



ELSA MicroLink™ 56k Internet

User Manual

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Preface

Thank you for placing your trust in this ELSA product.

With the *ELSA MicroLink 56k Internet* you have chosen a modem which enables you to make use of the new 56k technology. The *ELSA MicroLink 56k Internet* supports the AT command set in compliance with V.250.

Exact manufacturing standards and stringent quality control are the basis for high product standards and consistent quality to ensure your fullest satisfaction with this modem.

About this manual

This manual will inform you about all aspects of your *ELSA MicroLink 56k Internet*. It also contains an overview of the AT command set.

Online documentation



The modem CD contains extensive electronic documentation in addition to the printed handbooks. This provides information on topics such as the installation of access software, the online services and other support notes. This information has been stored in PDF format. A browser (e.g. Netscape Navigator or Microsoft Internet Explorer) is required for reading and printing HTML files. The ACROBAT Reader program is required to read and print PDF files. It can also be found on the included CD and may be installed using the CD setup program.

To read the online documentation, proceed as follows:

- ① Insert the included ELSA modem CD in your CD drive. The CD setup will start automatically under Windows 95, Windows 98 and Windows NT 4.0. If you are using a different operating system, please start the CD setup program (CDSETUP.EXE) on the CD.
- ② In the CD setup program, select **Installation of:**, mark the option **ONLINE documentation** (requires ACROBAT Reader), and click **Display**.

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Introduction

The *ELSA MicroLink 56k Internet* is a desktop device that is contained by a flat, stable plastic casing. The hardware installation is fast and user-friendly thanks to plug&play support (see Installation Guide).

The included *ELSA-COMMUNICATE! Lite* software suite is a communications program which provides you with the most important data communications applications in a convenient, easy-to-use package.

ELSA-COMMUNICATE! Lite provides the following features in conjunction with your modem:

- telephone answering machine
- fax
- Internet e-mail
- address book (e.g. fax and telephone numbers)
- integrated terminal program

It is possible to upgrade to the full version of *ELSA-COMMUNICATE! PRO*.

Your *ELSA MicroLink 56k Internet's* vocabulary

The following is an outline of the essential technical features of the modem to provide a quick overview of its functionality:

- **Transmission modes** – *ELSA MicroLink 56k Internet* supports the following transmission modes and speeds:
 - V.90: 28,000 to 56,000 bps (receiving bit rate only)
 - K56flex: 28,000 to 56,000 bps (receiving bit rate only)
 - V.34: 2400 to 33,600 bps duplex
 - V.32bis: 4800 to 14,400 bps duplex
 - V.32: 4800 to 9600 bps duplex
 - V.22bis: 1200 to 2400 bps duplex
 - V.23: 1200 bps half-duplex
 - 75/1200 bps duplex
 - 1200 bps half-duplex
 - Bell 212A: 1200 bps duplex
 - V.21: 300 bps duplex
 - Bell 103: 300 bps duplex
- **V.90** – International ITU standard for data communications with 56k modems.

- **Fax operation** – The *ELSA MicroLink 56k Internet* supports fax transmission and reception at speeds of 2400 to 14,400 bps in addition to the modem operating modes. The Class 1, Class 1.0, Class 2 and Class 2.0 fax command sets permit the use of any standard fax software, as well as the Windows 95, Windows 98, Windows NT or Windows for Workgroups e-mail functions.
- **Fax polling** – The modem supports fax polling. The unit can be used for fax polling or the operation of a polling system together with suitable fax software.
- **Answering machine** – With the included voice software, you can use the *ELSA MicroLink 56k Internet* as an answering machine.
- **Access control, callback and remote configuration** – Access control serves to protect your modem from operation or configuration by unauthorized persons. By means of a password, the so-called supervisor password, certain modem functions can be locked. Five access flags can be used to define which modem functions are locked.
 - The callback function automatically returns calls placed to the modem. A total of 19 callback numbers and their associated passwords can be stored.
 - The remote configuration function allows you to configure your modem from any location you are calling from and can be combined with the automatic callback function.
- **Error correction** – The MNP4 and V.42 error correction protocols implemented in the modems allow error-corrected data transmission even with poor quality telephone connections. *ELSA MicroLink 56k Internet* with MNP4 or V.42 can establish reliable, error-free connections to other, similarly equipped modems.
- **Data compression** – *ELSA MicroLink 56k Internet* uses the MNP5 and V.42bis data compression methods. Using MNP5, the transfer rates can be doubled, or even quadrupled in the case of V.42bis.
- **AT command set** – The AT command set in accordance with V.250 is used for communications with the *ELSA MicroLink 56k Internet*.
- **Flash-ROM technology** – Firmware updates can be performed quickly and easily using flash ROM technology. This provides a convenient way to equip your unit with future options.
- **Guaranteed** – two-year warranty on *ELSA MicroLink 56k Internet*
- **Protected** – The *ELSA MicroLink 56k Internet* satisfies the CE requirements.

What do I need for *ELSA-COMMUNICATE! Lite*?

The following minimum requirements must be fulfilled for the use of the modem with *ELSA-COMMUNICATE! Lite*:

- **Computer:** A PC with at least a 486 processor is recommended. Approx. 100 MB free disk space is required for a complete installation. After installation, the *ELSA-COMMUNICATE! Lite* takes up about 25 MB disk space.
- **CD-ROM:** CD-ROM drive
- **RAM:** a minimum of 16 MB
- **Modem:** *ELSA MicroLink 56k Internet*
- **Operating system:** Microsoft Windows 95, Windows 98 or Windows NT
- **Active speakers:** We recommend the use of active speakers in conjunction with a sound card.
- **Headset or Microphone:** a headset or microphone can only be used in conjunction with a sound card.

Package contents

Please ensure that the delivery is complete before beginning with the installation of your modem:

- *ELSA MicroLink 56k Internet*
- Power adapter
- Telephone line connection cable
- Modem connector cable (V.24/RS232 cable)
- CD-ROM with application software
- Documentation: Installation Guide, User Manual (as PDF file)

ELSA reserves the right to change the package contents without prior notice.

CE CE conformity

The CE seal indicates 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 *ELSA MicroLink 56k Internet* has such a CE seal, guaranteeing:

- 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

Control commands

The so-called AT command set established itself as the worldwide standard for modem control command syntax (AT = command prefix Attention). The implementation of this command set was left up to the individual manufacturer. The V.250 command set is a standard for the AT command set. This is recommended by Microsoft for the PC98 specification and is a requirement of the PC99 specification.

Your *ELSA MicroLink 56k Internet* is a state-of-the-art modem equipped for the V.250 command set.

A terminal program is required to enter AT commands via a PC (e.g. *ELSA-COMMUNICATE! Lite*).

Entering and executing AT commands

After being switched on, the modem is in the command state. Commands can only be accepted, interpreted and executed in this phase.

In the event that several commands are to be sent to the modem, these may be entered individually, each with an AT command prefix and a concluding **Enter**. It is also possible, however, to enter these commands consecutively in a single command line after an introductory **AT** and to conclude the line with an **Enter**.

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

Escape command

Use the characters **Ctrl-X** and **Ctrl-C** to abort a command line or a screen output (e.g. in case of displaying the register contents use **AT%R**).

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

After the successful establishment of a connection to the remote station, the modem switches from the command phase to the transfer phase.

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

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

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

After the three escape characters have been entered, the modem is in the command state. However, data transmission is interrupted only after the recognition of a valid command line.

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

All commands sent to the modem must begin with the ASCII characters **AT** or **at** (not valid: At or aT) and must be concluded with **Enter**. A valid command line in an escape sequence is restricted to a maximum of 40 characters.

The command **AT&F** loads the firmware default parameter settings. If a connection exists, this command is not executed.

Bit-oriented registers

Bit-oriented registers are primarily used to provide status information. Please note that changing the value of a bit-mapped register can affect several functions at once! Great caution should thus be applied when changing bit-oriented registers! To change the configuration of your modem, you should use the AT commands instead. A complete description of the S registers can be found on the ELSA modem CD.

Modifying bit-oriented registers

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

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

Overview of AT command set and registers

In this brief overview, which is grouped according to topics, you find frequently needed AT commands and registers you can use to change your modem settings. A complete description of the AT command set and registers can be found on the CD which comes with the modem.

The 'Commands and registers' column lists AT commands and registers you can use to change the basic settings of the modem. The 'More commands and registers' column lists AT commands and registers for extended control of the modem.

Basic control features

Configuration	Commands and registers	More commands and registers
Basic initialization of the modem	AT&F	
Control of call establishment (dialing)	ATD, ATT, ATX	AT\$D, AT:D, S6, S7, S8, S14 (bit 6)
Call acceptance, taking over of the line, hang up	ATA, ATD, ATH, AT&D2, S0	AT-H, AT\T, S14.6, S28 (bit 7)
Transition between command and transfer phase	+++ , ATO	S2
Control of speaker and of call signaling	ATL, ATM, S54 (bit 0)	
Read out modem information	ATI, ATS, AT&V	AT%R, AT\S, AT%V, S86
Control data compression	AT+DS	
Control error correction	AT+ES	
Control data flow monitoring	AT+IFC	S130
Control dial lock or dial delay	S31 (bit 7)	

Extended control features

Configuration	Commands and registers	More commands and registers
Operation with saved initializations	AT&V, AT&T, AT*W, AT&Y, ATZ	S54
Operate with saved phone numbers	AT+ASTO	
Protected access and callback	AT\$B, AT\$Y, AT\$S, AT\$P, AT\$R	S35, S42, S43, S53
Remote configuration	AT*E, AT*U, AT*X	S34

Special control features

Control modem signal lines	AT&C	AT\D, AT&S
Control the effects of DTR	AT&D	AT\$D, AT:D, S28 (bit 7)
Control modem answers	ATE, ATQ, ATV, ATV	AT&D, AT-H, AT-M, AT*Q, S96
Control call tones	AT&G	
Control transfer method	AT+MS	
Control data format	S28 (bit 0-1), S53	
Control telephone-side speed	AT+MS	

Appendix

Brief overview of the AT command set

The complete AT command set can be found in the online documentation on the included CD.

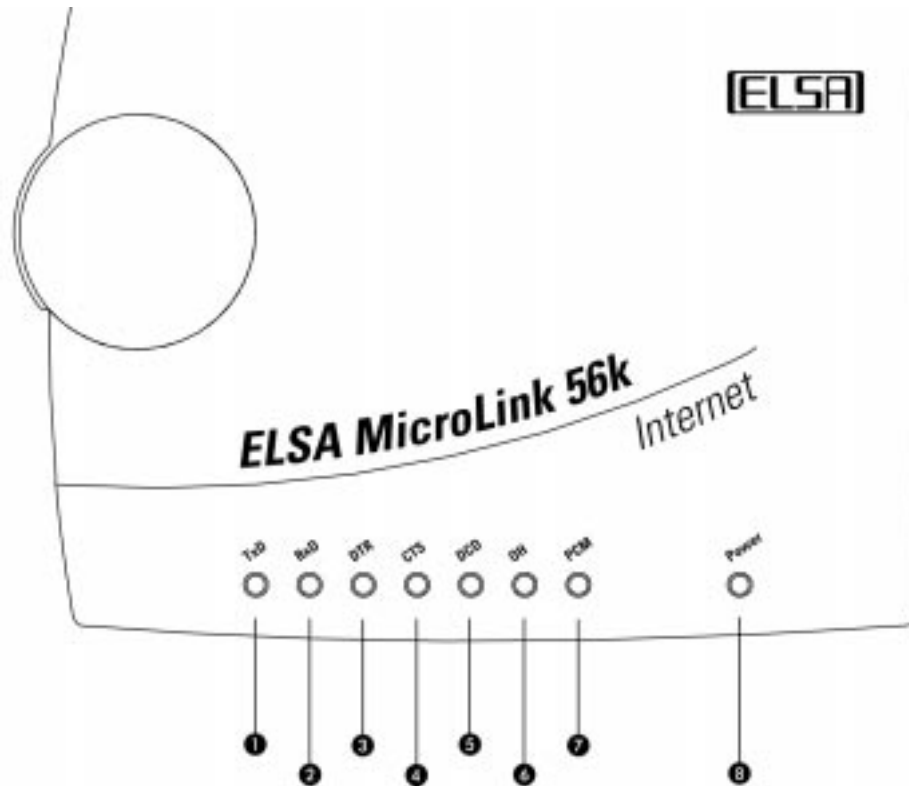
Command	Description
A	Answer incoming call
%A	Fallback character in the negotiation phase
+A8E	Control of the V.8 and V.8bis negotiation
+ASTO	Saving speed-dial numbers
\$B0 \$B1 \$B2	No callback RING and CONNECT are displayed before the access procedure RING and CONNECT are displayed after the access procedure
\C0 \\C1 \\C2	No data buffering in the negotiation phase Data buffering in the negotiation phase No data buffering, fallback character recognition (AT%A)
&C0 &C1	DCD is always active DCD follows the state of the carrier
\$CS	Query of the current modem settings
D	Call establishment
\$D0 \$D1	Disables DTR dialing Enables DTR dialing
&D0 &D1 &D2 &D3	Ignore DTR Change to command state DTR ON ⇒ OFF (ON ⇒ OFF) Hang up if DTR ⇒ OFF (ON ⇒ OFF) Abort connection and reinitialize if DTR ⇒ OFF ⇒
:D0 :D1	Modem does not go online if DTR OFF ⇒ ON Modem goes online if DTR OFF ⇒ ON
+DS	Data compression method
E0 E1	Disable command echo Commands echoed
%E0 %E1	Automatic retrain off Enable automatic retrain
*E0 *E1	Remote configuration off Remote configuration on
+EB	Break signal handling
+EFCS	FCS operating mode in V.42 mode
+ER	Display of error correction method
+ES	Selection of error correction method
+ESR	Control of selective repeat function in V.42 mode

Command	Description
+ETBM	Buffer handling on aborted connection
&F	Load default configuration
&G0 &G1 &G2 &G4 &G5 &G6	Calling tone on, no guard tone Calling tone on, guard tone 550 Hz Calling tone on, guard tone 1800 Hz Calling tone off, no guard tone Calling tone off, guard tone 550 Hz Calling tone off, guard tone 1800 Hz
H0 H1	Go on-hook Go off-hook
-H0 -H1	Normal operation Dumb mode
I0 I1 I2 I3 I4 I6 I7 I9	Report product code in nnn format Report checksum Report checksum result Display firmware version and date Display of current parameters Display product name Report self-test result Display plug&play information
L0 L1 L2 L3	Low speaker volume Low volume Medium speaker volume High speaker volume
M0 M1 M2 M3	Speaker always off Speaker on during call establishment Speaker always on Speaker on during waiting for answer tone
-M0 -M1	Plain text CONNECT messages dependent on ATV Plain text CONNECT messages independent of ATV
O0 O1	Transition to online status Return to online state with retrain
+MR	Return modulation method and line bit rate
+MS	Set modulation method
P	Set pulse dialing
\$P	Enter and save user password and callback number
Q0 Q1 Q2	Enable modem result codes Disable modem result codes Messages off in answer mode
*Q0 *Q1	CONNECT message after invalid escape sequence No CONNECT message after invalid escape sequence
%R	Display register contents
\$R	Display user password and parameters
S	Set and read the internal register
\S	Display the current configuration in verbose form
\$S	Set access flags

Command	Description
\$S?	Display current access flag setting
T	Tone dialing method
&T0	End loopback mode
&T1	Activate local loopback
&T3	Activate loopback for remote modem
&T4	Activation of loopback by remote modem permitted
&T5	Activation of loopback by remote modem locked
&T6	Activate remote digital loopback
\T	Inactivity timer
\$T0	Trace mode off
\$T1	Trace mode on
*U	Save current remote configuration
V0	Messages in short form as a digit
V1	Messages in plain text
%V	Display of firmware version
&V	Display configuration profiles
W0	No modified CONNECT messages
W1	Identification of error-free connections
W2	Identification of MNP and V.42(bis) connections
W8	Identification of MNP, V.42 and V.42bis connections
&W0	Save extended configuration profile 0
&W1	Save extended configuration profile 1
*W0	Save extended configuration profile 0
*W1	Save extended configuration profile 1
X0	Ignore dial tone/ignore busy tone
X1	Ignore dial tone/busy tone
X2	Wait for dial tone/ignore busy tone
X3	Ignore dial tone/evaluate busy tone
X4	Wait for dial tone/evaluate busy tone
*X	Exit remote configuration
&Y0	Load configuration profile 0 at startup
&Y1	Use configuration profile 1 at startup
\$Y	Change supervisor password
Z0	Load configuration profile 0
Z1	Load configuration profile 1
.	Setting and reading a bit in a register

Status display and troubleshooting

The LEDs on the front panel show the condition of the interface lines or the condition of the modem.



- | | |
|---|--|
| 1 | Data to modem |
| 2 | Data from modem |
| 3 | Computer operational |
| 4 | Hardware handshake control line from modem |
| 5 | Connection established |
| 6 | Modem online (off hook) |
| 7 | V.90 connection |
| 8 | Modem power on |

Technical data

Users with specific technical interests should refer to this chapter for detailed information on *ELSA MicroLink 56k Internet*. All connections and their pin assignments are described in detail.

Characteristics of the modem

	<i>ELSA MicroLink 56k Internet</i>
Power supply	230 V/9V _{AC} power adapter, TÜV-GS approved
Power consumption (approx.)	Transmission phase (online) 700 mA typ. Command phase (online) 350 mA typ.
Power consumption	9.9 VA typ.
Dimensions and design	168 x 35 x 130 mm (W x H x D), plastic housing
Ambient conditions	5..40°C 0..80%, non-condensing
Transfer protocols and speeds	56,000..300 bps asynchronous, transmission and reception 33,600..300 bps asynchronous (V.90, K56flex, V.34, V.32bis, V.32, V.22bis, V.21, V.23, V.80, Bell 212A and Bell 103)
Error correction	V.42 and MNP Class 4
Data compression	V.42bis and MNP Class 5
Command Set	AT command set in accordance with V.250/V.25ter
Fax operation	14,400..2400 bps in accordance with V.17, V.33, V.29 and V.27ter; fax command set, TR-29.2 Class 2 (SP-2388), Class 2.0 (TIA/EIA-592), Class 2.1 (ITU-I.32), Class 1 (TIA/EIA-578) and Class 1.0 (ITU-T-T.31)
Voice operation	Voice command set in accordance with TIA/EIA IS 101 and Rockwell
Dialing method	Dual-tone multifrequency dialing
External call	Via flash function or digit
BPS ADJUST	automatic in accordance with V.8 and V.100 (can be disabled)
Computer interface	V.24/RS-232
CE conformity	Tested in accordance with EN 50082/Part 1, EN 50081/Part 1, EN 61000-4-2,3,4,6, ENV 50204, EN 55022, Class B, EN 60950
EU approval	according to CTR21 + Advisory Notes EG 201 121

Frequently asked questions and answers

General topics



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" (e.g. *ELSA-COMMUNICATE! Lite*). After starting the communications software, you can enter AT commands in the terminal screen. The program sends these commands to your modem via the serial interface of your PC.



What is the initialization string of the modem?

The default setting of the modem is optimally configured for accessing BBSs, online services and Internet providers. 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 no longer accepts AT commands. Is it incorrectly configured or faulty?

If entered AT commands are not displayed on the screen and not executed by the modem, this can have several possible reasons. You should 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?
- 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.



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. 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 this is the case, dial out using the command **ATDT0W<number>**. 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>**, respectively. You can make this setting permanent with the **ATX3*W** command.

Your modem cannot be used on a PBX which only permits an outside line to be accessed using the grounding key.



I'm dialing via a PBX, and although I get a dial tone and the remote station is not busy, I constantly get a BUSY message? What's wrong?

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 the connection is even lost. What is 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 instead). 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. Be sure to always use the supplied adapter for this reason.

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. Type 8250 and 16450 chips only function reliably at speeds of up to 9600 bps; individual characters can be lost in the interface at speeds of 19,200 bps upwards, leading to CRC errors.



Why do I always get CRC errors with my modem during Zmodem downloads at 115,200 bps, even though I'm using a UART 16550 with FIFO in my COM port? The throughput rate for 28,800 bps CONNECTS is just 2000 cps.

The poor throughput is the result of the large number of CRC errors. Check that your computer BIOS settings for the entry **IDE HDD BLOCK MODE** are set to **DISABLED**.



My computer's serial port is in use by another application. How can I use the answering machine function nonetheless?

The modem will not start any answering machine activities as long as the serial port is in use by an application (DTR = ON) to prevent conflicts between the application and the answering machine.

When an answering machine function is enabled, the modem switches CTS to OFF and does not accept any commands from the port.

WinFax



What should be considered when using the WinFax software?

WinFax Pro 7.0 recognizes the device as a Class 2 modem, so that the initialization string will not require modification. In addition, **Use Hardware Protocol** must be enabled under **Setup ► Modem ► Properties Fax ► Protocol**.

As WinFax Pro 8.0 does not come with settings for the voice functions of the *ELSA MicroLink*, a compatible modem type must be selected. Select **Generic** from the list of modem manufacturers and as the modem type **Rockwell Fax/Voice** or **Rockwell Fax/Voice with Speakerphone** if your modem has a hands-free option.

Warranty conditions

The ELSA AG 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, at our sole discretion, be replaced or repaired free of charge if, despite proven proper handling and adherence to the operating instructions, these parts became defective due to fabrication and/or material defects. Also we reserve the right to replace the defective product by a successor product or repay the original purchase price to the buyer in exchange to the defective product. 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 from the buyer to the service station and/or to us.
- 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 for *ELSA MicroLink 56k Internet* is two years. This period begins at the day of delivery from the 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) 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.
- d) Warranty claims are only valid if 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 especially 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, and in as far as, the luminance of the TFT panel backlighting gradually decreases with time, or
- h) if the warranty claim has not been reported in accordance with 3a) or 3b).

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.
- b) 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.
- c) Claims for compensation of lost profits, indirect or consequential detriments, are excluded.
- d) ELSA is not liable for lost data or retrieval of lost data in cases of slight and ordinary negligence.
- e) In the case that the intentional or culpable negligence of ELSA employees has caused a loss of data, ELSA will be liable for those costs typical to the recovery of data where periodic security data backups have been made.
- f) The warranty is valid only for the first purchaser and is not transferable.
- g) 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.
- h) The law of the Federal Republic of Germany is applicable. The UN commercial law does not apply to dealings between ELSA and the purchaser.

Glossary

- **Adaptive modem** – This designates a →modem which automatically adapts itself to the transmission bit rate of the remote station.
- **ASCII** – The American Standard Code for Information Interchange is the most commonly used international code to represent a 128 character alphabet. It is also called standard ASCII, unlike extended ASCII, which is an extension of the code by international special characters and graphic symbols to a set of 256 characters (also called IBM character set). Standard ASCII can be coded with a word length of 7 bits ($2 \times 7 = 128$), whereas extended ASCII requires a word length of 8 bits ($2 \times 8 = 256$).
- **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 asynchronous transmission 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 X 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 AT command set (AT = command prefix ATtention) 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.
- **Communications software** – Communications software such as a terminal program is required to operate the ISDN terminal adapter from a personal computer, to change the transfer parameters for example, or to initiate file transfers (→Download, →Upload). An "intelligent terminal", i.e. a simple input/output device with additional functions for storage of received data or the transmission of local data, is emulated on a PC using such a program.
- **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.
- **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).
- **Download** – Download denotes a transfer of data, in which a file transmitted by the remote station is received and saved.
- **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 effective transfer rate must be distinguished from the transmission speed. The transmission speed indicates the number of bits per second sent through a data connection as a theoretical maximum value. The transfer rate, on the other hand, is the average quantity of communications data transferred within a given unit of time. The effective transfer rate can be reduced by signaling data or protocol routines which must also be transferred. The use of data compression processes permits the effective speed to be increased to multiples of the transmission speed.
- **Firmware** – Firmware is the designation for the complete body of microprograms belonging to an item of hardware which cannot be modified by the user.
- **FullFax** – Modems equipped with the FullFax 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 a FullFax modem can be used as a multifunctional device for both telefax and data communications.
- **Host** – Host designates a central computer that carries out certain functions for other units (e.g. terminals), for instance saving of data.
- **ITU-T** – The Telecommunications Standardization Sector of the International Telecommunications Union (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, while the I. and Q. series are standards for the ISDN. The ITU-T is the successor organization of the CCITT (Comité Consultatif International Télégraphique et Téléphonique).
- **Log-in** – In a log-in procedure (also called log-on 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.
- **Mailbox** – (Electronic Mail System, Bulletin Board System (BBS)). A Mailbox 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.
- **MNP** – Due to the noise and distortion characteristics of a telephone network, conventional modems cannot guarantee a perfect, error-corrected transmission. The Microcom Networking Protocol (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. 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 MOdulator/DEMOdulator. 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.
- **Parity bit** – The parity bit is a signal bit which is transferred in addition to the actual communications data. The bits set to logical '1' are completed to make an even or odd bit sum. The parity check is an error-recognition process. The effectiveness of this test is very questionable, however, as double errors cannot be recognized, for example. The setting 'no parity' is thus generally selected for data communications. This also has a positive effect on the effective transfer rate, as no additional parity bit must be transferred.
- **Pulse dialing** – In this dialing method, which is also called loop disconnect dialing, each dialed digit is coded with a number of pulses. So if you hear a "rattling" sound when dialing, it is pulse dialing. This method requires less technical effort than the more up-to-date tone dialing, but is also considerably slower.
- **SysOp** – Abbreviation of System Operator, the administrator or operator of a →BBS or data bank.
- **TAE6** – Abbreviation of the German Telekomunikations-Anschluß-Einheit, 6polig (6-way terminal adapter). The terminal adapter provided by Deutsche Telekom for the telephone network is known as TAE6-F for telephones or TAE6-N for modems, fax machines, answer-phones or charge counters.
- **Tone Dialing** – In this dialing method, which is also called touch tone dialing or multi-frequency dialing, each digit is coded with a particular pair of frequencies. So if a sequence of different short beeps is audible when dialing, it is tone dialing. Due to its speed, tone dialing is superior to the older pulse dialing method.
- **Transfer protocol** – A number of transfer protocols exist which are designed to ensure the smooth transfer of data from one computer to another. Over the course of time, protocols were developed with varying levels of performance and convenience. Basic functional principle: As a rule, data is transferred in blocks which are tested for completeness and lack of errors by the opposite side. If a transfer error is detected, the defective block is requested again. Examples of common transfer protocols are →Xmodem, Xmodem-1k, →Ymodem and Zmodem.
- **UART** – The UART chip (Universal Asynchronous Receiver/Transmitter) with FIFO buffer storage (type 16550) is used to ensure error-free communications via the asynchronous serial communications interface.
- **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.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 28,800 bps duplex.
- **V.42, V.42bis** – V.42 and V.42bis are error-correction and data compression processes standardized by the →ITU-T. V.42bis contains a data compression process which permits up to a fourfold increase in data throughput.

- **V.90** – V.90 is the standard for 56k modems as defined by the →ITU standards institute.
- **V.Fast Class** – V. This modulation process, which was developed by Rockwell in anticipation of the V.34 (V.Fast) standard, operates with at variable bit rates between 16,800 and 33,600 bps in steps of 2400 bps.
- **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.

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