

User's manual

Engineer^{IT} Navigator CAP 540



This manual belongs to:

User's manual

Engineer^{IT} Navigator
CAP 540*1.3

About this manual

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Introduction

1 Intended use of this manual

CAP 540 is a collection of programming, configuration and setting tools and libraries for a range of protection and control terminals.

This manual can be used to get an overview of CAP 540 and its contents and information on PC requirements and supported terminal product families. It also provides necessary information to install the terminal tool box CAP 540.

2 Intended audience

This manual can be used by operators, commissioners and system engineers.

2.1 Responsibilities

In order to fully understand the contents of this manual, you should have basic engineering knowledge and specific knowledge in system automation, depending on your purpose.

3 What is in this manual?

This manual is organized into chapters according to the intended audience so that each chapter corresponds to user's needs.

Chapter 1 gives an introduction to the manual.

Chapter 2 gives an overview of CAP 540 and its contents.

Chapter 3 specifies the requirements for your PC and operative system. It also shows which product families and releases are supported by this terminal tool box.

Chapter 4 describes how to install the CAP 540 Navigator.

Chapter 5 describes how to use the CAP 540 Navigator functionality.

Appendix A gives an overview of Toolbar buttons and menus.

4 How to find more information

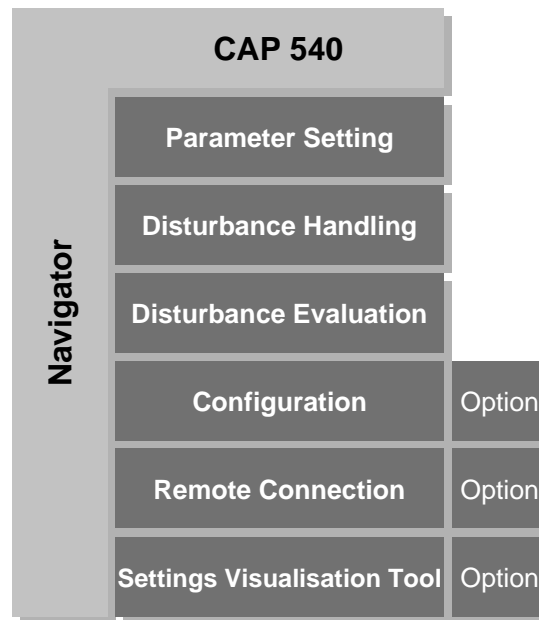
The following manuals provide complementary information:

- CAP 531*1.6 Configuration and Programming tool, User's Manual, 1MRK 511 105-UEN
- PST*1.2 Parameter Setting tool, User's Manual, 1MRK 511 114-UEN
- REVAL*2.0, User's Manual, 1MRK 511 053-UEN

Application

1

CAP 540 Terminal tool box



The CAP 540 terminal tool box contains these programming, configuration and setting tools and libraries for a range of protection and control terminals:

- CAP 540, Navigator
- PST, Parameter Setting Tool
- Disturbance Handling
- REVAL, Disturbance Evaluation
- CAP 531, Configuration and Programming Tool
- Remote Connection
- SVT, Setting Visualization Tool

CAP 540 also contains the User's Manuals for the tools in pdf-format and Acrobat Reader to view the manuals.

Internet Explorer 4 is also provided. It is needed for the help system in PST.

When you install CAP 540 Navigator, you get the following documents:

Table 1: Documents CAP 540

Document	Number
CAP 540*1.3 (This document) Navigator User's Manual	1MRK 511 142-UEN
CAP 531*1.6 Configuration and Programming tool User's Manual	1MRK 511 105-UEN
PST*1.2 Parameter Setting tool User's Manual	1MRK 511 114-UEN
SVT*1.0 Setting Visualisation Tool User's Manual	1MRK 511 122-UEN
REVAL*2.0 Disturbance Evaluation User's Manual	1MRK 511 053-UEN
Installation and Commissioning manual	1MRK 511 123-UEN

Requirements

Table 1: Requirements on PC

Item	Minimum required
Processor / Frequency	Pentium / 233MHz
RAM	128 MByte
Disk space	500 MByte
Monitor / Resolution	VGA compatible / 1024 x 768
CD-ROM drive	Needed to install the terminal tool box

Table 2: Requirements on operative system and help viewer

Operative System	ADD-ONS	Help viewer
Windows 95	DCOM 95	Internet Explorer 4 or later
Windows 98	DCOM 98 second edition	Internet Explorer 4 or later
Windows NT 4.0	Service Pack 4 or higher	Internet Explorer 4 or later
Windows 2000	–	Internet Explorer 4 or later
Windows XP Professional	Service Pack 1	Internet Explorer 4 or later

1

Supported terminal versions

REL 012*1.0	REL 5xx*1.0 and later
REL 100*3.0	REO 5xx*2.1 and later
REG 1xx*3.0	RES 505*2.3 and later
REOR 100*2.2 and *3.0	RET 521*2.0 and later
REB 551*1.1 and later	RED 521*2.0
REC 561*1.0 and later	

Installation

This chapter describes how to install the different parts in the CAP 540 Navigator.



Note!

When installing in Windows NT, Windows 2000 and Windows XP, you need to log on as administrator.

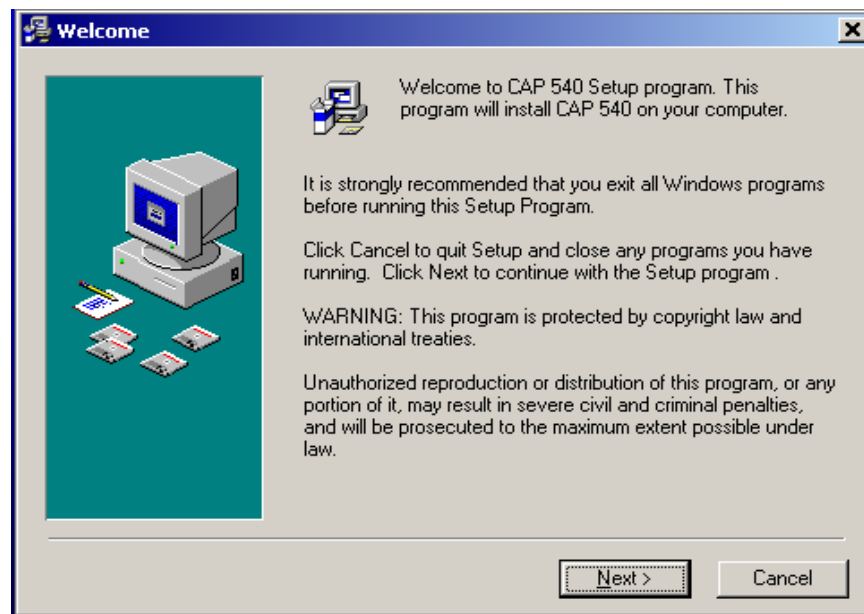
1

Installation of CAP 540 Navigator

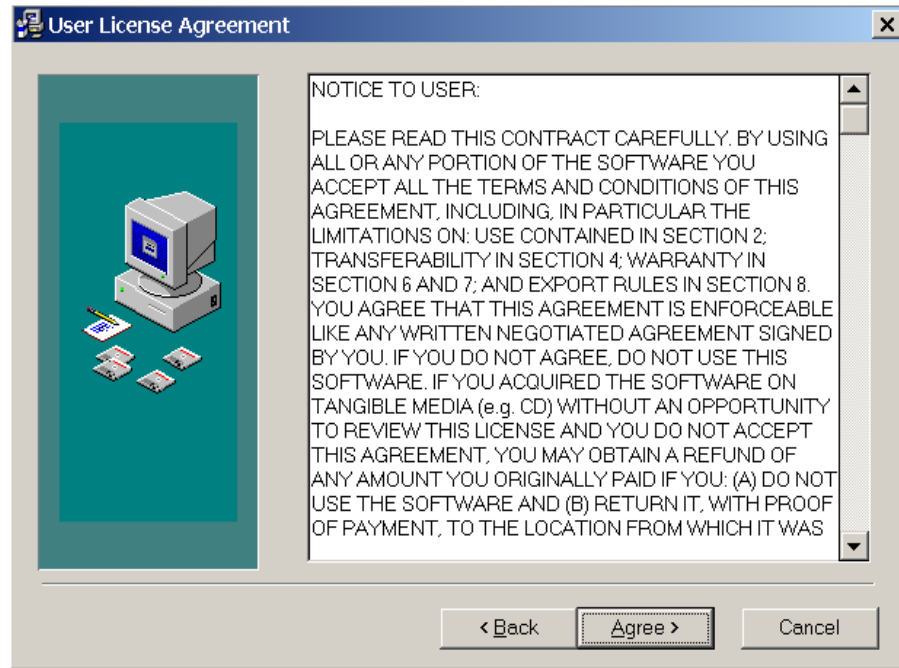
This section describes how to install the CAP 540 Navigator.

- 1 Insert the CAP 540 installation CD in the CD-ROM drive of your PC.
- 2 Double-click **CAP540setup1.exe** using Windows Explorer.

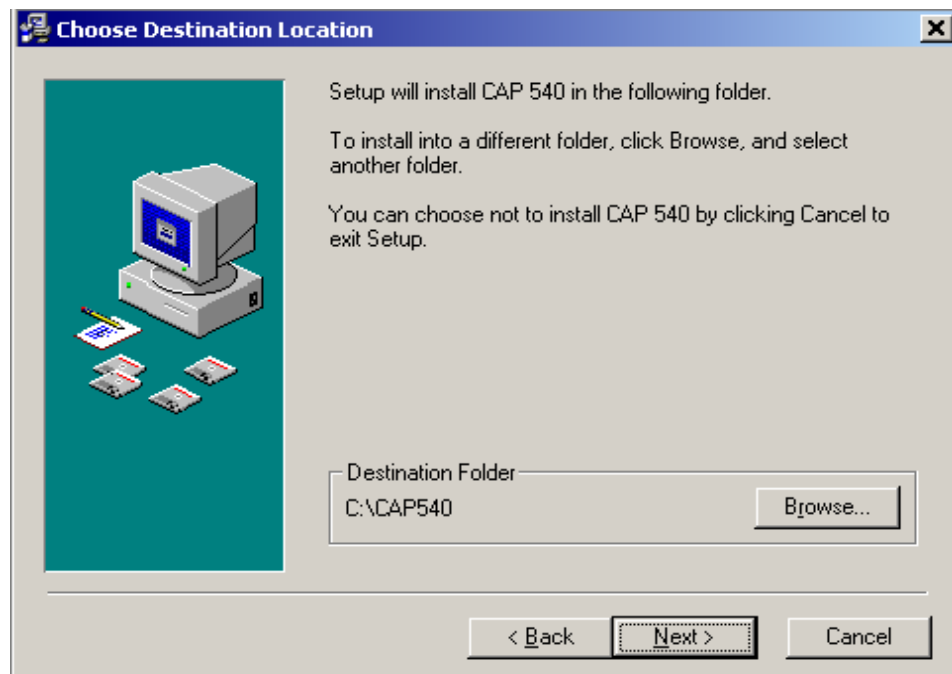
Enter your name in the first dialog. This name will appear under “Licensed to:”.
The following dialog appears.



- 3 Read the message and click **Next** if you want to continue with the installation.
The License Agreement dialog appears.

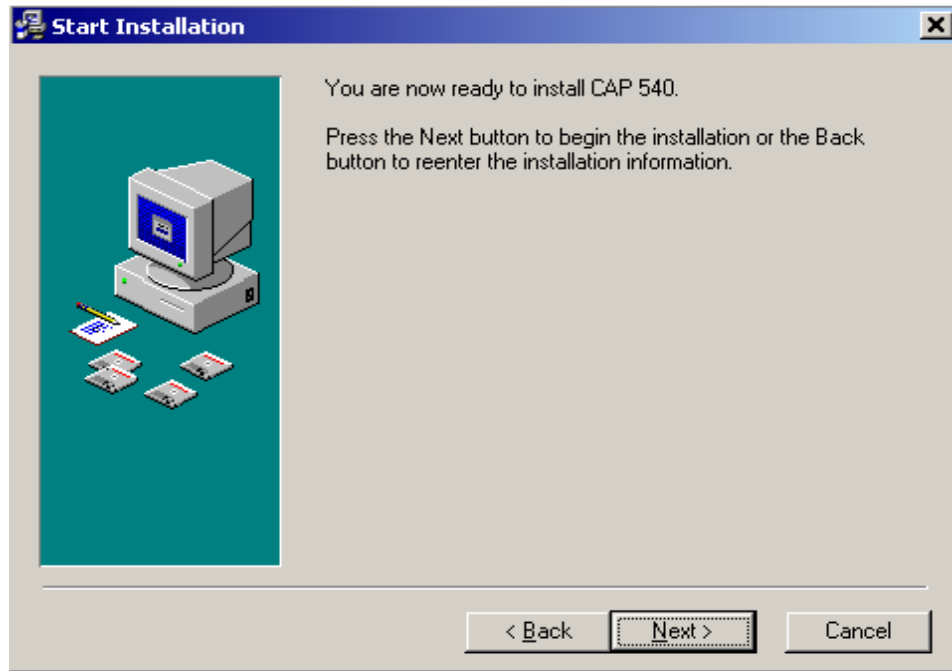


- 4 Click **Next** and the Destination Location dialog appears.



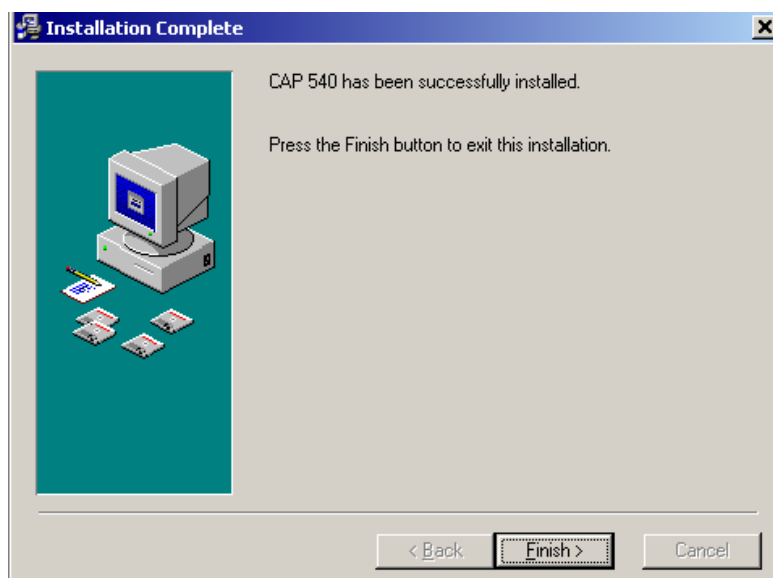
- 5 Select the drive and the folder where the CAP 540 software shall be installed and then click **Next**.

The Start Installation dialog appears.



- 6 Click **Next** to continue

The CAP 540 software Navigator is now being installed in your computer, showing you an installation progress bar. Then the following dialog appears.



- 7 Click the **Finish** button, and the installation is completed.
- 8 Next step is to install other Terminal Tool Box applications.
Follow the instructions on the screen until the installation is finished.
You may then have to restart the computer.
- 9 Acrobat Reader and Internet Explorer.
The CD-ROM also contains Acrobat Reader and Internet Explorer

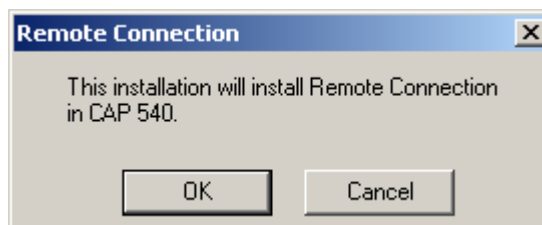
You have to continue with installing Acrobat Reader if you don't have this program installed already on your computer.

The help function in the Parameter Setting Tool uses Internet Explorer.
If you do not have Internet Explorer on your computer, you need to install it.

2 Installation of Remote Connection option

This chapter describes how to install the Remote Connection option. The Remote Connection option is only supplied on the CD if ordered.

- 1 Insert the CAP 540 installation CD in the CD-ROM drive of your PC.
- 2 Double-click **RemConSetup.exe** using Windows Explorer.



- 3 Click **OK** button to start installation.

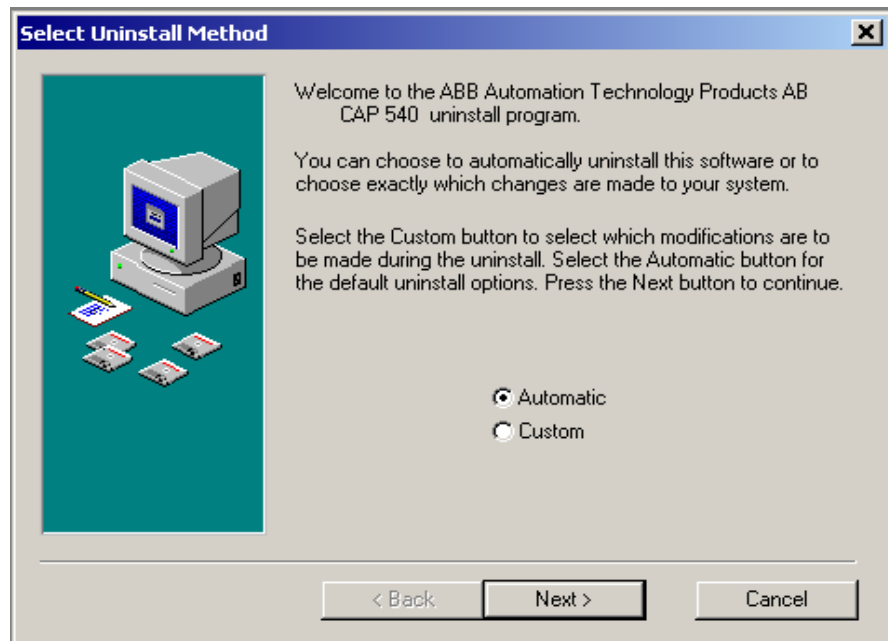
3

Uninstallation of CAP 540 Navigator

This chapter describes how to uninstall the CAP 540 Navigator.

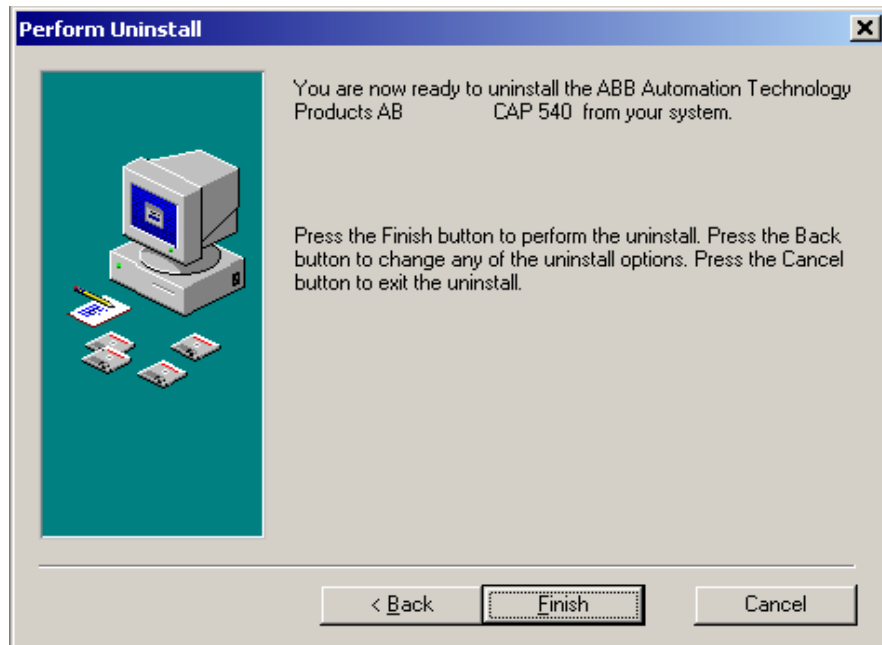
- 1 Go to the **Start** menu, select **Programs**, then **CAP 540**.
- 2 Click **Uninstall**.

The uninstall of CAP 540 starts and the following dialog appears.



- 3 Click **Automatic** and then click **Next**.

The following dialog appears.



- 4 Click **Finish** to start the uninstallation.

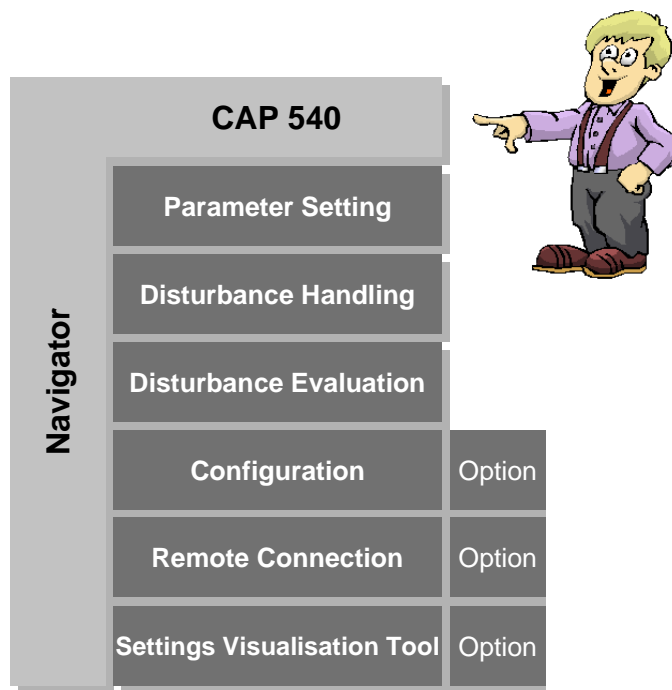
The CAP 540 Navigator is now uninstalling and a progress bar is displayed. This will also uninstall the Remote Connection option if installed.

How To Use CAP 540

This section describes how to navigate in CAP 540 and perform Configuration, Parameter setting, Disturbance Handling and Disturbance Evaluation.

1

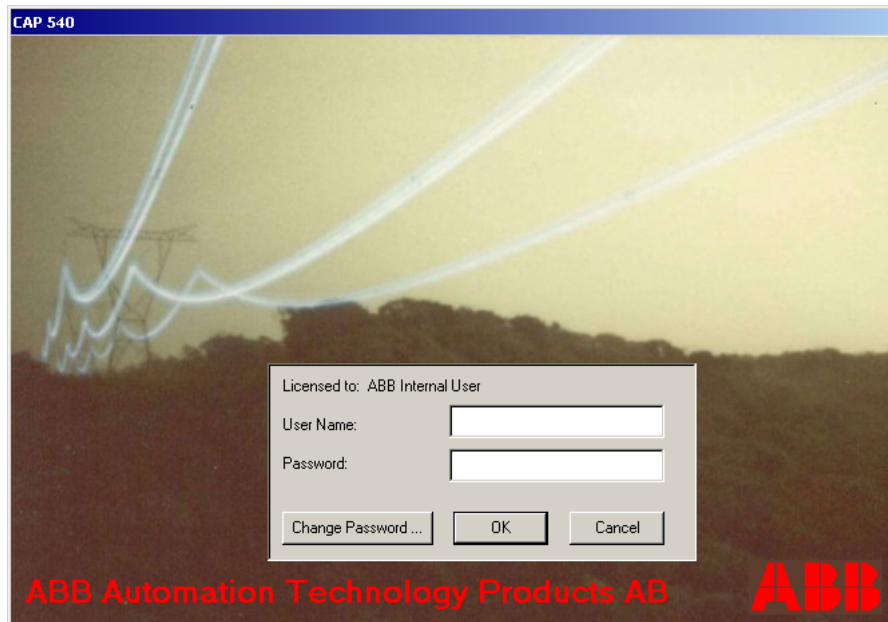
Navigate in CAP 540



CAP 540 is used through all stages of normal operation from parameter setting, commissioning and power system disturbance evaluation. It can also be used to clear front indications, switch setting groups and turn autoreclosure on/off. The engineering work can be done off-line on the PC. The configuration is prepared and tested before the commissioning. The system for disturbance handling is prepared and tested during commissioning.

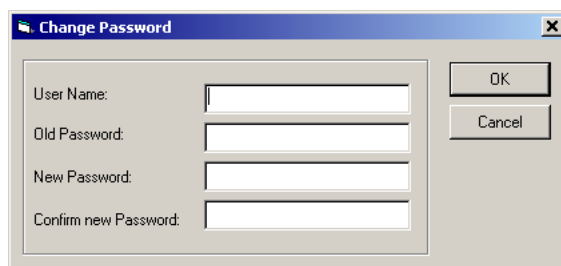
1.1 How to Log on

In order to use CAP 540 it must be installed in your computer, see How to install CAP 540. When starting CAP 540 the following Log On dialog appears:



Fill in User Name and Password and click **OK**. This dialog contains the possibility to change the password. Note that the password may have been linked by the Administrator to a certain authority level.

To change password click on button “Change Password”. The following dialog appears:



Type in User Name, Old Password, New Password and Confirm new Password.

Note!

*If you log on for the first time you must also enter the “Change Password” dialog to create a new password but **do not type** anything in the old password textbox.*

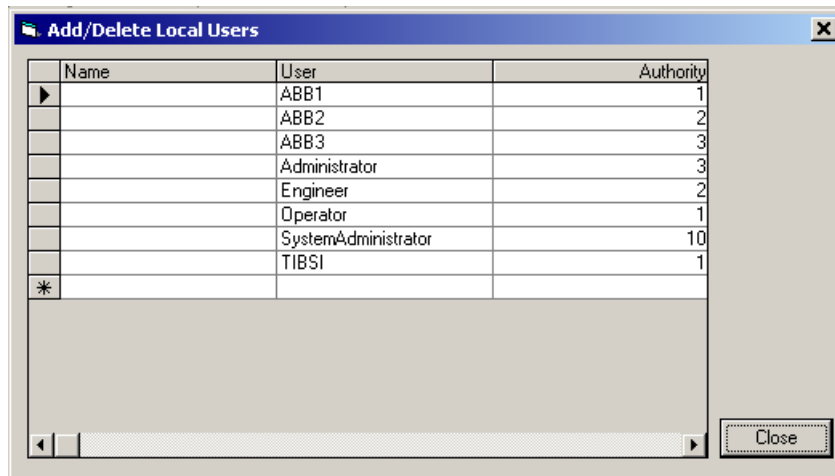


If you logon as a System Administrator, you can select users and the following menu is displayed:



The first time CAP 540 is started after installation, a dialog appears prompting the System Administrator for User Id and Password. The system administrator should change this password immediately to ensure security.

If you click **Users** the following dialog appears where you can add/delete users and define authority levels.



1.1.1

Authority levels:

1. Read
2. Read, Clear LED's and Manual trig of disturbance recorder rights.
3. Read and Write rights.
10. Administrator rights.

1.1.2

Other start alternatives of CAP 540

1.1.2.1

Start with Command Line Parameter /A

CAP 540 and the Time Scheduler will be started automatically without Login with Authority level = 1 (only read permission). The shortcut of CAP540.exe /A created at installation in CAP 540 main directory\ShortCut should be placed in the Windows Startup folder to start CAP 540 automatically when rebooting the PC after Power breakdown.

1.1.2.2

Start with Command Line Parameter /B,UserId,Password

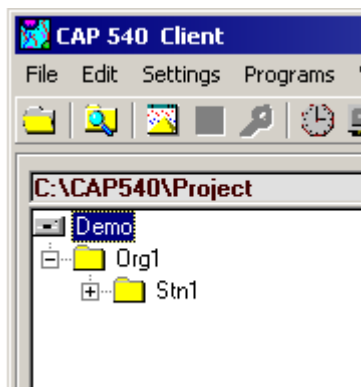
CAP 540 will be started automatically without Login with UserId and Password as Command Line Parameters. If the UserId or Password is not valid CAP 540 will yet be started but Authority level will be set to 1 (only read permission).

Create a shortcut of the program file CAP540.EXE on the desktop and type in the target text box of the shortcut e.g. C:\CAP540\CAP540.EXE /B,UserId,Password.

1.2

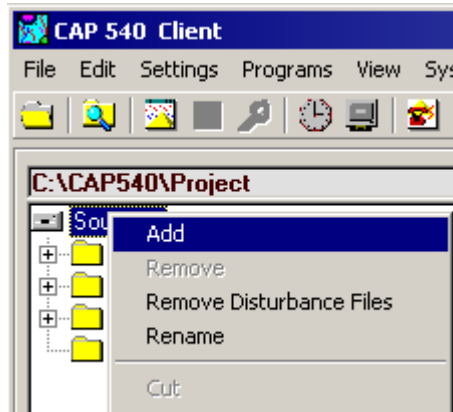
How to build a new project tree

When you have logged on as a first time CAP 540 user the following screen appears.

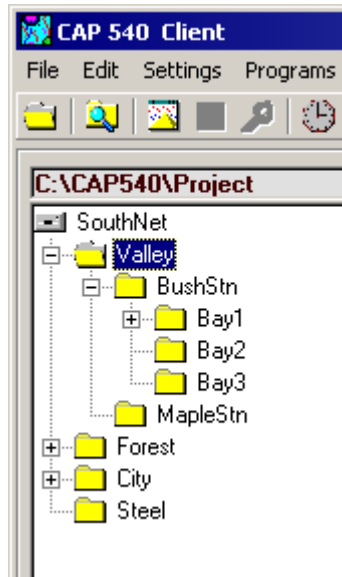


The Demo project can not be altered for this reason. Project can be stored on a local or network drive.

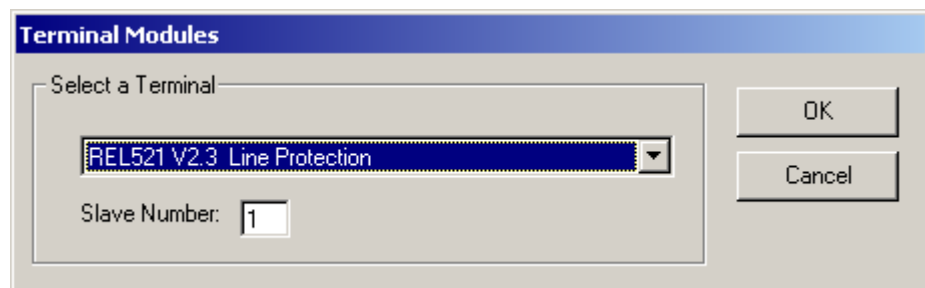
Create a new project by selecting **File/New Project**. Select Prj1.nbp and type the file name in the New Project dialog box e.g. a Power Network name like SouthNet. Click OK. A project structure down to Bay level will be created with default names. Right click on the nodes and select Add to add more nodes to your project.



When you have filled in all names your tree may look like below:

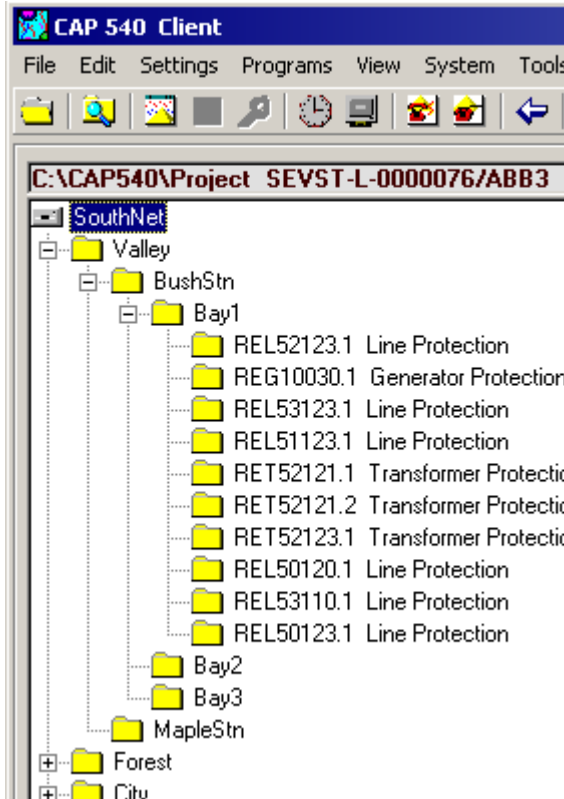


The last level is the Terminal level. Right click on a bay and select Add. In the Terminal Modules dialog select a terminal e.g. REL 521*2.3.



Type in a vacant slave number (it must be unique for each terminal that belongs to the same SPA loop).

Now the structure may look like this (Example of a complete structure down to Terminal level).



1.3 How to edit the project tree

1.3.1 Remove

Right click on a node (all nodes except Project) or click on menu Edit and select Remove. The selected node will now be deleted with all its configuration, setting and disturbance data.

1.3.2 Rename

Right click on a node (all nodes except Terminal) or click on menu Edit and select Rename or click on the node name once. Type the new name in the appeared text box.



Note!

If the project is created in a previous version of CAP 540 (< 1.3-01) long file names (>8 characters) related to each node name in the project structure are not supported. When a node is renamed only the first 8 characters will be used in the file name and these characters must also be unique for the node name.

1.3.3**Reassign**

Right click on a Terminal node or click on menu Edit and select Reassign. In the Terminal Modules dialog select a new Terminal of same type and version as the old one.

1.3.4**Cut**

Right click on a node (all nodes except Project and Organization) or click on menu Edit and select Cut. Click on a node **one level above** the selected node and click on Paste. The first selected node will now be moved to a location below the second selected node with a new default name.

**Note!**

The menu item Paste will only be visible for valid node types.

1.3.5**Copy/Paste**

Right click on a node (all nodes except Project and Organization) or click on menu Edit and select Copy. Click on a node **one level above** the selected node and click on Paste. A copy of the first selected node will now be created below the second selected node with a new default name.

**Note!**

The menu item Paste will only be visible for valid node types.

1.3.6**Move/insert**

This function is used to reorganize nodes below the same parent node.

Right click on a node (all nodes except Project) or click on menu Edit and select Move. Click on another node on **the same level** as the first selected one and click on Insert. The first selected node will now be moved to a location below the second selected node.

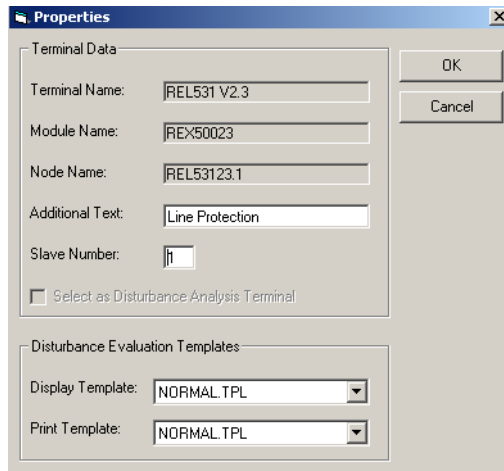
**Note!**

The menu item Insert will only be visible for nodes below the same parent node as the first selected node.

1.4

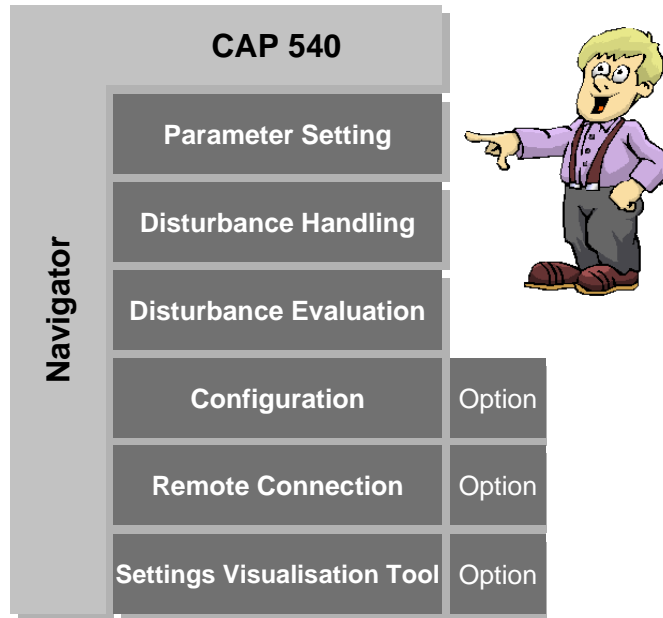
Properties

Right click on a Terminal node or click on menu Edit and select Properties to open the Terminal Properties dialog, see table below.

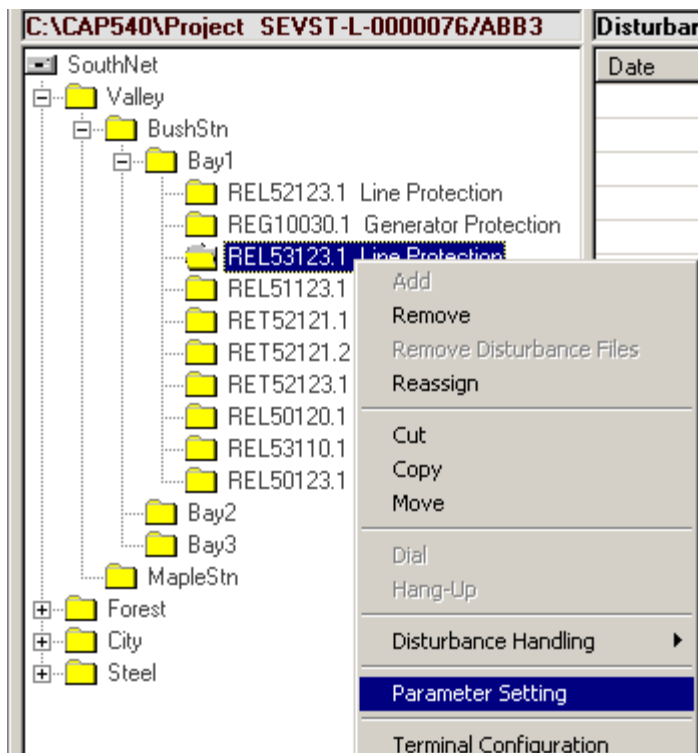


Terminal Name	Terminal name with version number.
Module Name	Terminal module name.
Node Name	Terminal node name in project tree.
Additional Text	User defined additional text to Terminal node name.
Slave Number	Unique Terminal identification number.
Display Template	Template for viewing disturbances. The template is created in the Disturbance Evaluation Program REVAL.
Print Template	Template for printing disturbances. The template is created in the Disturbance Evaluation Program REVAL.

2 Parameter setting



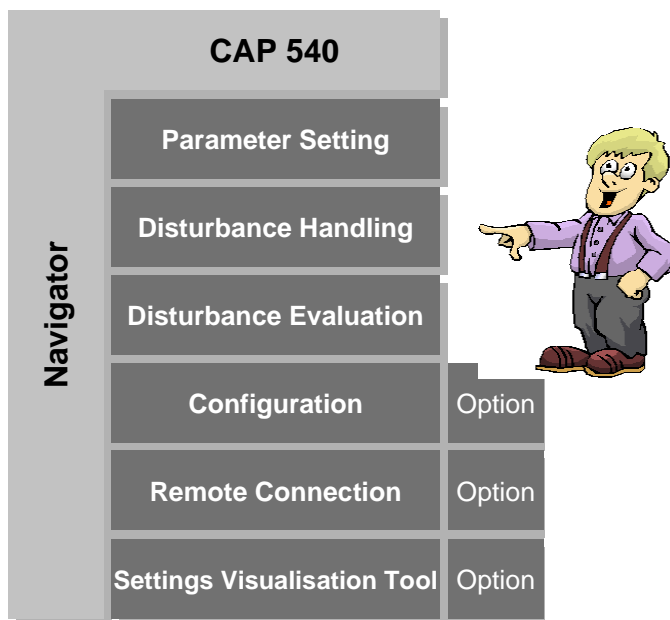
Start Parameter Setting from a terminal node with a right mouse click, see below or with a left mouse click on menu Programs.



Click **Parameter Setting** with left mouse button and the Parameter Setting screen appears. It is also possible to start Parameter Setting by clicking on the Parameter Setting tool bar button.

Continue according to the manual for PST (Parameter Setting).

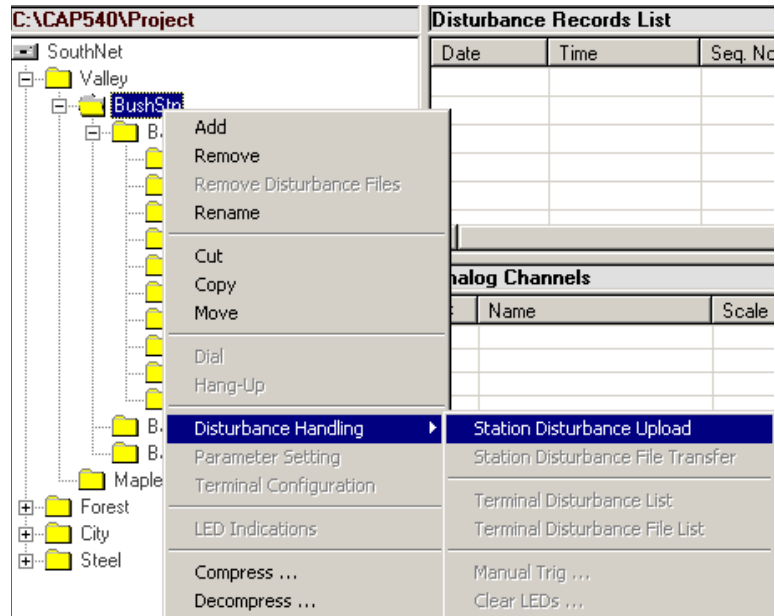
3 Disturbance Handling



3.1 Station level

Position the cursor on a Station level and click **right mouse button** or **click on menu Programs**.

Continue with **Disturbance Handling** and with any of the active choices in next dialog (Station Disturbance Upload or Station Disturbance File Transfer depending on if there is a Station PC or not). All new disturbances/files for the selected station will be uploaded.

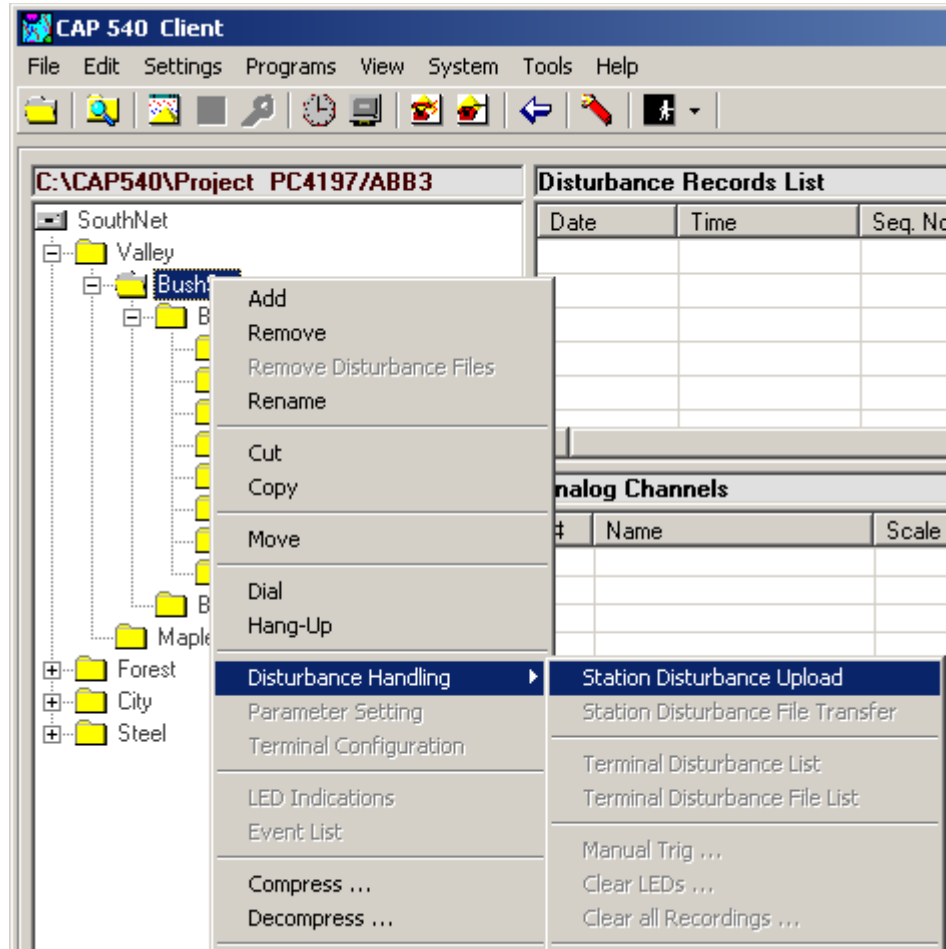


To make communication settings on the station level, see “Communication settings” on page 49.

3.2

Terminal level

Position the cursor on Terminal level and click the right mouse button. Continue with Disturbance Handling and with any of the active choices in next dialog (terminal disturbance list or terminal disturbance file list depending on if there is a station pc or not). It is also possible to trig the disturbance recorder manually, clear LED's or clear all recordings.



3.3 Disturbance Records List

Disturbance Records List shows the resulting data in four different displays: the list of disturbances (or list of disturbance files if you work from a Central PC towards Station PC) and three other displays of disturbance information data.

Disturbance Records List								
Date	Time	Seq. No	Stored in Local...	Stored in Remot...	Trig Signal	Fault Location	Fault Type	Fault Dire
<input type="checkbox"/>	990326	14:52:27.026	028	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:41:38.294	027	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:41:18.057	026	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:40:55.741	025	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:28:51.647	024	RH D		ZM4-START		
<input type="checkbox"/>	990326	14:18:25.035	023	RH D		ZM4-START		

Analog Channels											
#	Name	Scale Factor	Trig Low	On	Trig High	On	Trig	Trig Value	RMS Prefault	RMS Fault	Active

Digital Channels						
#	Name	Setting	Trig On	Trig Value	Active	

Events				
#	Name	Time		Status

Table 1: Disturbance Records List

Date	Time	Seq. No	Stored in Station PC	Stored in Terminal	Trig Signal	Fault Location	Fault Type	Fault Direction
Recording Date	Recording Time	Recording Sequence Number	Disturbance files (see below) stored locally on disk (Central PC or Station PC)	Disturbance files (see below) stored remotely on disk or terminal (Station PC or Terminal)	Recording start condition	Fault Location in% and km/miles	Fault type: L1-N L2-N L3-N L1-L2 L2-L3 L3-L1	Fault Direction: Forward Forward beyond range
R = Disturbance file REVAL format (.REV)				T = Disturbance file COMTRADE format (.DAT)				
H = Header file REVAL format (.REH)				G = Header file COMTRADE format (.CFG)				
D = Disturbance report file (.RSD)				E = Disturbance file EVE format				

Disturbance Records List continue								
Line Length	Line Frequency	Sampling Rate	Prefault Time	Postfault Time 1	Postfault Time 2	Total Recording Time	Recording Time Limit	CT-Earth
Line Length in km/miles	Line Frequency in Hz	Sampling Rate in Hz	Prefault Time in ms	Postfault Time in ms (REOR 100)	Postfault Time in ms (REOR 100)	Total Recording Time in ms	Recording Time Limit in ms	CT-Earth: in or out

Table 2: Analog Channels

#	Name	Scale Factor	Trig Low	On	Trig High	On	Trig	Trig Value	RMS Prefault	RMS Fault	Active
Channel number	Channel Name: user defined	Transformer Ratio in kV or A	Lower trig value in%	Lower trigger activated status: Yes or No	Higher trig value in%	Higher Trigger activated status: Yes or No	Trigger status: High or Low	Channel value at trigger time in kV or A	RMS Prefault value: Value/angle kV/A/Deg.	RMS Fault value: Value/angle kV/A/Deg.	Channel enabled: Yes or No

Table 3: Digital Channels

#	Name	Setting	Trig On	Trig Value	Active
Channel number	Channel Name: user defined	Normal channel status: Open = NO Closed = NC	Trigger enabled: Yes or No	Value at trigger time: Open or Closed	Trigger status at trigger time: Yes or No

Table 4: Events

#	Name	Time	Status
Event number	Event name: User defined	Event time: hh: mm: ss: ms ms	Event status: On or Off

The disturbance records have different colours based on different conditions.

Red	Disturbances/files that have not been uploaded.
Blue	The disturbance was recently uploaded and stays blue until you update the terminal disturbance list. This disturbance then turns black.
Black	The disturbance is "old"

The Disturbance Records List is the list of disturbances and will indicate with **red** color new not uploaded disturbances and with **blue** new uploaded disturbances. By clicking the right mouse button on a red row you will get the following pop-up menu:



Note!

You also get information of fault location and fault type if they are available in the terminal.

Disturbance Records List					
Date	Time	Seq. No	Stored in Local ...	Stored in Remot...	Trig Signal
<input checked="" type="checkbox"/>	001002	17:00:07.465	001	RH	Manual Trig
<input type="checkbox"/>	001002	16:58:11.797	000		Manual Trig
<input type="checkbox"/>	000927	13:00:42.263	002		Manual Trig
<input type="checkbox"/>	000927	13:00:35.003	001		Manual Trig
<input type="checkbox"/>	000927	13:00:25.403	000		Manual Trig

Analog Channels					
#	Name	Scale Fact	High	On	Trig

From this menu you can e.g. upload the selected disturbance from the terminal.

By clicking the right mouse button on an uploaded disturbance (black or blue) you get the following pop-up menu:

Date	Time	Seq. No	Local	Remote	Trig Signal
<input checked="" type="checkbox"/>	990326	13:17:45.609	020		ZM4-START
<input type="checkbox"/>	001102	11:54:23.864	000		Manual Trig
<input type="checkbox"/>	001004	13:45:07.732	000		Manual Trig
<input type="checkbox"/>	001002	17:00:07.465	001		Manual Trig
<input type="checkbox"/>	001002	16:58:11.797	000		Manual Trig
<input type="checkbox"/>	000927	13:00:42.263	002		Manual Trig

Analog Channels					
#	Name	Scale	High	On	Trig
01	U1	173.11	0	No	
06	I1	3000.1	0	No	
02	U2	173.11	0	No	
07	I2	3000.000/1.000 A	50	No	200
03	U3	173.189/0.064 KV	90	No	110
08	I3	3000.000/1.000 A	50	No	200
04	I14	173.189/0.064 KV	90	No	110

From this menu you can e.g. start Disturbance Evaluation (REVAL) and print disturbance data.

Click the left mouse button on an uploaded disturbance to get additional information in the lower three displays analog channels, digital channels and events, see below.

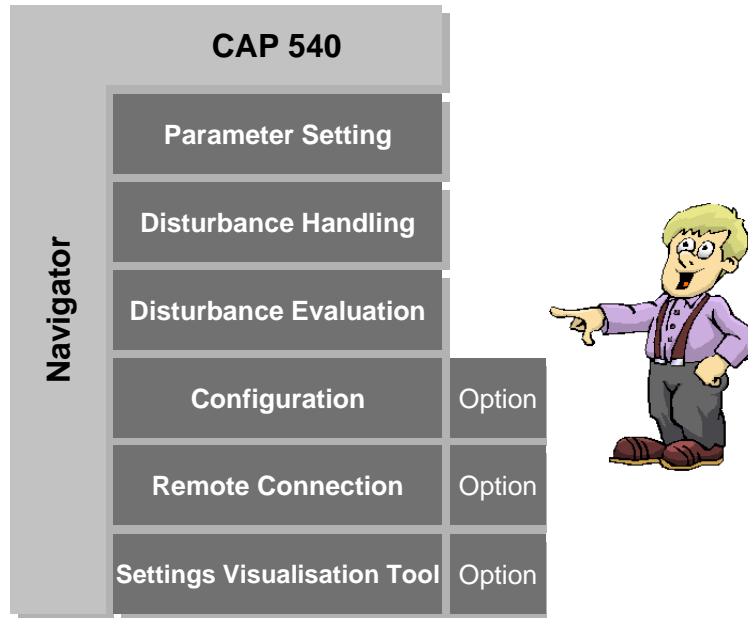
Disturbance Records List								
Date	Time	Seq. No	Stored in Local...	Stored in Remot...	Trig Signal	Fault Location	Fault Type	Fault Dire
<input type="checkbox"/>	990326	14:52:27.026	028	RH D		ZM4-STND		
<input checked="" type="checkbox"/>	990326	14:41:38.294	027	RH D		ZM4-STND	33.1 % , 39.7 ...	L1-L2 Forward
<input type="checkbox"/>	990326	14:41:18.057	026	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:40:55.741	025	RH D		ZM4-STND		
<input type="checkbox"/>	990326	14:28:51.647	024	RH D		ZM4-START		
<input type="checkbox"/>	990326	14:18:25.035	023	RH D		ZM4-START		

Analog Channels											
#	Name	Scale Factor	Trig Low	On	Trig High	On	Trig	Trig Value	RMS Prefault	RMS Fault	Activ
01	U1	173.189/0.064 KV	90	No	110	No		-94	171	14	Yes
06	I1	3000.000/1.000 A	50	No	200	No		-17880	2823	11614	Yes
02	U2	173.189/0.064 KV	90	No	110	No		-78	171	154	Yes
07	I2	3000.000/1.000 A	50	No	200	No		-1770	2831	2583	Yes
03	U3	173.189/0.064 KV	90	No	110	No		274	172	183	Yes
08	I3	3000.000/1.000 A	50	No	200	No		4335	2831	3098	Yes
04	U4	173.189/0.064 KV	90	No	110	No		0	0	0	Yes

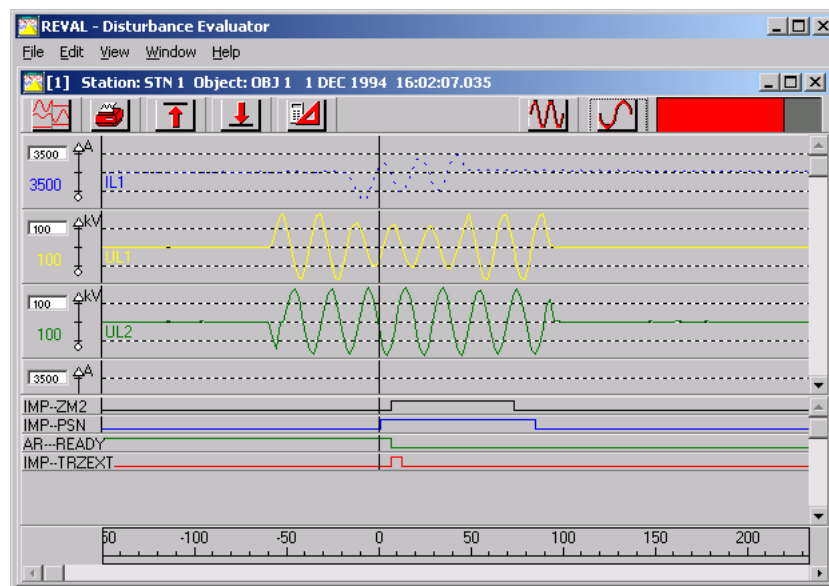
Digital Channels						
#	Name	Setting	Trig On	Trig Value	Active	
<input type="checkbox"/>	01	TRIP-TRIP	NO	Yes	Open	No
<input type="checkbox"/>	02	TRIP-TRL1	NO	Yes	Open	No
<input type="checkbox"/>	03	TRIP-TRL2	NO	Yes	Open	No
<input type="checkbox"/>	04	TRIP-TRL3	NO	Yes	Open	No
<input type="checkbox"/>	05	SOTF-TRIP	NO	Yes	Open	No
<input type="checkbox"/>	06	ZM3-STL1	NO	Yes	Open	No
<input type="checkbox"/>	07	ZM3-STL2	NO	Yes	Open	No

Events			
#	Name	Time	Status
01	ZCOM-CS	14.41.38.287	On
02	ZM4-STND	14.41.38.294	On
03	ZM3-STND	14.41.38.294	On
04	PHS-STFWL1	14.41.38.294	On
05	PHS-STFWL2	14.41.38.294	On
06	PHS-STFWL3	14.41.38.294	On
07	PHS-STPE	14.41.38.294	On
08	ZM2-STL1	14.41.38.301	On

4 Disturbance Evaluation



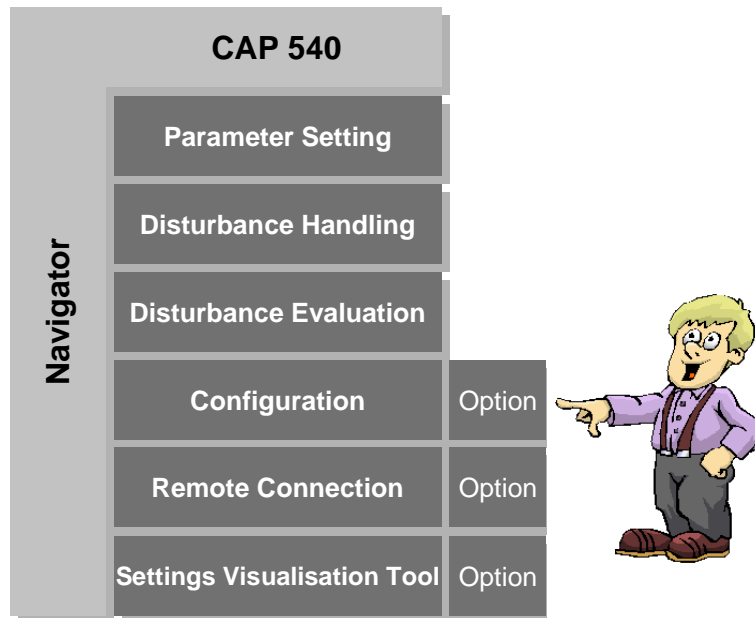
Disturbance Evaluation with the program REVAL can be started by double clicking the disturbance in the Disturbance Records List, clicking the icon for REVAL in the toolbar and browse the available files or from the dialog when right clicking an uploaded disturbance. The chart will appear as below. You can there study the analogue curves and the digital signals.



Refer to the REVAL manual for further guidance.

5

Configuration of terminals with CAP 531

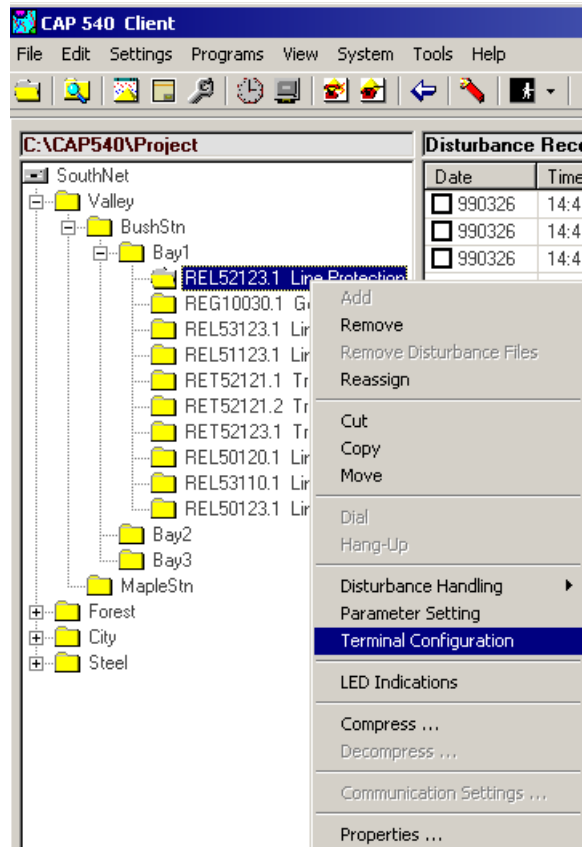
**Note!**

The Configuration Program CAP 531 is an optional feature in CAP 540.

The default configuration in the terminals is easily adapted to the customer's needs. The configuration consists of function blocks, logic gates and timers. The function blocks included in a terminal are available in a library of functions, where the engineer can pick a function and connect it according to the requirements.

5.1 How to start CAP 531 from terminal level in CAP 540

Position the cursor on Terminal level and click right mouse button or click on menu Programs.



Select **Terminal Configuration**. The CAP 531 screen appears. It is also possible to start Terminal Configuration by clicking on the Terminal Configuration tool bar button.

See the CAP 531 manual for further guidance how to configure terminals.

5.2 Import a SMS project tree

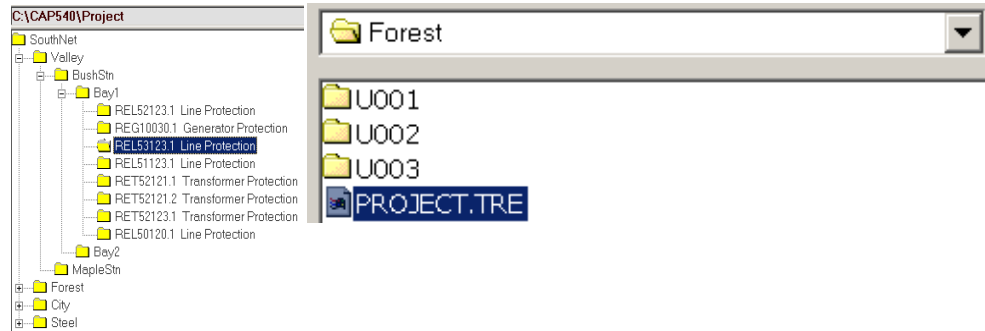
It is possible to import a project tree structure from SMS010, so that the structure from SMS010 can be reused in CAP 540. It is possible to change the imported structure in CAP 540.

- 1 Select **Import SMS 010 Project** in CAP 540 File menu.
- 2 Select the file **Choices.dsc** in the SMS 010 project.

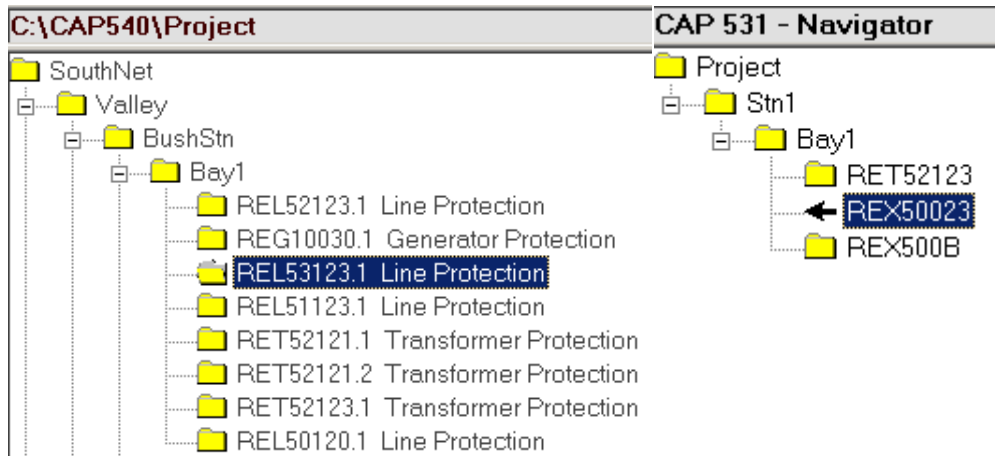
5.3

Import of an old CAP 531 configuration

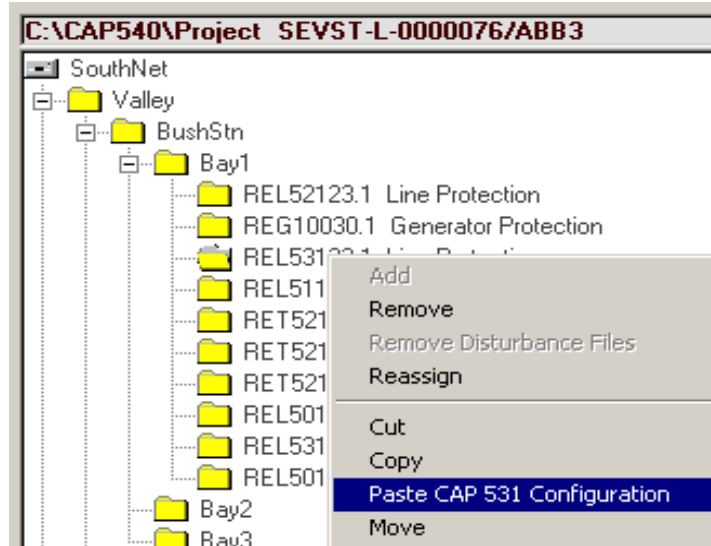
Select a terminal in the Navigator, go to the **File** menu and select **Import CAP 531 Configuration**. Select an old CAP 531 project.tre file, see below.



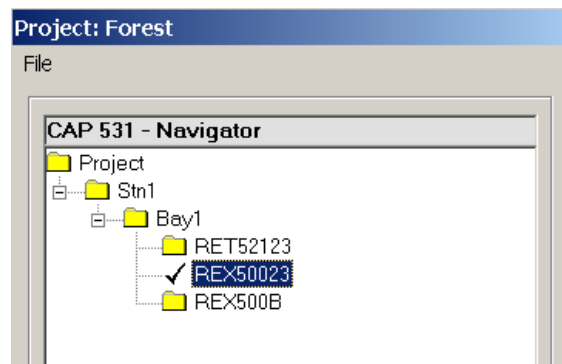
In the CAP 531 Navigator select the terminal from which you want to import the configuration. Click the right mouse button and select **Copy Terminal Configuration**. An arrow appears at the selected terminal as shown below.



In the Navigator select the target terminal. Click the right mouse button and select **Paste CAP 531 Configuration**.

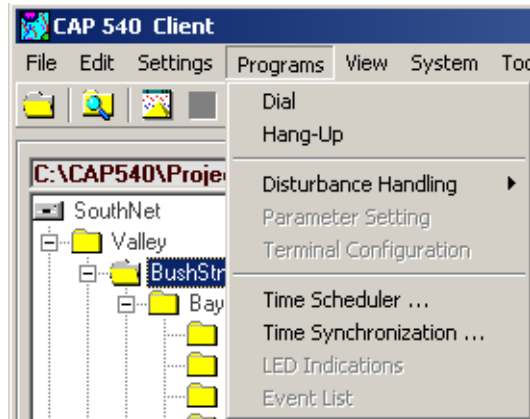


Once the Cap 531 Configuration is pasted, the Cap 531 Navigator displays the copied terminal with a check mark before it to accentuate the status of the terminal.



Repeat this procedure for all terminals in the CAP 531 project.

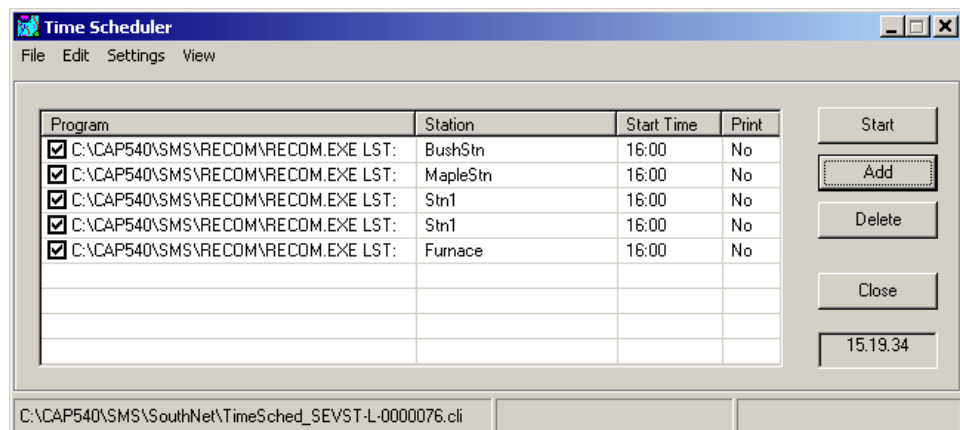
6 Other programs



In the pull-down menu you find more programs.

6.1 Time Scheduler

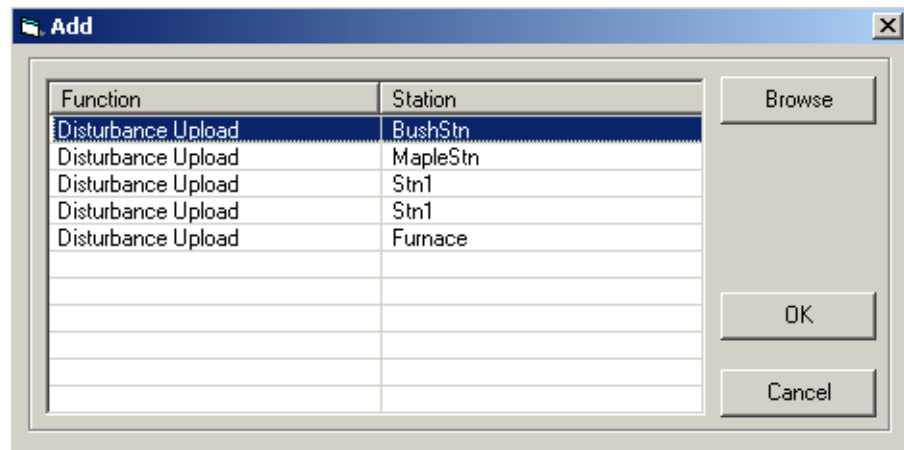
Is used for Auto Polling i.e. to start Disturbance Handling at predefined times. You can also decide whether to print the Disturbance by selecting the print-out type in the **Auto Print** box in the **Communication Settings** dialog box, see page 49.



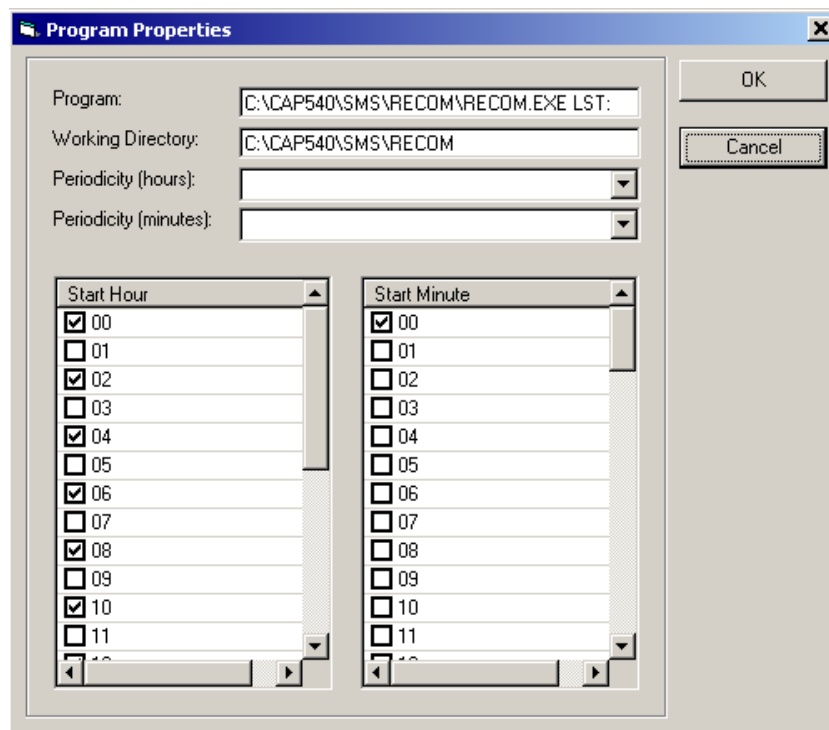
Explanation of letters in Print column.

R	Disturbance file REVAL format (.REV)
H	Header file REVAL format (.REH)
D	Disturbance report file (.RSD)
T	Disturbance file COMTRADE format (.DAT)
G	Header file COMTRADE format (.CFG)
No	No Print

Click on Add button to add stations to Program list, see dialog below.



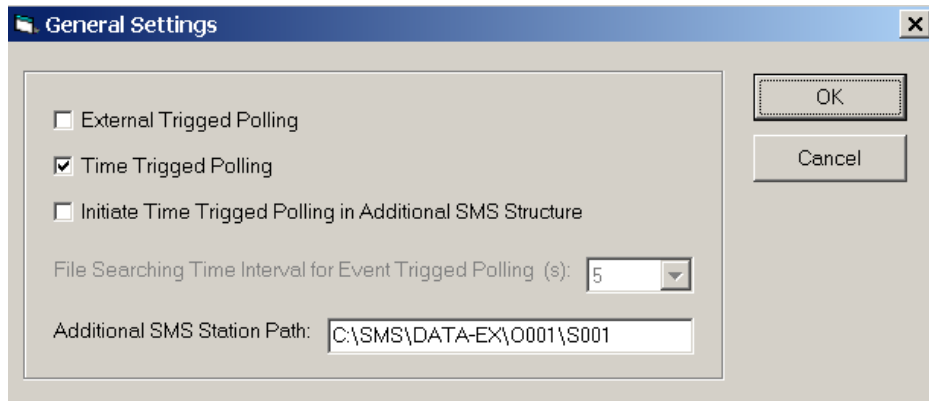
Select all stations to be time scheduled and click OK. In the Program list double click on one station at a time or select **Edit/Properties** to open the Properties dialog, see below.



Set the start time by selecting the **Start Hour** and **Start Minute** check boxes.

A quicker way to set the start time is to use the predefined times in the **Periodicity** drop down lists. The hours, for example 03, means that the polling is carried out every third hour, starting at 00:00.

Click on menu **Settings/General** to open the General Settings dialog, see below.



The options in the **General Settings** dialog are described below:

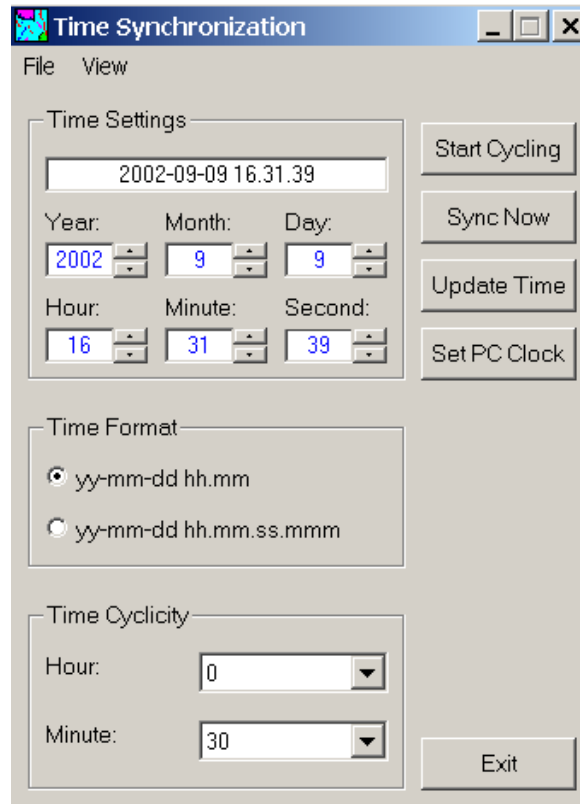
External Triggered Polling	An external event /file triggers the polling.
Time Triggered Polling	The clock triggers the polling (normal function)
Initiate Time Triggered Polling in additional SMS structure	Runs an additional polling in an old SMS010 structure after normal polling.
File SearchingTime Interval	The time interval for searching the file when External Triggered Polling was selected.
Additional SMS Station Path	The SMS010 path for “Initiate Time Triggered Polling in an additional SMS structure”.

Click on Start button to start the timer. At the start time the Disturbance Handling Program will start polling all terminals in the station (Station Disturbance Upload).

6.2

Time Synchronization

Is used when setting up the time synchronization of all terminals in the station connected to the same loop. The time message is sent to all COM ports used by the different stations in the project.



The buttons in the **Time Synchronization** menu are described below:

Start Cycling	Manual start of time synchronization cycling (follows the time cyclicity)
Sync Now	Immediate time synchronization (disregards time cyclicity).
Update Time	The time settings are updated from the PC clock.
Set PC Clock	The PC clock is updated from the time settings.
Exit	Exit from Time Synchronization.

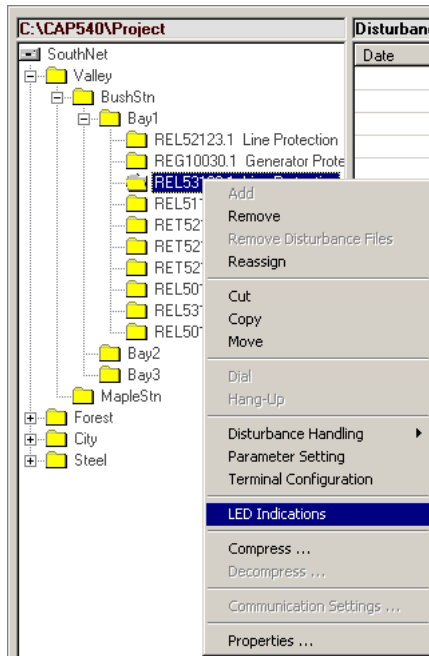
In the **Time Format** box there are two alternatives, the second option gives more detailed time information.

In the **Time Cyclicity** box you set the time interval for the time synchronization. Ex. 1 Hour and 30 minutes means that time synchronization is performed every 90 minutes.

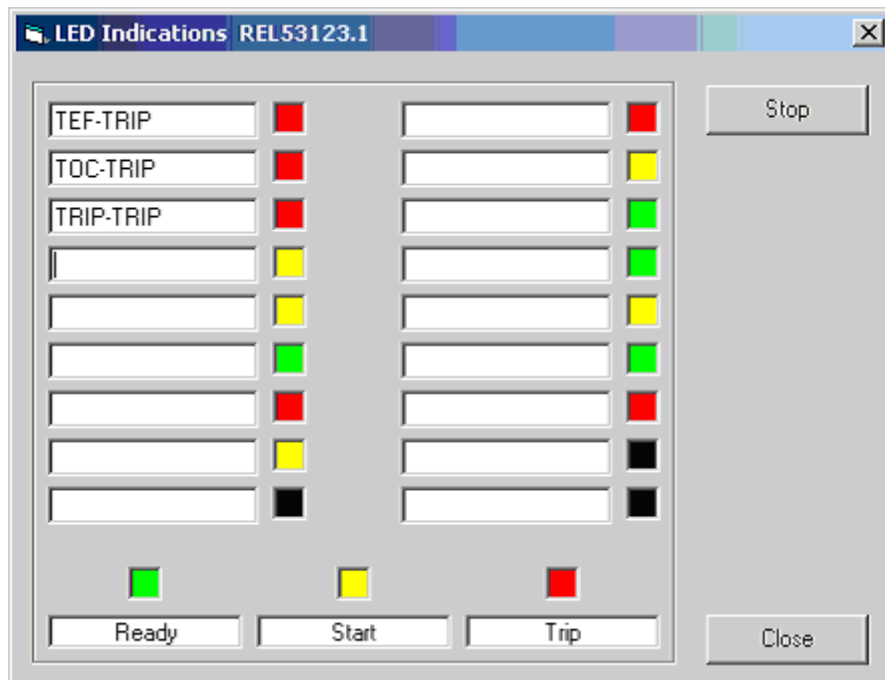
6.3

LED Indications

Start the LED indications from a terminal node with a right mouse click, see below.



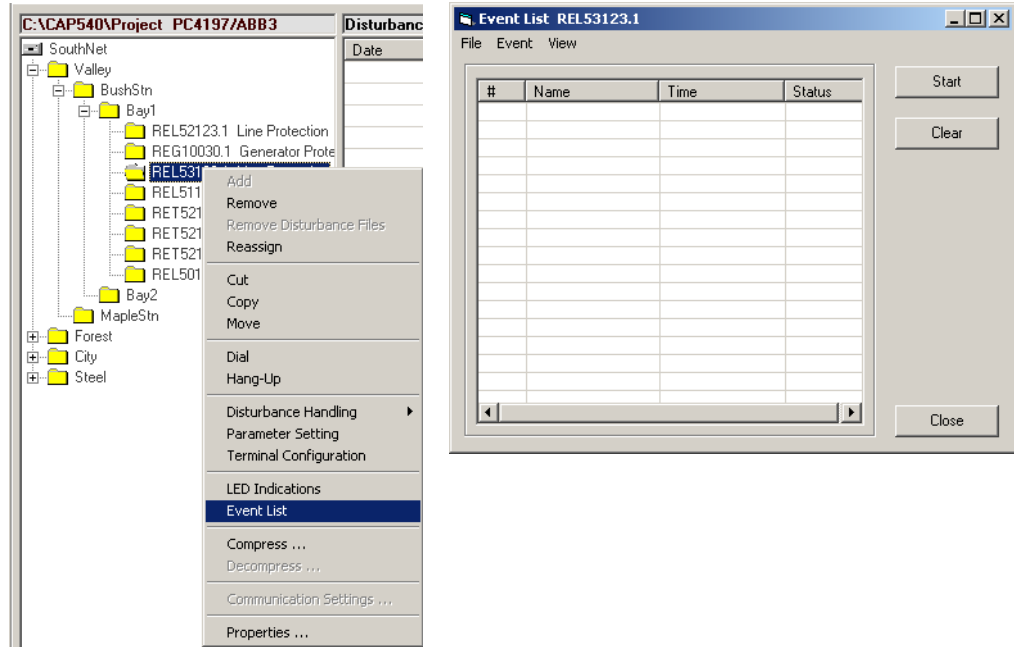
LED Indications is used to show the status of Terminal LED's. When pressing the Start/Stop button the communication to the Terminal will start. The communication will go on continuously until the Start/Stop button is pressed again.



6.4

Event List

Start Event List from a terminal node with a right mouse click, see below.

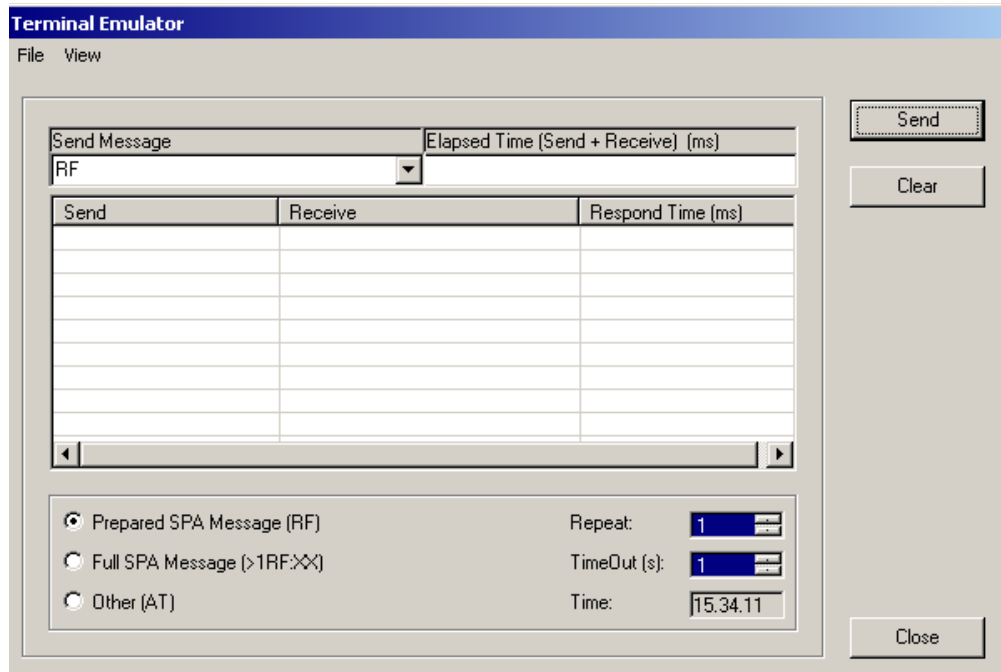


Event List is used to show the status of Terminal Events. When pressing the Start button the communication to the Terminal will start reading the Event buffer.

7 Tools

7.1 Terminal Emulator

Terminal Emulator is used for fault tracing when setting up the communication. Start the Terminal Emulator by selecting a terminal in the project structure and then select Terminal Emulator in the Tools menu.



Terminal Emulator settings:

Send Message	Send a message by typing a SPA code, or use the default "RF" to check the communication.
Elapsed time	Total time. (Send+Receive)
Send	The program displays the full message that was sent.
Receive	The program displays the full message received.
Respond Time (ms)	Respond time in milliseconds.
Prepared SPA Message	Configures to send short SPA messages.
Full SPA Message	Configures to send full SPA messages.
Other (AT)	Configures to send other commands, normally AT commands to the modem.
Repeat	Number of times the message is sent.
TimeOut	Time out after number of seconds

There are also two menus in the Terminal Emulator dialog box:

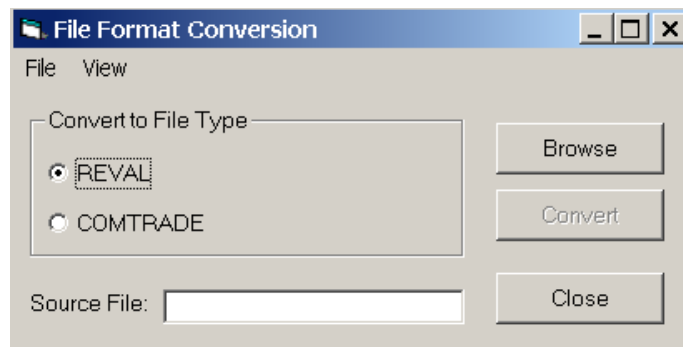
File where you can delete the log file.

View where you can watch the log file.

The log file is resaved for each sent message and overwrites the old file.

7.2

File Conversion

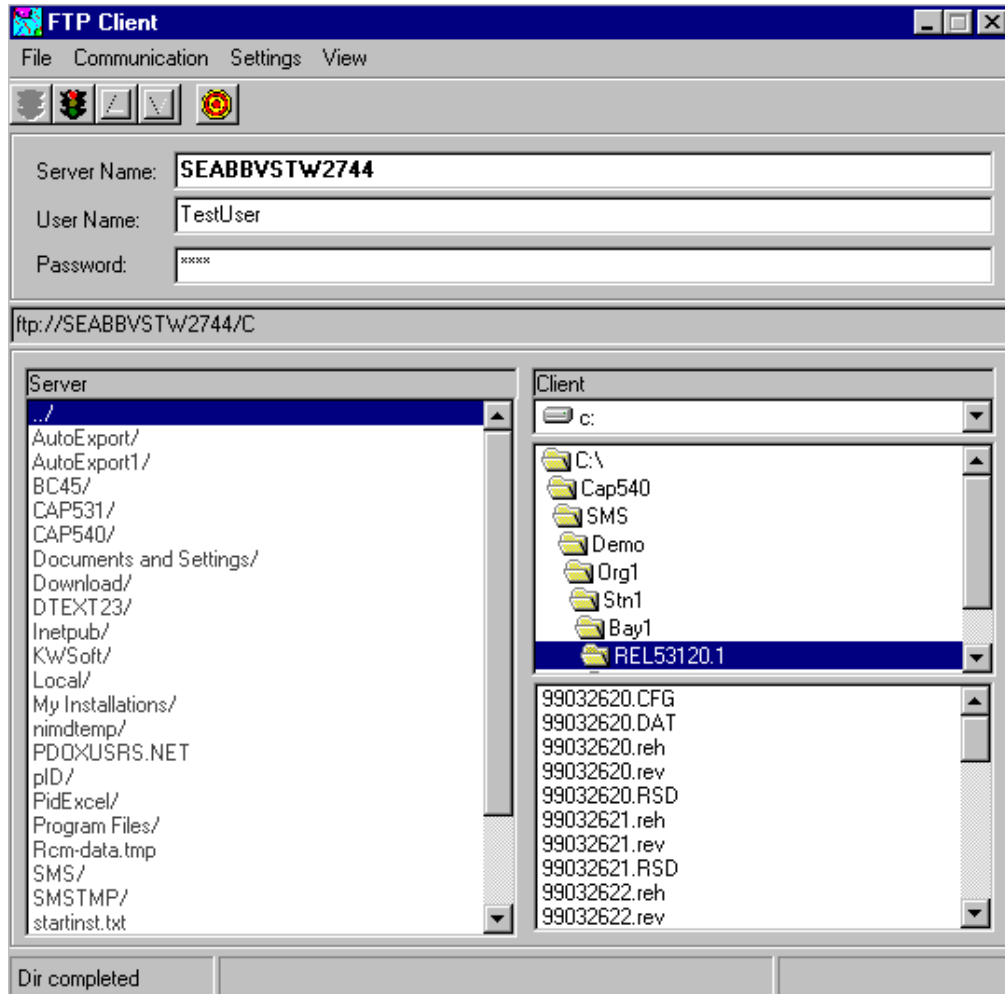


Enter which file to convert in the “Source File” field or browse if you need to. Select the file type you wish to convert to and click on **Convert**.

7.3

FTP Client

The FTP Client is used for checking the network connection to the FTP Server. Upload and download of files are also possible. Open the program via the **Tools** menu, continue with **Network** and select **FTP Client**.



Items in the **FTP Client** dialog box:

Server Name	Type in the name of the server to communicate with.
User Name	Type in your own user name on that server.
Password	Type in your password.
Server	Server file list.
Client	Client file list.

File menu items:

Save Login Data	Saves server name, user name and password settings for the next FTP Client session.
Delete Log File	Deletes the log file.
Exit	Exit FTP Client.

Communication menu items:

Connect	Connect to the FTP Server
Disconnect	Disconnect from the FTP Server
Upload	Transfer files from client to server.
Download	Transfer files from server to client.

Settings menu items:

Protocol	Select FTP or HTTP protocol. The HTTP protocol opens up an HTML-editor.
Station Log in Data	Retrieves the station log in data for the selected station. (previously set in Communication settings)

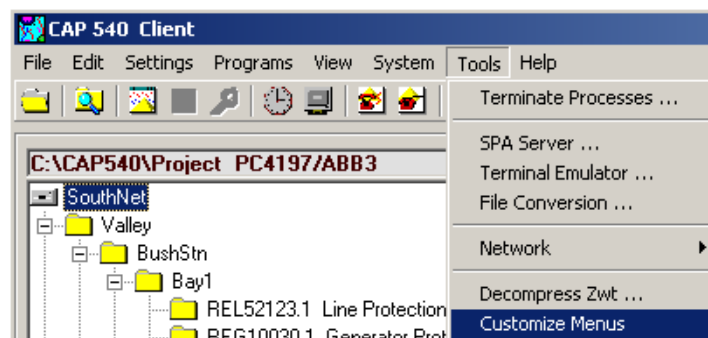
View menu items:

Log File	View the log file. If the HTTP protocol was selected above, more menu alternatives are listed.
Release Notes	View the release notes.

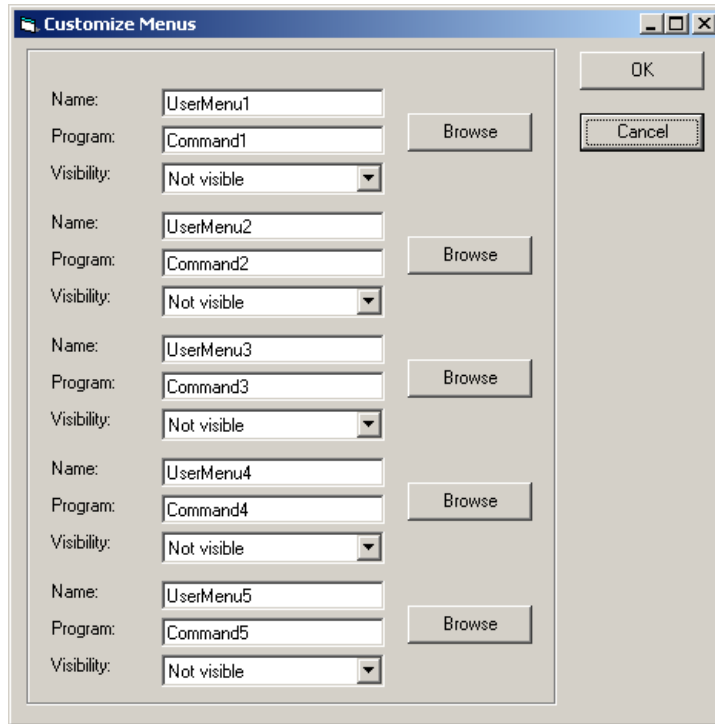
7.4

User defined menus

The menu item Customize Menus is used when the user wants to add own menu items (max 5) to the Tools menu. By clicking on menu Tools/Customize Menus the dialog below will be displayed.



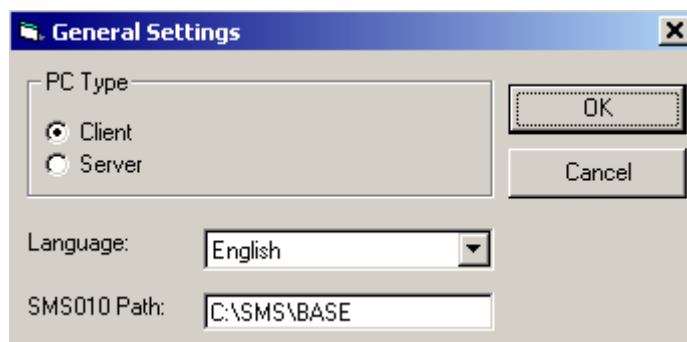
Add up to five menu items at the bottom of the Tools menu with menu name, program to be started and visibility which controls the visibility of a menu item depending on the selected node in the Navigator.



8 Settings

8.1 General settings

Click on menu **Settings** and select **General Settings**.

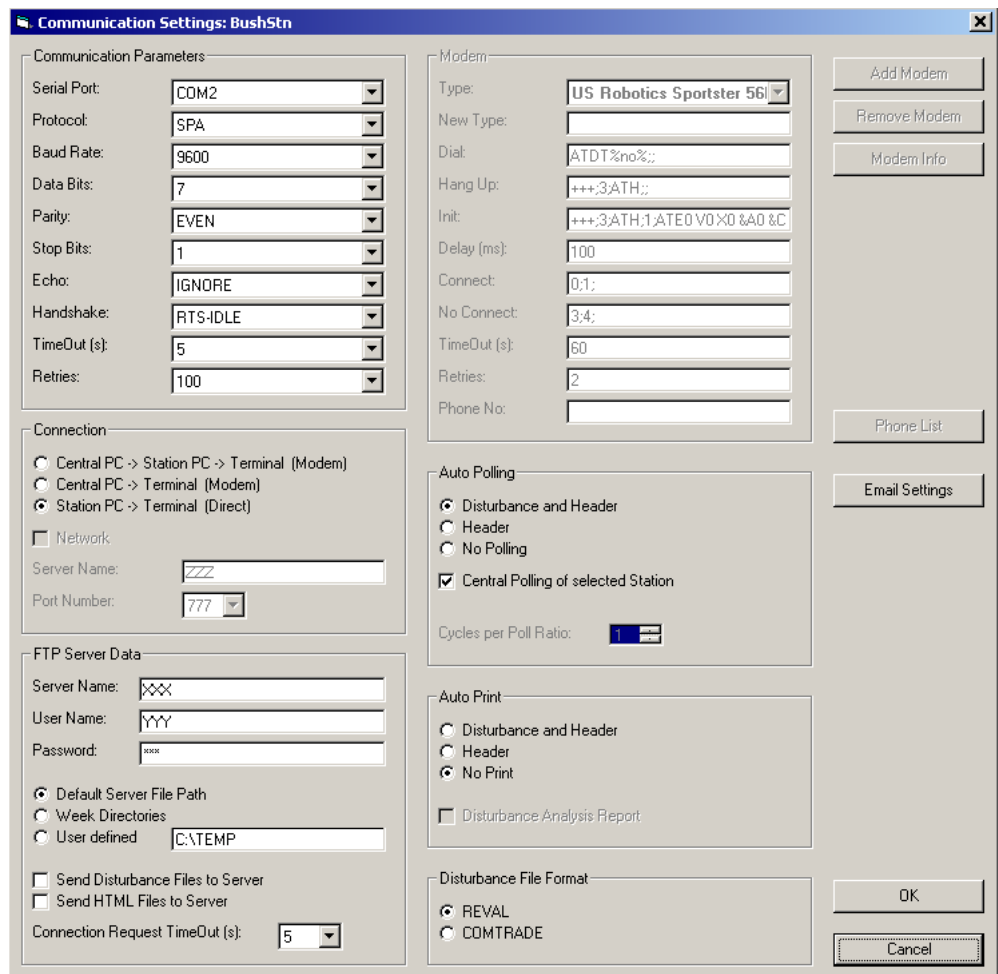


PC Type	Select PC type <ul style="list-style-type: none"> • Client Usually a Central PC. • Server Usually a Station PC. TCP Server and SPA Server is started automatically
Language	Select language in the drop down list.
SMS010 Path	Path of SMS 010

8.2

Communication settings

Click on Settings menu or right click on a station node and select **Communication Settings**. The dialog can only be opened if a station node is selected.



If you have the “Basic version” some alternatives in the dialog box are not applicable. With the “Remote Connection” option installed, those alternatives are activated.

- **Communication Parameters**

Serial Port	COM 1 - COM 250
Protocol	SPA, SR10, RAW (only for SMS 010 compability)
Baud Rate	300 - 115200 Baud
Data Bits	7 - 8 (Depending on Connection type)
Parity	ODD, EVEN, NONE (Depending on Connection type)
Echo	IGNORE, NONE, CHECK (only for SMS 010 compability)
Handshake	NONE, RTS-IDLE, RTS/CTS, XON/XOFF (For front-communication RTS-IDLE must be used, otherwise NONE)
TimeOut	Number of seconds before timeout when trying to establish a connection with the terminal and there is no reply.
Retries	Number of attempts to connect in case the terminal is busy.

Most of the serial communication settings do not have to be changed. Data Bits and Parity will be automatically changed depending on Connection type.

- **Connection**

Central PC-> Station PC ->Terminal (Modem)	You work on a Central PC which dials up a Station PC, which in turn is connected to a terminal.
Central PC-> Terminal (Modem)	The Central PC is connected to a terminal via modem.
Station PC-> Terminal (Direct)	There is a direct connection between the Station PC and the terminal.
Network	Network Connection between a Client PC and a Server PC. To be able to select Network Connection three conditions must be fulfilled: The project must be located on a shared network disk, the PC type must be Client and the Remote Connection option must be installed.
Server Name	Server PC name or IP address
Port Number	The Port number must be equal in Client PC and TCP Server in Server PC. To view Disturbance Upload Information in web browser the Port number must be 80.

- **FTP Server Data**

Server Name	FTP Server PC name
User Name	FTP User Id
Password	FTP Password
Default Server File Path	Disturbance files are stored in an identical file structure on the FTP Server.
Week Directories	The disturbance files are stored on the same path as below in User Defined, but there is also a directory for each week of the year. Example: C:\TEMPW1...W52 The disturbance files are sorted in the week directories according to disturbance date.
User Defined	Any given path can be entered for the server (independent of the terminal path).
Send Disturbance Files to Server	Disturbance files are sent to FTP server after disturbance polling.
Send HTML Files to Server	HTML files are sent to FTP Server after disturbance polling. HTML files of the disturbance are always created on the station PC for viewing Disturbance information in a web browser. The file is overwritten each time by the disturbance polling.
Connection Request Time Out (s)	FTP connection time out in seconds.

- **Modem**

If you use a modem which is predefined in the **Type** drop down list you do not have to change the settings. If you have a modem not included in the list, enter the name of the modem in the **New type** field. In this case you need to make sure that the settings in the **Init**, **Connect** and **No Connect** fields are correct according to the modem manual.

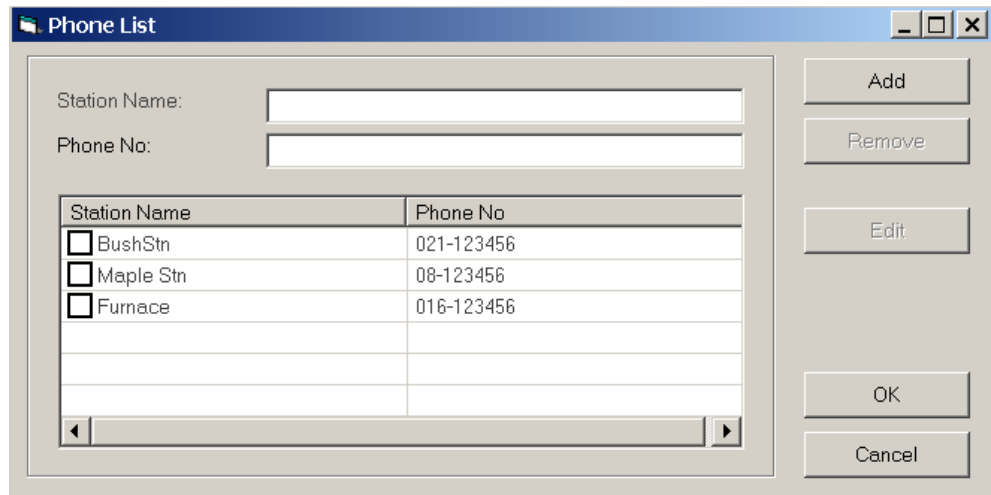
Init	Read the modem manual and enter correct AT commands to establish contact with the modem.
Connect	Read the modem manual and enter correct connect result codes from the modem.
No Connect	Read the modem manual and enter correct error result codes from the modem.
Delay (ms)	The time delay between the different AT commands.
Timeout	Indicates number of seconds granted to connect before there is a connection timeout.
Dial retries	Number of connection retries after timeout.
Phone No	The phone No. to the dial-up station. (Use phone list button for convenience)

Click on **Add Modem** button to add a new modem.

Click on **Remove Modem** button to remove the selected modem from the list.

Click on **Modem info** button to get information of modem settings.

Click on **Phone List** button to open the **Phone List** dialog box, see below.



To edit an old phone number select a station name, type the new number in the Phone No text box and click on Edit.

To add a new number type a station name and a phone number in the textboxes and click on Add.

To remove an item select a station name and click on Remove.

• **Auto Polling (Time Scheduler)**

Disturbance and Header	Upload of full disturbance.
Header	Upload of only header.
No Polling	No upload.
Central Polling of selected station	Possibility to skip polling of this station.

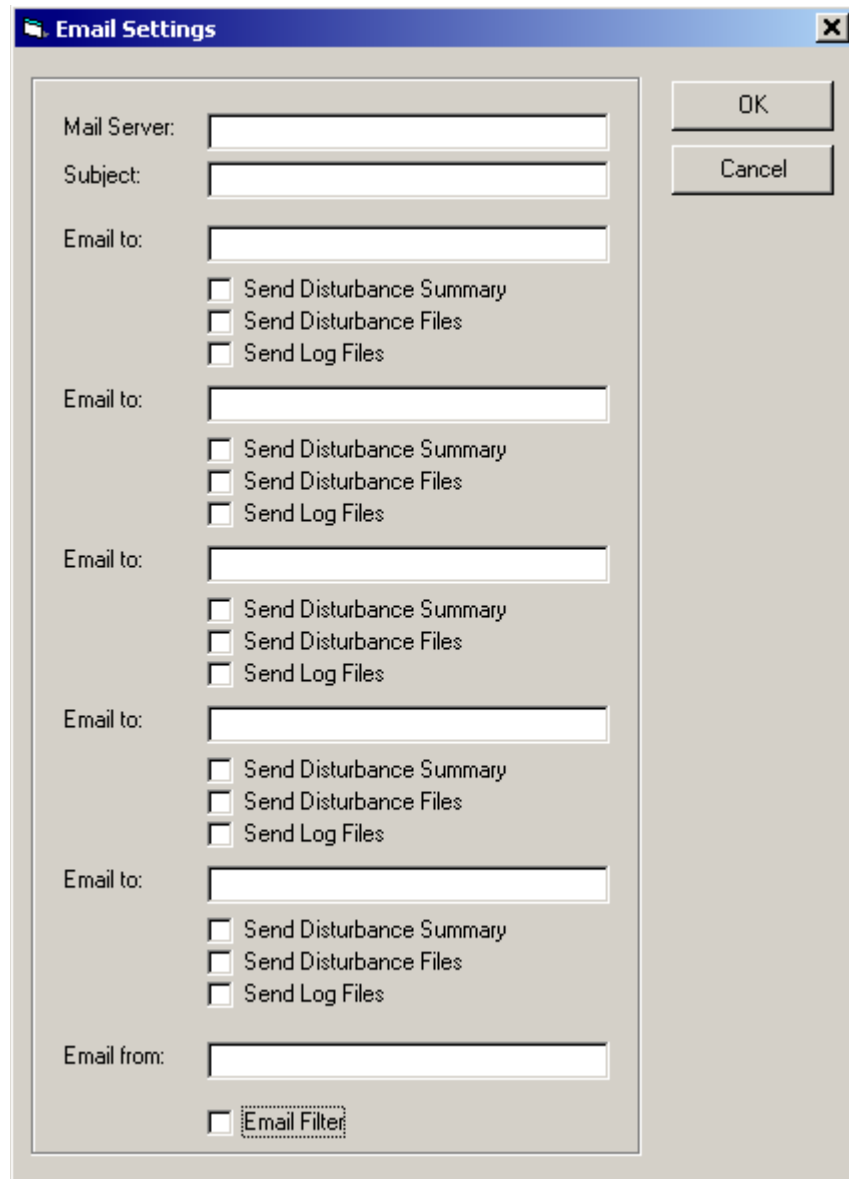
• **Auto Print (Time Scheduler)**

Disturbance and Header	Print of full disturbance.
Header	Print of header.
No Print	No print.

- **Disturbance File Format**

Select the file format REVAL or COMTRADE. The disturbance files are always stored in REVAL format. If COMTRADE format is selected the REVAL file will be converted to COMTRADE format and both REVAL and COMTRADE disturbance files will be stored on the PC disk.

Click on **Email Settings** button to open the Email Settings dialog box, see below.



Mail Server	Type the server name to mail to.
Subject	Type a subject which characterizes the disturbance.
Email to	Type in the receiver's Email address.
Email from	Type in your own Email address
Send Disturbance Summary	Send disturbance summary from latest polling as attachment, see example below.
Send Disturbance Files	Send disturbance files from latest polling as attachments.
Send Log Files	Send log files from latest polling as attachments.
Email Filter	When this box is checked Email will only be sent if the Trig Signal is identical to one of the checked signals in the Terminal Digital Channels List.

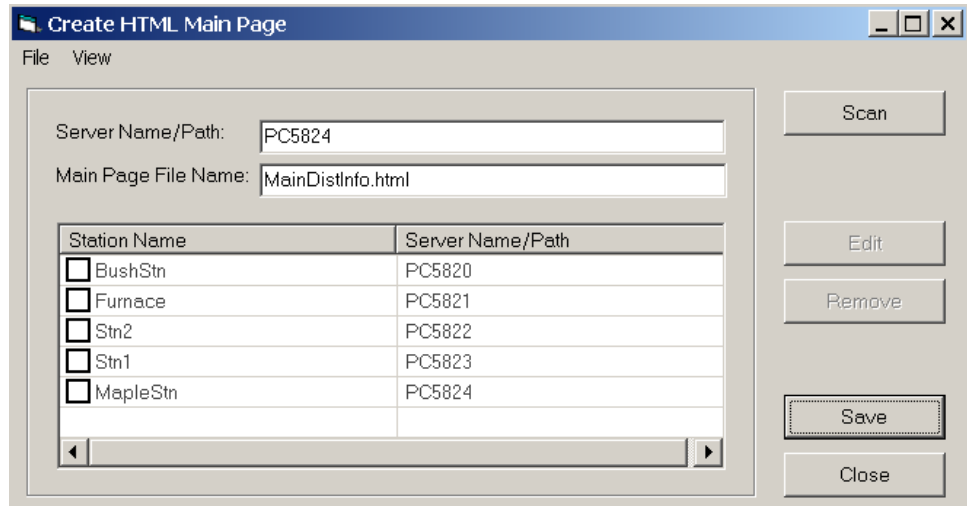
Example of Send Disturbance Summary

Station:	Stn 1
Bay:	Bay 1
Terminal:	REL511 V2.0 Line Protection
Terminal type:	REx500 2A
Disturbance Date:	03-11-04
Disturbance Time:	04:55:10.245
Disturbance File:	03110407.REH
Trig:	ZM3-TRIP
Recording Number:	7
Fault type:	L1-N
Fault Location:	37.8%

8.3

HTML settings

Click on **Tools, Network, HTML Main Page** to open the dialog, see below.



This function creates links to all stations in the project, in order to view Disturbance Upload Information in a web browser.

Push the **Scan** button to get a list of all stations in the project. Type in the server name of the remote Station PC in which the TCP Server is running or local path for each station. Click **Save** to save the data on the Main Page File.

View the Main Page in the web browser by selecting the **View** menu and then **Main Page**.

To edit an old server name select a station name, type the new name in the Server Name/Path text box and click on Edit.

To remove an item from the list select a station name and click on Remove.

9

Compress/Decompress

To compress/decompress a project click on menu File and select Compress Project/Decompress Project.

To compress/decompress a station, bay or terminal node object select the node in the project tree, click on menu Edit or right click on the node and select Compress/Decompress.

**Note!**

To decompress a node object the parent node must be selected.

Different file extensions are used for the node objects:

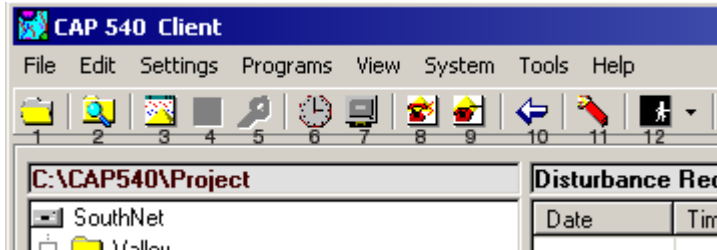
Node object	File extension
Project	.prj
Station	.stn
Bay	.bay
Terminal	.tml

10**Exit CAP 540**

Click File/Exit to exit CAP 540.

Appendix A, Toolbar buttons and menus

1 Toolbar buttons



The numbers below the toolbar buttons are represented and explained in the table below:

Toolbar Button No.	Toolbar Button Name and Function
1	Open CAP 540 Project.
2	Toggle between the Disturbance File Browser and the regular Navigator view.
3	Start Disturbance Evaluation program (REVAL).
4	Start Parameter Setting tool, see “Parameter setting” on page 25 for more information.
5	Start Terminal Configuration program, see “How to start CAP 531 from terminal level in CAP 540” on page 35 for more information.
6	Start Time Scheduler program, see page 38 for more information on the Time Scheduler and Auto polling.
7	Start Terminal Emulator program, see page 44 for more information.
8	Dial
9	Hang-up
10	Display Disturbance Records List to the right of the Navigator.
11	Terminate processes
12	List of logged on users (PC name/User Id)

2 Menus

2.1 File

Menu Items	Function
New Project	Create a new project.
Open Project	Open an old project.
Delete Project	Delete an old project (not the current).
Compress Project	Compress the current project.
Decompress Project	Decompress an old project.
Import SMS010 Project	Import a project created in SMS010.
Import Cap531 Configuration	Import an old configuration created in Cap 531, terminal by terminal.
Copy Project	Copy the current project.
Convert old Project	Convert an old project created in earlier versions of CAP 540 to support long file names.
Exit	Shut the program down.

2.2 Edit

Menu Items	Function
Add	A new node with a default name will be created in the Navigator.
Remove	Remove the selected node including all it's contents.
Remove Disturbance Files	Remove all disturbance files in the project.
Rename	Rename selected node.
Cut	Select a node to be moved.
Copy	Select a node to be copied.
Paste	Move or copy a node.
Move	Select a node to be sorted
Insert	Sort a node
Compress	Compress a station, bay or terminal
Decompress	Decompress a station, bay or terminal
Refresh	Refresh the Navigator.
Properties	List the properties of the selected terminal.

2.3

Settings

Menu Items	Function
General Settings	Select PC type and language, see page 48 for more information.
Communication Settings	Start Communication Settings dialog, see page 49 for more information.

2.4

Programs

Menu Items	Function
Dial	Dial a predefined phone number.
Hang up	Hang up the connection.
Disturbance Handling <ul style="list-style-type: none"> • Station Disturbance upload • Station Disturbance File Transfer • Terminal Disturbance List • Terminal Disturbance File List • Manual Trig • Clear LEDs • Clear All Recordings • Disturbance Evaluation 	<p>Upload disturbances of the entire station (all terminals) to Station PC or Central PC, depending on configuration.</p> <p>Upload disturbance files from Station PC to Central PC.</p> <p>Upload disturbances from terminal to Station PC or Central PC, depending on configuration.</p> <p>Upload disturbance files from Station PC to Central PC.</p> <p>Generate a disturbance in the terminal manually.</p> <p>Manually turn off the yellow LED on the terminal.</p> <p>Clear all disturbances in the terminal.</p> <p>Start Disturbance Evaluation program. Refer to the REVAL manual for more information.</p>
Parameter Setting	Start Parameter Setting tool, see page 25 for more information.
Terminal Configuration	Start Terminal Configuration program, see page 35 for more information.
Time Scheduler	Start Time Scheduler program, see "Other programs" on page 38.
Time Synchronization	Start Time Synchronization program, see page 41 for more information.
LED Indications	Show terminal LED status, see page 42 for more information.
Event List	Show terminal events, see page 43 for more information.

2.5

View

Menu Items	Function
Disturbance Records List	Display Disturbance Records List to the right of the Navigator.
Disturbance File Browser	Display a file system navigator.
Disturbance Communication Log	Display Disturbance Communication Log (SPA communication)
Modem Communication Log	Display Modem Communication Log (Modem communication).
Communication Status Log	Display General Communication Status Log.
General Error Log	Display General Error Log.

2.6

System

Menu Items	Function
Users	This dialog box is for the system administrator and enables adding and deleting users, see “How to Log on” on page 18 for more information.
Log On	Open the Log on dialog box, see page 18 for more information.
Security Mode	Disable all functions in the CAP 540 program.

2.7

Tools

Menu Items	Function
Terminate Processes	Ends all processes
SPA Server	This program is only run in a Station PC. The program handles the communication between the modem port and the SPA port for a Central PC - Station PC connection via modem. <ul style="list-style-type: none"> • Modem Port • SPA Port • SPA TimeOut
Terminal Emulator	Start the Terminal Emulator tool, see page 44 for more information.
File Conversion	Convert files to COMTRADE format, see page 45 for more information.

Menu Items	Function
<p>Network</p> <ul style="list-style-type: none"> • Connect • Disconnect • TCP Server • FTP Client • HTML Main Page • Ping 	<p>Connect to Server PC for checking network connection.</p> <p>Disconnect from Server PC.</p> <p>Start the TCP Server which handles the network communication in Server PC and transfers HTML-files to the client. The TCP Server will be started automatically if PC type = Server, see page 48 for more information.</p> <p>Start the FTP Client which is used for checking the network connection to the FTP-server, see page 45 for more information.</p> <p>Create a main page with links to all stations in the project to view Disturbance Upload Information in a web browser, see page 55 for more information.</p> <p>Ping an IP address.</p>
Decompress Zwt	Start CAP 531 to decompress old projects (.zwt)
Customize Menus	Possibility to create up to five user defined menus for starting optional programs

2.8

Help

Menu Items	Function
<p>Documentation</p> <ul style="list-style-type: none"> • CAP 540 Navigator • CAP 531 • Parameter Setting • Settings Visualisation • Disturbance Evaluation • Modem Info • Installation and Commissioning 	<p>CAP 540 User's Manual</p> <p>CAP 531 User's Manual</p> <p>PST User's Manual</p> <p>SVT User's Manual</p> <p>REVAL User's Manual</p> <p>Modem Info Manual</p> <p>Installation and Commissioning manual</p>
Tutorial	CAP 540 Tutorial
Release Notes	CAP 540 Release Notes
About CAP 540	Version and License Agreement information



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