Mwave Plug & Play Communication Adapter

USER'S GUIDE

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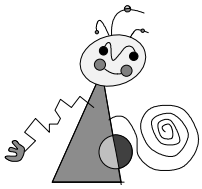
Version 1.0/GB June 1996



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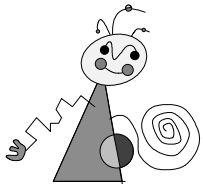


For your own safety

In the interest of your own safety and the flawless functioning of your new product and computer system please note the following:

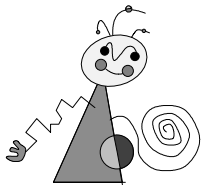
Before opening the computer make sure that the power plug is disconnected from the main socket.

Computer components are sensitive to static charge. Divert any electrostatic charge from your person before touching the components with your hands or any tools.

Make sure that the components you want to add to the computer are in compliance with the computer's characteristics.

Avoid address conflicts!

For changes that have occurred after the manual has been printed, refer to the README file/s on the CD supplied with your system! In the Windows File Manager double-click the README file to get the latest information.



About the manual

This manual explains how to install and use the Mwave Communication Adapter hardware and software.

Subheadings In the margins are subheadings to help you quickly find your way through this manual.

Important text passages are marked with the “notepad” and this format.

Numbers mark step by step instructions:

1. Start Windows.

Bullets mark instructions for optional steps the order of which is not important:

- Connect the board to the microphone.

All keyboard commands appear in this font:

`install` <↵>

represents the enter key.

Menus, commands, options or buttons which the user can select are written in *italics.*

Overview

Thank you for purchasing the Mwave Plug & Play Communication Adapter (hereafter referred to as “Mwave Communication Adapter”).

Your Mwave Communication Adapter is an all-in-one communication system—it provides:

- Complete telephony functionality
- Extensive fax/modem features
- Access to on-line services and Internet
- High performance
- ... and more.

This Mwave Communication Adapter User’s Guide explains how to install your hardware and software to use your Mwave Communication Adapter. Even if you don’t like reading manuals, we strongly recommend you take the time to browse the chapters so that you can decide which components you want to install.

This manual contains several terms with which you might not be familiar. Refer to the Glossary at the end of the manual for definitions of terms.

PRODUCT OVERVIEW

Your Mwave Communication Adapter provides numerous functions that would otherwise be available only by purchasing several different circuit boards. On a single board, miro has incorporated a fax machine, modem, telephone, telephone answering device. Your Mwave Communication Adapter is compatible with the Telephone Application Interface (TAPI).

Your Mwave Communication Adapter utilizes the Mwave technology developed by IBM. The board contains the MWAVE MDSP-2780 (DSP is an abbreviation for Digital Signal Processor).

The Mwave V.34 modem runs as realtime task on the Mwave DSP and works together with the modem device driver on the x86 host. The Mwave Manager allows the modem device driver to load the required modules/segments in real-time and to remove segments which are no longer in use. This means that the DSP resources are automatically and dynamically managed. This feature, called DynaSeg™, provides an enormous flexibility and makes for example simultaneous data/voice transmission possible with a V.34 modem.

FEATURES

- Modem support with a data transfer rate up to 28,800 bps, V.34
- Fax support with a data transfer rate up to 14,400 bps, V.17
- Connection to existing telephone lines
- Parallel operation with your existing telephone
- Telephone and data transmission over one telephone line (Mwave DSVD = Voice over data function)
- Call answering functions
- Full duplex speaker phone for hands-free operation
- Automatic discrimination between modem, fax, and voice data

WHAT IS PLUG & PLAY?

Before Windows 95 has been introduced, the user always had to take some hurdles when installing a new hardware component. Often the user had to set some jumpers on the board before the hardware installation. After having inserted the board into the computer he had to install the driver software and to select interrupts, DMA channels and/or IRQs using a configuration tool. The Windows 95 Plug & Play technology puts an end to this. Whether the computer system includes Plug & Play-compliant or legacy (non Plug & Play-compliant) components, Windows 95 can automatically detect and configure them. After having installed a new hardware component, Windows 95 detects that a new hardware component has been found, identifies the resources (IRQs, addresses, and DMAs) that are available, the resources that are used by other hardware components and adds the configuration information for the Plug & Play device to the Registry. Then, the device drivers are installed based on the Registry settings.

SYSTEM REQUIREMENTS

The following table shows minimum hardware and software requirements for using your Mwave Communication Adapter hardware and software. If your systems does not meet the minimum requirements, contact your reseller for upgrade information.

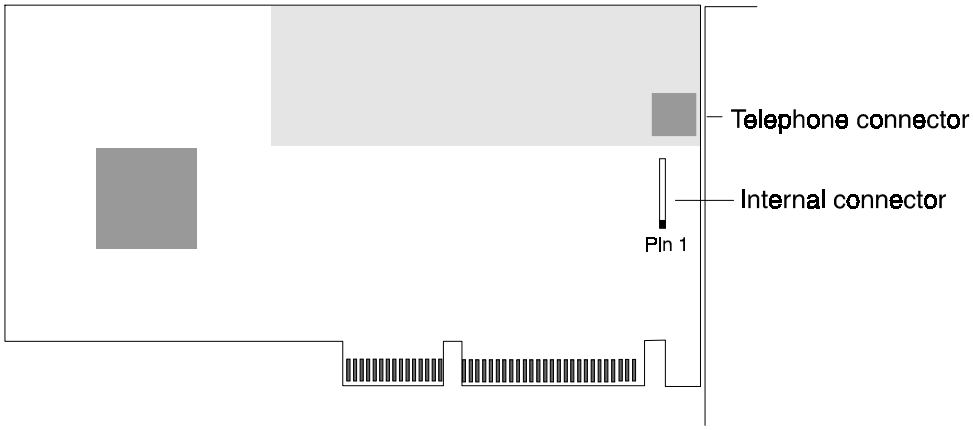
Component	Minimum Requirement	Note
Computer System	486 processor operating at 66 mHz	
RAM	8 MB	16 MB recommended
Expansion Slot	One free 16-bit ISA or EISA slot	
Operation systems	Windows 95	
Hard Disk Space	10 MB	
recommended:	CD-ROM Drive	Required for software installation*

* If you do not have nor intend to use a CD-ROM drive, you can purchase floppy disks at an additional charge.

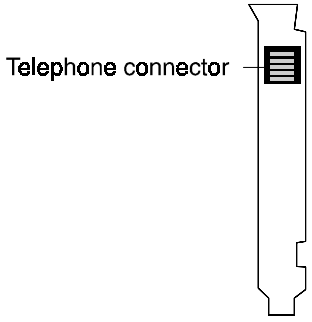
MWAVE COMMUNICATION ADAPTER DIAGRAM

The following diagram identifies the important components on your Mwave Communication Adapter circuit board. Take a few moments to study the diagram and familiarize yourself with the components and their respective names. The internal connector is described in the Appendix.

Side view



Rear view



Installation

This chapter contains step-by-step instructions for installing your Mwave Communication Adapter hardware and software. Please read this entire chapter before beginning installation procedures. Your systems configuration might require that you perform special steps during installation. The whole process will be easier if you are aware of such requirements before you begin.

To install the Mwave Communication Adapter, you need:

- a screwdriver for removing and re-installing your computer's cover and expansion slot screws.

If you already have a fax or modem card installed, we recommend you to remove it. Although you can use two fax/modems if you have a free COM port, you might experience problems in Windows or other applications.

For your information, the Mwave Communication Adapter fax/modem is fully Hayes-compatible.

INSTALLING THE MWAVE COMMUNICATION ADAPTER

It is extremely important that you always discharge any static electricity from your body before handling any of your computer components, including your Mwave Communication Adapter. To do so, touch any bare metal surface, such as the power supply unit inside your computer after removing its case. Failure to discharge static electricity can damage your computer system components.

The following steps summarize what you must do to install your Mwave Communication Adapter hardware and software. For detailed information about each step, consult the referenced sections.

Please read all steps in this section before you begin installing your Mwave Communication Adapter circuit board.

To install your Mwave Communication Adapter circuit board:

1. If your computer system is turned on, shut it down completely, and turn off all peripheral devices.
2. Disconnect the power cord and any cables connected to the back of your computer.

If you have several cables connected to your computer, you might find it helpful to identify them prior to disconnecting. Use colored pens, masking tape, or whatever method will help you reconnect each cable to its correct location.

3. Remove the cover from your computer system.
   Refer to your computer system manuals if you need help with this step.
4. Carefully touch the computer's power supply unit, or any bare metal surface, to discharge all electrostatic energy stored in your body.
5. Select an empty 16-bit ISA or EISA expansion slot to insert the Mwave Communication Adapter. If you don't have a slot available, remove one of your existing boards to make room.
6. Remove the expansion slot shield at the back of your computer.
7. Remove your Mwave Communication Adapter from its antistatic package.
8. Carefully insert the Mwave Communication Adapter into the expansion slot you've selected.
   Do this step carefully. Hold the board with both hands at its top edge. Use a gentle, end-to-end rocking motion to work the board connectors into the expansion slot. When you think the board is firmly seated, check it one last time.

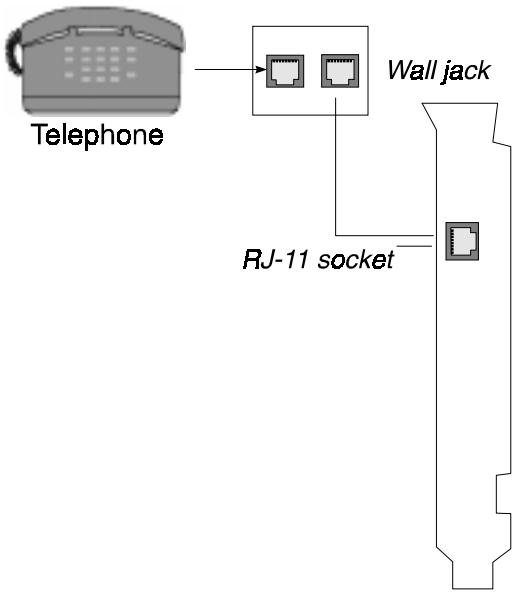
If you have trouble seating the board in the slot, don't force it. Instead, remove the board and check it visually for bent or broken connectors. Then, reinstall the board slowly and carefully.

9. Fasten the Mwave Communication Adapter's bracket to the expansion slot opening at the back of your computer. Use the screw that held the expansion slot shield or the board you removed from the slot.
10. Replace the cover on your computer and reconnect all cables you disconnected earlier.

CONNECTING THE MWAVE COMMUNICATION ADAPTER

Once you successfully installed your Mwave Communication Adapter, you can connect the Mwave Communication Adapter to a telephone wall jack and to the telephone.

To do so, use the telephone cable or cables included in your package.



INSTALLING YOUR Mwave Communication Adapter SOFTWARE

During installation, you have the opportunity to specify the disk and directory where you want to install various components. We recommend you take a few moments to plan which disk and directory you intend to use. It's best to do your planning ahead of time because once installation begins, you won't be able to explore your disks.

The amount of disk space required can vary greatly depending on which components you decide to install. You can run the setup program up to the point where it tells you disk space requirements then exit the program if you don't have sufficient space to complete installation. If necessary, you then need to free up space on your drive to meet the Mwave Communication Adapter requirements.

For maximum efficiency, you might want to defragment the drive you're going to use before installing your Mwave Communication Adapter software. If the drive is highly fragmented, your software cannot run at optimum speed. Several utility programs are available for defragmenting disks.

Your Mwave Communication Adapter package contains one CD (Compact Disc).

After you installed the Mwave Communication Adapter in your computer, Windows 95 detects the board automatically.

After the Windows 95 startup the *New Hardware Found* dialog box appears.

1. In this dialog box, click *the Driver from disk provided by hardware manufacturer* option. Click *OK*.
2. Insert CD from the Mwave Communication Adapter package contents.
3. In the *Install from disk dialog box* click *Browse*.
4. Go to you CD-ROM drive and select the MWDSPA04.INF file. Click *OK*.
5. In the *Install from disk dialog box* click *OK*.
6. Select *Mwave Plug & Play Communication Adapter* in the *Select Drive* dialog box. Click *OK*.
7. In the next dialog box, enter the desired location for your Mwave software. Click *OK*.

   The software for your Mwave Communication Adapter is now copied to your hard disk.
8. In the *System Settings Change* dialog box, click *Yes* to restart the computer.

   Windows 95 will find the Mwave Communication Adapter devices and all windows are created.
9. Confirm the message telling you that the Mwave folder setup is complete.
10. Restart Windows.

Now the Mwave Communication Adapter software installation is complete.

MWAVE QUICK TEST

After you completed the software installation, you can test you hardware with the Mwave Quick Test utility contained in the *Mwave Release x.xx* group.

CHANGING SETTINGS USING THE DEVICE MANAGER

After Plug & Play-compliant devices have been installed, Windows 95 identifies these devices and looks for free resources. If the devices which just have been installed do not want to use the resources which are occupied by the devices already installed, the settings should not change. If the devices request resources which are already used, the settings might change.

Therefore it is not recommended to change resource settings for a Plug & Play-compliant device because this would make it impossible for Windows 95 to allocate resources freely.

In some cases, for example if a conflict occurs, it may be necessary that a user has to change the resource setting after they have been configured. Then, a message should appear telling the user what he has to do. If you have to change the configuration manually, select *System* in *the Control Panel* and click *Device Manager*.

You can do either of the following:

- Look for a free resource, and allocate that resource to a device.
- Disable a conflicting Plug & Play-compliant device.
- Disable a legacy device by removing it and not loading the drivers.
- Reallocate the resources.

Changing the resource settings using the Device Manager can cause conflicts! Only experienced users should use the Device Manager.

Troubleshooting

This section describes problems you might encounter when using your Mwave Communication Adapter. The probable cause and possible solutions for each problem are provided.

INSTALLATION PROBLEMS

AUTOEXEC.BAT Because the installation software enters some SET commands in the AUTOEXEC.BAT, make sure these are set and that enough free memory is available. You can check this by entering the **`set`** command in the DOS prompt. The following variables should be shown:

SET MWPATH=C:\MWW\DLL;C:\MWW\MWGAMES;C:\MWW\DSP
SET BLASTER=A220 I5 D1
SET LIBPATH=C:\MWW\DLL
SET MWROOT=C:\MWW
SET PATH=XXX; C:\MWW\DLL;

XXX stands for the rest of the path.

EMM386 Under Windows 95 you should never use EMM386!

Motherboard On some mother boards there may be problems due to memory optimization.

BIOS Please make sure that the required IRQs (especially the DSP IRQ of the Mwave Communication Adapter) will not be used for the automatical management of the PCI slots—if present—. If necessary, disable the automatical allocation of the IRQs. This is absolutely necessary for Windows 3.1x and DOS.

ISA slot Please make sure that the Mwave Communication Adapter is seated firmly in the ISA slot on your mainboard.

Bus clock Please check, if the ISA bus clock of your computer is 8.33 MHz at the most. If the ISA bus clock is higher the Mwave Communication Adapter may not function properly. On older mainboards you can change the ISA bus clock using the jumper on your mainboard, for new mainboards only the BIOS has to be changed. For more information, refer to the manual of your mainboard.

GENERAL PROBLEMS

Your systems reports address conflicts.

Indicates an address conflict between your Mwave Communication Adapter and another device used by your computer.

Please make sure that the I/O address, the interrupt and the DMA channel used by Mwave Communication Adapter is not also used by another device on your system. To do so, check the settings in the Windows 95 device driver. If necessary, change the setting.

Refer to the Appendix “DMAs, IRQs, and Addresses” for detailed information.

Your system cannot detect your Mwave Communication Adapter, but there is no address conflict.

Normally indicates that your Mwave Communication Adapter board is not properly seated in the its expansion slot.

Shut your computer system down and check the installation of your Mwave Communication Adapter board. Refer to “Installing Mwave Communication Adapter” for instructions on installing your board.

Your system reports a COM interface conflict, but the COM interface is not in use.

Your computer is using a COM interface assignment of its own with the same number as the COM interface used by your Mwave Communication Adapter.

You need to deactivate the COM interface that is being used by your computer. You can normally accomplish this by running the BIOS Setup program when starting your computer. See your computer documentation for complete instructions.
Under Windows 95, you can also disable the COM interface using the Device Manager.

One of your disk drives is not functioning.

Normally indicates an I/O Address or DMA Channel conflict between the disk drive and your Mwave Communication Adapter.

Open the Device Manager and look for any address or channel conflicts. If present, assign different values to your Mwave Communication Adapter. Refer to the Appendix “DMAs, IRQs, and Addresses” for further details.

Your network functions have ceased to work.

Normally indicates an I/O Address conflict between your network and your Mwave Communication Adapter.

Run the the Device Manager and look for any address or channel conflicts. If present, assign different values to your Mwave Communication Adapter. Refer to the Appendix “DMAs, IRQs, and Addresses” for further details.

MODEM PROBLEMS

Your modem is not functioning—it starts, but the communication program does not run.

Normally due to a conflict between assignments for the COM interface or interrupts.

Check if the COM interface and interrupt assignments of the modem and of the application program correspond. If a conflict exists, make the necessary re-assignments.

Modem does not answer/is not accessed by the application.

Please check, if the COM port specified during the configuration is free and has not been used yet. In general, you should use COM port 4 and assign COM1 to the mouse. (Note: This could lead to problems with older graphics boards containing the S3 chip set because those use the I/O port 02E8h, this however, is already used by COM4).

You can also assign COM3 to Mwave Communication Adapter, then you have to assign the mouse to COM 2. COM1 and COM2 are mostly occupied so that they cannot be selected.

Note: Windows 95 manages the IRQs and address ranges of the COM interfaces dynamically as far as the PC BIOS admits this. This avoids conflicts. It may happen that the COM interface of Mwave Communication Adapter receives, e.g. the interrupt **IRQ 9**.
Please check to make sure if your communications or fax program permits this setting. With some old programs this is not possible. In this case, use the Windows 95 Device Manager to allocate the IRQ differently.

SOFTWARE PROBLEMS

Dialling not possible with modem or FAX

If you operate the Mwave Communication Adapter together with a PBX, it is required to add “X3” to the initialisation string. In this way, the Mwave Communication Adapter dials the desired number although you hear the busy tone or the tone of the PBX. Please make sure that you also enter the PBX number.

Board does not recognize incoming calls

If this is the case, you probably use the Mwave Communication Adapter together with a PBX. Some PBXs send tones which are not standardized. These are not recognized by Mwave Communication Adapter.

Please consult the person who is in charge of your PBX. He/she should adapt the tones for internal and external calls to the standard signal.

Technical data

Bus System 16-bit ISA or EISA Slot
Processor Mwave MDSP-2780

TELEPHONE SUBSYSTEM

Connector RJ-11 Socket
Sampling Rate 9.6 kHz
Resolution 13 bits linear
Transmit/ Receive Rate Max. 28.8 bps

CURRENT CONSUMPTION

+5V, app. 1.2 A
+12V, app. 0.08 A
-12V, app. 0.06 A

MODEM DATA

- Asynchronous operation through the COM interface
- Modem standards:
  ITU-T V.34 28.8 kbps (default setting)
  ITU-T V.32bis/14.4 kbps
  ITU-T V.32/9600 bps
  ITU-T V.22bis/2400 bps
  ITU-T V.22/1200 bps
  ITU-T V.21/300 bps (only for France)
  BELL 103/300 bps
  BELL 212A/1200 bps

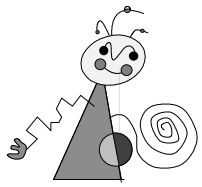
- Protocol standards:
  ITU-T V.42 LAPM error correction
  ITU-T V.42bis data compression
- MNP Class 2-4 error correction
  MNP Class 5 data compression
- Dynamic Rate Renegotiation
- Automoding
- Hayes AT command repertoire-compatibility
- Call status display, Auto-dial
- DTMF and pulse dialling *pulse dialling only for Germany

FAX DATA

- Call status display
- Auto-dial
- Tone and pulse dialling (pulse dialling only for Germany)
- G3 transmission operation
- ITU-T V. 17 14400 bps
- ITU-T V29/9600 bps
- ITU-T V.27ter 4800 bps
- ITU-T.4
- ITU-T.30
- TR-29.2 Class 2, FaxClass 2 compatible
- TR-29.2 Class 1, FaxClass 1 compatible
- Manual sending/receiving

VOICE DATA

- Voice Class 8 compatible
- Windows UniModem-V support
- Windows 95 TAPI support
- Full-duplex speakerphone
- DTMF detection and passing

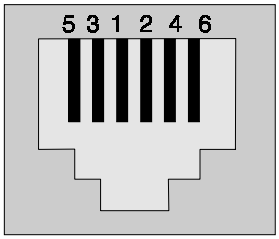


Appendix

PIN ASSIGNMENTS

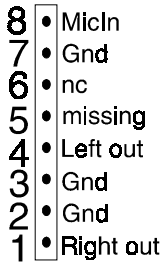
This appendix defines the pin assignment for the various connectors in your Mwave Communication Adapter board.

Telephone connection



Pin	Assignment	Pin	Assignment
1	line a	2	line b
3	telephone a2	4	telephone b2
5	not used	6	not used

Internal connector



Pin 8 (MicIn):
Use an internal cable to connect the microphone for the voice-modem function.

Pins 7, 3, 2 (Gnd):
Ground for Mic (7), Left out (3) and Right out (2)

Pin 6 (n.c.):
Not connected.

Pin 4 (Left out):
Left channel of the received signal of the telephone line.

Pin1 (Right out)
Right channel of the received signal of the telephone line.

DMAS, IRQS, AND ADDRESSES

IBM Personal Computers, compatible, and clones use DMA (Direct Memory Access) Channels, Interrupts (IRQs), and I/O Addresses in conjunction with installed expansion boards, such as the Mwave Communication Adapter. These components are used to exchange information between the expansion board and computer memory.

Each type of computer has a finite number of these components, and only one component can be assigned to any given expansion board (or, device). If two devices are assigned to use the same component, a conflict occurs which normally prevents a device from operating correctly—or operating at all.

The tables in this appendix indicate common assignments of DMAs, IRQs, and I/O Addresses for conventionally configured computer systems. Your system will probably be configured differently due to other devices being already installed. However, the tables might be of use to you in determining how best to configure your Mwave Communication Adapter. A chart is also provided to help you keep track of assignments in your particular computer system.

DMA channel

Your computer and your Mwave Communication Adapter use special channels through which they exchange information. These are known as DMA (Direct Memory Access) channels. These channels allow your Mwave Communication Adapter (and other external devices) to directly access your computer's memory, rather than going through the CPU. Bypassing the CPU in this manner significantly improves system performance.

The following table shows normal DMA assignments for most MS-DOS-compatible computers.

DMA Channel	Assignment
0	not used
1	not used
2	floppy disk controller
3	restricted availability
4	RAM Controller
5	not used
6	not used
7	not used

Interrupts (IRQs)

Your computer and Mwave Communication Adapter use a technique called interrupt request (IRQ) to communicate. For example, your Mwave Communication Adapter sends an interrupt request to your computer (to gain its attention) when it is ready to send or receive data through its assigned DMA channel. The following table shows the devices normally assigned to specific interrupts.

IRQ Number	Device	Interrupt Number
0	System Timer	08h
1	Keyboard	09h
2	EGA/VGA Boards: Connection to the second 8259A component	0Ah
3	COM2/COM4 (serial interface)	0Bh
4	COM1/COM3 (serial interface)	0Ch
5	LPT2 (parallel interface)	0Dh
6	Floppy Drive Controller	0Eh
7	LPT1 (parallel interface)	0Fh
8	Real-time Clock	70h
9	Diverted IRQ2	71h
10	available	72h
11	available	73h
12	normally available (provided PS/2 mouse not in use)	74h
13	Math Coprocessor	75h
14	Hard Disk Controller	76h
15	2nd IDE-Controller	77h

I/O addresses

The following table shows I/O addresses as configured in conventional computers.

Device	I/O Addr
Internal system use	0000h to 00FFh
Hard Disk Controller	01F0h
Joystick Port	0200h
Sound Boards	0220h
LPT2 (if installed)	0278h
COM4 (if installed)	02E8h
COM2 (if installed)	02F8h
CD-ROM interface, video digitizer	0300h
Network Boards	0360h
LPT1	0378h
LPT3 (if installed)	03BCh
COM3 (if installed)	03E8h
Floppy Disk Controller	03F0h
COM1	03F8h

In most cases, between 4 and 32 bytes are occupied from the specified addresses.

Mwave Communication Adapter Ressources

The Mwave Communication Adapter can use the following system ressources:

Device	DMA	IRQ	Address	Number
DSP	0, 1, 2, 3, 6, 7	3, 4, 5, 6, 7, 9, 10, 11, 14, 15	140 - 1F0	–
COM Port Modem/Fax	–	3, 4, 5, 9, 10, 11	–	1, 2, 3, 4, disable

Chart your system settings

As mentioned earlier, if you have any problems using your Mwave Communication Adapter, the cause is most often conflicting IRQ and/or DMA assignments. The following chart is provided to help you keep track of these assignments in your own Computer system. We recommend you maintain this chart and keep it up-to-date as a way to avoid conflicts.

Device	**DMA**	**IRQ**	**Address**
Mwave System			
Modem/Fax	—		

AT COMMANDS

Command mode vs. on-line state

AT commands are strings of characters that control the modem's actions. When you have started the modem by double clicking the corresponding icon, it is in command mode, i.e. it is capable of receiving commands.

When the D (Dial) or A (Answer) command has been entered, the modem is in the on-line state. When in this state, all characters sent to the modem are transmitted to the computer at the other end of the line.

The modem returns from the on-line state to command mode when a connection is broken. This is the case whenever one of the communication partners hangs up. If you want to send AT commands despite being in the on-line state, enter the characters +++ at the end of the command string. The modem responds with OK and you can enter the AT commands. The connection remains intact. To return to the on-line state, enter ATO.

Syntax of AT commands

Each command line is prefixed by AT. Be sure to enter either AT or at. Mixed notation is invalid. The +++ command is an exception to this rule.

If no parameters are specified for a command that can be used with various parameters, the 0 will be assumed automatically.

Example:

AT X<↵> corresponds to **AT X0**<↵>.

Conventions of the AT command overview

The following conventions apply in the AT command overview:

... can be replaced by any valid command or any command string.

The syntax appears in a different font. Example: AT...Bn...

n stands for a numeric value.

The Enter key (<↵>) must be pressed after every command.

The AT Commands

	Function	Description	Syntax	Param.	Param. Description
A	Answer	The A command causes the Mwave Modem to begin the answer process.	**AT...A**		
B	Standard	Selects the communication standard used by the Mwave Modem at 1200 bps or below.	**AT...Bn...**	n=0 n=1	CCITT standard Bell standard
C	Carrier Control	The C command enables the transmit carrier.	**AT...C1...[CR]**		
D	Dial	The modem dials a number and tries to establish a connection.	**AT...D {Dig./param.}** **AT...D {Dig./param.};...**	0-9; #, * P R S=n T W , ! @ ;	Numeric dialing digits Special dialing digits Pulse dial Force answer mode Dial stored number n, where n=0-3) DTMF dial Wait for dial tone Wait for time specified in register S8 Perform hook flash. Wait for quiet answer. Return to command state
E	Echo	Turns the command echoing On and OFF.	**AT...En...**	n=0 n=1	Turns command echoing off. Turns command echoing on.
F	On-line Echo	The F command is used by some modems to determine whether characters are echoed to the DTE (i.e. the PC) while the modem is in the on-line state.	**AT...F1...**	n=0 n=1	On-line character echo enabled. Not supported, returns "ERROR". On-line character echo disabled.
H	Hook control		**AT...Hn...AT...**	n=0	Places the line on-hook (hangs up) and causes a transition to the off-line command state.
I	Info Request	The I command presents modem identification information.	**AT...In...**	n=0 n=1 n=2 n=3 n=4	Returns: "Mwave Modem x.xx" where "x.xx" is the version of the modem. Returns: "OK". Verifies that the correct modem files are installed. Returns "OK" if all file versions are correct. Returns the names of the incorrect file(s) if any are incorrect Returns the version number of the installed modem files. Returns the modem capabilities string GENERIC Mwave.
L	Speaker Volume	The L command controls the volume of the speaker output.	**AT...Ln...**	n=0 n=1 n=2 n=3	Sets the speaker volume to the minimum level. Sets the speaker volume to a low level. Sets the speaker volume to a medium level. Sets the speaker level to a high level.
M	Speaker Control	The M command controls the operation of the speaker.	**AT...Mn...**	n=0 n=1 n=2 n=3	Sets the speaker off. Sets the speaker on until the data carrier is present during the hand shaking mode. Then it is turned off. Sets the speaker always on. Sets the speaker off during dialing and then on until the data carrier is detected.
O	On-line	The O command causes the modem to return to the on-line state for a previously established connection.	**AT...On**	n=0	Causes the modem to return to the on-line state.
P	Pulse Dial	The P command causes the modem to use pulse dialing for all subsequent numbers.	**AT...P**		
Q	Quiet	The Q command controls the result codes generated by the modem.	**AT...Qn...**	n=0 n=1	Enables result codes. Disables result codes.

	Function	Description	Syntax	Param.	Param. Description
S	Select Register	The S command selects one of the modem internal registers for future operations (also see the »S-Register Settings«, the »=« and the »?« command.	**AT...S...** **AT...Sn...**	n=0-29	If n is omitted, then 0 is assumed.
T	Tone Diall	The T command causes the modem to use DTMF (tone) dialing for all subsequent numbers.	**AT...T**		
V	Verbose Response	The V command controls the display of result codes.	**AT...Vn...**	n=0 n=1	Result codes are returned as digits. Result codes are returned as text messages.
X	Extended Results	The X command enables the call progress tone detection capabilities and effects the associated result codes.	**AT...Xn...**	n=0 n=1 n=2 n=3 n=4	Busy and dial tone detection are disabled. Result codes 0-4 are enabled. Busy and dial tone detection are disabled. Result codes 0-4, and line speed reporting via the "CONNECT xxxx" messages are enabled. Busy detection is disabled. Dial tone detection is enabled. Result codes 0-4, and line speed reporting via the "CONNECT xxxx" messages are enabled. Busy detection is disabled. Dial tone detection is disabled. Result codes 0-4, and line speed reporting via the "CONNECT xxxx" messages are enabled. Busy and dial tone detection are enabled. Result codes 0-4, and line speed reporting via the "CONNECT xxxx" messages are enabled.
Y	Space Disconnect	The Y command controls the long-space disconnect capabilities of the modem. If enabled, when a continuous BREAK of at least 1.6 seconds is received, disconnect from line. When ATH0 command is received or DTR goes low, generate a 4-second BREAK before going on-hook.	**AT...Yn**	n=0 n=1	Disables the long-space disconnect feature. Enables the long-space disconnect feature.
Z	Software Reset	The Z command causes the modem to reload a stored profile.		n=1 n=2 n=3	Recall stored profile 0. Recall stored profile 1. Recall factory defaults.
,	Wait	The comma command causes the modem to wait for the time specified by the contents of register S8 in seconds before processing any more characters in the command buffer.	**AT...,...**		
=	Set Register	The = command is used to set the value of the modem´s internal registers (S0-S28). The = command is usually coupled with the Sn command.	**AT...Sn=x...** **AT...=x...**	n=0-28 x=0-255	
&D	DTR Options	The &D command controls the modem´s to the DTR (Data Terminal Ready) control bit.	**AT...&Dn...**	n=0 n=1 n=2 n=3	Ignores DTR. Return to command state when ON-to-OFF transition is detected on DTR. Hang-up, disable auto-answer, and return to command state when ON-to-OFF transition is detected on DTR. Perform a software reset when ON-to-OFF reansition is detected on DTR, and loads the profile as specified in &Y.
&F	Factory Defaults Command	Loads the factory defaults into the internal registers.	**AT...&F...**		Factory defaults.
&G	Guard Tone	Controls the guard tone selection for the V.22*bis* datapump.	**AT...&Gn...**	n=0 n=2	Disables the V.22bis guard tones. Enables the 1800 Hz V.22bis guard tone.

	Function	Description	Syntax	Param.	Param. Description
&L	Leased Line Mode	The Mwave Modem is designed to work only on the public switched telephone network. Support for leased line operation is not provided.	**AT...&Ln...**	n=0	Selects switched-network line mode.
&K	Set DTE Flow Control	The &K command selects the flow control method that your Mwave modem provides to your DTE to prevent applications from losing data in the case that the application cannot extract data from the modem as fast as it is being transmitted by the remote end of the communications link. Note: The &K command is mapped to the \Q command.	**AT...&Kn**	n=0 n=1 n=2 n=3 n=4 n=5	Flow Control Disabled. Enables RTS/CTS hardware flow control. Reserved Enables RTS/CTS hardware flow control. Enables XON/XOFF software flow control. Enables transparent XON/XOFF software flow control.
&M	Comm Mode	Selects the communications mode. For this modem, only asynchronous mode is supported.	**AT...&Mn...**	n=0	Selects asynchronous communications.
&N	Force Speed	Selects the force speed mode. This command only applies to the V.32 and V.32bis modem. This command will force the modem to only connect at the speed specified in the S28 register.	**AT...&Nn...**	n=0 n=1	Support maximum allowable rate The modem selects the maximum allowable rate specified by the S28 register. If S28 = 0, then the modem will connect at the speed specified by the UART port speed (set by the application program). If S28 ≠ 0, then the modem will connect at the rate as specified in the description of the S28 register.
&P	Pulse Ratio	The &P commands is present for compatibility purposes. It does not change the make/break ratios.	**AT...&Pn...**	n=0 n=1	Returns "OK", but has no effect on timings. Returns "OK", but has no effect on timings.
&Q	Comm Mode	Selects the communications mode. For this modem, only asynchronous mode is supported.	**AT...&Qn...**	n=0	Selects asynchronous communications.
&S	DSR Options	Controls the operation of the DSR status bit. The DSR status bit is found in the UART modem status register.	**AT...&Sn...**	n=0 n=1	DSR is always ON while the modem is loaded. DSR is turned on just after handshaking is completed and turned off when the hangup process is started.
&U	Enbale Trellis Coding	Enables or disables the trellis coded data scheme in the V.32 and V.32bis modems. If issued while on-line command state, it does not take effect until the next connection is established.	**AT...&Un...**	n=0 n=1	Enable Trellis coding in V.32/V.32bis. Disable Trellis coding in V.32/V.32bis.
&V	View Active Configuration and User Profiles	Displays active & stored profiles and stored telephone numbers. Inputs from the DTE are ignored while the view information is being sent to the DTE.	**AT...&Vn...**		
&W	Write Configuration	Saves the active modem configuration. The following registers are saved in nonvolatile storage: S0, S2-S12, S14, S18, S21-S23, S25, S27, S28. In addition, the following command parameters are stored: \A, \K, \L, \N, \T, %A, %C, "Hn, "Nn, On. The initial value of each of these profiles is defined by the &F command.	**AT...&Wn...**	n=0 n=1	Store profile 0. Store profile 1.
&Y	Select Stored Profile on Power up Option	Determines which stored profile is established upon modem power up.	**AT...&Yn...**	n=0 n=1 n=2	Select stored profile 0 on power up. Select stored profile 1 on power up. Select factory defaults on power up.

	Function	Description	Syntax	Param.	Param. Description
&Z	Store Number	Saves up to four separate phone numbers (dial strings) to permanent storage. The &Z command may be followed by the dial string (36 characters max) or by the identifier (0-3) for the phone number to save. This command may not be followed by additional commands.	**AT...Z {dig./param.)** **AT...Zn= {dig/param.};...**	0-9; #, * P R T W , ! @ ;	Numeric dialing digits: Pulse dial Force answer mode. Must be entered as the last character. DTMF dial Wait for dial tone. Wait for time specified in register S8. Hook flash; the modem switches itself off for 90 ms (e. g. expedient for forwarding telephone calls in telephone systems.) Modem waits for 5 seconds (quiet answer). Return to command state after number is dialed.
\A	Maximum MNP Block Size	The \A extended command sets the maximum MNP stream mode block size to be used by the modem during an MNP session.	**AT...\An...**	n=0 n=1 n=2 n=3 n=4	max. block size of 64 bytes max. block size of 128 bytes max. block size of 192 bytes max. block size of 256 bytes variable block size
B	Send Break	Causes the modem to transmit a break signal. This command is valid only in on-line command mode.	**AT...\B...**		
K	Break Control	This command controls the actions to be taken by the Mwave Modem upon reception of a break signal from either the DTE or remote modem. The DTE may generate a break either through the UART hardware or by using the \B command. Parameters 1-3 generate identical behavior for a non-ECL connection. The default is \K3.	**AT...\Kn...**	n=0 n=1 n=2 n=3	When a break is received from the DTE and the modem is online, the modem escapes to command mode but a break is not sent to the the remote modem. When a break is received from the remote modem, it is reported immediately and is nondestructive to any buffered data. Breaks cause destruction of any buffered data, and they are reported immediately. The escaped state is not entered when a break is received from the DTE. Breaks are nondestructive, and the break is reported immediately. The escaped state is not entered when a break is received from the DTE. Breaks are nondestructive, and the break is queued in sequence with any buffered data and is reported in turn. The escaped state is not entered when a break is received from the DTE.
L	MNP Data Mode	Selects the MNP and V.42/V.42bis operational behavior. Whenever an Error Corrected Link is established, the session will attempt to also get a compressed link if possible. A V.42bis compressed link will be attempted first. If that fails or if a "H0 command" has been issued, then an MNP5 compressed link will be attempted. If that fails or if a "%C0 command" has been issued, a non-compressed link will be established.	**AT...\Ln...**	n=1 n=2	variable mode block mode
L	MNP Data Mode	Selects the MNP and V.42/V.42bis operational behavior. Whenever an Error Corrected Link is established, the session will attempt to also get a compressed link if possible. A V.42bis compressed link will be attempted first. If that fails or if a "H0 command" has been issued, then an MNP5 compressed link will be attempted. If that fails or if a "%C0 command" has been issued, a non-compressed link will be established.	**AT...\Ln...**	n=1 n=2	variable mode block mode

	Function	Description	Syntax	Param.	Param. Description
\T	Set Timer	Controls the operation of the inactivity timer.	**AT...\Tn...**	n=0 n=1-90	The timer is disabled. The timer is set to 1 - 90 minutes.
V	MNP Result Codes	Sets the MNP result codes.	**AT...\Vn...**	n=0 n=1	Disables MNP result codes. Enables MNP result codes.
%A	Auto Fallback Character	The %A extended command defines a character to be used to abort the MNP** negotiation process. The auto fallback character is a 7-bit character with no parity. The auto fallback character should not be set to the ASCII SYN character (decimal 22). This causes the MNP negotiation to be aborted for valid MNP frames. The default is %A0, which disables the auto fallback feature.	**AT...%C n...**	n=0 n=1	No data compression. Data compression is enabled for MNP class five.
%E	Fast Rate Renegotiation Control	The %E command controls the modem's response to a change in line quality and to requests for retrain or fallback/fall forward by the other end. This command only affects V.32 and V.32bis. When %E2 is active, the modem monitors the line quality. When line quality is insufficient to sustain the current connect speed, the modem will initiate a rate renegotiation to a lower speed within the V.32bis/V.32 modulation speeds (4800, 7200, 9600, 12000 and 14400 bps). The modem will keep falling back as needed until the speed reaches 4800 bps. If the line quality deteriorates further while connected at 4800 bps, the modems will hangup the telephone line. If the quality of the line increases, the modem will initiate a rate renegotiation to a higher speed if the modem currently has a V.32bis connection with the modem at the other end of the phone line. The rate renegotiation will be done without a retrain in this case. The modem will not increase the line speed if the modem is connected via V.32 to the other end of the phone line. Fall forward via Fast Rate Renegotiation is not supported in the V.32 specification.	**AT...%E n...**	n=0 n=1 n=2	Disable Auto-Retrain and Fast Rate Renegotiation. Enable Auto-Retrain. Enable Fast Rate Renegotiation and Auto-Retrain
"H	V.42bis Compression Control	The "H extended command controls the data compression to be negotiated for with V.42bis. This command may be issued at anytime but will only take effect on the next connection.	**AT..."H n...**	n=0 n=1 n=2 n=3	V.42bis Disabled V.42bis enabled for transmission only V.42bis enabled for reception only V.42bis enabled for both transmission and reception
"N	V.42bis Dictionary Size	The "N extended command controls the dictionary size to be negotiated for with V.42bis. This command may be issued at anytime, but will take effect only on the next connection.	**AT..."N n...**	n=0 n=1 n=2	512 Entries 1024 Entries 2048 Entries

	Function	Description	Syntax	Param.	Param. Description
'O	V.42bis Maximum String Length	The "O extended command controls the maximum string length to be negotiated for with V.42bis. This command may be issued at anytime, but will take effect only on the next connection.	**AT..."O n...**	n=0, 32 n= 6... 250	character maximum string length 6 to 250 character maximum string length
-SS	DSVD	The -SSE command controls the Mwave Digital Simultaneous Voice over Data (DSVD) function. When this function is enabled, a call is placed (via ATDT) to another Mwave Modem that is also enabled for Mwave DSVD, and a connection is established, the users can talk to each other over their microphone and speakers while still maintaining their normal data traffic.	**AT...-SSE[=] n...**	n=0, 32 n= 6... 250	Disable Mwave DSVD Enable Mwave DSVD
%T			**AT...%TT6 R, S, C, P...** R must be between 0 and B (hexidecimal value). S must 0, 3, or 4. All other values are invalid. A is the auxilliary channel option. It is not yet supported. Any value is ignored. P is the pre-emphasis index. Valid values are 0 to A hexidecimal.	R=0 R=1 R=2 R=3 R=4 R=5 R=6 R=7 R=8 R=9 R=A R=B S=0 S=3 S=4 C<=0 C>0	2400 bps (may not be selected unless S=0) 4800 bps 7200 bps 9600 bps 12000 bps 14400 bps 16800 bps 19200 bps 21600 bps 24000 bps (may not be selected if S=0) 26400 bps (may not be selected if S=0) B 28800 bps (may not be selected if S=0 or S=3) 2400 symbols per second 3000 symbols per second 3200 symbols per second Select V.34 low carrier Select V.34 high carrier
+MS	Select Modulation	The +MS command specifies the modulation to use in originating or answering a connection.	**AT...+MS=n**	n=3 n=11	V.23 V.34
-SSe	Mwave Simultaneous Voice over Data	The -SSE command controls the Mwave Digital Simultaneous Voice over Data (DSVD) function. When this function is enabled, a call is placed (via ATDT) to another Mwave Modem that is also enabled for Mwave DSVD, and a connection is established, the users can talk to each other over their microphone and speakers while still maintaining their normal data traffic.	**AT...-SSE[=]n**	n=0 n=1	Disable Mwave DSVD Enable Mwave DSVD

	Function	Description	Syntax	Param.	Param. Description
*TH	Data Rate Aggressiveness	The *TH command can be used to adjust the aggressiveness of the V.34 data rate. The normal default setting is 4. The higher the value of n, the less aggressive the Mwave V.34 modem will be to select the data rate. *TH8 sets the threshold 4 dB higher for the signal-to-noise ratio (SNR) for the same bit rate to be used. If you experience difficulty connecting, you may want to set n to a higher value to select a less aggressive setting than the default of *TH4. A higher value tends to make connections at a lower data rate unless the SNR is high enough.	**AT *THn...**		

S REGISTERS

The following table contains a summary of the S registers with their defaults, possible values and units.

S-Register	Default	Range	Units	Description
S0	**0**	**0-5**	Number of rings	This register contains an integer representing the number of rings to allow before going off-hook. When S0 contains a non-zero value, the Modem DSP software is in auto answer mode.
S1	**0**	**0-255**	Number of rings	This register contains the ring count.
S2	**43**	**0-255**	ASCII character	S2 contains the ASCII code for the escape character. If S2 contains a value greater than 127, then the escape sequence (+++) is disabled. The default is the "+" character.
S3	**13**	**0-127**	ASCII character	Contains the ASCII code for the carriage return.
S4	**10**	**0-127**	ASCII character	Contains the ASCII code for the line feed.
S5	**10**	**0-127**	ASCII character	Contains the ASCI code for the backspace key.
S6	**2**	**3-5**	Seconds	S6 contains the amount of time to wait (in seconds) after going off-hook, before dialing.
S7	**30**	**0-58**	Seconds	S7 contains the amount of time to wait for a data carrier in seconds. If a carrier is detected, a CONNECT result is returned, otherwise a NO CARRIER result occurs.
S8	**2**	**0-255**	Seconds	Contains the amount of time to wait for a comma command or dial modifier.
S9	**6**	**1-255**	1/10 seconds	S9 contains the amount of time to wait between a return of the carrier in the on-line state and the acceptance of the carriers.
S10	**14**	**0-65**	1/10 seconds	S10 contains the amount of time to wait between loss of the carrier and hang-up.
S11	**95**	**50-255**	Milli seconds	Contains the duration (ms) and inter-digit delay for DTMF tone dialing.
S12	**50**	**0-255**	1/50 seconds	Contains the guard time delay for recognition of the escape sequence (+++).
S24	**0**	**0-1**		S24 enables/disables modem calling tone. ATS24=1 enables tone, ATS24=0 disables tone. Enabling calling tone may make it easier for the modem you are calling to detect that this is a data call if the remote modem uses a voice/data/fax discriminator.
S25	**5**	**0-255**	1/10 seconds	S25 specifies the delay time threshold for which DTR must be active in order to be recognised. If DTR remains at a state for less than 25 seconds, it is ignored.
S30\T	**0**	**0-540**		S30\T sets the length of time, in tens of seconds, that the modem remains connected when no data is sent or received. The time resets when data is transmitted. In error-correcting mode, received data also resets the timer.
S28	**0**	**0-12**	–	Contains the user´s desired line connection speed. The connection speed will be the maximum speed supported by both modems not exceeding the speed specified by this register.
S32	**17**	**0-255**		S32 sets the value of the XON character.
S33	**19**	**0-255**		S33 sets the value of the XOFF character.
S49				The S49 values are bit-mapped to the S49 register. Value Description 01 Bit 0 - Reserved. 02 Bit 1 - Disables call indicator. 04 Bit 2 - Disables V.8 protocol. 08 Bit 3 - Disables V.34 protocol. These values are additive. For example, setting S49=7 disables call indicator, V.8 protocol, and V.34 protocol.

S-Register	Default	Range	Units	Description
S50	**0**			By setting various bits in the S50 register, you can disable some or all of the "symbol rates" or "baud rate" (which is different than a bit rate) that the V.34 modem will request for reception. Only the receiving modem can disable transmit symbol rates. The S50 values are bit-mapped to the S50 register. 01 Bit 0 - Disables 2400 baud receive symbol rate. 02 Bit 1 - Disables 2743 baud receive symbol rate. 04 Bit 2 - Disables 2800 baud receive symbol rate. 08 Bit 3 - Disables 3000 baud receive symbol rate. 16 Bit 4 - Disables 3200 baud receive symbol rate. 32 Bit 5 - Disables 3429 baud receive symbol rate. 64 Bit 6 - Disables asymmetric symbol rates. 128 Bit 7 - Reserved. These values are additive. For example, setting S50=7 disables 2400, 2743, and 2800 baud symbol rates.
S52	**2**			S52 controls various features of the V.34 data pump. The S52 values are bit-mapped to the S52 register. Value Bit Description 01 Bit 0 - Disable asymmetric data rates for V.34. 02 Bit 1 - Disable auxiliary channel for V.34. Bits 2-7 - Reserved
S53	**0**			01 Bit 0 - Reserved 02 Bit 1 - Disable requests for pre-emphasis (receive). 04 Bit 2 - Disable requests for constellation warping (receive). 08 Bit 3 - Disable requests for constellation shaping (receive). 16 Bit 4 - Disable requests for precoding (receive). Bits 5-7 - Reserved

Parameters for S28:

Param.	Description
00	UART setting
01	50 bps connection; Bell 103/V.21 protocol
02	75 bps connection; Bell 103/V.21 protocol
03	110 bps connection; Bell 103/V.21 protocol
04	134.5 bps connection; Bell 103/V.21 protocol
05	150 bps connection; Bell 103/V.21 protocol
06	300 bps connection; Bell 103/V.21 protocol
07	Reserved
08	1200 bps connection; V.22bis/Bell-212 protocol
09	2400 bps connection; V.22bis protocol
10	4800 bps connection; V.32/V.32bis protocol
11	7200 bps connection; V.32bis protocol
12	9600 bps connection; V.32/V.32bis protocol
13	12000 bps connection; V.32bis protocol
14	14400 bps connection; V.32bis protocol

MODEM MESSAGES

No.	Text	Explanation
0	OK	Acknowledges the execution of a command.
1	CONNECT	Indicates that a connection has been established with a remote modem at a speed of 0-300 bps.
2	RING	Indicates that an incoming call has been detected.
3	NO CARRIER	Indicates a failure to connect (handshake state) or a loss of carrier (on-line state).
4	ERROR	Error. Possible causes: Invalid command or command line too long.
5	CONNECT 1200	Indicates that a connection has been established with a remote modem at a speed of 1200 bps.
6	NO DIALTONE	Indicates that dial tone detection was attempted but not recognized. Enabled by X2 and X4.
7	BUSY	Indicates that a busy signal was detected during the call establishment. Enabled by X2 and X4.
8	NO ANSWER	Indicates that the required period of silence was not detected during the "wait for quiet answer" time period specified by modem register 7. This occures when an @ dial modifier is used.
10	CONNECT 2400	Indicates that a connection has been established with a remote modem at a speed of 2400 bps.
15	HOST DRIVER TIMEOUT	Indicates that the PC is not responding to interrupts from the board.
19	CONNECT ECL	Indicates that a connection has been established with an ECL (Error Correction Link), with data compression, using MNP.
20	CONNECT ECLC	Indicates that a connection has been established with an ECL (Error Correction Link) using MNP.
25	CONNECT 1200/ECL	Indicates that a connection has been established with an ECL (Error Correction Link) using MNP at 1200 bps.
26	CONNECT 1200/ECLC	Indicates that a connection has been established with an ECL (Error Correction Link), with data compression, using MNP at 1200 bps.
30	CONNECT 2400/ECL	see examples above
31	CONNECT 2400/ECLC	see examples above
32	BLACKLISTED	No further selection for desired numbers possible.
33	CONNECT 4800	see examples above
34	CONNECT 4800/ECL	see examples above
35	CONNECT 4800/ECLC	see examples above
37	CONNECT 7200	see examples above
38	CONNECT 7200/ECL	see examples above
39	CONNECT 7200/ECLC	see examples above
41	CONNECT 9600/ECLC	see examples above
42	CONNECT 9600/ECL	see examples above
43	CONNECT 9600/ECLC	see examples above
45	CONNECT 12000	see examples above
46	CONNECT 12000/ECL	see examples above
47	CONNECT 12000/ECLC	see examples above
49	CONNECT 14000	see examples above
50	CONNECT 14000/ECL	see examples above
51	CONNECT 14000/ECLC	see examples above
53	CONNECT 16800	see examples above
54	CONNECT 16800/ECL	see examples above
55	CONNECT 16800/ECLC	see examples above
57	CONNECT 19200	see examples above
58	CONNECT 19200/ECL	see examples above
59	CONNECT 19200/ECLC	see examples above
61	CONNECT 21600	see examples above
62	CONNECT 21600/ECL	see examples above
63	CONNECT 21600/ECLC	see examples above
64	CONNECT 24000	see examples above
65	CONNECT 24000/ECL	see examples above
66	CONNECT 24000/ECLC	see examples above
67	CONNECT 26400	see examples above
68	CONNECT 26400/ECL	see examples above
69	CONNECT 26400/ECLC	see examples above
71	CONNECT 28800	see examples above
72	CONNECT 28800/ECL	see examples above
73	CONNECT 28800/ECLC	see examples above

ERROR MESSAGES

Message	Message Text & Description
MWME0001	**Mwave Modem Internal Error.** Record the information in the error dialog box and report it to the sercvice contact listed in your installation manual.
MWME0002	**The Mwave phone line is already in use.** Another Mwave communications adapter application is currently using the phone line. In this case, the user needs to restart the operating environment and try again. If the modem operation ended prematurely this error might be encountered. In this case, restart Windows and try again.
MWME0003	**The Mwave phone handset is already in use.** Another application is currently using the phone handset. In this case, the user needs to restart the operating environment and try again. If the modem operation ended prematurely this error might be encountered. In this case, restart Windows and try again.
MWME0004	**The Mwave Communications port is already in use.** Another Mwave Communications adapter application is currently using the COM-port. If the modem operation ended prematurely this error might be encountered. In this case, restart Windows and try again.
MWME0005	**The Mwave DSP is overcommitted.** There are not enough resources (MIPS, Data Store, Instruction Store) available on the DSP to fulfill the request. Stop another Mwave Communications Adapter application and restart the modem.
MWME0006	**The Mwave Modem cannot locate the needed DSP files.** Check the MWPATH environment variable in the AUTOEXEC.BAT to make sure the paths to the .DSP files are correct.
MWMI0001	**Mwave Modem Help is not available.** The Mwave modem cannot find the MWMOS2.HLP help file.

GLOSSARY

The following glossary provides explanations of the most important terms used in this manual.

Cross-references are indicated by 🕮.

Address All memory locations in the computer are numbered (addressed). Each memory location can be addressed directly in this way. Some addresses are reserved for specific hardware components and must not be used otherwise. We speak of an address conflict if two hardware components use the same address.

analog The opposite of 🕮 digital. Analog quantities may assume any values.

ASCII American Standards Code for Information Interchange. ASCII character set: the standard character set used by IBM and compatible computers. The ASCII character set consists of 256 characters, of which the first 128 are defined.

asynchronous In an asynchronous data transfer, the data is transferred character-by-character (one character normally consists of 8 bits). The characters are embraced by control bits (start and stop bits). The control bits signal to the remote station whenever a new character is being sent and whether the last character has been sent completely.

AT commands Modem control command set, also referred to as the Hayes command set (🕮 Hayes). AT commands are prefixed with AT (=attention).

Auto answer The ability of a modem to process a call automatically after a defined number of rings.

Bell standard Standard of the American Bell Telephone Company.

bis French for “two” or “second revision”.

Bit Binary Digit. The smallest information unit of a computer. Two states “0” and “1” can be represented with one bit. Accordingly, 22=4 can be represented with two bits and 23=8 with three bits etc. In a computer, these two states are realised via “0 V” (no current = 0) and “5 V” (current = 1). 8 bits = 1 🕮 byte are needed to represent one character (a letter or number etc.).

bps Bits per second.

Bus In a computer, buses are used for communication between the processor and the hardware installed in the computer (hard disk or a graphics board etc.). Different amounts of information can be transferred depending on the width of the bus. A 8-bit wide bus can communicate exactly 8 🕮 bits (= one 🕮 byte = one character) at one time. One byte consists of eight 🕮 bits. With one byte, precisely one character (a letter or a number etc.) can be depicted. It is coded in binary, i.e. in “zeroes” (0) and “ones” (1). According to the 🕮 ASCII character set, the character “E” is coded as “01000101” or “45h” (hexadecimal).

Carrier The carrier frequency that modems send. The modulated data is transmitted from one modem to another on the carrier frequency.

Carrier frequency 🕮 Carrier.

CCITT Comité Consultatif International Télégraphique et Téléphonique. An umbrella organisation of the international telecommunications union that concerns itself with standardization of data and telephone services. The standards for data transfer through telephone networks are set out in the V. standards (e.g. V.32).

CD-ROM Compact Disk-Read Only Memory. A digital storage disk with a very high storage capacity that is read by a laser beam.

Clock frequency The speed at which the individual command sequences are run within the processor. The higher the 🕮 clock frequency is, the faster the commands run.

CNG tones Connecting tones that fax devices send to identify themselves as such.

COM interface Another designation for the serial interfaces in a PC (also: RS232). Through the COM interfaces, data is transferred in a data line bit-by-bit (all 🕮 bits of one 🕮 byte are transferred in succession). Serial data transfer is slower than through the parallel interface, but is substantially less susceptible to interference. Communication interfaces are identified by COM and a digit (e.g. COM1).

Command mode In the command mode, the modem interprets received characters as a command (🕮 On-line state).

CONFIG.SYS A configuration file under 🕮 DOS that is run automatically when starting the system. The CONFIG.SYS file contains drivers which, among other things, control output on the monitor, use of the keyboard and of the mouse.

CPU Central Processing Unit. The CPU controls essential functions.

Data pump Part of the modem's internal software that is crucial with regard to the quality and speed of a modem's data transfer capacity.

Dedicated line The opposite of 🕮 switched line. A dedicated line is a permanent connection between two communication partners. A dedicated line is always active.

Demodulation (Back-)conversion of analog signals to digital signals (🕮 Modulation).

digital Literally: represented by numbers. The opposite of 🕮 analog. In data technology, characters are mostly represented by binary signals, i.e. by signals that can only assume two states (“0” and “1”).

DMA channel By way of a D(irect)M(emory)A(ccess) channel, direct and thus very fast data transfer takes place between any hardware component (e.g. an expansion board) and the main memory, circumventing the CPU.

The DMA channels are numbered. One DMA channel can only be used by one hardware component at a time.

Driver Programs, among other things for integrating hardware (e.g. drivers for a CD-ROM drive) in the computer and for adapting the software to the hardware (e.g. drivers for a graphical user interface such as Microsoft Windows) in order to exploit the possibilities offered by expansion board.

DSP Digital signal processor. A DSP is a processor that is oriented to the tasks of digital data processing (filtering, amplification, generation of digitally coded analog signals).

DSR signal The D(ata)S(et)R(eady) signal indicates that the data is ready to be sent.

DTE Data Terminal Equipment. A device or a system unit for sending and receiving data.

DTMF Dial Tone Multifrequency (also: tone dialling). When using DTMF, pairs of tones are sent during dialling.

DTR signal The D(ata)T(erminal)R(eady) signal indicates that the modem is ready to receive.

DSVD Digital Simultaneous Voice and Data. DSVD allows the simultaneous transmission of data and digitally encoded voice signals over a single dial-up phone connection.

Echo On the one hand, modems can send all characters received directly back to the DTE so they can be seen on the screen. On the other hand, the modem sends back all data received from a remote station. These two operations are referred to as the "Echo".

Error correction Process for compensating for interferences on the telephone line. Known error correction methods are MNP5 and V.42bis.

Fallback Switching back to a slower data transfer rate when transmission quality is poor.

Fax Lat.: fac simile=make equal. When faxing, image data of originals is transmitted.

Full duplex operation Simultaneous transfer of data on one line in both directions, also referred to as duplex operation (🕮 Half duplex operation).

Guard Tone Comparison tone for international connections.

Half duplex operation Transfer of data on one line in both directions. Transfer can only take place alternately in one or the other direction, i.e. not simultaneously (🕮 Full duplex operation).

Hands free device A device that enables the user to talk and listen on the telephone without using the receiver.

Handshake phase Before data can be sent via a connection, both modems have to define which protocols and speeds are to be used. This "negotiation phase" is also referred to as the handshake phase.

Hayes An American modem manufacturer who was the first to integrate a command repertoire in modems (🕮 AT commands). The Hayes commands have established themselves as the defacto standard.

Headset A combination of headphones and microphone that is used instead of a telephone receiver.

IDE A general standard for the connection of a CD-ROM drive.

Impedance The apparent resistance of AC components.

Interface The transition point between two areas of a system or between two systems where information, pulses and signals are adapted so that they can be understood at the receiving end in the same way as at the sending end. For example, signals sent from the computer to the printer have to be adapted by an interface so that the printer will "understand" how to print them.

Interrupt An interrupt is a signal by means of which expansion boards and other hardware components request the 🕮 CPU. Each hardware component should possess its own interrupt.

ISA bus International Standard Architecture. A bus with a 16-bit width that is capable of transferring a data rate of 8 🕮 MBytes at a 🕮 clock frequency of 8 MHz.

KByte One kbyte (kilobyte) corresponds to 1024 🕮 bytes.

The “K” (kilo) always corresponds to the number “1024”.

Mailbox Computer software that is capable of receiving and sending data through one or several modems. Such a program generally runs unsupervised on a computer that has been specially reserved for this purpose (also: BBS=Bulletin Board System).

MByte On MByte (megabyte) is 1024 🕮 Kbytes.

MNP Microcom Networking Protocol, a data transfer process of the Microcom company. There are a total of ten MNP classes, some of which are upwardly compatible. MNP 1 to MNP 4 are pure data transfer protocols; from MNP 5 on, the data is also compressed.

Modem The word “Modem” is composed of the parts “modulator” (🕮 Modulation) and “demodulator” (🕮 Demodulation). By means of modems, computers can communicate with each other through analog telephone lines. In doing so, the modem converts the electronic digital signal emitted by the sending computer to acoustic signals (modulation). The analog acoustic signals are then transmitted through the telephone line and arrive at a second modem. The receiving modem converts the analog acoustic signals back to electronic digital signals and forwards these to the computer.

Modulation Conversion of digital to analog signals.

Multitasking Simultaneous execution of several functions.

Mwave The Mwave platform is a modular architecture developed by IBM for telecommunications and sound applications.

On-line state When in this state, all characters are sent from the modem to the distant station (🕮 command mode).

Operating system The operating system allows communication between the hardware, the software and the user. Among other things, the tasks of an operating system include file and program management.

Pulse dialling Pulse sequences are sent during dialling. The number 0 corresponds to ten pulse, the number 1 corresponds to one pulse and the number 2 to two pulses etc.

Register A memory.

Remote (distant) station In this case: the modem with which you are communicating during a connection.

S register Status register: a register in which the operating parameters of a modem are stored.

Switched line The opposite of a 🕮 dedicated line. When using a switched line, the other user must be dialled up in order to establish the connection.

TAPI Telephone Application Interface. Standardized interface for telephone applications.

Tele-communications The generic term used for the information channels provided by the telephone company.

Tone dialling 🕮 DTMF.

Trellis coding A special coding method with error correction; only used as from V.32.

UART Universal Asynchronous Receiver and Transmitter: a special component for controlling an asynchronous serial interface.

Voice recognition Recognition of spoken language by a computer. This has only been partly realised up to now.

V. standards 🕮 CCITT.

V.17: Half duplex data transfer at up to 14 400 bps when using fax devices.

V.21: Full duplex data transfer at 300 bps.

V.22: Full duplex data transfer at 1200 bps.

V.22bis: Full duplex data transfer at 2400 bps.

V.27ter: Half duplex data transfer at 4800 bps for fax modems.

V.29: Half duplex data transfer at 9600 bps for fax modems.

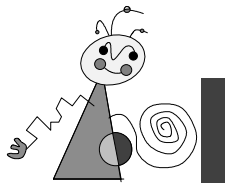
V.32: Full duplex data transfer at up to 9600 bps or fallback to 4800 bps.

V.32bis: Full duplex data transfer at a data transfer rate of 14400 bps.

V.42: Error correction method.

V.42bis: Data compression method.

NOTES



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