

# MTC200 Teleservice Remote Diagnostics Application Manual

**SYSTEM200**

	MTC200
<b>Title</b>	Teleservice Remote Diagnostics
<b>Type of Documentation</b>	Application Manual
<b>Document Typecode</b>	DOK-MTC200-TELESER****-AW02-EN-P
<b>Internal File Reference</b>	<ul style="list-style-type: none"> <li>• Box 6.1-18V-EN</li> <li>• Document Number 120-1700-B319-02/DE</li> </ul>
<b>Purpose of Documentation</b>	This documentation describes the possibilities of Remote Diagnostics and Teleservice in conjunction with PC based control systems, e. g. MTC200 or MT-CNC. Besides the hardware requirements, a very customary software product is described including its installation and parameter settings.

**Record of Revisions**

Description	Release Date	Notes
120-1700-B319-01/EN	07.99	New issue
120-1700-B319-02/EN	11.99	Updated, new software version

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**Published by** Rexroth Indramat GmbH  
Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main  
Telephone 09352/40-0 • Tx 689421 • Fax 09352/40-4885  
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# 1 Introduction

## 1.1 Overview

### What is Teleservice about?

Optimized complex production lines, expensive production plants, moving production abroad, economizing spare part storing and high costs for service management require high machine availability, efficient service and a quick response.

Teleservice enables enterprises and their branch offices to access data of machines located remote in order to carry out diagnostic or maintenance.

Using Teleservice enables the office on duty (usually the customer service department) to look at and to modify user data (NC/SPS programs, production data) of machines located remote and if necessary intervene operation.

Therefore communication between the customer service department and the machine must be established via the telephone line.

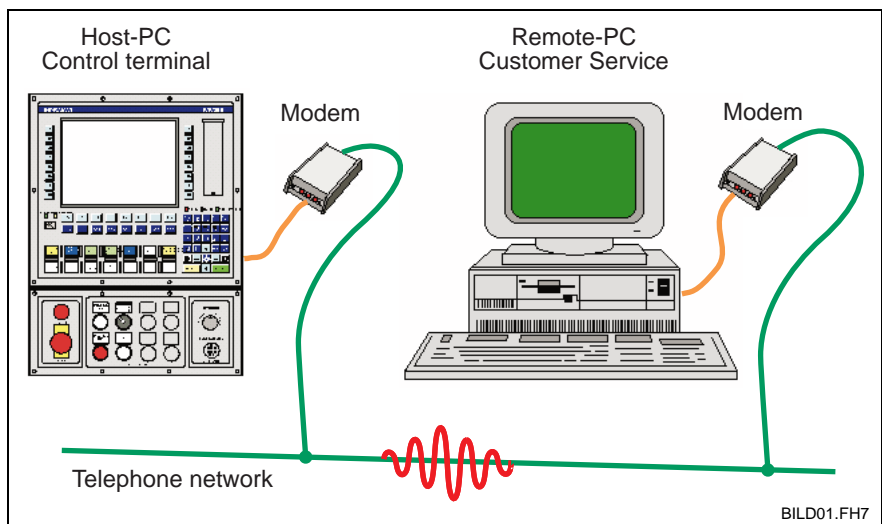


Fig. 1-1: Teleservice between customer service and machine

When using Teleservice contractual agreement between service provider and service recipient is recommended which clearly states the possibilities and responsibilities between the two parties.

**Typical Teleservice functions are:**

- File transfer including software and firmware updates
- Observe operations
- Remote operation of a machine control (local operation necessary as the machine keys are SPS inputs and cannot be controlled by the PC).

## The following components are required:

at the machine

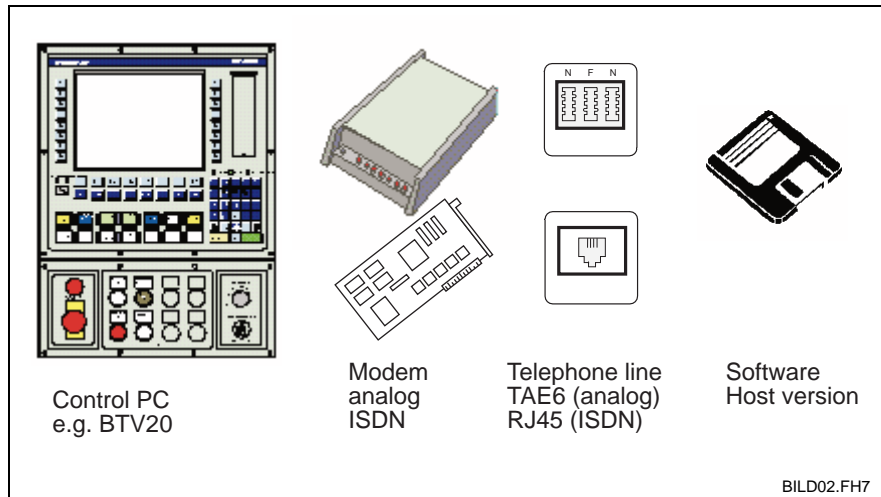


Fig. 1-2: Machine components

at the service provider  
(customer service)

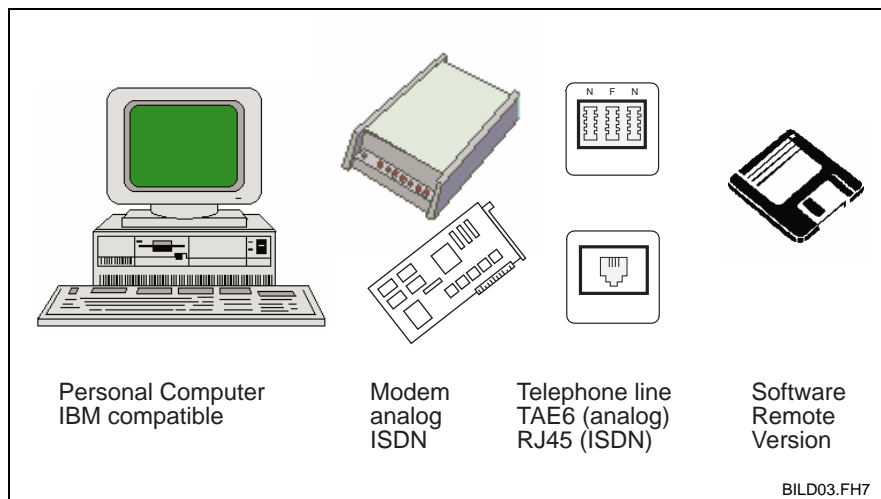


Fig. 1-3: Components at the service provider

## 1.2 Definition of Terms

- Host-PC** Within the Remote Diagnostic, the PC based operating terminal at the machine represents the so-called Host-PC. In order to facilitate a Teleservice session, the host software needs to be installed and called up on the operating terminal. The link to a Host-PC can be established at various locations. In this way, a Teleservice request can be handed over from internal maintenance via machine tool builder to the control manufacturer.
- Remote-PC** The PC, from which the link to the observing control system is established, is called Remote-PC. A Remote-PC can call any Host-PC. Selection is carried out via telephone number, meaning that the remote software needs to be installed on the Remote-PC only once. Host and remote software are two components of a software package that have to match.
- During a Teleservice session, the Host-PC's screen contents are simultaneously displayed on the Remote-PC's screen. The Remote-PC's key inputs can instantly be directed to the Host-PC for operation.
- Modem** Abbreviation for '**Mod**ulator/**Dem**odulator'. A communication device for information transfer via the telephone line. A modem converts (modules) digital data into analog signals for telephone line transfer. At the other end

of the line, these signals are converted into digital data (demodulated). Modems can transfer data at various speeds or data transfer rates.

**ISDN** (Integrated **S**ervices **D**igital **N**etwork). Almost all over the world, the conventional telephone network is based on analog data transmission. However, in many European countries the so-called ISDN standard has been available in the telephone network for several years. ISDN is based on a digital data transmission and facilitates, besides various special services, a higher transmission rate of 64 kBaud.

## 1.3 Exclusion of Liability

The information in this description is given for information purposes only. It refers to our current knowledge. However, we cannot undertake a liability. Furthermore we would like to point out that it is not possible to exclude product faults, especially in software programs, in all application fields. Especially the combination with other products with a design which we cannot influence, could cause constellations which have the effect of faulty functions of products or of a system.





## 2 System Requirements

### 2.1 Hardware

#### Operating Terminal and Remote-PC

The PCs in use must fulfill the following requirements (machine operating terminal and Remote-PC at customer service):

- IBM PC/AT or compatible system; ≥ 80486DX2/66 recommended
- Work memory min. 8 MB, 16 MB min. (Windows95/WindowsNT) from software version 17 onwards
- Operating system: MS-DOS from version 3.3 onwards, Windows 3.1 in extended mode, WindowsNT 3.51 or WindowsNT 4.0
- available hard disk space 3 MB min. (MS-DOS), 16 MB min. (Windows95/WindowsNT)
- Floppy disk drive HD 3,5" for the installation, (CD-ROM drive as an option)
- V24/RS232 (COM) interface to connect an external modem
- or an ISDN card (WindowsNT only, memory problems under DOS)

---

**Note:** Due to the fact that the COM2 interface is an optional feature in various controls, it must be checked whether a vacant V24/RS232 interface is available at the machine operating terminal.

---

#### Modem

A modem facilitates Host- to Remote-PC communication via telephone lines. Remote diagnostics require one modem for each participant. The modem must be supported by the remote- and host software. A list of supported modems is provided with the documentation of the software used.

**Analog modem** A so-called "**Hayes compatible**" modem featuring a transmission rate of 28.8 kBaud min. is recommended. Such a modem is capable of the "Hayes command set" representing today's communication standard. Nowadays, the market provides analog modems capable of data transfer rates between 33.6 and 56 kBaud.

**ISDN** ISDN data transfer is possible with an external ISDN adapter which is connected to a serial port or with an ISDN card in the PC (WindowsNT only).

**Device for analog operation and ISDN operation** If analog as well as digital data is to be transferred, a device should be used which consists of an analog modem and an ISDN adapter with automatic switch.

Up to now, Indramat has had good experience using the modem models listed below:

external:	<b>1&amp;1/ Creatix Modem Skyconnect</b> 33.6 kBaud analog
external:	<b>Creatix Modem SG 2834</b> 33.6 kBaud analog
external:	<b>Elsa MikroLink ISDN /TL V.34</b> automatic detection of analog (33,6 kBaud) or ISDN operation (64 kBaud)
internal ISA bus: (WindowsNT only)	<b>USRobotics Sportster Voice</b> 33.6 - 56 kBaud analog

Fig. 2 -1: Modem models

**Note:** On both sides of the transmission, the same modem type **must** be used (analog/analog or ISDN/ISDN). Internal, i. e. modem cards on the ISA bus cannot be used under DOS as memory problems occur with this configuration.

The decision about which modem type to be used depends on the final destination of the production line or machine. Not only the supply voltage and the telephone system may vary depending on the country. Also not every standard, like ISDN for example, is supported worldwide. Checking the local conditions is **absolutely necessary**.

## Cable Connections

### PC → Modem

A so-called V24/RS232 standard nullmodem cable is required for a connection between a PC and an external modem. The connection length must not exceed 15 meter according to V24/RS232 standard.

If an internal modem is used instead of an external one, the link mentioned above is not applied. The modem is directly plugged into an empty PC ISA bus slot and also communicates this way.

**Note:** See modem documentation for further details.

### Modem → telephone system

A telephone cable is required for the connection to the telephone network (in Germany for example a TAE6 telephone socket featuring coding 'N' in the case of a branch) and a Rj45 connector for the connection to the S<sub>0</sub> bus of the ISDN network. A direct exchange line should be available at the machine side to enable direct access initiated by the Host-PC.

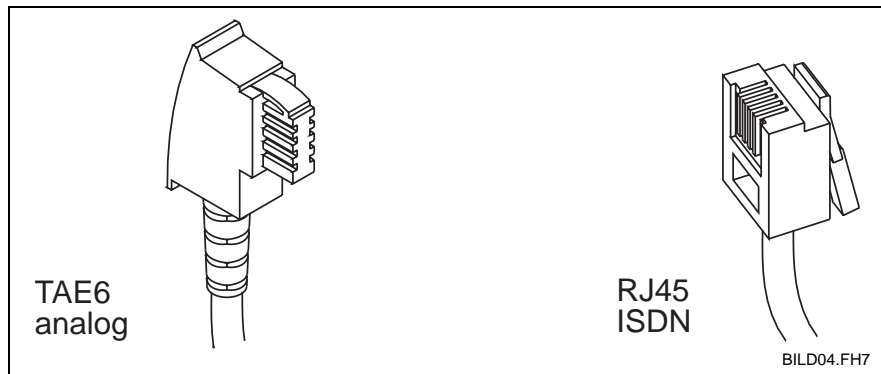


Fig. 2 -2: Telephone connectors for analog network and for ISDN

Due to connection technique variations of the telephone systems depending on the country, these facts need to be checked in advance or the required components should be provided at the final location of the installation.

**Note:** See modem documentation for further details.

## 2.2 Software

A special software is required to establish a link between Remote- and Host-PC and to carry out data transmission. Up to now, REXROTH INDRAMAT has successfully used the following software for Teleservice operation:

### *SYMANTEC™* **pcANYWHERE.**

This remote control and file transfer software is offered in three different versions:

- pcANYWHERE 5.0, for MS-DOS (MS-DOS from version 3.3 on)
- pcANYWHERE 2.0, for Windows (Windows 3.1 in extended mode)
- pcANYWHERE32 version 9,0 for Windows 95 and Windows NT 3.51 or 4.0

**Note:** The products pcANYWHERE V2.0 for Windows 3.11 and pcANYWHERE V5.0 for DOS are not Y2K compatible and will not be available on the market after 10/29/1999. *SYMANTEC™* announced that they will not provide interactive support for these products after 10/29/1999.

All parts of the software are licensed and must exclusively be used on one PC in accordance with the license agreement.

According to the user functions - host and remote - this DOS software consists of two parts, the so-called host software and the remote software. Although both parts can be purchased in a single package, merely the host software must be installed on the Host-PC and the remote software on the Remote-PC.

As the host software is required for each operating terminal which is to be equipped with Teleservice, but the remote software only once in the area of customer service, both parts can be purchased separately (for example a **pcANYWHERE 'Host only'** package).

The various *SYMANTEC###* **pcANYWHERE** platforms (DOS- and Windows versions) are capable of communicating with each other, i. e. using a remote software running under Windows95/WindowsNT a host version running under DOS can be accessed.

For installation and configuration follow the notes of the documentation supplied with the relevant software.

Please also consider the configuration examples for the MS-DOS version and the WindowsNT version in this documentation.

## 3 Configuration pcANYWHERE 5.0 for MS-DOS

### 3.1 General Information

Before the remote diagnostics software can be used successfully, both the remote and the host PC software must be configured correctly. The hardware equipment used for a remote diagnostics session can vary greatly. Therefore, the following settings serve as an example only. With these settings and the hardware used by REXROTH INDRAMAT, the remote control sessions and remote diagnostic sessions were executed successfully. For detailed configuration information please refer to the pcANYWHERE documentation.

### 3.2 Required Work Memory for Host-PC and Remote-PC

In order to avoid memory problems, a memory management e. g. EMM386 must be used on the Host-PC and the Remote-PC.

#### Necessary work memory with EMM386

Conventional memory: min. 61 kByte

Memory in the upper memory area  
„upper memory“ min. 9 kByte

The system files should have the following entries:

#### CONFIG.SYS

```
Switches=/f
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
BUFFERS=30,0
FILES=30
DOS=HIGH
DOS=UMB
FCBS=4,0
SHELL=C:\DOS\COMMAND.COM /e:768 /p
COUNTRY=049,437,C:\DOS\COUNTRY.SYS
```

#### AUTOEXEC.BAT

```
LH C:\DOS\SMARTDRV.EXE
PROMPT $p$g
path c:\dos
LH KEYB GR,,C:\DOS\KEYBOARD.SYS
```

The setting examples shown above of the 'pcANYWHERE' DOS software configuration are used by REXROTH INDRAMAT and are valid for German DOS.

### 3.3 Host Mode Configuration

For the configuration of the host mode, start pcANYWHERE after the DOS prompt by entering 'aw'.

#### Modem Settings

Select from the main menu:  
Be a host ...  
Select active configuration ...  
Modem

#### Modem



Fig. 3 -1: Modem settings

#### Host Settings

Select from the main menu:  
Be a host ...  
Host preferences ...  
Features

#### Function selection

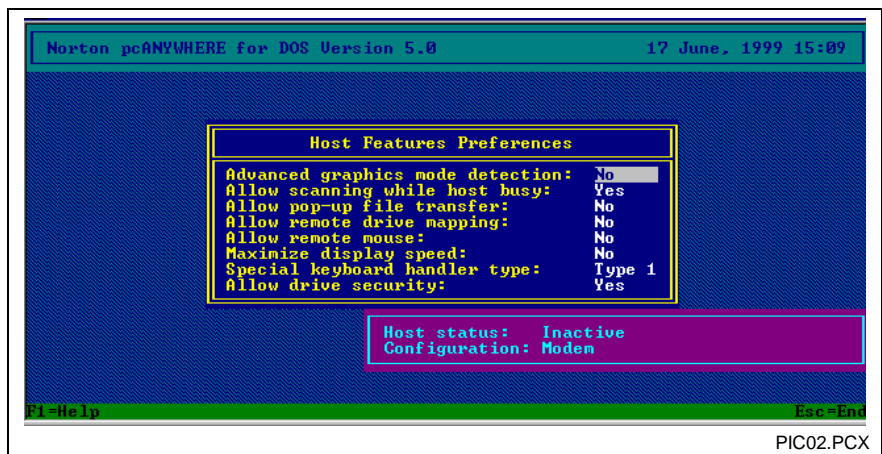


Fig. 3 -2: Host settings, function selection

## General Settings

Select from the main menu:

Be a host ...

Host preferences ...

General Settings

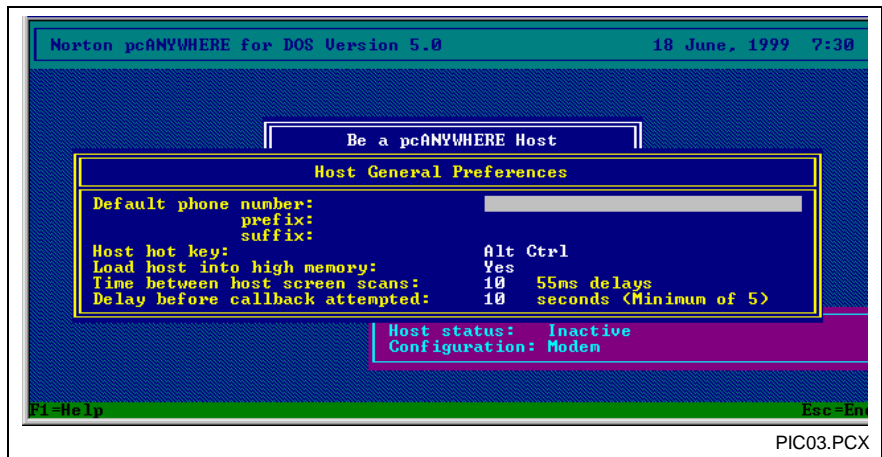


Fig. 3 -3: Host settings, general settings

## Security preferences

Select from the main menu:

Be a host ...

Host preferences ...

Security preferences

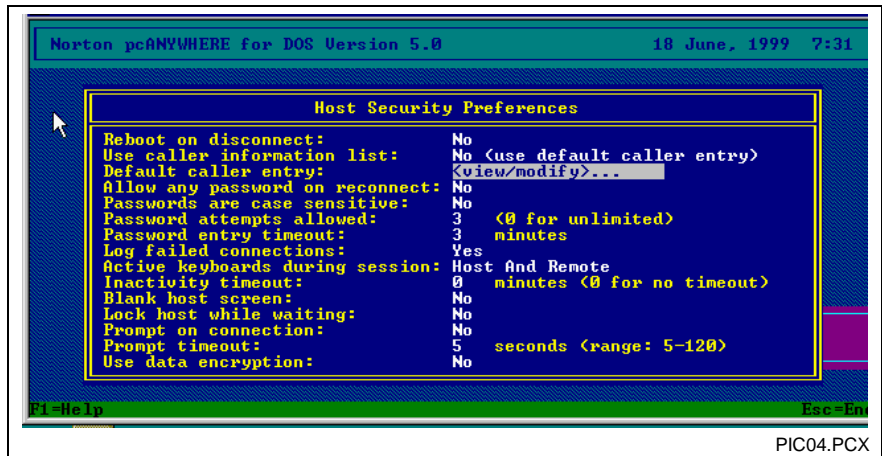


Fig. 3 -4: Host settings, security preferences

Select the entry 'default caller entry' <view/modify> for caller settings in the screen mask.

Caller information for: Default caller entry

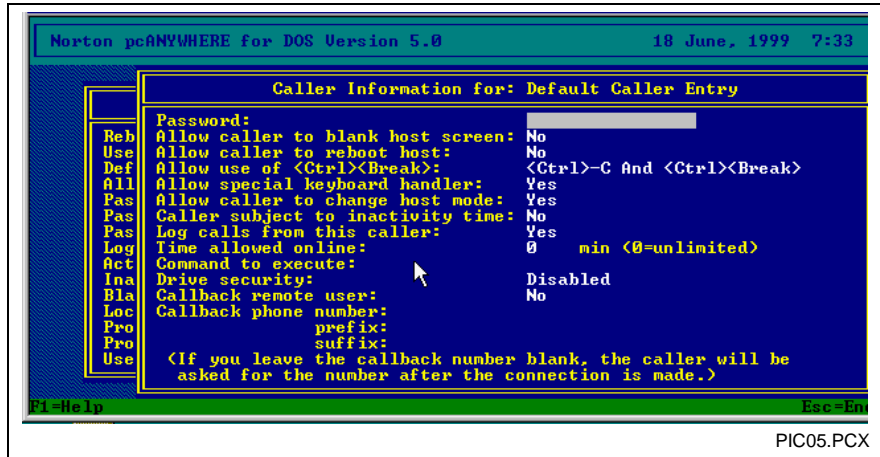


Fig. 3 -5: Host settings, caller settings

### 3.4 Remote Mode Configuration

For remote mode configuration, start pcANYWHERE at the DOS prompt by entering 'aw'. Determine the modem settings in the 'configure' menu and determine the parameters for computer identification and the telephone system.

### Communication Hardware

#### Modem

Select from the main menu:  
 Configure...  
 System hardware...  
 Modem

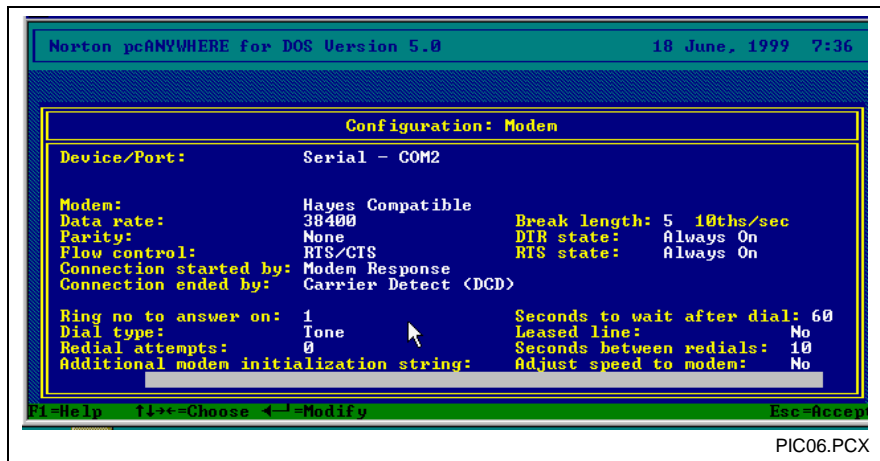


Fig. 3 -6: Modem parameters



### System setup

Select from the main menu:

- Configure...
- System setup

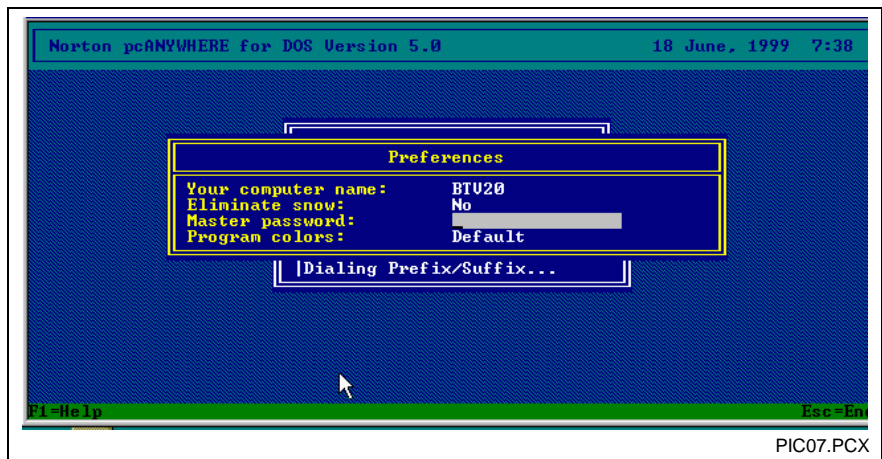


Fig. 3 -7: System parameters

### Dialing prefix / suffix

Select from the main menu:

- Configure...
- Dialing prefix / suffix

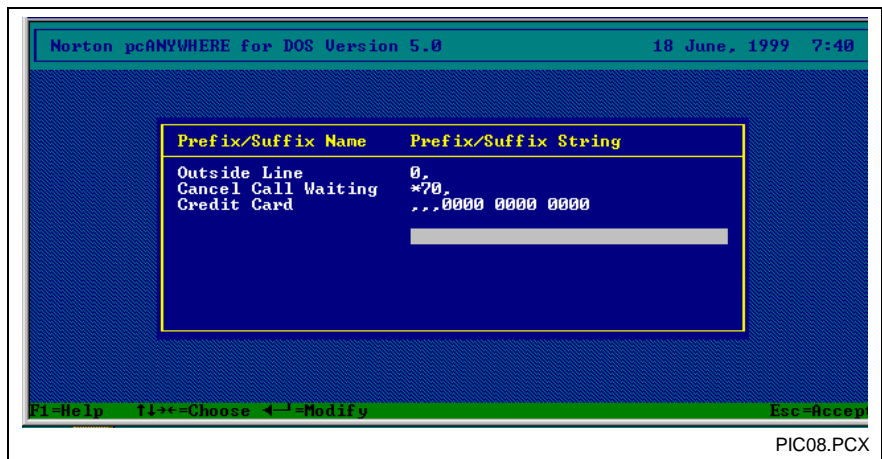


Fig. 3-8: Dialing parameters



## 4 Configuration pcANYWHERE 9.0 for WindowsNT

### 4.1 General Settings

Determine the standard settings for the remote diagnostic connections and the use of the program. The program settings and options are set in a dialog box with multiple registers.

**Note:** The following settings are a configuration example. The settings depend on the hardware in use (computer and telephone system). For detailed information please refer to the pcANYWHERE documentation.

#### System setup

These settings are important for the identification of your PC and the dialing properties.

Select from the menu:  
Tools  
Application Options...

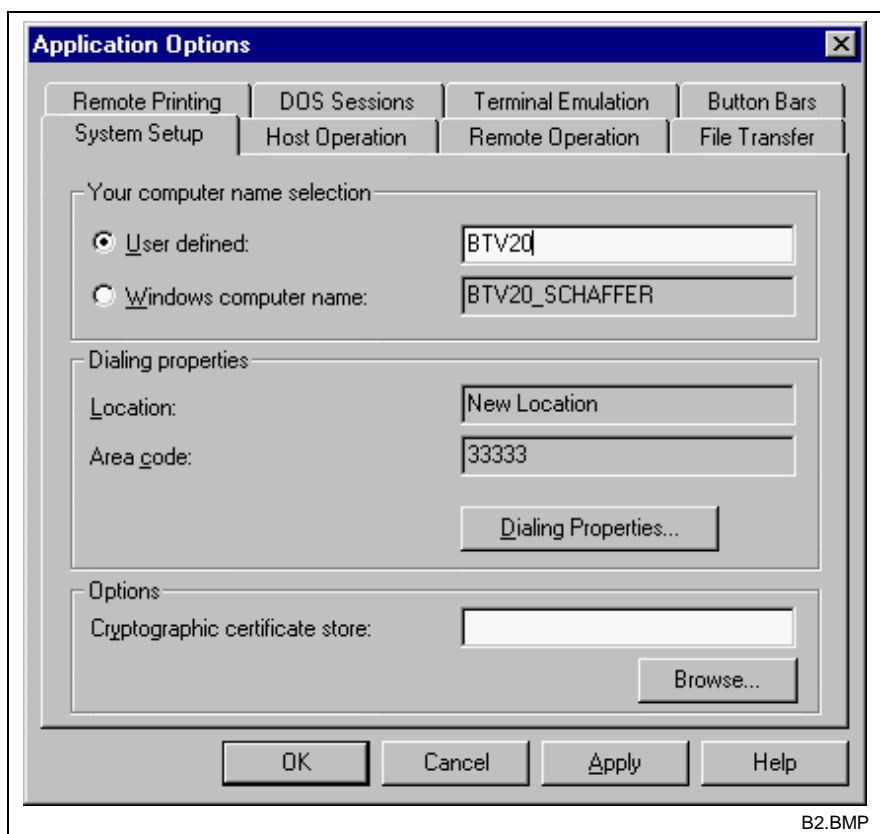


Fig. 4 -1: System setup

**Computer name selection** Select the computer name determined during the WindowsNT installation or determine a user-defined name for the remote diagnostic sessions.

**Dialing Properties** The button "Dialing properties" allows to determine the settings for the connection creation - depending on your telephone system. The following screen is displayed in German in the English software version.

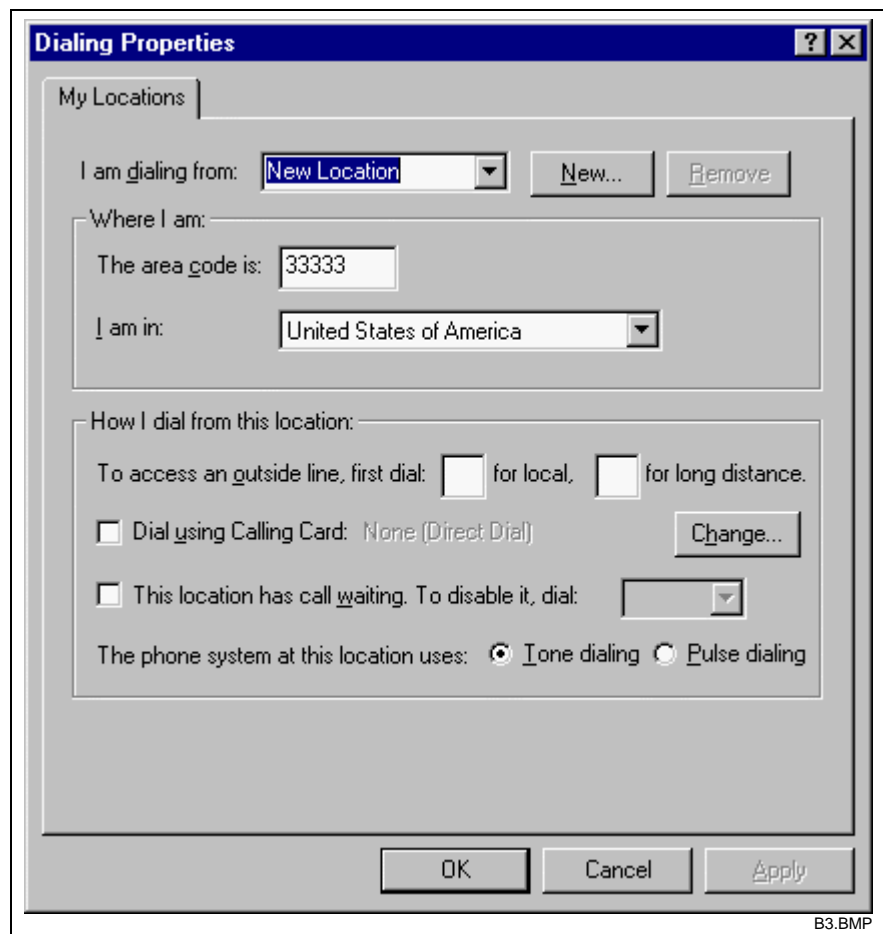


Fig. 4 -2 : Dialing properties

## DOS sessions

If the host executes DOS applications in full screen mode or the host user has changed to dos prompt, the remote user might notice problems when reading or displaying the contents of the host screen. The options menu allows adjustments.

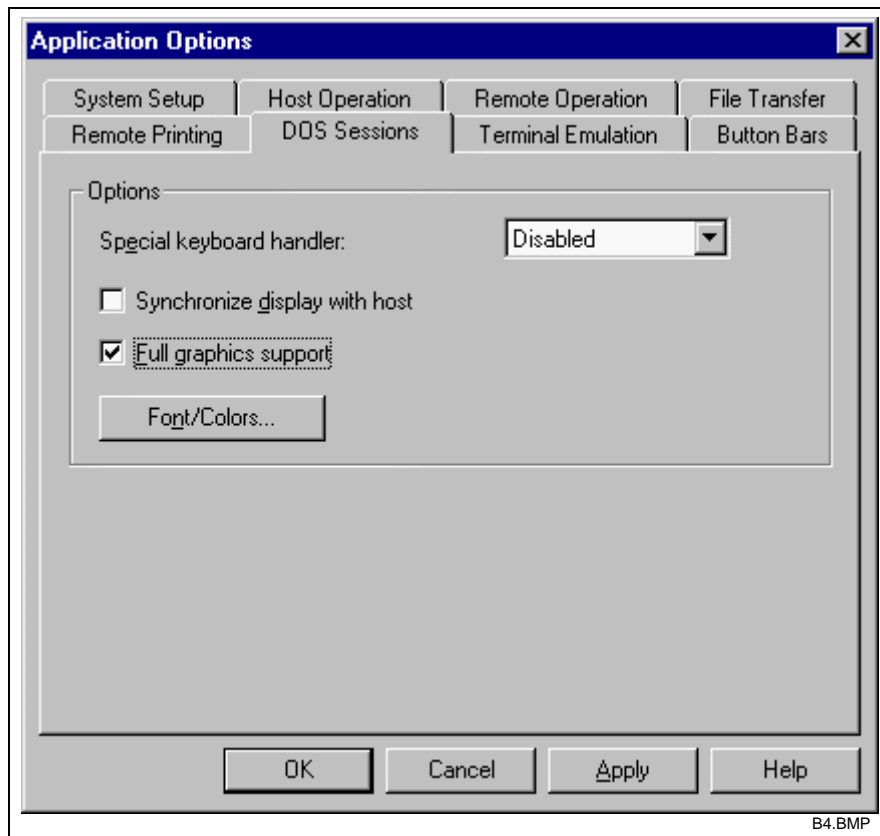


Fig. 4 -3 : DOS sessions

### File transfer

Options can be selected which influence the file transfer in all remote diagnostic sessions.

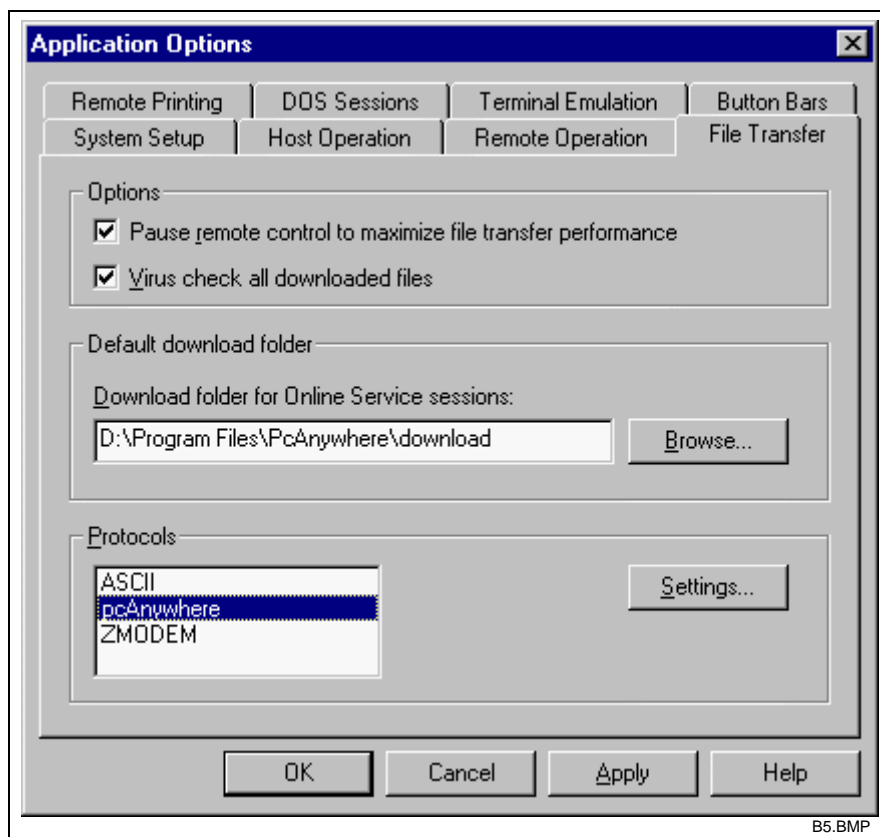


Fig. 4 -4 : File transfer

## 4.2 Host Mode Configuration

### Host operation

In the property tab "host operation" the number of rings can be determined until the Host PC is to accept the call. Furthermore the video mode can be selected.

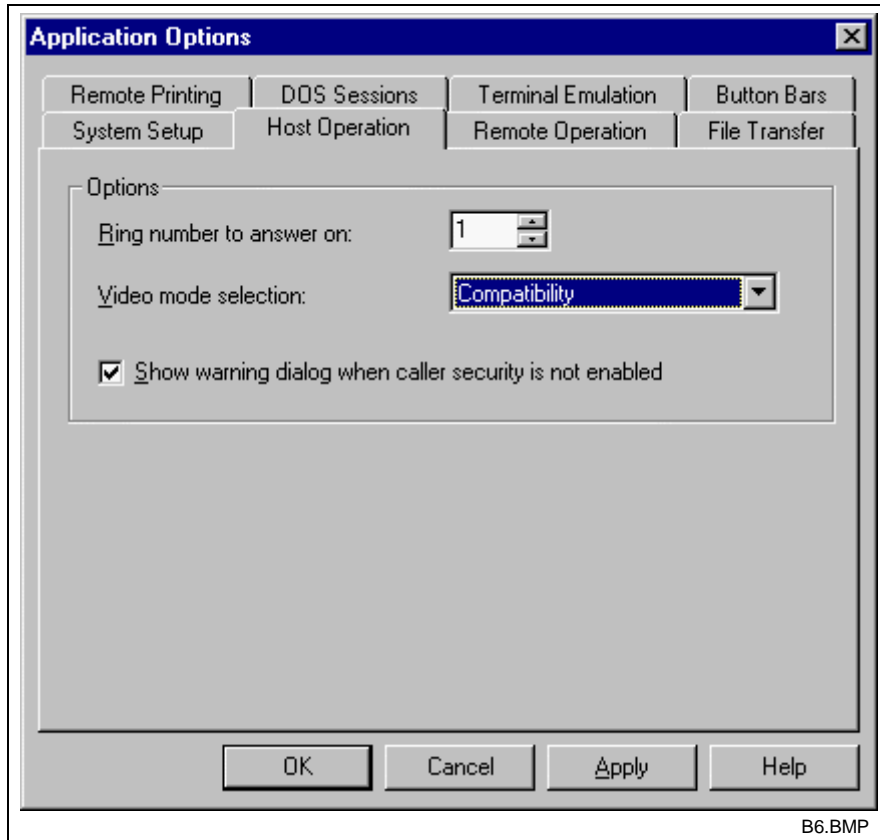


Fig. 4 -5 : Host operation

- Ring number to answer on** Select between 1 and 99 rings before the host is to accept the call.
- Video mode selection** Select "Compatibility" if the graphic display is incomplete or distorted during a host connection.
- Display host security warning if caller security is not activated** If this option is selected, the following dialog will be displayed if an unprotected host is started up.



Fig. 4 -6 : Host security alert for remote diagnostic access

## 4.3 Remote Mode Configuration

In this property tab the options for the remote diagnostic session for the remote PC can be selected. For example you determine the settings how the screen of the host PC is to be transferred and to be represented on the remote PC.

### Remote Operations

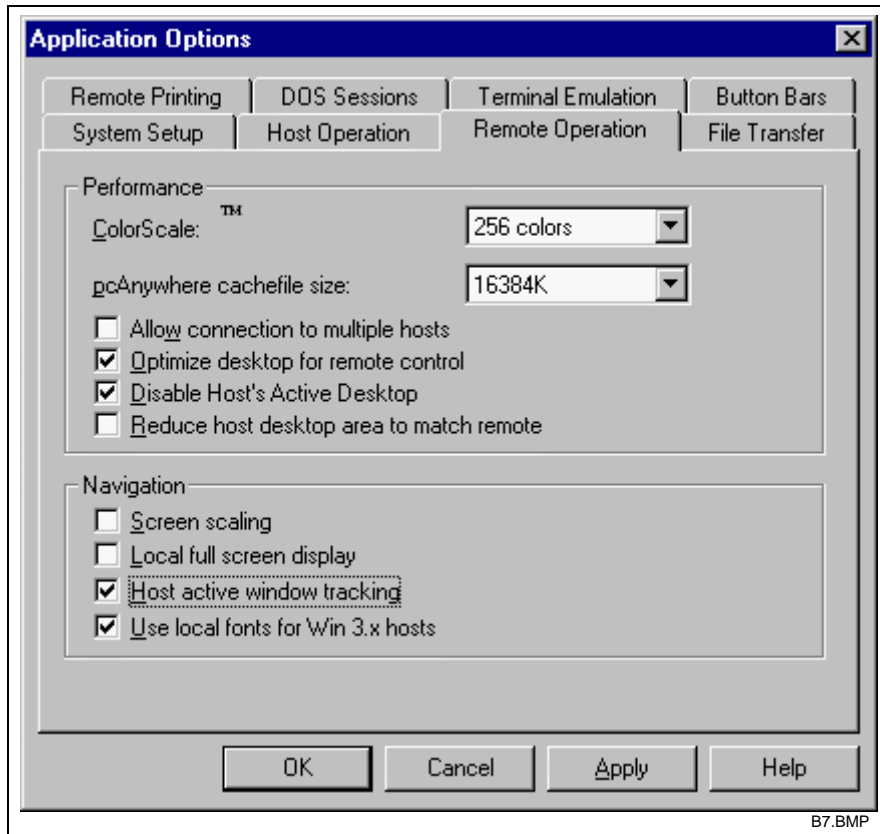


Fig. 4-7 : Remote Operations

- Optimize desktop for remote control** Activate this option. The desktop layout, the screen saver and the energy function will be disabled at the host PC as long as the remote diagnostic session is active.
- Disable Host's Active Desktop:** The speed can be improved by disabling all Active Desktop settings configured on the host PC.
- Host active window tracking:** This option automatically moves the display area of the remote PC into the currently active window on the host PC. If for example, an error message is displayed on the host outside of the remote PC display area, it could seem to the user as if the session had "hung up". If this box is checked, the following error message will be displayed automatically on the remote screen and can be confirmed or cancelled by the remote user.





## 5 Establish Remote Diagnostics with pcANYWHERE

### 5.1 General Information

#### Requirements

Before a remote diagnostics session can be executed successfully, both PCs which are to communicate with each other, must be configured correctly. Both PCs must be connected to the telephone line and must have the corresponding rights to establish a connection.

1. Check with the help of a telephone set whether the telephone connection between the devices is possible.
2. Check whether the modem is connected correctly and make sure that it is switched on.
3. Make sure that the host PC and remote PC settings for the combination of the devices PC/modem are correct.

#### Restrictions

During a remote diagnostics session, various data is transferred. Parts of the user interface are running in text mode, others are running in DOS graphics mode. Especially during the transfer of DOS graphics screens, the remote diagnostics operation is only possible with restrictions. Therefore not all control functions are available in a remote diagnostics session.

##### MUI in full screen mode

During the remote diagnostics session the MUI cannot be operated in "full screen mode".

##### Slow screen refresh in GUI and BVS

A graphic program running on the Host-PC during remote diagnostics, for example the Indramat user interface GUI (MTC200/MT-CNC **G**raphical **U**ser **I**nterface) of the MTC200/MT-CNC causes a very slow screen synthesis at the Remote-PC due to an extensive amount of data required for image transmission. To achieve remote diagnostic sessions at acceptable data transmission rates and in this way also reasonable screen refreshment rates, the use of the standard ASCII mode of the MTC200/MT-CNC user interface, the so-called MUI (MTC200/MT-CNC **M**achine **U**ser **I**nterface), on the Host-PC is recommended.

The machine operation in the GUI interface is nearly impossible due to the slow screen synthesis. The same problem occurs in the Operation and Visualization System (BVS).

##### GUI interface under WindowsNT

Under WindowsNT the GUI **cannot** be called during a remote diagnostics session. The remote diagnostics session can therefore only be used in the MUI. If the GUI is directly called in the batch file, the batch file must be changed (MT-RUNNT.BAT).

⇒ Change the call parameters '/B=10' to '/B=0'.

```

...
TITLE DOSBOF1_WIN
D:
CD D:\MT-CNC
TSRPG25I /C2 /O=16 /Z
MT-CNC /H /B=0 /W0
CD\
...

```

Fig. 5 -1: Batch file 'MT-RUNNT.BAT' with call parameter '/B=0' for MUI mode

##### BVS and Oscilloscope Function under WindowsNT

The Operation and Visualization System (BVS) and the Oscilloscope Function are running in DOS graphics mode. Consequently both functions cannot be displayed during a remote diagnostics session under WindowsNT.

**SPS in graphics mode** In order to call the SPS in a remote diagnostics session, the MUI must be switched to text mode. Therefore the DAT file of the control must be modified.

Up to version 17, the file MAIN\_EXE.DAT must be modified, from version 18 onwards the file of the corresponding destination control must be modified ("controtype.DAT-file"). The DAT files are included in the installation directory \MT\_TEXTE. For a MTC200, it is the MTC200-P.DAT file for example or ISP200-R.DAT for a ISP200 control.

In both versions, the parameter '/TEXT' must be added to the call of PCL.EXE in the DAT file.

```

...
;7
PCL.EXE /SEG /ONLINE /dtMTC200-P /ct1MTS-P /ct2MTC-P /TEXT
STATU15F.EXE /dtMTC200-P /ct1MTS-P /ct2MTC-P
GBO0060C.EXE
;11
...

```

Fig. 5-2 : Control type file 'MTC200-P.DAT' with call parameter '/TEXT' for SPS text mode

**Further restrictions** Quick events in the SPS (<1s) are not recognized due to the slow data transfer.

The GUI cannot be remote controlled completely as the machine keys are SPS inputs which cannot be operated by the PC keyboard.

During the remote diagnostics session the MUI cannot be operated in "full screen mode".

## 5.2 pcANYWHERE 5.0 for MS-DOS

### Starting the Host Software

The software (DOS host software) installed on the operating terminal must be initiated prior to starting the CNC-MUI. After terminating all programs initiated hereafter, the memory residing program can be removed from memory using a certain key combination (a so-called "hotkey").

A batch file containing the following commands can be created to start the host software:

```

@cls
@echo.
<pfad>\law_host /m:a

```

Replace <path> by the actual path where the host software was installed.

Usually the CNC user interface is called during AUTOEXEC.BAT execution. For this reason, the remote diagnostics call should be implemented in the AUTOEXEC.BAT as well.0

Further programs should not be started in order to avoid memory problems.

After initiating the modem, a window is displayed which displays the availability of the host computer.

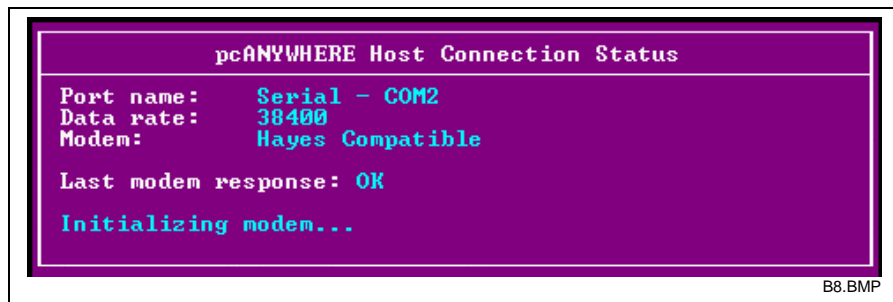


Fig. 5-3 : Availability display of the host computer

## Starting the Remote Software

To establish a communication to the host operating terminal, for example at the customer, the service technician has to start the remote program.

As with host operation, correct COM port configuration of the COM port where the modem is connected to is a requirement for a proper communication. For further details see *SYMANTEC™* and configuration examples of the description in hand.

### Invoking the remote software

Change directory to the **NORTON pcANYWHERE** DOS installation directory and call up program:

```
<pfad>\aw
```

After loading the remote software, the **pcANYWHERE** main menu is displayed.

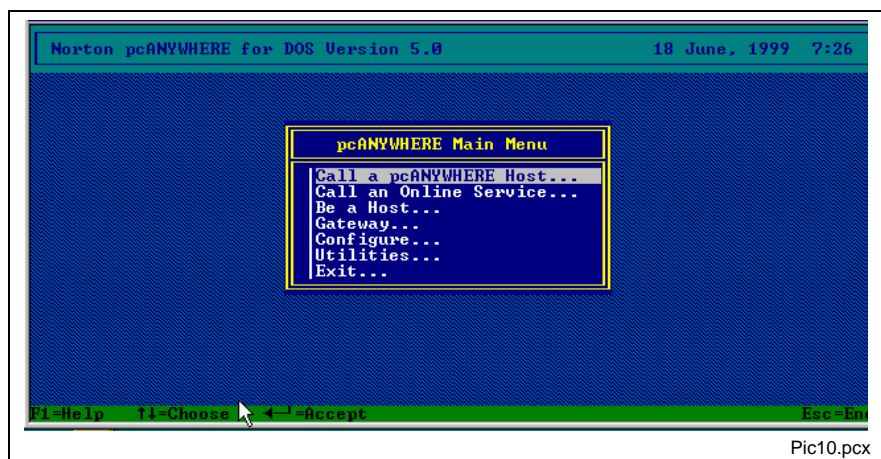


Fig. 5-4 : pcANYWHERE main menu

## Call Host

Select **Call Host...** in the main menu to call a host PC. In the following menu you have two possibilities to select:

### Quick Start

1. Select menu item **Quick Start...**  
The selection menu **Quick Start Options** is displayed.
2. Select **Change Connection Properties** in order to determine the caller settings (modem, telephone number).  
The settings for this connection type are saved.
3. Select **Call**.

If no Quick connect telephone number exists, then it is prompted for the host telephone number.

- or -

### Connect to a host

If you call various host PCs very often or if you call a certain host very often, you should save the configuration data in a host list.

- |                             |  |
|-----------------------------|--|
| <b>Configure connection</b> | <ol style="list-style-type: none"><li>1. Select <b>menu item Show/Change Host List...</b><br/>A host name list is displayed.</li><li>2. Select <b>pcANYWHERE Host by modem</b> in order to change the predefined configuration or press Insert in order to create a new configuration.<br/>An input screen with the most important call parameters is displayed.</li><li>3. Modify or complement the corresponding menu entries.</li></ol> |
| <b>Establish connection</b> | <ol style="list-style-type: none"><li>4. Select <b>'Connect to a host'...</b><br/>A host configuration menu is displayed.</li><li>5. Select the configuration for your call.<br/>The menu connection options is displayed.</li><li>6. Select <b>Call</b>.</li></ol>  |

After entering the host telephone number, the modem is trying to establish a connection to the operating terminal. Assuming correct installation and settings for host and remote, the entire screen of the operating terminal (host) is now displayed on the Remote-PC.

The remote diagnostics session can now begin.

## Exit Remote Diagnostics

To terminate the remote diagnostic session, the key combination predefined in 'Settings' must be entered, e. g. <Ctrl>+<Alt>.

- |                          |  |
|--------------------------|--|
| <b>Further functions</b> | Further information on special functions like "return call", "session protocol", etc. are described in the <i>SYMANTEC™</i> documentation. |
|--------------------------|--|

### 5.3 pcANYWHERE 9.0 for WindowsNT

In pcANYWHERE for WindowsNT both modes (host or remote) can be started in the same interface. After the program call, the following window is displayed:

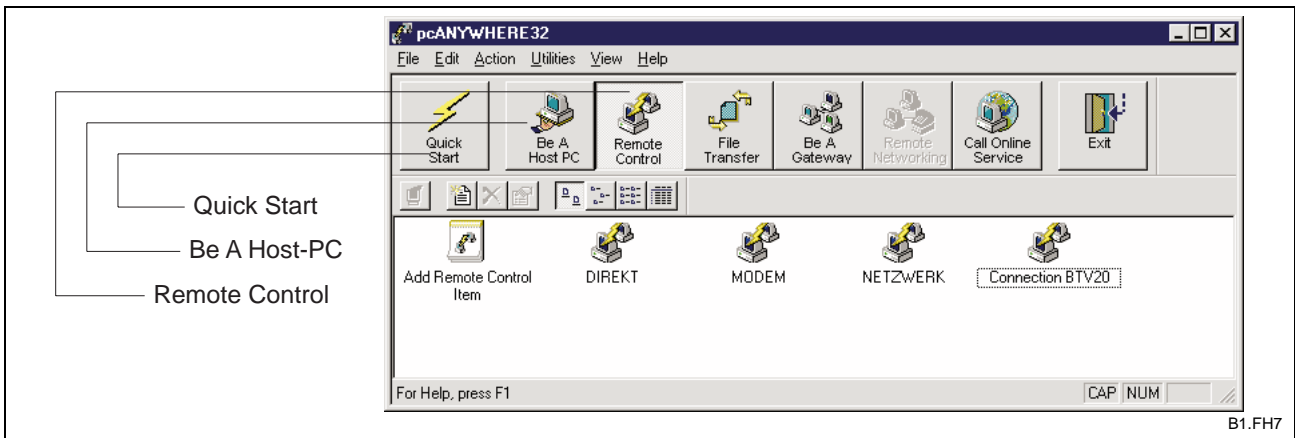


Fig. 5-5 : pcANYWHERE32 starting screen

**Be a host PC** The button "Be a Host-PC" switches to the Host mode of the program. A double click on the 'modem' symbol initialises the modem and waits for the call of the Remote-PC. 'Add host item' allows to create a user-defined connection object.

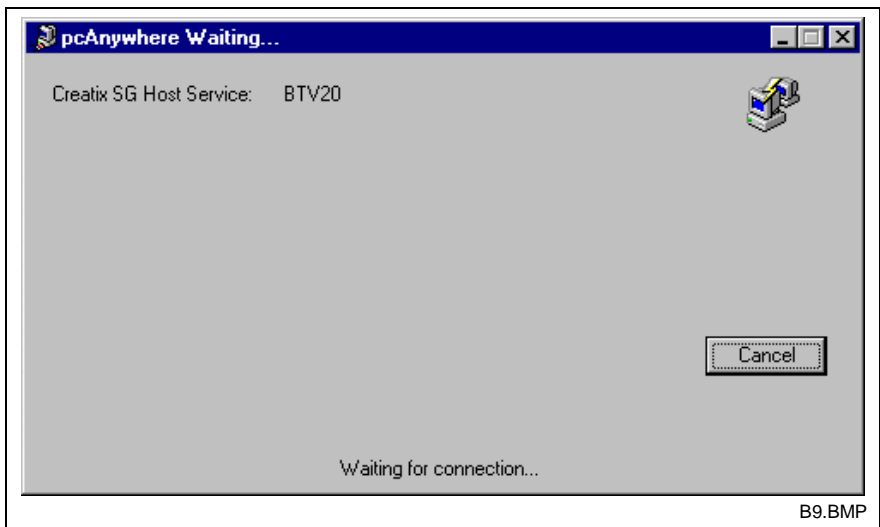


Fig. 5-6 : Availability in host mode

**Remote control** Double click on the 'modem' symbol creates connection to the Host PC after entering a telephone number. A user-defined connection object can be created with 'add remote control item'. E. g. the customer service can manage the various settings of different host PCs and select them directly.

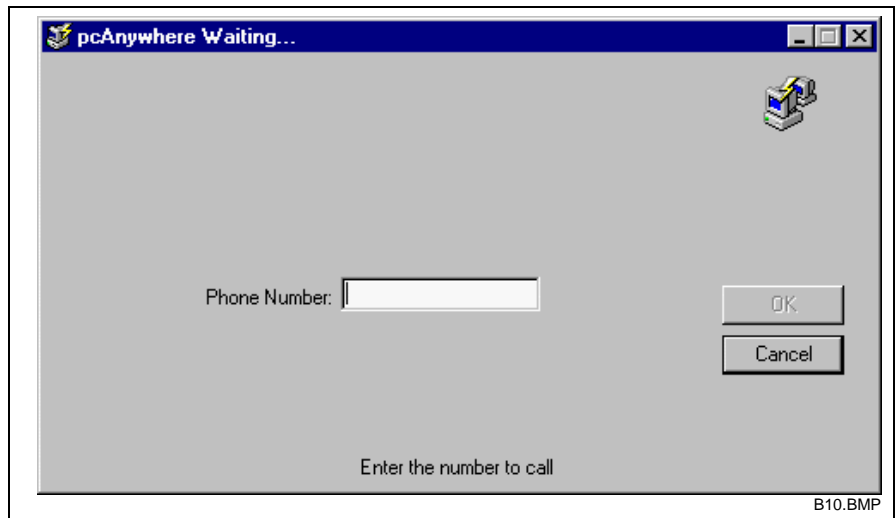


Fig. 5-7 : Connection creation in remote mode

## 6 Appendix: Troubleshooting

Listed below are several indications on possible errors and their relevant counter measures, especially when operating under MS-DOS.

Error description	Possible solutions, etc.
During initialization or operation error message: <i>'Not enough memory', 'Cannot load EMM386 or similar occurs.</i>	<p>Please compare the file CONFIG.SYS :</p> <pre>Switches=/f DEVICE=C:\DOS\HIMEM.SYS DEVICE=C:\DOS\EMM386.EXE NOEMS BUFFERS=30,0 FILES=30 DOS=HIGH DOS=UMB FCBS=4,0 SHELL=C:\DOS\COMMAND.COM /e:768 /p COUNTRY=049,437,C:\DOS\COUNTRY.SYS</pre> <p>and the file AUTOEXEC.BAT:</p> <pre>LH C:\DOS\SMARTDRV.EXE PROMPT \$p\$g path c:\dos LH KEYB GR,,C:\DOS\KEYBOARD.SYS LH doskey</pre> <p><i>Please also observe the remarks in the installation instructions of the corresponding control interface</i></p>
No connection is established:	Check configuration, the modem must be connected to the relevant COM port, ...
After a successful initialization by the remote user the connection gets lost.	In 'calling device settings' a 'return call to remote' is selected, although the telephone/modem line does not have international rights.
Dialing interruption:	Determine whether your telephone/modem is using tone or pulse dialog and set the correct mode in item 'System hardware' - 'Dialing mode'
Modem initialization error:	Some COM ports use an older, slower chip set. Reduce the baudrate prior to making the next attempt.
	The second COM port is not equipped within the operating PC, BTV-PC option.
Modem error:	Carry out modem Power Reset.
	Communication line, current line and telephone line of the modem must be connected correctly, for example connected to an external line.
	Modem 'switches' should be default settings. (AT commands via terminal program)
After calling the host mode, the initialization/dialing window is not displayed, the screen only flashes once.	Select and save again modem type, e. g. <i>'Hayes Compatible'</i> in item <i>'Host configuration - System hardware - Modem- Modem type'</i> .
The CNC user interface MUI is initiated, hotkey operation should remove the memory residential remote diagnostics software. The following message is displayed: <i>'System resources cannot be released'</i> .	The remote diagnostic's memory residential host mode can only be terminated after terminating the CNC-MUI! TSR programs are removed from DOS-RAM according to FILO principle (First In Last Out)!

Fig. 6-1: Notes about error counter measures





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