DMT500PC

User's Manual

Remote PC software

ABB Drives

ABB

DMT500PC
Remote PC software
For ACS 500, ACH 500, Series B

User's Manual

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This chapter gives an overview of the DMT500PC software.

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General

DMT500PC software is a link between a Personal Computer (PC) and ACS500 series variable speed drives. Its main purpose is to allow control possibilities of ACS500 using RS485 serial connection and GS-BUS communication protocol. The software can be used in monitoring, commissioning, control, and service.

The software consists of the following four separate functional parts:

- A. Remote panel

    - This part of the software acts like a ACS500 remote panel SAGS700PAN.

- B. Upload / Download

    - *Upload / Download* uploads or downloads the whole parameter set in/ from a file.

- C. Operating data

    - *Operating data* window displays all dynamically changing operating data signals with their values.

- D. Graphs of operating data

    - In *trend* windows it is possible to display graphs of selected operating data signals.

Hardware requirements   The DMT500PC software is designed to be used on an IBM-PC or compatible computer, and with the ACS 500™ or ACH 500™ standard AC drives from ABB Drives.

The minimum hardware and software requirements for both the computer and for the drives are:

- ACS500 with control board memory CRU03C or later.

- At least a 286 (AT) PC and one free COM port (RS232C or RS485).

- Signal converter RS232/RS485 (B&B Electronics 485OICR or equal).

- A mouse or another pointer-device is highly recommended.

The software is developed using National Instrument's (NI) Lab Windows (LW) environment. The software packet is delivered in a directly executable file format. The software package has the following minimum requirements for the system:

- DOS 3.0 or later

- 600 kilobytes free hard disk space for the installation

- 500 kilobytes or more free memory for run-time operation

- Display driver: VGA or EGA

Software Installation   The software is distributed on a 3½" diskette. The software installation is done from the DOS-prompt. Place the installation diskette into the A:-drive and follow the steps below.

There are two different installations depending on the display driver used by the system. These driver options include the VGA display, and the EGA display. If in doubt, please consult your hardware documentation provided to you with the computer to see which display driver you have.

Installation for VGA Monitors

Check that you have enough hard disk space available for installation of the DMT500PC software. The software package requires at least 600 kilobytes of free disk-space for installation.

DMT500PC software requires at least 500 kilobytes of free RAM for run time. The amount of free memory can be verified with the MEM - command.

If there is enough disk space and RAM available, you can proceed with the installation. To install the software, follow the steps below:

- Type `A:`
- Type `CD \`
- Type `SETUP C`, where `C` is the letter of the disk drive where the software is to be installed to.

This will complete the installation. The software is installed into a directory of `\DMT500PC`. To run the software, change the default directory to `\DMT500PC`, and start the software by:

- `CD \DMT500PC`
- `DMT500PC`

Installation for EGA Monitors

Check that you have enough hard disk space available for installation of the DMT500PC software. The software package requires at least 600 kilobytes of free disk-space for installation.

DMT500PC software requires at least 500 kilobytes of free RAM for run time. The amount of free memory can be verified with the MEM - command.

If there is enough disk space and RAM available, you can proceed with the installation. To install the software, follow the steps below:

- Type `A:`
- Type `CD \`
- Type `SETUP C`, where `C` is the letter of the disk drive where the software is to be installed to.
- Type `COPY A:\EGA\*.* C:\DMT500PC\*.*`. Here `C` is the letter of the target installation drive.

This will complete the installation. The software is installed into a directory of `\DMT500PC`. To run the software, change the default directory to `\DMT500PC`, and start the software by:

- `CD \DMT500PC`
- `DMT500PC`

Hardware connection
The ACS / ACH 500 drives have an on-board serial port with a RS-485 half-duplex interface. A normal IBM-PC has one or two serial ports (COM1: and COM2:), which are electrically RS-232. To connect to the drives, there needs to be an electrical conversion from RS-232 to RS-485.

The requirements for this converter are:

• It must have an optical isolation between the RS-232 and RS-485 sides for safety and noise reduction.

• The RS-485 is physically 'half-duplex'. The RS-485 transmitter control must be done either by

   - RTS signal from the PC, or

   - From Transmitted data stream from the PC.

With the serial RS-485 interface it is possible to connect the PC from one to 31 drives using one single wire.

Single Drive
To connect the converter to one drive at a time, follow the diagram *Figure 1-1, "Single drive connection"*. ABB Drives recommends the Belden 9844 cable for wiring. This is a shielded, twisted pair cable, with two twisted pairs. The wave impedance of the cable should be 120 Ω

Figure 1-1 Single drive connection
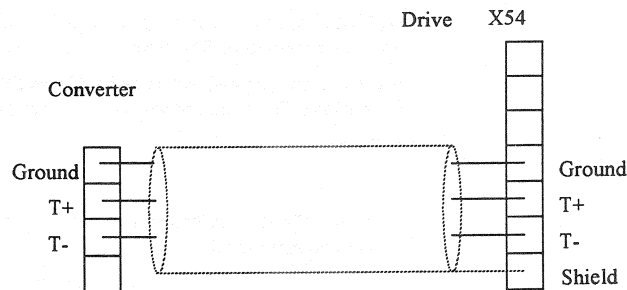
WARNING! Your drive contains dangerous voltages when connected to the line power. Always check that the ACS / ACH 500 drive is safe after disconnecting the power, by measuring the DC bus voltage and line input voltage. Failure to check voltages could cause death or serious injury. Only a qualified electrician should carry out the electrical installation.

Networked Drives   To connect the converter to multiple drives, follow the diagram *Figure 1-2,*
"Multiple drive connection". ABB Drives recommends the Belden 9844
cable for wiring. This is a shielded, twisted pair cable, with two twisted pairs.
The wave impedance of the cable should be 120 Ω

Figure 1-2 Multiple drive connection
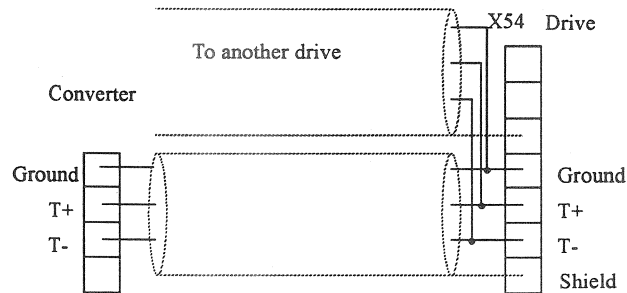
When networking the drives together, the following guidelines should be
followed:

- Every drive on the network must have its own, unique, station number to
  identify it on the network. To change the station number, modify the
  parameter *DRIVE ID-NUMBER* in group *10.8 Ext Communication.*

- The drive control board must be left electrically floating. The grounding
  connector, X53 must be properly grounded.

- Also any grounding wire like the green-yellow wire connected from X50:8
  to ground, needs to be removed.

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This chapter describes how to use the DMT500PC software package. The DMT500PC software has four separate functional parts. Each one of the parts has its own display 'panel', which are described in detail below.

Introduction

The DMT500PC software uses a software library Lab Windows for the user interface. This library is used to define all the number displays, push-buttons, and selection list.

To use the DMT500PC, any button or field can be selected by either

* using a mouse.

* going from one field to another with the tab-key. A shift-tab will go to the previous field on the display. The selected field is framed, and if it is a button, can be 'pressed' with the return key.

* holding the [Alt] key down at the same time as the first letter on the button text is pressed.

* Some buttons have a function key associated with it. Pressing this function key is identical to pressing the key with the mouse.

Communication Setup

To communicate properly to the ACS / ACH 500 drives, the communication setup on the PC and on the drive must be identical. Also the RS-232 to RS-485 converter must be connected to the correct serial port on the PC.

These setups are defined on the *Communication Set Up* panel in *Figure 2-1, "Communication Set Up"*.

When the program is started, a window shown in *Figure 2-1, "Communication Set Up"* will appear. In that window it is possible to select communication port, speed, and converter type.

In this window it is also possible to change the display update rate, or go to telephone modem configuration window.

The range for display update rate is 0–99: the smaller the number, the faster the update rate is (other controls like start and stop operate slower).

The *Telephone modem configuration* window is discussed in *Chapter "Modem Connection"*.

The DMT500PC supports two kinds of modems. It is necessary to define to the RS-485 converter when it is sending data to the RS-485 link, and when it is receiving data from there. This control can either be done using the RTS-signal from the RS-232 port, or it can be automatic. In the automatic mode, whenever the PC transmits data on the RS-232 port, this transmission will turn on the transmitter on the RS-485 side. 'Automatic' converters are typically setup to work properly with only one baud rate at a time.

It is recommended to use an automatic RS-232/485 converter. The advantage of that kind of converter is two times faster operation compared to an RTS-signal (or DTR or CTS) controlled converter. Converters must not echo back the transmitted characters.

The baud rate selection must be the same on all the drives, DMT500PC software, and on the converter for the communication to work without problems.

In the *Communication Set Up* window there are four types of controls:

- three push buttons (*OK, Cancel* and *Telephone modem configuration*),
- one slide (*Baud Rate*),
- two binary switches (*Com Port* and *Converter type*) and
- one numeric/string box (*Display Refresh Rate*).

All of these can be controlled by mouse. It is also possible to move from one control to another using TAB and Shift-TAB. The switch positions of slide and binary switches can be altered by arrow up and arrow down keys. It is also possible to select push buttons with key combination ALT+first letter (here: ALT-O). Once push button is selected, it is activated by pressing Enter. In numeric/string box the value is changed using keyboard (back space, delete etc.).

Figure 2-1 Communication Set Up
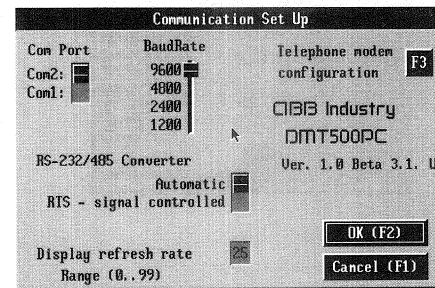
Remote Panel   When the *OK*-button in *Communication Set Up* window is pressed, the
Remote Panel window shown in *Figure 2-2, "Remote Panel window"*
appears.

This is the main panel for the software. In the center is the simulated remote
panel display with the remote panel buttons. This can be used for both
controlling the drive in keypad mode, and for modifying the drive parameters.

At first the program starts to scan drives in the network: this takes about 10
seconds with 9600 baud communication speed. When a device is found it is
added to the *Drive* list (on the right corner). If no devices are found a text "No
or bad communication" should appear.

Figure 2-2 Remote Panel window
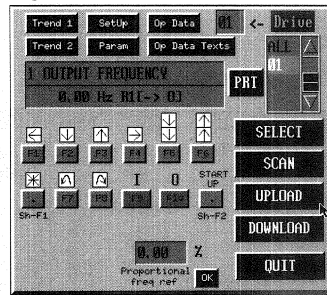
Drive selection

The DMT500PC can operate with one drive at a time, or it can send keypad control (Start, Stop, Direction, Proportional reference) to every drive at the same time.

The controls for doing the drive selection are on the right corner. ALL is the common mode control selection, while the numbers below it (1–31) list all the drives found from the network.

The selected drive is displayed on the left side of the drive selector in the rectangle.

To select a drive: click the desired drive in the list with the mouse (the background color of that number should change) and press *Select* button.

If *ALL* is selected, the following text will appear on the display: "MODE : ALL". In this mode it is possible to start/stop all the drives in the network, to give proportional reference and to change the direction of rotation. In *ALL*-mode the status information of each drive is displayed in *Status* window *Figure 2-3, "Status window in ALL-mode"*. The refresh rate is selected in *SetUp* window.

To update the list of on-line devices push *Scan* button. During the scan-time the DMT500PC will go through every possible address, and find out what drives are connected to the PC.

Remote panel operations

The remote panel can be used either with a mouse or by using the tab-key with the return. There are remote panel control buttons (F1 – F10, and Shift-F2) below the control panel display. These can be used to simulate the push-buttons found on the remote panel.

If you are using a mouse, the push buttons can be controlled simply by clicking - not by holding down the button. You can also use the function keys (marked on top of each button).

The single arrow keys (up/down) increase/decrease the value one step at a time (e.g. frequency 0.01 Hz). The double arrow buttons increase/decrease the value by increasing steps when pressed frequently.

Proportional frequency reference send a percentage frequency reference to the selected drives. 0% corresponds to the minimum frequency, while 100% corresponds to the maximum frequency. The reference is sent when the *OK*-button is pressed.

Figure 2-3 Status window in ALL-mode
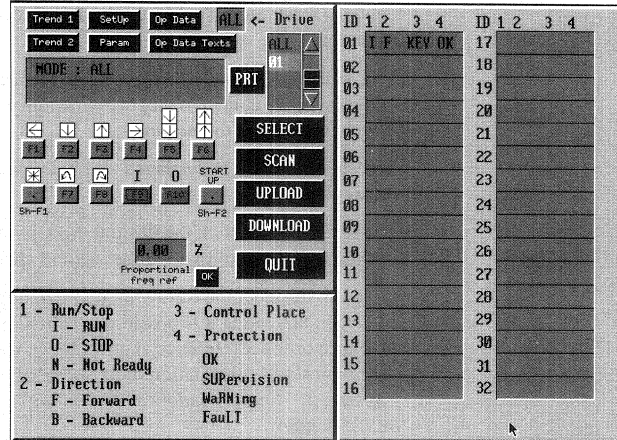
If the software is in the ALL-mode, the panel in *Figure 2-3, "Status window in ALL-mode"* is shown. The right side of this window shows an overview of all the drives connected to the network. This status includes:

* Is the drive running, stopped, or not ready to run,

* Direction forward or reverse

* Control location, keypad or external, and

* Drive status, OK, Supervision message, Warning message, or a Drive is faulted.

Drive parameter Upload and Download

The DMT500PC software can upload all the drive parameters from the drive into an IBM-PC file. These uploaded parameter settings can be downloaded back to the same, or another drive, at a later time.

This Upload / Download capability can be used for making software backups from the drives.

Upload from the selected drive is activated by pressing *Upload* push button. The software first asks for the file name, where all the parameter values will be stored. The file name must be a legal MS-DOS file name with 1-8 alphanumeric characters. File file extension is always . UPL. The file name must be entered without any extension.

The parameter download is selected with the *Download* button. The program first asks for the file name (with the extension of .UPL) where the parameter values to be downloaded are read from. The selection can be done either by double-clicking the desired file name or by selecting the file (background color changes) and pressing the Select button.

Software versions must be the same between the source drive (Uploaded parameters) and the target drive (Downloaded parameters). Software version (like CRU03D) can be verified from the parameter CRI PROG VERSION.

During the Download the target drive must be stopped.

It is recommended to Upload and Download parameter settings, where the control place is Keypad R1. The control place can be changed after the Downloading is complete.

This will prevent an accidental drive start-up while doing the download. The drive would start, if it is in external mode, and the digital inputs are in start condition.

It is not possible to edit UPL-files.

The parameters 1 (DRIVE ID-NUMBER) and 2 (BIT RATE SELECT) in group 10.8 EXT COMMUNICATION are not downloaded. Start-up data parameters D (Supply voltage), F (Motor current), and G (Motor power) are also set to the default values during the downloading.

Setup   *Setup* brings the Communication Setup window on the screen. This can be used for changing the communication settings for the software.

Quit   *Quit* will terminate the program execution, and will return back to DOS.

PRT (Print)   *PRT* button will print all the parameters in the drive, and their texts into an ASCII text file, or to a line printer connected to the LPT1: port.

To use the PRT button, first go to the operating data display with the actual frequency shown. This can be done by pressing the left arrow, until the 1 OUTPUT FREQUENCY is displayed. If the drive is running, the start-up parameters will not be printed.

Operating Data window   The operating data window displays the actual values from the operational data table. In addition to the actual values shown on the panel, the window will show the following additional information:

• Application block output. This is the output from the PI controller

• Actual value 1 in percentage

• Actual value 2 in percentage

• Run-time counter without rounding and

• Cumulative energy counter without rounding.

This panel is also used for selecting variables which are trended on the trend windows.

Operating Data window is activated by pressing *Op Data* button on the *Remote Panel*. The panel is shown in *Figure 2-4, "Operating Data window"*

Figure 2-4 Operating Data window

The texts on the operating data window can be changed to correspond to the selected language on the drive. This is done from the remote panel window.

To change operating data texts: go to the first operating data display on the remote panel window. The display shows 1 OUTPUT FREQUENCY, 0.00Hz R1[<- 0] while using the English language, and press *Op Data Texts* button. Note that the frequency value should not be in brackets [ ].

To select which parameters are monitored in the *Operating Data* window, press the button in front of the desired parameters. This also selects the parameters for trending.

Run-time hour counter is displayed in format hours.minutes.

kWh counter is displaying the cumulative energy in multiples of 100 kWh.

To hide the window, press the *Op Data* button again.

Trend 1   The Trend 1 display shows an on-line trace of one operating data signal on the selected drive. Which signal is displayed is selected from the Operating Data window. The first selected signal is trended. The sampling rate depends on the hardware used and on the communication speed. More than 10 samples / second are possible with a 486 running at 33 MHz, and with a 9600 baud connection. The sampling rate is not tied to the real-time clock, and therefore is not accurate.

To activate *Trend 1* window, press *Trend 1* button in *Remote Panel* window.

When *Trend 1* is activated, the scale of the graph is asked. The display scale is entered as two numbers separated with a comma. The default display scale is from -50 to 50 (-50,50). scales are inputted in the form lowerlimit,upperlimit.

The *Trend 1* window is trending the first selected parameter from the *Operating Data* window. The trended signal is not changed on the Trend window while the window is active, even if the selection is changed on the *Operating Data* window. To change the trended signal, deactivate and reactivate the *Trend 1* display by pressing *Trend 1* button twice.

To hide the window, press *Trend 1* button again.

Figure 2-5 Trend 1 window
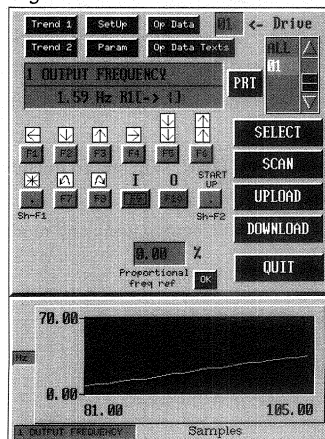
Trend 2   The Trend 2 display shows an on-line trace of one to six operating data signals on the selected drive. Which signals are displayed is selected from the Operating Data window. The first six selected signals are trended.

The maximum sampling rate depends on the hardware used and on the communication speed. More than 10 samples / second are possible with a 486 running at 33 MHz, and with a 9600 baud connection. If the sampling rate is slower than the maximum possible, the sampling is tied to the real time clock.

Before activating *Trend 2*, select signals to monitor in *Operating Data* window *Figure 2-4, "Operating Data window"*.

To activate *Trend 2*, press *Trend 2* button in *Remote Panel* window.

Figure 2-6 Trend 2 window
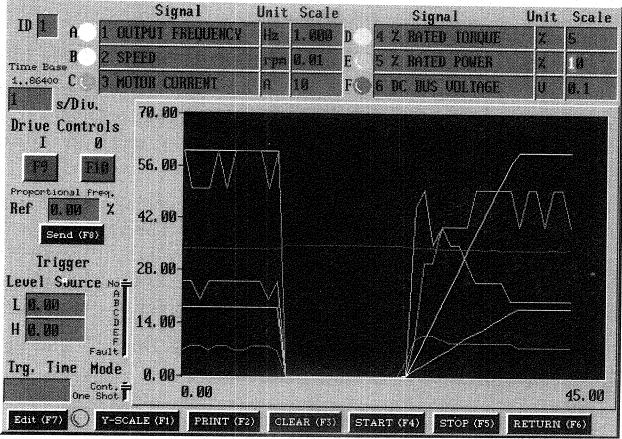
The names, units, scales, and colors of the monitored signals are displayed on top of the window *Figure 2-6, "Trend 2 window"*.

Drive ID-number and sampling rate are displayed on the upper left corner of the window.

Basic drive controls (start, stop and frequency reference) are in the middle of left side of the window.

Trigger controls (level, source, time and mode) are on the lower left corner of the window.

Edit (F7) allows changes to the following controls: *Scale, Time Base, Trigger Level, Trigger Source,* and *Trigger Mode.* To change the values of these controls press Edit (the Red LED turns on), edit controls, and press Edit again to activate the changes (the Red LED turns off).

Y-SCALE (F1) changes the y-axis scaling. The scales are entered in the form lower limit,upper limit. If you just press OK, the default limits (-50Hz, 50Hz) are selected.

Print (F2) prints the current window in a HP-GL file or sends it to a printer. In the executable version the default printer is HP LaserJet II on LPT1. It is possible to print the HP-GL files for an example by using WinWord 2.0. It is also possible to save the current display in a file (.SCR) and view these files.

Clear (F3) removes traces from the current graph.

Start (F4) starts the data acquisition, if *Edit* is not active and trigger *Source* is "No" or "Fault".

Stop (F5) stops the acquisition.

Return (F6) hides *Trend 2* window and returns back to the *Remote Panel.*

Individual signals can be scaled with the *Scale* constants. These *Scales* can be edited while Edit is active (Red LED is on). The signal value is multiplied by this *Scale,* before the trace is drawn on the *Trend 2* display.

Time Base selects the sampling rate. There are 10 sampling points per division. For an example 10 seconds/division equals 1 sample/second. Maximum sampling rate depends on the baud setup, number of monitored signals and PC used. The maximum sampling rate is >10 samples/second with one signal, *Time Base* = 0, *Trigger Source* = "No", 9600 bits/s, and with a 486 PC running at 33MHz.

Drive Controls operate just like the controls in the *Remote Panel*

Conditional Tracing

Trigger function can be used for tracing some low speed and exceptional phenomena. With this feature, the DMT500PC software can be left to look for the signals, and to stop the data collection when the triggering condition has been met. This will keep the data for the traces on the PC until it is used.

There are two different modes for data collection, and for triggering conditions. These are selected by the *Mode* selection. This has two values:

- Cont

    - Continuous mode. Traces are drawn as long as the trigger conditions are true. When the triggering condition goes false, the data collection stops.

- One Shot

    - The drawing is started once the triggering conditions become true. The data collection is stopped when the triggering conditions become un-true, or once 45 samples have been collected.

- Triggering can be re-activated by pressing the *Edit* button twice.

Source selects trigger source. The selections are:

- No - No trigger
- A, B, ... , F - Signal A, B, ... , F
- Fault - ACS500 Fault

Level defines trigger activation limits for the signals. The triggering condition is true, only when the actual signal value is within the range defined by the Lower and Higher limits. These limits are:

- L - Lower limit
- H - Higher limit

*Trg. Time* displays the time when the last triggering occurred.

If trigger source is one of the signals (A...F), the program scans the selected signal. Once the scaled value of that signal gets into the trigger window (level low ... level high), the program starts drawing traces of the selected signals.

Poor or no communication is indicated in Trend 2 window so that all traces go to the value of -10.

Modem Connection

The DMT500PC software can also be used remotely through telephone lines using telephone modems, and a signal converter.

Figure 2-7 Modem connection
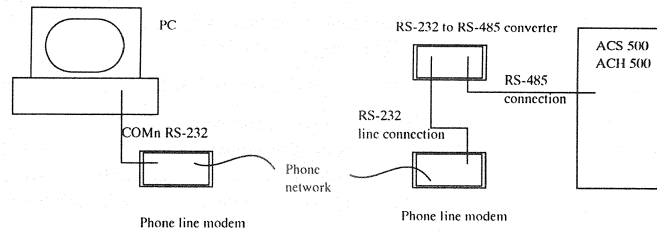
Telephone Modem Configuration window shown in *Figure 2-8, "Modem Configuration Window"* is activated by pressing *Telephone modem configuration (F3)* button in *Communication Set Up* window *Figure 2-1, "Communication Set Up"*.

Figure 2-8 Modem Configuration Window

On the left side of the window there are text boxes for modem control strings. *Default (F9)* sets the strings to AT-modem defaults. *Modem Echo* displays the modem feedback during dialing.

Target Phone Number is the number which is used when *Dial (F6)* button is pressed.

It is possible to write five most frequently used numbers with comments in the boxes on the right. These numbers are transferred to *Target Phone Number* by pressing the push buttons (F1...F5) in front of them.

When *Dial (F6)* button is pressed, program sends *Originate* and *Dial* strings with *Target Phone Number* to the modem using communication port and baud rate selected in *Communication Set Up* window. During dialing the Dialing LED is glowing and modem response is displayed in the Modem Echo screen. When dialing is finished, the Dialing LED turns off and the program is in telephone communication mode. Now it is possible to push *Return (F8)* and use the program as in the normal mode.

The program doesn't check whether there is a connection or not. That makes it possible to establish the telephone connection before starting the program. In that case you should also activate *Telephone Modem Configuration* window and press the *Dial* button (e.g. with empty strings in *Target Phone Number* and *Modem Commands*. This routine is required to set the program in telephone communication mode.

After the session the connection is closed by pressing the *Hang Up (F7)* button. The *Hang Up* strings are sent during this disconnection.

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