up | A, D, H, &D2, S0 | -H, \T, S14.6, S28.7 |
| Switch between command and data transfer phases | +++ , O | S2 |
| Control of loudspeaker and call signaling | L, M, S54.0 | |
| Read out modem information | I, S, &V | S86, %R, \S, %V |
| Control of data compression | %C, \N | |
| Control of error correction | \N | |
| Control of data flow controller | \Q, \N | S130.6 |
| Control of dial lock or delayed dialing | S31.7 | |

Advanced command options

| Configuration | Commands and registers | Further commands and registers |
|--|-------------------------|--------------------------------|
| Operation with stored initializations | &V, &W, *W, &Y, Z | S54 |
| Operation with stored subscriber numbers | \F, \P, &Z | |
| Access restriction and callback function | \$B, \$Y, \$S, \$P, \$R | S35, S42, S43, S53 |

| | | |
|----------------------|------------|-----|
| Remote configuration | *E, *U, *X | S34 |
|----------------------|------------|-----|

Specialized command options

| Configuration | Commands and registers | Further commands and registers |
|--|------------------------|--------------------------------|
| Control of modem response lines | &C | \D, &S |
| Control of DTR effects | &D | \$D, :D, S28.7 |
| Control of modem responses | E, Q, V, \V | &D, -H, -M, *Q, S96 |
| Control of calling tones | &G | |
| Influencing the data transmission method | %B, %G, %L, %M | |
| Control of data format | S28.0-1, S53 | |
| Control of telephone-line transfer rate | %B, %G | %L |

5.6 Description of AT Commands

| | |
|---|--|
| Command entry | All commands given to the modem must begin with the ASCII characters AT or at (At or aT are not valid) and end with <CR> (Carriage Return). |
| Exception | The only exception is the command A/ , which repeats the last command line. This command is entered without AT and must not be followed by <CR>. |
| Abort command | A command line or screen output (e.g. display of the register contents with AT%R) can be aborted with <Ctrl><X> or <Ctrl><C>. |
| Parameters | Commands which require an additional parameter may also be entered without the parameter. A missing parameter is regarded as parameter 0 (e.g. ATL = ATL0). |
| Identification of the default configuration | Parameter settings that apply to the default modem configuration, as set at the factory, are marked by the symbol *. |

A Accept incoming call

ATA

This command accepts an incoming call. 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).

| | |
|----------------------|--|
| ◇ ATTENTION ◇ | 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 58). However, the line is not disconnected if bit 6 of register S14 is set to 1 (default value = 0). With this setting it is possible for the computer to transmit characters to the modem while the connection is being established (see also page 61).

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 32). The bit rate adaptation according to ITU-T V.100 is disabled in this case.

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 <CR>** by the one party and subsequent entry of **ATD <CR>** by the other party. The parties must also agree on which command is to be given on which side.

This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

%A **Fallback character in the negotiation phase**

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

This command defines the character which is regarded as fallback command during call acceptance. This command requires the settings **ATN3** (see page 43) and **ATIC2** (see page 31).

If the modem receives this character in the negotiation phase while trying to establish an error-corrected connection (setting **ATN3**), 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.

◇ **NOTE** ◇ The values n = 63 and n = 126 cannot be used, because these characters are needed in the V.42 negotiation phase and would therefore cause conflicts.

B **ITU-T or Bell transmission modes**

- * **ATB0 : Modem complies with ITU-T standards V.21/V.22bis**
- ATB1 : Modem complies with Bell standards 103/212A** (not available in the UK)

This command determines whether your modem transmits at 300 or 1200 bps in compliance with the ITU-T standards V.21 or V.22bis or according to the Bell standards 103 or 212A.

◇ **NOTE** ◇ V.8 speed recognition can be switched off by means of the command ATB1

%B **DCE rate**

| | |
|--------------------|----------------------|
| AT%B300 | : 300 bps |
| AT%B1200 | : 1200 bps |
| AT%B1200/75 | : 1200/75 bps |
| AT%B75/1200 | : 75/1200 bps |
| AT%B2400 | : 2400 bps |
| AT%B4800 | : 4800 bps |
| AT%B7200 | : 7200 bps |
| AT%B9600 | : 9600 bps |
| AT%B12000 | : 12,000 bps |
| AT%B14400 | : 14,400 bps |
| AT%B16800 | : 16,800 bps |
| AT%B19200 | : 19,200 bps |
| AT%B21600 | : 21,600 bps |
| AT%B24000 | : 24,000 bps |
| AT%B26400 | : 26,400 bps |
| AT%B28800 | : 28,800 bps |
| AT%B31200 | : 31,200 bps |
| * AT%B33600 | : 33,600 bps |

The **AT%B** command sets the desired transmission bit rate on the telephone side (the DCE rate), as long as the bit rate is not determined by the DTE rate (see **AT%G0** command, page 38).

| |
|--|
| \$B Activating access restriction and automatic callback functions |
|--|

- * **AT\$B0** : no callback
- AT\$B1** : Variant 1 - RING & CONNECT are displayed prior to the access procedure
- AT\$B2** : Variant 2 - RING & CONNECT are displayed following the access procedure

If your modem is used by several users, you can employ the access protection feature to restrict access to the modem. Different access rights to the modem can be set up using five so-called access keys.

The callback function with password request offers the caller the possibility of initiating automatic callback by the called modem.

The command **AT\$B** activates or inactivates access restriction and automatic callback.

The command **AT\$B0** switches off the access restriction and callback functions.

The command **AT\$B1** causes the messages RING and CONNECT to be displayed prior to the access procedure.

The command **AT\$B2** causes the messages RING and CONNECT to be displayed following the access procedure. This setting is recommended since the access restriction changes the timing sequence of RING and CONNECT. This setting, however, corresponds as closely as possible to making a connection without any access restriction.

After making the connection, the called mode does not immediately switch to the transparent mode, but first activates its callback routine, which requests the user at the remote modem to provide identification by entering the user password and perhaps the subscriber number.

Example:

```
ELSA MICROLINK 33.6TS

PASSWORD : *****
SUBSCRIBER NUMBER : *****
PASSWORD OK
```

If the information is correct, the message PASSWORD OK is transmitted, and the called modem immediately hangs up. After a time preset in Register S43 (see Page 68), the subscriber number previously stored or entered as a security measure alongside the user password is automatically dialed. The modem does not switch to the transparent mode until the user has complied with a renewed request to enter the user password and perhaps the subscriber number. If no (valid) subscriber identification is provided within the time preset in Register S42, the called modem hangs up.

When operated without the callback function, the connection is switched to the transparent mode.

%C Data compression

- AT%C0 : No data compression**
- AT%C1 : Data compression according to MNP5 only**
- AT%C2 : Data compression according to V.42bis only**
- * **AT%C3 : Data compression according to V.42bis or MNP5**

This command determines which data compression method is employed for an error-corrected connection. It is to be regarded in correlation with the commands **AT+N** (see page 43) and **AT-J** (see page 40). An overview of the interdependencies of these commands can be found in the appendix, page 82 Error Correction and Data Compression.

The default setting is **AT%C3**, so the modem automatically recognizes which compression method (depending on the capabilities or setting of the remote modem) to use.

\C Data buffering in the negotiation phase

- * **AT\C0 : No data buffering in the negotiation phase**
- AT\C1 : Data buffering in the negotiation phase**
- AT\C2 : No data buffering, fallback character recognition (AT%A)**

During a call acceptance with the setting **AT+N3** (see page 43), the **AT\C** command determines how the modem treats characters which 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 **AT\C0**, no buffering and no early fallback takes place.

In the setting **AT\C1**, up to 200 characters can be buffered, which 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 **AT\C2**, 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 DCD option

- AT&C0 : DCD is always active**
- * **AT&C1 : DCD follows the state of the carrier**
- AT&C2 : DCD is dropped during hang up only**

Communications programs normally evaluate the DCD (Data Carrier Detect) interface line in order to determine whether a connection (i.e. a carrier signal) is present. The modem supports this function with the setting **AT&C1**.

D Dial command

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 following special characters may be included:

| Special characters | Meaning |
|--|--|
| P T | Dialing method Select pulse dialing Select tone dialing |
| ! , & or [| Getting dial tone Press flash button (only for tone dialing) |
| W or : @ | Dial tone Wait for (second) dial tone Wait for silence: Depending on the time defined in register S7, the modem waits for at least one RING, followed by five seconds of silence (10 seconds in Switzerland), or hangs up with NO ANSWER |
| , < = | Dial pause Dial pause as defined in register S8 Dial pause 1 second Dial pause 3 seconds |
| M Q V X Y Z | Changing the operating mode only for the following connection V.42 mode (AT\N4) V.42 mode and fallback to normal mode (AT\N5) V.42 mode and fallback to MNP mode (AT\N6) V.42 or MNP and fallback to normal mode (AT\N3) MNP mode (AT\N2) Normal mode (AT\N0) |
| L Sm /m | Dialing stored telephone numbers Redial the last number Dial a number stored in the directory (m = 0 to 19, see AT&Z) Dial a number stored in the directory (m = 0 to 9), see AT\P) |
| ; | Return to the command state after the dial string (for appending additional dial commands if the maximum length of a dial string is exceeded) |
| . | Transferring a connection to an attached telephone The modem hangs up and responds NO CARRIER when the receiver of the attached telephone is lifted. |

NOTE ◇

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\P** and **AT&Z** commands, pages 44 and 57). These special characters must be entered directly after **AT(...)**D. The **;** character for appending additional dial commands must be located at the end of a dial string.

The connection establishment can be aborted at any time during dialing by entering any character, except for Line Feed, XON and XOFF (additional details about establishing a connection can be found in section **Fehler! Verweisquelle konnte nicht gefunden werden.;** page **Fehler! Textmarke nicht definiert.**).

In addition, entry of **ATD** without parameters 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.

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** <CR> command (see also **ATA** command, page 28).

This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

\$D Automatic dialing with DTR

- * **AT\$D0** : Disable DTR dialing
- AT\$D1** : Enable DTR dialing

If DTR dialing is enabled and the state of the DTR interface line changes from OFF to ON, the modem automatically dials the number stored in position 0 (see commands **AT\P**, page 44, and **AT&Z**, page 57).

%D Delay before forced hang up

AT%Dn : (n = 0..255 seconds; default = 0)

The **AT%Dn** command can be used to define a maximum delay, during which the modem tries to empty its sending and receiving buffers, before it terminates the connection. If a connection is terminated because the carrier is lost, only the characters still in the receiving buffer can be read. If the buffer is empty or the modem is set to **AT%D0**, the connection is terminated immediately without delay.

&D DTR control

- AT&D0** : Ignore DTR
- AT&D1** : Change to command state if DTR → OFF
- * **AT&D2** : Hang up if DTR → OFF
- AT&D3** : Reinitialize modem 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.

When set to **AT&D1**, a transition of the DTR interface line from ON to OFF has the following effects. If the modem is in the command state, the transition has no effect. Whilst a connection is being made, a transition of DTR from ON to OFF aborts the connection being made. If the modem is in the data transmission state (i.e. a connection already exists), it switches to the command state.

When set to **AT&D2**, a transition of the DTR interface line from ON to OFF has the following effects. If the modem is in the command state, the transition has no effect. Whilst a connection is being made, a transition of DTR from ON to OFF aborts the connection being made. If the modem is in the data transmission state (i.e. a connection already exists), the connection is terminated and the modem switches to the command state.

When set to **AT&D3**, the modem behaves in the same manner as when set to **AT&D2**. In addition, the modem is re-initialized when DTR changes from ON to OFF (see also: **ATZ** and **AT&Y**).

When set to **AT&D2** and **AT&D3** with DTR = OFF, the modem does not respond with RING to an incoming call. Automatic call acceptance is not possible until DTR has changed from OFF to ON. A RING message followed by call acceptance despite DTR = OFF is possible if bit 7 of Register S28 is set.

: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**.

\D DSR/CTS control

- * **AT\D0** : DSR and CTS always on
- AT\D1** : DSR follows answer tone, CTS always on
- AT\D2** : DSR always on, CTS follows DCD
- AT\D3** : DSR follows answer tone, CTS follows DCD

This command affects the meaning of the DSR and CTS interface lines. If a hardware data flow control is employed (see also **ATIQ** command, page 46), the setting of the **AT\D** command is meaningless for the CTS interface line.

The following table provides an overview of the interdependencies of the **AT\D**, **AT&C** and **AT&S** commands (default settings are marked in **bold**):

| &C | \D | &S | Effect | | |
|---------------|-----------|---------------|-------------------------|---------------|---------------|
| 0 | 0 | 0 | DSR always ON | CTS always ON | DCD always ON |
| 0 | 0 | 1 | DSR follows answer tone | CTS always ON | DCD always ON |
| 0 | 1 | 0 | DSR follows answer tone | CTS always ON | DCD always ON |
| 0 | 1 | 1 | DSR follows answer tone | CTS always ON | DCD always ON |
| 0 | 2 | 0 | DSR always ON | CTS always ON | DCD always ON |
| 0 | 2 | 1 | DSR follows answer tone | CTS always ON | DCD always ON |
| 0 | 3 | 0 | DSR follows answer tone | CTS always ON | DCD always ON |
| 0 | 3 | 1 | DSR follows answer tone | CTS always ON | DCD always ON |

| &C | \D | &S | Effect | | |
|----------|----------|----------|-------------------------|----------------------|----------------------------|
| 1 | 0 | 0 | DSR always ON | CTS always ON | DCD follows carrier |
| 1 | 0 | 1 | DSR follows answer tone | CTS always ON | DCD follows carrier |
| 1 | 1 | 0 | DSR follows answer tone | CTS always ON | DCD follows carrier |
| 1 | 1 | 1 | DSR follows answer tone | CTS always ON | DCD follows carrier |
| 1 | 2 | 0 | DSR always ON | CTS follows DCD | DCD follows carrier |
| 1 | 2 | 1 | DSR follows answer tone | CTS follows DCD | DCD follows carrier |
| 1 | 3 | 0 | DSR follows answer tone | CTS follows DCD | DCD follows carrier |
| 1 | 3 | 1 | DSR follows answer tone | CTS follows DCD | DCD follows carrier |
| 2 | 0 | 0 | DSR always ON | CTS always ON | DCD OFF at hangup |
| 2 | 0 | 1 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |
| 2 | 1 | 0 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |
| 2 | 1 | 1 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |
| 2 | 2 | 0 | DSR always ON | CTS always ON | DCD OFF at hangup |
| 2 | 2 | 1 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |
| 2 | 3 | 0 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |
| 2 | 3 | 1 | DSR follows answer tone | CTS always ON | DCD OFF at hangup |

E Command echo

ATE0 : Disable command echo

* **ATE1 : Enable command echo**

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 Automatic retrain

AT%E0 : Disable automatic retrain

* **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 **ATO1** (see page 44).

***E** Activating the remote configuration facility

* **AT*E0 : Remote configuration on**

AT*E1 : Remote configuration off

The remote configuration facility allows the caller to configure the modem independently of location, and can be employed on its own or in conjunction with the automatic callback function. A total of 19 different user passwords can be stored by means of the command **AT\$P** (see Page 45).

The command AT*E activates and inactivates the remote configuration facility.

The command AT*E0 switches remote configuration off.

The command AT*E1 activates remote configuration.

Once a connection has been made, the modem is as usual in the online state. Only after the configuration command has been entered, which consists of a sequence of four characters (standard setting: ****, see also Register S34, Page 66) and a valid command line, does the modem switch to the remote configuration mode. This makes it possible to exit temporarily from the online data transmission mode without breaking the connection.

Configuration The configuration command can be recognized only **command** in the data transmission state.

Valid command line A valid command line starts with **AT** or **at** and ends with **M**. The command **A/** or **a/** is not valid after the configuration command. Further, a valid command line cannot exceed 40 characters.

The user at the remote modem is requested to provide identification by entering the corresponding user password. If the information is correct, the message PASSWORD OK is transmitted, and remote configuration is then active.

If remote configuration is used in conjunction with the automatic callback with password request, the password request is issued directly after making the connection, so that the remote configuration is activated immediately after the valid configuration command has been entered.

Example:

```
ELSA MICROLINK 33.6TS

PASSWORD : *****
PASSWORD OK

REMOTE CONFIGURATION ACTIVE

OK
>
```

◇ **NOTE** ◇ The prompt symbol (>) indicates that you are in the configuration mode. Blocked commands generate the response ERROR.

&F Restore factory configuration

AT&F

This command loads the factory default settings of the modem firmware. (Exception: S54, S64, S86, S87, S88, S89, S99, S130, and S229 will not be changed). The modem is reset to the delivery state. If a connection exists, this command is not executed.

\F Display stored telephone numbers

AT\F

This command displays the telephone numbers stored with the **AT\P** or **AT&Z** command (see pages 44 and 57) from position 0 to 19.

%G DCE rate control

- * **AT%G0** : DCE rate determined by DTE rate
- AT%G1** : DCE rate set with **AT%B**

Normally, the DCE rate (the transmission speed on the telephone side) is always set to the same bit rate the serial interface of the computer is using (DTE rate). That means that after each **AT** entered with a new DTE rate, the DCE rate is changed as well. If the selected DTE rate is not supported on the telephone side (e.g. 115,200 bps), an attempt is made to establish the next connection with the next lower bit rate the modem supports (e.g. 28,800 bps) (see also section 5.3, page 25).

With **AT%G1**, the DCE rate is independent of the DTE rate and can only be changed by **AT%B** (see page 29).

&G Set calling tone and guard tone

- * **AT&G0** : Calling tone on, no guard tone (not in the **UK**)
- AT&G1** : Calling tone on, guard tone 550 Hz
- AT&G2** : Calling tone on, guard tone 1800 Hz (default for the **UK**)
- AT&G4** : Calling tone off, no guard tone (not in the **UK**, default for **USA**)
- 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 from the answering modem for the duration of the connection. This tone is meaningless in those countries in which *MicroLink* modems are approved by the national telecommunications service.

The calling tone is a periodic tone which 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.

◇ **NOTE** ◇ In the **United Kingdom**, the guard tone cannot be switched off, and default is 1800 Hz. In the **USA**, the calling tone is off by default to avoid confusion with a 300-bps carrier (Bell 103).

H Hang up/Connect modem command

ATH0 : Terminate existing connection

ATH1 : Connect modem to line

If the modem is in the command state after an Escape command (see section 5.2, page 24) or a change of DTR from ON to OFF with a preceding **AT&D1** (see page 34), the **ATH0** command can be used to hang up and thus terminate an existing connection.

With **ATH1** the modem can be told to go off-hook (pick up the phone) even without an incoming call. The modem will be connected up to 255 seconds before hanging up.

This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

-H Dumb mode

* **AT-H0 : Normal operation**

AT-H1 : Dumb mode

With the **AT-H1** command the modem can be set to a "dumb" mode. This means that an incoming call will always be accepted as soon as the DTR line is active. The only commands accepted in this operating mode are **ATD** (dialing) and **AT-H**. In dumb mode, all echoes and result codes (e.g. OK, RING, CONNECT) are suppressed. (Polling is possible during connection establishment, see also page 61.)

◇ **NOTE** ◇

To set the modem back to normal operation, the **AT-H0 <CR>** and **AT&F <CR>** commands must be entered in two separate command lines.

I Display product information

ATI0 : Display product code in nnn format

ATI1 : Display checksum

ATI2 : Display checksum result

ATI3 : Display firmware version and date

ATI4 : Display current configuration profile

ATI5 : Display serial number

ATI6 : Display product name

ATI7 : Display result of self-test

ATI9 : Display Plug and Play information

A three digit ASCII string type number (modem product code) is displayed with **ATI0**.

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 53).

ATi4 displays the current modem configuration.

ATi5 displays the internal factory serial number of the modem.

ATi6 displays the product name of the modem.

ATi7 displays the result of the self-test the modem automatically performs after being switched on.

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

-J Detect phase

AT-J0 : Disable detect phase

* **AT-J1** : Enable detect phase

This command determines whether the calling modem, when establishing a V.42 connection, sends a control sequence (detect phase) to the remote modem or not.

Some remote modems may not be able to recognize a detect phase. In case of difficulties in establishing V.42 connections with such modems, the detect phase can be suppressed with **AT-J0**.

Exception: If the modem is set to **ATiN3** without detect phase it only attempts to establish an MNP connection before falling back to a physical connection. In order to establish a V.42 connection, **AT-J1** must be set. An overview of the effects of **AT-J** and **ATiN3** can be found in the description of the **ATiN** command, page 43.

\J Constant DTE rate

* **ATJ0** : DTE rate independent of CONNECT bit rate

ATJ1 : DTE rate depends on DCE rate

With the **ATJ0** setting a constant bit rate is maintained between computer and modem. This prevents the DTE rate from being adapted to the DCE rate.

The **ATJ1** command makes the computer connection bit rate (DTE rate) adjust to the CONNECT (DCE) bit rate. This applies to all transfer modes up to V.32bis.

\K Break control

AT\Kn (n = 0..5)

This command affects the handling of break signals received by the modem. The following tables indicate the effects of the parameter **n**. The modem is able to buffer up to four breaks (received and to be sent).

During an error-corrected connection or a connection in normal mode, the breaks sent by the computer are handled in the following manner:

| n | Effect |
|---------|---|
| 0, 2, 4 | Modem changes to command state, no break is sent to remote system |
| 1 | Modem clears sending buffer, a break is sent to remote system |
| 3 | Modem sends break immediately to remote system; no loss of data |
| 5 | Modem inserts break into data stream; no loss of data |

During a connection in normal mode, the breaks received from the remote system are handled as follows:

| n | Effect |
|------|--|
| 0, 1 | Modem clears sending buffer, transmits break to computer |
| 2, 3 | Modem immediately transmits break to computer |
| 4, 5 | Modem inserts break into data stream; no loss of data |

L Speaker volume

- ATL0 : Low volume
- ATL1 : Low volume
- * ATL2 : Medium volume
- ATL3 : High volume

This command controls the volume of the modem speaker.

%L V.100 bit rate adaptation

- AT%L0 : Partial bit rate adaptation
- * AT%L1 : V.100 bit rate adaptation
- AT%L2 : No fallback
- AT%L3 : V.100 bit rate adaptation

This command controls the bit rate adaptation (automatic speed matching) during the establishment of a connection.

With **AT%L1** (default setting) and with **AT%L3**, the *MicroLink 33.6TS* operates in accordance with the ITU-T standard V.100. Modems complying with this standard automatically adapt themselves to the transmission bit rate of the other party.

If a connection is established to a modem that does not operate in accordance with ITU-T V.100, the **AT%L0** command should be used to allow only partial bit rate adaptation, in which a fallback to a lower bit rate is possible only within one transmission mode (e.g. V.32bis from 14,400 to 12,000, 9600, 7200 and 4800 bps). If a connection cannot be established with this setting as well, the modem should be configured to **AT%L2**. A connection is then established only with the bit rate determined by the **AT%B** command (see page 29).

M Speaker control

- ATM0 : Speaker always off
- * ATM1 : Speaker on during connection establishment (outgoing/incoming call)
- ATM2 : Speaker always on
- ATM3 : Speaker on during 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 for outgoing calls only as well as for outgoing and incoming calls. This setting also influences the ring signal for an incoming call via S54.

-M Verbose CONNECT messages

- * AT-M0 : Verbose CONNECT messages dependent on ATIV
- AT-M1 : Verbose CONNECT messages independent of ATIV

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

With **AT-M0** (default setting) the output of CONNECT messages depends on the setting of the **ATIV** command (see page 54).

With **AT-M1** the following result codes are displayed upon successful connection, regardless of the setting of the **ATIV** 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 |

%M V.8 bit rate adaptation

- * AT%M0 : V.8 bit rate adaptation on
- AT%M1 : V.8 bit rate adaptation off

This command controls the bit rate adaptation during the establishment of a connection.

With **AT%M0** (default setting) *MicroLink 33.6TS* operates in accordance with the ITU-T standard V.8. Modems complying with this standard automatically adapts itself to the transmission bit rate of the other party. If the remote modem does not support V.8, the modem automatically tries to adapt its bit rate according to ITU-T V.100.

\N Operating mode

| | \N0 | \N1 | \N2 | \N3* | \N4 | \N5 | \N6 |
|--------|-----|-----|-----|------|-----|-----|-----|
| V.42 | | | | (↓) | ■ | ↓ | ↓ |
| MNP | | | ■ | ↓ | | | ■ |
| normal | ■ | | | ■ | | ■ | |
| direct | | ■ | | | | | |

This command determines whether error correction is employed and which method is used. This command is connected with the **AT%C** (data compression, see page 31) and **AT-J** (detect phase, see page 40) commands. An overview of the interdependencies of these commands can be found in appendix B, Error Correction and Data Compression. If the error correction has been disabled with **ATN0** or **ATN1**, data compression is not possible.

When set to **ATN0**, the modem operates in normal mode and establishes physical connections without an error correction method.

With **ATN1** the modem establishes connections in direct mode. No buffering or data flow control takes place in these physical connections. This operating mode is not possible with V.34 and V.Fast Class. With V.34 and V.Fast Class the modem operates in normal mode.

When set to **ATN2**, the modem attempts to establish an error-corrected connection with MNP. If the other party does not support MNP, the connection is aborted.

With **ATN3** (default setting) the modem attempts to establish an error-corrected connection. If this is not possible, a connection in normal mode is re-established. The **AT-J** command determines whether the modem only tries to establish a connection with MNP, or also with V.42 (see page 40).

When set to **ATN4**, the modem attempts to establish an error-corrected connection with V.42. If this is not possible, the connection is aborted.

With the settings **ATN5** and **ATN6** the modem first attempts to establish an error-corrected connection with V.42. If the other party does not support V.42, **ATN5** causes an automatic fallback to a physical connection, while with **ATN6** the modem attempts to establish an error-corrected connection with MNP. If that protocol is not supported as well, the connection is aborted.

The following table shows which types of connections can be established between two modems dependent on the setting of **ATN** (and, in the case of the calling modem, also dependent on **AT-J**):

| Answer | Originate | | | | | | | |
|--------|---------------|---------------|-------|--------|------|-------|---------------|-------|
| | AT\N0 | AT\N1 | AT\N2 | AT\N3 | | AT\N4 | AT\N5 | AT\N6 |
| | | | | -J0 | -J1 | | | |
| AT\N0 | normal | direct/normal | none | normal | | none | normal | none |
| AT\N1 | normal/direct | direct/normal | none | normal | | none | normal/direct | none |
| AT\N2 | none | none | MNP | MNP | | none | none | MNP |
| AT\N3 | normal | direct/normal | MNP | MNP | V.42 | V.42 | V.42 | V.42 |
| AT\N4 | none | none | none | none | V.42 | V.42 | V.42 | V.42 |
| AT\N5 | normal | direct/normal | none | normal | V.42 | V.42 | V.42 | V.42 |
| AT\N6 | none | none | MNP | MNP | V.42 | V.42 | V.42 | V.42 |

◇ **NOTE** ◇

The direct mode is not possible with V.34 and V.Fast Class. With V.34 and V.Fast Class, the modem operates in normal mode.

O Return to online state

AT00 : Return to online state without retrain

AT01 : Return to online state with retrain

If the modem is in the command state after an Escape command (see section 5.2, page 24) or a transition of DTR from ON to OFF with a preceding **AT&D1**, the **AT00** command can be used for changing back to the online state and resuming the online data transmission.

This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

P Set pulse dialing

ATP

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

\P Store telephone numbers

AT\Pmn

Up to ten telephone numbers can be stored in the non-volatile memory of the modem with this command. The **ATD/m** command (see page 33) dials the telephone number **n** (max. 36 digits) stored in the **m**-th position (**m** = 0..9). The numbers are kept in the memory even when the modem is switched off. A number stored in position **m** can be deleted with the **AT\Pm** command. The rules applying to **n** are the same as explained on page 33.

The numbers stored with **AT\P** can be overwritten with the **AT&Z** command (see page 57). This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

\$P**Entering user password and callback number****AT\$P0;dialing prefix****AT\$Pmemory position;mode;password;number**

The command AT\$P can store a total of 19 different user passwords in a list. The following parameters can be used, and must be separated from each other by semicolons. The following entries are possible:

dialing prefix A separate dialing prefix for callback numbers is stored in memory position 0 of the non-volatile memory. If special dialing characters (see command **ATD**) are used, care must be taken to enter these immediately after the semicolon (e.g.: **at\$p0;t0w**).

memory position This parameter, which is followed by at least one further parameter, determines a memory position between 1 and 19 for the corresponding entry in the list. If, for example, the entry should be at the fourth position, the number 4 must be entered (e.g.: **at\$p4;1;otto;0815**).

An individual entry on the list can be overwritten by entering the respective parameter. If for example you wish to alter only the user password, then enter a new password to replace the old one.

Example: The password 'OTTO' in the entry AT\$P4;1;OTTO;0815 is to be replaced by 'HANS' (AT\$P4;1;HANS;0815). To do so, enter the following:

at\$p4;;hans

◇ **NOTE** ◇ If the command **AT\$Pmemory position** is used without further parameters, the corresponding entry between 1 and 19 is removed from the list (e.g.: **at\$p4** deletes the entry from memory position 4).

mode This parameter can be used to set different security levels (see the following Table).

Individual values of the parameters <mode> are set as in bit-oriented registers (see page 58) and have the following meanings:

| Bit | Dec. | Meaning |
|------|------|---|
| 0 | 0 | Entry blocked |
| | 1 | Entry active |
| 1..2 | 0 | Password is sufficient identification |
| | 2 | Request subscriber number as additional identification |
| | 4 | Request password; then callback the stored subscriber number |
| | 6 | Request password and subscriber number; then callback the entered subscriber number with three dialing attempts |
| 3 | 0 | reserved |

| Bit | Dec. | Meaning |
|------|------|------------------------------------|
| 4..5 | 0 | Remote configuration blocked |
| | 16 | Remote configuration, inquiry mode |
| | 32 | Remote configuration, editing mode |
| 6..7 | 0 | reserved |

password This parameter determines the user password. The password must contain at least 4 characters and cannot exceed 8 characters.

number This parameter may be used to enter a subscriber number of no more than 32 characters, which is stored in a list together with the associated user password.

Q Enable/disable modem result codes

- * **ATQ0 : Enable modem result codes**
- ATQ1 : Disable modem result codes**
- ATQ2 : Disable result codes in answer mode**

This command can be used to suppress the messages sent by the modem to the connected computer (see appendix "Modem Result Codes" on page 80) always (**ATQ1**) or only in answer mode (**ATQ2**).

*Q Message after invalid Escape sequence

- * **AT*Q0 : Enable CONNECT message after invalid Escape sequence**
- AT*Q1 : Disable CONNECT message after invalid Escape sequence**

This command can be used to suppress the CONNECT message when returning to the online state after an invalid Escape command (see section 5.2, page 24).

\Q Flow control serial interface

- AT\Q0 : Disable flow control**
- AT\Q1 : XON/XOFF bidirectional handshake**
- AT\Q2 : CTS unidirectional handshake**
- * **AT\Q3 : RTS/CTS bidirectional handshake**
- AT\Q4 : XON/XOFF unidirectional handshake**

With this command various handshake methods for the data flow control at the serial interface can be selected.

Data flow control is especially important if the transmission bit rate to the computer is not equal to the DCE rate. That is the case e.g. when error correction and data compression methods are used. Without a handshake procedure there is an inevitable risk of buffer overflow.

When using a hardware handshake via the **ATQ2** or **ATQ3** command, the data flow is controlled by the RTS (Request To Send) and CTS (Clear To Send) interface lines. Data sent by the computer to the modem are temporarily stored there in a buffer. If the buffer is filled to a critical level, the modem will switch the CTS to OFF, and the computer will stop data output until the CTS is again switched ON. The computer can likewise switch the RTS to OFF if it is temporarily unable to accept further data from the modem.

The **ATQ1** and **ATQ4** commands select a software handshake with the XON/XOFF characters. When the modem receives the character <DC3> (= Ctrl-S = XOFF) from the computer, data output is stopped until a <DC1> (= Ctrl-Q = XON) is sent. On the other hand, the modem sends a XOFF or XON to the computer when its buffer is full or ready to be refilled. The **ATX** command (see page 55) determines whether the XON and XOFF characters are also sent to the remote modem or not. By default, they are not sent.

With unidirectional handshake methods, the handshake signals coming from the computer are ignored.

%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 command AT\$R is used to display existing user passwords, callback numbers and all other parameters.

Example:

```
at$r
00 - TOW
01 - 05;PHILIP      ;123456789
02 - 05;MICHAEL    ;333
03 -
04 - 01;NICK       ;
05 -
06 - 33;PAULA      ;333
07 - 35;DANIELA    ;333
08 - 37;SHANNON    ;333
09 -
10 -
11 -
12 -
```

◇ **NOTE** ◇

If the commands AT\$P or AT\$R are used when the access key 'P' (see Page 50) is inactive, a request to enter the supervisor password is issued. If an incorrect password is entered, the commands are not executed, and the message ERROR is displayed.

S Read/write S register values

ATSn=x : Set register **n** to value **x**
ATSn? : Read the value of register **n**
ATSn : Make register **n** the default register
AT? : Read the value of the default register
AT=x : Set the default register to value **x**

The register number **n** (0..239) 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 58). The S registers are described individually in section 5.7.

If a register is set to an invalid value, the command is ignored and answered with ERROR. If invalid settings are made in a bit-mapped register, only the invalid bits are ignored; all other bits are accepted.

. Setting and reading one bit of a register

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

This command can be used to change register values. The value **n** of the bit in the register concerned can be set to the value **m**. If access is denied, the value of the S register remains unchanged and the modem responds with ERROR.

Example: If the dial lock (see Page 65) preset in Register S31 is to be changed to delayed dialing, bit 7 of this register must be set using the command **ATS31.7=1**.

&S DSR control

* **AT&S0** : DSR is always active
AT&S1 : DSR is active between answer tone and hang up

This command influences the meaning of the DSR signal line (see also page 85). This interface line is normally always active. When set to **AT&S1**, DSR is active only in the time between the end of the answer tone and the termination of the connection.

\S Verbose display of the current configuration

AT\S0 : Display the entire list
AT\S1 : Display the entire list
AT\S2 : Display from part 2
AT\S3 : Display from part 3

AT\S4 : Display from part 4**AT\S5 : Display from part 5**

The **AT\S** command displays the current configuration profile of the modem in verbose form, as follows:

Example:

```

1. CONNECTION / HANG UP
LAST DIAL
DIAL MODE                TONE      T/P
DIAL LOCK                000      MIN
DIAL/BUSY TONE           003      X3
DTR DIALING              OFF      $D0
PAUSE LENGTH             002      S8=2
AUTO ANSWER              001      S0=1
GUARD/CALLING TONE       000      &G0
DISCONNECT DELAY         000      %D0
INACTIVITY TIMER         000      \T0

Press any key to continue...

2. LINE INTERFACE
MODEM = SERIAL BPS       OFF      %G1
MODEM BPS                 33600     %B33600
V.8                       On       %M0
HALF-DUPLEX              Off      S27.7=0
BPS ADJUST               OFF      \J0
SPEED MATCH              V100     %L1
BELL                     OFF      B0
AUTO RETRAIN             ON       %E1
ALLOW RD LOOPBACK        OFF      &T4

Press any key to continue...

3. PROTOCOLS
MODEM MODE                NORMAL    \N0
COMPRESSION               ALL      %C3
DETECT PHASE              ON      -J1
BREAK CONTROL             005      \K5
FALLBACK CHARACTER        000      %A0
FALLBACK MODE             FB 200    \C1

Press any key to continue...

4. HOST INTERFACE
SERIAL BPS                115200    AT
DATA FORMAT/PARITY        8N1      AT
TRANSMIT XON/XOFF         OFF      \X0
DATA FLOW CONTROL         RTS/CTS   \Q3
DSR/CTS CONTROL           000      \D0
CARRIER DETECTION        001      &C1
ESCAPE CHARACTER          +       S2=43
EFFECT OF DTR             002      &D2
MEANING OF DSR            000      &S0

Press any key to continue...

5. ON-SCREEN-MESSAGES AND SPEAKER
MODEM MESSAGES            ON       Q0
COMMAND ECHO              ON       E1
FORM OF MESSAGES          LONG     V1
MESSAGES DEP ON \V        ON      -M0
CONNECT MESSAGES          008      \V8
TIES CONNECT              ON      *Q0

```

| | | |
|-----------------|-----|----|
| SPEAKER CONTROL | 001 | M1 |
| SPEAKER VOLUME | 002 | L2 |

\$S Set Access Key

AT\$S

Using the **AT\$S** command, the access key can be modified. In this way, modem access privileges can be determined. When the command is called, and after the valid password is entered, the current access key configuration (CONFIG) is displayed. The new configuration (CONFIG) is shown after the access key is modified by entering after 'SET'. Values for which no entry is provided are automatically echoed as '-'.

Modifications made to the access key apply to the whole modem (and not only to a single configuration profile) and are saved in non-volatile memory.

Example:

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

Modification of an access key is only possible with a supervisor password. The following access keys are allowable alone or in combination:

| Value | Meaning |
|----------|--|
| A | All commands which do not modify the non-volatile memory may be used ('All') |
| W | The commands AT\$P , AT\$P , AT&W , AT*W , AT&Y and AT&Z may be used ('Write') |
| I | If I is not occupied, the modem is in a forced busy state. Calls cannot be accepted with ATA or ATS0 = 1 . The RING message is suppressed and only M3 signals an incoming call ('Indial') |
| O | Outgoing calls are permitted ('Outdial') |
| P | Password list can be demanded and modified ('Password') |

◇ **ATTENTION** ◇ Inaccessible commands are ended with **ERROR**.

\$S? Request Access Key

AT\$S?

The **AT\$S?** command allows for querying the current access key. Calling this command outputs a list of the current access keys to the screen.

Example:

```
at$S?
CONFIG : AW-----
OK
```

T Set tone dialing

ATT

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

&T Diagnostic testing

AT&T0 : Normal operation

AT&T1 : Local analog loopback

AT&T3 : Local digital loopback ¹⁾

* **AT&T4** : Remote digital loopback accepted ¹⁾

AT&T5 : Remote digital loopback accepted ¹⁾

AT&T6 : Remote digital loopback

This command sets several testing loopbacks and can be used as a function test.

AT&T1 is effective in the command state only and places the modem into a local analog loopback. Each character sent from the host to the modem is echoed.

The **AT&T3** and **AT&T6** commands are effective in the online state only. Upon receiving this command, the modem enables a local or remote digital loopback when entering the next online state.

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.

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.

When the modem is set to **AT&T4**, it is possible for a remote modem to establish a remote digital loopback. This can be suppressed by the **AT&T5** setting.

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

This command can only be the last one in a command line (i.e. any commands following this command will not be performed).

¹⁾ These commands are only valid if no error correction method is active.

\T Disconnect inactivity timer

AT\Tn ($n = 0..255 \times 10$ seconds; default = 0)

This command controls the time after which the modem automatically terminates a connection, if no data have been sent or received within this period (see also register S30, page 65). The value of **AT\T** is a multiple of 10 seconds. Valid values for **n** are **0..255**. The default value **0** disables the inactivity timer.

\$T Logging mode

- * **AT\$T0** : logging mode off
- AT\$T1** : logging mode on

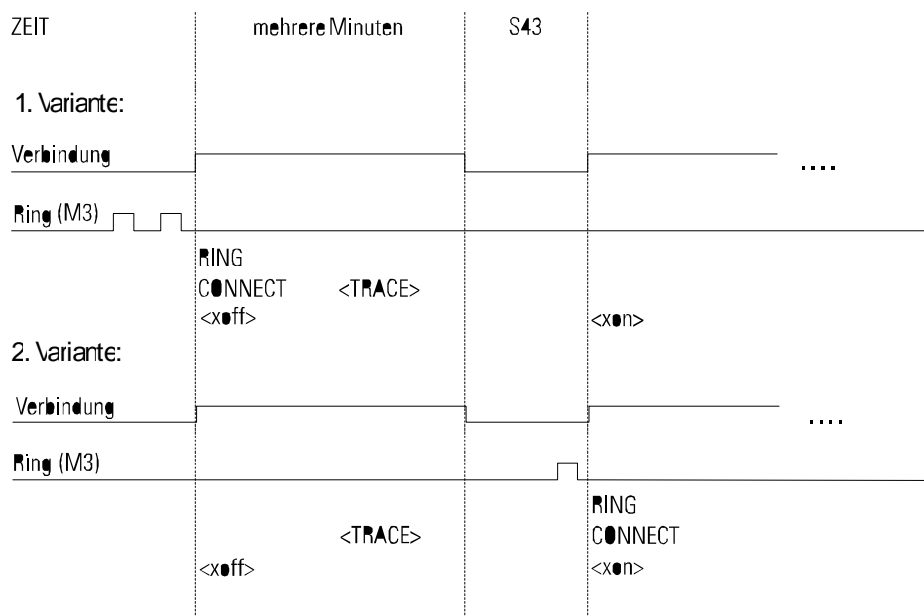
The **AT\$T** command can be used to turn the logging mode (trace mode) on or off. The logging mode allows illegal accesses to be logged.

The command **AT\$T0** turns off the logging mode and does not return messages.

The command **AT\$T1** turns on the logging mode and all messages are preceded by a '+R'. Trace text cannot be output in abbreviated format.

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

The following diagram shows the use of the first (**AT\$B1**) and second (**AT\$B2**) variants with logging mode turned on (**AT\$T1**):



If the first variant is used, the modem responds after one RING with the password and calling station's number. Afterwards, the trace text +RNO CARRIER and +RCONNECT display (at the same time as <xon>), as well as the entries from the remote modem (user password and calling number).

If the second variant is used, the trace text before the RING and CONNECT is displayed. After one +RRING and +RCONNECT the password and calling station's number is displayed. Afterwards, the messages +RNO CARRIER and +RCONNECT appear as trace text (at the same time as <xoff>) as well as the entries from the remote modem (user password and calling number).

◇ **ATTENTION** ◇ Depending on the setting for the **ATIQ** command (see page 46), <xon> and <xoff> represent the corresponding handshake signal.

If the access protection or automatic callback function is activated, a call can produce the following messages for the remote modem:

| | |
|---------------------------|--|
| PASSWORD | The password input is echoed on the screen. |
| NUMBER | The numbers entered are echoed on the screen. |
| PASSWORD OK | This message appears if the password-protected access is activated without the callback function. |
| CALLBACK IN <i>n</i> MIN. | If the callback function is activated, the value for <i>n</i> determined in register S43 is shown. |
| NO CARRIER | This message appears when an ID is incorrect three times. |

***U Adopting Current Configuration**

AT*U : Adopt current configuration

Modifying the current configuration in a remotely configured modem is undone when the remote configuration mode is exited. Using the **AT*U** command, the current configuration in the remote configuration mode can be adopted. The settings remain active even after leaving the remote configuration mode.

If the modifications should also be saved after the modem is turned off, they must be saved with the **AT&W** or **AT*W** command.

V Form of result codes

ATV0 : Enable short form result codes (digits)

*** ATV1 : Enable long form (verbose) result codes**

This command allows you to choose whether the messages sent by the modem to the connected computer are displayed as digits or words. The result codes in short form and verbose form are listed in section 0, page 80.

%V Display firmware version

AT%V

This command displays the modem firmware version on the monitor and corresponds to the **ATI3** command (see page 39).

&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, page 54) of the modem on the monitor.

\W**CONNECT messages for error-corrected connections**

ATV0 : No modified CONNECT messages

ATV1 : Identification of error-corrected connections

ATV2 : Identification of MNP and V.42(bis) 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):

CONNECT xxxx/REL (REL = reliable)

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

CONNECT xxxx/REL - MNP (MNP connection)

CONNECT xxxx/REL - LAPM (V.42(bis) connection)

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

CONNECT xxxx/MNP (MNP1..4 connection)

CONNECT xxxx/MNP5 (MNP5 connection)

CONNECT xxxx/LAPM (V.42 connection)

CONNECT xxxx/LAPM/V42BIS (V.42bis connection)

Furthermore, the **ATV8** setting can be used to display "Extended CONNECT messages", which 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 75) must be set to 1 (**ATS96=72**). Possible values for the transmission mode string are:

V23, V21, V22BIS, V32, V32BIS, VFC, V34, B103*, B212A* (* = not in the UK)

An overview of all possible CONNECT messages can be found in the Online-Documentation on the CD shipped with this product.

&W**Save current configuration profile**

AT&W0 : Save configuration profile 0

AT&W1 : Save 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 current values of the following commands and registers are saved:

| | | | | | | | | | | |
|----|----|----|----|-----|----|-----|-----|-----|-----|-----|
| %A | &D | &G | %L | \Q | \T | S14 | S25 | S32 | S42 | S53 |
| B | %D | -H | M | &S | V | S15 | S26 | S35 | S46 | S54 |
| %B | \D | -J | -M | \S | \V | S18 | S27 | S36 | S47 | S64 |
| %C | E | \J | \N | T | X | S21 | S28 | S37 | S48 | S93 |
| &C | %E | \K | P | &T4 | \X | S22 | S30 | S38 | S51 | S95 |
| \C | %G | L | Q | &T5 | S0 | S23 | S31 | S39 | S52 | |

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

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

***W** Save extended configuration profile

AT*W0 : Save extended configuration profile 0

AT*W1 : Save extended configuration profile 1

In addition to the parameters and registers stored with **AT&W**, this command also saves the values of the following registers in the non-volatile memory of the modem:

S2..S12, S29, S33..S34, S40, S42..S43, S60, S63..S64, S66, S94, S96, S99, S101..S103; S130, S229

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 tones / busy tones

ATX0 : Ignore dial tone / 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** the modem waits for a dial tone before dialing. With **ATX0**, **ATX1** or **ATX3** the modem does not wait for the dial tone, so that "blind dialing" is possible, e.g. while establishing a connection between two extensions.*)

In addition, this command selects whether your modem recognizes a busy tone and replies with BUSY or ignores the busy tone and aborts the dialing attempt with NO CARRIER.

◇ **NOTE** ◇ With the **ATX0** setting only the message CONNECT (or "1" in short form) is displayed, regardless of the transmission bit rate and the type of connection.

\X Handling of XON/XOFF characters

- * **AT\X0** : XON/XOFF characters are not passed to the remote side
- AT\X1** : XON/XOFF characters are passed to the remote side

This command influences the handling of the characters XON and XOFF which serve for data flow control if an XON/XOFF software handshake has been selected (see also **AT\Q**).

The **AT\X0** setting causes the XON/XOFF characters to be used only for the data flow control between the local modem and computer and are **not** transmitted to the remote modem.

With the **AT\X1** setting these characters likewise control the data flow between the local modem and computer. However, the characters are **also** sent to the remote system.

***X** End remote configuration

AT*X : End remote configuration

With the **AT*X** you end remote configuration and switch to the Online Phase.

&Y Select startup configuration profile

- * **AT&Y0** : Load configuration profile 0 at startup
- AT&Y1** : Load configuration profile 1 at startup

This command determines which of the two stored configuration profiles (0 or 1) is loaded and used when the modem is turned on.

\$Y Modify Supervisor Password

AT\$Y

The **AT\$Y** can be used to modify the supervisor password. The authorized user must enter the supervisor password. The factory set supervisor password is **ELSA**. This default password can be modified using the **AT\$Y** command.

The password must have a minimum of four characters and a maximum of eight. Numbers, capitals and punctuation are valid characters. The system is case-insensitive. Characters entered are always echoed with * and can be corrected with R or _. Each entry line must be ended with M.

When **AT\$Y** is called, the new password must be entered twice and ended each time with M. The doubled entry prevents a typographical error from being saved as the supervisor password.

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

If the entries are different, the command ends with an ERROR message. The **AT\$Y** command must then be restarted so that the password change process can be carried out.

Example:

```
at$y
PASSWORD      : ****
NEW PASSWORD   : *****
NEW PASSWORD   : *****
OK
```

Z Load configuration profile

ATZ0 : Load configuration profile 0

ATZ1 : Load configuration profile 1

This command loads a configuration profile (0 or 1) from non-volatile memory. Any existing connection will be broken. This command is independent of the **&Y** command.

This command can only be the last one in a command line (i.e. any commands following this command will not be performed). If you have not saved a configuration profile before (**AT&W**, **AT*W**), the default configuration will be loaded (**AT&F**).

&Z Store telephone numbers

AT&Zm=n : Store telephone number **n** in position **m**

Up to twenty telephone numbers can be stored in the non-volatile memory of the modem with this command. The **ATDSm** command (see page 33) dials the telephone number **n** (max. 36 digits) stored in the **m**-th position (**m** = 0..19). The numbers are kept in the memory even when the modem is switched off. A number stored in position **m** can be deleted with the **AT&Zm=** command. The rules applying to **n** are the same as explained on page 33.

The numbers stored with **AT&Z** can be overwritten with the **ATP** command (see page 44). You can display the stored telephone numbers with the **ATF** command.

5.7 Registers

MicroLink 33.6T has internal registers you can use to modify the configuration of the modem (see **ATS_n** command, page 48). On the following pages, the functions of each register are described. Please note that changing the value of a bit-mapped register can affect several functions at once!

Bit-mapped registers Be very careful with changing bit-mapped registers, i.e. registers which control more than one single function! The bit-mapped registers mainly serve for the display of the modem status. To change the configuration of your modem, you should use the more convenient and safe AT commands instead. The default values for the individual bits are printed in **bold** face.

Changing individual bits The following example illustrates how to change the value of a bit-mapped register. To set, for example, bit 6 of register S14 (allow polling during connection establishment), proceed as follows:

- First, use the **ATS14?** command to display the current value of register S14 (current value = 138).
- Add the decimal value of bit 6 = 1 (decimal value = $2^6 = 64$) to the current register value (new register value = $138 + 64 = 202$).
- Set register S14 to the new value (202) with the **ATS14=202** command. This will set bit 6 of S14 to 1 without affecting the other bits.

◇ **NOTE** ◇

To make the new value remain valid even after the modem is switched off, the active configuration profile must be saved with the **AT*W** command.

S0 Number of rings to auto-answer

| | | |
|--------------------------------|---|---|
| Valid values | : | 0..5 rings (in the Netherlands : 0..8) |
| Default value | : | 0 |
| Storage in non-volatile memory | : | AT&W or AT*W |

The number of rings after which the modem automatically answers an incoming call is set in register S0. A value of 0 disables auto-answer, i.e. incoming calls are not accepted.

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.

With $S0 > 0$ the connection establishment can be aborted by any character (except for <LF>). However, the connection is not terminated if bit 6 of register S14 is set to 1 (default value = 0). With this setting the connected computer can still send signals to the modem during the establishment of a connection (see page 61).

S1 Ring counter

| | | |
|--------------------------------|---|--------------------|
| Valid values | : | 0..255 ring pulses |
| Default value | : | 0 |
| Storage in non-volatile memory | : | no |

Register S1 contains the number of rings of an incoming call. The value of S1 is reset to zero if no further pulses from the telephone network are registered after a period of time (default: 5 seconds) that has been set in register S99 (see page 76). No new calls can be distinguished within this period of time, and no numbers can be dialed.

S2 Escape character

| | | |
|--------------------------------|---|------------------|
| Valid values | : | 0..255 (decimal) |
| Default value | : | 43 (+) |
| Storage in non-volatile memory | : | AT*W |

The Escape command '+++' (see also section 5.2, page 24), which is used to change from the online state to the command state in an existing connection, can be redefined in register S2.

◇ **NOTE** ◇ Changing to the command state is locked by the value 0 or values ≥ 128 .

S3 Carriage Return character

| | | |
|--------------------------------|---|----------------------|
| Valid values | : | 0..127 (decimal) |
| Default value | : | 13 (Carriage Return) |
| Storage in non-volatile memory | : | AT*W |

The character for <CR> (Carriage Return, Enter) can be redefined in register S3.

S4 Line Feed character

| | | |
|--------------------------------|---|------------------|
| Valid values | : | 0..127 (decimal) |
| Default value | : | 10 (Line Feed) |
| Storage in non-volatile memory | : | AT*W |

The character for <LF> (Line Feed) can be redefined in register S4.

S5 Backspace character

| | | |
|--------------------------------|---|----------------------|
| Valid values | : | 0..32, 127 (decimal) |
| Default value | : | 8 (Backspace) |
| Storage in non-volatile memory | : | AT*W |

The character for <BS> can be redefined in register S5.

S6 Waiting before blind dialing

| | | |
|--------------------------------|---|--|
| Valid values | : | 3..6 seconds (in the UK : 4..5 seconds) |
| Default value | : | 3 seconds (in the UK : 4 seconds) |
| Storage in non-volatile memory | : | AT*W |

The time to elapse before the modem performs blind dialing (see also **ATX**, **ATX1** or **ATX3**, page 55) can be set in register S6.

S7 Waiting for carrier

| | | |
|--------------------------------|---|---|
| Valid values | : | 10..100 seconds (in the UK : 10..59) |
| Default value | : | 90 seconds (in the UK : 59 seconds) |
| Storage 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 |
| Storage in non-volatile memory | : | AT*W |

The length of a dialing pause caused by the dialing character ',' (see page 33) is determined in register S8.

S10 Delay for hang up after carrier loss

| | | |
|--------------------------------|---|---------------------|
| Valid values | : | 1..255 1/10 seconds |
| Default value | : | 3 (0.3 seconds) |
| Storage 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 only relevant for transmission via V.21, V.22bis and V.23.

S11 Tone duration for tone dialing

| Country | Valid values | Default value |
|---------|--------------|---------------|
|---------|--------------|---------------|

| | | | | |
|-----------------|--------|----------------|----|----------------|
| United Kingdom | 85..95 | 1/1000 seconds | 90 | 1/1000 seconds |
| The Netherlands | 70..95 | 1/1000 seconds | 70 | 1/1000 seconds |
| USA | 40..95 | 1/1000 seconds | 40 | 1/1000 seconds |

Storage 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..255 (1/50 seconds)
 Default value : 50 (1 second)
 Storage in non-volatile memory : AT*W

The length of the Escape Prompt Delay is set in register S12 (see also section 5.2, page 24).

S14 Bit-mapped options

The contents of register S14 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|-----|------|---|-------|
| 0 | 0 | none | |
| 1 | 0 | 0 = command echo disabled | ATE0 |
| | 2 | 1 = command echo enabled | ATE1 |
| 2 | 0 | 0 = result codes enabled | ATQ0 |
| | 4 | 1 = result codes disabled | ATQ1 |
| 3 | 0 | 0 = short form result codes (digits) | ATV0 |
| | 8 | 1 = long form (verbose) result codes | ATV1 |
| 4 | 0 | 0 = normal operation | AT-H0 |
| | 16 | 1 = dumb mode | AT-H1 |
| 5 | 0 | 0 = tone dialing | ATT |
| | 32 | 1 = pulse dialing | ATP |
| 6 | 0 | 0 = polling not allowed during connection establishment | |
| | 64 | 1 = polling allowed during connection establishment | |
| 7 | 0 | 0 = modem in answer mode | |
| | 128 | 1 = modem in originate mode | |

S16 Bit-mapped options

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

| Bit | Dec. | Meaning |
|-----|------|---------|
|-----|------|---------|

| | | | |
|------|---------|--|-------|
| 0 | 0 1 | 0 = local analog loopback inactive 1 = local analog loopback active | AT&T1 |
| 1 | 0 | none | |
| 2 | 0 4 | 0 = local digital loopback inactive 1 = local digital loopback active | AT&T3 |
| 3 | 0 8 | 0 = no initiated remote digital loopback 1 = initiated remote digital loopback active | |
| 4 | 0 16 | 0 = remote digital loopback inactive 1 = remote digital loopback active | AT&T6 |
| 5..6 | 0 | reserved | |
| 7 | 0 | none | |

S21 Bit-mapped options

The contents of register S21 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|-----------|--|------------------|
| 0..2 | 0 | none | |
| 3..4 | 0 | 0 = ignore DTR status change | AT&D0 |
| | 8 | 1 = change to command state if DTR → OFF | AT&D1 |
| | 16 | 2 = hang up if DTR → OFF | AT&D2 |
| | 24 | 3 = reinitialization if DTR → OFF | AT&D3 |
| 5 | 0 | 0 = DCD signal is always active (ON) | AT&C0 |
| | 32 | 1 = DCD signal indicates existence of carrier | AT&C1 |
| 6..7 | 0 | none | |

S22 Bit-mapped options

The contents of register S22 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|-----------|--|------------------|
| 0..1 | 0 | 0 = low speaker volume | ATL0 |
| | 1 | 1 = low speaker volume | ATL1 |
| | 2 | 2 = medium speaker volume | ATL2 |
| | 3 | 3 = maximum speaker volume | ATL3 |
| 2..3 | 0 | 0 = speaker always off | ATM0 |
| | 4 | 1 = speaker on when dialing and waiting for answer tone | ATM1 |
| | 8 | 2 = speaker always on | ATM2 |
| | 12 | 3 = speaker on when waiting for answer tone | ATM3 |
| 4 | 0 | 0 = do not wait for dial tone | ATX0/ATX1/ATX3 |
| | 16 | 1 = wait for dial tone | ATX2/ATX4 |
| 5 | 0 | 0 = ignore busy tone | ATX0/ATX1/ATX2 |
| | 32 | 1 = evaluate busy tone | ATX3/ATX4 |

| | | | |
|---|-----------|--|----------------------------|
| 6 | 0 | 0 = display the reduced CONNECT message as with ATX0 | ATX0 |
| | 64 | 1 = display the full CONNECT message | ATX1/ATX2/ATX3/ATX4 |
| 7 | 0 | none | |

S23 Bit-mapped options

The contents of register S23 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|--------------------|-----------|--|------------------------------|
| 0 | 0 | 0 = initiated remote digital loopback not allowed | AT&T5 |
| | 1 | 1 = initiated remote digital loopback allowed | AT&T4 |
| 1..3 ¹⁾ | 0 | 0 = DTE rate 300 bps | |
| | 2 | 1 = DTE rate 600 bps | |
| | 4 | 2 = DTE rate 1200 bps | |
| | 6 | 3 = DTE rate 2400 bps | |
| | 8 | 4 = DTE rate 4800 bps | |
| | 10 | 5 = DTE rate 9600 bps | |
| | 12 | 6 = DTE rate 19,200 bps | |
| | 14 | 7 = DTE rate ≥ 38,400 bps | |
| 4..5 ¹⁾ | 0 | 0 = 7E1 | |
| | 16 | 1 = 8N1 | |
| | 32 | 2 = 7O1 | |
| | 48 | 3 = 7N2 | |
| 6..7 | 0 | 0 = guard tone off (not in the United Kingdom) | AT&G0 / AT&G4 |
| | 64 | 1 = guard tone 550 Hz | AT&G1 / AT&G5 |
| | 128 | 2 = guard tone 1800 Hz (default for the United Kingdom) | AT&G2 / AT&G6 |

¹⁾ The value of S23 is overwritten after every AT.

S25 DTR delay

| | | |
|--------------------------------|---|------------------------|
| Valid values | : | 0..255 (1/100 seconds) |
| Default value | : | 5 (0.05 seconds) |
| Storage 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 meaning:

| Bit | Dec. | Meaning |
|-----|------|---------|
|-----|------|---------|

| | | | |
|------|-----------------|--|---------------------|
| 0..5 | 0 | reserved | |
| 6 | 0 64 | 0 = ITU-T V.21/V.22bis 1 = Bell 103/212A (not available in the United Kingdom) | ATB0 ATB1 |
| 7 | 0 128 | 0 = duplex 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 meaning:

| Bit | Dec. | Meaning | |
|------|--------------------------|---|---|
| 0..1 | 0 1 2 3 | 0 = word length in asynchronous direct mode (AT\N1): 8 bits/character 1 = word length in asynchronous direct mode (AT\N1): 9 bits/character 2 = word length in asynchronous direct mode (AT\N1): 10 bits/character 3 = word length in asynchronous direct mode (AT\N1): 11 bits/character | |
| 2..3 | 0 4 8 12 | 0 = partial bit rate adaptation 1 = V.100 bit rate adaptation on 2 = no fallback 3 = V.100 bit rate adaptation on | AT%L0 AT%L1 AT%L2 AT%L3 |
| 4 | 0 | reserved | |
| 5 | 0 32 | 0 = bit rate tolerance: -2,5% + 1,0% 1 = bit rate tolerance: - 2,5% + 2,3% | |
| 6 | 0 64 | 0 = Disable automatic retrain 1 = Enable automatic retrain | AT%E0 AT%E1 |
| 7 | 0 128 | 0 = RING message and call acceptance not possible if DTR = OFF 1 = RING message and call acceptance possible if DTR = OFF | |

◇ **NOTE** ◇

Direct mode is not possible with V.34 and V.Fast Class. With V.34 and V.Fast Class, the modem operates in normal mode.

Setting the word length requires asynchronous direct mode (AT\N1) and is only active in the online phase. This means that the settings with a terminal program such as Telix for Windows, cannot be tested without a connection, since the modem in command phase sends return messages in 8N1 (10 bits/character). A test is only possible with a corresponding station.

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 meaning:

| Bit | Dec. | Meaning |
|-----|---------------|---|
| 0 | 0 1 | 0 = Automatic fallback to V.23 allowed 1 = Automatic fallback to V.23 not allowed |

| | | | |
|---|-----|--|-------|
| 1 | 0 | 0 = Disable asymmetric bit rates | |
| | 2 | 1 = Enable asymmetric bit rates | |
| 2 | 0 | 0 = Enable V.8 negotiation | AT%M0 |
| | 4 | 1 = Disable V.8 negotiation | AT%M1 |
| 3 | 0 | reserved | |
| 4 | 0 | 0 = Enable V.34/V.Fast Class rate renegotiation | |
| | 16 | 1 = Disable V.34/V.Fast Class rate renegotiation | |
| 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 | |
| 7 | 0 | 0 = V.8 answer tone with V.Fast Class | |
| | 128 | 1 = V.8 answer tone without V.Fast Class ID | |

S30 Disconnect inactivity timer

| | | |
|--------------------------------|---|---------------------|
| Valid values | : | 0..255 × 10 seconds |
| Default value | : | 0 (timer off) |
| Storage in non-volatile memory | : | AT&W or AT*W |

The period of time after which the modem automatically terminates the connection (if no further data have been received or sent) can be set in register S30 (see also **ATIT** command, page 51). A value of zero disables the inactivity timer.

S31 Bit-mapped options

The contents of register S31 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|------|--|--------|
| 0..2 | 0 | 0 = no guard tone, calling tone on (not in the United Kingdom) | AT&G0 |
| | 1 | 1 = guard tone 550 Hz, calling tone on | AT&G1 |
| | 2 | 2 = guard tone 1800 Hz, calling tone on (default for the United Kingdom) | AT&G2 |
| | 4 | 4 = no guard tone, calling tone off (not in the United Kingdom, default for USA) | AT&G4 |
| | 5 | 5 = guard tone 550 Hz, calling tone off | AT&G5 |
| | 6 | 6 = guard tone 1800 Hz, calling tone off | AT&G6 |
| 3 | 0 | 0 = calling tone according to ITU-T V.25 | |
| | 8 | 1 = calling tone according to ITU-T V.8 | |
| 4 | 0 | 0 = manual dialing off | AT:D0 |
| | 16 | 1 = manual dialing on | AT:D1 |
| 5 | 0 | 0 = DTR dialing off | AT\$D0 |
| | 32 | 1 = DTR dialing on | AT\$D1 |
| 6..7 | 0 | reserved | |

S33 Bit-mapped options

Register S33 stores the settings of the **AT\$B** and **AT\$T** commands (see pages 30 and 47). The register content is stored with the **AT*W** command in non-volatile memory. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|----------|-------------------------------------|---------------|
| 0..1 | 0 | 0 = no callback | AT\$B0 |
| | 1 | 1 = callback variant 1 | AT\$B1 |
| | 2 | 2 = callback variant 2 | AT\$B2 |
| 2 | 0 | 0 = callback log off | AT\$T0 |
| | 4 | 1 = callback log on | AT\$T1 |
| 3 | 0 | 0 = remote configuration off | AT*E0 |
| | 8 | 1 = remote configuration on | AT*E1 |
| 4..7 | 0 | reserved | |

S34 Configuration command

Valid values : 0..127 (decimal)
 Default value : 42 (*)
 Storage in non-volatile memory : **AT*W**

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

S35 Number of Callback Attempts

Valid values : 1..12
 Default value : 3
 Storage in non-volatile memory : **AT*W**

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

S36 Error correction

In Register S36 you can select which type of error correction (if any) is to be used.

The "selective rejects" from the V.42 error correction protocol are also supported. This facility enables erroneous data packets to be re-transmitted, without losing other data packets sent subsequently. Up to six selective rejects can be defined and processed simultaneously.

Settings for register S36 can be stored to non-volatile memory with the commands **AT&W** or **AT*W**.

The individual bits have the following meanings:

| Bit | Dec. | Meaning | |
|------|------|--|--------------|
| 0..2 | 0 | 0 = Normal mode | AT\N0 |
| | 1 | 1 = Direct mode | AT\N1 |
| | 2 | 2 = MNP | AT\N2 |
| | 3 | 3 = V.42/MNP with fallback to normal mode | AT\N3 |
| | 4 | 4 = V.42 | AT\N4 |
| | 5 | 5 = V.42 with fallback to normal mode | AT\N5 |
| | 6 | 6 = V.42 with fallback to MNP | AT\N6 |
| 3..6 | 0 | reserved | |
| 7 | 0 | 0 = Selective Reject (SREJ) on | |
| | 128 | 1 = Selective Reject (SREJ) off | |

S37 Bit-mapped options

The contents of register S37 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|------|--|------------------|
| 0..5 | 1 | 1 = DCE rate 75/1200 bps | AT%B75/1200 |
| | 2 | 2 = DCE rate 1200/75 bps | AT%B1200/75 |
| | 3 | 3 = DCE rate 300 bps | AT%B300 |
| | 5 | 5 = DCE rate 1200 bps | AT%B1200 |
| | 6 | 6 = DCE rate 2400 bps | AT%B2400 |
| | 7 | 7 = DCE rate 4800 bps | AT%B4800 |
| | 8 | 8 = DCE rate 7200 bps | AT%B7200 |
| | 9 | 9 = DCE rate 9600 bps | AT%B9600 |
| | 10 | 10 = DCE rate 12,000 bps | AT%B12000 |
| | 11 | 11 = DCE rate 14,400 bps | AT%B14400 |
| | 12 | 12 = DCE rate 16,800 bps | AT%B16800 |
| | 13 | 13 = DCE rate 19,200 bps | AT%B19200 |
| | 14 | 14 = DCE rate 21,600 bps | AT%B21600 |
| | 15 | 15 = DCE rate 24,000 bps | AT%B24000 |
| | 16 | 16 = DCE rate 26,400 bps | AT%B26400 |
| | 17 | 17 = DCE rate 28,800 bps | AT%B28800 |
| | 18 | 18 = DCE rate 31,200 bps | AT%B31200 |
| | 19 | 19 = DCE rate 33,600 bps | AT%B33600 |
| 6 | 0 | 0 = DCE rate determined by DTE rate | AT%G0 |
| | 64 | 1 = DCE rate set by AT%B | AT%G1 |
| 7 | 0 | 0 = DTE rate determined by CONNECT bit rate | AT\J0 |
| | 128 | 1 = same effect as AT\J0 | AT\J1 |

S38 Delay before forced hang up

| | | |
|--------------------------------|---|----------------|
| Valid values | : | 0..255 seconds |
| Default value | : | 0 seconds |
| Storage in non-volatile memory | : | AT&W or AT*W |

Register S38 can be used to define a maximum delay during which the modem tries to empty its sending and receiving buffers before it terminates the connection. If a connection is terminated because the carrier is lost, only the characters still in the receiving buffer can be read. If the buffer is empty or S38 = 0, the connection is terminated immediately without delay.

S39 RTS/CTS delay in half-duplex mode

| | | |
|--------------------------------|---|----------------------|
| Valid values | : | 0..255 1/100 seconds |
| Default value | : | 3 (0.03 seconds) |
| Storage in non-volatile memory | : | AT&W or AT*W |

In half-duplex mode, CTS follows the state of RTS. When RTS changes from OFF to ON, the modem waits for the time defined in register S39, before CTS is set to ON as well.

S42 Waiting for user password

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

Register S42 defines the period of time the modem waits for the user password to be entered after a successful connection establishment.

S43 Callback delay

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

Register S43 defines the delay after which an automatic callback is performed.

S46 Data compression

| | | |
|--------------------------------|---|---------------------|
| Valid values | : | 0..3 (decimal) |
| Default value | : | 3 (V.42bis or MNP5) |
| Storage in non-volatile memory | : | AT&W or AT*W |

Register S46 determines whether a data compression method is used, and which one is used.

| Dec. | Meaning | |
|------|---|--------------|
| 0 | No data compression | AT%C0 |
| 1 | MNP5 data compression only | AT%C1 |
| 2 | V.42bis data compression only | AT%C2 |
| 3 | V.42bis or MNP5 data compression | AT%C3 |

S47 Fallback character

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

Register S47 defines the ASCII character (n = 1..127), which is regarded as fallback command during call acceptance. (see also **AT%A** command, page 29). This command requires the settings **ATN3** (see page 43) and **ATC2** (see page 31) The default value 0 disables the fallback character recognition entirely.

◇ **NOTE** ◇ The values 63 and 126 cannot be used, because these characters are needed in the V.42 negotiation phase and would therefore cause conflicts.

S48 Bit-mapped options

The contents of register S48 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|------|--|--------------|
| 0..1 | 0 | reserved | |
| 2 | 0 | 0 = Detect phase off | AT-J0 |
| | 4 | 1 = Detect phase on | AT-J1 |
| 3..4 | 0 | 0 = no data buffering in the negotiation phase | ATC0 |
| | 8 | 1 = data buffering in the negotiation phase | ATC1 |
| | 16 | 2 = no data buffering, fallback character detection (AT%A) | ATC2 |
| 5..7 | 0 | 0 = Break control | ATK0 |
| | 32 | 1 = Break control | ATK1 |
| | 64 | 2 = Break control | ATK2 |
| | 96 | 3 = Break control | ATK3 |
| | 128 | 4 = Break control | ATK4 |
| | 160 | 5 = Break control | ATK5 |

S51 Bit-mapped options

The contents of register S51 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|------|----------------------------------|-------------|
| 0..3 | 0 | 0 = no handshake | ATQ0 |
| | 1 | 1 = XON/XOFF bidirectional | ATQ1 |
| | 2 | 2 = RTS/CTS unidirectional | ATQ2 |
| | 3 | 3 = RTS/CTS bidirectional | ATQ3 |
| | 4 | 4 = XON/XOFF unidirectional | ATQ4 |

| Bit | Dec. | Meaning |
|------|------|--|
| 4 | 0 | 0 = XON/XOFF characters are not passed to remote station |
| | 16 | 1 = XON/XOFF characters are passed to remote station |
| 5..6 | 0 | none |
| 7 | 0 | reserved |

S52 Bit-mapped options

The contents of register S52 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning |
|------|------|--|
| 0..1 | 0 | 0 = DSR always active, CTS always active |
| | 1 | 1 = DSR follows answer tone, CTS always active |
| | 2 | 2 = DSR always active, CTS follows DCD |
| | 3 | 3 = DSR follows answer tone, CTS follows DCD |
| 2..3 | 0 | 0 = DCD is always active (ON) |
| | 4 | 1 = DCD indicates presence of carrier |
| | 8 | 2 = DCD dropped only during hang-up |
| 4..7 | 0 | reserved |

S53 Bit-mapped options

Register S53 sets the data format between computer and modem. (This setting is independent of the data format on the telephone side, which is always 8N1). The settings for this register can be stored to non-volatile memory with the commands **AT&W** or **AT*W**. The individual data bits have the following meanings:

| Bit | Dec. | Meaning |
|------|------|---|
| 0..1 | 0 | Online data format 8N1, 7E1, 7O1 or 7N2 |
| | 1 | Online data format 8E1 |
| | 2 | Online data format 8O1 |
| | 3 | Online data format 8N2 |
| 1..7 | 0 | none |

S54 Bit-mapped options

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 the setting for the acoustic signal depends on the setting **ATMn**. The settings for this register can be stored to non-volatile memory with the command **AT*W**.

| Bit | Dec. | Meaning |
|-----|------|---------|
|-----|------|---------|

| | | |
|---|--------|---|
| 0 | 0 1 | 0 = An incoming call is not notified acoustically 1 = An incoming call is notified acoustically |
| 1 | 0 2 | 0 = Initializing loads the serial speed from the profile 1 = Initializing does not modify the serial speed |
| 2 | 0 4 | 0 = XOFF (Software- handshake) remains after initialization 1 = XOFF (Software handshake) is reset after initialization |

S64 Transmitted signal level settings for dial-up line operation

| | | |
|-----------------------------|---|-------------------|
| Valid values | : | 10..15 (-x,5 dBm) |
| Standard value | : | 10 (-10,5 dBm) |
| Save in non-volatile memory | : | AT*W |

In Register S64 the modem's transmission signal strength for dial-up line operation can be adjusted. A value of 10 represents -10,5 dBm.

S65 Received signal level

Register S65 can be read only. It contains the received signal level in -dBm (for example, a value of 35 means a signal level of -35 dBm). Levels down to -43 dBm should be properly detected.

S66 Bit-mapped options

The register S66 decides the symbol rate in V.34- and V.Fast class operation. With this option, certain symbol rates can be suppressed. The settings for this register can be stored to non-volatile memory with the command **AT*W**. The individual data bits have the following meanings:

| Bit | Dec. | Meaning |
|------|---------|--|
| 0 | 0 1 | 0 = Symbol rate 2400 bps off 1 = Symbol rate 2400 bps on (max. 21,600 bps) |
| 1 | 0 | reserved |
| 2 | 0 4 | 0 = Symbol rate 2800 bps off 1 = Symbol rate 2800 bps on (max. 24,000 bps) |
| 3 | 0 8 | 0 = Symbol rate 3000 bps off 1 = Symbol rate 3000 bps on (max. 26,400 bps) |
| 4 | 0 16 | 0 = Symbol rate 3200 bps off 1 = Symbol rate 3200 bps on (max. 31,200 bps) |
| 5 | 0 32 | 0 = Symbol rate 3429 bps off 1 = Symbol rate 3429 bps on (max. 33,600 bps) |
| 6..7 | 0 | reserved |

S84 Bit-mapped options

Register S84 displays the symbol rate established during a V.34 or V.Fast class connection. The symbol rate is displayed as a value from 0 to 5 according to the table below. This register is read-only. The individual bits have the following meanings:

| Bit | Dec. | Meaning |
|------|------|--------------|
| 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 | Meaning |
|-----|--|
| . | |
| 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 |
| 17 | No loop current (not in the United Kingdom and USA) |
| 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 | Fallback not permitted because of AT%L2 |
| 25 | No modem or fax is answering at the number called |
| 27 | Dialing automation |
| 30 | ATH (online) |
| 31 | ATZ (online) |
| 32 | AT&T0 (in analog loopback) |
| 33 | Termination via keystroke |
| 34 | Termination via DTR |

| Dec | Meaning |
|-----|--|
| . | |
| 41 | Termination through change in signal level |
| 42 | Termination through synchronization loss |
| 43 | Termination through 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. | Meaning |
|------|------|--|
| 0..4 | 1 | 1 = DCE line transmit bit rate 75 bps (V.23) |
| | 2 | 2 = DCE line transmit bit rate 1200 bps (V.23) |
| | 3 | 3 = DCE line transmit bit rate 300 bps |
| | 4 | 4 = reserved |
| | 5 | 5 = DCE line transmit bit rate 1200 bps |
| | 6 | 6 = DCE line transmit bit rate 2400 bps |
| | 7 | 7 = DCE line transmit bit rate 4800 bps |
| | 8 | 8 = DCE line transmit bit rate 7200 bps |
| | 9 | 9 = DCE line transmit bit rate 9600 bps |
| | 10 | 10 = DCE line transmit bit rate 12,000 bps |
| | 11 | 11 = DCE line transmit bit rate 14,400 bps |
| | 12 | 12 = DCE line transmit bit rate 16,800 bps |
| | 13 | 13 = DCE line transmit bit rate 19,200 bps |
| | 14 | 14 = DCE line transmit bit rate 21,600 bps |
| | 15 | 15 = DCE line transmit bit rate 24,000 bps |
| | 16 | 16 = DCE line transmit bit rate 26,400 bps |
| | 17 | 17 = DCE line transmit bit rate 28,800 bps |
| | 18 | 18 = DCE line transmit bit rate 31,200 bps |
| | 19 | 19 = DCE line transmit bit rate 33,600 bps |
| 5 | 0 | reserved |
| 6 | 0 | 0 = no fax connection |
| | 64 | 1 = fax connection established |
| 7 | 0 | 0 = ITU-T |
| | 128 | 1 = Bell (not available in the UK) |

S88 Bit-mapped options

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

| Bit | Dec. | Meaning |
|-----|------|--------------------------------|
| 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 | none |

S89 Bit-mapped options

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

| Bit | Dec. | Meaning |
|------|------|--|
| 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 = reserved |
| | 5 | 5 = DCE line receive 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 |
| | 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 |
| | 19 | 19 = DCE line receive bit rate 33,600 bps |
| 5..7 | 0 | 0 = modulation type V.23 |
| | 32 | 1 = modulation type V.21 |
| | 64 | 2 = modulation type V.22bis |
| | 96 | 3 = modulation type V.32 |
| | 128 | 4 = modulation type V.32 bis |
| | 160 | 5 = modulation type V.Fast Class |
| | 192 | 6 = modulation type V.34, symmetric bit rates |
| | 224 | 7 = modulation type V.34, asymmetric bit rates |

S93 DTE rate

The contents of register S93 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The possible values have the following meaning:

| Bit | Dec. | Meaning |
|-----|------|---------|
|-----|------|---------|

| | | |
|------|----|----------------------|
| 0..4 | 0 | DTE rate 300 bps |
| | 1 | DTE rate 300 bps |
| | 2 | DTE rate 300 bps |
| | 3 | DTE rate 300 bps |
| | 4 | DTE rate 600 bps |
| | 5 | DTE rate 1200 bps |
| | 6 | DTE rate 2400 bps |
| | 7 | DTE rate 4800 bps |
| | 8 | DTE rate 7200 bps |
| | 9 | DTE rate 9600 bps |
| | 10 | DTE rate 12,000 bps |
| | 11 | DTE rate 14,400 bps |
| | 12 | DTE rate 19,200 bps |
| | 13 | DTE rate 38,400 bps |
| | 14 | DTE rate 57,600 bps |
| | 15 | reserved |
| | 16 | DTE rate 115,200 bps |
| 5..7 | | reserved |

◇ **NOTE** ◇ The value of S93 is overwritten after every AT command.

S95 Bit-mapped options

The contents of register S95 can be stored in the non-volatile memory using the **AT&W** or **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning | |
|------|------|--|-------|
| 0..3 | 0 | 0 = no modified CONNECT messages | ATV0 |
| | 1 | 1 = indication of error-corrected connections | ATV1 |
| | 2 | 2 = differentiation MNP - V.42 | ATV2 |
| | 8 | 8 = differentiation MNP - V.42 - V.42bis | ATV8 |
| 4 | 0 | 0 = CONNECT messages dependent on ATV | AT-M0 |
| | 16 | 1 = CONNECT messages independent of ATV | AT-M1 |
| 5 | 0 | 0 = CONNECT message after invalid Escape sequence | AT*Q0 |
| | 32 | 1 = no CONNECT message after invalid Escape sequence | AT*Q1 |
| 6..7 | 0 | 0 = modem result codes enabled | ATQ0 |
| | 64 | 1 = modem result codes disabled | ATQ1 |
| | 128 | 2 = modem result codes disabled in answer mode | ATQ2 |

S96 Bit-mapped options

The contents of register S96 can be stored in the non-volatile memory using the **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning |
|-----|------|---------|
|-----|------|---------|

| | | |
|------|--------------------|--|
| 0..1 | 0 1 2 | 0 = decimal display of S register values 1 = hexadecimal display of S register values 2 = binary display of S register values |
| 2 | 0 4 | 0 = message 'Press any key to continue' enabled 1 = message 'Press any key to continue' disabled |
| 3 | 0 8 | 0 = Verbose modem configuration in German 8 = Verbose modem configuration in English |
| 4 | 0 | reserved |
| 5 | 0 64 | 0 = Display send bit rate 1 = Display send and receive bit rate |
| 6 | 0 64 | 0 = Identification of MNP, V.42 and V.42bis connections with ATV8 1 = Extended CONNECT messages with ATV8 |
| 7 | 0 | reserved |

S99 Delay between rings

| | | |
|--------------------------------|---|------------------------|
| Valid values | : | 10..255 (1/10 seconds) |
| Default value | : | 50 (5 seconds) |
| Storage 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 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-mapped fax options

Register S130 controls settings for fax operation. The contents of register S130 can be stored in the non-volatile memory using the **AT*W** command. The individual bits have the following meaning:

| Bit | Dec. | Meaning |
|------|-----------------|---|
| 0..1 | 0 | reserved |
| 2 | 0 4 | 0 = reversed bit order for T.4 data (Class 2 '89, receive) 1 = normal bit order for T.4 data (Class 2 '89, receive) |
| 3 | 0 8 | 0 = operation with conventional fax software 1 = Special settings for fax operation with ELSA Transfax |
| 3 | 0 | reserved |
| 4 | 0 16 | 0 = fillbits are removed from T.4 data 1 = fillbits are not removed from T.4 data |
| 5 | 0 | reserved |
| 6 | 0 64 | 0 = CTS and XON/XOFF handshake if no AT\Q command (Class 1/Class 2 only) 1 = CTS and XON/XOFF handshake after AT\Q command (Class 1/Class 2 only) |
| 7 | 0 128 | 0 = fax operation according to V.33, V.17, V.29 and V.27ter possible 1 = fax operation according to V.33, V.29 and V27ter possible |

5.8 Using the Speakerphone

The Speakerphone is a hands-free feature which can be used with either a headset or a separate microphone/earphone or a microphone with corresponding active speakers. Using the Speakerphone is ideal for telephone conferences or it can also be used for room monitoring e.g. as a baby monitor. The modem filters out all echoes and feedback.

#VLS Turning the Speakerphone on- and off

- * **AT#VLS=0** : Speakerphone off
- AT#VLS=6** : Speakerphone on

This command is used to activate or deactivate the Speakerphone.

To create a Speakerphone connection, enter the command **AT#CLS=8** or **AT+FCLASS=8** and **AT#VLS=6**. Then choose the telephone number for your call using the **ATD** command (see page 32).

◇ **ATTENTION** ◇ All other values which can be entered for the **AT#VLS** command are designed for use with voice applications.

#SPK Turning the Microphone On and Off and Adjusting Volume

AT#SPK=i,m,n

The **AT#SPK** command can be used to turn the microphone on and off, as well as adjust the volume and the microphone sensitivity for a Speakerphone connection.

The following parameters can be used, always separated by a comma (for example **AT#SPK=2,10,2**). The individual entries can be overwritten by the entries for each parameter:

- i** This parameter turns the microphone on and off. The default value is the microphone activated (**default value = 1**). Entering a value of **0** deactivates the microphone. The value **2** activates room monitoring. This turns the speaker off and sets the microphone sensitivity to maximum. In this mode, the *MicroLink 33.6TS* can be used as a baby monitor.
- m** This parameter can be used to adjust the speaker volume within the value range of **0..16** (**default value = 5**) The value 0 is loud and 16 is soft.
- n** This parameter can be used to adjust the microphone sensitivity within the value range of **0..3** (**default value = 1**).
- ◇ **ATTENTION** ◇ The commands **AT#SPK?** and **AT#SPK=?** allow for querying the current values or value ranges. The **#SPK** command is only valid for Speakerphone connections. **AT#CLS=8** or **AT+FCLASS=8** and **AT#VLS=6** must also be used.

5.8.1 Room Monitoring

If you wish to configure the modem for room monitoring, enter the commands **AT#CLS=8**, **AT#VLS=6** and **AT#SPK=2**. If the modem is called, it picks up on the first ring and changes the microphone to the telephone line. In this way, you can remotely verify the sounds in a room. This means the modem could be used, for example, as a baby monitor.

By pressing the "2" button on a touch-tone telephone (**DTMF tone 2**) the speaker can also be turned on and the monitored room can be spoken to. The "1" (**DTMF tone 1**) button turns the speaker off again. As soon as the receiver is hung up, the modem hears a busy signal and hangs up. In addition, the connection is ended after one minute unless the time is extended one minute by pressing "1" or "2". Every other DTMF tone hangs up the modem. Pressing "0" turns off the room monitoring mode.

Entering the command sequence **ATZ**, **ATS229=64** and **AT*W** turns the modem back to room monitoring the next time it is turned on. This allows it to be used without being connected to a computer. Entering the **ATZ**, **ATS229=0** and **AT*W** commands returns the modem to normal mode.

| DTMF Tone | Room Monitoring Mode |
|------------|--|
| 0 | Modem hangs up and room monitoring is turned off |
| 1 | Microphone is turned on and speaker turned off; room monitoring extended one minute. |
| 2 | Microphone and speaker are turned on; room monitoring extended one minute. |
| 3..9, #, * | Modem hangs up immediately. Room monitoring mode remains active. |

5.9 The *MicroLink 33.6TS* Voice Function

MicroLink 33.6TS is equipped with a voice function. Together with the included voice software, the modem can also be used as an answering machine.

A more detailed description of the voice commands can be found on the CD included with the modem, on the ELSA web site <http://www.elsa.de> or in the Support Mailbox *ELSA ONLINE*.

◇ **ATTENTION** ◇ During local playback of messages where a telephone is connected, the modem switches to the exchange, so that an caller receives a busy signal.

If you play old voice files on your *MicroLink 33.6TS* and they sound "scratchy" and distorted, it may be that these voice files were recorded using an old procedure. This older procedure differs from the new one in its byte sequence. You can configure both procedures using register S229.

S229 Byte Sequence for Recorded Voice Use Data

| | | |
|-----------------------------|---|-------------------|
| Valid values | : | 0..1, 64 decimal |
| Default value | : | 0 (new procedure) |
| Save to non-volatile memory | : | AT*W |

Register S229 can be used to set the byte sequence for saving recorded files for voice use. By default, the new procedure is preset (default value = 0). Entering **ATS229=1** returns to the older procedure. Entering **ATS229=64** switches the modem to room monitoring. This setting can be saved using **AT*W** or can be recorded in the initialization for your program.

The values in register S229 are not reset using the **AT&F** command.

Appendix

A Result Codes

Command affecting
acknowledgments

The default setting Q0 confirms the modem input and sends messages (such as for an incoming call or a connection).

With **ATV1** (default setting, see page 53) the modem sends the result codes in verbose form (followed by <CR> <LF>). If configured to **ATV0**, the modem sends the result codes in short form as a number (followed by <CR>).

| V1 | V0 | Meaning |
|-------------|----|--|
| OK | 0 | Command line executed |
| RING | 2 | Incoming call |
| NO CARRIER | 3 | No connection reached or carrier lost for longer than 10 seconds |
| ERROR | 4 | Error in entered command |
| NO DIALTONE | 6 | No dial tone detected |
| DIAL LOCKED | 6 | Dial function locked (not in all countries) |
| BUSY | 7 | Telephone line busy |
| NO ANSWER | 10 | After dialing the special character @, no pause recognized |
| DELAYED | | Delayed dialing when an alternative lock-out is used |

CONNECT messages

The CONNECT messages, i.e. the result codes indicating a successful connection, are influenced by the **AT-M**, **ATV** and **ATX** commands (see pages 42, 54 and 55). An overview of the Connect-messages can be found in

the Online Documentation on the CD shipped with this product.

B Fax Operation

In addition to the modem operating modes, the *MicroLink 33.6TS* supports sending and receiving faxes at 14.400..2400 bps. As a result of the fax command set Class1 and Class 2, it is possible to use any standard fax software (e.g. Delrina WINFAX), E-mail function of Windows 95, or Windows for Workgroups.

Fax Command Sets

Class 2/Class 2.0 The compliance with the fax command set TR-29.2 Class 2 (SP-2388) and TR-29.2 Class 2.0 (TIA/EIA-592) also allows any standard fax software to be used (e.g. WinFax or Bitfax).

Class 1 The support of the fax command set Class 1 (TIA/EIA-578) allows you to use your ELSA-*MicroLink*[®]-modem for the E-mail function of Windows for Workgroups and the file transfer function of WinFax PRO 4.0.

◇ **NOTE** ◇ 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.

Data Flow Control in Fax Operation

By default the modem *MicroLink 33.6TS* is capable of using both hardware and software handshake simultaneously in fax Class 1 and Class 2, as long as the **ATIQ** command is not used. As soon as a certain handshake method is selected with **ATIQ**, only the selected method is used. The possibility to use both handshake methods simultaneously is controlled by bit 6 of register S130 (see page 76).

Adaptive Answer Function

ELSA *MicroLink*[®] modems are capable of automatically detecting whether an incoming call is a fax call or a data call. This "Adaptive Answer Function" requires a special initialization which is usually taken care of by the communications software. A more detailed description of the initialization for the Adaptive Answer Function can be found in the online documentation on the included CD.

C Error Correction

AT%C

AT-J

AT+N

The two following tables provide an overview of the interdependencies between the **AT%C**, **AT-J** and **AT+N** commands which you use to configure your modem to error correction and data compression methods.

Example:

The default configuration for the modem is **AT%C3**, **AT -J1** and **AT \N3**. In the upper table this configuration is described as case **4**. Column **4** of the lower table shows the error correction and data compression methods possible for this setting (connection with V.42bis, V.42, MNP5, 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.

| | \N0 | \N1 | \N2 | \N3 | | \N4 | \N5 | \N6 |
|-----|-----|-----|-----|-----|----------|-----|-----|-----|
| | | | | -J0 | -J1 | | | |
| %C0 | 0 | 0 | 2 | 16 | 9 | 14 | 10 | 5 |
| %C1 | 0 | 0 | 3 | 1 | 15 | 14 | 10 | 11 |
| %C2 | 0 | 0 | 2 | 16 | 7 | 13 | 8 | 12 |
| %C3 | 0 | 0 | 3 | 1 | 4 | 13 | 8 | 6 |

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|----------|----|---|---|---|----------|---|---|---|---|---|----|----|----|----|----|----|----|
| V.42bis | | | | | | | | | | | | | | | | | |
| V.42 | | | | | | | | | | | | | | ■ | ■ | | |
| MNP 5 | | | | | | | | | | | | | | | | | |
| MNP4 | | | ■ | ■ | | ■ | ■ | | | | | ■ | ■ | | | | |
| physical | *) | ■ | | | ■ | | | ■ | ■ | ■ | ■ | | | | | ■ | ■ |

*) Physical connection (AT+N0 in normal mode **or** AT+N1 in direct mode)

D Technical Specifications

| | | |
|--------------------------|---|---|
| Power supply | Europe: | AC adapter, 230V _{AC} / 9V _{AC} , 800 mA |
| | USA: | UL listed AC adapter, 120V _{AC} / 9V _{AC} , 1.5 A |
| Operating current | <i>MicroLink 33.6TS</i> | |
| | Online state | 700 mA approx. |
| | (connection):approx. | 350 mA approx. |
| | Command state (stand-by):approx. | |
| Power input | Online state (connection): | 9.2 VA approx. |
| | Command state (stand-by): | 6.0 VA approx. |
| Environment | Temperature: | 5..40°C (41..104°F) |
| | Relative humidity: | 0..80%, non-condensing |
| CE approval | according to EN 50082/part1, EN 55022, EN 60950 | |
| Design | Desktop model with metal housing | |
| Dimensions | 108 x 38 x 140 mm (W x H x D) | |

International Connector Types

Connector for Belgium



Connector for the UK



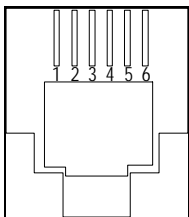
Connector for the Netherlands



Connector for the USA and Spain



RJ11 socket pin assignment



| Line | Telephone socket |
|----------------|------------------|
| - | 1 |
| b ₂ | 2 |
| b | 3 |
| a | 4 |
| a ₂ | 5 |
| - | 6 |

E The RS-232C Interface

Types of interface lines The serial interface between modem and computer consists of various data lines, control lines and signal lines. The status of the majority of these interface lines is indicated by LEDs on the front panel of the housing.

The pin configuration of the RS-232C interface for 9-pin or 25-pin connectors is as follows:

| 9-pin | 25-pin | US name | ITU-T name | DIN name | Description | Signal direction |
|-------|--------|---------|------------|----------|---------------------|------------------|
| U* | 1 | GND | 101 | E1 | Protective Ground | - |
| 5 | 7 | GND | 102 | E2 | Signal Ground | - |
| 3 | 2 | TxD | 103 | D1 | Transmit Data | terminal → modem |
| 2 | 3 | RxD | 104 | D2 | Receive Data | terminal ← modem |
| 6 | 6 | DSR | 107 | M1 | Data Set Ready | terminal ← modem |
| 8 | 5 | CTS | 106 | M2 | Clear to Send | terminal ← modem |
| 9 | 22 | RI | 125 | M3 | Ring Indicator | terminal ← modem |
| 1 | 8 | DCD | 109 | M5 | Data Carrier Detect | terminal ← modem |
| 4 | 20 | DTR | 108 | S1 | Data Terminal Ready | terminal → modem |
| 7 | 4 | RTS | 105 | S2 | Request to Send | terminal → modem |

* U = housing/shield

The interface lines have the following meaning:

Computer/terminal
ready for operation

DTR = *Data Terminal Ready*

The effect of this control line on the modem is determined by the **AT&D** command (see page 34).

Request data from
the modem

RTS = *Request To Send*

The effect of this control line on the modem is determined by the **ATIQ** command (see page 46).

Modem ready for
operation

DSR = *Data Set Ready*

This signal line is usually always active (ON), but is influenced by the commands **ATID** (see page 35) and **AT&S** (see page 48).

Modem ready to send

CTS = *Clear To Send*

This output is usually always active (ON), but is influenced by the commands **ATID** (see page 35) and **ATIQ** (see page 46).

Incoming call

RI = *Ring Indicator*

This modem output is active (ON) when the modem detects an incoming call.

Connection

DCD = *Data Carrier Detect*

This modem output is usually active (ON) when the modem detects a carrier signal during an existing connection. It is influenced by the **AT&C** command (see page 32).

F Answers to Frequently Asked Questions

General Modem Operation

How can I give AT commands to my modem?

To communicate with a modem via your PC, you need a communications software, also called "terminal program". All ELSA *MicroLink*® modems are shipped with the communications program **Telix**. After starting Telix, you can enter AT commands in the terminal screen. Telix sends these commands to your modem via the serial interface of your PC. See the Telix documentation for detailed information on how to use Telix.

What is the best initialization string for using my modem to call a BBS?

All ELSA modems are already preconfigured for standard BBS, Online Services and Internet Provider operation. If you have changed the configuration and come across problems with a BBS, you can restore the factory default settings with the **AT&F** command and save the configuration with **AT*W**.

My modem does not recognize any AT command - is it improperly configured or defective?

If entered AT commands are not displayed on the screen and not executed by the modem, this can have several possible reasons. Please check the following settings:

- Is your communications program set to the correct serial interface (COM port), i.e. the one your modem is connected to?
- Is the DTE rate (serial port bit rate) of your communications program set to a value within the speed range recognized by your modem? *MicroLink 33.6TS* recognizes DTE rates up to 115,200 bps.
- If your modem configuration has been changed, try to reset the modem to the factory default configuration with the **AT&F** command (even if this command does not appear on the screen). In the default state, you should be able to enter an **AT** which is answered with **OK** by the modem.

How can I disable the online data compression to transfer files which have already been compressed (e.g. ZIP or ARC files)?

The data compression is controlled by the **AT%C** command. The default setting **AT%C3** selects V.42bis data compression. Since it makes no sense to compress already compressed files again during the transfer, the V.42bis compression protocol is able to recognize compressed files and to disable the compression during the file transfer. It is thus not necessary to disable the data compression manually.

I get a NO DIALTONE message from the modem after each dialing attempt and cannot establish a connection. What can be the reason?

You are probably dialing from an extension of a private telephone exchange (PABX). Most private telephone systems require an escape digit (e.g. 0) to be dialed to get the dial tone of the main (external) line. If the digit is 0, use the dial command **ATDT0W**<number> (tone dialing) or **ATDP0W**<number> (pulse dialing). The dialing parameter **W** causes the modem to wait for the continuous dial tone before dialing the <number>.

If you are calling another extension within the telephone system, no dial tone is present. In this case, use the dial command **ATX3DT**<number> or **ATX3DP**<number>, respectively. The **X3** parameter tells the modem not to wait for a dial tone. You can make this setting permanent with the **ATX3*W** command.

I am dialing from an extension of a telephone system, and though the line is not busy, I always get a BUSY message from the modem. What is the reason?

In some cases the modem may regard the internal dial tone of a private telephone exchange as a busy tone. Disable the busy tone detection with the **ATX0** command (in the Netherlands: **ATX2**), and save this setting with **AT*W**. If you dial a busy line with this setting, you will get a NO CARRIER message.

I frequently get CRC errors when uploading or downloading files to/from a BBS; sometimes even the connection is lost. What can be the reason?

CRC errors can have different reasons. One possible reason is an improper or missing handshake method. To take advantage of data compression protocols, the DTE rate (i.e. the serial port rate defined in the communications software) should normally be set higher than the telephone side (DCE) rate (e.g. 115.200 bps *MicroLink 33.6TS* instead of 38.400 bps). However, this absolutely requires a handshake method for data flow control, either hardware handshake (RTS/CTS) or software handshake (XON/XOFF).

The same handshake method must be set in both the modem and the communications software. If this is not the case, CRC errors are likely to occur in data transfers. If you are using RTS/CTS handshake, the reason may also be the interface cable: If you are using an RS-232 adapter from 25-pin to 9-pin (also called "mouse adapter"), it is possible that the RTS and CTS lines (pins 4 and 5) are not connected. Please make sure that you use an RS-232 adapter with all lines connected.

Another possible error source is the serial interface of your computer. At bit rates of 19,200 bps and higher under DOS, and generally under Windows or OS/2, a UART chip of type 16550 should be used. This UART is equipped with a 16-byte FIFO buffer, allowing considerably higher transfer rates. UARTs of the types 8250 and 16450 are reliable up to 9600 bps only. At rates of 19,200 bps and higher, these UARTs may lose characters and will thus cause CRC errors.

Why do I get CRC errors while downloading with ZMODEM and 115,200 even though my COM port is equipped with a UART 16550 with FIFO? The throughput rate for 28,800 bps CONNECTs is just 2000 cps.

The poor throughput rate is caused by constant CRC errors. Check that your computer BIOS settings for the entry IDE HDD BLOCK MODE are set to DISABLED.

WinFax

What should be considered when using the Delrina WinFax software?

The WinFax PRO 4.0 package includes the test software DELTEST which classifies ELSA modems as Class 1 modems. As ELSA *MicroLink* modems also support Class 2 fax commands, we recommend that you configure your modem as a Class 2 modem. Fax transmissions with this command set are far more reliable than with Class 1. In most cases, the selection of the "Generic Class 2 Modem" and the initialization string **AT&F&C1&D2S7=55** should enable immediate and problem-free operation. If problems arise, you can add the following command for the handshake setting to the initialization string: AT&C1&D2\Q4.

WinFax Pro 7.0 recognizes the modem as a "Generic Class 2 Modem." The preset initialization string must not be modified under any circumstance. In addition, "Use Hardware Logging" under "Logging" must be activated using "Setup/Modem/Properties/Fax."

OS/2

When using Telix for DOS or the communications program ZOC in a DOS box under OS/2, I frequently get CRC errors. When I run Telix directly under DOS, no errors occur. I am using a 16550 UART, so the UART type cannot be the reason.

The standard communications drivers shipped with OS/2 may cause problems when transferring data across the serial interface of your PC at high rates. In this case, the optimized communications drivers SIO.SYS and VSIO.SYS programmed by Ray Gwinn will help. They must be entered as devices in the CONFIG.SYS file instead of the standard OS/2 drivers COM.SYS and VCOM.SYS.

You can download these shareware drivers from our Online-media. The compressed file contains detailed installation instructions.

Telix

How can I set the bit rate in Telix to 33.6.. bps for *MicroLink 33.6TS* ? I only find settings for 9600, 19,200 and 38,400 bps.

The bit rate you set in Telix is the DTE rate, i.e. the speed of your serial interface. This rate cannot be set to 33.600 bps. However, it is possible and recommended to set the DTE rate to a higher value than the 33.600 bps which is supported by *MicroLink 33.6TS* on the telephone side (DCE rate). On the serial interface, *MicroLink 33.6TS* can transfer data at up to 115,200 bps. On the telephone side, the modem then attempts to use the next lowest possible speed (i.e. 33.600 bps). If V.42bis data compression is enabled, which can compress data down to about 25% of the original size, it is possible to achieve effective transfer rates up to four times higher than the DCE rate, if the DTE rate is set to 115,200 bps. Therefore, it is recommended to set the DTE rate to 115,200 bps for *MicroLink 33.6TS*.

G Product Support

You need help?

If you encounter any problems during the installation or operation of your modem, please consult this manual first.

If you have further questions, you can contact our Support team. In this case, please always provide the following information:

- Precise model name and firmware version of the modem (the firmware version can be displayed with the **ATI3** command, see page 39)
- Configuration of the modem (the parameter settings can be displayed with the **ATI4** command, see page 39)
- Your computer configuration
- Name and version of your communications program

◇ IMPORTANT ◇

- A detailed error description. To be certain, try to reproduce the error at least three times and exactly describe the steps you took to deliberately trigger the error.
- Use the supplied diagnostic software MODEMTST.EXE to test your *MicroLink* modem. The latest version of MODEMTST is always available in the *ELSA ONLINE* Support BBS for download.

Who to contact?

First you should contact the dealer or firm where you bought your modem. If there are still questions remaining, contact one of the following:

- The **ELSA ONLINE** Support BBS in Germany:
Phone +49-241-606-9800
33,600..300 bps
8 data bits, no parity, 1 stop bit
MNP4, MNP5, V.42 and V.42bis
- The **ELSA forum in CompuServe**:
GO ELSA
- Or write to:
ELSA GmbH
Data Communications Support
Sonnenweg 11
52070 Aachen
Germany
Fax +49-241-606-6499
- In very urgent cases, call the **ELSA Hotline** in Germany:
Phone +49-241-606-6143
Monday to Thursday from 9 am to 4:30 pm (CET)
Friday from 9 am to 12 pm (CET)

- In the USA, you may also contact the ELSA subsidiary:
ELSA Inc.
2150 Trade Zone Blvd., Suite 101
San Jose, CA 95131
USA
Phone +1-408-935-0350
 +1-800-272-ELSA
Fax +1-408-935-0370
BBS +1-408-935-0380
Internet <http://www.elsa.com>

Configuration problems?

In the *ELSA ONLINE* Support BBS and in ELSA's CompuServe forum you will find information about the configuration of many applications for the use with ELSA *MicroLink*® modems.

Support BBS

The *ELSA ONLINE* Support BBS has been established as a service for customers and other persons interested in ELSA products (modems, ISDN products and graphics boards).

The Support BBS is divided into product-specific forums, which are structured similar to file directories. In these forums, you can exchange experiences with other users and ask questions to the ELSA Support team. Furthermore, the Support BBS always holds the latest product information, examples and software tools.

◇ **ATTENTION** ◇

Please pay attention to the forum structure of *ELSA ONLINE*. If you have a question, please always choose the appropriate forum, for example the MODEMS forum if you have questions about your modem. This facilitates our support work and guarantees that your question is answered as soon as possible.

After connecting to the ELSA Support BBS, you will see the following opening screen:

Login screen of
ELSA ONLINE

```

Connected to ELSA ONLINE (Port 21)
via MicroLink Modem at 33600 bps, protocol: V.42bis
////////////////////////////////////
                ELSA ONLINE Support-Mailbox
                ELSA GmbH, Aachen

Modem: +49/0-241-6069800      (33600.. 300 bps)
ISDN  : +49/0-241-6069820      (64000.. 1200 bps)

                Durchgehend geoeffnet

////////////////////////////////////
Vor- und Nachname:

```

Enter your first and last name at the prompt "Vor- und Nachname". If you are a new user, you can now select the language for the BBS menus and texts.

◇ NOTE ◇

If you feel lost the first time you visit our BBS, don't be discouraged! There is no way to damage your or our computer system by making wrong entries. The BBS software is designed to give you any possible help to find your way. Most problems will disappear if you read the login bulletin and other provided help and information texts carefully.

Registration

To make sure you have access to the BBS when you need it, you should register as soon as possible. To register, you can call the ELSA Support BBS at any time, 24 hours a day.

When logging in for the first time, you will give yourself a password (4 to 10 characters). You are then an **unregistered user** with very limited rights. You cannot access the product forums before your registration.

The registration is performed via the menu item "REGISTER" and is at no additional cost for you (except for the costs for the call). To register, you must tell the system your address, phone number and, if available, your fax number. Your registration will be worked on within a few working days. After that, you are a registered user, entitled to access the product information forums and ask questions to our Support team.

◇ NOTE ◇

When trying to access a software Support forum (such as TELIX or TELIXWIN) for the first time, you will be asked for the serial number of your software. You will find the Telix serial number on the original Telix disk label. After entering a valid serial number, you are entitled to access the forum and write E-mails to our Support team.

CompuServe

You can reach our ELSA Support forum in CompuServe via *GO ELSA*. In this forum, we offer you the same support and service as in the *ELSA ONLINE* Support BBS.

◇ **ATTENTION** ◇

Please pay attention to the structure of the mail and file areas in the ELSA forum. Please always choose the appropriate mail area for your questions, for example "ELSA modems" for questions about your modem. This facilitates our support work and guarantees that your question is answered as soon as possible.

If you have questions about CompuServe, CIM (CompuServe Information Manager) or the CompuServe registration, please contact the toll-free CompuServe support directly.

Repair?

If you are not sure whether your modem is defective or maybe only the configuration is wrong, please call the ELSA Hotline, before you send us the modem for repair.

If you want to send in the modem for repair, please use suitable packing material and the original box to prevent damage to the modem during transport. Please include a copy of the original purchase receipt as well.

You can help us doing the repair as fast as possible by including a detailed error description with the device, in order to help us tracking down the error source. Please send your ELSA product directly to our Service department.

H Warranty Conditions

This warranty is given to purchasers of ELSA products in addition to the warranty conditions provided by law and in accordance with the following conditions:

1. Warranty coverage

- a) The warranty covers the equipment delivered and all its parts. Parts will be replaced free of charge if, despite proven proper handling and adherence to the operating instructions, these parts became defective due to fabrication and material defects. Operating manuals and possibly supplied software are excluded from the warranty.
- b) Material and service charges shall be covered by us, but not shipping and handling costs involved in transport to the service station.
- c) Replaced parts become property of ELSA.
- d) ELSA are authorized to carry out technical changes (e.g. firmware updates) beyond repair and replacement of defective parts in order to bring the equipment up to the current technical state. This does not result in any additional charge for the customer. A legal claim to this service does not exist.

2. Warranty period

The warranty period is 36 months for color monitors, data communications and computer graphics products. It begins at the day of delivery from the authorized ELSA dealer. Warranty services do not result in an extension of the warranty period nor do they initiate a new warranty period. The warranty period for installed replacement parts ends with the warranty period of the device as a whole.

3. Warranty procedure

- a) If defects appear during the warranty period, the warranty claims must be made immediately, at the latest within a period of 7 days.
- b) In the case of any externally visible damage arising from transport (e.g. damage to the housing), the transport company representative and ELSA should be informed immediately. On discovery of damage which is not externally visible, the transport company and ELSA are to be immediately informed in writing, at the latest within 7 days of delivery.
- c) Only authorized ELSA dealers may accept warranty claims. ELSA will supply the purchaser with a list of names and addresses of authorized dealers on request.
- d) Transport to and from the location where the warranty claim is accepted and/or the repaired device is exchanged, is at the purchaser's own risk and cost.
- e) Warranty claims are only valid if a copy of the original purchase receipt is returned with the device.

4. Suspension of the warranty

All warranty claims will be deemed invalid

- a) if the device is damaged or destroyed as a result of acts of nature or by environmental influences (moisture, electric shock, dust etc.);
- b) if the device was stored or operated under conditions not in compliance with the technical specifications;
- c) if the damage occurred due to incorrect handling, especially to non-observance of the system description and the operating instructions;
- d) if the device was opened, repaired or modified by persons not authorized by ELSA;
- e) if the device shows any kind of mechanical damage;
- f) if, in the case of an ELSA Monitor, damage to the cathode ray tube (CRT) has been caused by mechanical load (e.g. from shock to the pitch mask assembly or damage to the glass tube), by strong magnetic fields near the CRT (colored dots on the screen), or through the permanent display of an unchanging image (phosphor burnt).
- g) if the warranty claim has not been reported in accordance with 3a).

5. Operating mistakes

If it becomes apparent that the reported malfunction of the device has been caused by unsuitable software, hardware, installation or operation, ELSA reserves the right to charge the purchaser for the resulting testing costs.

6. Additional regulations

- a) The above conditions define the complete scope of ELSA's legal liability. The warranty gives no entitlement to additional claims, such as any refund in full or in part. Compensation claims, regardless of the legal basis, are excluded. This does not apply if e.g. injury to persons or damage to private property are specifically covered by the product liability law, or in cases of intentional act or culpable negligence. Claims for compensation of lost profits, indirect or consequential detriments, are excluded. ELSA is not liable for retrieval of lost data unless ELSA employees intentionally or by culpable negligence caused its loss and the purchaser has guaranteed that the data can be retrieved with justifiable effort from data material kept in machine legible form.
- b) The warranty is valid only for the first purchaser and is not transferable.
- c) The court of jurisdiction is located in Aachen, Germany in the case that the purchaser is a merchant. If the purchaser does not have a court of jurisdiction in the Federal Republic of Germany or if he moves his domicile out of Germany after conclusion of the contract, ELSA's court of jurisdiction applies. This is also applicable if the purchaser's domicile is not known at the time of institution of proceedings.
- d) The law of the Federal Republic of Germany is applicable. The UN commercial law does not apply to dealings between ELSA and the purchaser.

I Glossary

| | |
|----------------------------------|---|
| Adaptive modem | This designates a →modem which automatically adapts itself to the transmission bit rate of the remote station. ELSA was the first manufacturer to obtain a postal registration for an <i>adaptive modem</i> and is using an optimized method according to ITU-T V.100. Since then every modem delivered by ELSA is adaptive according to V.100. |
| ASCII | The A merican S tandard C ode for I nformation I nterchange is the most commonly used international code to represent a 128 character alphabet. It is also called <i>standard ASCII</i> , unlike <i>extended ASCII</i> , which is an extension of the code by international special characters and graphic symbols to a set of 256 characters (also called <i>IBM character set</i>). Standard ASCII can be coded with a word length of 7 bits ($2^7 = 128$), whereas extended ASCII requires a word length of 8 bits ($2^8 = 256$). |
| Asynchronous transmission | In serial data transmission a method is needed to synchronize transmitter and receiver in order to enable the receiver to detect the beginning and end of a transmitted character. In <i>asynchronous transmission</i> this structuring is achieved by marking each byte to be sent with one start bit and one or two stop bits. Especially in the microcomputer sector, this start/stop method is one of the most commonly used transmission methods, since, unlike synchronous transmission, it is comparatively easy to perform. |
| AT command set | "Intelligent" modems are able to establish connections and accept calls automatically. This requires a set of modem control commands. The extended <i>AT command set</i> (AT = command prefix AT tention) has become a world-wide standard for the syntax of these commands. All ELSA modems are equipped with an automatic dialing device and can accept calls automatically. They use an extended AT command set, depending on the respective modem type. |
| Baud | <i>Baud</i> (abbreviation: Bd) is the unit for the step rate (1 Bd = 1 step per second), i.e. the frequency of status changes on a transmission channel per second. Erroneously, the unit Baud is often confused with the transmission rate measured in →bps. In the case of signals having only two states, the step rate is identical with the transmission rate. Rates over 1200 bps are, however, normally performed by transmission of four, eight or more bits per step, so that in these cases the step rate is lower than the transmission rate. Example: V.32 = step rate 2400 Baud, transmission rate 9600 bps. |
| BBS | Abbreviation of B ulletin B oard S ystem (also called Electronic Mail System). A <i>BBS</i> is an automatic information system with one or more connections to a telephone network or digital networks like the ISDN. The users of a BBS usually have the opportunity to send messages to each other and to use the BBS as a communication forum. In addition, many BBS's are offering libraries containing software and information about various areas. The ELSA ONLINE Support BBS, which can be accessed by modem with the phone number +49- |

241-6069800 (Germany), was set up as a forum for ELSA customers to exchange experiences and to post questions for the ELSA support team. Furthermore, **ELSA ONLINE** constantly offers topical product information, application examples and user software.

CCITT

→ITU-T

Communications software

In order to access a modem from a personal computer, for example to choose transmission parameters or to start a data transfer (→Download, →Upload), a suitable *communications software*, also called *terminal program*, is needed. Such a program emulates an "intelligent terminal" on the PC, i.e. a simple input/output device equipped with additional features for saving received data and transmitting stored data. All ELSA *MicroLink*® modems supporting the →AT command set are shipped with the communications program **Telix**.

Data flow control

Modems featuring *data flow control* are equipped with an internal receiving and sending buffer in order to optimize data flow in error-correcting modems. The most important two control methods, also called *handshake*, are hardware control using the signals RTS and CTS, and software control using the characters XON and XOFF. ELSA modems featuring error correction are capable of both methods for data flow control.

Data format

To allow a data exchange between two stations in an →asynchronous transmission, the parties must agree on the length and structure of the bytes to be transferred. This specification is called *data format*. The most common data formats for asynchronous transmission are: 8N1 (1 start bit, **8** data bits, **no** parity bit and **1** stop bit = 10 bits per byte) and 7E1 (1 start bit, **7** data bits, 1 parity bit (**even** parity) and **1** stop bit = 10 bits per byte).

DCE rate

DCE is the abbreviation of **Data Communications Equipment**, another name for your modem. The DCE rate is the speed your modem uses for communications over the telephone line, given in →bps. It must not be confused with the →DTE rate.

Download

Download denotes a transfer of data, in which a file transmitted by the remote station is received and saved.

DTE rate

DTE is the abbreviation of **Data Terminal Equipment**, meaning the local computer or terminal your modem is connected to. The DTE rate is the speed your DTE (i.e. your communications software) uses to communicate with your modem over the serial interface, given in →bps. It must not be confused with the →DCE rate.

Duplex

In this mode of operation (also called *full duplex*), data can be sent and received simultaneously. In *half-duplex* mode, data transmission is possible in both directions as well. However, the two connected systems cannot send or receive simultaneously, but only alternately in one direction. In *simplex* mode, data can be sent only in one previously determined direction, i.e. a conversational mode is not possible.

| | |
|--------------------------------|--|
| Effective transfer rate | The <i>effective transfer rate</i> must be distinguished from the transmission rate. The transmission rate indicates the number of bits per second physically transmitted over a data line as a theoretical maximum value, whereas the transfer rate is a measure of the average amount of transmitted utilizable data per time. Control data and protocol routines, which are to be sent in addition, can reduce the effective speed of transmission. On the other hand, using data compression methods can result in an increase of the effective transfer rate to a multiple of the transmission bit rate. |
| Firmware | <i>Firmware</i> means the totality of control software integrated with the hardware of a device, which cannot be modified by the user. |
| FullFax | ELSA MicroLink modems equipped with the <i>FullFax</i> feature are capable of sending and receiving documents to and from Class 3 telefax devices. Of course, the other modem functions are fully maintained, so an ELSA FullFax modem can be used as a multifunctional device for both telefax and data communications. |
| Host | <i>Host</i> designates a central computer that carries out certain functions for other units (e.g. terminals), for instance saving of data. |
| ITU-T | The <i>Telecommunications Standardization Sector</i> of the <i>International Telecommunications Union</i> (ITU) is working on the standardization of data and telephone services. The ITU-T standards of the V. series mainly deal with data transmission across telephone networks. The ITU-T is the successor organization of the CCITT (<i>Comité Consultatif International Télégraphique et Téléphonique</i>). |
| Log-in | In a <i>log-in</i> procedure (also called <i>log-on</i> procedure), a system user has to identify by entering a registered user identification and to prove his entitlement of access with a password, before he is allowed to use the services of a →host. |
| MNP | Due to the noise and distortion characteristics of a telephone network, conventional modems cannot guarantee a perfect, error-corrected transmission. The <i>Microcom Networking Protocol</i> (MNP) is an error correction method making 100% error-corrected transmission possible even on distorted telephone lines. This method is used world-wide in millions of modems. It may only be used by manufacturers licensed by Microcom, the developer of MNP. Besides the error correction protocol, MNP class 5 additionally provides a data compression method, thus increasing the effective transfer rate by a factor 1.3 to 2.0. Thus in a physical connection of 14,400 bps an →effective transfer rate of up to 28,800 bps can be achieved. To transmit data that have already been compressed (e.g. *.ZIP, *.ARC), MNP class 4 should be used, for no considerable further compression can be reached by MNP5 with these files, and the compression method might even slow down the transmission. ELSA <i>MicroLink</i> ® modems featuring MNP support both classes of this error correction protocol, as well as the methods according to →V.42, V.42bis. |

| | |
|------------------------------|---|
| Modem | Abbreviation of MOD ulator/ DEM odulator. A modem converts digital signals into "acoustic" signals and vice versa. Modems have gained a great importance for data transfer across public telephone networks, since they allow fast and inexpensive connections of data processing systems over long distances. ELSA has been developing and manufacturing modems since the German Telekom regulations were liberalized in 1987. ELSA developed the first modem with three transmission bit rates (300, 1200 and 2400 bps) that obtained a Telekom approval in Germany, as well as the first registered V.32bis high-speed modem. Today ELSA offers all common transmission rates from 300 to 33,600 bps with →effective transfer rates up to 134,400 bps. |
| Parity bit | The parity bit is a control bit that is sent in addition to a number of data bits in a data transmission. The data bits set to "1" are supplemented by the parity bit to an even or odd bit sum. The parity check is a simple method of error detection. However, this method is not very reliable, as for example double bit errors are not recognized. Therefore in data communications normally "no parity" is selected, which besides results in an increase of the transmission speed, since no additional parity bit has to be sent. |
| Pulse dialing | In this dialing method, which is also called <i>loop disconnect dialing</i> , each dialed digit is coded with a number of pulses. So if you hear a "rattling" sound when dialing, it is <i>pulse dialing</i> . This method requires less technical effort than the more up-to-date →tone dialing, but is also considerably slower. |
| Speakerphone | Term for a loudspeaker system that can be used, for example, for teleconferencing. |
| SysOp | Abbreviation of S ystem O perator, the administrator or operator of a →BBS or data bank. |
| Tone Dialing | In this dialing method, which is also called <i>touch tone dialing</i> or <i>multi-frequency dialing</i> , each digit is coded with a particular pair of frequencies. So if a sequence of different short beeps is audible when dialing, it is <i>tone dialing</i> . Due to its speed, tone dialing is superior to the older →pulse dialing method. |
| Transmission protocol | To transmit data files from one computer to another, a range of <i>transmission protocols</i> exists in order to provide a trouble-free file transfer. Over the years, protocols of different efficiency and convenience have been developed. In principle, they all work as follows: Data are usually transmitted as data blocks and are checked for errors and incompleteness on the receiving side. If an error has been detected, the defective block is requested once more and transmitted again. The →communications software Telix (supplied with every ELSA <i>MicroLink</i> ® modem that uses the AT command set), supports many common transmission protocols, such as →XModem, XModem-1k, Ymodem and →ZModem. |
| UART | A UART (U niversal A synchronous R eceiver/ T ransmitter) is a chip used to convert a parallel data flow to a serial one and vice versa. Personal |

computers normally use these asynchronous interface chips for modem communications.

Upload

Upload denotes a file transfer, in which a data file is sent to another data station (for example a →BBS) and is saved there.

V.Fast Class

V.Fast Class is a modulation method defined by Rockwell, anticipating the ITU-T V.34 standard, with bit rates from 16,800 bps up to 28,800 bps, which operates at variable bit rate and adapts itself to the current line quality in steps of 2400 bps. The modems measure the quality of each connection and thus determine the appropriate transmission behavior.

V. series

The →ITU-T standards of the *V. series* contain standards for data transmission over telephone networks. V.21 describes the protocol for 300 bps →duplex; V.22bis for 1200 bps and 2400 bps duplex; V.23 for 1200 bps half-duplex, 1200/75 bps and 75/1200 bps duplex; V.32 for 4800 bps and 9600 bps duplex; V.32bis for rates up to 14,400 bps duplex; and V.34 for rates up to 33,600 bps duplex. The product line of ELSA *MicroLink*® modems covers all the above transmission protocols.

V.42, V.42bis

The →ITU-T standards V.42 and V.42bis describe an error correction and data compression method, respectively. V.42bis includes a data compression protocol that can increase the →effective transfer rate by a factor up to four. *MicroLink 33.6TS* supports (besides →MNP) both V.42 and V.42bis. Thus effective transfer rates of up to 115,200 bps (or 96,000 bps respectively) can be achieved.

XModem

XModem is a →transmission protocol featuring automatic error detection and error correction. Data are transmitted as data blocks of 128 bytes. If a transmission error has been detected, the defective block is transmitted again. Xmodem is one of the most common protocols and is supported by many standard terminal programs, but has meanwhile been surpassed by more efficient modern protocols like →ZModem.

ZModem

ZModem is a very fast and reliable →transmission protocol. It is one of the few protocols based on the →duplex technology. That means that the receiving of acknowledgments and error reports from the remote station does not interrupt the transmission of further data blocks. The block length is automatically adapted to the error rate. By means of these two measures, ZModem achieves a comparatively high transfer rate. In addition, it provides supplementary features like transmission of several files in batch mode or resumption of disrupted transmissions at a later time. ZModem is especially suitable for transmissions via satellite lines or networks with data packet switching. ZModem is supported by the →communications software **Telix**.

J Index

| | | | |
|---------------------------------|---------------------------------------|--|--------------------------------|
| 16550 UART..... | 107 | Carrier loss..... | 74 |
| Accepting a call..... | 71 | CCITT..... | 118 |
| Access flags..... | 10 | CE approval..... | 11 |
| Access key..... | 61, 62 | Clear down sequence..... | 79 |
| Access rights..... | 39 | COM port..... | 105 |
| Adaptive answer function..... | 97 | Command echo..... | 45 |
| Adaptive modem..... | 114 | Command line buffer..... | 33 |
| Answer mode..... | 75 | Command state..... | 28, 29, 33, 43, 55, 72, 76, 80 |
| Approvals..... | 14 | Communications program..... | 24, 46 |
| ARC files..... | 105 | Communications software..... | 28, 116 |
| ASCII..... | 29, 114 | Compressed files, transferring..... | 105 |
| Asymmetric bit rates..... | 79 | CompuServe..... | 109 |
| Asynchronous transmission..... | 114 | Configuration..... | 37, 50, 60, 65 |
| AT command..... | 9 | Configuration command..... | 80 |
| AT command set..... | 9, 28, 115 | Configuration profile..... | 66, 67, 68, 69, 70 |
| AT commands..... | 36, 105 | CONNECT messages..... | 53, 58, 66, 91, 96 |
| AT prefix..... | 31, 33 | Connection..... | 96 |
| Auto-answer..... | 71 | Connection Factor..... | 17 |
| Automatic callback..... | 10 | Connection termination, reasons..... | 87 |
| Automatic dialing with DTR..... | 43 | Connection, establishing..... | 26 |
| Automatic retrain..... | 46 | CRC errors..... | 106 |
| BABT approval..... | 14 | CTS..... | 44, 84, 85, 103 |
| Backspace character..... | 73 | CTS control..... | 44 |
| Baud..... | 115 | Data bits..... | 31 |
| BBS..... | 115 | Data buffering in the negotiation phase..... | 40, 84 |
| Bell..... | 38, 78, 88 | Data compression..... | 40, 54, 83, 105, 118, 120 |
| Bit rate..... | 9, 31, 38, 39, 48, 51, 53, 77, 88, 90 | Data flow control..... | 44, 58, 69, 106, 116 |
| Bit rate adaptation..... | 9, 37, 52, 78 | Data flow control (fax)..... | 97 |
| Bit rate tolerance..... | 78 | Data format..... | 31, 116 |
| Bit-mapped registers..... | 71 | DCD..... | 41, 44, 76, 85, 104 |
| Blind dialing..... | 68, 73 | DCE rate..... | 31, 38, 48, 88, 116 |
| Break..... | 51, 84 | Default configuration..... | 37, 47, 105 |
| Buffer clearing delay..... | 43, 82 | Delay before forced hang up..... | 43, 82 |
| BUSY message..... | 106 | Detect phase..... | 50, 84 |
| Busy tone..... | 68 | Diagnostic testing..... | 63 |
| Call acceptance..... | 37, 44, 71, 78 | Dial command..... | 27, 41 |
| Call failure reason codes..... | 87 | DIAL LOCKED message..... | 96 |
| Callback..... | 39 | Dial tone..... | 17, 26, 27, 42, 68, 96 |
| callback..... | 57, 80, 81 | Dialing method..... | 42 |
| Callback delay..... | 83 | Dialing speed..... | 74 |
| Callback log..... | 80 | Direct mode..... | 78 |
| callback number..... | 56 | Disconnect inactivity timer..... | 64, 79 |
| Callback, automatic..... | 10 | Download..... | 117 |
| Calling tone..... | 48, 80 | DSR..... | 44, 60, 85, 103 |
| Carriage return character..... | 72 | DSR control..... | 44 |
| Carrier..... | 41, 73, 76, 85, 96 | DTE rate..... | 39, 48, 51, 77, 90, 105, 117 |

| | | | |
|---|-----------------------------|----------------------------------|-----------------------------|
| DTMF signaling | 15, 62 | Interference | 19 |
| DTR | 43, 44, 76, 77, 78, 80, 103 | ITU-T | 38, 78, 88, 118 |
| DTR dialing | 43, 80 | Level | 86 |
| Dumb mode | 49, 75 | Line Feed character | 73 |
| Duplex | 46, 78, 117 | Logging mode | 64 |
| Echo | 45, 75 | Log-in | 118 |
| Effective transfer rate | 117 | Long result codes | 65 |
| EPD | 29 | Loop disconnect signaling | 15, 55 |
| Error correction | 53, 81, 98, 118, 120 | Loopback | 63, 75, 77 |
| ERROR message | 96 | Manual dialing | 44, 80 |
| Error-free connections | 9 | MNP | 42, 50, 53, 66, 89, 91, 118 |
| Escape character | 29, 72 | MNP4 | 9, 118 |
| Escape command | 29, 55, 58, 72 | MNP5 | 9, 40, 83, 118 |
| Escape digit | 26 | Modem | 118 |
| Escape prompt delay | 29, 30, 74 | National Information Sheet | 14 |
| Extended configuration profile | 68 | National regulations | 14 |
| Extension | 26, 27, 106 | negotiation phase | 38, 40, 84 |
| Factory configuration | 47 | NO ANSWER | 96 |
| Factory default configuration | 105 | NO CARRIER message | 96 |
| Fallback character | 83 | NO DIALTONE message | 96, 106 |
| Fallback character in the negotiation phase | 38 | Normal mode | 42, 51, 54 |
| Fax connection | 88, 117 | OK message | 96 |
| Fax Mode | 9 | Online | 28, 29, 30, 55 |
| Fax Operation | 97 | Online state | 28, 29, 55, 58, 72, 80 |
| Fax register settings | 92 | Operating mode | 53 |
| FCC | 19 | Originate mode | 75 |
| Firmware | 47, 50, 66, 117 | OS/2 | 107 |
| Flash button | 42 | PABX | 26, 106 |
| Flash key | 26 | Parameters | 37 |
| Flow control | 58 | Parity | 31, 119 |
| Forced hang up delay | 43, 82 | Password | 83 |
| FullFax | 117 | Password change | 70 |
| Guard tone | 48, 77, 80 | Password protection | 9 |
| Half-duplex | 46, 78, 117 | Pause character | 74 |
| Handshake | 58, 69, 84, 106 | PBX | 26 |
| Handshake method (fax) | 97 | Polling | 75 |
| Hang up after carrier loss | 74 | Private telephone exchange | 26, 106 |
| Hang up delay | 43, 82 | Product information | 49 |
| Hang-up command | 49 | Product Support | 109 |
| Hang-up, reasons | 87 | Pulse dialing | 26, 27, 42, 55, 75, 119 |
| HDTP approval | 17 | Rate renegotiation | 79 |
| Help | 109 | Received signal level | 86 |
| Host | 118 | register | 60 |
| Inactivity timer | 64, 79 | Register contents | 58 |
| Initialization string | 105 | Registers | 30, 59, 71, 91 |
| Installation | 23 | remote configuration | 46 |
| Interface | 58 | Remote configuration | 10, 69 |
| Interface lines | 44, 58, 103 | REN | 15, 20 |

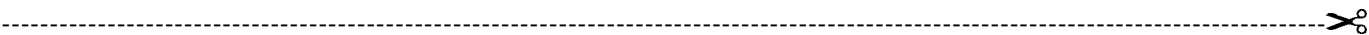
| | | | |
|------------------------------------|-----------------------------|--------------------------------|-----------------------------|
| Repair | 109 | V.100 | 37, 78 |
| Result codes | 57, 75, 91 | V.100 bit rate adaptation..... | 52 |
| Result codes, form..... | 65 | V.17 | 92 |
| Retrain | 46, 78 | V.21 | 38, 120 |
| RI | 104 | V.22bis | 38, 120 |
| Ring counter | 72 | V.23 | 79, 120 |
| RING message..... | 78, 96 | V.25 calling tone | 80 |
| Ring pulse delay | 91 | V.27ter | 92 |
| Ringer Equivalence Number..... | 15, 20 | V.29 | 92 |
| Rings, number to auto answer | 71 | V.32 | 120 |
| RJ11 socket pin assignment | 100 | V.32bis | 120 |
| RS-232C cable | 23 | V.33 | 92 |
| RS-232C interface | 103 | V.34 | 8, 79, 120 |
| RTS | 84, 103 | V.42 | 9, 42, 50, 53, 66, 91, 120 |
| RTS/CTS delay..... | 82 | V.42bis | 9, 40, 66, 83, 91, 105, 120 |
| Safety instructions | 11 | V.8 | 79 |
| Serial interface | 103, 105 | V.8 bit rate adaptation..... | 53 |
| Service | 109 | V.8 calling tone | 80 |
| Short result codes | 65 | V.Fast Class..... | 79, 120 |
| Signal level..... | 86 | V.Fast Class ID | 79 |
| Speaker..... | 52, 76 | V.FastClass..... | 8 |
| Speakerphone operation | 93 | Veiligheid regels..... | 17 |
| Special dialing characters..... | 27, 41, 42 | Verbose result codes | 65 |
| Speed matching..... | 52 | Version | 66 |
| Start bit..... | 31 | Version number | 50 |
| Stop bits | 31 | Voice function | 9 |
| Stored telephone numbers..... | 47 | Volume | 51, 76 |
| Supervisor password..... | 10, 69, 70 | Word length..... | 78 |
| Support | 109 | Xmodem | 121 |
| SysOp..... | 119 | XON/XOFF | 58, 68, 84 |
| T.4 data..... | 92 | ZIP files | 105 |
| TAE6-N plug pin assignment..... | 100 | Zmodem | 121 |
| Telephone number..... | 26, 41 | | |
| Telephone numbers..... | 55, 70 | | |
| Telix | 105, 108, 116, 120, 121 | | |
| Terminal program | 28 | | |
| Testing | 63 | | |
| Tone dialing..... | 26, 27, 42, 62, 74, 75, 119 | | |
| Transfer rate..... | 9, 117 | | |
| Transmission level..... | 86 | | |
| Transmission mode | 28, 38 | | |
| Transmission protocol | 37, 119 | | |
| Transmission rate..... | 117 | | |
| UART..... | 107, 120 | | |
| Upload | 120 | | |
| user password | 56, 59 | | |
| user password | 56, 57, 83 | | |
| V. series..... | 120 | | |

British Telecom Application Form

This page applies only to the BABT approved British versions of the *MicroLink 33.6TS* modem. The modem model described in this manual may not be BABT approved at this time.

If you want to connect your modem to the British Telecom PSTN, you are required to fill in the form found below and send it to your local BT agency in order to have the appropriate connection socket installed. Please don't forget to enter your modem's Approval Number, which is printed on the label placed on the modem housing.

Please refer to section 3.1 of this manual for further information on national regulations for your modem.



To : British Telecom

I am now the owner of an

ELSA *MicroLink*[®] 33.6TS modem

BABT Approval Number (See label on the modem housing)

Please come and fit extension socket(s) for me as soon as possible.

Name:

Address:
.....

Telephone No:

Date:

Signed: