

# **SR 2496**

## User manual

<mv205a0.121engl>

© CREATIX Polymedia GmbH, Saarbrücken 1994

This handbook is protected by copyright. It must not be copied, reproduced, translated or transmitted in electronic media, in whole or in part.

Accuracy of the information is not guaranteed.

Any mention in this handbook of products made by other manufacturers is for information purposes only and represents no misuse of trademarks.

Creatix Polymedia GmbH  
Fasanerieweg 15  
66121 Saarbrücken

# Table of Contents

CHAPTER 1 INTRODUCTION.....	1
Installation Instructions .....	1
CHAPTER 2 SETTING UP	
CONNECTIONS.....	2
The Modem as an Automatic Dialling Unit.....	2
Typical Examples of Operating Modes .....	2
CHAPTER 3 STANDARD	
AT COMMANDS .....	3
Examples of Command Syntax .....	3
AT - Attention-Code.....	3
<b>Detailed Command Descriptions .....</b>	<b>4</b>
A – Answer Mode.....	4
A/ – Repeat last Command line .....	5
B – BELL/CCITT Standard.....	5
D – Automatic Dialling and Dialling Parameters .....	5
E – Echo Function .....	5
I – Product Information .....	6
O – Return to On-Line Operation.....	6
Q – Modem Messages ON/OFF .....	6
Sr=n – Modify Register Values .....	6
Sr? – Read Register Values .....	6
V – Verbal or Numeric Modem Messages .....	6
X – Extended Connection Messages -	
Setting up connections .....	6
Y – Long Space Disconnect .....	7
Z – Reset/Loading a Stored Profile.....	7

The +++ – Esc Sequence .....	7
&C – Control Line M5 (DCD) .....	7
&F – Loading Factory Settings.....	7
&G – Guard Tone .....	8
&M – Asynchronous Dialling/Synchronous	
Data Transmission .....	8
&R – Control Lines S2 and M2 .....	8
&S – Control Line M1 (107/DSR).....	8
&T – Modem Test Functions .....	9
&V – Displaying Active Configuration.....	9
&W – Storing a Set Profile .....	9
&X – Setting the Clock Signal in	
Synchronous Operation .....	10
&Y – Selecting a Start Configuration .....	10
&Z – Telephone Number Storage .....	10
CHAPTER 4 MNP AND	
V.42 COMMANDS .....	11
\A – Maximum MNP Block Size .....	11
\B – Sending a Break Signal.....	11
\C – MNP Buffer.....	11
D/ – Dialling a Stored Telephone Number.....	12
DL – Redial .....	12
\E – Data Echo during a Normal Connection.....	12
\F – Displaying Stored Telephone Numbers .....	12
\G – Flow Check (XON/XOFF).....	12
\J – Baud Rate Adjustment .....	12
\K – Type of Break Control .....	13
\N – Data Transmission Mode.....	13
\O – Setting Up an MNP Connection during	
On-Line Operation .....	14
\P – Storing a Telephone Number.....	14

\Q – Serial Flow Check .....	14	S11 – Dialling Speed.....	21
\S – Displaying Current Modem Configuration .....	15	S12 – Guard Time for the Esc Sequence .....	21
\T – Inactivity Timer.....	15	S14 – Bit-Map Options.....	22
\U – Accepting an MNP Connection .....	15	S16 – Bit-Map Options.....	22
\V – MNP Switching Messages.....	16	S18 – Setting Maximum Test Time .....	22
\X – Onward Transmission of an XON/XOFF Signal .....	16	S21 – Bit-Map Options.....	22
\Y – Switching to Reliable Mode .....	16	S22 – Bit-Map Options.....	23
\Z – Switching to Normal Mode.....	16	S23 – Bit-Map Options.....	23
%A – Fallback Character .....	16	S25 – DTR Delay Time .....	23
%C – Authorise Data Compression .....	17	S26 – Delay from RTS to CTS.....	23
%E – Authorise Automatic Retrain .....	17	S27 – Bit-Map Options.....	24
%R – Displaying Recorded Values .....	17	<b>MNP Registers.....</b>	<b>24</b>
%V – Displaying Firmware Version.....	17	S36 – Bit-Map Options.....	24
<b>V.42 Commands .....</b>	<b>17</b>	S37 – Fallback Characters in Autoreliable Mode ..	24
W – Authorising V.42 Modem Messages .....	17	S38 – Bit-Map Options.....	25
&K – Determining Flow Check.....	17	S39 – Bit-Map Options.....	25
&Q – Using the V.42bis Standard .....	18	<b>V.42 Registers .....</b>	<b>25</b>
<b>CHAPTER 5 S-REGISTERS .....</b>	<b>19</b>	S36 – Controlling the Setting up of Connections ..	25
<b>Standard S Registers .....</b>	<b>20</b>	S82 – Handling the Break Signal.....	25
SO – Ring Character before Modem engages .....	20	<b>CHAPTER 6 MODEM MESSAGES .....</b>	<b>26</b>
S1 – Ring Character Counter .....	20	<b>CHAPTER 7 TROUBLE- SHOOTING .....</b>	<b>28</b>
S2 – Character for Esc Sequence .....	20		
S3 – Character for Carriage Return.....	20		
S4 – Character for Line Feed .....	20		
S5 – Character for Backspace.....	20		
S6 – Waiting Time for Dialling Tone .....	20		
S7 – Waiting for the Carrier Signal .....	21		
S8 – Pause Time using Comma .....	21		
S10 – Line Break on Carrier Loss.....	21		

# CHAPTER 1 INTRODUCTION

In choosing the SR 2496 Modem, you have selected a versatile unit which is equally suitable for data communication and fax transmission. It has the following features:

- Transmission systems to CCITT V.21, V.22/V.22bis
- Automatic Selection and Programming via Hayes Command Set
- MNP 1-4, V.42 Error Correction
- MNP 5, V.42bis Data Compression
- Effective Transmission Rate of max. 9600 bps (V.22bis with V.42bis)
- Tone and Pulse Dialling
- Automatic Answering
- Number Storage for four Telephone Numbers
- Two Configuration Memories
- LED Indicators for Power, Online and Carrier
- Fax Transmission is compatible with Fax Group 3; V.27ter (Send up to 9600 bps, Receive up to 4800 bps);
- Fax-Software Interface: Class 2

## Installation Instructions

1. Using the interface cable supplied, connect the modem to a free COM interface on the computer (25-pole or 9-pole with pins; if necessary, the adaptor may be used).
  2. Use the telephone cable supplied to link the modem to a telephone jack.
  3. The power supply to the modem is via the connector unit supplied, which should be plugged into a mains socket 220-240 V AC.
  4. When the "Power" LED is illuminated, the modem is ready for data communication with the values which were pre-set by the manufacturer.
  5. Configure the modem with the communications or fax software to suit your requirements.
- ⇒ *Ensure that the correct COM interface is allocated in the software.*

## CHAPTER 2      SETTING UP CONNECTIONS

There are various methods which you can use to set up a data connection with a remote modem. These are described below.

### Answering

**Manual:** You answer the call by lifting the telephone connected to the line and then enter ATA\* to permit the modem to take over the line.

**Automatic:** Here, the SO Register (or the comms. software) must be set to determine how many times the telephone will ring before the modem comes on line when a call is made.

### Calling :

**Manual:** You dial the number on the telephone connected to the line and enter ATD (without parameters) when the other party is ready to receive a data transmission.

**Automatic:** In automatic mode, you can use the following commands to cause the modem to dial the number required ATD with dialling parameter D/- (DS) to dial a stored number DL-command, to re-dial the last number you called. You will find more information in the descriptions of the individual commands.

### The Modem as an Automatic Dialling Unit

If the dialling command ends with a semi-colon (for example ATDP0681 12345;) the modem will dial the number and then

transfer the telephone line to the telephone. (\*A detailed description of the individual commands is provided in Chapters 3 and 4)

### Typical Examples of Operating Modes

#### *Automatic Dialling with AT Commands*

Enter ATD "Dialling Sequence", where "Dialling Sequence" is the telephone number with all the necessary parameters  
eg. ATDP O , 0681 123456

Zero (0) is dialled from a private automatic branch exchange with pulse dialling (p) to get a line, then a dialling pause (,) of two seconds, followed by the telephone number 0681 123456

#### *Storing a Telephone Number*

Enter AT&Zn="Dialling Sequence", where "Dialling Sequence" is (as described above) the telephone number with all its dialling parameters and n is the position in the memory assigned for the telephone number.

eg. AT&Z1=P 0 , 0681 123456 So the dialling sequence P O , 0681 123456 will be entered into memory 1.

#### *Dialling a stored Number*

Enter ATDSn, where n is the memory of the required number.

#### *Redialling*

Enter ATDL to redial the last number you called.



*The Online LED lights when the data connection is made. The Carrier LED lights when the carrier tone of the other party is recognised.*

## CHAPTER 3 STANDARD AT COMMANDS

The modem can be programmed with so-called AT commands from the data terminal equipment (computer, PC or terminal) and be given instructions for automatic dialling. Generally speaking, these procedures will be covered by the communication software or fax software, so you will not normally be required to know all the details of the commands described below.

The modem must be in Command mode in order to receive commands. In this mode, all the characters sent by the computer will be interpreted as commands and, where appropriate, confirmed on the screen by a modem message. Where a connection is established with a remote modem, the modem will switch to data mode and transmit all the characters it receives, on to the other party.

The Esc sequence (+++) can be used to switch the modem from an existing connection to the command mode, without breaking off the connection to the remote modem. In this condition, any commands which are entered are not transmitted on to the other party.

The modem is activated by AT commands, the value of which will modify the type of the command. So-called modem messages give information on the type of the commands.

Commands are introduced via the Hayes Command Set by the AT (at) character sequence and can also be entered as a list of commands, with or without spaces between the

individual commands. The backspace key is used for deletion purposes. Commands may be issued in upper or lower case letters. When the modem is in the command mode it will automatically recognize data frameworks and data speeds.



*AT commands can be transmitted to the modem with the following data rates: 9600, 4800, 2400, 1200, 600 and 300 bps.*

### Examples of Command Syntax

ATX1<CR>

ATQO<CR>

ATDP12345<CR>

These individual commands, which all end with the enter key <CR> can also be entered with any number of spaces between the various symbols, for ease of recognition. The effectiveness of the commands is not affected by the spaces.

ATX1QODP12345<CR> or

AT X1 QO DP 12345<CR>

### AT - Attention-Code

The AT- (Attention) Code which introduces each command line (except A/-command and the Esc sequence) can be entered in upper or lower case lettering. However, it cannot be deleted by using the backspace key.



*The AT code enables the modem to recognize the speed, parity and character length of the communication programme.*

A number of different commands can be included in one line, separated by spaces. The command line must end with the ASCII character in the S3 or S4 Register (or both of them together). The standard value for S3 is carriage return (<CR>=13 decimal) and for S4 is line feed (<LF>=10 decimal).

A command line without <CR>, <LF> will remain in the command buffer until a <CR>, <LF> is entered, or until it is broken off with <Ctrl-X>. Once <CR>, <LF> is received, the modem will carry out the commands following the AT and will answer with an appropriate modem message.

The maximum length of a command line is 40 characters. If the capacity of the command buffer is exceeded, the modem will issue a fault message.

**Table 1 Standard AT Commands**

ATA	Answer Mode: Modem uses telephone line
A/	Repeat last command line; entered without "AT"
ATB	Switch between Bell and CCITT Standards at 300 and 1200 bps
ATDn	Select telephone number "n"
ATE	Control modem command echoes on screen
ATI	Information about modem product code
ATO	Return to on-line operation (Data mode) after entering Esc. sequence
ATQ	Control modem messages
ATSr?	Read Register "r" and issue value
ATSr=n	Write value "n" in Register "r"
ATV	Format modem messages
ATX	Modem function when dialling
ATY	Line break when a space signal is received
ATZ	Modem reset and load one of the stored modem profiles
+++	Escape sequence for temporary return to command mode
AT&C	Control M5-(DCD) signal at serial interface

AT&F	Loading a factory setting
AT&G	Controlling a guard tone
AT&M	Synchronous data transmission after asynchronous dialling
AT&O	Synchronous data transmission after asynchronous dialling
AT&R	Controlling M2 and S2 signal at serial interface
AT&S	Controlling M1(DSR) signal at serial interface
AT&T	Modem test functions
AT&V	Display of stored modem profiles and telephone numbers
AT&W	Storing modem settings
AT&X	Controlling Clock signal in synchronous operation
AT&Y	Selecting configuration which will be effective after modem start-up
AT&Zn=x	Filing telephone number "x" in memory position "n"

## Detailed Command Descriptions

### A – Answer Mode

This command is used for manually setting up a connection via a telephone connected to the same line. When the "A" command is entered, the modem switches into the telephone line when the telephone receiver is lifted. In this condition, it transmits in "Answer" mode (Upper channel "oK"). If further characters are entered after the "A" command and before a connection is made, the modem will interrupt the connection set-up and go into the Command mode. It issues the message "NO CARRIER".

If no carrier is received by the other party after the waiting time set in the "S7" register, the modem will answer with "NO CARRIER" and return to the command mode. If the modem receives the carrier, it will give a "CONNECT" message and switch into Data mode.



## A/ – Repeat last Command line

The A/ command causes the modem to repeat the command line which is stored in the command buffer. This command is entered without AT and no return answer is issued. A command line which has been entered remains until the modem receives a new AT command.

## B – BELL/CCITT Standard

The B command allows change-overs between the CCITT Standard and Bell Standard with connections having a data rate of 300 bps or 1200 bps.

ATB0: V.21 (300 bps); V.22/V.22bis (1200 bps) (Factory setting)

ATB1: Bell 103 (300 bps); Bell 212A (1200 bps)

☞ *The “B” command applies only to 300, 1200 and 1200/75 bps connections.*

## D – Automatic Dialling and Dialling Parameters

The D command engages the automatic dialling function. The parameters for this command cover figures 0 to 9, letters P, T, W and the tone dial characters A to D, \* and #. Punctuation marks not listed here can be added, to make the command easier to identify; this has no affect on the command itself. The dialling parameters are described below:

P, T     These parameters switch between “Pulse” (P) and “Tone” (T) in the Dialling command. For either of these, the dialling process begins after the waiting time set out in the “S6” register (the factory setting

is 2 seconds). Pulse dialling is the standard setting. In the “Dial” command, it is possible to switch between the two processes, if a mixed dialling process is required in order to make the connection.

L     The last number is dialled again  
S=n     Dials the number stored under AT&Z=n  
W     Wait for a further dialling tone  
0 - 9     Numbers of the telephone number  
A-D,\*,#     Additional characters for tone dialling  
!     Call the exchange by “Flash”  
;     After dialling, the modem returns to the command mode. It does not make any data connection but remains on-line, so that you can enter further commands or lift the telephone receiver and take over the line (modem as automatic dialling device).  
,     Waiting time 2 seconds.

☞ *If the “D” command is entered without any parameters, the modem will go on-line when the telephone receiver is lifted in Originate mode.*

## E – Echo Function

The “E” command determines whether the modem will give a local echo of the inputted commands when it is in command mode.

ATE0     No command echoes to the computer  
ATE1     Command echoes are issued (factory setting)

## I – Product Information

### O – Return to On-Line Operation

The “O” command returns the modem to the On-line mode which it had left temporarily via the Esc sequence.

ATO0 Return to On-line mode

ATO1 Return to On-line mode with Retrain

### Q – Modem Messages ON/OFF

ATQ0 Modem messages are issued (factory setting)

ATQ1 No modem messages are issued. The S-register values, identification numbers, test sums and results of test loops with 'self-test' are, however, always issued.

### Sr=n – Modify Register Values

This command is used to write the value “n” in the register “r” (see Chapter relating to the S-Register).

### Sr? – Read Register Values

This command enables the user to read the value of Register “r” (see Chapter relating to the S-Register).

### V – Verbal or Numeric Modem Messages

The V command determines the type of modem messages to be sent back to the computer.

ATV0 Numeric modem messages

ATV1 Verbal modem messages (factory setting); information covering error correction and data compression is controlled via the V command.

## X – Extended Connection Messages - Setting up connections

The X command determines which modem messages are authorised. Messages 0 to 4 are basic and are issued with every possible modem configuration (see Chapter 7: Modem Messages).

ATX0 The modem issues only messages 0 to 4. When dialling, the modem goes on-line, waits for the period pre-set in the S6 register (the standard is 2 sec) and then dials, whether or not there is a dialling tone. Once the connection has been made, a CONNECT message is issued. If this is not achieved in the time set in the S7 register (the standard is 30 sec), a NO CARRIER message is issued. The modem does not recognize a dialling or engaged tone.

ATX1 Same as X0, however, the modem issues messages 0 to 5 and 10 (factory setting).

ATX2 The modem issues messages 0-6 and 10 and awaits a dialling tone. If this is not recognized within 5 seconds, it issues the message “NO DIAL-TONE”. It does not recognize an engaged tone.

ATX3 The modem issues messages 0-5, 7 and 10. In other respects it is the same as X0, except that the engaged tone is recognized and signalled with the message BUSY. After dialling, the modem awaits a “free” tone within 30 seconds (standard in S7 register) and then a carrier tone within the time preset in the S7 register. If one of these conditions is not

met, a “NO CARRIER” message is issued. It does not recognize a dialling tone.

ATX4 The modem issues messages 0-7 and 10 and it recognizes both dialling and engaged tones. It waits for a “free” tone and carrier signal, as described in X3.

## Y – Long Space Disconnect

The Y command determines whether the modem recognizes a “Long Space Disconnect” signal and will break off the line if a Space signal is received from the remote modem for a period of longer than 1.6 seconds.

ATY0 Space-signal is not recognized (factory setting)

ATY1 Space-signal is recognized. The modem sends a space-signal of its own for 4 seconds, before shutting down, so that the other party hangs up.

## Z – Reset/Loading a Stored Profile

The Zn command is used to reset the active configuration profile. In this, the NVRAM values are entered into the relevant registers and the remaining parameters are modified to the factory setting.

The n parameter is used to select one of the configuration profiles stored under &W (n = 0, 1)



*Where they occur on the same line as the Z command, the subsequent commands are ignored.*

## The +++ – Esc Sequence

The Esc- (Escape) sequence may be used to switch from an existing data connection, from the data (On-line) mode to the command mode, without breaking off the connection. The command is made up of the waiting time (Guard Time) which is preset in Register 12 and an ASCII character, which is repeated three times. The Esc- Sequence is specified as a “Plus” sign in Register 2 (factory setting) but can be changed as desired. The standard waiting time is one second.

The Esc sequence must be entered three times, with the relevant waiting times both before and after. The Esc characters must not be longer than this waiting time. Once a valid Esc sequence has been received, the modem will switch to command mode and send an “OK” message, while the connection is maintained (see also “O” and “&D” commands).

## &C – Control Line M5 (DCD)

The &C0 command controls the M5 signal at the serial interface.

&C0 The M5 signal is always on

&C1 The M5 signal indicates the actual condition of the carrier which is received (factory setting)

## &F – Loading Factory Settings

The AT&FO is used to input the factory setting. This will over-write any previous settings.

Factory settings

E1	Echo “On”
QO	Modem messages “On”
V1	Verbal messages
Y0	Long Space Disconnect “Off”
X1	Dial blind
&B0	CCITT
&C1	M5 displays carrier recognition
&D2	When S1 (DTR) disappears, modem shuts down (DTR)
&G0	Guard tones switched off
&R0	CTS follows RTS (RTS-CTS Handshake)
&T4	Modem accepts test loop from remote modem
S0	00 automatic answering “Off”
\NO	Buffering

### **&G – Guard Tone**

In “Answer” mode (transmission in the upper channel) a guard tone can be transmitted (not with Bell 212A or 103)

&G0	Guard tone “Off” (standard setting)
&G1	550 Hz guard tone
&G2	1800 Hz guard tone

### **&M – Asynchronous Dialling/Synchronous Data Transmission**

The modem can use this command to switch to synchronous data transmission following (asynchronous) dialling.

&M0	Commands and transmission are asynchronous (factory setting)
-----	--

&M1 This mode is used with terminals which can work either synchronously or asynchronously. The modem switches to synchronous operation for the period of data transmission.

&M2 As for &M1; however, when changing over the S1 (DTR) from “Off” to “On”, the number stored under &Z0 is dialled.

&M3 You can dial with the telephone. The modem will take over the line after an “Off” to “On” changeover of the S1 (DTR) in synchronous mode.

### **&R – Control Lines S2 and M2**

In synchronous operation (&M1-&M3), S2 and M2 are controlled as follows:

AT&RO M2 (106/CTS) follows S2 (106/RTS). When the S2 changes over from “On” to “Off”, the M2 switches on after the time period preset in the S26 register. Data received in the M2-OFF status are not noted (factory setting).

AT&R1 The modem ignores the S2, while M2 is set to data mode and synchronous data can be received. M2 remains until the connection is broken. In the asynchronous mode, M2 is always set.

### **&S – Control Line M1 (107/DSR)**

&S0 Control Line M1 is permanently set

&S1 M1 (DSR) in accordance with CCITT V.22bis/V.22 (factory setting)

## &T – Modem Test Functions

Various diagnostic commands are available to you, to limit communication problems. These commands are issued in “command” mode. Where local or remote digital test loops are involved, a telephone connection must be set up, from which you use the Esc sequence to go into command mode.

**&T0** Concludes any type of test loop. The &T0 command must occur at the end of a command line. In order to end a local analogue (&T1) or remote digital test loop (&T7), you must first use the Esc- sequence to go into command mode.

**&T1** Local, analogue test loop. This test checks the data connection between computer/modem and modem/computer. The modem reads the information on the transmission line and echoes it over the receiving line. While in the check loop, you can input data via the keyboard and check it on the screen. Errors can be caused by the modem or by the computer. The check loop is ended by the &T0 command, or at the end of the time preset in the S18 register.



*The &T1 command must be given in Esc- mode.*

**&T3** Local, digital test loop. The modem receives data from the remote modem and re-transmits these data back to it. The remote modem can then compare the two sets of data.

**&T4** Authorises a remote digital test loop for the remote modem (factory setting). This command overrides the &T5 command.

**&T5** A remote digital check loop from the remote modem is not enabled.

**&T6** Remote digital check loop. This checks the interaction between local computer, local modem, telephone line and remote modem. Data transmitted from the local computer are returned by the remote modem and compared by the local computer. If the data which were entered via the keyboard appear on the screen, the test is successful. If not, a local, analogue test loop should be applied to each modem, in order to localise the error. If no error is found here, the problem is probably on the telephone line.

**&T7** As &T6 but with local “self test”

**&T8** Local, analogue test loop with “self test”

## &V – Displaying Active Configuration

You can use this command to display the command/register values for current and stored modem configurations and stored telephone numbers.

## &W – Storing a Set Profile

This command is used to file various values of the current configuration profile of S registers in a non-volatile memory (NVRAM). These values can be re-loaded using the Zn command.

Stored Register Values:

S0, 14, 18, 21, 22, 25, 26, 27, 36, 37, 38, 39, 40 and 41

Stored Standard AT Commands:

Bn, En, Fn, Ln, Mn, P(T), Qn, Vn, Xn, Yn, &Cn, &Gn, &Jn, &Mn, &Qn, &Rn, &Sn, &T4/&T5, &Xn

Stored MNP Commands:

\An, \Cn, \En, \Gn, \Jn, \Kn, \Nn, \Qn, \Tn, \Vn, \Xn, %An, %Cn, Wn

&W0 Storage of current configuration in first non-volatile memory (memory 0).

&W1 Storage of current configuration in second non-volatile memory (memory 1).

## **&X – Setting the Clock Signal in Synchronous Operation**

The &X command determines how the Clock signal is produced.

AT&X0 The modem produces its own transmitter pulse. The terminal does not await a transmitter pulse (factory setting).

AT&X1 The modem awaits a transmitter pulse from the data terminal (computer). It does not produce its own transmission pulse.

AT&X2 The modem produces its transmitter pulse from the pulse which it has received (pulse loop). However, it is not possible to set two synchronously linked modems at the same time in this operating mode.

## **&Y – Selecting a Start Configuration**

You may use the &Y command to determine which stored profile (&W command) will be operative when the system is switched on.

AT&Y0 Loads profile 0 when the system is switched on

AT&Y1 Loads profile 1 when the system is switched on

## **&Z – Telephone Number Storage**

The command &Zn=x is used to store a telephone number, so that it may be recalled by a short number with ATDS = n. In this expression, x represents the telephone number with all its relevant dialling parameters, such as tone-dialling (T) or dialling pause (,). A total of 4 numbers can be stored (n = 0-3).

# CHAPTER 4 MNP AND V.42 COMMANDS

**Table 2** MNP Commands

ATVA	Maximum MNP Block Size
ATVB	Send Break Signal to remote modem
ATVC	Buffer data when setting up MNP connection
ATD/n	Select one of 4 stored telephone numbers
ATDL	Redial
ATNE	Data echo during normal connection
ATNF	Display stored telephone numbers
ATNG	Modem-to-modem flow check
ATNU	Baud rate adjustment via the computer
ATNK	Type of break control
ATNW	Data transmission mode
ATLO	Setting up an MNP connection in On-line operation
ATLP	Storing a telephone number
ATLQ	Serial flow check
ATLS	Display current modem configuration
ATLT	Inactivity timer
ATLU	Accept an MNP connection from normal connection
ATLV	MNP connection messages
ATLX	Treating the XON/XOFF signal
ATLY	Switching from normal mode to MNP mode
ATLZ	Switching from MNP mode to normal mode
AT%A	Determining a Fallback character in association with \C2
AT%C	Authorising data compression
AT%E	Authorising automatic Retrain
AT%R	Display S register values
AT%V	Display Firmware version
ATVA	Maximum MNP Block Size

**Table 3** V.42bis Commands

ATWn	Authorising V.42 modem messages
AT&Kn	Local serial flow check
AT&Qn	Authorising V.42bis operation

## \A – Maximum MNP Block Size

The \A command determines the maximum size of data blocks for MNP 4 and MNP 5 (but not for MNP 1 to 3).

ATVAO Maximum block size is 64 Bytes

ATVA1 Maximum block size is 128 Bytes

ATVA2 Maximum block size is 192 Bytes

ATVA3 Maximum block size is 256 Bytes (factory setting)

## \B – Sending a Break Signal

The \B command is used to send a Break signal to the remote modem. (See also \K command covering the effects of a Break signal). To enter the \B command, you must first quit any existing data connection to return to the command mode, using the Esc- sequence. The length of the Break signal is preset to 300 ms.

## \C – MNP Buffer

The \C command determines whether the data received during the setting-up of the MNP connection are buffered and whether the Fallback character (%A command) is recognized.

AT\CO No buffering during the setting-up of the MNP connection and the Fallback character is not recognized (factory setting).

AT\C1 During the setting-up of an MNP connection, up to 200 characters are stored in the buffer. The Fallback character is not recognized. If the buffer is filled before the MNP connection is complete, the modem sets up a normal connection and the buffered data are transferred to the computer.

AT\C2 During the setting-up of an MNP connection, no characters are stored in the buffer. If the modem recognizes a Fallback symbol during this setting-up process, it will break off the MNP "proceedings" and set up a normal connection.

## **D/ – Dialling a Stored Telephone Number**

The ATD/n command can be employed to dial a telephone number which has been stored in memory with \Pn (n = 0-3).

## **DL – Redial**

The last telephone number you called is re-dialled. It remains stored until the modem is switched off.

## **\E – Data Echo during a Normal Connection**

AT\E0 Echo switched off

AT\E1 Echo switched on

## **\F – Displaying Stored Telephone Numbers**

This gives a display of the telephone numbers stored in memory using \Pn.

## **\G – Flow Check (XON/XOFF)**

The \G command determines whether the "Modem-to-Modem" Flow Check is switched on during a normal connection (see \N0 command). If the MNP buffer is full, the modem sends a "XOFF" character (13 dec.) to the computer, so that this will discontinue the data transmission. As soon as the buffer is ready to accept data again, the modem sends a "XON" character (11 dec.) and the computer starts transmitting data again.

AT\GO XON/XOFF: Flow check "Off" (factory setting)

AT\G1 XON/XOFF: Flow check "On" (see \Q)

## **\J – Baud Rate Adjustment**

The \J command is used to adjust the speed of transmission between modem and computer, independent of the speed of transmission along the telephone line.

AT\J0 Baud rate adjustment switched "off". The speed of transmission modem/computer remains unchanged at the interface, even where the speed of transmission modem/modem is lower. If the interface speed is set to 4800 (9600) bps and MNP connections are authorised, you should specify \J0. If the modem speed is not the same as the interface speed, the buffer can overflow unless a flow check is employed, thus leading to loss of data.

AT\J1 Baud rate adjustment switched "on". The modem operates on the RS-232 interface at the same speed as on the telephone line.

You can use this setting where the computer sets



the correct speed on the basis of modem messages (autobaud) or can adjust its speed to input characters (factory setting).

## VK – Type of Break Control

The VK command determines how the Break signal is handled.

**Table 4** K-Command Parameters

	Break from Computer in CONNECT condition during a normal or MNP connection	Break from Computer in CONNECT condition during a DIRECT connection	Break from remote modem in CONNECT condition during a normal connection	VBn command from computer in command mode during a normal or MNP connection
VK0	Break to remote modem; modem goes into command mode	Break to remote modem; modem goes into command mode	Clears buffer; break to computer	Clears buffer; break to remote modem
VK1	Clears buffer; break to remote modem	Break to remote modem	Clears buffer; break to computer	Clears buffer; break to remote modem
VK2	As VK0	As VK0	Break to computer	Break to remote modem

VK3	Break to remote modem	As VK1	As VK2	As VK2
VK4	As VK0	As VK0	Break in data sequence to computer	Break in data sequence to remote modem
VK5	Break in data sequence to remote modem	As VK1	As VK4	As VK4

## VN – Data Transmission Mode

The VN command determines the data transmission mode (direct, normal or MNP).

**ATVN0** The modem attempts to establish a normal connection (without data compression and error correction). Data are buffered as with MNP, permitting various data speeds at interface and on the telephone line (see VJ). (factory setting).

**ATVN1** The modem establishes a direct connection with the remote modem. No MNP and the Baud rate at the interface is adjusted to the Baud rate on the telephone line. To achieve successful data transmission, the data speed at the computer must be aligned to match the transmission speed.

**ATVN2** The modem attempts to set up an MNP connection. If MNP is not authorised at the remote modem, this breaks off the connection and goes into command mode.

AT\N3 Depending on the remote modem setting, the modem will attempt to set up a normal, MNP or V.42 connection (Auto Reliable Mode). Hardware flow check is authorised (factory setting).



*Some types of modem will not accept any MNP connection. In such cases, use the \N0 command (buffering) or the \N1 command (direct mode).*

## \O – Setting Up an MNP Connection during On-Line Operation

You can use this command to switch from a normal connection to an MNP connection. It does not matter which modem set up the connection originally.

In order to employ this command, the remote computer in a normal connection condition must first send the \U command to the remote modem. Thereafter, you have 12 sec in which to enter the Esc sequence and the \O command. As soon as it receives the \O command, the modem will immediately attempt to set up an MNP connection. If this is unsuccessful on two occasions, it will return to a normal connection. Where an MNP connection exists, the \O command has no affect.

## \P – Storing a Telephone Number

The \Pnx command can be used to store up to 4 telephone numbers in the NVRAM (as the &Z command). In this, the character “n” (n = 0-3) represents the memory position and “x” the dialling “string”. The command line can be a maximum of 30 characters, including the dialling parameters.

For example

command: AT\P1T0681982120

effect: The tone dialling number 0681 982120 is stored in number memory 1.



*Stored numbers can be dialled by using D/n.*

## \Q – Serial Flow Check

The \Q command specifies the modem/computer flow check:

- Software flow check (XON/XOFF). The modem sends ASCII characters with the transmitted data
- Hardware flow check (RTS/CTS). Special RS-232 signal lines control the flow of data.

These two methods enable the modem to stop the computer and the data transmission and not to restart transmission until the memory is ready.

AT\Q0 Flow check switched “off”

AT\Q1 Bi-directional XON/OFF flow check. The modem sends ASCII characters to the computer (and the computer to the modem). (See also \X command.)

AT\Q2 Uni-directional CTS flow check. When the modem switches on the CTS signal, the computer transmits data until the CTS signal is switched off again by the modem.

AT\Q3 Bi-directional RTS/CTS flow check. The modem uses the CTS signal to start and stop the transmission of data from the computer. The RTS signal controls data transmission from the modem to the computer (RTS “off”: modem stops data transmis-

sion. RTS “on”: modem transmits data). (Factory setting).

AT\Q4 Uni-directional XON/XOFF flow check. As for \Q1 but here the modem does not react to XON/XOFF signals from the computer.



*The RTS/CTS flow check is absolutely essential where binary data are being transmitted which can themselves contain XON/XOFF characters.*

## \S – Displaying Current Modem Configuration

The \S command is used to issue the active commands and register values. In addition, it will provide information regarding the type and duration of the current (last) connection.

**Table 5** Current Modem Configurations

IDLE	000:00:00	
LAST DIAL	9999	
MODEM BPS	---	AT
MODEM FLOW	OFF	AT\G0
MODEM MODE	DIR	AT\N1
AUTO ANS.	OFF	ATS0=000
SERIAL BPS	9600	AT
BPS ADJUST	OFF	AT\J0
SERIAL FLOW	BHW	AT\Q3
PASS XON/XOFF	OFF	AT\X0
PARITY	8N	AT
BREAK	5	AT\K5
EXIT CHAR	043	ATS2=043
CMD ECHO	ON	ATE1
RESULTS	ON	ATQ0
RESULT TYPE	LONG	ATV1W0

DATA ECHO	OFF	AT\E0
INACT TIMER	000	AT\T000
AUTO RETRAIN	OFF	AT%E0
COMPRESSION	ON	AT%C1
MAX BLK SIZE	256	AT\A3
AUTO BUFF	0	AT\C0
AUTO CHAR	000	AT%A000
PAUSE TIME	002	ATS8=002
DTR	2	AT\D2
CARR DET	1	AT\C1
SPEAKER CTRL	1	ATM1
LEASE LINE	OFF	AT&L0
ASYNC/SYNC	0	AT&Q0
CTS/RTS	OFF	AT&R0
RDLB ENABLE	ON	AT&T4
DIAL MODE	1	ATX1
PULSE DIAL	US	AT&P0
GUARD TONE	0	AT&G0
BELL	OFF	ATB0
OK		

## \T – Inactivity Timer

The \Tn command determines how many minutes (n = 0 - 90) a data connection can remain without activity, before the modem breaks off the connection. (Factory setting = 0; timer switched off).

## \U – Accepting an MNP Connection

The \U command determines whether the modem will accept an MNP connection from a normal connection when it is in On-line mode. Firstly, however, the Esc sequence must be entered, followed by the \U command. The modem will

then wait 12 seconds for an enquiry from the remote modem for an MNP connection. If this attempt at a connection is unsuccessful, the modem will return to a normal connection. If an MNP connection already exists, the \U command has no affect.

## **\V – MNP Switching Messages**

The \V command controls the CONNECT messages, with information on data compression and error correction. The message format (numeric or verbal) is determined within the \V command, while the value of the X command determines what messages are issued (see X command).

ATV0 No MNP connection messages.

ATV1 MNP connection messages authorised.

## **\X – Onward Transmission of an XON/XOFF Signal**

The \X command determines whether the ASCII characters of the flow check can be transferred to the remote modem.

ATX0 XON/XOFF characters are recognized but not transferred (factory setting)

ATX1 XON/XOFF characters are recognized and are transferred to the remote modem. With the \X0 setting, the XON/XOFF characters sent by the local computer to the local modem are not transmitted on to the remote modem. On the other hand, XON/XOFF characters received from the remote modem can be used to check the flow of data from modem to modem; however, they cannot be transmitted onward to the local computer. In the \X1 set-

ting, XON/XOFF characters from the local computer are transmitted to the remote modem and XON/XOFF characters received from the remote modem are transmitted to the local computer (the \X1 option applies only to the normal operational mode).

## **\Y – Switching to Reliable Mode**

With this command, the modem attempts to set up an error-free connection from a normal connection. In the “Originate” mode, the modem introduces an error-free connection following this command. In the “Answer” mode, it accepts an error-free connection.

The \Y command can be used only in the Esc command mode. If no error-free connection is created, the modem switches back to a normal connection (see \O command).

## **\Z – Switching to Normal Mode**

This command causes both the local and the remote modems to switch back from the error-free, MNP (“Reliable”) operation to “Normal” mode. This results in the loss of all the data in the buffer. You must be in Esc command mode in order to actuate the \Z command.

## **%A – Fallback Character**

The %A command determines the character which will cause the modem to return (Fallback) from an MNP connection to a “Normal” connection. To this end, the \C2 command must be active (see \C2) and you must enter the %A command before an MNP connection is established. (n = 0-127 ASCII). The Fallback character must be entered *during* the

setting up of the MNP connection. The factory setting is n = 13 (Enter key).

### **%C – Authorise Data Compression**

The %C command determines whether an MNP 5-data compression is carried out.

AT%0 MNP 5 data compression not authorised

AT%1 MNP 5 data compression authorised

### **%E – Authorise Automatic Retrain**

AT%E0 No Automatic Retrain authorised

AT%E1 Automatic Retrain if there is a poor connection

### **%R – Displaying Recorded Values**

The AT%R command displays the values for Registers S0 to S29 in both hexadecimal and decimal configurations.

### **%V – Displaying Firmware Version**

The AT%V command displays the ROM version number.

## **V.42 Commands**

### **W – Authorising V.42 Modem Messages**

ATW0 V.42 modem messages not authorised (factory setting).

ATW1 V.42 modem messages authorised.

### **&K – Determining Flow Check**

The command AT&K determines the flow check control for modem/computer with V.42 connections (see also AT\Q Command).

- Software Flow Check (XON/XOFF; Transmission On/Off) where ASCII characters from the modem are blended in with the transmitted data, in order to control the data flow.
- Hardware Flow Check (RTS/CTS; Request to Send/Clear to Send), where special RS-232 signal lines between the modem and computer are used to control data flow.

With both methods, the computer stops the transmission of data when the data store is full and transmits when the store can accept data.

AT&K0 Flow Check switched off.

AT&K1,2 Modem message ERROR

AT&K3 Bi-directional RTS/CTS flow check. The modem uses the CTS signal to start and stop data transmissions from the computer. The RTS signal is used to control the transmission of data from the modem to the computer (RTS “off”: modem stops data transmission. RTS “on”: modem transmits data) (Factory setting).

AT&K4 Bi-directional XON/XOFF Flow Check. The modem sends ASCII characters to the computer (and from the computer to the modem) in order to control the flow of data.

AT&K5 Transparent XON/XOFF flow check.

## **&Q – Using the V.42bis Standard**

The AT&Q command is used to establish a connection with data compression as per V.42bis.

AT&Q4 Modem message ERROR.

AT&Q5 This instructs the modem to set up a data connection as per V.42bis. To prevent a V.42bis connection, you should issue the command &Q0, &Q3 or &Q6 (or change the register values S36, S46 and S48).

AT&Q6 Modem sets up a data connection with buffer.

## CHAPTER 5 S-REGISTERS

The modem has S registers for the storage of active configurations. The contents of a number of registers are filed in a non-volatile memory (NVRAM) which can be interrogated via the Z-, &Y- and &W- commands. The following registers are stored in the NVRAM: S0, S14, S18, S21, S22, S23, S25, S26, S27

Most registers can also be affected via AT commands.

**Table 6** The S-Registers

Register	Range	Default	Description
Standard-Registers			
S0	0-255 ring character	00	No. of ring characters before modem engages
S1	0-255 ring character	00	Ring character counter
S2	0-127 ASCII	43	Character for Esc sequence
S3	0-127 ASCII	13	Character for carriage return
S4	0-127 ASCII	10	Character for line feed
S5	0-32, 127 ASCII	08	Character for backspace
S6	2-255 sec	03	Waiting time for dialling tone
S7	1-60 sec	30	Waiting time for carriage after dialling
S8	0-255 sec	02	Pause character Comma
S9	1-255 1/10 sec	06	Answer time after carrier recognition
S10	1-255 1/10 sec	14	Delay from carrier loss to hanging up
S11	50-255 1/1000 sec	90	Dialling speed (fixed)
S12	20-255 1/50 sec	50	Guard time for Esc sequence
S13	-	-	Not in use

Register	Range	Default	Description
S14	(Read only)	170	Bit-map options
S15	-	-	Not in use
S16	(Read only)	128	Modem test options
S17	-	-	Not in use
S18	1-255 sec	00	Maximum test loop time
S19	-	-	Not in use
S20	-	-	Not in use
S21	-	00 hex	Bit-map options
S22	-	70	Bit-map options
S23	-	027	Bit-map options
S24	-	-	Not in use
S25	0-255 1/100 sec	05	Delay time for DTR recognition
S26	0-255 1/100 sec	01	Delay from RTS to CTS
S27	-	00	Bit-map options
MNP-Registers			
S36	-	07	Bit-map options
S37	0-126, 128	00	Autoreliable fallback character
S38	-	20	Bit-map options
S39	-	03	Flow control
V.42 Registers			
S36	0, 1, 3, 4, 5, 7	7	Fallback in setting up Connection
S46	136, 138	138	Protocol selection
S48	0, 3, 7, 128	107	Recognition of remote modem settings
S82	3, 7, 128	128	Break signal

## Standard S Registers

### **S0 – Ring Character before Modem engages**

The value in this Register indicates how many ring characters will occur before the modem automatically answers a call. When S0 = 0 the automatic answering is switched off.

Range: 0 to 255 ring characters

Factory setting : 0

### **S1 – Ring Character Counter**

The value of this Register is increased by 1 for every ring character and is deleted again where pauses of longer than 8 sec occur.

Range: 0 to 255 ring characters

Factory setting: 0

### **S2 – Character for Esc Sequence**

This is the ASCII value of the character defined as the Esc sequence. It is used to switch from data mode to command mode. The factory setting (43) represents the plus sign (+). You can enter values between 0 and 255 in this Register; however, the Esc sequence is switched off where values exceed 127.

Range: 0 to 255

Factory setting: 43 (ASCII+)

### **S3 – Character for Carriage Return**

This is the ASCII value of the carriage return, which is used to complete command lines and modem messages.

Range: 0 to 127

Factory setting: 3 (ASCII CR, carriage return)

### **S4 – Character for Line Feed**

This is the ASCII value for the line feed character. The modem sends this character after the CR character, to end verbal modem messages.

Range: 0 to 127

Factory setting: 10 (ASCII LF, Line feed)

### **S5 – Character for Backspace**

This is the ASCII value of the backspace, which is used to delete the character to the left of the cursor (and the last character in the command memory).

Range: 0 to 32, 127

Factory setting: 08 (ASCII Backspace)

### **S6 – Waiting Time for Dialling Tone**

The value of the S6 register determines when the modem will begin dialling after “lifting” the receiver. During this period, it must wait for the dialling tone. The function of the S6 Register depends on the X command. Where X0, X1 or X3 occur, the modem will wait for the pre-determined time, even if the dialling tone occurs earlier.

Factory setting: 3 sec fixed



## S7 – Waiting for the Carrier Signal

The S7 Register determines how long the modem will wait for a carrier signal from the remote modem, before it “hangs up”.

Range: 0 to 60 sec

Factory setting: 30 sec

## S8 – Pause Time using Comma

In the dialling command, dialling pauses can be entered by using the comma character.

Range: 0 to 255 sec

Factory setting: 2 sec

## S10 – Line Break on Carrier Loss

The S10 Register determines the period of time which can elapse after loss of carrier by the opposite party, before the connection is broken.

Range: 1 to 254 1/10 sec

Factory setting: 14 (1.4 sec)

## S11 – Dialling Speed

The length of the characters and pauses with tone-dialling is 90 ms (fixed).

## S12 – Guard Time for the Esc Sequence

The Guard time stored in the S12 Register determines the period of time, during which the modem cannot accept characters, both before and after the Esc sequence (+++). Further, the time between the individual Esc characters must not

be longer than the Guard time. Otherwise, the modem cannot recognize the Esc sequence.

Where the Register value is zero, the modem will always go into command mode after 3 successive Esc characters. The value must be greater than 20 in order to activate the Guard time.

Range: 0 or 20 to 255; interval 20 ms

Factory setting: 50 (1 sec)

## S14 – Bit-Map Options

Bit	Value	Description
0	-	Reserved
1	0	Echo off (E0)
	1	Echo on (factory setting)
2	0	Modem messages on (Q0; factory setting)
	1	Modem messages off (Q1)
3	0	Numeric modem messages (V0)
	1	Verbal modem messages (V1)
4	0	Accept entered commands (factory setting)
	1	Ignore entered commands
5	0	Tone dialling (T)
	1	Pulse dialling (P; factory setting)
6	-	Reserved
7	0	Answer mode (A, D)
	1	Originate mode (factory setting)

## S16 – Bit-Map Options

Bit	Value	Description
0	0	Local analogue test loop off (factory setting)
	1	Local analogue test loop on (&T1)
1	-	Reserved
2	0	Local digital test loop off (factory setting)
	1	Local digital test loop on (&T3)
3	0	No remote digital test loop from remote modem
	1	Remote digital test loop from remote modem authorised
4	0	Locally triggered remote digital test loop off
	1	Locally triggered remote digital test loop on (&T6)
5	0	Locally triggered remote digital test loop with Self Test off
	1	Locally triggered remote digital test loop on (&T7)
6	0	Local analog test loop with Self Test off
	1	Local analog test loop with Self Test on
7	0	Automatic Retrain not authorised (%E0)
	1	Automatic Retrain authorised (%E1)

## S18 – Setting Maximum Test Time

Where S18 = 0, test loops must be terminated with T0.

Range: 0 to 255 sec

Factory Setting: 0 (no test time limitation)

## S21 – Bit-Map Options

Bit	Value	Description
0, 1	-	Reserved
2	0	RTS follows CTS (&R0: Factory setting)
	1	Modem ignores RTS; CTS in data mode on (&R1)
3, 4	0, 1	Reserved
	2	When DTR changes from On/Off, modem goes into command mode and off-line (&D2; factory setting)
	3	Reserved

Bit	Value	Description
5	0	DCD always on (&C0)
	1	DCD on when carrier is recognized (&C1; Factory setting)
6	0	DSR always n (&S0; factory setting)
	1	In data mode "receiver lifted" (&S1) (Factory setting)
7	0	Long Space Disconnect not authorised (Y0; Factory setting)
	1	Long Space Disconnected authorised (Y1)

## S22 – Bit-Map Options

Bit	Value	Description
0-3	-	Reserved
0	0	Modem goes on-line for dialling, waits for the time preset in S6 Register and dials, independent of dialling tone. CONNECT message when connection is made (X0)
	1-3	Reserved
4-6	4	As 0 but also CONNECT1200/2400 messages
	5	As 4 but modem waits up to 5 sec for a dialling tone (X2)
6	6	As 4 but recognizes engaged tone and gives BUSY message (X3) (X3; factory setting)
	7	As 4 but modem waits up to 5 sec for a dialling tone, recognizes engaged tone and gives BUSY message (X4)
7	-	Reserved

## S23 – Bit-Map Options

Bit	Value	Description
0	0	Remote digital test loop for remote modem not authorised (&T5)
	1	Remote digital test loop for remote modem authorised (&T4; factory setting)
1-3	0	Transfer speed 0 to110 bps
	1	Transfer speed 300 bps
	2	Transfer speed 1200 bps
	3	Reserved
	4	Transfer speed 4800 bps
	5	Transfer speed 9600 bps
4, 5	6	Transfer speed 19200 bps
	0	Even parity
	1	Space parity/no parity
	2	Odd parity
6, 7	3	Mark parity
	0	No Guard tone (&G0; Werkseinstellung)
	1	Guard tone 550 Hz (&G1)
	2	Guard tone Hz (&G2)
	3	Reserved

## S25 – DTR Delay Time

The S25 Register determines how long the modem requires in order to recognize the change-over of the DTR signal.

Range: 0 to 255 1/100 sec

Factory setting: 5 (0.05 sec)

## S26 – Delay from RTS to CTS

The S26 register determines when the modem will switch on the CTS signal after an On/Off change to the RTS.

Range: 0 to 255 1/100 sec

Factory setting: 1 (0.01 sec)

## S27 – Bit-Map Options

Bit	Value	Description
0,1,3	0	Asynchronous (&M0; factory setting)
	1	Synchronous mode after dialling (&M1)
	2	Supports synchronous terminals (&M2)
	3	Manually synchronous dialling (&M3)
	4	Reserved
	5	Asynchronous error check
	6	Asynchronous with buffer
2, 3	7	Reserved
	-	Reserved
4, 5	0	Modem produces clock signal (&X0; factory setting)
	1	Modem accepts external clock signal (&X1)
	2	Pulse loop (&X2)
6	0	CCITT V.22/V.22bis ( <b>B0</b> )
	1	Bell 212A ( <b>B1</b> ; factory setting)
7		V.23 Standard ( <b>B2</b> )

## MNP Registers

### S36 – Bit-Map Options

Bit	Value	Description
0,1	0	Standard (non-MNP) connection (I <sub>N0</sub> )
	1	Direct connection only (I <sub>N1</sub> ; factory setting)
	2	MNP only
	3	Auto-Reliable
2	0	XON/XOFF flow check "off" (I <sub>G0</sub> ; factory setting)
	1	XON/XOFF flow check "on" (I <sub>G1</sub> )
3	0	XON/XOFF characters recognized but not sent to remote modem (I <sub>X0</sub> ; factory setting)
	1	XON/XOFF characters recognized and sent to remote modem (I <sub>X1</sub> )
4, 5	-	Reserved
6, 7	0	Flow check "off" (I <sub>Q0</sub> ; factory setting)
	1	XON/XOFF flow check (I <sub>Q1</sub> )
	2	Unidirectional CTS flow check (I <sub>Q2</sub> )
	3	Bidirectional RTS/CTS flow check (I <sub>Q3</sub> )

### S37 – Fallback Characters in Autoreliable Mode

This Register determines the character which returns the modem from an MNP (Reliable) connection to a normal connection.

Range: 0 to 127 (ASCII)

Factory setting: 0

### S38 – Bit-Map Options

Bit	Value	Description
0,1	0	No buffer (I <sub>C0</sub> ; factory setting)
	1	Buffer; 4 sec or 200 characters or until a packet is recognized (I <sub>C1</sub> )
	2	As 0 but on receipt of a Fallback character returns to normal operation (I <sub>C2</sub> )
2	0	Baud rate adjustment not authorised (I <sub>J0</sub> )
	1	Baud rate adjustment authorised (I <sub>J1</sub> )
3	0	No data echo with normal connection (I <sub>E0</sub> ; factory setting)
	1	Echo "on" (I <sub>E1</sub> )
4	0	No MNP modem messages (I <sub>V0</sub> ; factory setting)
	1	MNP modem messages authorised (I <sub>V1</sub> )
5, 6	-	Reserved
7	-	Send break signal to remote modem (I <sub>B</sub> )

### S39 – Bit-Map Options

Bit	Value	Description
0-2	0	Flow check switched off (&K0)
	1, 2	Modem message ERROR
	3	Bidirectional RTS/CTS flow check (&K3; Factory setting)
	4	Bidirectional XON/XOFF flow check (&K4)
	5	Transparent XON/XOFF flow check
3-7	-	Reserved

## V.42 Registers

### S36 – Controlling the Setting up of Connections

Range: 0 to 7 (ASCII)

Factory setting: 7

- 0: Modem disconnects
- 1: Modem remains on-line and starts data transmission in asynchronous direct mode
- 2: Reserved
- 3: As 1 but with buffer (&Q0)
- 4: Modem seeks a connection with the V.42 alternative protocol (compatible with MNP 2-5). If the handshake is unsuccessful, the modem disconnects
- 5: As 4 but an asynchronous direct connection is established if the handshake is unsuccessful
- 6: Reserved
- 7: As 4 but a normal connection with buffer is established if the handshake is unsuccessful (factory setting)

### S82 – Handling the Break Signal

The S82 Register determines how the modem will handle the Break signal during a V.42 connection (depends on the communication software used).

Range: 3, 7, 128 (ASCII)

Factory setting: 128

# CHAPTER 6 MODEM MESSAGES

Modem messages are a response by the modem to the computer, after a modem command has been entered. Messages can be in full (verbal; V1) or in digital form (numeric; V0). The X command in force at the time will determine which messages are authorised. Extended modem messages containing information on data connections with error correction and compression, are controlled by the \V command (for MNP protocols) or by the W command (for V.42 protocols).

**Table 7** Standard Messages (see V-command)

Verbal	Numeric	Description	Active X Command				
			X0	X1	X2	X3	X4
OK	0	Modem successfully completed command	*	*	*	*	*
CONNECT	1	Data connection made to remote modem with an available Baud rate (X0) or with 300 bps (X1-X4)	*	*	*	*	*
RING	2	Modem recognizes incoming call	*	*	*	*	*
NO CARRIER	3	Modem has lost carrier or not recognized it in specified time (S7 register) and goes into command mode	*	*	*	*	*

Verbal	Numeric	Description	Active X Command				
			X0	X1	X2	X3	X4
ERROR	4	Modem has recognized an error in command line and goes into command mode	*	*	*	*	*
CONNECT 1200	5	Modem has set up data connection with 1200 bps and goes into data mode		*	*	*	*
NO DIAL-TONE	6	Modem has gone on-line and has not recognized a dialling tone within 5 seconds	*	*			
BUSY	7	Modem recognizes engaged character after automatic dialling				*	*
NO ANSWER	8	After dialling parameter @ modem has not recognized a 5 sec pause		*	*	*	*
ABORTED	9	Receiver not on hook	*	*	*	*	*
CONNECT 2400	10	Modem has set up data connection with 2400 bps and goes into data mode		*	*	*	*
CONNECT 4800	11	Modem has set up data connection with 4800 bps (buffer) and goes into data mode		*	*	*	*
CONNECT 9600	12	Modem set up data connection with 9600 bps (buffer) and goes into data mode		*	*	*	*

**Table 8** MNP Messages (see \V command)

Verbal	Numeric		Description	Active X Command				
	MNP	V.42		X0	X1	X2	X3	X4
CONNECT 9600/REL	25	20	Modem has set up MNP data link with 9600 bps and goes into data mode. No info. on data compression		•	•	•	•
CONNECT 4800/REL	24	19	Modem has set up MNP data link with 4800 bps and goes into data mode. No info. on data compression		•	•	•	•
CONNECT 2400/REL	23	18	Modem has set up MNP data link with 2400 bps and goes into data mode. No info. on data compression		•	•	•	•
CONNECT 1200/REL	22	17	Modem has set up MNP data link with 1200 bps and goes into data mode. No info. on data compression		•	•	•	•
CONNECT 300/REL	20	17	Modem has set up MNP data link with 300 bps and goes into data mode. No info. on data compression		•	•	•	•

**Table 9** V.42 Modem Messages (see W command)

Verbal	Numeric	Description	Active X Command				
			X0	X1	X2	X3	X4
PROTOCOL: NONE	70	Modem has set up a direct connection or connection with buffer and goes into data mode		•	•	•	•
PROTOCOL: LAP-M	77	Modem has set up a V.42 LAP-M data connection and goes into data mode		•	•	•	•
PROTOCOL: ALT	80	Alternatives Protokoll; Modem hat MNP-Verbindung aufgebaut und geht in den Datenmodus		•	•	•	•
COMPRESSION: NONE	69	Modem goes into data mode. No data compression		•	•	•	•
COMPRESSION: CLASS 5	66	Modem goes into data mode; MNP 5 data compression was handled		•	•	•	•
COMPRESSION: V.42bis	67	Modem goes into data mode; data compression was handled to V.42bis					

## CHAPTER 7 TROUBLE-SHOOTING

If a fault occurs while you are using your SR 2496 Modem, the following list of the most frequent faults, with the corrective measures to be taken, will be of help to you.

- Modem issues ABORTED messages when you attempt to set up a connection:  
Replace the handset.

- Modem issues NO DIALTONE message when you attempt to set up a connection:  
Check the X-command parameter. If necessary, try the ATX1 command.

- Modem will not dial:  
Check that the connection between modem and computer is correct (in Pulse dialling, the ON-LINE LED must flicker at the same rate as the dialling pulses. See installation instructions in Chapter 1).

- The installation is correct but there is no access to the modem:  
Check that the COM interface you have selected is not already occupied by another serial unit (eg. a mouse). Each serial unit which is installed requires its own COM interface (eg. Mouse on COM1 and modem on COM2). If necessary,

installation of transfer the driver software (eg. mouse driver) must be modified.

- No connection to remote modem:  
Have you entered the correct number? Do the dialling parameters match the requirements of your private automatic branch exchange? Is it necessary, for example, to dial a zero to obtain an outside line and is it necessary to have pauses during the dialling process? Does the private automatic branch exchange operate with pulse-dialling or tone-dialling?

(See Chapter 2: Setting up Connections and Chapter 3: D and X commands).

The manufacturer of the private automatic branch exchange will be able to advise you on the dialling process required.

(See also Chapter 2: Setting up Connections and Chapter 3: D and X commands).