Environment reference manual

www.irai.com

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Installation

If you are installing from the AUTOMGEN CD-ROM, put the CD in your CD-ROM drive.

Installation is automatically launched.

If this does not occur, launch the « Setup.exe » executable located in the CD-ROM root directory.

The CD-ROM contains AUTOMGEN7, ACROBAT READER (for access to on-line documentation) CROSSROADS (a 3D conversion utility program) and DIRECTX 8 (for managing 3D display).

If you are installing it from files downloaded from Internet, launch the execution from the downloaded executables. The Internet site can also be used for downloading ACROBAT READER, CROSSROADS and DIRECTX8 modules.

Network installation

AUTOMGEN can be installed in a network without any problems.

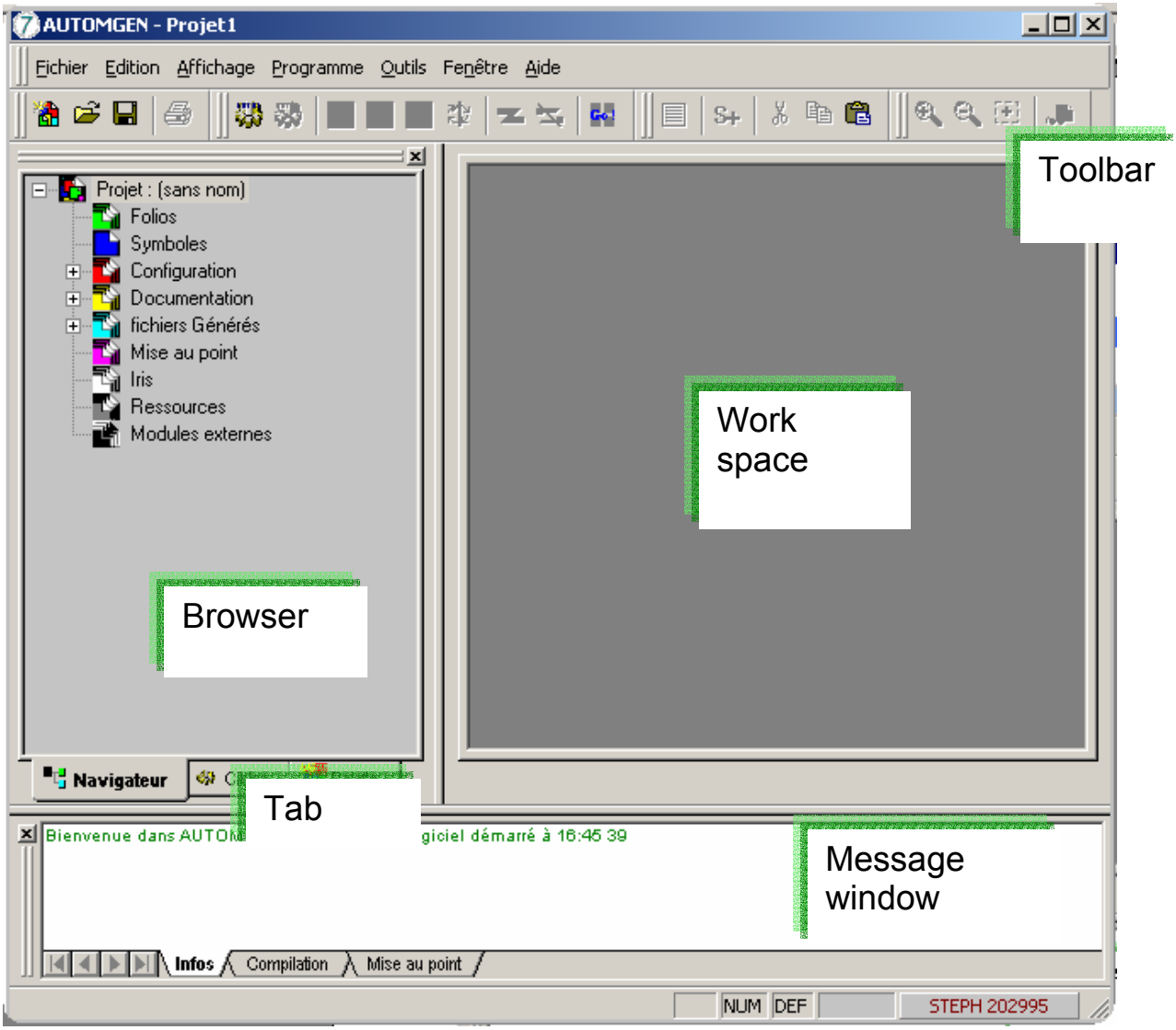
Execute the installation process on the «server« PC (make sure you have all the access rights at the time of installation).

To launch AUTOMGEN on client PC's, create a shortcut to the « autom7.exe » executable in the AUTOMGEN installation directory on the server PC.

To make post-processors appear in the target tab on Client PC's, install the post-processors on client PC's then uninstall AUTOMGEN on client PC's (this is to create only lines in the « Target » windows).

The environment

General overview



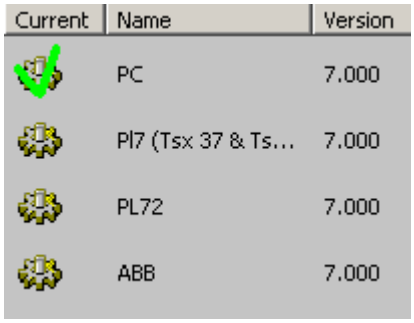
Main AUTOMGEN window

Parameters can be set for the entire environment. The toolbars can be moved (using) and parameters set for them (« Tools/Customize environment » menu).

The environment state is saved when you close the program. This state can also be saved in a project file (see project options).

Selecting targets

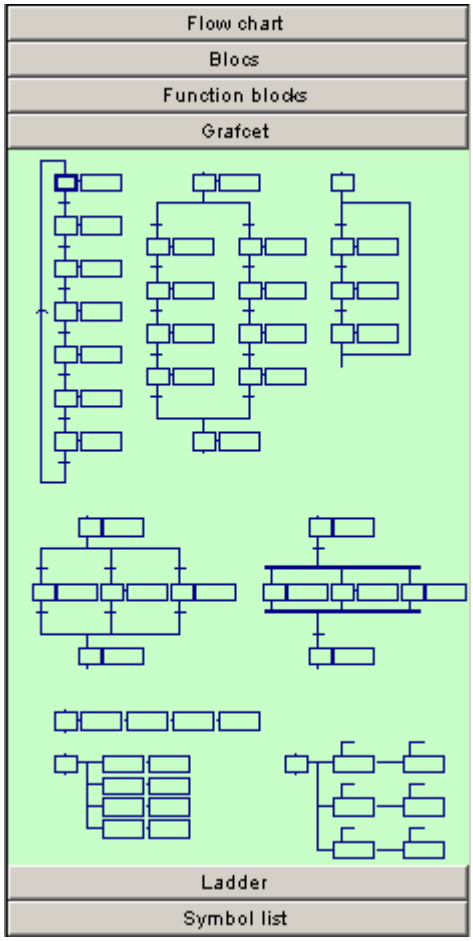
The « Targets » tab is located at the bottom of the browser window, it can be used to access the list of installed post-processors.



The active target is indicated by a green check mark. Gray targets cannot be accessed due to the installed license (see the « Licenses » chapter for additional information). To modify the current target, double click on the corresponding line.

Palettes

The « Palette » is located at the bottom part of the browser window, it can be used to access the program graphics elements.



The palette provides a group of elements which can be selected and placed on sheets. To select an element, click on the palette with the left side of the mouse, drag the selection, release the mouse, click in the selected area and move the area to the sheet.

The palette also contains a list of project symbols. You can drag and drop them on a text or action on a sheet.

Displaying or hiding the project window or message window

Select the « Project » or « Messages » option from the « Window » menu.

Displaying the work space in full screen mode

Select the « Full screen » option from the « Display » menu. Click on  to exit full screen mode.

Keyboard shortcuts

Keyboard shortcuts are written in the menus. « Masked » shortcuts can also be used:

CTRL + ALT + F8	Save the project in executable format
CTRL + ALT + F9	Save the project
CTRL + ALT + F10	Access project properties
CTRL + ALT + F11	Display or hide AUTOMGEN window

Parameters can be set for the entire environment, its state is saved when you close AUTOMGEN. Environment windows can be hidden. The « Windows » menu is used to display them again. The work space can be displayed in full screen mode. The tabs at the bottom of the browser window are used to access selection for the current post-processor and the graphics palette.

Licenses

A license establishes AUTOMGEN user rights. The following elements are established by license:

- the number of all or none inputs/outputs that can be used,
- post-processors that can be used,
- the number of users (only for network licenses).

Registering a license

When you install AUTOMGEN, you can use it for free for a period of 40 days.

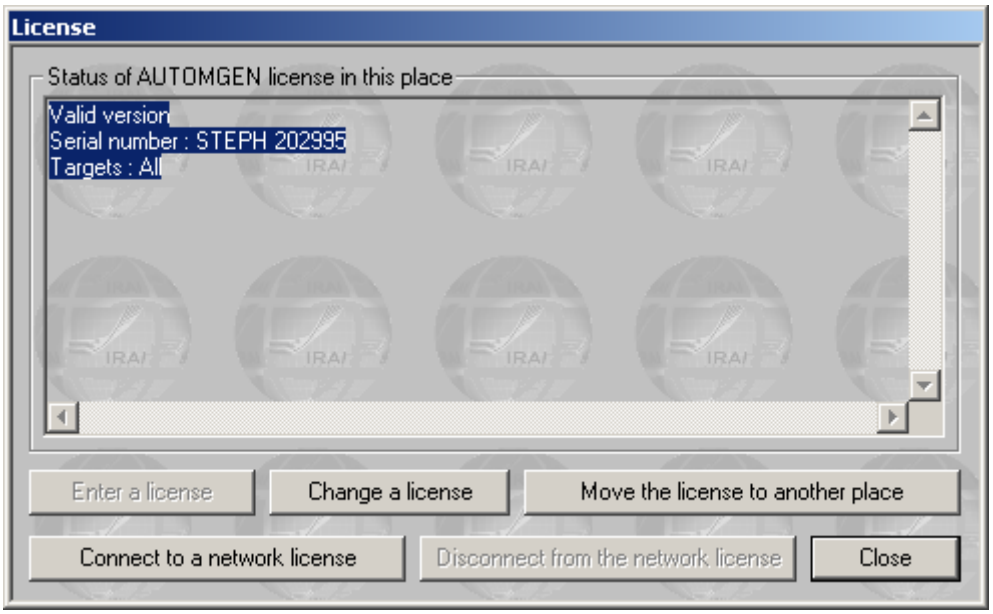
You must register your license within 40 days.

To register your license, send IRAI:

- the serial number printed on the label glued to the software box, or the reference of your delivery note or order form,
- the user code provided with the software indicating the PC where you have installed the product.

You will then receive an enable code (also called validation code).

The « License » option in the AUTOMGEN « File » menu can be used to display the status of your license and obtain a user code (click on « Registering the license »).



License status.

A user code is valid for a period of 10 days.

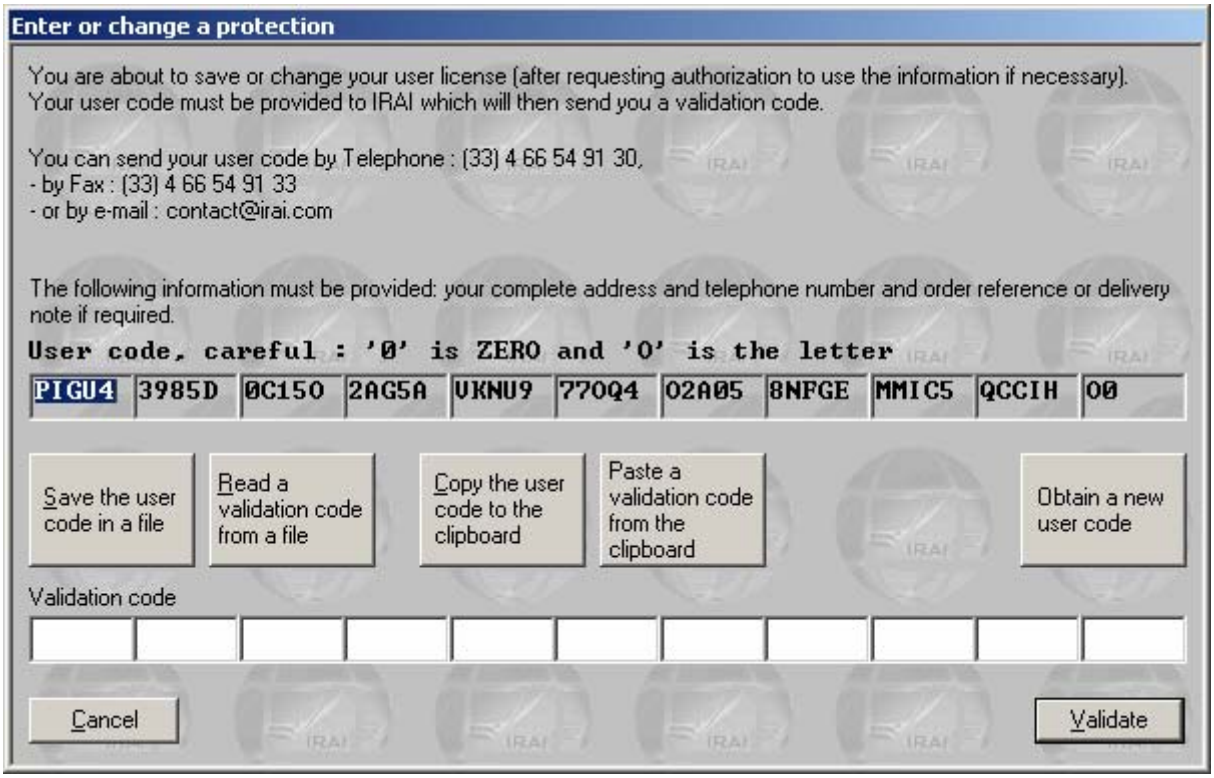
So a maximum period of 10 days can pass from when you send a user code to IRAI and when you receive an enable code provided by IRAI.

Sending a user code to IRAI

There are various methods you can use. Exchanging codes by e-mail is highly recommended as it limits the risk of error.

A single error in the code will prevent the license from being registered.

Sending a file by e-mail (the best solution)



License registration dialogue box

To generate a file containing your user code, click on « Save user code in a file ». You can then transmit the file with « .a7u » extension as an attachment and send it to the address contact@irai.com.

Copying the user code in an e-mail message

By clicking on « Copy user code to clipboard », you can then paste the code in the body of the message and transmit it to the e-mail address contact@irai.com.

By fax (not recommended)

By clicking on « Copy user code to clipboard », you can then paste the code in a document and send it by fax to 33 4 66 54 91 33. If possible avoid writing the code by hand and print it using a font which differentiates between the letter « O » and the number zero.

By telephone (highly unadvisable)

By telephoning 33 4 66 54 91 30. Be sure to differentiate between the letter « O » and number zero. Be careful of consonants which are difficult to tell apart on the telephone (for example « S » and « F »).

Entering the validation/enable code

Validating by a e-mail received file

If you have received an « .a7v » file by e-mail, save the file on your hard disk, click on « Read a validation code from a file » and select the file.

Validating for a code received in the text of an e-mail

Select the code in the message text (make sure you only select the code and do not add any spaces to the end). Click on « Paste a validation code from the clipboard ».

Validating for a code received by fax or telephone

Enter the code in the spaces under the title « Validation code ».

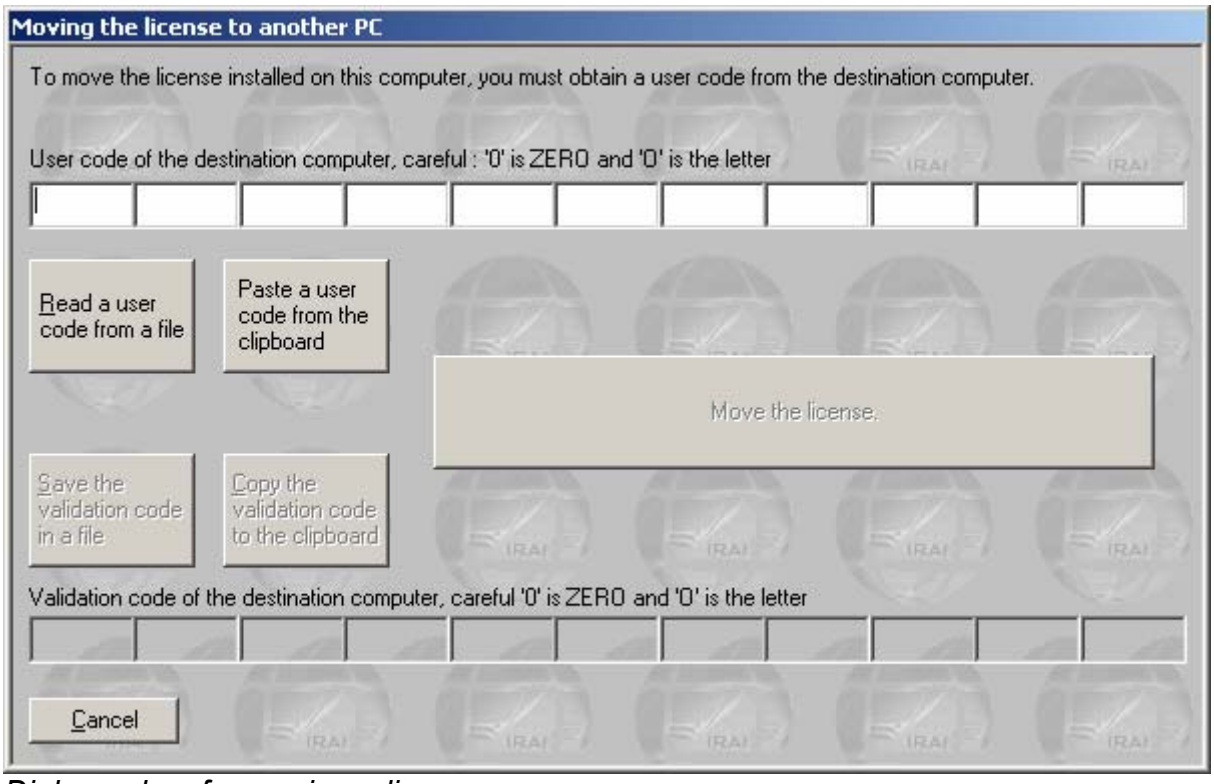
Modifying a license

Modification of a license Involves changing the elements authorized by the license (for example adding a post-processor).
The license modification procedure is identical to registration.

Moving a license from one computer to another

This procedure is more complex. The instructions below must be scrupulously followed to obtain good results. In the instructions below, « source » PC indicates the computer with the license and the « target » PC is the PC where the license needs to be moved.

1- if it has not already been done, install AUTOMGEN on the target PC,
2- generate an « .a7u » user code file on the target PC and move this file to the source PC (for example on a floppy disk),
3- on the source PC, select the « Move the license to another place » option,

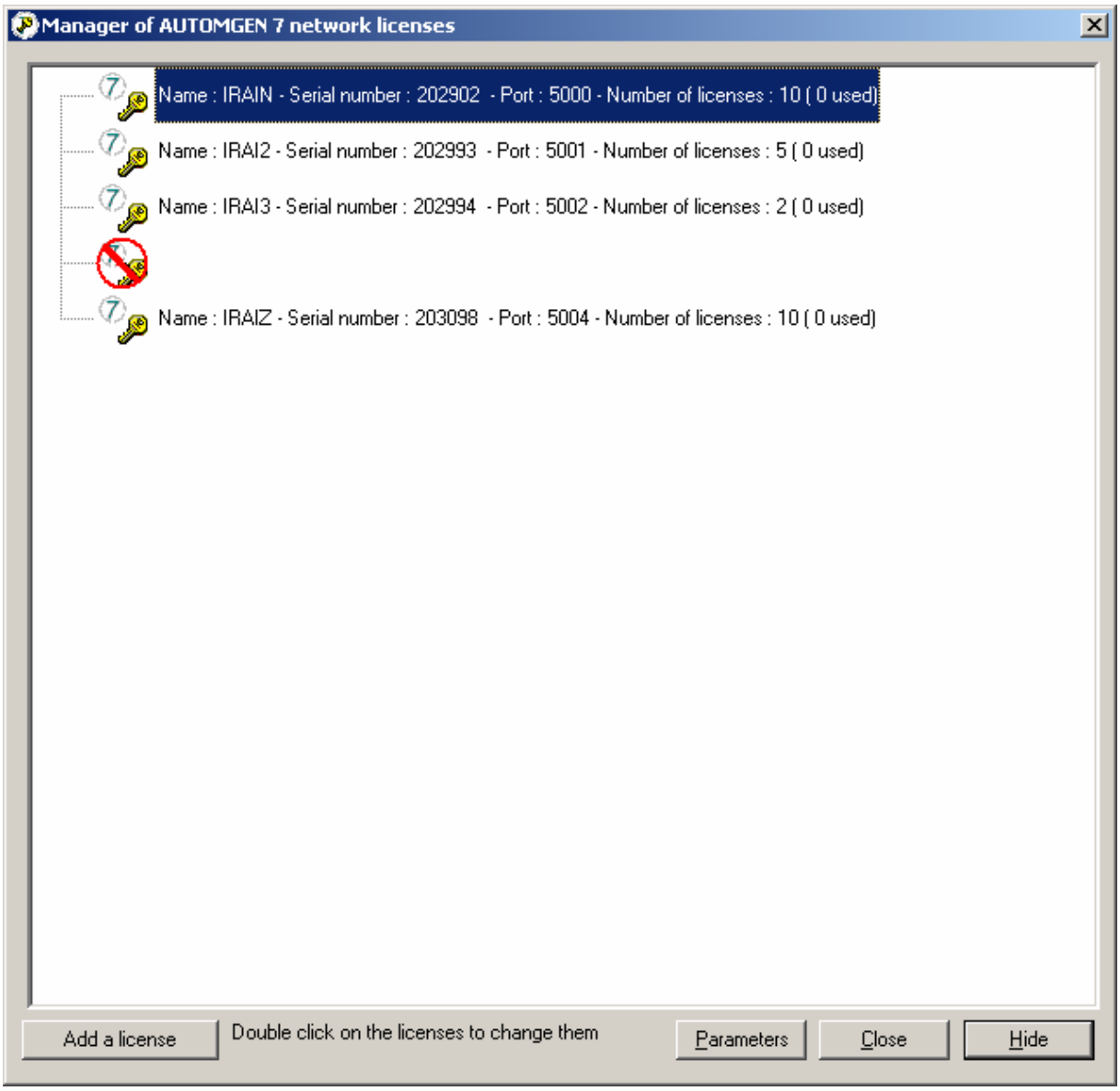


Dialogue box for moving a license

4- on the source PC, click on « Read a user code from a file » and select the « .a7u » file that came from the target PC,
5- on the source PC, click on « Move the license »,
6- on the source PC, click on « Save the validation code in a file », recopy the generated « .a7v » file to the target PC,
7- on the target PC, click on « Read a user code from a file » and select the « .a7v » file that came from the source PC.

Network licenses

The « akey7.exe » executable manages the network license. This executable must be launched from one of the network computers. The network must be able to be used with TCP IP protocol. When launched, the network license manager is hidden and only a icon appears in the WINDOWS keybar. To display the network license manager window, double click on the icon in the keybar.



The network license manager

Up to 16 different licenses can be managed by the network license manager. A network license is characterized by a number of users and a type of copyright (number of all or none inputs/outputs and useable post-processors). For each license the number of possible user/s, number of connected user/s and list of connected users (using AUTOMGEN) is displayed in a tree format attached to each license. Each license is associated to a port number (a numeric value starting from 5000 by default). The first port number used can be configured by clicking on « Parameters ».

Adding a network license

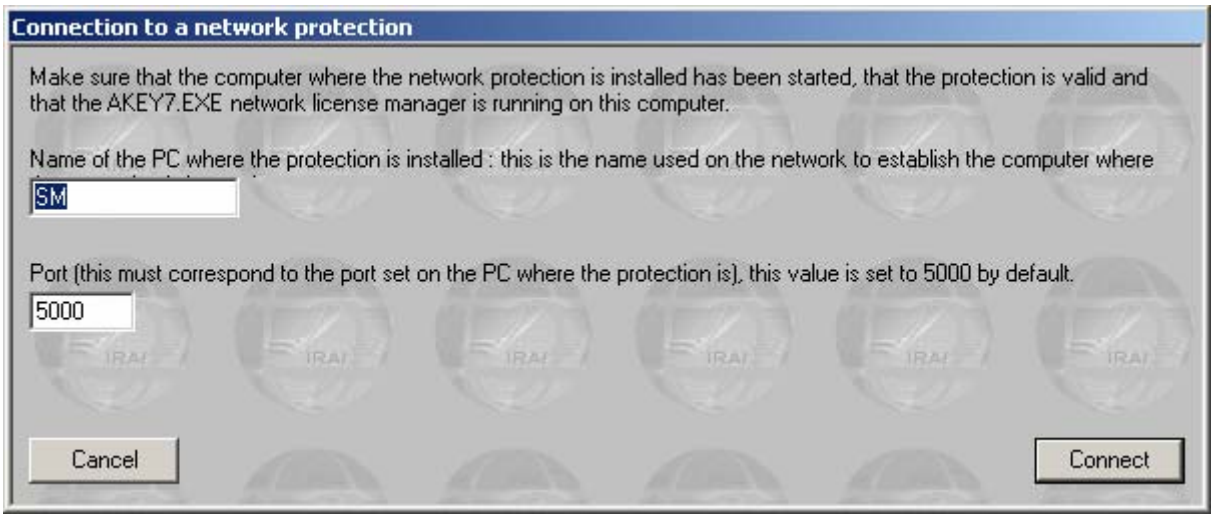
You can add a license by clicking on « Add a license ». The license registration principle is the same as for single license versions.

Modifying a license

Double click on the licenses to modify them. The license modification procedure is the identical to that used for single license versions.

Connecting to client stations

Click on « Connect to a network license » to connect a client station to a network license.



Connecting to a network license

The PC name (the one from the network) where the « akey7.exe » was launched must be provided as well as the port number corresponding to the desired license.

You must register your license with IRAI (contact@irai.com) by sending your user code by e-mail (« File/License » menu. The network license manager is used to manage multiple licenses on TCP IP network PC's.

The project

AUTOMGEN[7] is strongly based on the idea of a project. A project groups together the elements that compose an application. The browser (see page 23) displays all the project elements (sheets, symbols, configuration, IRIS objects etc.) in a tree format.

The new file format of AUTOMGEN[7] (files with « .AGN » extension) includes all project elements.

When you save an « .AGN » file you are assured of saving all the elements of an application. You can easily and effectively interchange applications created with AUTOMGEN.

« .AGN » files are compacted with « ZIP » technology, they do not need to be compressed to be interchanged, their size is already optimized.

Importing an application from an older version of AUTOMGEN

You need to import all the sheets (« .GR7 » files) and symbol file (« .SYM » file) if there is one. To do this use the importation procedures described in the following chapters.

Importing a project created with another software workgroup

(available during the first six months of 2002)
The « Import » command from the « File » file menu is used to import « .FEF » files from SCHNEIDER software workgroups.

Generating a free distribution executable file

The « Generate an executable » command from the « File » menu is used to generate an executable starting from a project in progress (an « .EXE » file executable on a PC with WINDOWS). The AUTOMGEN « viewer » is automatically integrated with the generated executable (the executable user does not need AUTOMGEN). This viewer makes it possible to use the application without modifying it. You can easily distribute your applications. The generated executable is not covered by copyright. This technique is normally used for producing a supervising application.

Modifying project properties

With the right side of the mouse click on the « Project» element on the browser and select « Properties » from the menu.

Modifying security options

You can restrict reading or modification access to a project by passwords.

Advanced options

« Save the environment aspect with the project » : if checked, the position of the windows and the aspect of the toolbars are saved in the « .AGN » file. When the project is opened, these elements are reproduced.

« Hide the main window upon launching … » : if checked, the AUTOMGEN window is hidden when the project is opened. Only IRIS objects incorporated in the project will be displayed. This option is normally used to create « package » applications which only leave IRIS objects displayed. Use the [CTRL] + [F11] keys to redisplay the AUTOMGEN window.

The other options are used to change the display of the AUTOMGEN window when a project is opened.

User interface

« Block IRIS object configuration » : if checked, a user cannot modify IRIS object configuration.

The other options are used to modify the behavior of the user interface.

Model

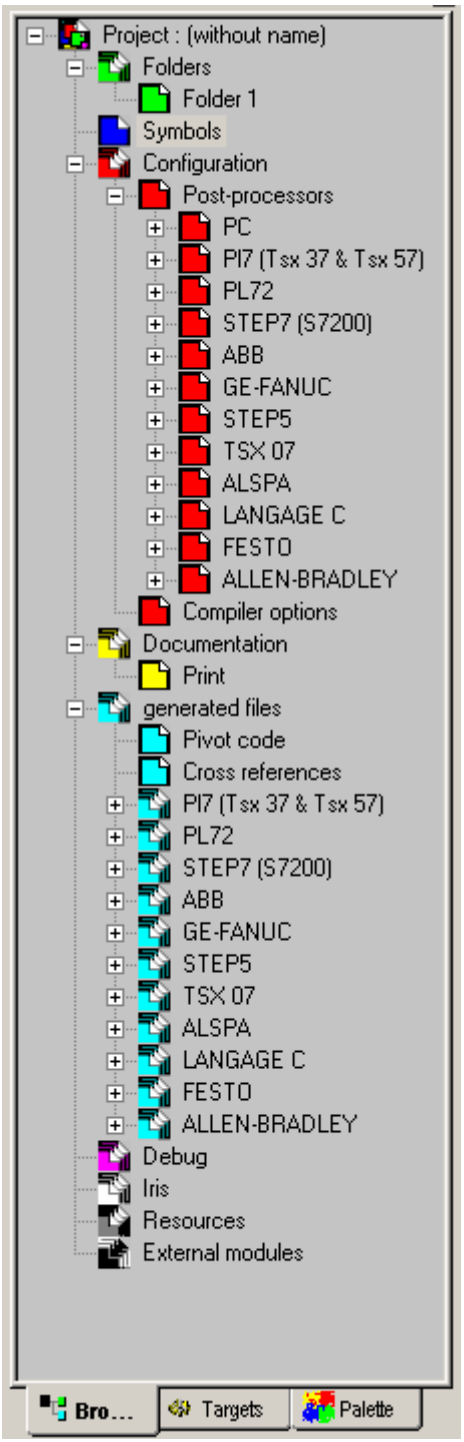
« This project is a document model » : if checked, when opened all the options and the documents it contains act as a model for the creation of a new project. This functionality is used to create standard configuration which can be uploaded when AUTOMGEN is launched (for example a default symbol file or a default processor configuration).

Automatic GO

«Automatic go at project launch » : if checked, the application is automatically run when a project is opened.

The project is used to group together the elements of an AUTOMGEN application. Once regrouped, the elements form a compact file with « .AGN » extension. The project models are used to be able to easily manage different software configurations. Generation of executables makes it easy to distribute applications.

The Browser



Browser tree

A central element for application management, the browser is used for fast access to different application elements : sheets, symbols, configuration, printing, IRIS objects etc.

The « + » and « - » icons are used to develop or retract project elements.

Actions on the browser are effected by double clicking on the elements (opens the element) or by clicking with the right side of the mouse (adds a new element to a project, special action on an element etc.).

Certain operations are effected by dragging and dropping the elements and moving them on the browser.

The colors (generally called up at the bottom of documents in the work space) are used to identify families of elements.

Sheets

A sheet is a page where a program or part of a program is designed.

Using sheets is extremely simplified in AUTOMGEN[7]. The sheet chaining orders needed in the previous versions are no longer used. For multiple sheets to be compiled together, they only need to be in the project.

The icons associated to the sheets are shown below:

- normal sheet,
- normal sheet (excluding compilation),
- sheet containing a macro-step expansion,
- sheet containing a function block program,
- sheet containing a key,
- sheet containing a key (excluding compilation).

Icons are marked with a cross indicating a closed sheet (not displayed in the work space). Double clicking on this type of icon opens (displays) the associated sheet.

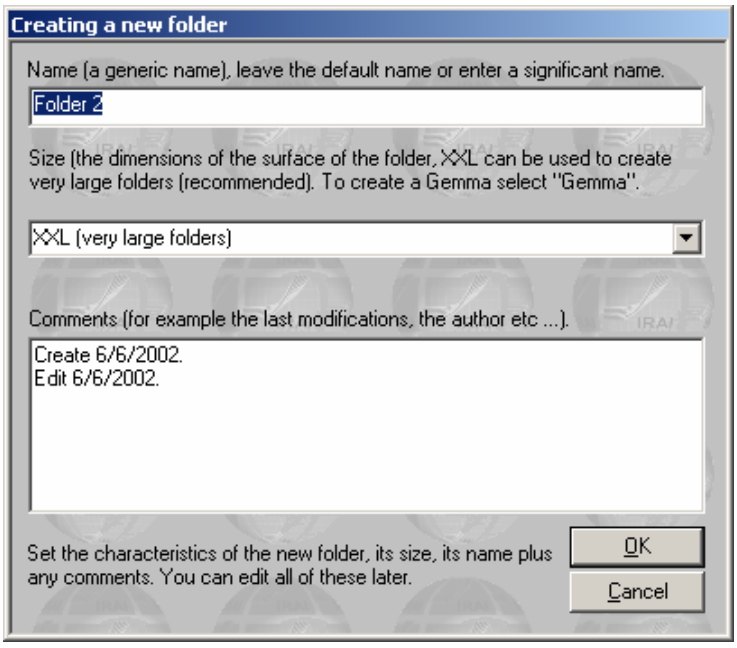
Adding a new sheet

With the right side of the mouse click on the « Sheets » element on the browser then select « Add a new sheet ».

Select the sheet size (XXL is the recommended format, the other formats are for older versions of AUTOMGEN, GEMMA is only used for creating GEMMA models).

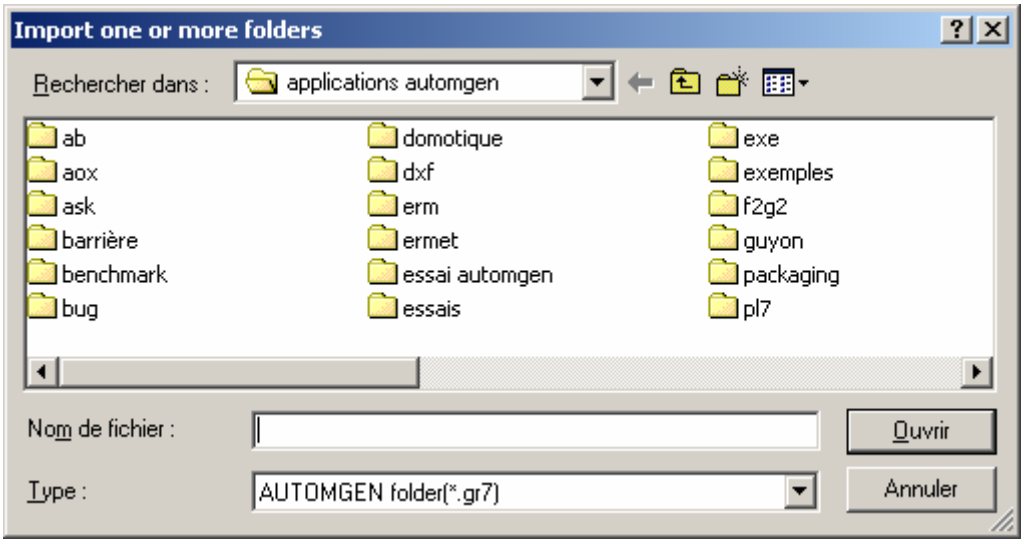
The sheet can be given any name, but each project sheet must have its own name.

The comment area is up to your discretion for modifications or other information relative to each sheet.



Importing old AUTOMGEN version sheets, importing CADEPA sheets

With the right side of the mouse click on the « Sheets » element on the browser then select « Add one or more existing sheets ».



Selecting one or more sheets to import.

From the « Type » list select « AUTOMGEN » or « CADEPA » for the sheet type to import then click on OK.

There are some restrictions for importing CADEPA sheets:

- the step numbers must be individual (the same step number cannot be used on multiple sheets),
- references must be converted with links to CADEPA before being able to import them.

By keeping the [CTRL] key pressed down, you can select multiple sheets.

Modifying the sheet compilation order

The sheets are compiled in the order they are listed in for the project. To modify this order, click on the sheet with the left side of the mouse on the browser and move it in the list.

Deleting a sheet from the list

With the right side of the mouse click the sheet to be deleted on the browser and select « Delete » from the menu.

Exporting a sheet to a « .GR7 » file

With the right side of the mouse click the sheet to be deleted on the browser and select « Export » from the menu.

Copying, Cutting, Pasting a sheet

With the right side of the mouse click the sheet on the browser and select « Copy/cut » from the menu. To paste, with the right side of the mouse click on the « Sheet » element on the browser and select « Paste ».

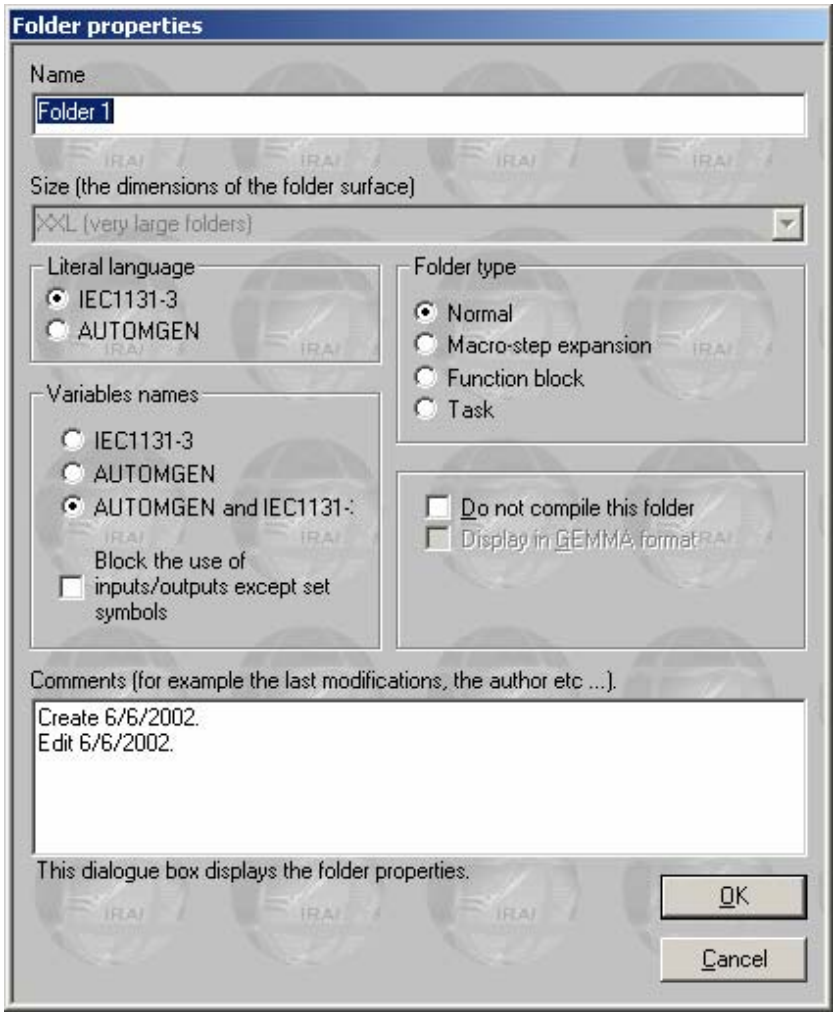
This option makes it possible to copy or transfer sheets from one project to another.

Renaming a sheet

See « Modifying properties » below.

Modifying sheet properties.

With the right side of the mouse click the sheet on the browser and select « Properties » from the menu.



You can modify the sheet name, the syntax used for literal language and variable names. The « Do not compile this sheet » option is used to exclude the sheet from the compilation. The « Display in GEMMA format» option is only available if the sheet format is GEMMA and is used to display and modify a sheet in GEMMA format. The « Block the use of inputs/outputs other than set symbols » option blocks the use of i, %i, o %q variables not attributed to symbols. The « comments » area is left to your discretion.

Symbols

The list of symbols provides the correspondence between « symbol » names and variable names. A project may only have one symbol table.

Creating a symbol table

With the right side of the mouse click on the « Symbols» element on the browser and select « Create a symbol table » from the menu.

Importing a symbol table

With the right side of the mouse click on the « Symbols» element on the browser and select « Import a symbol table » from the menu.

Configuration

Post-processors

This section contains all the post-processor configuration elements (see the post-processor manual for more information).

Compiler options

Double click on this element to modify the settings of compiler options.

Documentation

This is used to access the file printing function (double click on the « Print » element. You can print a complete file composed of an end paper, cross reference table, symbol list and sheets. The print setup function is used to display all these elements.

Generated files

Generating the instruction list in pivot code

By double clicking on « Pivot code » you generate a list in low level literal language (AUTOMGEN pivot code). Viewing of the generated code is normally reserved for specialists involved in understanding the translation methods used by the compiler.

Generating the cross reference list

Double clicking on the « Cross reference » element generates and displays the list of variables used in an application with any associated processor variables and the name of or sheet(s) where they are used.

Post-processors

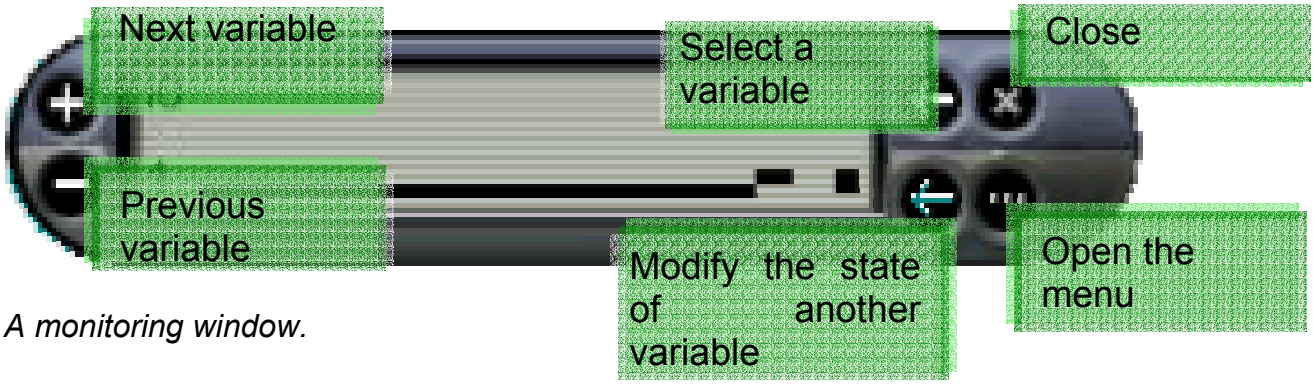
The other elements concern the files generated by the post-processors: instruction lists are in processor language.

Settings

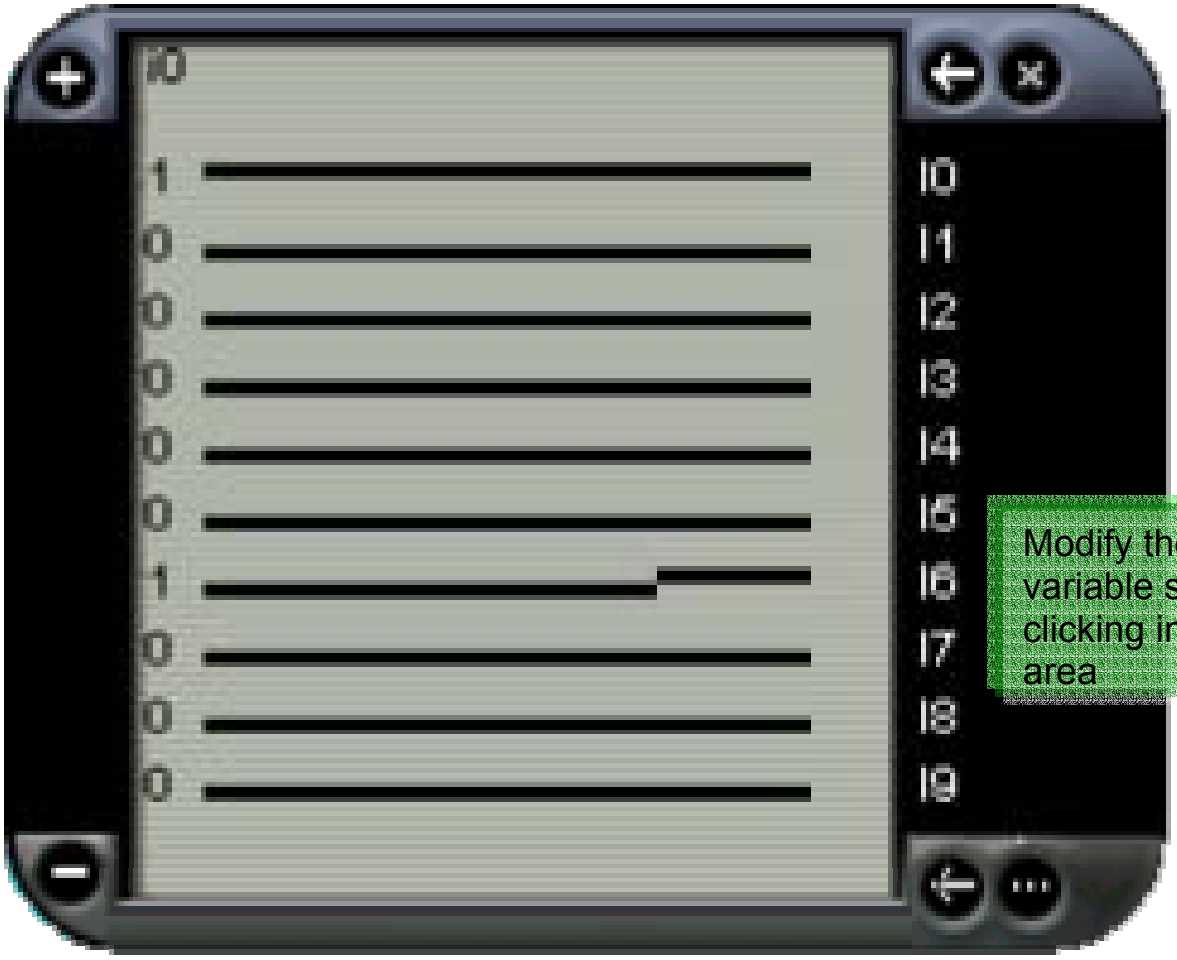
Contains the tools to display and modify the state of the variables.

Viewing and modifying a variable or variable table

With the right side of the mouse click on « Settings » and select « Monitoring » to open an element where you can see the state of a variable or variable table.



A monitoring window.



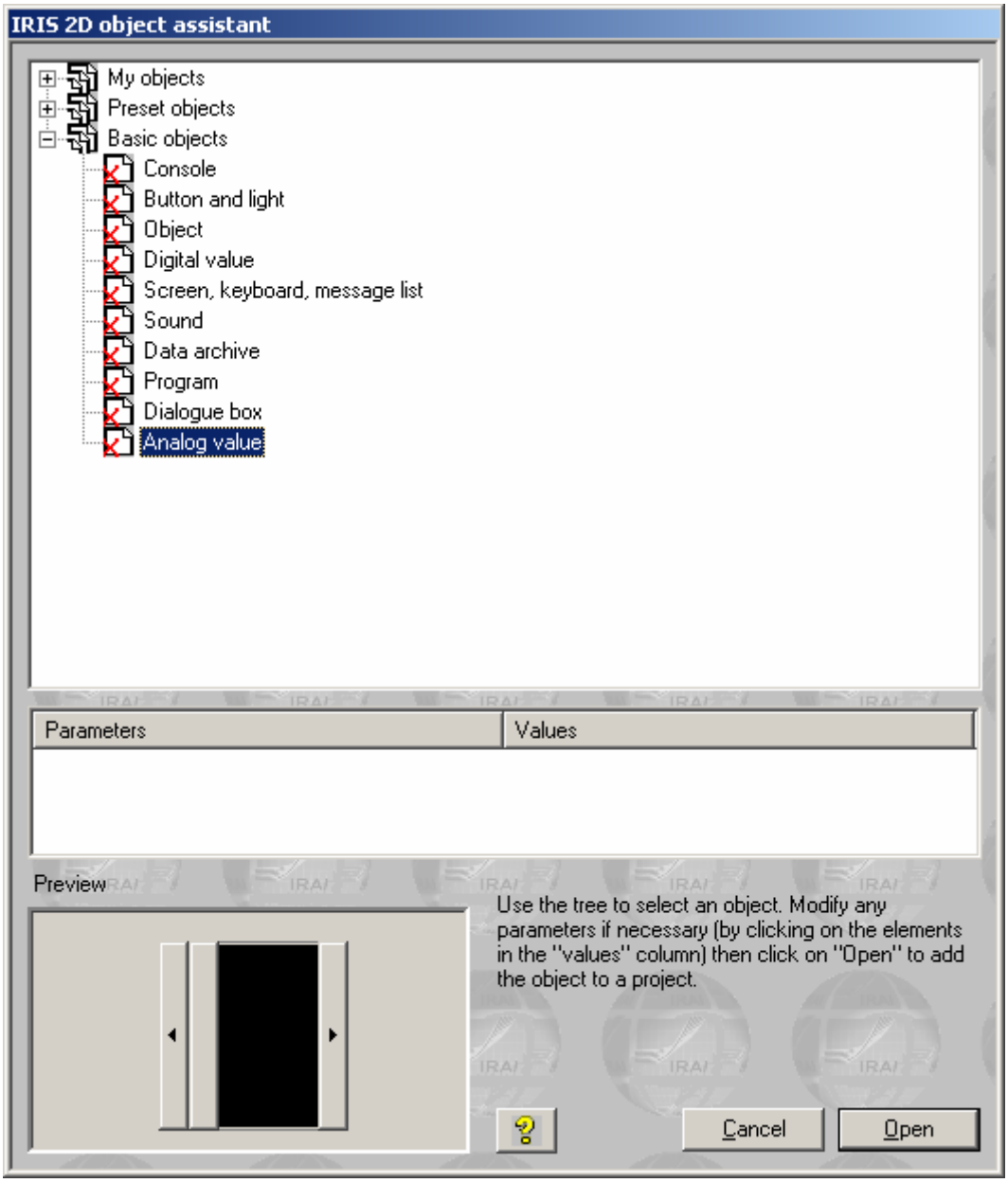
The monitoring window in « Variable table » mode.

IRIS objects

IRIS 2D objects are used to create consoles, supervision applications and simulation applications of 2D operating parts. IRIS 3D is used to create simulation applications of 3D operating parts. Each IRIS 2D object appears in the project tree (see the chapters IRIS 2D references and IRIS 3D references for additional information).

Adding an IRIS 2D object

Click with the right side of the mouse on « Add an IRIS 2D object ». The object selection assistant is used to select it and set its parameters.



Selection assistant for an IRIS 2D object

Deleting an IRIS 2D object

With the right side of the mouse click on the IRIS object on the browser and select « Delete » from the menu.

Displaying or hiding an IRIS 2D object

With the right side of the mouse click on the IRIS object on the browser and select « Display/hide » from the menu.

Cutting, copying, pasting an IRIS 2D object

With the right side of the mouse click on the IRIS object on the browser and select « Copy » or « Cut » from the menu.

To paste, with the right side of the mouse click on the « Sheet » element on the browser and select « Paste ».

To paste an IRIS object on a console, select « Paste» from the console menu or click with the right side of the mouse on the console on the browser and select « Paste».

Adding a new IRIS 2D object on a console

Select « Add an object » from the console menu or click with the right side of the mouse on the console on the browser and select « Add an object on the console » from the menu (for more information on the console see the chapter « Console » object)

Modifying the properties of an IRIS 2D object

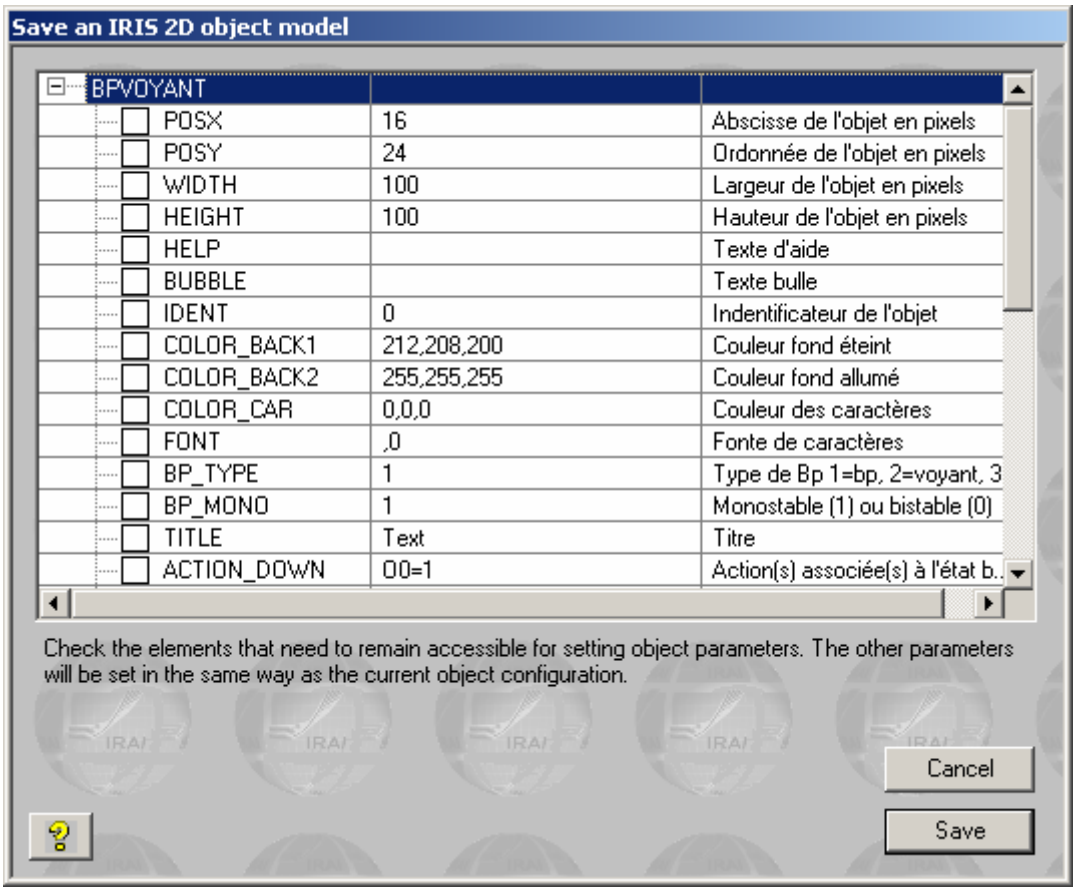
With the right side of the mouse click on the IRIS object on the browser and select « Properties ». For higher level objects (parent objects), special properties can be accessed:

Properties of high level objects

Display establishes under which conditions the object is displayed or hidden. The reinstallation option is used to return an object to its initial state when dynamic display is launched (normally used for OP simulation applications).

Setting an object model accessible on the assistant

With the right side of the mouse click on the IRIS object on the browser and select « Save as model » from the menu.



Selection of modifiable parameters for users of your models

You can select the list of parameters which remain accessible to the user on the assistant. By clicking on « Save », you save your object model. The storage directory for object models is « <AUTOMGEN installation directory>\i2d\lib ». You can use a sub-directory called « my objects » for saving your models.

Importing an IRIS 2D object in an earlier version of AUTOMGEN

With the right side of the mouse click on the « IRIS» element on the browser and select « Import IRIS 2D objects ». Select one or more « .AOF » files.

Creating an IRIS 3D console

With the right side of the mouse click on the « IRIS » element on the browser and select « Add an IRIS 3D console » (see the chapter on IRIS 3D for more information).

Resources

This project element is used for adding all types of files to a project. Files which are added will become an integral part of the project and will be saved along with the other elements. To refer to a pseudo directory where the resources are, the key word « <RESDIR> » can be used in the specific directory name in AUTOMGEN. For example IRIS objects can refer to bitmaps if they are included in the resources.

Adding a file to the resources

With the right side of the mouse click on the « Resources» element on the browser and select « Add » from the menu.

Deleting a file from the resources

With the right side of the mouse click the resource file on the browser and select « Delete ».

Renaming a file in the resources

With the right side of the mouse click the resource file on the browser and select « Rename ».

Modifying a file in the resources

With the right side of the mouse click the resource file on the browser and select « Modify ».

Adding and converting 3D STUDIO files in the resources

3D STUDIO files can be converted into .x files and added to the resources by clicking with the right side of the mouse on the « Resources » element on the browser and selecting « Import 3D files » (see the chapter IRIS 2D references and IRIS 3D references for more information).

External modules

These elements are reserved for executable modules developed by third parties and interfaced with AUTOMGEN.

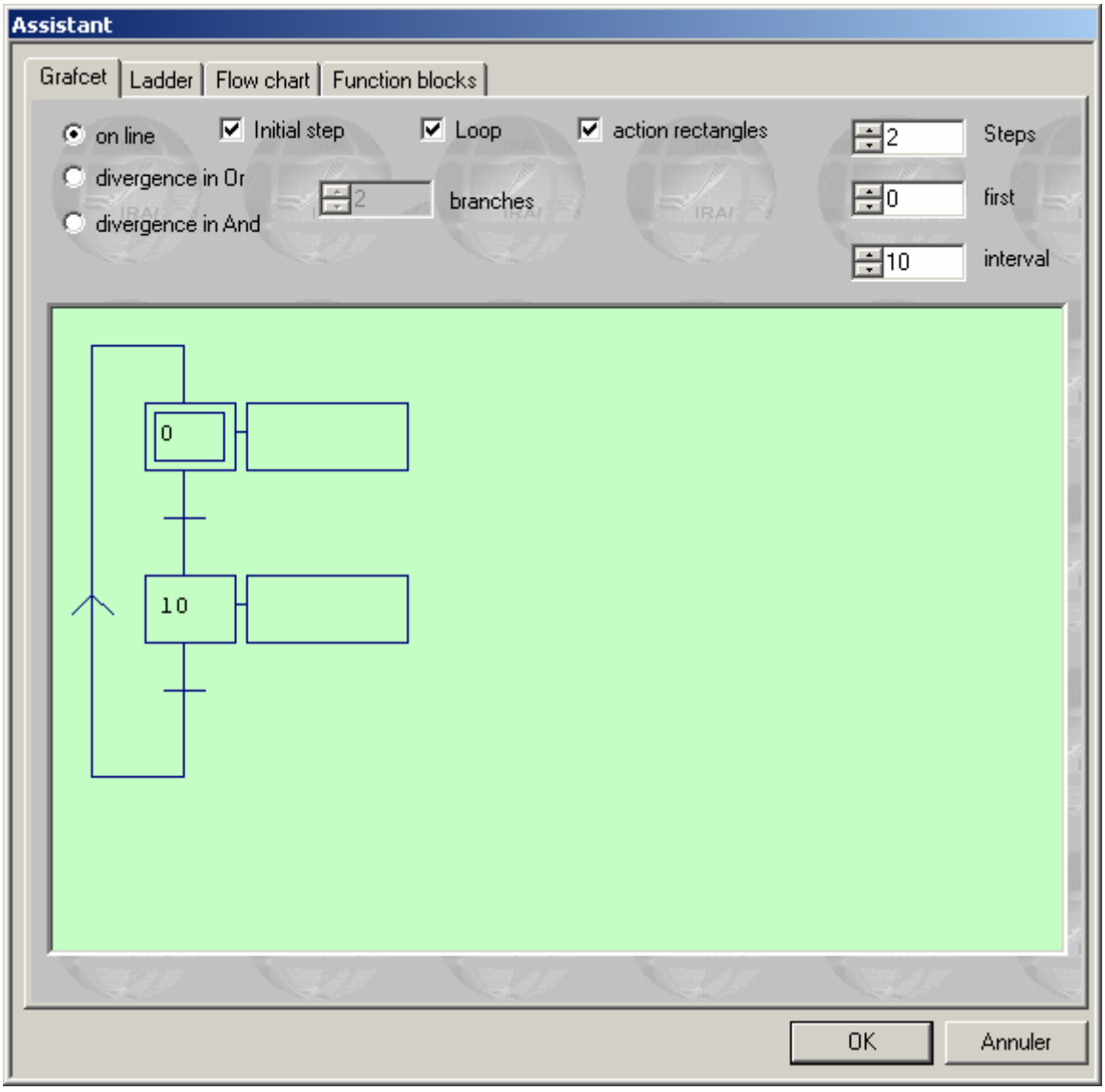
The browser is used to display and manage all the project elements. By double clicking on the elements or by clicking with the right side of the mouse, you access the different functions applicable to each element.

Designing programs

Various tools are available for designing programs.

Designing with the assistant

This is without doubt the simplest when starting with AUTOMGEN. With the right side of the mouse click on an open sheet in the work space and select « Assistant » from the menu. You will then be guided for making selections. When you have finished click on « OK » and put the design on the sheet by clicking with the left side of the mouse.



The assistant

Designing with the shortcut menu

Click with the right side of the mouse on an open sheet in the work space, the menu will propose a series of elements that you can put on the sheet. This is an instinctive and fast creation method.

Designing with the pallet

By selecting elements on the pallet you can quickly create programs starting from previously created elements.

Enhancing and customizing the pallet

« .GR7 » files are used to set the pallet, they are located in the directory « <AUTOMGEN installation directory>\pal ». You can delete, modify, rename or add files. To generate « .GR7 », files use the « Export » command by clicking with the right side of the mouse on a sheet on the browser. The names displayed on the pallet are « .GR7 » files. Relaunch AUTOMGEN for a new element to be displayed on the pallet.

Designing with the keyboard keys

Each key is associated to design blocks. The « Blocks » element also provides access to the blocks. The table below lists the blocks and their use.

Delete block

Aspect	Associated key	Generic name	Comments	Languages
	[A]	Delete	Used to make a cell blank again	All

Link blocks

Aspect	Associated key	Generic name	Comments	Languages
|	[E]	Vertical link	Link from top to bottom or bottom to top	All
——	[F]	Horizontal link	Link from right to left or left to right	All

	[G]	Upper left corner	Link towards the bottom right or bottom left	All
	[H]	Upper right corner	Link towards the bottom left or bottom right	All
	[I]	Lower left corner	Link from top to right or left to top	All
	[J]	Lower right corner	Link from top to left or right to top	All
	[Z]	Cross	Crosses two links	All

Grafcet blocks

Aspect	Associated key	Generic name	Comments	Languages
	[B]	Step	Normal step	Grafcet
	[C]	Initial step without activation	Initial step without activation	Grafcet
	[D]	Initial step	Initial step	Grafcet
		Macro-step	Only available in the shortcut menu	Grafcet
	[T]	Transition	Transition	Grafcet
	[K]	Left limit of an « And » divergence	Compulsory to the left of an « And » divergences	Grafcet
	[L]	Supplementary branch of an « And » divergence or an « And » convergence	Do not use as a left or right limit of an « And » divergence	Grafcet

	[M]	Right limit of an « And » divergence	Compulsory to the right of an « And » divergence	Grafcet
	[N]	Extension of an « And » divergence	If placed in the [K], [L], [M], [P] or [O],[P],[Q], [L] blocks	Grafcet
	[O]	Left limit of an « And » convergence	Compulsory to the left of an « And » convergence	Grafcet
	[P]	Supplementary branch of an « And » convergence or an « And » divergence	Do not use as a left or right limit of an « And » convergence	Grafcet
	[Q]	Right limit of an « And » convergence	Compulsory to the right of an « And » convergence	Grafcet
	[R]	« Or » divergence	Do not use as a limit of an « Or » convergence	Grafcet
	[S]	« Or » convergence	Do not use as a limit of an « Or » divergence	Grafcet
	[U]	Skip or repeat left step	« Or » convergence or divergence	Grafcet
	[V]	Skip or repeat right step	« Or » convergence or divergence	Grafcet
	[SPACE] on an [E] block	Link towards the top	For relooping and repeating steps	Grafcet

Flowchart blocks

Aspect	Associated key	Generic name	Comments	Languages
	[0] (zero)	Flowchart assignment	Separates the « test » from the « action » area	Flowchart

	[1]	« Not » function	Complements the block input signal	Flowchart
	[2]	« And » function	Combines the inputs in an « And » logic	Flowchart
	[3]	« Or » function	Combines the inputs in an « Or » logic	Flowchart
	[4]	Block environment	Enlarges an « And » or « Or » function block	Flowchart
	[5]	Bottom of block	Ends an « And » or « Or » function block	Flowchart

Ladder blocks

Aspect	Associated key	Generic name	Comments	Languages
	[(]	Start left coil	Starts an action	Ladder
	[)]	Start right coil	Ends an action	Ladder
	[U]	Left limit	Ends the diagram	Ladder
	[V]	Right limit	Starts the diagram	Ladder
	[R]	Connection	« Or » function	Ladder
	[S]	Connection	« Or » function	Ladder

Action blocks

Aspect	Associated key	Generic name	Comments	Languages
	[W]	Action rectangle left limit	Starts an action	Grafcet and Flowchart

	[X]	Action rectangle environment	Extends an action	Grafcet and Flowchart
	[Y]	Action rectangle right limit	Ends an action	Grafcet and Flowchart
	[S]	Divergence Action	Used to vertically juxtapose action rectangles	Grafcet and Flowchart
	[V]	Divergence Action	Used to vertically juxtapose action rectangles	Grafcet and Flowchart

Test blocks

Aspect	Associated key	Generic name	Comments	Languages
	[7]	Left limit of a test	Starts a test	Flowchart and ladder
	[6]	Right limit of a test	Ends a test	Flowchart and ladder

Organization chart blocks

Aspect	Associated key	Generic name	Comments	Languages
	[<]	Organization chart input	Indicates the input in a rectangle	Organization chart
	[=]	« False » output	Output if a test rectangle is false	Organization chart

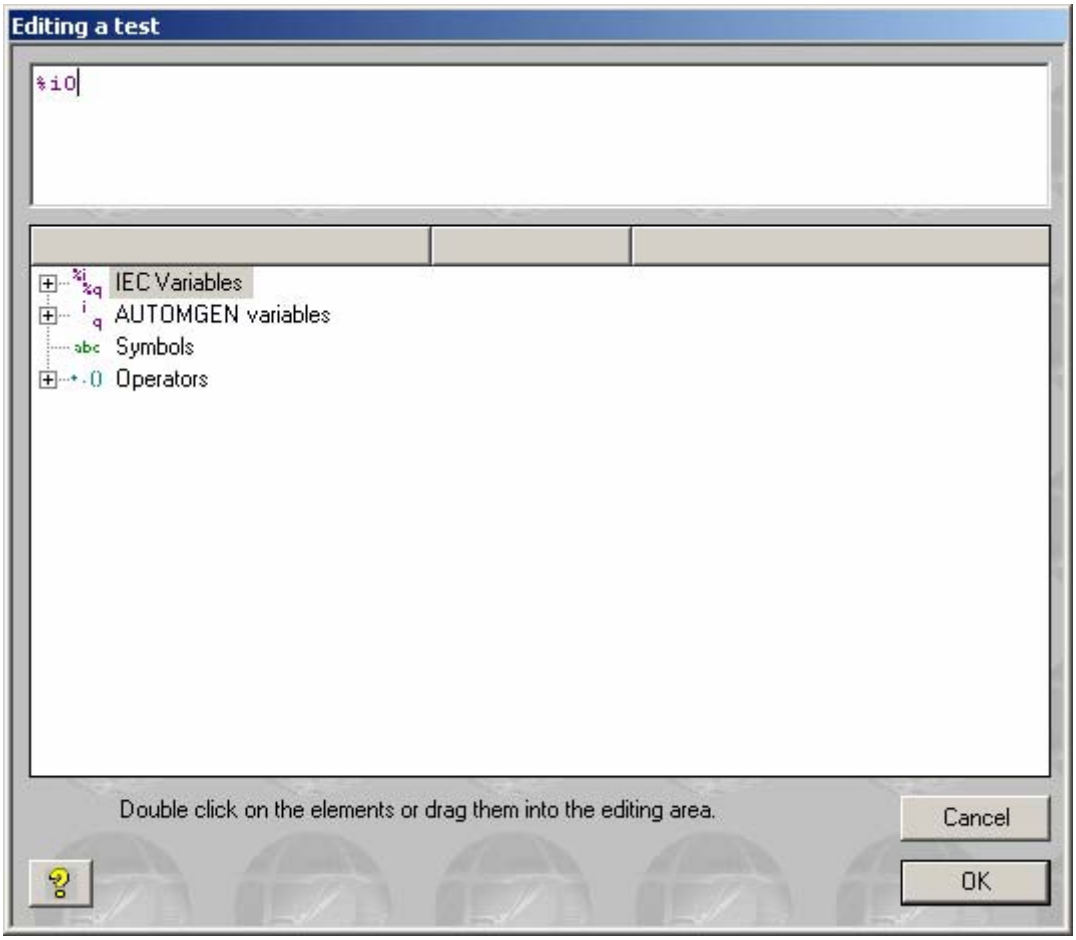
Function block blocks

Aspect	Associated key	Generic name	Comments	Languages
	[8]	Upper left corner of a function block	Starts the name of the function block	Function block
	[9]	Upper right corner of a function block	Ends the name of the function block	Function block
	[:]	Lower left corner of a function block	Adds an input to the function block	Function block
	[;]	Left limit of a function block	Adds an input to the function block	Function block
	[>]	Right limit of a function block	Adds an output to the function block	Function block
	[?]	Lower right corner of a function block	Adds an output to the function block	Function block

Documenting program elements

To document program elements, click below with the left side of the mouse. To create comments, click on a blank space on the sheet. To validate modifications, push the [Enter] key or click outside the editing are with the left side of the mouse. To delete modifications, push the [Esc] key or click outside the editing area with the right side of the mouse.

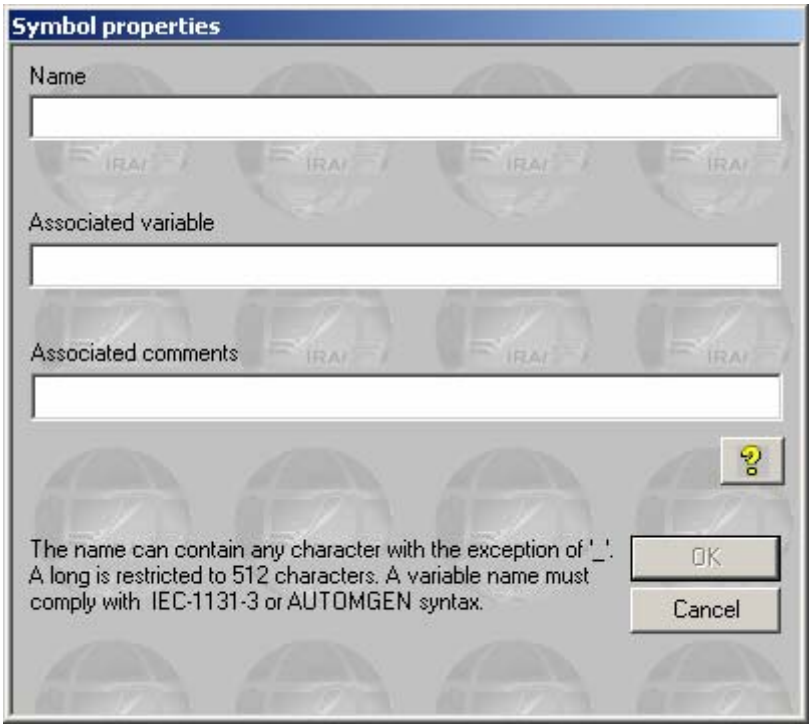
When editing tests and actions, a « … » button appears under the editing area. If you click on it you access an assistant for creating tests or actions.



Test creation assistant

Adding symbols

To create a symbol, click with the right side of the mouse on the symbol table in the work space and select « Add ». Or click the S+ button on the toolbar. You can also launch program compiling containing unset symbols. You will be asked for variables corresponding to the symbols during the compilation.



Attribution of symbols during compilation

To easily design a program, create a new sheet, then click with the right side of the mouse on the bottom of the sheet. Select « Assistant » from the menu, you will then be guided by it.

Running an application

To run an application easily

The  button on the toolbar is the quickest way to see application run results. This pushbutton activates the following mechanisms:

- compilation of the application if it is not updated (not already compiled after the last modifications),
- installation of the run module (with downloading if the current target is a processor and following the connection options),
- passage of the target to RUN,
- activation of the dynamic display.

To end the run

Click on  . On the processor target, the program continues to be run on the target. On the PC, the program is stopped.

To compile only

Click on  .

To stop the compilation

Click on  .

To connect to a processor or install a PC

Click on  .

To disconnect a processor or uninstall a PC

Click on  .

To put the target in RUN mode

Click on  .

To put the target in STOP mode

Click on  .

To initialize the target

Click on  .

To run a program cycle on the target (generally not supported on processors)

Click on  .

To activate the dynamic display

Click on  .

To run an application, click on the « GO » button. To end the run, click again on the same button.

The compiler

The compiler translates the sheets into a set of pivot language equations (these can be displayed by double clicking on the « Generated code / pivot language » element on the browser).

The pivot language is then translated into a language which can be run by a post-processor (the current post-processor can be displayed and selected by double clicking on the « Targets » panel accessible by clicking on the « Targets » tab at the lower part of the window where the browser is.

Modifying compiler options

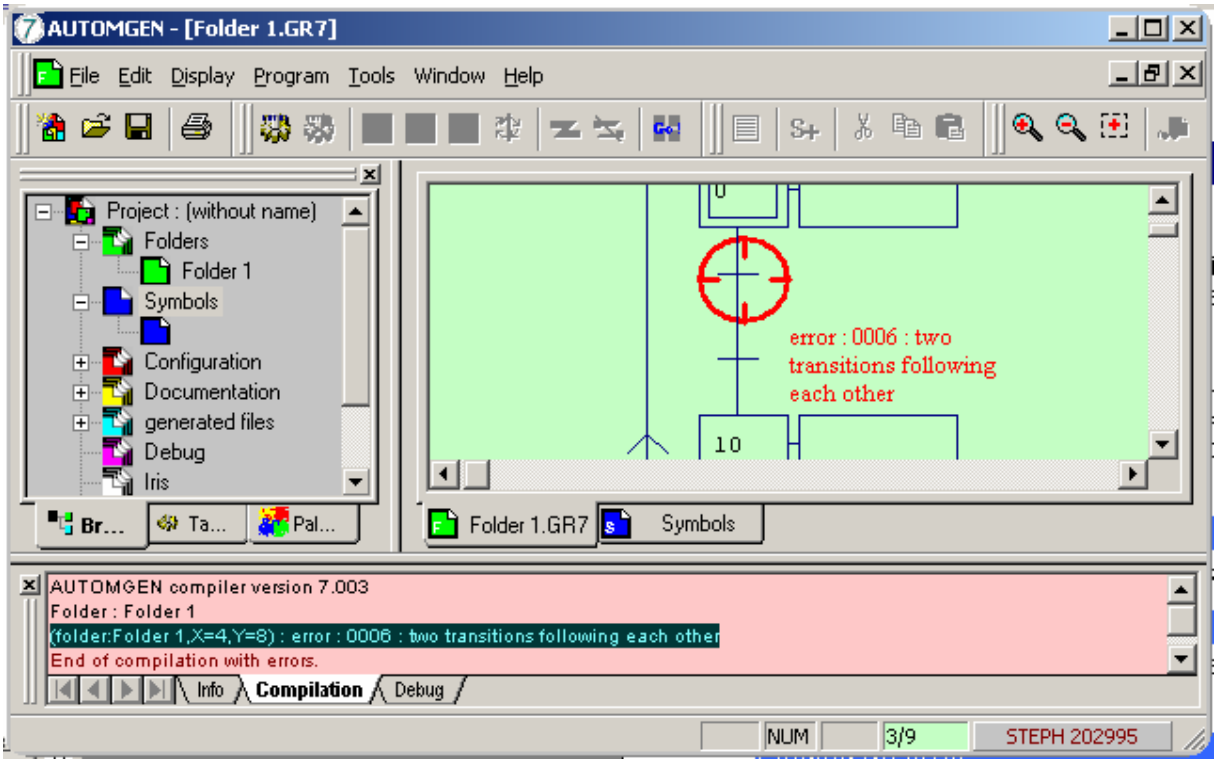
Double click on the element « Configuration / Compiler options».

Displaying compilation messages

The « Compilation » panel on the messages window contains the counts produced by the last compilation.

Finding an error

By double clicking on error messages, you can find the source.



An error message and its source

If the message windows are hidden and if one or more errors are detected by the compiler, a dialogue box indicates the first error detected (to display the message windows : use the « Messages » command from the « Windows » menu).

At the end of the compilation the « Compilation » window provides a list of any errors. By double clicking on the error messages, the site in the program that caused the error is displayed.

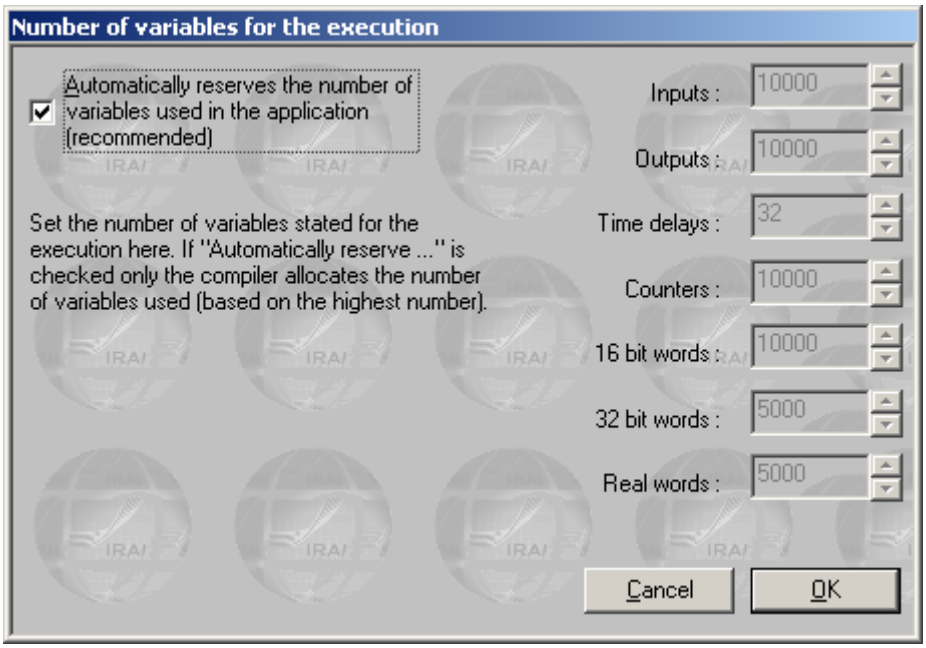
Running programs on a PC

The « run PC» target is an actual processor loaded in your PC.

You can:
- test your applications,
- drive a virtual operating part created with IRIS 2D or 3D,
- drive input/output cards connected to the PC.

Configuring the number of variables

Double click on the « Configuration / Post-processors / Executor PC / Variables » element.



Selecting the number of variables

The space needed for the variables used in the application is automatically reserved by default. You can manually select the amount of memory to reserve for each type of variable. This may be necessary if an indexed addressing is used to access a variable table.

PC system variables

Bits 0 to 99 and words 0 to 199 are system variables and can not be used as user variables in your applications. The two tables below provide details on the PC system variables.

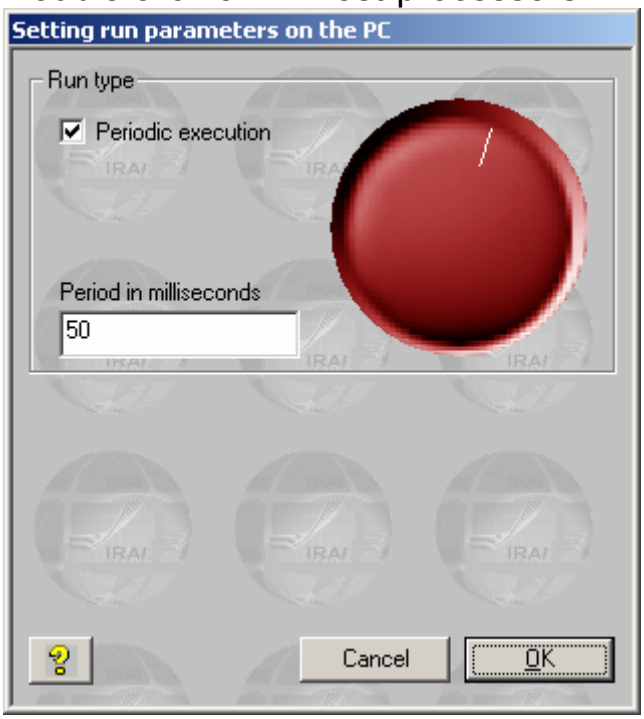
Bits	Use
0	active at first cycle, activation of initial Grafcet steps
1 to 4	reserved for I/O drivers
5 to 7	reserved for I/O driver errors
8	error on watchdog overflow is equal to 1
9 and 10	error general PC fault
11	run mode 1=RUN, 0=STOP
12	emergency stop pass to 1 in the event of an error or set to 1 to stop the program
13 to 29	reserved for drivers
30	bit associated to timer 1
31	bit associated to timer 2
32	bit associated to timer 3
33	bit associated to timer 4
34	bit associated to timer 5
35	bit for repeating sector (pass to 1 on repeat sector, reset to zero is the job of the programmer)
36	setting this bit to 1 causes reading of the clock in real time and transfer to System words 4, 5, 6, 7, 8, 51 and 52.
37	setting this bit to 1 causes writing of System words 4, 5, 6, 7, 8, 51 and 52 in the real time clock.
38 to 55	reserved
56	division by zero
57 to 67	reserved for future versions
68 to 99	reserved for the stack of boolean processing

Words	Use
0	reserved for the upper part of the multiplication result or the remainder of the division
1 to 3	timers in milliseconds
4	timer in 1/10 second
5	timer in seconds
6	timer in minutes
7	timer in hours
8	timer in days
9 to 29	reserved for I/O drivers
30	timer 1 counter

31	timer 2 counter
32	timer 3 counter
33	timer 4 counter
34	timer 5 counter
35	timer 1 procedure
36	timer 2 procedure
37	timer 3 procedure
38	timer 4 procedure
39	timer 5 procedure
40	lower part of clock reference
41	upper part of clock reference
42 to 50	reserved for I/O drivers
51	timer in months
52	timer in years

Modifying the run period

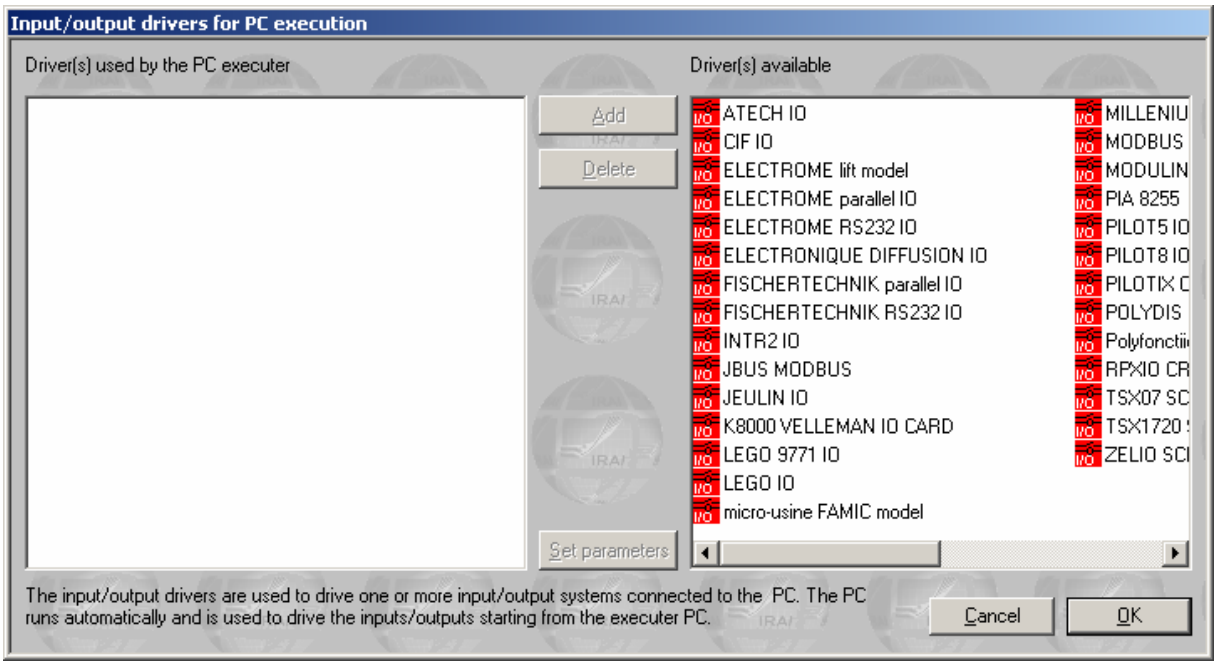
Double click on « Post-processors / Executor PC / Run ».



Setting the run period

Driving inputs/outputs

Double click on « Configuration / Post-processor / Executor PC / I/O Drivers ».



Adding an I/O driver

Select a driver from the list on the right and then click on « Add ».

« Set parameters » is used to configure certain drivers.

The executor PC transforms your PC into a program processor, it can be used to drive inputs/outputs directly connected to your computer.

IRIS 2D references

IRIS 2D objects are used to create supervision and simulation applications of 2D operating parts.

The link between the objects and the automatically functioning applications is always created by interchanging the variable state.

IRIS 2D objects are contained in WINDOWS windows.

An IRIS 2D object

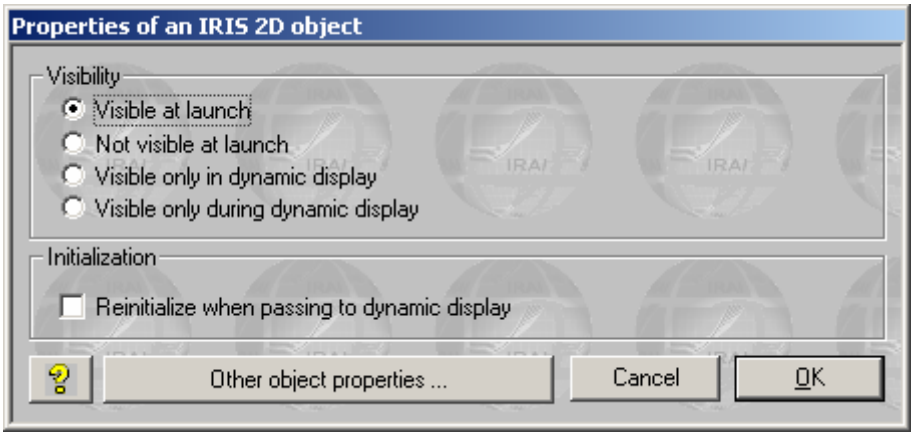
IRIS 2D objects have two possible states: the « Configuration » mode (used to modify the object characteristics) and « Use » mode (for using an object). The « User » mode is also called « Employ » mode.

Modifying object display

The objects can be hidden or displayed. This property can be specified when opening an object or when changing the state of the dynamic display in the environment. Only higher level objects (not objects located on a console) can be displayed or hidden. Objects located on a console are displayed or hidden at the same time as the console.

To dynamically modify the visibility of objects, click with the left side of the mouse on the objects on the browser and select « Display/Hide ».

To modify the display properties, click with the left side of the mouse on the objects on the browser and select « Properties ».



Display properties of an object.

Modifying object characteristics

Removing an object

Method 1: click the ☒ button on the surface of the object.
Method 2: with the right side of the mouse click on the object on the browser and select « Delete » from the menu.

Dimensioning an object

By dragging the object from one of its edges you can enlarge or shrink it (you can also precisely modify the size of an object by accessing its properties, see below).

Moving an object

Drag the object by clicking with the left side of the mouse on the minibar located on the upper part of its surface.

Putting an object in « User » mode

Method 1: click on the button ☒ on the object with the left side of the mouse.
Method 2: click with the right side of the mouse on the object.

Putting an object in « Configuration » mode

Click with the right side of the mouse on the object.

Modifying the characteristics of an object

Method 1: click on the button.
Method 2: push down the [CTRL] key on the keyboard and click with the right side of the mouse on the object, then release the [CTRL] key.

Method 3: with the right side of the mouse click on the object on the browser and select « Properties » from the menu.

Block access to configuration for all objects

With the right side of the mouse click on « Project » on the browser, select « Properties » and check « Block IRIS 2D object configuration » on the « Advanced » tab.

Basic objects, preset objects

The basic objects set major functionality types. Preset objects are based on a basic type and a configuration to meet a specific need. For an example, an emergency pushbutton is an object derived from a basic object used to create pushbuttons and lights. To access preset objects, use the assistant by clicking with the right side of the mouse on the « IRIS » element on the browser and select « Adding an IRIS 2D object ».

List of basic objects

« Console » object

The console object is the only object which can contain other objects on its surface. It is used to create command consoles and animation surfaces for virtual operating parts. This object has a pushbutton ... used to manage objects on its surface: add, move, delete etc.

The « Button and light » object

This is used to create pushbuttons and lights that interact with the processing application variables.

The« Object » object

This is a polymorphic element primarily used to simulate operating parts.

The « Digital value » object

This is used to display numeric values of the processing application in a number format.

The « Screen, keyboard, message list » object

This is used to display information on the processing application in a text format.

The « Sound » object

This is used to produce output sounds when the variable state of the processing application changes.

The « Data archive » object

This is used to display processing application data in a table or chart format and save them in the computer memory or on the disk.

The « Program » object

This is used for processing run separately from the processing application.

The « Dialogue box » object

This is used to display messages in a pop-up window format regarding changes in the variable state of the processing application.

The « Analog value » object

This is used to display processing application numeric variables in an analog numeric format (bars, dials etc.).

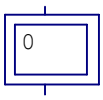
Practical experience

In this chapter you will be able to quickly create your first IRIS 2D application. We are going to create a console, put a pushbutton on it and link the object variables to the processing application.

Step 1

Creating a minimal application with AUTOMGEN see chapter Designing programs.

This is a Grafcet with one step as shown below.



Step 2

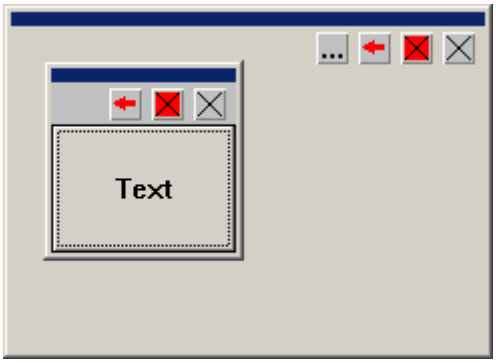
Launch the run of the AUTOMGEN application (click on the « Go » button on the toolbar).

Step 3

With the right side of the mouse click on the « IRIS » element on the browser and then select « Add an IRIS 2D object » from the menu. In the « Basic objects » category, double click on « Console ».
At this point the object will appear on the screen in this format:

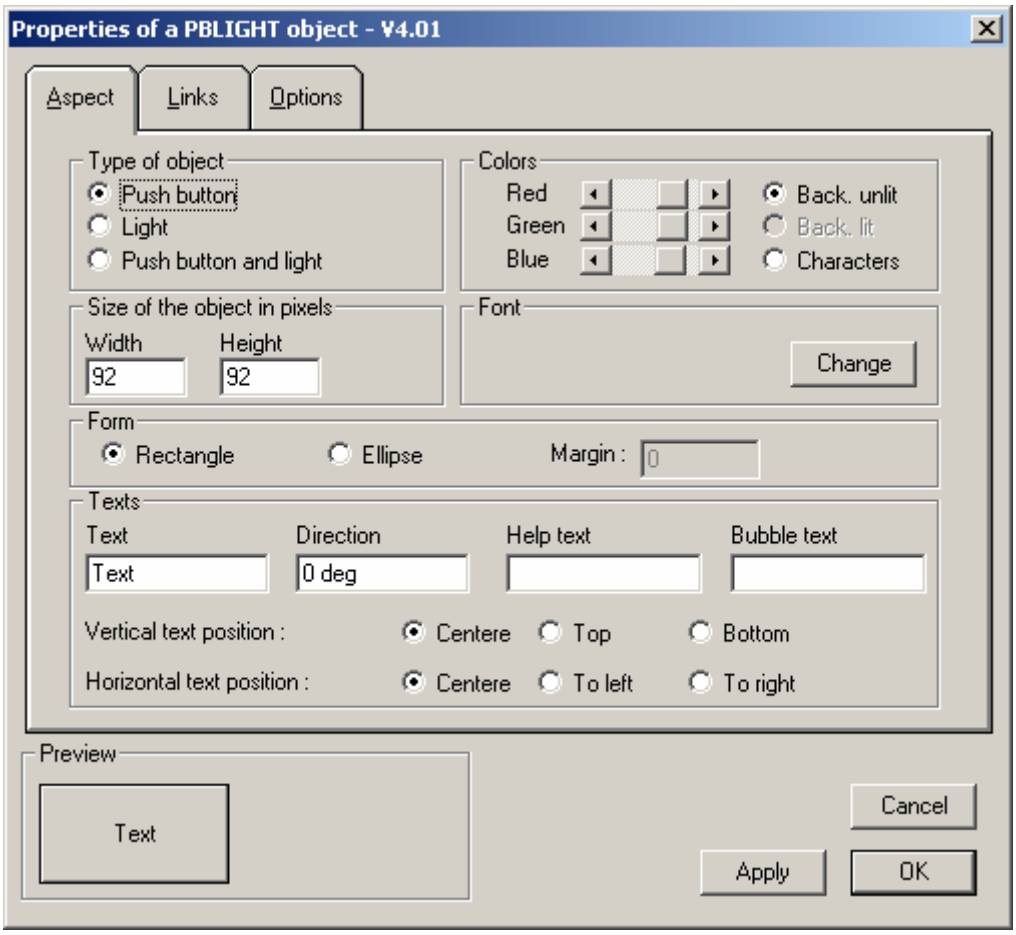
Step 4

To add a pushbutton to the console click on the console icon  (menu access) and select the « Add an object » option. In the « Basic objects » category, double click on « illuminated button ».
The object will then appear on the console:



Step 5

Now we are going to associate the pushbutton to a processing application output, for example %Q4. Click the pushbutton icon  (not the console icon). The pushbutton properties dialogue box will open:



Click the « Links » tab (upper part of the dialogue window). In the « Action when button is pressed » section enter « %Q4=1 ». In the « Action when button is released » section enter « %Q4=0 ». Then click on « OK » on the pushbutton on the lower part of the dialogue window. Actions on the pushbutton will drive processing application output 4. You can open a « Monitoring » window from the « Set-up » menu by clicking with the right side of the mouse on the browser. You display the state of output 4 when you click then release the pushbutton.

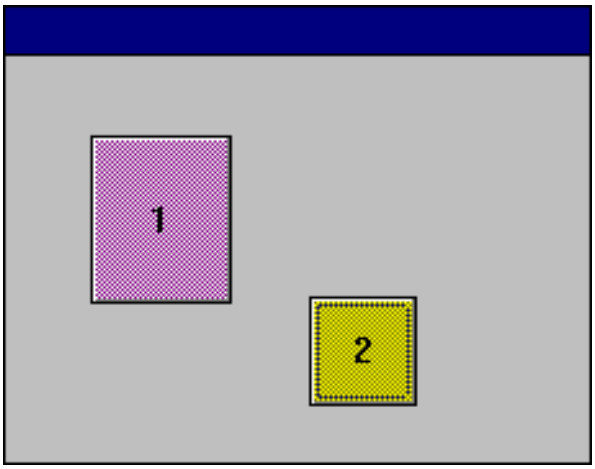
Step 6

We are going to associate a light to the « Illuminated Button » object, this light will be associated to a processing application input (for example 12).

Click the pushbutton icon  again. In the « Aspect » tab click on the « Pushbutton and light » radio button. Click on the « Links » tab and enter « %i2 » in the « Light state » section. Click on the « OK » pushbutton in the lower part of the property dialogue window. You can keep the state of variable « %i2 » modified (with a « Monitoring » window or by modifying the state of the physical input, if it exists).

Step 7

We are going to duplicate the « Illuminated Button » on the console in order to obtain a second pushbutton whose properties we will modify. Click on the pushbutton with the left side of the mouse while pressing down the [SHIFT] key. Black squares will appear around the selected object. Click on the console icon  and select the « Copy » option. Click on the console icon  and select the « Paste » option. Now there are two overlapping « Illuminated Button» objects. Drag the upper one (it is the only accessible one) by its upper bar and move it away from the other pushbutton. The object which has been duplicated has the same properties as the first. Now you can set the parameters for the second object, for example, so it is linked to output 5 and input 3.
You can also customize the aspect of the pushbuttons by using the aspect tab for the two objects. You can modify the size of the objects by dragging their edges.
The three objects on the screen (console and two pushbuttons) are in « Configuration » mode, this means that they have a mini bar on the upper part of their surface, icons and edges for modifying their dimensions. The objects have another mode called « Employ », in this mode their aspect is permanent: the upper bar, icon and edges for modifying the dimensions no longer exist. To tilt an object, click on it with the right side of the mouse.
At this point you will have created an object that looks like this:



Creating an autonomous supervision application

To create an autonomous supervision application (without developing a processing application with AUTOMGEN) follow the procedure below:

- create correspondences for the AUTOMGEN variables and the processor variables by double clicking on the « Configuration / Post-processor / <post-processor name> / Variable correspondence » element (see the post-processor manual for more information).
- compile the application by clicking on the  button on the toolbar (this validates the variable correspondence).
- configure the connection mode on « Only connect » by double clicking on « Configuration / Post-processor / <post-processor name> / Connection option ».

Comments:

- the « Automatic go » project option is used to obtain an application which automatically connects to the target to be started.
- the « Generate an executable » on the « File » menu is used to obtain an autonomous supervision application which is zipped and not covered by copyright in the format of a single executable file.

Syntax for accessing the state of variables

You can use variable names in AUTOMGEN , IEC 1131-3 or a symbol syntax. The « … » pushbuttons located near the drag areas in the object are used to access the assistant for selecting a variable name.

Boolean state

This syntax is used in the object « states » section.

To test the state of a boolean variable, use the variable name, for example: « i0 », « %q0 », « gate open ».

To test the complement state of a boolean variable, add a character « / » in front of the variable name, for example: « /i4 », « /%M100 », « /high level ».

To test the equality of a numeric variable with a constant, use the name of the numeric variable followed by « = », « < », « > » and a constant, for example: « %MW200=4 », « speed>2 ».

The complement state is used for creating « if different », « if less than or equal to» and « if greater than or equal to » tests, for example: « /%MW201<300 ».

The operator '&' is used to test a bit of a numeric variable, for example M200&4 tests the third bit (4 = 2 power 3) of word m200.

Numeric state

This syntax is used in the object « states » section.

To read the state of a numeric variable, use the variable name, for example: « %MW300 », « m400 », « pressure », « _+V_ ».

Modifying the state

This syntax is used in the object « order » section.

To modify the variable state, add the « = » sign followed by a constant after the variable name.

The following constants are used for boolean variables:
« 0 », « 1 », « F1 » (set to 1), « F0 » (reset), « UF » (end set), for example : « %Q0=1 », « %I10=F1 », « %I12=UF ».

For numeric variables, the constant is a number, for example: « M200=1234 », « speed=4 ».

Special orders

The following key words can be used in the object order sections:

« RUN » : puts the target in RUN mode,

« STOP » : puts the target in stop,

« INIT » : initializes the target,

« STEP » : effects a step on the target,

« GO » : identical to the environment GO command,

« ENDGO » : stops the GO command,

« EXIT » : exits the environment,

« UCEXIT » : exits the environment without asking for confirmation,

« OPENAOF(<object>) » : displays an object. « <object> » designates an object by its title and identifier number (configured in object properties) with the « #identifier » syntax.

« CHAINAOF(<object>) » : displays an object and hides the current object. « <object> » designates an object by its title and identifier number (configured in object properties) with the « #identifier » syntax.

Interchanging objects

« PARENTPARAM(parameter {+n} {-n}) »
This is used for a sister object to access a parent console parameter. The parameter must be set in the parent console « Links / Data for sister objects » section. See the chapter « Console » object SISTERPARAM(identifier , parameter)
When used for the OBJECT object, this syntax makes it possible to read an object's value. See the « Object » object.
SETPARAM(identifier , parameter , value)
Used to modify the object parameter.
To access the list of parameters that can be modified, click with the right side of the mouse on « Illuminated Button» while editing the action areas of an object, then select the « Parameters » command.

Details of a « Console » object

« Aspect » tab

Window

This is used to set the aspect of the console window: presence of edges, a title bar (in this case a title can be given) presence of close and reduce icons. If you check « Display help messages » you set-up a message area at the bottom of the window, the size of this area is automatically established based on the selected font (see below). If this area is not set, messages from the sisters will be displayed on the parent console of the console and on the bottom of the AUTOMGEN environment window (if the object does not have a parent).

Console background

This establishes the console background: color (see below), transparent (accessible only if the console is the sister of another console), bitmap (the background is set by a « .BMP » file, for example created with PAINTBRUSH).

Colors

This is used to select the color for the console background (if a colored background is selected - see above), the background and the characters of the help message display area (if this area is valid - see above).

Fonts for the help area

This establishes the font used for displaying help messages at the bottom of the console.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Texts

Help text and bubble text.

« Bitmap » tab

Bitmap

If the console background contains a bitmap (see « Aspect » tab) the editing area must contain a complete access name to a « .BMP » file (16 color, 256 color and 24 bits formats are supported).
The « SCAN » and « EDITOR » pushbuttons are respectively used to search for a « .BMP » file and edit a file with WINDOWS PAINTBRUSH software.

« Links » tab

Data for sister objects

This editing area is used to set parameters that sister objects can access with the key word « PARENTPARAM ». One setting per line must be written. Each setting must comply with the following syntax: « PARAMETER=VALUE ».

« Options » tab

Grid

This is used to set a grid (invisible) for positioning objects. Only the « Move» command on the console integrated menu uses the grid. Grid values are expressed in number of pixels. Values 0 and 1 cancel the grid effect. This function must be used to perfectly align objects.

Resetting sisters

If you check « Continue to reset sisters ... » you establish that the sister must continue to be updated when the console is changed to an icon. This option is used, when it is not selected, to increase system performance when a console changed to an icon only contains visual elements.

« Sisters » tab

Sisters

This section contains the list of console sister objects. The « Properties » pushbutton is used to directly open the properties dialogue box for the sister selected from the list. The « Destroy » pushbutton eliminates the selected object. The « Positions » editing areas are used to set object positions.

« External » tab

Executable name

Name of an executable file operating on the console.

Parameters

Parameters provided on the command line for the executable.

Details of an « Illuminated Button » object

« Aspect » tab

Object type

This is used to select the object type: pushbutton, light or pushbutton integrated with a light.

Colors

This is used to select the object color. If the object is a pushbutton, the « Background off » setting represents the color of the pushbutton. If the object is a light or a pushbutton integrated with a light the « Background on » setting establishes the color of the background when the light is on and « Background off » when the light is off. If the object aspect is established by a bitmap only the character color can be set.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object. This is necessary if the object aspect is established by a bitmap.

Font

This is used to select character font and size. The font file used must be present on the PC where the program is run.

Text

This is used to specify the text displayed on the object, its position, its print direction as well as the help text displayed when the button is pressed and a bubble text which is displayed when the cursor is placed on the object.

« Links » tab

Action when

This is used to set the actions to be effected when the button is pressed and when it is released.
An action can be setting the state of a variable, for example:

```
O0=1, m200=4, _depart cycle_=3
```

Or a preset key word
Configuration example where the input 10 reflects the pushbutton state (i10 to 0 if the button is released, i10 to 1 if the button is pressed):

Action when the button is pressed: `i10=1`
Action when the button is released: `i10=0`

Light state
Establishes the light state. This section must contain the name of a variable which drives the light: 0 = light off, 1 = light on.

For example:

```
b31, o4, _light init_, m200=50, m400<8, m500&16
```

Identifier
This is used to refer to an object in relation to the other objects.

Deactivation condition
This is used to deactivate the light. If this section contains a variable name, then that variable deactivates the object if it is true.

« Options » tab

Type of pushbutton
This establishes if the pushbutton is bistable (it remains pressed) monostable or a combination of the two: monostable with a simple click and bistable with a double click.

Keyboard
This is used to associate a key to a pushbutton. If this key or combination of keys is present on the keyboard then the pushbutton will be pressed.

Different syntaxes can be used to set the key code:
- a simple character: For example A, Z, 2,
- the $ character followed by hexadecimal key code,
- the name of a function key, for example F5.

For combinations of keys CTRL+ or SHIFT+ must be added to the beginning.
For example: CTRL+F4 or SHIFT+Z.

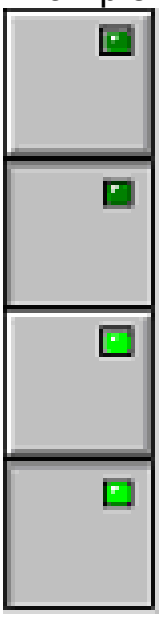
Bitmap
This is used to specify a bitmap which contains the design of an object.

The « Resize the image » option is used to extend the bitmap over the entire surface of the object.

The bitmap file contains the four possible object aspects: button released light off, button pressed light off, button released light on, button pressed light on.

Even if the file is a pushbutton without a light or a light there are always four aspects of which only two are used.
The bitmap file is divided horizontally in four.

Example:



The « Different aspect if the cursor is on the object… » option is used to display a different image when the cursor passes over the object.

If this option is checked, the bitmap file contains 8 aspects, four supplementary aspects are added to the right of the bitmap to contain the design of the object when the cursor is on the object.

Example:

Sounds

If WAV files are selected, the object can produce sounds if the object is pressed, released or if the cursor is on the object.

Details of a « Digital value » object

« Aspect » tab

Format

This is used to set the type of display:

- Always display the sign: display the '+' sign for positively signed values,
- Signed value: sets the signed or unsigned mode for 16 or 32 bit integers (only base 10),
- Display all digits: display the 0 at the beginning of the value if necessary.

Base

- Establishes the display base for 16 and 32 bit integers.

Colors

This is used to select the background colors of the object (if it is not transparent) and the characters.

Font

This is used to select character font and size. The font file used must be present on the PC where the program is run.

Number of digits
Sets the length of the integer and decimal parts.

Background
This is used to select either a colored or transparent (if the object is only placed on one console) background.

Object size
This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

« Texts » tab

Bubble Text
Text displayed in a bubble when the user puts the cursor on the object.

Text displayed before and after the value
This is used to display information to the left and right of a numeric value.

« Links » tab

Variable or symbol
This designates the variable to display. To access a time delay counter or procedure the following syntax must be used:

- for the counter: COUNT (time delay), example: COUNT(t3),
- for the procedure: PRED(TIME DELAY), EXAMPLE: PRED(t7),

The Variable state can be modified
If this is checked then the user can modify the variable state by clicking on the object.

Details of an « Analog value » object

« Aspect » tab

Objects
This is used to set the type of display.

Print direction
This establishes print direction: horizontal or vertical.

Colors

This is used to select the background colors of the object (if it is not transparent) and the object.

Background

This is used to select either a colored or transparent (if the object is only placed on one console) background.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Texts

Bubble text.

« Links » tab

Variable or symbol

This designates the variable linked to an object (a word or a counter).

User action …

This establishes if a variable can be modified by the user.

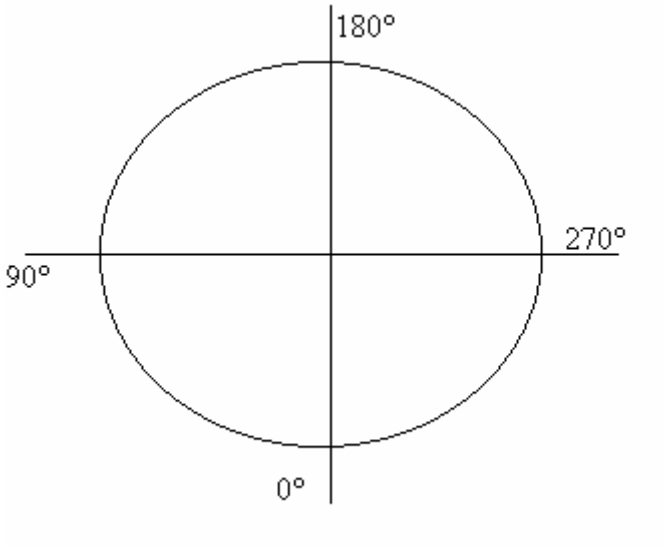
« Limits» tab

Minimum, maximum

Minimum and maximum values.

Start angle, end angle

To display the type of dial which establishes the start angle and end angle. The values are expressed in degrees:



« Graduations » tab

Using the graduations

This validates or invalidates the use of graduations

Start value, end value

Values displayed for the graduations, these values can be signed and/or floating point numbers.

No small graduations, no large graduations

No graduations (two levels) related to start and end values. These values can be floating point numbers.

Font

This establishes the characters used for the graduations.

Area N°1, area N°2 and area N°3

This is used to establish colored areas. « Start value » and « End value » set each area. The color for each area is specified by three components of red, green and blue between 0 and 255.

Colors

This establishes the character and graduation color. Again here the colors are expressed by their three components: red, green and blue.

Details of « Screen, keyboard, message list » object

Links with the application

The link between the object and the application is made using word tables.

To send data to a type of object (with or without the keyboard) the data must be placed starting from the second word of the reception table plus the length of the data in the first word in the table (maximum length is 255). Each word contains a datum.

The data can be: an ASCII character, a number of a preset message + 8000 hexa, or a special command: 100 hexa deletes the window, 200 hexa displays the date, 300 hexa displays the time, 400 displays the message number.

When the object has reread the available data in a table it resets the first word to 0 to indicate that the operation has been effected.

The principle is the same for « with keyboard » objects: the first word of the transmission table contains the number of characters entered on the keyboard, the following words contain the characters (one per word). The application must reset the first word to 0 when it has used the data.

The interchange table for the « Message box, alarm list » object has a fixed length of 10 words. As is true for the « Screen » type the first word starts the message display. If it is different than 0 it designates a message number to be displayed. Only registered messages can be displayed. The first word can also take an ffff hexa value to clear the message box.

Description of 10 words used for interchanges with the « Message box »:

Word 0 represents the first word on the table, Word 1 the second, etc.
Word 0: message number to be displayed if 0 is no messages or ffff hexa to clear all messages,
Word 1: class number for the message (see chapter message classes for a more detailed explanation).

The following words establish the date and time and can displayed for each message. A value equal to ffff hexa asks the object to use the current computer date and time (this does not include milliseconds).
Word 2: day
Word 3: month
Word 4: year
Word 5: hours
Word 6: minutes
Word 7: seconds
Word 8: milliseconds
Word 9: reserved (put 0)

Message classes

Message classes are used to classify messages into families which share the following characteristics: background color, character color and an icon.
there are two preset classes:

- the information message class: blue characters on a white background, icon  , it bears the number -1,
- the alarm message class: white characters on a red background, icon  , it bears the number -2.

Other classes can be set by the user.
A bubble text can be associated with the object.

« Aspect » tab

Object type

This is used to set an object type. See chapter links with the application

Colors

This is used to select the background colors of the object and the characters.

Font

This is used to select the character font used for displaying texts.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Texts
Bubble text.

« Links » tab

Reception, transmission
This sets the first variables of the reception and transmission tables. These areas can contain a variable name or symbol.

« List » tab

These sections do not regard « Message box » objects.

Icons
If this is checked an icon is displayed before the messages.

Classes
If this is checked a message class number is displayed

Days, Months, Years, Hours, Minutes, Seconds, 1/1000 seconds
If these are checked each one of these elements is displayed.

Messages
If this is checked a message is displayed.

Numbers
If this is checked a message display number is displayed.

Message classes
This editing area is used to establish new message classes. Each line sets a class. The following must appear in order and be separated by commas on each line: the background color three components red, green and blue), the character color (three components red, green and blue), the class name, the bitmap file name for the icon associated to the class.
For example:
255,0,0,0,0,0,ALARM,alarm.bmp
Means:
Red background color, black character color, ALARM class name, file containing icon: « alarm.bmp ».

« Options » tab

Displaying character hexadecimal codes

This option is used to display hexadecimal code for each character in place of its ASCII representation. It is used for « Screen ... » type objects and is normally used for starting up programs.

Horizontal, vertical scroll bar

Displays or hides scroll bars.

Converting OEM characters to ANSI

If this is checked, the characters from the processing application are automatically converted from OEM characters (MS-DOS) to ANSI characters (WINDOWS). The reverse conversion is applied to characters which drive the object for the processing application.

Duplicating messages to ...

This section can receive a file or peripheral name (for example, « LPT1 » for the printer) It is possible to specify multiple files and/or peripherals by separating them with a comma. The displays will be automatically duplicated: Printing « edge of the water ».

Associating a message storage file ...

This is used for setting a file which will be associated to the object and used for storing information. If this file exists then the messages will be saved (according to the number set in the « number of memorized lines» section, when the number is reached the oldest data is deleted. When the object is open, and if a storage file exists since its last use, then the data contained in the file is transferred to the object.

Write the old message to ...

This is used to set a file or a peripheral which receives old messages (the messages which are eliminated from the storage file to make room).

Number of memorized lines ...

This establishes the message storage file capacity in number of lines. The value 0 attributes the maximum space that can be used (not a fixed limit).

« Messages » tab

Preset messages

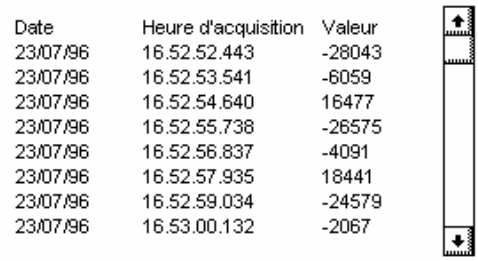
This editing box is used to document preset messages (one per line).

Details of « Data archive » object

« Aspect » tab

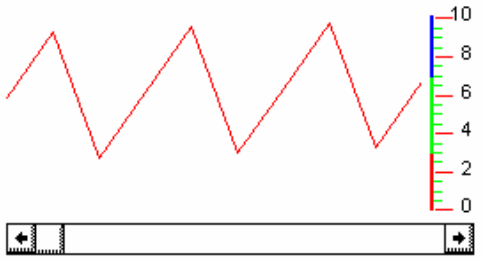
Objects

This is used to set the type of display.
The object can be represented in table format (figure 1.1) or graph format (figure 1.2).



Date	Heure d'acquisition	Valeur
23/07/96	16.52.52.443	-28043
23/07/96	16.52.53.541	-6059
23/07/96	16.52.54.640	16477
23/07/96	16.52.55.738	-26575
23/07/96	16.52.56.837	-4091
23/07/96	16.52.57.935	18441
23/07/96	16.52.59.034	-24579
23/07/96	16.53.00.132	-2067

(figure 1.1)



(*figure 1.2*)

Colors

This is used to select the font color when the object is in a table format as well as color for marking values on the graph.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Text

A bubble text associated with the object.

« Data » tab

First variable to read

This is used to select the first variable to be archived.

Number of variables to read

This indicates to the ARCHIVE object the consecutive number of variables to the « First variable to read » that it must archive.

Number of memorized registrations

This is used to size memory database.
A registration represents an acquisition of « n » variables (« n » is the number of variables to read).

Periodic reading

Variable acquisition will be done at fixed intervals of ARCHIVE object running.

Start reading

Variable acquisition will be effected when the « Control word » has given the order.

Period

This is used to establish the time between two acquisitions. The time is in Day(s)/Hour(s)/Minute(s)/Second(s)/Millisecond(s) format:
J for days
H for hours
M for minutes
S for seconds
MS for milliseconds

E.g.: 2J
E.g.: 2H10M15S

Control

This is used to set a variable (a word) that controls the ARCHIVE object. From the value taken in the count, its contents is reset by the ARCHIVE object.

Value	**Action**
0	Nothing
1	Start an acquisition (Reading started)

2	Freeze the acquisitions
3	Restart archiving (after freezing)
4	Clear the memory database
5	Destroy the archive file
6	Activate « Save last acquisitions » mode
7	Cancel « Save last acquisitions » mode

« Options » tab

Use the image file

The image file is used:
At the end of using the ARCHIVE object, to save the database present in the memory.
When the ARCHIVE object is launched, to reconstruct the database present in the memory during the last use.

Using the archive file

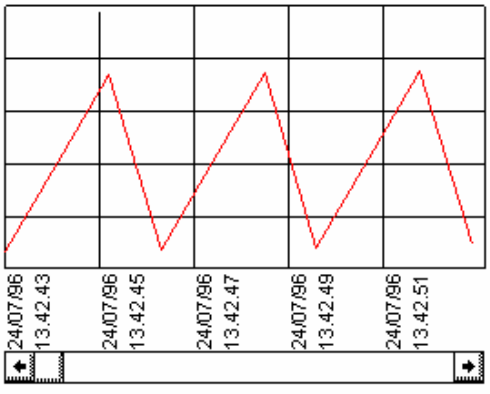
Each acquisition is saved in the file in standard database format.

Displaying

Acquisition date: This is used to display the acquisition date of a registration.
Acquisition time: This is used to display the acquisition time of a registration.
Hours, minutes, seconds, milliseconds: This is used to configure the acquisition time display.
The time display is effected downstream from the display of acquisitions for the TABLE object (figure 3.1) or under the grid when it is set for the GRAPH object (figure 3.2)

Date	Heure d'acquisition	Valeur
24/07/96	13.42.43.112	3141
24/07/96	13.42.44.211	25217
24/07/96	13.42.45.309	-18451
24/07/96	13.42.46.408	3489
24/07/96	13.42.47.506	25525
24/07/96	13.42.48.605	-17931
24/07/96	13.42.49.703	4085
24/07/96	13.42.50.802	26149
24/07/96	13.42.51.900	-17375
24/07/96	13.42.52.999	4709

(figure 3.1)



(figure 3.2)

« Tables » tab

Font

This is used to select a font for displaying the column name, times and acquisition value.

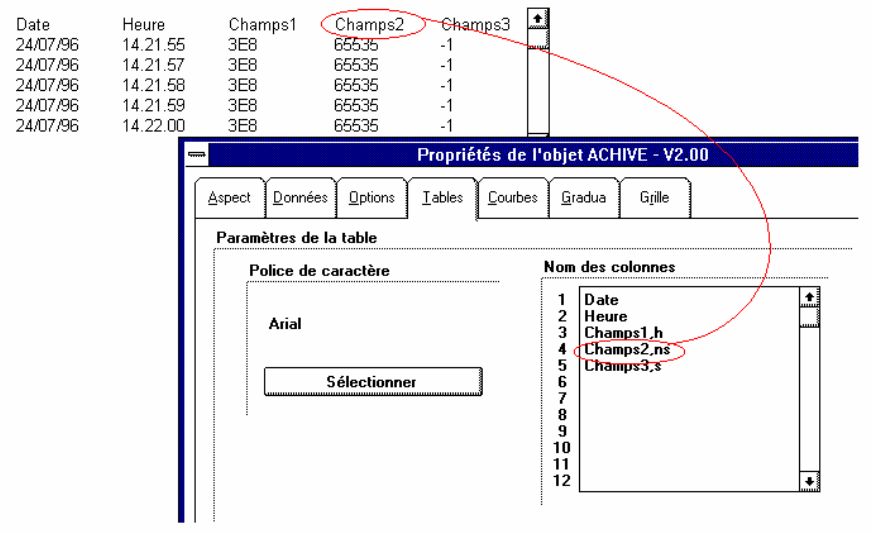
Column name

This is used to set the column name for the TABLE object as well as the display format for these columns (figure 4.1)
syntax: name, format

format *	**Display**
no format specified	Signed, decimal, visible
h	Hexadecimal
d	Decimal
ns	Not signed
s	Signed
nv	Not visible
v	Visible

* The different options can be combined, for example:

Format	**Display**
d,ns,v	Decimal without sign visible



(*figure 4.1)*

« Graph» tab

Minimum, maximum value

This is used to select the minimum and maximum values for displaying graphs.
Only values included between the minimum and maximum values will be displayed on the screen.

Display

This is used to set the display time.
This is communicated to the ARCHIVE object in the day(s)/Hour(s)/Minute(s)/Second(s)/Millisecond(s) format:
J for days
H for hours
M for minutes
S for seconds
MS for milliseconds
E.g.: **Display 2H30M10S**
E.g.: **Display 100MS**

Plotting values on the graph

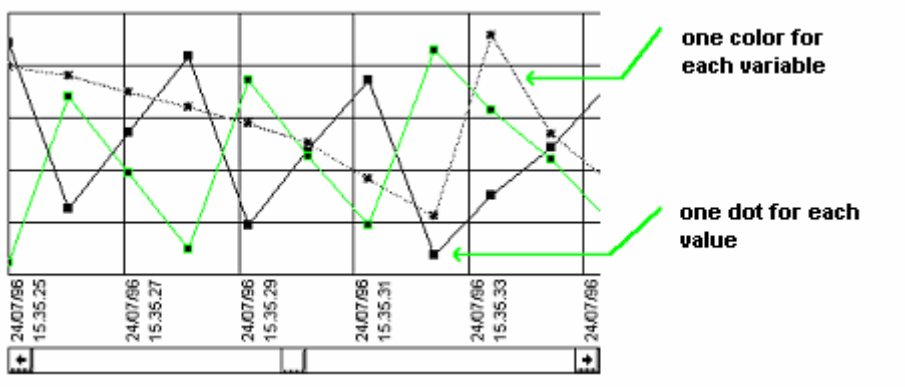
This is used to make a mark on the graph for each acquisition (figure 5.1)

Displaying time

This is used to display the date and time of an acquisition of one or more variables on the grid if it is open. Colors and fonts can be set for the time display.

Outline colors

This is used to set a color for each graph. The first graph has the color of the first line, the second graph has the color of the second line etc.
Colors are in Red, Green, Blue format.
E.g.: 255,0,0 red outline
If a color is not set on a line, the graph corresponding to this line will not be outlined.



(*figure 5.1)*

« Graduations » tab

Using the graduations

This validates or invalidates the use of graduations (figure 6.1).

Start value, end value

Values displayed for the graduations, these values can be signed and/or floating point numbers.

No small graduations, no large graduations

No graduations (two levels) related to start and end values. These values can be floating point numbers.

Font

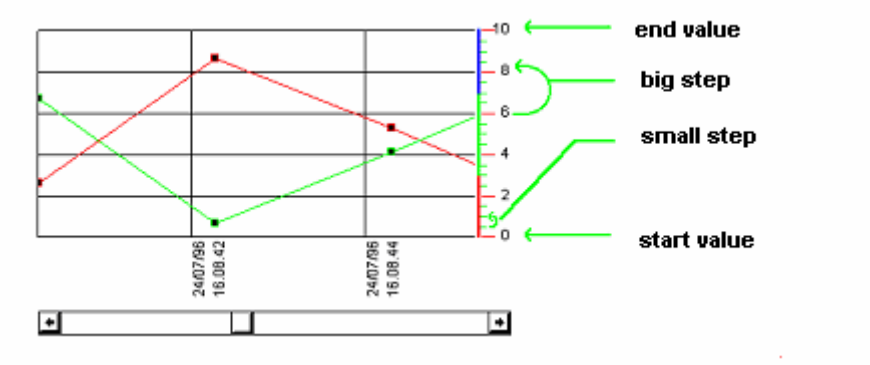
Establishes the characters used for the graduations.

Area N°1, area N°2 and area N°3

This is used to establish colored areas. "Start value" and "End value" set each area. The color for each area is set by three components of red, green and blue between 0 and 255.

Colors

This establishes the character and graduation color. Again here the colors are expressed by their three components: red, green and blue.



(figure 6.1)

« Grid » tab

Displaying the grid

This validates or invalidate grid display.

Not for ordinates

This sets the vertical pitch of the grid.

Not for abscissas

This sets the horizontal pitch of the grid. The pitch is in Day(s)/Hour(s)/Minute(s)/Second(s)/Millisecond(s) format:
J for days
H for hours
M for minutes
S for seconds
MS for milliseconds
E.g.: 1J
E.g.: 2H30M15S

Color

This is used to set a color for each grid.
The color is in Red, Green, Blue format
E.g.: 255,0,0 Red outline

Details of « Object » object

« Aspect » tab

Type

This is used to set one of the object type aspects:

- « n bitmap aspects » : the object aspect is provided by a bitmap file which can contain various aspects, see the chapter « Bitmap » tab
- « n bitmap colors » : the object aspect is provided by a bitmap file, the color is controlled by a processing application variable that replaces the blank pixels of the bitmap. The other bitmap pixels must be black. The processing application variable provides a color number, the colors are set in the « Colors » tab.
- « gauge bitmap » : the object is a gauge with a format set by a bitmap. The blank bitmap pixels set the format. The other pixels must be black. The minimum, maximum and print direction are set in the « Gauge » tab.
- « n format colors » : a rectangle, a rectangle with rounded edges or an ellipse. The color is managed in the same manner as « n bitmap colors ».
- « gauge formats » : the object is a rectangular gauge. The principle is the same as for a « gauge bitmap »

Colors

This is used to select the character color for the text displayed on the object.

Font

This establishes the font used for displaying text on the object.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Texts

Help text and bubble text.

The text displayed on the object: the position and print direction can be modified.

« Links » tab

Clicked object, not clicked object

This sets the actions to be effected when the user clicks on the object and when the user stops clicking the object.
An action can be setting the state of a variable, for example:
`O0=1, m200=4, _depart cycle_=3`
Or a preset key word.
A configuration example where the input i10 reflects the clicked state of an object (i10 to 0 if the object is not clicked, i10 to 1 if the object is clicked) :
Clicked object: `i10=1`
Not clicked object: `i10=0`

Permanently connect with ..

This area can receive the identifier of a sister object. If this object exists then the position of the object is modeled on it. The identifier of an object is an integer value between 1 and 32767. It is specified in the « Identifier» editing area of the « Links » section.

Aspect/Color/Filling

This area of the dialogue box contains 8 editing areas which can be used to set different types of object behavior based on the processing application variables.
No matter what their behavior they will always have a position which depending on the type of object will design:

- an aspect contained on a bitmap for the « n bitmap aspects » type
- a color number for « n bitmap colors » or « n format colors »
- filling for the « gauge bitmap » or « gauge format » types.

The « Position » area can contain a numeric variable name (C or M). The areas « + Position » and « - Position » can contain a name of boolean variables.

Two types of operation are possible:

- if the « + Position » and « - Position » areas are documented then the boolean variables contained in them will drive the position: they add or delete the value specified in the speed area. If the « Position » area is documented then the current position is written in the variable which contains the name.
- if the « + Position » and « - Position » areas are blank then the value containing the variable where the name is written in the « Position » area will be read as the object position.

The position can vary between the values set in the « Min » and « Max » areas.
Sensors can be added (boolean variable names) which will be true for the minimum and maximum position (position equal to minimum or maximum).

Horizontal movement, vertical movement

These dialogue box areas each contain 8 editing areas respectively used to set the horizontal and vertical position of the object. The principle is identical to that described above.

« Formats » tab

Formats

For « n format colors » this section is used to select a rectangle, a rectangle with rounded corners or an ellipse.

« Bitmap » tab

File name

For « n bitmap aspects, n bitmap colors and gauge bitmap » this editing area must contain a complete access name to a « .BMP » file. These files can be created with PAINTBRUSH or another graphics editing program able to create « .BMP » files.
The « Scan » and « Edit » pushbuttons are respectively used to search for « .BMP » files and to edit (launch of PAINTBRUSH) « .BMP » file if its name is in the editing area.

Number of aspects

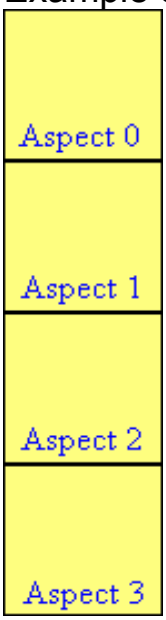
This editing area must contain the number of aspects (images) contained in a « .BMP » file. This option is used for « n bitmap aspects ». The different object aspects must be designed one under the other. The highest aspect is the number 0.

« Wmf » tab

File name

For « Meta files » this editing area must contain a complete access name to a « .EMF » file.

Example of a « .BMP » file with 4 aspects:



The bitmap has transparent areas ...

This option is used to create an object with certain transparent areas (the background of the parent console will be displayed). The transparent areas are set by pixels of the same color, a color established by the three components, red, green and blue. To set these components use the three scroll bars. The color must be precisely set: exactly the same proportion of red, green and blue as the color of the pixels in the transparent areas.

« Colors » tab

Colors

This area is used for « n bitmap colors » and « n format colors » Each line contains the setting for a color. The syntax used for each line is:
proportion of red (between 0 and 255), proportion of green (between 0 and 255) and proportion of blue (between 0 and 255). The first line designates color number 0, the second line number 1, etc.
This area is used for « gauge bitmap » and « gauge format ». The first line (color 0) and the second (color 1) establishes the two colors of the gauge (active and inactive part).

« Gauge » tab

Gauge

This section is used for « gauge bitmap » and « gauge format ». The « Minimum value » and « Maximum value » establish the limits for the gauge drive variable.

Gauge print direction

This establishes one of the four possible directions for the gauge.

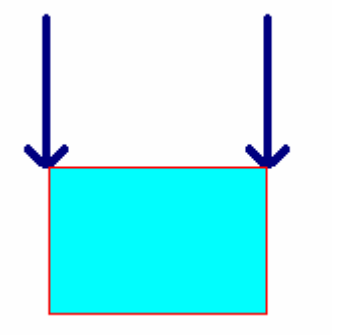
« Sensor» tab

The OBJECT object can be used as a sensor. The sensor is associated with a boolean variable where the result is true if the sensor is in contact with one or more of the preset colors (see below), otherwise it is false.

Detection position

This is used to set the side of the object which must be detected. Detection is effected on the two edges of the selected side.

Example for a detection from below:



Detected colors

A sensor is capable of detecting up to three different colors. If one of these three colors is at the test points then the boolean variable associated to the sensor (see chapter « Links » tab) is positioned at 1, otherwise it is positioned at 0.
The three editing areas can contain a color setting in the format of three values between 0 and 255 which respectively correspond to the percentages of red, green and blue. The percentages of these three colors must exactly correspond to the colors of the object to be detected in order for the sensor to work.

« Options » tab

Key

Set a key used to simulate a click on an object.
Different syntaxes can be used to set the key code:

- a simple character: For example A, Z, 2,
- the $ character is followed by hexadecimal key code,
- the name of a function key, for example F5.

For combinations of keys « CTRL+ » or « SHIFT+ » must be added to the beginning
For example: « CTRL+F4 » or « SHIFT+Z ».

The TAB key is used to access this object

If this is not checked then the TAB key cannot be used to activate the object.

Advanced techniques

Dynamic object linking

This possibility is used to momentarily link one object to another. The « + Position » and « - Position » parameters which manage the horizontal and vertical position are used in a special way for linking one object to another. These two parameters must contain the name of a numeric variable (M). The « + Position » variable must contain the f000 value (hexadecimal) and the « - Position » the identifier of the object to be connected. The « + Position » variable is reset once the connection has been made. To cancel the object connection the value f001 (hexadecimal) must be put in the « + Position » variable. See chapter : Example of operating part simulation 1

Interchanging parameters between two objects

A object can access the parameters of a sister object by using the key word « SISTERPARAM ».
The syntax is:
SISTERPARAM(identifier of the sister object, parameter)
« parameter » can assume the following values :

STATE	object state: Aspect/Color/Filling value
STATE	same as above but with negative value
POSX	position on horizontal axis
POSX	same as above but with negative value
POSY	position on y axis

POSY same as above but with negative value
POSX+STATE position on horizontal axis plus state
POSX+STATE position on horizontal axis minus state
POSY+STATE position on vertical axis plus state
POSY+STATE position on vertical axis minus state

Details of « Sound » object

« Aspect » tab

Object size
This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

« Sounds » tab

Name of sound files
Complete access name to « .WAV » files.

Associated variables
The boolean variable associated to each sound.

Details of « Dialogue box » object

« Aspect » tab

Type of box
This is used to select the various controls present in the dialogue box: only one OK button, two buttons OK and CANCEL, or two buttons YES and NO.

Icons
This is used to select the icon that will appear in the dialogue box. There are four different icons, but it is possible not to display any of them. It is also important to note that a special system is associated to each icon. See the section on the BEEP option for more information on the subject.

Object size
This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Beep

This is used to specify if the dialogue box display must be accompanied by a sound warning.

Title

This is used to specify the title of the dialogue box.

Message type

There are two possibilities. A preset message is a message present in the processing application user variables. The other possibility is to specify a message list in this case the displayed message is a function of the monitored variable state.

« Links » tab

Variable name

This specifies the name of the variable to monitor. Boolean or numeric variables can be entered.

For example:

m200, i0

If the variable is boolean, then message no. 1 on the list will be displayed when the state of that variable passes to 1.

For a numeric variable, if the « Message list » configuration option is checked, then the dialogue box will be displayed when the value is between 1 and the number of messages memorized on the list.

For example, if the list contains 8 messages, then it will not display anything when the variable assumes negative values or those over 8. On the other hand, when the value is between 1 - 8, then the appropriate message is displayed.

If the « Preset message » option is activated, then the dialogue box will display a message of the length contained in the variable, and situated in the processing application variables based on that variable.

For example. if m200=4, this means that a message 4 characters long is situated in the 4 variables following m200, or rather m201, m202. m203, m204.

Dialogue box return code

With a boolean variable, no matter what action the user effects, it contents will go to 0. For a numeric variable, there are different return codes:

Press on an OK button: the variable assumes the value 8000 (hexa)
Press on an CANCEL button: the variable assumes the value 8001 (hexa)
Press on an YES button: the variable assumes the value 8002 (hexa)
Press on an NO button: the variable assumes the value 8003 (hexa)

Comment: Activation of a dialogue box is based on a rising edge, this means passage from 0 to 1 for a boolean variable, and passage from a value outside the message list range to a value included in it, for a numeric variable.

Identifier

This is used to refer to an object in relation to the other objects.

« Messages » tab

Message list

Enter the different preset messages in this area.

Details of « Program » object

Run time distribution

IRIS objects are run by turns. The run time distribution is managed in a straightforward manner by the object manager. two priority levels are possible for « PROG » objects: if Priority run » is checked on the « Program » tab, then the whole program is run while the object is present. Otherwise, only one line is run before the object yields. There are exceptions to this rule: access functions to the processing variables (« READVAR » and « WRITEVAR ») may cause yielding, the YIELD function sets a yield. In priority run mode, this function must be used inside a loop in order not to block running of other objects.

Display

The object surface can be used for displaying information. The « PRINT » function is used to display information.

Syntax

The character « ; » (semicolon) is used as a separator. Comments can be written between the chains « (* » and « *) ». There is no difference between upper and lower case letters for key words and function names, on the other hand, for variable names there is a difference.

Stating variables

The variables used in a program must be stated before the program between the key words « BEGINVAR; » and « ENDVAR; ».
The following types of variables can be used:

INT	16 bit signed integer
UINT	16 bit unsigned integer
LONG	32 bit signed integer
ULONG	32 bit unsigned integer
STRING	string of characters
FLOAT	float

The general syntax of a statement is:
<type> <variable name>;
The general syntax for stating a variable table is:
<type> <variable name> [<length>];

For example:

```
BEGINVAR;
INT counter;     (* a 16 bit signed integer *)
STRING string;   (*a string*)
(*a table of 100 32 bit unsigned integers*)
ULONG table[100];
ENDVAR;
```

Writing a program

The program must be written between the two key words « BEGIN; » and « END; »

Example:

```
BEGIN;
print "Good morning !";
END;
```

Constants

- 16 bit integer: a decimal number between -32768 and 32727 where "S" follows a hexadecimal number between 0 and FFFF. Example: 12, -4, $abcd
- 32 bit integer: a decimal number between -2147483648 and 214743648 where "L" or "S" follows a hexadecimal number between 0 and FFFFFFFF followed by "L". Example: 10000L, -200000L, $12345678L
- string of characters: quotation mark characters followed by a string followed by quotation mark characters. Controls characters can be entered in a string. « \ n » replaces an LF character (ASCII code 10), « \r » a CR character (ASCII code 13). Example: "Abcdef", "" (zero string), "Follow\r\n"

- float: a decimal number followed by the character "R", the characters "." are used to divide the integer part from the decimal part. Example: 3.14r, -100.4r

Assignment

The string « := » indicates an assignment.

Example:

```
counter:=4;
var:="ABCDEF";
```

Calculations

Calculation operators are evaluated from left to right. Parentheses can be used to specify a calculation priority.

List of calculation operators:

- + addition (chaining for strings)
- - subtraction
- * multiplication
- / division
- << shift to the left
- >> shift to the right
- ^ raise by a power
- binary "and" AND
- binary "or" OR
- binary "exclusive or" XOR

Examples:

```
result:=var1*(var2+var3);
result:=result<<2;
```

Tests

Syntax:

```
IF <condition> THEN ... ENDIF;
```

or

```
IF <condition> THEN ... ELSE ... ENDIF;
```

Example:

```
IF (count<100) AND (count>10)
      THEN
      count:=count+1;
      ELSE
      count:=0;
      ENDIF;
```

Loops

Syntax:

```
WHILE <condition> DO ... ENDWHILE;
```


Example:

```
count:=0;
WHILE count<1000
      DO
      table[count]:=table[count+1];
      count:=count+1;
      ENDWHILE;
```

Variable or variable table address

The syntax &variable name or &variable table name provides the address of a variable or variable table. This syntax is necessary for some functions.

List of functions

For the proposed examples below, the following is supposed:
vint is an INT type variable, vlong is a LONG type variable, vuint is a UINT type variable, vulong is a ULONG type variable, vfloat is a FLOAT type variable, vstring is a STRING type variable.

PRINT

Display function. The data to be displayed is written after and separated by commas. Example:

```
print "The result is :",vint/12,"\n";
```

NOT

Complement. This function can be used with the if test to complement a result.
Example:

```
if not(1<2) then ...
```

ABS

Absolute value.
Example:

```
print abs(0-4); (* display 4 *)
```

VAL

Provides the value of a string expressed in decimal number format.
Example:

```
vlong=val("-123456"); (* vlong will contain -123456 *)
```


HVAL

Provides the value of a string expressed in hexadecimal number format.
Example:

```
vuint=hval("abcd"); (* vuint will contain abcd hexa *)
```

ASC

Provides the ASCII code of the first character of a string.
Example:

```
vuint :=asc("ABCD"); (* vuint will contain 65 : ascii code of 'A' *)
```

CHR

Provides a string composed of one character where the ASCII code is changed into a parameter.
Example:

```
vstring:=chr(65); (*vstring will contain string "A" *)
```

STRING

Provides a string composed of n characters. The first subject is the number of characters, the second the character.
Example:

```
vstring:=string(100," ");
(* vstring will contain a string composed of 100 spaces *)
```

STR

Converts an integer numeric value into a string representing the value in decimals.
Example:

```
vstring:=str(100); (* vstring will contain the string "100" *)
```

HEX

Converts an integer numeric value into a string representing the value in hexadecimals.
Example:

```
vstring:=str(100); (* vstring will contain the string "64" *)
```

LEFT

Provides the left part of a string. The first subject is the string, the second the number of characters to extract.
Example:

```
vstring:=left("abcdef",2); (* vstring will contain"ab" *)
```


RIGHT

Provides the right part of a string. The first subject is the string, the second the number of characters to extract.
Example:

```
vstring:=right("abcdef",2); (* vstring will contain "ef" *)
```

MID

Provides part of a string. The first subject is the string, the second the position where the extraction begins, the third the number of characters to extract.
Example:

```
vstring:=mid("abcdef",1,2); (* vstring will contain "bc" *)
```

LEN

Provides the length of a string.
Example:

```
vuint:=len("123"); (* vuint will contain 3 *)
```

COS

Provides the cosine of a real value expressed in radians.
Example:

```
vfloat:=cos(3.14r); (* vfloat will contain the cosine of 3.14 *)
```

SIN

Provides the sine of a real value expressed in radians.
Example:

```
vfloat:=sin(3.14r); (* vfloat will contain the sine of 3.14 *)
```

TAN

Provides the tangent of a real value expressed in radians.
Example:

```
vfloat:=tan(3.14r); (* vfloat will contain the tangent of 3.14 *)
```

ATN

Provides the tangent arc of a real value.
Example:

```
vfloat:=atn(0.5r); (* vfloat will contain the tangent arc of 0.5 *)
```

EXP

Provides the exponential of a real value.
Example:

```
vfloat:=exp(1r); (* vfloat will contain the exponential of 1 *)
```


LOG

Provides the logarithm of a real value.
Example:

```
vfloat:=log(1r); (* vfloat will contain the logarithm of 1 *)
```

LOG10

Provides the base 10 logarithm of a real value.
Example:

```
vfloat:=log10(1r);
(* vfloat will contain the base 10 logarithm of 1 *)
```

SQRT

Provides the square root of a real value.
Example:

```
vfloat:=sqrt(2); (* vloat will contain the square root of 2 *)
```

DATE

Provides a string representing the date.
Example:

```
print "The date is :",date(),"\n";
```

TIME

Provides a string representing the time.
Example:

```
print "The time is :",time(),"\n";
```

RND

Provides a random number.
Example:

```
print rnd();
```

OPEN

Opens a file. The first subject is the file name, the second the access mode, which can be: « r+b » opening in reading and writing, « w+b » opening in writing (if the file exists it is destroyed. The function provides a long which identifies the file. If the opening fails, the value provided is 0.
Example:

```
vulong:=open("new","w+b");
```

CLOSE

Closes a file. The subject is the file identifier provided by the OPEN function.

Example:
```
close(vulong);
```

WRITE

Writes data in a file. The first subject is the file identifier provided by the OPEN function. The second subject is a variable address, the third the number of bytes to be written. The function provides the number of bytes actually written.
Example:
```
vuint:=write(vulong,&buff,5);
```

READ

Reads data in a file. The first subject is the file identifier provided by the OPEN function. The second subject is a variable address, the third the number of bytes to be read. The function provides the number of bytes actually read.
Example:
```
vuint:=read(vulong,&buff,5);
```

SEEK

Moves a file pointer. The first subject is the file identifier provided by the OPEN function, the second the position.
Example:
```
seek(vulong,0l);
```

GOTO

Effects a jump to a label in the subject. The subject is a string.
Example:
```
goto "end"
...
end:;
```

CALL

Effects a jump to a subprogram. The subject is a string containing the subprogram label.
Example:
```
BEGIN;
(* main program *)
call "sp"
END;
BEGIN;
(* subprogram *)
```



```
sp:
print "In the subprogram\n";
return;
END;
```

RETURN

Indicates the end of a subprogram.

READVAR

Reads one or more variables of the processing application. The first subject is the processing variable name (variable or symbol name). The second subject is the variable or 32 bit (longs or floats) variable table address The third subject is the number of variables to be read. If the function is executed with no errors, the value of 0 is provided.
Example:

```
readvar("i0",&buff,16); (* read 16 integers starting from i0 *)
```

WRITEVAR

Writes one or more variables of the processing application. The first subject is the processing variable name (variable or symbol name). The second subject is the variable or 32 bit (longs or floats) variable table address. The third subject is the number of variables to be written. If the function is executed with no errors, the value of 0 is provided.
Example:

```
writevar("o0",&buff,16);
(* write 16 outputs starting from o0 *)
```

CMD

Executes a command. The subject is a string which specifies the command to be executed. This function makes it possible to use preset IRIS commands. For more information see the chapter Special orders . If the command is executed with no errors, the value of 0 is provided.
Example:

```
cmd("run");
```

YIELD

Yields control. This function is used so as not to monopolize the execution when the object is run in priority mode.
Example:

```
WHILE 1
      DO
      ...
      yield();
ENDWHILE;
```

DLL

Calls up a DLL. The first subject is the DLL file name. The second is the function name. The third is a pointer on a 32 bit variable which will receive the function return code. The other subjects are passed to the function.
Example:

```
dll "user","messagebeep",&vulong,-1;
```

Error messages

« separator ';'	missing »a semicolon is missing
« syntax error »	syntax error detected
« variable set more than once »	a variable set more than once
« not enough memory »	the program run has saturated the available memory
« variable not set »	a variable used in the program has not been set
« constant too big »	a constant is too big
« program too complex »	an expression is too complex, it must be broken down
« incompatible variable or constant type »	a variable or constant is not the expected type

« ')' missing »	A closing parenthesis is missing
« ENDIF missing »	The key word ENDIF is missing
« 'ENDWHILE' missing »	The key word ENDWHILE is missing
« label cannot be found »	a goto or subprogram label cannot be found
« ')' missing »	the closing square bracket is missing
« element number outside limit »	a table element outside of the limits has been used
« too many overlapping 'CALL' »	too many overlapping subprograms have been used
«'RETURN' found without 'CALL' »	RETURN found outside a subprogram
« variable size too small »	the size of a variable is insufficient
« DLL file cannot be found »	the DLL file cannot be found
« function cannot be found in DLL »	the function cannot be found in the DLL file
« division by zero»	a division by 0 has been produced»
« mathematical error »	a mathematical function has caused an error

« Aspect » tab

Colors

This is used to select the object background and character color.

Object size

This establishes object dimensions in number of dots. These values can be modified to precisely set the size of an object.

Text

This is used to specify a bubble text which is displayed when the cursor is on the object.

« Program » tab

Program

This editing area contains the program.

Run

If this is checked than the program is run.

Priority run

If this is checked than the program is run more rapidly.

Run at start-up

If this is checked then the program is run when the object is opened. This option is used to save an object with the « Run » option not checked by requesting a run when the object is loaded.

Go to the error

If an error has been detected when a program is running, then the pushbutton is used to place the cursor in the place that caused the error.

IRIS 2D examples

The examples file names refer to the « Examples » subdirectory of the directory where AUTOMGEN is installed.

Example of composed objects

This example is used to let you understand how to create a « Decimal keyboard » object composed of keys. « 0 » to « 9 » plus a key [ENTER] for validating.

You will create a « Console » object, then starting from the console menu you will create an « Illuminated Button » object. We are going to set parameters for this object then we will duplicate it to obtain other keys. Then we will adjust the duplicated key properties to customize them: text display on the key and action We will then have a keyboard with a uniform key aspect.

Link with the application will be effected by using a word.

When a key is pressed it will write its code (0 to 9 or 13 for the validation key) in that word.

To specify that word we can give its name in the action section of the properties for each object. The problem is that when we reuse the « Decimal keyboard » object and if we want to use another word, it is necessary to modify the properties of the 11 « Illuminated button » objects.

To get around this problem we are going to use the possibility that sister objects have of accessing a parameter set in the properties of the parent console. The « Links » tab of the console property window is used to set the parameter. Only write on one line in the editing area. « KEYBOARD=M200 ». This line means that the keyboard parameter is equal to M200.

The keyboard keys refer to the « KEYBOARD » parameter and not directly to word M200. To change the word used, just change the parameter setting in the console properties.

Going back to the aspect of our keyboard...

In order for the aspect of the keyboard to be satisfactory we are going to set a grid to align the keys. In the console properties window and the « Options » tab write the value « 10 » in the two « Grids » sections This way the function moved from the console menu will use a 10 pixel grid. We are also going to set the dimensions for the first key. We can directly modify the dimensions of the key by dragging it by its edges, but for greater precision we are going to modify the dimensions form the « Object size in pixels » section of the « Illuminated Button » object window property tab.

For example, enter « 30 » for the width and height.

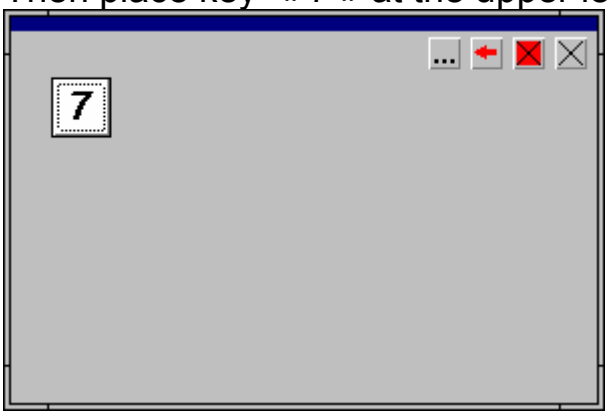
At this point you can also customize the style of the key. the color and font used for marking etc.

We are going to place this first key to the upper left of the keyboard (this is an arbitrary choice). The keyboard we are going to create will look like the numberpad of a computer keyboard. We are then going to mark this key with the text « 7 » in the « Text » section of the « Aspect » tab.

We are also going to set parameters for the functional aspect of the key: in the « Action when the button is pressed » section of the « Links » tab we are going to write: « PARENTPARAM(KEYBOARD)=7 ». This means that when the pushbutton is pressed the word designated for the « KEYBOARD » parameter of the parent console will receive the value 7. Delete whatever is in the « Action when the pushbutton is released'» section.

We can also assign a computer keyboard key to the « Illuminated Button » object. Then it will be possible to use the keyboard with the mouse or computer keyboard. To assign a key to the « Illuminated Button », object use the « Key » section of the « Options » tab. For example, enter « 7 » to associate computer keyboard key « 7 » to the object.

Then place key « 7 » at the upper left of the keyboard, like this:



To move this key, select the object ((SHIFT) key pressed, then click with the left side of the mouse on the object), then use the « Move » function from the console menu. This function is the only one which uses the grid instead of moving by dragging the bar of sister objects.

To create other keys, duplicate the existing key:

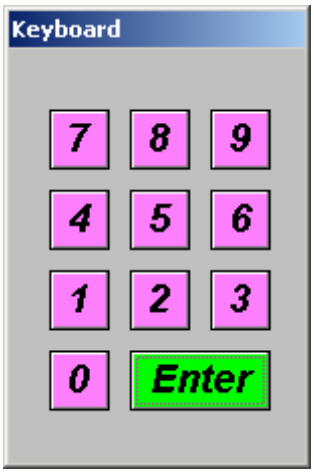
- select the first key,
- select « Copy » from the console menu, then « Paste »
- move the previously pasted key,
- set parameters for the new key: (text, links and computer keyboard key).

When you have finished the above row (keys « 7 », « 8 » and « 9 ») you can then select all three keys together and duplicate them.

You can create a validation key (wider for filling the surface of the keyboard).

To finish, resize the console and put the objects in « Employ » mode.

The final result should look like this:



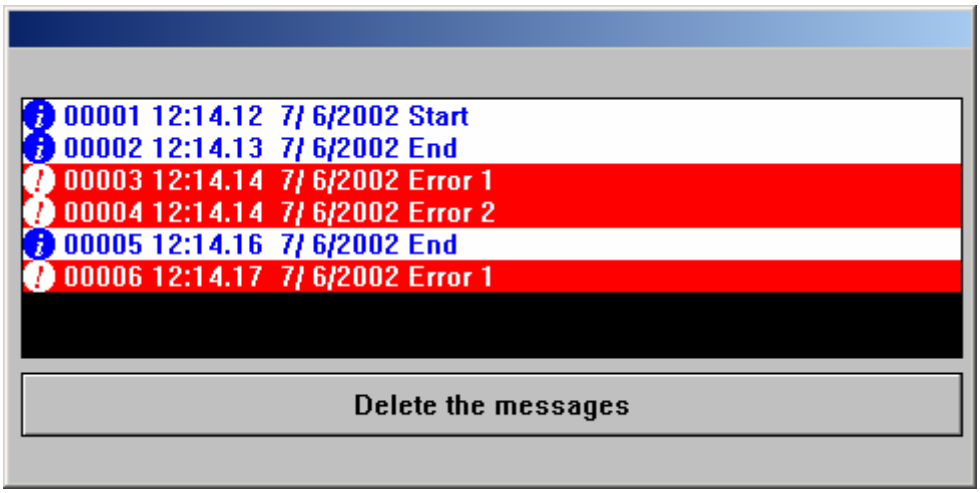
« Examples\IRIS2D\keyboard.agn »

Example of using the « Screen, keyboard, message list » object as a message list

Instructions:

- the object must display four different messages based on the state of four inputs (i0 to i3),
- for input 0 : an information message « Start cycle »,
- for input 1 : an information message « End cycle »,
- for input 2 : an error message « Error 1 »,
- for input 3 : an error message « Error 2 ».
- the messages must be displayed when the rising edge of the inputs appears,
- a record of 50 messages will be kept in the object and saved on the disk,
- the messages will be duplicated by a printer connected on « LPT1 : »,
- a pushbutton must be used to delete the messages.

Solution:



« Examples\IRIS2D\screen keyboard 1.agn »

Variation:

Pressing on the pushbutton « Delete the messages » causes the « Do you want to delete messages » dialogue box to open with a choice of YES or NO.

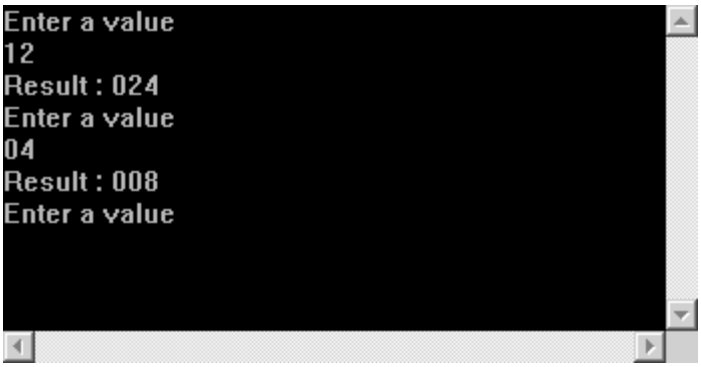
Solution:

« Examples\IRIS2D\Screen keyboard 2.agn »

Example of using the « SCREEN KEY » object as a terminal

Instructions:
Display a message « Enter a value », requires that a decimal value be typed on the keyboard (two characters) then displays that value multiplied by two after the « Result : » text.

Solution:



« Examples\IRIS2D\terminal 1.agn »

Variation:
The displayed messages are stored in the object and no longer in the processing application.

Solution:
🖫 « Examples\IRIS2D\terminal 2.agn »

Example of an application composed of multiple pages

This example will let you understand how to create an application composed of multiple elements: in this case a menu is used to access two different pages.

🖫 « Examples\IRIS2D\menu.agn »

Example of using the «OBJECT » object

Simulation of a jack.

Instructions:

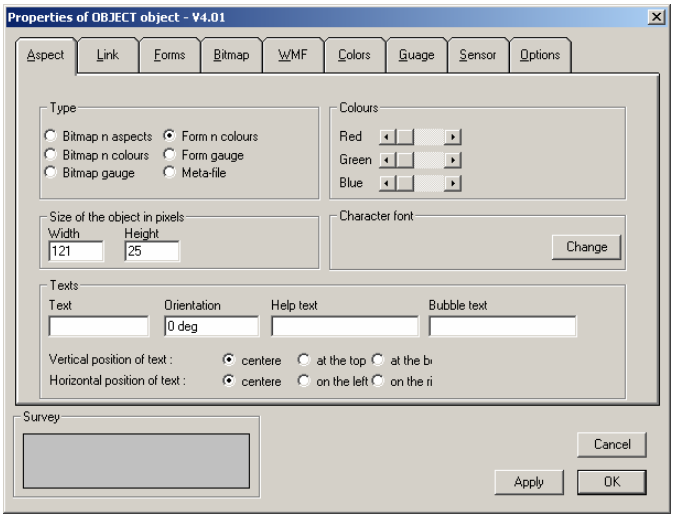
- jack driven by two o0 outputs (extract the jack) and o1 (retract the jack).
- two limit inputs i0 (jack retracted) and i1 (jack extracted.

Three objects will be used:

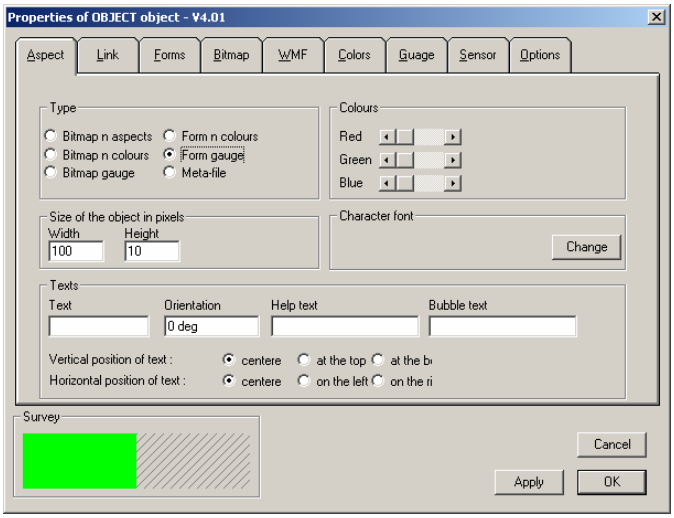
- a « Console » object acting as support,
- an « Object » for the jack body,
- an « Object » for the jack shaft.

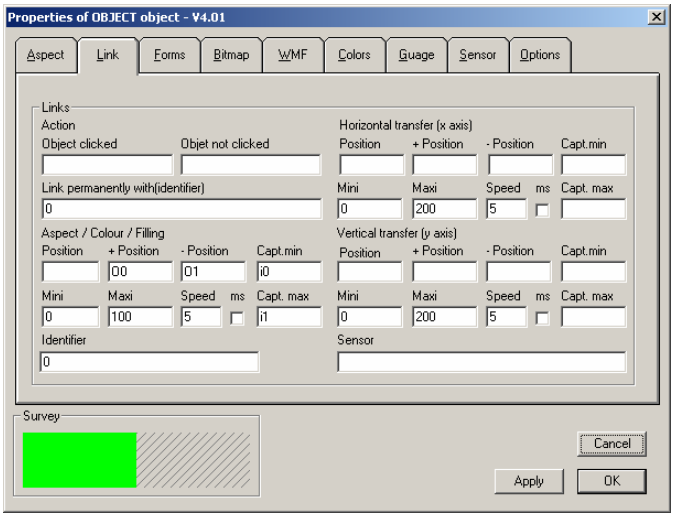
Solution:

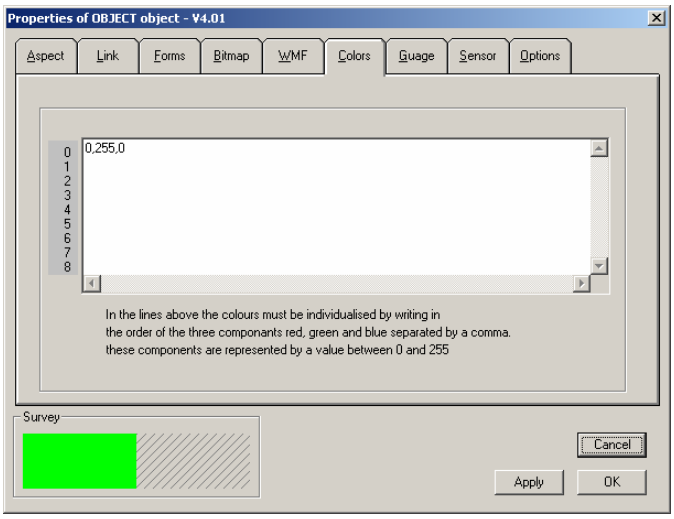
The jack body is an OBJECT object which remains static, only its aspect is configured:

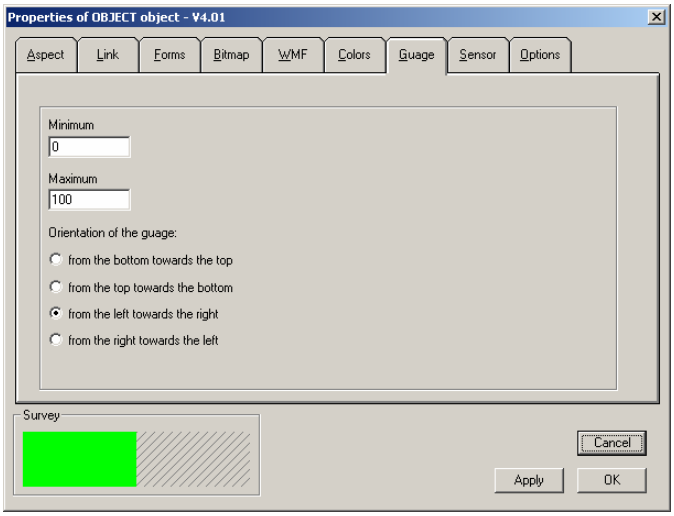


The jack shaft is an OBJECT object configured as follows:









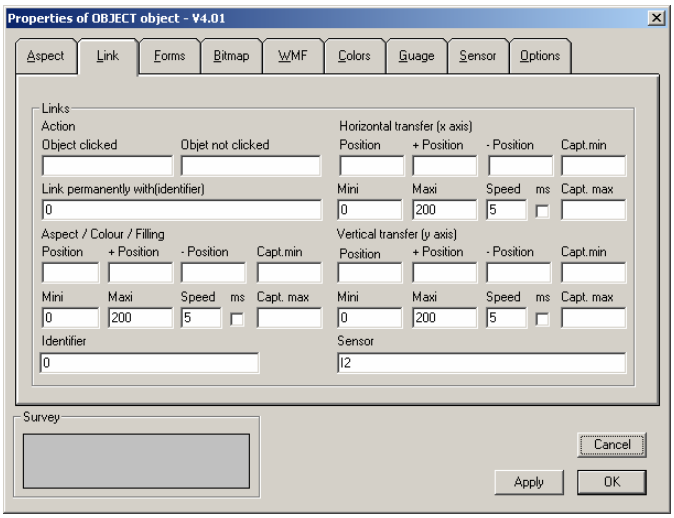
« Examples\Simulation PO\2D\tutorial1.agn »

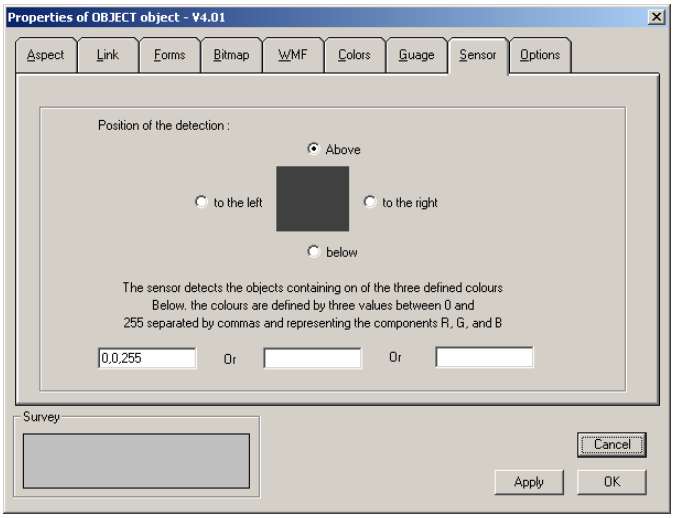
Variation:

An intermediate position needs to be added on the jack. We are going to use two supplementary objects for this: a piece attached to the jack shaft which will activate a sensor and a sensor.

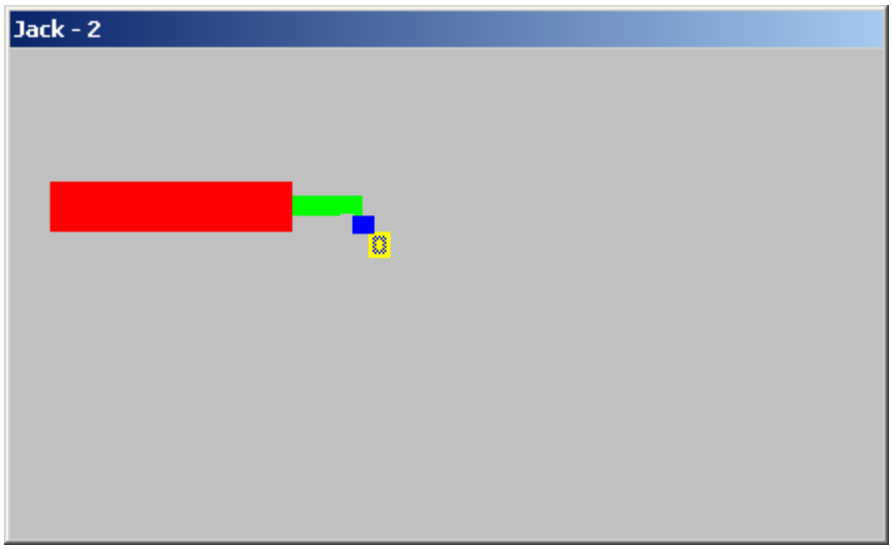
To connect the piece activating the sensor to the jack shaft, the jack shaft needs to be associated to an identifier: in the « Identifier » section of the « Links » tab write « 100 ». To connect the piece to the shaft, in the « Horizontal movement, Position» section of the « Links » tab write: « SISTERPARAM(100,STATE) ». This connects the piece with the jack shaft state.

The object used as a sensor is set with parameters as follows:



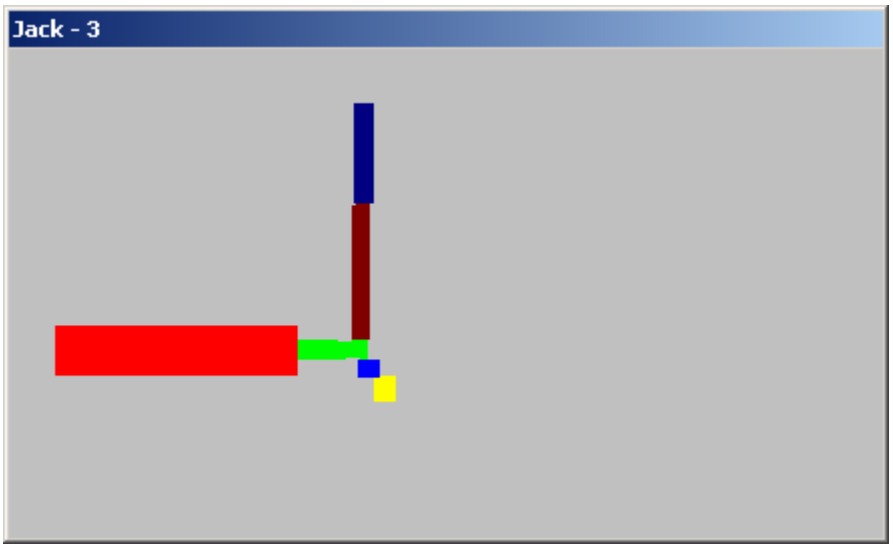


The result is as follows:



« Examples\Simulation PO\2D\tutorial2.agn »

Second variation:
A vertical jack attached to the horizontal jack shaft is added. This jack is activated by one output (O2=1 to extract the jack, O2=0 to retract it). Two limits are associated to i3 and i4.
The result is as follows:



« Examples\Simulation PO\2D\tutorial3.agn »

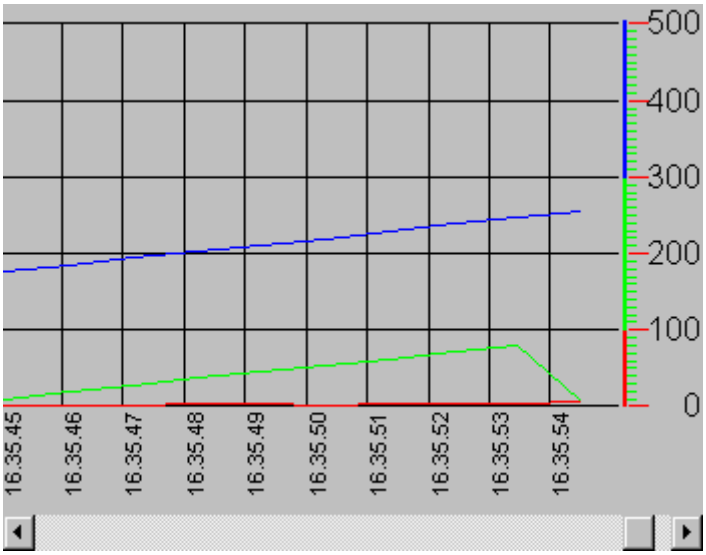
Two OBJECT objects are added: one for the body of the jack and one for the shaft.

Example of using the «ARCHIVE» object

Instructions:

- archive the state of 3 words of the processing application (m31 to m33) every second.
- the state of 4 words will be displayed on a graph left on display for 10 seconds of acquisition.
- 1000 values will be memorized in the object.
- the acquisitions will be archived in a text format « data.txt » file.

Solution:



« Examples\IRIS2D\archiving »

Example of using the «PROG » object

Instructions:

- pressing on a pushbutton must cause the inversion of the output states O0 to O99.

Solution:

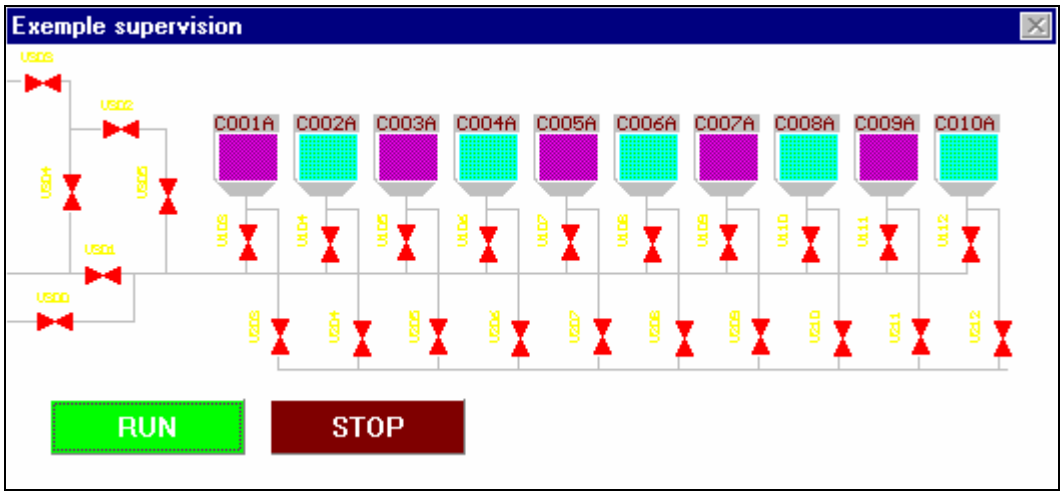
« Examples\IRIS2D\program.agn »

Examples of supervision application 1

The following example illustrates the creation of a supervision application. The supervision application displays the state of gates and

the level of tanks. The user's actions on the gates will invert the gate state (open or closed). The RUN/STOP state of the application will also be displayed and two pushbuttons will be used to go from RUN to STOP.

The result is as follows:



« Examples\IRIS2D\supervision 1 »

OBJECT objects will be used to represent the gates. A bitmap file is created to represent the gates: open state (green) and closed state (red):

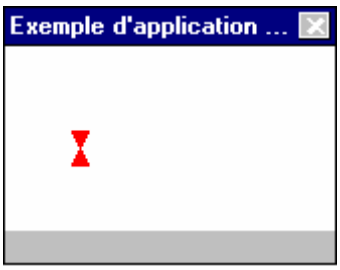
Examples of supervision application 2

This example illustrates the use of a more evolved OBJECT object. The application displays the state of a gate which can be:

- gate open (commanded opening and open gate sensor true): green,
- gate closed (commanded close and closed gate sensor true): red,
- gate opening in progress (commanded opening and open gate sensor false): blue,
- gate closing in progress (commanded closing and closed gate sensor false): purple.

The user can invert the gate state by clicking on it.

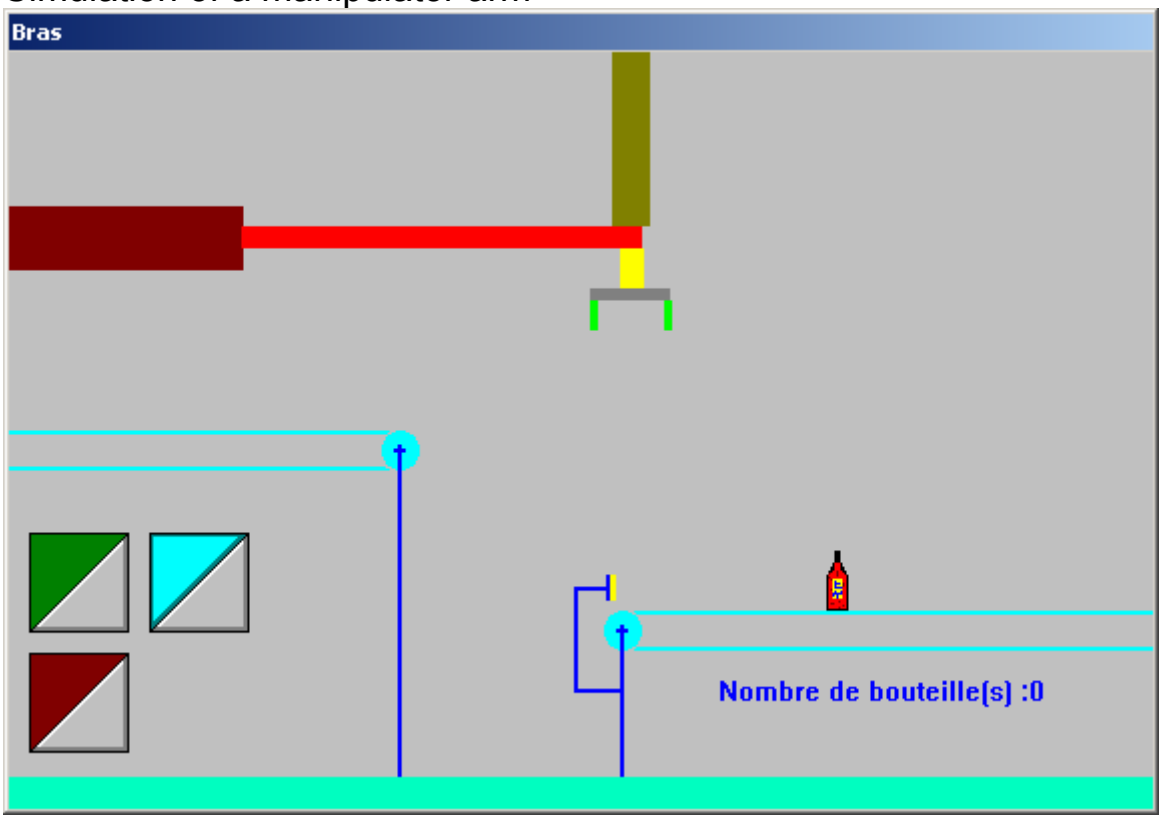
The processing application manages the gate state.



« Examples\IRIS2D\supervision 2.agn »

Example of operating part simulation 1

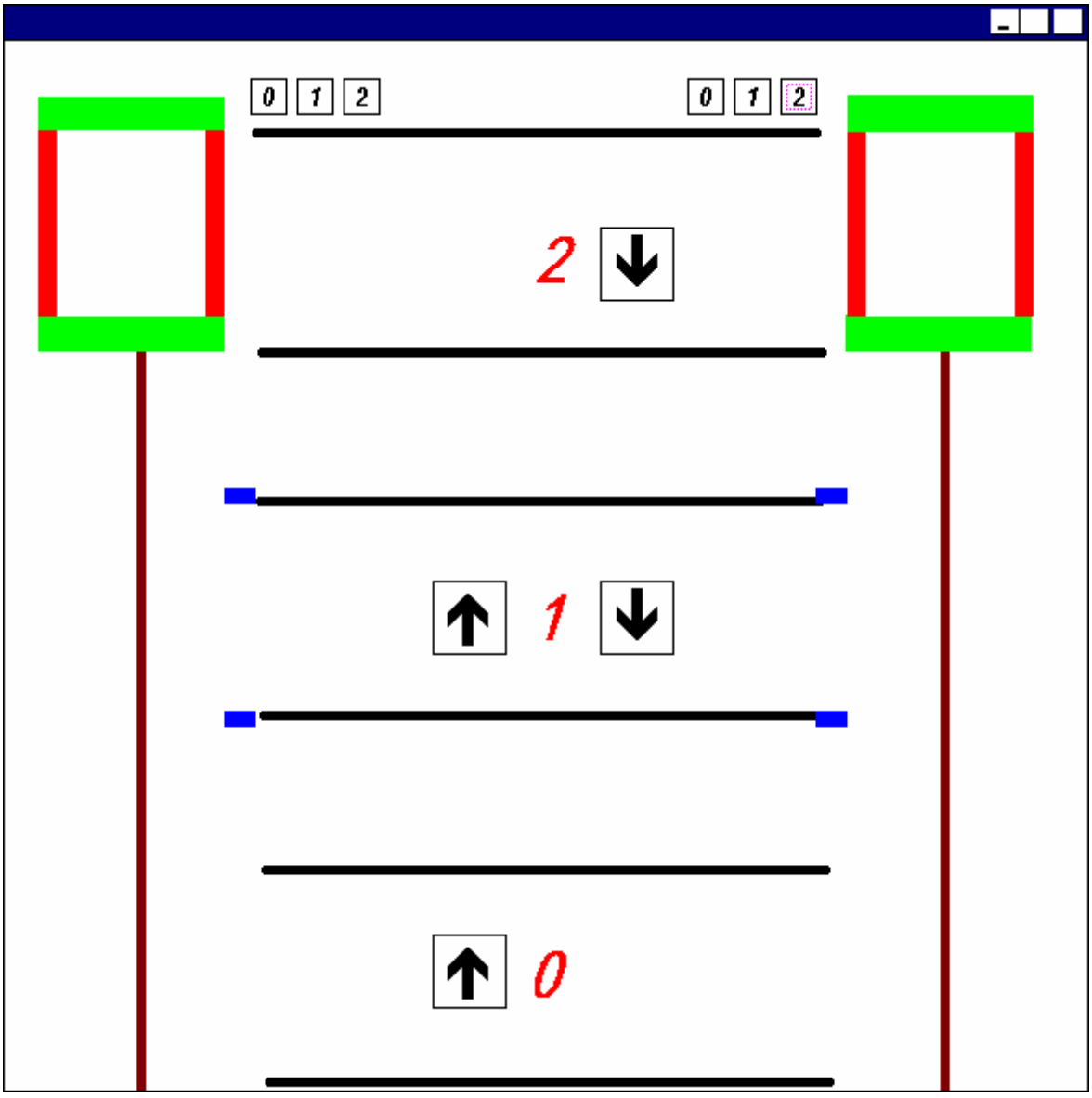
Simulation of a manipulator arm



« Examples\Simulation PO\2D\manipulator arm.agn »

Example of operating part simulation 2

Simulation of an elevator



« Examples\Simulation PO\2D\elevator.agn »

IRIS 2D objects are used to create supervision and simulation applications of 2D operating parts.

IRIS 3D references

IRIS 3D is used to create simulation applications of 3D operating parts.

IRIS 3D is used to animate 3D objects using standard model makers: 3D STUDIO, SOLIDWORKS, SOLIDCONCEPTER, etc …

The native format of the files processed by IRIS 3D is « .X » files set by Microsoft's DIRECTX 8.

A « .3DS » to « .X » converter is integrated into the environment.

The CROSSROADS program provided on the AUTOMGEN installation CD-ROM or downloaded from www.irai.com is used to convert a significant number of 3D files to « .3DS » format.

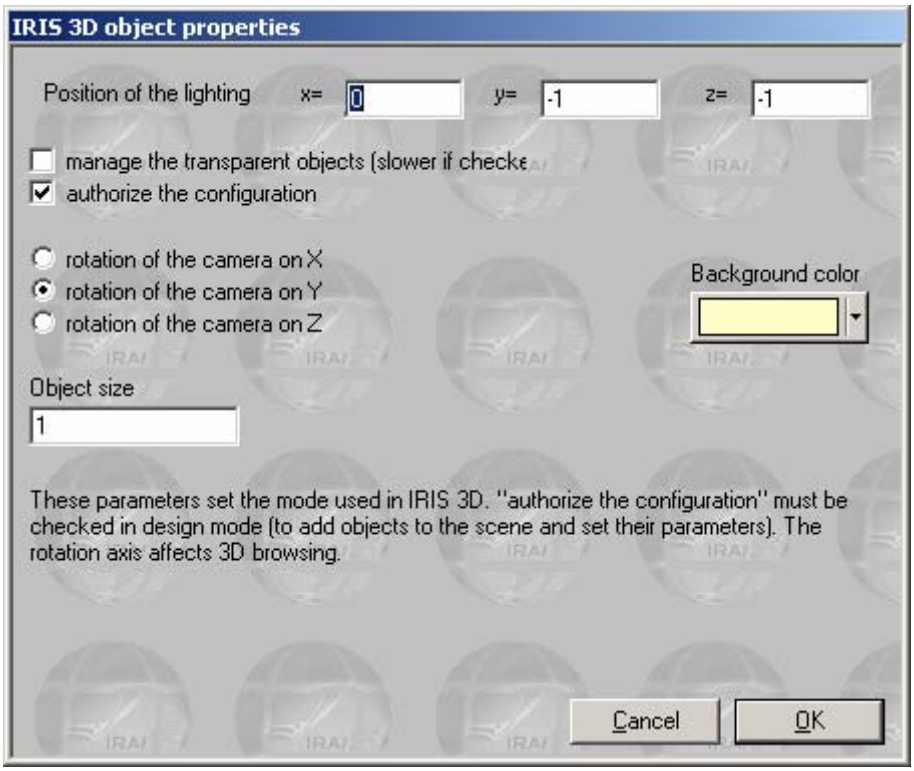
IRIS 3D is in a window format enclosed in the IRIS 2D console. 3D objects are animated on the console.

Each 3D file represents an object in IRIS 3D. The elements in an operating part must have their own movement and must be represented by separated files. For example, for a jack composed of a body and a shaft, files must be created for the jack body and for the jack shaft.

To create animation of objects in a 3D world, one or more behaviors can be applied to each of the objects. A behavior is composed of an object modification (moving, changing color etc.) and a link with the processing application variables to condition this modification. For example: extract the jack shaft if the output for the processing application is true.

Creating an IRIS 3D console

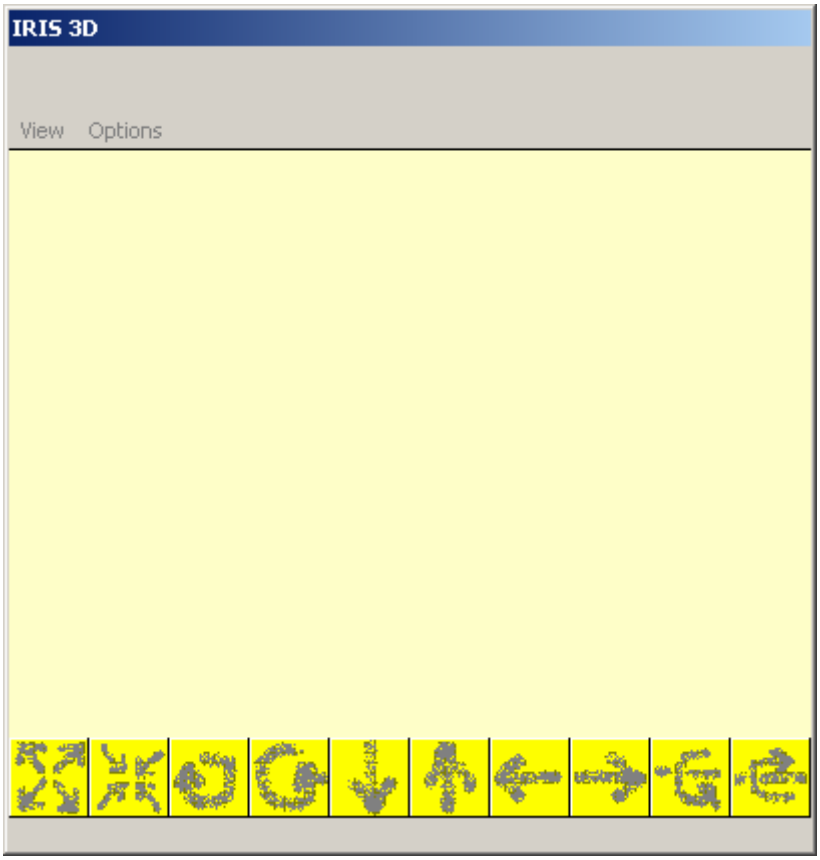
With the right side of the mouse click on the « Iris » element on the browser and then select « Add an IRIS 3D console ».



Creating an IRIS 3D console

Adding 3D files to the project

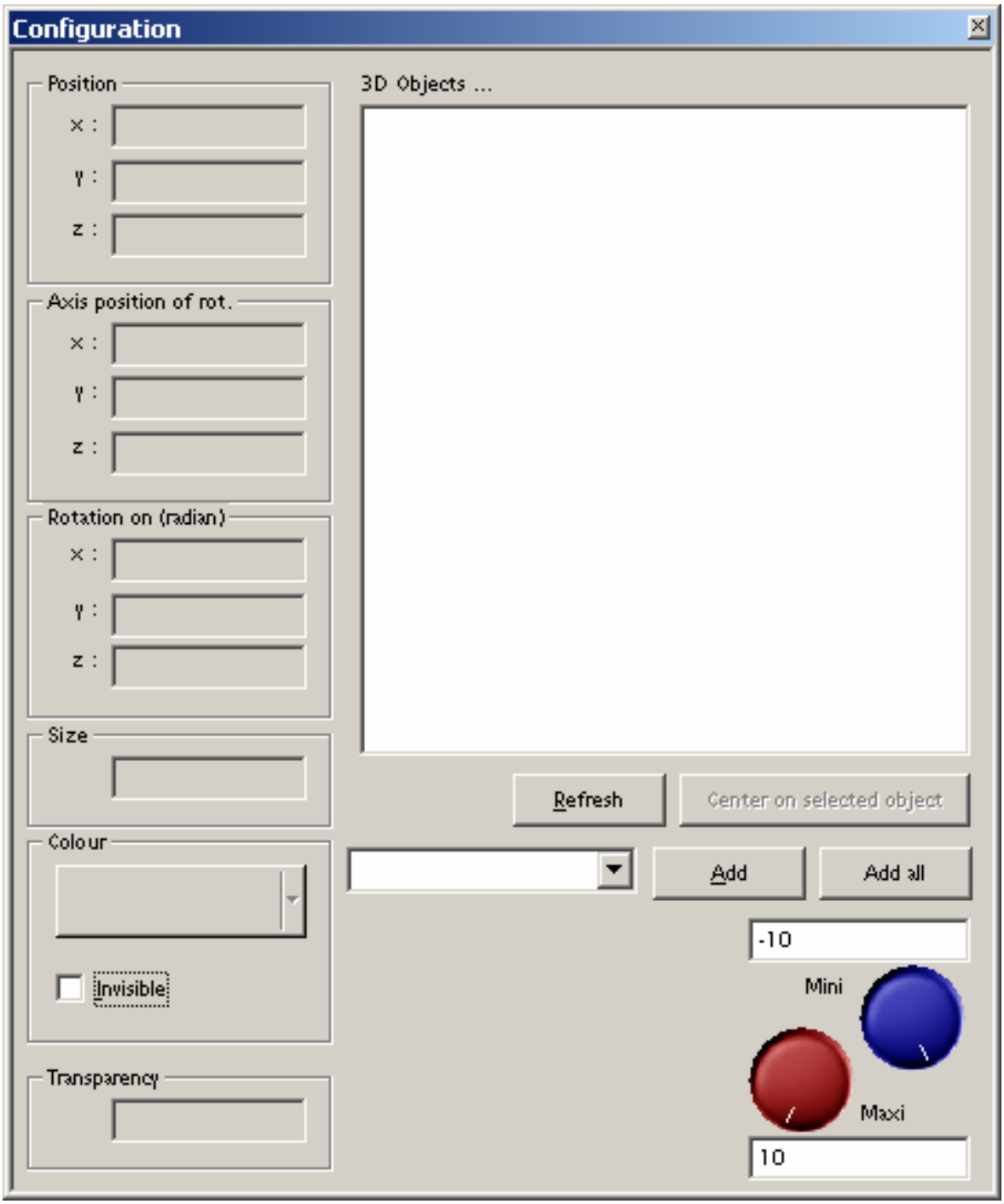
With the right side of the mouse click on the « Resources» element on the browser and select « Import one or more 3D files » from the menu. Select one or more « .3DS » files. (if your files are not in « .3DS » format, use « CROSSROAD » to convert them).



The IRIS 3D console

Configuring the objects

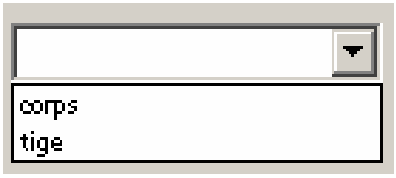
Select « Open the configuration window » from the « Options » menu on the IRIS 3D window.



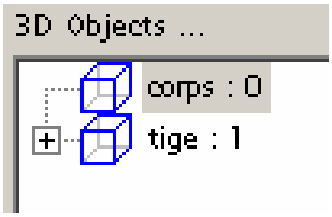
The IRIS 3D configuration window

Adding objects to the 3D world

By clicking on the  element you access the list of 3D objects present in the resources. For example:



By selecting an object on that list and clicking on « Add » you add the selected object to the 3D world. By clicking on « Add all » you add all the objects on the list to the 3D world. The objects you have added will appear on the list in the configuration window.



Removing a 3 file from the resources

With the right side of the mouse click the 3D file on the browser and select « Delete ». The object needs to be deleted from the 3D world.

Removing an object from a 3D world

Click with the right button of the mouse on the object in the IRIS 3D configuration window and select « Delete from the menu. »

Applying a behavior to an object

Click with the right button of the mouse on the object in the IRIS 3D configuration window and select « Add … » from the menu. ».

Name of AUTOMGEN variables

The name of AUTOMGEN variables used in the behaviors are limited to the following syntaxes:

Access to boolean variables

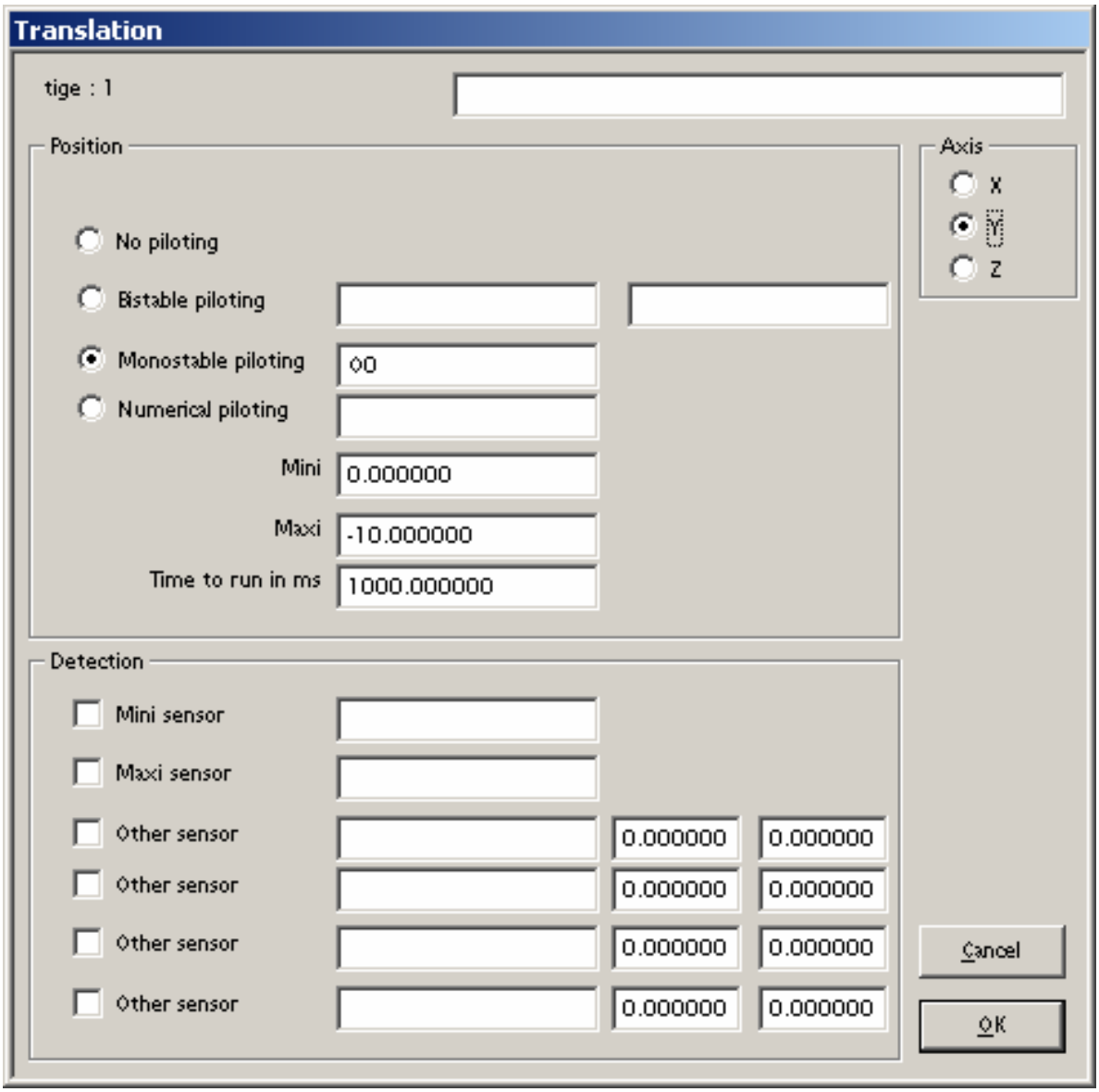
On : output « n », for example O8, O10,
/On : complement of the output « n », for example /O1, /O15,
In : input « n », for example 10,14,
/In : complement of the input « n », for example /I4, /I56,
Bn : bit « n », for example B100, B200,
/Bn : complement of bit « n », for example /B800, /B100,

The access to bits B is limited to a table of linear bits, a command #B must be used to reserve bits (see the language manual),

Access to numeric variables

Mn : word « n », for example: M200, M300
Fn : float « n », for example: F200,F400

Adding a translation



Properties of a translation

Name

The first area is used to enter a generic name for the translation. This name appears in the list of the IRIS 3D configuration window, it is only used for comments and can be left blank.

Axis

Establishes the dimension to be applied to the translation.

Type

- without driving: no translation, this is used to make a translation inoperable without needing to delete it (to run tests for example)/
- bistable driving: two boolean variables: the translation is driven by two boolean variables: the first drives the translation in one direction (from min to max), the second in the other direction (from max to min).

State of the first variable	State of the second variable	Object
0	0	Immobile
1	0	Translation of min to max
0	1	Translation of max to min
1	1	Immobile

- monostable driving : a boolean variable drives the translation if the variable is true

Variable state	Object
1	Translation of min to max
0	Translation of max to min

- numeric driving: the position of the object on the designated axis is equal to the specified numeric variable.

Amplitude and origin

The « Min » and « Max » areas establish the amplitude and origin of the translation.

Speed

The stroke time establishes the speed for going from the min point to max point (it is identical to the return speed).

Detection

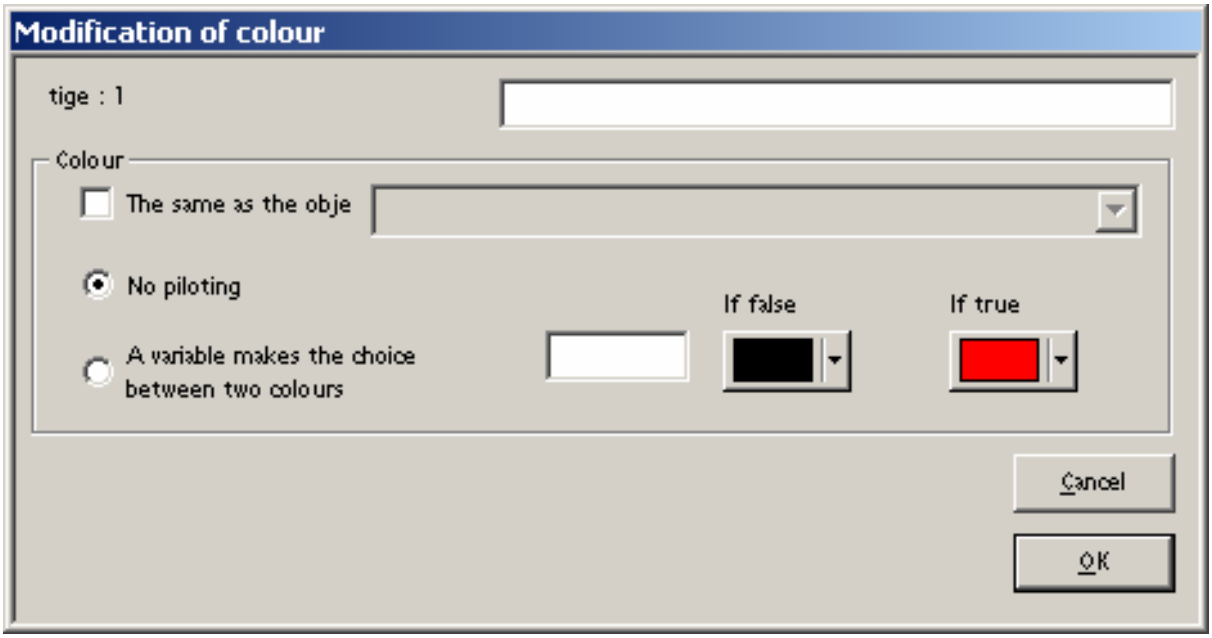
This is used to set the sensors for the translations. The min and max sensors manage the limits, the other 4 possible sensors can be used to create intermediate positions.

Adding a rotation

The parameters are completely similar to the translations see chapter Adding a translation. The angles are expressed in radians.

The object rotation center must be set for each object in the IRIS 3D configuration window.

Adding a color change

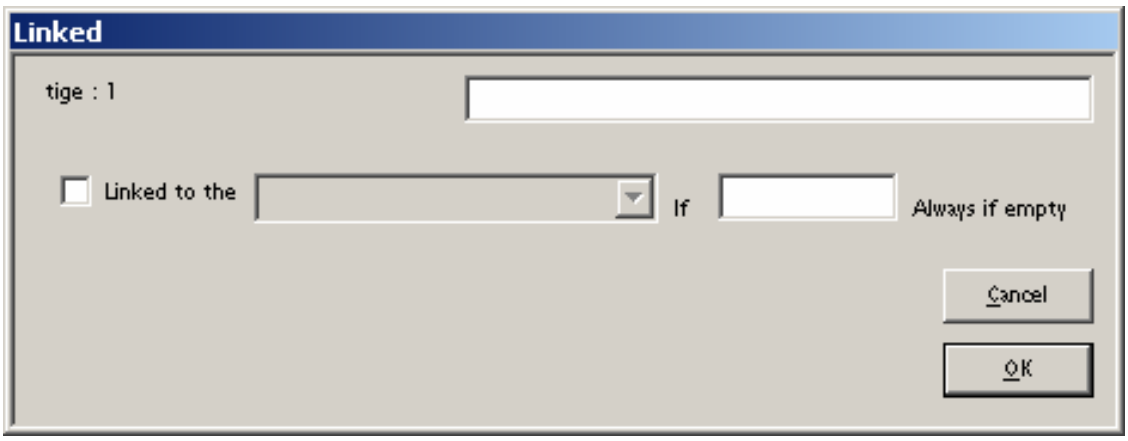


Color change

Driveing of a color using a variable must refer to a boolean variable.

Adding a link

A link forces an object that this behavior is applied to, to follow the movements of another object.

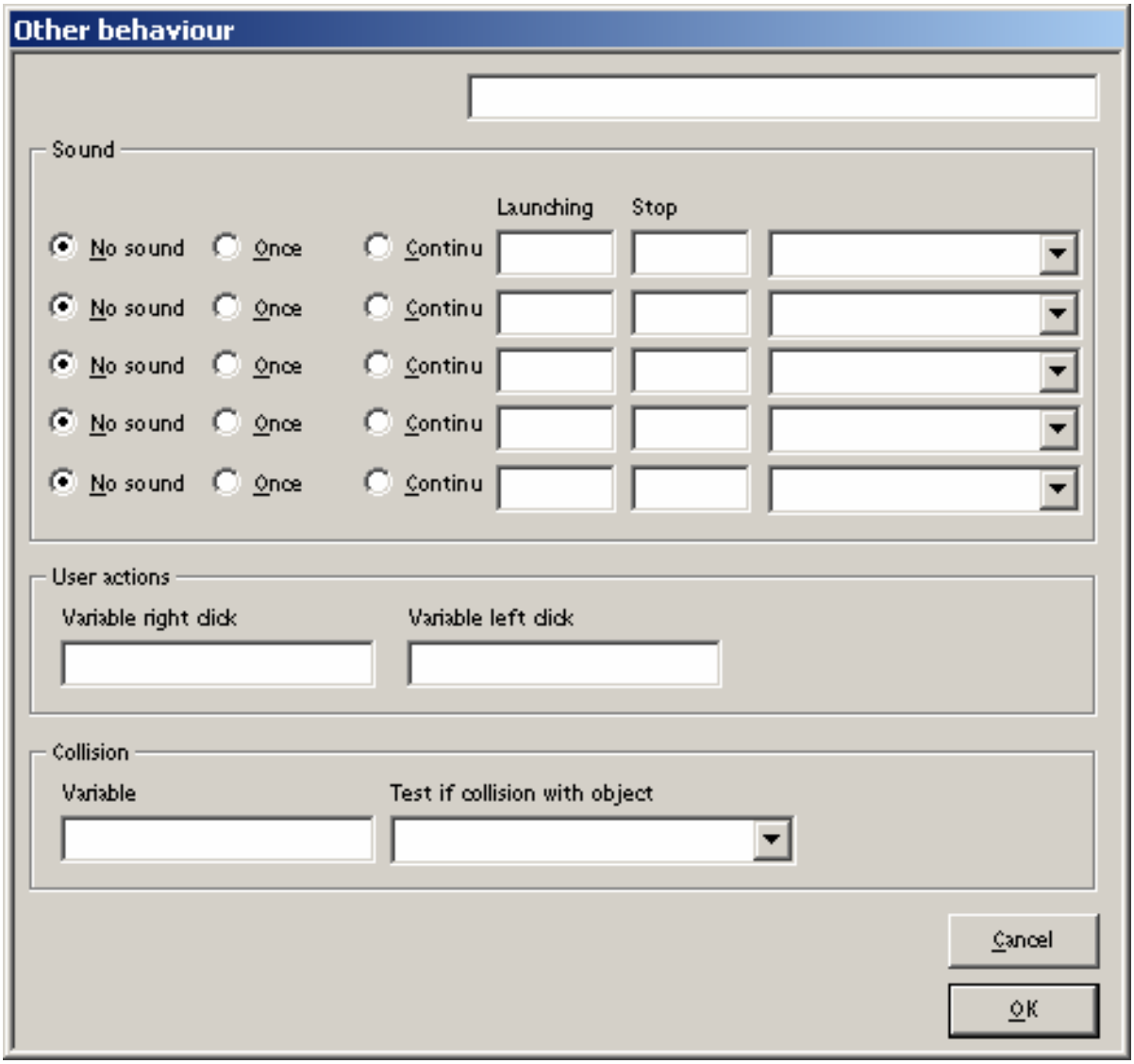


Links between objects

The link condition can be a boolean variable. The link is unconditional (object always linked) if the condition is left blank.

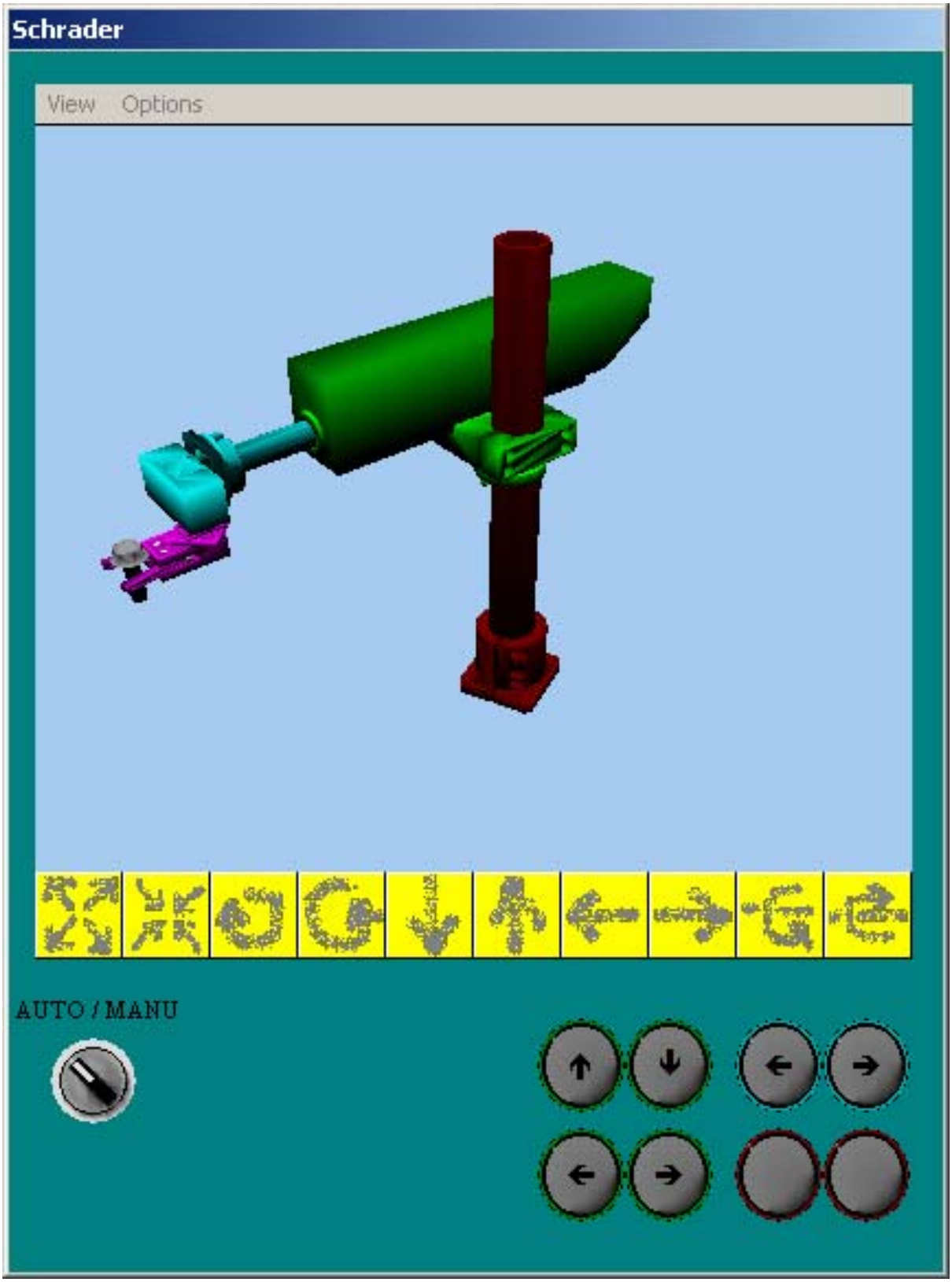
Adding another behavior

This is used to use a sound associated to a condition, or to change a boolean variable to 1 when the user clicks with the right or left side of the mouse on the object the behavior is applied to.



Other behaviors

IRIS 3D example



« Examples\Simulation PO\3D\Scharder.agn »

IRIS 3D is used to design simulation applications of 3D operating parts. The objects must be created in a standard model maker and imported in the AUTOMGEN project resources. Behaviors are then applied to the objects to create 3D animations.

