



**Drives and
Automation**

SBL PROGRAMMING SOFTWARE

SAF Block Language - Graphical Editor

Software Users Guide

Manual Version 1.70

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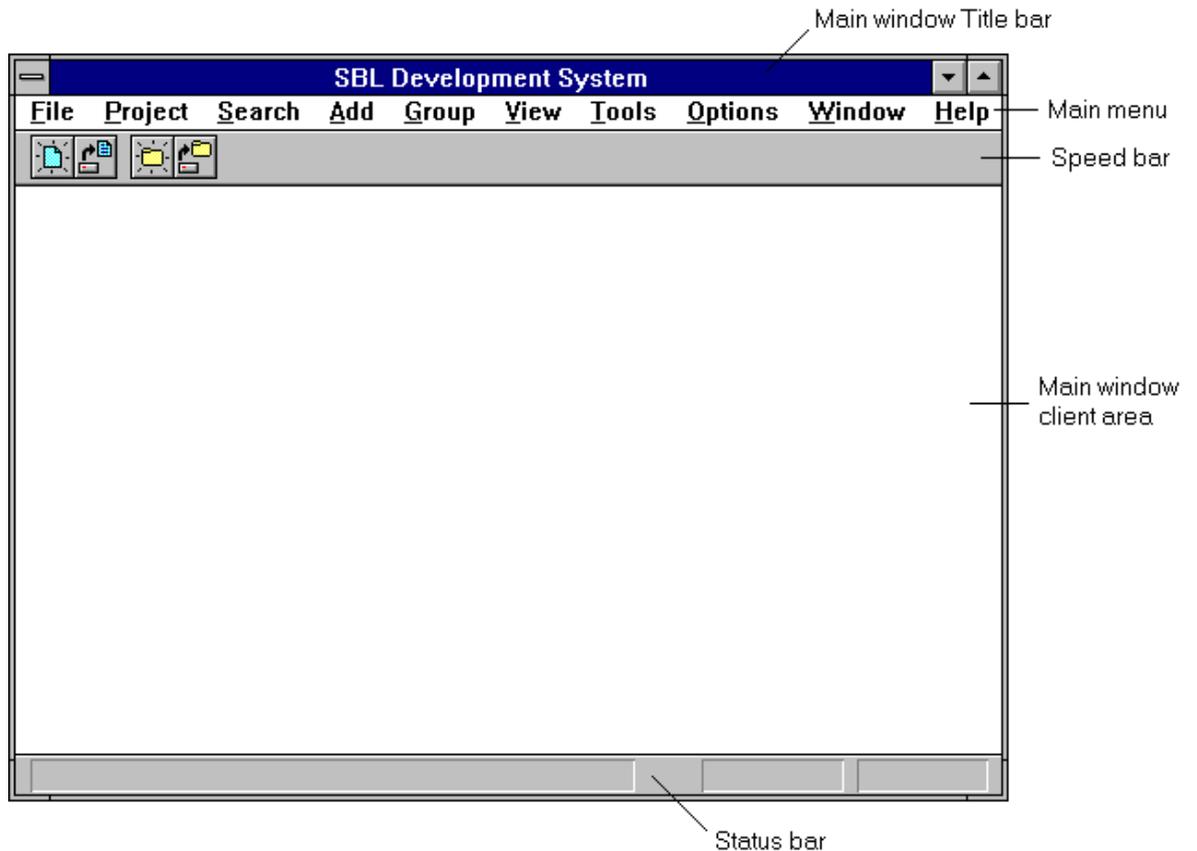
Introduction to SBL Development System

SBL Development System for Windows is a graphical block language editor with many powerful integrated debugging tools to help you create, debug and maintain **SAF Block Language** programs quickly and efficiently.

Features

- Graphical block language editor
- Password protected macros
- Graphical annunciator
- 16 channel real-time scope
- 16 channel chart recorder with trigger
- Text based multi node annunciator
- All objects snap to a grid for easy alignment
- Multiple zoom levels
- Symbol table for quickly locating symbol names
- Context sensitive speed bar
- Context sensitive popup menus

Main Window



Main window title bar

If a project is open the project name will be appended to the main title.

Main menu

Hi Light a menu command and press **F1** for a description of that command.

Speed bar

The speed bar contains icons which function as buttons to provide quick access to some of the more frequently used menu commands. The commands available from the speed bar depend on the type of window currently active.

Main window client area

All SBL windows are confined to the main window client area. Windows can be tiled or cascaded within this space and the project and report windows are tiled and cascaded in the bottom portion of this space.

Status bar

The status bar displays various messages including fly by hints for speed bar buttons, as well as cursor coordinates for sheet windows and the modified status of the current window.

Introduction to SBL Programming

The **SBL Development System** has been developed by **SAF Drives and Automation** to provide an efficient, user friendly programming environment for creating, debugging and maintaining **SAF Block Language** programs. **SBL** programs are created by combining graphical objects such as blocks, constants, labels and tags. These objects are placed on sheets and connected together using graphical connections. Connections between sheets are made by placing a label on a connection in one sheet which can then be referenced from labels on any other sheet in the project. Labels can also be used to make connections between points on the same sheet. A symbol table with browse and search features is provided to make using labels easier and more efficient. Blocks are chosen from SBL block libraries which can be updated as new functions are added to the **SAFphire**. Constants provide a means of initializing values within an SBL program such as limits, references, scaling factors, etc. When connected to tags these constants can also be adjusted or tuned through the hand held terminal of the **SAFphire**. Hand terminal access passwords are defined by placing a password table within the program. Fault messages can also be defined by adding a fault table to the program. Comments can be placed throughout SBL drawings as a means of documenting changes or explaining the operation of the program. Revision blocks are also available to track modifications made to each sheet.

Macros provide a means for the user to create custom blocks. Macros are created by placing objects on a sheet to perform a desired function. Two additional objects, inputs and outputs, are available when creating macros. Connections to objects within a macro from objects on other sheets or macros can only be made through inputs and outputs. Labels can still be used to make connections within a macro. When editing a macro, browsing the symbol table will only display symbols valid for that macro. When a macro is added to a sheet or other macro it will have the appearance of a block. The input and output names of this block will match the names of the input and output objects that were placed on the macro sheet. The only limit to the size of a macro is that it must fit on a single sheet, but macros can also include other macros. The SBL editor and compiler support nested macros up to 16 levels deep. Macros can be added as many times as needed and to as many sheets as needed. The only limit is that a macro can not be used more than 999 times in the same program which is more than adequate for even the largest programs. Macros, when used effectively, can save time, improve readability and reduce the size of your projects making them easier to maintain. Any changes made to a macro are automatically made to every occurrence of that macro in the project. Because macros can be used more than once in a project it is advised that hand terminal tags are not used in

macros since this would result in the existence of more than one tag with the same name. This will generate warnings when the project is compiled and only the last occurrence of the macro will have a valid tag.

Another feature of macros is the ability to password protect sections of your program. Macros that have been saved with a password cannot be viewed, edited or printed without first entering the password. Whenever the SBL editor attempts to open or save a macro it prompts the user for the password. When saving the macro the user also has the option of changing the password.

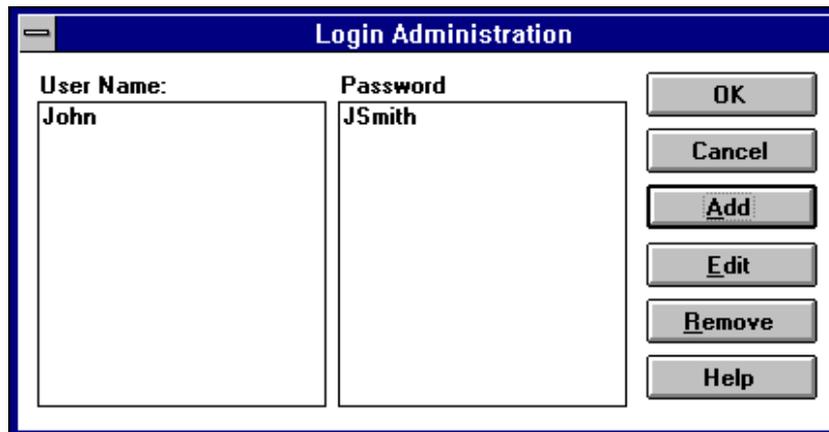
Although an SBL program can consist of only a single sheet most require many sheets to implement all of the required functionality. Projects are used to combine many sheets into one SBL program. Sheets are added to a project to inform the SBL editor and compiler which sheets are to be included in the program. The execution order of the sheets is determined by the order in which they appear in the project listing. This order can be changed by dragging and dropping the file names in the project window. The project window will also display any macros that are included in any sheet or macro. All File types that can be created with SBL can be added to a project so that copying or printing a project will include all files related to the project. File type other than sheets or macros are ignored by the compiler so they can appear anywhere in the project listing.

Logging In As Administration

Before anyone can access the **SBL** Development System they must be assigned a user name and password. The user name of the user currently logged in is placed in the title blocks of all sheets created or edited by that user. It is also included in the information table downloaded to the SAFphire whenever a program is downloaded.

Only the system administrator using the user name **super** is allowed to add, edit or remove user passwords. When first installed the system administrator password is **user** but should be changed to prevent unauthorized access. See Changing System Administrator Password for information on how to do this.

To add, edit or remove passwords enter **super** for the user name and the system administrator password and click on the **Admin** button or press  to access the **Log In Administration** dialog box. A list of the current user names and their passwords will be displayed.

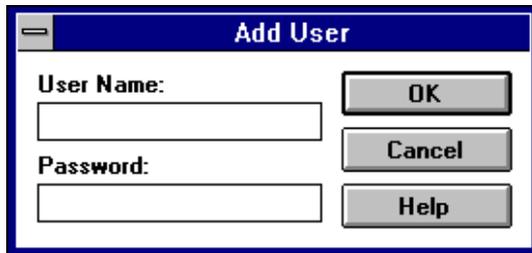


 **Note:** Both the user name and password are case sensitive.

Adding New Users:

To add a new user click the **Add** button or press  to access the **Add User** dialog box. Enter the new user name and password and click the **OK** button or press the  key to save them to the user list. Clicking the **Cancel** button or pressing the  key will abort without saving the new user name and password. The new user name and password will be now be added to the list. Repeat this process for all new users to be added and click

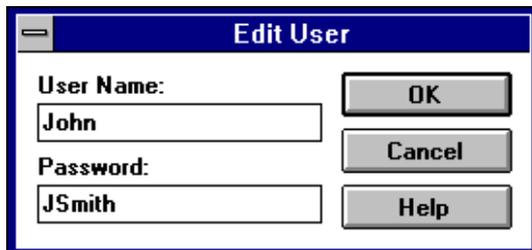
the **OK** button when finished.



The screenshot shows a dialog box titled "Add User". It contains two text input fields. The first is labeled "User Name:" and the second is labeled "Password:". To the right of these fields are three buttons: "OK", "Cancel", and "Help".

Editing User Names and Passwords:

To edit an existing users user name or password select the user from the list by clicking the left mouse button while the cursor is over the user name or password to be edited. Then click the **Edit** button or press **ALT E** to access the **Edit User** dialog box. Both the user name and password can be edited as required then click the **OK** button or press the **ENTER** key to save the changes. Clicking the **Cancel** button or pressing the **ESC** key will abort without saving any changes.



The screenshot shows a dialog box titled "Edit User". It contains two text input fields. The first is labeled "User Name:" and contains the text "John". The second is labeled "Password:" and contains the text "JSmith". To the right of these fields are three buttons: "OK", "Cancel", and "Help".

Removing Users:

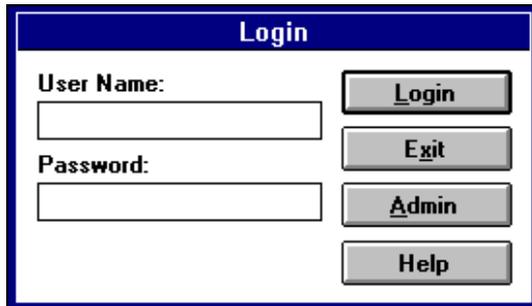
To remove an existing user select the user from the list by clicking the left mouse button while the cursor is over the user name or password to be removed. Then click the **Remove** button or press **ALT R** to remove the user name and password from the list.

Changing System Administrator Password

To change the system administrator password follow the procedure for adding a new user and enter **super** for the user name. The password entered will be the new system administrator password and **user** will no longer be accepted. To return to using **user** as the password simply remove the **super** user from the list.

Logging In as User

In order to access the **SBL Development System** users must first log in using the user name and password that has been assigned to them by the system administrator. The user name is placed in the title block of any sheet modified and saved by this user. The user name is also stored in the SAFphire if the user downloads a new block program and will appear in the node status information returned by the SAFphire.



 **Note:** Both the user name and password are case sensitive.

User Name

Enter the user name assigned to you by the system administrator.

Password

Enter the password assigned to you by the system administrator.

Login button

Click this button to log in and enter the **SBL Development System**.

Exit button

Click this button or press  to exit the **SBL Development System** and return to Windows.

Admin button

Click this button to log in as the system administrator.

Menu Commands

File Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
New		Create new file.
Open		Open an existing file.
Save		Save the contents of the active window. Sheets and macros are saved only if they have been modified. This is to prevent changing the date stamp of the file since the date stamp is used to determine if a compile is required. When saving a Macro the user will be prompted for the macro's password even if the macro was not previously assigned a password so that the user can assign or change the password.
Save As		Save the contents of the active window to a new file.
Save All		Save the contents of all open windows.
Close		Close the active window. If the contents of the active window have been modified the user will be prompted to save the changes. Closing the project window does not close the project.
Import Group		Import a group of objects. This function is provided to allow the user to import groups exported with a previous version of SBL. This function may be removed from future versions of SBL.
Print		Add the contents of the active window to the print queue.
Printer Setup		Select and setup the printer to be used by SBL. Changing the orientation will not have

any effect on how files are printed. Sheet files are always printed in the same orientation as they were created. All other file types default to portrait orientation.

Exit

Exit SBL Development System prompting the user to save any files that have been modified. Save the current states of all open windows to the desktop file.

Project Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
New		Create a new project.
Open		Open an existing project.
Close		Close the current project prompting the user to save any files that have been modified. Save the current states of all open windows to the desktop file.
Add File		Add an existing file to the current project.
Copy		Backup the current project to a new directory and/or drive.
Print All		Print all files that have been added to the current project as well as the contents of the project file, the last compiler report and the symbol table for the current project.
Make		Compile only those sheets in the current project that have changed since last compile.
Build All		Compile all sheets in current project.

Edit Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Cut		Remove the selected object(s) from the sheet or macro window and place them in the clipboard.
Copy		Copy the selected object(s) from the active sheet or macro window to the clipboard.
Paste		Copy the clipboard contents to active sheet or macro window.

Search Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Find		Find object by name on active sheet.
Find & Rename		Find and rename object on active sheet.
Find Next		Find the next matching object in the active window.

Add Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Block		Add a block from the SBL block library to the active sheet or macro window.
Macro		Add a macro to the active sheet or macro window.
Constant		Add a constant to the active sheet or macro window.

Connection		Add a connection to the active sheet or macro window.
Comment		Add a comment to the active sheet or macro window.
Label		Add a label to the active sheet or macro window.
Tag		Add a hand terminal tag to the active sheet or macro window.
Revision Block		Add a revision block to the active sheet or macro window.
Fault Table		Add a fault table to the active sheet or macro window.
Password Table		Add a password table to the active sheet or macro window.
Input		Add an input to the active macro window.
Output		Add an output to the active macro window.
Parameters		Add parameters to the active annunciator window.

View Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Project		Display the project window.
Compiler Report Symbols		Display the compiler report window.
Print Queue		Display the browse symbol table dialog box.
Zoom In		Display the print spooler queue.
		Zoom in one level to show more detail.

Zoom Out		Zoom out one level to show less detail.
Zoom Min		Zoom out to the minimum zoom level showing as little detail as possible.
Zoom Max		Zoom in to the maximum zoom level showing as much detail as possible.
Zoom Window		Allows the user to select an area to zoom in on. Select an area to zoom in on by positioning the zoom window cursor at one corner of a rectangular area. Click and hold the left mouse button and drag the zoom window outline to include the area to be displayed. SBL will zoom to the highest zoom level that will display the entire area outlined by the zoom window. The sheet will scroll when the cursor reaches the edge of the window allowing an area not currently visible to be selected. Press the  key to cancel this mode without zooming. If the left mouse button is pressed and released without selecting an area SBL will zoom to the maximum zoom level and position the cursor position in the center of the window if possible.
Zoom Point		Selecting Zoom Point will cause the mouse cursor to change to a magnifying glass. Positioning this cursor over a point on a sheet and clicking the left mouse button will cause SBL to zoom to the first zoom level where text is displayed and center this point in the window if possible. If the current zoom level is already at or above this level zoom point has no effect..

Tools Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Annunciate		Toggle the annunciator on or off.

Download		Download current program to the selected SAFphire node.
Upload Data		Upload the data table from the selected SAFphire node and update all constants in the program.
Remote Save		Save the values in the data table to non-volatile memory on the selected SAFphire node. Constants that have been tuned since the program was downloaded will revert back to they're original values on power up unless a remote parameter save command is executed. See Communication Options for information on configuring nodes.
Node Status		Read and display the current status of selected SAFphire node.
Scope		Open a real-time scope window.
Chart Recorder Cursors		Open a new chart recorder window. Enable Scope and Chart Recorder cursors. When the mouse cursor is moved over a scope or chart recorder window a cross hair cursor will appear when cursors are enabled. This allows more accurate measurements of time and values.
Reset Communications Upload Tables		Install or reset communication module. Upload the existing program tables from the selected SAFphire node. These tables can later be restored to the SAFphire using the Restore Tables command. This is useful for creating a backup of an existing program for which the original files are no longer available.
Restore Tables		Download previously uploaded program tables to the selected SAFphire node. See the Upload Tables command for more information.

Download
Firmware
Upload
Project

Download embedded firmware to SAFphire.

Upload a compressed project archive which was previously downloaded to a SAFphire. This menu item is only visible when the Data Compression Library DLL is present in the SBL directory.

Options Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Editor		Display editor options dialog box.
Compiler		Display compiler options dialog box.
Communications		Display communications options dialog box.

Window Menu

<u>Comm and</u>	<u>Speed Bar</u>	<u>Description</u>
Cascade		Cascade all currently open windows. If the Project or Compiler Report windows are open they are arranged at the bottom of the main window.
Tile Vertically		Tile all currently open windows from left to right. Windows are resized so that each window is completely visible and as tall as possible unless more than three windows are open. If more than three windows are open Tile Vertically and Tile Horizontally have the same effect. If the Project or Compiler Report windows are open they are arranged at the bottom of the main window.
Tile Horizontally		Tile all currently open windows from top to bottom. Windows are resized so that each

window is completely visible and as wide as possible unless more than three windows are open. If more than three windows are open **Tile Vertically** and **Tile Horizontally** have the same effect. If the **Project** or **Compiler Report** windows are open they are arranged at the bottom of the main window.

Arrange Icons

Arrange the icons of all minimized windows at the bottom of the main window.

Close All

Opens a sub menu from which the user can choose the type of windows to close. If the contents of a window to be closed have been modified SBL will prompt the user to save the changes. If a project is open closing all windows will not close the project. The following is a list of the available window types that may be closed using this command.

- Windows** - closes all windows
- Sheet Windows** - closes all sheet windows
- Macro Windows** - closes all macro windows
- Annunciator Windows** - closes all annunciator windows
- Recorder Windows** - closes all chart recorder windows
- Text Windows** - closes all text windows

Help Menu

Comm and

Speed Bar

Description

Contents

Open SBL help and display contents.

Search for help on...
Using Help

Open SBL help and display search dialog box.

Open Windows help on help.

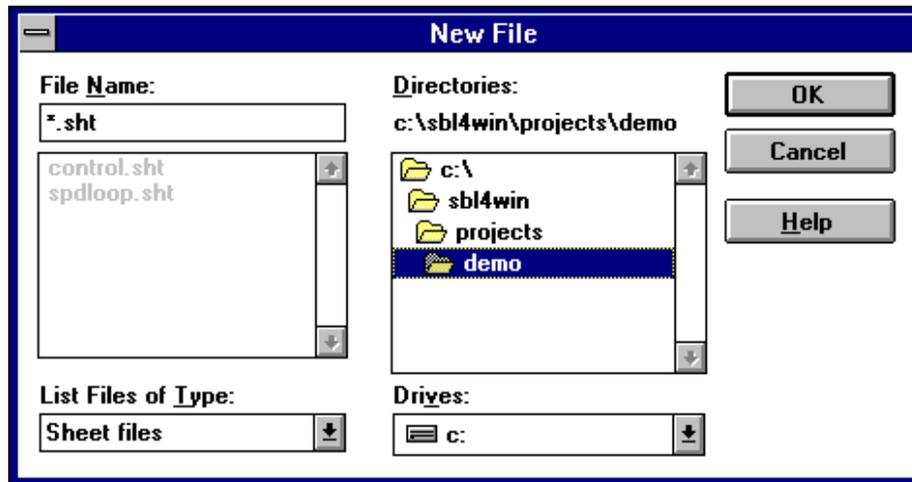
Block Library

Open help for currently loaded SBL block library and display contents.

Block	Display help for selected block.
About SBL	Display SBL About dialog box.

Creating New Files

Select **New** from the **File** menu, or click on the new file button  on the speed bar, to display the **New File** dialog box.



File Name:

Enter the name of the new file to create. A new subdirectory can also be created by preceding the file name with the new directory name. For example: To create a new sheet called "control" in a new subdirectory of the demo directory called "newdemo" enter "newdemo\control.sht". If no extension is specified the type of file created will default to sheet. If a file name is chosen from the list of existing files the user will be prompted to confirm that the new file will overwrite the existing file.

List Files of Type:

Use this drop down list box to display the list of available file types. Selecting a file type from this list will display a list of all existing files of the selected type in the selected directory. Below is a list of available file types that can be created from this dialog box:

Sheet files	(.sht)
Macro files	(.mac)
Annunciator files	(.ann)
Text files	(.txt)

Directories:

If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file. The user can select a different directory or create a new one in which to create the file. If the file is created in a different directory and later added to the project it will be automatically copied to the project directory.

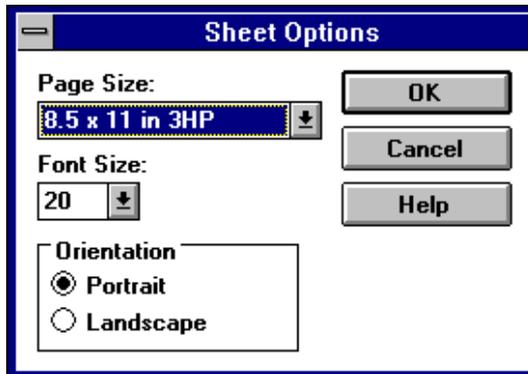
Drives:

Use this drop down list box to select a different drive on which to create the new file.

When creating a new sheet or macro file the Sheet Options dialog box will be displayed allowing the user to select the sheet size and orientation as well as the font size used to print the sheet. Title blocks are automatically added to sheet or macro files. Title blocks may be moved but cannot be copied or deleted. Most of the fields of the title block are filled in by SBL, the user can edit the title block description by double clicking the left mouse button on the title block or by positioning the cursor over the title block and pressing the  key. See Editing Title Block for more information.

Sheet Options

The sheet options dialog box allows the user to specify the sheet size and orientation as well as the font size when creating a new sheet or macro.



Page Size:

Select the paper size you wish to use when printing this sheet. The **3HP** indicates three hole punched and leaves an extra wide margin along one side.

Font Size:

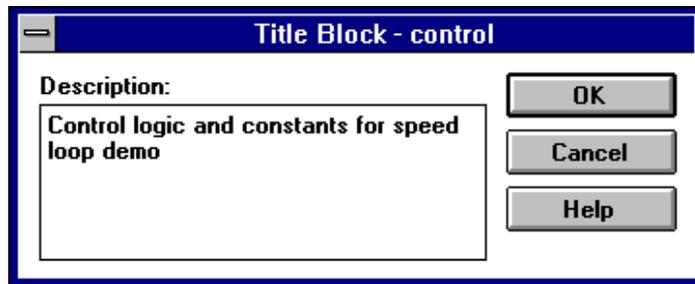
Select the font size to use when printing this sheet. The font size is used to determine the size of the objects on the sheet, the larger the font size the fewer objects that will fit on the sheet.

Orientation:

Select the orientation of the sheet. Selecting portrait orientation will display and print the sheet with the longest side vertical. Selecting landscape will display and print the sheet with the longest side horizontal. Due to rounding errors when scaling to match the screen resolution sheets may sometimes appear square but will print correctly.

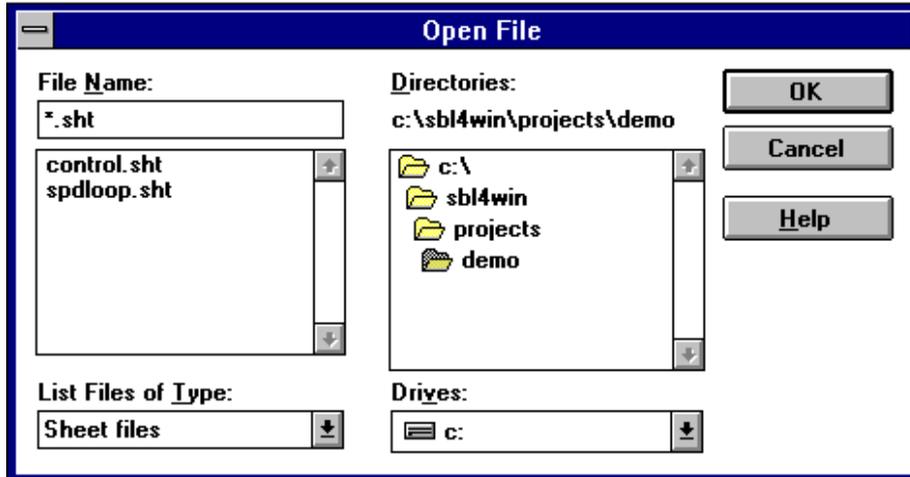
Title Block

Title blocks are automatically placed on each sheet or macro created. The default position for the title block is the bottom right corner of the sheet but can be moved to any location on the sheet. Title blocks cannot be copied or deleted. Most of the title block's fields are automatically filled in by SBL. The description field is the only field that can be edited by the user. To edit the description double click the left mouse button on the title block or press the **INSERT** key while the cursor is over the title block to display the **Title Block** dialog box. The title bar of the dialog box will identify the sheet on which the title block is located.



Opening a File

Select **Open** from the **File** menu, or click on the open file button  on the speed bar, to display the **Open File** dialog box.



File Name:

Enter the name of the file to open or select it from the list of available files. If no extension is specified the type of file to open will default to sheet.

List Files of Type:

Use this drop down list box to display the list of available file types. Selecting a file type from this list will display a list of all existing files of the selected type in the selected directory. Below is a list of available file types that can be opened from this dialog box:

- Sheet files (.sht)
- Macro files (.mac)
- Annunciator files(.ann)
- Text files (.txt)
- Project files (.prj)
- Scope files (.rsc)
- Recorder files (.rec)

Directories:

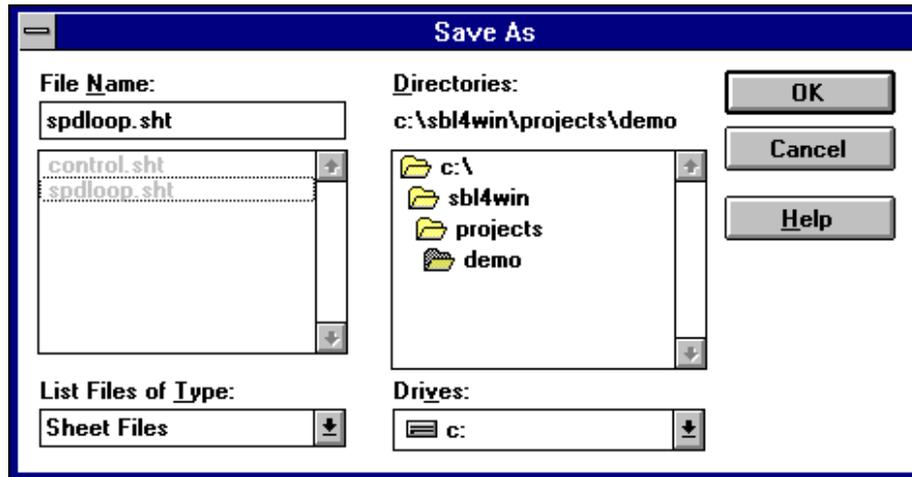
If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file.

Drives:

Use this drop down list box to select a different drive from which to open a file.

Renaming Files

Select **Save As** from the **File** menu to display the **Save As** dialog box. The File Name list box will display a list of all existing files of the selected type in the selected directory. Select the directory and enter the name of the file being saved or select a file from the list to overwrite. You can also specify a new directory to save the file to and SBL will create the new directory.



File Name:

Enter the new name of the file to save the contents of the current window to. A new subdirectory can also be created by preceding the file name with the new directory name. For example: To save the current sheet to a new sheet called "spdloop2" in a new subdirectory of the demo directory called "newdemo" enter "newdemo\spdloop2.sht". The extension does not need to be specified as the extension will be determined by the type of file being saved. If a file name is selected from the list of existing files the user will be prompted to confirm that the new file will overwrite the existing file.

List Files of Type:

Only the file type matching the type of file being saved will be available.

Directories:

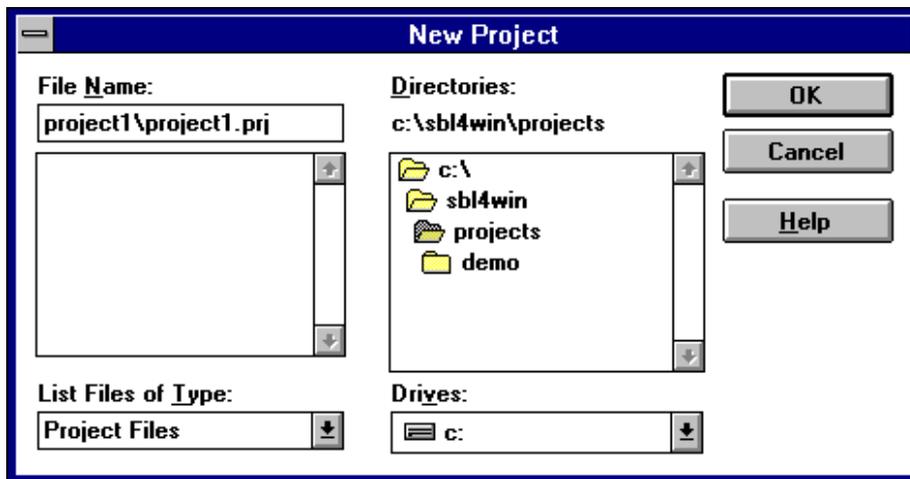
If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file. The user can select a different directory or create a new one in which to save the file. If the file is saved in a different directory and later added to the project it will be automatically copied to the project directory.

Drives:

Use this drop down list box to select a different drive on which to save the new file.

Creating a New Project

Select **New** from the **Project** menu, or click on the new project button  on the speed bar, to display the **New Project** dialog box. It is possible to have more than one project per directory and include the same sheets in more than one project. It is recommended that a new directory be created for each project so that each project has its own copy of all sheets. If you choose to create multiple projects in the same directory and use the same sheets in more than one project be aware that any changes made to a sheet in one project will affect the other projects in which that sheet was used.



File Name:

Enter the name of the new project to create. A new subdirectory can also be created by preceding the project name with the new directory name. For example: To create a new project called "project1" in a new subdirectory of the demo directory called "project1" enter "project1\project1.prj". The extension does not need to be specified as projects are the only file type that can be created from this dialog box. If a project name is chosen from the list of existing projects the user will be prompted to confirm that the new project file will overwrite the existing file.

List Files of Type:

Project files are the only type of file that can be selected using this dialog box.

Directories:

If a project is already open the current project directory will be selected

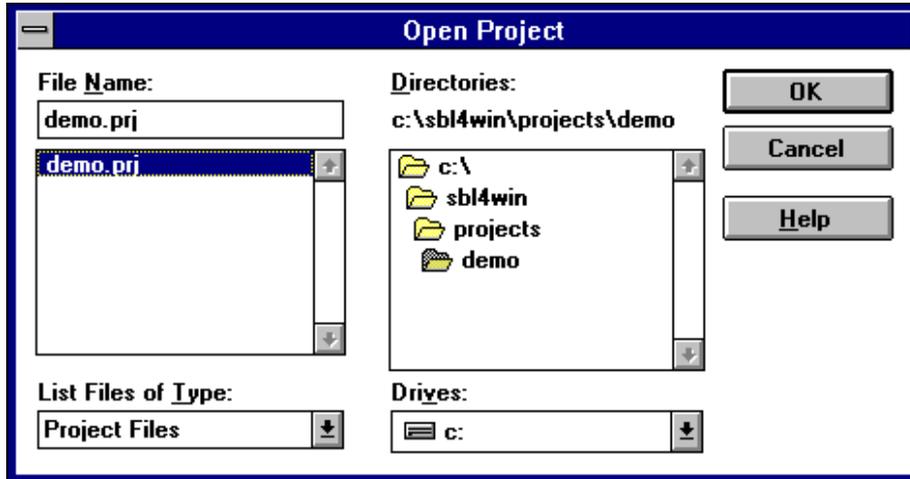
otherwise the selected directory will be the directory that contains the SBL.EXE file. The user can select a different directory or create a new one in which to create the new project.

Drives:

Use this drop down list box to select a different drive on which to create the new project.

Opening a Project

Select **Open** from the **Project** menu, or click on the open project button  on the speed bar, to display the **Open Project** dialog box.



File Name:

Enter the name of the project to open or select it from the list of available projects.

List Files of Type:

Project Files are the only file type that can be selected using this dialog box.

Directories:

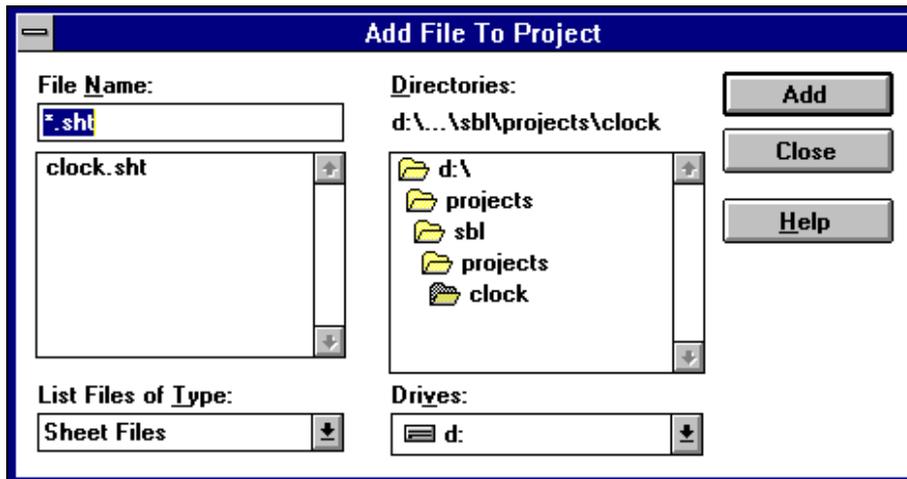
If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file.

Drives:

Use this drop down list box to select a different drive from which to open a project.

Adding Files To a Project

Select **Add File** from the **Project** menu, or click on the add file button  on the speed bar, to open the **Add File To Project** dialog box. When a file is added to a project the Project Name field of the title block on that sheet is updated with the name of the project it was added to. Also the Page ## of ## fields in the title blocks of all sheets belonging to the project are updated.



File Name:

Enter the name of the file to add or select it from the list of available files. If no extension is specified the type of file to add will default to sheet.

List Files of Type:

Use this drop down list box to display the list of available file types. Selecting a file type from this list will display a list of all existing files of the selected type in the selected directory.

Below is a list of available file types that can be added to a project:

Sheet files	(.sht)
Macro files	(.mac)
Annunciator files	(.ann)
Text files	(.txt)
Scope files	(.rsc)
Recorder files	(.rec)

Directories:

The project directory will be selected when this dialog box is opened. If a

file is added from another directory it will automatically be copied to the project directory.

Drives:

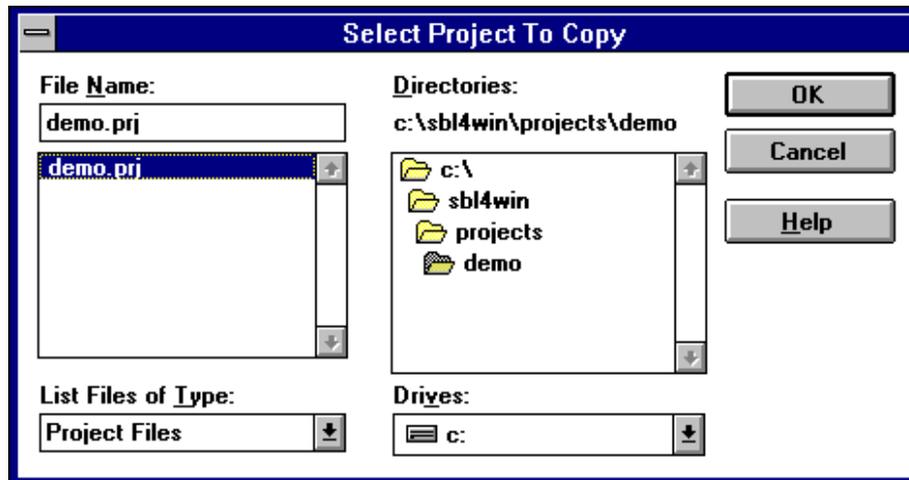
Use this drop down list box to select a different drive from which to add a file.

Copying a Project

Select **Copy** from the **Project** menu to open the **Select Project To Copy** dialog box. If a new name is specified the project and all appropriate files are renamed.

 **Note:**

Desktop configuration files (*.dsk) contain information that may not be compatible with other computers. Therefore it is recommended that these files not be copied from one computer to another as errors may occur when the project is opened on the computer that it was copied to. Using the Project Copy command to copy projects will not copy the desktop configuration file. And is the recommended method of backing up projects.



File Name:

Enter the name of the project to copy or select it from the list of available projects. The extension does not need to be specified as projects are the only file type that can be selected from this dialog box.

List Files of Type:

Project files are the only type of file that can be selected using this dialog box.

Directories:

If a project is already open the current project directory will be selected otherwise the selected directory will be the directory that contains the

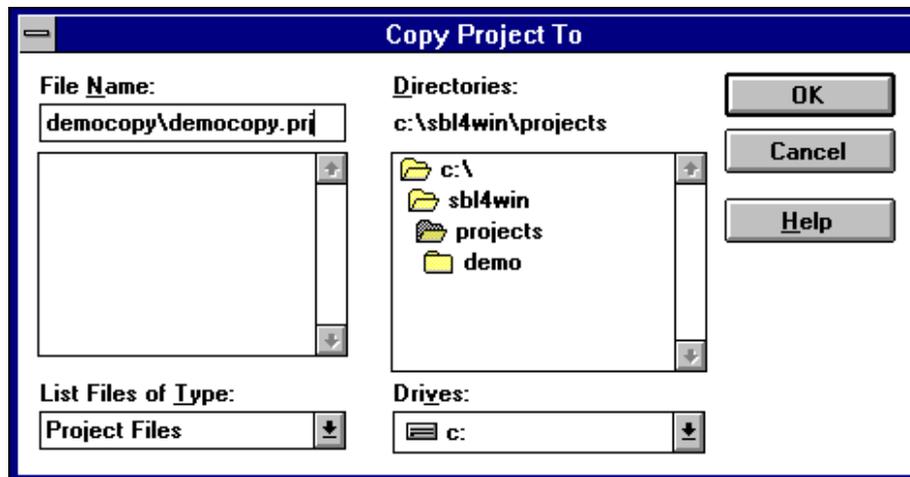
SBL.EXE file. The user can select a different directory from which to select a project to copy.

Drives:

Use this drop down list box to select a different drive from which the project is to be copied.

 **Note:**

If the project to be copied is currently open SBL will prompt the user to close it before continuing to copy the project. This is to ensure that all changes are saved before copying the project. The user can choose not to save changes before copying the project.



File Name:

Enter the name of the new project to create, SBL will default to the same name as the project being copied.. A new subdirectory can also be created by preceding the project name with the new directory name. For example: To create a new project called "democopy" in a new subdirectory of the demo directory called "democopy" enter "democopy\democopy.prj". The extension does not need to be specified as projects are the only file type that can be copied from this dialog box. If a project name is chosen from the list of existing projects the user will be prompted to confirm that the new project file will overwrite the existing project.

List Files of Type:

Project files are the only type of file that can be selected using this dialog box.

box.

Directories:

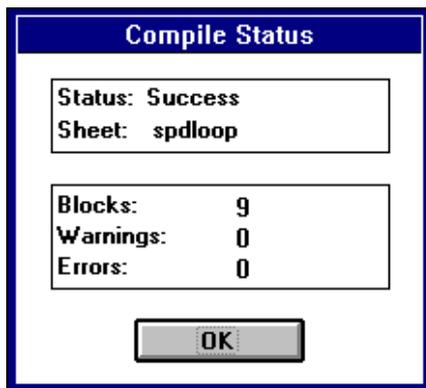
If a project is already open the current project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file. The user can select a different directory or create a new one to copy project to.

Drives:

Use this drop down list box to select a different drive to which the project is to be copied.

Compiling a Program

Select **Compile** from the **Project** menu, or click on the compile project button  or the compile sheet button  on the speed bar to compile the current program. The progress of the compile is displayed in the compile status box. To abort a compile click the Cancel button at any time during the compile. When the compile is complete the compile status box will display the total number of blocks in the program and the number of errors and warnings generated by the compiler. When the compile status box is closed a compiler summary will be displayed in the Compiler Report Window. The compiler summary includes the progress of the compiler as each file was processed as well as any warning or error messages generated by the compiler. If the program was compiled successfully a table summary will also be included which lists the number of blocks and constants in the program as well as the size of each of the tables that are downloaded to the SAFphire. See Compiler Error Messages for a detailed description of the possible warning or error messages generated by the compiler.



Compiler Warning And Error Messages

The compiler will continue to compile the program after encountering a condition that generates a warning, but will abort the compile when errors are encountered. After encountering an error the compiler will continue to compile the current sheet to try and find all possible errors on that sheet. Warnings are generated when the compiler encounters a condition that is suspicious and a potential error but will not prevent the program from being compiled. Errors are generated when the compiler encounters a condition that is invalid.

Select a warning or error message in the compiler report window and press the  key to display a detailed description of the warning or error. Or select a warning or error from the lists below.

All compiler warning and error messages have the following format:

Warning or error identifier followed by a colon, the sheet name on which the warning or error occurred, the coordinates at which the warning or error occurred followed by a brief description of the warning or error.

Examples:

Warning 102: *sheetname*, [x,y] Label not attached to connection

Error 205: *sheetname*, [x,y] Constant connected to block output by label

Error 200

This error message is generated when the compiler encounters a block which is not in the currently loaded SBL block library.

Error 201

This error message is generated when the compiler encounters a constant which is connected to another constant on the same sheet. The coordinates of both constants are given.

Error 202

This error message is generated when the compiler encounters two constants are connected together by a label on the indicated sheet. The coordinates given are for the label making this connection.

Error 203

This error message is generated when the compiler encounters a constant which is connected to a block output on the same sheet. The coordinates of both the constant and the block output are given.

Error 204

This error message is generated when the compiler encounters a constant on one sheet which is connected to a block output on another sheet by labels on a third sheet. The coordinates given are that of one of the labels making the connection.

Error 205

This error message is generated when the compiler encounters a block output which is connected to another block output on the same sheet. The coordinates of both block outputs are given.

Error 206

This error message is generated when the compiler encounters two block outputs of blocks on other sheets connected together by labels on the indicated sheet. The coordinates given are for one of the labels making this connection.

Error 207

This error message is generated when the compiler encounters a block input that is not connected to a constant or block output.

Error 208

This error message is generated when the compiler encounters a constant or a block output connected to a block input of a different data type. The coordinates given are for the block input. This error can also be generated when the compiler encounters a tag connected to a constant or block output of a different data type. In this case the coordinates given are for the tag.

Error 209

This error message is generated when the compiler encounters a tuneable tag connected to a block output. The coordinates given are for the tag. This is invalid since block outputs can not be tuned by the user.

Error 210

This error message is generated when the compiler encounters a tag that has the same name as another tag connected to a different block output or constant.

Error 211

This error message is generated when the compiler detects bad or missing entries in the symbol table. To correct this error close the project and delete the symbol table file (*.sym) for the project. This will cause SBL to automatically rebuild the symbol table when the project is reopened.

Error 212

The indicated block does not contain the same number of block inputs and/or block outputs as defined in the SBL block library.

Error 213

The indicated macro has exceeded the maximum number of nested macros allowed. SBL supports a maximum of sixteen nested macros which is usually more than enough for most applications. This error message usually indicates that a macro has included itself causing an endless loop of nested macros.

Error 214

The indicated external label has no matching source label on any other sheet in the program.

Error 215

The indicated external label is not valid since external labels are not allowed within macros. All external connections to objects within a macro must be made using macro inputs and outputs.

Warning 100

This warning message is generated when the compiler encounters a constant that is not used in the program. Unused constants do not cause any problems but each constant adds two bytes to the size of the data table that is downloaded to the SAFphire.

Warning 101

This warning message is generated when the compiler encounters a label that is not referenced by any other labels in the program.

Warning 102

This warning message is generated when the compiler encounters a label that is not attached to a connection.

Warning 103

This warning message is generated when the compiler encounters a tag that is not connected to a constant or block output.

Warning 104

This warning message is generated when the compiler encounters a tag that is not attached to a connection.

Warning 105

This warning message is generated when a block input is connected to an output of a block that is higher in the execution order and therefore executed later in the current scan. Any change in the data for this input will not be processed until the next scan therefore causing a one scan delay from the time the output of the second block changes before the output of the first block will change.

Warning 106

This warning message is generated when the compiler encounters a tag that is connected to the same block output or constant as another tag with the same name. The second tag is ignored.

Warning 107

This warning message is generated when the compiler encounters a tag that is connected to the same block output or constant as another tag.

Warning 108

This warning message is generated when the compiler encounters a fault table which defines a fault that has already been defined in a fault table on another sheet. The previously defined fault will be overwritten with the new fault.

Warning 109

This warning message is generated when the compiler encounters a password table which defines a password that has already been defined in a password table on another sheet. The previously defined password will be overwritten with the new password.

Warning 110

The indicated tag is contained within a macro and will be ignored since tags within macros would be duplicated each time the macro was used.

Warning 111

The indicated macro input is not connected to a constant or block output. This will result in an error when the macro is compiled if this input connects to a block input within the macro.

Warning 112

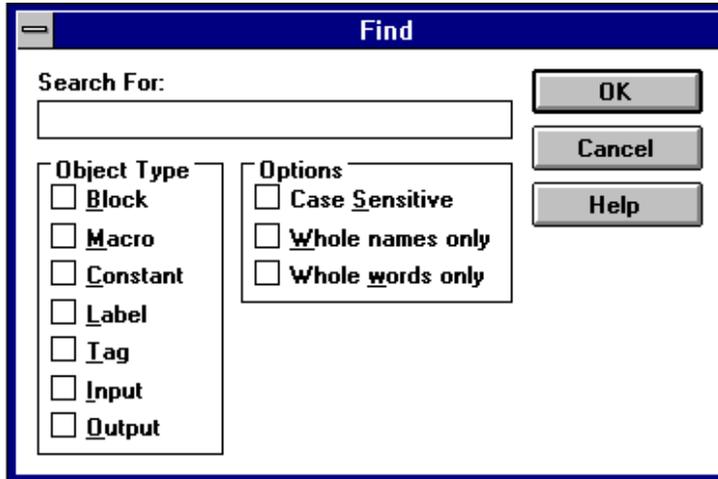
The indicated macro output is not connected to a constant or block output within the macro.

Warning 113

The indicated macro output is not connected directly to a macro input with the macro.

Find Object

Select **Find Object** from the **Search** menu, or click on the Find Object button  on the speed bar, to open the **Find Object** dialog box.



Search For:

Enter the string to search for.

Object Type:

Select the type of the object(s) to search for. Any combination of object types may be selected.

Options:

Case Sensitive:

Enable this option to perform a case sensitive search.

Whole names only:

Enable this option to find only names that match exactly.

Whole words only:

Enable this option to find names that contain the specified word.

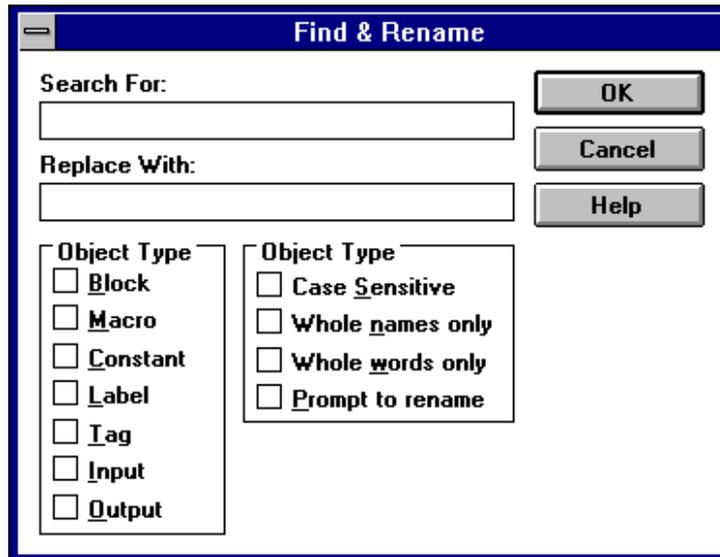
Note:

If both **Whole names only** and **Whole words only** options are selected the **Whole words only** option is ignored. If neither **Whole names only** or

Whole words only option is selected all names containing the specified string will be found.

Find And Rename Object

Select **Find & Rename** from the **Search** menu, or click on the Find & Rename button  on the speed bar, to open the **Find & Rename** dialog box.



Search For:

Enter the string to search for.

Replace With:

Enter the string to replace the existing string.

Object Type:

Select the type of the object(s) to search for. Any combination of object types may be selected.

Options:

Case Sensitive:

Enable this option to perform a case sensitive search.

Whole names only:

Enable this option to find only names that match exactly.

Whole words only:

Enable this option to find names that contain the specified word.

Prompt to rename:

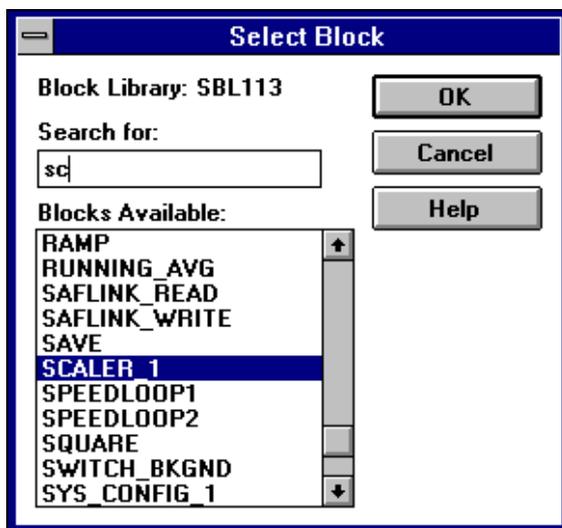
Enable this option to confirm renaming of object to New Name.

 **Note:**

If both **Whole names only** and **Whole words only** options are selected the **Whole words only** option is ignored. If neither **Whole names only** or **Whole words only** option is selected all names containing the specified string will be found.

Adding a Block

Select **Block** from the **Add** menu to open the **Select Block** dialog box. Select a block from the currently loaded block library to add to the active sheet or macro. When adding a block the user will be prompted to name the block with a unique name. Typically this name should describe the blocks function within the program. Position the block and click the left mouse button or press the **ENTER** key to place the block. To edit the name of an existing block, position the cursor over the block and double click the left mouse button or press the **INSERT** key to open the Edit Object Name dialog box.



Block Library:

Displays the name of the currently loaded SBL block library.

Search for:

Enter the first few letters of the block name to quickly locate the block to be added.

Blocks Available:

Scroll through the list of blocks available in the block library using the scroll bar or the keyboard cursor keys to locate the block to be added. Select the block to be added and click the **OK** button or double click on the selected block.

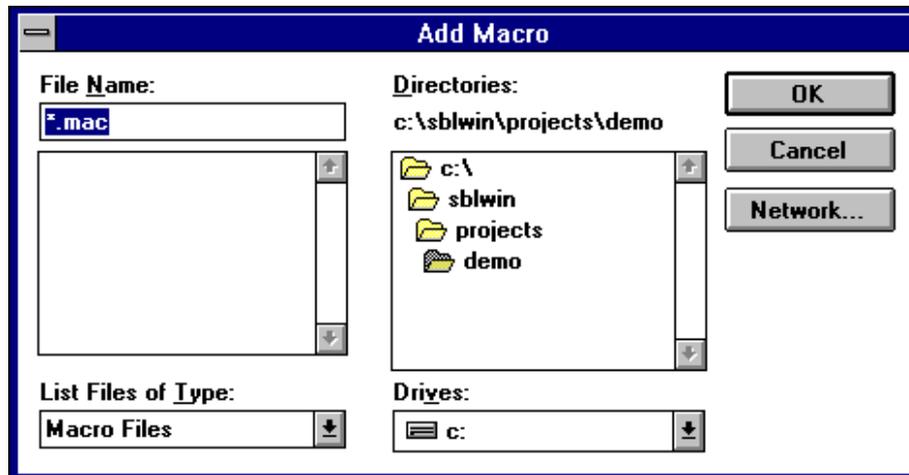
 **Note:**

The execution order of blocks is determined by their graphical placement on the sheet. The upper-left most block being the first to execute and the lower-right most block being last. Precedence is given to left most blocks.

Adding a Macro

Select **Macro** from the **Add** menu to open the **Add Macro** dialog box. Select a macro to add to the active sheet or macro. When adding a macro the user will be prompted to name the macro with a unique name. Typically this name should describe the macro's function within the program. Position the macro and click the left mouse button or press the **ENTER** key to place the macro. To edit the name of an existing macro, position the cursor over the macro and double click the left mouse button or press the **INSERT** key to open the Edit Object Name dialog box.

 Note: See Introduction to SBL Programming for more information on macros.



File Name:

Enter the name of the macro to add or select it from the list of available macros.

List Files of Type:

Macro Files are the only file type that can be selected using this dialog box.

Directories:

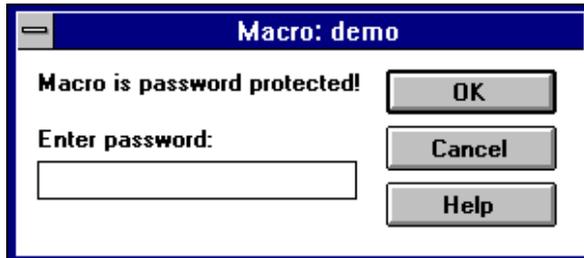
If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file.

Drives:

Use this drop down list box to select a different drive from which to add the macro.

Macro Passwords

When opening a macro that has been password protected SBL with prompt the user for the password. The macro password dialog box is displayed whenever SBL attempts to open a macro for editing or printing. If the correct password is not entered the macro file cannot be viewed or printed.



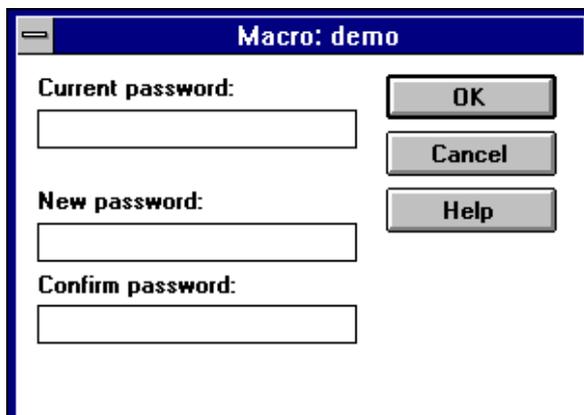
Enter Password:

The user must enter the password that exactly matches the password that the macro was saved with before SBL will open or print the macro file.

 **Note:** Macro passwords are case sensitive.

Changing Macro Passwords

The following dialog box is displayed every time SBL attempts to save a macro file, prompting the user for the password of the macro and also allowing the user to change the current password. The user is also prompted to assign a password when the macro is first created.



Current Password:

If the macro file was previously saved with a password the user must enter the password that exactly matches the password that the macro file was saved with before SBL will save any changes to the macro file. If the macro file was not previously saved with a password this edit box will be disabled.

New Password:

Enter the new password to use when saving the macro file. Macro passwords can be up to 15 characters in length and are not limited to alphanumeric characters. If the macro file was previously saved with a password the current password must be entered before any changes will be saved to the macro file.

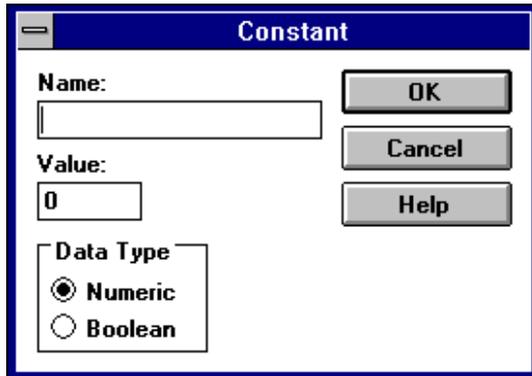
Confirm Password:

This password must exactly match the password entered for **New Password**. This is to help prevent saving a macro file with an incorrect password due to typing errors.

 **Note:** Macro passwords are case sensitive.

Adding a Constant

Select **Constant** from the **Add** menu to open the **Constant** dialog box. To edit an existing constant position the cursor over the constant and double click the left mouse button or press the **INSERT** key.



Name:

Enter a name for the constant which describes this values function within the program.

Value:

Valid Values:

Numeric: -32767 to 32768

Boolean: 0 or Off, -1 or On

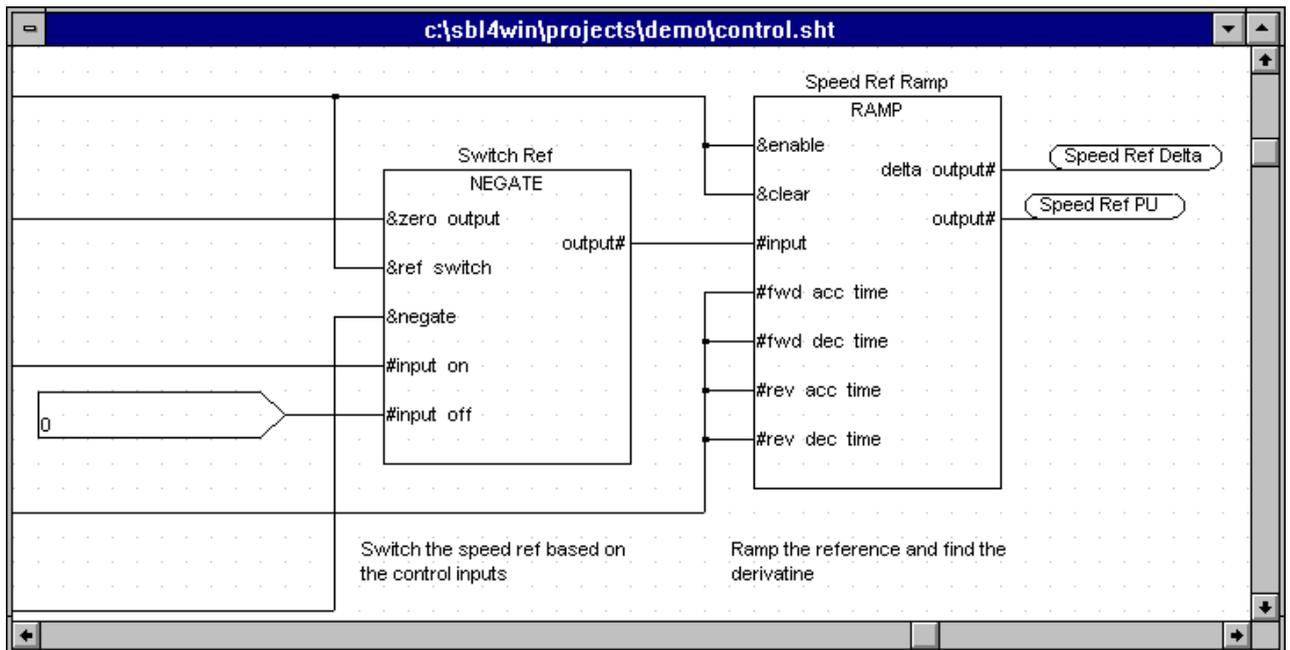
(any non-zero boolean value will be automatically changed to -1)
(On and Off are not case sensitive)

Data Type:

Specify the data type of this constant. **Numeric** for values ranging from -32768 to 32767 or **Boolean** for values of On and Off only.

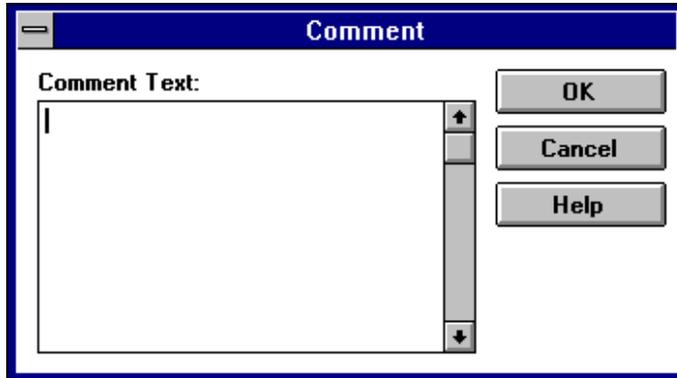
Adding a Connection

Select **Connection** from the **Add** menu to add a connection to the active sheet. Position the pencil cursor at the starting point of the connection and click the left mouse button or press the **ENTER** key to start drawing the connection. Connections can also be started by placing the arrow cursor at the starting point of the connection and double clicking the left mouse button. Move the pencil cursor to the end point of the connection and click the left mouse button or press the **ENTER** key to finish drawing the connection. Multiple segments of a connection can be drawn by moving the pencil cursor in two directions at the same time. Click the left mouse button to end each segment. To edit an existing connection place the arrow cursor on the existing connection and double click the left mouse button or press the **INSERT** key. Use connections to connect objects as shown below. Connection dots are automatically placed wherever two connections connect together.



Adding a Comment

Select **Comment** from the **Add** menu to open the **Comment** dialog box.

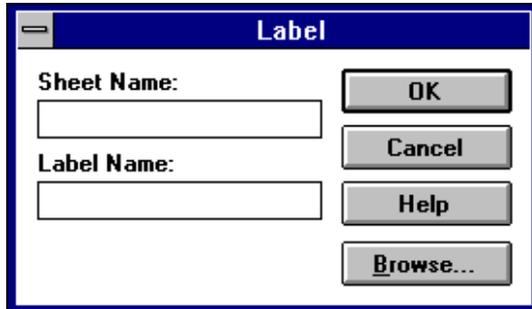


Comment Text:

Enter the text in this multi line edit box. The comment can be as long as you like as long as it will fit on the sheet without overlapping any other objects. Press **CTRL** **ENTER** to advance to the next line within the multi line edit box.

Adding a Label

Select **Label** from the **Add** menu to open the **Label** dialog box.



Sheet Name:

To make a connection to a label on another sheet enter the name of the sheet on which the constant or label is located. The sheet name of the label is not required to connect to a constant or label on the same sheet or if the label being added is a source label to which other labels will connect.

Label Name:

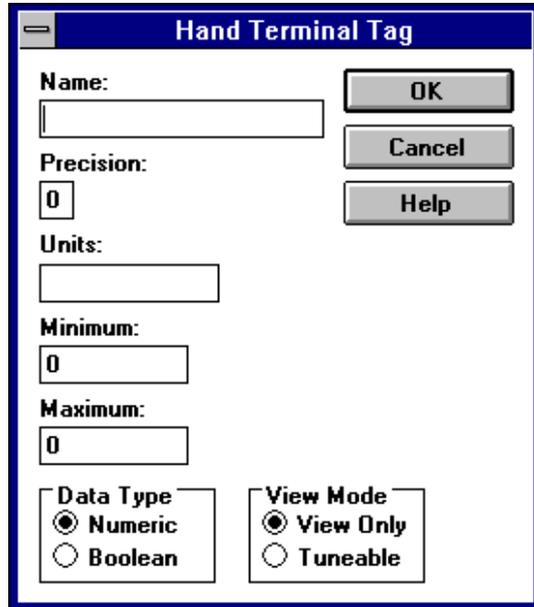
Enter the name of the constant or label to connect to or a unique name if the label is to be a source label to which other labels will connect.

Browse...

Click this button or press **ALT B** to browse the symbol table and select an already defined constant or label to connect to. Search strings can be entered for **Sheet Name** and **Label Name** and only matching constants and labels will be displayed in the Browse Symbol Table dialog box.

Adding a Tag

Select **Tag** from the **Add** menu to open the **Hand Terminal Tag** dialog box.



The image shows a dialog box titled "Hand Terminal Tag". It contains several input fields and control elements:

- Name:** A text input field with an empty space.
- Precision:** A spin box containing the number "0".
- Units:** A text input field with an empty space.
- Minimum:** A spin box containing the number "0".
- Maximum:** A spin box containing the number "0".
- Data Type:** Two radio buttons: "Numeric" (selected) and "Boolean".
- View Mode:** Two radio buttons: "View Only" (selected) and "Tunable".
- Buttons:** "OK", "Cancel", and "Help" buttons are located on the right side of the dialog.

Name:

Enter the name to be displayed when viewing this tag on the hand terminal.

Precision:

Enter the precision in terms of the number of digits to be displayed to the right of the decimal point.

Units:

Enter a description of the value to be displayed. The units can be up to seven characters in length and contain any displayable character.

Minimum:

This is the minimum value that this tag may be tuned to using the hand terminal. This value is only required if View Mode is set to Tunable.

Maximum:

This is the maximum value that this tag may be tuned to using the hand

terminal. This value is only required if View Mode is set to Tunable.

Data Type:

Select the data type to match that of the value to be displayed on the hand terminal.

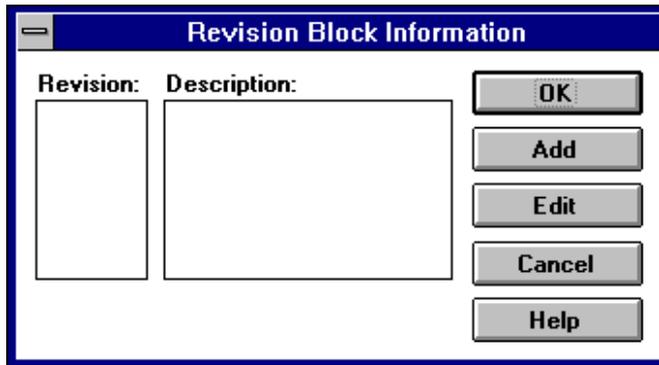
View Mode:

Select Tunable to allow the constant to which this tag is attached to be tuned using the hand terminal.

 **Note:** Block outputs cannot be connected to tunable tags.

Adding a Revision Block

Select **Revision Block** from the **Add** menu to open the **Revision Block Information** dialog box. A revision block can contain up to five revision descriptions and a sheet can contain any number of revision blocks.



Rev.:

Displays a list of up to five revisions.

Description:

Displays the revision description for each revision in the list

Add

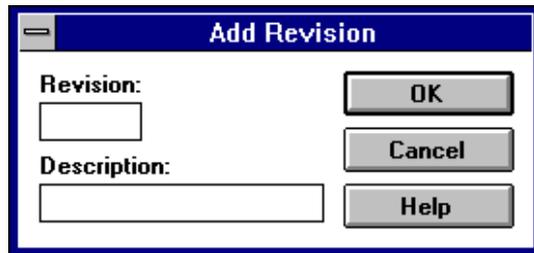
Click this button or press  to add a new revision to the revision block.

Edit

Click this button or press  to edit an existing revision in the revision block

Adding and Editing Revisions

The following dialog box will appear when adding revisions to a revision block. The same dialog box will appear when editing a revision and the title bar of the dialog box will change to **Edit Revision** and the revision code and description of the revision being edited will be displayed.



The image shows a dialog box titled "Add Revision". It contains two input fields: "Revision:" and "Description:". To the right of the "Revision:" field is an "OK" button. To the right of the "Description:" field are "Cancel" and "Help" buttons.

Rev.:

Enter a revision code up to 3 characters in length.

Description:

Enter a description of the revision up to a maximum of 20 characters in length. If all uppercase characters are used SBL may not be able to display all 20 characters in the space provided.

Adding a Fault Table

Select **Fault Table** from the **Add** menu, or **Add Fault Table** from the sheet or macro popup menu to open the **Fault Table** dialog box. Fault tables may exist on more than one sheet in a project but if the same fault is defined in more than one fault table the compiler will generate a warning and the last fault table processed will be the one which defines the fault message.

Fault:	Message:
1:	
2:	
3:	
4:	
5:	
6:	
7:	
8:	
9:	
10:	
11:	
12:	
13:	
14:	
15:	

Fault:

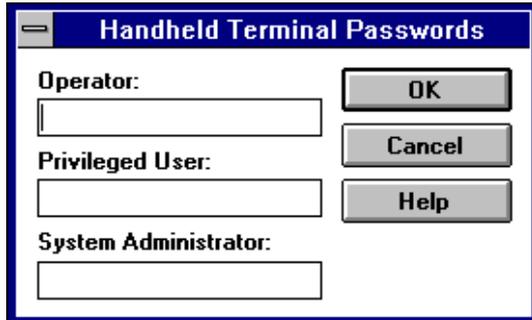
Fault tables are used to define up to 15 fault messages in an SBL program. These messages are displayed on the hand terminal when the appropriate fault code is applied to the fault code input of the config block.

Message:

Position the cursor in the edit box of the message to be edited by clicking on the box with the mouse cursor or by using the **TAB** key or **SHIFT** **TAB** keys. Type the text to be displayed on the hand terminal for this fault.

Adding a Password Table

Select **Password Table** from the **Add** menu to open the **Handheld Terminal Passwords** dialog box. Password tables can exist on more than one sheet in a project but if the same password is defined more than once the compiler will generate a warning and the last password table processed will be the one which defines the password.

The image shows a dialog box titled "Handheld Terminal Passwords". It has a blue title bar with a minus sign on the left. The dialog contains three text input fields on the left, each with a label above it: "Operator:", "Privileged User:", and "System Administrator:". To the right of these fields are three buttons: "OK", "Cancel", and "Help", arranged vertically.

Operator:

Enter the handheld terminal password for **Operator** access.

Privileged User:

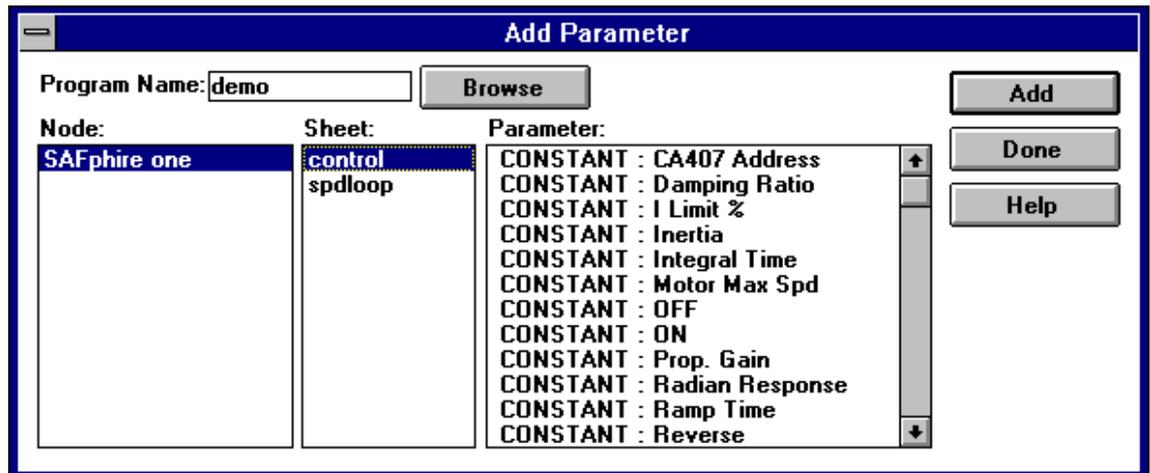
Enter the handheld terminal password for **Privileged User** access.

System Administrator:

Enter the handheld terminal password for **System Administrator** access.

Adding Parameters to Annunciator Files

Select **Parameters** from the **Add** menu, or click on the add parameters button  on the speed bar, to open the **Add Parameter** dialog box and add parameters to the current annunciator window. The program must have been successfully compiled before it's parameters can be added to an annunciator window.



Program Name:

Displays the name of the program last downloaded to the selected node. If no program has been downloaded to this node, or if you wish to associate parameters from a different program with this node, click the **Browse** button to select another program.

Browse:

Click this button to browse for the program whose parameters you want to add to the current annunciator window. These parameters will be associated with the selected node even if this program has not been downloaded to that node. See Browse for File for more information.

Node:

Displays a list of nodes already used in the annunciator window as well as any other currently configured nodes. See Communication Options for more information on configuring nodes.

Sheet:

Displays a list of all available sheet names for the selected block program. Select a sheet from this list to display a list of all available parameters on

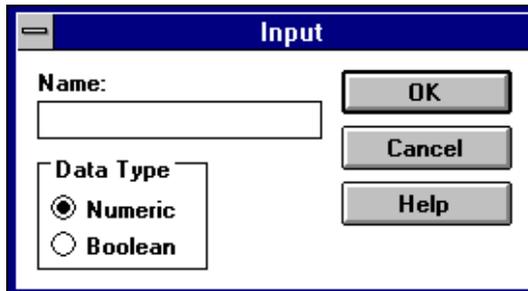
that sheet.

Parameter:

Displays a list of all parameters for the selected sheet. These parameters include all constants and block outputs found on that sheet. Labels that are attached to block outputs are included in place of the block output name. All block outputs are included regardless of whether or not they are used in the program. Select the parameters to be added to the current annunciator window, multiple parameters can be selected, then click the **Add** button or press the key.

Adding Macro Inputs and outputs

Select **Input** from the **Add** menu to open the **Input** dialog box or select **Output** from the **Add** menu to open the **Output** dialog box. Both dialog boxes are identical with the exception of the title.



Name:

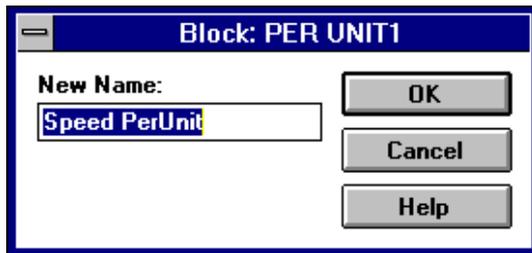
Enter a descriptive name for this input or output up to 15 characters in length. When macros are added to a sheet or another macro they are displayed as blocks with input and output names that are defined using the **Input** and **Output** objects. The order in which inputs and outputs appear when the macro is drawn as a block is determined by their position on the macro sheet. Inputs are always drawn on the left side of the block and outputs on the right with the upper-left most object being first and the lower-right most object being last. Precedence is given to left most objects.

Data Type

Select the data type of this input or output to match the data type of the input it is connected to. This is used by the compiler for type checking when the program is compiled.

Edit Object Name

This dialog box appears when editing a block's or macro's name or whenever a block, macro, constant, tag or a group containing any of these objects is copied. The title bar of the dialog box will identify the type of object and in the case of blocks will also identify the type of block to be renamed.



Project Window

Select **Project** from the **View** menu, or click on the view project button  on the speed bar, to open or activate the project window. The project window lists all files currently included in the project. The execution order of sheet files is determined by their order in the project window. To change the order click and hold the left mouse button on dot next to the files icon and drag it to the new position. Macros cannot be dragged independently of the sheet they are included in. File types other than sheet and macro files are ignored by the compiler so they will not affect the execution order even if they are mixed in with the sheet files. Double clicking on a file name or using the cursor keys to select the file and pressing  key will open that file. Files can also be deleted from the project by selecting the file to be deleted and pressing the  key.

If a sheet or macro file's icon has a + symbol in it then that sheet or macro includes at least one other macro. Clicking on the icon or selecting the file with the cursor keys and pressing the  bar will open the branch to show any included files. SBL supports up to 16 levels of nested macros. The project window is automatically updated whenever a macro is added to, or deleted from a sheet or macro.

Compiler Report

Select **Report** from the **View** menu to display or activate the compiler report window. The compiler report is generated as the compiler progresses through the project list compiling each sheet and macro. Any warnings or errors generated by the compiler are displayed with the name of the sheet or macro that contains the warning or error as well as the coordinates of the object where the problem occurred. If no errors occurred during the compile a table size summary is also included in the compiler report. See the CA408 Multiprocessor card description in SAFphire Hardware for table size limitations for the version of the CA408 card being used.

Double clicking on a warning or error message or using the cursor keys to select the message and pressing the **ENTER** key, will display the sheet on which the error occurred and position the cursor at the coordinates where the problem was detected. Selecting an warning or error message and pressing the **F1** key will display a detailed explanation of that warning or error message.

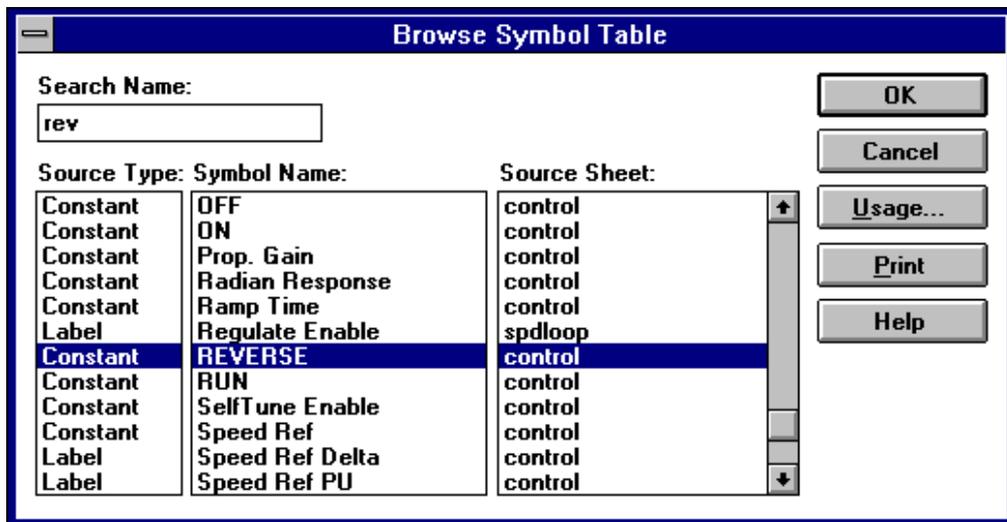
See **Compiler Error Messages** for a detailed description of the possible warning or error messages generated by the compiler.

Symbol Table

Select **Symbols** from the **View** menu to display the **Browse Symbol Table** dialog box.

If the **Browse** button in the **Add Label** dialog box is used to access this dialog box only those symbols whose names begin with the text entered in the **label name** field of the **Add Label** dialog box will be displayed. If text was entered in the **Sheet Name** field of the **Add Label** dialog box then only symbols on the source sheet whose names begin with this text will be displayed. If no text was entered in either field of the **Add Label** dialog box all symbols used in the program will be displayed. Also if the **Browse Symbol Table** dialog box was accessed from the **Add Label** dialog box, selecting a symbol from the list and clicking the **OK** button will cause the **Add Label** dialog box to be filled in with the correct information for the selected symbol. This helps prevent spelling errors when adding labels to sheet or macros.

 **Note:** If the active window is a macro then only the symbols available for that macro will be displayed.



Search Name:

Enter the first few characters of the name of the symbol you're searching for to help locate it quickly.

Source Type:

Displays the source type of the symbol. A source type of **Constant** means that the symbol is a constant and all labels of the same name connect to this constant. A source type of **label** means that the symbol is a label.

Symbol Name:

Displays a list of constant and label names.

Source Sheet:

Displays the name of the sheet on which the constant or source label can be found. The source label refers to the first label by that name placed on any sheet in the project.

Usage...

Select a symbol from the list and click this button to display the Symbol Usage dialog box.

Print

Click this button to print the symbol table. All symbols used in the program will be listed as well as the number of matching symbols on each sheet.

See [Add Label](#) for more information on labels.

Symbol Usage

Click the **Usage** button in the **Browse Symbol Table** dialog box to display this dialog box. The usage count of the selected symbol will be displayed for each sheet or macro that the symbol is used on.

Usage:	
control	1

Symbol Name:

Displays the name of the constant or label.

Source Type:

Displays the source type of the symbol. A source type of **Constant** means that the symbol is a constant and all labels of the same name connect to this constant. A source type of **label** means that the symbol is a label.

Source Sheet:

Displays the name of the sheet on which the source symbol is located.

Usage:

Displays a list of all sheets on which labels of the same name are found. The number of matching labels on each sheet is also displayed.

Total Usage:

Displays the total number of occurrences of this symbol in the program.

Find

Select a sheet from the usage list and click this button to find the first occurrence of this symbol on that sheet. The sheet will be opened if it is not already and the cursor will be located at the first matching symbol found.

Print Queue

Select **Print Queue** from the **View** menu to display the current status of the print spooler.



Currently Spooling:

Displays the name of the file currently being printed.

Files in Queue:

Displays a list of the files waiting to be printed.

Remove

Select a file in the queue list and click this button to remove that file from the print queue.

Abort

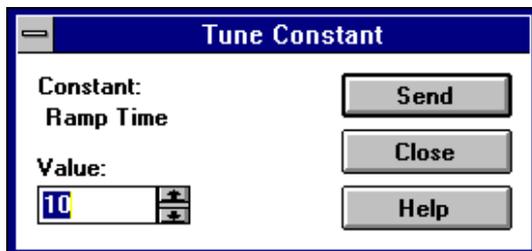
Click this button to remove all files from the print queue.

Annunciating

Select **Annunciate** from the **Tools** menu to toggle the annunciator on and off. A check mark will be displayed beside this menu item when the annunciator is on. Activating the annunciator will install the currently selected communication module if it is not already installed. See Communication Options for more information on communication modules. Once the annunciator is activated all open annunciator windows will be announced as well as magnified views of constants and blocks. The status bar will display the annunciating message and the number of parameters being announced. The status bar will also display an update indicator that will indicate how quickly the parameters are being updated. Each time the indicator advances one position all parameters have been updated. Only the parameters that are completely visible in each annunciator window are announced.

Tuning Parameters

Select the constant to be tuned in the annunciator window or press the space bar to display a magnified view of a constant on a sheet. Then press the **F5** key to display the **Tune Constant** dialog box.



Constant:

Displays the name of the constant being tuned.

Value:

Displays the actual value of the constant. To tune the constant type the new value in the **Value** edit box. The constant can also be tuned by clicking on the up or down arrow buttons at the end of the **Value** edit box or by pressing the **↑** **↓** cursor keys. Using the arrow buttons or the cursor keys will default to incrementing or decrementing the value by one, press and hold the **SHIFT** key to increment or decrement by ten, or press and hold the **CTRL** key to increment or decrement by one hundred. Using the arrow

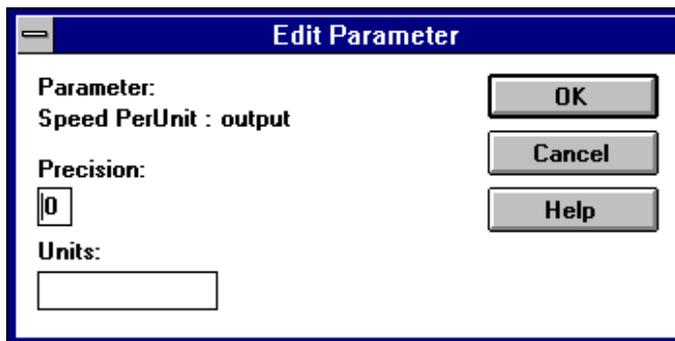
buttons or the cursor keys to tune the value will immediately send each new value to the SAFphire. New values that are typed are not sent until the **Send** button is clicked or the **ENTER** key is pressed.

Send

Click this button or press the **ENTER** key to send the value currently displayed in the value edit box.

Editing Parameters

Numeric parameters can also include precision and units information. When parameters are added to an annunciator window they inherit the precision and units of any tag connected to the parameter. The precision and units of any numeric parameter can be edited by selecting the parameter and pressing the **ENTER** key or by double clicking the left mouse button on the parameter to be edited.



Parameter:

Displays the name of the numeric parameter being edited.

Precision:

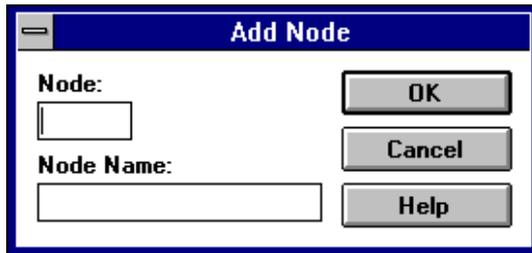
Enter the precision in terms of the number of digits to be displayed to the right of the decimal point.

Units:

Enter a description of the value to be displayed. The units can be up to seven characters in length and contain any displayable character.

Configuring Nodes

Nodes are configured by assigning a name to the node. All references to this node will be by the name assigned to the node when the node is configured. This dialog box also appears when editing a selected node, the title bar will change to **Edit Node** and the selected node number and name will be displayed. Both the node number and name can be edited.



Node:

Enter the node number of the node being configured. This number must match the switch settings of the CA408 card. See the CA408 Multiprocessor card description in SAFphire Hardware for more information.

Node Name:

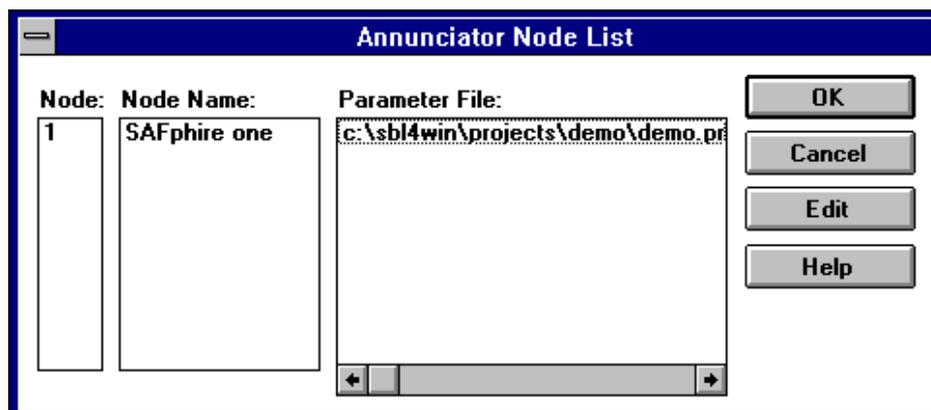
Enter a unique name up to 15 characters in length to be used when referring to this node.

Annunciator Node List

Click the right mouse button when the cursor is over a text annunciator window, or press the **F7** key when the active window is a text annunciator window, to open the **Annunciator Node List** dialog box.

All annunciator files contain a node list that includes the node number and name of each node referenced by parameters in the annunciator file. The annunciator node list also contains the path and name of the parameter file used when the parameters were added to the annunciator file. Although in most cases it should not be necessary for the user to edit the annunciator node list this dialog box is provided to eliminate the need to recreate a text annunciator file if any of the information contained in the node list becomes invalid. This can happen when a project is copied and/or renamed or a SAFphire's node number is changed. Select the node to edit and click the **Edit** button or press the **ALT E** keys to open the Edit Annunciator Node dialog box. This allows the user to announce a node other than the one used when the parameters were added to the annunciator file. If a project containing an annunciator file is copied to another directory, or is renamed, the parameter file in the annunciator node list will still refer to the old parameter file. If this occurs it will be necessary to edit the parameter file path for the affected nodes. SBL will attempt to locate the parameter file automatically and will prompt the user to locate it if it is not found.

 **Note:** The annunciator node list is independent of the communication node list.



Node:

Displays the node number of the node to be announced for any parameters referencing this node.

Node Name:

Displays the name assigned to the node.

Parameter File:

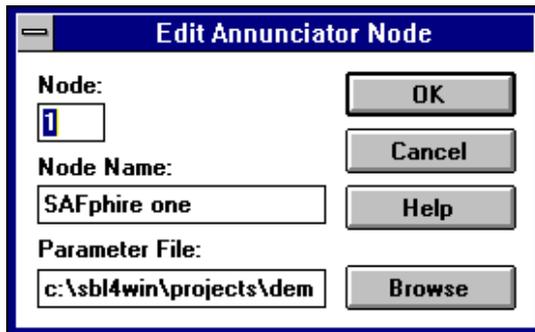
Displays the path and name of the parameter file containing the parameters for this node.

Edit

Select a SAFphire node and then click this button to edit that nodes annunciator configuration. See Edit Annunciator Node for more information.

Edit Annunciator Node

The **Edit Annunciator Node** dialog box allows the user to change the node that will be annunciated for parameters referencing this node name. The node name can also be edited but this only affects the name that is displayed in the annunciator window. This dialog box can also be used for manually locating the correct parameter file for the node if the project has been copied.



Node:

Enter the node number of the node being configured. This number must match the switch settings of the CA408 card. See the CA408 Multiprocessor card description in SAFphire Hardware for more information.

Node Name:

Enter a unique name up to 15 characters in length to be displayed in the annunciator window for parameters that reference this node.

Parameter File:

Displays the current parameter file containing the parameters that reference this node. This text will scroll when the cursor reaches the edges of the edit box. The path and or name of the file can be edited by typing the new path and or file name or by clicking the **Browse** button or pressing



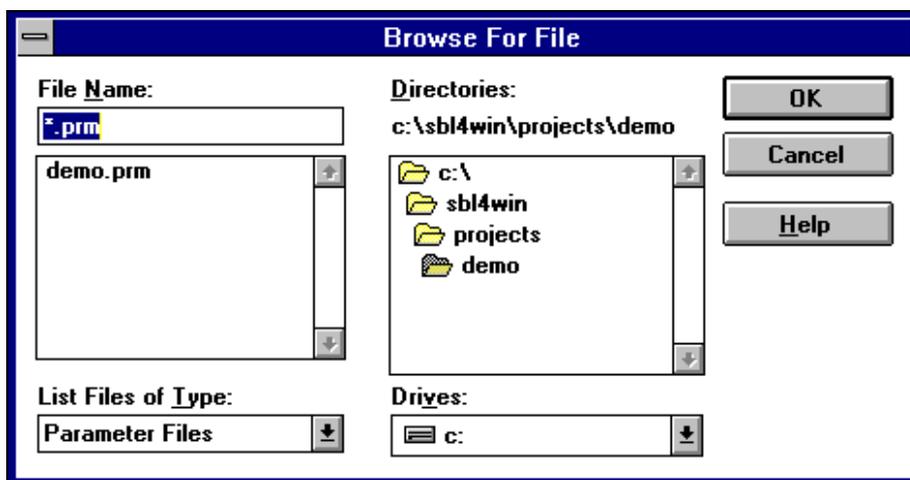
to browse for the file.

Browse

Click this button to browse for the parameter file to be used for parameters referencing this node. See Browse for File for more information.

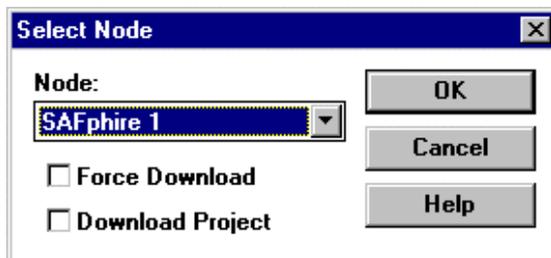
Browse For File

The **Browse For File** dialog box is displayed when the annunciator cannot locate a parameter file and the user chooses to browse for the file. This dialog box is also displayed when user clicks the **Browse** button in the Edit Annunciator Node dialog box to search for the node's parameter file and when the user clicks the **Browse** button in the Add Parameter dialog box to search for a project. Select the directory and the appropriate file and click the **OK** button or press **ENTER** to select the file.



Downloading a Program

Select **Download** from the **Tools** menu to download the current program. If the program has been modified since it was last compiled SBL will prompt the user to compile before downloading. If the download inhibit input of the system config block is enabled the message **Download Denied by SAFphire** will be displayed. Check the **Force Download** check box to override the download inhibit. A status window will be displayed showing the progress as each table of the program is downloaded. Check the **Download Project** check box to download a compressed project archive containing all files that have been added to the project. This project archive is saved in non-volatile memory in the SAFphire and can later be uploaded from the SAFphire using Upload Project.



Node:

Select the node to download the current program to. Only nodes that have been previously configured will be listed. See Communication Options for information on configuring nodes.

Force Download

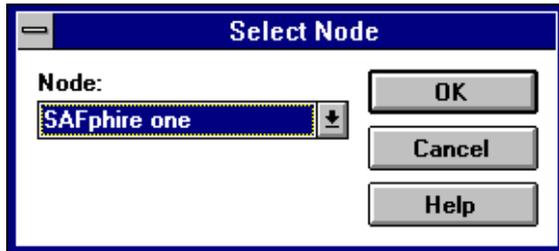
Check the Force Download check box to override the download inhibit input to the system config block.

Download Project

Check the Download Project check box to download a compressed project archive containing all files added to the project. This check box is only visible when the Data Compression Library DLL is present in the SBL directory.

Selecting a Node

Some tools that are used to communicate with a SAFphire require the user to select a SAFphire node to communicate with. SAFphire nodes must be configured and assigned a node name before they can be communicated with using these tools. See Communication Options for more information.



Node:

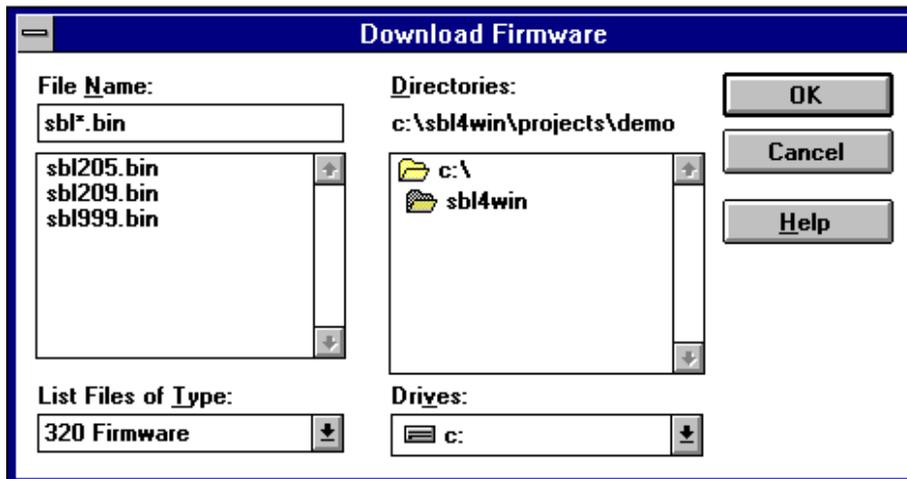
Select the SAFphire node to communicate with from the list of previously configured nodes.

Downloading Firmware

Select **Download Firmware** from the **Tools** menu to download a new version of embedded firmware to a SAFphire. There are currently three types of embedded firmware that can be downloaded to a SAFphire, **320 Firmware**, **386 Firmware** and **Boot Block Firmware**. SAFphire processor cards are shipped with the current version of firmware already loaded but in some cases it may be necessary to change the firmware after installation. Although these changes are usually made by a SAF Engineer, this feature is provided to allow the user to carry out such changes under the guidance of a SAF Engineer. Care needs to be taken to ensure that the SBL block library being used is compatible with the 320 firmware running in the SAFphire. The user can determine the version of firmware currently running on a SAFphire by displaying the Node Status of the SAFphire.

 **Note:**

Only newer versions of the CA408 processor card support this feature. See the CA408 Multiprocessor card description in SAFphire Hardware for more information on this feature.



File Name:

Enter the name of the file to download or select it from the list of available files. If no extension is specified the type of file to open will default to 320 firmware.

List Files of Type:

Use this drop down list box to display the list of available file types. Selecting a file type from this list will display a list of all existing files of the

selected type in the selected directory.

Below is a list of available file types that can be opened from this dialog box:

320 Firmware	(sbl*.bin)
386 Firmware	(code*.bin)
Boot Block Firmware	(boot*.bin)

Directories:

The selected directory will default to the directory that contains the SBL.EXE file.

Drives:

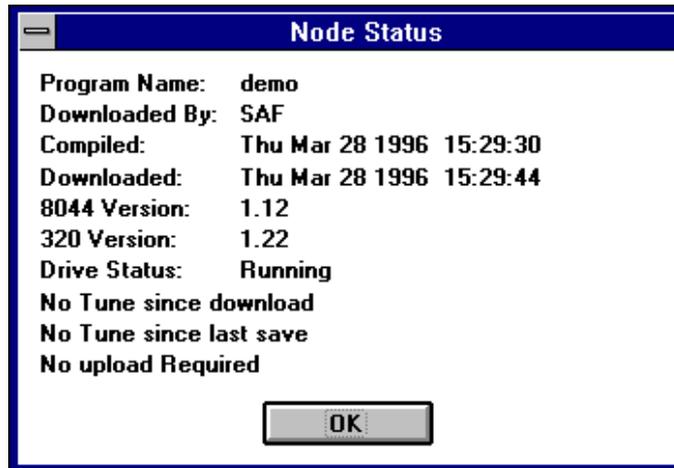
Use this drop down list box to select a different drive from which to download the firmware file.

Uploading the Data Table

Select **Upload** from the **Tools** menu to upload the data table for the current program. This allows the user to update all constants on all sheets of the program after constants have been tuned either from the annunciator or the handheld terminal. SBL uploads from the node that the current program was last downloaded to. If no download record for this program is found the user will be prompted to select the node to upload from. SBL then checks that the same program is running on that node and has not been modified since it was downloaded. If the program has been modified since it was downloaded the user will be prompted to continue, depending on the changes that were made SBL may not be able to update the constants. The block table is then uploaded and compared to the block table of the current program. If no differences are found a **Remote Save** command is then sent to the SAFphire and the data table is uploaded. If the size of the data table has not changed SBL will then proceed to update all constants on all sheets with the values found in the data table. The status bar will display the progress as each of these steps are executed.

Displaying Node Status

Select **Node Status** from the **Tools** menu to display the status of the selected SAFphire node. SBL uploads the status table from the selected node and displays it in the node status dialog box.



Program Name:

Displays the name of the program currently running on this node.

Downloaded By:

Displays the user name of the user that was logged in to SBL when this program was downloaded.

Compiled:

Displays the date and time that the program currently running on this node was compiled.

Downloaded:

Displays the date and time that the program currently running on this node was downloaded.

8044 Version:

Displays the version number of the communication processor firmware. For SAFphires with a newer version of the CA408 processor card this refers to the version of 386 firmware.

320 Version:

Displays the version number of the main processor firmware.

Drive Status:

Displays the current state of the Status Code input of the System Config block. The five valid status codes are:

Running

Jog

Stopped

Error

Faulted

Note: If there is no System Config block in the program currently running on this node the default status code is **Running**.

No Tune since download

Indicates if any parameters have been tuned from the hand terminal since the program was downloaded to this node.

No Tune since last save

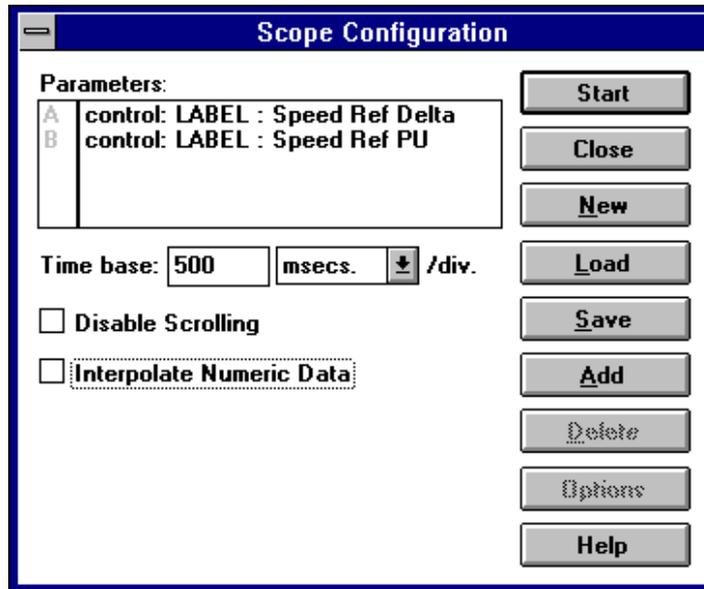
Indicates if any parameters have been tuned from the hand terminal since the the last Remote Parameter Save command.

No upload required

An upload is required if any parameters have been tuned and a **Remote Save** command executed since the program was downloaded.

Scope

Select **Scope** from the **Tools** menu to display the **Scope Configuration** dialog box.



Parameters:

Displays a list of up to 16 parameters to be announced by the scope.

Time Base:

Specify the time per horizontal division to be used when displaying the waveforms. The time base can be any value from 10 msecs. to 65535 mins. The scope window is divided into 10 horizontal divisions.

Disable Scrolling

On some computers scrolling the scope window when the waveform reaches the right edge of the window may be too slow and cause some data to be lost. Disable scrolling and when the waveform reaches the right edge of the window the scope window will be cleared and the waveforms will start again at the left edge of the window.

Interpolate Numeric Data

Selecting this option will cause the waveforms to be drawn with diagonal lines between sampled values. This can result in smoother waveforms by

lines between sampled values. This can result in smoother waveforms by eliminating the steps normally displayed between sampled values.

Start

Click this button to open the scope window and start displaying waveforms.

Close

Click this button to cancel all changes and close the scope configuration dialog box.

New

Clicking this button will erase the current scope configuration so that a new configuration may be entered.

Load

This button allows the user to load a previously saved scope configuration file. Scope configuration files can be loaded into both scope and chart recorder configuration dialog boxes.

Save

Click this button to save the current scope configuration to a file.

Add

Click this button to open the Add Parameters dialog box to select parameters to be announced.

Delete

Select a parameter from the parameter list and click this button, or press the **DELETE** key, to delete the parameter. SBL will prompt the user confirming this action before any parameters are deleted.

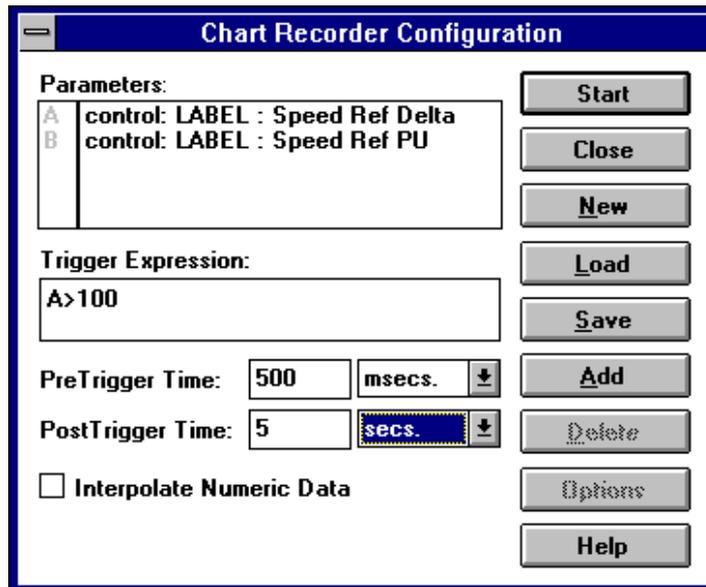
Options

Select a parameter from the parameter list and click this button to open the Parameter Options dialog box. This allows the user to edit the parameters min. and max. values as well as the Name and units to be displayed for this

parameter.

Chart Recorder

Select **Chart Recorder** from the **Tools** menu to display the **Chart Recorder Configuration** dialog box. If a trigger expression is entered the chart recorder can be triggered manually by pressing the **T** key while the message "**Waiting for trigger ...**" is displayed in the status bar.



Parameters:

Displays a list of up to 16 parameters to be recorded by the chart recorder.

Trigger Expression:

Trigger expressions can be used to define an event that will trigger the chart recorder to start recording data. By entering Pretrigger and posttrigger times the user can select to have data recorded both before and after the trigger event. Trigger expressions are entered as a Boolean equation using logical and relational operators as well as parentheses. Parameters are referenced using the single character identifier displayed in parameter list. The following is a list of operators available in order of precedence.

Parentheses

Logical operators

! Not
& And
| Or

Relational Operators (All relational operators have the same order of precedence)

=, == Equal
<>, != Not equal
< Less than
<= Less than or equal
> Greater than
>= Greater than or equal

PreTrigger Time:

Enter the length of time to record data preceding the trigger event.

PostTrigger Time:

Enter the length of time to record data following the trigger event.

Interpolate Numeric Data

Selecting this option will cause the waveforms to be drawn with diagonal lines between sampled values. This can result in smoother waveforms by eliminating the steps normally displayed between sampled values.

Start

Click this button to start recording data.

Close

Click this button to cancel all changes and close the chart recorder configuration dialog box.

New

Clicking this button will erase the current chart recorder configuration so that a new configuration may be entered.

Load

This button allows the user to load a previously saved scope configuration file. Scope configuration files can be loaded into both scope and chart recorder configuration dialog boxes.

Save

Click this button to save the current chart recorder configuration to a file.

Add

Click this button to open the Add Parameters dialog box to select parameters to be recorded.

Delete

Select a parameter from the parameter list and click this button, or press the **DELETE** key, to delete the parameter. SBL will prompt the user confirming this action before any parameters are deleted.

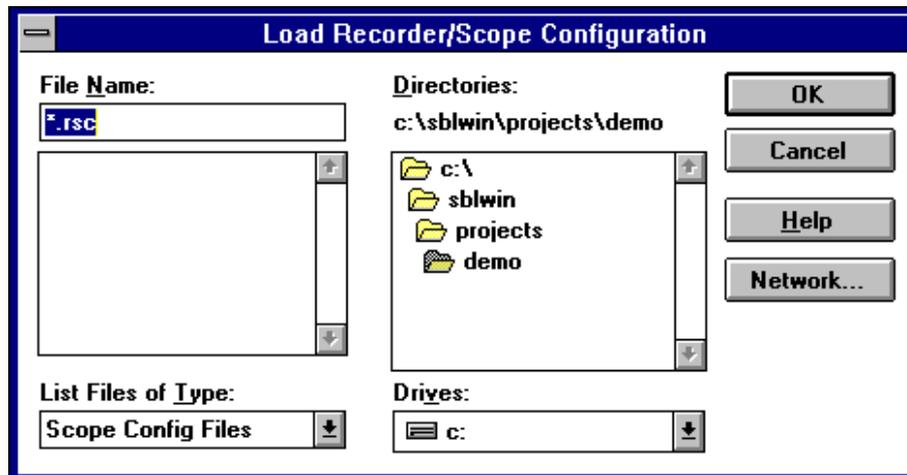
Options

Select a parameter from the parameter list and click this button to open the Parameter Options dialog box. This allows the user to edit the parameters min. and max. values as well as the Name and units to be displayed for this parameter.

Scope Configuration Files

Scope configuration files can be loaded into both the Scope Configuration and Chart Recorder Configuration dialog boxes. These files are completely interchangeable between scope and chart recorder configurations. Only relative information is loaded into the appropriate dialog box and any missing information is initialized to default values.

Loading Scope Configuration Files



File Name:

Enter the name of the scope configuration file to open or select it from the list of available files.

List Files of Type:

Scope configuration files are the only file type that can be selected using this dialog box.

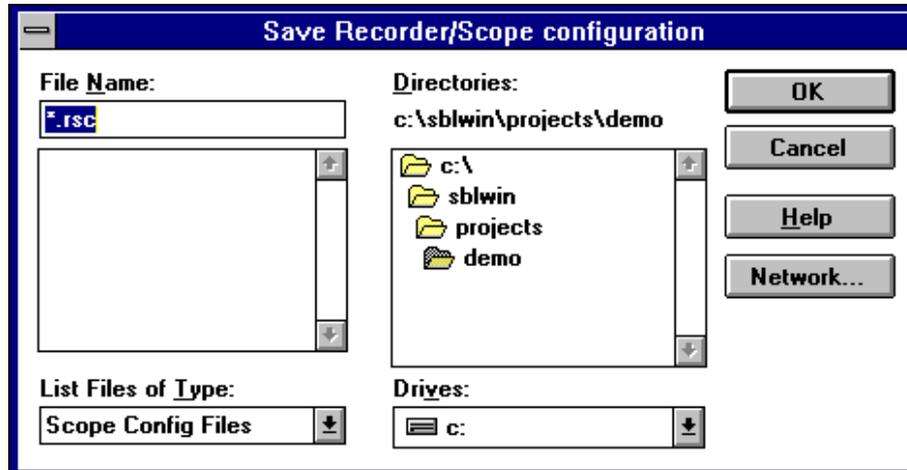
Directories:

If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file.

Drives:

Use this drop down list box to select a different drive from which to open the scope configuration file.

Saving Scope Configuration Files



File Name:

Enter the name of the file to save the current scope or chart recorder configuration to. If a file name is selected from the list of existing files the user will be prompted to confirm that the new file will overwrite the existing file.

List Files of Type:

Scope configuration files are the only file type that can be selected using this dialog box.

Directories:

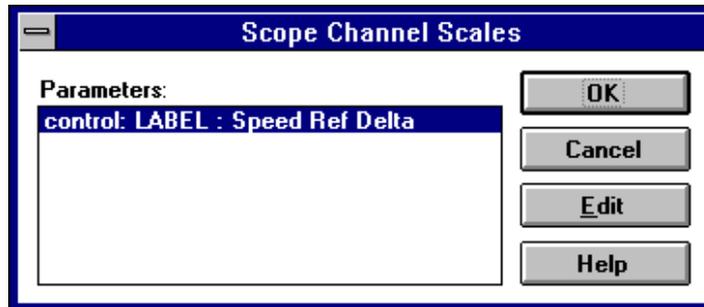
If a project is open the project directory will be selected otherwise the selected directory will be the directory that contains the SBL.EXE file.

Drives:

Use this drop down list box to select a different drive from which to open the scope configuration file.

Editing Scope and Chart Recorder Scales

Click the right mouse button with the cursor over a scope or chart recorder window to open the **Scope Channel Scales** dialog box.



Parameters:

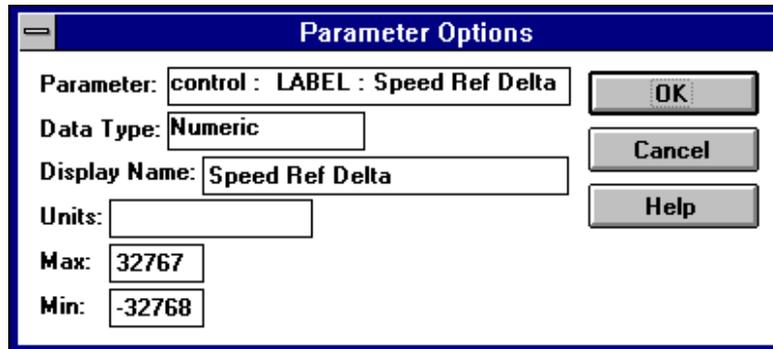
- Displays a list of available parameters that have been added to the scope or chart recorder configuration.

Edit

- Select a parameter from the parameter list and click this button to edit the Parameter Options for this parameter.

Parameter Options

Click the **Options** button in the Scope or Chart Recorder configuration dialog boxes to open the **Parameter Options** dialog box.



Parameter:

Displays the selected parameter's full name which includes the sheet name, block name and output name. If the parameter is a constant or label the block name is replaced with CONSTANT or LABEL respectively and the output name is the constant or label name.

Data Type:

Displays the parameter's data type as Numeric or Boolean

Display Name:

The display name is the name that is displayed in the scope or chart recorder window for this parameter. The default for the display name is the parameter's output name but the user can change this to any name up to 15 characters in length.

Units:

Enter the units that will be displayed for this parameter. If the parameter has a Tag attached to it this will default to the Tag's units. The units can be up to 7 characters in length.

Max:

Enter the maximum value that will be displayed for this parameter. If the parameter has a Tag attached to it this value will default to the Tag's max.

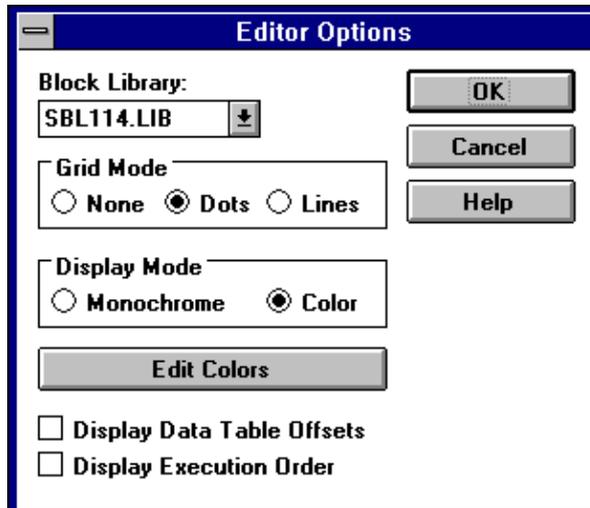
value otherwise it will default to 32767. This value can be any value between -32768 and 32767 and is used for calculating the scale used for this parameter.

Min:

Enter the minimum value that will be displayed for this parameter. If the parameter has a Tag attached to it this value will default to the Tag's min. value otherwise it will default to -32768. This value can be any value between -32768 and 32767 and is used for calculating the scale used for this parameter.

Editor Options

Select **Editor** from the **Options** menu to display the **Editor Options** dialog box.



Block Library:

Select the **SBL** block library that contains the blocks to be used when creating **SBL** block programs.

Grid Mode

Select the drawing mode to be used when displaying the grid in sheet and macro windows. Depending on the processor and video card being used, selecting **Dots** for the grid mode can cause sheet and macro windows to be redrawn slowly. Selecting **Lines** as the grid mode is a faster method of displaying the grid but depending on the colors selected it can be difficult to see the objects. Select **None** to prevent SBL from displaying a grid when drawing sheet and macro windows.

Display Mode

Select between **monochrome** and **color** display modes. In **monochrome** mode SBL uses a default set of colors consisting mainly of white on black to improve readability on LCD laptops. When **color** mode is selected SBL will default to the same monochrome colors but the user can then edit the colors by clicking on the **Edit Colors** button.

Edit Colors

Click this button to open the Edit Colors dialog box. This will allow the user to customize the colors used by SBL when drawing sheet and macro windows. All printing is done in monochrome mode regardless of the display mode settings.

Display Data Table Offsets

Selecting this option displays the data table offsets assigned to all blocks and constants by the compiler. The data table offsets are displayed in hexadecimal format. The offsets for blocks are displayed below the name of each input and output. A constant's offset is displayed below the constants name to the right of the value. This option was added as an aid for development and debugging of **SBL** and will be of little use to most users.

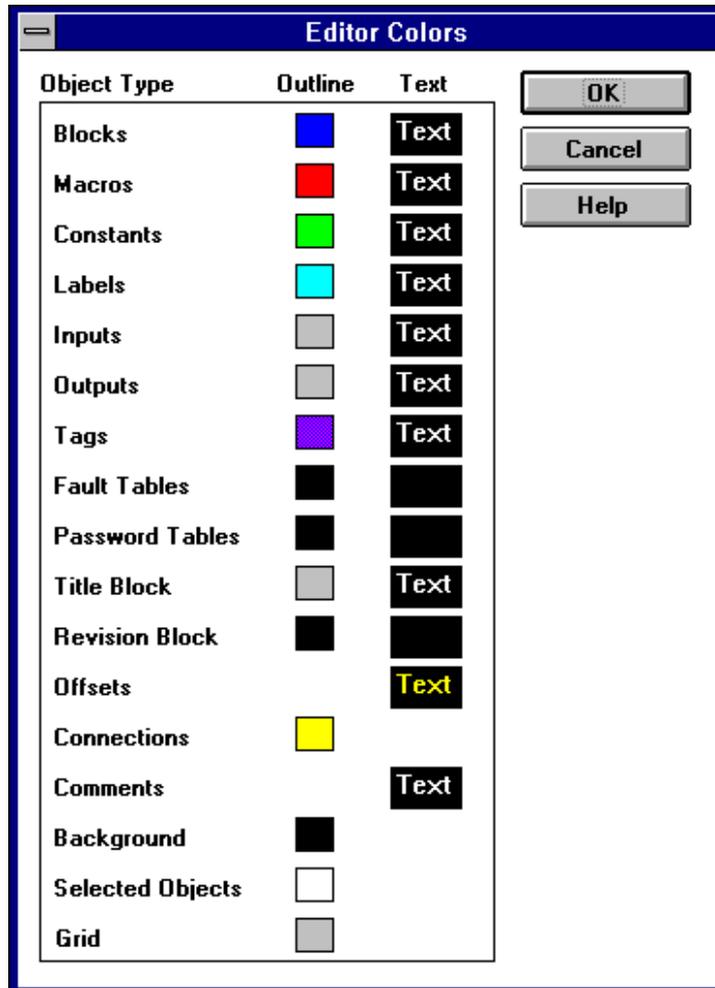
Display Execution Order

Selecting this option displays the execution order assigned to all blocks during compile.

The execution order is displayed at the bottom of each block. Macros that contain more than one block will display a range of execution orders to indicate that more than one block is executed by the macro. This feature is useful as a means of verifying that blocks are being executed in the order intended by the user.

Editor Colors

Click the **Edit Colors** button in the Editor Options dialog box to display the **Editor Colors** dialog box.



Object Type

Lists all of the objects and other elements for which the colors can be edited.

Outline

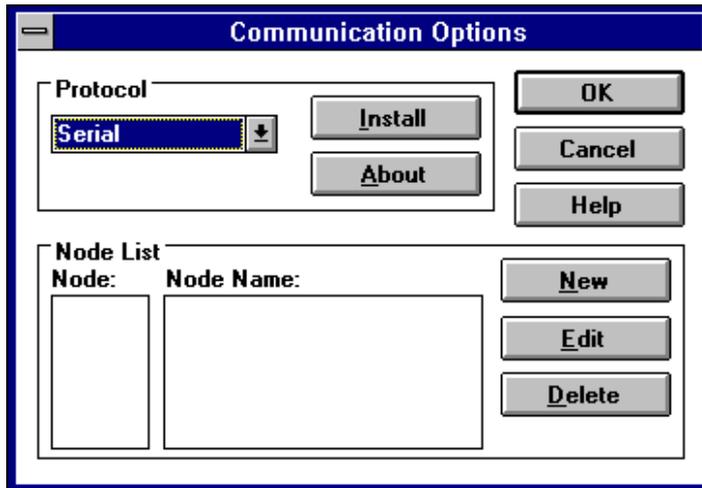
Click on the **Outline** box beside the **Object Type** to edit that objects color. This is the color used when drawing the graphical portion of an object, that is all parts other than text. Some objects have no graphical portion and therefore this color selection is not available.

Text

Click on the **Text** box beside the **Object Type** to edit that objects text color. This is the color used when displaying the text portion of an object. Some objects have no text portion and therefore this color selection is not available.

Communication Options

Select **Communications** from the **Options** menu to display the **Communication Options** dialog box. Select and install the communication protocol to be used when communicating with SAFphire nodes. Configure the node identification for all SAFphire nodes to communicate with by assigning the node a name.



Protocol

Select the communication module to be used when communicating with SAFphire nodes. Each module supports a specific communication protocol. The module you choose will depend on the hardware installed on both the computer and the SAFphire nodes. Additional hardware and/or modules may be available in the future. Contact **SAF Drives and Automation** for more information.

Install

Click this button to configure and install the selected communication module.

About

Click this button to display a description and version information for the selected module.

Node:

Displays a list of currently configured SAFphire nodes. All SAFphire nodes

must be assigned a name. This name is used to identify the SAFphire node during communications.

Node Name:

Displays a list of names currently assigned to SAFphire nodes.

New

Click this button to open the **Add Node** dialog box and configure a new SAFphire node. See *Configuring Nodes* for more information on configuring SAFphire nodes.

Edit

Click this button to open the **Edit Node** dialog box and edit a previously configured SAFphire node. See *Configuring Nodes* for more information on configuring SAFphire nodes.

Delete

Select a SAFphire node or name from the lists and click this button or press  to delete the selected node.

Keyboard Usage

The function of the following keys depends on the type of window currently active. See the Mouse section for information on using the mouse.

All Windows



Press this key for context sensitive help.

Sheet and Macro Windows



Use the cursor keys to move or copy objects as well as draw connections. The cursor keys can also be used to scroll the sheet by toggling on scroll lock. The cursor must be inside the active sheet or macro window before the cursor keys become active. When the cursor is moved to the edge of sheet window using the cursor keys the sheet will scroll each time the cursor key is pressed.



Position the cursor over an object and press the **ENTER** key to "grab" the object. A grabbed object is displayed with an outline. Once grabbed an object can be moved, copied or deleted. Use the mouse or the cursor keys to move or copy the object and press the **ENTER** key again to release the object.



Position the cursor over an object and press the **SPACE** bar to toggle between normal and magnified view. Magnified views of blocks and constants are annunciated when the annunciator is enabled.



To copy an object grab and position the object as if moving it but press and hold the **CTRL** key and press the **ENTER** key to release the copied object. All objects except title blocks can be copied including groups of objects. SBL will prompt the user for a new name for all copied blocks, macros, constants and tags.



Position the cursor over an object and press the **INSERT** key to edit that objects properties.



To delete an object position the cursor over the object, press the **ENTER** key to grab the object, then press the **DELETE** key to delete the object.

-  Press the  key after grabbing an object to cancel the operation without making any changes. The  key can also be used to close dialog boxes without saving changes as if the **cancel** button had been clicked.
-  Press the  key when annunciating a magnified view of a constant to tune the constant's value. See Tuning Parameters for more information.
- 
 Press the  key while holding the  key to change the cursor to the block help cursor. Position the cursor over a block and click the left mouse button, or press the  key, to display a detailed description of that block.

Project Window

-  Use the  and  cursor keys to select a file from the project file list.
-  Press the  key to open the selected file.
-  Press the  key to add files to the project file list.
-  Press the  key to remove the selected file from the project file list. SBL will prompt to confirm this action before any files are deleted.

Report Window

-  Use the   cursor keys to select a warning or error message from the compiler report.
-  Press the  key to display the cause of the selected warning or error message. The sheet containing the warning or error will be displayed and the cursor will be positioned at the point where the warning or error was detected.
-  Press the  key to display a detailed description of the selected

warning or error message.

Annunciator Windows



Use the  cursor keys to select a parameter.



Press the  key to edit the selected parameter's precision and units.



Press the  key to add parameters to the annunciator window.



Press the  key to remove the selected parameter from the annunciator window. SBL will be prompt the user to confirm this action before any parameters are deleted..



Press the  key while annunciating to tune the selected constant's value. See Tuning Parameters for more information.



Press the  key to view and edit the annunciator file's node list. See Annunciator Node List for more information.

Scope and Chart Recorder Windows



Pressing the escape key will stop both the scope and the chart recorder.

Mouse Usage

The function of the mouse buttons depends on the type of window currently active. See the Keyboard section for addition commands and shortcuts using the keyboard.

Sheet and Macro Windows

Left Mouse Button

Press and hold the left mouse button while the cursor is over an object to "grab" that object. Use the mouse to drag the object to a new position. Release the mouse button to "drop" the object in the new position. To copy the object to this position hold the **CTRL** key when releasing the left mouse button. To delete the object press the **DELETE** key while holding the left mouse button. Double click the left mouse button while the cursor is over an object to edit that objects properties.

Right Mouse Button

Click the right mouse button while the cursor is over the sheet or macro window, but not over any object, to pop up a floating menu which contains some of the more frequently used menu commands for this window. Press and hold the right mouse button while the cursor is over an object to display a magnified view of the object. The magnified view of blocks and constants will be announced if the annunciator is activated.

Project Window

Left Mouse Button

Click the left mouse button while the cursor is over a file name to hi light that file. Double click the left mouse button while the cursor is over a file name to open the file. Press and hold the left mouse button while the cursor is over a files bitmap to drag that file to a new position in the file list.

Right Mouse Button

Click the right mouse button while the cursor is over the project window to pop up a floating menu which contains some of the more frequently used menu commands for this window.

Report Window

Left Mouse Button

Click the left mouse button while the cursor is over a message to highlight that message. Double click the left mouse button while the cursor is over a warning or error message to display the sheet on which the error occurred. The cursor will be positioned at the coordinates given in the message.

Right Mouse Button

Click the right mouse button while the cursor is over the report window to pop up a floating menu which contains some of the more frequently used menu commands for this window.

Annunciator Windows

Left Mouse Button

Click the left mouse button while the cursor is over a parameter to highlight that parameter. Double click the left mouse button while the cursor is over a numeric parameter to edit that parameter's precision and units.

Right Mouse Button

Click the right mouse button while the cursor is over an annunciator window to pop up a floating menu which contains some of the more frequently used menu commands for this window.

Scope and Chart Recorder Windows

Left Mouse Button

Has no function in this window.

Right Mouse Button

Click the right mouse button while the cursor is over a scope or chart

recorder window to pop up a floating menu which contains some of the more frequently used menu commands for this window.

Technical Support

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