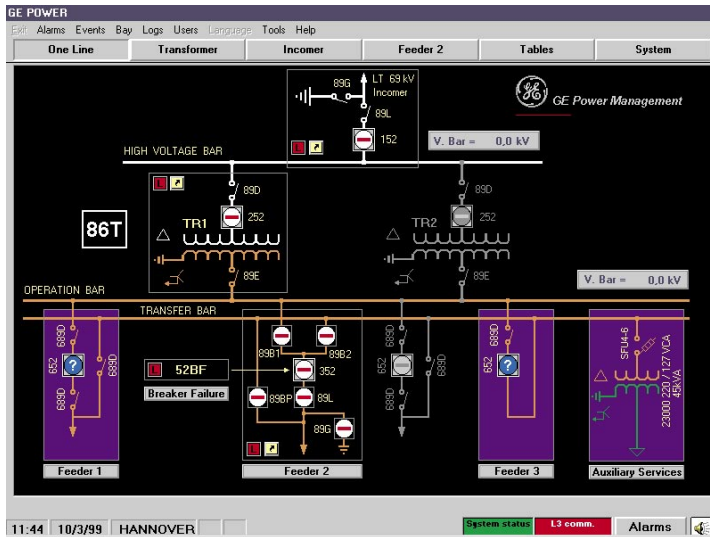




GE Consumer & Industrial
Multilin

GE-POWER

Substation Monitoring and
Management Software
Instruction manual
GEK-106270C



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1. INTRODUCTION

1.1 DESCRIPTION

The LEVEL 2 system allows controlling and supervising a substation from a local PC. It is compound of two different software packages:

- **CONCENTRATOR**: performing communications with LEVEL1 (IEDs) and LEVEL3.
- **GE_POWER**: displays and monitors all the information gathered by the CONCENTRATOR (general status, analog measures, events, alarms, etc.).

The system includes

- Level 1 equipments or IEDs that gather information from the environment, information that is later collected by the Concentrator.
- PC or F600, where Concentrator and GE_POWER programs will be executed.

In order to work properly the GE_POWER software needs certain information configuration related to the substation and equipment, info that the software gets through databases. The equipment configuration is made with the GE_Intro program, and the substation configuration with the GE_CONF program.

It also requires general information that will be located in the *n2.ini* file. This file will be modified when creating the configuration with GE_CONF, but it can also be edited with any editor if it needs a modification. The information that the user can modify is:

- Database ⇒ substation configuration database, generated by GE_CONF.
- UserTimeOut ⇒ system timeout after which it automatically generates a logout if no operation has taken place on the system.
- PathBD ⇒ relay model database path
- PathConfig ⇒ substation configuration database path.
- PathBMP ⇒ path of the bmps used in the GE_POWER screens
- PathExe ⇒ GE_POWER.exe (executable) path
- PathFiles ⇒ historic data path
- PathAlpsLink ⇒ Alps.exe (executable) path
- PathGEOsc ⇒ GE_Osc.exe (oscillography visualization program) path,

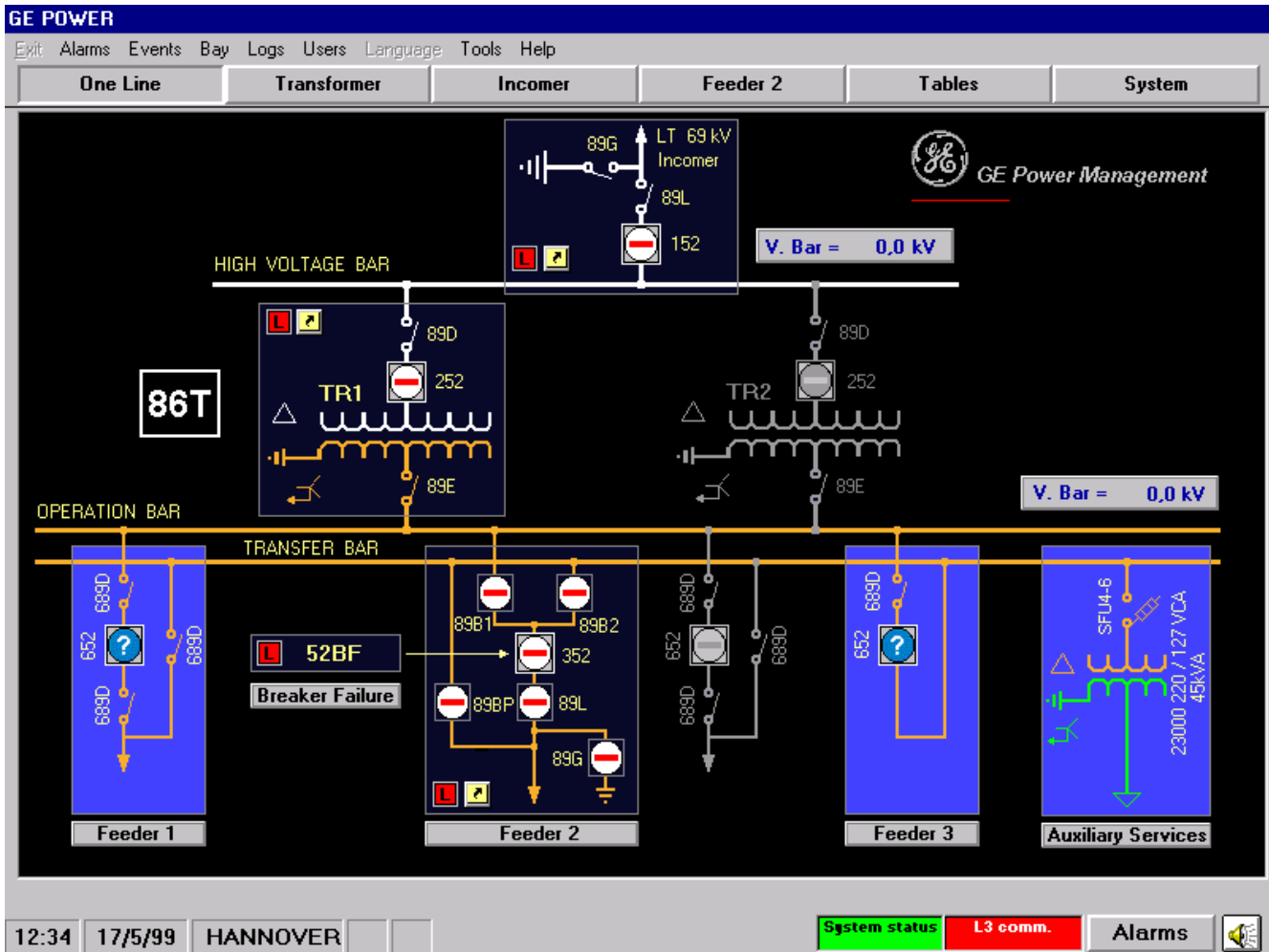
1.2 SYSTEM REQUIREMENTS

The system is ready to run GE_POWER in an F600, but it can also be run in remote mode from a PC. In order to do so the minimum hardware we need to install and run GE_POWER is:

- A last generation PENTIUM processor
- 128 M RAM
- Removable data storage device (disk drive, USB...)
- CD-ROM Drive
- RS-232C serial port

2. SYSTEM SCREEN

The system screen includes the following elements:



- A menu bar including all the system options.

Exit Alarms Events Bay Logs Users Language Tools Help

- A status bar.

12:37 17/5/99 HANNOVER System status L3 comm. Alarms

SYSTEM SCREEN

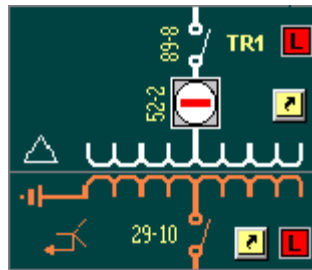
- A series of screens where the user can see represented all the substation components (switchgear, measures, status, etc.) configured using GE_CONF software. There is a button bar with the name of the screens at the top of the screen for moving through them.



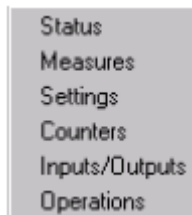
These screens are a graphic representation of the system status. They contain elements of different kinds, some of them represented by icons. All the elements are configured using GE_CONF, which instructions manual describes them in more detail.

These screens can include the following elements:

- A drawing representing an equipment or bay. Its background color will change depending on whether communication with the relay is present or not:



When pressing the mouse right button, the following floating menu will pop up:



Here, the user can choose to display the status, measures, settings, counters, and inputs/outputs of any equipment.

- Buttons for switching from the current screen to a different one. When placing the mouse on these elements, a label with the message "GO TO..." will appear.



- Drawings representing the substation switchgear:



SYSTEM SCREEN

When clicking on it with the mouse right button, the previous menu will appear together with the performing operations option:



- Buttons representing a determined operation in an equipment. When clicking them we execute the operation.

Measures retrieved by the substation equipments, continuously refreshed:

V = 67.50 kV

Measurement values can also be represented by icons, each icon counting for a measure values range.

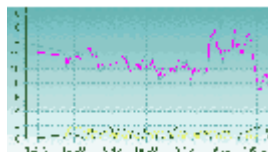
- Icons representing digital status: one icon for ON and another one for OFF



- Template selector: scrolling-down menu that allows to select among several bays (ModBus type). The screen where the selector is has generic elements that represent at each point in time the values given by one bay or another, according to the selection made on the template.



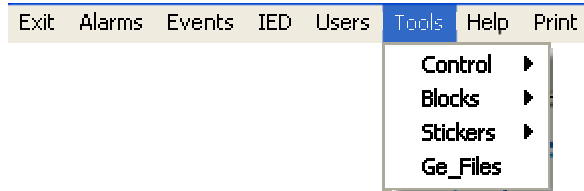
- Setpoints that allow to update the value of a piece of data and send it to the equipment.
- Graphs that represent the actual value of one or several magnitudes.



- An element that shows the date and/or time of the system.

25-feb-05 12.17.40

- There are also some dynamic elements, called stickers, which the user can create, modify and eliminate during GE_POWER execution. You need a special permission in order to work with stickers and to be in control of the system (after requesting it in **Tools>Control**).



These elements are reminders where you can write your own text. You can place them anywhere on the screen, even on other elements to show information about them. To see the text related to a sticker, it is enough with moving the mouse on the sticker.

In order to create a sticker it is necessary to have the system control and to apply for a new sticker in the **Tools>Control>New Sticker** menu. Next, click the pointer where we want the sticker to be placed. A dialog box pops up where we can write the sticker-related text.

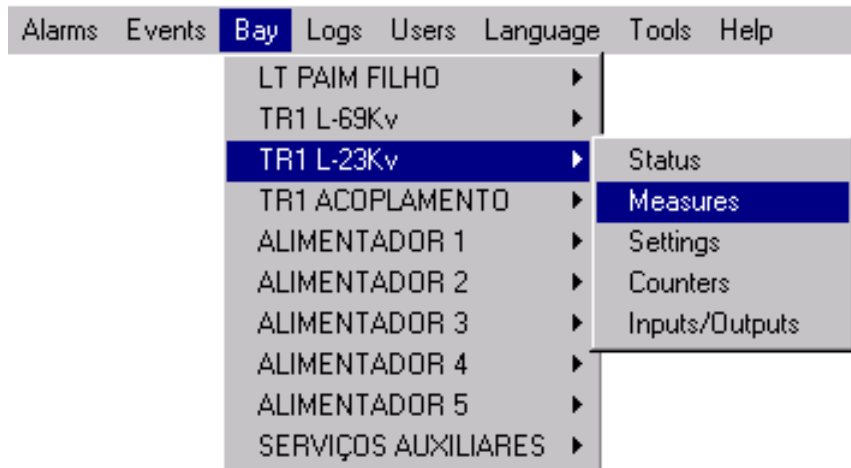
If we want to change or eliminate a sticker, we just need to place the pointer on the mentioned sticker, click the right button of the mouse, and choose the desired option.

We can also move stickers once they are placed on the screen.

2.1 MENU BAR

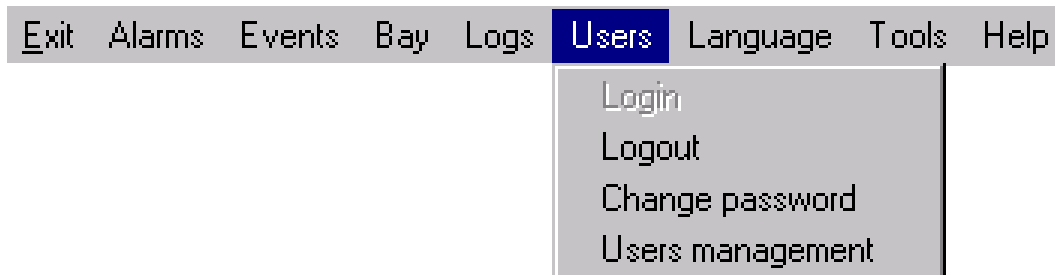
The Menu Bar includes the following items:

- **EXIT:** Exits GE_Power.
- **ALARMS:** displays all the system alarms, with the ones in Active and/or Not Acknowledged position at each point in time.
- **EVENTS:** shows the substation IEDs events in chronological order. When starting up, it shows the last 150

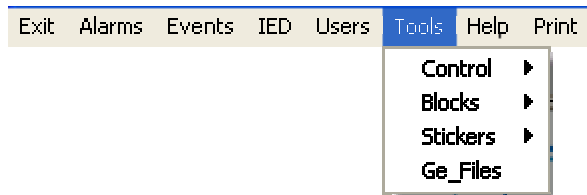


produced in the system (as long as they are stored), and adds to the screen the events that are taking place.

- **BAY:** shows a drop-down menu to select the equipment or IED which data we want to access. Another menu appears when placing the mouse on the equipment, in order to choose the data type (status, measures, settings, counters, and inputs/outputs).
- **USERS:** In this menu, the user can log in and out of the system, as well as change the user password, access users management and Activate/Deactivate AutoAdminLogon.



- **TOOLS:** provides with the necessary tools for visualizing historic data of the substation (events, logs, osciloperturbographie, demand and historic of operations).



Control allows the user to ask for the system Control (to be able to configure the events and operations blockings, to put a bay in Local/Remote in Level 2, and to make the stickers modification), or to leave it

Blockings allows to see the Events and Operations blockings and the Local/Remote status of the bays regarding Level 2. If in possession of the system control, the user can also change them.

Stickers allows to manage stickers: Add, Eliminate and Modify, if the user has the system control.

GE_Files runs the program with the same name to visualize data with the PC where GE_POWER is being run.

- **HELP:** allows to obtain certain information about the substation (configuration database, last revision date and equipments that compose the substation), and about GE_POWER (version and date).
- **PRINT:** Menu composed by two options. With the first one we can print the current screen and with the second option we can choose a printer for event printing. We should consider that the printer should be of the matrix kind so events are printed line by line.

2.2 STATUS BAR



The status bar displays the following information, from left to right:

- Computer time.
- Computer date.
- Substation name.
- Number of current user.
- Access level of current user.
- LOCAL or REMOTE
- Control ON or Control OFF, to show if the current user has the system control
- System status:
 - Green: system ready (no pending requests)
 - Red: busy system (there is a request to the system).
- Communication with level 3:
 - Green: there is communication between Level 2 and Level 3.
 - Red: there is no communication between Level 2 and Level 3.
- Alarms button: press here for having access to the alarms panel. This button flashes with the most urgent active alarm.
- Sound button: turns on and off the sound alarm.

3. SYSTEM

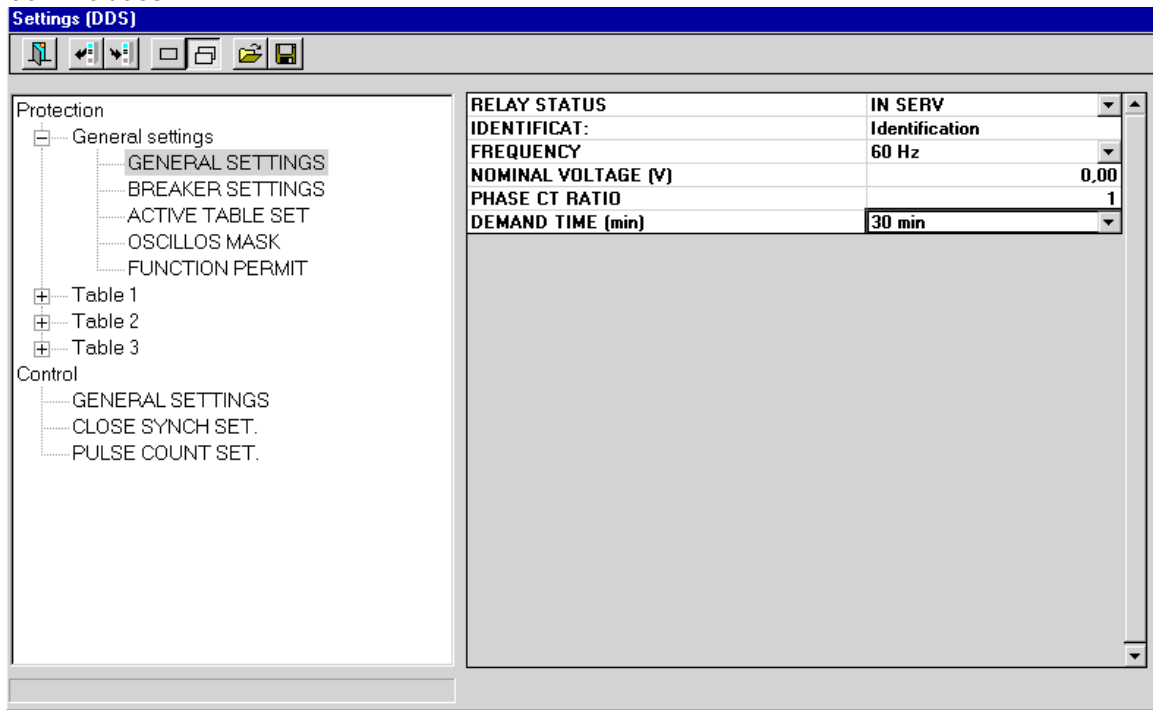
3.1 SETTINGS

Settings can be viewed and modified in two different ways:

- by selecting the “**BAY-SETTINGS**” option from the menu bar
- clicking the selected bay with the mouse right button , in any GE-POWER screen.

The settings window looks as follows:

This window includes:



- A button bar at the top, with the following seven buttons:
 1. **Exit** the settings editing.
 2. **Receive** settings from the unit.
 3. **Send** settings to the unit.
 4. **Work with a settings group individually**: when pressing retrieve or send, it applies only to the selected settings group.
 5. **Work with all the unit’s setting groups**: when pressing retrieve or send, it applies to all groups of the unit.
 6. **Open** a settings file.
 7. **Save** a settings file.
- A grid with all the settings groups of the unit.
- A grid with the settings of the selected group.
- A progress bar indicates the quantity of groups sent or received when working with all the groups.

3.1.1 CHECKING THE SETTINGS

Open the settings window (by default, the system will choose to work with one group), select “**Protection**” or “**Control**”, and then the table and the name of the desired setting group.

3.1.2 EDITING, MODIFYING AND SENDING A SETTINGS GROUP

For editing settings, it is first necessary to follow the “Checking the settings” steps. Once a group is selected, the user can perform the changes. The “**SEND SETTINGS**” button in the bar must be pressed in order to send the changes.

If the user selects a different settings group without having previously sent the new settings to the unit, changes will be lost.

3.1.3 RETRIEVING AND STORING ALL THE RELAY SETTINGS.

Select “**Working with all the setting groups**”. Every time this button is pressed, GE-POWER retrieves automatically all the relay settings. Then press the “**SAVE**” button.

Each time we press the retrieving button in this working mode, we receive all the relay settings.

3.1.4 SENDING A SETTINGS FILE

For sending a complete settings file to the protection unit, press the “**OPEN**” button, select a file, and then press the “**SEND**” button.

3.1.5 EDITING A SETTINGS FILE

The user can edit a settings file and later retrieve it and send it to the unit. In order to achieve this, it is necessary to work with all the groups. The user can perform all the desired changes and then save the file.

The settings file can be retrieved for edition by pressing the “**OPEN**” button.

3.2 STATUS

For viewing the status of a unit, select the “**BAY - STATUS**” option from the menu bar or press the mouse right button on the desired bay. The list of the unit status appears with its current value represented with colors.

The screenshot displays the GE POWER software interface. At the top, there is a menu bar with options: Exit, Alarms, Events, Bay, Logs, Users, Language, Tools, Help. Below the menu bar are tabs for navigation: One Line, Transformer, Incomer, Feeder 2, Tables, and System. The main window is divided into several sections:

- Left Panel:** A schematic diagram of a substation bay. It includes a high voltage bus labeled "86T", an "OPERATION BAR", a "TRANSFORMER" section, and "Feeder 1" with circuit breakers labeled 652, 689D, and 688D. A "Breaker" status indicator is visible.
- Center Panel:** A "Status (DDS)" window with a scrollable list of status items. The items are grouped into categories:
 - PICKUPS:** 46P Pickup, 51P Pickup, 51N Pickup, 50P Pickup, 50N Pickup.
 - TRIPS:** 46P Trip, 51P Trip, 51N Trip, 50P Trip, 50N Trip.
 - RECLOSER:** 79 out of service, Reclose in progress, Reclose initiate, External reclose initiate, Reclose inhibit, Reclose command, Last trip, 79 Ready.
 - Lockout:** Failed to open, Repetitive tripping, No conditions to reclose, Faulty recloser, Global lockout.
 - PROTECTION ALARMS:** Parallel EFPBM alarm.
- Right Panel:** A schematic diagram of "Auxiliary Services" showing a transformer labeled "SFU4-6" with specifications "23000 220 / 127 VCA" and "45KVA". A voltage indicator shows "V. Bar = 0,0 kV".

At the bottom of the interface, there is a status bar showing the time "13:10", date "17/5/99", location "HANNOVER", and system status indicators: "System status" (green), "L3 comm." (red), and "Alarms" (yellow).

3.3 MEASURES

For viewing all the measures of a unit, select the “*Bay>Measures*” option from the menu bar or press the right mouse button on the desired bay.

The screenshot displays the GE POWER software interface. At the top, there is a menu bar with options: Exit, Alarms, Events, Bay, Logs, Users, Language, Tools, Help. Below the menu bar is a navigation bar with tabs: One Line, Transformer, Incomer, Feeder 2, Tables, System. The main display area is divided into several sections:

- Measures(DDS) Window:** A central window displaying a list of electrical parameters and their values, all of which are 0.00.

Ia (A)	0,00
Ib (A)	0,00
Ic (A)	0,00
In (A)	0,00
I2 (A)	0,00
Vab (kV)	0,00
Vbc (kV)	0,00
Vca (kV)	0,00
VBB (kV)	0,00
P (MW)	0,00
Q (MVAR)	0,00
COS PHI	0,00
FREQUENCY (Hz)	0,00
MODULE DIF. (V)	0,00
ANGLE DIF. (°)	0,00
FREQUENCY DIF. (Hz)	0,00
TRIPS IN 1 HOUR	0
I. MAXIMETER (A)	0,00
I2t A COUNTER (kA2s)	0,00
I2t B COUNTER (kA2s)	0,00
I2t C COUNTER (kA2s)	0,00
N° OPENINGS	0
N° RECLOSURES	0
MEAS. ANALOGIC 1	0,00
MEAS. ANALOGIC 2	0,00
- Schematic Diagram:** A diagram of a substation bay labeled '86T'. It shows a 'HIGH VOLT' busbar connected to an 'OPERATION BAR' and a 'TRANS' (transformer) section. Below the busbar are three feeders: Feeder 1, Feeder 2, and Feeder 3. To the right, there is an 'Auxiliary Services' section with a transformer labeled 'SFU4.6' and a voltage of '23000 220 / 127 VCA 45kVA'. A 'V. Bar = 0,0 kV' indicator is visible.
- Status Bar:** At the bottom, there is a status bar showing the time '13:13', date '17/5/99', location 'HANNOVER', and system status indicators: 'System status' (green), 'L3 comm.' (red), and 'Alarms' (yellow).

3.4 COUNTERS

For viewing all the counters of a unit, select the “**Bay>Counters**” option from the menu bar or press the mouse right button on the desired bay.

The screenshot shows a window titled "Counters (DDS)" with a toolbar containing three icons: a bar chart, a refresh symbol, and a send symbol. Below the toolbar, there is a list of counters with their corresponding values in text boxes:

I2t A COUNTER (kA2s)	0,09
I2t B COUNTER (kA2s)	0,00
I2t C COUNTER (kA2s)	0,00
Nº OPENINGS	5
Nº RECLOSURES	3
PULSE CNT 1	0,00
PULSE CNT 2	0,00
PULSE CNT 3	0,00
PULSE CNT 4	0,00

The counters window has a toolbar with three buttons with the following functions:

- **Exit** the counters window.
- **Retrieve** counters.
- **Send** counters.

When you need to change the value of a counter, select its text box (its background will turn black), assign the new value, and then press the third button of the toolbar (send). GE_POWER will ask you to confirm the operation.

Counters must be changed one by one, therefore, when modifying several counters, the above operation must be repeated as many times as there are counters.

3.5 UNIT INPUTS AND OUTPUTS

In order to display all the inputs/outputs of a unit, select the “*Bay>Inputs/Outputs*” option from the menu bar or from the floating menu.

The screenshot displays the GE POWER software interface. At the top, there is a menu bar with options: Exit, Alarms, Events, Bay, Logs, Users, Language, Tools, Help. Below the menu bar are navigation tabs: One Line, Transformer, Incomer, Feeder 2, Tables, System. The main window is titled "Inputs/Outputs (DDS)" and contains a list of protection inputs and outputs for DMS units:

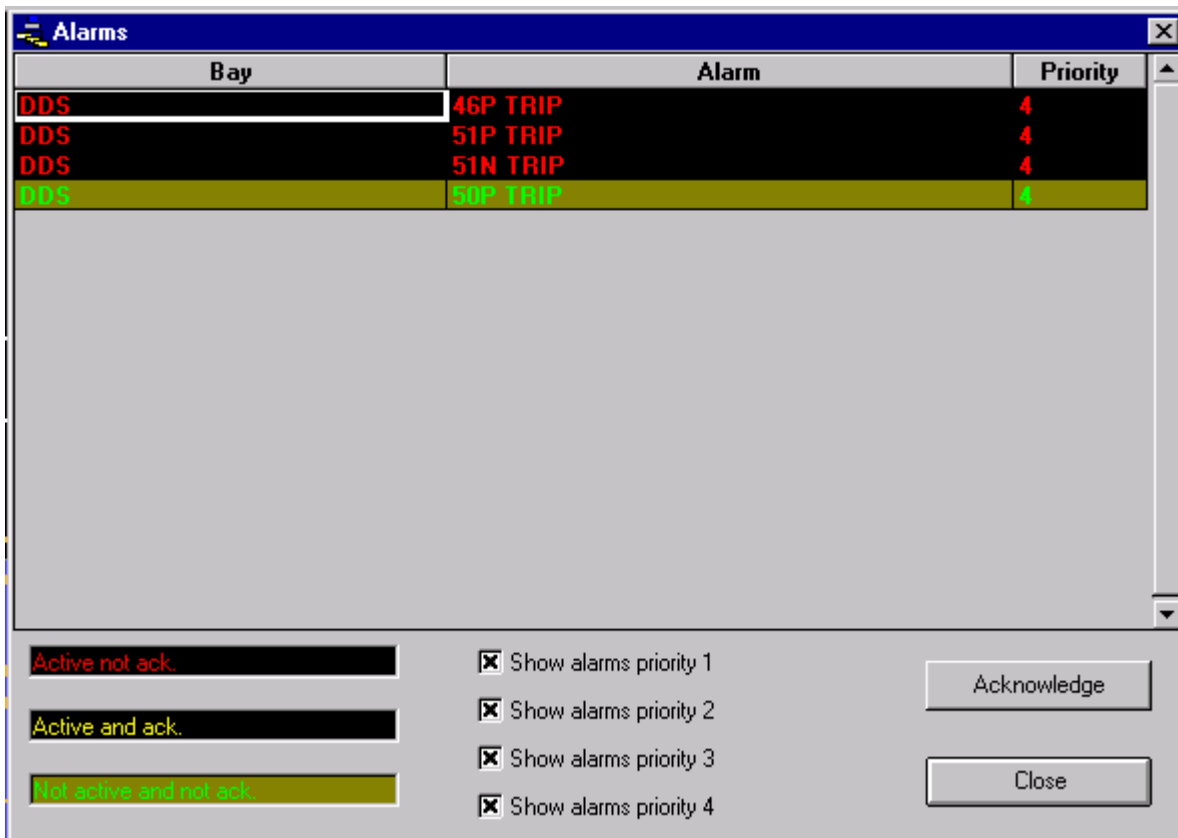
EP01	DMS - Protection Input 1
EP02	DMS - Protection Input 2
EP03	DMS - Protection Input 3
EP04	DMS - Protection Input 4
EP05	DMS - Protection Input 5
EP06	DMS - Protection Input 6
SP01	DMS - Protection Output 1
SP02	DMS - Protection Output 2
SP03	DMS - Protection Output 3
SP04	DMS - Protection Output 4
SP05	DMS - Protection Output 5
SP06	DMS - Protection Output 6
SP07	DMS - Protection Output 7
SP08	DMS - Protection Output 8
EC01	
EC02	
EC03	
EC04	
EC05	
EC06	
EC07	
EC08	
EC09	
EC10	
EC11	
EC12	
EC13	
EC14	
EC15	

The background shows a schematic diagram of a substation. On the left, there is a "Feeder 1" with a voltage of 86T. In the center, there is a "TRANSFORMER" with a "Breaker" and a "V. Bar = 0.0 kV" label. On the right, there is an "Auxiliary Services" section with a voltage of 23000 220 / 127 VCA and 45KVA. The bottom status bar shows: 13:15, 17/5/99, HANNOVER, System status (green), L3 comm. (red), Alarms, and a speaker icon.

3.6 ALARMS

System alarms can be viewed from different places:

- Selecting the “*Alarms*” option from the menu bar or pressing the Alarms button on the bottom right side of the screen will display the alarms of all the units.
- Clicking with the mouse right button on any navigation button will display the alarms of the bays represented on the related window.



3.6.1 ALARMS ACKNOWLEDGEMENT

The alarms acknowledgement is performed for each equipment. Select any alarm and press the “**ACKNOWLEDGE**” button.

3.7 OPERATIONS

Operations associated to a switchgear are performed by clicking with the mouse right button on a switchgear and selecting the desired operation.

Another way of performing operations is by clicking the Operations objects, buttons configured for developing a determined operation.

3.8 EVENTS

System events can be viewed by selecting the Events option in the menu bar. Initially the last 150 substation generated events will be displayed (if there are that many) and the new ones will be added when they take place.

Bay	CPU	Event	Date & Time
DDS	Protection	79 RECLOSE IN PROGRESS	05/17/1999 12:21:48.564
DDS	Protection	79 OUT OF SERVICE	05/17/1999 12:21:48.059
DDS	Protection	46P TRIP	05/17/1999 12:21:48.051
DDS	Protection	50P TRIP	05/17/1999 12:21:37.047
DDS	Protection	46P TRIP	05/17/1999 12:21:32.791

Active
 Not active

Close

For each event, we will see the following on-screen information:

- The equipment that generated it
- Event description
- Time/date when the event took place
- The color of the text that represents the event on the screen shows the status of the event ON/OFF.

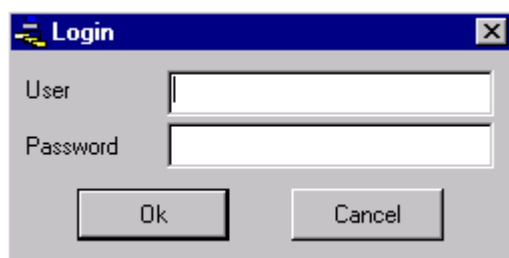
4. USERS AND ACCESS LEVELS

The different access levels that enable and disable the GE-POWER functions, applied to different users, are configured using the GE-CONF Substation Configuration Software. GE-POWER includes some configurable functions enabled by default.

When a user wants to operate in the system, s/he must be registered on the database and log in so that all his/her operations can be registered. Once s/he has finished, he/she must log out.

4.1 SYSTEM LOGIN AND LOGOUT

For logging in, select “**Users>Login**” from the menu.



Enter your user name, and password, and then press “**OK**”. From now on you will be able to perform all the operations assigned to you by the Users Administrator.

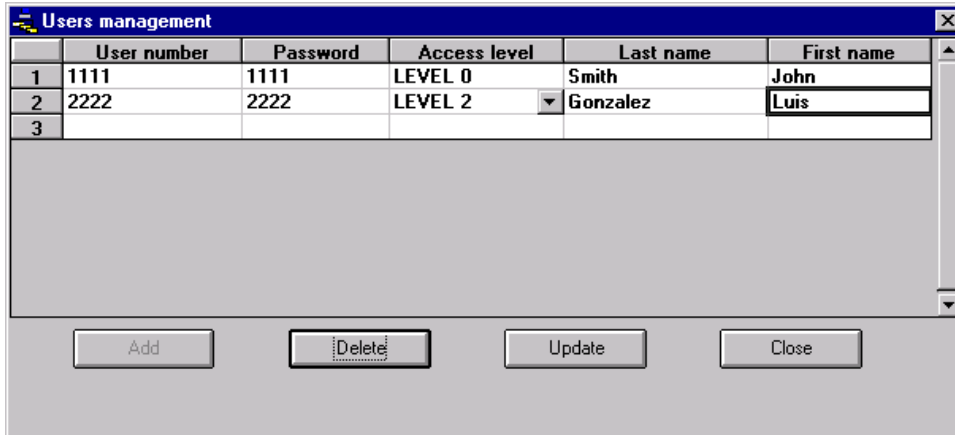
In order to log out, select “**Users>Logout**” from the menu. For safety reasons, in case a user forgets to log out, the system will do it automatically after a period of time without operation.

4.2 CREATE A NEW USER

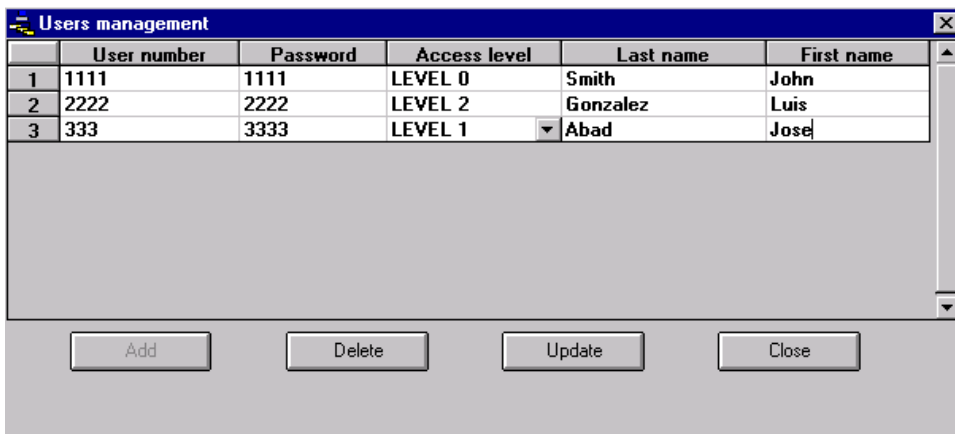
- Select “**Users>Management**” from the menu bar. The following window will appear:



- Press the “**Add**” button and click twice on the “**User number**” column.



- Fill in the form with all the information about the new user.



- Press the “**Update**” button

If you wish to enter more users, repeat the above steps.

4.3 DELETE USER

- Select “**Users>Users Management**”
- Select the user you wish to delete by clicking on it.



4.4 *ACTIVATE/DEACTIVATE AUTOADMINLOGON*

When activating AutoAdminLogon we allow the system not to ask for a user name or password when starting up. Therefore the system and also Conccent and GE_Power programs re-start without requiring the presence of a user.

4.5 SYSTEM CONTROL

The user in control can take actions that would not be able to take otherwise. :

- Set a bay in Local/Remote from GE_Power viewpoint. It is different from the Local/Remote status of the relay. This status shows if we can start operations from GE_Power or Level 3.
- Operations blocking: operations can be blocked/unblocked so they cannot be run from GE_Power.
- Event blocking: limiting the events sent to Level 3.
- Stickers: we can create stickers, which are notes we post anywhere on the screen. They can indicate the blocking of the operations of an element, that it is being repaired, ... any situation we want to leave record of. Stickers can afterwards be eliminated.

These four actions are also shown in the other GE_Powers linked to the network, thanks to a Peer-to-peer communication among the different PCs, even if the actions can only be modified from the GE_Power in charge.