Training document for the company-wide automation solution Totally Integrated Automation (T I A)

MODULE C1

Sequencer programming with S7-GRAPH

We thank the company Michael Dziallas Engineering and the instructors of vocational schools as well as further persons for the support with the production of the document.

PAGE:

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The following symbols stand for the specified modules:

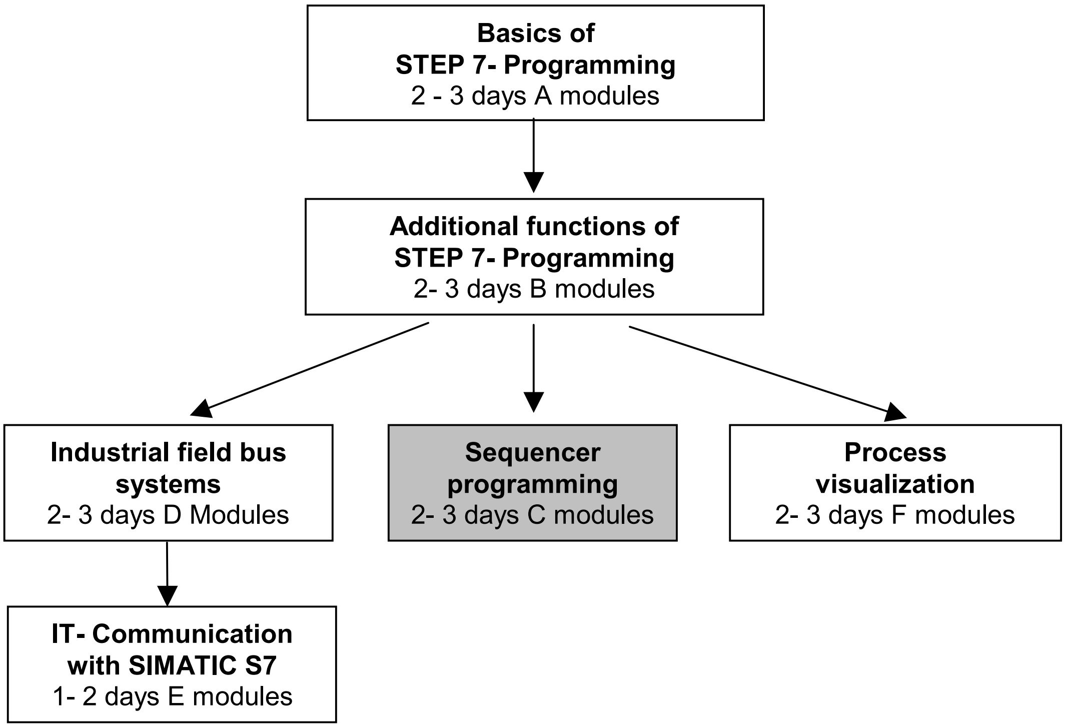
ℹ **Information**

🖥 **Programming**

⚠ **Notes**

1. FORWARD

The module C1 is assigned content wise to **Sequencer programming**.



Learning goal:

In this module, the reader will learn the programming of a sequential control system with the graphic programming tool S7-GRAPH. The module shows the principle procedure in the following steps by means of a detailed example.

- Installation of the software
- Performance of types from the sequential control system and the representation possibilities from movement sequences, switch states, signal flow and motion charts.
- Generation of a simple movement execution displayed as a path step chart and as a function chart by means of a programming example.
- The pertinent sequential control system is examined as a sequencer program in S7-GRAPH. With the help of the debug- and diagnostic functions, the mode of operation of the generated program can be checked.
- Through a modifier of the task position with additional marginal conditions, further functions from S7-GRAPH are arranged .

Requirements:

For the successful use of this module, the following knowledge is assumed:

- Knowledge in the use of Windows 95/98/2000/ME/NT4.0
- Basics of PLC- Programming with STEP 7 (e.g. Module A3 – 'Startup' PLC- Programming with STEP 7)

Required hardware and software

1 PC, Operating system Windows 95/98/2000/ME/NT4.0 with

- Minimal: 133MHz and 64MB RAM, approx. 65 MB free hard disk space
- Optimal: 500MHz and 128MB RAM, approx. 65MB free hard disk space

2 Software STEP 7 V 5.x

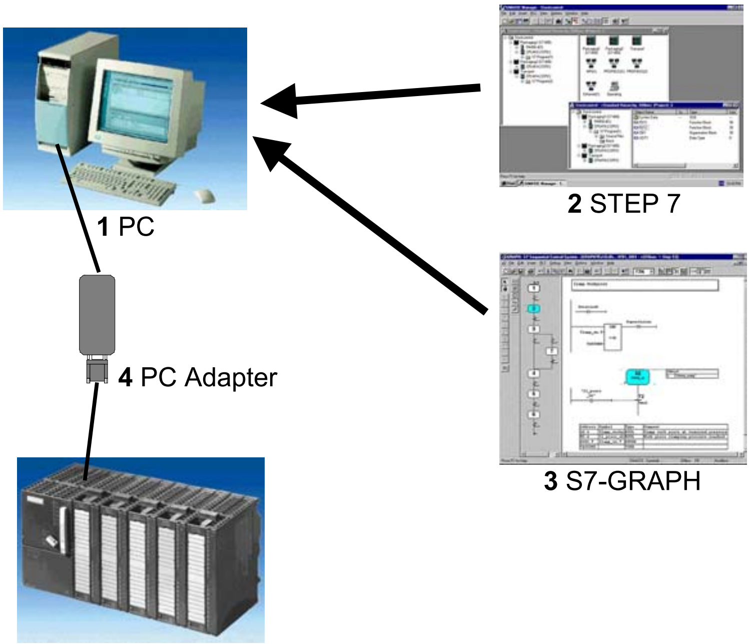
3 Software S7-GRAPH V5.x

4 MPI- Interface for the PC (e.g. PC- Adapter)

5 PLC SIMATIC S7-300 with at least one digital in- and output module. The inputs must be lead through a functional unit.

Example configuration:

- Power supply: PS 307 2A
- CPU: CPU 314
- Digital inputs: DI 16x DC24V
- Digital outputs: DO 16x DC24V / 0.5 A



2. NOTES FOR THE OPERATION OF S7- GRAPH

With the programming language S7-GRAPH, the function range of STEP 7 is extended to a graphic programming possibility for sequential control systems. With S7-GRAPH you can clearly and quickly program a sequential control system. The process is divided into single steps and the execution is plotted.
In the single steps, the required actions are specified. The continued switching conditions to the respective next step (transitions) can be provided in the programming language LAD or FBD. The programming language S7-GRAPH corresponds to the specified execution language SFC "Sequential Function Chart". in the Norm DIN EN 61131-3 (IEC 61131-3).

With the operation of S7-GRAPH, the following should be considered:

- The software package STEP 7 professional version **(not STEP 7 Mini!)** is required
- The provided programs are executable on CPUs of the SIMATIC S7-300 and S7-400.
- Due to the increased storage requirement of the program's applications, only the CPUs starting from CPU 315 are used.
- For training purposes, simple sequencers can start from CPU 314/314-IFM, as presented in this example document.

3. INSTALLATION OF THE S7-GRAPH SOFTWARE

S7-graph is an option package to STEP 7, thus it assumes that the professional version of STEP 7 is already installed on your computer. (see module A2-Installation of STEP 7 V5.x/handling of authorizing). S7-graph is delivered on CD ROM with an enclosed disk, which contains an authorization, that must be transferred to the PC in order to make the use of S7-GRAPH possible. This authorization disk can also be used on another PC or can be copied in order to authorize the software. For the topic of installation and transmission of authorization, please refer to module A2 (Installation of STEP 7 V5.x/handling of authorization).

To install S7-GRAPH, please proceed to the following measures.

1. Place the S7-GRAPH CD in the CD- ROM drive.
2. The setup program should start automatically. If not, it can be started by double clicking on the **setup.exe** executable file on the CD. The setup program will guide you through the whole installation process of the S7-GRAPH software.
3. In order to use the professional version of S7-GRAPH, the software must be authorized on your computer. The files from the authorization disk must be transferred onto the PC. This process will execute at the end of the software installation. A dialog window will appear and ask you if you would like to authorize the software. If **Yes** is selected, the authorization disk must be inserted in order to transfer the proper files to the PC.

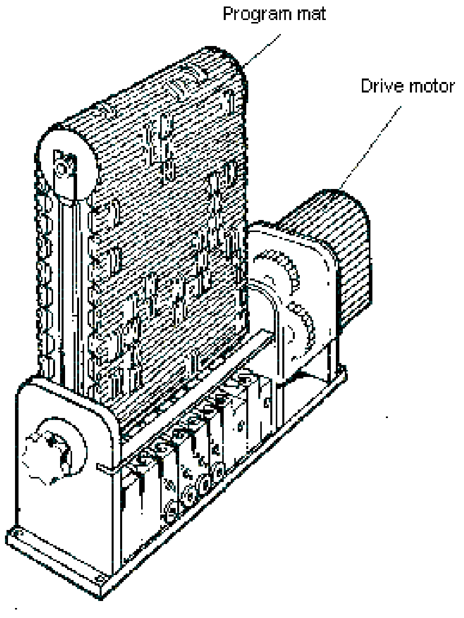
4. SEQUENTIAL CONTROL SYSTEMS

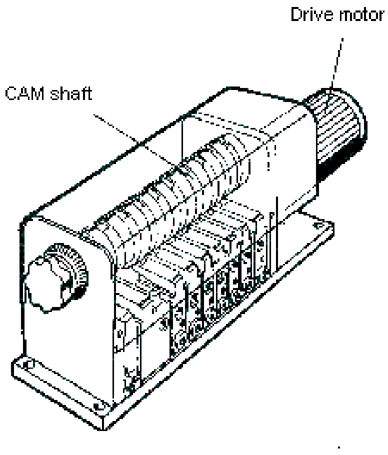
A sequential control system is a controller with inevitable step by step execution, in which the further phases from a step depend on further conditions, which take place on the next planned step. The step sequence can be programmed in a special way, e.g. with jumps, loops, branches.
With S7-GRAPH, sequential control systems can be programmed, so that the step by step sequence can be very simply and quickly graphically displayed.

There are two types of sequential control systems:

4.1 Time-dependent sequential control system

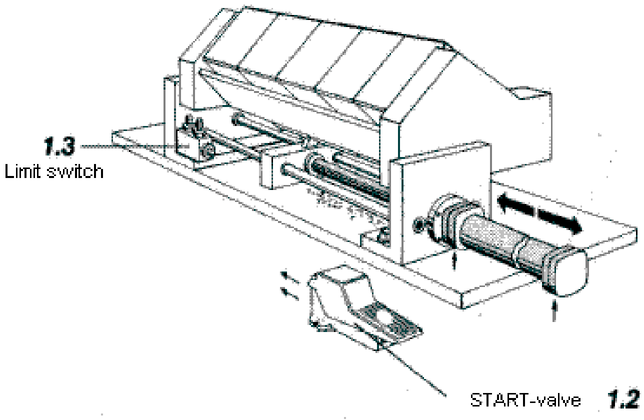
By the time-dependent sequential control system, the further operating conditions are only dependent on time. For the creation of the further conditions, e.g. timers, time counters, drum controllers or CAM mats with a continuous number of revolutions can be used.

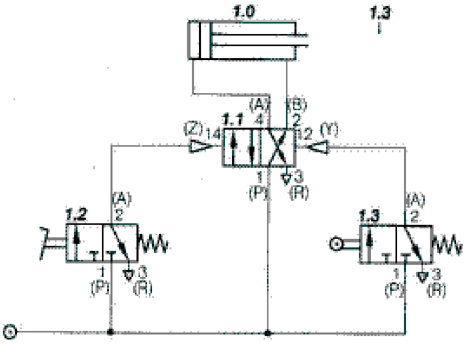




4.2 Processor-dependent sequential control system

By the processor dependent sequential control system, the further operating conditions are only dependent on the signals of the controlled system. For the creation of the signals, signal element like a limit switch, switch, button or sensors can be used. The required signals can also be operated on with timer functions.





Cutting apparatus

With operation of the start-valve, the cylinder of the cutting apparatus extends. After reaching the front end position, the limit switch is actuated and the cylinder automatically retracts.

5. DISPLAY POSSIBILITIES OF MOTION EXECUTION AND SIGNAL STATES

Cooperating work and control elements can be clearly pointed out through suitable representation possibilities. Even with the sophisticated setting of tasks, the connections are still recognized as fast and safe. Besides a simple representation of motion executions and switch states, it also makes the communication of different experts in a large framework possible.

Possible display forms of motion executions and signal states

- **Description of the control tasks**
  The control sequence is described in the form of text.

- **Inscription in chronological order**
  The control sequence is represented in short lines.

- **Table mode**
  The step by step execution is queued in a table.

- **Short representation**
  The sequence can be quickly and simply displayed by a simplified display of the motions.

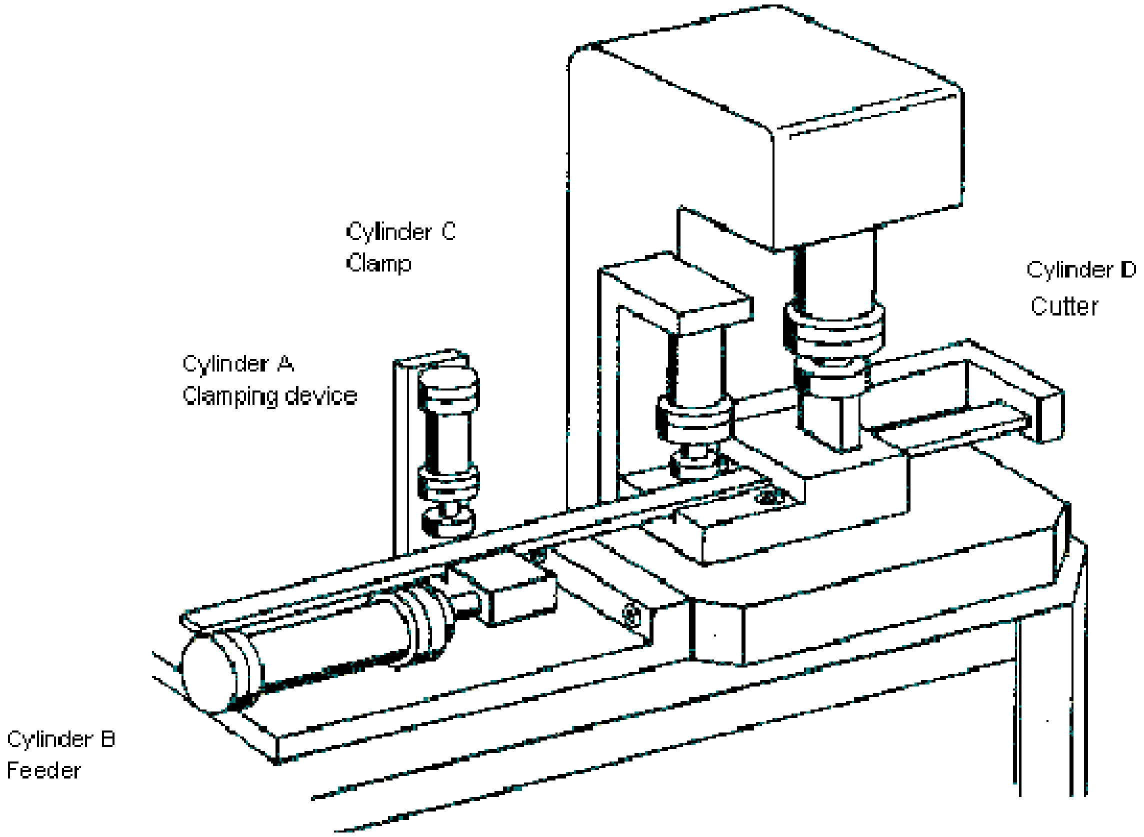
- **Motion chart**
  With help from the path-step and path-time charts, the motion execution is displayed graphically. A better overview of the connections is given.

- **Function chart**
  A process orientated representation of the control problem. The function chart replaces or supplements the verbal description and represents a control problem with its substantial characteristics and respective applications clearly. S7-GRAPH is a programming language that basically corresponds to a function chart.

By means of a program example, the different display possibilities will be described.

5.1 Description of the control tasks

A controller for a cutting apparatus is to be sketched. With the cooperation of a supply unit and a cutting apparatus, the rod material will be shortened. The material follows through the feed cylinder (cylinder B), which moves along the pneumatic clamping device (cylinder A). If the material is pushed up against an end stopper, it is held by the clamp (cylinder C). At the same time, the cutting procedure can begin (cylinder D), and afterwards, the opening of the clamping device (cylinder A) take place. The clamping device (cylinder A) is opened so it goes back into the starting position(cylinder B). If the cutting procedure is terminated (cylinder D) and the supply unit has reached the starting position, then the clamp (cylinder C) will be opened and it can begin a new working execution. The start is released by the actuation of the START-button, if all cylinders are in the rear end position.



5.2 Inscription in chronological order

Cylinder A extends and closes the clamping device,
Cylinder B extends and pushes the material to the end stopper.
Cylinder C extends and clamps the rod material in the cutting apparatus.
Cylinder A retracts (the clamp device opens) and cylinder D extends (Cut),
Cylinder B retracts (the feed device returns to starting position) and cylinder D retracts,
Cylinder C retracts and opens the clamp device.

5.3 Table mode

Step	Cylinder A	Cylinder B	Cylinder C	Cylinder D
1	Forward	-	-	-
2	-	Forward	-	-
3	-	-	Forward	-
4	Back	-	-	Forward
5	-	Back	-	Back
6	-	-	Back	-

5.4 Short representation

For the motion sequence it is often insignificant which tasks with a movement are satisfied, so a motion sequence can also be used for many different controls. By more extensive controls, the motion sequence should first be described in short representation, since a quick overview of the movements is given here.

By short representation, movement names are assigned.

Name for the extension or forward travel of a cylinder:	**+**
Name for the retraction or return travel of a cylinder:	**-**

For motors, M+ can be used for moving right, M- for left and M* for stop.
Parallel movements are written in short representation.

For our program example short representation is represented as follows:

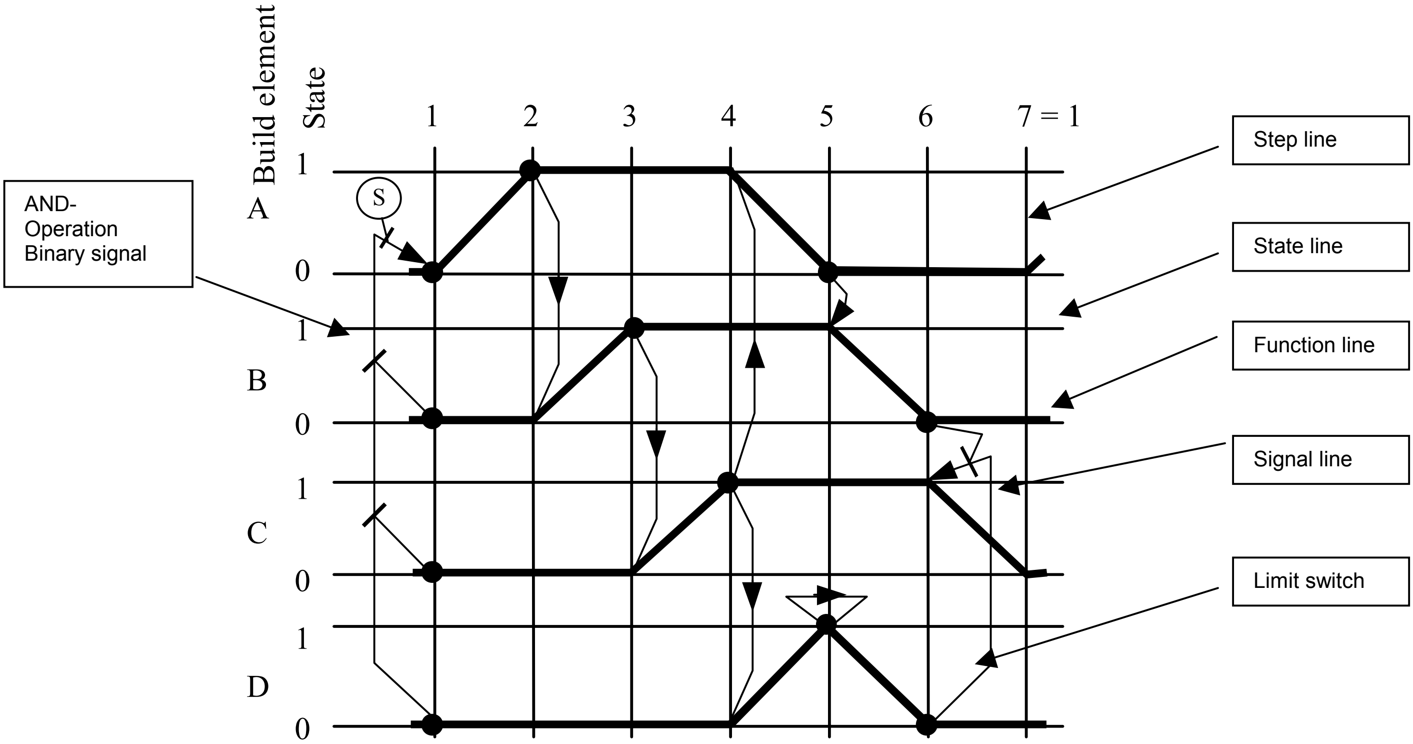
			A-	**B-**	
A+	**B+**	**C+**	**D+**	**D-**	**C-**

5.5 Motion chart

5.5.1 Path-step chart

Here the working execution of a work element is represented and as a function of the respective steps (step: A change of the condition of any physical unit), the setback way is applied. If several work elements are available for a control, then they are represented in the same way and drawn one under another. The relation is produced by the steps. With the path-step chart, the distance of the step lines is always alike. Additionally the signal lines can be registered into the path-step chart.

For our example, the path step-chart appears in the following dimensions .



5.5.2 Path-time chart

The path-time chart is a path-step chart by which the additional course of the movements is essentially pointed out by a time border at the lower end of the diagram. There the duration of a movement can be read. The distance of the step lines changes depending upon the required time. The number of steps and the kind of movements remain unchanged.

6. DEVELOPMENT OF A CUTTING APPARATUS

For the developing of a cutting apparatus, a function chart should be generated after the assignment of the signal elements and work elements.

6.1 Assignment of the signal elements

S0		Start-Button
S1	a0	Limit switch cyl. A retraction
S2	a1	Limit switch cyl. A extension
S3	b0	Limit switch cyl. B retraction
S4	b1	Limit switch cyl. B extension
S5	c0	Limit switch cyl. C retraction
S6	c1	Limit switch cyl. C extension
S7	d0	Limit switch cyl. D retraction
S8	d1	Limit switch cyl. D extension

6.2 Assignment of the work elements

Y1	Solenoid valve for cylinder A ext/ret
Y2	Solenoid valve for cylinder B ext/ret
Y3	Solenoid valve for cylinder C ext/ret
Y4	Solenoid valve for cylinder D ext/ret

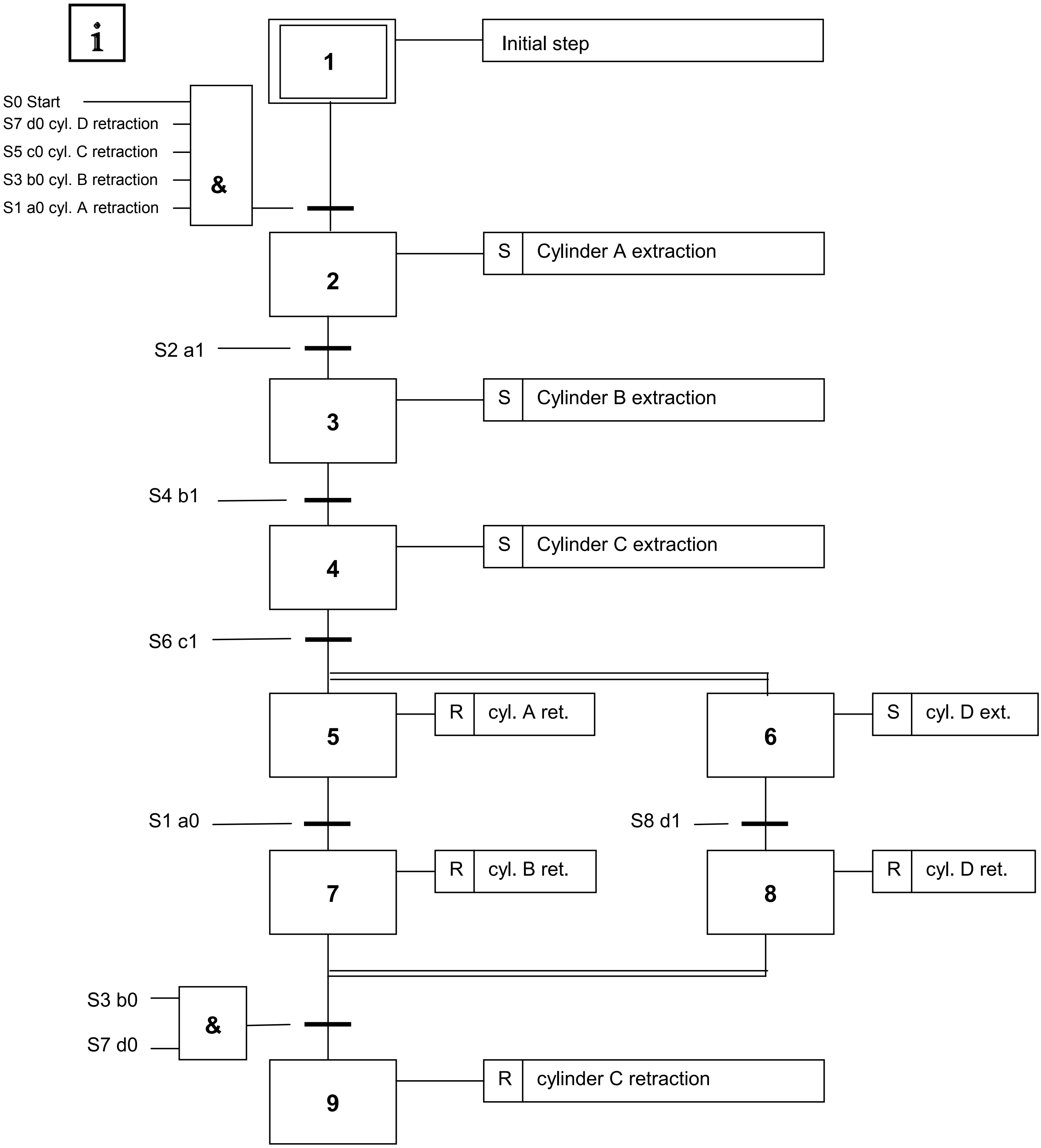
6.3 Function chart in DIN EN 61131-3 (IEC 61131-3)

The function chart is a process orientated representation of a control problem, independent of the realization of e.g. the used equipment. It facilitates a cooperating of different technical disciplines, e.g. mechanical engineering, pneumatics, hydraulics, process engineering, electrical engineering, electronics etc.. A control problem is clearly represented with its substantial characteristics in a basic structure (step field) and with the details in a fine structure (instruction field) necessary for respective application.

Note

Since the cutting apparatus can work in two separate stations(feed station and cutting apparatus), a function chart with a simultaneous branch must be provided.

6.4 Function chart of the cutting apparatus in DIN EN 61131-3 (IEC 61131-3)

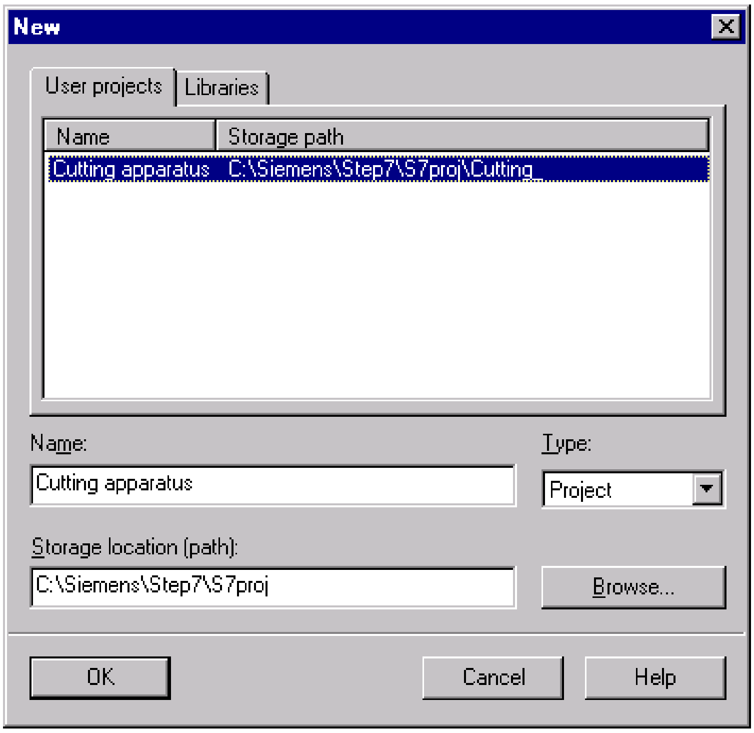


7. GENERATION OF AN S7-GRAPH PROGRAM

ℹ From the function chart, an executable S7-GRAPH program will be provided.

7.1 Starting SIMATIC Manager and generating a new project

1. Click on the symbol **New**.
2. Give a project name.
3. Click on **OK**.



Name	Storage path
Cutting apparatus	C:\Siemens\Step7\S7proj\Cutting

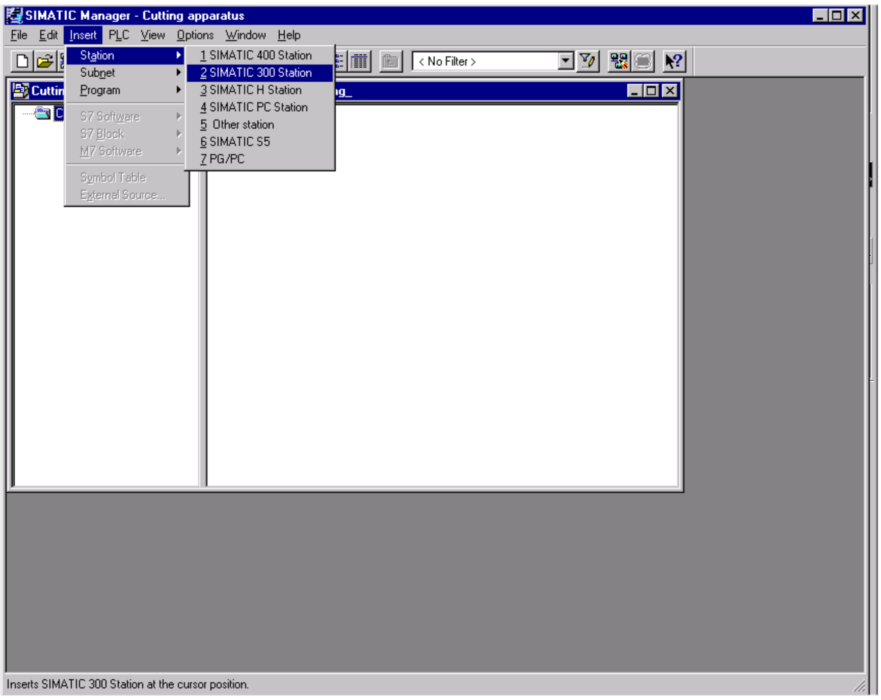
Name: Cutting apparatus

Type: Project

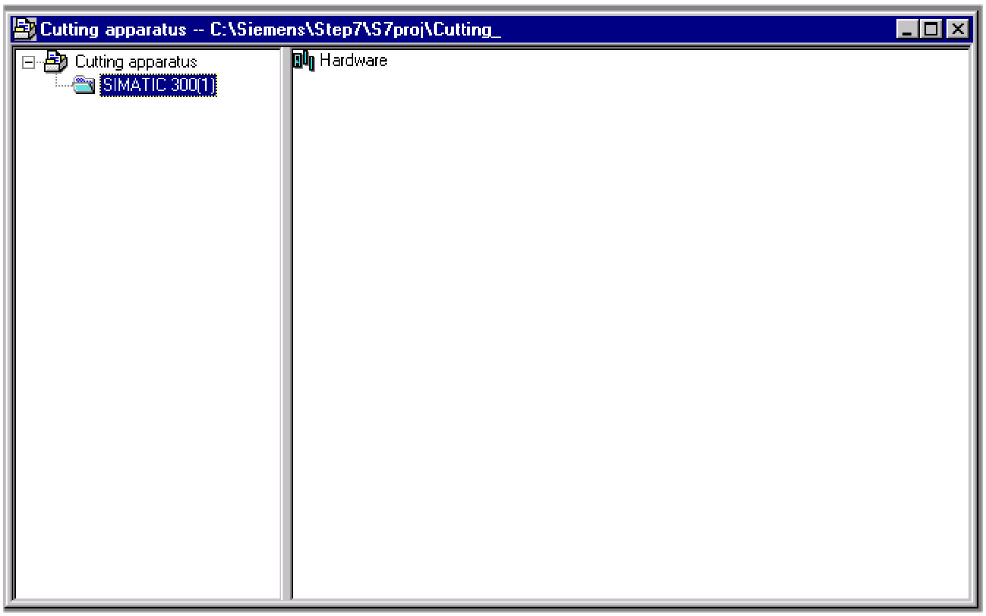
Storage location (path): C:\Siemens\Step7\S7proj

7.2 Inserting a SIMATIC 300-Station and opening hardware configuration

1. Highlight project name **Cutting apparatus**.
2. Click on **Insert**.
3. Choose a **Station**.
4. Click on **SIMATIC 300-Station**.
5. Choose **SIMATIC 300(1)**.
6. Double click on **Hardware**.

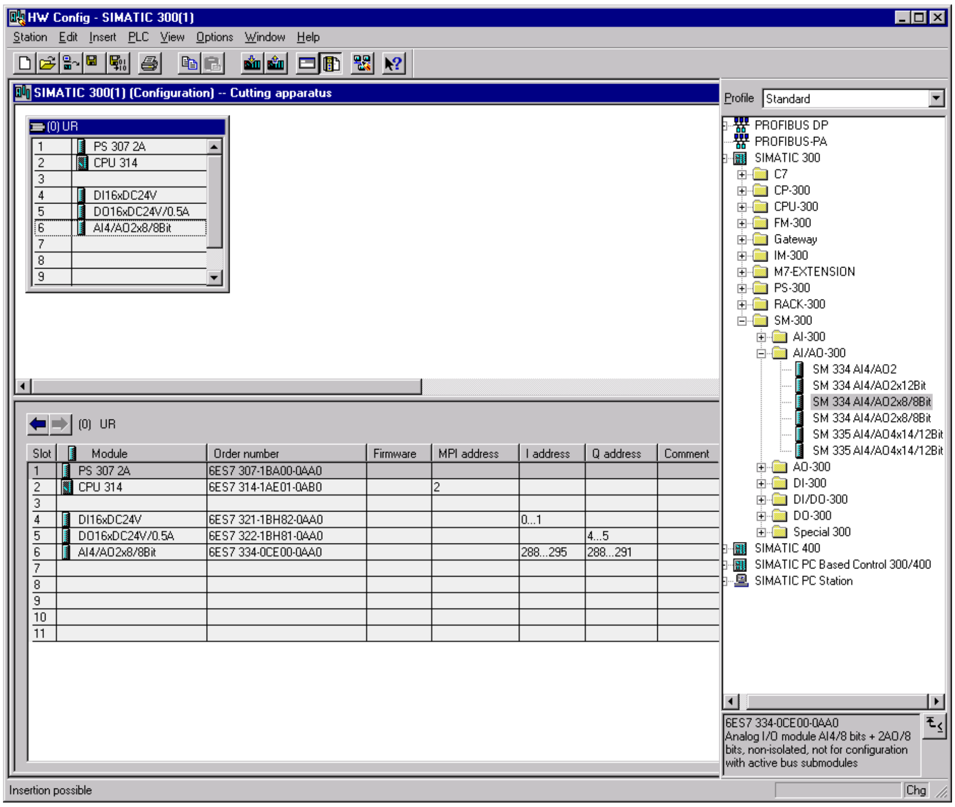


Inserts SIMATIC 300 Station at the cursor position.



7.3 Configuring hardware and transferring in automation equipment

1. Enter hardware components.
2. **Save** and **Compile**.
3. **Download** hardware **to Module**.
4. Close window.



(0) UR

1	PS 307 2A
2	CPU 314
3	
4	DI16xDC24V
5	DO16xDC24V/0.5A
6	AI4/AO2x8/8Bit
7	
8	
9	

(0) UR

Slot	Module	Order number	Firmware	MPI address	I address	Q address	Comment
1	PS 307 2A	6ES7 307-1BA00-0AA0					
2	CPU 314	6ES7 314-1AE01-0AB0		2			
3							
4	DI16xDC24V	6ES7 321-1BH82-0AA0			0...1		
5	DO16xDC24V/0.5A	6ES7 322-1BH81-0AA0				4...5	
6	AI4/AO2x8/8Bit	6ES7 334-0CE00-0AA0			288...295	288...291	
7							
8							
9							
10							
11							

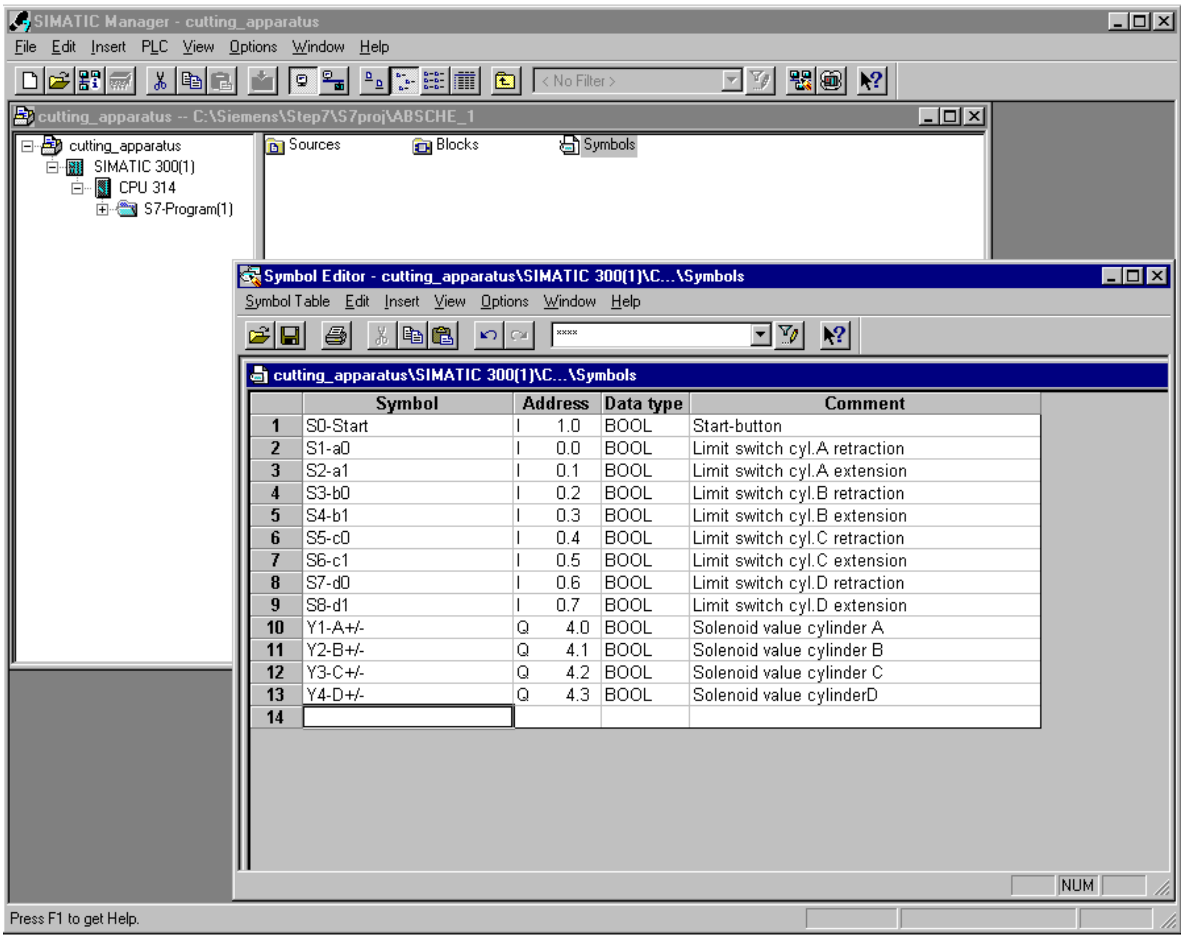
6ES7 334-0CE00-0AA0
Analog I/O module AI4/8 bits + 2AO/8 bits, non-isolated, not for configuration with active bus submodules

Insertion possible

Note
The represented hardware configuration is an example.
Depending on the used automation equipment, a separate hardware configuration should be made.

7.4 Generating a symbol table and inputting symbols

1. Open CPU 314 node tree and click on **S7-Program(1)** .
2. Double click on **Symbols**.
3. Enter symbol table.
4. Save symbol table.
5. Close window.

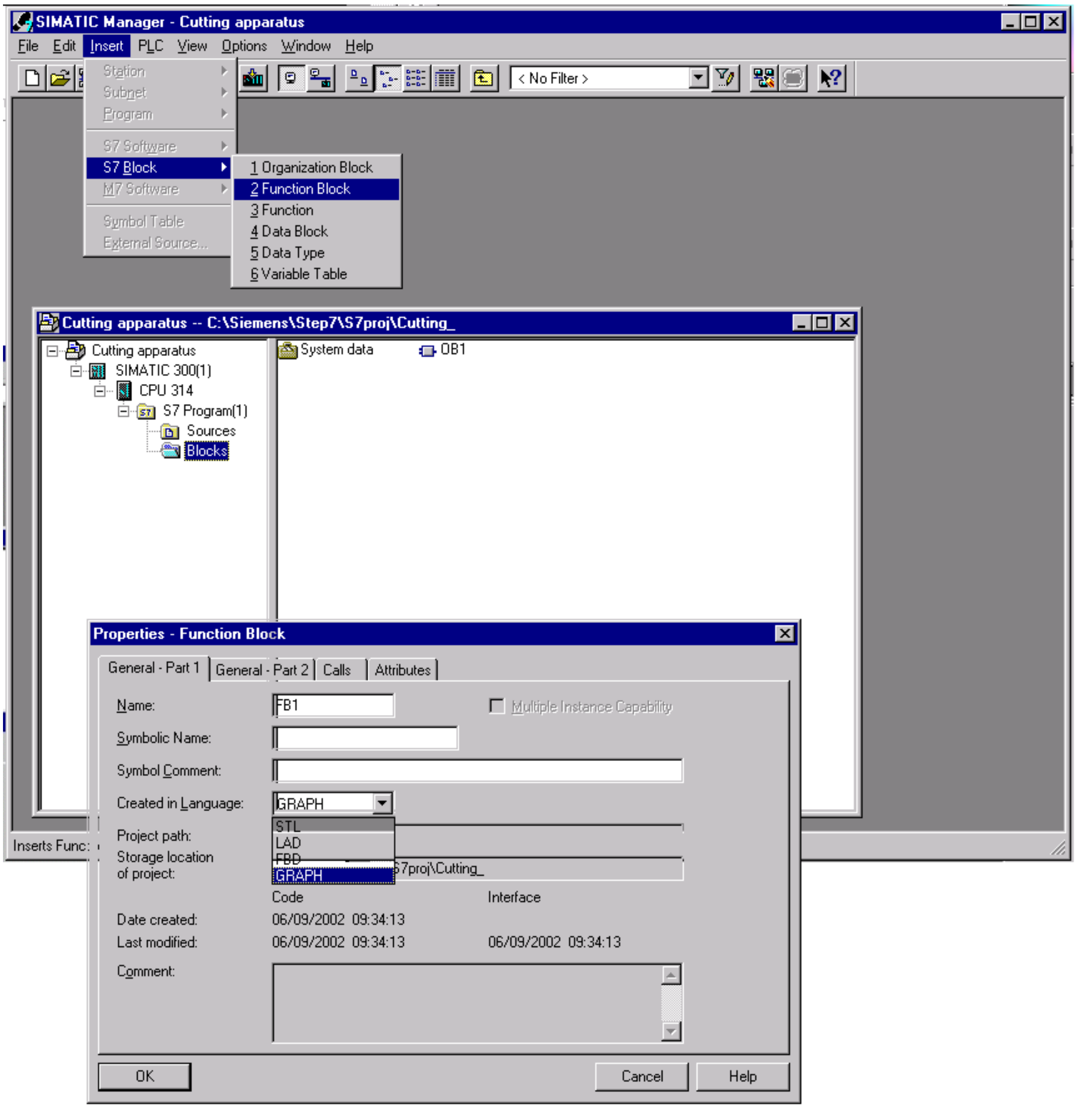

SIMATIC Manager - cutting_apparatus
File Edit Insert PLC View Options Window Help
< No Filter >
cutting_apparatus -- C:\Siemens\Step7\S7proj\ABSCHE_1
cutting_apparatus
SIMATIC 300(1)
CPU 314
S7-Program(1)
Sources
Blocks
Symbols
Symbol Editor - cutting_apparatus\SIMATIC 300(1)\C...\Symbols
Symbol Table Edit Insert View Options Window Help
cutting_apparatus\SIMATIC 300(1)\C...\Symbols
NUM
Press F1 to get Help.

	Symbol	Address		Data type	Comment
1	S0-Start	I	1.0	BOOL	Start-button
2	S1-a0	I	0.0	BOOL	Limit switch cyl.A retraction
3	S2-a1	I	0.1	BOOL	Limit switch cyl.A extension
4	S3-b0	I	0.2	BOOL	Limit switch cyl.B retraction
5	S4-b1	I	0.3	BOOL	Limit switch cyl.B extension
6	S5-c0	I	0.4	BOOL	Limit switch cyl.C retraction
7	S6-c1	I	0.5	BOOL	Limit switch cyl.C extension
8	S7-d0	I	0.6	BOOL	Limit switch cyl.D retraction
9	S8-d1	I	0.7	BOOL	Limit switch cyl.D extension
10	Y1-A+/-	Q	4.0	BOOL	Solenoid value cylinder A
11	Y2-B+/-	Q	4.1	BOOL	Solenoid value cylinder B
12	Y3-C+/-	Q	4.2	BOOL	Solenoid value cylinder C
13	Y4-D+/-	Q	4.3	BOOL	Solenoid value cylinderD
14					

Note
The address of the operands must be adjusted to the respective automation devices.

7.5 Inserting S7-GRAPH function blocks

1. Open S7-Program node tree and click on Blocks.
2. Click on **Insert**.
3. Choose **S7-Block**.
4. Click on **Function block**.
5. Choose **GRAPH** Created in Language.
6. Click on **OK**.



Name: FB1

Symbolic Name:

Symbol Comment:

Created in Language: GRAPH

Project path:

Storage location of project: ...S7proj\Cutting_

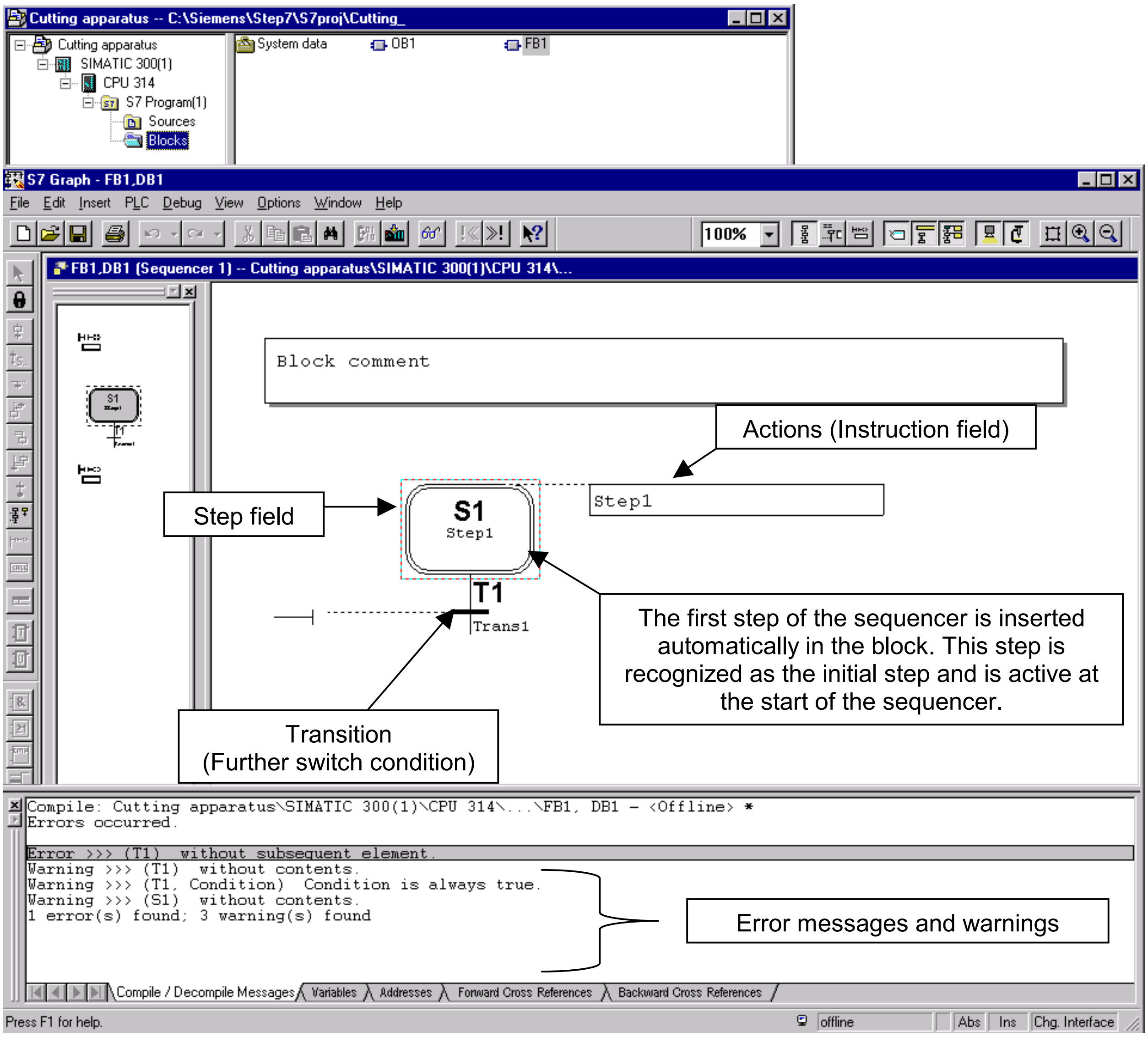
	Code	Interface
Date created:	06/09/2002 09:34:13	
Last modified:	06/09/2002 09:34:13	06/09/2002 09:34:13

Comment:

7.6 Opening S7-GRAPH and inputting sequencers.

1. Click **Blocks**.
2. Double click on **FB1**.

The S7-GRAPH will open.


Cutting apparatus -- C:\Siemens\Step7\S7proj\Cutting_
Cutting apparatus
SIMATIC 300(1)
CPU 314
S7 Program(1)
Sources
Blocks
System data
OB1
FB1
S7 Graph - FB1,DB1
File Edit Insert PLC Debug View Options Window Help
100%
FB1,DB1 (Sequencer 1) -- Cutting apparatus\SIMATIC 300(1)\CPU 314\...
Block comment
Step1
S1
Step1
T1
Trans1
Compile / Decompile Messages
Variables
Addresses
Forward Cross References
Backward Cross References
Press F1 for help.
offline
Abs
Ins
Chg. Interface

Actions (Instruction field)

Step field

The first step of the sequencer is inserted automatically in the block. This step is recognized as the initial step and is active at the start of the sequencer.

Transition
(Further switch condition)

```
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\...\FB1, DB1 - <Offline> *
Errors occurred.

Error >>> (T1) without subsequent element.
Warning >>> (T1) without contents.
Warning >>> (T1, Condition) Condition is always true.
Warning >>> (S1) without contents.
1 error(s) found; 3 warning(s) found
```

Error messages and warnings

7.7 The principle of a sequencer

A sequencer consists of a series of steps, which are activated in a fixed order dependent on the conditions by further switching.

The editing of a sequencer always begins with an initial step or with several initial steps, that stand in an arbitrary place in the sequencer. As long as the actions of a step are implemented, the step is active. During execution of several steps, all are active at the same time.

A step is left, when all possible lined up errors are repaired and/or confirmed and the following transition is performed to the step.

The next step which follows the performed transition becomes active.

At the end of a sequencer rests a jump to any step of the sequencer or another sequencer of the FB. Thus a cyclic operation of the sequencer is possible. At the end of the sequencer rests a chain end. The execution ends with the reaching of the chain end.

7.8 Active step

An active step is a step, whose actions are directly being worked.
The step is active:

- When the conditions of the preceding transition have been accomplished or
- When it is defined as an initial step and the sequencer was initialized
- When it is called through an event dependent action.

7.9 Elements of a sequencer

Step + transition

Jump

Branch stop

Sequencer insert

Open simultaneous branch

Close simultaneous branch

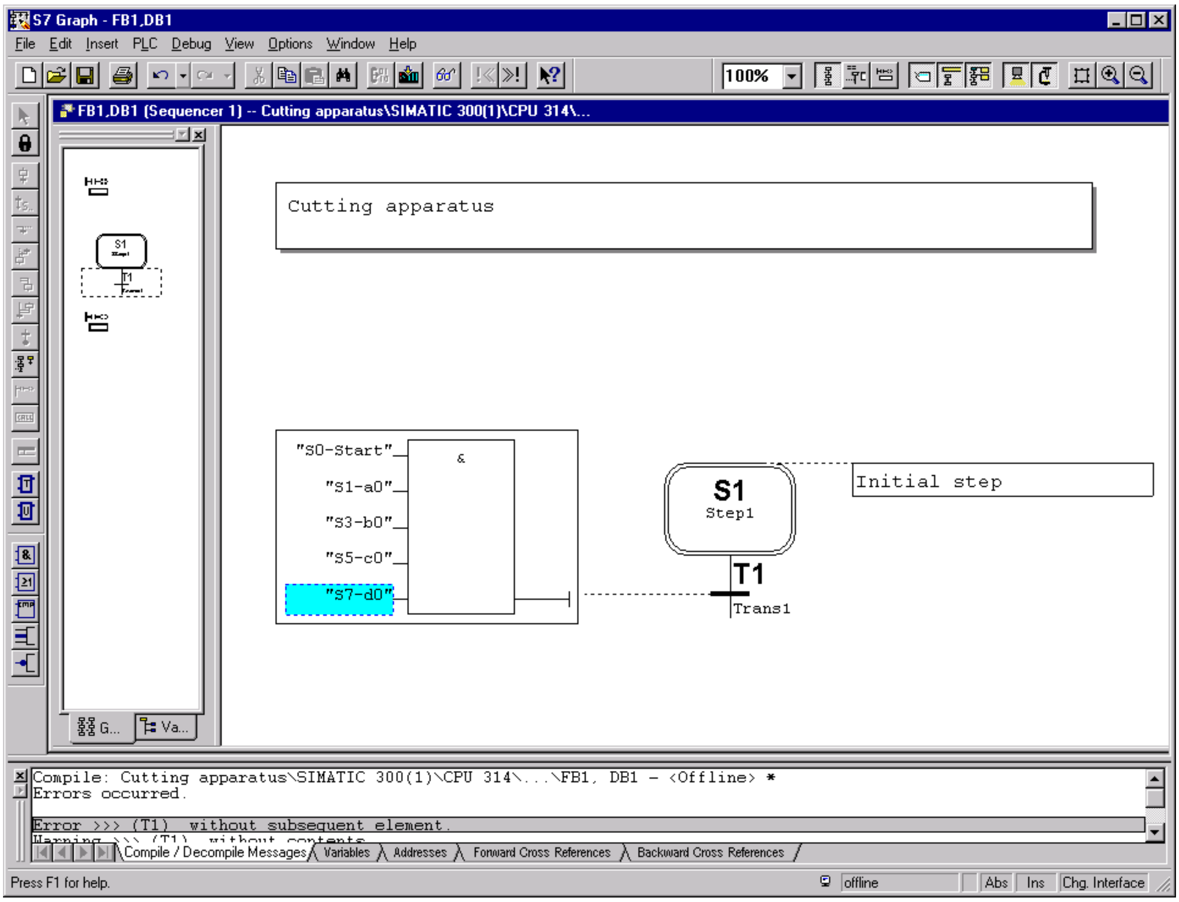
Open alternative branch

Close alternative branch

7.10 Generation of a sequencer in the function chart

7.10.1 First step

1. Double click on **Block comment** and **Step description** and enter information.
2. Click on the **Input of the Transition**.
3. Insert an **And symbol**.
4. Add **additional bin. inputs**.
5. Enter operands on the And-symbol.

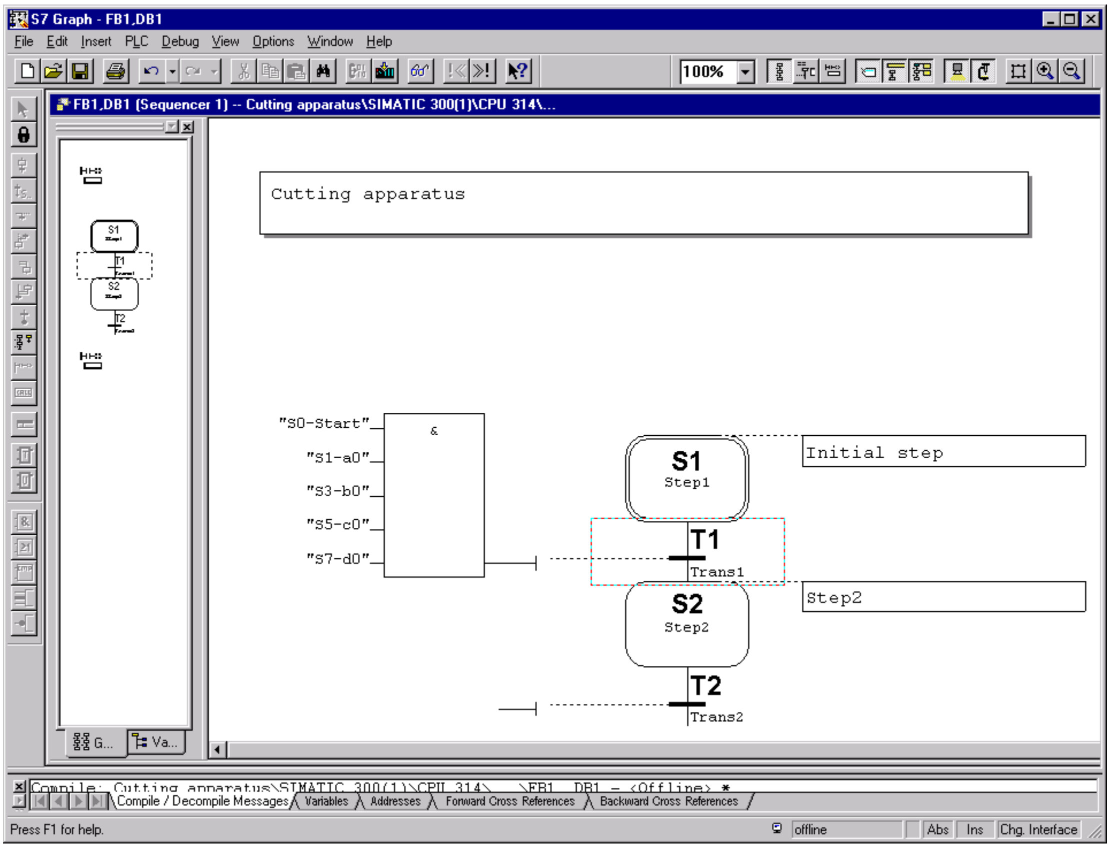


```
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\...\FB1, DB1 - <Offline> *
Errors occurred.

Error >>> (T1) without subsequent element.
Warning >>> (T1) without contents
```

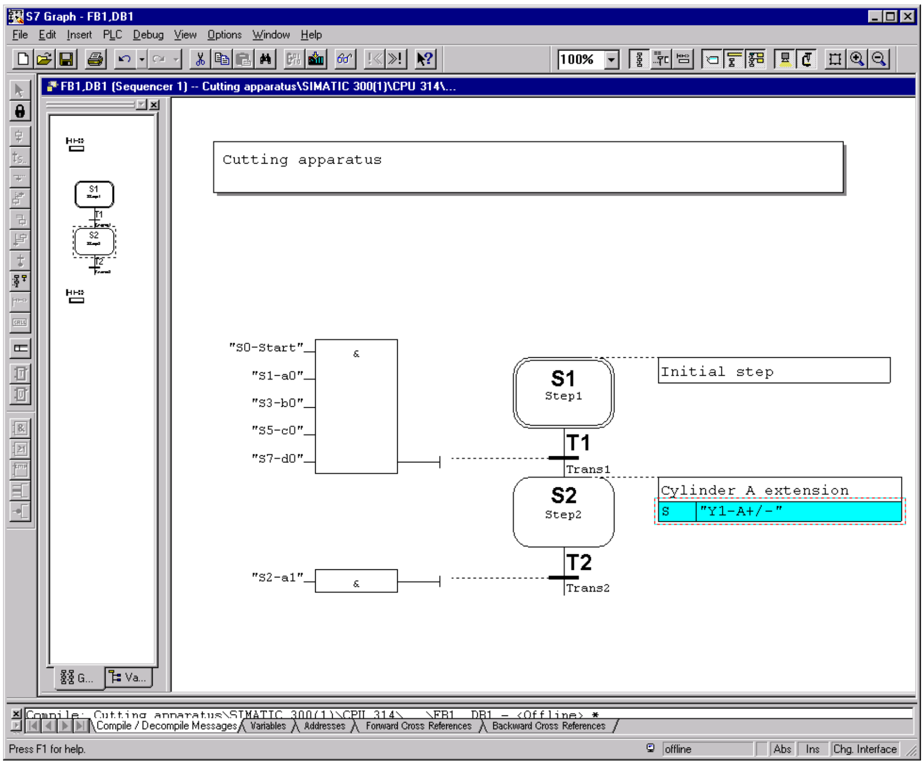
6. Right click on **Transition T1**.
7. Click on **Step + Transition** under Insert New Element.

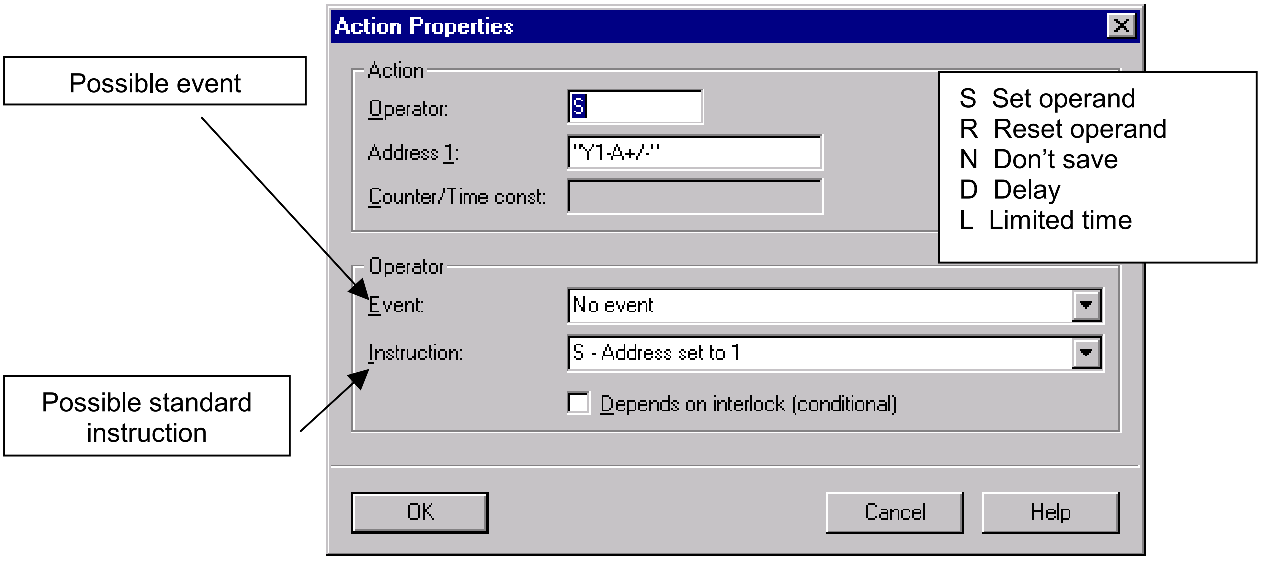
The second step is entered.


S7 Graph - FB1,DB1
File Edit Insert PLC Debug View Options Window Help
100%
FB1,DB1 (Sequencer 1) -- Cutting apparatus\SIMATIC 300(1)\CPU 314\...
Cutting apparatus
"S0-Start"
"S1-a0"
"S3-b0"
"S5-c0"
"S7-d0"
&
S1
Step1
Initial step
T1
Trans1
S2
Step2
Step2
T2
Trans2
G...
Va...
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\ \FB1 DB1 - <Offline> *
Compile / Decompile Messages
Variables
Addresses
Forward Cross References
Backward Cross References
Press F1 for help.
offline
Abs
Ins
Chg. Interface

7.10.2 Second step

1. Click on **Description field** and enter step description.
2. Enter **Action** .
3. Double click on the action to be performed or click on it with the right-mouse button and choose **Object Properties**.
4. Enter transition.


S7 Graph - FB1,DB1
File Edit Insert PLC Debug View Options Window Help
100%
FB1,DB1 (Sequencer 1) -- Cutting apparatus\SIMATIC 300(1)\CPU 314\...
Cutting apparatus
"S0-Start"
"S1-a0"
"S3-b0"
"S5-c0"
"S7-d0"
&
S1
Step1
Initial step
T1
Trans1
S2
Step2
Cylinder A extension
S "Y1-A+/-"
"S2-a1"
T2
Trans2
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\ \FB1 DB1 - <Offline> *
Compile / Decompile Messages
Variables
Addresses
Forward Cross References
Backward Cross References
Press F1 for help.
offline
Abs
Ins
Chg. Interface


Action Properties

Action

Operator: S

Address 1: "Y1-A+/-"

Counter/Time const:

Operator

Event: No event

Instruction: S - Address set to 1

□ Depends on interlock (conditional)

Possible event

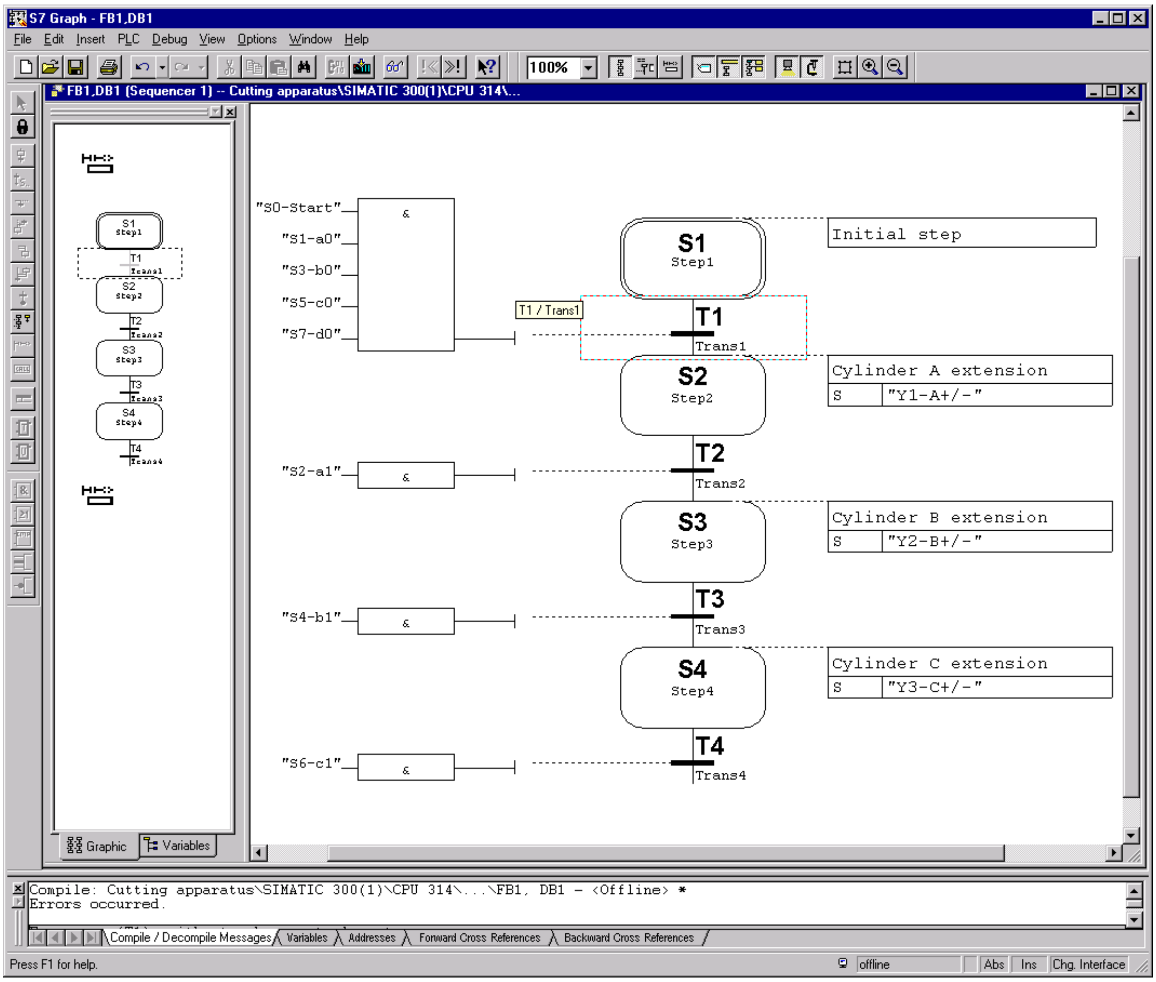
Possible standard instruction

S Set operand
R Reset operand
N Don't save
D Delay
L Limited time

Forward Installation Sequent. control system Representation **Configuration** Debug functions Marginal conditions FB-Parameters

7.10.3 Third and fourth step

1. Click on **Transition T2**.
2. Click on **Step + Transition** two times in order to insert Step S3 and Step S4.
3. Enter step descriptions and actions.
4. Enter transitions.



Initial step	

Cylinder A extension	
S	"Y1-A+/-"

Cylinder B extension	
S	"Y2-B+/-"

Cylinder C extension	
S	"Y3-C+/-"

```
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\...\FB1, DB1 - <Offline> *
Errors occurred.
```

The next steps are inserted with a branch.

There are two types of branches

The alternative branch,

It is inserted after the selected step and begins with a transition.
The steps of an alternative branch are only worked on if the transition is accomplished.
The branch can be closed, either to the left to a transition or terminated with branch end.

Close alternative branch.

branch end.

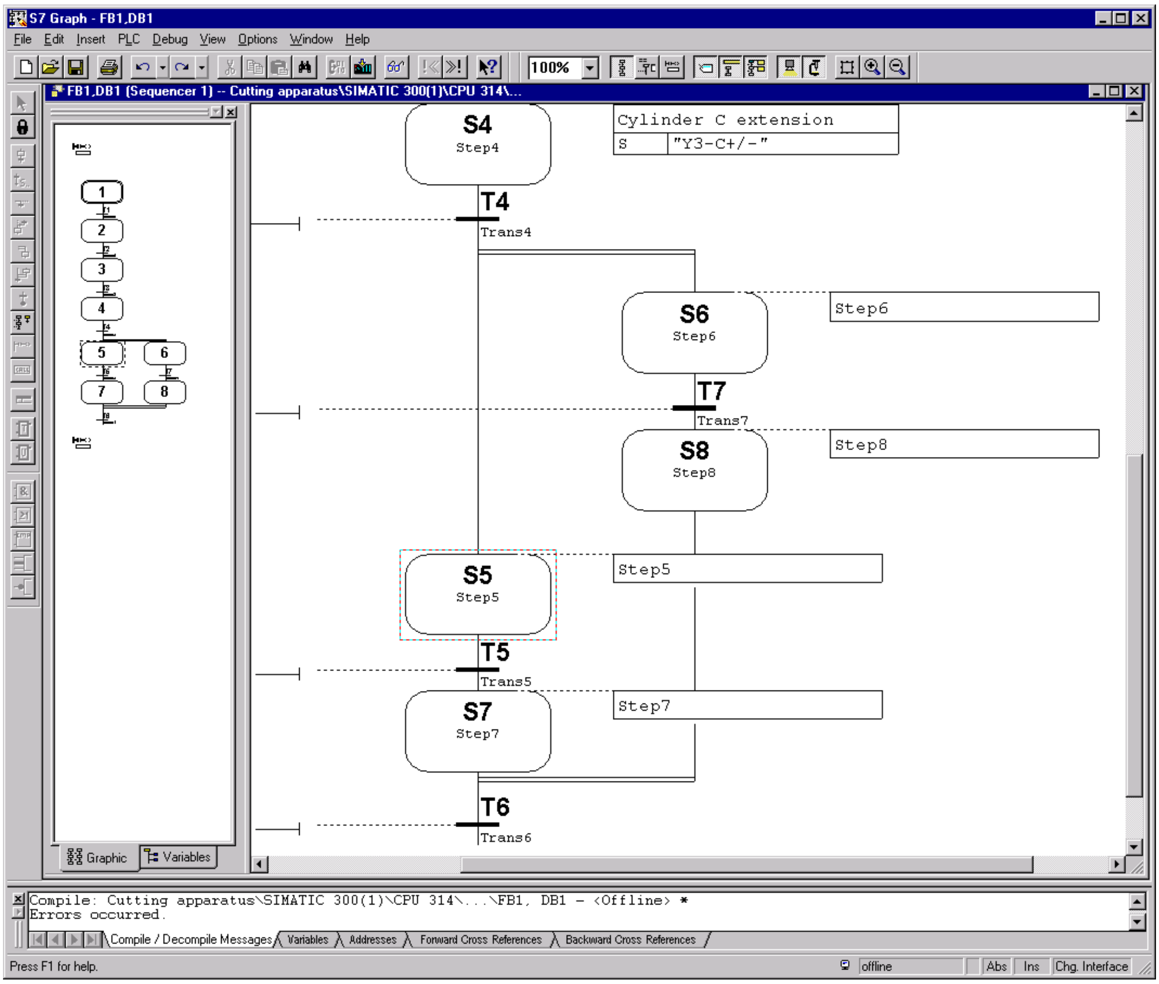
The simultaneous branch,

It is inserted after the selected transition and begins with a step.
The steps of a simultaneous branch must be worked on, since they will continuously run parallel to the basic steps.
The branch must be closed to the left to a step.

Close simultaneous branch.

7.10.4 Inserting a branch

In order to insert branches, it is better to change into the overviews representation.



Cylinder C extension	
S	"Y3-C+/-"

```
Compile: Cutting apparatus\SIMATIC 300(1)\CPU 314\...\FB1, DB1 - <Offline> *
Errors occurred.
```

Press F1 for help.

In order to generate a simultaneous branch, the following actions must be performed:

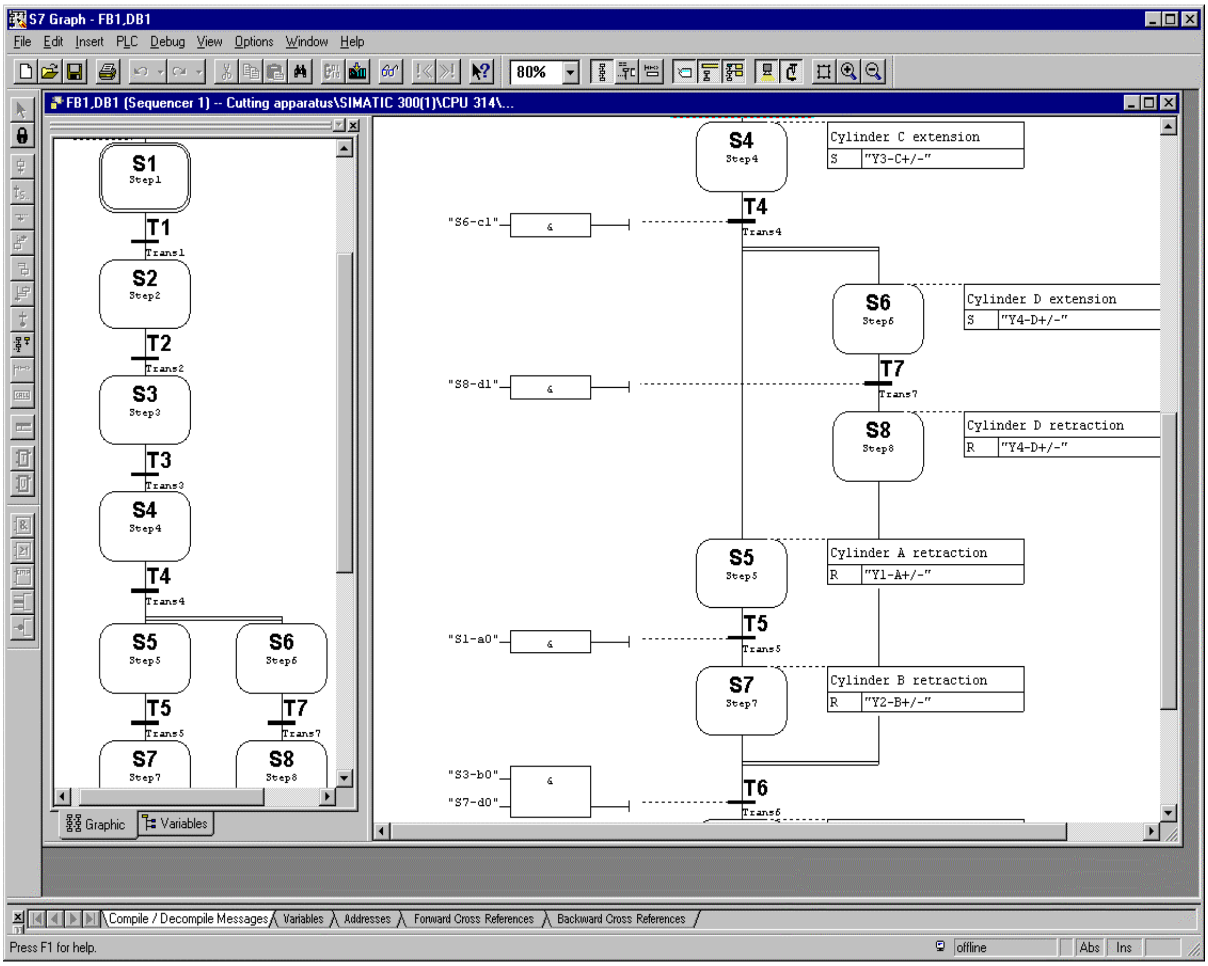
1. Click on **Transition T4**.
2. Insert **Step + Transition** (Step S5 and Transition T5 are inserted).
3. Click on **Transition T4**.
4. Click on **Simultaneous Branch open** (Step S6 is inserted).
5. Click on **Transition T5**.
6. Insert **Step + Transition** (Step S7 and Transition T6 are inserted).
7. Click on **Step S6**.
8. Insert **Step + Transition** (Step S8 and Transition T7 are inserted).
9. Click on **Step S8**.
10. Click on **Simultaneous Branch close**.
11. Click on **Step S7**.

For the inputing of the actions and transitions, one should change to the one page representation.

Forward Installation Sequent. control system Representation **Configuration** Debug functions Marginal conditions FB-Parameters

7.10.5 Entering actions and transitions of the Step S5 to Step S8 and the entering of the last step

1. Change to **One page representation (80%)**.
2. Enter actions.
3. Enter transitions.
4. Click on **Transition T6**.
5. Insert **Step + Transition**.



Cylinder C extension	
S	"Y3-C+/-"

Cylinder D extension	
S	"Y4-D+/-"

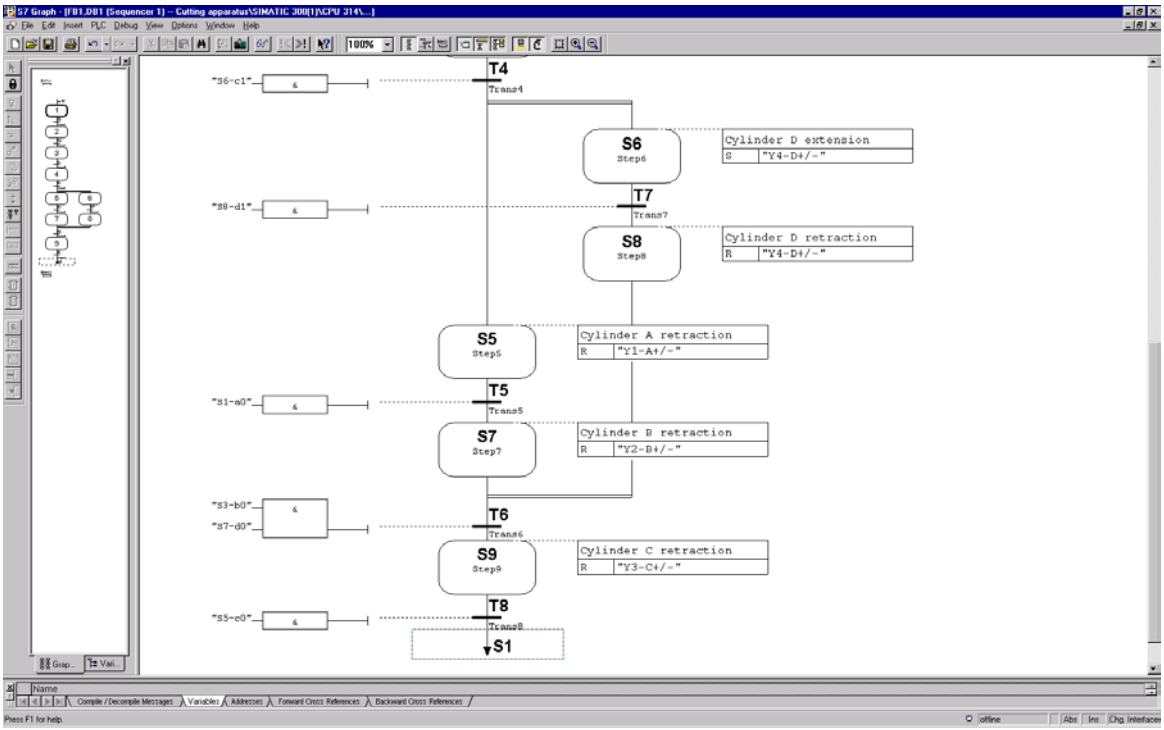
Cylinder D retraction	
R	"Y4-D+/-"

Cylinder A retraction	
R	"Y1-A+/-"

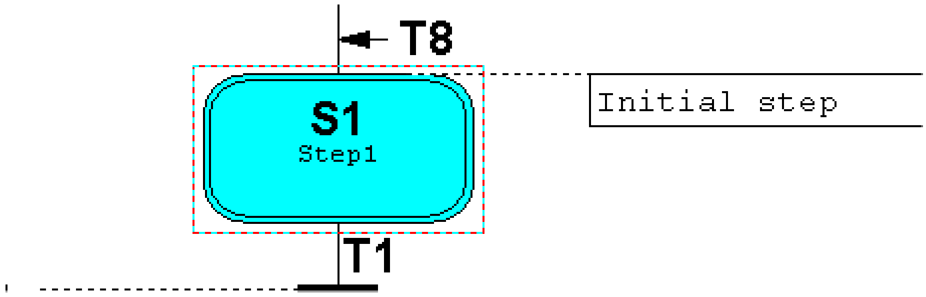
Cylinder B retraction	
R	"Y2-B+/-"

7.10.6 Editing the last step and inserting a return to the first step

1. Enter step description and action.
2. Enter transition.
3. Click on **Transition T8**.
4. ↧S.. Insert jump.



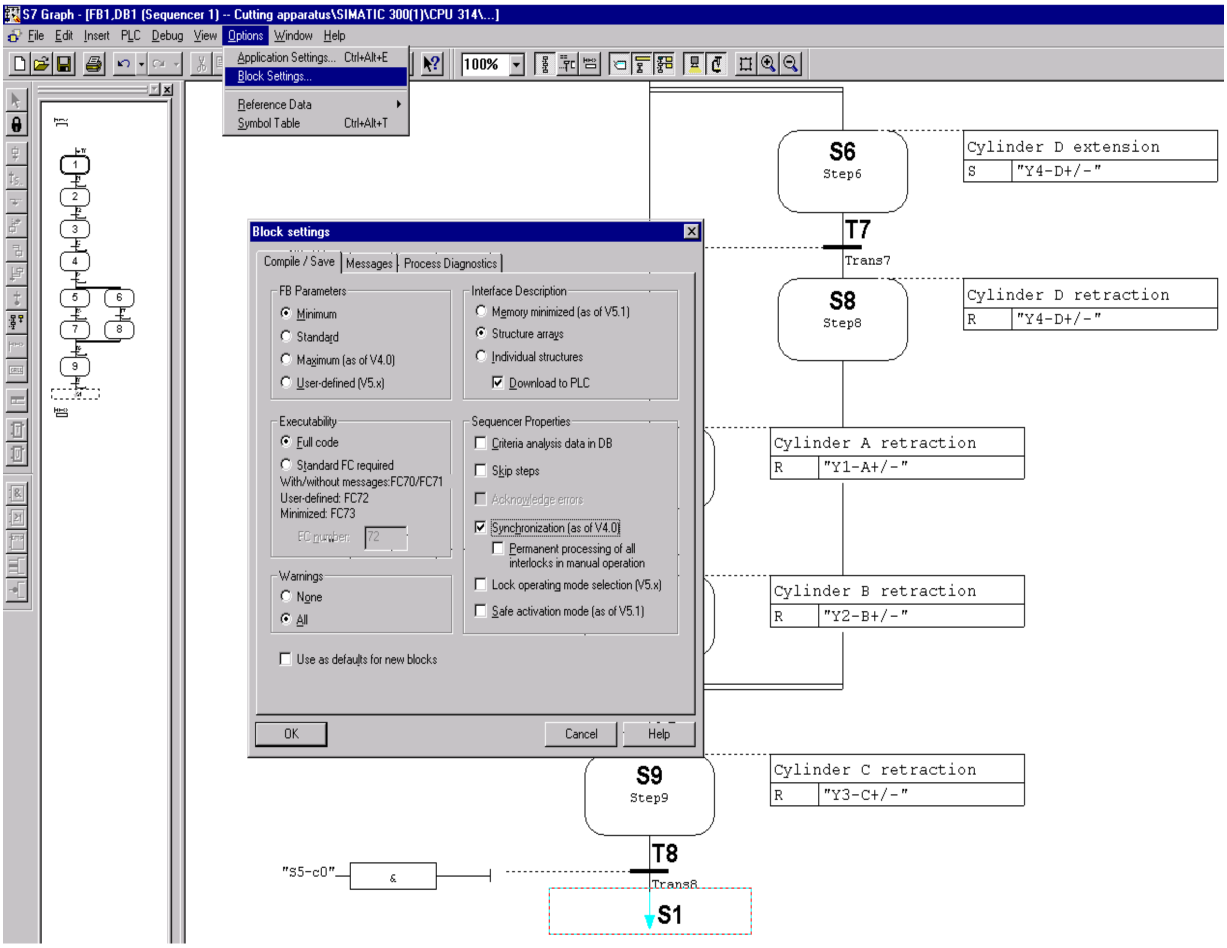
5. Insert S1 at the jump point or click on **Step S1**, so that the jump goal is inserted.



7.10.7 Block-Characteristics setting and saving finished blocks

Before saving the block, the block settings should be modified.

1. Click on **Options**.
2. Click on **Block Settings**.



Block settings

Compile / Save | Messages | Process Diagnostics

FB Parameters
- ● Minimum
- ○ Standard
- ○ Maximum (as of V4.0)
- ○ User-defined (V5.x)

Interface Description
- ○ Memory minimized (as of V5.1)
- ● Structure arrays
- ○ Individual structures
- ☑ Download to PLC

Executability
- ● Full code
- ○ Standard FC required

With/without messages:FC70/FC71
User-defined: FC72
Minimized: FC73
FC number: 72

Sequencer Properties
- □ Criteria analysis data in DB
- □ Skip steps
- □ Acknowledge errors
- ☑ Synchronization (as of V4.0)
- □ Permanent processing of all interlocks in manual operation
- □ Lock operating mode selection (V5.x)
- □ Safe activation mode (as of V5.1)

Warnings
- ○ None
- ● All

□ Use as defaults for new blocks

OK | Cancel | Help

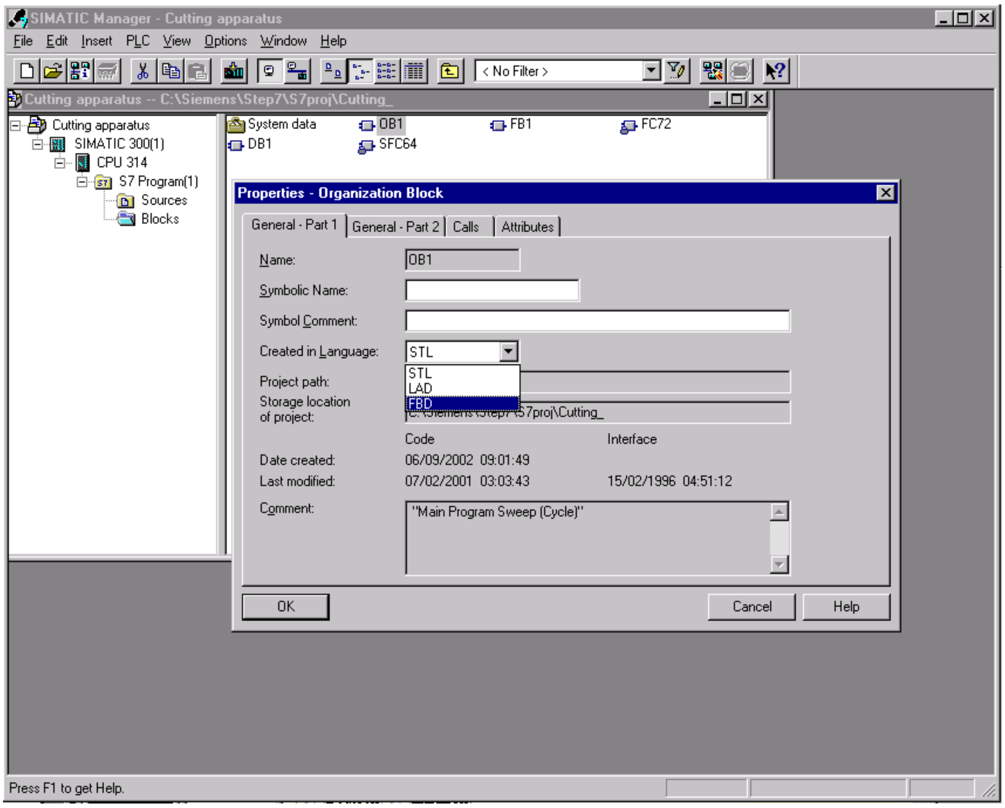
3. Set the FB Paramenter to **Minium**.
4. Set executability to **Full code** so that the standard FCs are contained in the function block.
5. Click on **Synchronization**.
6. Click **OK**.
7. Save the block.
8. Close S7-GRAPH.

Note

If there are still errors, then it cannot be not be stored in the block. An incorrect block can be generated only as source. When storing the block, a pertinent data block and the SFC64 are produced. Both are copied into the block list.

7.11 Setting characteristics of the Organization Block and opening OB1

1. Click on **Blocks** .
2. Double click on **OB1**.
3. In the properties of the Organization block select **FBD** as created in language.
4. Click **OK**.



Name: OB1

Symbolic Name:

Symbol Comment:

Created in Language: STL (STL, LAD, FBD)

Project path:

Storage location of project: C:\Siemens\Step7\S7proj\Cutting_

	Code	Interface
Date created:	06/09/2002 09:01:49	
Last modified:	07/02/2001 03:03:43	15/02/1996 04:51:12

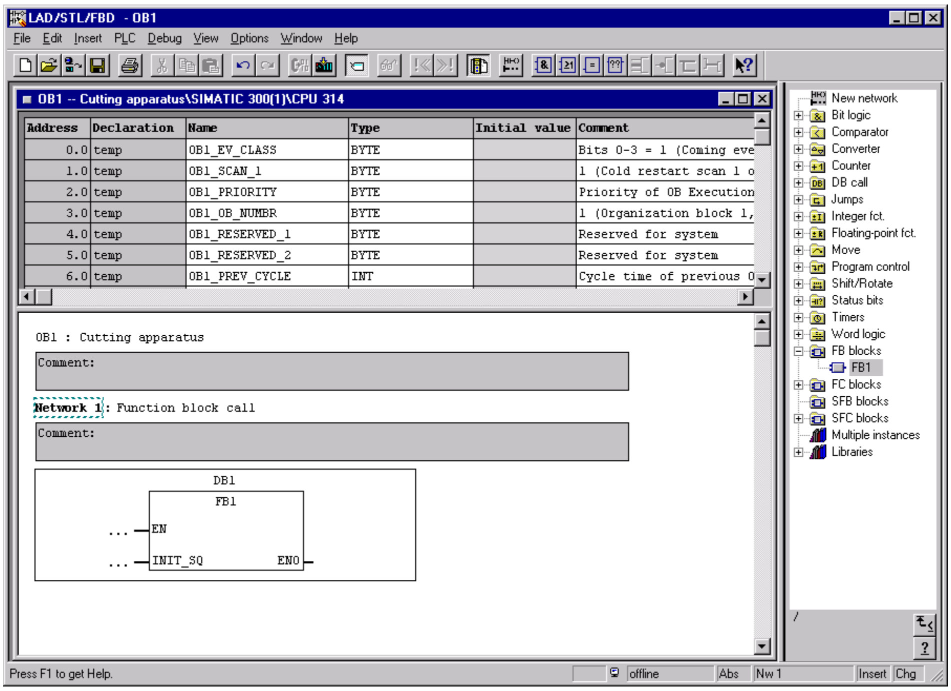
Comment: "Main Program Sweep (Cycle)"

Note

If the OB1 is not automatically opened after the adjustment of the properties, then the OB1 must be double clicked once again in the block list.

7.12 Editing Organization Block OB1 and downloading blocks into a module

1. Enter block and network headings.
2. Click on the entry field
3. Open **Program Elements**.
4. Insert **FB1** through a double click.
5. Enter DB1.
6. Save block OB1.
7. Close LAD/STL/FBD.



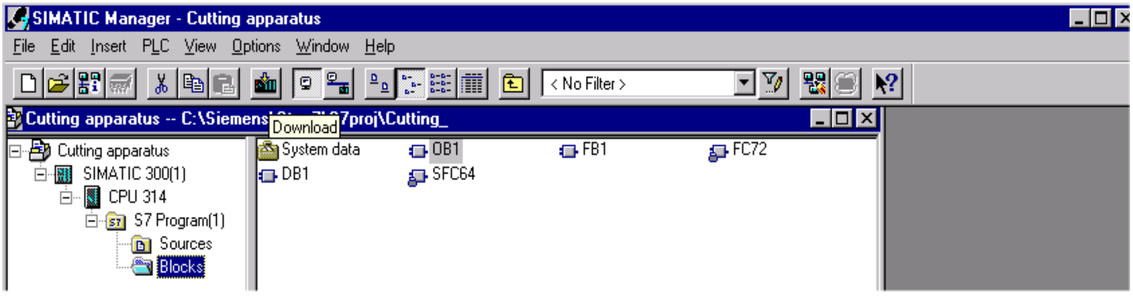
Address	Declaration	Name	Type	Initial value	Comment
0.0	temp	OB1_EV_CLASS	BYTE		Bits 0-3 = 1 (Coming eve
1.0	temp	OB1_SCAN_1	BYTE		1 (Cold restart scan 1 o
2.0	temp	OB1_PRIORITY	BYTE		Priority of OB Execution
3.0	temp	OB1_OB_NUMBR	BYTE		1 (Organization block 1,
4.0	temp	OB1_RESERVED_1	BYTE		Reserved for system
5.0	temp	OB1_RESERVED_2	BYTE		Reserved for system
6.0	temp	OB1_PREV_CYCLE	INT		Cycle time of previous O

```
OB1 : Cutting apparatus
Comment:

Network 1: Function block call
Comment:

                DB1
          FB1
... -EN
... -INIT_SQ        ENO-
```

8. Click on **Block** and blocks and **Download module**.


SIMATIC Manager - Cutting apparatus
File Edit Insert PLC View Options Window Help
< No Filter >
Cutting apparatus -- C:\Siemens\S...7proj\Cutting_
Download
Cutting apparatus
SIMATIC 300(1)
CPU 314
S7 Program(1)
Sources
Blocks
System data
OB1
FB1
FC72
DB1
SFC64

After the transferring of the blocks into the module, the program can be debugged.