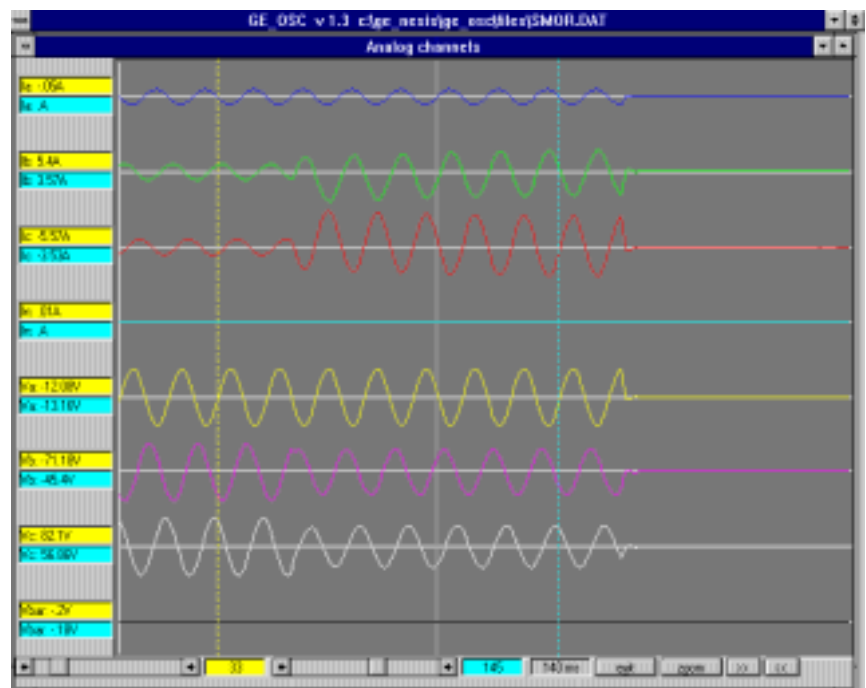




# *GE Power Management*

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## *Oscillography Software*

### **GE\_OSC**

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*Instructions*  
GEK 105596B

# TABLE OF CONTENTS

<b>1. OVERVIEW .....</b>	<b>2</b>
1.1. GE_OSC .....	2
1.1.1. <i>Analysis Tools</i> .....	2
1.1.2. <i>Structure of Directories</i> .....	3
1.1.3. <i>Templates</i> .....	3
1.2. GE_TRADE .....	4
1.3. INSTALLATION .....	4
1.3.1. <i>System Requirements</i> .....	4
1.3.2. <i>Installation Disks</i> .....	4
1.3.3. <i>Result of the Installation</i> .....	5
<b>2. GENERAL SCHEME .....</b>	<b>6</b>
<b>3. PROGRAM OPERATION.....</b>	<b>7</b>
3.1. DATA ENTRY .....	7
3.1.1. <i>Open COMTRADE Files</i> .....	8
3.1.2. <i>Templates</i> .....	9
3.1.3. <i>Analysis Tools</i> .....	14
3.1.4. <i>Directory Configuration</i> .....	14
3.1.5. <i>Language</i> .....	14
3.2. WAVEFORM DISPLAY .....	14
3.2.1. <i>Individual Waveform Display</i> .....	15
3.2.2. <i>Different Waveforms Display in the same Window</i> .....	16
3.2.2. <i>Composition of Waves</i> .....	18
3.3. PHASORS .....	20
3.3.1. <i>Information Supplied</i> .....	20
3.3.2. <i>Possible Operations</i> .....	20
3.4. INFORMATION .....	22
3.5. DIGITAL CHANNELS .....	22
3.5.1. <i>Group Display</i> .....	22
3.5.2. <i>Digital Channels Composition</i> .....	23
<b>4. EXAMPLE.....</b>	<b>26</b>

# 1.

# ***OVERVIEW***

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The GE\_OSC is a tool from the GE\_NESIS software package that includes a main program with the possibility to add a conjunction of analysis tools to help in the study of the data obtained in COMTRADE format, as well as conversion of GE relay formats to COMTRADE.

The GE-OSC package includes two different programs:

- GE\_OSC
- GE\_TRADE

GE\_OSC is an oscillographic treatment program for records in COMTRADE, ASCII or binary format.

GE\_TRADE is a program for converting the format used by GE relays into COMTRADE, ASCII or binary format.

## ***1.1. GE\_OSC.***

The GE\_OSC program plots oscillography data obtained during a fault and display fault reports and fault events. The data displayed will include currents, voltages, digital inputs, digital outputs, and protection flags in a COMTRADE ASCII format.

The main program allows:

- Analog channels display
- Digital channels display
- Sequence components display and calculation

### ***1.1.1. Analysis Tools***

The actual version includes an additional analysis tool for distance protection. In beta stage are available two other tools:

- Overcurrent relay analysis
- Frequency relay analysis

The analysis tools can be added to the main program at any time and in any order. Also they can be deleted easily if they are not needed.

Each tool is an executable program (.EXE) completely independent from the main program and from the other tools.

More information can be obtained from the specific analysis tool instruction book.

### **1.1.2. Structure of Directories**

The directory structure is as follows:

```
\GENESIS\GE_OSC\EXE
\GENESIS\GE_OSC\INI
```

The EXE directory contains the executable programs, for example:

GE\_OSC.EXE Refer to the main program.  
DISTANCE.EXE refers to the distance tool.

The INI directory contains the initialization disk files:

FICHER.INI is used for communication between the main program and the different tools.  
GEOTRO.INI and GEINGLES.INI contain the messages and text appearing in the programs.  
TOOLS.INI contains information about the tools that are loaded in the main program.

These initialization files are managed by the program and must not be changed by the user.

The FILES directory contains the COMTRADE files that are displayed by the program. It is an optional directory. The files that you need to display do not necessarily have to be in this directory, but it is recommended to have them in it, in order to maintain a correct installation of the program.

The TEMPL directory contains the templates to display the oscillography. As in the previous case, the templates do not necessarily have to be in this directory.

### **1.1.3. Templates**

The GE\_OSC program can be used with any file in COMTRADE, ASCII or binary format, no matter which equipment generated the file.

In order to give the program a universal use, templates are used to define the data coming from different devices. Up to now two different templates are needed:

```
*.CNF
*.DIS
```

The CNF template is used by the GE\_OSC main program. This template contains information about the analog channels, digital channels and three-phase groups (for the calculation and presentation of the sequence components).

The DIS template is used by the distance tool and it contains information about the line and the distance characteristic zones.

The GE\_OSC program provides forms for generating the CNF template, and the distance tool provides forms for generating the DIS template. Both templates can be created and modified by the user.

## ***1.2. GE\_TRADE***

GE\_TRADE is a program that converts the oscillography format used by General Electric relays into a COMTRADE, ASCII or binary format.

The GE\_TRADE program works with the following relays:

- ALPS
- DFM
- DGP
- DLP
- MLP
- DTP
- SMOR-A
- DFP

For further information, the user can check the available help in the GE-TRADE program.

## ***1.3 INSTALLATION***

### ***1.3.1 System Requirements***

#### **Hardware**

The minimum PC hardware requirements consist of the following components:

- 386 processor or higher
- 4 M RAM
- 10 MB hard drive
- floppy 3 ½ disk drive
- VGA color monitor
- Laser compatible graphics printer

#### **Software**

Require WINDOWS 3.1 or WINDOWS 95 for the PC operating system, the GE Communication package (depending of the type of relay) and the GE plotting software package GE\_OSC.

### ***1.3.2 Installation Disks***

Before installing the program, we recommend the following steps:

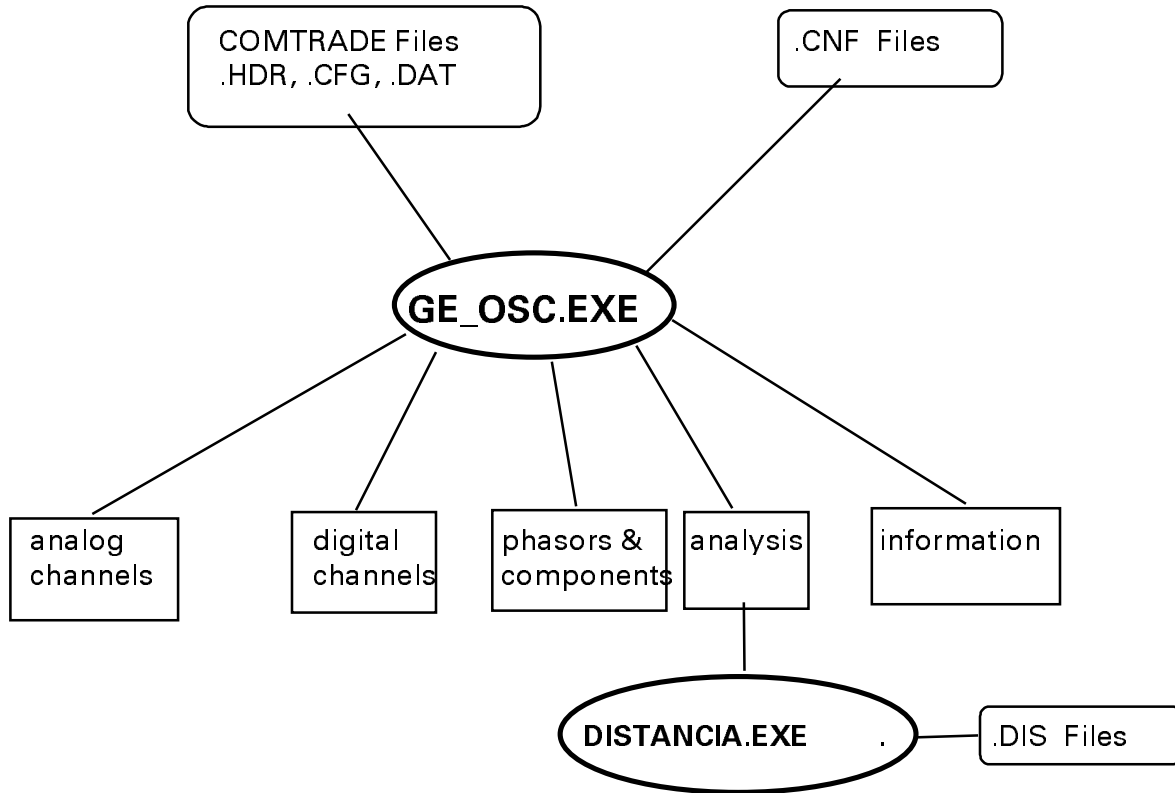
- Restart WINDOWS
- Close all the applications and install the program without any other software resident in

memory.

The software is delivered in three floppy disks. To start the installation, insert the floppy disk N° 1 in the floppy drive and execute "a:\setup.exe" from the "Main" window. After this first step, follow the software instructions.

### ***1.3.3. Result of the Installation***

As a result of the installation, a GE\_OSC group will be created in Windows, with two different icons: the first corresponding to the GE\_OSC program, and the second to the GE\_TRADE program.

**2.****GENERAL SCHEME**

From the oscillography in COMTRADE ASCII FORMAT we can make the following operations:

- Display of the waveform. A single waveform per window or several waveforms in one window with the same time axis or with different time axis.
- Display of the digital channels: per groups defined in the template or forming a group defined by the user.
- Display of phasors and sequence components.
- Display of the information contained in the header file (.HDR)
- Specific analysis on the file (distance protection performance, frequency protection performance,...)

## 3. ***PROGRAM OPERATION***

---

### 3.1. ***DATA ENTRY***

The currents, voltages and flags displayed with the GE\_OSC program are plotted in the COMTRADE ASCII format (IEEE Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems). (IEEE, C37.111-1991)

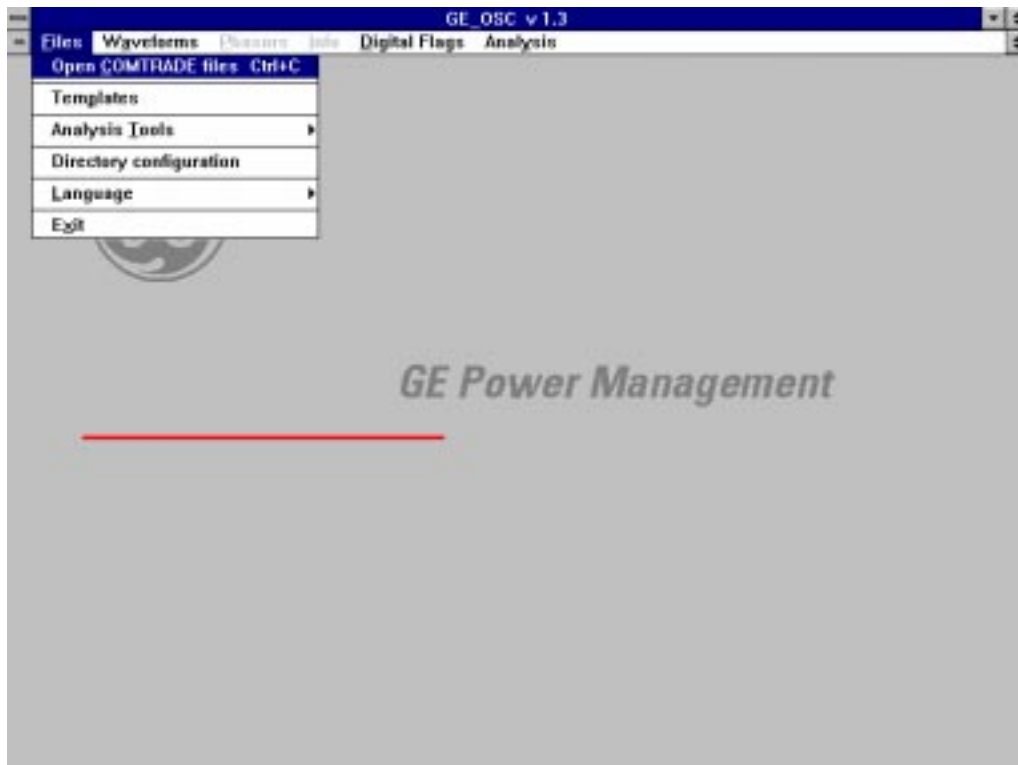
The COMTRADE format needs the three following files completely defined:

- Header File (.HDR)
- Configuration File (.CFG)
- Data file (.DAT)

The .CFG and .DAT files are essential for the operation of the program. The .HDR file is not essential, and in case it does not exist, the program will not be able to display data in the selected option.

There is no limitation for the number of data samples in the Data File. The only limitation is the time response of the PC (depending of the processor) on the base of the time used to do the calculation having into account the number of samples.

The screen of the main menu is as follows:



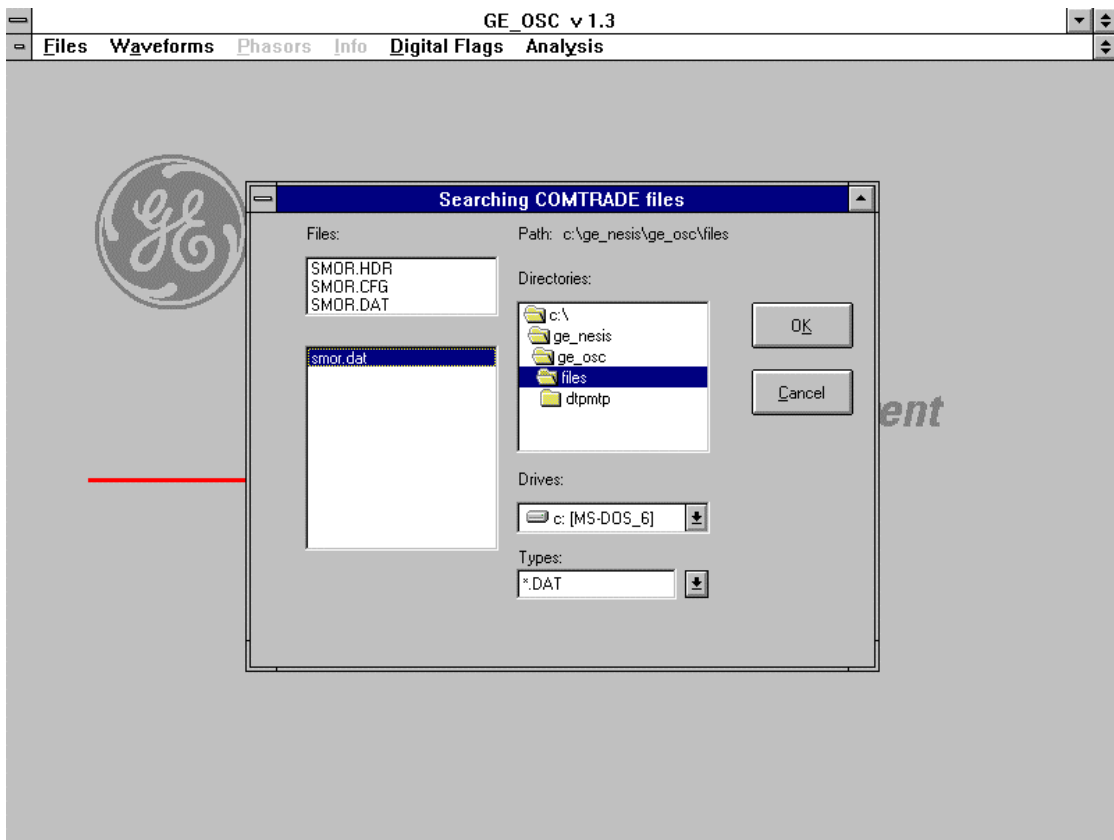


Selecting the “Files” option, we have the following possibilities:

- Open COMTRADE files
- Templates
- Analysis tools
- Directory configuration
- Language (Spanish or English)
- Exit

### 3.1.1. Open COMTRADE Files

After selecting the Open COMTRADE files option, the software displays the following screen:



Selecting one of the three COMTRADE files, the software automatically loads the three COMTRADE files associated to the specific event. It is compulsory to have the three COMTRADE files in the same directory. If the .CFG or .DAT files associated to the event do not exist, it is not possible to continue. The .HDR does not need to exist. In that case it will not be possible to display in the corresponding option.

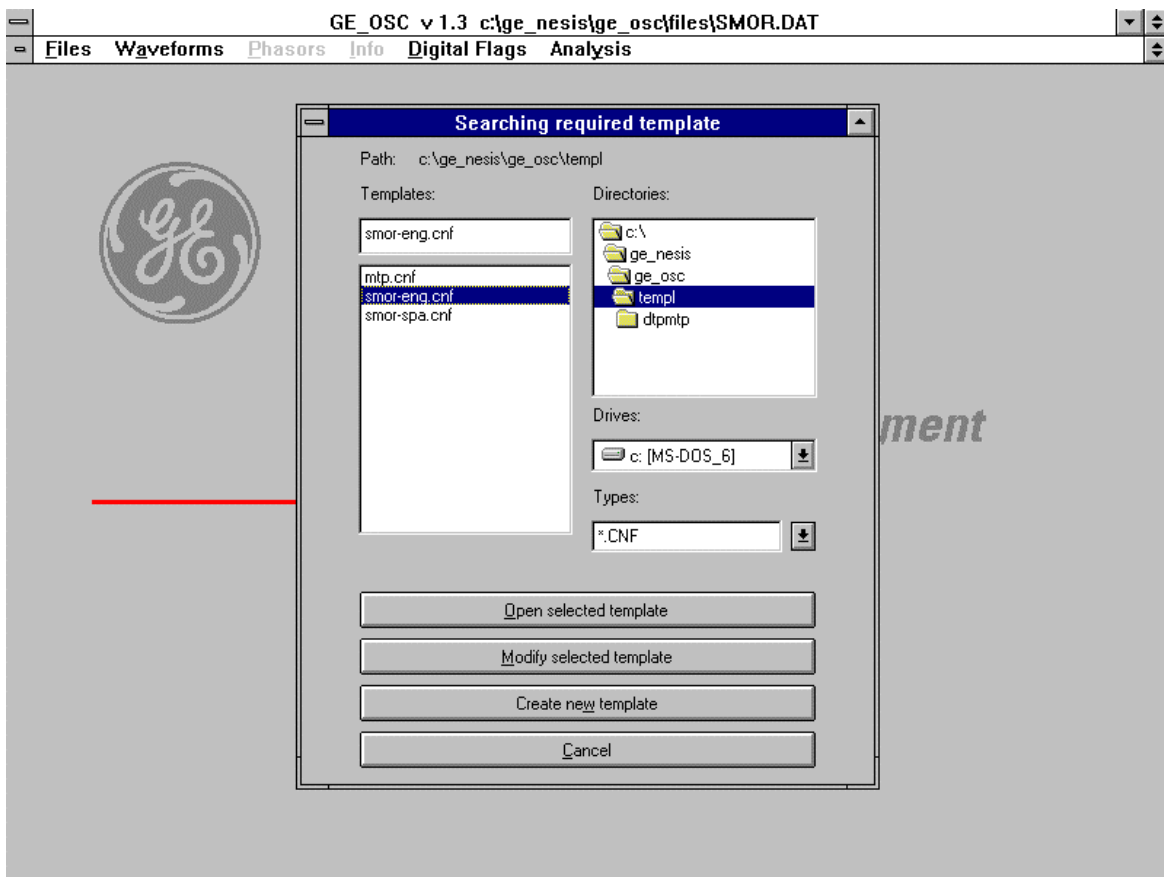
The software provides an option for configuring the directory that contains the oscillographic records.

When a file is loaded in a COMTRADE binary format, the software gives the possibility to convert it into a COMTRADE ASCII file.

After loading the COMTRADE files, the program displays a form for loading the appropriate template. There are three possibilities:

- Select an existing template
- Modify an existing template
- Create a new template

The template selection form is displayed as follows:



### 3.1.2. Templates

The template's purpose is to facilitate the users to obtain the oscillography data from any other sources as digital fault recorders from other manufacturers. The only restriction is to have files in COMTRADE ASCII format. The templates contain information about the following items:

- Analog channels
- Three-phase signal groups

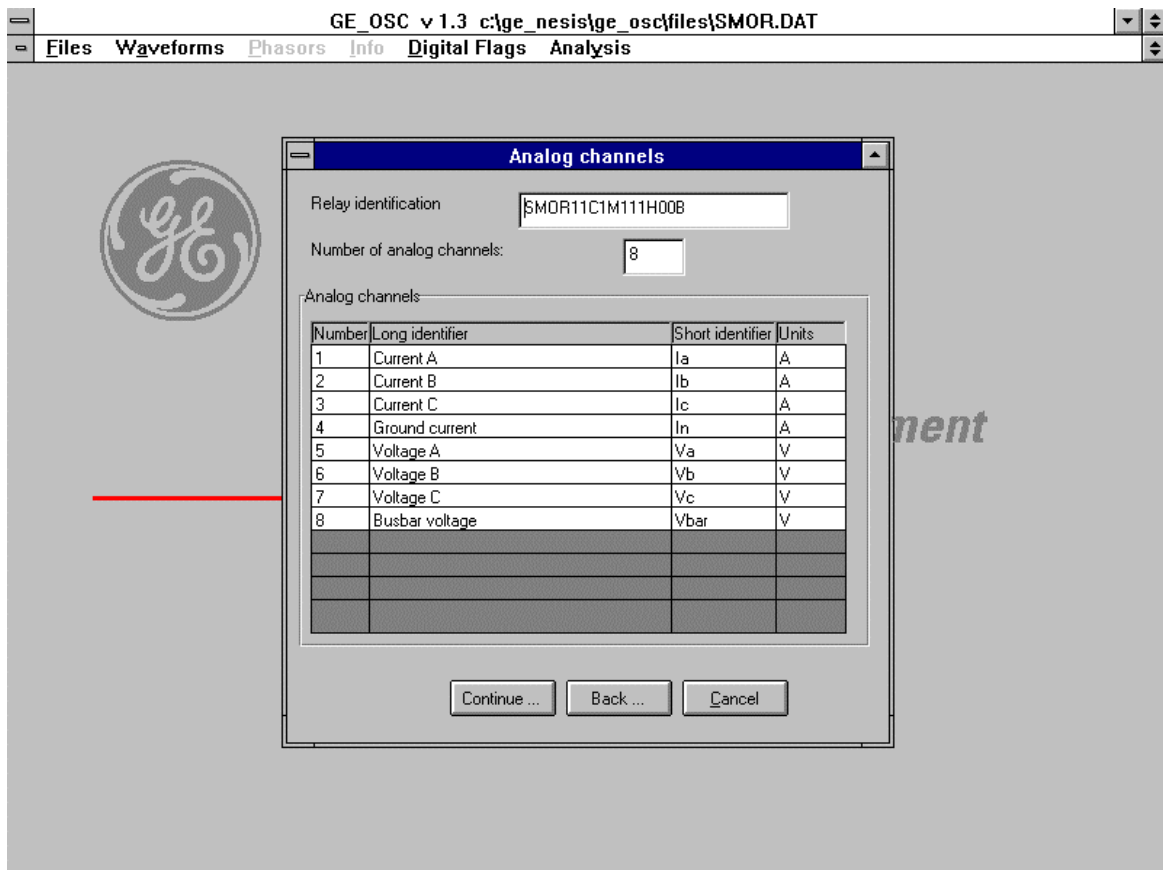
- Digital channels

There are two possibilities for selecting the templates:

- After loading the COMTRADE files (this option is used when opening a new file)
- Selecting "Templates" in the "Files" option from the main program (this option is used when the user wants to change the template in the same file)

In both cases it is possible to select an existent template, modify it or to create a new one. In case of modifying or creating a new template, the following forms will be displayed:

### 3.1.2.1. Analog Channels Definition



The information needed for this form is as follows:

- Oscillography record identification
- Number of analog channels in the template (with a maximum of 12)

For each analog channel:

- Position of the analog channel (1,2,...25,..)in the analog channel COMTRADE file.
- Large identifier of the analog channel (used to identify the associated window in the

- option of analog channel display).
- Short identifier of the analog channel (used to identify the channel in any other screen).
- Units used (A, V, kV,...).

### 3.1.2.2 Definition of Three-phase Signals Group

It is used to identify the signals group that compose a three-phase system. On this group it will be made the phasors and sequence components calculation.

The following form is used:

The information that we need to incorporate is as follows:

- Number of three-phase groups (maximum 4)
- Name of each three-phase group
- Scale factor for each three-phase group
- For each group select three analog channels.

**Note:** The scale factor of the three-phase group is used when the program needs to plot the phasors waveform. In the same window we can display up to two three-phase groups with different maximum values. If the two groups are plotted with the same scale, in certain cases it can be difficult to visualize one of them (big difference between the maximum values from one group to the other group). The user can modify the scale



- Add a new channel with a double click on a digital channel from the left side list. The channel will appear automatically on the right side list with its corresponding channel number.
- Delete an existing channel with a double click it, from the right side list.

Once a group has been defined it has to be closed in order to define the next group.

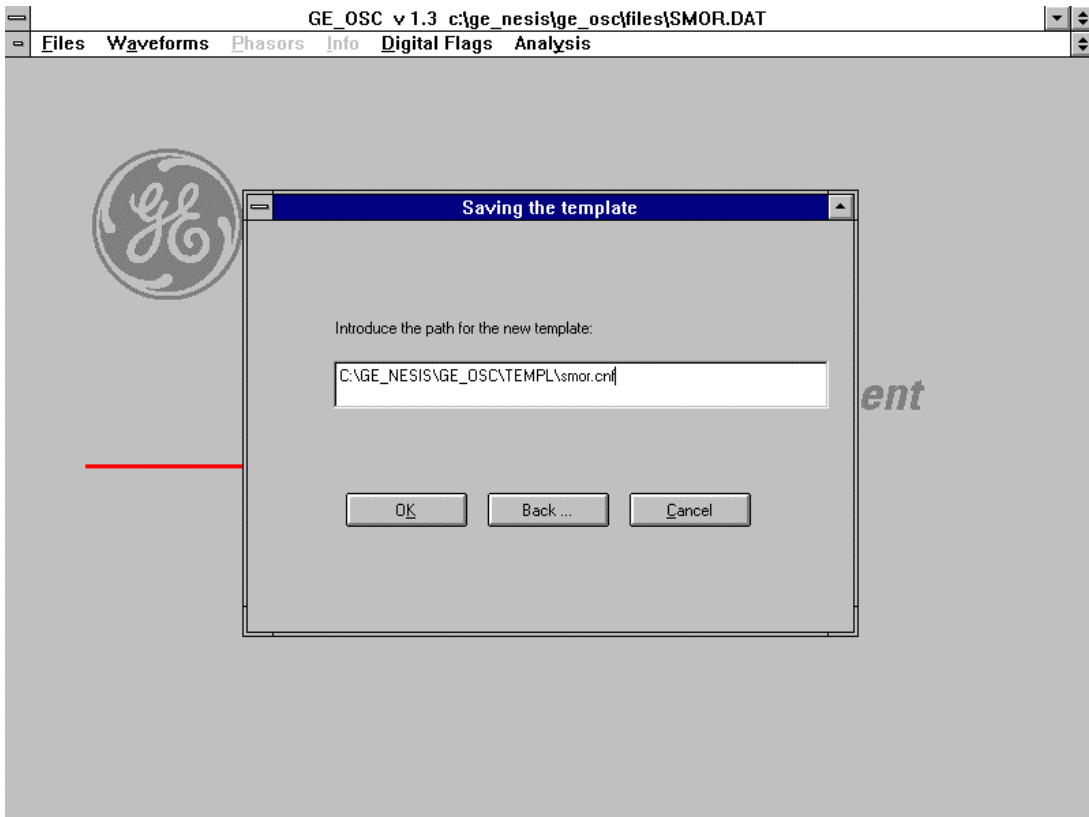
The same operating sequence can be done with each group (up to a maximum of 8), going from group to another one using the icons "next group" or "previous group".

The yellow pointer shows where the next digital channel is going to be loaded. Its position can be changed using the vertical movement bar or clicking the cell where we want to position the pointer.

### 3.1.2.4. Saving the Template

After completion of the template definition, we must save it using the following form.

It is necessary to define the directory and the name of the new template. It is recommended to use the same name if we are working with an existing template.



### **3.1.3. Analysis Tools**

They are used to load and unload tools. The analysis tools are independent executable files.EXE (not linked between them, nor with the main program).

To load a new tool, we need two data

- Name defined for the new tool in the “analysis” menu (main menu).
- Directory and name of the executable file corresponding to the tool selected.

After these two steps, the new toolkit will appear in the analysis option with the name already defined.

After loading the tool, this is maintained permanently until we proceed to eliminate it. To eliminate a tool, we need to select it from the list following the instructions given by the software.

### **3.1.4. Directory Configuration**

A form is provided for configuring the following directories:

- directory containing the COMTRADE format records
- directory containing the templates
- directory containing the tools

The default values for these directories are as follows:

- C:\GE\_NESIS\GE\_OSC\FILES
- C:\GE\_NESIS\GE\_OSC\TEMPL
- C:\GE\_NESIS\GE\_OSC\EXE

### **3.1.5. Language**

Basically there are two languages available: English and Spanish.

All the messages and text names can appear in the desired language. For other languages, the user can translate the texts in the files GEOTRO.INI and GEINGLES.INI.

## **3.2. Waveform Display**

The software has three possibilities:

- Individual waveform display.
- Different waveform display in the same window.
- Composition waveform display.

### ***3.2.1 Individual Waveform Display***

The maximum number of analog channels that can be displayed is 12 (up to 8 in the same screen), with each analog channel in its corresponding window.

Each analog channel is scaled independently.

#### ***3.2.1.1. Information Supplied from each Analog Channel***

We have two indicators (represented in yellow and blue colors). Each indicator can be displaced using a horizontal bar. Each indicator permits to show the number of sample and the analog channel magnitude for the corresponding sample.

Additionally, the following information is available:

- Time in milliseconds between the two indicators.
- Magnitude difference between the two indicators for a specific analog channel.
- Identification of the analog channel being displayed.
- Identification of the COMTRADE file that is being displayed.

#### ***3.2.1.2. Operations Selectable by the User***

The actions that the user can select in this option are as follows:

- Moving the two indicators independently for all the samples of the file. Each indicator is displaced sample by sample using the arrows of the horizontal bar, and cycle by cycle clicking on the bar. Each position shows the following information:
  - Sample number.
  - Analog channel value for the sample.
  - Time in millisecond between the two indicators.
  - Analog magnitude difference between the two indicators
- Performing an infinite number of zooms looped and to jump between the zooms.

Process to perform a zoom:

- Press the zoom icon
- Select the zoom area clicking and dragging the mouse on the drawing area. During this action the program will show a rectangle over the selected area. When finishing this action, the size of the signal will be enhanced to the full window.
- Accept or cancel the zoom.

The icons “«” and “»” (backward and forward respectively) offer the possibility to move between the zooms defined.



- Resizing the window, adjusting the information to the new size. To do this action, we apply the same actions available in WINDOWS.
- To exit, we have two possibilities:
  - The icon "close", closes the window selected for the action
  - The icon "exit", closes all the windows.

### ***3.2.2. Different Waveforms Display in the same Window***

A maximum of 8 channels can be displayed in the same window, to the size of the screen. All the currents are plotted in the same scale, as well as the voltages.

#### ***3.2.2.1. Information Supplied***

We have two indicators (represented in yellow and blue colors). Each indicator can be displaced using a horizontal bar. Each indicator permits to show the number of sample and the analog channel magnitude for the corresponding sample.

Additionally, the following information is available:

- Time in milliseconds between the two indicators.
- Magnitude difference between the two indicators for a specific analog channel.
- Identification of the analog channel being displayed.
- Identification of the COMTRADE file that is being displayed.

#### ***3.2.2.2. Operations Selectable by the User***

The actions that the user can select in this option are as follows:

- Moving the two indicators independently for all the samples of the file. The following information will be updated:
  - Sample number.
  - Analog channel value for the sample.
  - Time in millisecond between the two indicators.
- Performing an infinite number of looped zooms and to jump between the zooms.

Process to perform a zoom:

- Place the indicators in such a way that the area to be enhanced is placed between them.
- Press the zoom button.

The icons "«" and "»" (backward and forward respectively) offer the possibility to move between the zooms defined.

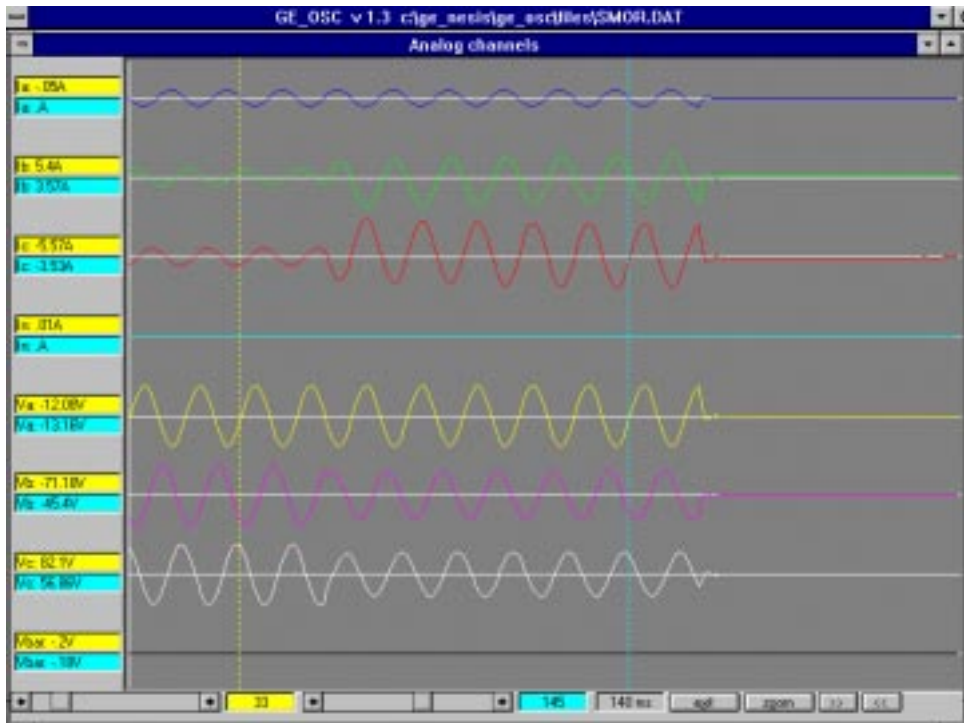
- Resizing the window, adjusting the information to the new size. To do this action, we

apply the same actions available in WINDOWS.

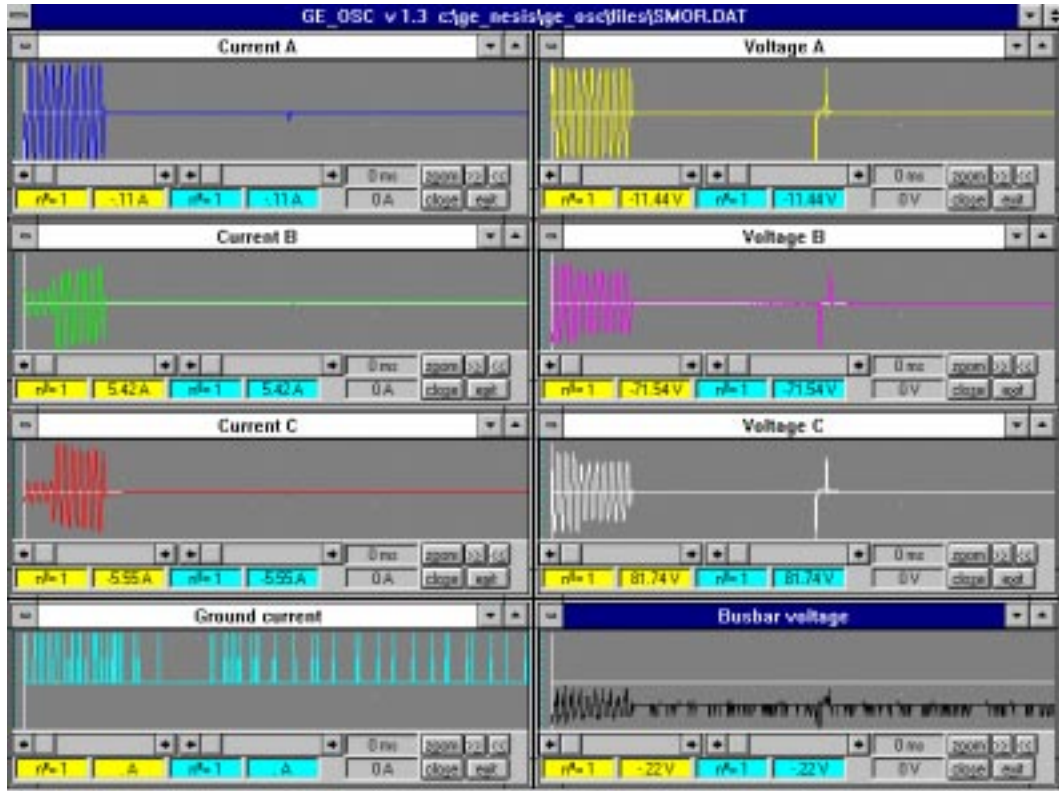
The form for selecting the waves to be displayed in the same window or in different windows is as follows:



The result of choosing the same screen:



The result of choosing separate windows:



### 3.2.2. Composition of Waves

It is possible to display a maximum of 3 windows on the same screen, being possible to present in each window 6 analog channels (from the 12 available).

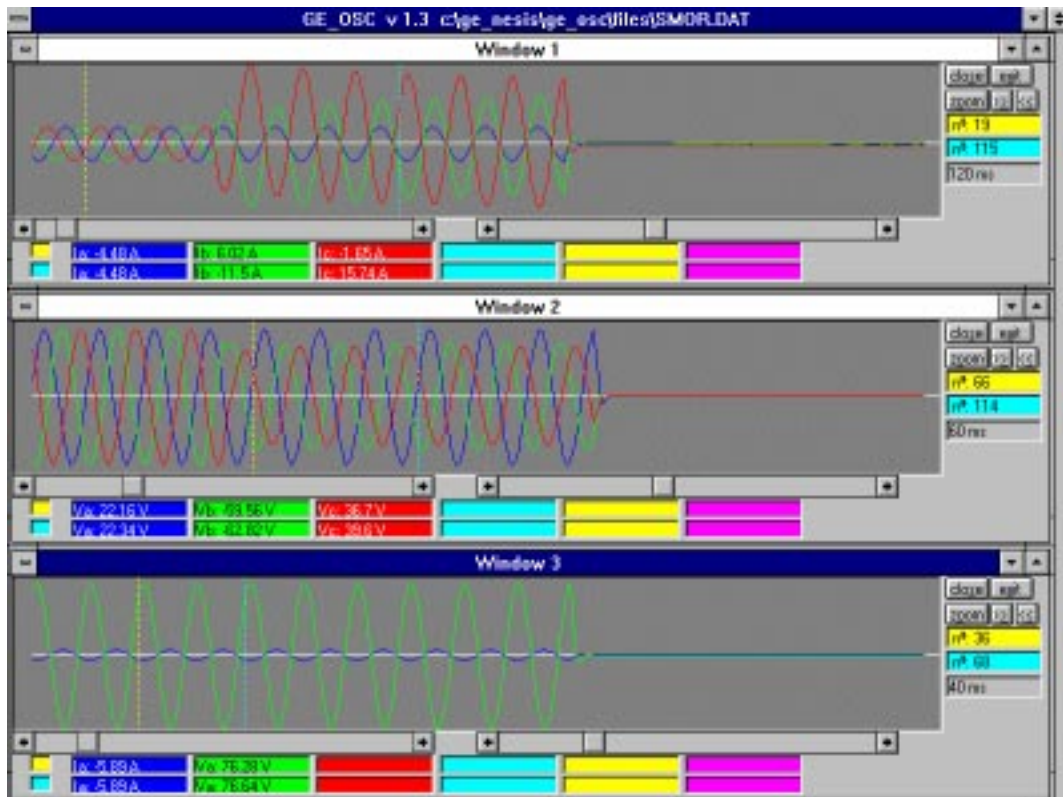
All the analog channels in each window are displayed in the same scale.

The information supplied and the possible options are the same as 3.2.1.1 and 3.2.1.2, with the particularly that the actions will affect all the waveforms in the particular window.

The guideform to select the waves to display are as follows:



The result of this selection is the following screen:



### **3.3. PHASORS**

With this option we can display the real and sequence components of any of the three-phase groups defined in the corresponding template.

We can display simultaneously up to two complete three-phase groups, in phase values and symmetrical component values. Both components are displayed in separate windows (See screen enclosed).

#### **3.3.1. Information Supplied**

In each window, the software provides the following information:

- Graphic representation of phase or symmetrical components' phasor values.
- Number of sample and value of all the represented phasors in module and angle.
- Identification of the represented phasors.

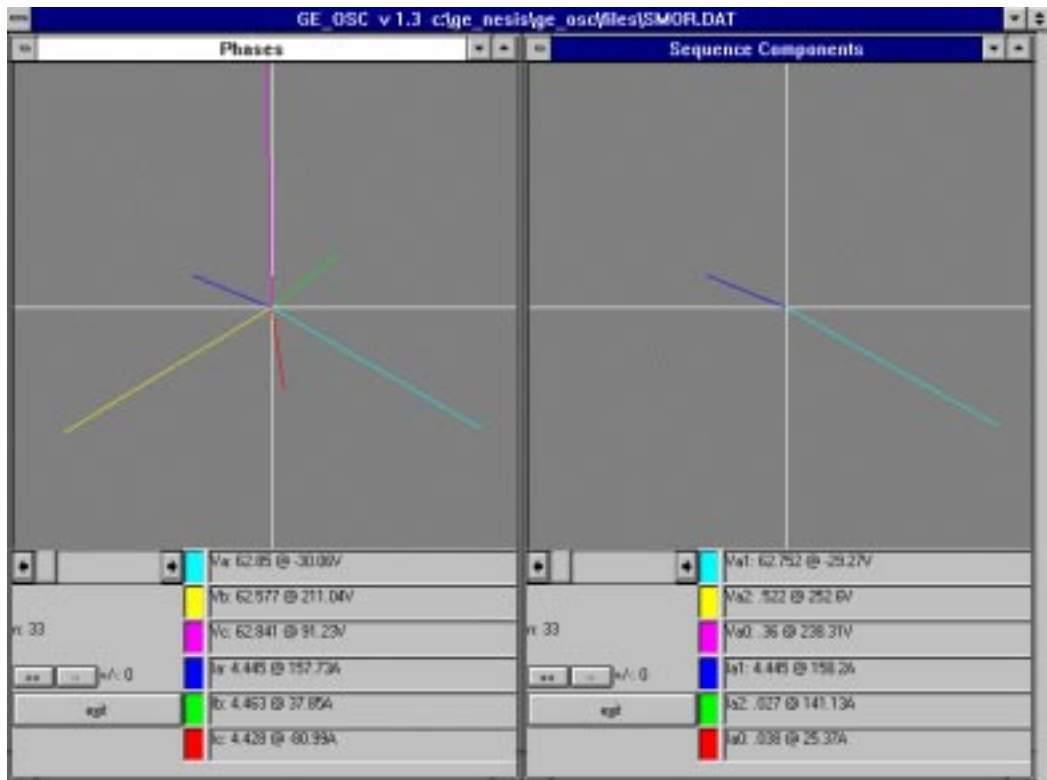
#### **3.3.2. Possible Operations**

- Move the indicator through all the samples that compose the register. The indicator is displaced sample by sample using the arrows of the horizontal bar, and cycle by cycle clicking on the bar. With this action the following values are updated:
  - Sample number.
  - Phasor value for the sample.
  - Graphical representation.
- Resize the window, adapting the contents to the new size
- Change the scale of the drawing with the “++” and “—” icons. The number beside the icons shows the scale of the drawing, being 0 by default, positive values for upper scales and negative values for lower scales (Each increase or decrease means a change of 25% in the scale).

The screen to select the phasors to be displayed looks as follows:



The result of the selection will be the following screen:



### 3.4. INFORMATION

With this option we can display the information contained in the COMTRADE header file (.HDR). This file can contain any type of general information in any format.

For using this option, a header file (.HDR) must exist.

### 3.5. DIGITAL CHANNELS

We have two possibilities:

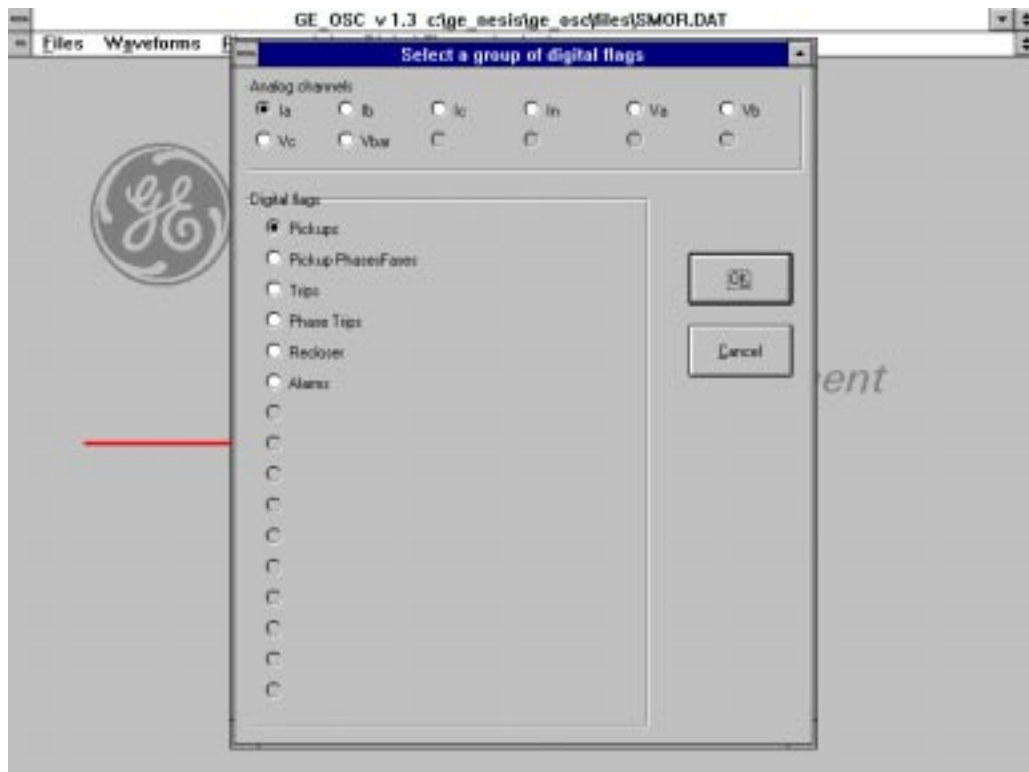
- Group display
- Digital channel composition.

#### 3.5.1. Group Display

We select one of the digital channel groups already defined in the template, displaying in the same screen all the digital channels that compose this group, and an analog channel as reference.

As we indicated before, the maximum number of digital groups is 16 and 19 flags per group.

The form for selecting the digital group is as follows:



### 3.5.2. Digital Channels Composition

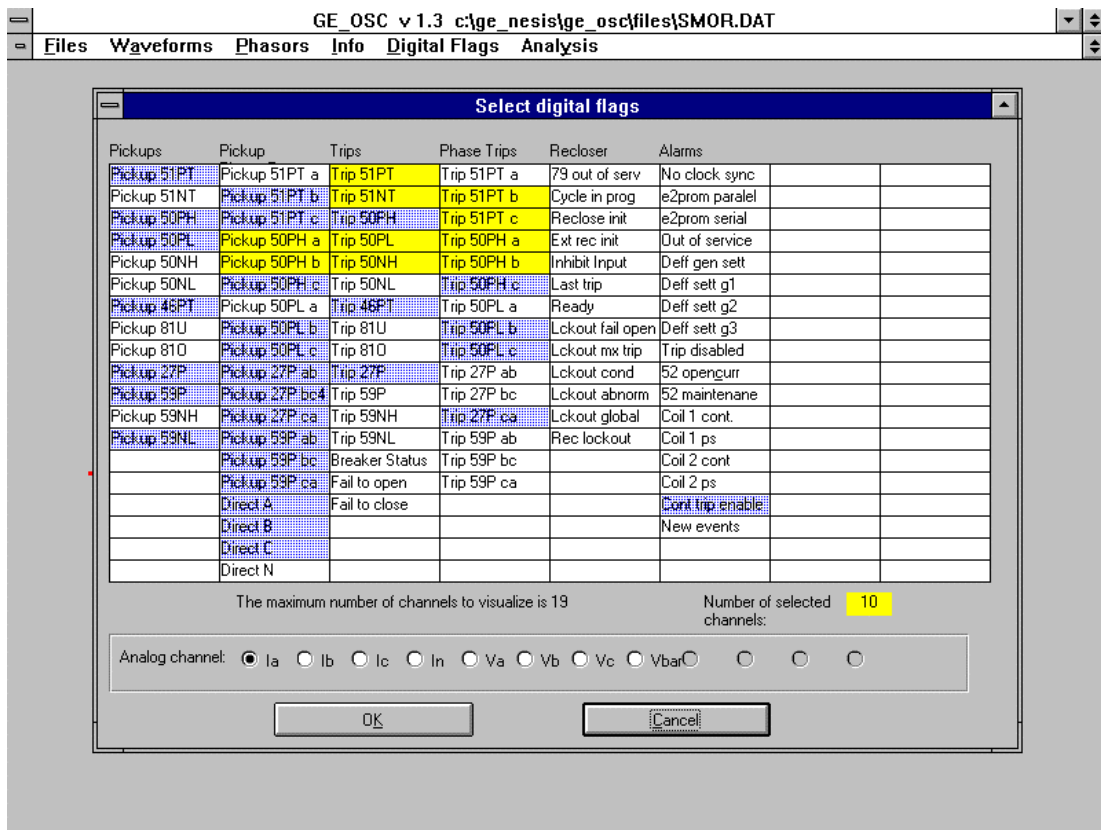
All the digital channels appear in two banks. Each bank can contain up to 8 groups with 19 channels per group. The maximum of digital channels to work with is 304.

If the number of groups to work with is less than 9, the software works automatically with bank 1. If we work with more than 8 groups, the digital channels are displayed in two banks of 8 groups each.

The digital channels activated during the event (those were there has been a change of status) will appear shadowed in blue.

We have to choose the digital channels to be displayed (from any of the defined groups) and one of the analog channels as reference. The maximum of digital channels that can be displayed simultaneously is 19.

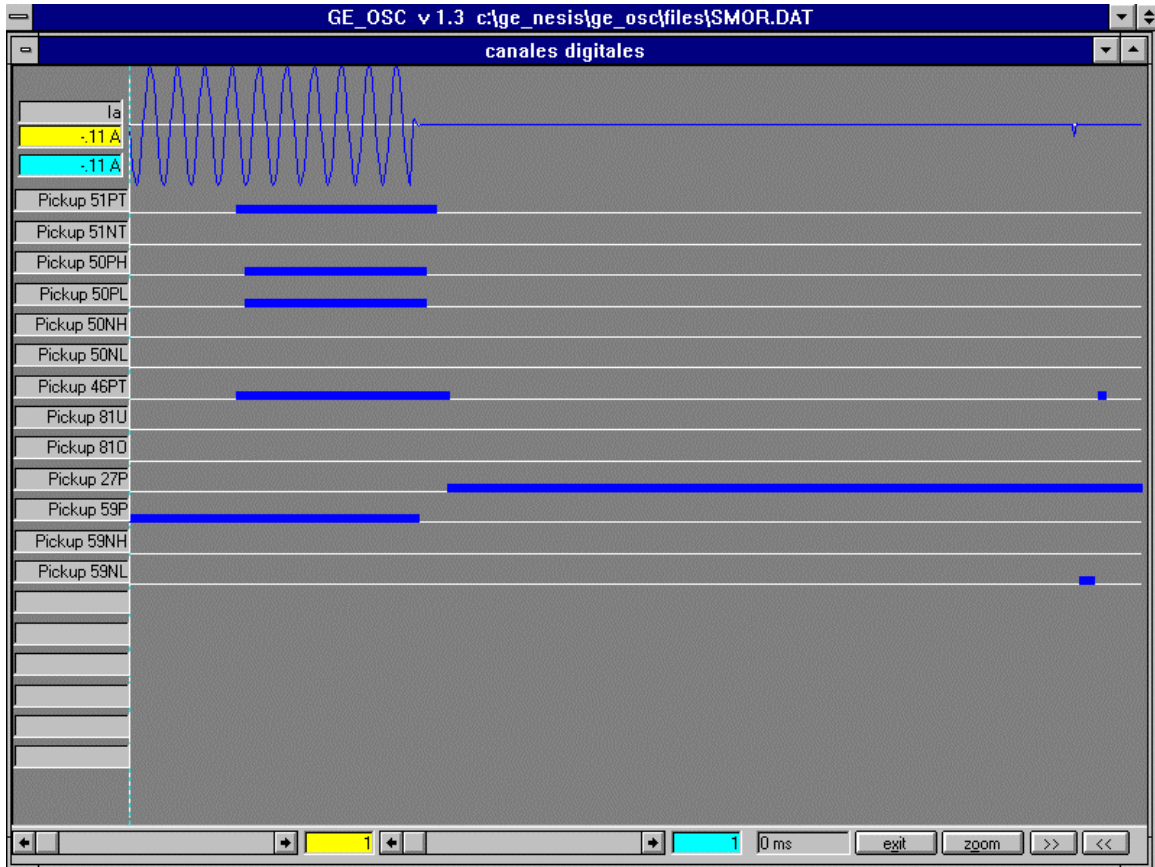
The form to select the digital channels to be displayed is as follows:



To select a digital channel, we click it with the mouse. The selected channel will change to yellow. If we want to eliminate a channel from the selection, we double click on it.

The display screen looks like:





The displayed data is:

- For each indicator (there are two indicators), we have the number of sample and the analog value used as reference for the sample.
- Time in milliseconds between the two indicators
- Identification of the analog channel used as reference.
- Identification of the digital flags that we are displaying.
- Identification of the COMTRADE files being displayed.

The possible operations are as follows:

- Move the two indicators independently for all the samples of the specific record. The indicators are displaced sample by sample using the arrows of the horizontal bar, and cycle by cycle clicked on the bar. With this action the following values are updated:
  - Number of sample
  - Value of the analog channel used as reference.
  - Time in milliseconds between the two indicators.
- Do an infinite number of zooms on the time axis (the analog magnitude scale is not modified)

To perform a zoom we need:

- We position the two indicators, in order to define the area to maximize.
- Click on the zoom icon.

The “<<” and “>>” buttons allow to move among the zooms.

- Resize the window, adapting the contents to the new size

## 4.

## EXAMPLE

---

1. Start the program from Windows using the correspondent icon.
2. In the main menu, select the "files" option.
3. Select the option "Open COMTRADE files"
4. In the form "Searching COMTRADE files", select the following file:  
C:\GENESIS\GE\_OSC\FILES\SMOR1.CFG.  
(We can select any of the COMTRADE files. The three files (.HDR, .CFG, .DAT) from the same record need to be located in the same directory).
5. In the form "Select template", select the following template:  
C:\GENESIS\GE\_OSC\TEMPL\SMOR1.CNF  
and press the icon "Open the selected template"

Now, we can select any of the following options:

- Analog channels
- Phasors
- Digital channels

and perform all the possibilities described in this instruction book.