

STEP 5 programming software

Application

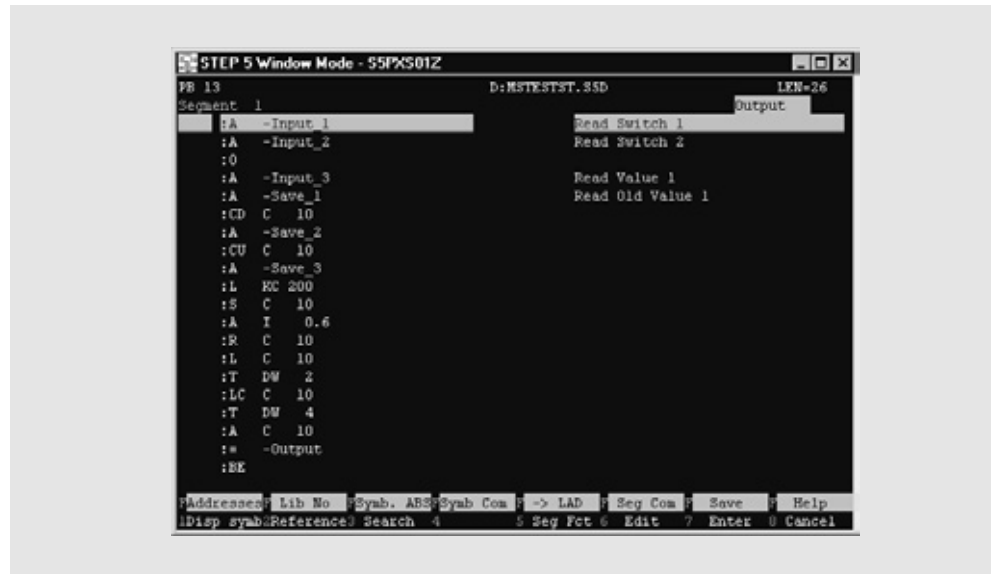


Fig. 7/2 STEP 5, STL representation

STEP 5 is the time-tested programming software for SIMATIC S5 programmable controllers. With STEP 5 it is possible to create, test and document user programs for all SIMATIC S5 programmable controllers.

STEP 5 is an attractive solution for all S5 users:

- Ergonomic user interface according to the SAA standard; makes STEP 5 user friendly and easy to operate
- Novell-based network capability; facilitates data maintenance and archiving considerably
- Large range of functions; manages even complex tasks without great effort

STEP 5 is available in two variants:

- **STEP 5/ST basic package for programming devices and PCs;** for programming, testing, documenting, installing and automatic documentation of S5 programs for the programmable controllers S5-90U, S5-95U/F, S5-100U, S5101-U, S5-115U/H/F, S5-135U, S5-150U and S5-155U/H.
- **STEP 5/ST for mini PLCs for PC;** STEP 5/ST for mini PLCs is specially for programming the mini controllers S5-90U, S5-95-U/F and S5-100U. Only the following software packages are executable: GRAPH Mini, COM IP 266, COM GRAPH, COM Text, COM 95F, COM DB1, COM 521 BASIC. All other COM packages and optional packages cannot be used.

STEP 5 runs under the operating systems

- MS-DOS 5.0 or higher
 - Windows 3.x and
 - Windows 95
- on
- PG 730, PG 750, PG 770
 - PG 720, PG 740, PG 760 or
 - AT-compatible PC.
- At least 4 megabytes of RAM are required.

Design

STEP 5/ST basic package for programming devices and PCs

The scope of supply includes:

- STEP 5 programming software (including KOMDOK)
- STL editor/batch compiler
- COM DB 1 parameterization software

The basic package is installed on the programming devices PG 720, PG 740 and PG 760 as standard software. If it is required for a PC it is supplied on CD and diskettes.

STEP 5/ST for mini controllers

The scope of supply includes:

- STEP 5 programming software for mini controllers; based on the STEP 5 programming language.

STEP 5 for mini controllers is only supplied for PC on CD and diskettes.

STEP 5 programming software (continued)

Function Structured programming

With STEP 5 it is possible to program clearly from simple AND/OR operations to complex functions, e.g. switch off delays or arithmetic calculations. A STEP 5 program can be several thousand statements long. To keep programs as clear as possible, STEP 5 features several control structures:

- **Blocks**
A linear sequence of commands is subdivided into sections and each section packed into a block. There are different types of blocks for different technological subtasks of a program. The executable program consists of calls of blocks in other blocks. Nesting is possible to a depth of 32 levels.
- **Segments**
For fine structuring inside blocks subtasks can be programmed in individual segments. Segments can be copied from one block to another.
- **Comments**
A complete program, blocks, segments and individual statements can be commented directly. This ensures that the program remains understandable on every level of abstraction.

Methods of representation

STEP 5 can be programmed in three methods of representation:

- **Statement list (STL):**
The program consists of a sequence of mnemonic abbreviations of the commands to be executed by the programmable controller.
- **Ladder diagram (LAD):**
Graphic representation of the automation task with circuit diagram symbols (American representation)

• Control system flowchart (CSF):

Graphical method of representing the automation task with symbols according to DIN 40700/DIN 40719

With all three methods of representation, absolute or symbolic designations for operands can be used.

In LAD and CSF, complex functions and function block calls can be entered using the function keys. They are displayed as graphic symbols on the screen.

Programs that were created in STL cannot necessarily be displayed in LAD or CSF because STL has several features of its own. However, programs in LAD or CSF can be translated to STL. LAD and SCF are largely mutually compatible.

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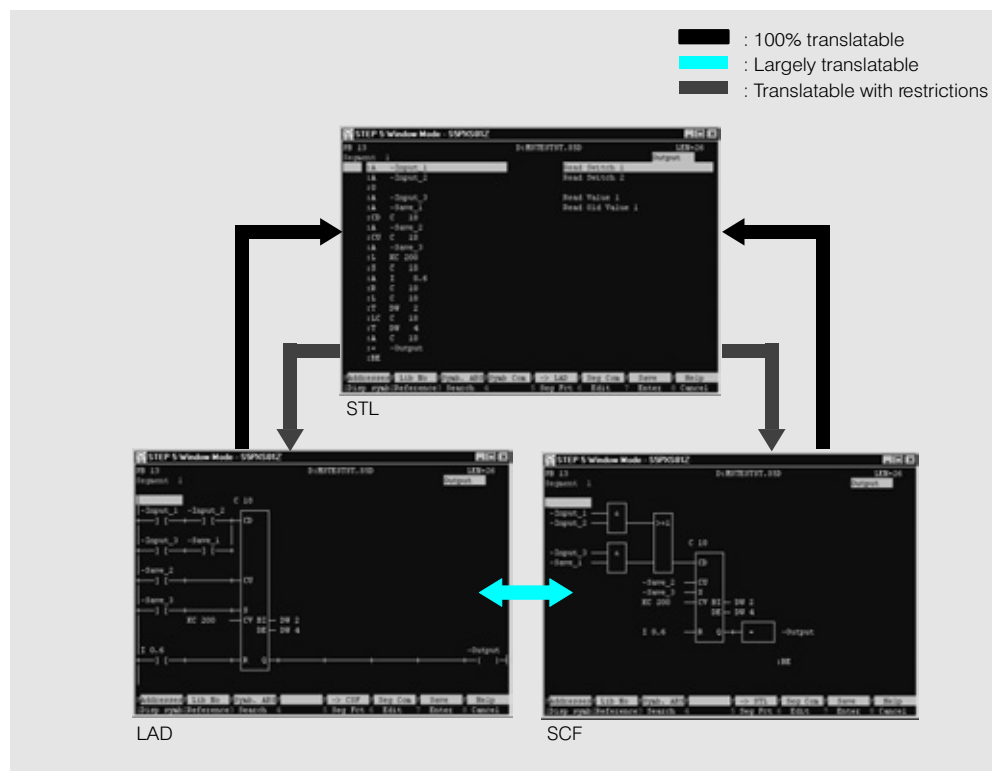


Fig. 7/3 Compatibility of the STEP 5 methods of representation

STEP 5 programming software (continued)

Function (continued) Blocks

There are 5 types of block:

- Organization blocks (OB); for organizing the control program
- Program blocks (PB); contain the control program, subdivided according to functional or technological criteria

- Sequence blocks (SB); for programming sequential control systems
- Function blocks (FB); contain frequently recurring or especially complex parts of the program (e.g. signaling and calculation functions). Function blocks can be parameterized and have an extended operation set

- Data blocks (DB) for storing data that is required to process the control program, e.g. actual values, limit values, texts

Types of operation

STEP 5 makes a distinction between three types of operation:

- **Basic operations;** e.g. logic operations, storage operations, loading and transferring, timer operations, counter operations, comparison operations, arithmetic operations, block operations. They can be executed in organization, program, sequence and function blocks.

Except for addition (+F), subtraction (-F) and organizational operations they can be executed in all three methods of representation

- **Supplementary operations;** complex functions, e.g. substitution statements, test functions, word logic, decrementing/incrementing and branching functions. This can only be executed in STL.

- **System operations;** These access the operating system directly and must therefore only be used by experienced programmers. They can only be executed in STL.

Additional functions

A whole range of easy-to-use additional functions make program handling easy:

- Storage of user-specific project settings

- Symbol editor; for creating and automatically updating assignment lists for the symbolic programming of blocks
- Automatic generation and updating of cross-reference lists
- Comparison of user programs between diskette, hard disk, PLC or EPROM

- Transfer of blocks to EPROM or EEPROM submodules for the programmable controllers
- Rewiring of inputs, outputs, flags, timers and counters (i.e. renaming operands in the entire user program or individual blocks)

Test- and service functions

For commissioning and maintenance, STEP 5 provides a number of test and service functions;

- Direct and program-dependent signal state display, i.e. status of variables or blocks (program status)

- Control of outputs, flags etc.
- Detection of double assignment of bit, byte and word addresses for I/Q/F/S

Program documentation

With the menu "documentation" it is possible to output the following documentation on a printer:

- Complete programs or program sections, if necessary with comments
- Cross-reference lists for operand symbols (I/Q/F/T/C/S) and/or individual operands (e.g. I 1.7)

- Program overview display, if necessary with call structure of all blocks of a complete program
- Assignment plan for inputs, outputs, flags, timers and counters
- Assignment lists with comments (up to 40 characters per assignment)

In addition to standard output, user-friendly output of documentation functions (previously called KOMDOK) can be used. It permits, for example, automation of printout using control statements or graphic preparation, sorting and evaluation of program data.

STEP 5 programming software (continued)

Function (continued) STEP 5 Version 7.0

STEP 5 Version 7.0 includes a whole range of improvements and innovations over the previous version.

Real DOS application

Version 7.0 is the first "real" DOS variant of STEP 5 and makes consistent use of the functions of this operating system:

- Consistent implementation of the SAA standard
- Use of DOS directory paths; the previous restriction to one directory per drive has been abolished
- Use of all drive letters from A to Z

Improved performance

Version 7.0 includes further increases in performance:

- Use of the entire RAM including extended memory (XMS)
- Reduction of the memory requirements in the conventional memory area
- Lower package reloading times for improved strategy
- Integration of the EPROM driver into the STEP 5/ST basic package; it no longer needs to be resident in the RAM

Ergonomic user interface

Operator ergonomics has been improved once again:

- Shallower menu structures; by and large there are now only two menu levels
- Standardization of the dialog field structure
- New acceleration keys and hotkeys
- Project settings in "index cards"
- Access to interfaces from project settings
- Direct fast callup of editors from the project settings, the block directory and ISTACK
- Test functions quickly accessible through new menu items "test" and "PLC"
- Online/offline switchover now in dialog boxes

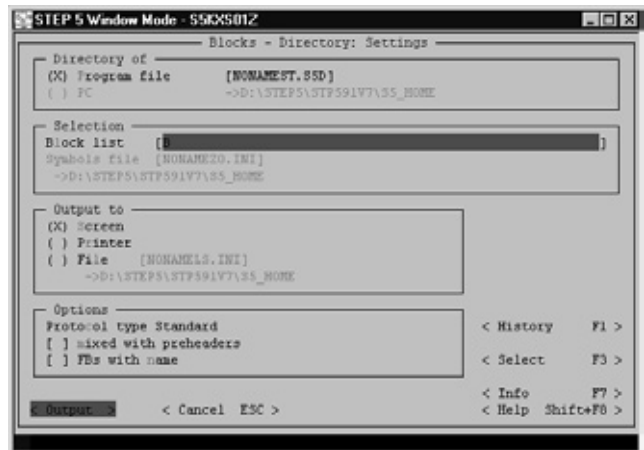


Fig. 7/4 Dialog field-structure



Fig. 7/5 Project settings (index cards)

- Extended and standardized syntax for the block list, valid for all functions (editor, printer etc.)

New functions

Numerous new functions have been integrated into the program:

- Switchover between various languages within STEP 5
- Call of a DOS shell from STEP 5
- Automatic loading of the last active optional package on restarting STEP 5 (if parameterized)
- Retention of the project files last used in the "file" menu
- History (repetition function) for input fields in dialog boxes or in program handling

- Extension of help and info functions in the menu and in the dialog boxes, fast access by menu keys
- Integration of COM packages into the "change" menu
- New options for general project settings, e.g. compatibility monitoring between older and new STEP 5 versions

Extensive downward compatibility

In the development of STEP 5/ST V7.0, the greatest possible compatibility with versions 3.x and 6.x has been retained.

If new options are used, e.g. DOS paths, incompatibility with older STEP 5 versions can arise because they do not know these functions. In this case a message appears indicating abandonment of compatibility.

STEP 5 basis packages (continued)

Technical specifications

	STEP 5/ST basic package for programmers and PCs	STEP 5/ST for mini-controllers
Current version	V 7.0	V 7.0
Operating system	MS-DOS V5.0 and higher Windows 3.x Windows 95	MS-DOS V5.0 and higher Windows 3.x Windows 95
RAM capacity in the programmer/PC min.	4 Mbytes	4 Mbytes
Disk requirements in the programmer/PC	13 Mbytes	13 Mbytes
Platform	PG, PC	PC
Target system	S5-90U S5-95U/F S5-100U S5-101U S5-115U/H/F S5-135U S5-150U S5-155U/H	S5-90U S5-95U S5-100U

Ordering data

	Order No.		Order No.
<p>STEP 5/ST-basic package for PG and PC (V7.0) on the basis of MS-DOS with authorization diskette, for programming all PLCs with PCs, on 3 1/2" diskettes in German, English, French, Spanish, Italian. Single license Copy license</p>	<p>6ES5 894-0MA04 6ES5 894-0MA04-0KL1</p>	<p>PC-AG cable (734-1) Connecting cable between SIMATIC S5 (15-pin) and PC (25-pin), 3.2m</p> <p>PG-AG cable (734-2) (included in the scope of supply of the programmer, 3.2m) connecting cable between the programmer and SIMATIC S5, 5 m 10 m 25 m</p> <p>Documentation for STEP 5/ST for PG/PC (V7.0) (also for STEP 5/ST basic package and STEP 5/ST for mini controllers) German English French Spanish Italian</p>	<p>6ES5 734-1BD20</p>
			<p>STEP 5/ST for mini-controllers (V7.0) on the basis of MS-DOS with authorization diskette for programming mini PLCs, S5-90U, 95U and 100U, executable on PC, on 3 1/2" diskettes in German, English, French, Spanish, Italian Single license Copy license</p>