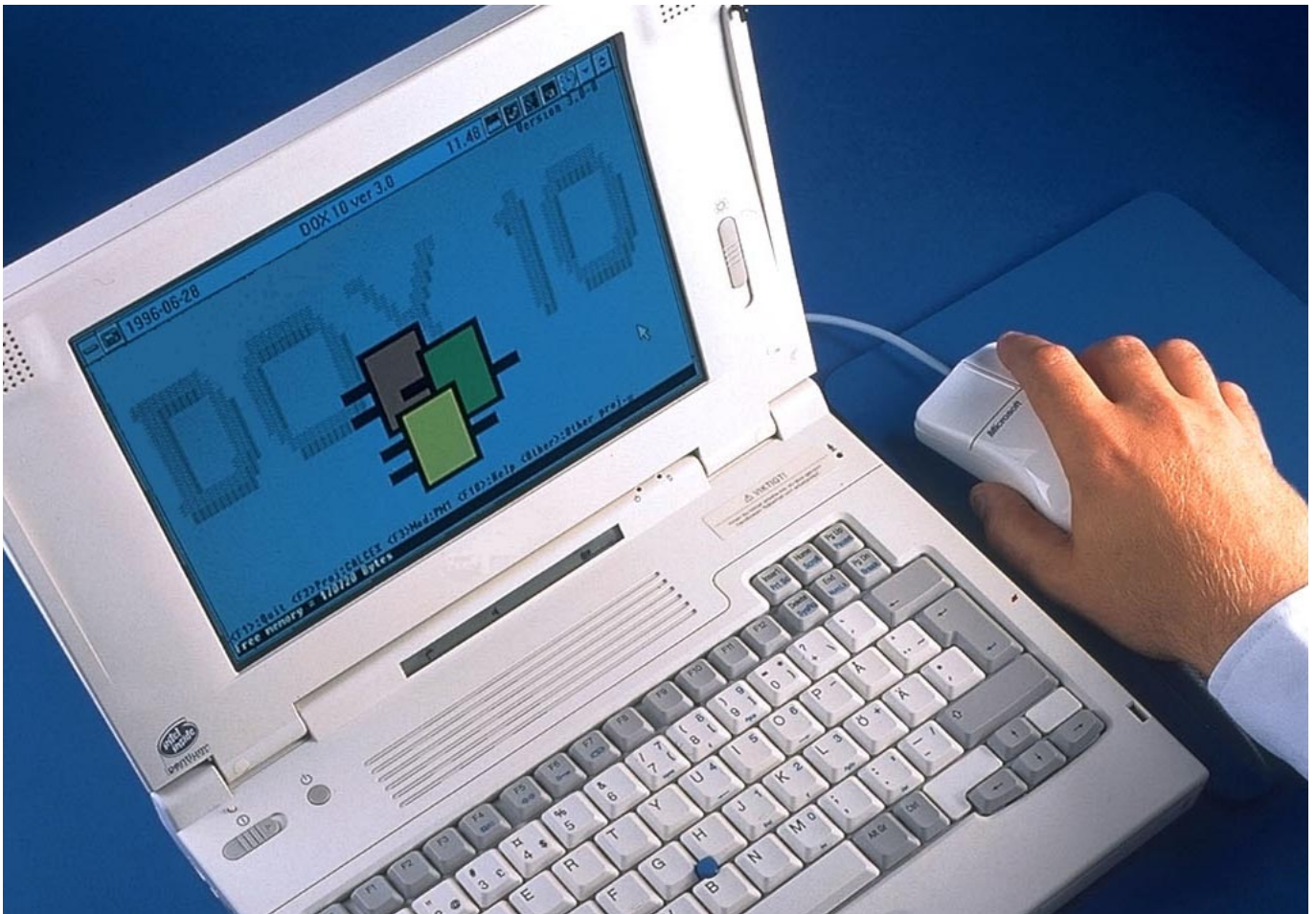


DOX 10

The Powerful Engineering Tool for SattCon Control Systems



DOX 10 is a powerful software development tool. It permits efficient programming of the SattCon family of products¹ from ABB Automation.

DOX 10 runs on a normal PC and offers a menu-driven programming environment with pull-down menus. Sensitive help at all levels makes it easy to use.

DOX 10 provides five powerful programming methods - Function Block Diagram, Ladder Diagram, Sequential Function Chart, Instruction List and Structured Text. Editors with functions such as search, replace, cut and paste... simplify programming.

The product includes a library with a large number of open, predefined function blocks. The user can also create function blocks when needed

which can be reused for an unlimited number of times, increasing user efficiency and application quality. By using customized function blocks in all control systems, standardized solutions will be assured throughout the whole plant, making commissioning and maintenance tasks easier.

Program development is performed off-line. During test and commissioning DOX 10 offers a number of on-line facilities, including program changes.

A project can be built up with a hierarchical structure, that makes it easy to find and follow the program elements.

Programming remotely can be performed by either SattBus or Ethernet.

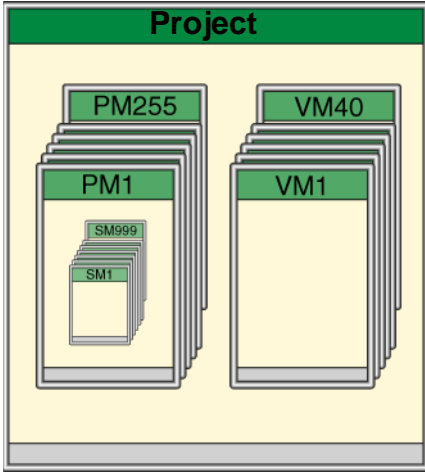
DOX 10 has these main features:

- Five programming methods
- Large numbers of predefined function blocks for efficient programming
- User defined function blocks
- Extensive on-line facilities
- Programming in DOS or Windows environments
- A hierarchical structure that is easy to search through and follow
- Remote programming via SattBus or Ethernet (SattCon 200 only)
- Minimal hardware requirements

¹ SattCon 05, SattCon OP45, SattCon 15, SattCon 35, SattCon 115/125 and SattCon 200.

Modularization

DOX 10 supports modularization of the project into program modules (PMs) and submodules (SMs). A program can consist of a maximum of 255 program modules, each with up to 1000 submodules.



A DOX 10 project can be structured in modules

The program may be structured so each program module controls a process section and each submodule controls, for example, a machine. All the program modules and submodules may be named and fully documented.

Variable declarations may be placed in a maximum of 40 variable modules (VMs), referencing any number of program modules.

Programming Environment

DOX 10 is fully menu driven, with most functions available through additional shortcut keys, which makes DOX 10 quick and easy to use.

Help menus are also available for all the main functions within the system.

Any of the three programming environment languages; English, German or Swedish, can be selected during the program installation.

Programming

Programming in DOX 10 is performed off-line.

For the SattCon 35 and SattCon 200 PLCs there are template projects pre-configured for fast project kickoff.

There are four different editors supporting five programming styles in DOX 10:

- **Function Block Diagram and Ladder Diagram (FBD/LD)**

Function blocks and ladder elements may be placed anywhere in the submodule. Interconnections between different function blocks or between function blocks, ladder elements, and variables are made by graphical connections.

- **Instruction List (IL)**

Here, programming is performed using a list format for the PLC instructions. It is also possible to insert function blocks in to the list.

- **Sequential Function Chart (SFC)**

A sequential function chart is created from various steps chosen from a menu. The step transitions are automatically inserted. The

underlying program code is placed in the steps and transitions using the FBD/LD and IL editors.

- **Structured Text (ST)**

(Valid for SattCon 200 only).

Mathematical functions written in this high level language could interface with PID controller functions, or be used separately in program modules. This language makes it simple to use floating point calculations and mean value calculations for controllers, arrays, statistic process analyses....

Programming functions

All the program editors can be used in a project, however, a program module can only support one editor.

Some examples of common editor functions are listed below:

- **Cut and paste**

A section of the project can be marked, moved and copied. The section may be inserted in another part of the project or even another project.

- **Search**

Variables, instructions, function blocks..., can be searched for within the entire project or sections. A cross referencing variable list may be displayed and a jump to any hit be made.

- **Search and replace**

This function replaces single variables or a range of variables, function blocks... with new ones.

An immediate check of syntax is performed for written variables, function blocks, connections....

The screenshot displays the DOX 10 v3.0 software interface with three overlapping windows:

- Top-left window (DOX 10 v3.0):** Shows a ladder diagram for 'Start circuit motor 1'. It features a series of normally open contacts labeled 'Stop1', 'Limit1', and 'Start1_1', followed by a normally closed contact 'Start1_2'. The output coil is labeled 'Motor 1'. A timer 'T1' is set to 20 seconds. A note indicates 'Automatic check of feedback, 10 seconds Alarm will sound after 10 seconds'. A legend identifies components: 'ACOF-3', 'AC#', 'OOP', 'OPEN', 'Motor 1', '10seconds', and 'Alarm1'.
- Top-right window (SattCon 200 - Calc IDE - [RESPROG.CLS]):** Shows a structured text editor with the following code:


```
Power      AT  %QW0   : LREAL;
Amp hour   AT  %QW1   : LREAL;
END_VAR    (* output *)

(* Calculate the power, P = U * I. *)
Power := Voltage * Current / 1000;

(* Calculate the current
variable INTERVAL
in milliseconds:
ampereseconds per
Transform the value
and add it to the
Acc_Ahour := Acc_Ahour
/ 3600);
Amp hour := Acc_Ahour
```
- Bottom-right window (DOX 10 v3.0):** Shows a sequence diagram for 'PM2\Sequence'. It starts with an 'Init 001' step. This leads to three parallel steps: 'Start1 001', 'Start2 002', and 'Start3 003'. From 'Start1 001', the sequence goes to 'Fill A 002', then 'Level A 004'. From 'Start2 002', it goes to 'Fill B 003', then 'Level B 005'. From 'Start3 003', it goes to 'Fill C 004', then 'Level C 006'. Finally, all three levels lead to a 'Mix 008' step.

DOX 10 offers five different programming methods

Function Overview	SC05	SC15	SC05 (V3)	SC05 (V4)	SC35	SC200
Status display	X ²	X ²	X	X	X	X
Overwrite			X	X	X	X
Force			X	X	X	X
Translate changes	X	X	X	X	X	X
Send changes			X	X	X	X
Status display of selected variables	X	X	X	X	X	X
Calculation program						X
Programming via network						X

Available on-line functions

Function Blocks

DOX 10 includes a library of standard, system specific, function blocks. It is also possible to make user defined function blocks. Text tags, simply displayed in the program editor, can be attached to each function block.

The source code of a user defined function block is generated using either the FBD/LD or IL editor.

Variable Editing

The Variables may be labelled with symbolic names (identifiers) and comments. All the variables used in the program are automatically put in a variable editing area.

Translation

Once programming is complete, a translation to instruction list code is performed. If any errors are detected, they are displayed one at a time. The correct program can then be compiled and sent to the connected control system.

Later modifications can be translated and sent to the control system while it remains running.

On-line Functions

The on-line functions are PLC specific. In DOX 10 there are several powerful functions:

- Status display
The value and status of bit and word variables is easily displayed. The program editors and variable lists all highlight in color values and status. The SFC display highlights the active steps too.

- On-line list
This is a “clipboard” of variables, dynamically displayed with status that the user generates.
- On-line changes
Modifications can be transmitted to control systems on-line.
- Force
Variables can be selected and forced to a chosen state. Multiple variables can be forced simultaneously.
- Overwrite
Similar to a force, however, the variables will be overwritten as a one-shot and, thereafter, the program takes over again.
- PLC Control
The functions Start, Stop and Reset can be controlled directly from the on-line displays (program editors and variable lists).

Program Documentation

DOX 10 has extensive built-in facilities for documentation. There are also, program, cross-reference, variable list... printing functions with the possibility of create page headers and footers.

Backup and Restore

DOX 10 contains functions for backing up and restoring projects to and from floppy discs.

Password

DOX 10 works with four different privilege levels. The password entered when opening a DOX 10 project determines which operations within the program are permitted.

Text Editing

DOX 10 contains a simple text editor for editing both external text files and texts included in the control system functions.

Terminal Emulation

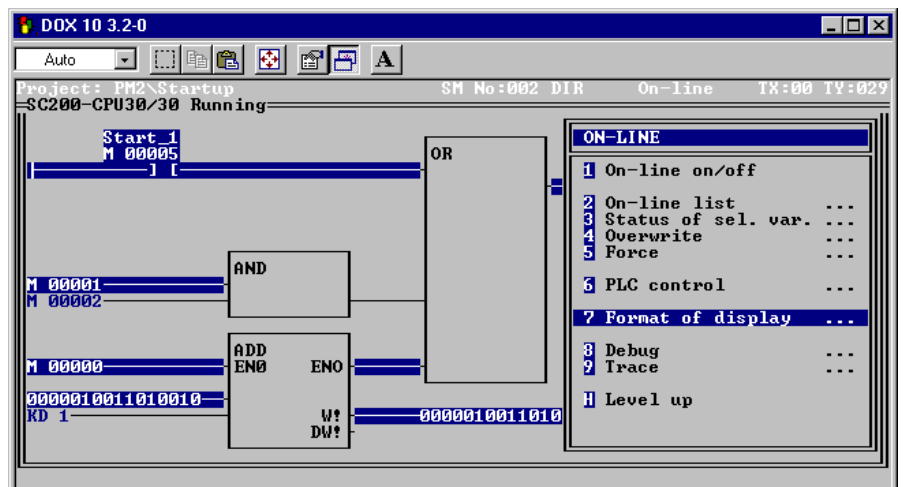
With the built-in terminal emulator, DOX 10 can be used as a terminal for the connected control system.

Control System Identifier

When sending a program to the control system, the program name, time and date is transmitted too. This is then used to avoid the incorrect transmission of a project to a control systems.

Installation

The installation of DOX 10 is performed with a menu based installation program. The installation incorporates both a DOS installation (DOX 10 itself) and a Windows installation (for calculation programs and programming via network).



²Limited performance

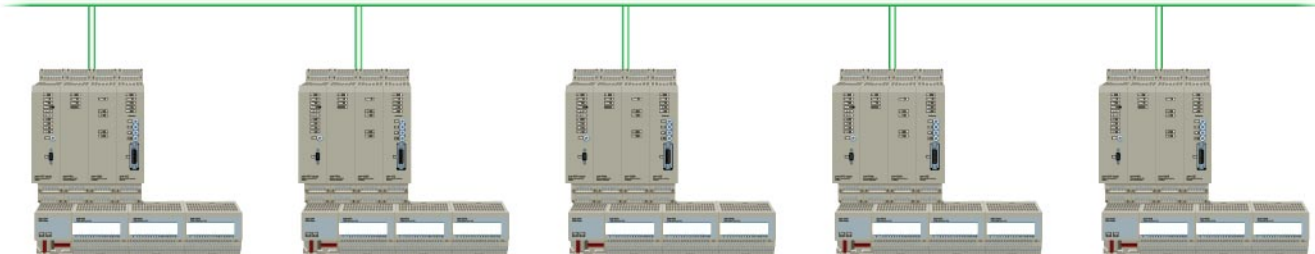
Programming via Network

(Valid for SattCon 200 only).

Programming, including program transmission/receiving and on-line functions, may be performed via SattBus or Ethernet network. Several SattCon 200 systems can be accessed from the same PC, e.g. for program loading, status display, terminal emulation....



SattBus/Ethernet



Technical Data

Software		Hard disk	
Program language	Function block diagram, instruction list, ladder diagram, sequential function chart, structured text	DOS	20 Mbyte
Control system versions	SattCon 05 Slimline SattCon 05 version 3 SattCon 05 version 4 SattCon 15 SattCon 35 SattCon 115/125 SattCon 200	Windows	27 Mbyte
Programming environment language	English, German or Swedish	Disk drive	3.5" 1.4 Mbyte
Hardware		Communication	DOS and Windows
Computer			RS232C serial channel for PLC communication. Serial/parallel channel for printer (not required). Serial/mouse channel for mouse (not required).
DOS	IBM PC with 80386 processor or compatible.	Windows	SattBus PC card if the programming is performed via a Sattbus network (1-4 cards). Ethernet PC card if the programming is performed via an Ethernet network.
Windows	IBM PC with 80486 processor or compatible.	Screen	Color or monochrome
Operating system		Printer	IBP PRO (or compatible), HP LaserJet II, III, HP LaserJet 4, 4m, Texas Microlaser, Canon LBP 4-plus, Epson FX-1050, Facit B3100, 3150, 3350, QMS 410, QMS 860 (A3). Other printers may be configured by the user in DOX 10.
DOS	MS-DOS version 3.2	Pointing device	Arrow keys or mouse (not required).
Windows	Windows 3.11 or Windows 95	Keyboard	Standard PC keyboard.
Internal memory		Graphical board, color	EGA
DOS	640 kbyte. An extra 1 to 2 Mbyte internal memory as a disk-cache is recommended.		
Windows	8 Mbyte		



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