

SOFTWARE MANUAL

α SIMPLE APPLICATION CONTROLLER

Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct programming and operation of the $\alpha/\alpha 2$ series controller.
- Before attempting to install or use the $\alpha/\alpha 2$ Series Controller this manual should be read and understood.
- If in doubt at any stage of the installation of the $\alpha/\alpha 2$ Series Controller always consult a professional electrical engineer who is qualified and trained to local and national standards which apply to the installation site.
- If in doubt about the operation or use of the $\alpha/\alpha 2$ Series Controller please consult the nearest Mitsubishi Electric distributor.

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AL-PCS/WIN-E

Software Manual

Manual number : JY992D74001

Manual revision : L

Date : 3/2008

FAX BACK

Mitsubishi has a world wide reputation for its efforts in continually developing and pushing back the frontiers of industrial automation. What is sometimes overlooked by the user is the care and attention to detail that is taken with the documentation. However, to continue this process of improvement, the comments of the Mitsubishi users are always welcomed. This page has been designed for you, the reader, to fill in your comments and fax them back to us. We look forward to hearing from you.

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Guidelines for the safety of the user and protection of AL-PCS/WIN-E

This manual provides information for the use of AL-PCS/WIN-E. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

- a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.
- b) Any commissioning or service engineer must be of a competent nature, trained and qualified to local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.
- c) All operators of the completed equipment (see Note) should be trained to use that product in a safe manner in compliance to established safety practices. The operators should also be familiar with documentation which is connected with the actual operation of the completed equipment.

Note : the term 'completed equipment' refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the symbology used in this manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware warnings



- 1) Indicates that the identified danger **WILL** cause physical and property damage.



- 2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.



- 3) Indicates a point of further interest or further explanation.

Software warning



- 4) Indicates special care must be taken when using this element of software.



- 5) Indicates a special point of which the user of the associated software element should be aware.



- 6) Indicates a point of interest or further explanation.

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Further Information Manual Lists

| | Manual Name | Manual No. | Description |
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| <input type="radio"/> | α Software Manual <This manual> | JY992D74001 | This manual contains explanations of operation for AL-PCS/WIN-E Programming Software. |
| <input type="radio"/> | α Hardware Manual | JY992D74201 | This manual contains hardware explanations for wiring, installation and specification for α series controllers. |
| <input checked="" type="radio"/> | α Programming Manual <English only> | JY992D76601 | This manual contains instruction explanations for the α Series controllers. |
| <input type="radio"/> | α Series Instruction Manual | JY992D90901 | This manual contains hardware explanations of installation for α Series controller. |
| <input type="radio"/> | AL-EEPROM Hardware Manual | JY992D74301 | This manual contains hardware explanations of installation for AL-EEPROM. |
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| <input checked="" type="radio"/> | α2 Programming Manual <English only> | JY992D97101 | This manual contains instruction explanations for the α2 Series controllers. |
| <input type="radio"/> | α2 Series Communication User's Manual <English only> | JY992D97701 | This manual contains explanations for the setup, messaging, diagnostics, bit assignments, etc. for communications using the α2 series controller. |
| <input type="checkbox"/> | α2 Series Instruction Manual | JY992D97501 | This manual contains hardware explanations of installation for α2 Series controller. |
| <input type="checkbox"/> | AL2-4EX, AL2-4EX-A2, AL2-4EYR, AL2-4EYT Instruction Manual | JY992D97401 | This manual contains hardware explanations of installation for AL2-4EX, AL2-4EX-A2, AL2-4EYR and AL2-4EYT extension module. |
| <input type="checkbox"/> | AL2-2DA Instruction Manual | JY997D09301 | This manual contains hardware explanations of installation for AL2-2DA expansion module. |
| <input type="checkbox"/> | AL2-2PT-ADP Instruction Manual | JY997D09401 | This manual contains hardware explanations of installation for AL2-2PT-ADP expansion module. |
| <input type="checkbox"/> | AL2-2TC-ADP Instruction Manual | JY997D09501 | This manual contains hardware explanations of installation for AL2-2TC-ADP expansion module. |
| <input type="checkbox"/> | AL2-EEPROM-2 Hardware Manual | JY992D96801 | This manual contains hardware explanations of installation for AL2-EEPROM-2. |
| <input type="checkbox"/> | AL-232CAB Hardware Manual | JY992D76001 | This manual contains hardware explanations of installation for AL-232CAB. |
| <input type="checkbox"/> | AL2-GSM-CAB Hardware Manual | JY992D97201 | This manual contains hardware explanations of installation for AL2-GSM-CAB. |
| <input type="radio"/> | AL-ASI-BD, AL2-ASI-BD Hardware Manual | JY992D81401 JY992D81402 | This manual contains hardware explanations for wiring, installation and specification, etc. for AL-ASI-BD and AL2-ASI-BD. |

Refer to these manuals.

Refer to this manual if necessary.

Refer to the content of these manuals if necessary though it is included in α2 Hardware Manual.

Definitions

The following terms will be used throughout this manual and the AL-PCS/WIN-E programming software.

Function Block Programming - The method by which the α Simple Application Controller is programmed.

Function Blocks - the heart of the α series. They process information received from inputs or other sources, manipulate the data, and control the system Outputs. There are 40 (α series: 26, α2 series: 40) function blocks that can be found in the Accessories Toolbar under the FUNC or LOGIC headings. The function blocks have been pre-programmed to perform specific actions and may have variable parameters that can be adjusted for specific programming needs.

Function Block Diagram base (FBD base) - All system program components (Inputs, Outputs, Function Blocks, Memory Bits, or Keys) are placed on the FBD base during programming.

Digital - A type of Input or Output that only recognizes an On or Off state. An On state can also be referred to as “High” or “1” while the Off state can be referred to as “Low” or “0”.

Analog - A type of input/output that measures a Voltage or Ampere value rather than an On/Off signal.

Abbreviations

The following definitions or abbreviations will be used throughout this manual.

- The AL-PCS/WIN-E software will be referred to as the AL-PCS/WIN-E or the programming software.
- The α and α2 Series Simple Application Controller may be referred to as the α series or the controller.
- Function Blocks may be referred to as FB(s).
- Function Block Diagram may be referred to as FBD.
- Input/Output may be referred to as I/O.
- Personal Computer may be referred to as PC
- Microsoft® Windows®, Windows® 95, Windows® 98, Windows® Me, WindowsNT® Workstation 4.0, Windows® 2000, Windows® XP and Windows Vista® may be referred to generically as Windows®.

Registration

- Microsoft® Windows®, Windows® 95, Windows® 98, Windows® Me, WindowsNT® Workstation 4.0, Windows® 2000, Windows® XP and Windows Vista® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- The company name and the product name to be described in this manual are the registered trademarks or trademarks of each company.

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1. Introduction

This section describes the major functions of the AL-PCS/WIN-E programming software (hereafter referred to the AL-PCS/WIN-E or programming software) and the outline of this manual.

This Software Manual is written for AL-PCS/WIN-E version V2.60. Further version of AL-PCS/WIN-E may change without notice. Refer to the help file for AL-PCS/WIN-E's changes.

1.1 Outline

The software package AL-PCS/WIN-E is a programming tool designed to be used with the α Series Simple Application Controllers (α and α2 series). The AL-PCS/WIN-E runs on Microsoft® Windows® 95, Windows® 98, Windows® Me, WindowsNT® Workstation 4.0, Windows® 2000, Windows® XP and Windows Vista® (hereafter referred to collectively as Windows®). The software has been designed to be both powerful and user friendly. While many of the software features can be learned intuitively, a detailed help file has been incorporated into the software to assist users in finding answers to their questions.

1.1.1 Major Features of the AL-PCS/WIN-E Software

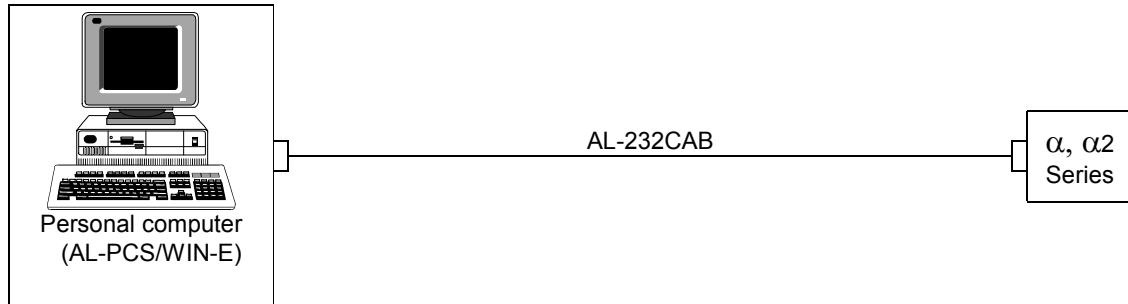
The AL-PCS/WIN-E is a powerful tool for programming the α Series and α2 Series Simple Application Controller (hereafter referred to the α Series or controller) in Function Block style. The Visual Nature of the software helps the user to see and understand the relationships between all parts of the program. Powerful and easy to use, the AL-PCS/WIN-E has incorporated the following features for your convenience:

- User-friendly Programming
The program can be made the visually and easily.
The Software has been designed to operate in a user-friendly windows format.
- Monitoring and force ON/OFF
Real-time monitoring AL-PCS/WIN-E allows bit device testing.
- Simulation function
When the simulation function is used, operation of the program can be tested off-line.
- Remote maintenance function
The software allows remote maintenance function to download, and to up-load and to monitor the program to the α series via telephone line.
- Monitoring in System Sketch window
The customer can make the monitor screen for the customer's system in the Monitoring in System Sketch Window.
- User-defined function block
The user can create customize function block from the combination of the original function blocks.
- Auto wizard function (Only supports AL-**M-* model)
This function allows beginners to create function block program with the aid of a guidance window.
- Russian Input
The VLS Software (V2.50) corresponds to the Russian input of α2 (V3.00).
For details, refer to Chapter 14.

1.2 System Configuration

1.2.1 Direct Connection with AL-PCS/WIN-E

Figure 1.1: Direct Connection with AL-PCS/WIN-E



1.2.2 Remote Maintenance With AL-PCS/WIN-E

Figure 1.2: Remote Maintenance with AL-PCS/WIN-E

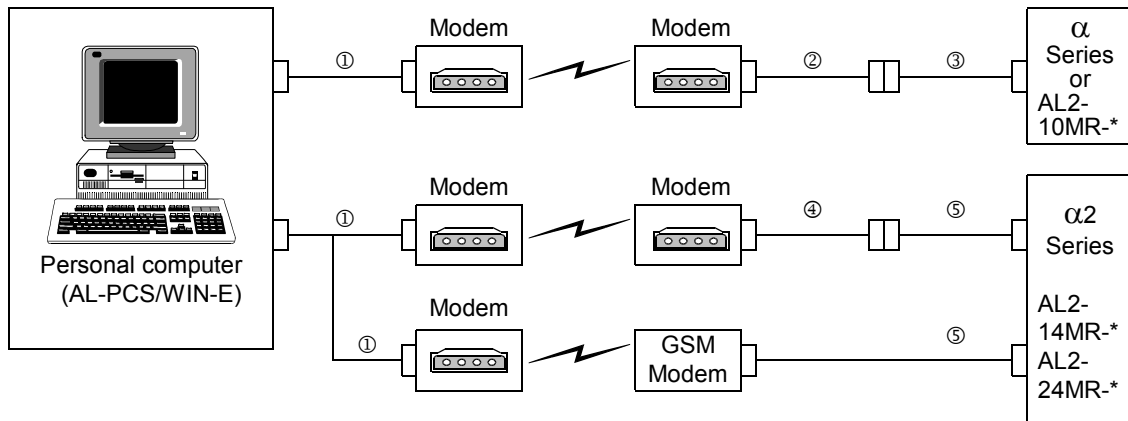


Table 1.1: Connecting by Modem

| | Using Cable |
|---|---|
| 1 | RS-232C straight cable for the modem (specified by Modem manufacture) |
| 2 | User made RS-232C cable (Refer to Figure 11.2) |
| 3 | AL-232CAB |
| 4 | RS-232C straight cable for the modem (Refer to Figure 11.3) |
| 5 | AL2-GSM-CAB |

1.3 Applicable Controllers

Table 1.2: Applicable Controllers

| Model Name | AL-PCS/WIN-E Version (SW0D5C-ALVLS-E) |
|------------|--|
| AL-6MR-A | Version 1.00 or later |
| AL-10M*-* | |
| AL-20M*-* | |
| AL2-14MR-* | Version 2.00 or later |
| AL2-24MR-* | |
| AL2-10MR-* | Version 2.40 or later |

1.4 Version Up Lists

Table 1.3: History of AL-PCS/WIN-E (SW0D5C-ALVLS-E)

| Version | Description |
|---------|---|
| V1.00 | Supported α Series controllers with Windows® 95, Windows® 98 and WindowsNT® workstation 4.0. |
| V1.30 | Supported AL-ASI-BD AS-interface module. |
| V1.41 | For Windows® Me and Windows® 2000. |
| V2.00 | Supported α2 Series controllers. |
| V2.10 | <ul style="list-style-type: none"> • For Windows® XP • Up to COM10 is available for COM port setting • The Import/Export function for User Function Block programming is added. |
| V2.30 | Supported α2 Series controllers Version 2.00. <ul style="list-style-type: none"> • Radio clock (DCF 77 [Manufactured by Theben AG]) • AL2-2DA analog output module • AL2-2PT-ADP PT100 adaptor module • AL2-2TC-ADP thermocouple analog sensor adaptor module • New function block (Analog Output [AO], PID [PID]) |
| V2.40 | Supported AL2-10MR-*. Supported α2 Series controllers Version 2.20. <ul style="list-style-type: none"> • New function block (Short Message Receiving [SMR], Call Detect [CD]) • Enhanced Daylight Saving Time Setup. • Enhanced User Program Protection. Replace signals. Import/Export of the Time Switch Setup. |
| V2.50 | Supported α2 Series controllers Version 3.00. <ul style="list-style-type: none"> • The addition of menu language setting • The addition of menu call key setting • The addition of the Russian input |
| V2.60 | For Windows Vista®. |

1.5 Product Configuration

Check the contents of the AL-PCS/WIN-E box against this list to confirm that the following accessories are supplied.

Table 1.4: Product Configuration

| Items | Number | Description |
|----------------------|--------|---------------------------|
| CD-ROM | 1 | SW0D5C-ALVLS-E |
| Manual (this manual) | 1 | Manual number JY992D74001 |

2. Installing and Starting AL-PCS/WIN-E

This section describes how to install the AL-PCS/WIN-E programming software package and to connect the α Simple Application Controller to the Personal Computer. The Operation System requirements are outlined and the equipment necessary to make all proper connections are detailed.

2.1 System Requirements

The AL-PCS/WIN-E is designed to be installed on a computer that meets or exceeds the following specifications. Please check whether your personal computer meets these requirements prior to the software installation.



Table 2.1: Personal Computer Requirements

| Item | Description |
|--------------------------|---|
| Operating System*1 | Microsoft® Windows® 95, Windows® 98, Windows® Me, WindowsNT® workstation 4.0, Windows® 2000, Windows® XP and Windows Vista® |
| CPU*2 | Pentium 133 MHz or more (recommended) |
| Hard Disk | 10 MB of free capacity |
| Memory*2 | 32 MB or more (recommended) |
| CD-ROM Drive | Required for Setup |
| Pointing Device | Mouse or other pointing device |
| Display*2 | SVGA (800 x 600) 256 colors or more (recommended) |
| RS-232C Serial Interface | 1 port or more The RS-232C serial interface must be assigned to a COM port (COM1 to COM10). |

*1 The Russian input should use Russian OS (Windows®) when OS (Windows®) to be used is Windows® 2000, Windows® XP or Window Vista®, Russian can be entered on VLS by using the Windows® multi-language function. For details, refer to Chapter 14.

*2 Take care that the used computer meets or exceeds the CPU, memory and display specifications outlined by the OS.

2.2 Installing AL-PCS/WIN-E



To install the AL-PCS/WIN-E component files from the CD-ROM. Note that this software cannot be run from the install CD. It must be installed onto hard-drive and subsequently run the software from the drive.



Note:

If the PC had been installed with AL-PCS/WIN-E, please uninstall it. If it is uninstalled before the install, the AL-PCS/WIN-E may not operate correctly. For uninstall, refer to section 2.3.

To install AL-PCS/WIN-E:

- 1) Restart Windows[®], and do not start-up any other applications.
- 2) Insert the SW0D5C-ALVLS-E CD into CD-ROM drive.
- 3) Execute "setup.exe."
- 4) During the SW0D5C-ALVLS-E Setup dialog box, click "NEXT" whenever ready thus proceeding to the next panel.
- 5) If the destination folder need to be changed for the AL-PCS/WIN-E component files, click "Browse", and use the browser to locate the appropriate destination.
- 6) Click "NEXT".
- 7) If the Program folders need to be changed for the AL-PCS/WIN-E, enter the program folder name.

Note: When using on Windows Vista[®]

If the destination folder changes to an arbitrary folder (user created), it is not necessary to start the program via "Run as Administrator". For starting AL-PCS/WIN-E, refer to section 2.4.

- 8) Click "NEXT" to begin the installation. When the process is complete, a message will follow indicating. He successful installation of the AL-PCS/WIN-E software.
- 9) Select "Yes, I want to restart my computer now", and Click "Finish" to restart your computer.

2.3 Uninstalling AL-PCS/WIN-E

It is possible to remove all of the AL-PCS/WIN-E component files installed on your system with the Install/Uninstall in the Control Panel.

To uninstall AL-PCS/WIN-E:

- 1) Click the "Start" Menu, select "Settings" and then "Control Panel."

Note:

- Click the "Start" menu, choose "Control Panel" in Windows® XP and Windows Vista®.

- 2) Double-click "Add/Remove Programs" in the control panel.

Note:

- Click "Add or Remove Programs" on the control panel in Windows® XP.
- Click "Programs" on the control panel in Windows Vista®.

- 3) Select "Install/Uninstall" tab on Add/Remove Programs property.

Note:

- Select "Change or Remove Programs" on "Add/Remove Programs" window in Windows® 2000.
- Select "Change or Remove Programs" on "Add or Remove Programs" window in Windows® XP.
- Double-click "Uninstall a program" of "Programs and Features" in Windows Vista®.

- 4) Select "Mitsubishi SW0D5-ALVLS-E" to uninstall.

Note:

- Double-click "Mitsubishi SW0D5-ALVLS-E" to uninstall in Windows Vista®, and go to step 6.

- 5) Click [Change/Remove] button.

- 6) Click "Yes" to begin the uninstall of the AL-PCS/WIN-E component files. When the process is complete, a AL-PCS/WIN-E is successfully uninstalled from your personal computer.

2.4 Starting AL-PCS/WIN-E



This software cannot be run from the install CD. It must be installed onto hard-drive and subsequently run the software from the drive.

To start AL-PCS/WIN-E:

- Click the “Start” menu, choose “Program” ⇒ “Mitsubishi Alpha Controller”, and click the name of the program you want to start.

Note:

- "All Programs" appears in Windows® XP and Windows Vista®.

- It is possible to also double-click a program icon (shortcut) to begin start-up.



Caution; Starting AL-PCS/WIN-E on Windows Vista®

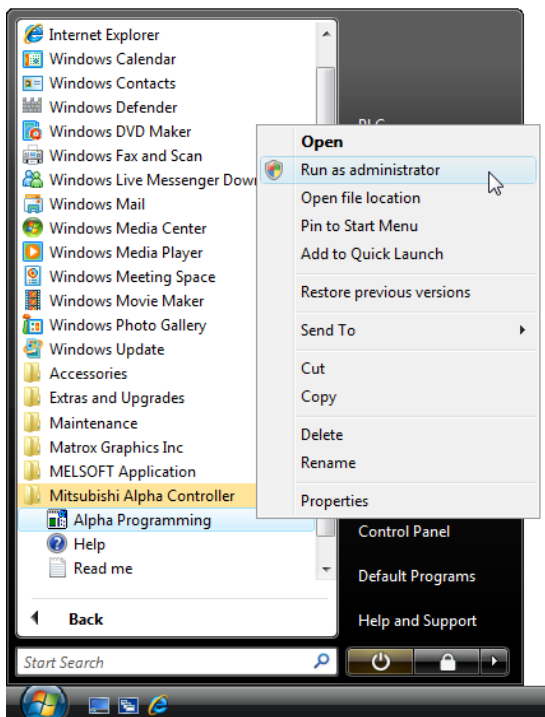
When starting on Windows Vista®, AL-PCS/WIN-E must be started by following method. If it starts by other methods, AL-PCS/WIN-E does not operate correctly.

- Run AL-PCS/WIN-E as an administrator.
When starting by the Start menu and program icon (shortcut), it starts by "Run as Administrator" in the menu of a right-click. (Refer to the section below on “How to run AL-PCS/WIN-E as an administrator”).
- Installation to the arbitrary folder (user created)
The installation destination of AL-PCS/WIN-E is installed in the arbitrary folder (user created). The starting method is the same as Windows® XP.

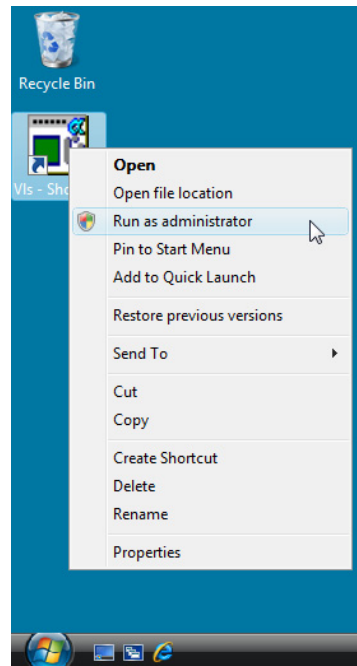
How to run AL-PCS/WIN-E as an administrator

When starting through the Start menu or through a program icon (shortcut), right-click on the program icon or menu item and select "Run as Administrator."

Start Menu



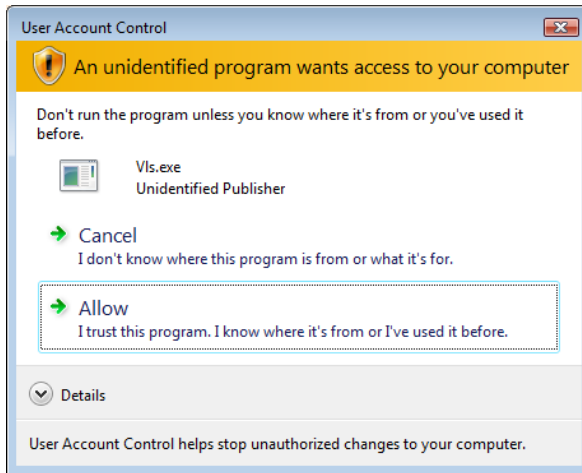
Shortcut





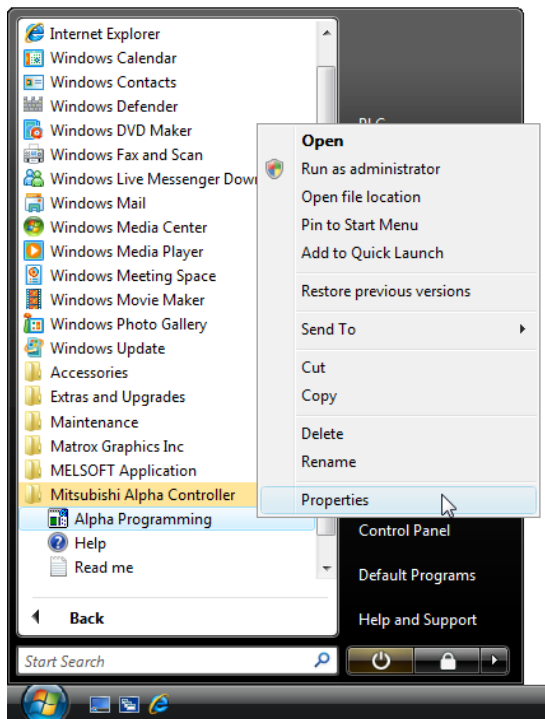
Note; When user account control is enabled in Windows Vista®

The following dialog box appears when starting. Click "Allow."



Note;

With Windows Vista®, all users can run AL-PCS/WIN-E as an administrator by the following method.

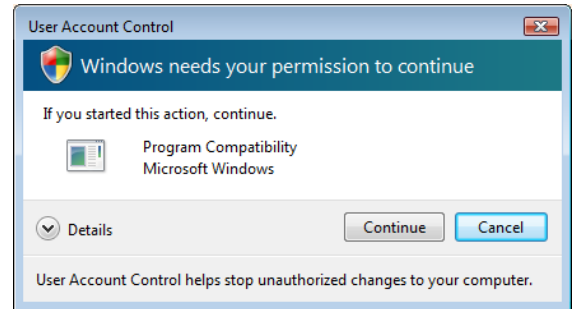
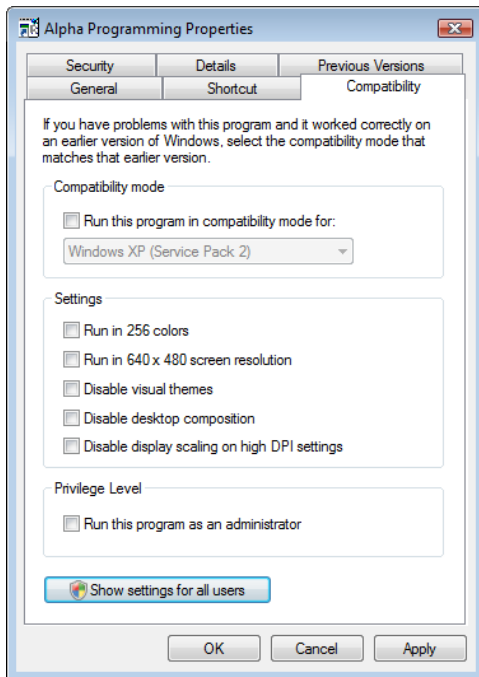


- 1) Right-click the "Alpha Programming" in Start menu, and choose "Properties". "Alpha programming Properties" dialog box appears.

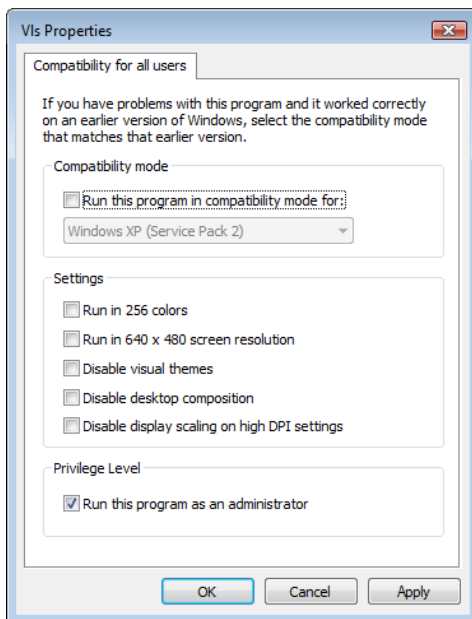
- 2) Select "Compatibility" tab, and then click "Show settings for all users" button. "VIs Properties" dialog box appears.

Note;

"User Account Control" dialog box appears when user account control is enabled. Click "Continue" button.



- 3) Click "Run this program as an administrator" check-box to add check mark, and then click "OK" button. "VIs Properties" dialog box closes.
- 4) Click "OK" button to complete setting. "Alpha programming Properties" dialog box closes.



3. Using the Help Files

The AL-PCS/WIN-E includes a powerful package of help files to guide the user through the programming options. Use the F1 key, or click the help icon, or use the Help pull down menu to access the help files.

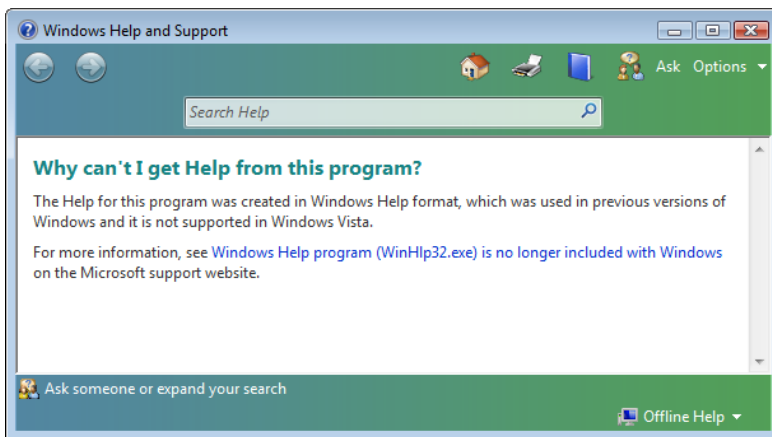


Note; When using Windows Vista®

When Help is run using Windows Vista®, the following "Windows Help and Support" screen may appear, and the Help screen is not displayed.

Perform the following procedure to install "WinHlp32.exe" which is needed to display the Help screen. (Note: The personal computer needs to be connected to the internet.)

- 1) Click the Help button.
- 2) The screen shown below opens. Click the displayed link.



- 3) The Microsoft Support Knowledge Base page opens. (<http://support.microsoft.com/kb/917607/en-us>)
Follow the instructions and download the Windows Help program for Windows Vista® (WinHlp32.exe).
- 4) Install the downloaded file.

3.1 The F1 Key

The F1 key will provide specific help on a highlighted object.

Click a system component on the FBD base to highlight it and press the F1 Key to bring up a dialog screen. To receive Help on a command, move to the command with the mouse until the instruction is highlighted. Use F1 to access the Help dialog box before using the command.

3.2 The Context Help



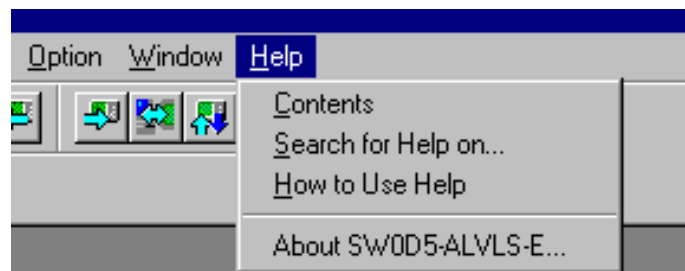
The Context Help command can provide help with Toolbars and associated commands. When choosing the Toolbar's Context Help button or pushing the "Shift" + "F1" key, the mouse pointer will change to an arrow and question mark. Then click on the item needing clarification in the application window. The Help topic will be shown for the item you clicked.



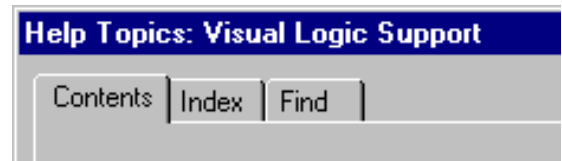
Context Help button

3.3 Help in Menu Bar

It is possible to also get Help by clicking "Contents" and "Search for Help on..." (Help menu). Upon entering the Help menu the options list will be shown.



When "Search for Help On..." or "How to Use Help..." is chosen, three tabs will appear on top of the window. These tabs can be used in addition to the Help files available on the display.



3.3.1 The Contents Command or Tab

The contents menu allows the user to choose from the following categories or chapters. When an option is chosen, the main topics available for that category pop up on screen. Choose the desired topic to bring up a dialog box.

Words or phrases that are highlighted in green contain additional information in another dialog box. Click on the highlighted text to view its dialog box.



Introduction - Choose from a basic introduction, information on the FBD base, or the System Sketch Operations.

Menu Options - Choose to view detailed information upon each pull down menu available at the top of the screen.

Tool Bars - Explains about the Standard, Drawing, Accessories, Controller, Image and User Function toolbar.

Functions and Signals - Learn about the functions and capabilities of the Inputs, Outputs, and Function Blocks available for programming with the AL-PCS/WIN-E.

Various Modes of Operation - Explains about the different modes of operation including the Programming mode, the Simulation Mode, and the Monitoring Mode.

Special features - This section describes the various ways of Dragging and Dropping objects, and of Moving Objects with the arrow keys.

Sub FBD Window - The sub FBD window can include the part of the main FBD window or a part of another Sub FBD window. In the FBD window, the sub FBD window is shown by "User Func" icon. This User Func icon has some input pins and output pins according to the contents of its Sub FBD window.

Help Support - Provides information on using the Contents Help icon, F1 key, and help dialog boxes.

3.3.2 Search for Help On...

It is possible to search the informations and instruction for using AL-PCS/WIN-E or various pieces of reference information from the desired categories.

To search for Help:

- 1) Clicking “Search for Help On...” in the help menu to bring up the opening Help window.
- 2) Click on the desired category to bring up information and instructions for using AL-PCS/WIN-E or various pieces of reference information.

3.3.3 The Contents Tab

The contents menu allows the user to choose from the following categories or chapters. When an option is chosen, the main topics available for that category pop up on screen. Choose the desired topic to bring up a dialog box.



Introduction - Choose from a basic introduction, information on the FBD base, or the System Sketch Operations.

Menu Options - Choose to view detailed information upon each pull down menu available at the top of the screen.

Tool Bars - Explains the Standard, Drawing, Accessories, Controller, Image and User Function toolbar.

Functions and Signals - Learn about the functions and capabilities of the Inputs, Outputs, and Function Blocks available for programming with the AL-PCS/WIN-E.

Various Modes of Operation - Explains about the different modes of operation including the Programming mode, the Simulation Mode, and the Monitoring Mode.

Special features - This section describes the various ways of Dragging and Dropping objects, and of Moving Objects with the arrow keys.

Help Support - Provides information on using the Contents Help icon, F1 key, and help dialog boxes.

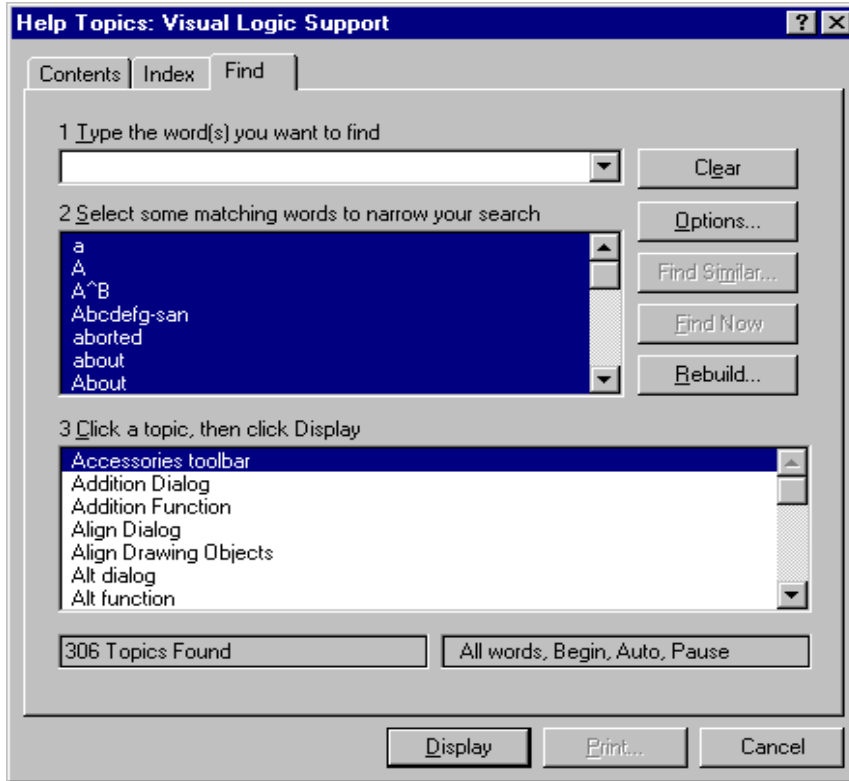
3.3.4 The Index Tab

The windows provides information on index topics. Type the first few letters of the required topic or scroll to the topic in the index list.



3.3.5 The Find Tab

The Find tab generates a list of key words on the AL-PCS/WIN-E and lets you search for help on those words. A matching words directory gives an option to narrow the number of matches found. A third directory lists the topics in which your word appears.



Find Setup Wizard

At first, the Find tab needs to be setup. Perform the setup in accordance with the Find Setup Wizard.

To setup Find tab:

- 1) Choose “Minimize database size (recommend)”, and click “NEXT”.
- 2) Click “Finish” to start creating the word list of AL-PCS/WIIN-E.

3.3.6 How to Use Help

Gives detailed information on “How to Use Help” and Customize the Help settings for the users convenience. Topics include finding, copying, viewing, and printing help files and manipulating the data in dialog boxes. Learn how to change the color or font size of a dialog box, add comments, or bookmark especially useful information.

3.3.7 About SW0D5-ALVLS-E

Use this command to display the copyright notice and version number of your copy of AL-PCS/WIN-E (SW0D5-ALVLS-E).

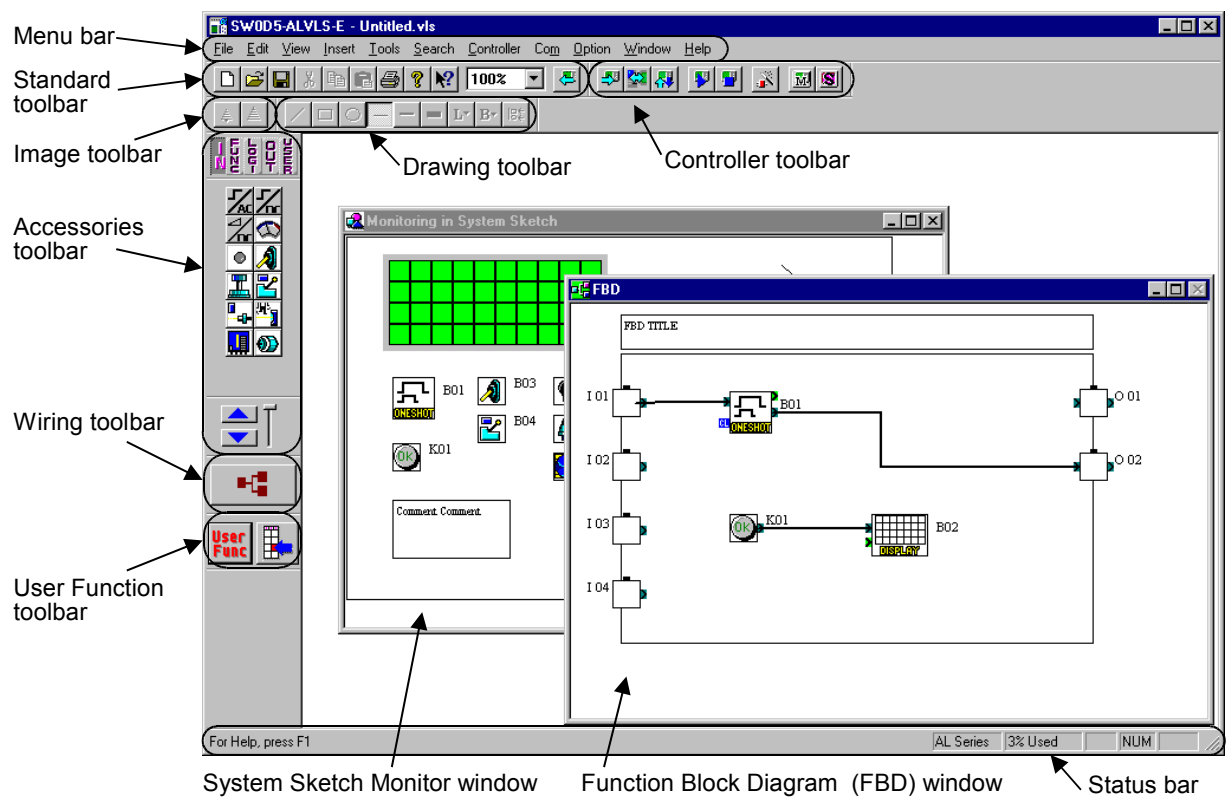
4. What You Should Know Before Starting to Program

This section describes the basic functions and background information necessary to operate the AL-PCS/WIN-E. Please read and understand this section prior to beginning your first program.

There are two screens that can be accessed from the AL-PCS/WIN-E, the Function Block Diagram base (FBD window) and the System Sketch Monitoring screen.

4.1 Screen Identification

The Toolbars have been labeled on the screen below for the user’s reference. These Toolbars can be turned On or Off in the View menu. The Menu Bar runs across the top of the screen. The two main viewing screens will be discussed later in the chapter.



Menu bar - The “File”, “Edit”, “View”, “Insert”, “Tools”, “Search”, “Controller”, “Com”, “Option”, “Window”, and “Help” options are located in the menu bar. Further information can be found in the chapter 5 and Help on AL-PCS/WIN-E.

Standard toolbar - The Standard toolbar contains the “New”, “Open”, “Save”, “Cut”, “Paste”, “Print”, “About”, “Help”, “Zoom”, and “Read from Controller” buttons. Further information can be found in the Help on AL-PCS/WIN-E.

Image toolbar - The Image toolbar contains the “Import” and “Export” buttons within the Monitoring in System Sketch Window. The import button is used for inserting the previously exported image (*.img) file into the Monitoring in System Sketch Window. Further information can be found in Help on AL-PCS/WIN-E.

Drawing toolbar - The Drawing toolbar contains the “Line”, “Rectangle”, “Oval”, “Thin”, “Medium”, “Thick”, “Line Color”, “Brush Color”, and “Align Drawing Objects” buttons. Further information can be found in the Help on AL-PCS/WIN-E.

Controller toolbar - The Controller toolbar contains the “Write to Controller”, “Verify Controller Data”, “Diagnosis of controller”, “Run Controller”, “Stop Controller”, “FBD Auto Wizard”, “Start/ Stop Monitor”, and “Start / Stop Simulation” buttons. Further information can be found in chapter 8 ~ 10 and Help on AL-PCS/WIN-E.

Accessories toolbar - The Accessories toolbar contains the “Input Signals”, “Functions”, “Logic Functions”, “Output Signals”, and “User Functions” Accessory toolbar. Further information can be found in the Help on AL-PCS/WIN-E.

Table 4.1: Accessories toolbar

| Toolbar | Description |
|-----------------|---|
| Input Signals | Input signals accessory toolbar are icons for the input signal and system bit. |
| Functions | Functions accessory toolbar are icons for the function blocks. |
| Logic Functions | Logic functions accessory toolbar are icons for the logic function blocks. |
| Output Signals | Output signals accessory toolbar are icons for the Output signal and control bit. |
| User Functions | User functions accessory toolbar are icons for the registered user function. |

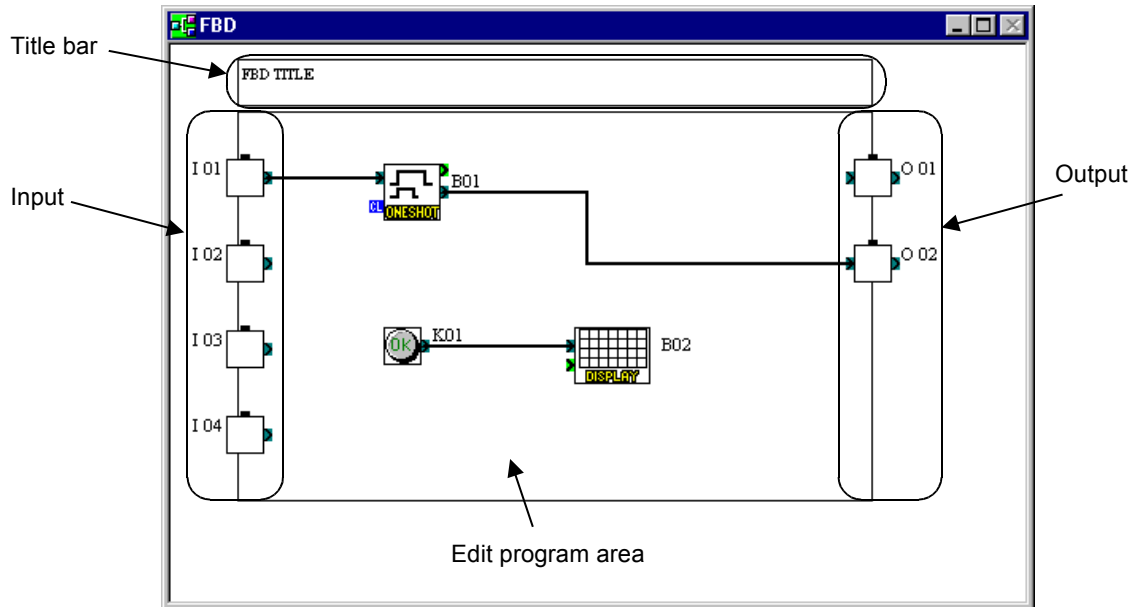
Wiring toolbar - The Wiring toolbar is only the “wiring” button. Further information can be found in chapter 6 and Help on AL-PCS/WIN-E.

User function toolbar - The User function toolbar are “User Func” and “User Func Registration” buttons. Further information can be found in the chapter 6 and the Help on AL-PCS/WIN-E.

Status bar - The Status bar is current status of the “used series”, “percentage of the used function block”, “caps lock key”, “num lock key”, and “scroll lock key”. Further information can be found in Help on AL-PCS/WIN-E.

4.2 The Function Block Diagram (FBD) Window

The Function Block Diagram (FBD) window is used to program the α series controller. The FBD window consists of a large wiring area (lime green by default), a title box and input and output rectangles vertically along the right and left hand sides, respectively. Programming components are placed on the wiring area or in the rectangles, and connected by single wires to construct the program for the α series. The FBD window is also known as FBD Wiring area.

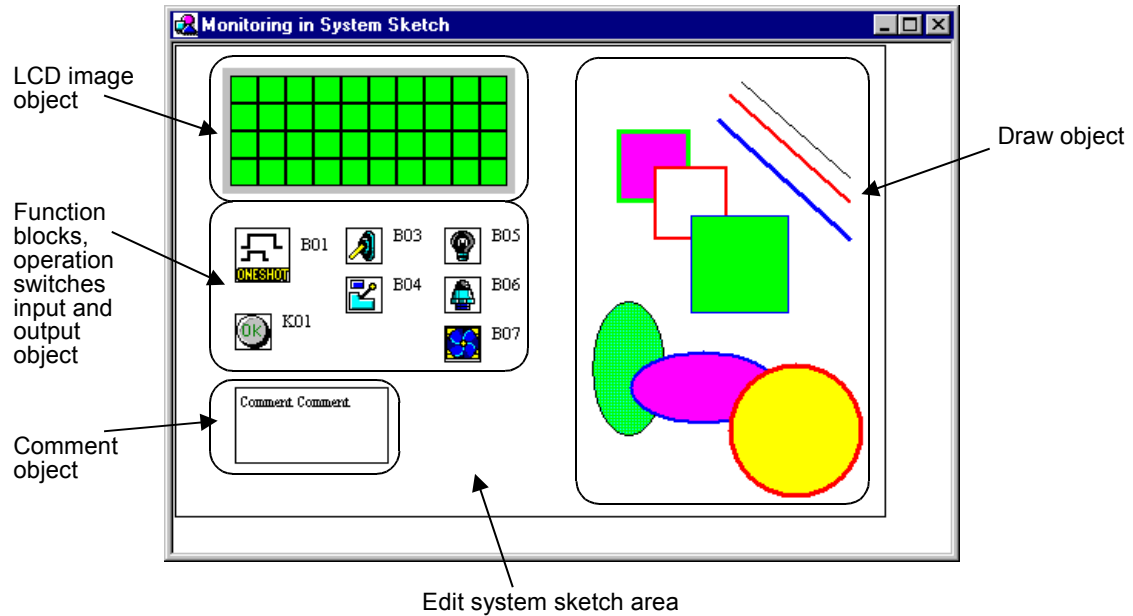


The user can perform the following ten operations using FBD window. Refer to Chapter 6 for more details. The size for edit program area can be changed by the operation of mouse.

- 1) Place the I/O signals and functions using the Accessories Toolbar.
- 2) Assign parameters to functions.
- 3) Wire the various program components together (with the help of Wiring Analyser).
- 4) Writes the Program logic and I/O device's information to the α series.
- 5) Invoke Auto FBD Wizard to begin to program with guidance.
- 6) Test the program logic with Internal Devices (Input and Output signals placed in the FBD wiring area).
- 7) Simulate and check the programming logic off-line without connecting an α series. The user can:
 - force input signals ON/OFF
 - change function parameters (timers, counters, analog data, etc.)
 - display comments or function values on screen
 - Monitor component status via changing wire colors (ex. Red Wire = OFF, Blue Wire = ON)
- 8) Read information from an α series and recreate the Program on the FBD window.
- 9) Monitor an α series on-line.
- 10) Print the FBD screen and component information shown on the FBD window.

4.3 The Monitoring in System Sketch Window

The Monitoring in System Sketch window is the customizing monitor window. The icons for I/O, the function blocks, the images, and the state of LCD, etc. can be displayed in this window. Further information can be found in chapter 7.



The following operations can be performed in System Sketch window. The size for the edit system sketch area can be changed by the operation of mouse.

- 1) Draw a diagram using the Drawing toolbar.
- 2) Place the I/O devices and Function Blocks to represent the α series set-up.
- 3) Place OLE components in the System Sketch window.
- 4) Monitor/test an operational α series.
- 5) Simulate and check the programming logic without connecting the actual α series.
- 6) Print the System Sketch Monitor window and the component information contained in the window.
- 7) Import Bitmap Images.

4.4 The Programming Mode

This is the mode in which all programs are created and system components are added or deleted. Also known as the Drawing mode, all the toolbars and the menu options will be enabled for programming or drawing. The FBD window and System sketch windows will default to the Programming mode when files are created or opened. The indication title will be displayed as “FBD” in the FBD window and as “Monitor in System sketch” in the System sketch window.

4.4.1 The FBD Window in Programming Mode



As the name suggests, all the functions necessary to build a program can be accomplished in the programming mode. The user may add FBs or other signals, set or change parameters, move components, and perform wiring operations in the programming mode. (See Chapter 6 for more details.)

The Auto Wizard Function is also available in this mode. The main purpose of Auto FBD Wizard is to educate inexperienced users so that they can get acquainted with Signals, Function Blocks, Wiring and related programming items.

4.4.2 “Monitoring in System Sketch Window” in the Programming Mode

The user is allowed to add, modify, move, and resize the drawing objects in System sketch window. Use the Accessories Toolbar to add components as in the FBD window. Copy components to or from the FBD window. Select any component in the window by pressing the mouse left button and drag the object to the desired location. Double click on a Function Block to open the parameter setting dialog.

Objects can be drawn via the Drawing Tool bar with the Line, Oval, and Rectangle commands and/or import objects with the commands in the Insert Menu.

4.5 The Simulation Mode



The Simulation mode will mimic the conditions under which a program is run without physical connection to the hardware. This is a very powerful tool for debugging programs prior to writing the contents to an actual target α series.

The information generated by the program will be continuously read from the Simulator. The On/Off status and current values of the Signals and Function Blocks will be updated by the AL-PCS/WIN-E or the user can input values for simulation purposes. The user can control the On/Off state of Inputs with the click of a mouse and can directly set analog values.

4.6 The Monitor Mode



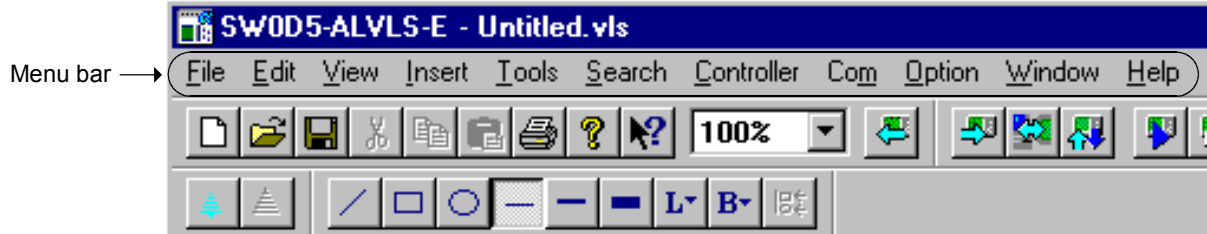
The Monitor Mode can monitor and test the actual target α series hardware which is connected to the PC through an AL-232CAB or modem. The information regarding the state and current value of Signals and Functions will be continuously read from the target α series and updated accordingly in the AL-PCS/WIN-E.

If the α series contents are updated via the α series operation keys, a message box will appear stating the α series contents are updated and monitoring will be stopped. The application will automatically switch to Program mode.

MEMO

5. Menu Bar Functions

This chapter gives a brief description of the available functions contained in the Pull Down menus.



5.1 File

New (Ctrl+N) - Creates a new file with windows in both the FBD and Monitoring in System Sketch window. When the FBD window and the system sketch monitor window have already been displayed, the dialog box to save the file under the display is viewed.

Open... (Ctrl+O) - Opens an existing file with windows in both the FBD and Monitoring in System Sketch window. When the FBD window and the system sketch monitor window have already been displayed, the dialog box to save the file under the display is viewed.

Close - Closes existing active documents in both the FBD and System Sketch window, and the dialog box to preserve the file under the display is viewed.

Save (Ctrl+S) - Saves (overwrites) the current file to its current name and directory. When creating new file, this process is same as "Save As...".

Save As... - Saves the current file under a new name and or directory. The first time a file is saved this command will come up so that the file can be named.

Print Setup... - Selects a printer and printer connection from the Print Setup Dialog Box that appears on the screen.

Print Preview - Views the active document as it would appear if printed. This command is disabled if either of the FBD or Monitoring in System Sketch window is minimized.

Print... (Ctrl+P) - A Print Dialog box appears onscreen for selecting options and Print data.

Export Registered User Func - The registered UserFunc data (User Function Block) is exported (stored) to a designated folder; Thus, registering the UserFunc data (User Function Block) is possible from one PC to another.

Import Registered User Func - The exported UserFunc data (User Function Block) is imported from a designated folder; Thus, registering/transferring the UserFunc data (User Function Block) is possible from one PC to another.

Recent File(Max.8) - Displays the history of the file opened in the past. The histories are displayed up to 8 for the one preserved as a file. Moreover, by selecting the arbitrary file from the displayed history, and selecting; The file that has been opened in the past can be opened again.

Exit - Ends the VLS session. When the displayed file was not saved, the dialog box to preserve the file under the display is viewed.

5.2 **Edit**

Undo (Ctrl+Z) - Cancels the Previous Instruction. There is only one level of Undo available.

Redo (Ctrl+Y) - Cancels the Previous Undo Instruction. There is only one level of Redo available.

Cut (Ctrl+N) - Removes the selected data from the Screen and place it to the Clipboard.

Copy (Ctrl+C) - Copy the selected data to the Clipboard.

Paste (Ctrl+V) - Adds the data from the Clipboard to the Program

Delete (Del) - Deletes the selected data from the program.

Select All (Ctrl+A) - Select All the function blocks on the screen.

Insert Func - Inserts a new function block on the FBD window or on the Monitoring in System Sketch Window. Select the function block to be inserted. Click the position where the function block to be placed on the FBD window or the Monitoring in System Sketch Window.

Change Func - Changes the function block placed by the FBD window or the Monitoring in System Sketch Window. Select the function block to be placed newly after the icon to be altered is clicked.

Insert Logic - Inserts a new logic block on the FBD window or on the Monitoring in System Sketch Window. Select the logic block to be inserted. Click the position where the logic block is to be placed on the FBD window or on the Monitoring in System Sketch Window.

Change Logic - Changes the logic block placed by the FBD window or the Monitoring in System Sketch Window. Select the logic block to be put newly after the icon to be changed is selected.

5.3 View

Close (O)pen System Sketch - Closes the System Sketch Screen. If the screen is closed, the title will change to Open System Sketch.

Close (O)pen FBD - Closes the Function Block Diagram base. If closed, the menu option will change to Open FBD.

Standard Toolbar - When the Check mark appears, the Standard Toolbar will be displayed onscreen.

Controller Toolbar - When the Check mark appears, the Controller Toolbar will be displayed onscreen.

Drawing Toolbar - When the Check mark appears, the Drawing Toolbar will be displayed onscreen.

Accessories Toolbar - When the Check mark appears, the Accessories Toolbar will be displayed Onscreen.

Wiring Toolbar - When the Check mark appears, the Wiring Toolbar will be displayed onscreen.

Image Toolbar - When the Check mark appears, the Image Toolbar will be displayed onscreen.

User Function Toolbar - When the Check mark appears, the User Function Toolbar will be displayed onscreen.

Status Bar - When the Check mark appears, the Status Bar will be displayed Onscreen.

Zoom - Choose from 200 (Ctrl+PageUp), 150, 100 (Ctrl+Home), 75, 50 (Ctrl+PageDown), 25, or 10% zoom factors.

5.4 Insert

LCD Image - Displays the same content as the liquid crystal display of the α series. LCD image is active only in the Monitoring in System Sketch Window.

Comment - The FBD window and the Monitoring in System Sketch Window displays comment. The comment control statement is not limited to a number of strokes with this software.

Insert New Object... - Inserts the data made by other applications as a display panel item on the Monitoring in System Sketch Window.

Links... - This menu will be active when the selected object is the linked file. The object file must appear on the “Link” when inserting object via the “Insert New Object...” In this menu, the following is possible.

- Display the linked file information
- Update the linked file data
- Edit the linked file with the used source application. In this case, the application is opened.
When this object is double-clicked, the source application will be opened.
- Change the current file to other file.
- Break the link information. Therefore, the linked file is converted to AL-PCS/WIN-E data. In this case, the file cannot be edited with the source application.

Object - Opens the application in which the selected embedded or linked object was created thus editing is possible.

5.5 Tools

Start Auto FBD Wizard - Starts the auto FBD wizard function. However, this command supports only the α series (Model: AL-**M*-*). This command is not available when the α2 Series controller is selected.

Renumber Signals - Updates the FB number of the icon placed on the FBD window and the Monitoring in System Sketch Window. When the function block is deleted after the program is constructed, the number of the icon becomes empty. The number allocated to the function block is updated when “Renumber Signals” is executed, and the number of the deleted icon is filled.

Replace Signals - The Replace Signals function allows the user to exchange a signal object assignment with other objects present on the FBD and system sketch windows.

5.6 Search

By Comment - Searches for a Function Block by the attached comment. The comment does not have to be displayed nor is the search case sensitive. The text, however, must be an exact match. If a match is found, the block will be highlighted.

By Signal Number - Search for the Function Block by the coded signal number. The alphanumeric sequence as it appears onscreen - one letter followed by two numbers. The letters are not case sensitive. Ex. - M01, I06, B12.

5.7 Controller

Write to Controller - Write the program from the AL-PCS/WIN-E to the memory of the α series. The contents of the α series memory will be completely overwritten.

Read from Controller - Uploads the contents of the α series memory into the VLS program. The current program in VLS will be overwritten.

Verify Controller data with Program - Verify the data in the FBD matches the data in the α series memory.

Clear Controller Contents - Clears the memory of the α series that is connected to the PC.

Diagnosis of Controller - Brings up a dialog box with the following information about the connected α series:

Table 5.1: Diagnosis of Controller

| Items | Description | | α Series | α2 Series |
|---------------------------|--|---|----------|-----------|
| Version | Version number; Ex. 1.60 | | ✓ | ✓ |
| Input Terminals | Number of input terminals | | ✓ | ✓ |
| Analog Inputs | Number of analog inputs. | | ✓ | ✓ |
| Output Terminals | Number of output terminals | | ✓ | ✓ |
| Input Type | DC | DC input type | ✓ | ✓ |
| | AC | AC input type | | |
| Error Code | See Note 1 (table 5.2) | | ✓ | ✓ |
| Run Status | Running | α series into Run mode | ✓ | ✓ |
| | Stopped | α series into Stop mode | | |
| Program Write | Enable | It is possible to write program data from the AL-PCS/WIN-E. | ✓ | ✓ |
| | Disable | It is impossible to write program data from the AL-PCS/WIN-E. | | |
| Clock Status | Going | Clock is going. | ✓ | ✓ |
| | Stopped | Clock stops. Set current time into the α series. The clock will be going. | | |
| User Memory | Used memory size / Total memory size | | ✓ | ✓ |
| Used Blocks | Used function (logic) blocks / Maximum function (logic) blocks allowed | | ✓ | ✓ |
| Max. Scan Time (ms) | Maximum 1 scan time | | - | ✓ |
| Min. Scan Time (ms) | Minimum 1 scan time | | - | ✓ |
| Current Scan Time (ms) | Current scan time | | - | ✓ |
| Dedicated ComPort Error | See Note 2 (table 5.3) | | - | ✓ |
| Copy to Memory Cassette*1 | Permission | Copy program α2 → cassette possible | - | ✓*2 |
| | Forbidden | Copy program α2 → cassette not possible | - | ✓*2 |
| Program file name | VLS file name of user program | | - | ✓*2 |

*1 α2 V2.00 or later

*2 VLS V2.40 or later

Table 5.2: Diagnosis of Controller

| Items | | Description | α Series | α2 Series | |
|---------------------|--|--|---|-----------|---|
| GSM | Status | Response from GSM modem | When the Check mark appears, there is response. | - | ✓ |
| | | Initial successful | When the Check mark appears, initialization is successful. | - | ✓ |
| | | Set PIN Code | When the Check mark appears, α2 series has the correct pin code setting. | - | ✓ |
| | | Network registration finished | When the Check mark appears, network registration is finished. | - | ✓ |
| | | GSM CME Error | When the Check mark appears, GSM SME Error has occurred. | - | ✓ |
| | | GSM CMS Error | When the Check mark appears, GSM SMS Error has occurred. | - | ✓ |
| | | Remote Access successful | When the Check mark appears, remote access is successful | - | ✓ |
| | | SMS is sending or retrying | When the Check mark appears, SMS is sending or retrying | - | ✓ |
| | | SMS is waiting for sending | When the Check mark appears, SMS is waiting for sending status | - | ✓ |
| | | SMS is failed in sending | When the Check mark appears, SMS has failed to send | - | ✓ |
| | | SMS failed in sending due to wrong setting | When the Check mark appears, SMS failed in sending due to incorrect setting | - | ✓ |
| | CME Error | Please see manual for GSM modem. | - | ✓ | |
| | CMS Error | Please see manual for GSM modem. | - | ✓ | |
| Signal Strength (%) | This status shows state of the radio wave on GSM network. See Note 3 (Table 5.4) | - | ✓ | | |

Note 1: Error Codes for α Series Main Module

The α series returns from error condition when the power supply is reentered after the error causation is obviated.

Table 5.3: Error Codes for α Series Main Module

| Message | Description |
|-------------|---|
| No Error | Error has not occurred in the α series. |
| EEPROM fail | Memory cassette is incorrect. Please check the memory cassette is correctly installed, into α series. |
| Other Error | Program data is incorrect. The program included in the memory cassette has more points of input and/or output than is allowed in the α series. Please check model type, and download program data into α series. If the α series has not recovered please consult a Mitsubishi Distributor. |

Note 2: Dedicated ComPort Error

Please check the following points for Dedicated ComPort Error.

Table 5.4: Dedicated ComPort Error

| Message | Description |
|-------------|--|
| No Errors | No error with communication via AL2-GSM-CAB. |
| Parity etc. | Parity, overrun or framing error occurred during communication via AL2-GSM-CAB. Checking Points: Check the connection, data format (Data bit, Parity, Stop bit and Baud rate) and communication timing during communication via AL2-GSM-CAB. If the connection, data format and communication timing are correct, thus possibility to have received the influence of the electrical noise may have caused the problem. |
| Time-out | Time-out error occurred during communication via AL2-GSM-CAB. Checking Points: Check the connection, data format (Data bit, Parity, Stop bit and Baud rate) and communication timing during communication via AL2-GSM-CAB. |

Note 3: Signal Strength

This status shows the state of the radio wave on GSM network.

Table 5.5: Signal Strength

| Value (%) | Reception Level of Radio Wave |
|-----------|-------------------------------|
| 0 | -113dBm or less |
| 3 | -111dBm |
| 6~96 | -109 ~ -53dBm |
| 100 | -51dBm or more |
| 0 | Not received radio wave |

Check Used Memory (Memory Configuration and Usage) - Check the amount of the following items in the displayed file.

Table 5.6: Check Used Memory (Memory Configuration and Usage)

| Items | Description | α Series | α2 Series |
|--------------------------------|---|----------|-----------|
| Used Memory | Used memory / Total memory | ✓ | ✓ |
| Used Block(s) | Used function (logic) blocks / Maximum blocks allowed | ✓ | ✓ |
| Input Signal(s) | Number of input terminals | ✓ | ✓ |
| Communication Memory (byte(s)) | Used memories for communication by dedicated protocol | - | ✓ |

Simulation - The simulation mode will run the program in the AL-PCS/WIN-E without an α series. This is very useful to check your program prior to transferring it to the actual system.

Drive Controller - Change the connected α series into Run or Stop mode.

Monitor/Test - Monitor the status of the connected α series from the AL-PCS/WIN-E.

5.8 Com

Configuration - Sets the Configuration of the communication port. The user can choose between a modem or a Com port to communicate with the α series.

Connect Line - Dial a Telephone number by invoking the Ring Telephone dialog.

Disconnect Line - Disconnect an ongoing call. An active Modem line should be disconnected before it can be used again for communication.

5.9 **Option**

Select Controller Type - It is possible to change model type (series, I/O points) for programming. This menu is displayed in FBD window only.

Change Input/Output Pins... - It is possible to change number of I/O pins for the user function block. This menu is displayed in the Sub FBD window only.

User Defined Icons - Import your own user defined icons for the signal icon and the function icon (Technical, Fancy).

Function Icon Set - Select the icon set to be displayed on screen from the LCD Image, the system icon (Technical, Fancy) or user icon (Technical, Fancy).

Set Wire Color - Set the wire color for the Edit and Simulation modes on the FBD window.

Set Base Color - Set base color of the FBD (Function Block Diagram) or the Monitoring in System Sketch base.

Date Format - Select one of the following formats in which the calendar date will be shown. mm/dd/yy, dd/mm/yy, yyyy/mm/dd.

Change Current Time - Change the current time in α series.

Radio Clock... - Set the connection port to use the Radio clock (DCF77). This option is not available when the α series controller is selected.

Language... - The following language displayed on Display screen is set up. English, German, French, Italian, Spanish, Swedish, and Russian.*¹

*¹ About Russian, it corresponds more than by V3.00 of the α2 series.

Menu Call Key... - The menu call key is set up.

GSM and Serial Communication... - Sets modem and GSM modem settings for remote maintenance and serial communications for the dedicated protocol.

Dedicated Communication... - Set station number and communication data for dedicated protocol communication.

Analog Input... - Sets the temperature scale of the analog inputs to use with the AL2-2PT-ADP and AL2-2TC-ADP. This option is not available when the α series controller is selected.

Select Font - Changes font all windows.

Password- Enter Password for program protection.(α, α2 series)

- Enter Password for program read protection. (α2 version 2.20 or later)

- Set the "Copy to Memory Cassette Protection". (α2 version 2.20 or later)

Grid - Choose the Horizontal and Vertical Grid line spacing from 2 to 32.

Show Grid - Hide or Display the Grid lines on the FBD window.

5.10 **Window**

Cascade - Use this command to arrange multiple open windows in an overlapped fashion.

Tile - Use this command to vertically arrange multiple open windows in a non-overlapped fashion.

1 **M**onitoring in System Sketch - Open the Monitoring in System Sketch Window for monitoring or editing.

2 **F**BD - Open the Function Block Diagram base for monitoring or editing.

3 **S**ub FBD (F***) - Open the Sub Function Block Diagram base for monitoring or editing.

5.11 Help

Contents - Shows the Table of Contents of the Help Function. The user can click on the desired chapter and the help file will appear onscreen.

Search for Help on... - Displays the opening screen of the Help command. Choose from a list of instructions and reference information on the features of the AL-PCS/WIN-E.

How to Use Help - Provides information on how to use and customize the help function.

About SW0D5-ALVLS-E... - Provides the Version number and Copyright notice for the AL-PCS/WIN-E package.

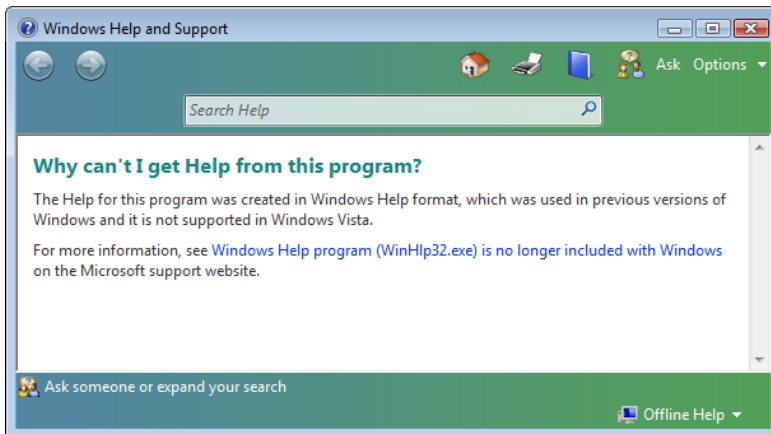


Note; When using Windows Vista®

When Help is run using Windows Vista®, the following "Windows Help and Support" screen may appear, and the Help screen is not displayed.

Perform the following procedure to install "WinHlp32.exe" which is needed to display the Help screen. (Note: The personal computer needs to be connected to the internet.)

- 1) Click the Help button.
- 2) The screen shown below opens. Click the displayed link.



- 3) The Microsoft Support Knowledge Base page opens.
(<http://support.microsoft.com/kb/917607/en-us>)
Follow the instructions and download the Windows Help program for Windows Vista® (WinHlp32.exe).
- 4) Install the downloaded file.

6. Function Block Diagram (FBD) Programming

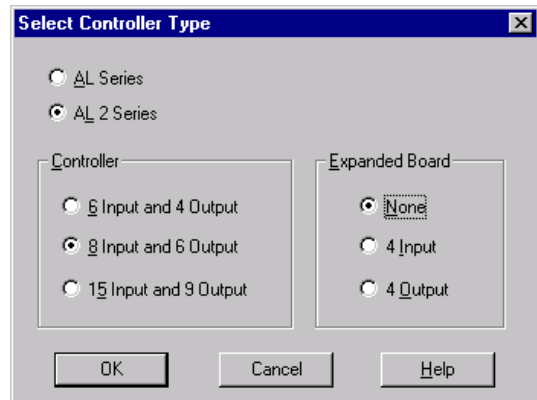
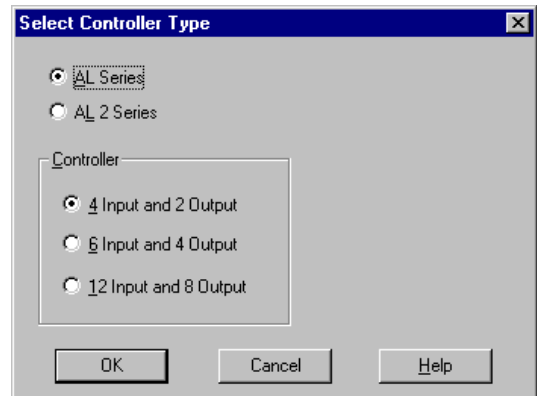
6.1 Opening a New File

When creating a new file, follow the instruction below.

Moreover, open an existing file with the “Open...” command under File or by clicking on the Open icon. A list of the current AL-PCS/WIN-E files contained in the “Prog” default folder will appear. Choose a file from this folder or browse and open a file in another location.

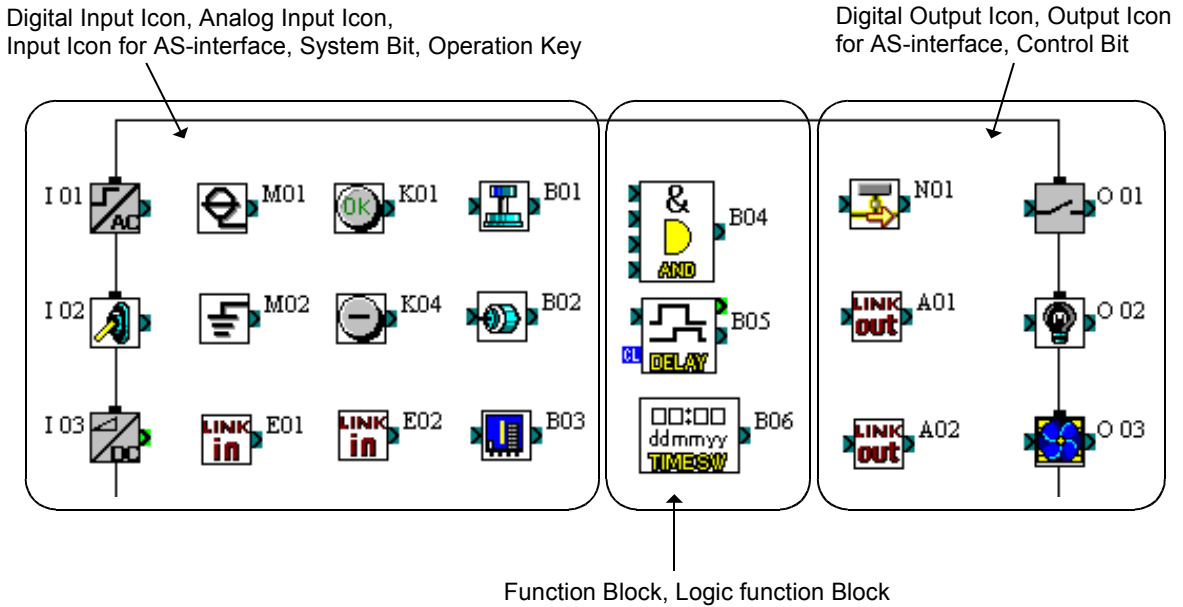
To open a New File:

- 1) Starting AL-PCS/WIN-E. (Refer to Section 2.4)
- 2) Click “New” button on Standard Toolbar, or Choose and click “File” then “New” in the Menu bar.
- 3) Choose the appropriate series name, and click it.
- 4) Choose I/O point, and click it.
- 5) Click “OK”



6.2 Component Items (Icons) of the Program

Programs for the α series can be created and edited from the Program Edit Mode. Program Edit is the default mode for the AL-PCS/WIN-E. The α series is programmed by placing items on the FBD Base and connecting the various components together with the wiring analyzer. There are 8 types of system components that can be placed on the FBD base. A short description of the function and placement locations possible for the various components follows;



6.2.1 FBD Base

The Function Block Diagram (FBD) base in the FBD Window provides the platform upon which the program for the α series is constructed. The FBD base consists of a large wiring area (lime green by default), a title box and input / output rectangles vertically along the right and left hand sides, respectively. Programming components are placed on the wiring area or in the rectangles, and connected by wires to construct the program of the α series.

6.2.2 Inputs

The types of input signals are the Digital Inputs, Analog Inputs and AS-interface bits. The icons can be found under the Input Signals Accessories Toolbar “IN” at the left of the FBD base.

- 1) The digital signals can be placed on the Input rectangles at the left of the FBD base or on the base itself. Each icon functions in the same way. The different icons have been developed to aid in the documentation and understanding of the program. Use an input icon that corresponds to the actual input device to be connected to the α series. The names of the signals will appear when the mouse arrow is placed on the icon.
- 2) The analog and temperature (from AL2-2PT-ADP or AL2-2TC-ADP adapter) signals can only be placed in Input Rectangles I01 - I08.

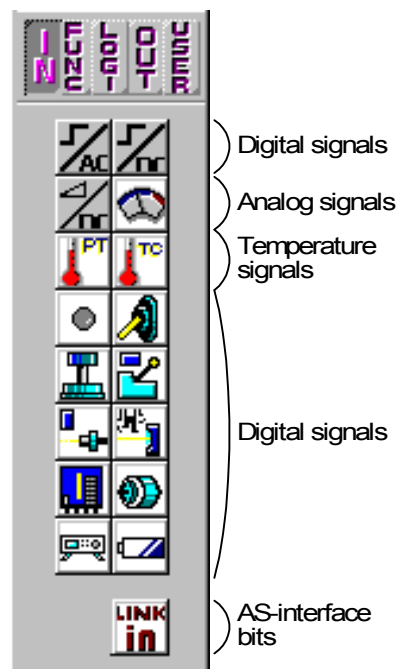


Table 6.1: Applicable Analog Signals

| Series | Signal | Location |
|-----------|-------------|---|
| α Series | Analog | AL-**M*-D model + AL-PCS/WIN-E Version 1.00 or later |
| | Temperature | Not support |
| α2 Series | Analog | AL2-**MR-D model + AL-PCS/WIN-E Version 2.00 or later |
| | Temperature | AL2-14MR-*, AL2-24MR-* model (V2.00 or later) + “AL2-2PT-ADP or AL2-2TC-ADP” + AL-PCS/WIN-E Version 2.30 or later |

- 3) Four AS-interface bits, “LINK in” icon E01 - E04, are available when using the following location. These inputs can be placed anywhere on the FBD base and will not be counted toward the number of system Inputs.

Table 6.2: Applicable AS-interface module

| Series | Location |
|-----------|--|
| α Series | AL-20M*-* model + AL-PCS/WIN-E Version V1.30 or later |
| α2 Series | AL2-14MR-*, AL2-24MR-* model + AL-PCS/WIN-E Version V2.00 or later |

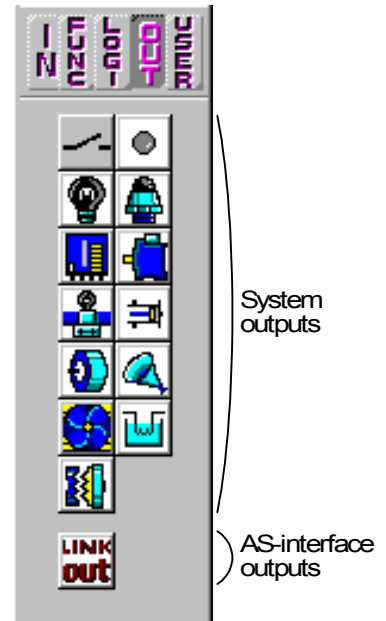
6.2.3 Outputs

Output signals is the Digital Outputs and AS-interface bits. The icons can be found under the Output Signals Accessories Toolbar “OUT” at the left of the FBD base.

- 1) The system outputs should be placed in the output rectangles on the right side of the FBD base. Outputs placed outside the rectangles will act as neutral blocks. The outputs blocks have one input pin and one output pin that can connect to other function blocks or outputs.
- 2) 4 AS-interface outputs, “LINK out” icon A01 - A04, are available when using the following location. These Outputs can be placed anywhere on the FBD base and will not count towards the number of system outputs.

Table 6.3: Applicable AS-interface module

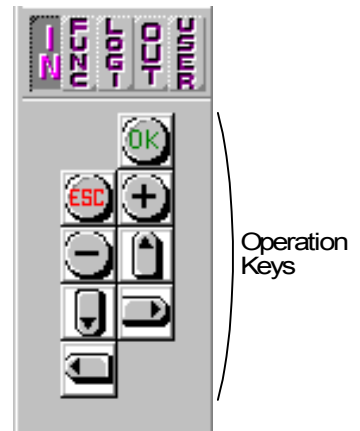
| Series | Location |
|-----------|--|
| α Series | AL-20M*-* model + AL-PCS/WIN-E Version 1.30 or later |
| α2 Series | AL2-14MR-*; AL2-24MR-* model + AL-PCS/WIN-E Version 2.00 or later |



6.2.4 Operation Keys

There are eight signals that correspond to the front panel keys and these signals may be used as additional digital inputs. These are the ESC, OK, “+”, “-”, ▲, ▼, ◀ and ▶ keys. Press the front panel keys while the α series is in Run mode to active the signals.

These keys may be placed only on the FBD Base and can be found in the Input Signals Accessories Toolbar “IN”. The names of the signals will appear when the mouse arrow is placed on the icon.



6.2.5 System Bits

These System bits act as digital inputs and can be placed on the FBD base. The system bits have the following set functions. These bits can also be found under the Input Signals Accessories Toolbar “IN”. The names of the signals will appear when the mouse arrow is placed on the icon.

Table 6.4: System Bits

| System Bit | | Description | α Series | α2 Series |
|--|-----|--|----------|-----------|
| Continuous ON | M01 | Always “ON” | ✓ | ✓ |
| Continuous OFF | M02 | Always “OFF” | ✓ | ✓ |
| 1 Second Clock | M03 | Alternate - 0.5 seconds “ON”, 0.5 seconds “OFF” | ✓ | ✓ |
| Time Switch Error | M04 | “ON” when Real Time Clock data error occurs | ✓ | ✓ |
| Summer Time/Day Light Saving Time Status | M05 | “ON” when Summer time schedule is activated | ✓ | ✓ |
| ASI Status 1 | M06 | “ON” when communication Error of AS-interface occurs | ✓ | ✓ |
| ASI Status 2 | M07 | “ON” when communication Error by AS-interface power failure occurs | ✓ | ✓ |
| Initial Pulse Normally Open | M08 | “ON” when turn Stop mode turns to Run mode in the α2 Series. The “ON” signal acts as a pulse output and then turns “OFF”. | - | ✓ |
| Initial Pulse Normally Closed | M09 | “OFF” when turn Stop mode turns to Run mode in the α2 Series. The “OFF” signal acts as a pulse output and then turns “ON”. | - | ✓ |
| DCF77 Decoding Active | M10 | “ON” during DCF77 decoding | - | ✓ |
| DCF77 Decoding Successful | M11 | Pulses “ON” when DCF77 finishes decoding without an error | - | ✓ |
| CD On | M12 | “ON” when CD (DCD) signal is turned “ON” (receiving CD signal from modem) | - | ✓ |
| GSM Network Registration | M13 | “ON” when it is possible to access the GSM network. | - | ✓ |
| Remote Access | M14 | “ON” when the α2 series is accessed via GSM. | - | ✓ |

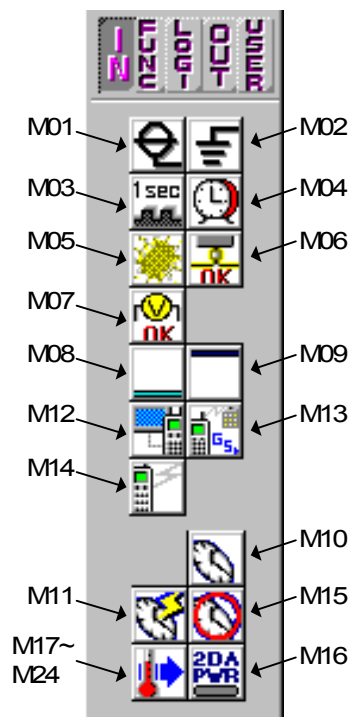


Table 6.4: System Bits

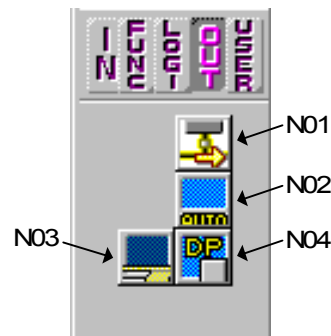
| System Bit | | Description | α Series | α2 Series |
|--------------------------------|-----|--|----------|-----------|
| DCF77 Decoding Unsuccessful | M15 | “ON” when DCF77 finishes decoding with an error | - | ✓ |
| 2DA Power Supply | M16 | “ON” when external power supply for the AL2-2DA is On. | - | ✓ |
| Error Flag of Analog Input I01 | M17 | “ON” when the following occurs. <ul style="list-style-type: none"> • A wire becomes disconnected • The input value is outside of the range for the AL2-2PT-ADP and AL2-2TC-ADP at the corresponding input. | - | ✓ |
| Error Flag of Analog Input I02 | M18 | | - | ✓ |
| Error Flag of Analog Input I03 | M19 | | - | ✓ |
| Error Flag of Analog Input I04 | M20 | | - | ✓ |
| Error Flag of Analog Input I05 | M21 | | - | ✓ |
| Error Flag of Analog Input I06 | M22 | | - | ✓ |
| Error Flag of Analog Input I07 | M23 | | - | ✓ |
| Error Flag of Analog Input I08 | M24 | | - | ✓ |

6.2.6 Control Bits

These Control bits act as digital outputs and can be placed on the FBD base. The control bits have the following set functions. These bits can also be found under the Output Signals Accessories Toolbar “OUT”. The names of the signals will appear when the mouse arrow is placed on the icon.

Table 6.5:Control Bits

| Control Bit | | Description | α Series | α2 Series |
|----------------------------|-------|---|----------|-----------|
| ASI Control | N01 | ON: Disconnected to AS-interface network OFF: Connect to AS-interface network | ✓ | ✓ |
| Auto LCD Light not allowed | N02*1 | ON: The back light is “OFF” in LCD. OFF: The back light is controlled by the “Light Time” setting in Menu. | - | ✓ |
| LCD Light Controller | N03*1 | ON: The back light is “ON” in LCD. OFF: The back light is controlled by the “Light Time” setting in Menu. | - | ✓ |
| DisplayFB Controller | N04 | ON: The user screen is controlled by the setting of “Display Manager” with AL-PCS/WIN-E. OFF: The user screen is controlled by user program. | - | ✓ |



*1 When both N02 and N03 are ON and hence the back light is “ON” because N03 is given the priority.

6.2.7 Logic Function Blocks



The 6 Logic Function Blocks - AND, OR, NOT, XOR, NAND, NOR - can receive only digital inputs. These blocks turn their Output on depending on the ON/OFF conditions of their Inputs. The Logic Blocks can be found under the Logic Functions Accessories Toolbar "LOGI". The names of the blocks will appear when the mouse arrow is placed on the icon. Further information about each block can be found in the programming manual and Help on AL-PCS/WIN-E.

Table 6.6: Logic Function Blocks

| Logic Function Block | Description | α Series | α2 Series |
|----------------------|--|----------|-----------|
| AND | Output "ON" when all Inputs are "ON", Unused inputs considered "ON" | ✓ | ✓ |
| OR | Output "ON" when at least one input "ON", Unused inputs considered "OFF" | ✓ | ✓ |
| NOT | Inverts a signal; changes an "OFF" to an "ON" and vice versa | ✓ | ✓ |
| XOR | Exclusive OR; Output "ON" when only One of Two Inputs is "ON" | ✓ | ✓ |
| NAND | Not AND; Output "OFF" only when all Inputs "ON", Unused inputs considered "ON" | ✓ | ✓ |
| NOR | Not OR; Output "OFF" when at least one Input is "ON", Unused inputs considered "OFF" | ✓ | ✓ |



6.2.8 Function Blocks



The kind of the supporting function blocks are different as shown in the table below according to the series.

The Function Blocks can be found under the Functions Accessories Toolbar “FUNC”. The names of the blocks will appear when the mouse arrow is placed on the icon.

Further information about each block can be found in the programming manual and Help on AL-PCS/WIN-E.

Table 6.7: Function Blocks

| Function Block | | Description | α Series | α2 Series |
|-----------------------|--------|---|----------|-----------|
| Name | Symbol | | | |
| Boolean | BL | Logic equation using AND, OR, XOR, NOT | ✓ | ✓ |
| Set/Reset*1 | SR | Latch a relay in SET or RESET position, give Set or Reset priority | ✓ | ✓ |
| Retentive Set/Reset*1 | RSR | Latch a relay in SET or RESET position, give Set or Reset priority. The last output status is kept when the power supply is cycled OFF and ON. However, last output status is lost when the α2 series is placed in the Stop mode. | - | ✓ |
| Delay | DL | Delay a signal on the Rising, Falling, or both Edges | ✓ | ✓ |
| One Shot | OS | Send a single pulse; Time or Input signal based, Reset pin available | ✓ | ✓ |
| Pulse | PL | Send a Pulse on the Rising, Falling, or both Edges | ✓ | ✓ |
| Alternate*2 | AL | Output alternates turning ON or OFF with each input pulse | ✓ | ✓ |
| Retentive Alternate*2 | RAL | Output alternates turning ON or OFF with each input pulse. The last output status is kept when the power supply is cycled OFF and ON. However, last output status is lost when the α2 series is placed in the Stop mode. | - | ✓ |
| Counter | CN | Count upwards on pulses, can reset at a signal | ✓ | ✓ |
| Up/Down Counter | UD | Count upward or downward, Set a Preset Value for the Output to come ON | ✓ | ✓ |
| Flicker | FL | Send a pulse train; ON/OFF times, repetitions, duration, or continuous operation | ✓ | ✓ |
| Compare | CP | Compare two values for <, >, =, <=, >=, <> (Analog, Direct Set, or FB values) | ✓ | ✓ |
| Time Switch*3 | TS | Use the RTC to turn output ON/OFF; Calendar or weekly schedule | ✓ | ✓ |

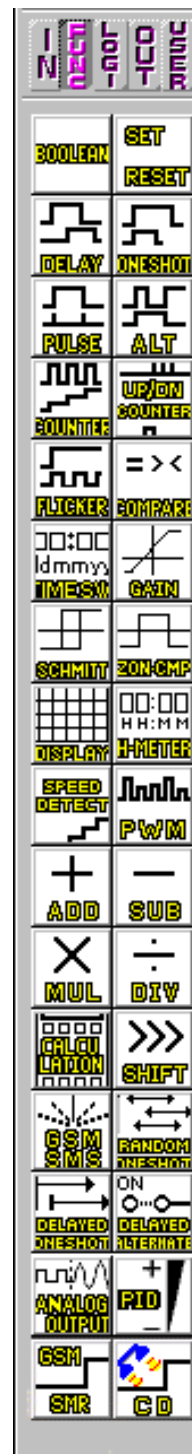


Table 6.7: Function Blocks

| Function Block | | Description | α Series | α2 Series |
|---------------------------------------|--------|---|----------|-----------|
| Name | Symbol | | | |
| Time Switch Maintenance ^{*3} | TSm | Use the RTC to turn output ON/OFF; Calendar or weekly schedule The schedule can be changed with "Setup TS" in the Top menu. | ✓ | ✓ |
| Offset Gain | OG | Manipulate Analog Values; $y = A/B \cdot x + C$; Set High and Low Limit Values | ✓ | ✓ |
| Schmitt trigger | ST | Turn an Input ON at the High Value and OFF at the Low Value (or vice versa) | ✓ | ✓ |
| Zone Compare | ZC | Compare a value to a range of values (Analog, Direct Set, or FB values) | ✓ | ✓ |
| Display | DP | Display User Screen (messages or data) on the LCD display | ✓ | ✓ |
| Hour Meter | HM | Records the accumulated time a signal has been ON | ✓ | ✓ |
| Speed Detect | SPD | The signal input frequency (On/Off) is measured for a set length of time. The frequency is compared to a value range and the Output is turned ON/OFF according to the result. | - | ✓ |
| Pulse Width Modulation | PWM | A continuous pulse train is output when this function block is driven. The characteristics of the pulse are defined as; Pulse duty (Direct set, Analog, FB values), cycle time. | - | ✓ |
| Addition | ADD | $y = A + B$ | - | ✓ |
| Subtraction | SUB | $y = A - B$ | - | ✓ |
| Multiplication | MUL | $y = A \times B$ | - | ✓ |
| Division | DIV | $A \div B = q, r$ (quotient and remainder) | - | ✓ |
| Calculation | CAL | Equation using +, -, ×, ÷, % and the selected data. | - | ✓ |
| Shift | SFT | Shift operation; When "SFT" signal is input, last "I" signal status is output. When using 8 bit shift operation, "Shift" function block should be continued 8 times. | - | ✓ |
| GSM SMS | SMS | The contents of an LCD screen is sent as an SMS message. | - | ✓ |
| Short Message Receiving | SMR | Output change by Short Message | - | ✓ |
| Call Detect | CD | Calling Line Identification Presentation (CLIP) Phone number detection | - | ✓ |
| Random One Shot | ROS | The random length single pulse is output. | - | ✓ |
| Delayed One Shot | DOS | After a delay time, send a single pulse | - | ✓ |

Table 6.7: Function Blocks

| Function Block | | Description | α Series | α2 Series |
|-------------------|--------|---|----------|-----------|
| Name | Symbol | | | |
| Delayed Alternate | DAL | After a delay time, output alternates turning ON or OFF with each input pulse | - | ✓ |
| Analog Output | AO | Output analog value to specified channel on the installed AL2-2DA. | - | ✓ |
| PID | PID | PID control | - | ✓ |
| Control Display | CDP | Control which Display screen appears on the LCD. This function block can only be set by "Display Manager" in the AL-PCS/WIN-E software. When control bit N04 is ON in α2 series, it possible to control the displayed User Screen. | - | ✓ |
| Connect | _B | This CONNECT function block is an internal FB used to show the memory used by the system bits, the bits for AS-interface, and the operation keys. No function block appears on screen or shows as being used in the "Memory Configuration Usage" dialog box, the purpose is only to calculate the memory that is used by the bits listed above. | ✓ | ✓ |

*2 When adding check mark on "Remember Output Signal after a Power Cut" check box, this icon is "Retentive Set/Reset (RSR)" in α2 series.

Latch a relay in SET or RESET position, gives Set or Reset priority. The last output status is kept when the power supply is cycled "OFF" and "ON". However, last output status is lost when the α2 series is placed in the Stop mode.

*3 When adding check mark on "Remember Output Signal after a Power Cut" check box, this icon is "Retentive Alternate (RAL)" in α2 series.

Output alternates turning "ON" or "OFF" with each input pulse. The last output status is kept when the power supply is cycled "OFF" and "ON". However, last output status is lost when the α2 series is placed in the Stop mode.

*4 When adding check mark on "Maintenance" check box, this icon is "Time Switch Maintenance (TSM)". Use the RTC to turn output ON/OFF; Calendar or weekly schedule The schedule can be changed with "Setup TS" in the Top menu.

6.2.9 User Function Blocks

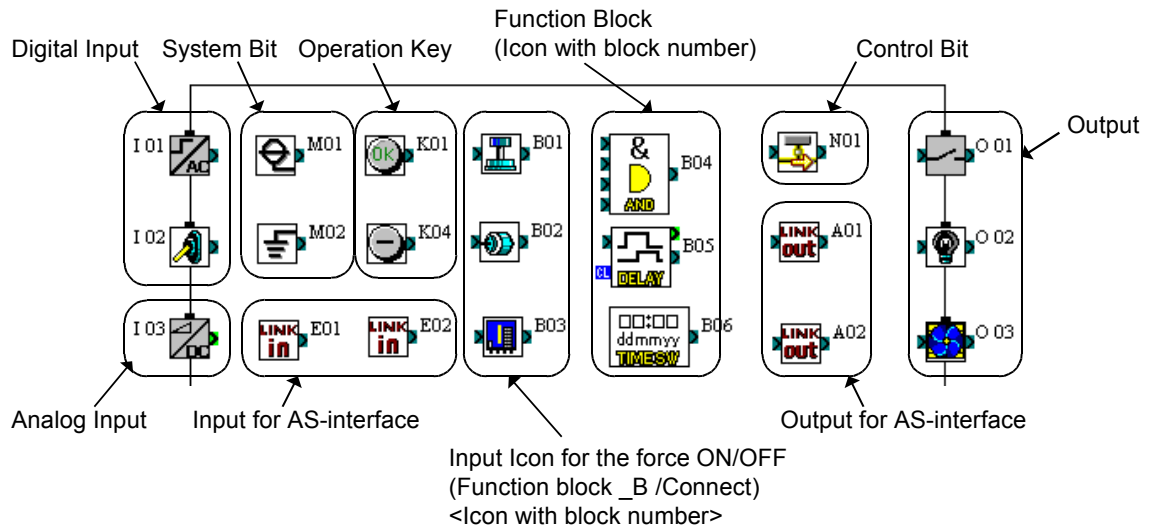
This user function block is registered function block created by the customers. The user function block can be composed from the Input pin(s), the output pin(s), the sub FBD base, system bits, control bits, logic function blocks, function blocks, and user function blocks. For registering the user function block, refer to section 6.7.

6.3 Arrangement of Icons and Resize FBD Base

The icon can be arranged, moved or deleted on the FBD base. An ERROR dialog box will appear to detail any errors in block placement.

6.3.1 Arrangement of Icons

The icon can be chosen from the Accessories Toolbar by clicking the icon, and arranged by releasing on the FBD base. Moreover, Function blocks and Logic function blocks can be arranged from “Insert FUNC” on the Edit Menu bar.



Note:

The icon with block number (B**: Ex. B01,B20) can be arranged up to the following numbers on the FBD base. If the icon’s block number is already used on the “Monitor in System Sketch Window”, the number of maximum arrangement might decrease.

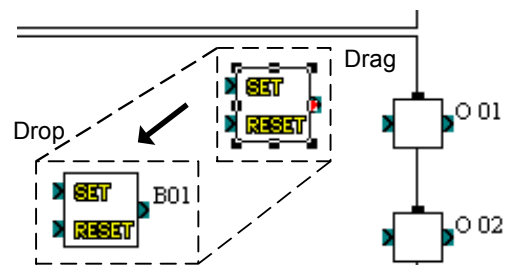
Table 6.8: Blocks Number of Maximum Arrangement

| Series Name | Block Number Maximum Arrangement |
|-------------|----------------------------------|
| α series | Maximum 64 blocks (B01 ~ B64) |
| α2 series | Maximum 200 blocks (B01 ~ B200) |

6.3.2 Moving Icons

The icon can be moved after they have been placed on the FBD base by left clicking on the icon and dragging the icon with the left button depressed. When the left button is released, the icon will be dropped in the new position. Blocks can only be moved inside the FBD base. Wiring connections will move with the icon.

Illegal operations will be explained via a dialog box and the icon will be returned to its previous position.

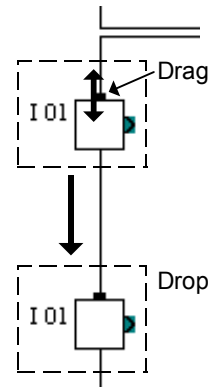


6.3.3 Deleting of Icon

The icon can be deleted after it has been chosen on the FBD base by left clicking on the icon and pushing “delete” button on the keyboard.

6.3.4 Moving Input and Output Rectangles

The input and output rectangles can be moved to the vertical direction by dragging a small rectangular head on the I/O rectangle.

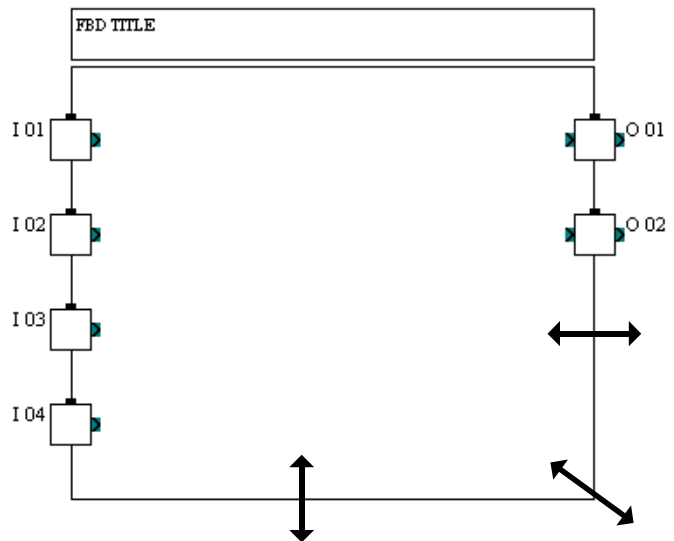


6.3.5 Resize FBD Base

When the FBD window is opened, FBD base has a pre-determined minimum size. The Base can be resized in width or height by dragging either the right or bottom edges respectively. By dragging the right-bottom corner of the base rectangle, the base height as well as width changes. The Base cannot be resized on the left and top edges.

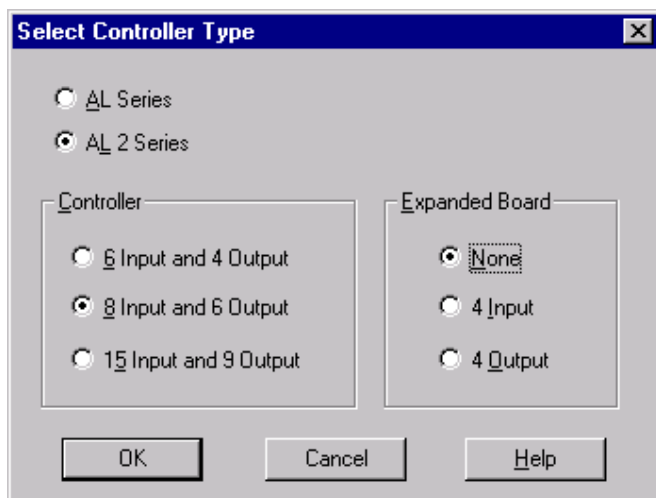
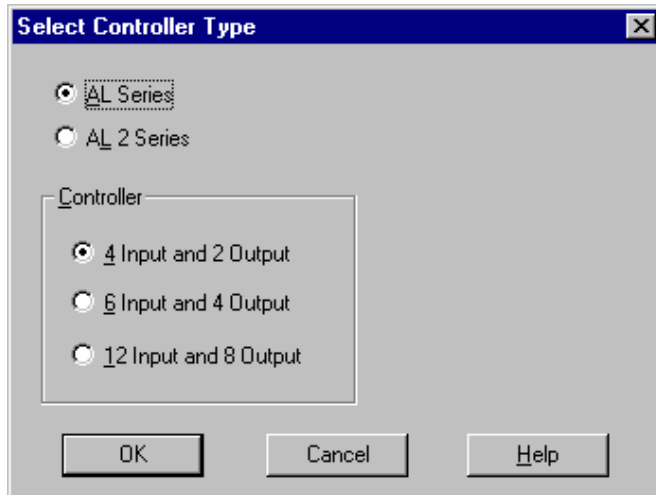
When the right edge of the base is changed, output rectangles, components, and wiring connected to the output rectangles moves with the base.

When the Base size is reduced, all the block items along with wiring present in that area are moved inward.



6.3.6 Select Controller Type

The I/O points and the series on the FBD base can be changed by the “Select Controller Type” window. This window can open from the “Select Controller Type” on the Option Menu. Moreover, It is possible to see this window when opening a new file.

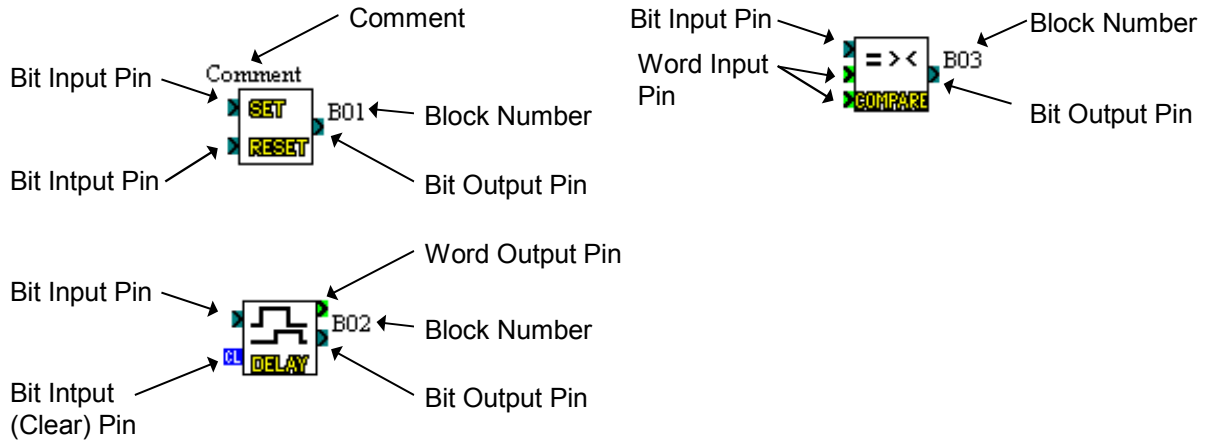


6.4 Connection (Wiring) between Icons

6.4.1 Input and Output Pins

The small rectangles present on left and right side of icon are known as pins. These pins are of 4 types, Bit Input (Clear) pin, Bit Output pin, Word Input pin and Word Output pin. Pins which are present on the left side of icon are known as INPUT pins. Pins which are present on the right side of icon are known as OUTPUT pins.

The pin is enclosed in a light green square on the AL-PCS/WIN-E display to differentiate it from a bit pin.



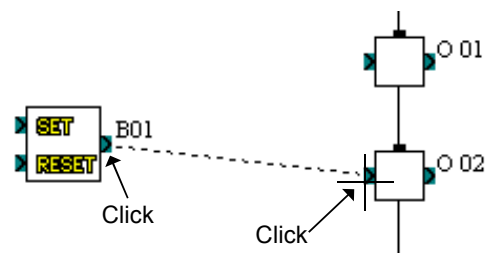
6.4.2 Connection (Wiring) between Icons

The wiring tool graphically represents, in the form of terminated lines, the connections made between the inputs, outputs, signals and functions present in the FBD window.

The Wiring tool can be invoked by clicking the Wiring Toolbar. Placed on the left hand side of the FBD windows.

To connect between icons:

- 1) Click the Wiring toolbar
- 2) Click the input or output pin on the icon to connect the wire
- 3) Click the output or input pin on the target icon to make a connection between the two entities.
- 4) If the pins have not physically connected, return to part 2).
- 5) The wiring toolbar will remain activated until the user clicks on any other toolbar or on vacant space within the FBD base.





Note:

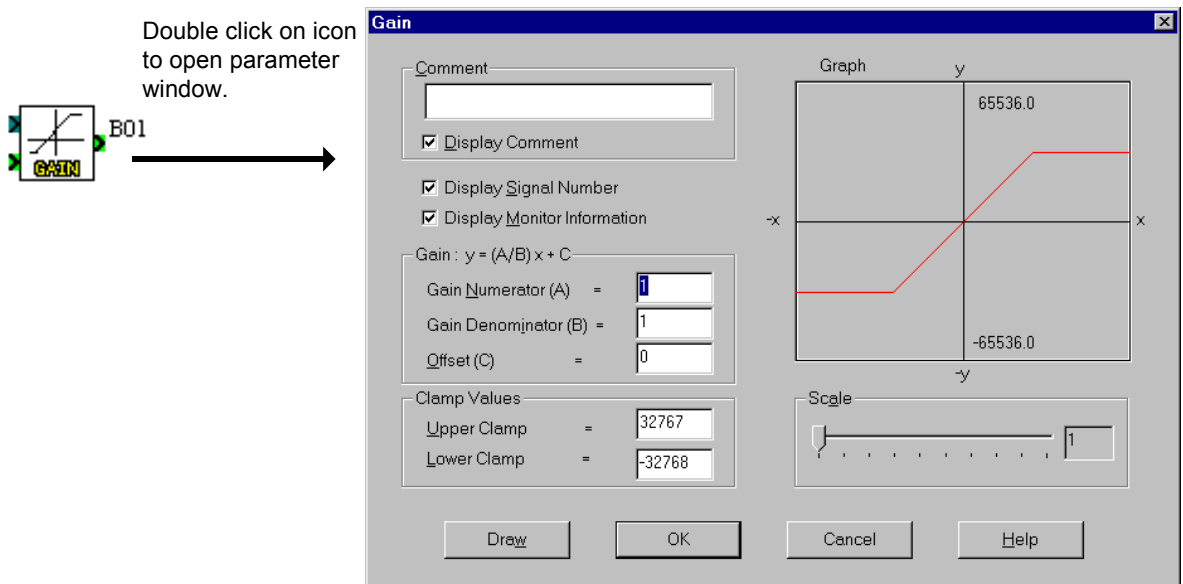
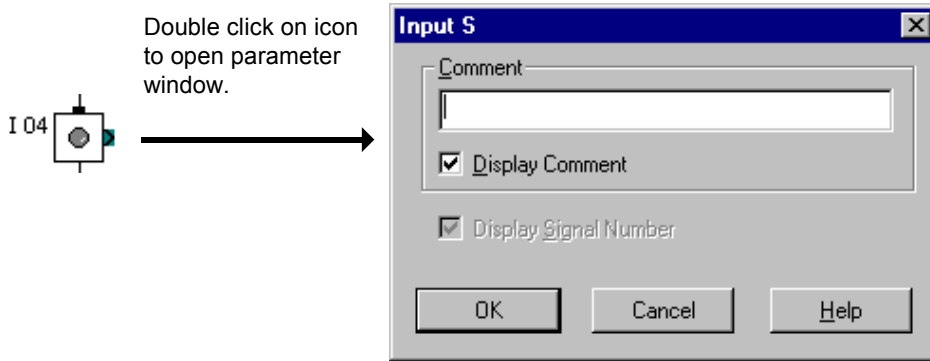
Bit Output Pins are connected to Bit Input Pins and Similarly Word Output Pins are connected to Word Input Pins. However, Bit pins cannot be connected to word pins, but output pins can connect to multiple input pins.

In the following cases an appropriate error message occurs:

- Input Pin cannot be connected to Input Pin.
- Output Pin cannot be connected to Output Pin.
- Bit Pin can not be connected to Word Pin.
- Input Pin can not have more than one wire connected to it.
- No pin is located in this position.

6.5 Setup Icons

The dialog box of all icons contains the comment box, the Display comment check box and the Display Signal Number box. This dialog box can be viewed by double clicking on the icon. The Display Comment box will display the comment only when checked. Similarly, the Display Signal Number box will display the signal number next to the icon if checked.



6.5.1 Comments

The Comment Edit box is used to enter a comment which will be displayed on the top of the icon. This can be up to 256 characters but only 16 characters will be considered for display. However, when printing icon information, the comment over 16 characters will be printed, too.

6.5.2 Parameter of Function Blocks

Function block parameters can be viewed by double clicking on the Function Block. A dialog box will pop up that shows the parameters that can be adjusted and a comments section for producing easy documentation. Each Function Block has its own set of Parameters that may be set including the various Display Boxes shown at the right.

Further information about parameter of each function block can be found in the programming manual and “Help” on the AL-PCS/WIN-E.



Note:

If using the slider portion of the parameter settings, the value can only be set from 0 - 100. If entering the digits in the box, the listed maximum tolerances can be entered.

6.6 Auto FBD Wizard (Only AL-**M*-*)

The program can be easily created using the Auto FBD Wizard according to the procedure of 8 clear steps. The user can proceed forwards and backwards along this line. Each step is accompanied by a guidance box that will bring up instructions in a dialog box. In the procedure of eight steps, the following 6 content is set.

However, this command supports only the α series (Model: AL-**M*-*). When choosing α2 series, this command does not support the Auto FBD Wizard.

Open the Auto FBD Wizard with the icon or the Start Auto FBD Wizard option from the Tools Menu.



- 1) Choose an output (Step 1)
- 2) Select up to 4 function blocks in the following lists to be used (Step 2, 3).
Use the boolean automatically if necessary.
 - Set/Reset function block
 - Delay function block
 - Alternate function block
 - Flicker function block
 - One Shot function block
 - Counter function block
 - Compare function block
- 3) The combination of the function blocks to be used is selected (Step 4).
- 4) Choose the Input Signal for bit Input Pin of the left most function block (Step 5, 6)
Select up to 4 signals for one Input Pin.
- 5) Set the parameters for the function block(s) and select the signal for the Clear Pin and Word Input Pin (Step 7)
- 6) Check operation (Step 8)



Note:

- Display the Help file concerning the Auto FBD wizard when Clicking the “Guidance” check box.
- To move back to previous menus, click “Back” button.
- To go to next menu, click “Next” button.
If the setting or selection do not finish in the menu (step), “NEXT” is disabled.

6.6.1 Choose an Output (Step 1)

Select one target output for the program to be created from Auto FBD Wizard. Click a target output terminal to select.

Click the "NEXT" button to proceed to the next step when selecting it.

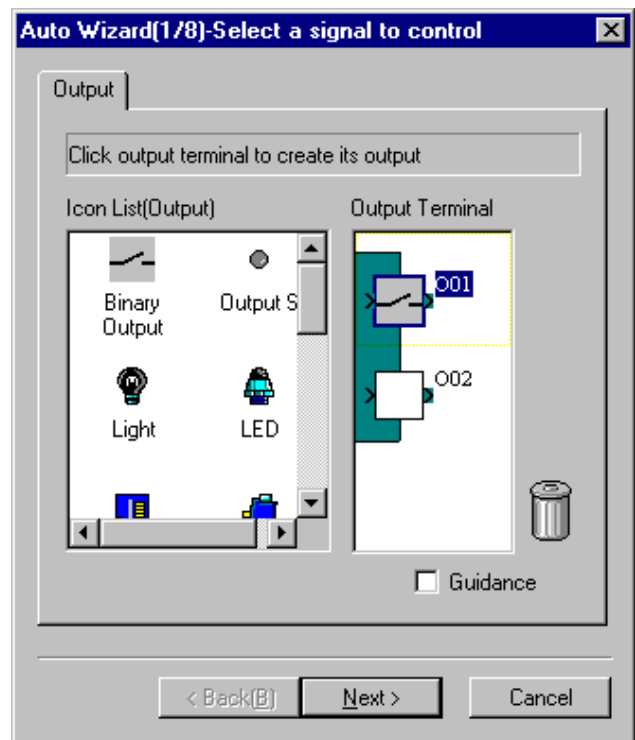
When the icon has already been put on the output terminal with the FBD base, the icon will be displayed in the output terminal.

To allocate the icon:

Click the icon from the output icon in the left of the screen list, and click the output terminal which needs to be allocated again.

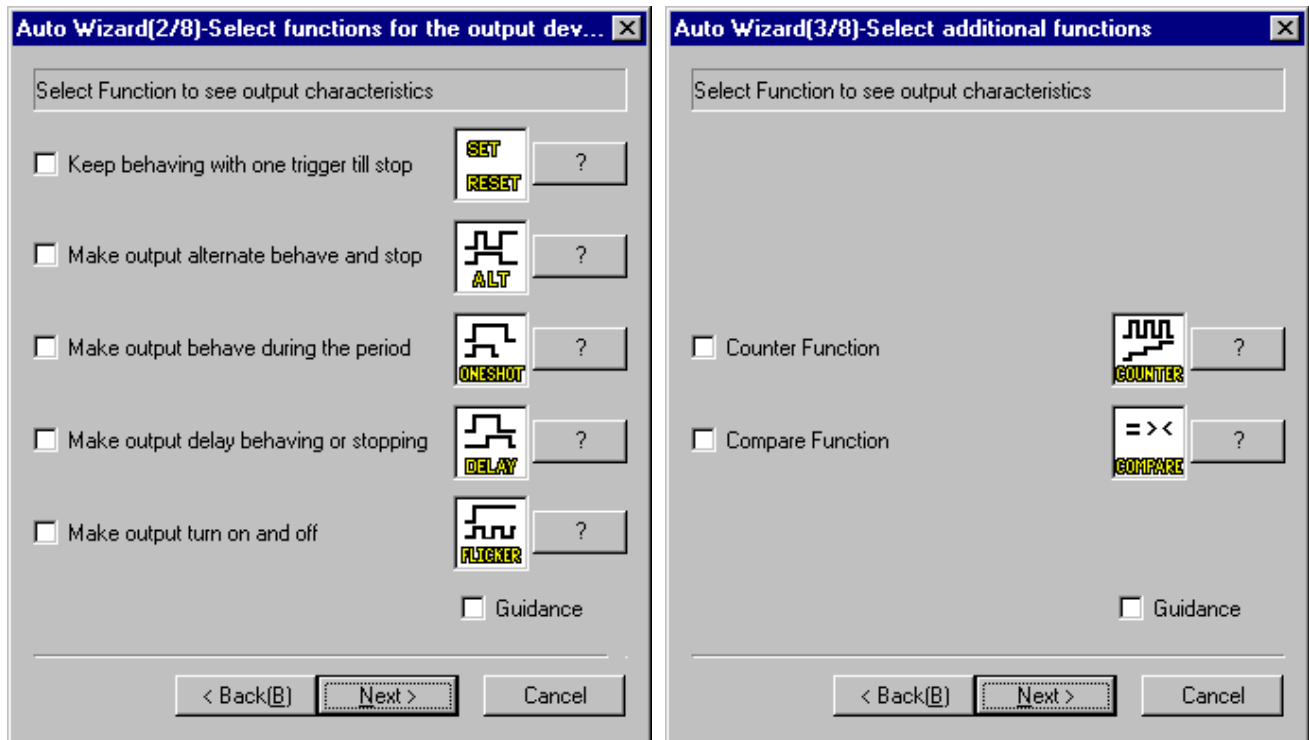
To delete the icon to be allocated:

Move the output icon to be deleted from the output terminal to the trash bin by drag & drop.



6.6.2 Choose Function Blocks (Step 2, 3)

A list of function blocks appears on the screen from which up to 4 total blocks can be chosen to place in the circuit with the output from the following dialog boxes. Click the check box in the function block to be used. The Blocks that can be selected are the Set/Reset, Alternate (ALT), One Shot, Delay, Flicker, Counter and the Compare functions. Click "NEXT" button to proceed.

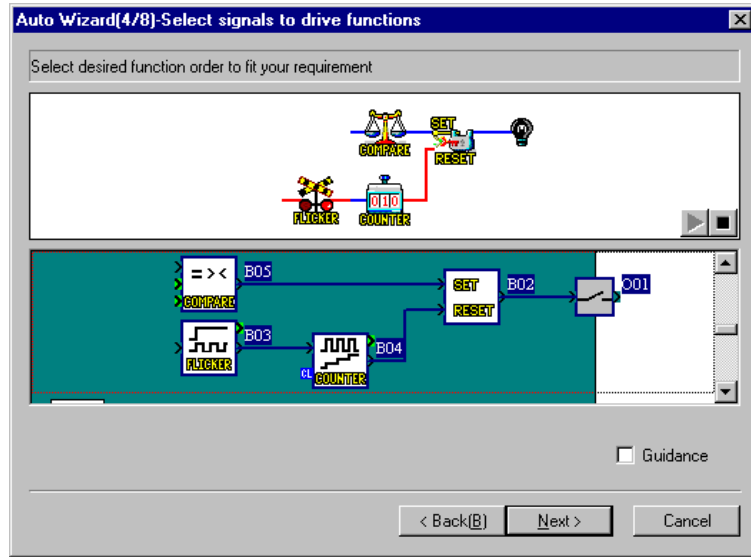


Note:

Choose the box with the “?” mark to find out more information on a particular function.

6.6.3 Select Signal Order (Step 4)

The Wizard will show the possible combinations of Functions Blocks. A pictorial representation will appear at the top of the screen and the function block icon connection will be shown below. Use the Up and Down arrow keys to scroll through the possible combinations. Depending upon the number and type of Function blocks chosen, dozens of possible combinations will show on screen. The first combination will be chosen as a default if no selection is made.



6.6.4 Adding a Logical Condition (Step 5)

Choose to have the output conditions driven by input signals or to have them continuously driven. Flicker or Compare function block comes left most, it is displayed as shown in the right figure.

Active depending on other signals: Using Flicker or compare function

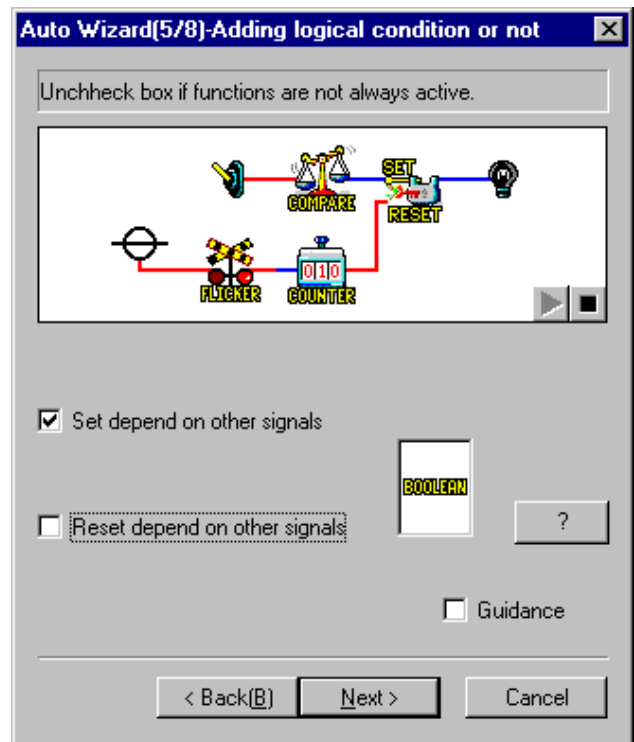
When adding, check this option, the input signal can be connected to left most Flicker or Compere function block.

Set depends on other signals: Using Set/Reset function, and Flicker or Compare function

When adding check this option, the input signal can be connected to left most Set/Reset function block connected to the set pin side of the Flicker or Compere function block.

Reset depends on other signals: Using Set/Reset function, and Flicker or Compare function

When adding check this option, the input signal can be connected to left most Set/Reset function block connected to the reset pin side of the Flicker or Compere function block.



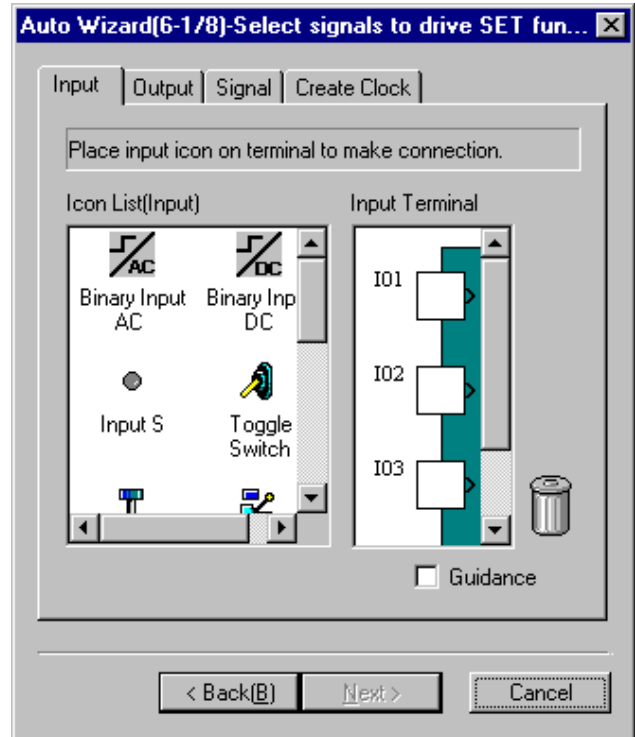
Note:

When the check mark has been added, the display is redundant, the Boolean function block is automatically added to the input pin of the left most function block.

6.6.5 Select Input Signals to Drive Functions (Step 6)

Choose up to 4 input signals which connects to the “Bit Input Pin” on the left most function block from the following.

- Input terminal (Input Tab)
- Output Terminal (Output Tab)
- Operation key (Signal Tab)
- System Bit (Signal Tab)
- Control Bit (Signal Tab)
- Function block (Signal Tab)
- Time Switch function block (Signal or Create Clock Tab)



Note:

- When selecting the Set/Reset function block on the step 2 and 3, the step 6 will be set twice (6-1 and 6-2). At first set for the “set depend on other signals”, at second set for the “Reset depends on other signals”.
- When no addition is intended check the “Active depend on other signals”, “Set depend on other signals” and “Reset depend on other signals” from step 5, then step 6 will not appear, thus the next step 7 appears.

1) Input Tab

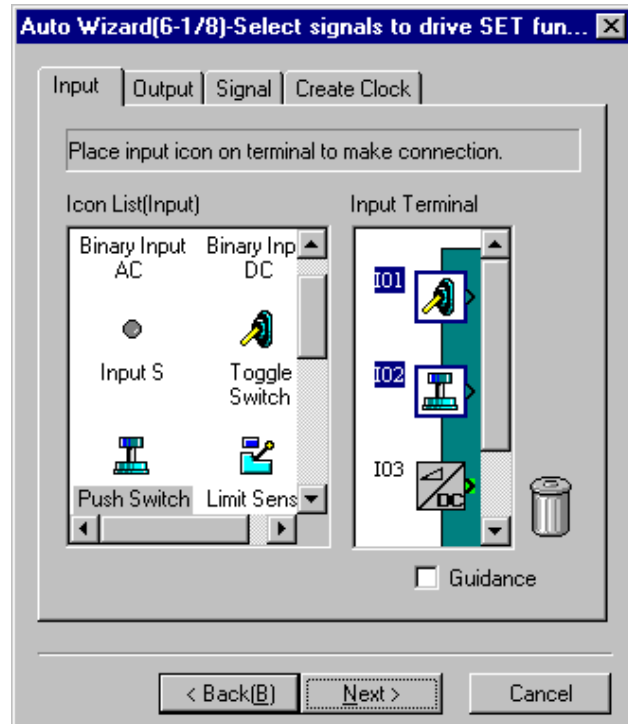
Click the target Input terminal to select. When the icon has already been put on the Input terminal with the FBD base, the icon will be displayed in the Input terminal as shown.

To allocate the icon:

Click the icon from the Input icon to select the appropriate device selection, and click the Input terminal which needs to be allocated again.

To delete the icon to be allocated:

Move the Input icon to be deleted from the Input terminal to the trash bin by drag & drop.



2) Output Tab

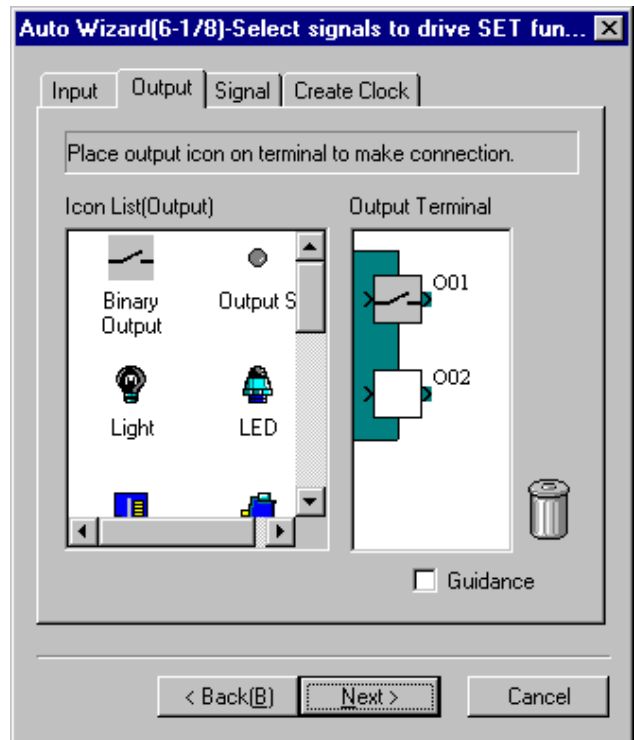
Click the target Output terminal to select the appropriate device.
 When the icon has already been put on the Output terminal with the FBD base, the icon will be displayed in the Output terminal as shown.

To allocate the icon:

Click the icon from the output icons in the left of the screen list, and click the output terminal which wants to be allocated again.

To delete the icon to be allocated:

Move the output icon to be deleted from the output terminal to the trash bin by drag & drop.



3) Signal Tab

Set internal signal(s) by the “New Signal” or “Start Select” from the following signals.

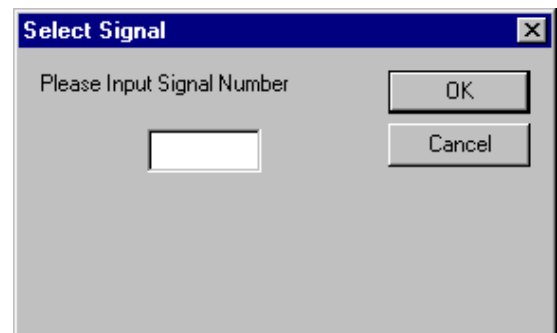
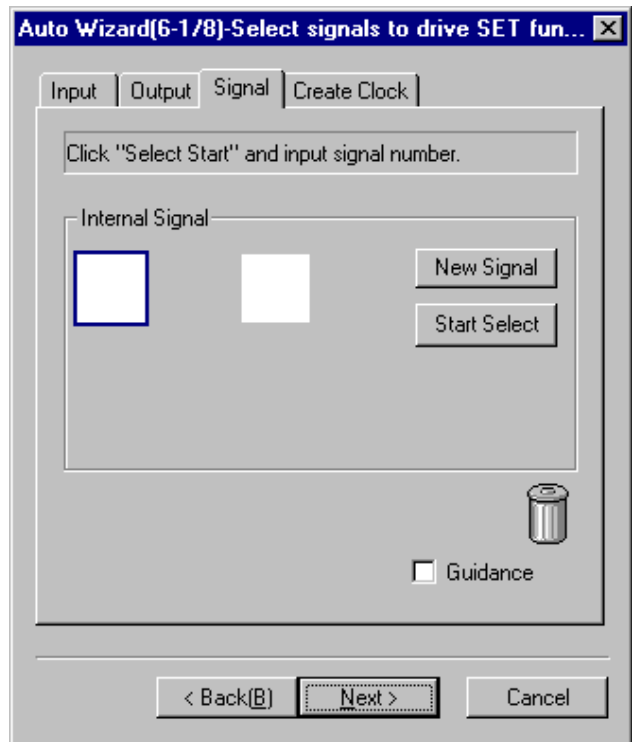
- Input signal with block number (by New Signal button)
- Operation key (by Start Select button)
- System bit (by Start Select button)
- Control bit (by Start Select button)
- Input and Output for AS-interface (by Start Select button)
- Function block (by Start Select button)

New Signal button:

Clicking this button a new input signal with appropriate block number will be add.

Start Select button:

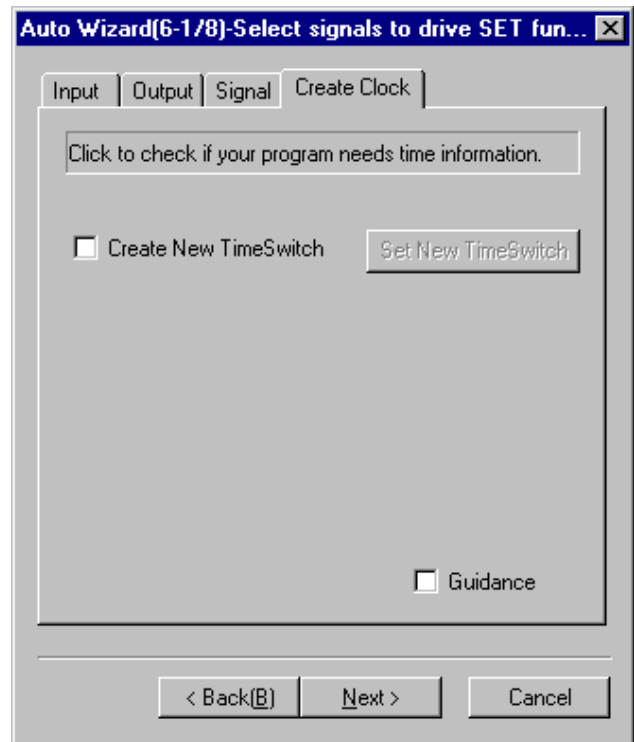
Input signal number of the operation key, the system bit, the control bit, the input/output for AS-interface or the function block.



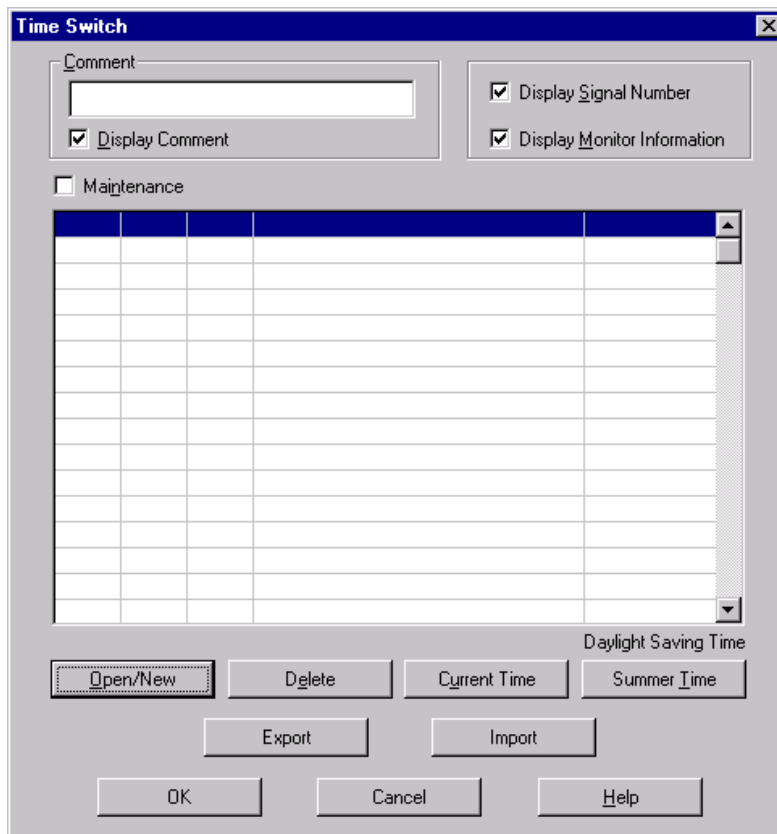
- 4) Create Clock
Add output signal for new Time Switch function block, and set parameter for this time Switch function block by the “Set New TimeSwitch” button

To add new Time Switch function block:

- a) Click the check box as shown “Create New TimeSwitch” to add the new Time Switch function block.



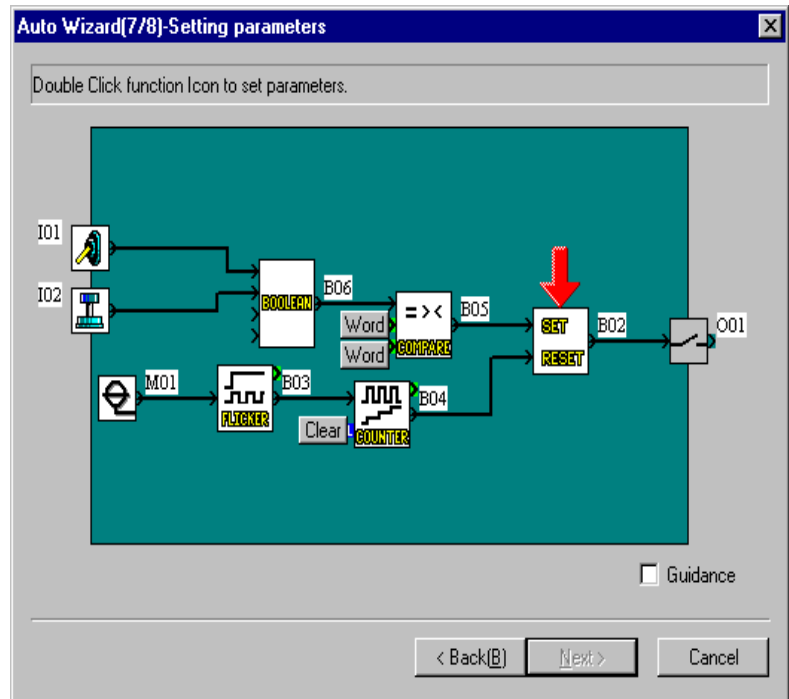
- b) Click the “Set New TimeSwitch” button to set parameter for the Time Switch function block. A setting operation is identical to the parameter of the Time Switch function block set on the FBD base. Further information about parameters of each function block can be found in the programming manual and “Help” on the AL-PCS/WIN-E.



6.6.6 Setting Parameters (Step 7)

Set parameters for the Function Blocks, word input signal and clear input signal in this screen. A red arrow will appear above the Function Block that should have parameters set. Double click on the Function Block to open the parameter dialog box and enter the parameters as required.

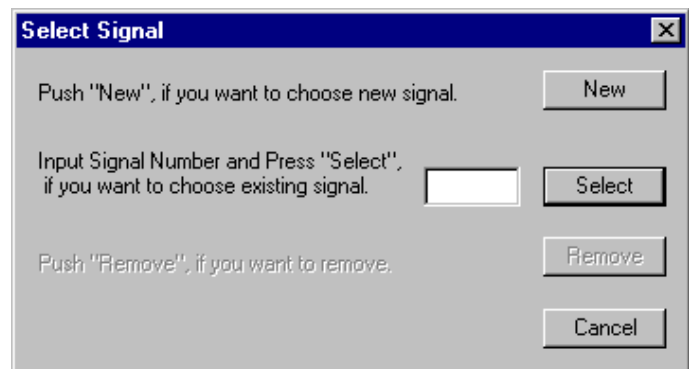
Further information about the parameters of each function block can be found in programming manual and the "Help" on the AL-PCS/WIN-E.



To set word and clear input pin:

Click the "Word" or "Clear" button on the Setting parameters window. When clicking "Word" button, do not appear "New" button.

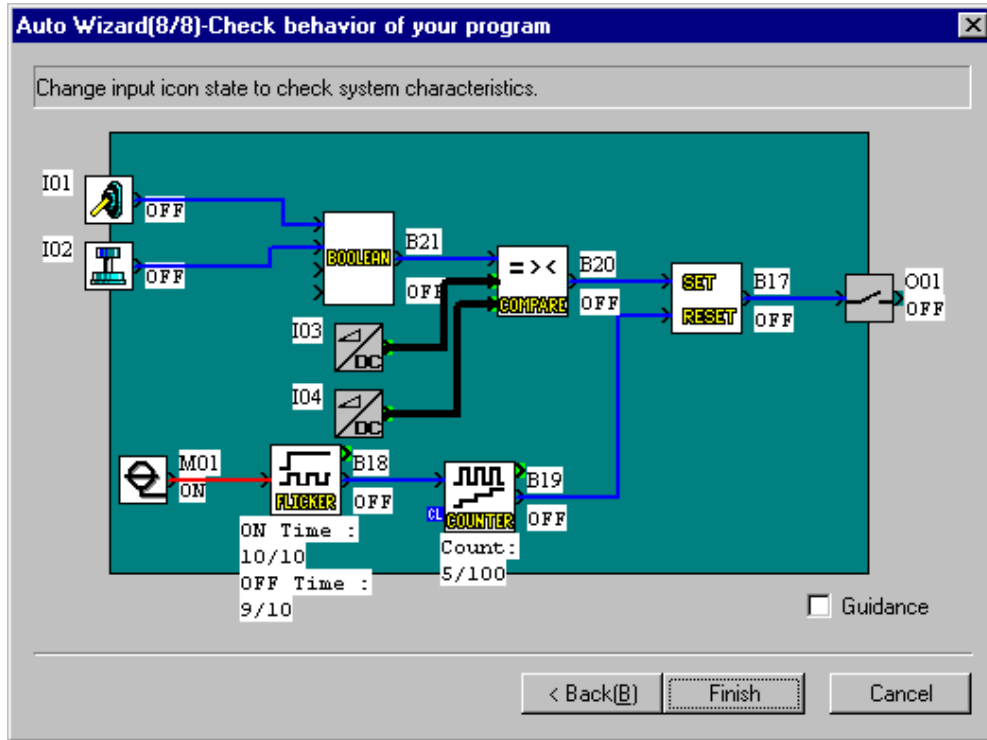
- When the input signal with block number needs to be used, click "New" button.
- When the following signal want to be used, enter signal number, and click the "Select" button.
- When deleting the set signal, click the "Remove" button to delete the set signal. If the signal has not already been set, this button will not be appeared.



6.6.7 Operation Check (Step 8)

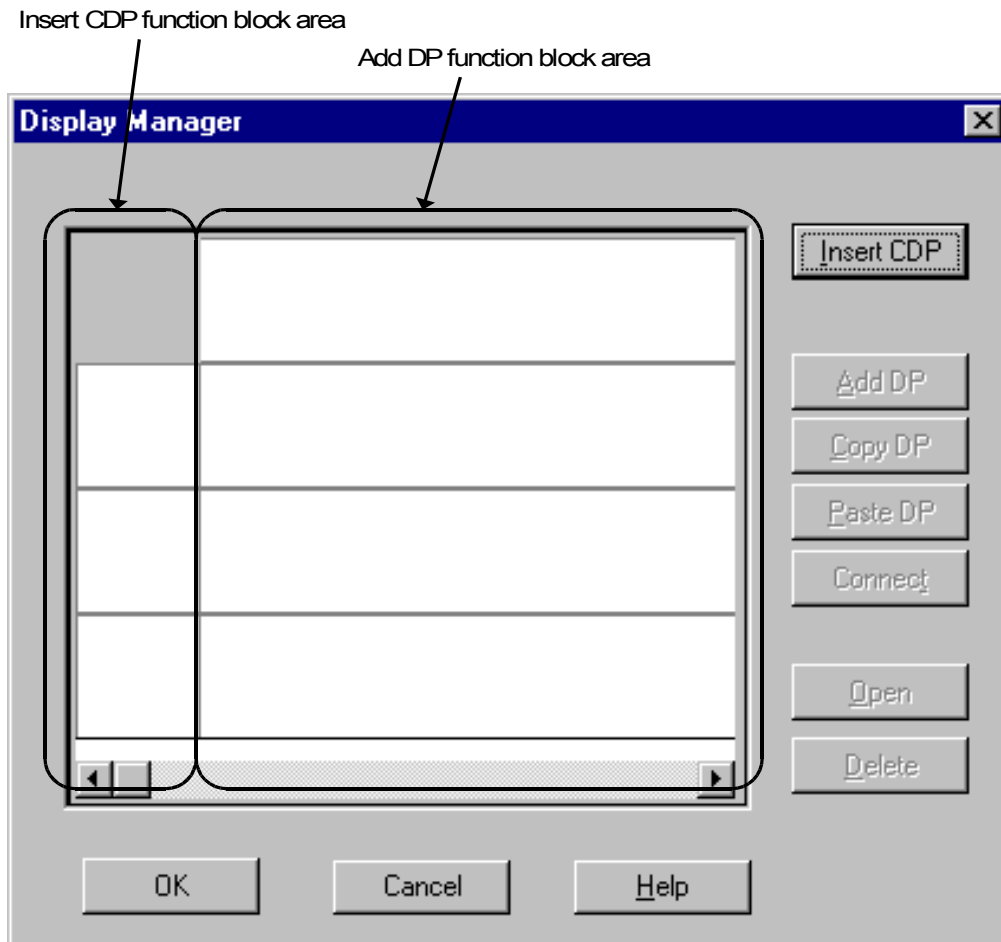
Check the operation of the program by turning the Input Signals On and Off. When clicking the input icon or function block icon (without Boolean function block), the relevant icon' output signal is turned to the ON color. In this case, the connection wire will be changed ON color (default color: Red).

When finished with the operation check, Click "Finish" button to place the completed circuit on the FBD base.

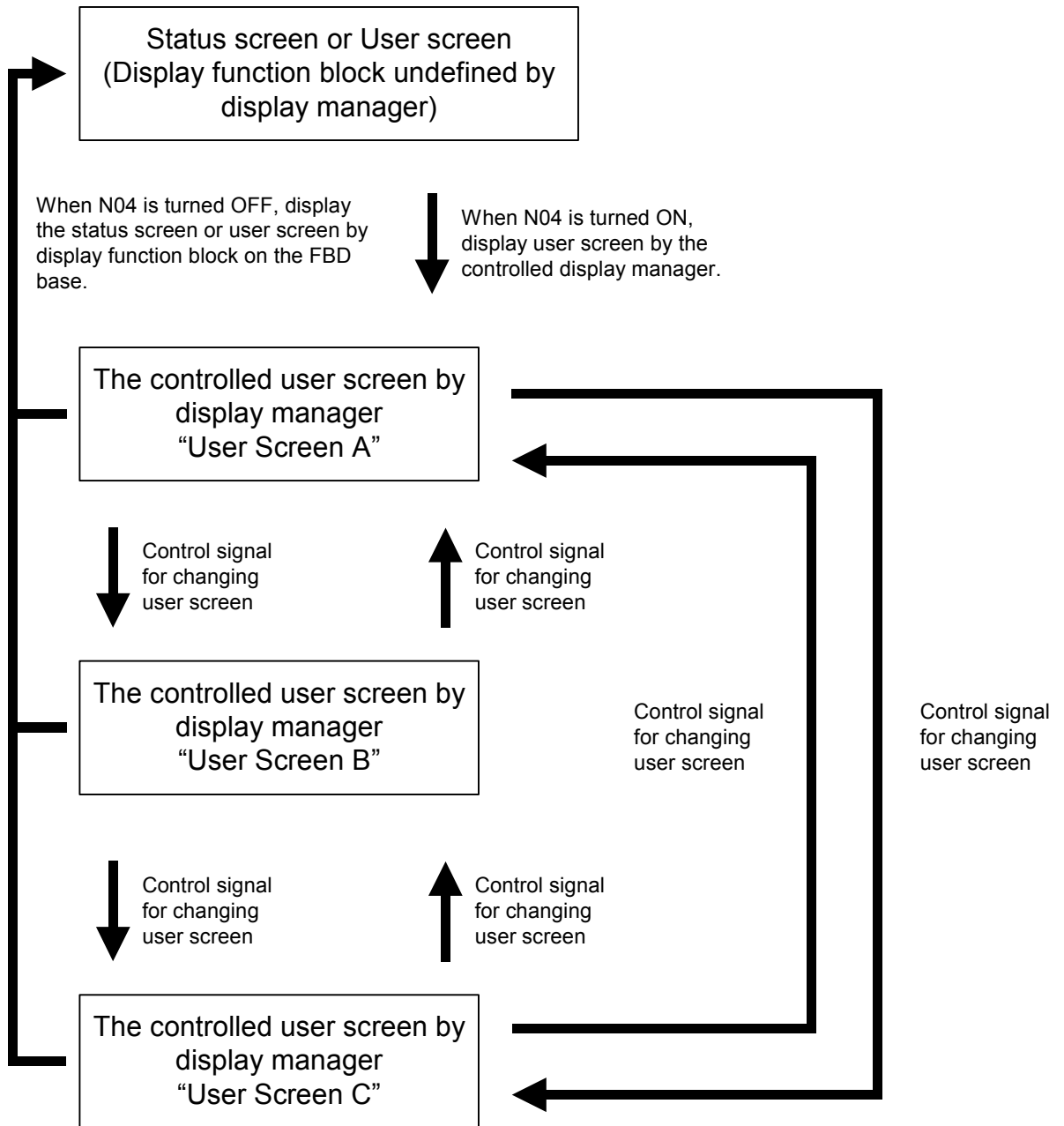


6.7 Display Manager

Display Manager controls the sequence of user screens to be displayed according to the signal that specifies each user screens. When N04 has been turned ON, Display Manager becomes effective. The user screen set with Display Manager is displayed on the α2 series. The displayed user screen can be composed up to 10 Display function blocks. However, the Display Manager can only be set using the α2 series.



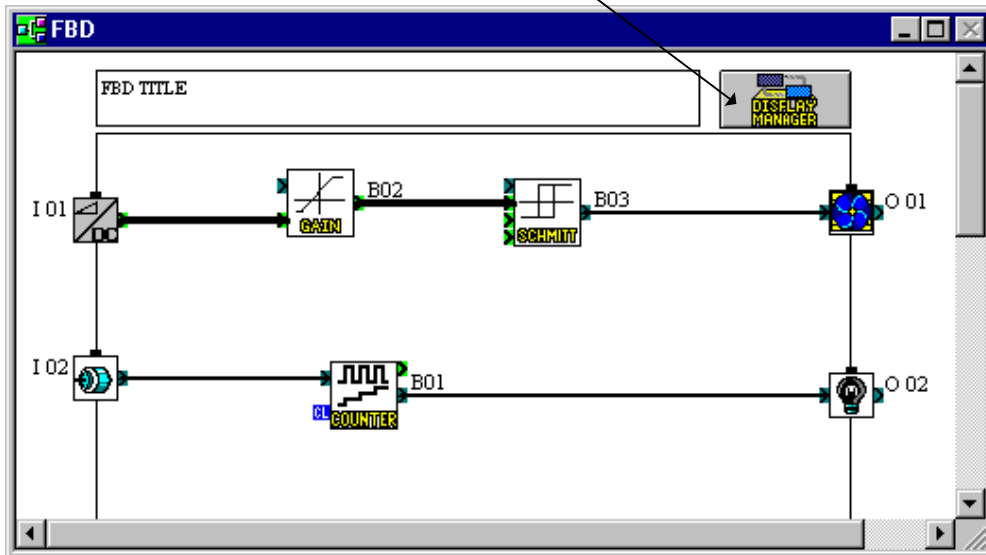
Operation Image:



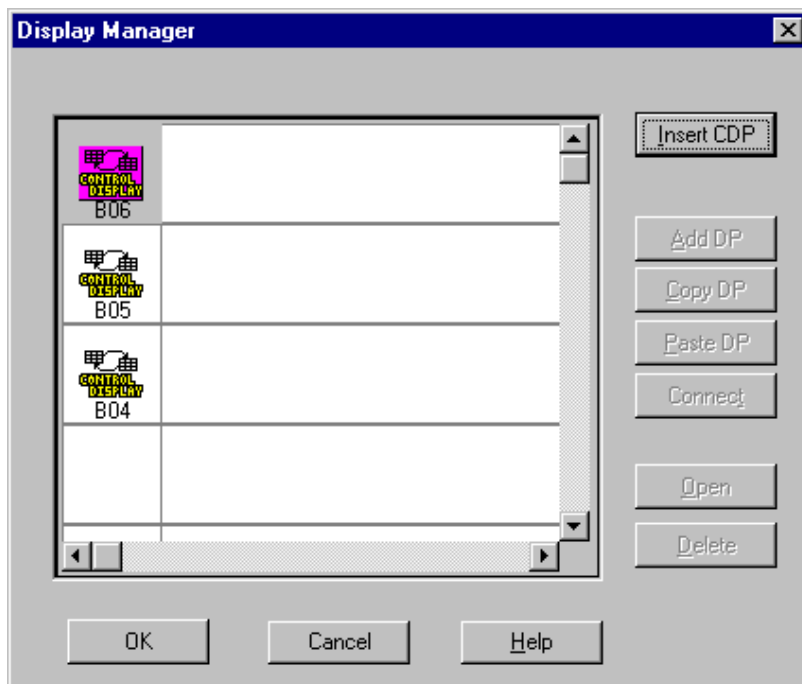
To Set Display Manager:

- 1) Double click the “Display Manager” button on the FBD base window.

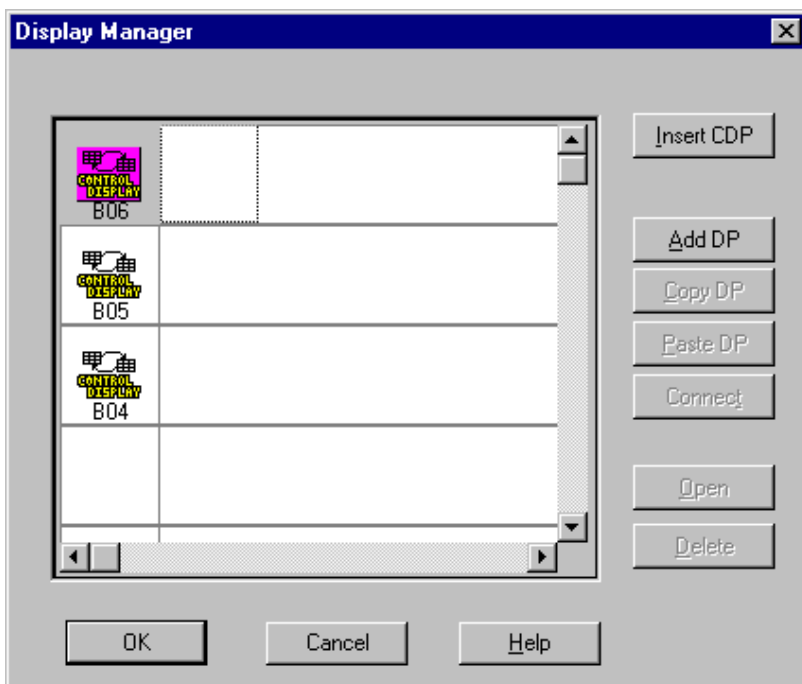
Display Manager button



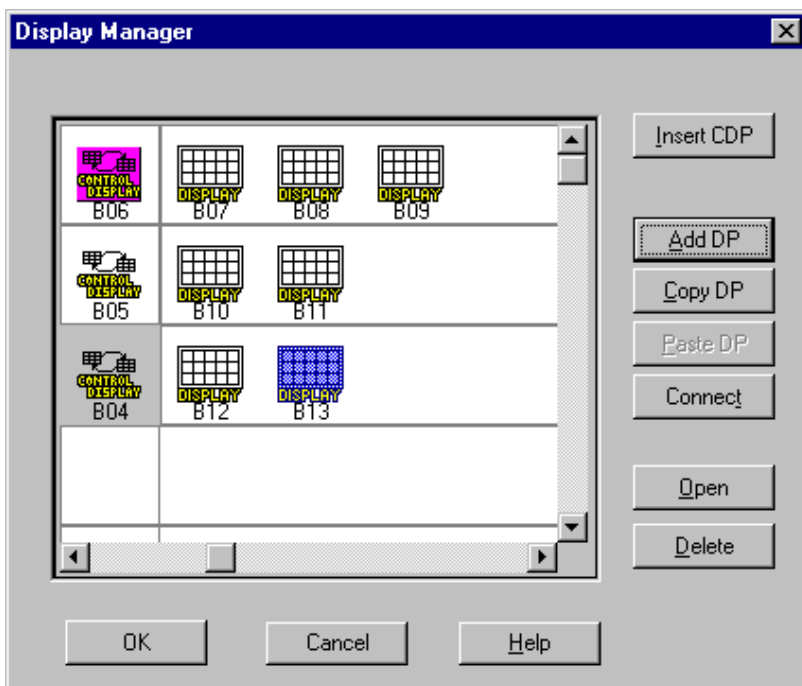
- 2) Click the “Insert CDP” button to Insert CDP function block for the control user screen function



- 3) Choose the “CDP (Control Display Function)” icon to add a DP (Display function block) for each user screen.

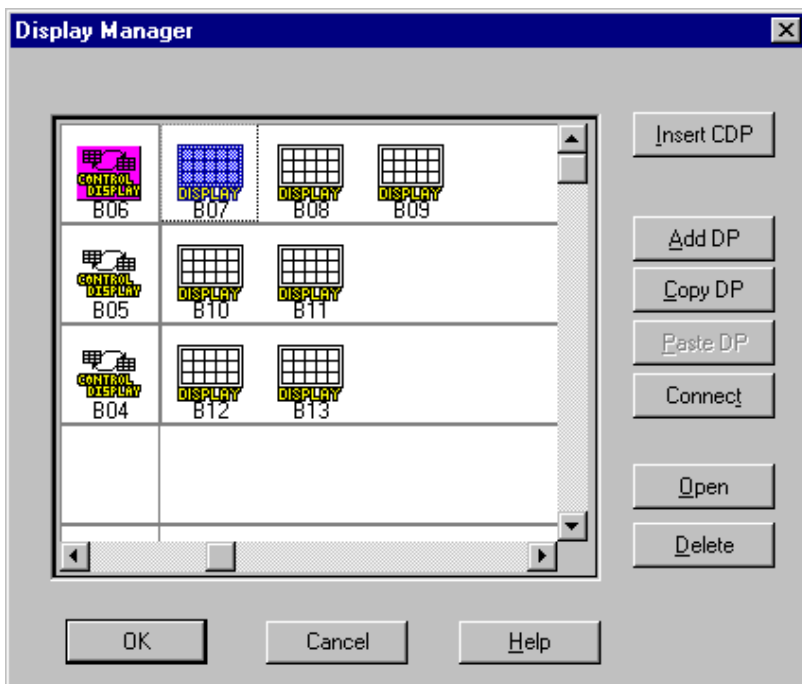


- 4) Click the “Add DP” button to add DP function block(s) for the CDP function block. It is possible to add a maximum of 10 DPs into 1 CDP.



- 5) Choose the “Display” icon for indication FB (Function Block) or Analog value, and click “Connect” button.

When not displaying them, please go to step 7)..



- 6) Click the “Connect” button to display the FB value or the Analog Input value
 - **Free:** Displays the Text, Date or Time. (Default setting)
 - **FB Word Output:** Displays FB value. Choose function blocks from list.
 - **Analog Input:** Displays Analog Input value. Choose Analog Input port.

When completing connection, click the “OK” button.

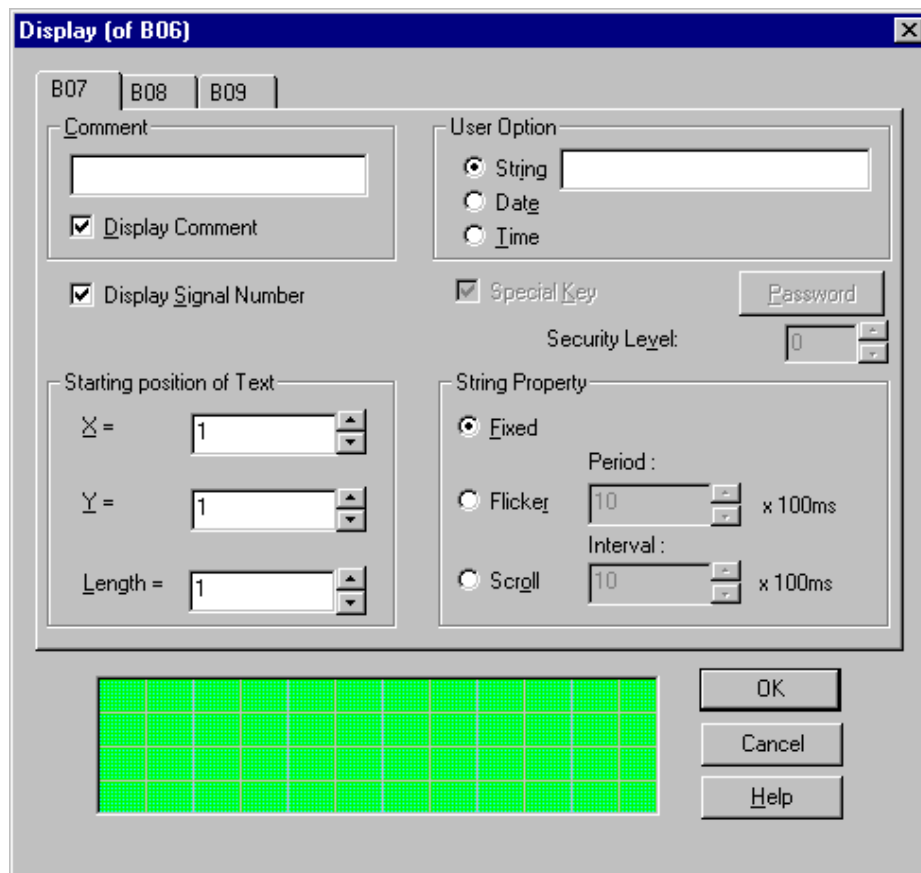


- 7) Double-click the “Display” icon or click the “Open” button to set parameters. Further information about parameters of the Display function block can be found in the programming manual and “Help” on the AL-PCS/WIN-E.
On completion of the parameter settings, click the “OK” button.

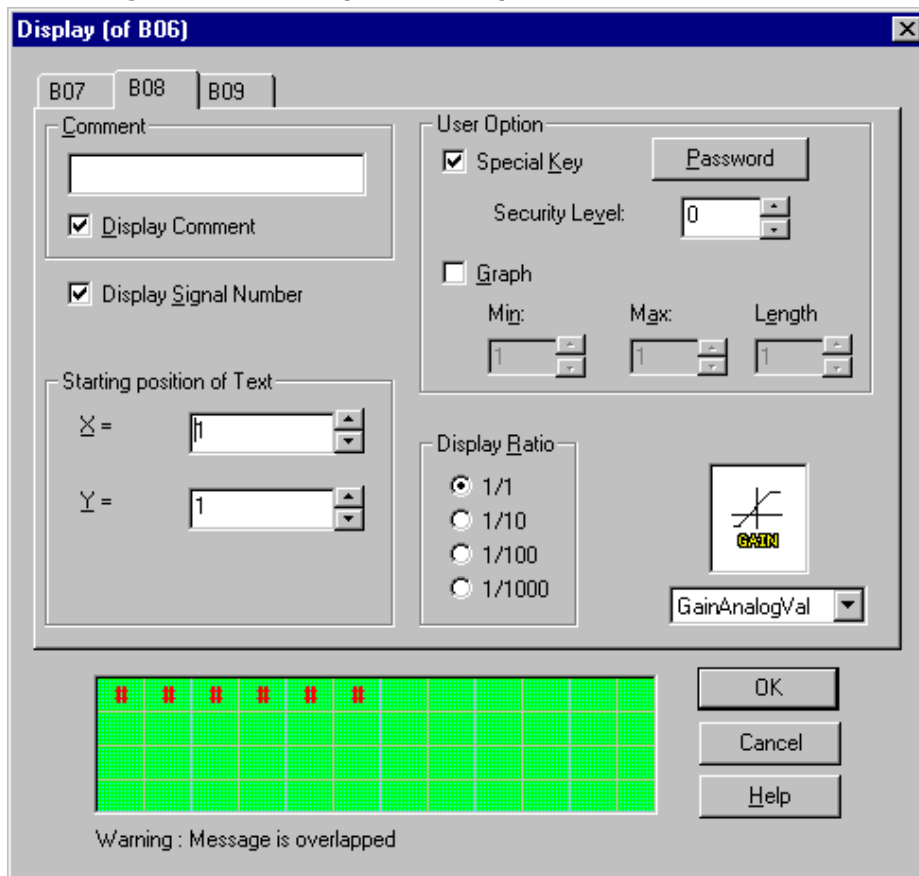


Caution is required, when the Latin special character is being used in the Russian environment, or when Russian is being used in the environments other than Russian. For details, refer to Chapter 14.

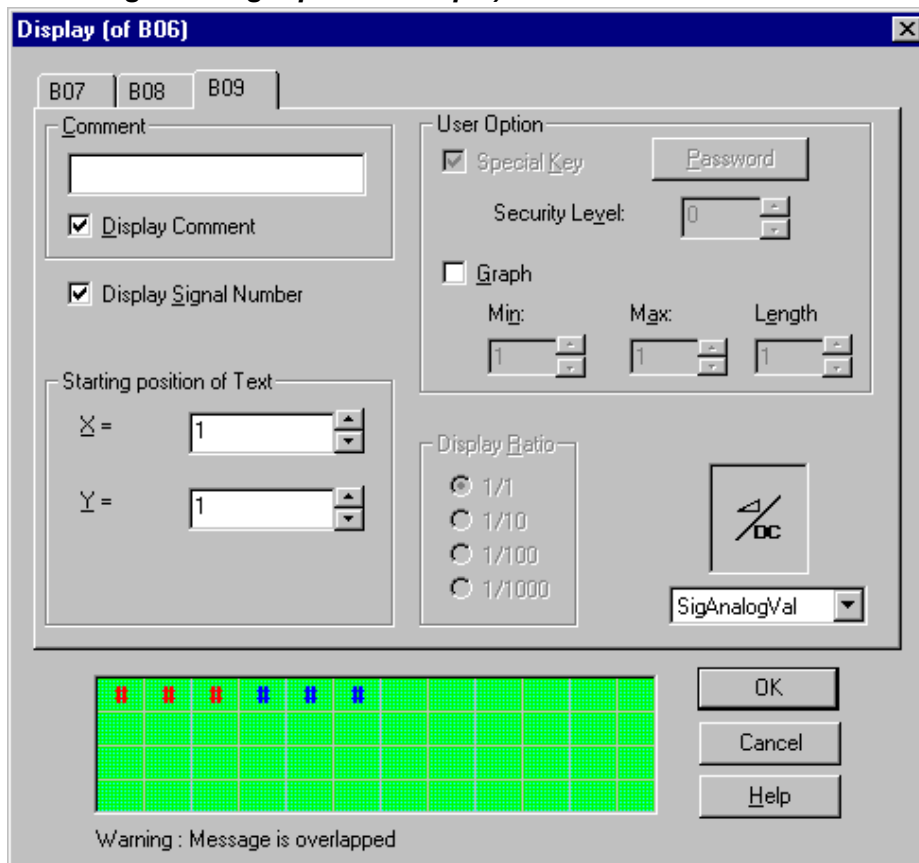
Choosing “Free” on step 6).



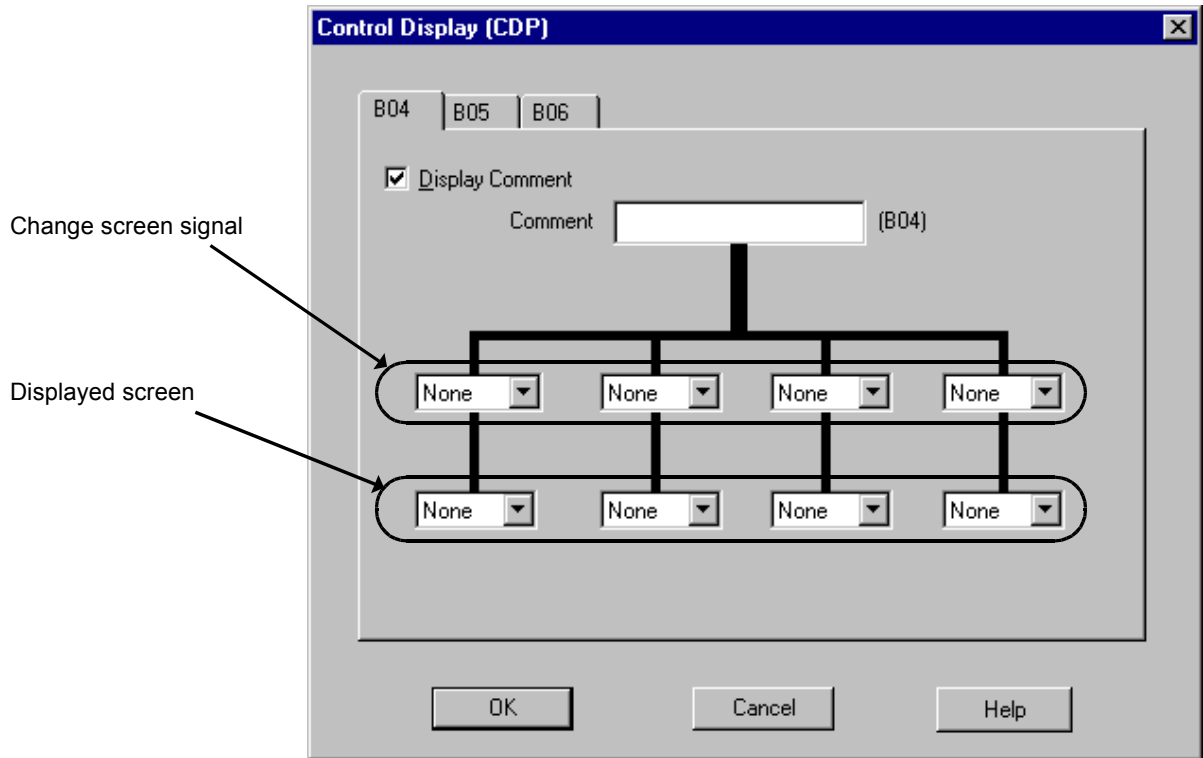
Choosing “FB Word Output” on step 6)



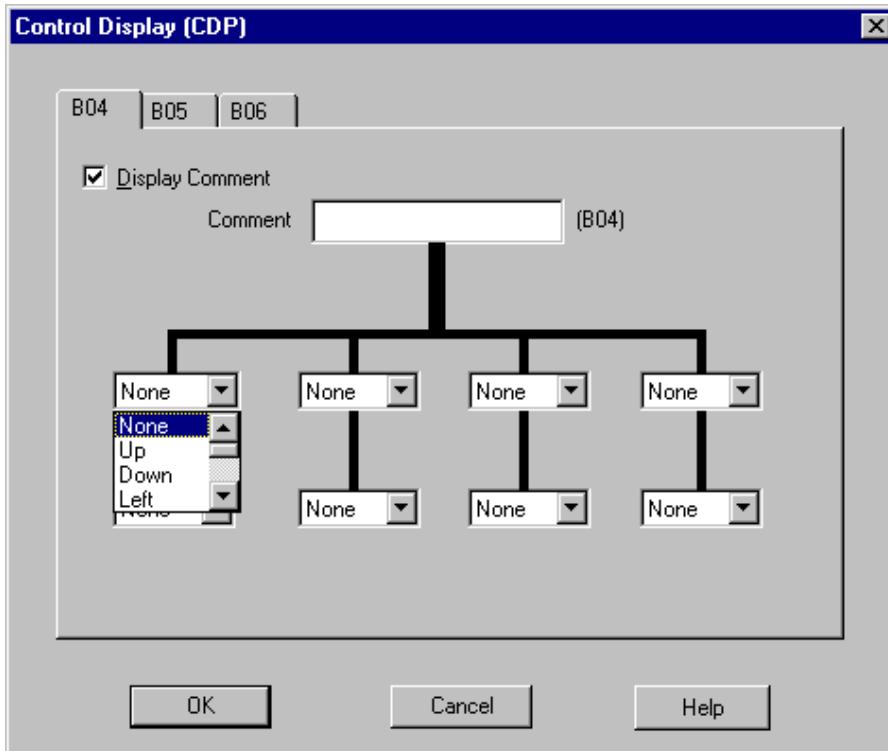
Choosing “Analog Input” on step 6)



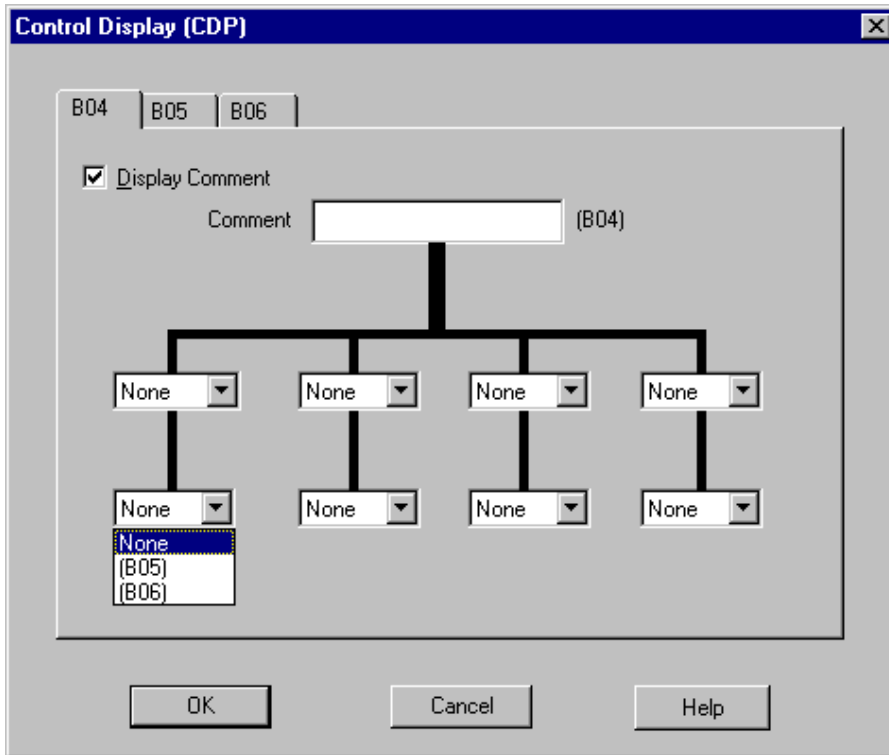
- 1) Double-click the “CDP” icon or click the “Open” button to set parameter.



- 2) Select the signal for changing user screens from the pull-down menu options.



- 3) Select the next displayed user screen from the pull-down menu options. When completing the control key setting, click the "OK" button.



- 4) When completing the control key's setting, click the "OK" button.

6.8 Register the User Function Block

The User function block is a user-defined combination of ordinary functions saved for repeated use.



Note:

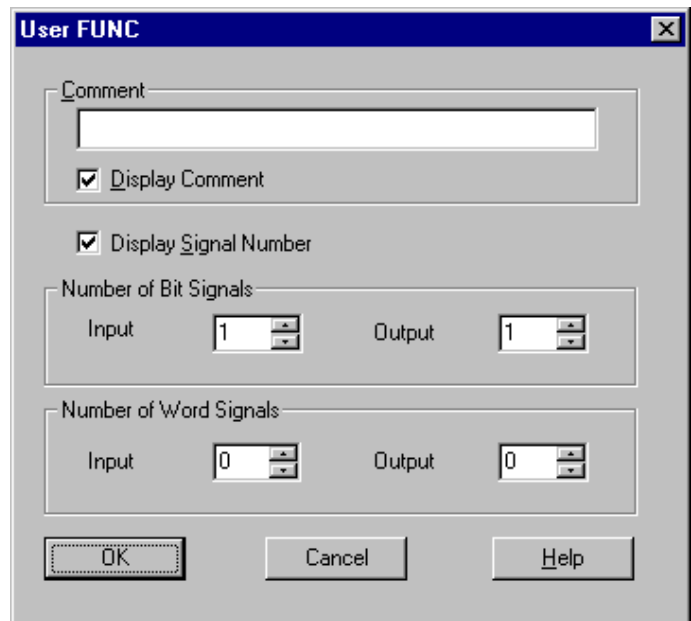
The system will use the original function block when reading the program from the α series with AL-PCS/WIN-E to which this user function block is not registered and display the program.

To register the user function block:

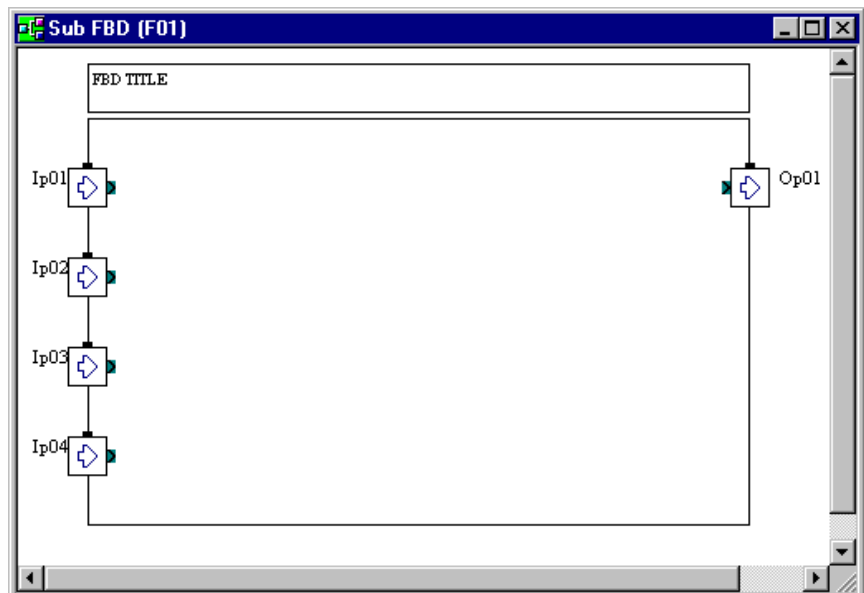
- 1) Click “User func” button on the User function toolbar, and click on the FBD base.



- 2) Set parameter for the sub FBD base.



- 3) Arrange Icon for user function block.
- 4) Connect each icon.
- 5) Set the parameters for the function blocks.



6) Click “UserFunc Registration” button to register the User Function Block.



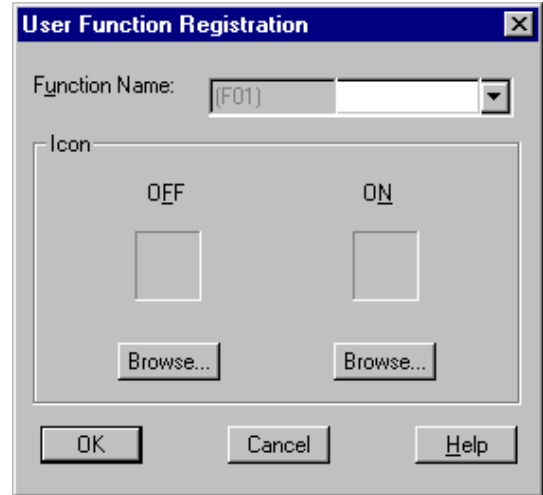
7) Set the OFF and ON images.

Registering ON/OFF images

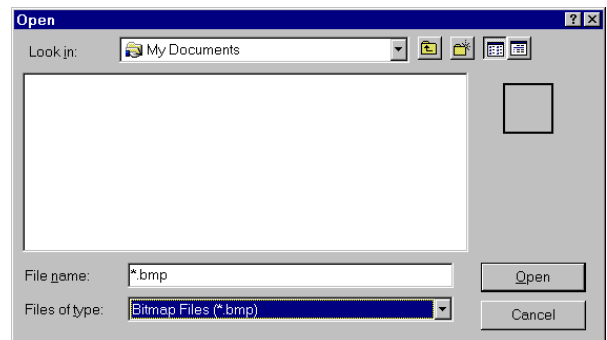
Table 6.9: ON/OFF Image Specifications

| | Specifications |
|-----------|-----------------------|
| File Type | Bitmap file |
| Size | 36 × 36 pixels |
| Color | 16 color or 256 color |

a) Click the “Browse...” button to register each image.



b) Choose the ON or OFF image from the Open window. Then, click the “Open” button to register the ON or OFF image.



When registering the bitmap image (*.bmp) for the ON or OFF icons, the AL-PCS/WIN-E generates the *_ON.bmp or *_OFF.bmp image for the registered user function block. “*” is the name of the registered User Function Block.

8) Click the “OK” button to finish the registration of the User Function Block. When registering the user function block, the *.ruf, *_ON.bmp and *_OFF.bmp files should be stored in the following folder.

Table 6.10: Generation Files for User Function Block

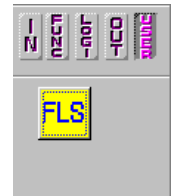
| File name | Stored Folder | Description |
|-----------|--|---|
| *.ruf | “Installed application folder”\Library\UserFunc (E.g. C:\Program Files\Alvls\Library\UserFunc) | The Information file for the User Function Block. |
| *_ON.bmp | “Installed application folder”\Library\Bitmap (E.g. C:\Program Files\Alvls\Library\Bitmap) | The ON image icon for the User Function Block. |
| *_OFF.bmp | “Installed application folder”\Library\Bitmap (E.g. C:\Program Files\Alvls\Library\Bitmap) | The OFF image icon for the User Function Block. |

“*” is the name of the registered User Function Block.

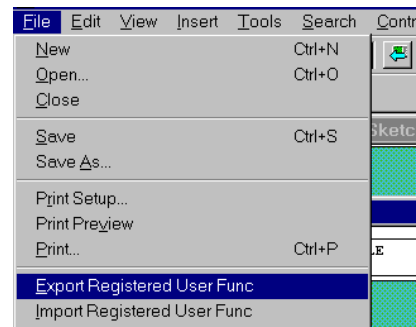
6.8.1 Export Registered User Function Block

The registered UserFunc data (User Function Block) is exported (stored) to a designated folder; Thus, registering the UserFunc data (User Function Block) is possible from one PC to another.

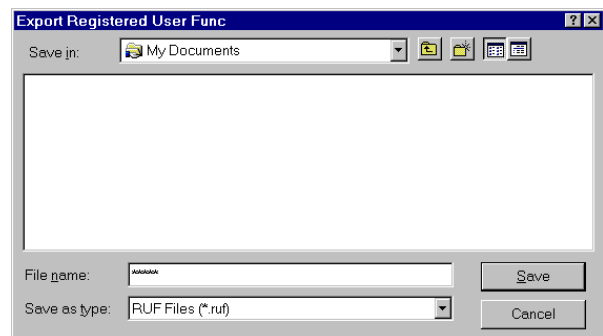
- 1) Click the icon of the UserFunc to Export.



- 2) Select “Export Registered User Func” from the File menu.



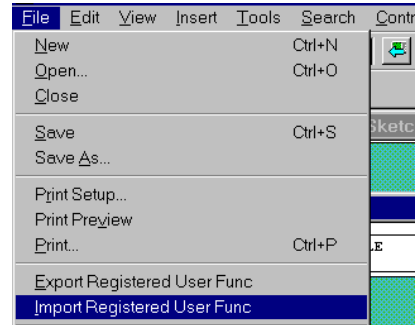
- 3) In the “Export Registered User Func” dialog box, choose the folder that saves the exported file and enter the UserFunc name then click the “Save” button. The *.ruf, *_ON.bmp and *_OFF.bmp files should be stored together in the chosen folder. “*” is the name of the registered User Function Block.



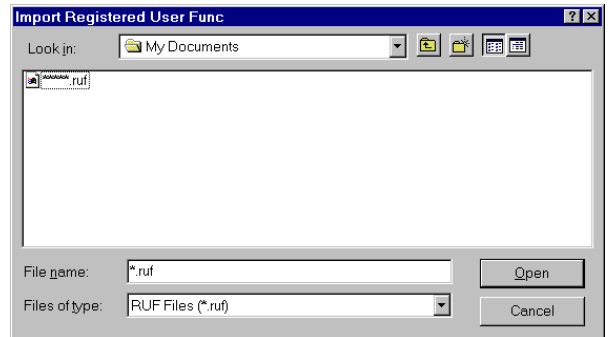
6.8.2 Import Registered User Function Block

The exported UserFunc data (User Function Block) is imported from a designated folder; Thus, registering/transferring the UserFunc data (User Function Block) is possible from one PC to another.

- 1) Select “Import Registered User Func” from the File Menu.



- 2) The “Import Registered User Func” dialog box will be displayed. In the “Import Registered User Func” dialog box, specify any folder, which holds the data to Import, and enter (select) the name of the Imported data*1, then click the “Open” button.



1 The Imported data (.ruf, *_ON.bmp and *_OFF.bmp files) must be stored in the same folder.

“*” is the name of the registered User Function Block.

6.9 Change FBD Base Colors and Icons

6.9.1 Change FBD Base Colors

The FBD base color can be changed via the “Set Base Color” command in the Option Menu. Further information can be found in Help on AL-PCS/WIN-E.

6.9.2 Customize Icons

The signal registered by the user and the image for the function block icon can be used. The icon can be registered in “User Defined Icons” in the Option Menu. The customer can choose registered icon by “Function Icon Set” in the Option Menu. Further information can be found in Help on AL-PCS/WIN-E.

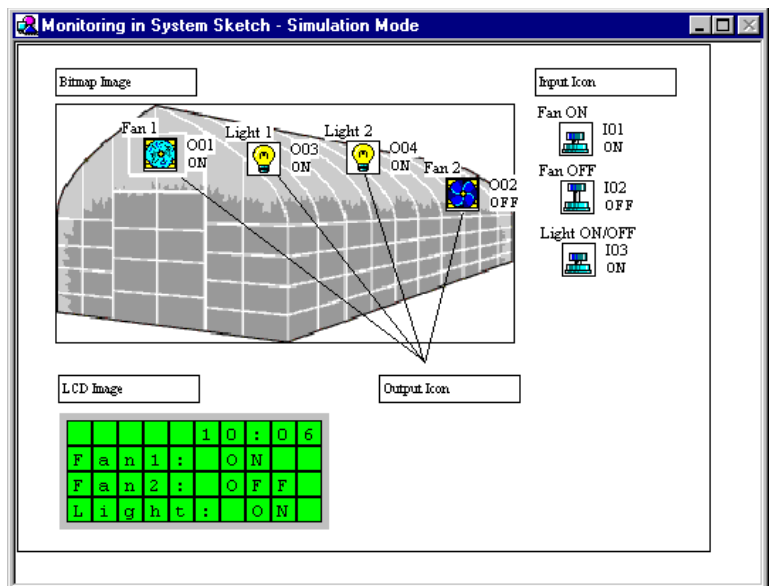


Note:

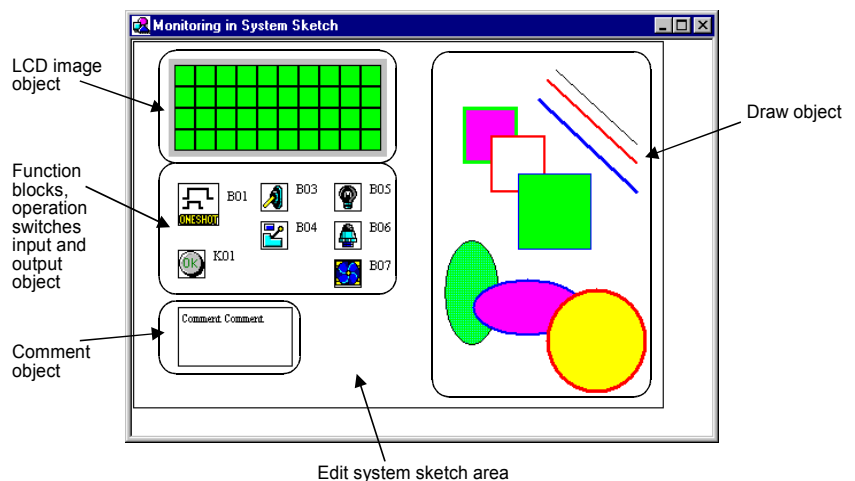
- Unregistered function blocks use system icon with AL-PCS/WIN-E.
- Unregistered user defined icons in AL-PCS/WIN-E reading from α series controller shall display system icons.

7. Monitoring in System Sketch Window

The Monitoring in System sketch window allows for user-defined customization as shown in the window.



- Icons of I/O signal and function block, etc. used for FBD window. If unused the icons in the FBD window are arranged. States of the icons will be displayed regardless of the operation of the FBD program.
- Comment
- Importing file (OLE)
- Figure drawn by figure toolbar
- LCD image of α series main unit



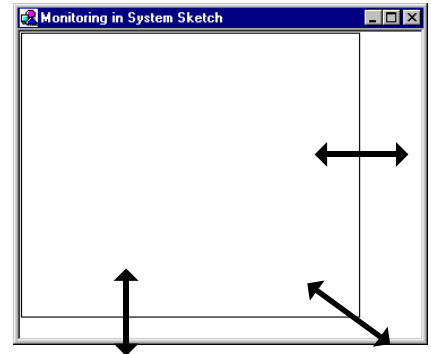
Note:

When this window is active, the following toolbar and functions are applicable.

- Functions within the Toolbar that became active.
 - Image and Drawing Toolbar
 - “LCD Image” and “Insert New Object...” in the Tools menu.
- Function within the Toolbar that become inactive.
 - Wiring and User Function Toolbar
 - “Auto FBD Wizard” in the Tools menu
 - “Select controller Type...” in the Option menu

7.1 Monitoring in System sketch Base Resize

When the monitoring in system sketch window is active, the base has a minimum size. The Base can be resized in width or height by dragging either the right or bottom edges respectively. By dragging the right-bottom corner of the base rectangle, the base height as well as width changes. The Base cannot be resized on the left and top edges.



7.2 Change Base Color and Icons

7.2.1 Changing the Base Color

The base color can be changed via the “Set Base Color” command in the Option Menu. Further information can be found in Help on AL-PCS/WIN-E. (Default color: lime green)

7.2.2 Customize Icons

The signal registered by the user and the image for the function block icon can be used. The icon can be registered in “User Defined Icons” in the Option Menu. The customer can choose registered icon by “Function Icon Set” in the Option Menu. Further information can be found in Help on AL-PCS/WIN-E.

7.3 Drawing Lines, Ovals, and Rectangles

Lines can be drawn by clicking on the line icon and then moving the mouse accordingly. Click the mouse button to start the line and release the button when the desired end point is reached.



Ovals and Rectangles can be drawn in the same manner by choosing the appropriate icons.

7.3.1 Moving and Resizing Lines, Ovals, and Rectangles

The objects can be moved within the System Sketch base size limit by clicking on them and dragging them to the new position. Resizing can be done by pressing the left mouse button on any of the edges and dragging the mouse. The mouse cursor changes to double headed arrow when it is moved over the edges indicating the direction in which Resizing can be done.

The objects can be Resized within the boundaries of the System Sketch base only.

The Cut, Copy, and Paste options can be performed on objects within the System Sketch window.

7.3.2 Changing Colors

To change the color of an existing line, select the line with the left mouse button. Click on the Line Color Icon and choose the new color for the line. This Line will be drawn in this color.

This color will appear as the outline Line color for Ovals and Rectangles. The fill color for the Rectangle and the Oval can be changed by clicking on the Brush Color icon and choosing a new color.

7.3.3 Changing the Line Width

An existing Line width can be changed by selecting the Line in the System Sketch Window and clicking the desired line width - thin, medium, or thick. The line width for Ovals and Rectangles is changed in the same manner. This will now be the active Line width for all the drawing tools.

7.4 LCD Display Image

The LCD Display can be inserted into the System Sketch Window by either using the insert window or during Simulation or Monitoring.

To Insert LCD Display Image:

There must be an existing Display function block in the FBD base for the Insert LCD command to be activated in the Insert Menu. Click on the command to insert the LCD screen onto the System Sketch Window. If it is already present in System sketch window, an error dialog box will appear.



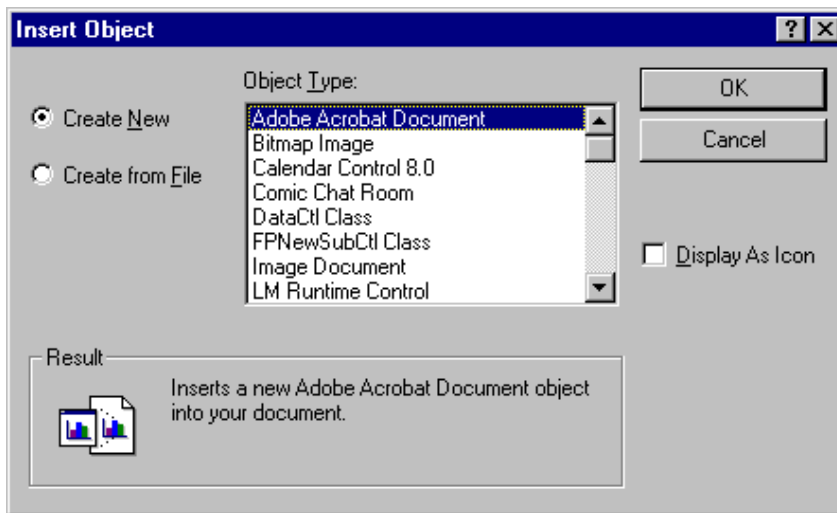
Simulation and Monitor Mode:

A Display function block will cause a dialog box to appear upon entering Simulation or Monitor Mode. This box will give a prompt for whether to add the Display to the System Sketch Window base. Check yes to automatically add the LCD Display.

7.5 Adding an OLE File

An OLE object can be inserted into the System Sketch Window. We can edit this object by double clicking on it. The object can be moved within the System Sketch base, and can be resized within the limits of the System Sketch base size. The OLE Object can be inserted using Insert New Object dialog box.

Select the type of information to be inserted into System Sketch Window. Some common object types include Graphs, Document, and Bitmaps Image, etc..



7.6 Adding a Signal or Function Block

Signals and Functions Blocks can be copied from the FBD base area or added with the Accessories Toolbar and placed on the System Sketch Window. Analog Signals and Function Blocks must be copied from the FBD base.

If a Function Block is copied from the FBD Base, its number is copied and the parameters will be displayed in the Simulation or Monitor Mode. Wiring connections cannot be copied to the Monitoring in System Sketch Window.

Items placed in the Monitoring in System Sketch Window using the Accessories Toolbar will have new function block numbers assigned to them but these numbers will not affect the number of function blocks that can be placed in the program. Function Blocks can be copied to the FBD base and then incorporated into the program.

Move items with the mouse to any area inside the System Sketch base window.

8. Simulation Mode

Simulation mode allows the user to run the system program Offline. Changes to Function Block parameters can be made during the simulation process, analog values can be input as necessary, and the input signals themselves can be turned ON/OFF.

This is a powerful tool to debug new programs or to check updates to current programs.



Caution is required, when the Latin special character is being used in the Russian environment, or when Russian is being used in the environments other than Russian. For details, refer to Chapter 14.



Note: Inactive Functions during Simulation Mode

The Edit, Insert, and Tools Menu will be deactivated along with the Accessories, Wiring, and Drawing Toolbars. No program editing in regards to adding, deleting, wiring, or moving any system components can occur while in Simulation Mode.

8.1 Display of the Signal Icon, Wire and Function Block

8.1.1 Input and Output Icons

The input and output icons will all be labeled with their number (I01, O02, M03, K04, E01, A01, etc.) and ON/OFF status.

8.1.2 Wire

The digital wire connections will change color so that outputs pins that are On will become red and output pins that are Off will become blue. (These colors can be changed in the Options menu when in the Programming Mode).

8.1.3 Function Block

The function block will all be labeled with their number (B01, B02, B03, etc.), ON/OFF status, timer values, counter values, priority settings, and other parameter values. At a glance, all the important information about each component is displayed.

8.2 Start the Simulation Mode

When the program is ready to be tested, enter the Simulation mode by clicking on the Simulation icon in Controller Toolbar or by using the Simulation Start option in the “Controller” Menu. The FBD Window or the Monitoring in System Sketch Window can be viewed as required.

8.3 Turn Signals ON/OFF (Force ON/OFF)

The following icon can be turned ON/OFF by a single clicking on the icon.

Table 8.1: Turn Signal ON/OFF

| Items | Destination |
|---------------------------------|---|
| Inputs | All input terminals (I01 ~ I15, EI1 ~ EI4), Inputs for AS-interface (E01 ~ E04) |
| Outputs | All output terminals (O01 ~ O09, EO1 ~ EO4), Outputs for AS-interface (A01 ~ A04) - See Note |
| Operation Keys | All operation keys (K01 ~ K08) |
| System Bits | M06, M07, and M10 ~ M24 |
| Control Bits | All control bits (N01 ~ N04) - See Note |
| Output Signal of Function Block | All function blocks - See Note |



Note:

The outputs, control bits and all function blocks can be turned ON/OFF, but the output of icon may be affected by the ON/OFF state of the input pins. Some icons will remember their output states until they are reset.

8.4 Change Function Block Parameters

Function Block parameters can be changed by double clicking on the function block. Change the parameters as desired and click the OK box to accept. The new values will be shown on screen and any change to the program settings will be performed. The TimeSw cannot be edited during the Simulation mode.

8.5 Exiting the Simulation Mode

To exit the Simulation mode, press the Simulation icon with the mouse left button or use the Simulation Stop Command in the “Controller” menu.

9. Read/Write Program From/To Controller

This chapter explains read/write the program from/to the α series controller. For remote maintenance Set the modem accordingly. Refer to Chapter 11 for line connection.



Note: Relocation file

This file has format as any other “.vls” file, containing information about FBD and System Sketch Windows including position information. Data which is written to Controller contains only FBD information excluding position information. This file is created, after data has been successfully written to the Controller, in the Relocation directory so that it can be used while “Read from Controller” is executed.



Note: Program protection

Password (α, α2 series).

- If a user password is written to the controller, program read access is prohibited until the correct password is entered.
- If a user attempts to write a new program to the controller, and if the program is locked with a password, the user does not have write access until the program in the controller is unlocked.

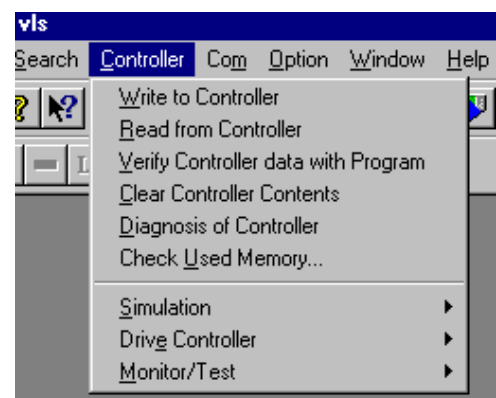
Program Read Protection (α2 series Version 2.20 or later).

- If a Program Read Protection password is written to the controller, program read access is prohibited.
The program read protection is reset, when the controller content is erased (VLS or α2) or an unprotected user program (program read protection not set) is downloaded by VLS.

Refer to the programming manual for detailed program protection.

9.1 Write Program to Controller

- 1) Click “Write to Controller” in the Controller menu.



- 2) Unclick the “Create Relocation file” option if not required.
- 3) Check the “Run and Start Monitoring” option if the user requires the a series controller to incite operation.
- 4) Click “OK” button to begin writing program to the α series controller.

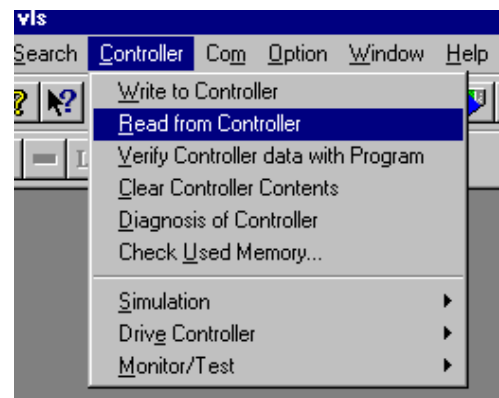


Note:

Writing a program to α series controller is possible only, when the controller is in "Stop status".

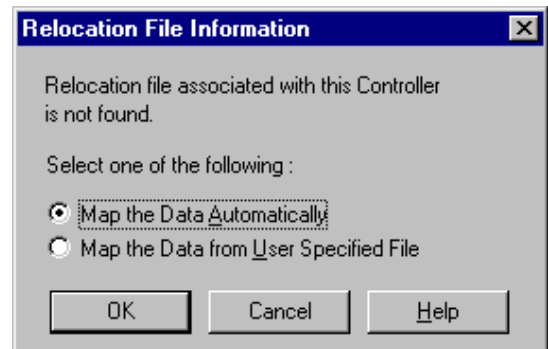
9.2 Read Program from Controller

- 1) Click “Read from Controller” in the Controller menu.



- 2) Click either of the radio buttons. When the relocation file for this program is found in the relocation directory, this window will not be opened, and reading the program will be executed.

- **Map the Data Automatically**
Arrange the icon suitably without using the relocation file.
- **Map the Data from User Specified File**
Use the relocation file of the specified program file and arrange the icon.



- 3) Click “OK” button to begin reading program from the α series.



Note: Relocation file

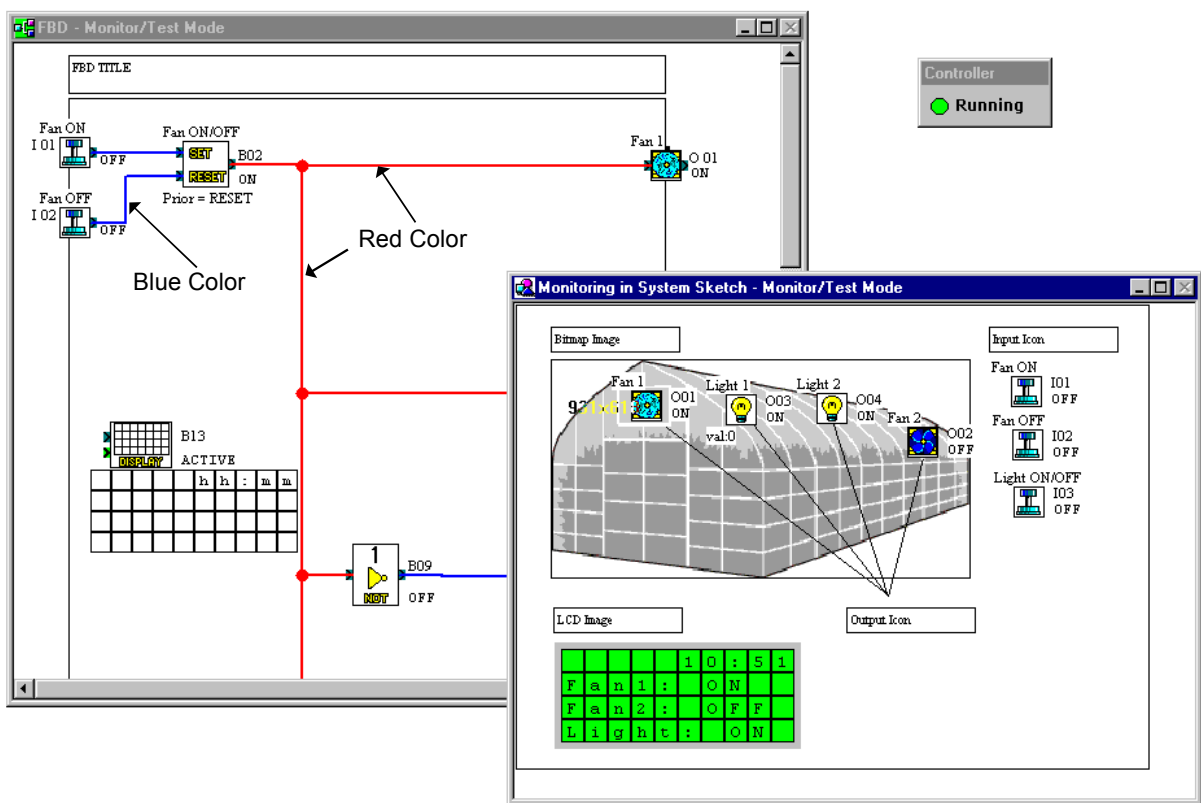
This file has format as any other “.vls” file, containing information about FBD and System sketch windows including position information. Data which is written to Controller contains only FBD information excluding position information. This file is created, after data has been successfully written to the Controller, in the Relocation directory. Thus, it can be used while “Read from Controller” is executed.

10. Monitoring

The Monitor Mode can be used to monitor the current conditions of an α series that is running a program. The α series must be communicated to the AL-PCS/WIN-E via the AL-232CAB or modem or, when Monitor Mode is started an error dialog box will appear. The α series status (Running or Stopped) will be monitored continuously and will be displayed as shown.



Caution is required, when the Latin special character is being used in the Russian environment, or when Russian is being used in the environments other than Russian. For details, refer to Chapter 14.



Note:

The contents of the AL-PCS/WIN-E memory and the α series memory must be the same before monitoring can take place. The AL-PCS/WIN-E package will read the contents of the α series continuously and update the information accordingly. Changes made to program parameters will be transferred to the α series and will affect the operation of the equipment.



Note: Inactive Functions during Monitor Mode

The Edit, Insert, and Tools Menu will be deactivated along with the Accessories, Wiring, and Drawing Toolbars. No program editing in regards to adding, deleting, wiring, or moving any system components can take place while in Monitor Mode.

10.1 Display of the Signal Icon, Wire and Function Block

10.1.1 Input and Output Icons

The input and output icons will all be labeled with their number (I01, O02, M03, K04, E01, A01, etc.) and ON/OFF status.

10.1.2 Wire

The digital wire connections will change color so that outputs pins that are On will become red and output pins that are Off will become blue. (These colors can be changed in the Options menu when in the Programming Mode).

10.1.3 Function Block

The function block will all be labeled with their number (B01, B02, B03, etc.), ON/OFF status, timer values, counter values, Priority Settings, and other parameter values. At a glance, all the important information about each component is displayed.

10.2 Start the Monitor Mode

Enter the Monitor Mode by clicking on the Monitor Icon or by using the Monitor Start command in the Controller Menu.

10.3 Turn Signals ON/OFF (Force ON/OFF)

The following icon can be turned ON/OFF by a single clicking on the icon.



Caution: Force Signal ON/OFF

Take care in checking the safety consideration of the system when forcing ON/OFF as the result could cause serious damage to the machine and person.

Table 10.1: Turn Signal ON/OFF

| Items | Run Mode | Stop Mode |
|--------------------------------------|----------|-----------|
| Inputs (I01 ~ I15, EI1 ~ EI4) | Note 1 | Note 1 |
| Outputs (O01 ~ O09, EO1 ~ EO4) | × Note 2 | ✓ |
| Inputs for AS-interface (E01 ~ E04) | Note 1 | Note 1 |
| Outputs for AS-interface (A01 ~ A04) | × Note 2 | ✓ |
| Operation Keys (K01 ~ K08) | Note 1 | Note 1 |
| Control Bits (N01 ~ N04) | × Note 2 | ✓ |
| Output Signal of Function Block | Note 3 | × Note 4 |

Note 1:

The Inputs terminal, AS-interface’s input bits and operation keys can be turned ON/OFF, but the icon state is affected by the ON/OFF state of the hardware, hence changing the ON/OFF status of the signal is unpractical.

Note 2:

The outputs terminal and AS-interface’s output bits cannot be turned ON/OFF because the output is affected by the ON/OFF state on the program.

Note 3:

All function blocks can be turned ON/OFF in Run mode, but the output of function block might be affected by the ON/OFF state on the program, hence changing the ON/OFF status of the signal is unpractical.

Note 4:

Not all function blocks can be turned ON/OFF.

10.4 Change Function Block Parameters

Function Block parameters can be changed by double clicking on the function block. Change the parameters as desired and click the OK box to accept. The new values will be shown on screen and any change to the program settings will be performed. The TimeSw cannot be edited during the Monitor mode.



Caution: Change Function Block Parameters

Take care in checking the safety consideration of the system when forcing ON/OFF as the result could cause serious damage to the machine and person.

10.5 Exiting the Monitor Mode

The customer can stop the Monitoring and switch to Program Mode either by clicking the Monitoring button present in the Controller toolbar or by selecting the Monitor/Test Stop command in the “Controller” Menu.



Note

If during monitoring, the program or parameters in the α series CPU are updated, monitoring will be stopped and a message box will appear stating that the α series contents were changed. The application will automatically switch to Program (Edit) mode. The updated program must be uploaded to the PC to begin monitoring again.

Example of times when the new program needs to be uploaded:

- Changing program or parameter with the front panel keys
- Upon the completion of Auto-Tuning, the program in the controller will be updated with new PID parameters. For α2 only.

11. Remote Maintenance

The α series can communicate via modems to a PC using AL-PCS/WIN-E. The user can Upload or Download Programs, monitor counter values or function block times, change parameter settings, or write new data to the α series. All communications are initiated from AL-PCS/WIN-E so that the user controls the information flow from the PC. The α series cannot initiate error messages or send messages to external devices.

The α series will initiate its modem upon startup therefore receive or transmit data as requested from AL-PCS/WIN-E.

11.1 System Configuration

Figure 11.1: Remote Maintenance with AL-PCS/WIN-E

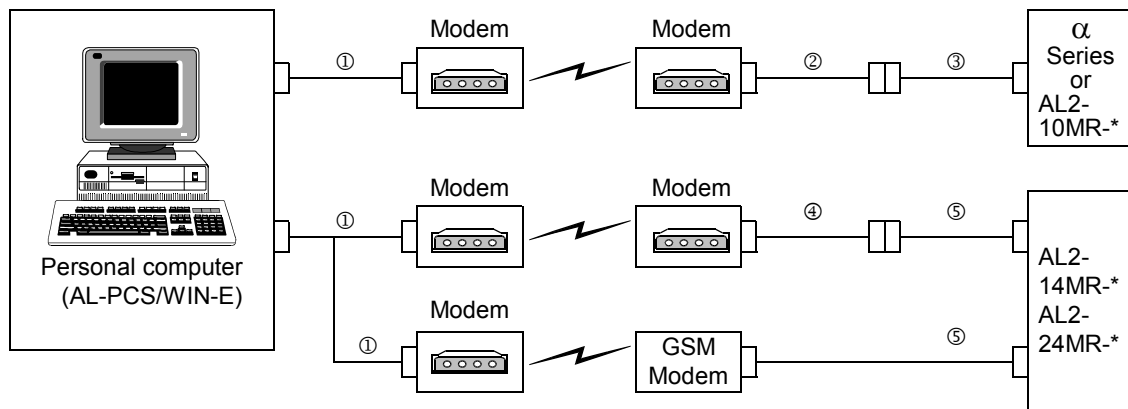


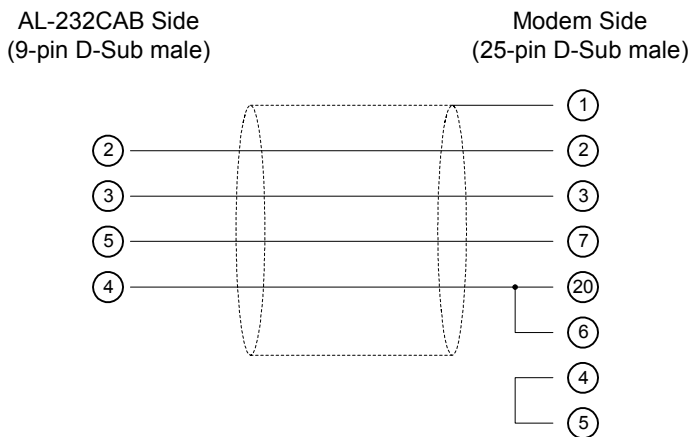
Table 11.1: Cable List of Remote Maintenance with AL-PCS/WIN-E

| Using Cable | |
|-------------|---|
| 1 | RS-232C straight cable for the modem (specified by Modem manufacture) |
| 2 | User made RS-232C cable (Refer to Figure 11.2) |
| 3 | AL-232CAB |
| 4 | RS-232C straight cable for the modem (Refer to Figure 11.3) |
| 5 | AL2-GSM-CAB |

11.2 Cable Reference

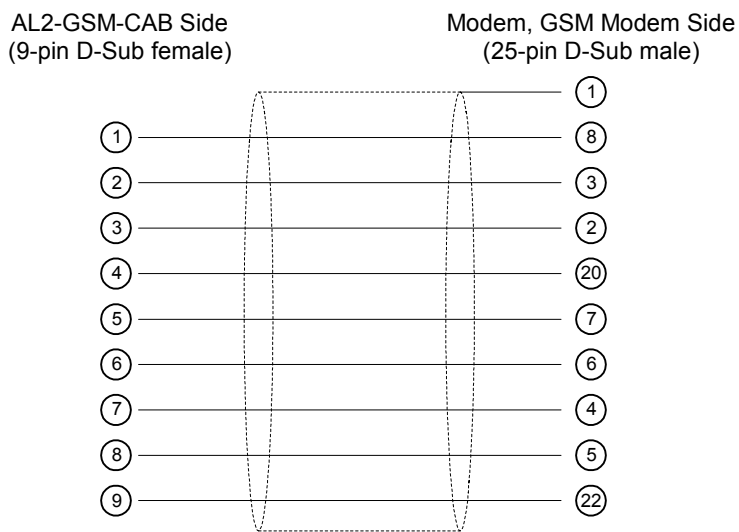
11.2.1 User made RS-232C Cable Between Modem and AL-232CAB (Model Type: AL-**M*-*)

Figure 11.2: RS-232C Cable Between Modem and AL-232CAB (Model Type: AL-M*-*)**



11.2.2 RS-232C Straight Cable Between Modem (GSM Modem) and AL2-GSM-CAB (Model Type: AL2-14MR-*, AL2-24MR-*)

Figure 11.3: RS-232C Straight Cable Reference Between GSM Modem and AL2-GSM-CAB (Model Type: AL2-14MR-*, AL2-24MR-*)



11.3 Recommended Modems

The following modems have been successfully tested.

Table 11.2: Tested Modems

| Modem Type | Maker Name | Model Name |
|------------|------------|------------|
| Modem | 3com | SP560V-P |
| | OMRON | ME3314 |
| | AIWA | PV-AF3360 |
| GSM modem | Siemens | M20T |

11.4 Modem Initialization at the Controller side

The α series must be initialized with the modem’s AT command that can be entered from the α series front panel or transferred from AL-PCS/WIN-E.

The AL-PCS/WIN-E provides three preprogrammed commands for commonly used modems or the user may enter the command according to the modems specifications.

11.4.1 Modem Setting

- 1) Personal Computer side

Install the file for the correct settings of the attachment in the modem.

- 2) Setting of α series’ modem

The modem on the α series side is set by the ModemInit command of the main unit.

- a) The modem command (AT command)

Use the AT command to initialize the modem. Confirm details of the AT command in the manual of the modem to be used. AT commands have been prepared for select modems in the table 9.4 (modem) and 9.5 (GSM modem) below.

Table 11.3: Tested Modems

| Maker name | Model name | Modem command (AT command) |
|------------|------------|--|
| 3com | SP560V-P | ATE0Q1&B1&D0H0&I0&R1&S0S0=2S15=8&W |
| OMRON | ME3314 | ATE0S0=2Q1&D0S15=8&R1&H0&W |
| AIWA | PV-AF3360 | ATE0S0=2Q1&D0&M5\Q0\J0&W |
| Siemens | M20T | ATE0S0=2&S0;+IFC=0,0;+CMEE=1;+IPR=9600&W |

Further information on the method to initialize a modem of the α2 series side can be found in the α or α2 Programming Manual. Initialize a modem by using the AL-PCS/WIN-E, refer to section 11.4.2 and 11.4.3.

When modems not listed in the table above are used, set the AT command to meet the following requirements.

Table 11.4: AT Command for Modems (Other GSM Modem)

| Setting Item | Set content | Example Setting | | |
|---|----------------------------------|-----------------|--------|-----------|
| | | SP560V-P | ME3314 | PV-AF3360 |
| Setting of command echo | None | E0 | E0 | E0 |
| Call frequency of auto-answering | Twice | S0=2 | S0=2 | S0=2 |
| Displayed result code | None | Q1 | Q1 | Q1 |
| DTR control | Always on | &D0 | &D0 | &D0 |
| DSR control | Always on | &S0 | | |
| Communicate mode | V.42bis mode | S15=8 | S15=8 | &M5 |
| Speed of terminal fixed dimension | Fixed | &B1 | \J0 | |
| Terminal flow control scheme | None | ~&R1 | \Q0 | |
| Flow control of transmission data | None | &H0 | &H0 | - |
| Flow control of received data (software) | None | &I0 | | |
| Flow control of received data (RTS control) | None | &R1 | | |
| Writing in nonvolatile memory | Write in the nonvolatile memory. | &W | &W | &W |

Table 11.5: AT Command for GSM Modem

| Setting Item | Set content | Example Setting |
|--|--|-----------------|
| | | M20T |
| Enable command echo | Echo mode OFF | E0 |
| Set number of ring before automatically answering the call | Enable automatic answering on the ring twice | S0=2 |
| Set circuit data set ready (DSR) function mode | DSR always ON | &S0 |
| Set TE-TA local data flow control | <ul style="list-style-type: none"> Specifies the method which will be used by TE when data is received from TA: None Specifies the method which will be used by TA when data is received from TE: None | +IFC=0,0 |
| Report mobile equipment error | Enable result code and use numeric value | +CMEE=1 |
| Set fixed local rate | Baud Rate: 9600 bps | +IPR=9600 |
| Set circuit data carrier detect (DCD) function mode*1 | DCD line is ON only in the presence of Data Carrier | &C1 |
| Select bearer service type*1 | 9600 bps (V.32), asynchronous modem, non-transparent | +CBST=7,0,1 |
| Store current parameter to use defined profile | The user profile is stored in non-volatile memory | &W |

*1 For a Siemens M20T case, these settings are not necessary because they are default settings. When using other GSM Modems, these settings are necessary.

b) Timing related modem initialization

The α series allows synchronized start-up from the main unit using delayed modem commands. The delay can range from 0 - 10 seconds. This command can be useful to ensure the AT command is correctly transmitted when the α series start up is faster than the modem start up.

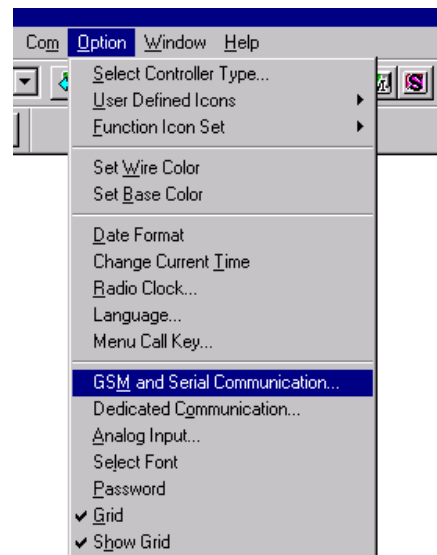
Further information for the modem operation can be found in the α and α2 Programming Manual.

11.4.2 Set the Modem Initialization

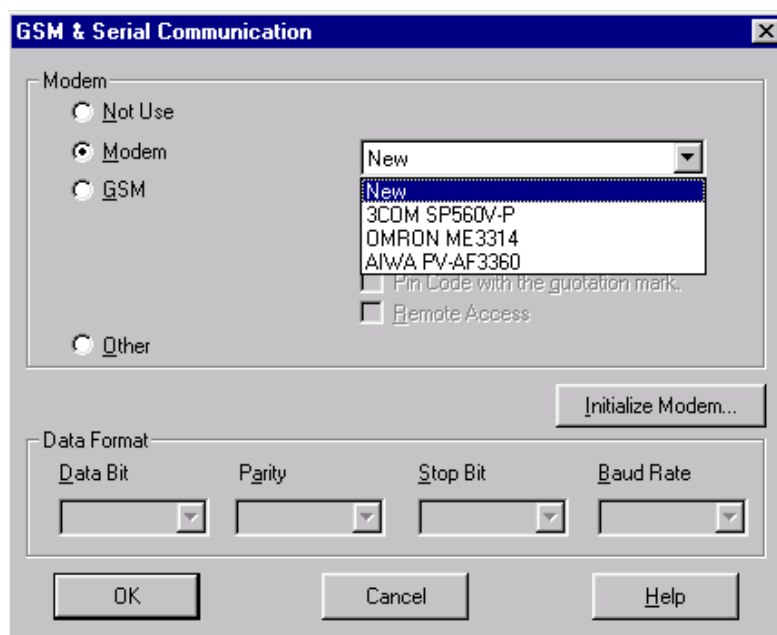
Set it according to the following procedures when setting the modem on the α or α2 series side.

To set the modem initialization on the α series side:

- 1) Click "Option" in the Menu bar, and choose "GSM and Serial Communication..."



- 2) Click "Modem" (radio button), and choose the appropriate modem on the pull down menu.



- 3) Using other modems, choose “New” on the pull down menu.
- 4) Click “Initialize Modem”.

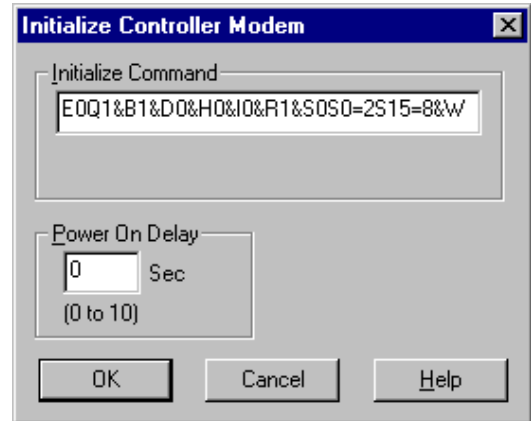
Input the AT command for new modems into the Initialize Command.
 When choosing the following modem, the initialize commands already have default settings.

However, it is possible to add some AT command.

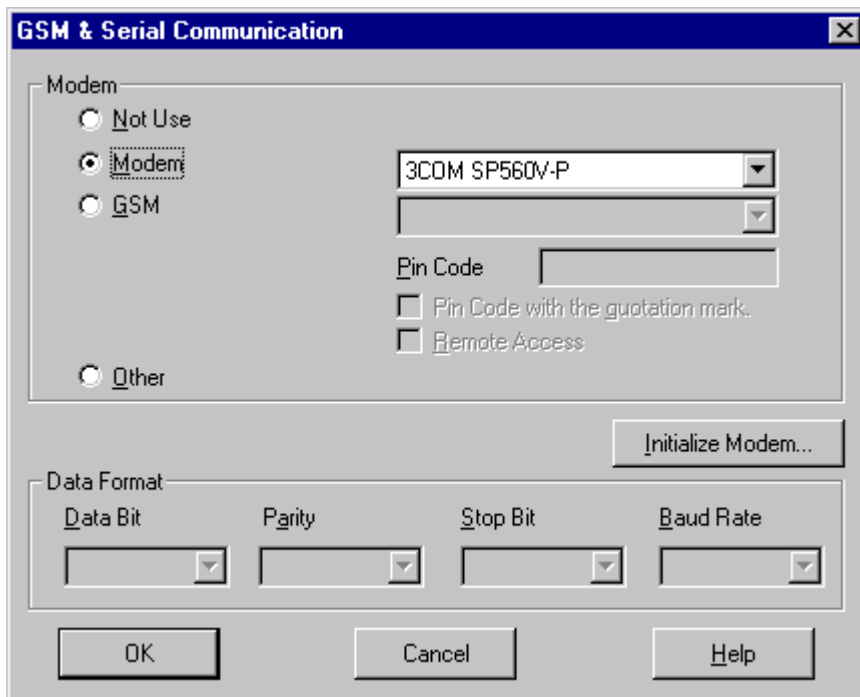
Further information about AT commands can be found in the modem manufacturer’s manual.

Table 11.6: Preprogrammed Modem

| Maker name | Model Name |
|------------|------------|
| 3com | SP560V-P |
| OMRON | ME3314 |
| AIWA | PV-AF3360 |



- 5) Set “Power On Delay” to 0 ~ 10s.
- 6) Click “OK”.
- 7) Click “OK” to complete the GSM & Serial Communication on the GSM & Serial Communication window.

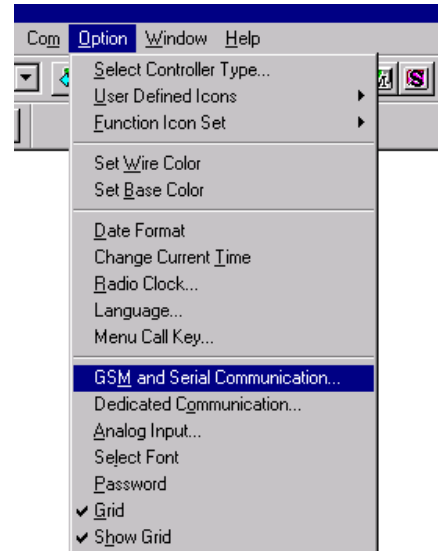


11.4.3 Set the GSM Modem Initialization

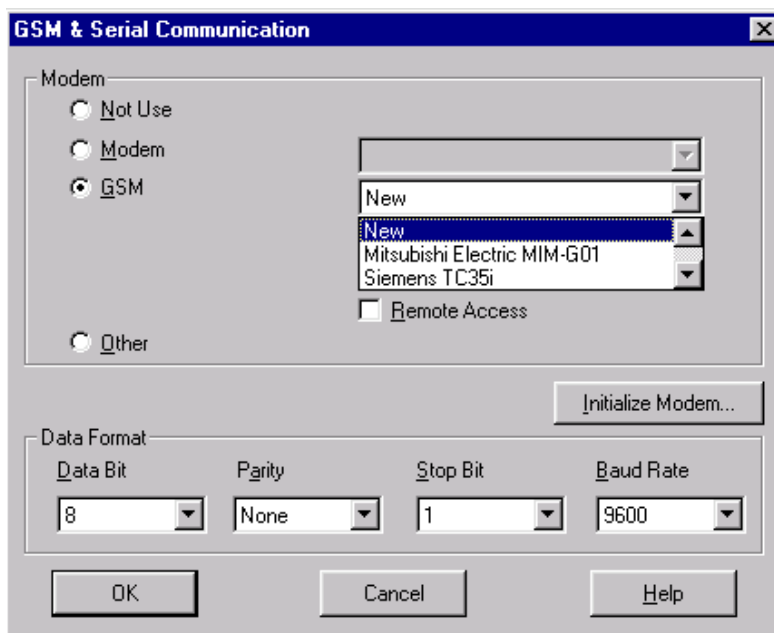
Set it according to the following procedures when setting the GSM modem on the α2 series side. This setting is for α2 series. When using α series (Model: AL-**M*-*), this setting does not appear.

To set the GSM modem initialization on the α2 series side:

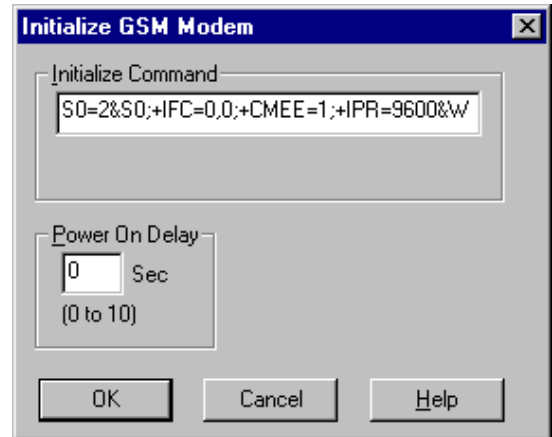
- 1) Click “Option” in the Menu bar, and choose “GSM and Serial Communication...”.



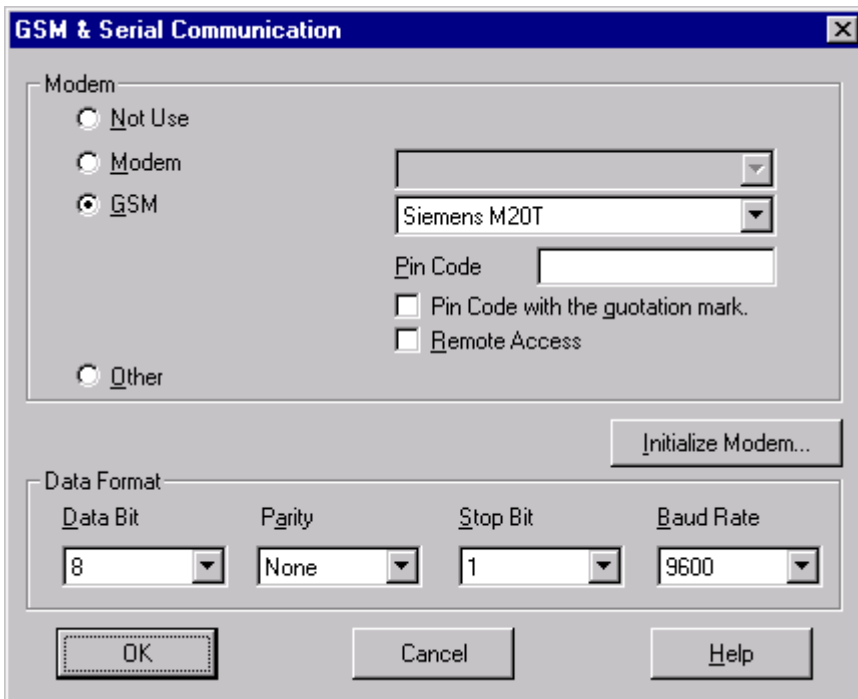
- 2) Click the “GSM” (radio button).



- 3) Using other modems, choose “New” on the pull down menu.
- 4) Click “Initialize Modem”.
This initialize command already has a default setting.
However, it is possible to add AT commands. Further information about AT commands can be found in the GSM modem manufacturer’s manual.
- 5) Set “Power On Delay” to 0 ~ 10s.
- 6) Click “OK”



- 7) Set “Pin Code” for using GSM modem on the α2 series side.



- 8) Click “Remote Access” to access using AL-PCS/WIN-E.
- 9) Set “Data Bit, Parity, Stop Bit and Baud Rate” into the Data Format. When using the Siemens M20T, do not change default setting.

Table 11.7: Default Setting of Data Format

| Items | Default Setting |
|-----------|--------------------|
| Data Bit | 8 bit |
| Parity | None (None parity) |
| Stop Bit | 1 bit |
| Baud Rate | 9600bps |

- 10) Click “OK” to complete this setting.

11.5 PC to Modem Configuration Check

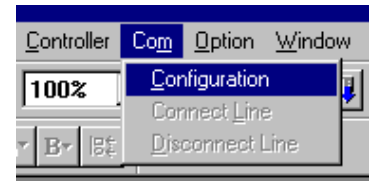
The modem setup can be checked in the “Com/Configuration/Test” function.

When checking the PC to modem the configuration file for the modem is installed to your PC, and the modem should connect to PC. When the connected modem cannot be used for PC, this test cannot be executed.

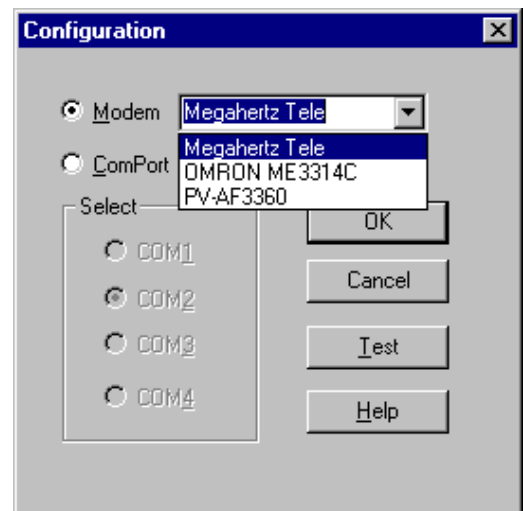
Further information about the installation of the modem can be found in the manufacture’s for the modem manual.

To test configuration modem on the PC side:

- 1) Click “Com” on the Menu Bar, and choose “Configuration”.



- 2) Click “Modem”, and choose the connected modem to PC on the pull down menu.
- 3) Click “Test” to execute this test.

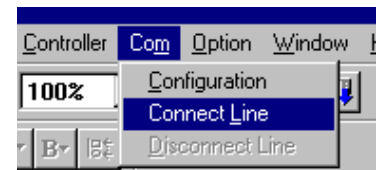


11.6 Connecting the Modem Telephone Line

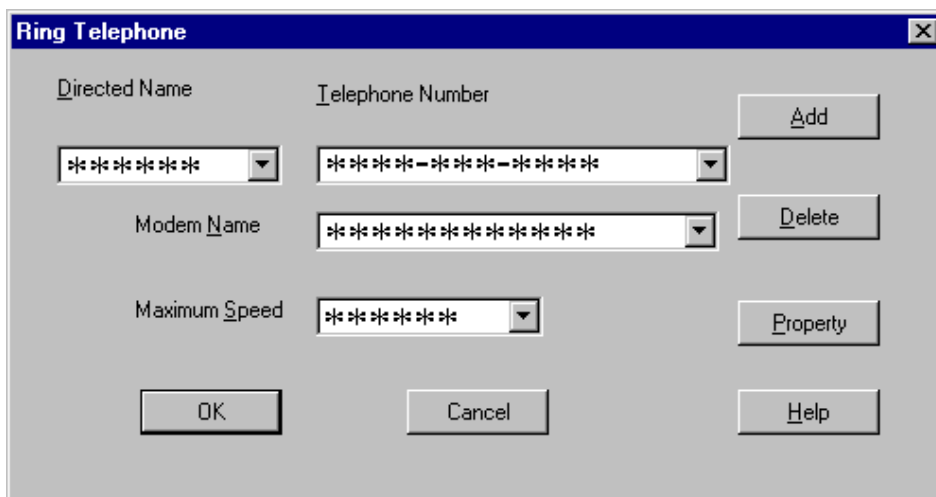
This section explains about the connection destination via the telephone line. When connecting to the α series by telephone line, connect on the Ring Telephone window. Moreover, when executing to connection to the telephone line, the α series is already started up. The α series automatically initializes its modem on power-up when modem initialization was set in the parameters. Further information about modem initialization on the α series side can be found in section 11.4, the α and α2 series programming manual.

To connect the modem by telephone line:

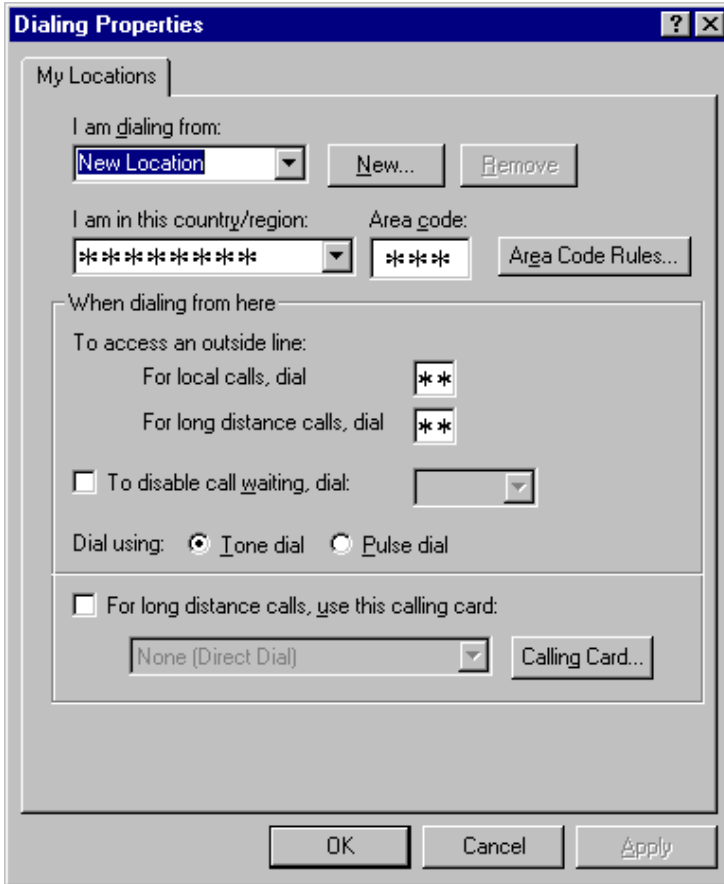
- 1) Click “Com” on the Menu Bar, and choose “Connect Line”.



- 2) Input the Directed Name, Telephone Number, Modem Name, and Maximum Speed on the Ring Telephone dialog box. Further information concerning ring telephone settings can be found in Help of AL-PCS/WIN-E.



- 3) Click “Property” to set or choose the Dialing Properties in windows, and set each item in the Dialing Properties dialog box.



- 4) Click “OK” to complete this setting.
- 5) Click “OK” to connect by telephone line on the Ring Telephone dialog box. When the process is complete, a message tells you that AL-PCS/WIN-E has connected via telephone line.

11.7 Data Transfer

After the modem line has been successfully established, data can be transferred between AL-PCS/WIN-E and the α series. Commands from the “Controller” pull down menu or Icons from the “Controller Toolbar” can be used to Upload/Download programs, verify or clear the controller’s memory, run “Diagnosis of Controller”, Check the Used Memory, Start/Stop, and Monitor Test Results.

When the α series is running, the α series program cannot be changed.

11.8 Disconnecting the Telephone Line

Return to the “Com” pull down menu and choose “Disconnect Line” to end modem communication.

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12. Setting for Computer Link (AL2-14MR-*, AL2-24MR-*)

The α2 Series controller can communicate with a personal computer and data link using dedicated protocol. The personal computer acts as the host station, and the α2 series Controller acts as a local station. Therefore, all communications start from the computer side, and communication cannot start from α2 series side.

The α2 Series acts according to the request by the computer (send data, write and change status of Run/Stop, etc.).

This chapter explains the method of setting the computer link on the α2 Series side with AL-PCS/WIN-E. Further information for the computer link command, data format, and communication frame, etc. can be found in α2 Series Communication Manual.

12.1 Setting for the Computer Link

The computer link setting is set from 2 dialog boxes. Follow the computer link setting.



Note:

To set the computer link effectively; Write setting data in the α2 series without fail, and turn the power supply of the α2 series when the setting is completed.

If the power supply is not turned OFF to ON, the α2 series will not effect this setting.

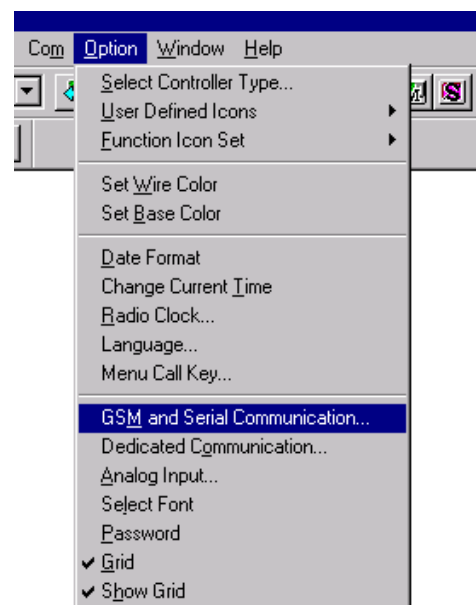


Note:

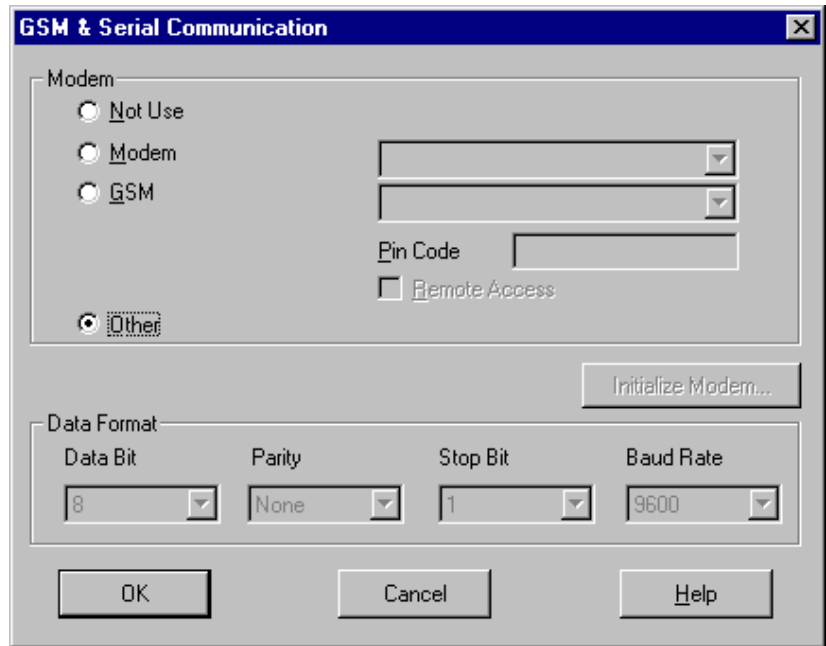
- When communicating the contact state and parameter data of a function block via computer link, operate 6) ~ 8). Moreover, function blocks must be on the FBD window.
- When communicating only hardware state (input terminal, output terminal, system bit and control bit, etc.), do not need to operate 6) ~ 8).

To set the computer link;

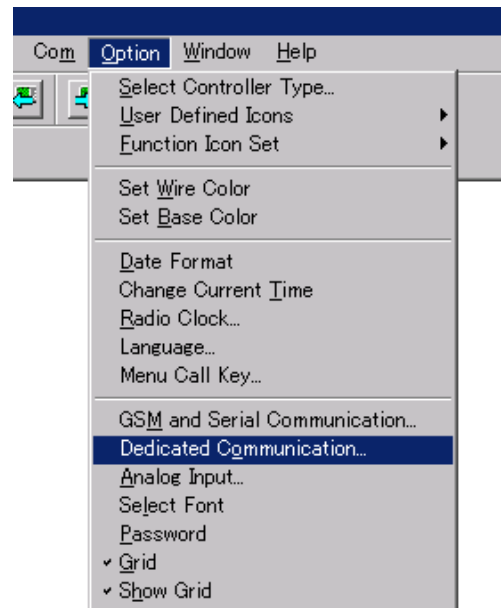
- 1) Click “Option” on the Menu Bar, and choose “GSM and Serial Communication...”.



- 2) Click "Others" radio button.
- 3) Click "OK" button to complete the GSM & Serial Communication Window.



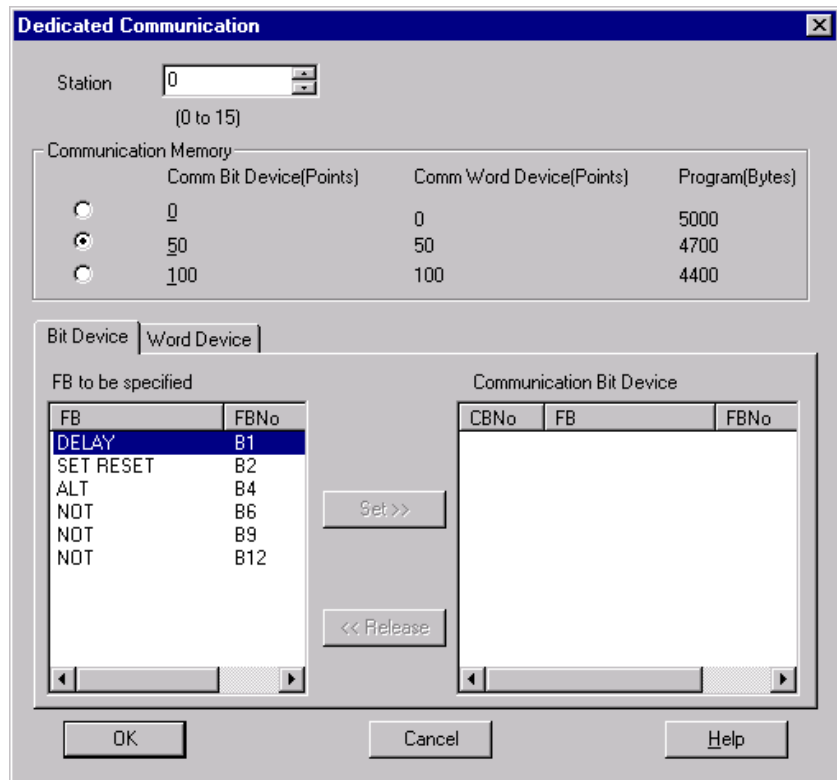
- 4) Click "Option" on the Menu Bar, and choose "Dedicated Communication..."



- 5) Set station number.
- 6) Choose number of the communication data for computer link from the Communication Memory.
- 7) Select the Communication Bit device in Bit Device Tab.

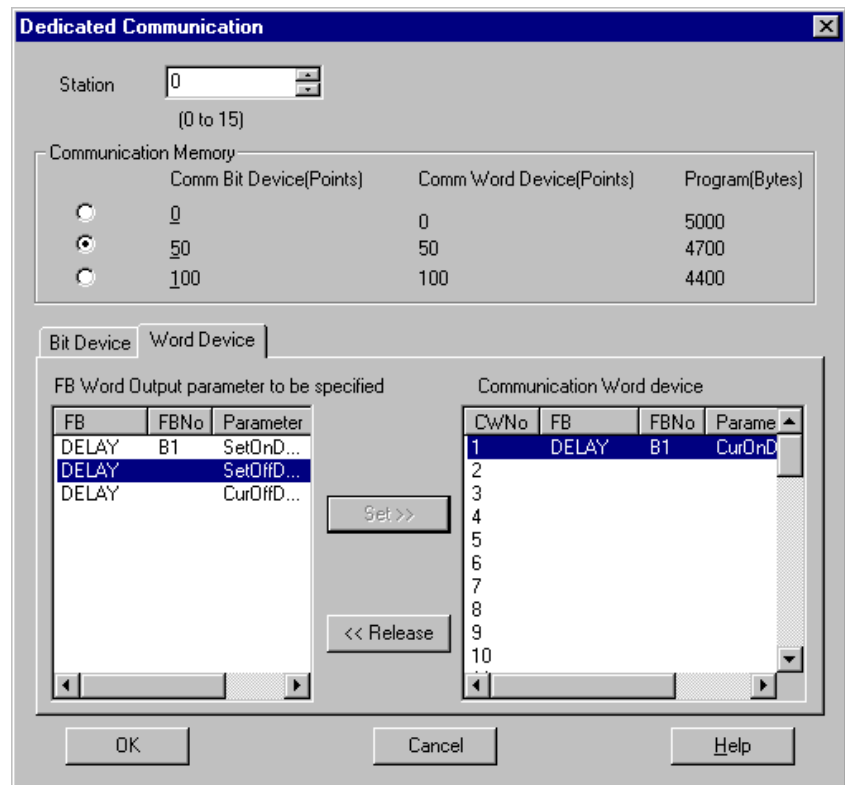
To set bit device:

- a) Choose the bit device in the “FB to be specified”.
- b) Choose the VB Number in the “Communication Bit device”.
- c) Click the Set button
- d) If completing the setting for bit device(s), continue a) ~ c).
- e) Click the Word Device Tab.



- 8) Select the Communication Word device in Word Device Tab.

- a) Choose the word device in the “FB Word Output parameter to be specified”.
- b) Choose the VB Number in the “Communication Bit device”.
- c) Click the Set button
- d) If completing the setting for word device(s), continue a) ~ c).



- 9) Click “OK” button to complete Dedicated Communication Window.
- 10) Write data to the α2 series, and the power supply of α2 series needs to be turned OFF to ON to support computer link.

MEMO

13. Information about AS-interface Programming

AS-interface modules are available for the following module and can be programmed with the AL-PCS/WIN-E. The following special symbols apply only to the AS-interface network. Further information about AS-interface programming can be found in α and $\alpha 2$ series Programming Manuals, and AL/AL2-ASI-BD Hardware Manual.

Table 13.1: Applicable α Series

| Series | Model Type |
|-------------------|------------------------|
| α series | AL-20M*-* |
| $\alpha 2$ series | AL2-14MR-*, AL2-24MR-* |

13.1 AS-interface Input Icon and System Bit Icon

There is an AS-interface icon available in the Input Signal Accessory Toolbar (“In” Menu).

Table 13.2: AS-interface Input Icon

| Icon on Accessory Toolbar | Icon on FBD | System Bit or Input Number | Description |
|---------------------------|-------------|----------------------------|--|
| | | M06 | “ON” when communication Error for AS-interface occurs |
| | | M07 | “ON” when communication Error by AS-interface power failure occurs |
| | | E01 ~ E04 | Input device from AS-interface master module |

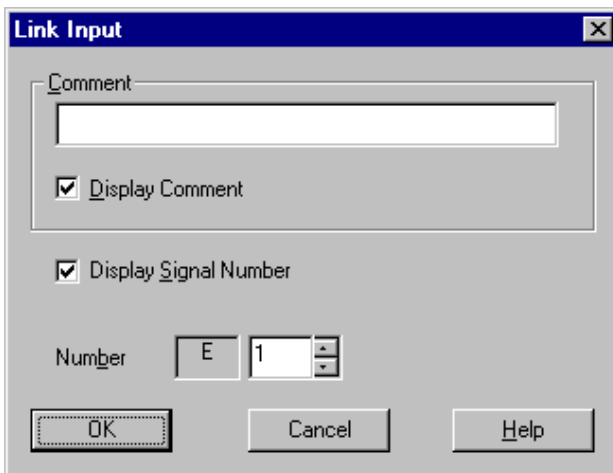


13.1.1 AS-interface Input Icon

There is an AS-interface icon available in the Input Signal Accessory Toolbar (“In” Menu). A total of 4 AS-interface “Link In” inputs (E01 ~ E04) can be added to the FBD base. The AS-interface inputs do not count towards the number of α series Inputs available.

To arrange input for AS-interface Network:

- 1) Click “Link in” icon in the Input Signal Accessory Toolbar (In menu), and click on the FBD window to arrange AS-interface input icon.
- 2) Set number of input for AS-interface network.



- 3) Click “OK”

13.1.2 ASI System Bits Icon

The M06 and M07 are system bits dedicated strictly to the AS-interface network. These system bit for the AS-interface Network line is connected to the AL/AL2-ASI-BD for both Power and communication purposes.

13.2 AS-interface Output Icons and Control Bit Icon

There is an AS-interface icon available in the Output Signal Accessory Toolbar (“Out” Menu).

Table 13.3: AS-interface Output Icon

| Icon on Accessory Toolbar | Icon on FBD | System Bit or Input Number | Description |
|---------------------------|-------------|----------------------------|---|
| | | N01 | OFF: Connect to AS-interface network ON: Unconnected to AS-interface network |
| | | A01 ~ A04 | output device from AS-interface master module. |

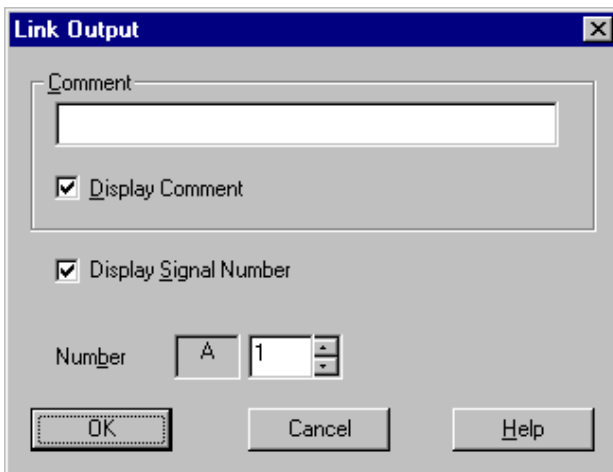


13.2.1 AS-interface Output Icon

There is an AS-interface icon available in the Output Signal Accessory Toolbar (“Out” Menu). A total of 4 AS-interface “Link Out” outputs (A01 ~ A04) can be added to the FBD base. The AS-interface Outputs do not count towards the number of α series Outputs available.

To arrange input for AS-interface Network:

- 1) Click “Link out” icon in the Input Signal Accessory Toolbar (“Out” menu), and click on the FBD window to arrange AS-interface output icon.
- 2) Set number of output for AS-interface network.



- 3) Click “OK”

13.2.2 Active/Passive State

The α series can be switched from an Active to a Passive state on the AS-interface network by changing the state on the N01 Control Icon. In the Active State, N01=0, communication is possible over the network. This icon can be found in the "Out" Menu next to the AS-interface "Link Out" icon.

When multiple α series are added to a network, each slave must be given an address. In order to address the slaves from the Master station, only one unaddressed slave can be active at any one time. Once a slave has an address, another passive slave can be turned to an active state to receive its address.

Please refer to the α and $\alpha 2$ series Programming Manuals, the AL/AL2-ASI-BD Hardware Manual and the manual for the AS-interface Network Master Controller.

14. When Russian Is Used

14.1 How to Input Russian

- 1) Use Russian Windows® OS.
- 2) When Windows® 2000, Windows® XP and Windows Vista® are used, Russian can be entered on VLS by using the Windows® multi-language function.
(For details, refer to Section 14.2)

14.2 The Setting of the Multi-Language Function of Windows®



The note when using Russian:

The following message is displayed, when displaying the Latin special character in the Russian environment, and when displaying Russian in the environments other than Russian.



[Yes]:The character which is not convertible is displayed by "?."

[No]: Closes the dialog box without changing.

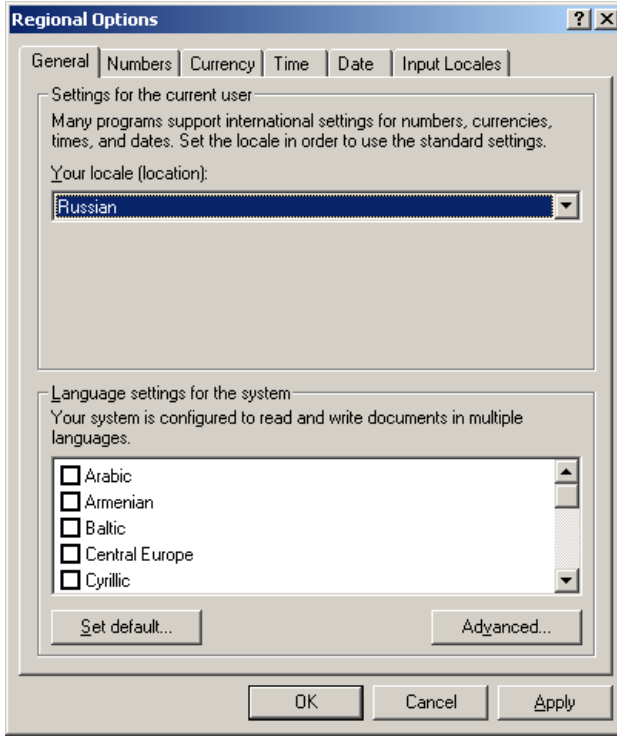
The portion where the message is displayed

- When Opening Setting Dialog of Display FB and SMR FB
- When Display FB is monitored in the FBD Window
- When Display FB is monitored in the Monitor Window

14.2.1 In the Case of Windows® 2000

Russian is set up from "Regional Options."

For details of the Windows® operation method, refer to Windows® Manual/Help.



14.2.2 In the Case of Windows® XP

Russian is set up from "Data, Time, Language, and Regional Options."

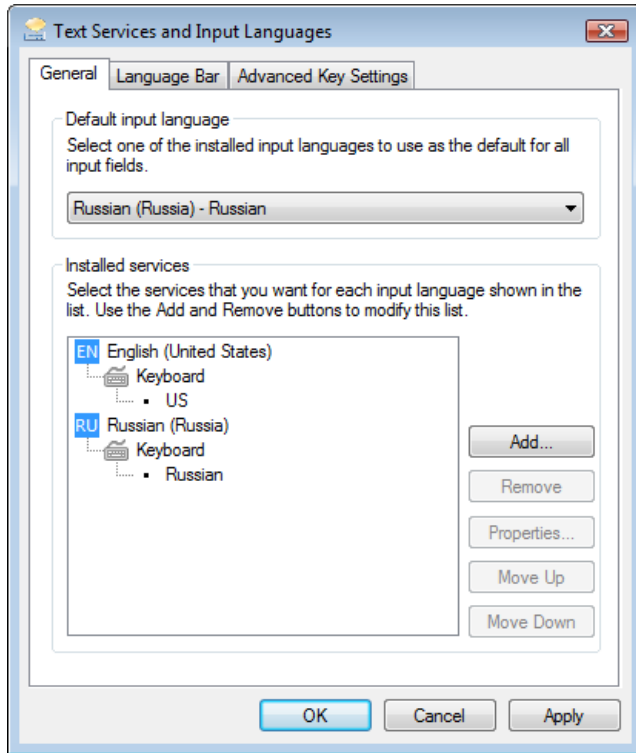
For details of the Windows® operation method, refer to Windows® Manual/Help.



14.2.3 In the Case of Windows Vista®

Russian is set up from "Clock, Language, and Region."

For details of the Windows® operation method, refer to Windows® Manual/Help.



MEMO



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