



Kuhnke Electronics
Beginner's Guide
KUBES and MOBES
User Software for Kuhnke Controllers

E 327 GB

10.06.2003 / 43293

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1 KUBES - a Programming Tool

KUBES is a programming and user program for programmable logic controllers. It runs under the Microsoft WINDOWS interface thus offering the user-friendliness of all WINDOWS programs. Using KUBES is therefore easy to learn.

KUBES contains all functions required for the

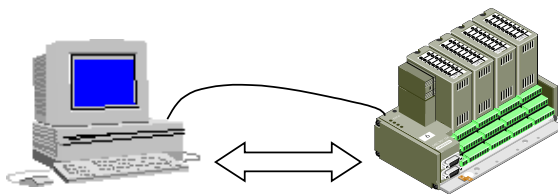
- creation,
- start-up,
- optimisation,
- documentation,

of programs for Kuhnke's programmable logic controllers.

1.1 KUBES for Single and Network Projects

Creating or editing programs for individual (not network-) controllers is done in so-called single projects.

To establish communication between KUBES and the controller you can connect one of the PC's V.24 interface (RS232), e.g. Com 1, with the socket of the controller's programming interface.



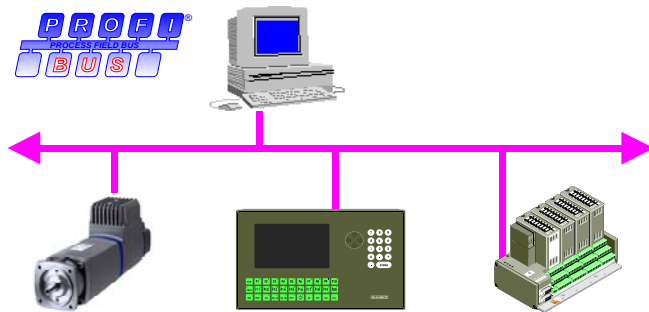
The MOBES add-on program allows you to remote control PLCs using a modem and the telephone line.

MOBES is described in chapter 5 MOBES.

Introduction

Developing programs for controllers networking via PROFIBUS is possible in so-called network projects. Creation and management of these projects are done under VEBES, the network configurator software. The actual programming is done under KUBES, however.

If your PC is equipped with a PROFIBUS interface (e.g. PC Control 645), then KUBES has direct access to all Kuhnke controllers communicating via a PROFIBUS network.



If you wish to program a PC Control 645, then you can also do so via the PC bus.

1.2 Module Orientated Programming

Programming under KUBES is module orientated, i.e. you divide your overall problem up into a number of coherent subtasks. You then work through each of these individual sections (modules). The individual modules form a hierarchical system in which higher-level modules call up lower-level ones. The transparency of complex programs is thus enhanced considerably.

There are also pre-programmed modules available for special tasks (KUBES modules).

1.3 Target Systems

Use KUBES to program any of the following Kuhnke PLC systems.

Overview

- Modu Control 657, 657P
- Compact Control 667, Pico Control 667
- Eco Control 667
- Compact Control 680C
- KDT 680CT
- Profi Control 680I, 680V, 645-500, 645-12M
- ProfiControl 690PLC+
- PC Control 644, 645-500, 645-12M
- CanControl 691, CanControl 690PLC+
- DriveControl 682 DP

You can also use KUBES for a variety of customised controllers.

1.4 Functions

KUBES provides various tools for working on projects:

Symbol table editor

Here you assign symbols to the operands used in your program and describe them by comments.

Module editor

The Module Editor is a KUBES utility program that allows you to create and edit program modules. The editor provides word processing functions as well as module checking and testing functions.

Test and debug functions

These are used for testing programs on-line in the connected controller.

The overall design of KUBES follows certain project planning steps which always have to be executed in a specific sequence when editing a project. Refer to chapter 4 First Steps to find a description of the appropriate procedure.

1.5 KUBES IEC 1131-3

European standard EN IEC 61131-2 defines what is required of PLC systems. Part 3 of the standard, i.e., IEC 61131-3 is the guideline for PLC programming which went under the name of IEC1131-3 before. The objective of standardisation is to ensure the conformity of PLC programs (at various levels).

KUBES version 5.51 and higher can integrate the add-on package called KUBES IEC1131.

KUBES IEC1131 consists of:

- POU editor with support for the following programming languages: instruction list, function diagram, ladder diagram and structured text,
- Configuration, resource and task manager,

- IEC task compiler,
- Test and commissioning tools such as Tul32 and On-line Editor,
- PC-based PLC simulator: WinPLC32.

Programming to IEC61131-3 provides the following added benefits:

- Use of various programming languages,
- Programs structured by POU's (program organisation units) of type program, function and function block,
- Definition and declaration of variables of various data types as in high-level languages,
- Extensive libraries full of standard functions (e.g. for real numbers) and standard function blocks.

For further information, please refer to the Quick Start Guide, E612GB, or the User's Guide, E614GB.

1.6 User Information

Apart from this Beginner's Guide, you can also refer to the Online Help System to learn how to use KUBES. This on-line help contains a complete instruction manual. Activate it either via the "Help" command button or via function key F1.

There is a help menu button in each of the menu bars of the Main Menu, the Symbol Table Editor and the Module Editor. Clicking on it displays a short description of the corresponding menu bar as well as a list of the individual menus marked as jumps (the underlined terms in green writing). Clicking on a jump mark displays help texts on the selected menu option. Most of the dialogue windows also have a help button. These directly activate help texts on the corresponding window.

The help screens have their own menu bar. Clicking on the "Contents" button will display a table of contents of the KUBES online help. Clicking on the "Search" button will display an interactive index of help topics which allows you to quickly go to any place within the online help system. Tick item "Always on top" of the "?" menu to permanently keep the help screen in the foreground so that you have it available while working with KUBES. From the "File" menu you can also print every help topic displayed.

On each KUBES help screen you will find a short description of the selected help topic, a list of the prerequisites necessary for activating certain menu options, and clear instructions for using the menus. Additional information is shown in italics, whereas important safety information is set in obvious boxes.

During installation of KUBES, the file KUBES.DOC is copied to the program root. This file contains information about changes and modifications of the new program version.

2 Reliability, Safety

2.1 Application

Kuhnke products are designed as resources for use in industrial environments.

All other applications need to be discussed with the factory first. The manufacturer shall neither be liable for any other than the intended use of our products nor for any ensuing damages. The risk shall be borne by the operator alone. The use as intended includes that you read and apply all information and instructions contained in this manual.

2.2 Target Group

This instruction manual contains all information necessary for the use of the described product (control device, control terminal, software, etc.) according to instructions. It is written for the personnel of the construction, project planning, service and commissioning departments. For proper understanding and error-free application of technical descriptions, instructions for use and particularly of notes of danger and warning, extensive knowledge of automation technology is compulsory.

2.3 Reliability

Reliability of Kuhnke controllers is brought to the highest possible standards by extensive and cost-effective means in their design and manufacture.

These include:

- selecting high-quality components,
- quality agreements with our suppliers,
- measures for the prevention of static charge during the handling of MOS circuits,
- worst case planning and design of all circuits,
- inspections at various stages of fabrication,

- computer-aided tests of all assembly groups and their interaction in the circuit,
- statistical assessment of the quality of fabrication and of all returned goods for the immediate taking of appropriate corrective actions.

2.4 Notes

Despite the measures described in chapter 2.3 , the occurrence of faults or errors in electronic control units - even if most highly improbable - must be taken into consideration.

Please pay particular attention to the additional notes which we have marked by symbols in this instruction manual. While some of these notes make you aware of possible dangers, others are intended as a means of orientation. They are described further down below in descending order of importance.

2.4.1 Danger



This symbol warns you of dangers which may cause death or grievous bodily harm if operators fail to implement the precautions described.

2.4.2 Attention



This symbol draws your attention to information you must take a look at to avoid malfunctions, possible material damage or even dangerous states.

2.4.3 Note



This symbol draws your attention to additional information concerning the use of the described product. It may also indicate a cross reference to information to be found elsewhere (e. g. in other manuals).

2.4.4 Instruction



Wherever you see these symbols in the left margin, you will find a list of steps instructing you to take the appropriate computer or hardware actions.



They are intended as a means of orientation at places where steps and background information alternate (e.g. in beginner's manuals).

2.4.5 Under Construction



This symbol tells you that the function described was not or not fully available at the time this document went to press.

2.5 Safety

Our products normally become part of larger systems or installations. The information below is intended to help you integrate the product into its environment without dangers to humans or material/equipment.



To achieve a high degree of conceptual safety in planning and installing an electronic controller it is essential to exactly follow the instructions given in the manual because wrong handling could lead to rendering measures against dangers ineffective or to creating additional dangers.

2.5.1 Project planning and Installation

- 24 V DC power supply: Generate as electrically safely separated low voltage. Suitable devices are, for example split transformers constructed in compliance with European Standard EN 60742 (corresponds to VDE 0551).
- In case of power breakdowns or power fades: the program structure is to ensure that a defined state at restart excludes all dangerous states.
- Emergency switch-off installations must comply with EN 60204/IEC 204 (VDE 0113). They must be effective at any time.
- Safety and precautions regulations for qualified applications have to be complied with.
- Please pay particular attention to the notes of warning which, at relevant places, will make you aware of possible sources of dangerous mistakes or faults.
- Relevant standards and VDE regulations are to be complied with in every case.
- Control elements are to be installed in such a way as to exclude unintended operation.
- Control cables are to be layed in such a way as to exclude interference (inductive or capacitive) which could influence controller operation or its functionality.

2.5.2 Maintenance and Servicing

- Precautions regulation VBG 4.0 must be observed, and section 8 (Admissible deviations when working on parts) in particular, when measuring or checking a controller in a power-up condition.
- Repairs must be carried out by specially trained Kuhnke staff only (usually in the main factory in Malente). Warranty expires in every other case.
- Only use parts approved of by Kuhnke. Only genuine Kuhnke modules must be used in modular controllers.
- Modular systems: Always plug or unplug modules in a power-down state. You might otherwise damage the modules or (possibly not immediately recognisably!) inhibit their functionality.
- Always dispose of any batteries and accumulators as hazardous waste.

2.6 Electromagnetic Compatibility

2.6.1 Definition

Electromagnetic compatibility is the ability of a device to function satisfactorily in its electromagnetic environment without itself causing any electromagnetic interference that would be intolerable to other devices in this environment.

Of all known phenomena of electromagnetic noise, only a certain range occurs at the location of a given device. It is defined in the relevant product standards.

The international standard regulating construction and degree of noise resistance of programmable logic controllers is

IEC 61131-2 which, in Europe, has been the basis for European Standard
EN 61131-2.



Refer to IEC 61131-4, User's Guideline, for general installation instructions to be complied with to ensure that hardware interface factors and the ensuing noise voltages are limited to tolerable levels.

2.6.2 Interference Emission

Interfering emission of electromagnetic fields, HF
in acc. with EN 55011, limiting value class A, Group 1



If the controller is designed for use in residential areas, then high-frequency emissions must comply with limiting value class B as described in EN 55011.

Fitting the controller into an earthed metal cabinet and equipping the supply cables with filters may be appropriate means of maintaining the relevant limiting values.

2.6.3 General Notes on Installation

As component parts of machines, facilities and systems, electronic control systems must comply with valid rules and regulations, depending on their field of application.

General requirements concerning the electrical equipment of machines and aiming at the safety of these machines are contained in Part 1 of European Standard EN 60204 (corresponds to VDE 0113).



For safe installation of our control system please observe the following notes (→ 2.6.4 and following).

2.6.4 Protection against External Electrical Influences

Connect the control system to the protective earth conductor to eliminate electromagnetic interference. Ensure practical wiring and laying of cables.

2.6.5 Cable Routing and Wiring

Lay power supply circuits separately, never together with control current loops:

- DC voltage 60 V... 400 V
- AC voltages 25 V ... 400 V

Joint laying of control current loops is allowed for:

- shielded data signals
- shielded analogue signals
- unshielded digital I/O lines
- unshielded DC voltages < 60 V
- unshielded AC voltages < 25 V

2.6.6 Location of Installation

Make sure that there are no impediments due to temperatures, dirt, impact, vibration and electromagnetic interference.

2.6.6.1 Temperature

Consider heat sources such as general heating of rooms, sunlight, heat accumulation in assembly rooms or control cabinets.

2.6.6.2 Dirt

Use suitable casings to avoid possible negative influences due to humidity, corrosive gas, liquid or conducting dust.

2.6.6.3 Impact and Vibration

Consider possible influences caused by motors, compressors, transfer lines, presses, ramming machines and vehicles.

2.6.6.4 Electromagnetic Interference

Consider electromagnetic interference from various sources near the location of installation: motors, switching devices, switching thyristors, radio-controlled devices, welding equipment, arcing, switched-mode power supplies, converters / inverters.

2.6.7 Particular Sources of Interference

2.6.7.1 Inductive Actuators

Switching off inductances (such as from relays, contactors, solenoids or switching magnets) produces overvoltages. It is necessary to reduce these extra voltages to a minimum.

Reducing elements may be diodes, Z-diodes, varistors or RC elements. To find the best adapted elements, we recommend that you contact the manufacturer or supplier of the corresponding actuators for the relevant information.

3 Installing KUBES

3.1 System Requirements

KUBES is a very complex program offering a lot of functions. To be able to install and run it properly, your PC and system software have to meet certain minimum requirements.



For these requirements, please read chapter 6.1 Technical Data.

3.2 Installation

Prerequisite

- If you have not yet installed MS®Windows, do so first. The WINDOWS user guide contains all necessary instructions.

To install KUBES

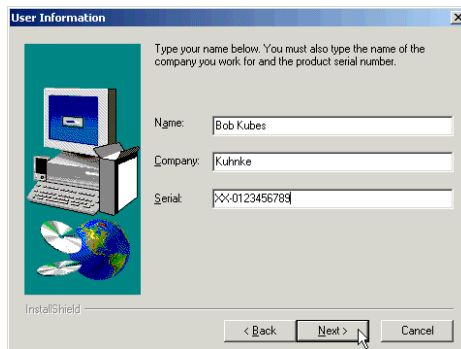
We assume that you have started WINDOWS and closed down all applications you don't need.



- Insert KUBES disk #1 or the CD into the correct disk drive.
Note: We assume that you are using drive A: for a diskette installation; replace the drive specifier by the correct one if you are installing from another drive.
- Open the **Start** menu.
- Select **Run** from it.
- Enter the following command into the text box:
A:\setup
- Then click on OK or press Enter to confirm and execute the command.

Installing KUBES

This will run the KUBES installer.



The User Information dialogue will request you to specify your name, the name of the organisation owning the licence, and the serial number allocated to your copy of the product.

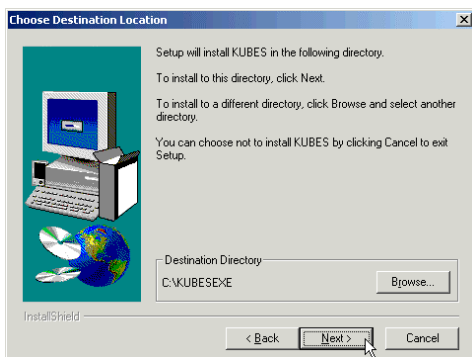


Locate the serial number of your software licence either on the delivery document or on the order confirmation slip.



In case your serial number is not at hand at the time of installation, you can enter it later by running KUBES and choosing KUBES Serial Numbers from the Options menu.

Another dialogue will pop up suggesting a KUBES root directory. (C:\KUBESEXE)

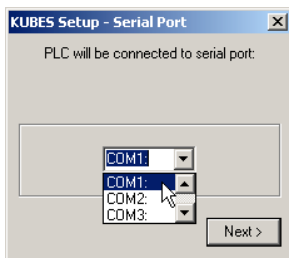


- Here too, we recommend that you accept the default. Again click on Next when you are ready.



The installer will start to copy all KUBES files to the program root.

After a little while, the "KUBES-Setup – Serial Port" dialogue will be displayed. You will be prompted for the port to be used for controller installation.



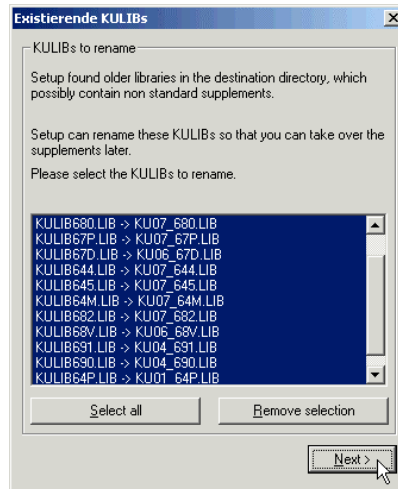
Installing KUBES



- We recommend that you accept the default setting. Click on Next when you are ready.

Installation will be continued.

If the installer finds that an older version of KUBES resides in the root directory, KUBES will ask you whether you wish to overwrite or rename the old KUBES module libraries:



Either

If you have stored modules in the existing library that are not part of the standard software package, then save these by renaming them (also applies if you are unsure):



- Click on "Yes".

BIBS, the library manager, provides you with the opportunity to later copy the non-standard modules from the saved library to the current one.

Or

If you are sure that no modules will be lost, e.g. because you never use the relevant controller or because you don't have a library of special KUBES modules, you can overwrite the old library.



- Click on "No".

At the end of the installation procedure, you will be told that KUBES has been installed successfully.



- Click on "OK".

This will exit the installer. A program folder will have been added to your Start menu called "ProfiSoft" and containing the KUBES program icon.

Installing KUBES

4 First Steps

This chapter is meant to be a guide for KUBES beginners. Its objective is to give instructions for learning. You can skip it if you are already familiar with KUBES.

The next section mainly consists of some exercises concerning KUBES. The functions are not described in detail, however. As the title of this chapter suggests, the exercises are your first steps towards working with KUBES.

4.1 Keyboard or Mouse?

As is the case in all WINDOWS applications, all KUBES functions can be controlled with the mouse. However, if you prefer to use the keyboard, KUBES also allows you to control its functions by that means.

The table below summarises the major keyboard functions you need to operate KUBES.

Shortcut	Function
tab or shift + tab	<u>Tabulator key</u> , in text: moves to the next tab stop position; in dialogues: moves to the next box or field; opposite direction: Shift + Tab
Esc	<u>Cancel key</u> , stops functions; closes dialogue boxes while discarding the entries
↵	<u>Enter</u> , confirms a selection; executes a command; opens a highlighted menu
↑, ←, ↓, →	<u>Arrow keys</u> , move the cursor through text, list boxes and active menus
Ctrl	<u>Control key</u> , see function keys
Alt	<u>Alternate key</u> , activates the menu bar of the active window
<u> </u>	<u>Underlined letter</u> , opens the corresponding menu (hotkey = +Alt); executes the corresponding command
F1	Runs the context-sensitive online help system from

Shortcut	Function
	menu bars or dialogue boxes
Alt + F4	Exits KUBES
Ctrl + F1	Moves the focus to the Main Menu bar
Ctrl + F2	Moves the focus to the Module Editor (if a project is open)
Ctrl + F3	Moves the focus to the Symbol Table Editor (if a project is open)
Ctrl + F4	Opens window "Display single address"
Ctrl + F5	Opens window "Display Address Range"
Ctrl + F6	Opens window "Logic diagram"
Ctrl + F7	Opens window "Analogue diagram"

4.2 Tutorial: Working on a Project

The tutorial means to guide you to writing a simple KUBES program. This procedure is called project planning.

The task of the future program is to switch on an output "MOTOR" via an input "ON" and to switch it off again via another input called "OFF" (latching). The program code will be entered into a program module called "M_CTRL".

The tutorial has twelve steps. Their order reflects the order to be maintained in the majority of project planning cases.

- 1 Prepare devices
- 2 Start KUBES
- 3 Open project
- 4 Configure controller
(*Profi Control 680I, Profi Control 680V, Compact Control 680C, KDT 680CT only*)
- 5 Fill symbol table
- 6 Write program
- 7 Transmit program to controller
- 8 Start, test and adapt program

- 9 Save project (copy to disk)
- 10 Document (print) program
- 11 Create EPROM file(s)
- 12 Exit KUBES

Please work down the steps in the above order as this is the quickest way of successfully obtaining a working program.

Looking at the steps you will realise what the general objectives of this tutorial are:

- Take your first steps with KUBES.
- Understand the basic project planning procedure (project planning steps).
- Grasp the basics of module programming.
- Realise the benefits of symbol-based programming.
- Use simple test functions.
- Get first results quickly and successfully.

4.2.1 Step 1: Prepare devices

What you need:

- A PC for online operation, hosting an installation of KUBES
- A controller with at least 2 inputs and one output (Profi Control 680I: input module in slot 0, output module in slot 1, RAM module for the program)
- Input simulator plug
- A 24 VDC power supply unit
- A 2-core power supply lead
- A programming cable PC ↔ controller (Part no. 657.151.03).

First Steps



- Attach: the programming cable to the programming interface (V.24) and the PC's KUBES V.24 port (set up during KUBES installation, usually COM 1); the power supply lead to the controller's supply connectors (24 VDC); the power supply unit to the 24 VDC connectors of the simulator plugs and inputs I00.00 and I00.01.
- Switch on the PC and power supply unit.

4.2.2 Step 2: Start KUBES

We're assuming that KUBES is installed on your PC and that you have started Windows. If not, please proceed as described in chapter "3. Installing KUBES" first. Then return to this point.



- Open the Programs option of the Start Menu, choose folder ProfiSoft and click on the KUBES icon.

The KUBES application window will appear, displaying its title bar (KUBES: main status bar), the main menu bar and the tool bar:



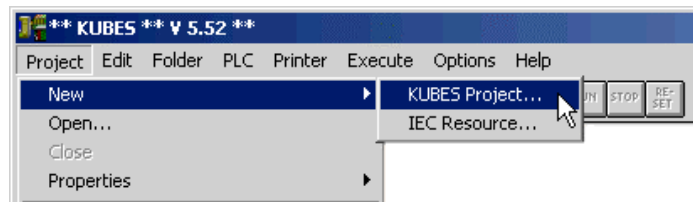
4.2.3 Step 3: Open project

At this step, you will create a new project. 'Project' is the collective term for all data belonging to a control program. KUBES collects this data in a project directory on disk. The name of the directory is the same you specify as the project name.

We want to describe this third step in every detail. This will give you the opportunity to see what your system does.



- Select the "Project" menu by clicking on the word "Project" in the menu bar.



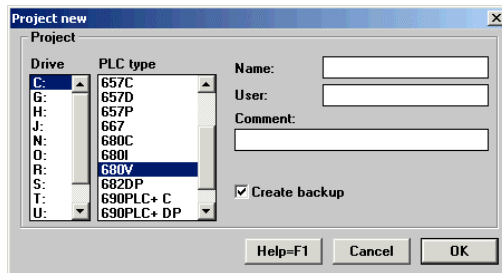
The "Project" menu will drop down:



- Select New from it.
- Select "KUBES project..." from the sub-menu.

First Steps

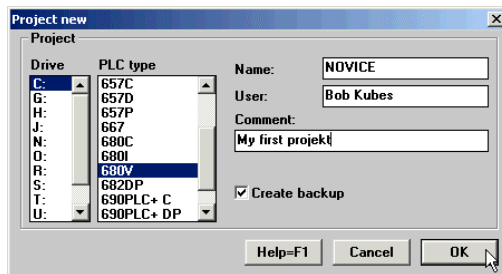
The New Project dialogue will be displayed.



The I cursor should be in the text box next to "Name" in the top right corner.



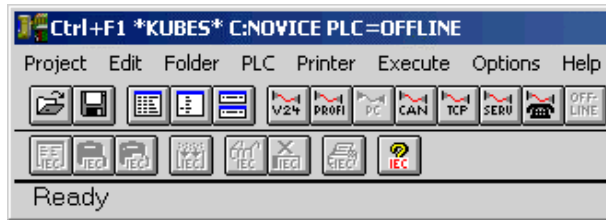
- Now enter the project name. Our project will be called "NOVICE".
- Click on the text box labelled "User" and enter your name.
- Go to the text box underneath "Comment".
- Enter an explanatory text:
e.g. My first project ↵ (Press Enter).
- In the list box labelled "Controller", click on the type of controller connected to your system.



You have now made all entries required for creating and opening this project.



- Confirm your entries by clicking on "OK".



This will close the dialogue box. KUBES will update the Main Status bar (title bar):

The Main Status bar tells you that the project is now open and ready for editing.

4.2.4 Step 4: Configure controller

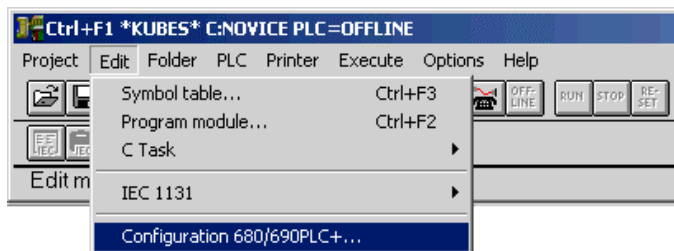
You only need to take this step if you are using Profi Control 680I or Compact Control 680C or Profi Control 680V or KDT 680CT equipped with one or several modules.

Otherwise you can go straight on to section 4.2.5 Step 5: Fill symbol table.

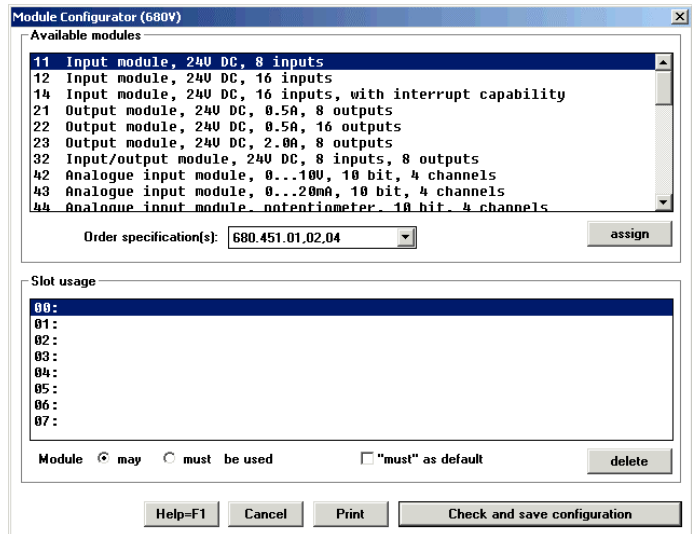
You will have to decide which modules you want to apply and into which slots you want to plug them.



- Choose "Configuration 680/690PLC+..." from the "Edit" menu.



The following dialogue will pop up:



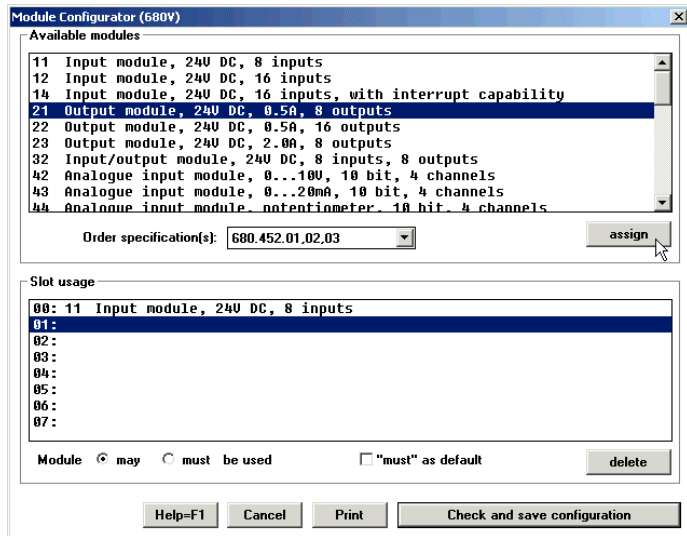
The upper box lists the modules, the lower list box contains the slots of the controller. A module as well as a slot are highlighted by default.

According to this default selection, an input module will be assigned to slot 0.

Below the slot assignment box you determine whether or not a module must necessarily be plugged in before the controller starts.



- Select the appropriate module and slot, then click on the button labelled "assign".

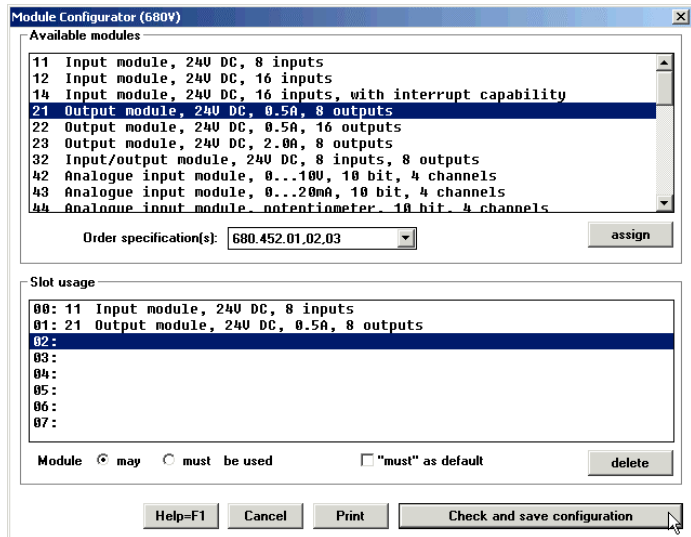


Now you want to assign an output module to slot 1.

As you can see on the screen, slot 1 is selected already. Proceed in the same way as you did for the input module (click on the "assign" button...).



- Close the dialogue box by clicking on the "Check and save configuration" button.



You have learnt that:

- in 680 range controllers, all required modules are assigned to certain slots via the software (and that these modules must then of course be plugged in accordingly).

4.2.5 Step 5: Fill symbol table

Add names and comments to the inputs and outputs (operands) you want to use on your controller.



- Select "Symbol Table" from the "Edit" menu.

The window of the Symbol Table Editor will open underneath the Main menu:

Ctrl+F3 Symbol table editor			
Edit Entry Block Selection Help=F1 Return			
Address	Symbol	Comment	Supplement
I00.00	<	>>	>>
I00.01	<	>>	>>
I00.02	<	>>	>>
I00.03	<	>>	>>
I00.04	<	>>	>>
I00.05	<	>>	>>
I00.06	<	>>	>>
I00.07	<	>>	>>
I00.08	<	>>	>>
I00.09	<	>>	>>
I00.10	<	>>	>>
I00.11	<	>>	>>
I00.12	<	>>	>>
I00.13	<	>>	>>
I00.14	<	>>	>>
I00.15	<	>>	>>

The first input group is shown with the cursor in the "Symbol" column.



- Type the entries for the first inputs as shown below. Move to the next column either by clicking on it with the mouse or by pressing the TAB key after every entry and at the end of the line:

on	Switch on motor	X:1:1
off	Switch off motor	X:1:2

This results in the following display:

Ctrl+F3 Symbol table editor			
Edit Entry Block Selection Help=F1 Return			
Address	Symbol	Comment	Supplement
I00.00	< ON	>> Switch on motor	>> X:1:1
I00.01	< OFF	>> Switch off motor	>> X:1:2
I00.02	<	>>	>>
I00.03	<	>>	>>
I00.04	<	>>	>>
I00.05	<	>>	>>
I00.06	<	>>	>>
I00.07	<	>>	>>
I00.08	<	>>	>>
I00.09	<	>>	>>
I00.10	<	>>	>>
I00.11	<	>>	>>
I00.12	<	>>	>>
I00.13	<	>>	>>
I00.14	<	>>	>>
I00.15	<	>>	>>

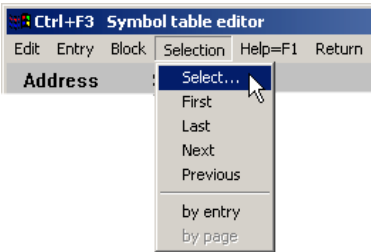
As you will undoubtedly have noticed, all entries in the "Symbol" column are put in capitals as soon as you move the cursor to the next line.

First Steps

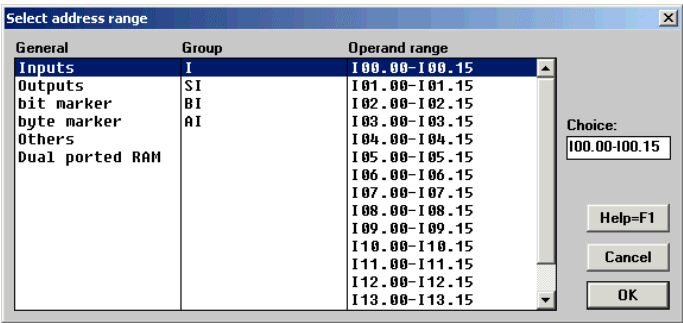
For the purposes of our little example, we still need to define the output. You will therefore use the "Selection" menu to display the first output group.



- Pick item "Select" from the "Selection" menu (on the menu bar of the Symbol Table Editor).

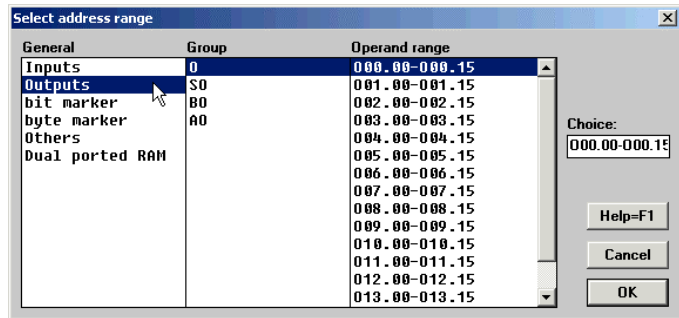


The "Select address range" dialogue will appear with the first input group being selected:



- Go to the "General" column and click on "Outputs".

The contents of the other list boxes will change accordingly, the first group of outputs is selected:



- Confirm this selection by clicking on "OK".

The dialogue will disappear and the Editor displays the selected output range, i.e. 000.00...000.15.



- Type the entries for the first output in the same way as you did for the inputs:

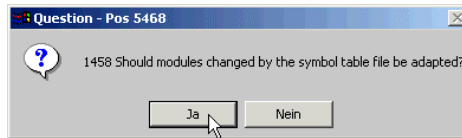
motor motor control output X:2:1

The entry will be displayed on the screen accordingly. This also completes your symbol table.



- Quit the Symbol Table Editor by clicking on "Return" in the menu bar.

A system query will pop up:



This is of no importance at this point as you have not programmed any modules as yet.



- Answer the system query with "No" by clicking on the corresponding command button.

You have learnt that:

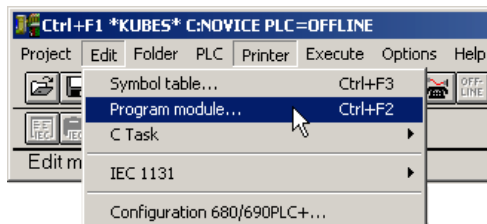
- in the symbol table, operands are (or can be) assigned a symbol, a comment and a supplementary comment and how you enter this information for different address ranges.

4.2.6 Step 6: Write program

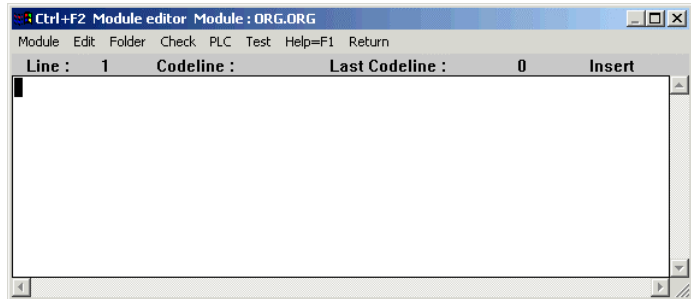
Write the user program that is to actuate an output by means of the inputs defined in the symbol table.



- Select "Program Module" from the "Edit" menu.



The Module Editor will open underneath the Main Menu and display the last module edited for the current project. In the case of a new project, the organisation module (called ORG.ORG) will be created automatically and loaded into the Module Editor.



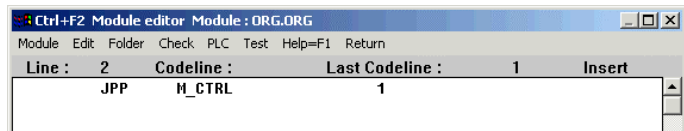
Now let the programming begin. The cursor is in line 1. Actually, you could enter all of the program code required for actuating the output into the organisation module. It would work, too!

However, the actual job of the organisation module is to work as a kind of springboard for accessing other modules such as program modules, function modules etc. Let's take this into consideration.



- Enter the following line to load the module:
JPP SPACE M_CTRL ↵

The Module Editor displays this as follows:



The command you just entered means: Jump to the program module called M_CTRL.

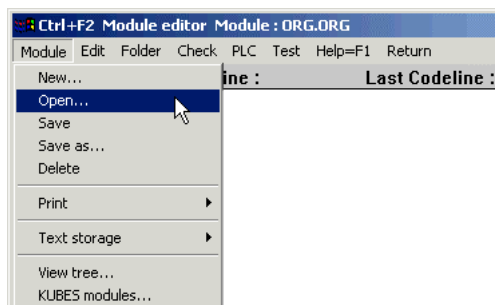
As this module did not exist before, it will be created as soon as you have entered the command. The "1" behind it represents the serial number of this module, i.e. M_CTRL is the first program module in this project.

In the controller, this command will later run the "M_CTRL" module in every program cycle and execute the program contained in it.

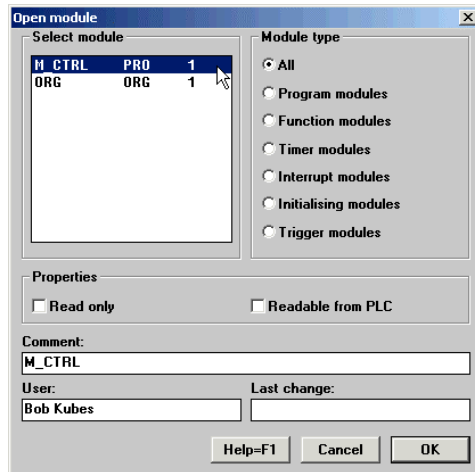
The next thing to do is to load this module (M_CTRL) into the editor.



- For this you again use the "Module" menu, picking the "Open" item from it.

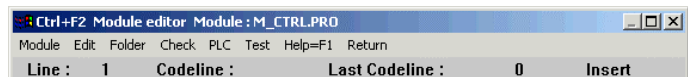


The "Get Module" dialogue will be displayed:



- Select module M_CTRL and click on "OK" to confirm.

This will close the dialogue box and refresh the status bar of the Module Editor:



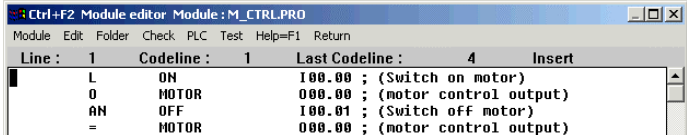
Now you can finally write the actual program. Do you remember what it was to do?

You wanted input "ON" to switch on output "MOTOR", whereas input "OFF" was to switch it off again.



- Write:
 L SPACE ON ↵
 O SPACE MOTOR ↵
 AN SPACE OFF ↵
 = SPACE MOTOR ↵

The Module Editor displays this as follows:



The screenshot shows the 'Module editor' window for 'Module : M_CTRLPRO'. The menu bar includes 'Module', 'Edit', 'Folder', 'Check', 'PLC', 'Test', 'Help=F1', and 'Return'. The table below represents the content of the editor:

Line :	1	Codeline :	1	Last Codeline :	4	Insert
	L	ON		I00.00 ; (Switch on motor)		
	O	MOTOR		000.00 ; (motor control output)		
	AN	OFF		I00.01 ; (Switch off motor)		
	=	MOTOR		000.00 ; (motor control output)		

You find all entries sorted into columns supplemented by the addresses and comments from the symbol table. The supplementary comments are not shown, though. These only appear in the printout of the symbol table, e.g. on wiring diagrams. In the symbol table, you added comments to the operands.

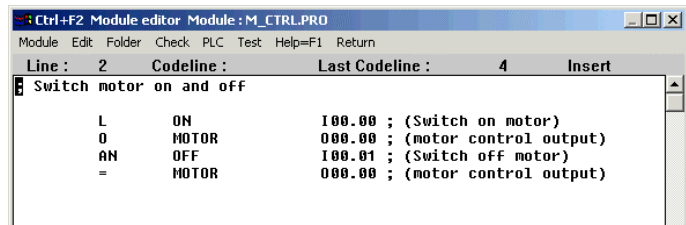
The Module Editor allows you to add comments, too. But here you put them between the lines, as headlines as it were. In order to distinguish them from the codelines – they are the ones with the commands – comment lines must always start with a semicolon in column 1, i.e. as the first character in the line.

At the moment, the cursor is in line 5. Now you want to type a comment into line 1.



- Click on the beginning of line 1.
- Press ↵ to make an empty line.
- Move the cursor back to the first line.
- Enter your comment:
;Switch motor on and off ↵

The Module Editor should now look like this:



Your little program is now complete. In order to prevent it from getting lost you must still save it, though.



- Save the module by picking "Save" from the "Module" menu.

You have learnt that:

- you open the Module Editor via the "Edit" menu in the Main Menu bar,
- you use the "Module" menu to load a module into the editor,
- an organisation modules exists for every new project you create,
- you can create a module by entering a module call – if it does not exist already,
- a codeline consists of a command and (almost always) an operand,
- you can enter operands by just typing in the symbol (although you may also type the address, e.g. I00.00),
- a comment line starts with a semicolon,
- you must save a module if you want to preserve it.

This was the offline part of the exercise. Your program is complete but not yet in the controller. There it must be, however, if you want to execute it and test it with KUBES in online mode.

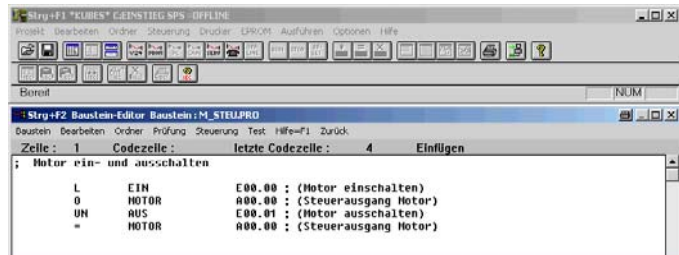
First Steps

For the next steps you must connect the controller to the PC and switch it on.

4.2.7 Step 7: Transmit program to controller

At this point at the latest, the controller must be connected to the PC and switched on as described at Step 1.

At the moment, the Module Editor still has the focus. You can tell by the status bar:



The online mode is enabled via the "PLC" menu on the main menu bar. To select it, you must first move the focus to the main status bar:

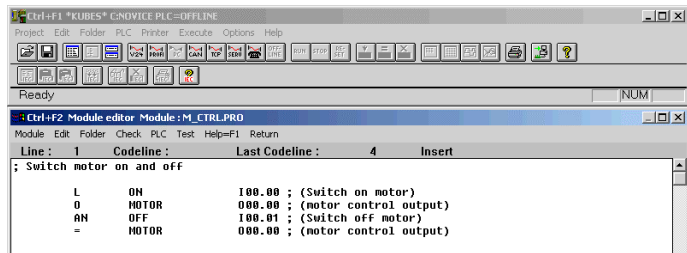


- Click on the Main Status bar (title bar of the KUBES application window).

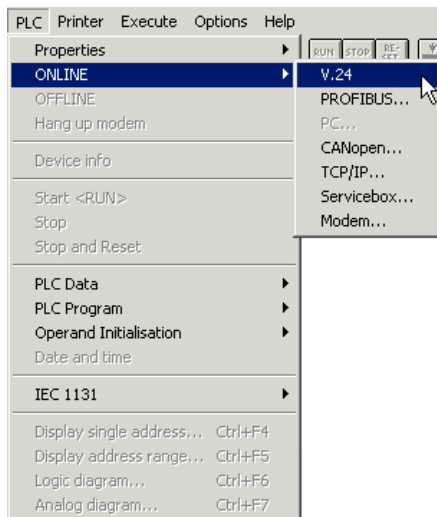


If you prefer to control the program via the keyboard, you can also use keyboard shortcuts to enable the main status bar (Ctrl + F1), the Module Editor (CTRL + F2), the Symbol Table Editor (CTRL + F3) - these are also shown on the title bars -, and the online help system (F1).

You now activated the main menu bar:



- Choose "ONLINE" from the "PLC" menu; a sub-menu will appear from which you choose "V24" as this is the driver you will need for your program.



There are other ways of communicating with controllers online:

- PC
for direct connections to PC Control 645 via the PC bus

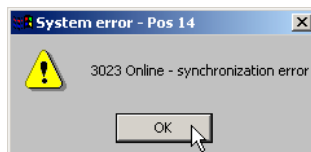
First Steps

- PROFIBUS
for PROFIBUS connections to PC slot cards such as PC Control 645-500
- Modem
for connections via telephone/modem using the MOBES software (see chapter 5 MOBES)
- CanOpen
for CanOpen connections to PC slot cards such as Can Control 645-500
- Service Box
for going through the Service Box to connect with PROFIBUS stations.

The main status bar reflects the change:



In case the attempted connection fails, KUBES will display the following error prompt after a few seconds:



There are various possible causes for this error, e.g.:

- the cable is connected to the wrong PC port,
- the controller is switched off (all LEDs are off),
- wrong or broken programming cable.

Corrective action:

- remove cause,
- select "ONLINE / V24" again.



Utility program LOOK.EXE:

LOOK.EXE is stored in the KUBES root. Its purpose is to check the V.24 connection between PC and controller.

To run LOOK.EXE:

go into MS-DOS mode (DOS prompt window)

write: CD \KUBESEXE<Enter> ,

write: LOOK n<Enter>

(n=1: Com1, n = 2: Com2)

LOOK checks whether a controller is connected and ready and tells you the type of controller.

We assume that the connection has been established successfully. Some information has been added to the main status bar:

Code	Explanation
N	program not adjusted
PLC=ONLINE	connection ok
RUN	controller is running
RESET	program execution stopped and reset made
RAM	a RAM memory module is plugged in
Free:xx	xx kbyte free in user memory (KUAX 667: indicated in byte)

In this case, the controller started immediately, hence the word "RUN" in the status bar. However, you will have to stop program execution if you want to transmit the program.

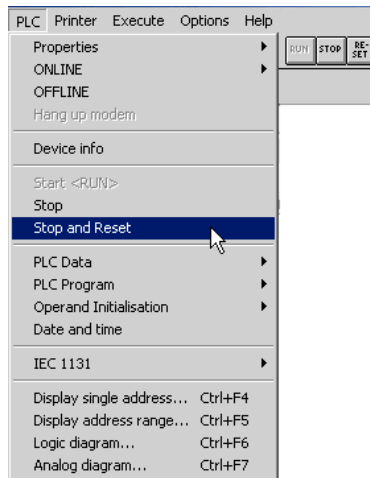
First Steps



- Again open the "PLC" menu:

By now, a lot more commands are available as KUBES is now online.

Item "Transmit Program" is still dimmed, though. The reason is that the controller is running ("RUN" is shown).



- Now choose "Stop and Reset".

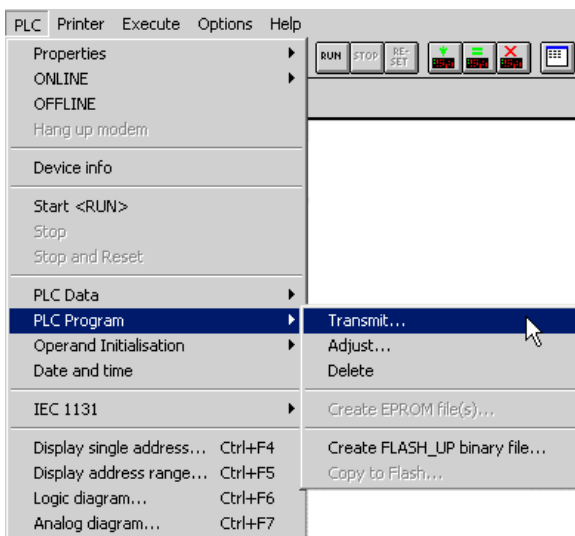


Do NOT select "Stop" as this command just stops the controller without resetting outputs and markers. If there is a machine connected to the controller, this might cause serious damage to humans and machines as active outputs can no longer be turned off by the program.

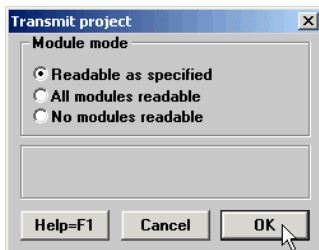
The main status bar again reflects the change:



- Transmit the program to the controller.
- Choose "PLC Program" from the "PLC" menu; a sub-menu will appear from which you choose "Transmit".



KUBES displays an execution message:



Afterwards, the main status bar will look like this:



The new entries mean:

The "A" tells you that the program has been adjusted. In other words: you can be sure that the program in the controller is an accurate copy of the one on the PC.

"H" means there could be a hierarchy error.

At this point, this is only a preliminary warning as the controller can only check the point once you start it.

"Free:xx": the transmitted program is too short to have caused any changes in this status message.

You have learnt that:

- the online functions (i.e. the not module-related ones) are controlled via the "PLC" menu on the main menu bar,
- dimmed menu items are (currently) not available,
- you receive current online information via the main status bar.

4.2.8 Step 8: Start and test program

KUBES is in online mode and the program is in the controller. All requirements for starting the program have been met.



- Start the controller from KUBES.
(Why not try a tool bar icon for a change. It is labeled "Run").

The main status bar responds immediately:



Look at the displayed information again. The "H" has disappeared, i.e. the controller realised that there is no hierarchy error. The program is running. By the way, you can also tell by the green "RUN" LED on the controller.

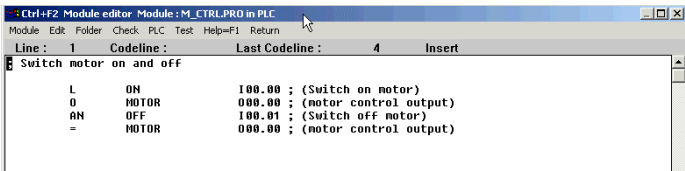
KUBES includes a whole lot of test functions. In this tutorial, you will use the "dynamic display of the Module Editor". This test function is the best for showing the interconnection between cause and effect (program and status of the operand).

At this point, the Module Editor should still be running and show the program contained in module M_CTRL.PRO.



- Move the focus to the Module Editor.

The status bar of the Module Editor is highlighted:



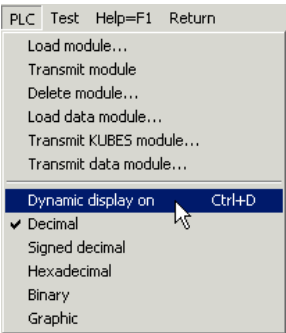
It now contains an additional piece of information: the module name is followed by "in PLC". Program testing is possible and useful only if this information is shown.

Like the Main Menu, the menu bar of the Module Editor, too, has a "PLC" menu.

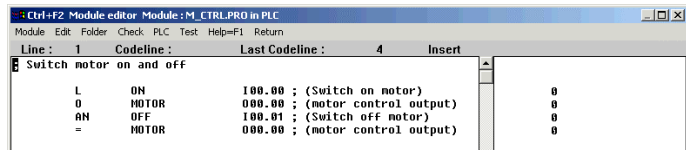
However, you can only use this menu for online functions concerning the module in the editor.



- Choose "Dynamic display on" from the "PLC" menu.



Another window will open on the right side of the editor:

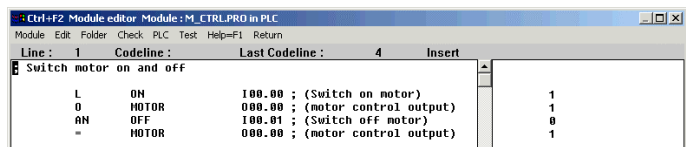


It shows the status of the operands in the program window on the left (0 = off, 1 = on).



- Now flip the switch connected to input "ON" (I00.00).

Look at what happens in the dynamic display window:



- Switch off input "ON" (I00.00).

As you can see, output "MOTOR" (O00.00) stays on. And that is as it should be, because this is a latching circuit after all.



- Switch on input "ON" (I00.01).

This will switch off the output. Your program works.



You can also monitor the whole process via the LEDs on the controller: an active input or output is indicated by its LED being on.

You have learnt that

- the controller, upon going into run mode, checks the program for any hierarchy errors,

First Steps

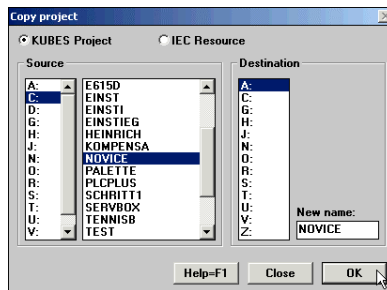
- the items of the Module Editor's "PLC" menu control online functions for the module in the editor,
- the dynamic display of the Module Editor appears to the right of the program code to be tested.

4.2.9 Step 9: Save project (copy to disk)



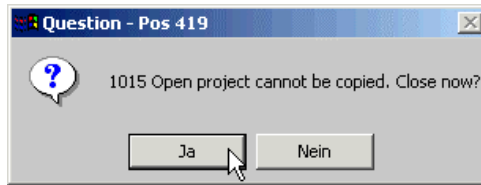
- Click on "Return" to exit the Module Editor.
- Choose "Copy" from the "Project" menu.

The "Copy Project" dialogue will appear:



- From the "Destin." list box select the drive you want to copy the project to.
- If you select a floppy disk drive, be sure to insert a formatted disk into that drive.
- Click on "OK" to confirm.

The project is still open. Open projects cannot be copied, though. You must therefore close it first:



- Click on "Yes" to answer the prompt.

The prompt box will disappear.

KUBES will close the project and copy all project files to the selected drive.

You have learnt that:

- projects and all their data are copied to disk to save them. This goes for transferring them to another PC, too, of course.

4.2.10 Step 10: Document (print) program

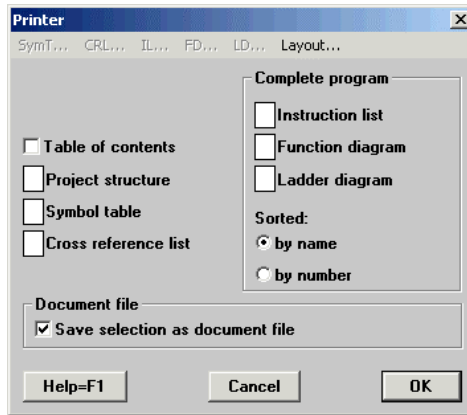
KUBES prints via WINDOWS' Print Manager. You benefit from this approach in that you can output KUBES projects to any printer installed under WINDOWS.

Please refer to your WINDOWS manual for information about printer installation under WINDOWS.



- Connect your printer and prepare it for printing. (If you have worked through Step 9, no project is open.)
- Open the project "NOVICE" again.
- Choose "Print" from the "Printer" menu.

The "Printer" dialogue will be displayed:

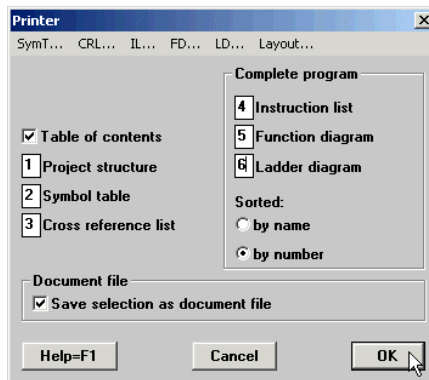


The cursor is on the "Contents" option.



- Click on the checkbox.
A tick appears in the box, indicating that the table of contents will be printed.
- Move the cursor to the "Project structure" option and enter "1".
- Do the same for the other options, numbering them through from "Symbol table" to "Ladder diagram".

The dialogue now looks like this:





- Confirm the entries by clicking on "OK".

- KUBES will output the project to the printer.

To roughly know what the printout should look like, please refer to section 6.5, Tutorial Program Documentation.

You have learnt that:

- you can print any combination of project structure, symbol table, cross reference list, instruction list, function diagram and ladder diagram of an open project

4.2.11 Step 11: Create EPROM file

This step was included in the tutorial only to round off the picture. You will not fully complete it either as you will not need to have your first little program on EPROM. We have therefore reduced this step to the creation of one (or two) EPROM file(s). The number of files actually created depends on your controller.

Should you wish to skip this step, please feel free to continue with Step 12 "Exit KUBES".



- Verify that KUBES is still online. Choose "Online" from the menu if not.
- Adjust the program. In the main status bar, the project name must be followed by "A".
- If it is not, open the "PLC" menu again and pick item "Transmit program" from it.

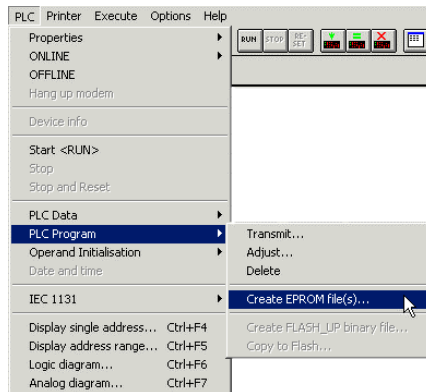
KUBES will output a box informing you of the transfer operation. "A H" will appear on the main status bar.



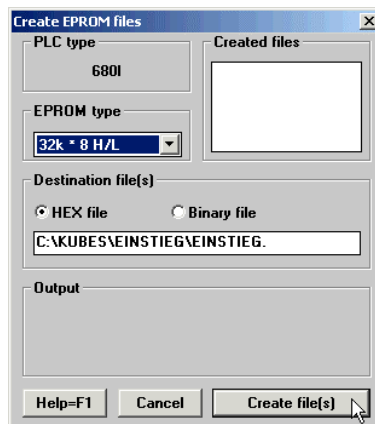
You can also choose "Adjust program" from the "PLC" menu to adjust the PC and controller programs. However, we recommend you use the "Transmit program" option as it transmits the program in its shortest and most memory-saving form.



- Start the controller and stop it again after about 10s by using the "Stop and Reset" command.
Note: At runtime, during the first program cycles, the hardware generates and stores a checksum. When you restart the controller, another checksum will be generated and compared with the stored one.
- Choose "Create HEX/BIN-File" from the "EPROM" menu.



A dialogue box will appear:



Whereas the dialogue may look different depending on the type of controller (for example, not all controllers demand that you specify the EPROM type), the input you need to make is basically the same in all cases.

First Steps



- Go to the dropdown list next to "EPROM type" and choose the correct EPROM size.
- Click on one of the option buttons to select the file type according to the specifications of your EPROM programming device:
binary file or
HEX file (for all programming devices that support the Intel hex format).



KUBES suggests a destination drive and file name. You can change these, though. The extension to the file name will be added automatically. Refer to the instruction manual of your controller for further information.



- Confirm your selection by clicking on "Create file".

KUBES will create the EPROM file(s).

You have learnt that:

- KUBES provides options for software-controlled program adjustment,
- you need to start and stop the controller before you can create EPROM files,
- different file types are available for creating EPROM files.

4.2.12 Exit KUBES

Exiting KUBES is just as easy as starting it:



- Double-click on the control menu box (i.e. the KUBES icon on the main status bar).

Or

- Click on the control menu box. This opens the control menu from which you choose "Exit".

Each of these possibilities will close all KUBES windows and exit the application. If there is an open project which you modified in any way, you will be reminded to save the changes.

4.2.13 Conclusion

You have now completed all steps of the tutorial and produced your first working KUBES program. Although we deliberately chose a very simple example, it will have helped giving you a first idea of what you can do with KUBES. You have learnt about all steps necessary for planning KUBES projects.

As from version 4.02, KUBES is delivered with a context-sensitive WINDOWS online help system. Opening a KUBES window and displaying a useful text on the very topic you need is not just a click or hitting a button (F1) away. You will soon realise that once you have grasped the methodology of the WINDOWS help engine, it will give away its information a lot faster than any printed manual.

And last but not least: KUHNKE also provides KUBES training seminars. Feel free to contact one of our sales offices or agents in your area for any further arrangements or have our training folder sent to you.

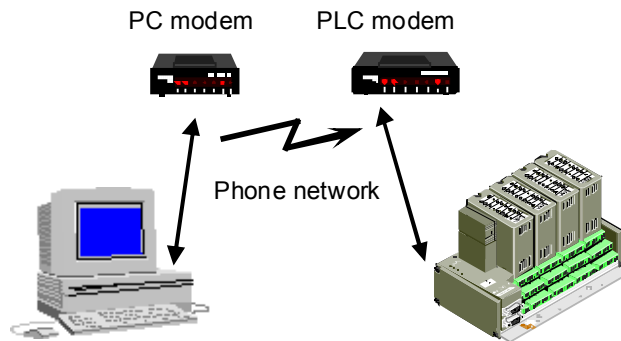
5 MOBES

What is MOBES good for?

MOBES, the remote programming software enables KUBES to practice all online functions via the telephone.

All it takes at one end of the line is to connect a modem (PC modem henceforward) to the programming PC.

At the other end, a PLC's programming interface is connected to a modem (PLC modem in the text below).



5.1 What Do You Need?

PC end

- PC with KUBES version 5.20 or higher installed on it
- MOBES (680.509.00)
- Modem as listed in the modem database delivered with MOBES. This list currently includes:
 - Elsa Microlink 33.6TQV• Elsa Microlink 56k
 - Elsa Microlink ISDN/TL V.34-PC
 - Zyxel U-1496E
 - U.S. Robotics 56k
- Connection lead to connect the PC modem: "Programming cable", part no. 657.151.03

PLC end

- PLC modem as listed in the modem database delivered with MOBES. This list currently includes:
 - Elsa Microlink 56k
 - Elsa Microlink ISDN/TL
 - U.S. Robotics 56k
 - SM2 type (various suppliers)
- Connection lead to connect the PLC modem:
connection cable "PLC-KDT", part no. 653.151.01



For safety reasons, PLC modems must be capable to store passwords and they must have a call-back function.

MOBES delivery package:

You will receive 2 diskettes when you order part number 680.509.00:

- One diskette containing the MOBES installer.
Chapter 5.2 Installing MOBES describes how to install MOBES.
- One diskette containing the MODCONF installer for default modem configurations (required for setting up a default PLC modem configuration in case MOBES is not available locally).

5.2 Installing MOBES

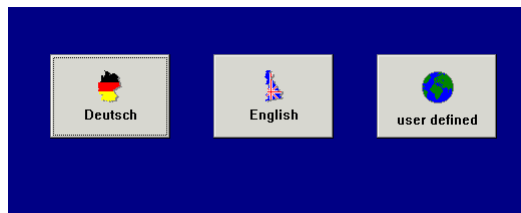
Prerequisites

- KUBES, version 5.20 or higher, installed on your PC.
- KUBES is not running.



Installation

- Insert the "MOBES" disk into your drive.
- Start the Setup program.
- Follow the on-screen instructions.
- Set the installation directory to the KUBES program root (default: "KUBESEXE").
- Choose the program folder containing the KUBES icon (default: "ProfiSoft").
- Select a language for MOBES' graphical user interface (GUI).



The GUI language variants are stored in the KUBES program root (KUBESEXE) as text files:

"Deutsch":	TXT_GER.INI
"English":	TXT_ENG.INI
"user-defined":	TXT_FRA.INI

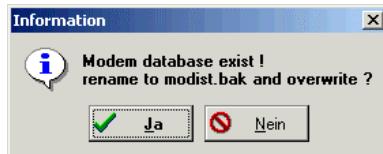
User-defined language

To display the MOBES environment in a language other than English or German, choose the "user defined" option in the above dialogue. In that case, MOBES will use the texts stored in TXT_FRA.INI. These texts are in German at the time of delivery. Please use an ASCII text editor such as NOTEPAD.EXE in Windows.



- *Make sure to maintain the text structure by changing the text only. Text in square brackets [xxx] must not be altered.*

If the installer finds a previous version of MOBES on your PC, it will display the following modem database prompt:



If you click on "Yes":

The existing MODLIST.INI will be renamed as MODLIST.BAK and replaced with the new MODLIST.INI.

If you click on "No":

The existing modem database will be kept and the new one will be stored as MODLIST.INI in the KUBES root.



You can run the "Import" function at any time to extend the existing modem database (e.g. by importing from MODLIST.BAK in the Windows root or from MODLIST.INI in the KUBES program root).

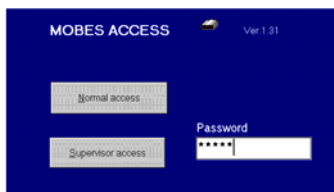
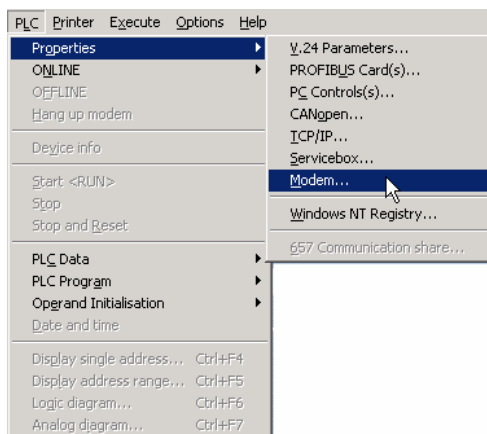
Following successful installation, you can run MOBES via KUBES and use its functionality for any KUBES project.

5.3 PC Modem

5.3.1 Installation



- Connect the PC modem.
An external modem connects via the programming cable (part no. 657.151.03) put between the chosen PC port (COM x) and the modem.
- Switch on the modem.
- Run KUBES.
- Choose "Setup/Modem" from the "PLC" menu.



MOBES



- Enter "MOBES" as the password.
- Click on "Supervisor access".
- Click on the "PC modem" tab.
- Pick the appropriate modem from the list of modems.

The screenshot shows the 'MOBES C:\MOBES\GAS' window with the 'PC modem' tab selected. The window contains several configuration sections:

- Baudrate:** A dropdown menu set to '19200'.
- Modem:** A dropdown menu set to 'Elsa Microlink 56k-PC'.
- Times:** Two numeric input fields: 'Max. dial. time (sec)' set to '100' and 'Kubes timeout (msec)' set to '1000'.
- Interface:** Four radio buttons for COM1, COM2, COM3, and COM4, all of which are unselected.
- Connection:** Three radio buttons: 'Main station', 'PBX station', and 'Both modems conn. to PBX station'. The 'Main station' option is selected. Below these is a 'Get exchange' field with the value '0'.
- Dialling method:** Two radio buttons: 'Pulse dialling' and 'Tone dialling'. The 'Tone dialling' option is selected.
- Loudspeaker:** A section with an 'enabled' checkbox (checked) and a 'Volume' numeric input field set to '3'.

At the bottom of the window are three buttons: 'Save', 'Initialise', and 'Test call'. In the bottom right corner are 'Help' and 'Exit' buttons.



In case your modem is not in the list, you must first add it to the modem database (see ch. 5.7 Modem Database).

5.3.2 Modem Settings

Please fill in all of the fields of the PC Modem tab and verify that the default settings are correct.

Option	Function
Baud rate	Speed of data transfer [kbit/s] between PC and modem.
Max. dial time [s]	Time that the modem will wait for a connection to be made. When it is up, dialling will be aborted and an error prompt will be output (try to keep the default setting).

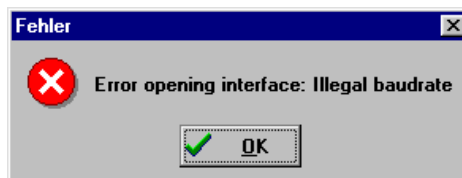
Timeout (KUBES) [ms]	Maximum time between a KUBES frame and the response from the modem (try to keep the default setting).
Port	Serial port that the modem is connected to.
Subscriber station	<p>Main station: The telephone number will be dialled without an exchange prefix (direct dialling).</p> <p>PBX station: The "Get exchange" box will pop up when you choose this option; into this box, type the line prefix that will request a public exchange line.</p> <p>Both modems conn. to PBX station: If both the PC modem and the PLC modem are connected to the same PBX system, only the telephone number/extension will be dialled without a dialling prefix.</p>
Dialling method	Pulse dialling or tone dialling
Loudspeaker	<p>You can use the modem's loudspeaker for first error diagnosis:</p> <p>enabled <input checked="" type="checkbox"/>: activates the loudspeaker</p> <p>Volume [1...7]: controls the loudspeaker volume</p>



- Click on "Initialise" to set up the modem.



Error messages will make you aware of bad settings:

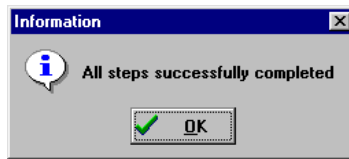


In this case, you set too high a baud rate.



- Click on "OK" to confirm the message.
- Click on "Cancel" to quit the dialogue.
- Change the wrong setting and try again.

The message tells you that the PC modem has been successfully initialised.



- First click on "OK", then on "Cancel"
-> this will take you back to the "PC Modem" tab.
- Click on "Save" to store the settings on your PC.

5.3.3 Trial Call

The "Trial Call" function allows you to verify that all PC modem settings are correct and that the modem is properly connected.

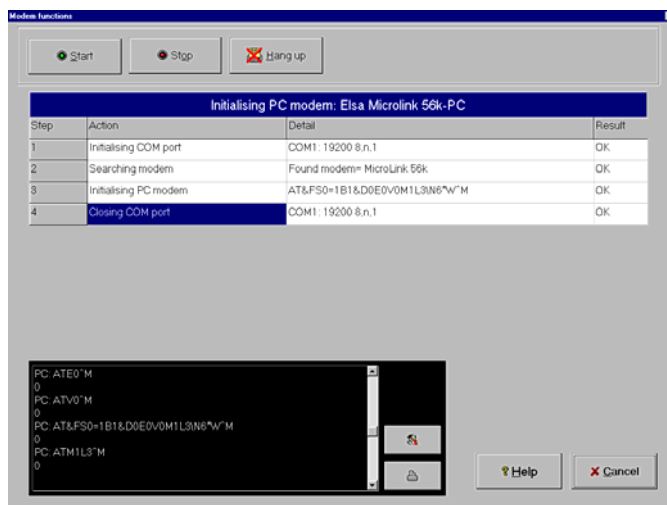
Prerequisites

- The database of phone numbers contains a telephone number by which a PLC can be contacted. To learn how to add entries to the database of phone numbers, please refer to section 5.4.2.



- Click on "Trial Call" to test your settings.
- Select the telephone number to be called.
- Click on "Start" to actually dial that number.

The connection will be checked. MOBES will tell you about its success and disconnect immediately:



The picture above illustrates a succesful trail call.



The screen is shown extended by the Expert Settings which you enable via tab "General".

See section 5.8 General

The black screen box displays all data transmitted via the telephone exchange line.

5.4 PLC Modem

The PLC modem interfaces between the PLC and the telephone network.

In this section we will describe how the modem is integrated in the KUBES project and set up via MOBES.



You can also use the "MODCONF" software program to configure the PLC modem. This is a practical way out, for example, if neither KUBES nor MOBES are locally available. MODCONF is delivered on a separate diskette. You are free to distribute it to your end customers without any licensing fees.

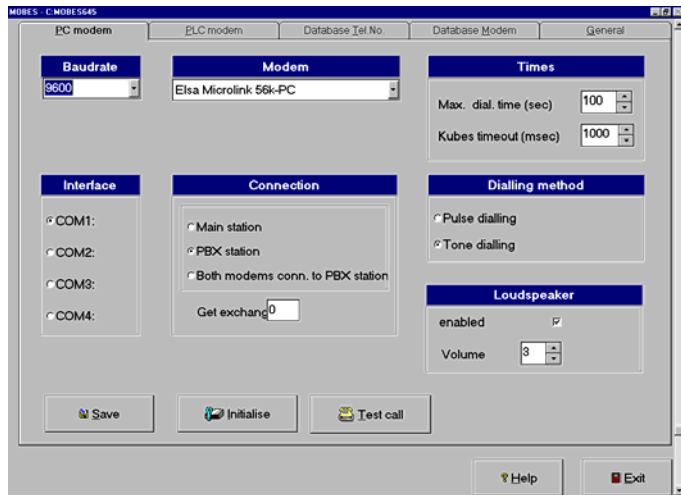


- Attach the programming cable (part no. 657.151.03) to the PLC modem and the appropriate PC port (COM x).
- Switch on the modem.
- Run KUBES.
- Open the relevant KUBES project.
- Choose "Setup/Modem" from the "PLC" menu.
- Click on "Normal access" if the required data (telephone number) is contained in the database already.
- Otherwise type in the MOBES supervisor password and press <Enter> to confirm.



The supervisor password for new MOBES installations is "MOBES". The supervisor can change it at any time (see the section on the "General" tab).

The MOBES dialogue will be displayed. The "PC modem" tab has the focus:



If the data required for connecting to the PLC modem are contained in the database already, you can skip this section and go straight on to chapter 5.5 „Configuring the PLC Modem via the PC“.

5.4.1 Editing Entries in the Telephone Database

Prerequisites:

- KUBES is up and running.
- A project is open.
- You started MOBES as the supervisor.



- Click on tab "Telephone Database":

MOBES C:\MOBES645

EC modem ELC modem Database Tel. No. Database Modem General

Telephone no.s

New Delete Copy

Modem

Timeout 50 [sek.]

Specify system

Country

Town

Comment

Call-back conn.

☒ Main station

☐ PBX station

☐ Both modems conn. to PBX station

☒ Pulse dialling

☐ Tone dialling

Save Print

Help Exit

Telephone number

- Click on "+ / New". A small dialogue box will pop up:



New telephone no.

OK Abbruch

- Type in the telephone number by which the PLC modem can be contacted.
- Click on "OK" to confirm.

The small dialogue box will disappear.



Call-back connection

- Main station:
The telephone number will be dialled without an exchange prefix (direct dialling).
- PBX station:
The "Get exchange" box will pop up when you choose this option; into this box, type the line prefix¹ that will request a public exchange line.
- Both modems conn. to PBX station:
If both the PC modem and the PLC modem are connected to the same PBX system, only the telephone number/extension will be dialled without a dialling prefix.

Modem

- Pick the appropriate modem from the list of modems.



In the case of some modems, the dialogue will be extended by some extra fields to contain user passwords etc.



In case your modem is not in the list, you must first add it to the modem database (see ch. 5.7 Modem Database).

¹ Line exchange request by flash key

If the PBX system demands that you press the flash key to request an exchange line and your modem is "Elsa Microlink 56K", you must use one of the following characters as the dial prefix: "!", "&" or "[

No	Password	Call-back tel. no.	Return call	Remote coi
1			No	No
2			No	No
3			No	No
4			No	No
5			No	No
6			No	No
7			No	No
8			No	No
9			No	No

Specify system

- These fields are to contain information about the system where the PLC modem is installed. This information will be helpful later, especially if several machines or plants are to be communicated with.



The next panel will look a little different for the various kinds of modems, depending on the chosen modem's features:

Call-back number and passwords

If you're working with an Elsa modem, for example, this section allows you to define up to 19 different access authorisations (passwords). Every password can be assigned the following PLC modem parameters:

- Remote configuration, yes or no.
- The PLC calls back after it has been contacted (next to the password, this is another safeguard against third-party access).



Tip: Use the tab key to move between fields.



We recommend that you specify at least one password for remote configuration. This will give you the opportunity to (remote) configure the PLC modem at any later time, after it has started operation.

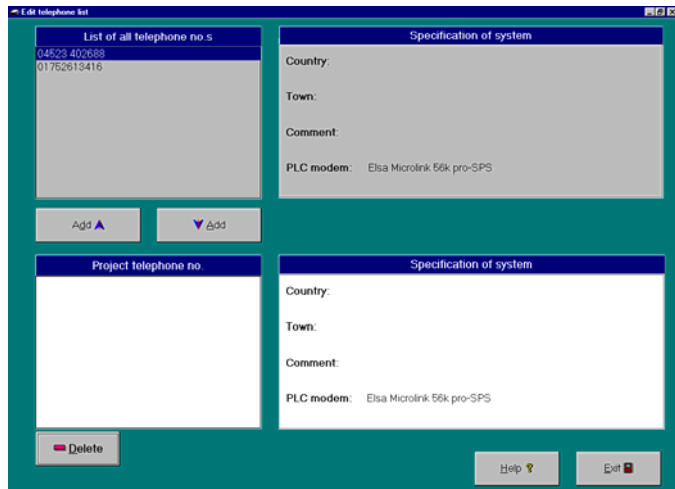
(For an example entry refer to ch. 5.4.2 Example Entry in the Telephone Database)



- Click on "Save" to keep your entries in the database and in the project.
- Click on the "PLC modem" tab.



- Click on "Edit" to transfer the entries to the KUBES project.



In the top panels you will find the entries you made before. The next step is to add this information to the open project:



- From the "List of all telephone no.s" select the number you need.
- Click on "↓Add" to add the entries to the project (bottom panel: Project phone no.).
- Click on "Exit". You will return to the "PLC modem" tab, showing the updated information.

MOBES C:\MOBES545

PC modem | **PLC modem** | Database Tel No. | Database Modem | General

Exchange tel. no.
04523 402688
[Edit](#)

Assigned modem data
Modem: Elsa Microlink 56k pro-SPS
Country:
Town:
Comment:

Local PC configuration
Baudrate PLC <-> Modem: 9600
Interface:
☒ COM1:
☐ COM2:
☐ COM3:
☐ COM4:
What is to be done ?
☒ Transfer table of call-back no.s
☒ Change Supervisor passwo
[Start](#)

Remote configuration of password table
Telephone no. 04523 402688
What is to be done ?
☐ Transfer table of call-back no.s
☐ Change Supervisor password
[Start](#)

[Help](#) [Exit](#)



Move on to chapter 5.5 Configuring the PLC Modem via the PC.

5.4.2 Example Entry in the Telephone Database

The settings shown below refer to a modem connection at Kuhnke's Systems Engineering division:

The screenshot shows the MOBES software interface with the following details:

- Telephone no.s:** 04523 402688
- Modem:** Elsa Microlink 56k pro-SPS
- Timeout:** 50 [sek.]
- Specify system:**
 - Country: Germany
 - Town: Bad Mente
 - Comment: modem Kuhnke R&D
- Call-back conn.:**
 - ☒ Main station
 - ☐ PBX station
 - ☐ Both modems conn. to PBX stati
 - ☒ Pulse dialling
 - ☐ Tone dialling
- Call-back tel. no. and passwords:**

No	Password	Call-back tel. no.	Return call	Remote con
1	compact		No	No
2			No	No
3			No	No
4			No	No
5			No	No
6			No	No
7			No	No
8			No	No
9			No	No

Kuhnke makes this extension available to you so that you can test your MOBES installation in case you have no external applications as yet. The telephone number is: +49-4523-402-688.



A Compact Control 680C machine is connected to the PLC modem. If you intend to use this number, you will have to make sure that you have defined "680C" as the type of controller for your KUBES project. Please understand that we must disallow remote configuration of this PLC modem.

Use "compact" as your password to access online communication with the PLC connected to the modem.

Should the unlikely case occur that you fail in establishing the connection, please phone us at the following extension:

+49-4523-402-0

Ask to be put through to the Electronics Project Management dept. of the Machine Building division.
We will help you from there.

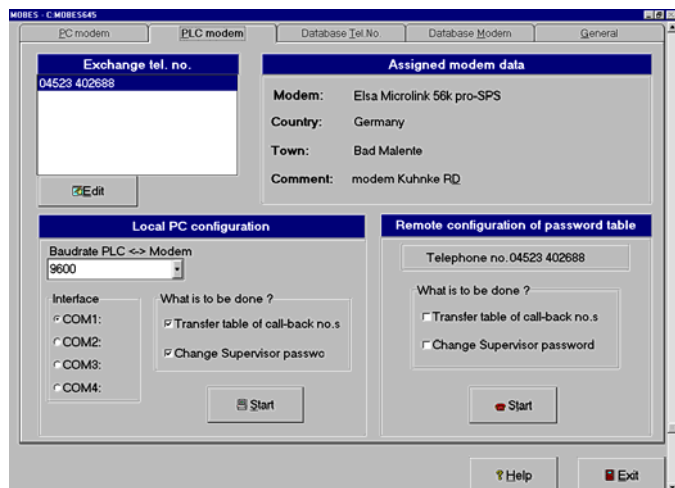
5.5 Configuring the PLC Modem via the PC

Prerequisites

- KUBES is up and running.
- A project is open.
- You started MOBES as the supervisor.
- The PLC modem is properly attached to the PC



- Click on "PLC modem"
- the focus will move to that tab:





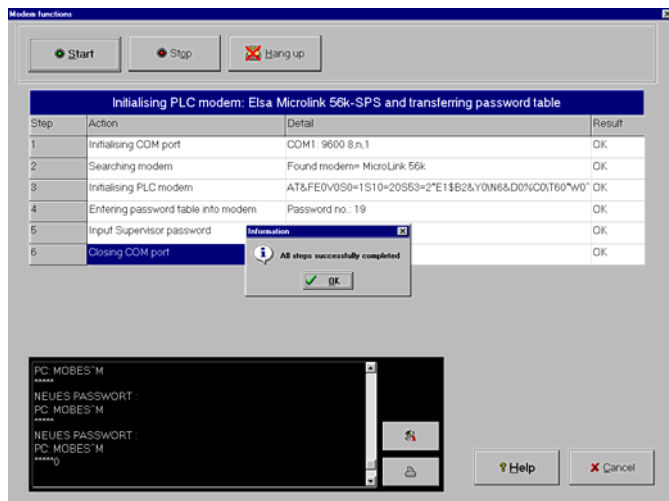
- Go to panel "Local PC configuration" and choose the port to which the modem is connected.
- Tick the functions to be carried out.
- Click on "Start".

This will set off the configuration procedure. At one point at least, you will have to input the supervisor password defined for the PLC modem. If you also ticked option "Change supervisor password", you will be requested to enter the new password twice.



The supervisor password for brand-new Elsa modems is "ELSA".

Every step of the configuration process is displayed on the screen. A message will tell you when the configuration has been successfully completed:





- First click on "OK" then on "Cancel".
- You will return to tab "PLC modem".

The PLC modem is now fully configured and can be connected to the PLC.



Remote configuration of a PLC modem is very similar, except that you use panel "Remote configuration of password table" instead.

5.6 Connecting via Modem

You wish to use a public telephone line to establish an online connection between KUBES and a PLC.

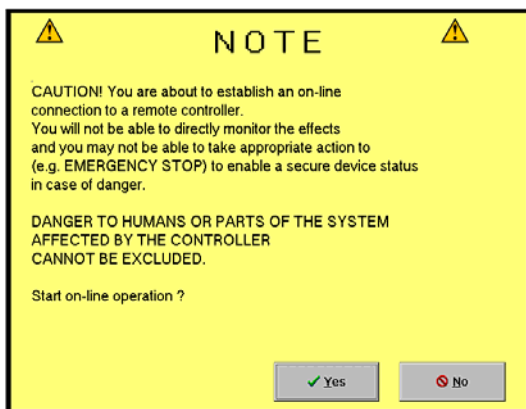
Prerequisites

- A PLC modem has been connected to the PLC and a telephone outlet.
- The PLC modem has been configured.
- A PC modem has been connected to the PC and a telephone outlet.
- The PC modem has been initialised.
- KUBES is up and running.
- The project (containing the data to be transmitted to the PLC modem) for access to the PLC has been opened.

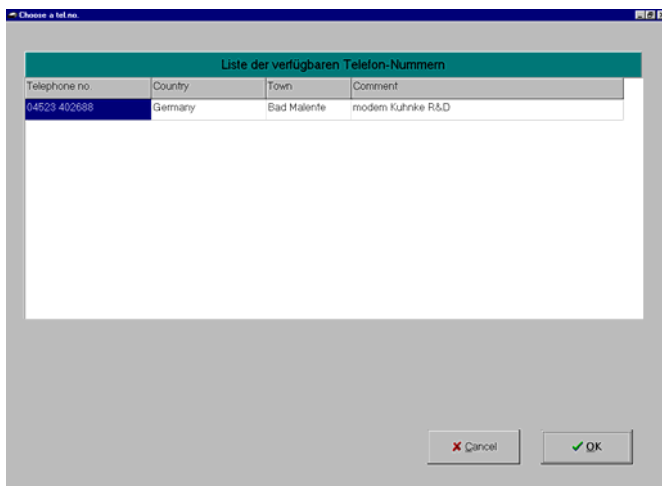


- Choose "ONLINE/Modem" from the "PLC" menu to start connecting online.

A warning is displayed making you aware of the dangers ensuing from online accesses to a remote controller:



- Click on "Yes" to continue connecting.
- In the dialogue that follows, click on "Tel. No." to display a list of available telephone numbers:





- Select the entry you need and click on "OK" to confirm. This will take you back to the previous dialogue which now contains the telephone number you just selected.
- Click on "Start" to start dialling. MOBES will document every step of the process. Once you are connected, MOBES will prompt you for the user password (see ch. 5.4.2 Editing Entries in the Telephone Database , dialogue "Call-back number and Password").

Modem functions

Start Stop

Tel. no: 04523 402688
Country Germany Town Bad Malmédy

Establishing on-line connection via modem			
Step	Action	Detail	Result
1	Initialising COM port	COM1: 19200 8.n.1	OK
2	Searching modem	Found modem= MicroLink 56k	OK
3	Initialising PC modem	AT&FS0=1B1&D0E0V0M1L3N6"W"M	OK
4	Dialling	Dialling: ATDT0W04523 402688	73%
5			
6			
7			
8			

```

0
PC: ATV0"M
0
PC: AT&FS0=1B1&D0E0V0M1L3N6"W"M
0
PC: ATM1L3"M
0
PC: ATDT0W04523 402688"M
  
```

Help Cancel

Click on "OK" to confirm. The PLC modem will check the password you entered against the ones in the list of passwords.

Once you are connected to the PLC modem and the user password you entered is contained in the list stored in the PLC modem you will be put through to the PLC. The PLC modem knows how to handle two situations:

User password without call-back

KUBES will go directly into online mode if you entered a user password for which no returning of the call by the PLC modem has been defined.

User password with call-back

If you entered a password for which a returning of the call by the PLC modem has been defined, the process will continue as follows:

- 1 The two modems will disconnect.
- 2 MOBES will wait for the PLC modem to call back within a preset time.
The PLC modem will dial the telephone number assigned to the user password in the table.
- 3 Once this has been successful, the user will be requested to enter the PLC modem's user password again.
- 4 KUBES will then go online.

5.6.1 Troubleshooting

MOBES will tell you the cause if it failed to connect to the PLC.

Possible causes are:

- Wrong user password.
Try again using the correct password.
- Wrong call-back number stored by PLC modem.
Reconfigure the PLC modem accordingly.
- PLC modem does not react.
The PLC modem may be "hanging", so restart and reconfigure it.
- Wrong cable.

5.7 Modem Database

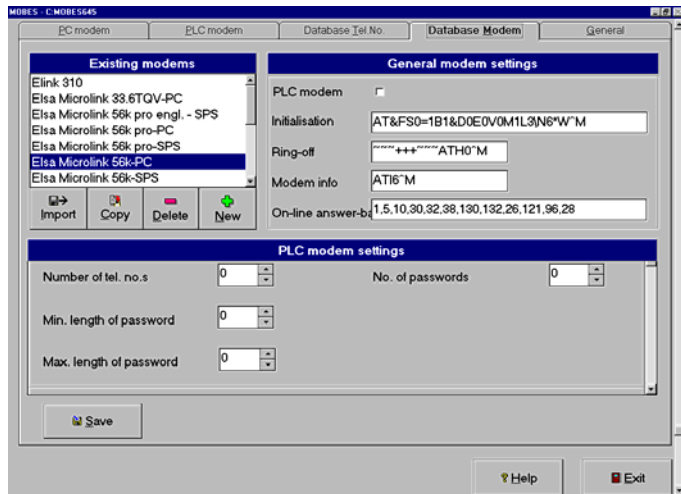
Kuhnke compiles and maintains the database. It is installed on your PC together with MOBES. The current modem database is called MODLIST.INI. The supervisor has complete access to it.

We recommend that you only define PLC modems approved of by Kuhnke. Not all of the modems available on the market are suitable for this application.

PC modems are not quite as much of a problem. You should not normally encounter any problems, if you configure your modem using the information detailed by the supplier.



- Run MOBES as the MOBES supervisor.
- Click on the "Database modem" tab.
- Make the appropriate settings by typing the information into the relevant fields.

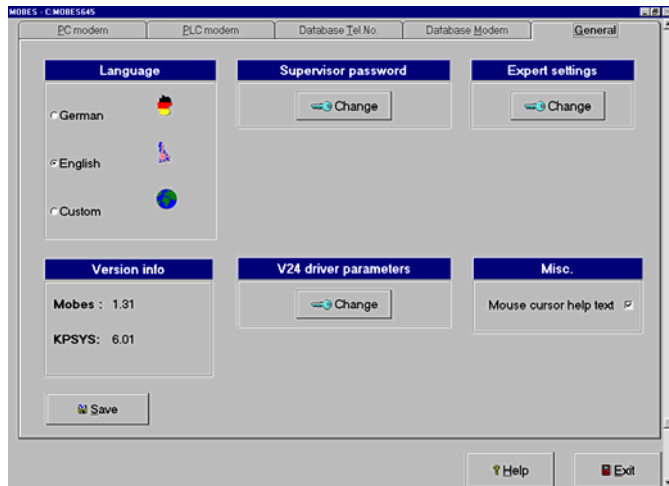


5.8 General

Only the MOBES supervisor has access to the settings on the "General" tab.



- Run MOBES as the MOBES supervisor.
- Click on the "General" tab.



Language

Choose a MOBES GUI language.

Supervisor password

Change the MOBES supervisor password as appropriate. Following installation, the password is "MOBES".

Expert settings

Enable these settings to have MOBES output all online data transfer actions to a separate window. Use these settings for error diagnosis and monitoring.

V24 driver parameters

These options control timeouts and the number of upload attempts.

Misc.

Enables/disables the tooltip texts.

6 Appendix

6.1 Technical Data

Name	KUBES 5
Features	Programming, testing, documenting of control programs
Target systems (controllers)	Modu Control 657, 657P Compact Control 667 Pico Control 667 Eco Control 667 Compact Control 680C KDT 680CT Profi Control 680I, 680V, 645-500, ProfiControl 690PLC+ PC Control 644, 645-500, 645-12M Can Control 691 CanControl 690PLC+
System requirements	
PC386, 486 or Pentium	
RAM	4 MB or higher
Monitor	Full graphics support, e.g. VGA
Hard disk	40 MB or bigger KUBES takes up approx. 5 MB
FDD	3½", 1.44 MB (standard)
Ports	- Mouse (optional) - Printer (optional) - V.24 (RS 232) for controller - PROFIBUS module (optional) e.g. PC Control 645-500
Software	
MS-DOS	Version 5.0 or higher
MS-WINDOWS	95, 98, 2000, Me and NT
KUBES	Version 5.40 or higher



We recommend the following configuration to let KUBES run to your satisfaction, i.e. be fast enough and make proper use of the possibilities provided by WINDOWS (e.g. display several windows):

- *PC 486 or Pentium processor*
- *8 MB or more RAM*
- *80 MB or larger hard disk*

6.2 Order Specifications

KUBES D
Kuhnke operating software, German 680.502.00

KUBES GB
Kuhnke operating software, English 680.502.11

KUBES F
Kuhnke operating software, French, 3.5" 680.502.21

Connection lead
Programming cable PC-to-KUHNKE controller 657.151.03

MOBES D / GB
Modem operating software, German/English 3.5" 680.509.00

PC-to-modem connection lead
Programming cable PC-to-KUHNKE controller 657.151.03

Modem-to-PLC connection lead
Programming cable KDT-to-PC 657.151.01

Beginner's Guide KUBES, German → E 327 D

Beginner's Guide KUBES, English → E 327 GB

Beginner's Guide KUBES, French → E 327 F

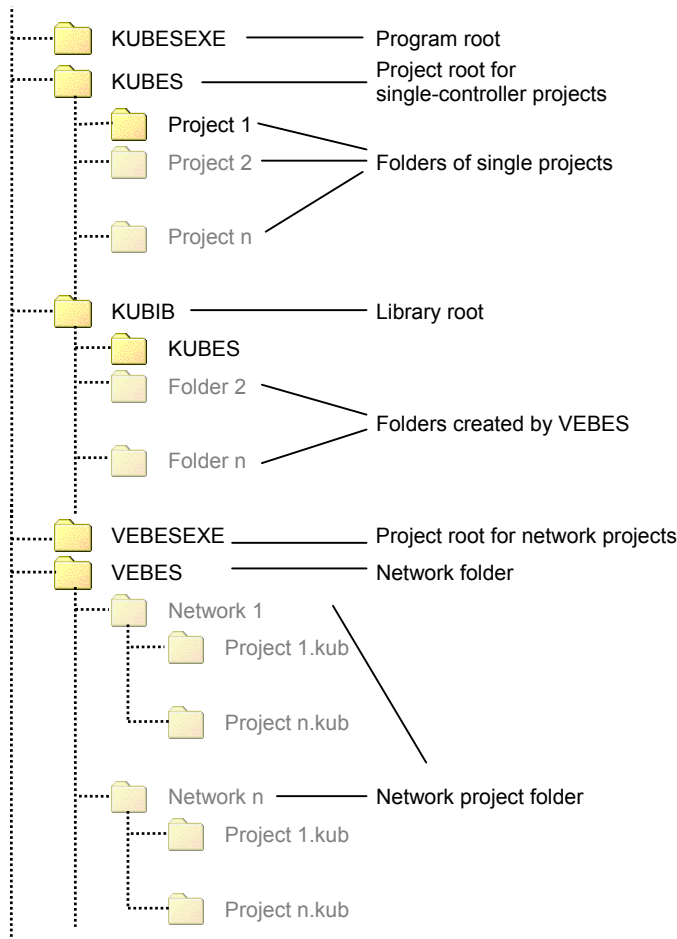
6.3 References

<i>Title / Subject</i>	<i>Number</i>	<i>Source</i>
Programming Manual Programming of Kuhnke's PLC systems	E 417 GB	Kuhnke GmbH
KUBES Modules	E 386 GB	Kuhnke GmbH
KUBES IEC 61131 Programming System	E 613 GB	Kuhnke GmbH
KUBES IEC 61131 Programming System Quick Start Manual	E 612 GB	Kuhnke GmbH

6.4 Organisation of Hard Disk Files and Folders

All program and user files are stored in various folders on your PC's hard disk.

6.4.1 Folders Created by KUBES



.....
*All dimmed folders are automatically created together with a network, project or folder.
The other folders are automatically created by KUBES or VEBES during installation.*
.....

6.5 Tutorial Program Documentation

6.5.1 Table of Contents

===== KUBES =====							
Table of contents							
Project : NOVICE Network :							
created : Aug 28 2001 14:29							
User : Kevin Kubes modified: Sep 03 2001 13:25							
Comment: My first project							
=====							
Project structure							
Symbol table							
I	SI	BI	AI	O	SO	BO	AO
M	SM	R	SR	BM	SBM	BR	SBR
BC	SBC	BD	SBD	T	PT	C	PP
C	PL	ABM	LM	FM	LBM	FBM	SLA
SLB	SLC	SLD	SLE	SLF	SLG	SLH	SLI
SLJ	SLK	SLL	SLM	SLN	SLO	SLP	ERR
DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Cross reference list							
I	SI	BI	AI	O	SO	BO	AO
M	SM	R	SR	BM	SBM	BR	SBR
BC	SBC	BD	SBD	T	PT	C	PP
C	PL	ABM	LM	FM	LBM	FBM	SLA
SLB	SLC	SLD	SLE	SLF	SLG	SLH	SLI
SLJ	SLK	SLL	SLM	SLN	SLO	SLP	ERR
DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
Instruction list							

Appendix

Organisation module			
Program module	*	, No.	1 to 255
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Timer module	*	, No.	1 to 5
Interrupt module	*	, No.	1 to 19
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Program module	*	, No.	1 to 255
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Ladder diagram			
Organisation module			
Program module	*	, No.	1 to 255
Function module	*	, No.	1 to 255
Timer module	*	, No.	1 to 5
Interrupt module	*	, No.	1 to 19

6.5.2 Project Structure

===== KUBES =====	
Project structure	
Project : NOVICE	Network :
created : Aug 28 2001 14:29	
User : Kevin Kubes	modified: Sep 03 2001 13:25
Comment: My first project	
=====	
ORG.ORG/1	
*----->M_CTRL.PRO/1	

6.5.3 Symbol Table

===== KUBES =====			
Symbol table			
Project : NOVICE Network :			
created : Aug 28 2001 14:29			
User : Kevin Kubes modified: Sep 03 2001 13:25			
Comment: My first project			
=====			
Address: Symbol: Comment: Supplement:			
I00.00	ON	Switch on motor	X:1:1
I00.01	OFF	Switch off motor	X:1:2
Address: Symbol: Comment: Supplement:			
O00.00	MOTOR	Output motor control output	X:2:1

6.5.4 Cross Reference List

===== KUBES =====									
Cross reference list									
Project : NOVICE		Network :							
		created : Aug 28 2001 14:29							
User : Kevin Kubes		modified: Sep 03 2001 13:25							
Comment: My first project									
=====									
I/O addr. Symbol		Mod.name Type No							
I00.00	ON	M_CTRL.PRO	1	L- 3					
I00.01	OFF	M_CTRL.PRO	1	AN- 5					
O00.00	MOTOR	M_CTRL.PRO	1	O- 4,	=- 6				

6.5.5 Organisation Module IL

===== KUBES =====									
Organisation module IL									
Project: NOVICE		Network :							
Module : ORG		No.: 1	created : Aug 28 2001 14:29						
User : Kevin Kubes		modified : Aug 28 2001 15:53							
=====									
1:	JPP	M_CTRL	1						
2:									

6.5.6 Program Module IL

```
===== KUBES =====
```

```
Program module IL
```

```
Project: NOVICE Network :
```

```
Module : M_CTRL No.: 1 created : Aug 28 2001 16:10
```

```
User : Kevin Kubes modified : Aug 28 2001 16:10
```

```
Comment: M_CTRL
```

```
=====
```

```
1: ; Switch motor on and off
```

```
2:
```

```
3: L ON I00.00 ; (Switch on motor)
```

```
4: O MOTOR O00.00 ; (Motor control output)
```

```
5: AN OFF I00.01 ; (Switch off motor)
```

```
6: = MOTOR O00.00 ; (Motor control output)
```

```
7:
```

6.5.7 Organisation Module FD

```
===== KUBES =====
```

```
Organisation module FD
```

```
Project : NOVICE Network :
```

```
Module : ORG No.: 1 created : Aug 28 2001 14:29
```

```
User : Kevin Kubes modified : Aug 28 2001 15:53
```

```
=====
```

```
(0)
```

```
.-----.
```

```
| JPP | -M_CTRL>
```

```
| _____ |
```

```
;
```

6.5.8 Program Module FD

```
===== KUBES =====
                                     Program module FD
                                     -----
Project : NOVICE                      Network :
Module  : M_CTRL    No.:1             created : Aug 28 2001 16:10
User    : Kevin Kubes                 modified : Aug 28 2001 16:10
Comment: M_CTRL
                                     -----
; Switch motor on and off
;
(2)
      .-----
ON-----|   >=1   |   .-----
MOTOR-----|       |---|       |
           |_____|   |   &   |
           OFF-----o|       | -MOTOR
                   |_____|
;
;
OFF      I00.01 Switch off motor      MOTOR      A00.00 Contr
ON       I00.00 Switch on motor
```


6.5.9 Organisation Module LD

```
===== KUBES =====
                                Organisation module LD
                                =====
Project : NOVICE                Network :
Module  : ORG                   No.: 1      created : Aug 28 2001 14:29
User    : Kevin Kubes          modified : Aug 28 2001 15:53
                                =====
| (0)
|
|      .----- .
|      | JPP      +-M_CTRL>
|      | _____|
|
;
;
;
```

6.5.10 Program Module LD

```
===== KUBES =====
                                Program module LD
                                -----
Project : NOVICE                Network :
Module  : M_CTRL   No.:1        created : Aug 28 2001 16:10
User    : Kevin Kubes          modified : Aug 28 2001 16:10
Comment : M_CTRL
                                -----
; Switch motor on and off
;
| (2)
|
| ON
| I00.00
+----] [-----+
| (3)          |
|              |
| MOTOR        | OFF
| O00.00        | I00.01
+----] [-----+----]/[-----
--
;
```

6.6 Sales & Service

Please visit our Internet site to find a comprehensive overview of our sales and service network including all the relevant addresses. You are, of course, always welcome to contact our staff at the main factory in Malente or at sales headquarters in Neuhausen:

6.6.1 Main Factory in Malente

Kuhnke GmbH
Lütjenburger Str. 101
D-23714 Malente
Phone +49-45 23-4 02-0
Fax +49-45 23-40 22 47
E-mail sales@kuhnke.de
Internet www.kuhnke.de

6.6.2 Sales Germany

Kuhnke GmbH
Sales Germany
Strohgäustr. 3
D-73765 Neuhausen
Phone +49-71 58-90 74-0
Fax +49-71 58-90 74 80
E-mail sales@kuhnke.de
Internet www.kuhnke.de

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