

Step7-300

STEP 7 V 5.x

.1

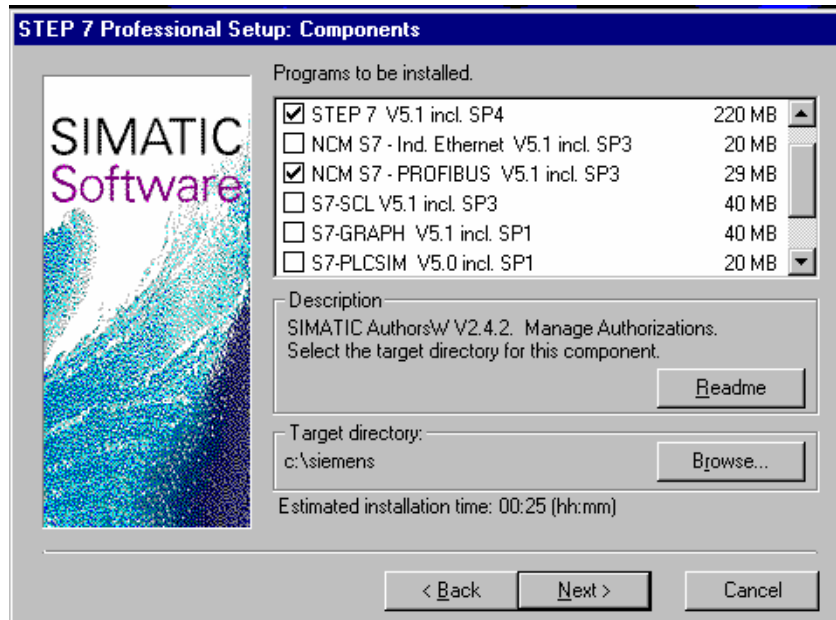


	:	STEP 7	
		STEP 7	-
		(S7-PLCSIM S7-GRAPH)	STEP 7
. S7-PLCSIM		STEP 7	-
		120	
		STEP 7 Mini	-
		(S7-PLCSIM S7-GRAPH)	
		STEP 7	
STEP 7			
	:	STEP 7	
		STEP 7	.1
			.2
		setup.exe	
		STEP 7	
		STEP 7	.3
			.4
		(→ Next).()	Next



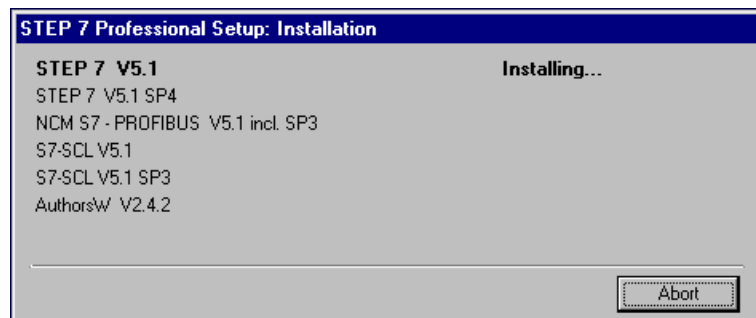
.5

. (→ Next) () **NCM S7-PROFIBUS**



.6

(→ Abort). ()



.STEP 7

.7



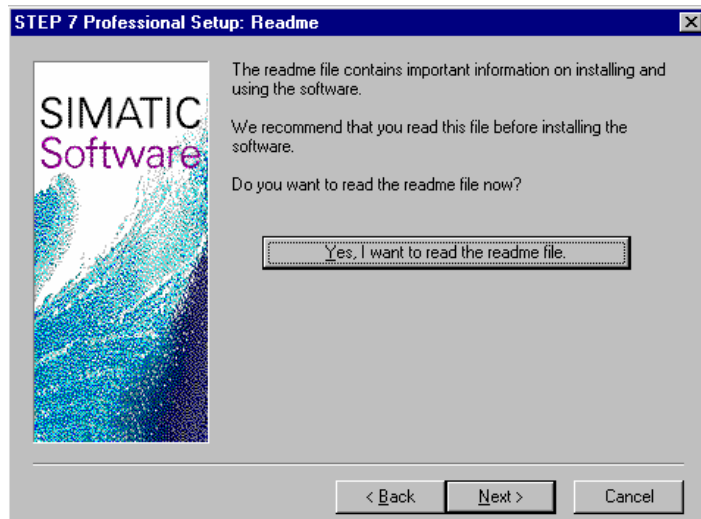
.(→ Next) ()



.(→ Next) ()

Readme " "

.8

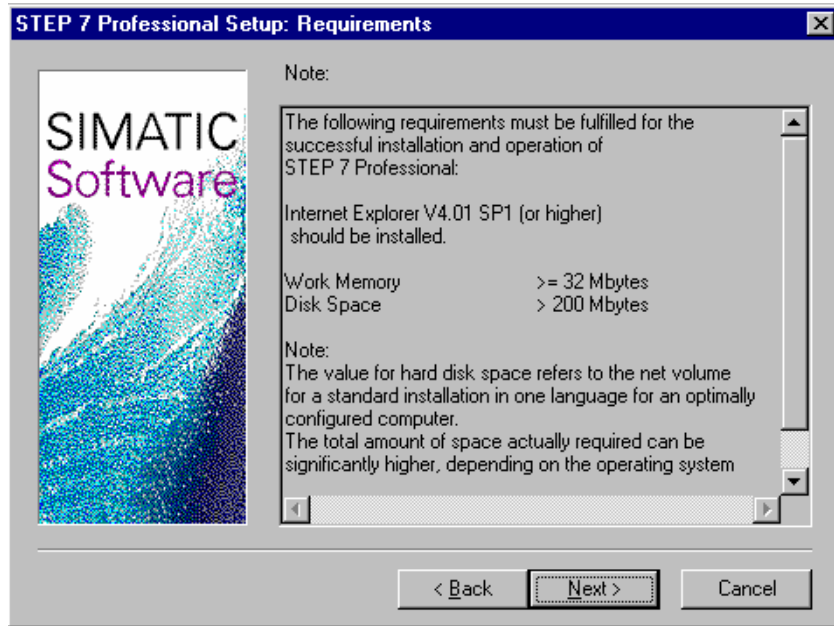


.9

STEP 7

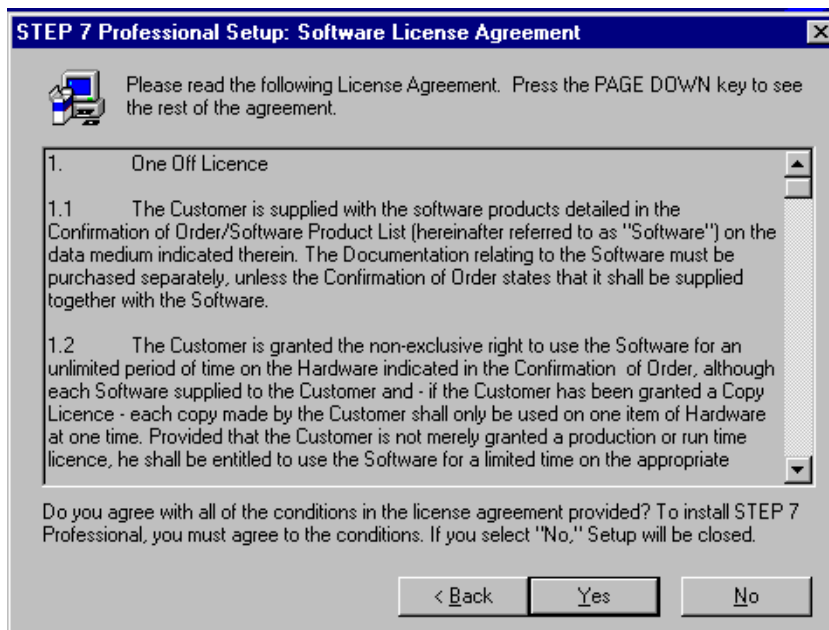
Explorer V4.01 SP1

.(→ Next) ()



. (→ Yes)()Yes

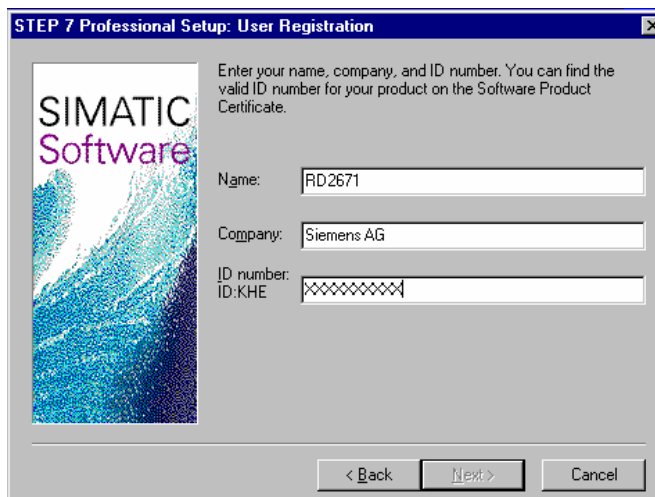
.10



.11

. ID: KHE...

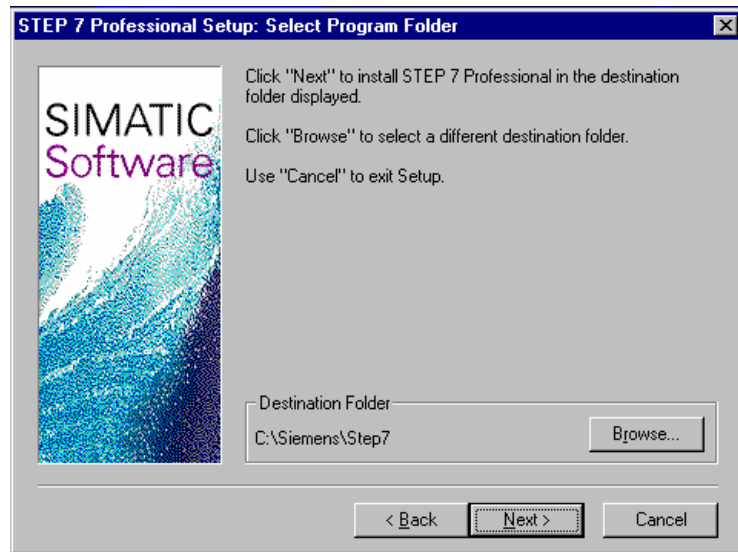
... (→ Name → Company → Identnr. ID: KHE → Next).



.12



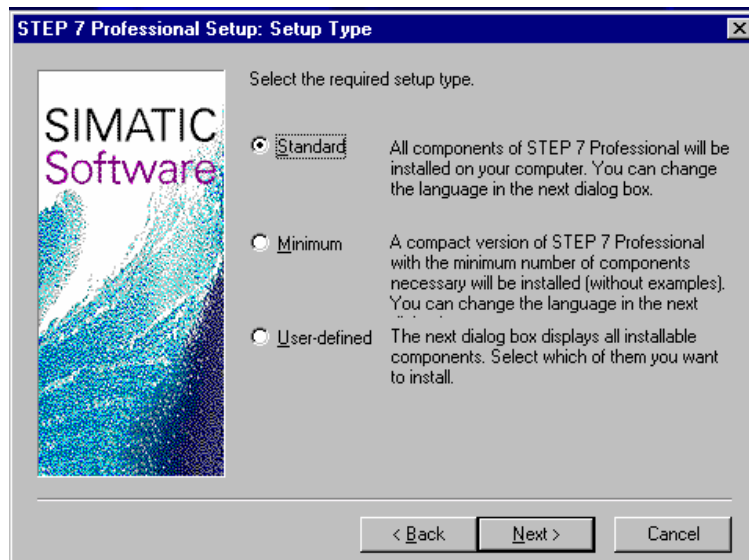
(→ Next)



(→ ()).

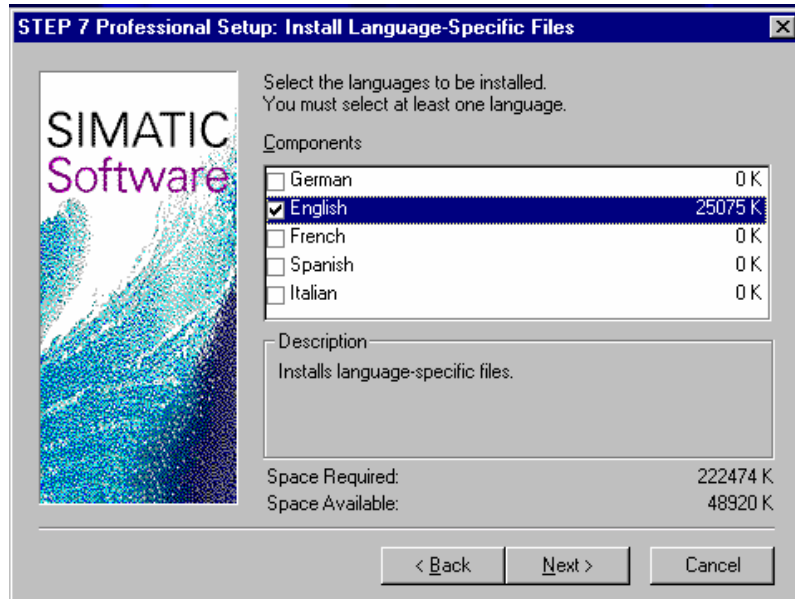
.13

.Next)



. (→ Next) ()

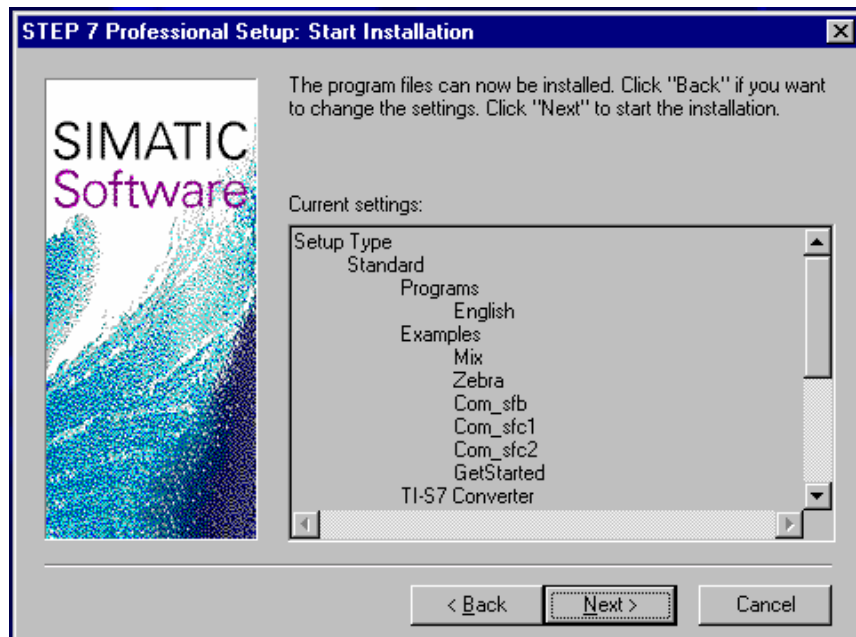
.14



(())

.15

. → Next)



.2

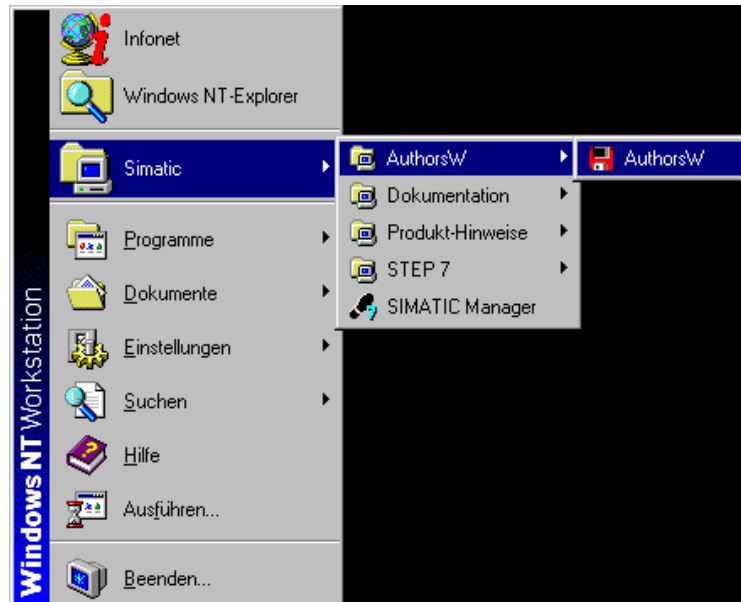
STEP 7



AuthorsW

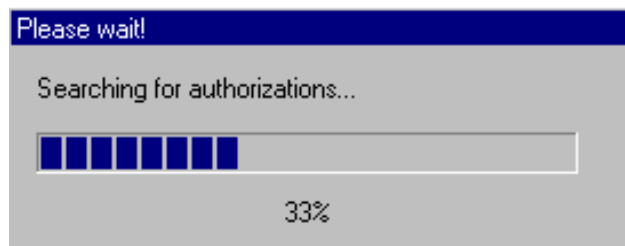
.1

(→ START → Simatic → AuthorsW → AuthorsW).



AuthorsW

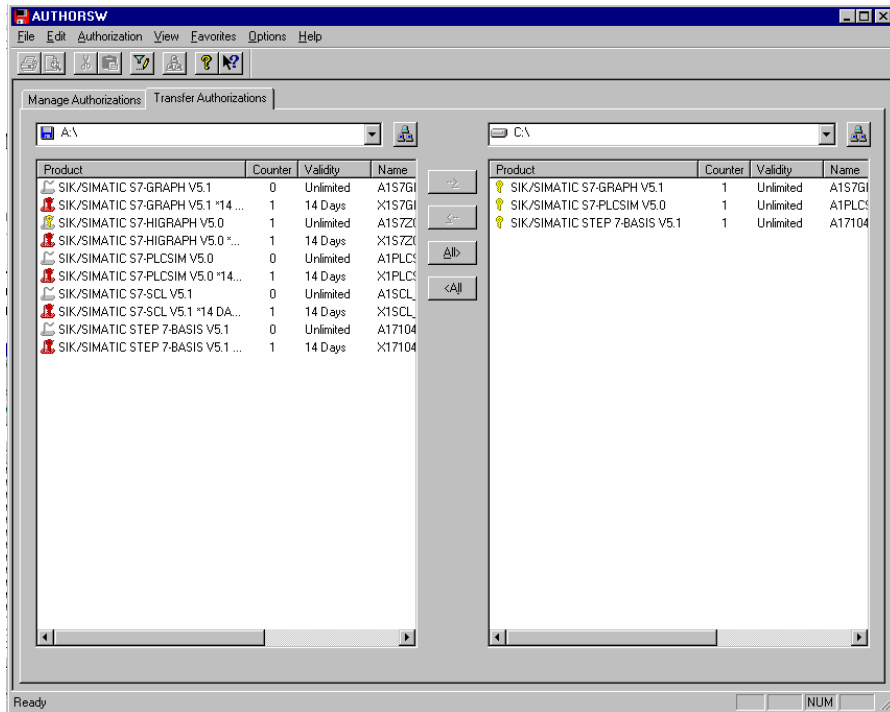
.2



.3 



(→ SIK/SIMATIC STEP 7 -Basis V5.0 → ←).



STEP 7



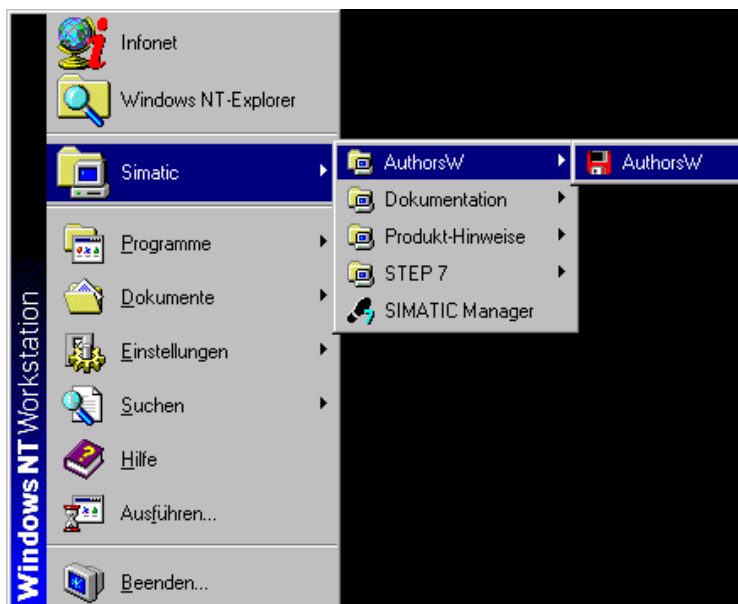
.5.x

4.x

AuthorsW

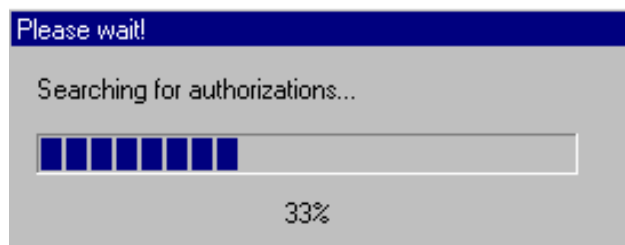
.1

(→ START → Simatic → AuthorsW → AuthorsW).

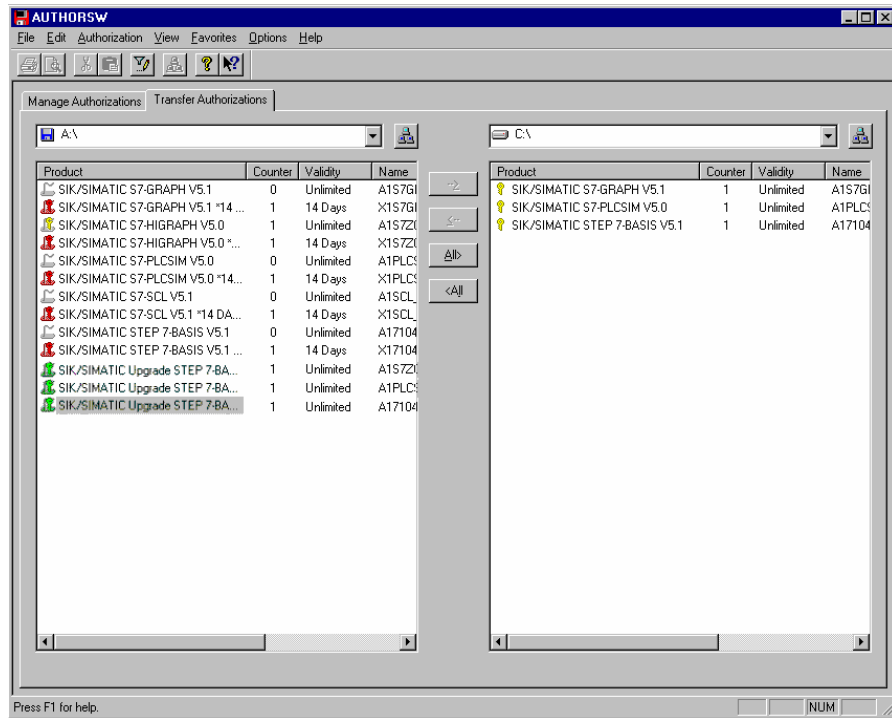


AuthorsW

.2

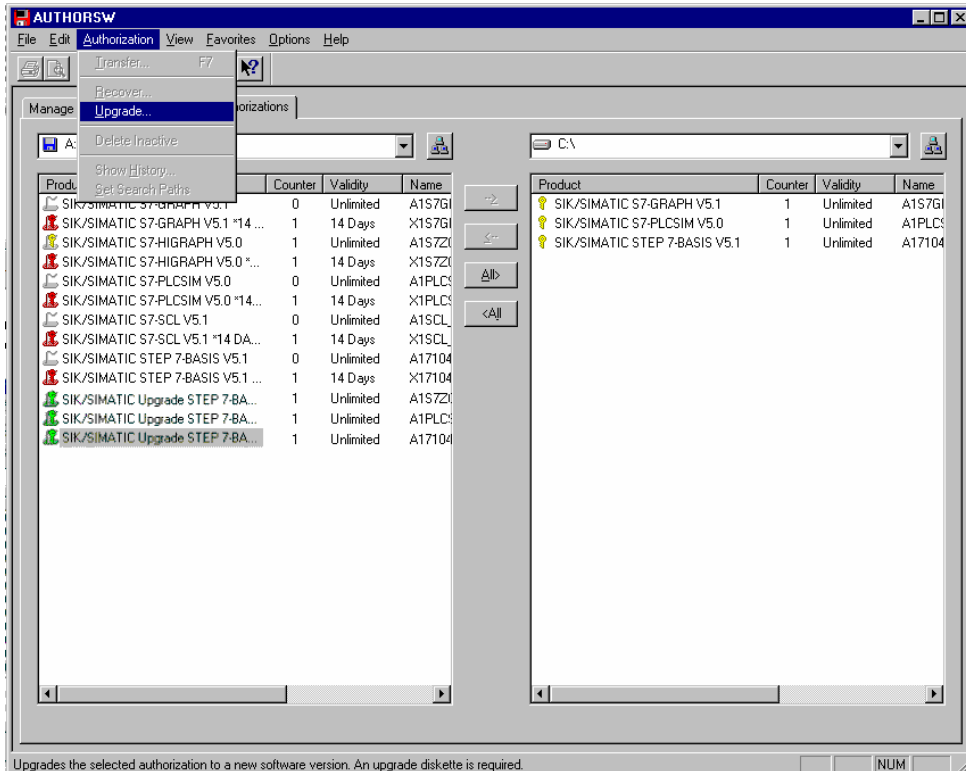


.3



(→ Authorization → Upgrade)

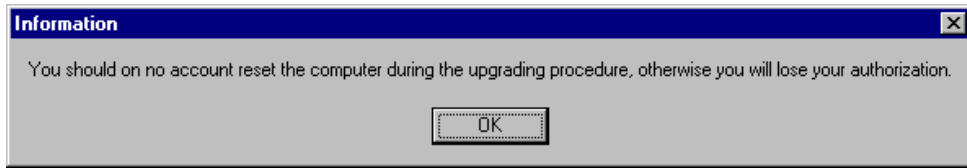
.4



(→ OK) **OK**

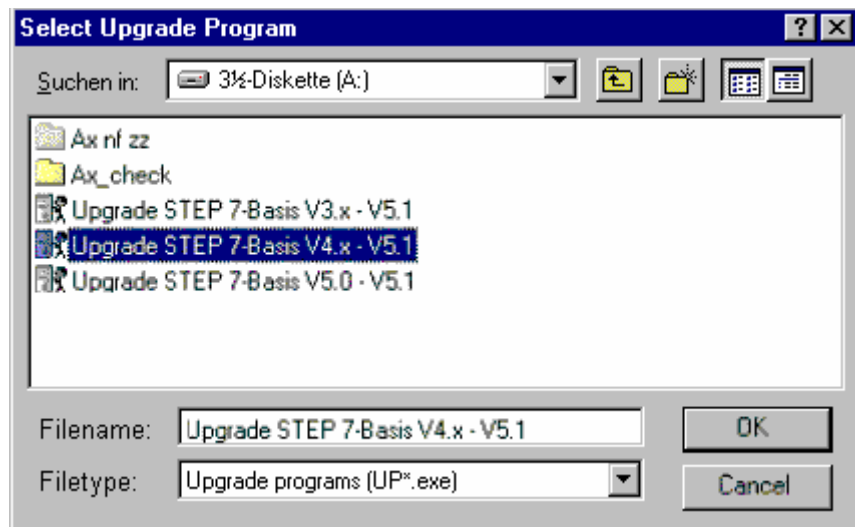


.5



.6

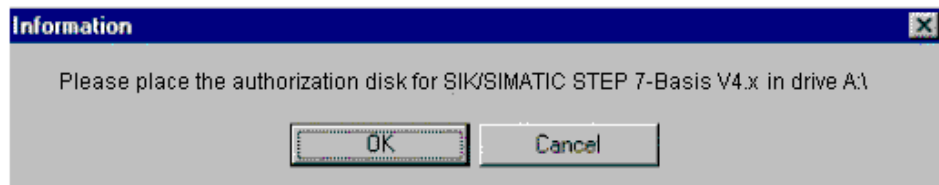
(→ Upgrade STEP 7 - Basis V4.x-V5.1 → Open)



(→ OK) **OK**

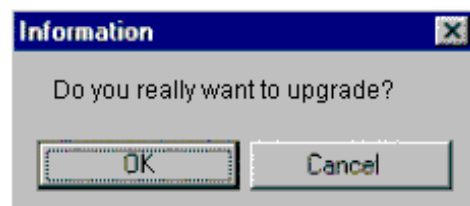
V4.x

.7




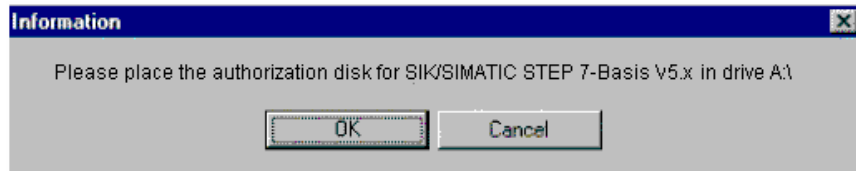
.8

(→ OK).



(→ OK

.9 
OK).



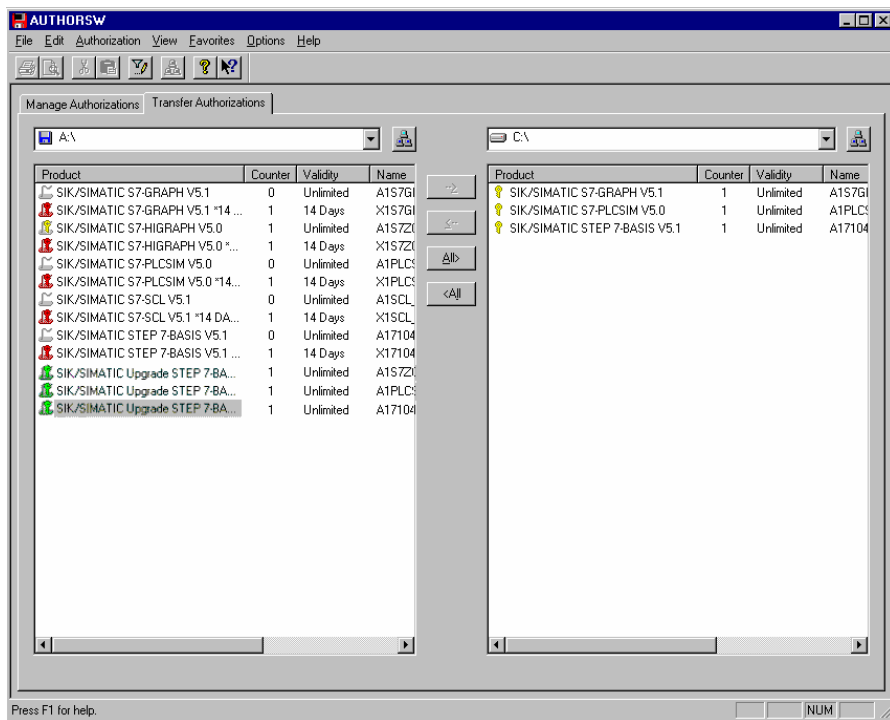
(→ OK).

.10



V5.1

.11



() .3

Multi Point MPI .MPI SIMATIC S7-300
) 32 () Interface 
 HMI : Human) - MPI (... HMI
 .SIMATIC S7 (Machine Interface

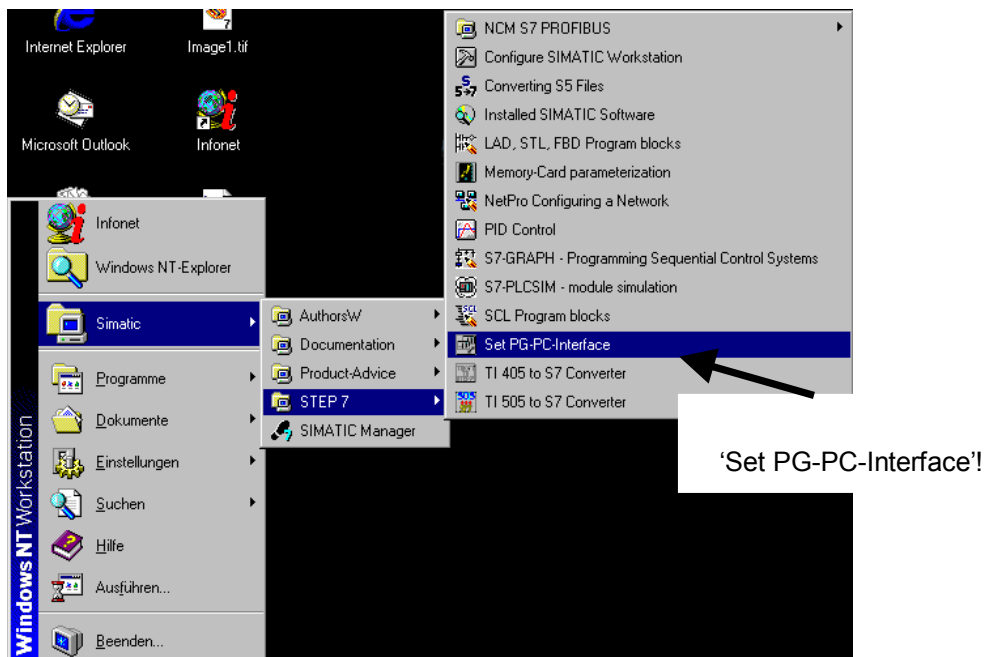
SIMATIC S7-300

: MPI

- ISA -
- ISA -
- PCI -
- PCMCIA -
- .(CP5511 -
- .(

Set PG-PC-Interface .1

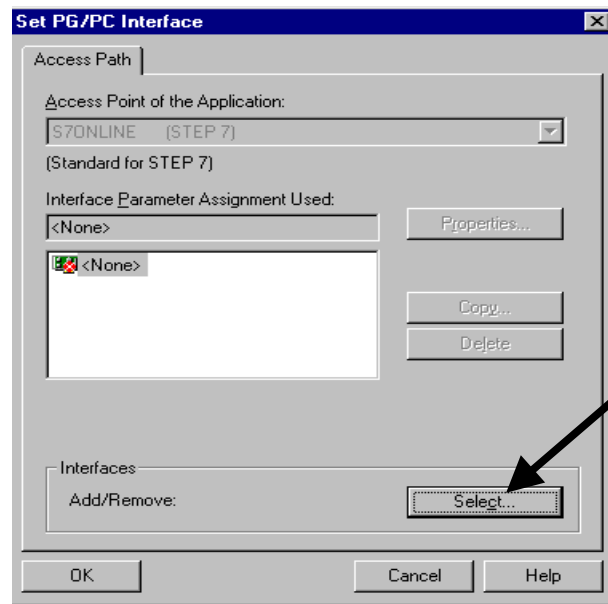
(→ Start → SIMATIC → STEP 7 → Set PG-PC-Interface)



. (→ Select). MPI

Select

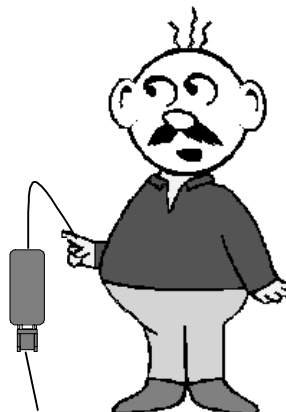
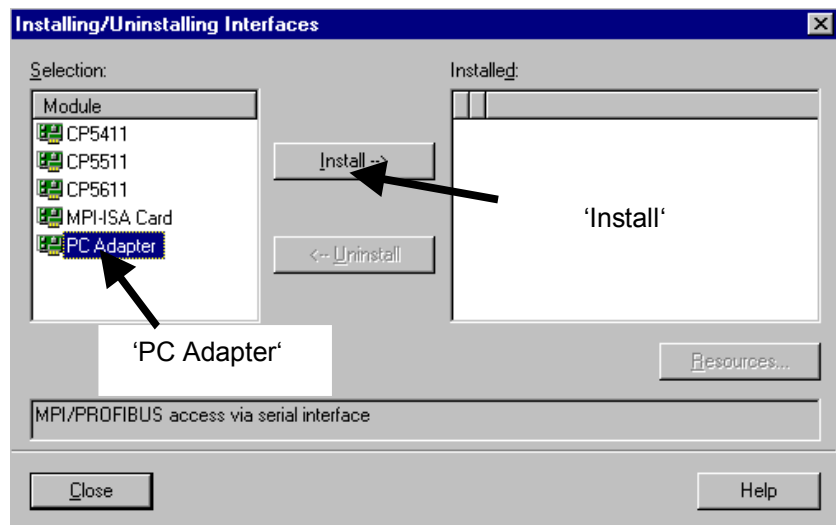
.2



Install PC-Adapter

.3

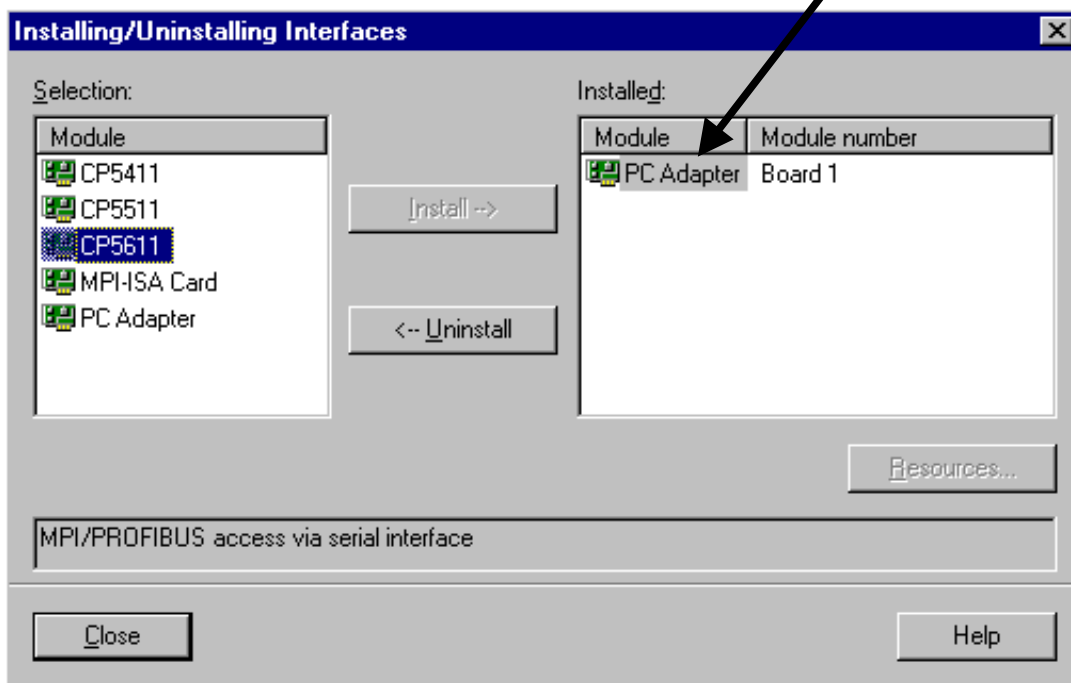
(→ PC-Adapter → Install).



(→ PC Adapter → Close).

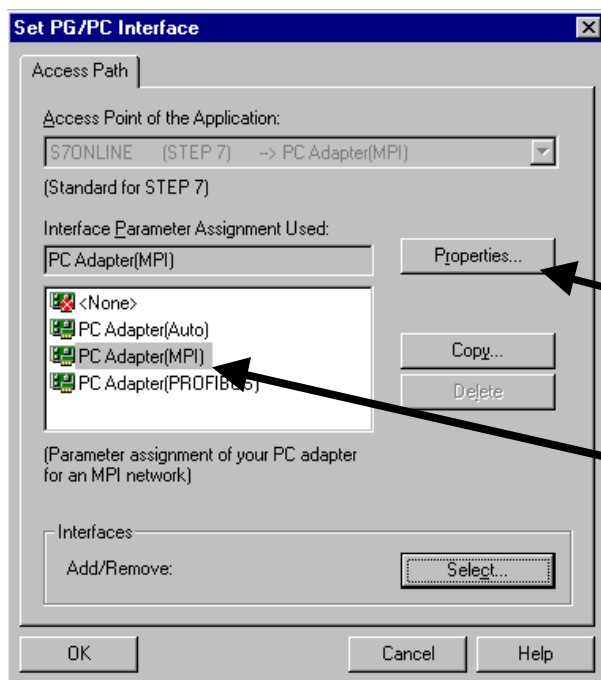


'PC Adapter' Board 1



PC-Adapter (MPI) () Properties .5

(→ PC Adapter(MPI) → Properties).



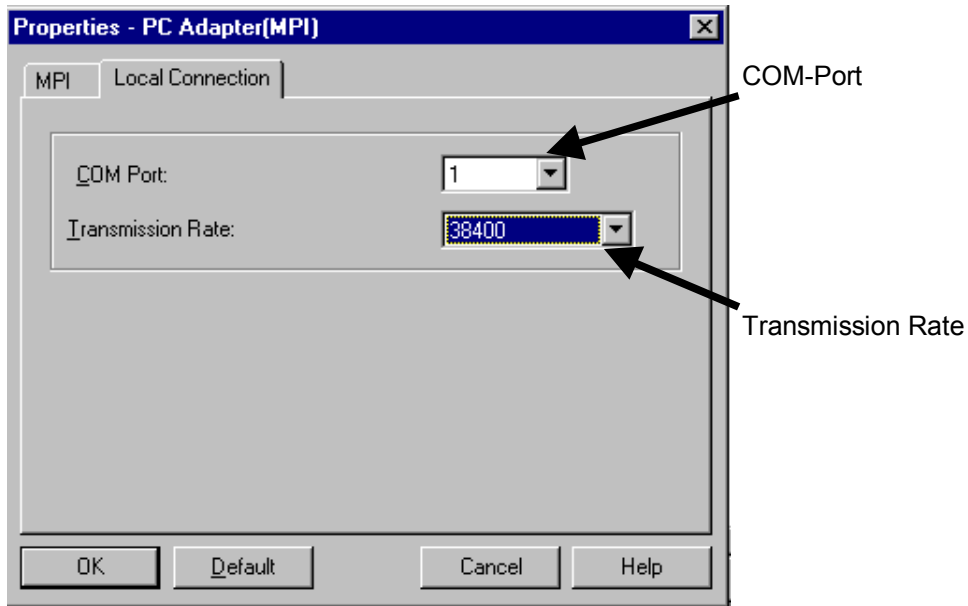
'Properties'

'PC Adapter (MPI)'

Transmission Rate

COM-Port

.6



)

.19200 Bit/s

(PC/MPI



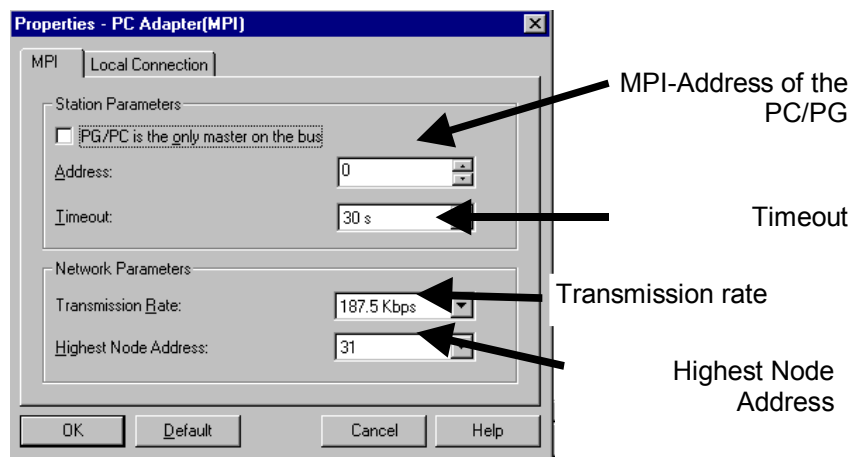
Timeout

MPI-Address MPI

.7

Highest Node Address

Transmission Rate



!

:

(→ OK → OK).

.8



(→ **SIMATIC Manager**

.9



SIMATIC Manager).



SIMATIC Manager

MPI

MPI

.10

MPI

.PLC

9 D Sub

() **Accessible Nodes** –

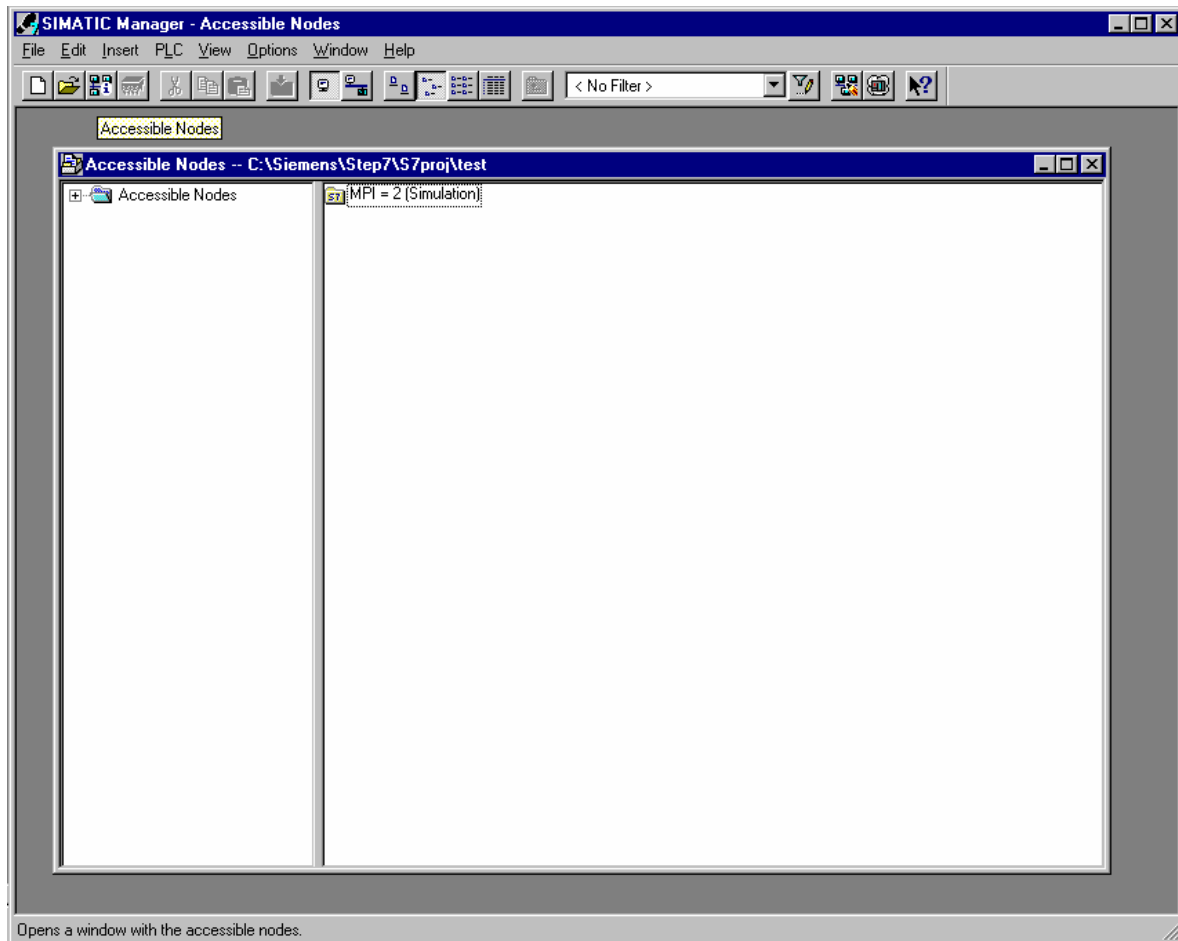
.11

MPI

MPI

(→)..2

CPU



STEP 7 .4



STEP 7 : STEP 7
STEP 7 -
.(S7-PLCSIM S7-GRAPH) STEP 7
STEP 7 -
STEP 7 Mini -
.(S7-PLCSIM S7-GRAPH)
STEP 7
STEP 7
STEP 7 V 5.X).
(
STEP 7
STEP 7 .1
STEP 7 .2
setup.exe
STEP 7
STEP 7 .3
() Yes

()

.5

Multi MPI .MPI

SIMATIC S7-300



) 32

() Point Interface

HMI : Human) -

MPI .(... HMI

.SIMATIC S7

(Machine Interface

SIMATIC S7-300

.MPI

ISA -

.(MPI-ISA)

ISA -

.(CP5611)

PCI -

)

PCMCIA -

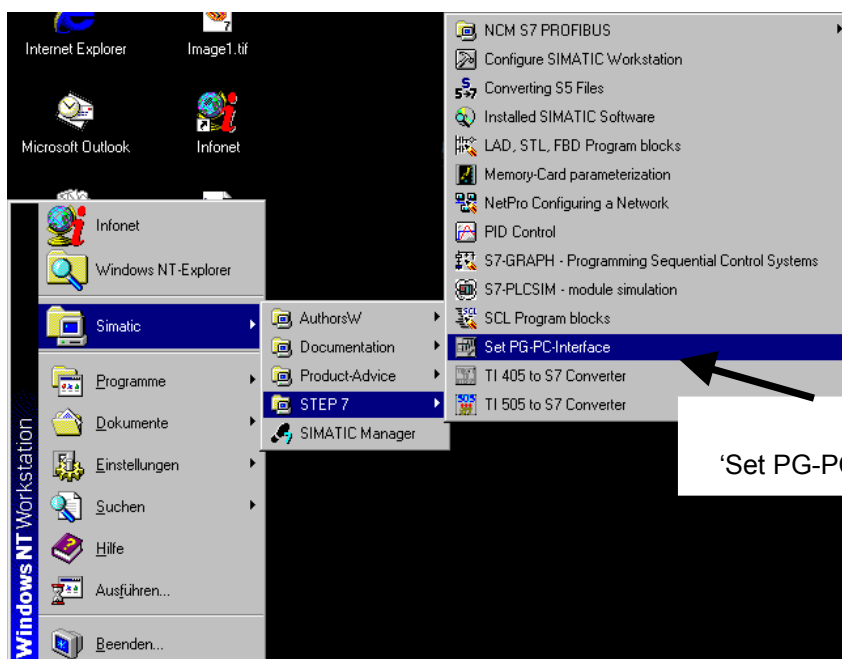
)

.(CP5511

.(

(→ Start → SIMATIC → STEP 7 **Set PG-PC-Interface** .1

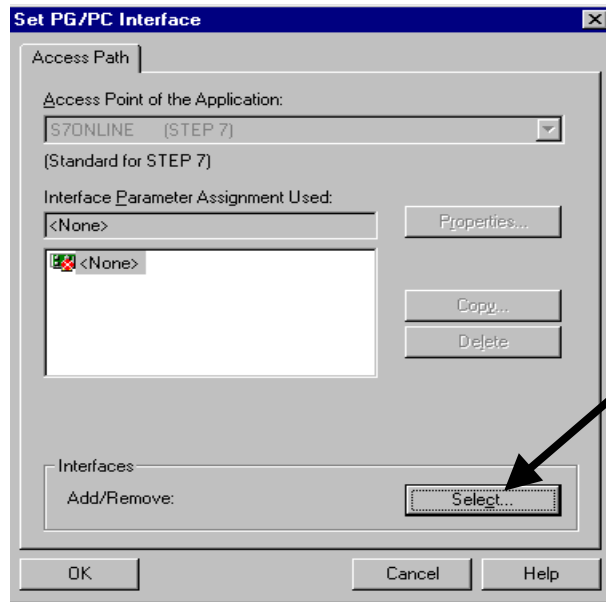
→ Set PG-PC-Interface)



. (→ Select). MPI

Select

.2

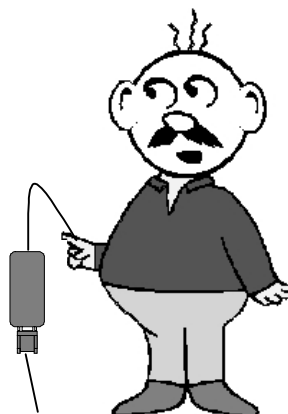
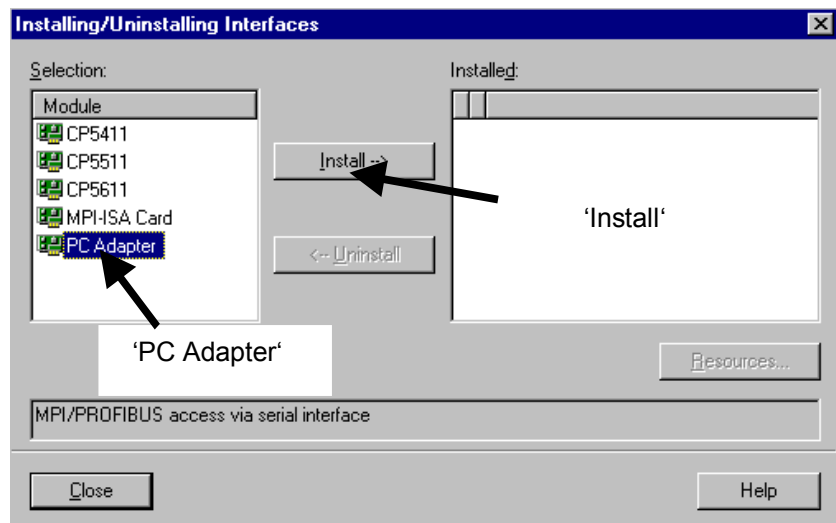


'Select'

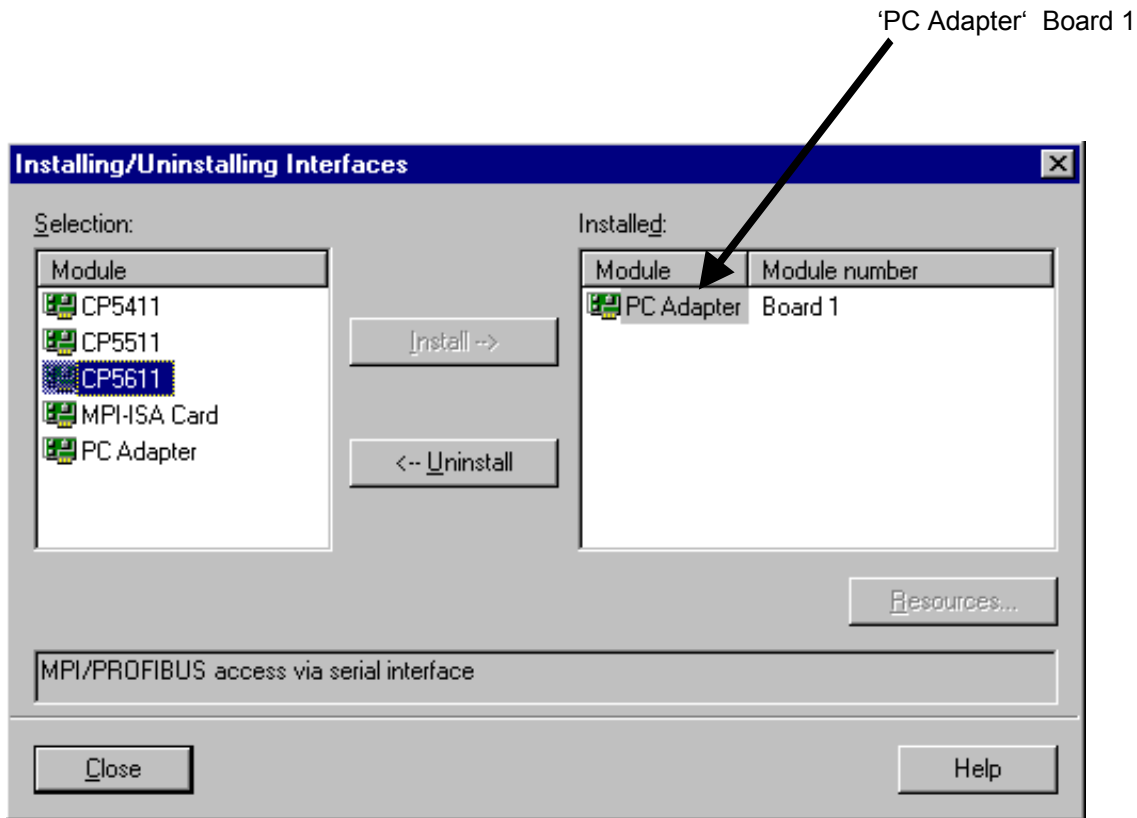
Install PC-Adapter

.3

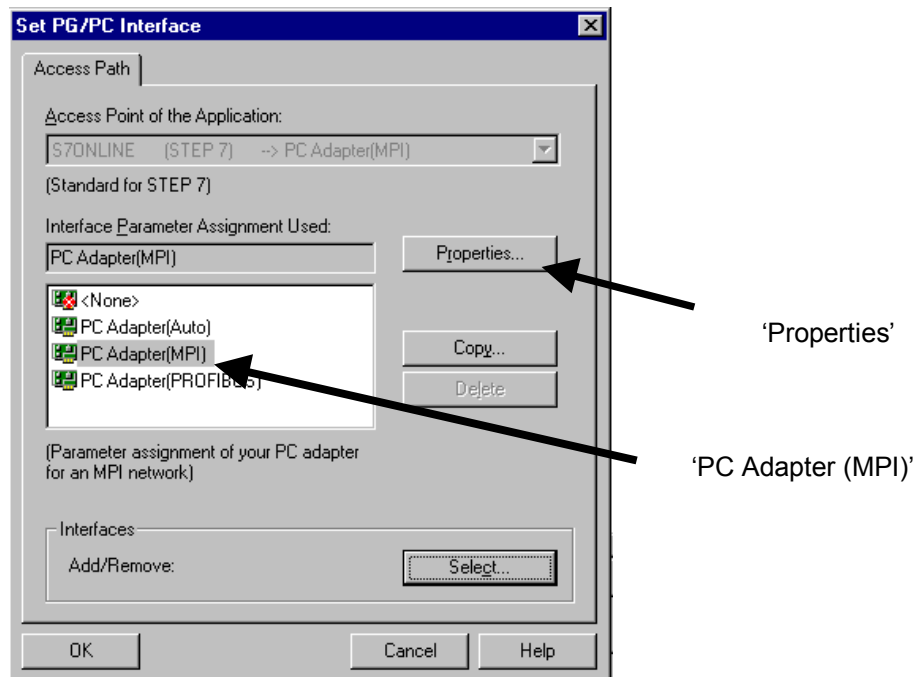
(→ PC-Adapter → Install).



(→ PC Adapter → Close).



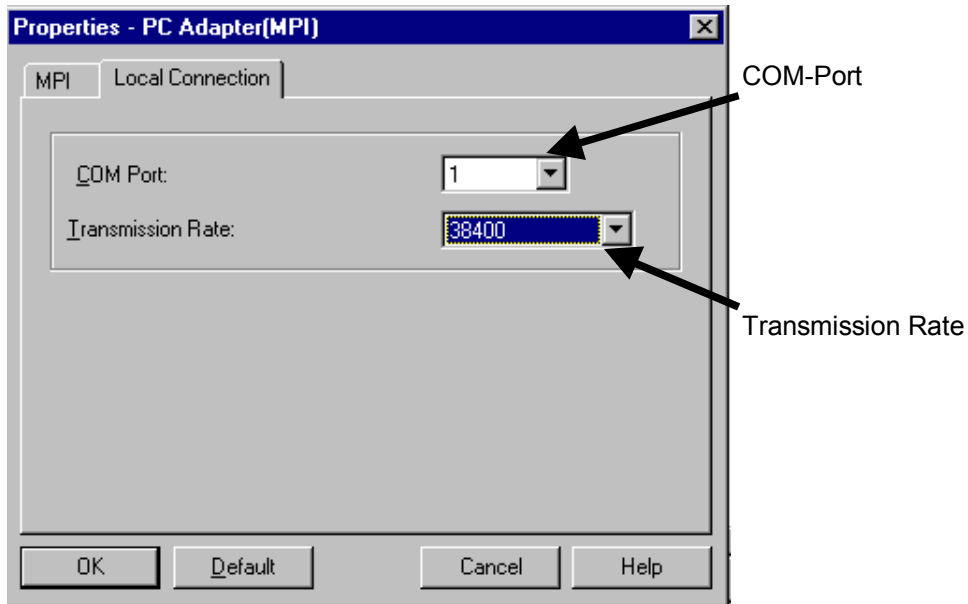
(→ PC **PC-Adapter (MPI)** () **Properties** .5
Adapter(MPI) → Properties).



Transmission Rate

COM-Port

.6



)

.19200 Bit/s

: (PC/MPI



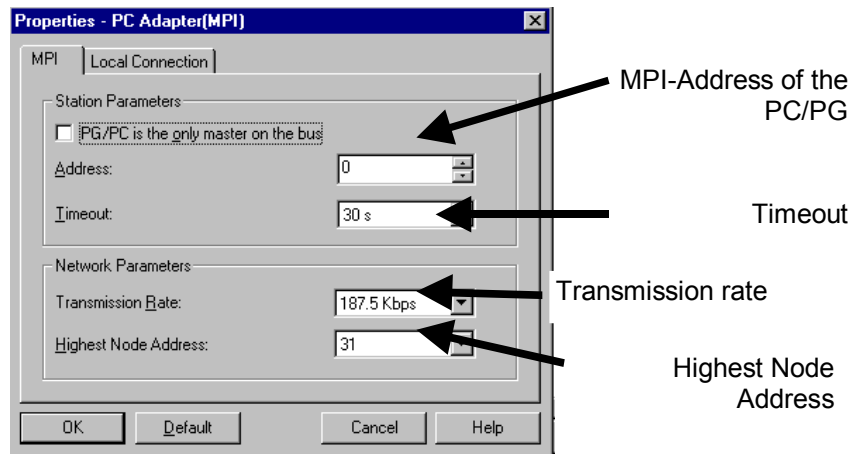
Timeout

MPI-Address MPI

.7

Highest Node Address

Transmission Rate



!

:



(→ OK → OK).

.8

(→ SIMATIC Manager

.9



SIMATIC Manager)



SIMATIC Manager

MPI


MPI

.10

MPI

.PLC


9 D Sub

() Accessible Nodes - 

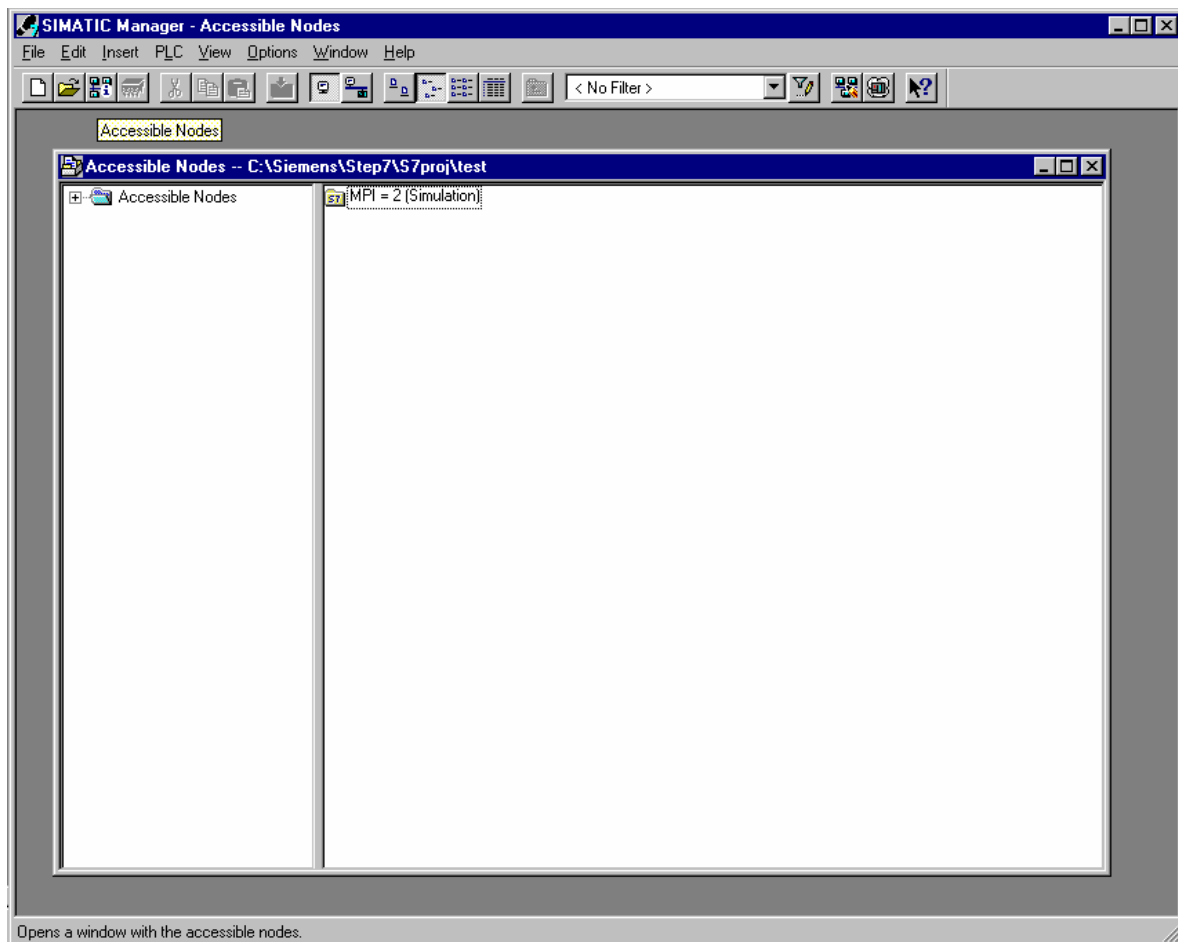
.11

MPI

MPI

(→ )..2

CPU



PLC

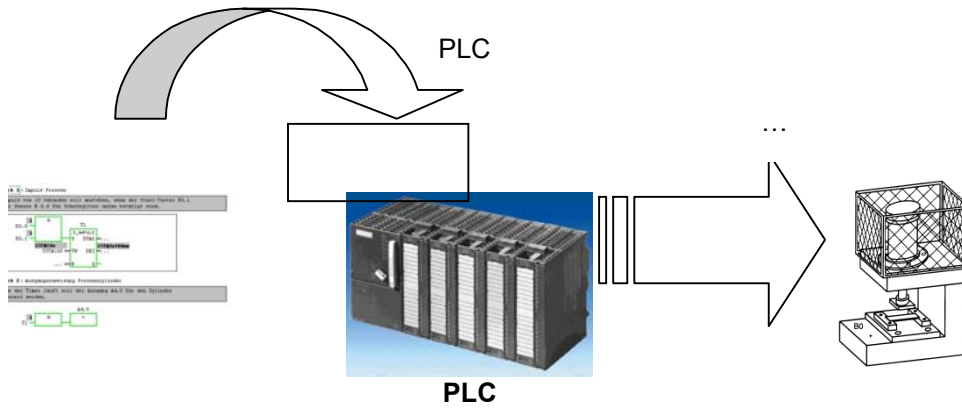
.6

PLC

.1 .6

() Programmable Logic Control
 (...)

PLC



PLC

.2 .6

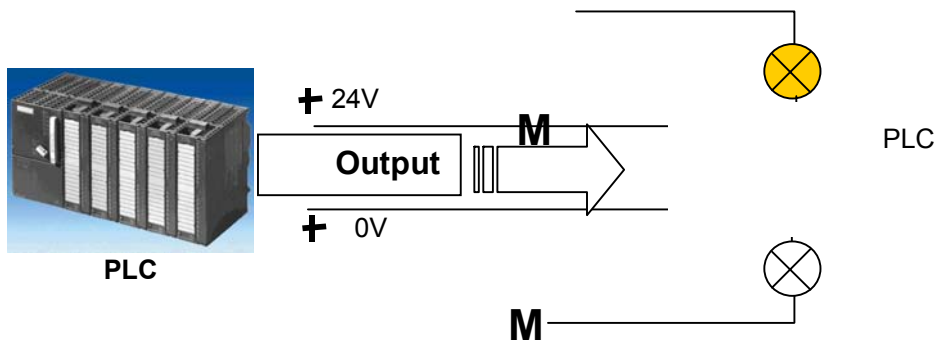
(24)

Actuators

Outputs

PLC

PLC



PLC

.3.6

.PLC

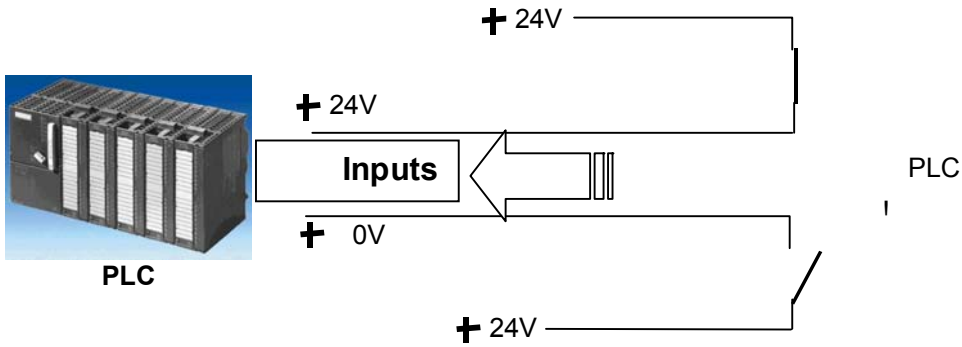
-

PLC



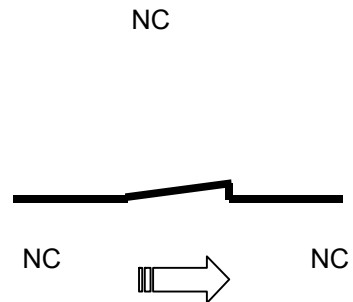
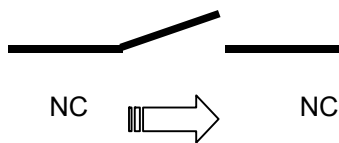
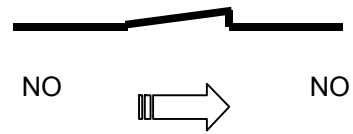
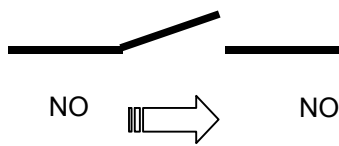
NC : Normally Closed

NO : Normally Open



.4.6

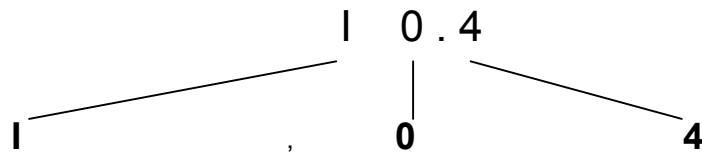
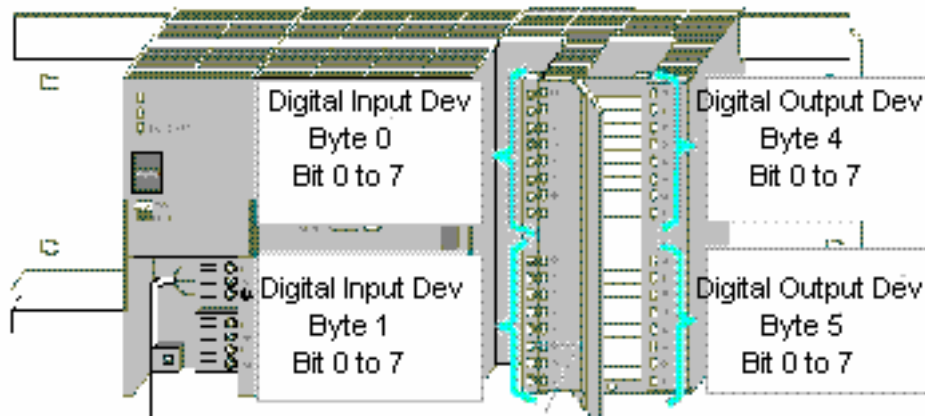
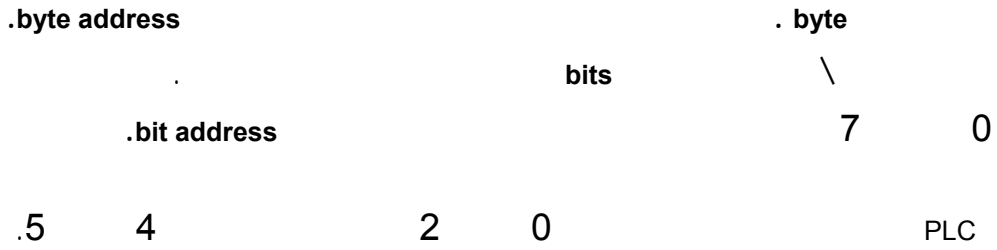
NC NO
NO



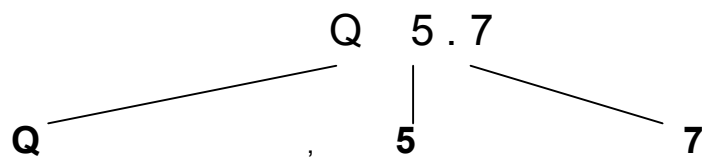
PLC

.5.6

PLC



4



7 :



PLC

.6 .6

: PLC



(PLC

)

PLC

.1

.(PII : Process Image Input)

0

1

.2

PII

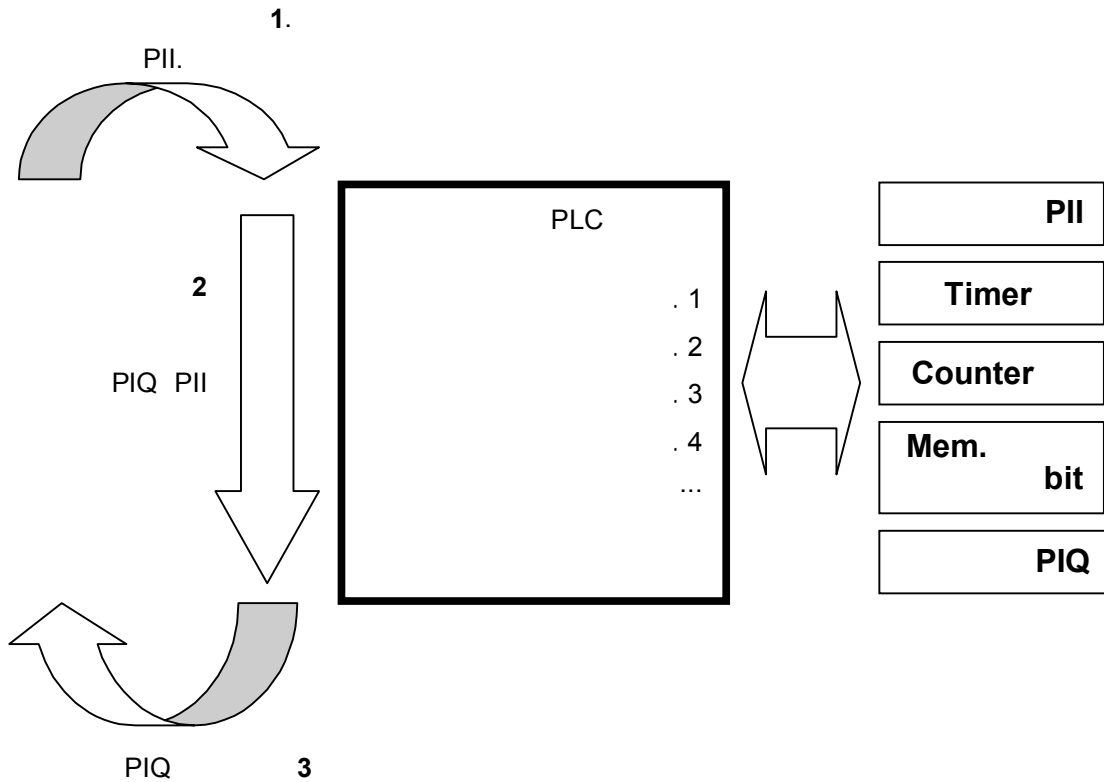
.(PIQ : Process Image Output)

PIQ

1

/

.3



PLC

.7 .6

PLC

(LAD:ladder diagram)

(STL: statement list)

:

(FBD: function block diagram)



FBD

. PLC

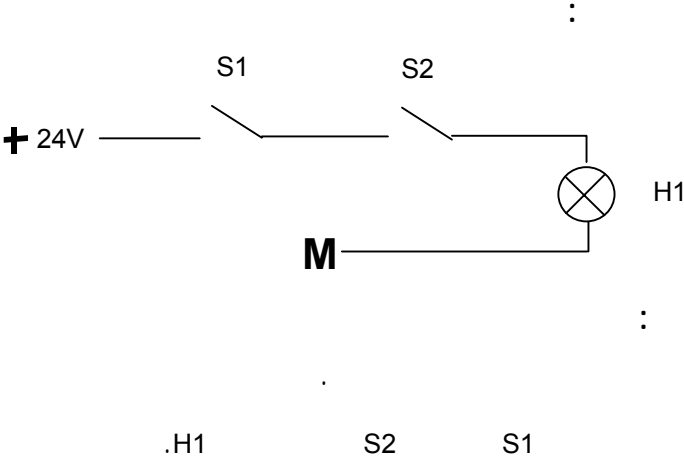
(NEGATION)

(OR) " " (AND) " "

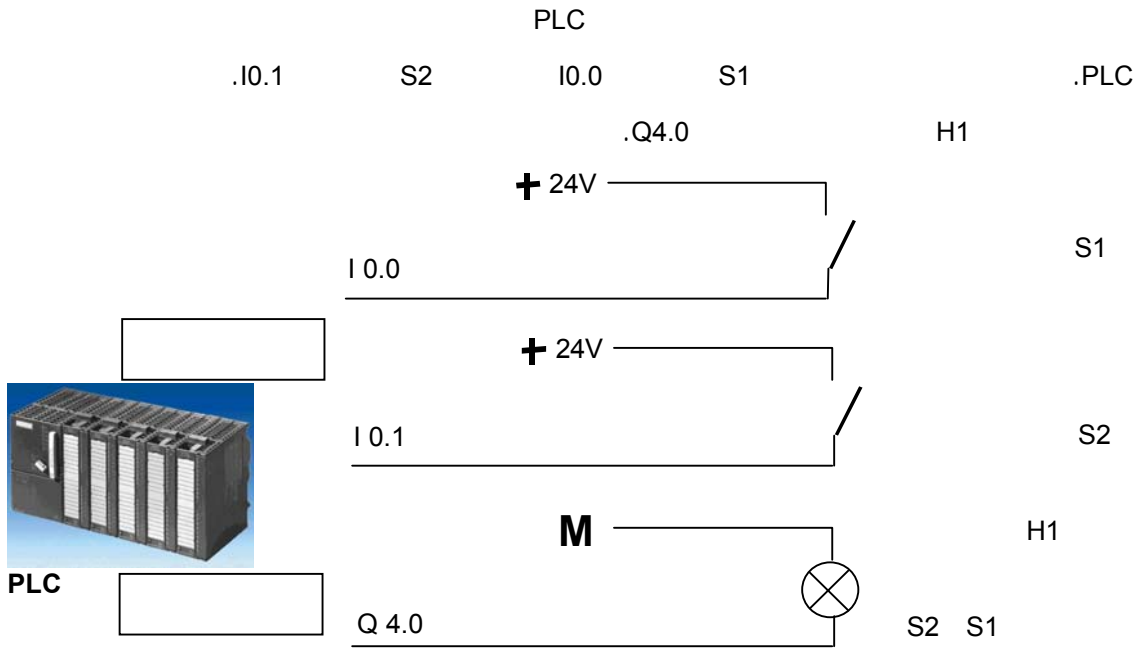
and .1 .7 .6

:AND





: PLC

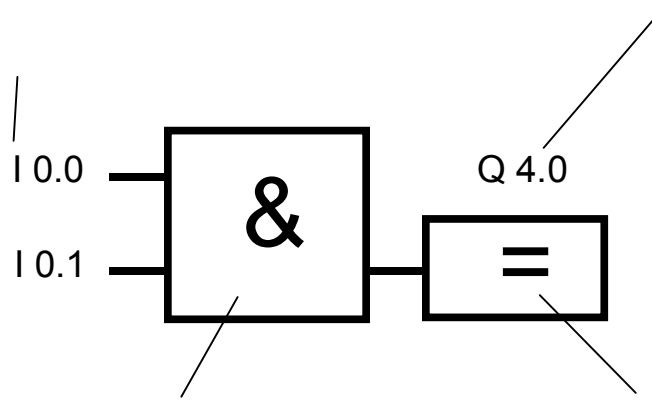


PLC

FBD AND

:FBD AND

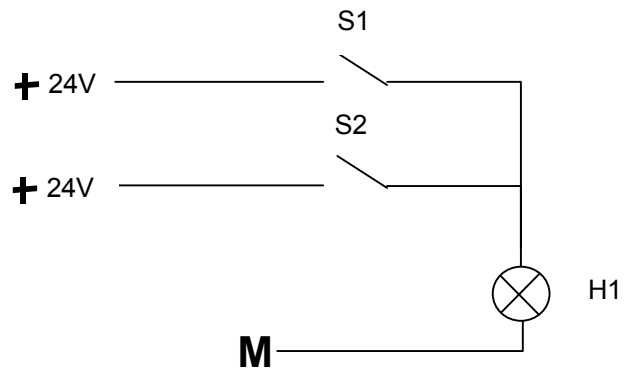
AND



.AND

OR .2.7.6

: OR



.H1 S2 S1

: PLC

PLC

.I0.1

S2

I0.0

S1

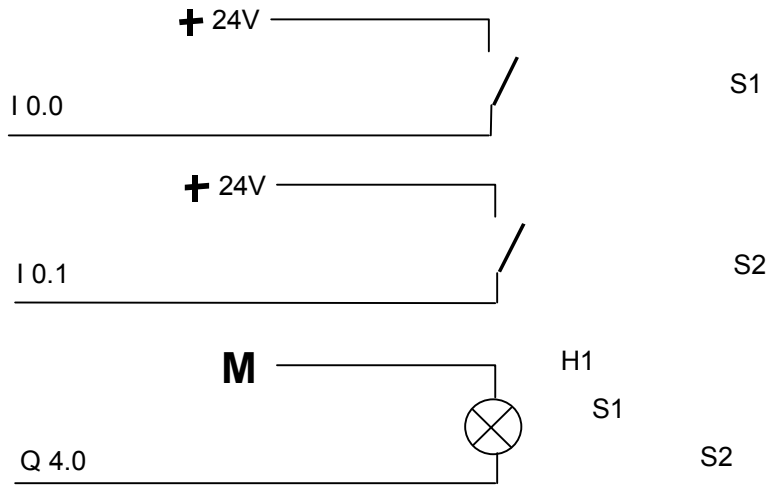
.PLC

.Q4.0

H1



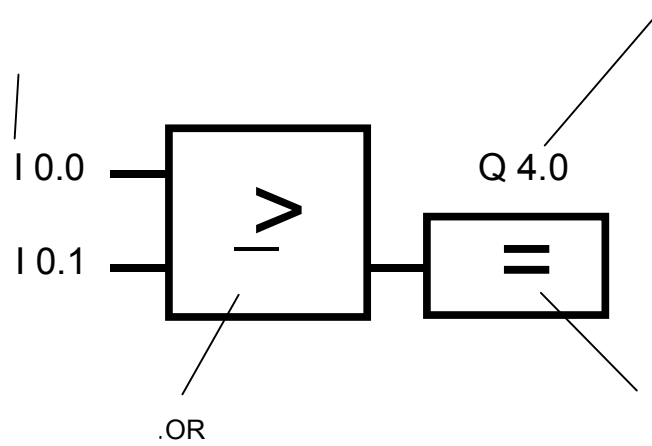
PLC



FBD OR

:FBD OR

OR -



.3.7.6

(NC)

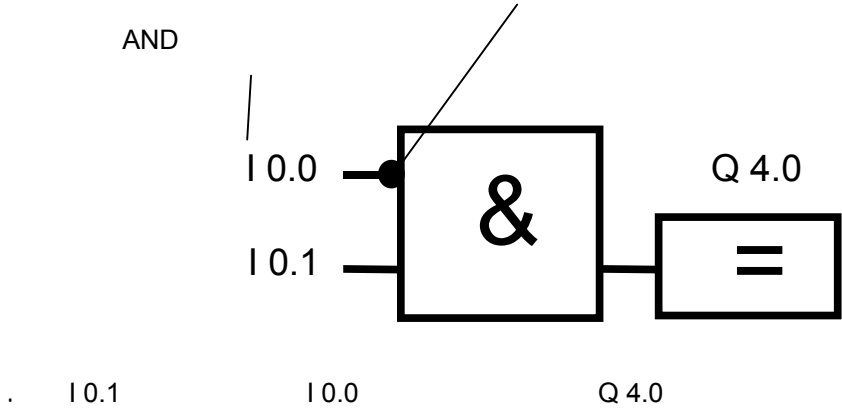
(NO)



.AND/OR

(Negation)

:FBD AND



PLC

PLC

.8 .6

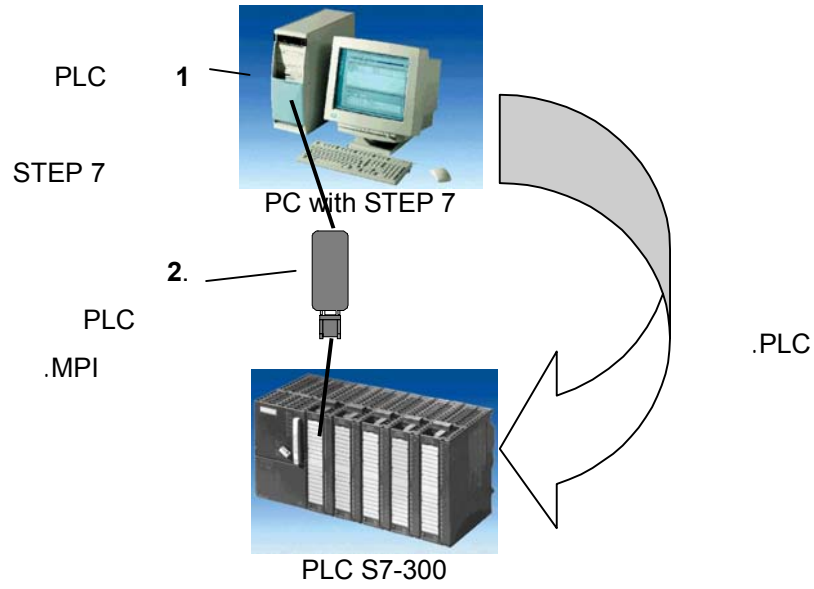
PLC

STEP 7

PLC



PLC MPI



.10-8

:



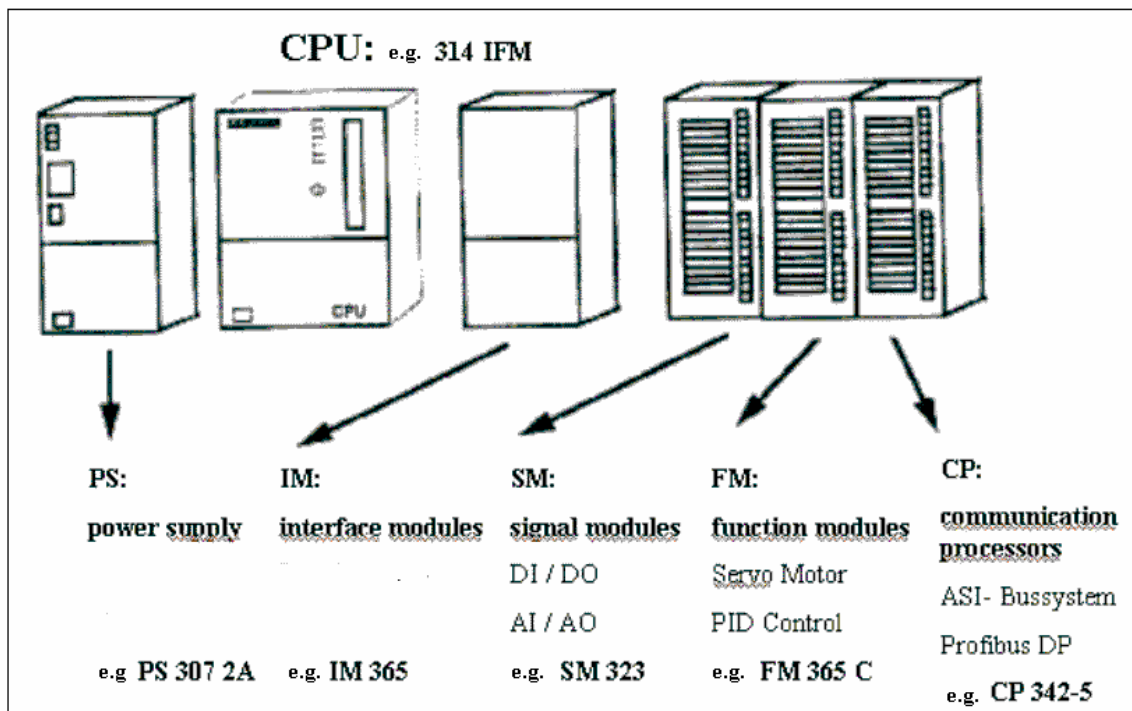
SIMATIC S7-300

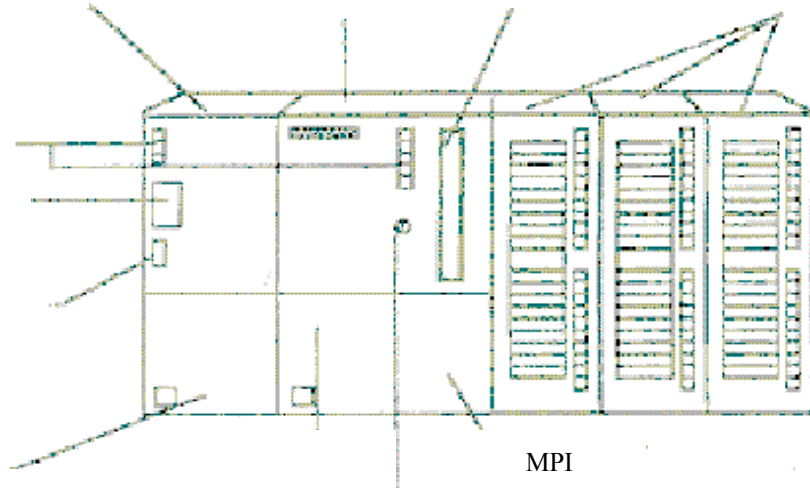
.7



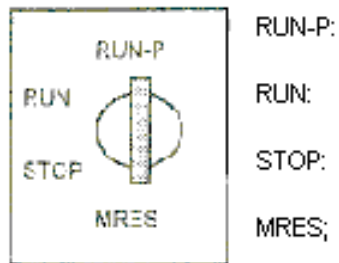
SIMATIC S7-300

(CPU: Central Processing Unit) -
 (CPU312IFM/CPU314IFM) /
 .(CPU315-2DP) PROFIBUS
 .10A 5A 2A (PS : Power Supply) -
 (IM : Interface Module) -
 SIMATIC S7-300
 (SM : Signal Module) -
) (FM : Function Module) -
 .(
 (CP : Communication processors) -





(MPI) MPI
 . () MPI





:

STOP	STOP	1
STOP 3 STOP	MRES (3) STOP	2
STOP 3	STOP .MRES	3

.8

.STEP 7



S1

.BO

10

5/2

Y0

S1

B0

I 0.0

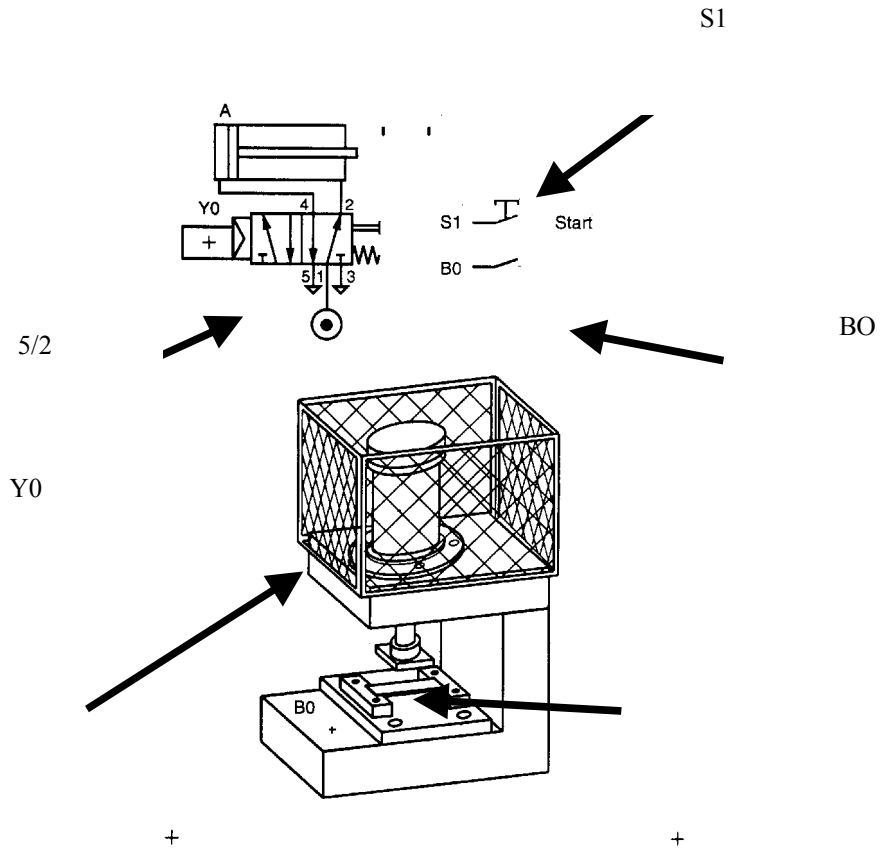
S1

I 0.1

Y0

Q 4.0

5/2



STEP 7

.9

.SIMATIC Manager

STEP 7



.(

)

.CPU SIMATIC 300 station

PLC

:

STEP 7

Project:

SIMATIC 300 Station:

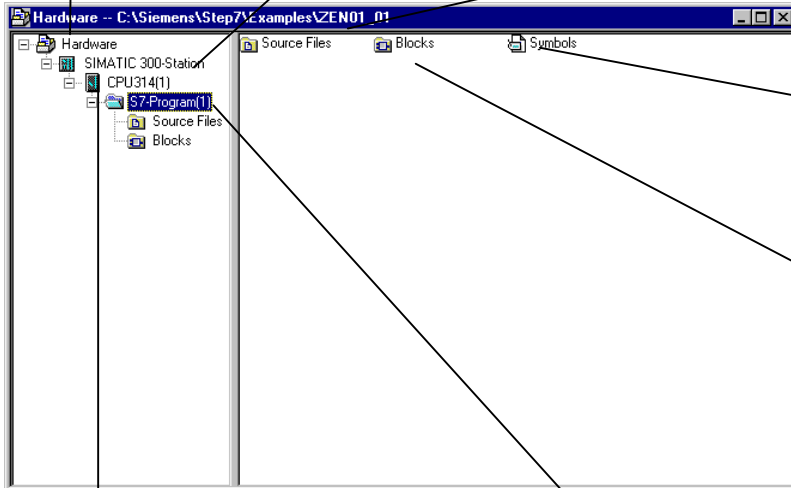
)SIMATIC 300 Station(
 MPI)
) PROFIBUS

) Hardware/SC*¹ (
 ... CPU

Source Files/SO*¹:
 SCL-)

Symbols/SY*¹:

Blocks/AP-off*¹:
 OB, FB,)
)FC, SFB, SFC, DB



CPU:
 S7
 . (Connection/CO*¹)

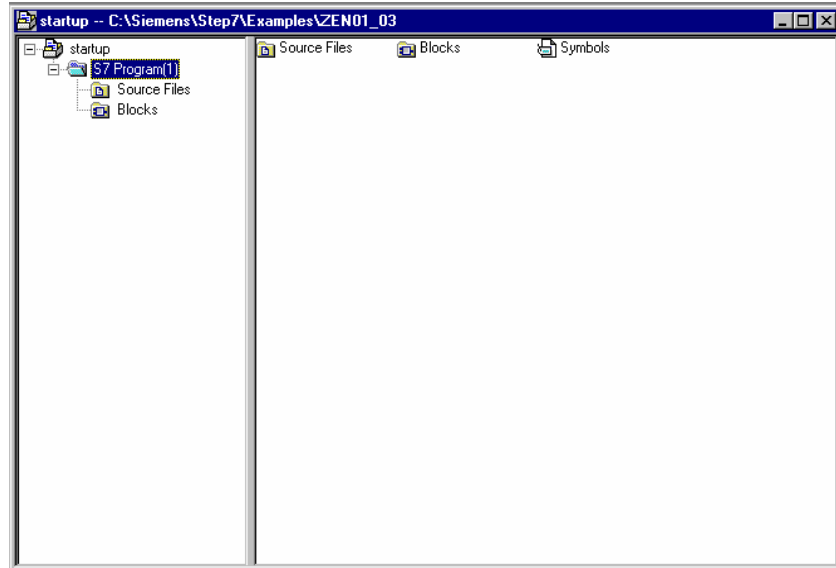
S7-Program:
 (Blocks/AP-off*¹)
 (Symbols/SY*¹)
 (Source files/SO*¹).

STEP 7 Version 2.x

*1



:



:

. WinAC S7-400 SIMATIC S7-300





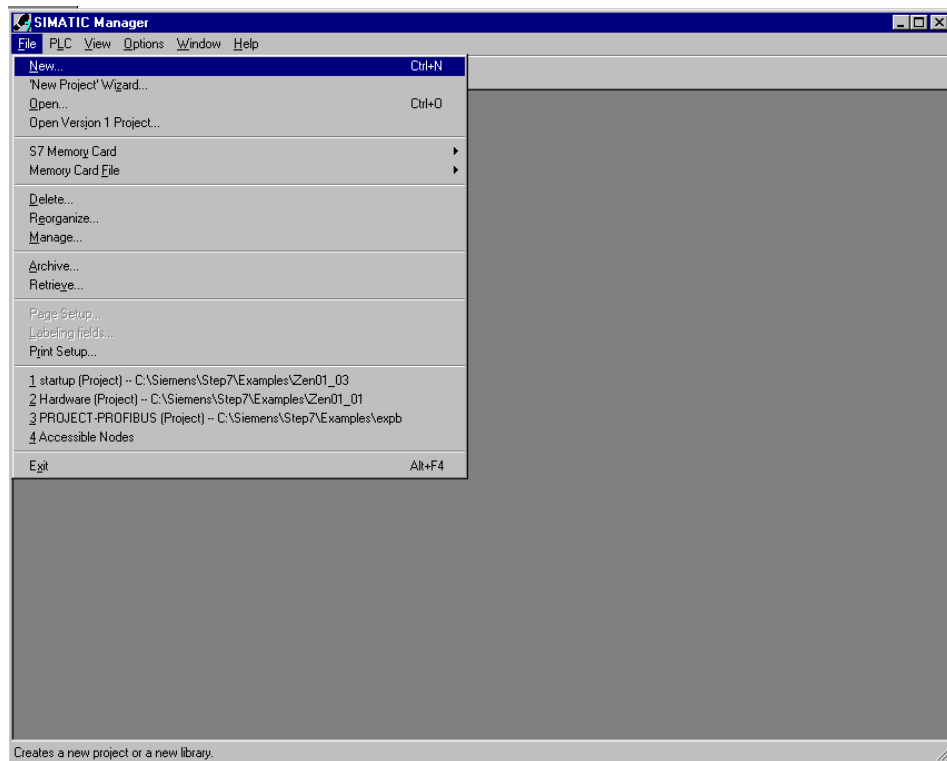
SIMATIC Manager STEP 7 .1



SIMATIC Manager

(→ SIMATIC Manager)

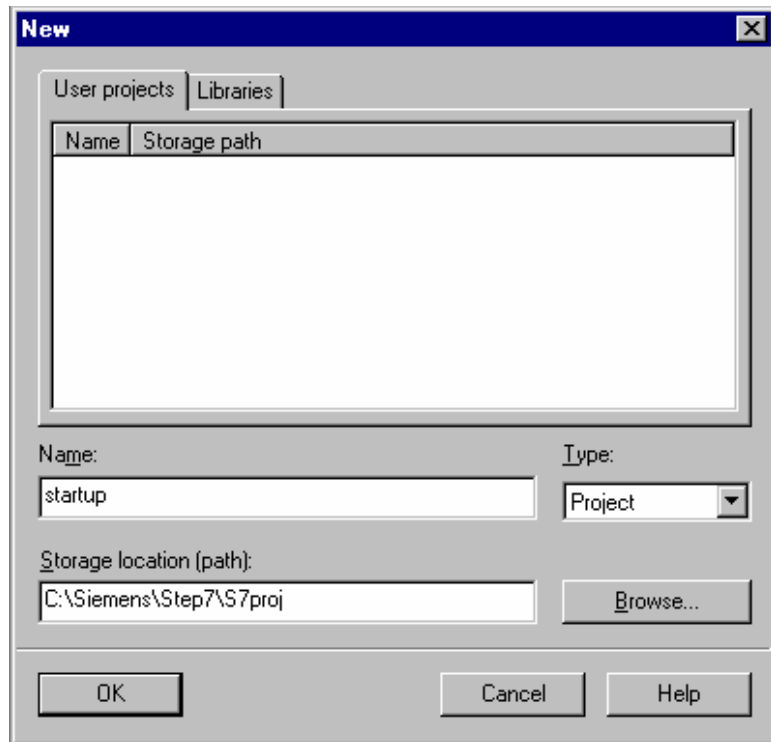
(→ . STEP 7 .2
File → New).





startup (→ startup → OK)

.3

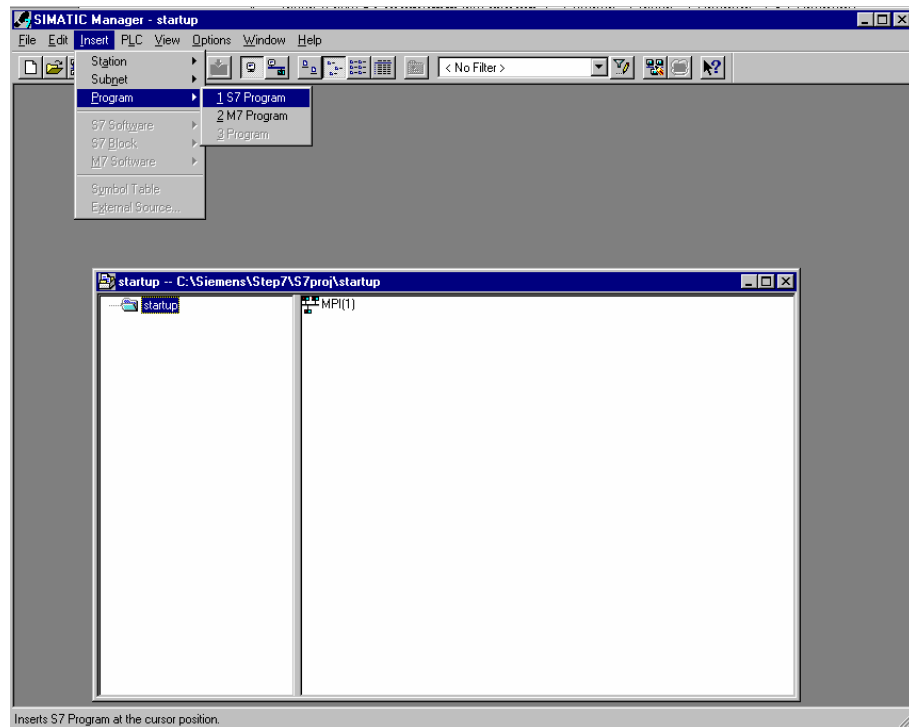


startup

S7-Program

.4

(→ startup → Insert → Program → S7-Program)



OB1:) . ()

STEP 7 .5

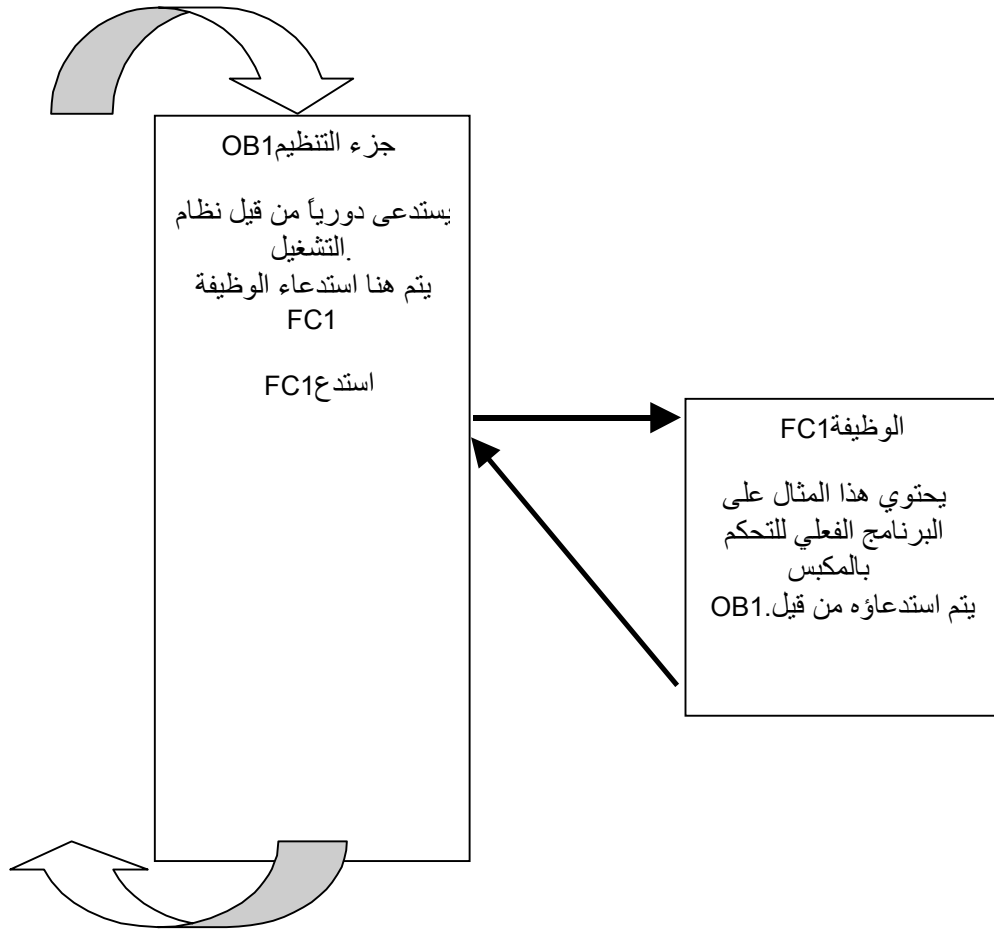


(Organization Block

(CPU)

(FC1 :

.Function)

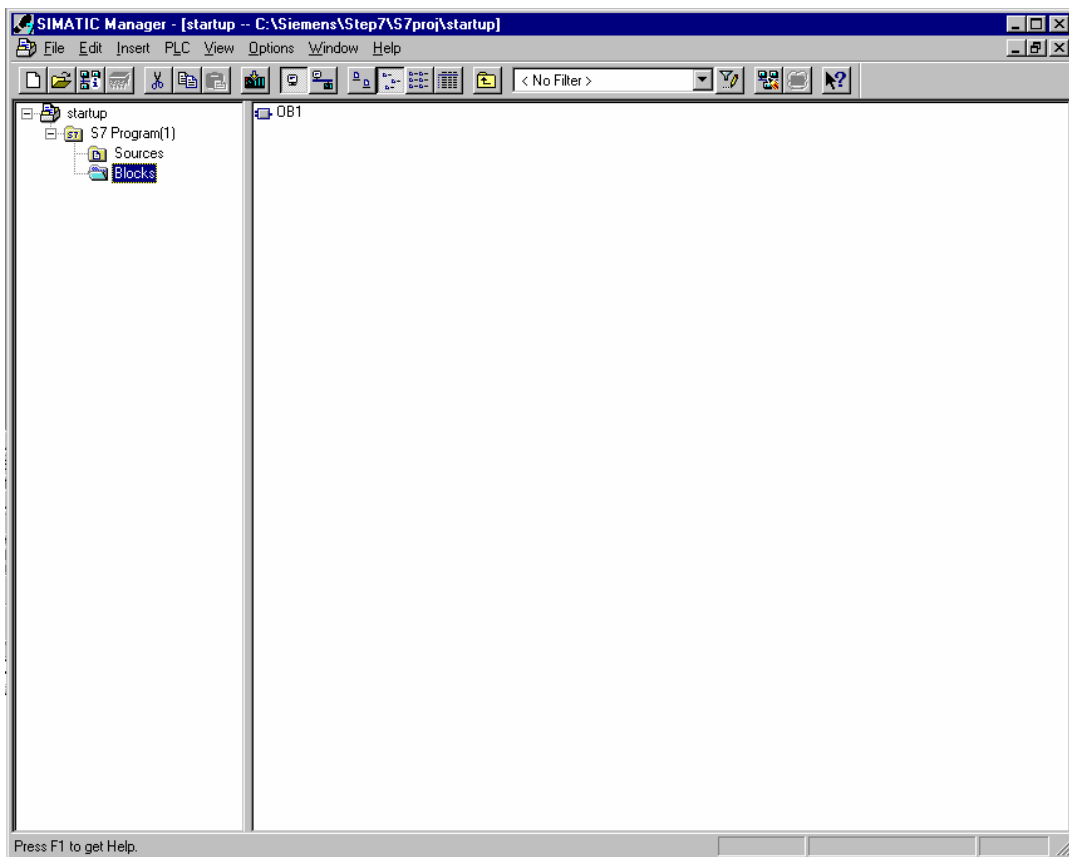




.(→ Blocks) 'Blocks'

FC1

.6

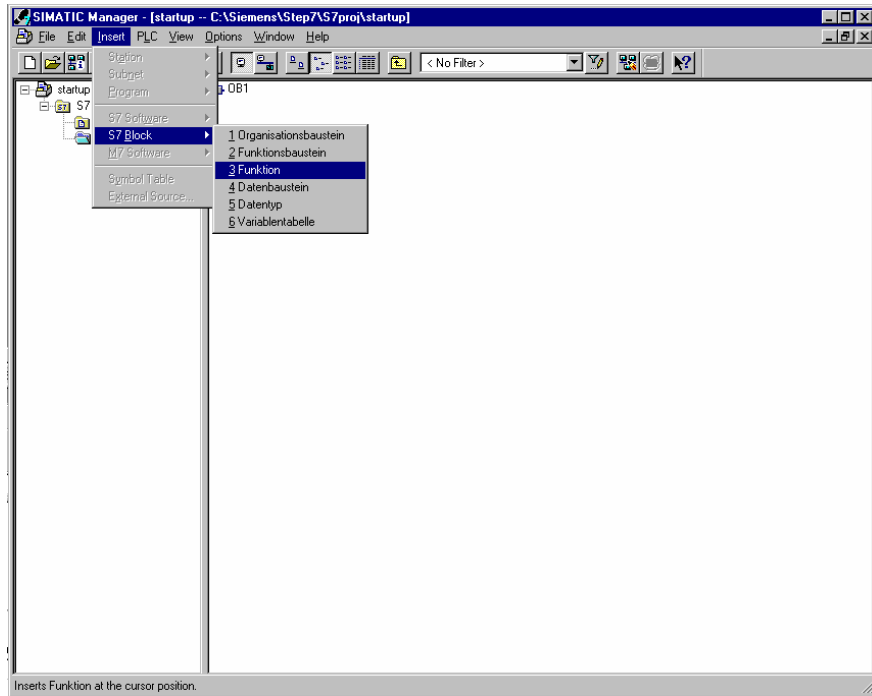


. (→ Insert → S7 Block →

S7- Block function

.7

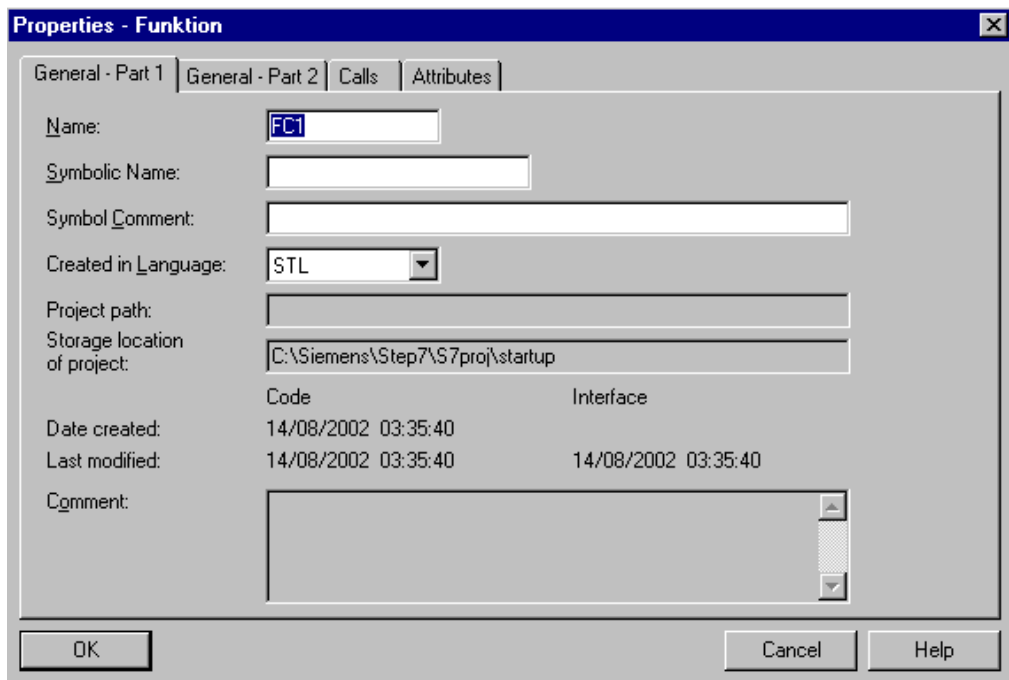
Function)



(→ FC1 .

.8

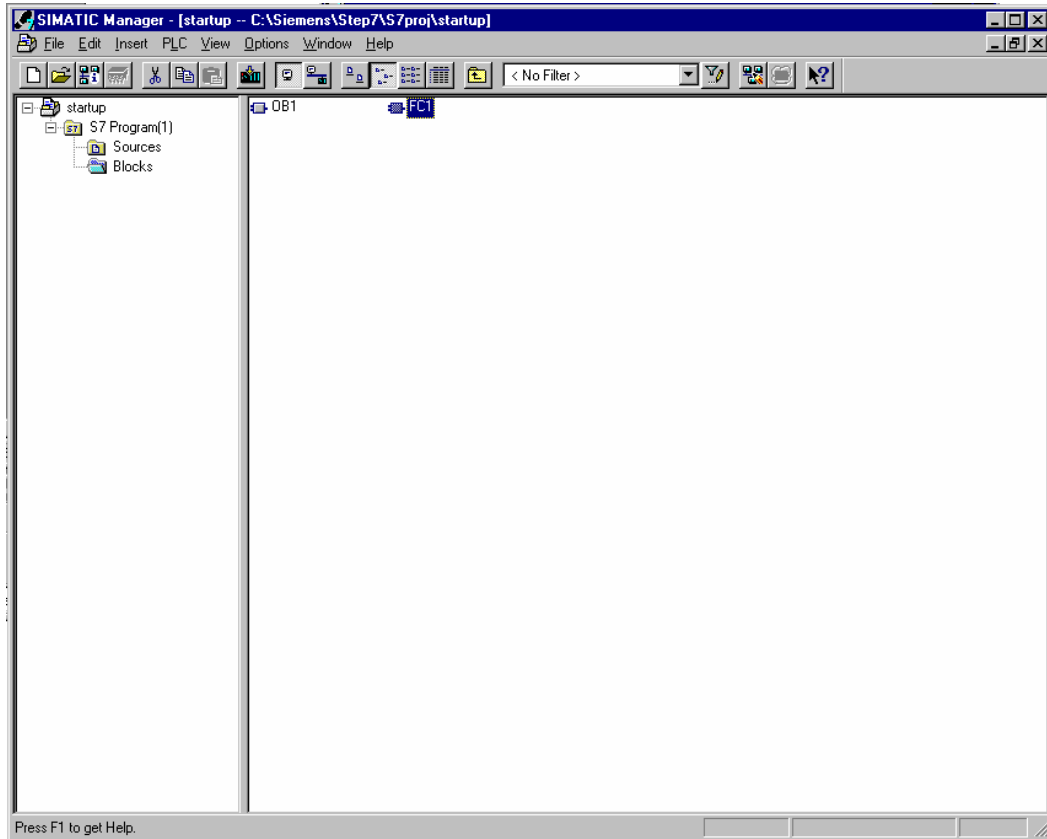
→ OK)



SIMATIC Manager

FC1 OB1

.9



FBD

STEP 7

.10

.STEP 7

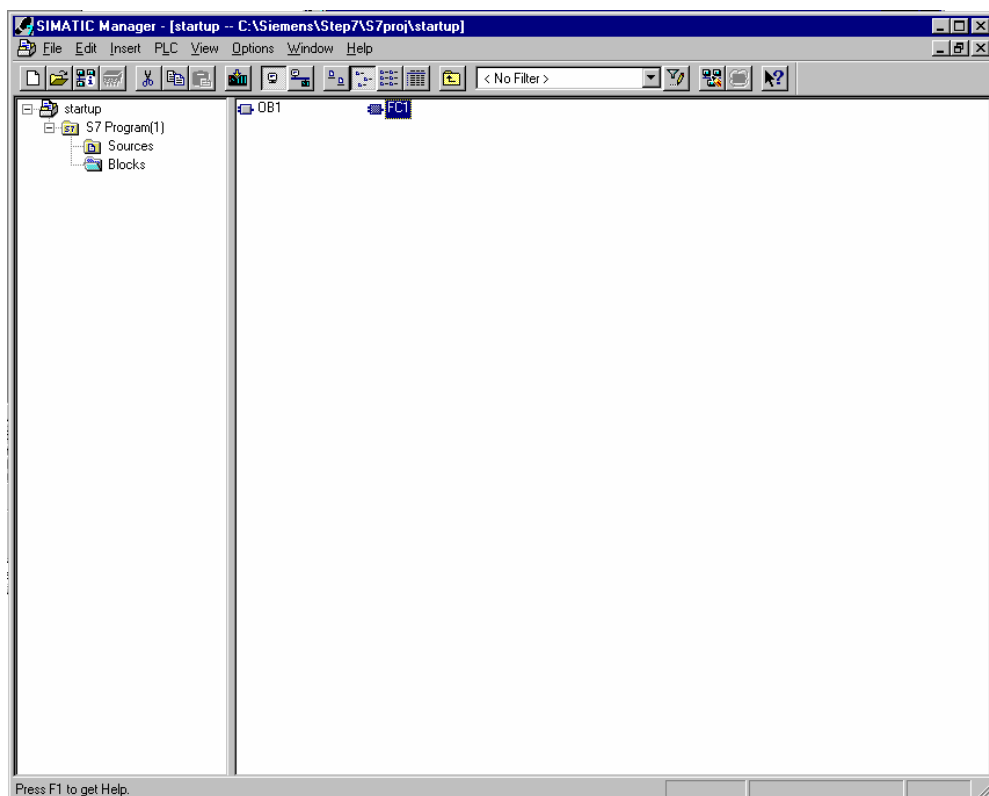
FBD



FC1

.1

.SIMATIC Manager (→ FC1)





VIEW

.2

LAD/STL/FBD to FBD (→ View → FBD).

The screenshot shows the Siemens STEP 7 software interface. The main window is titled 'LAD/STL/FBD - FC1'. The 'View' menu is open, showing options for 'LAD' (Ctrl+1), 'STL' (Ctrl+2), and 'FBD' (Ctrl+3). The 'FBD' option is selected. Below the menu, there are options for 'Data View', 'Declaration View', 'Display with', 'Zoom In', 'Zoom Out', 'Zoom Factor...', 'Toolbar', 'Breakpoint Bar', 'Status Bar', 'Column Width...', and 'Update View' (F5). The 'Program elements' window on the right shows a list of components including 'New network', 'Bit logic', 'Comparator', 'Converter', 'Counter', 'DB call', 'Jumps', 'Integer fct', 'Floating-point fct', 'Move', 'Program control', 'Shift/Rotate', 'Status bits', 'Timers', 'Word logic', 'FB blocks', 'FC blocks', 'SFB blocks', 'SFC blocks', and 'Multiple instances'. The status bar at the bottom indicates 'Changes to the FBD programming language in the current block.' and 'offline'.

.3



:

AND

OR

!

...

CPU

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

FC1 : Title:))
 Comment: [Redacted]

Network 1: Title: [Redacted]
 Comment: [Redacted]

Program elements:

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
- Word logic
- FB blocks
- FC blocks
- SFB blocks
- SFC blocks

Press F1 to get Help. | offline | Abs | Nw 1 Ln 1 | Insert

" "

STEP 7

:



.4



S_PULSE

(→ Timers → S_PULSE) .Timers

The screenshot shows the 'Program Elements' catalog in the SIMATIC Manager. The catalog is organized into a tree structure. The 'Timers' folder is expanded, showing a list of timer instructions including S_PULSE, S_PEXT, S_ODT, S_ODTS, S_OFFDT, -[SP], -[SE], -[SD], -[SS], and -[SF]. The 'S_PULSE' instruction is highlighted. The main workspace shows a ladder logic network with a table for variable declarations and a network editor.

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

FC1 : Title:
 Comment:

Network 1: Title:
 Comment:

Program elements catalog (on/off). offline Abs Nw 1 Ln 1 Insert

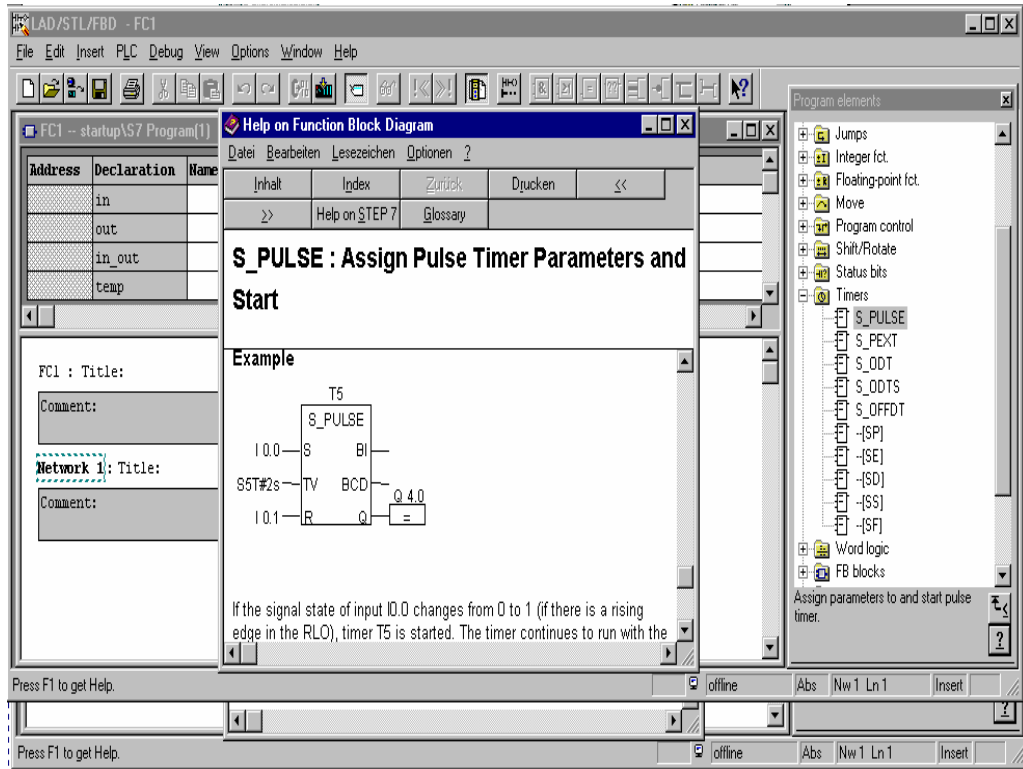


.5



?

(→ ?) .



‘0’ Q

‘1’ S

S_PULSE

:

‘0’ S

‘1’ Q

TV





S_PULSE

.6

S_PULSE

S_PULSE

(→ S_PULSE)..

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

Comment:

```

    ???
    S_PULSE
    ??? S BI ...
    ??? TV BCD ...
    ... R Q
    
```

Program elements:

- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
 - S_PULSE
 - S_PEXT
 - S_ODT
 - S_ODTS
 - S_OFFDT
 - [SP]
 - [SE]
 - [SD]
 - [SS]
 - [SF]
- Word logic
- FB blocks

Assign parameters to and start pulse timer.

Press F1 to get Help. offline Nw 1 Insert Chg



AND

.7

)



(s



)→(→ S

LAD/STL/FBD - FC1

File Edit Insert PLC Debug View Options Window Help

FC1 -- startup\57 Program(1)

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

Comment:

Program elements

- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
 - S_PULSE
 - S_PEXT
 - S_ODT
 - S_ODTS
 - S_OFFDT
 - (SP)
 - (SE)
 - (SD)
 - (SS)
 - (SF)
- Word logic
- FB blocks

Assign parameters to and start pulse timer.

Press F1 to get Help. offline Abs Nw 1 Insert Chg



LAD/STL/FBD - FC1

File Edit Insert PLC Debug View Options Window Help

FC1 -- startup\S7 Program(1)

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

Network 1: Title:
Comment:

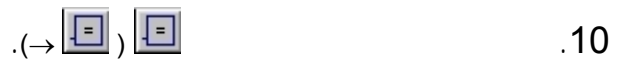
Network 2: Title:
Comment:

Program elements

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
 - S_PULSE
 - S_PEXT
 - S_ODT
 - S_ODTS
 - S_OFFDT
 - [SP]
 - [SE]
 - [SD]
 - [SI]
 - [SF]
- Word logic
- FB blocks
- FC blocks
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

Assign parameters to and start pulse timer.

Press F1 to get Help. | offline | Abs | Nw 1 | Insert | Chg



LAD/STL/FBD - FC1

File Edit Insert PLC Debug View Options Window Help

FC1 -- startup\S7 Program(1)

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

Network 1: Title:
Comment:

Network 2: Title:
Comment:

Network 3: Title:
Comment:

Network 4: Title:
Comment:

Network 5: Title:
Comment:

Network 6: Title:
Comment:

Network 7: Title:
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Network 8: Title:
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Network 9: Title:
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Network 10: Title:
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Network 11: Title:
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Network 12: Title:
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Network 13: Title:
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Network 14: Title:
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Network 15: Title:
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Network 16: Title:
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Network 17: Title:
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Network 92: Title:
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Network 93: Title:
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Network 94: Title:
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Network 95: Title:
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Network 96: Title:
Comment:

Network 97: Title:
Comment:

Network 98: Title:
Comment:

Network 99: Title:
Comment:

Network 100: Title:
Comment:

Program elements

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
 - S_PULSE
 - S_PEXT
 - S_ODT
 - S_ODTS
 - S_OFFDT
 - [SP]
 - [SE]
 - [SD]
 - [SI]
 - [SF]
- Word logic
- FB blocks
- FC blocks
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

Assign parameters to and start pulse timer.

Press F1 to get Help. | offline | Abs | Nw 2 | Insert | Chg

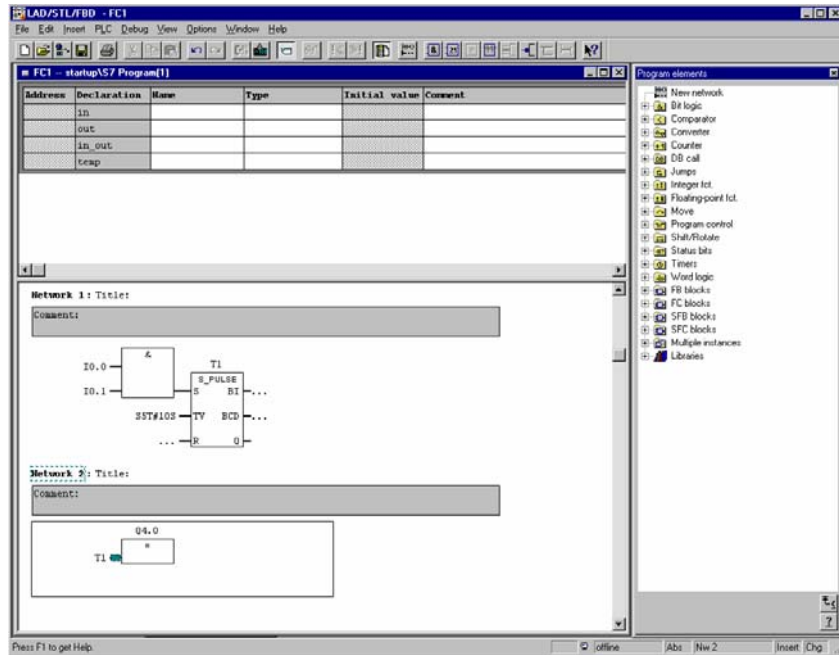


Q4.0

.11



.(→ Q 4.0 → T1 → →). PLC



SIMATIC Manager

."LAD/STL/FBD"

."OPEN".

OB1

(Point 12)

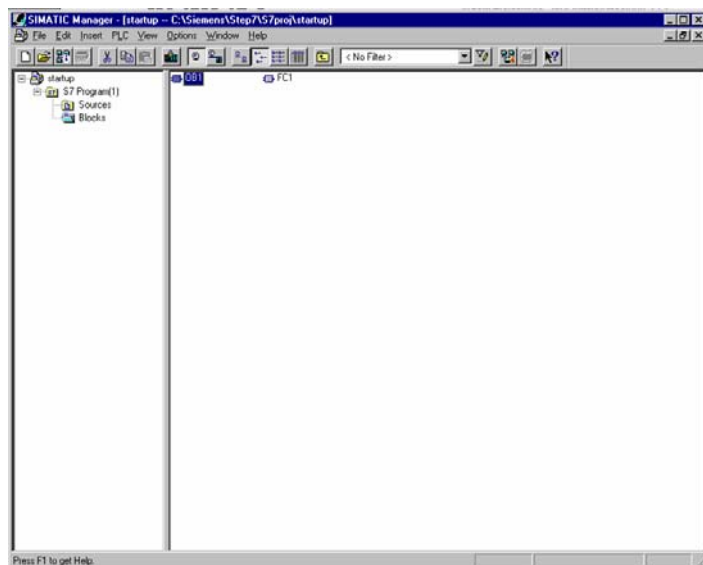
.SIMATIC Manager

FC

OB1

.12

(→ SIMATIC Manager → OB1).

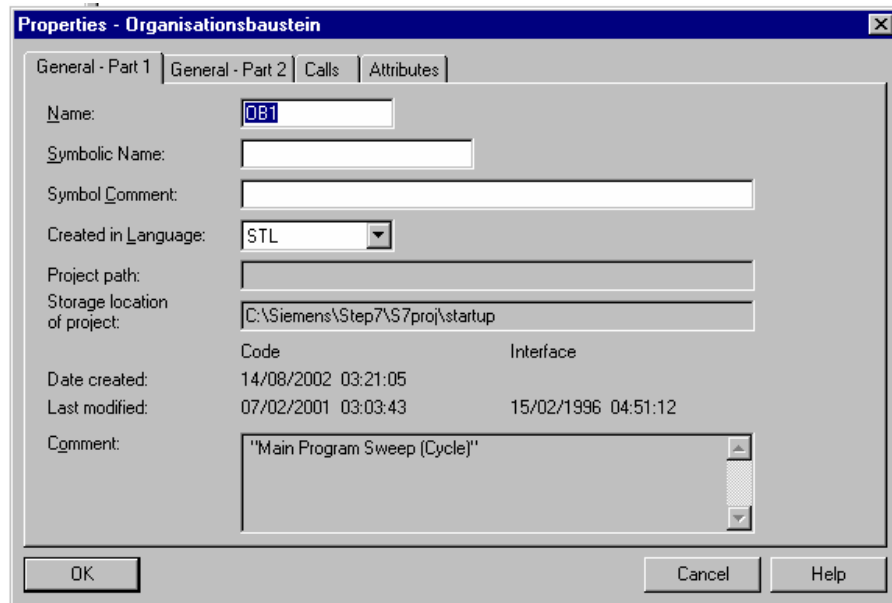




. (→ OK) .OK

OB1

.13



FBD

LAD/FBD/STL

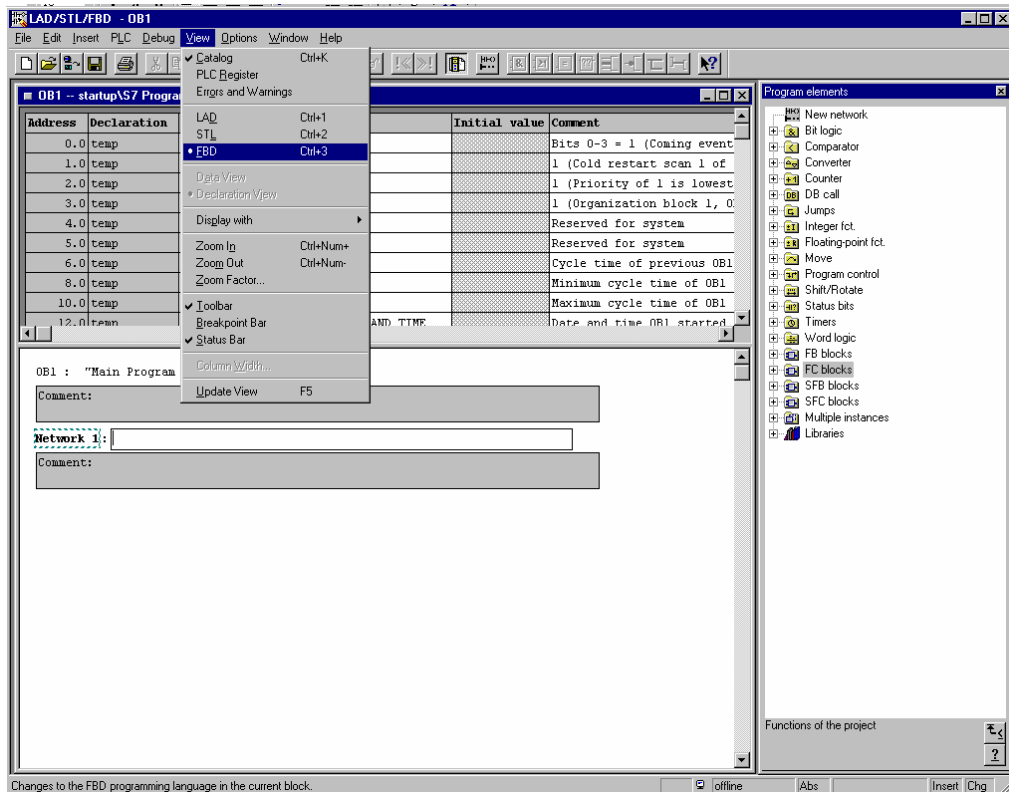
.14

(→ .

FBD

View

. FBD)→View





(FC Block) FC1 OB1 .15



OB1 Network 1



(→ FC Block → FC1 →  → ).

LAD/STL/FBD - OB1

File Edit Insert PLC Debug View Options Window Help

OB1 -- sta Save 57 Program(1)

Address	Declaration	Name	Type	Initial value	Comment
0.0	temp	OB1_EV_CLASS	BYTE		Bits 0-3 = 1 (Coming event
1.0	temp	OB1_SCAN_1	BYTE		1 (Cold restart scan 1 of
2.0	temp	OB1_PRIORITY	BYTE		1 (Priority of 1 is lowest
3.0	temp	OB1_OB_NUMBR	BYTE		1 (Organization block 1, 0
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 OB1
8.0	temp	OB1_MIN_CYCLE	INT		Minimum cycle time of OB1
10.0	temp	OB1_MAX_CYCLE	INT		Maximum cycle time of OB1
12.0	temp	OB1_DATE_TIME	DATE AND TIME		Date and time OB1 started

OB1 : "Main Program Sweep (Cycle)"

Comment:

Network 1: Call of FC1

Comment:

```

    FC1
    ... EN ENO
  
```

Program elements

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
- Word logic
- FB blocks
- FC blocks
- FC1
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

Saves the current block/source.

offline Abs Nw 1 Insert

CPU

STEP 7

.11

LAD/FBD/STL

FC1

.1



. (→ Window .FC1 OB1 Window

→ FC1)

LAD/STL/FBD - OB1

Address	Declaration	Name	Initial value	Comment
0.0	temp	OB1_EV_CLASS		Bits 0-3 = 1 (Coming event
1.0	temp	OB1_SCAN_1		1 (Cold restart scan 1 of
2.0	temp	OB1_PRIORITY		1 (Priority of 1 is lowest
3.0	temp	OB1_OB_NUMBR		1 (Organization block 1, 0
4.0	temp	OB1_RESERVED_1		Reserved for system
5.0	temp	OB1_RESERVED_2	BYTE	Reserved for system
6.0	temp	OB1_PREV_CYCLE	INT	Cycle time of previous OB1
8.0	temp	OB1_MIN_CYCLE	INT	Minimum cycle time of OB1
10.0	temp	OB1_MAX_CYCLE	INT	Maximum cycle time of OB1
12.0	temp	OB1_DATE_TIME	DATE AND TIME	Date and time OB1 started

OB1 : "Main Program Sweep (Cycle)"

Comment:

Network 1: Call of FC1

Comment:

```

    FC1
    EN ENO
  
```

Program elements:

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
- Word logic
- FB blocks
- FC blocks
 - FC1
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

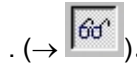
Functions of the project

Activates this window. offline Abs Nw 1 Insert



FC1

.2



LAD/STL/FBD - FC1

File Edit Insert PLC Debug View Options Window Help

FC1 -- startup\S7 Program[1]

Address	Declaration	Name	Type	Initial value	Comment
	in				
	out				
	in_out				
	temp				

FC1 : Title:
Comment:

Network 1: Title:
Comment:

Network 2: Title:
Comment:

Press F1 to get Help.

PLC RUN | Abs | Nw 2 | Insert

- New network
- Bit logic
- Comparator
- Converter
- Counter
- DB call
- Jumps
- Integer fct.
- Floating-point fct.
- Move
- Program control
- Shift/Rotate
- Status bits
- Timers
- Word logic
- FB blocks
- FC blocks
- SFB blocks
- SFC blocks
- Multiple instances
- Libraries

CPU 315-2dp

.12

.SIMATIC Manager

STEP 7



.()
 .CPU SIMATIC 300 station PLC

: . STEP 7

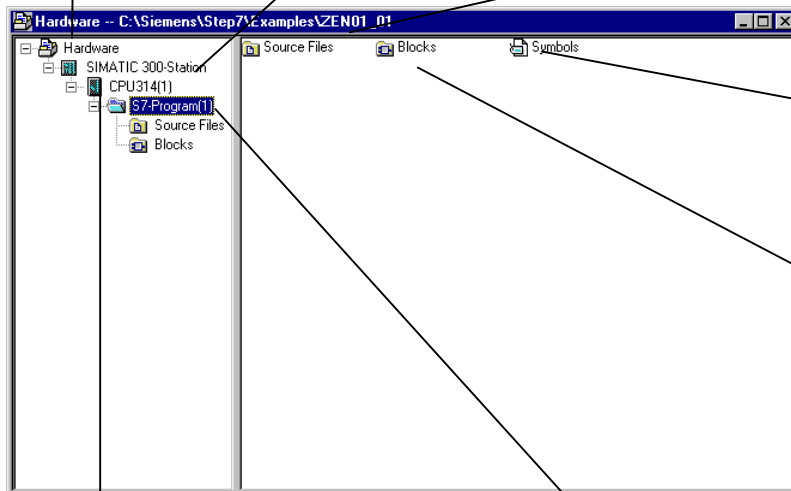
Project:

SIMATIC 300 Station:

)SIMATIC 300 Station(
 MPI)
) PROFIBUS

) Hardware/SC*¹ (
 ... CPU

Source Files/SO*¹:
 SCL-)
 ...



Symbols/SY*¹:

Blocks/AP-off*¹:
 OB, FB,)
)FC, SFB, SFC, DB

CPU:
 S7
 . (Connection/CO*¹)

S7-Program:
 (Blocks/AP-off*¹)
 (Symbols/SY*¹)
 (Source files/SO*¹).

STEP 7 Version 2.x

*1

.CPU SIMATIC 300 station

PLC



.CPU 315-2DP



SIMATIC Manager

STEP 7

.1



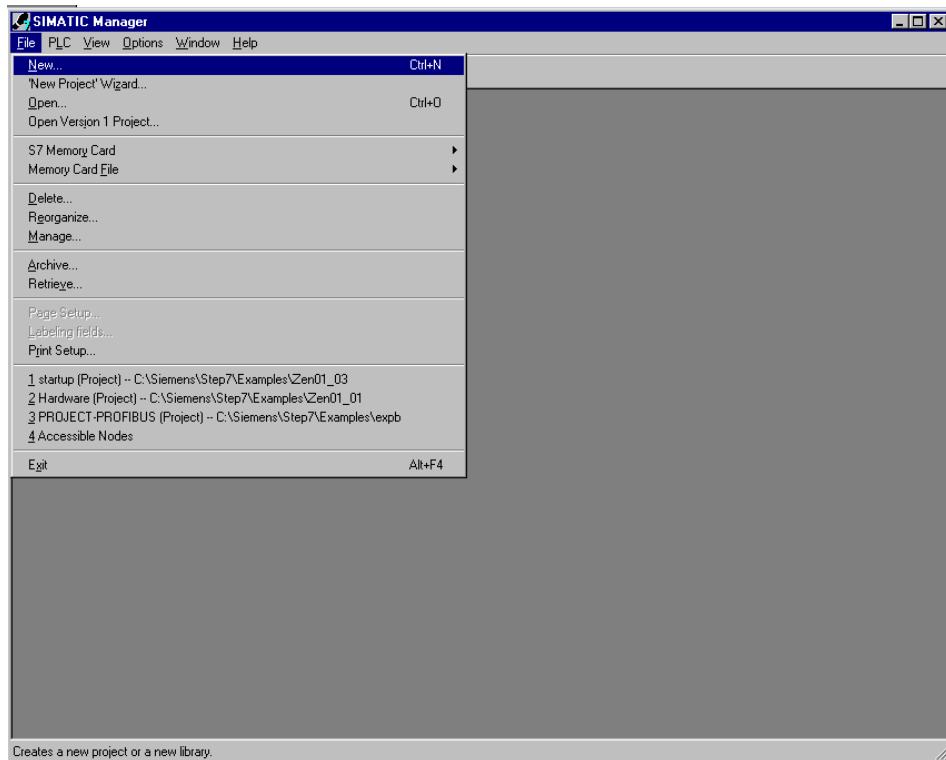
SIMATIC Manager

(→ SIMATIC Manager)

STEP 7

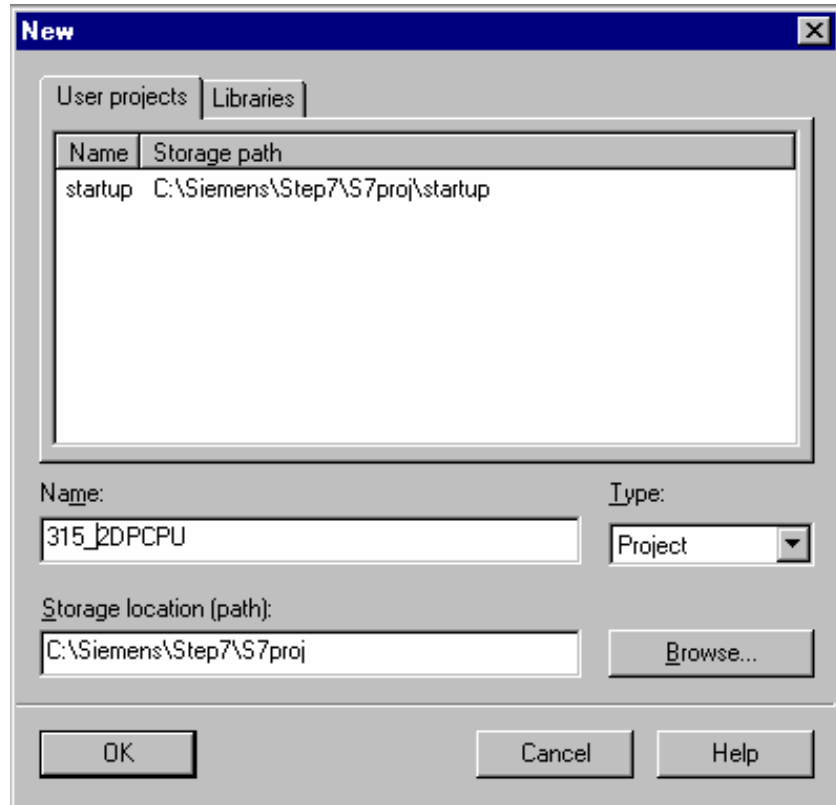
.2

(→ File → New).



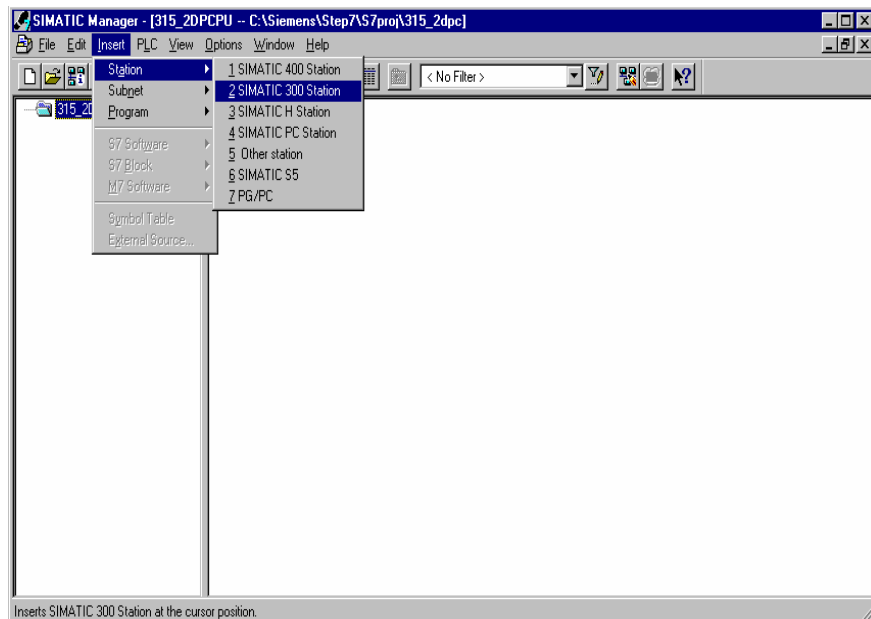
(→ 315_2DPCPU → Name 315_2DPCPU

.3
OK).



SIMATIC 300-Station (→ Insert → Station → SIMATIC

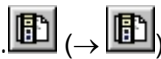
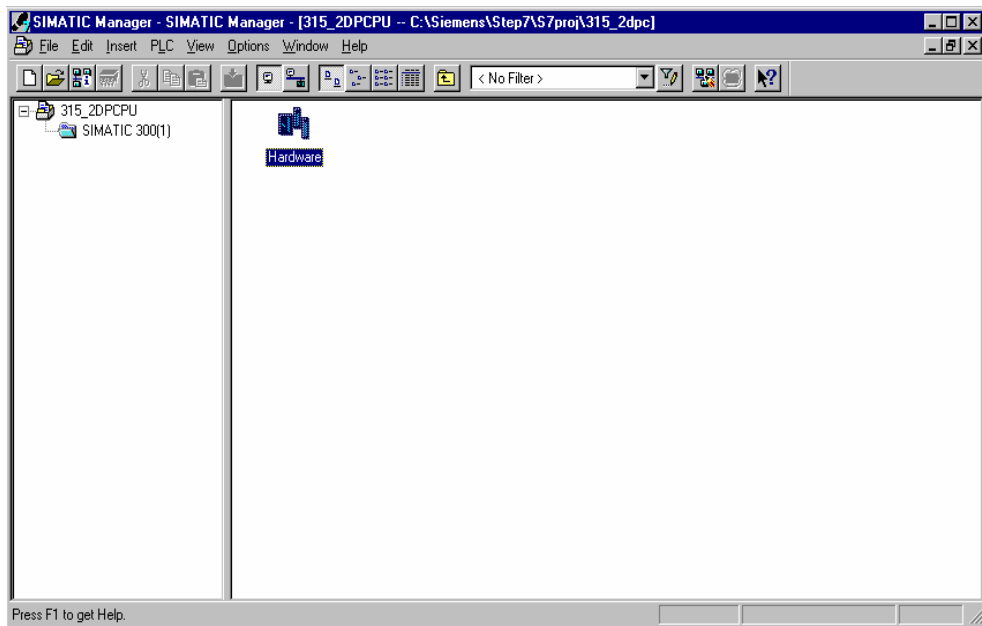
.4
300-Station).





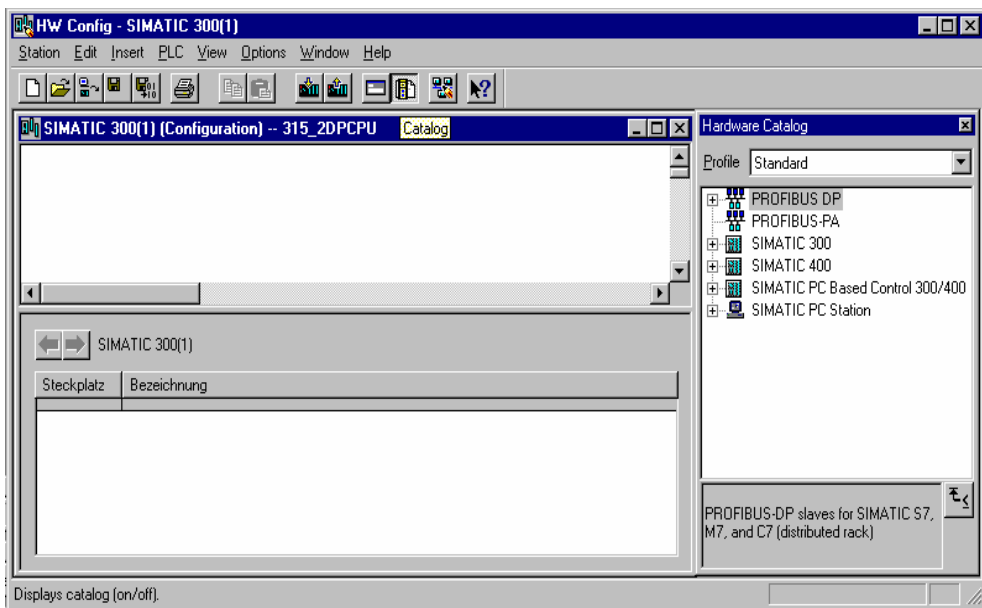
(→ Hardware). 'Hardware'

.5



.6

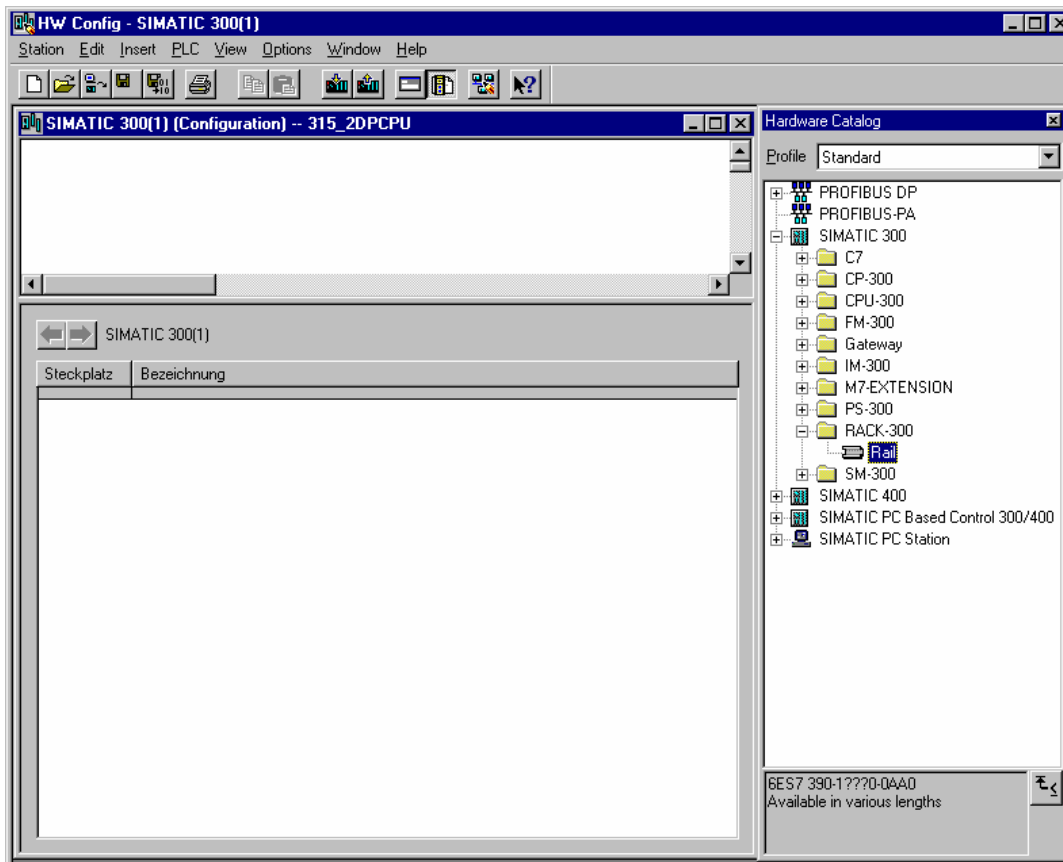
SIMATIC PC Based Control, SIMATIC 400 SIMATIC 300 PROFIBUS-DP





Rail). → RACK-300 → (→ SIMATIC 300 () Rail

.7



.RACK 0 (RACK)

.8



()

(→ SIMATIC 300 → PS-300 → PS 307 2A). **PS 307 2A**

HW Config - SIMATIC 300(1)

Station Edit Insert PLC View Options Window Help

SIMATIC 300(1) (Configuration) -- 315_2DPCPU

Hardware Catalog

Profile: Standard

- PROFIBUS DP
- PROFIBUS-PA
- SIMATIC 300
 - C7
 - CP-300
 - CPU-300
 - FM-300
 - Gateway
 - IM-300
 - M7-EXTENSION
 - PS-300
 - PS 307 10A
 - PS 307 2A**
 - PS 307 5A
 - RACK-300
 - Rail
 - SM-300
- SIMATIC 400
- SIMATIC PC Based Control 300/400
- SIMATIC PC Station

6ES7 307-1BA00-0AA0
Load supply voltage 120/230 VAC: 24 VDC / 2 A

Slot	Module	Order number	Firmware	M...	I...	Q...	C...
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

Insertion possible

()



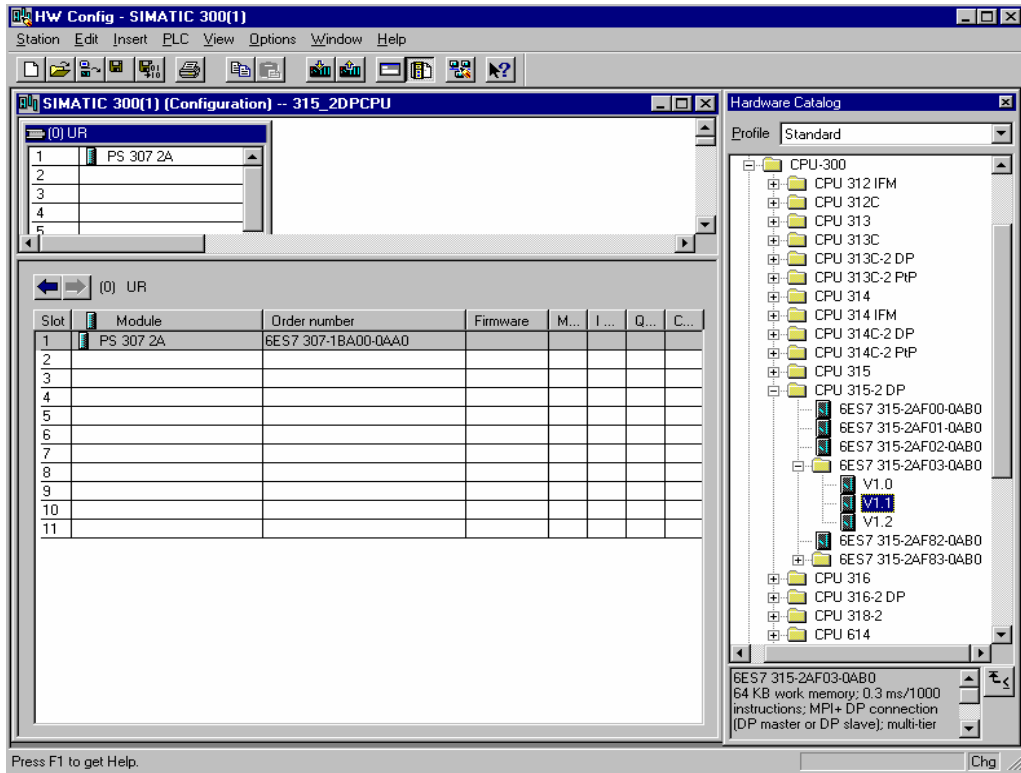


CPU 315-2DP

.9

.CPU

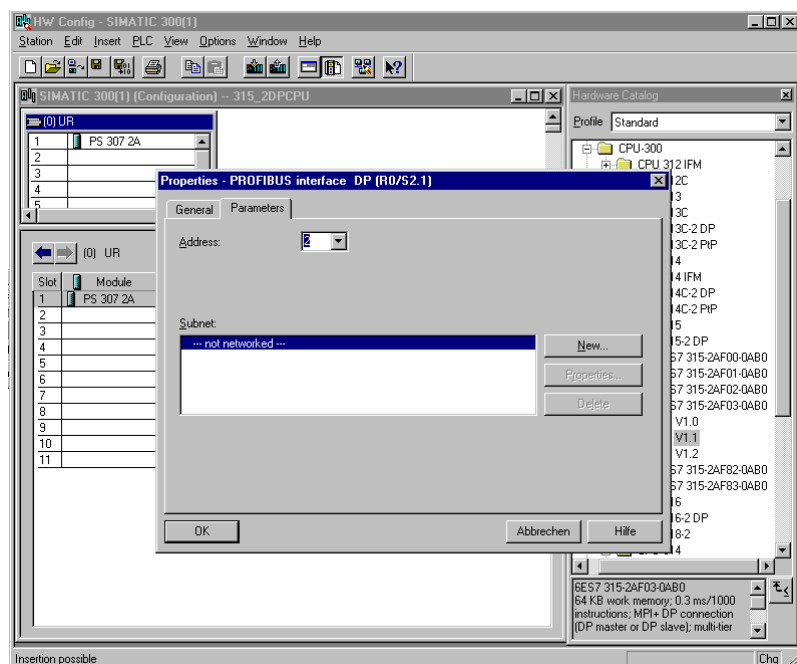
V1.1). →. (→ SIMATIC 300 → CPU-300 → CPU 315-2DP → 6ES7 315-2AF03-0AB0



PROFIBUS

.10

(→ OK). **OK**



16

.11



(→ SIMATIC 300 → SM300 → DI-

300 → SM 321 DI16xDC24V).

The screenshot shows the 'HW Config - SIMATIC 300(1)' window. The main configuration area displays a rack with the following modules:

Slot	Module	Order number	Firmware	M...	I...	Q...	C...
1	PS 307 2A	6ES7 307-1BA00-0AA0					
2	CPU 315-2 DP	6ES7 315-2AF03-0AB0	V1.1	2			
3	DP				1023		
4	DI16xDC24V	6ES7 321-7BH80-0AB0				0...1	
5							
6							
7							
8							
9							
10							
11							

The 'Hardware Catalog' on the right shows the navigation tree with 'SM 321 DI16xDC24V' selected. A tooltip at the bottom right provides details for the selected module: '6ES7 321-7BH80-0AB0 Digital input module DI 16x24 VDC, with hardware and diagnostic interrupts, extended environmental conditions'.



16

.12



(→ SIMATIC 300 → SM300 → DO-300 → SM

322 DO16xDC24V/0,5A).

HW Config - SIMATIC 300(1)

Station Edit Insert PLC View Options Window Help

SIMATIC 300(1) (Configuration) -- 315_2DPCPU

Hardware Catalog

Profile: Standard

DO-300

- SM 322 DO16xAC120V/0.5A
- SM 322 DO16xAC120V/0.5A
- SM 322 DO16xAC120V/230V/1A
- SM 322 DO16xDC24V/0.5A
- SM 322 DO16xDC24V/0.5A**
- SM 322 DO16xDC24V/0.5A
- SM 322 DO16xRel. AC120V
- SM 322 DO16xRel. AC120V/230V
- SM 322 DO32xAC120V/1A
- SM 322 DO32xDC24V/0.5A
- SM 322 DO4xDC15V/20mA, Ex
- SM 322 DO4xDC24V/10mA, Ex
- SM 322 DO8xAC120/230V/1A
- SM 322 DO8xAC120/230V/2A
- SM 322 DO8xAC230V/2A
- SM 322 DO8xAC230V/2A
- SM 322 DO8xDC24V/0.5A
- SM 322 DO8xDC24V/0.5A
- SM 322 DO8xDC24V/2A
- SM 322 DO8xDC24V/2A
- SM 322 DO8xDC48-125V/1.5A
- SM 322 DO8xREL. AC230V
- SM 322 DO8xRel. AC230V
- SM 322 DO8xRel. AC230V
- SM 322 DO8xRel. AC230V/8A

6ES7 322-1BH81-0AA0
Digital output module DO16 24 V / 0.5 A, grouping 8, extended environmental conditions

Press F1 to get Help. Chg

Slot	Module	Order number	Firmware	M...	I...	Q...	C...
1	PS 307 2A	6ES7 307-1BA00-0AA0					
2	CPU 315-2 DP	6ES7 315-2AF03-0AB0	V1.1	2			
3	DP				1023		
4	DI16xDC24V	6ES7 321-7BH80-0AB0			0..1		
5	DO16xDC24V/0.5A	6ES7 322-1BH81-0AA0				4..5	
6							
7							
8							
9							
10							
11							

:



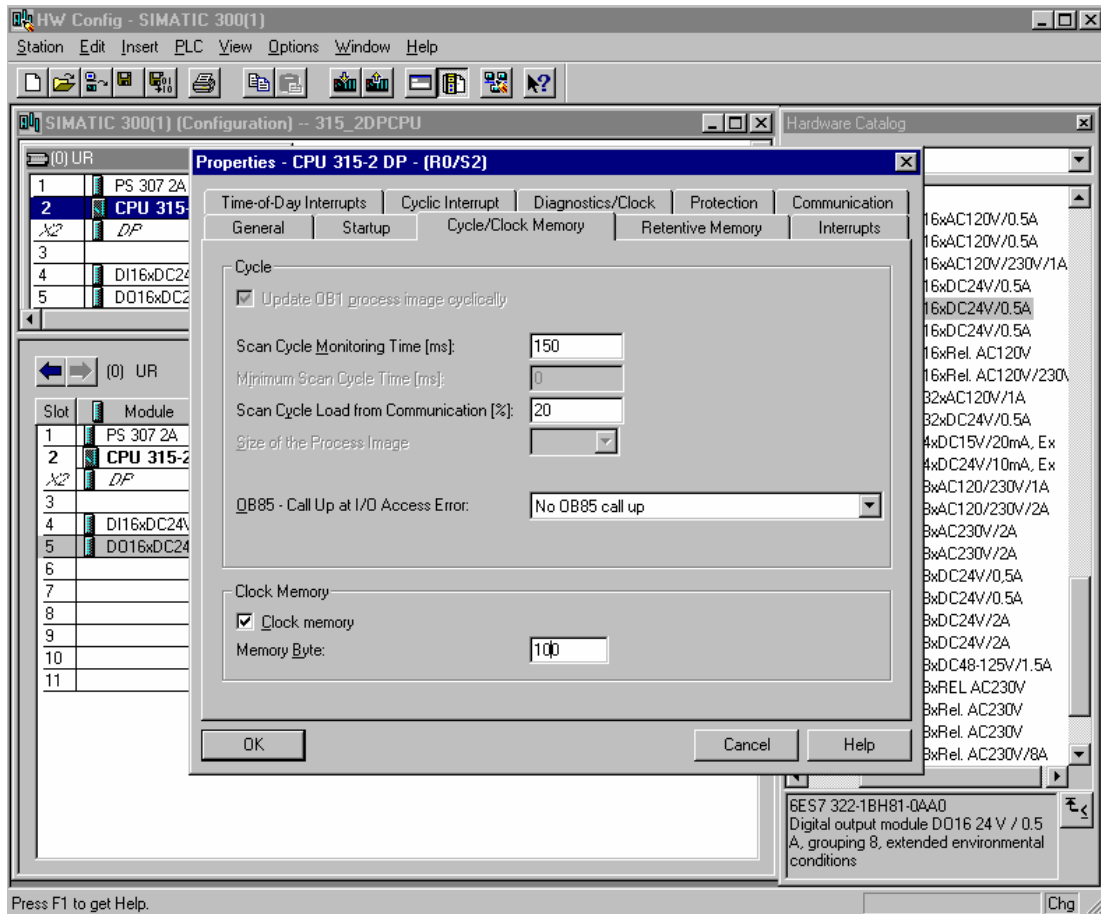
.13



object properties → OK).→(→ Right click CPU 315-2DP module→ insert.

.CPU

(→ Cycle/Clock memory → ∨ Clock memory → Memory byte 100).





S7 - 300

/

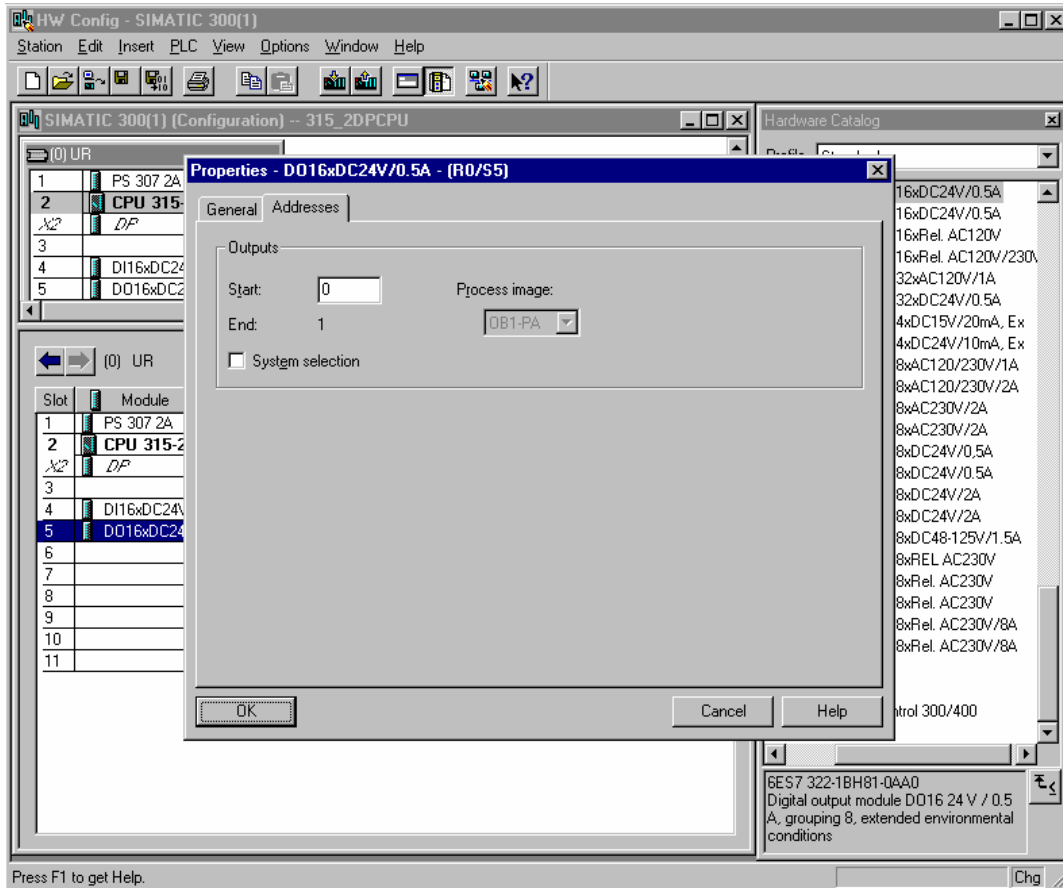
.14

PROFIBUS

. () 'Addresses'

()

(→ DO 16xDC24V/0.5A → Addresses → uncheck System selection → 0 → OK).





.15

PLC
 (→ . STOP CPU



HW Config - SIMATIC 300(1)

Station Edit Insert PLC View Options Window Help

SIMATIC 300(1) (Configuration) -- 315_2DPCPU

Profile: Standard

Slot	Module	Order number	Firmware	M...	I...	Q...	Co...
1	PS 307 2A	6ES7 307-1BA00-0AA0					
2	CPU 315-2 DP	6ES7 315-2AF03-0AB0	V1.1	2	1023		
3	DP						
4	DI16xDC24V	6ES7 321-7BH00-0AB0			0...1		
5	DO16xDC24V/0.5A	6ES7 322-1BH01-0AA0				0...1	
6							
7							
8							
9							
10							
11							

Special 300

- ATIC 400
- ATIC PC Based Control 300/400
- ATIC PC Station

6ES7 322-1BH01-0AA0
 Digital output module DO16 24 V / 0.5 A, grouping 8, extended environmental conditions

Press F1 to get Help. Chg

STEP 7

.13

(STL)

MB100



:

MB100

QB

QB0

:

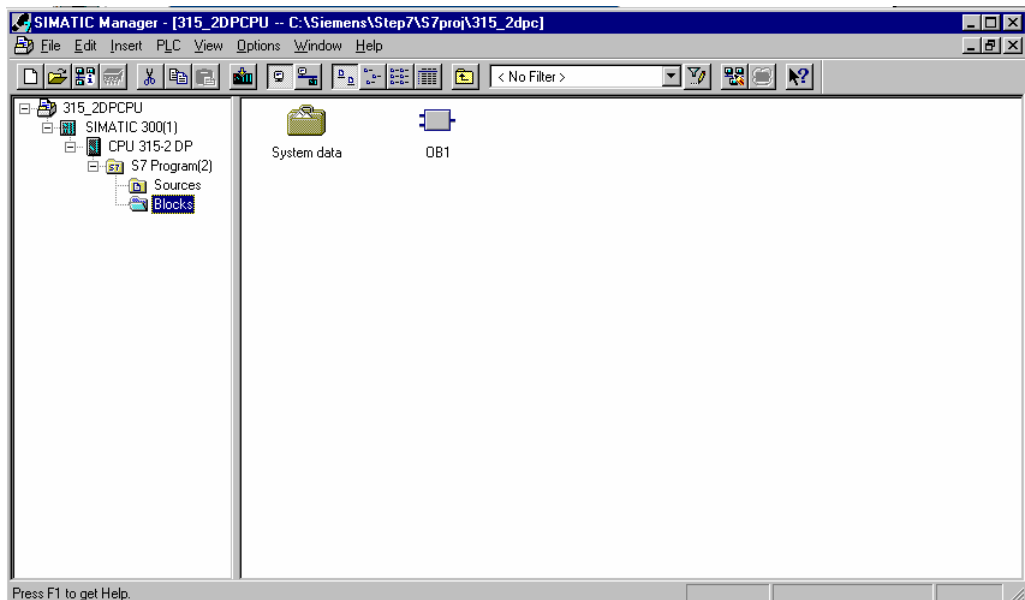
/



0	1	2	3	4	5	6	7	Bit:
0.1	0.2	0.4	0.5	0.8	1	1.6	2	: (s)
10	5	2.5	2	1.25	1	0.625	0.5	: (Hz)

.(→ SIMATIC **SIMATIC Manager** **Blocks**

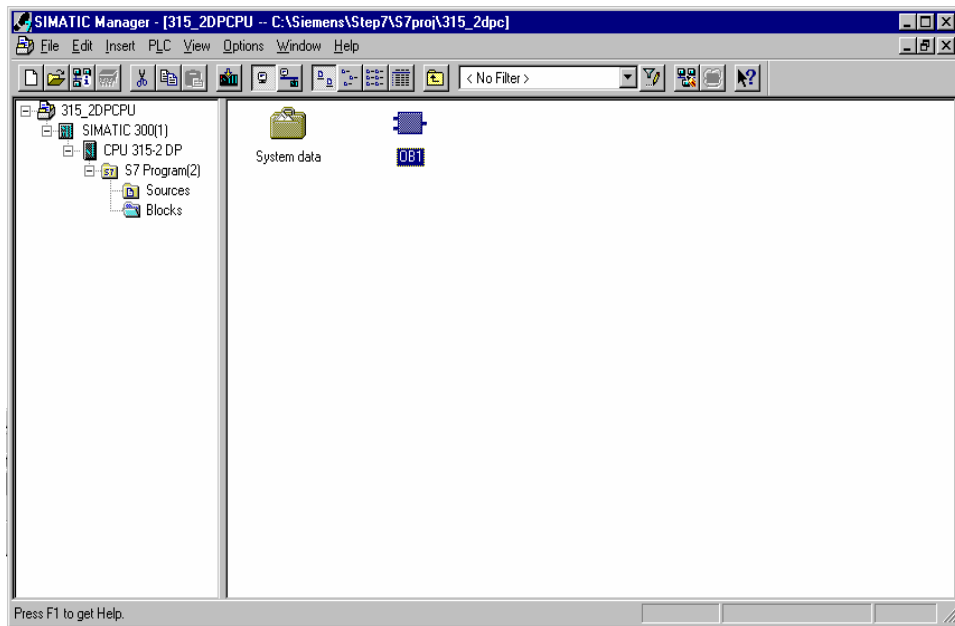
.1
Manager →Blocks)



(→ OB1). **OB1**

SIMATIC Manager

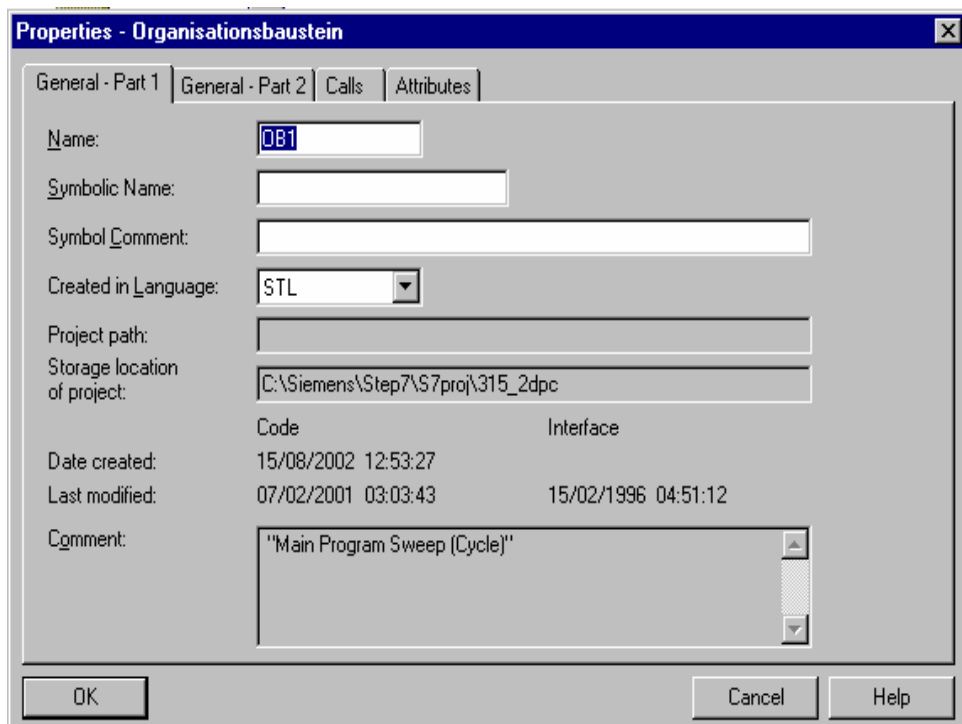
.2



. (→OK)..**OK**

OB1

.3



: FBD STL LAD

.4



OB1

STEP 7

STEP 7

.STEP 7



://



LAD/STL/FBD - OB1

File Edit Insert PLC Debug View Options Window Help

OB1 -- 315_2DPCPUSIMATIC 300(1)XCPU 315-2 DP

Address	Declaration	Name	Type	Initial value	Comment
0.0	temp	OB1_EV_CLASS	BYTE		Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1)
1.0	temp	OB1_SCAN_1	BYTE		1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1)
2.0	temp	OB1_PRIORITY	BYTE		1 (Priority of 1 is lowest)
3.0	temp	OB1_OB_NUMBER	BYTE		1 (Organization block 1, OB1)
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 OB1 scan (milliseconds)
8.0	temp	OB1_MIN_CYCLE	INT		Minimum cycle time of OB1 (milliseconds)
10.0	temp	OB1_MAX_CYCLE	INT		Maximum cycle time of OB1 (milliseconds)
12.0	temp	OB1_DATE_TIME	DATE_AND_TIME		Date and time OB1 started

OB1 : Clock memory

Comment:

Network 1: Clock given out of output bit

Comment:

```

L   MB 100           //Load clock memory
T   QB  0           //Transfer clock memory into output bit
    
```

Press F1 to get Help. offline Abs Nw 1 Ln 3 Insert Chg

MB 100 //Line 1 L
 QB 0 //Line 2 T
 2 1



STEP 7

.14

. OB1

.PLC

STEP 7



.1

(→)  → .STOP



LAD/STL/FBD - OB1

File Edit Insert PLC Debug View Options Window Help

OB1 -- 315_2DPCPU/SIMATIC 300(1)CPU 315-2 DP

Address	Declaration	Name	Type	Initial value	Comment
0.0	temp	OB1_EV_CLASS	BYTE		Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1)
1.0	temp	OB1_SCAN_1	BYTE		1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1)
2.0	temp	OB1_PRIORITY	BYTE		1 (Priority of 1 is lowest)
3.0	temp	OB1_OB_NUMBR	BYTE		1 (Organization block 1, OB1)
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 OB1 scan (milliseconds)
8.0	temp	OB1_MIN_CYCLE	INT		Minimum cycle time of OB1 (milliseconds)
10.0	temp	OB1_MAX_CYCLE	INT		Maximum cycle time of OB1 (milliseconds)
12.0	temp	OB1_DATE_TIME	DATE_AND_TIME		Date and time OB1 started

OB1 : Clock memory

Comment:

Network 1: Clock given out of output bit

Comment:

```

L   MB 100           //Load clock memory
T   QB  0           //Transfer clock memory into output bit
    
```

Press F1 to get Help. offline Abs Nw1 Ln3 Insert Chg

'OB1'

'RUN'



LAD/STL/FBD - OB1

File Edit Insert PLC Debug View Options Window Help

OB1 -- 315_2DPCPU/SIMATIC 300(1)MCPU 315-2 DP

Address	Declaration	Name	Type	Initial value	Comment
0.0	temp	OB1_EV_CLASS	BYTE		Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1)
1.0	temp	OB1_SCAN_1	BYTE		1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1)
2.0	temp	OB1_PRIORITY	BYTE		1 (Priority of 1 is lowest)
3.0	temp	OB1_OB_NUMBR	BYTE		1 (Organization block 1, OB1)
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 OB1 scan (milliseconds)
8.0	temp	OB1_MIN_CYCLE	INT		Minimum cycle time of OB1 (milliseconds)
10.0	temp	OB1_MAX_CYCLE	INT		Maximum cycle time of OB1 (milliseconds)
12.0	temp	OB1_DATE_TIME	DATE_AND_TIME		Date and time OB1 started

OB1 : Clock memory

Comment:

Network 1: Clock given out of output bit

Comment:

```

L   MB 100          //Load clock memory
T   QB  0           //Transfer clock memory into output bit
    
```

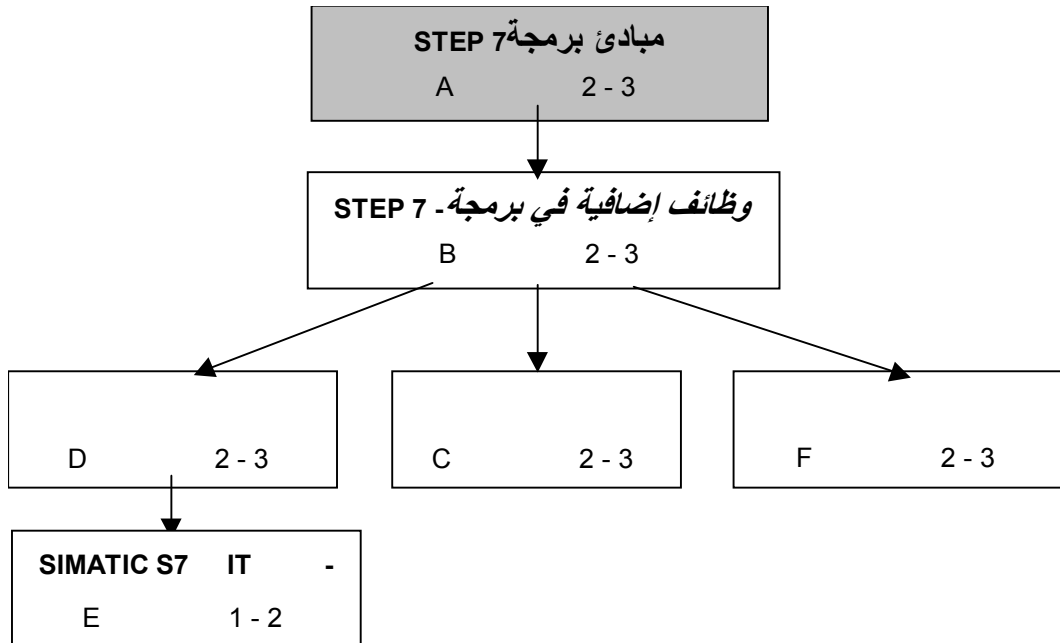
Press F1 to get Help. offline Abs Nw 1 Ln 3 Insert Chg

.1

STEP 7

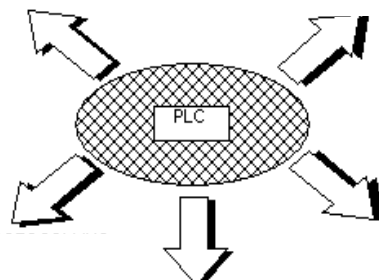
I

(Basics of STEP 7 - Programming).



:

(PLC : Programmable logic controllers)



.STEP 7

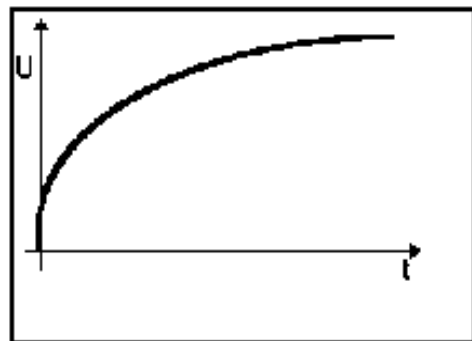
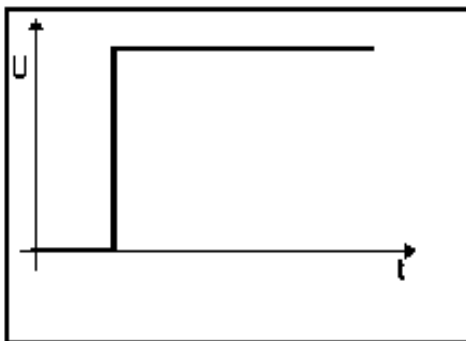
SIMATIC S7-300

:

PLC

.2

.1 .2



.1 .1 .2

		"1"
		"0"

" 0 " 24
 .0 0 1 24
 " 0 " "
 . 0 " "
) ()
 "1" .(

()
"0"
:
.1 0 ()
) " "
(/)
2n n
: 2x2 . 4
() 1 00
(2 / 1) 2 01
(2 / 1) 3 10
() 4 11

.2.1.2

0 24 :

-50 ... +150°C

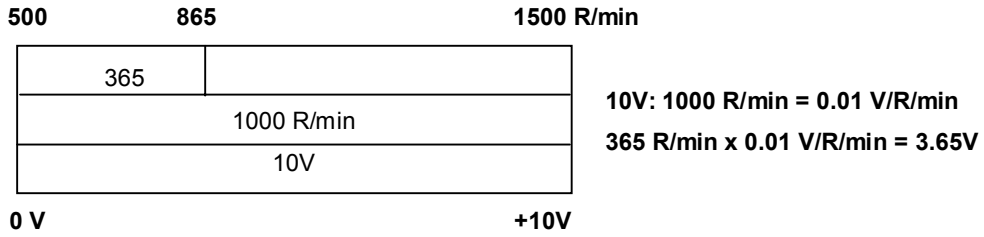
0 ... 200l/min

500 ... 1500 R/min

.0... +10V

500... 1500 R/min

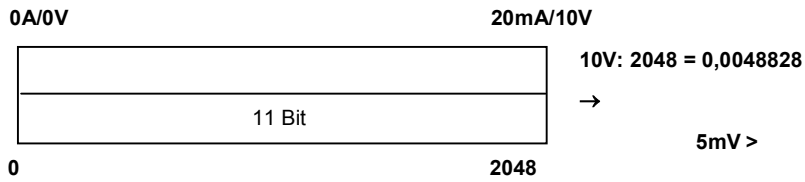
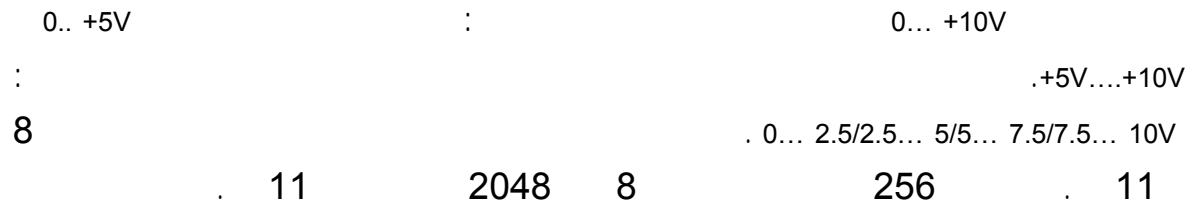
.+ 3.65V 865 R/min



PLC

(A/D conversion)

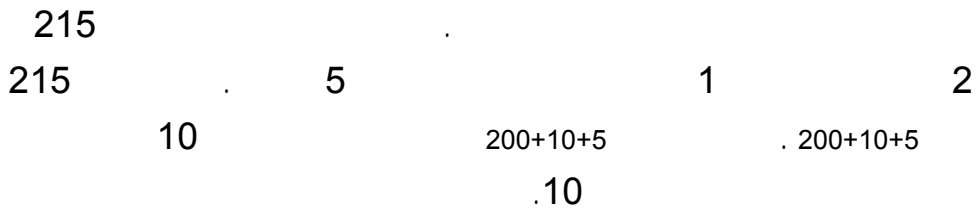
3065

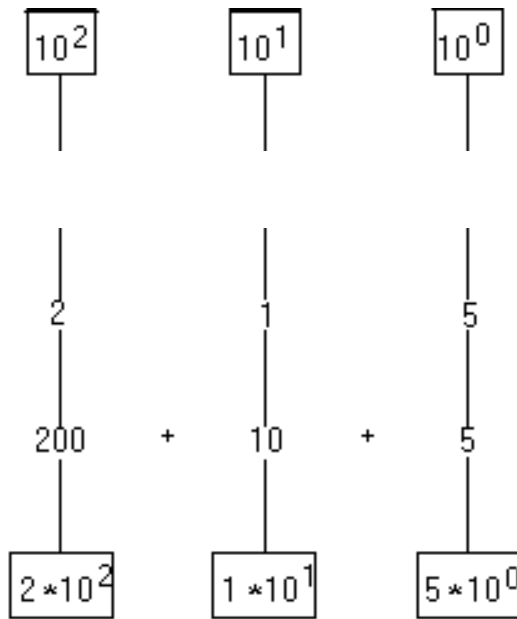


.2 .2

PLC

.1 .2 .2



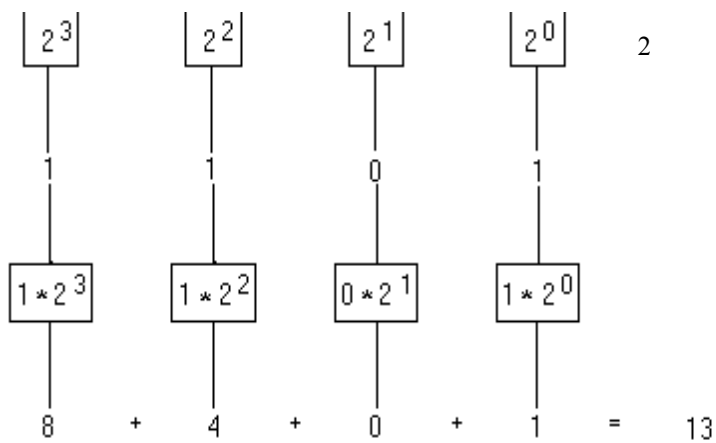


.10

.2.2.2

1 0

2



.2

(8-4-2-1-) BCD .3.2.2

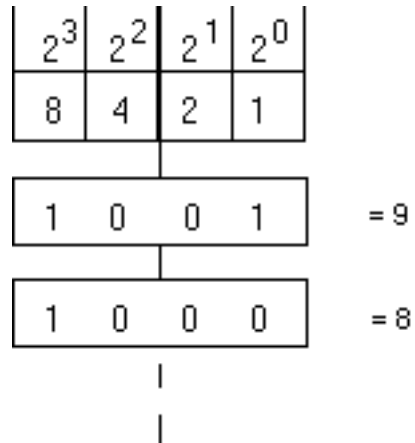
(BCD : Binary Coded Decimal numbers)

4

23

2

9



-4 BCD (tetrad)

285

() BCD

2	8	5
0010	1000	0101

.4.2.2



.16

.5.2.2

decimal number	binary number					hexadecimal number
	16	8	4	2	1	
0					0	0
1					1	1
2				1	0	2
3				1	1	3
4			1	0	0	4
5			1	0	1	5
6			1	1	0	6
7			1	1	1	7
8		1	0	0	0	8
9		1	0	0	1	9
10		1	0	1	0	A
11		1	0	1	1	B
12		1	1	0	0	C
13		1	1	0	1	D
14		1	1	1	0	E
15		1	1	1	1	F
16	1	0	0	0	0	1 0
17	1	0	0	0	1	1 1
18	1	0	0	1	0	1 2
19	1	0	0	1	1	1 3



.6.2.2

PLC

H (Binary)	B (Decimal)	D	(Hexadecimal)
111D	"111"		
7	111B		()
$(1 \times 16^0 + 1 \times 16^1 + 1 \times 16^2)$	111H		$(1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2)$
			.162).

←

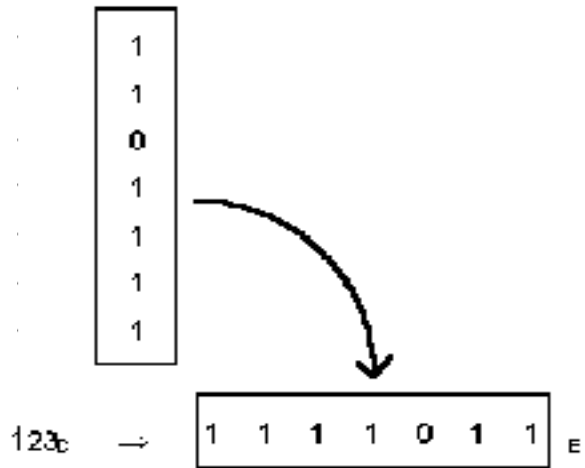
2

(2 1)

()

123

123 : 2 = 61
61 : 2 = 30
30 : 2 = 15
15 : 2 = 7
7 : 2 = 3
3 : 2 = 1
1 : 2 = 0



$$\begin{array}{cccccccc}
 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 \\
 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 & & & & & & & \\
 123 & = & 64 & + & 32 & + & 16 & + & 8 & + & 0 & + & 2 & + & 1
 \end{array}$$

←

16

←

2

16

2

123

$$123 : 16 = 7$$

$$7 : 16 = 0$$

11(B)
/



123₁₀ ⇒

7 3

16

$$123 = 7 \cdot 16 + 11$$

←

16

1111011

1 1 1 1 0 1 1_B

0 1 1 1

1 0 1 1

$$0x2^3 + 1x2^2 + 1x2^1 + 1x2^0 \quad 1x2^3 + 0x2^2 + 1x2^1 + 1x2^0$$

7 B_H

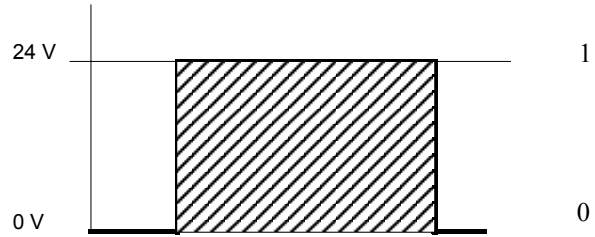
.3 .2

.PLC

()

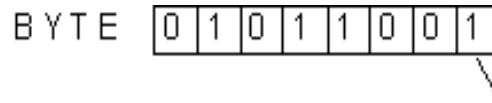
BIT .1 .3 .2

() Binary Digit
"0" "1"



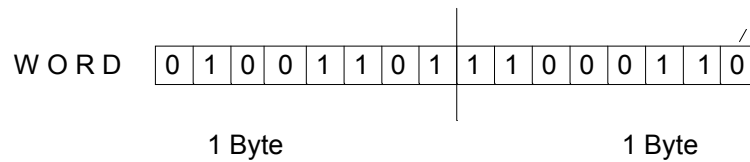
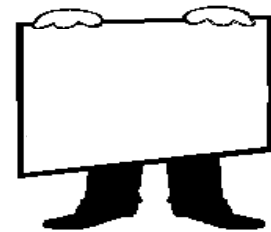
BYTE .2 .3 .2

8



WORD .3 .3 .2

16



16 2

IW0		IW2	
IB0	IB1	IB2	IB3
IW1			

عنوان الكلمة

I2.0 IW1 IW0 :

IW1 0

.I1.7 15 ... I1.0 8 I2.7 7 ... I2.1 1

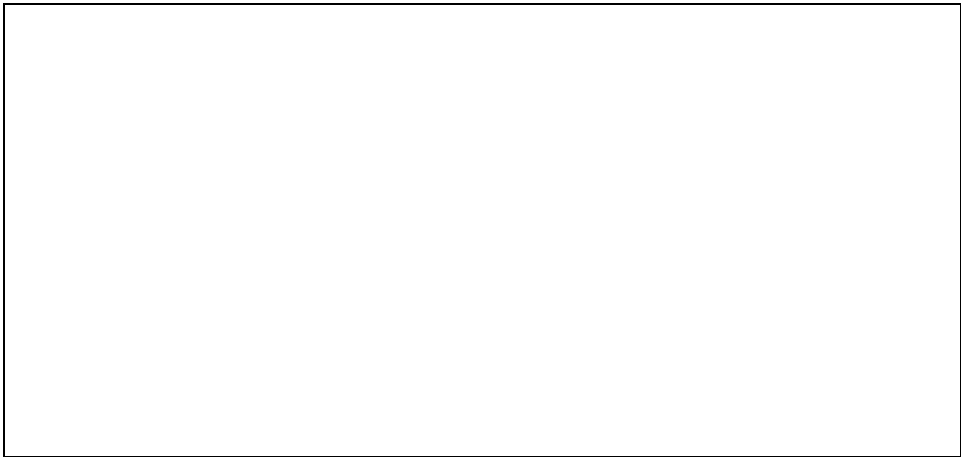
.8 7

.8.3.2

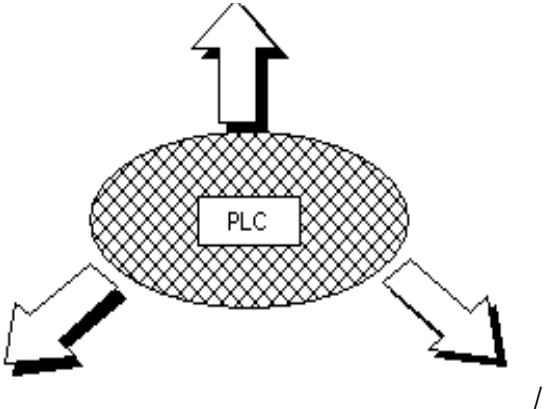
MD QD ID :

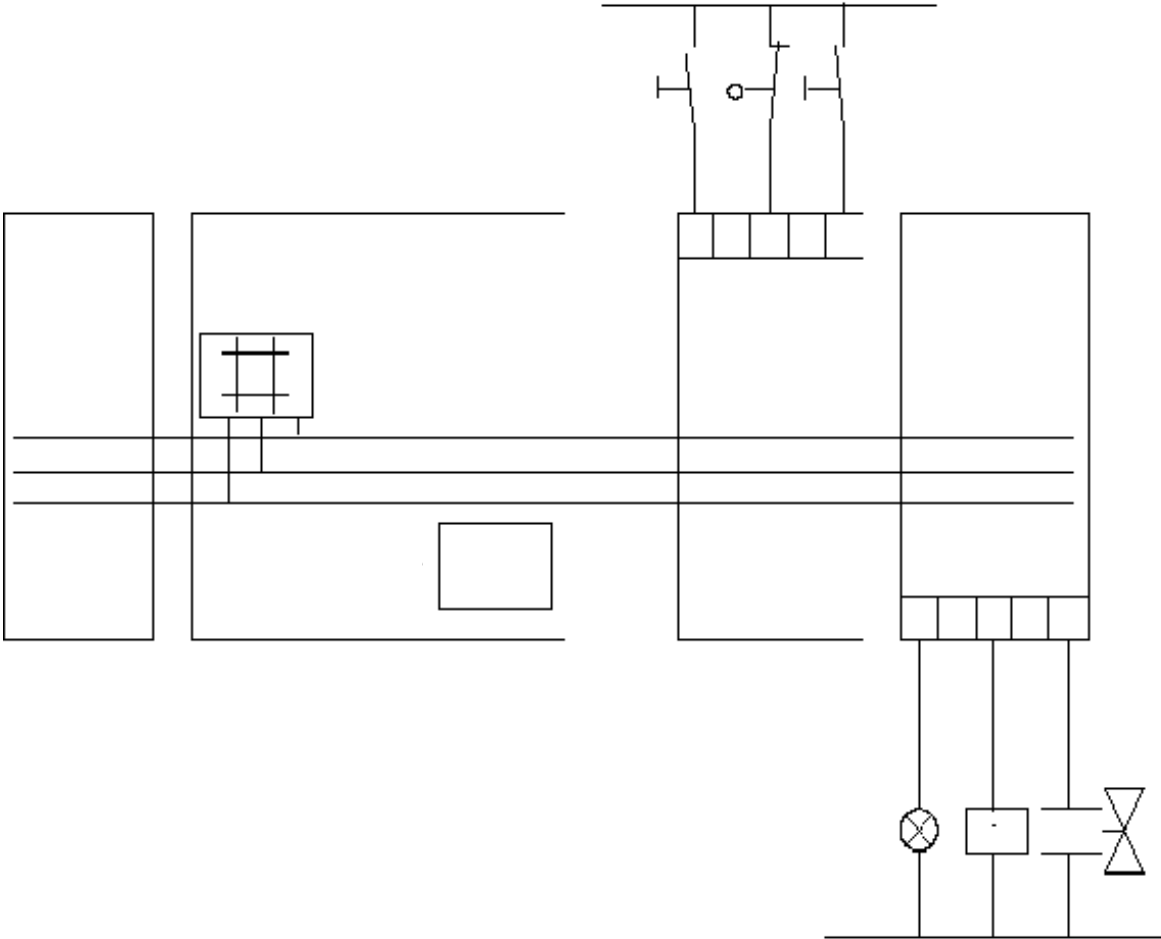
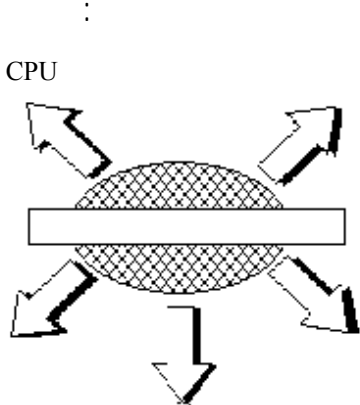
ID0			
IW0		IW2	
IB0	IB1	IB2	IB3
IW1			

عنوان الكلمة المزدوجة



PLC





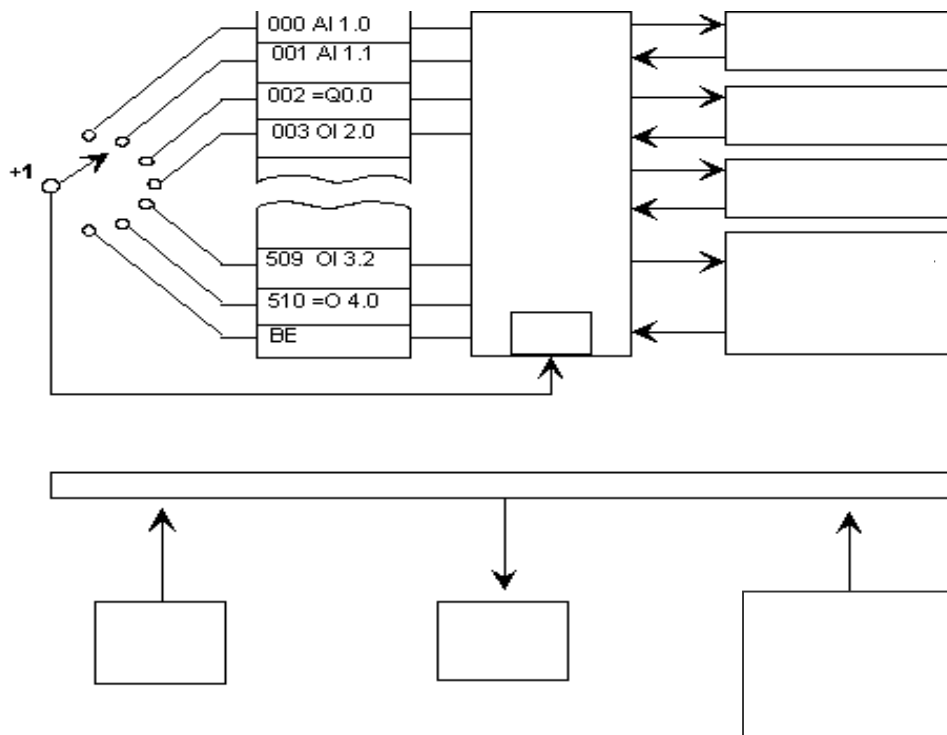
PLC

.5 .2

CPU

.1 .5 .2

: PLC

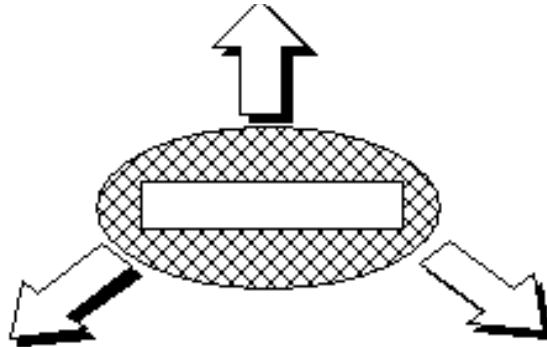


()

(BE) (PAE) .(PAA) PAA CPU

the BUS SYSTEM

.2 .5 .2



-
-
-

.3 .5 .2

24

24

.4 .5 .2

2048 1024 512

) 1 ()

()

.(1024

."0" "1"

RAM .5 .5 .2

/ RAM

SIMATIC S7-300
PLC
Flash- EPROM
EPROM : ERASABLE, PROGRAMMABLE read-only memory
EPROM
(Flash-EPROM)
5 EPROM
.CPU
RAM
RAM
.RAM
.6 .5 .2

SIMATIC S7 .6 .2

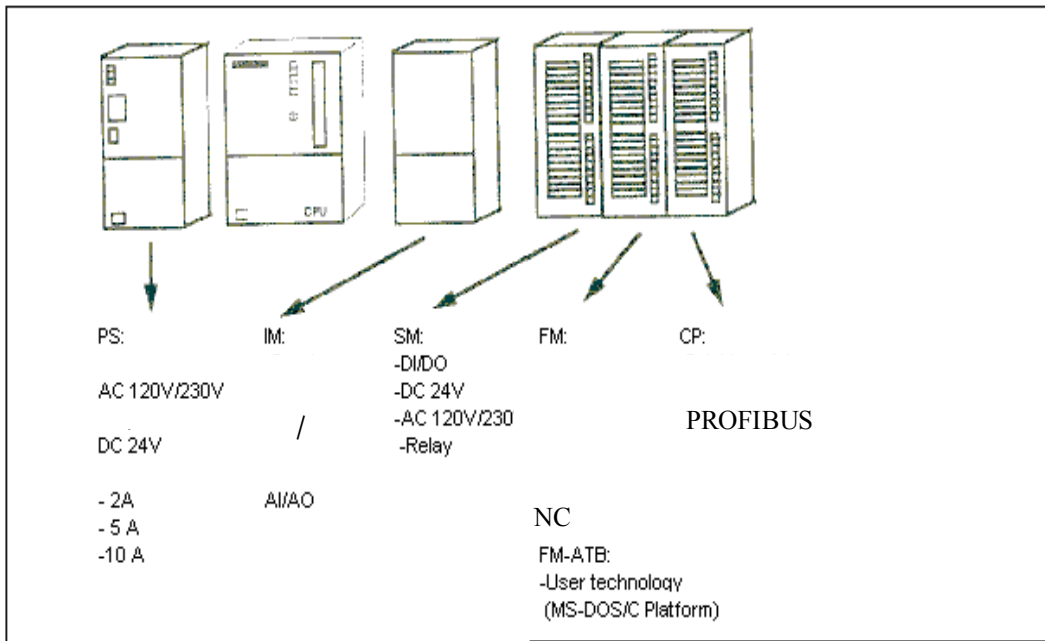
SIEMENS SIMATIC S7

SIMATIC S7

SIMATIC S7 - 300 .1 .6 .2

:

: SIMATIC S7-300 CPU



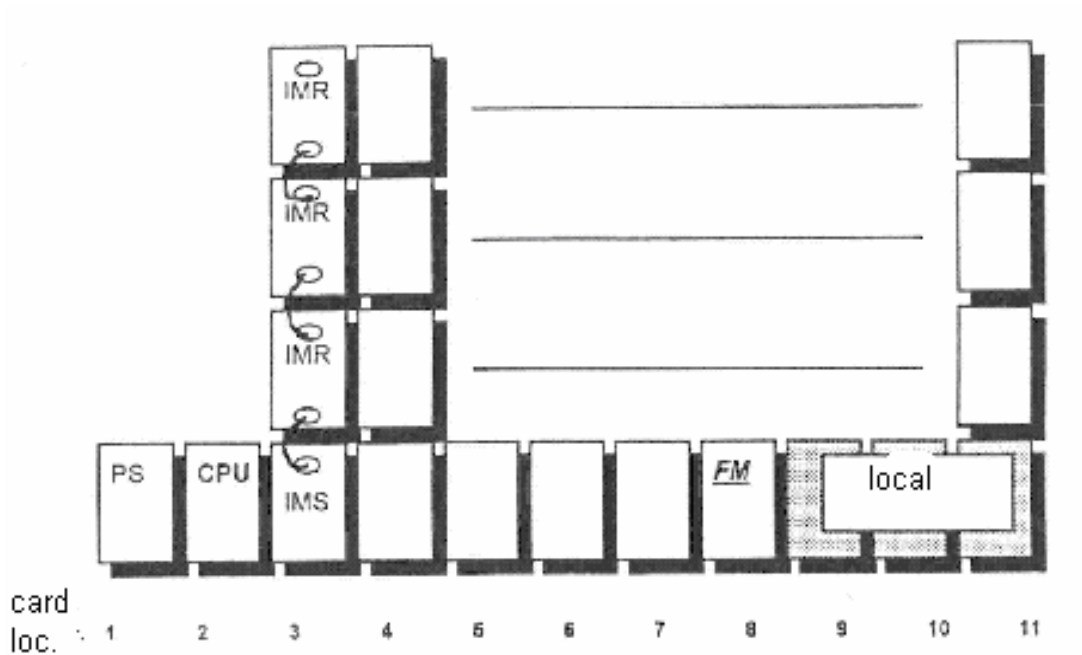
CPU 312 IFM	CPU 313	CPU 314 IFM	CPU 314	CPU 315	CPU315-2DP
6 Kbyte/2K RAM () 20Kbyte RAM	12Kbyte/4K RAM () 20Kb RAM	24Kbyte/8K RAM 40Kbyte () RAM	24Kbyte/8K RAM 40Kbyte () RAM	48Kbyte/16K RAM () 80Kbyte RAM	48Kbyte/16K RAM () RAM
128 Byte DI/DO	128 Byte DI/DO	512 Byte DI/DO	512 Byte DI/DO	1024 Byte DI/DO	1024 Byte DI/DO
32 Byte AI/AO	32 Byte AI/AO	64 Byte AI/AO	64 Byte AI/AO	128 Byte AI/AO	128 Byte AI/AO
0,6 ms / 1K	0,6 ms / 1K	0,3 ms / 1 K	0,3 ms / 1K	0,3 ms / 1K	0,3 ms / 1K
1024 bit	2048 bit	2048 bit	2048 bit	2048 bit	2048 bit
32	64	64	64	64	64
64	128	128	128	128	128
10 DI/6DO 4 DI 20KByte EPROM		0 DI/16DO 2 4 DI 4 AI / 1AO +: 11Bit			PROFIBUS DP (\)

:

:

	CPU 312C	CPU 313C	CPU 313C-2DP	CPU 314C-2DP
/ /	0.2 / 4 / 40µs	0.1 / 2 / 20µs	0.1 / 2 / 20µs	0.1 / 2 / 20µs.
RAM	16 KB	32 KB	32 KB	48 KB
SIMATIC	64 KB to 4 MB	64 KB to 4 MB	64 KB to 4 MB	64 KB to 4 MB
DI/DO AI/AO *PT100	10 / 6 -/-	24 / 16 4+1*/2	16 / 16 -/-	24 / 16 4+1* / 2
/ - - -	2 (10KHz) 2 (2,5 KHz) no no	3 (30KHz) 4 (2,5 KHz) yes no	3 (30KHz) 4 (2,5 KHz) yes no	4 (60KHz) 4 (2,5 KHz) yes 1
- MPI 187,5 kBaud - DP-Functionality	Yes No	Yes No	Yes Master/Slave	Yes Master/Slave

SIMATIC S7 - 300



SIMATIC S7-300/CPU314.

8 (8 CPU 313 CPU 314 FM) 32

:

() PS 1

() CPU 2

() IM 3

) CP FM SM 11-4

(

IMR

IMS

(IM 361)

IM 365

:

1 IM 365

10 IM 361

.SINUMERIK FM numerical control

FM

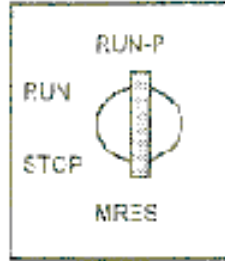
CPU



: CPU

()SF		
()BAF		
()DC5V	CPU DC5V	CPU. 5V
()FRCE		CPU
()RUN	RUN	CPU RUN CPU
()STOP	STOP	STOP CPU

: CPU



RUN-P:

RUN:

STOP:

MRES;

SIMATIC S7-300

CPU

()

.B&B PG

CPU

: Stop Run-P

: 1

: Run

: 2

.CPU

(

) S7

: 3

	STOP	1
3	STOP	2
	MRES (3) STOP	
3	STOP	3
	STOP	
	.MRES	

--	--	--

.7 .2

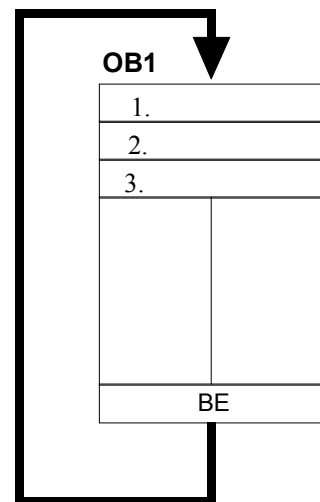
.1 .7 .2

.() [.()

.2 .7 .2

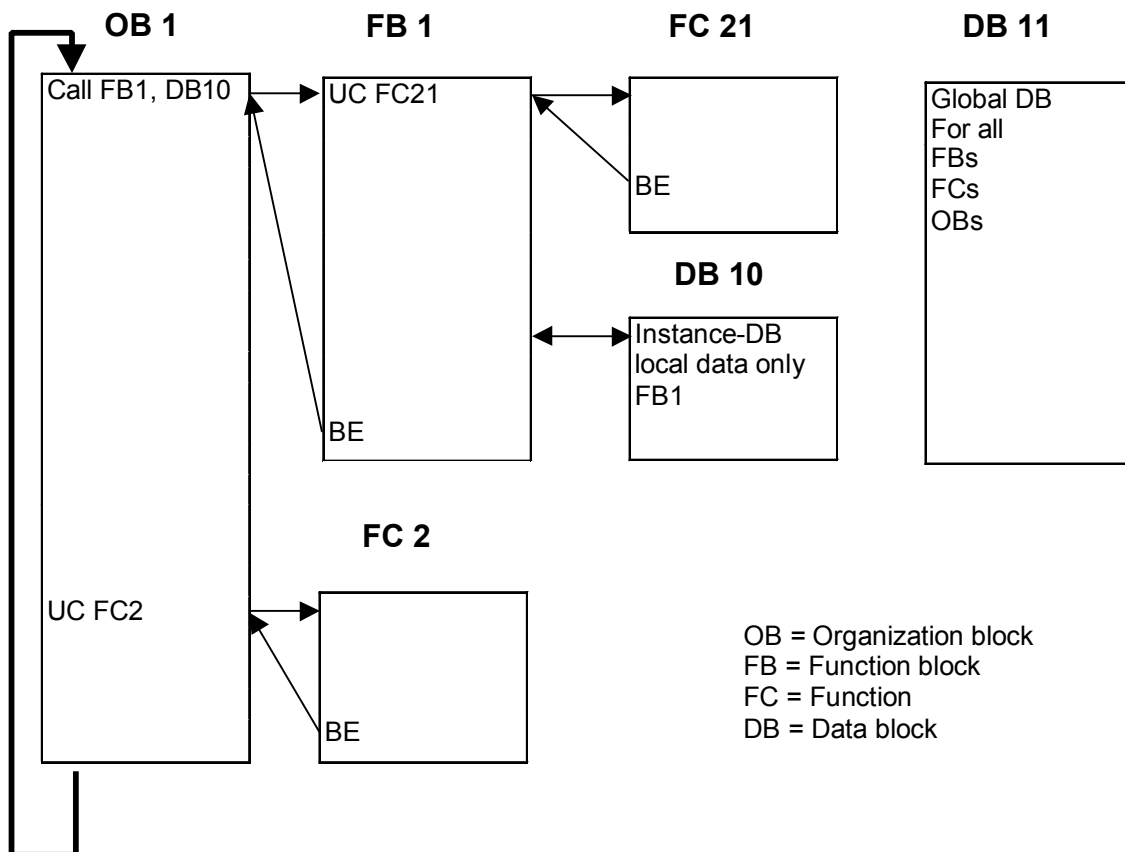
BE

OB

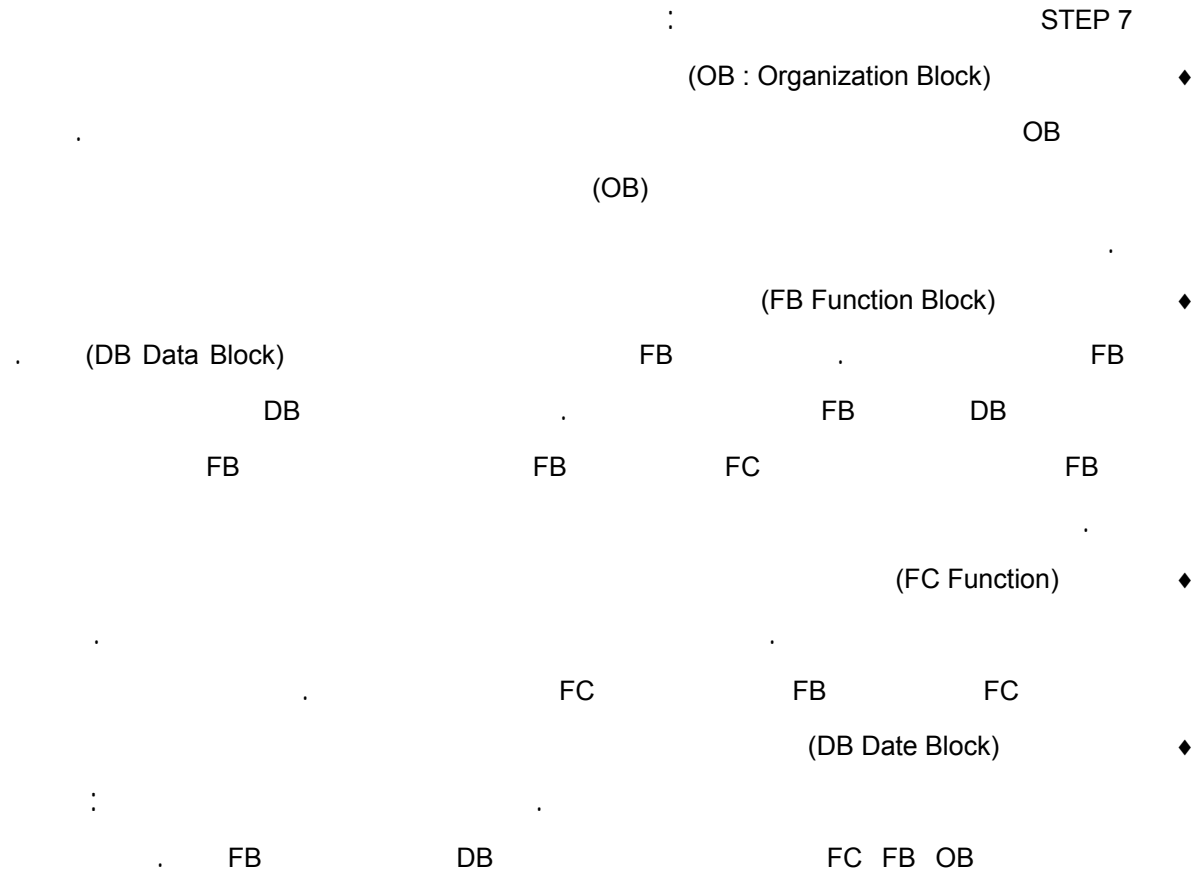


.3.7.2

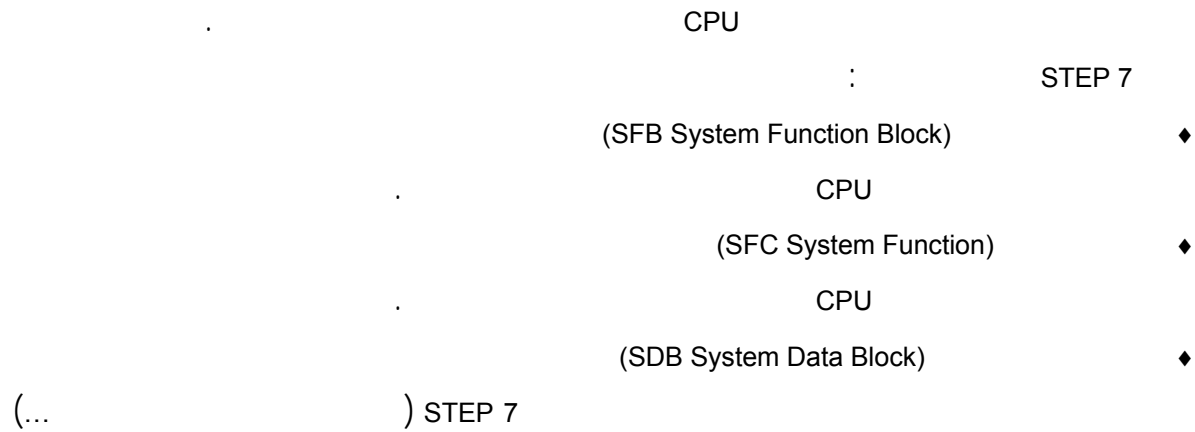
.(call xx/UC xx/CC xx)



.4.7.2

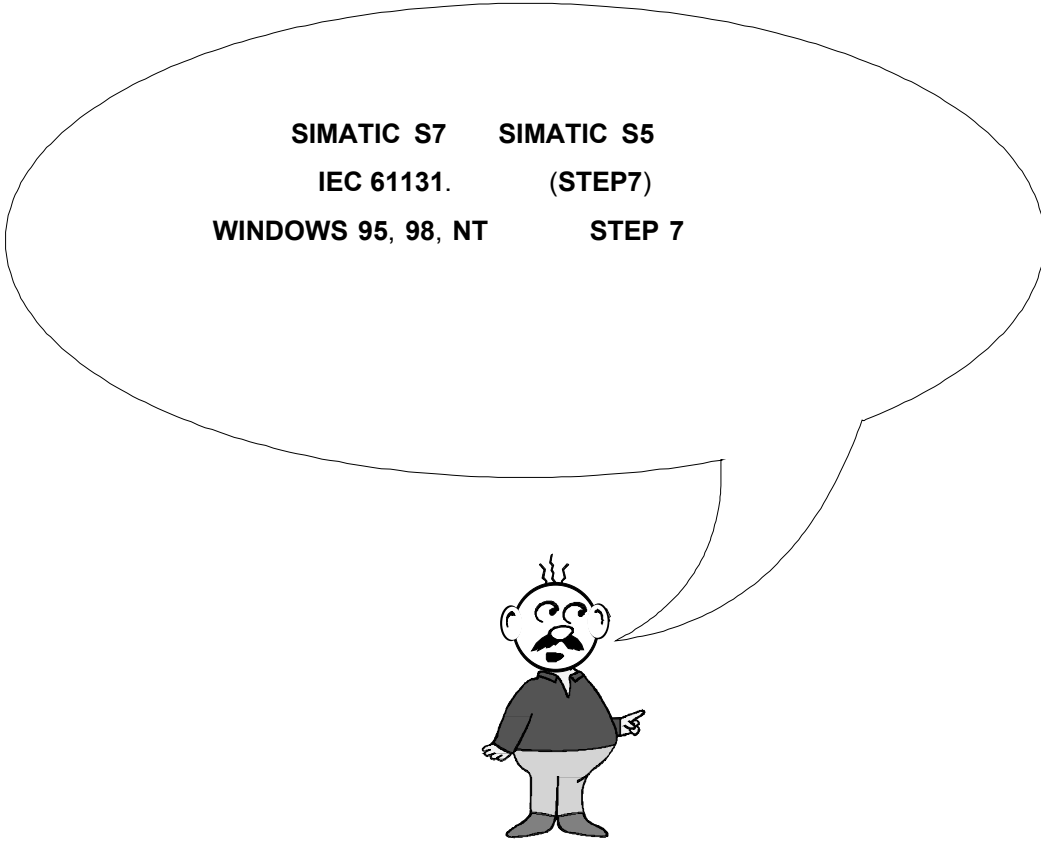


.5.7.2



STEP 7 .3

STEP 7 .1 .3



STEP 5 ⇒ STEP 7 .2 .3

.STEP 7 STEP 5 STEP 7 'S5 file conversion'

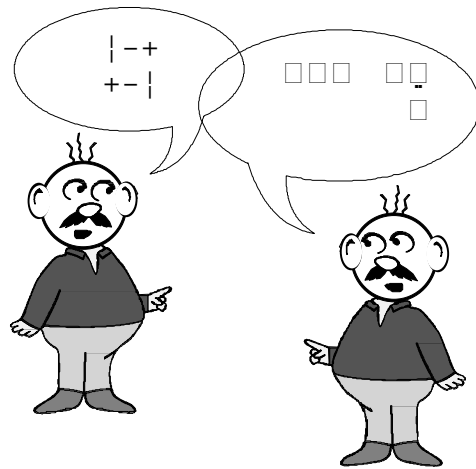
STEP 5
Module B6 (Conversion STEP 5 ->
STEP 7).



PLC

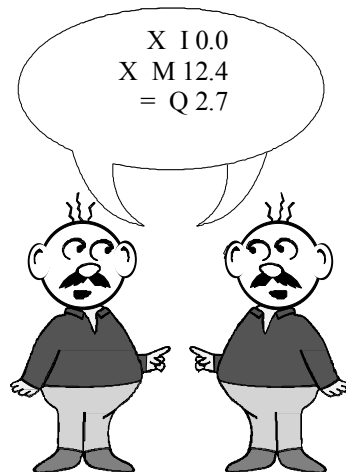
IEC 61131

.3 .3



.PLC

PLC



PLC

IEC 61131

(International Electrical Commission)

:

PLC

: 1

: 2

: 2

: 4

. PLC

: 5

.4 .3

.SIMATIC Manager

STEP 7

.()

.CPU SIMATIC 300 station

PLC

: . STEP 7

Project:

SIMATIC 300 Station:

)SIMATIC 300 Station(

MPI)

) PROFIBUS

) Hardware/SC*¹ (

... CPU

Source Files/SO*¹:

SCL-)

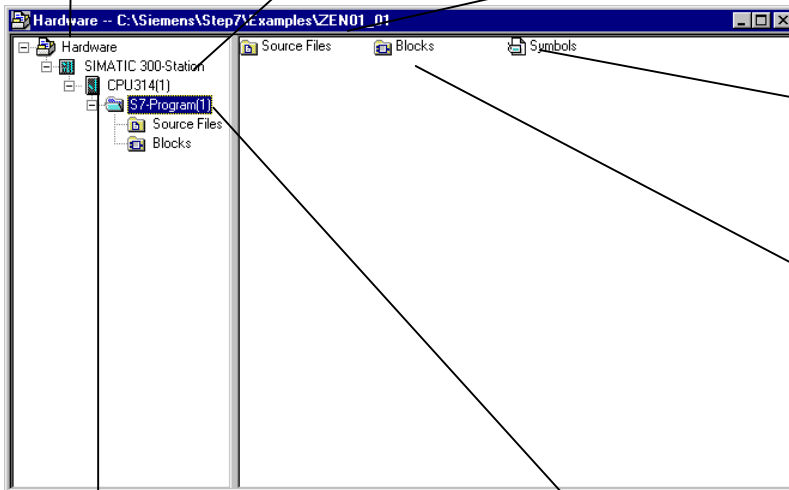
...

Symbols/SY*¹:

Blocks/AP-off*¹:

OB, FB, (

)FC, SFB, SFC, DB



CPU:

S7

. (Connection/CO*¹)

S7-Program:

(Blocks/AP-off*¹)

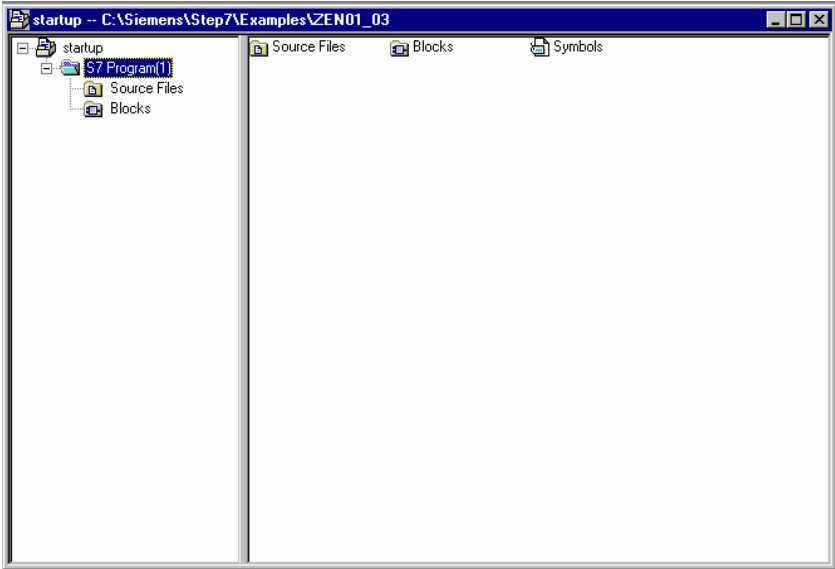
(Symbols/SY*¹)

(Source files/SO*¹).

STEP 7 Version 2.x

*1

:



.5.3

(SDB : .

PLC

SDB

.System Data Block)

'Hardware Configure'

(CPU

) CPU

.CPU

HW Config - SIMATIC 300(1)

Station Edit Insert PLC View Options Window Help

SIMATIC 300(1) (Configuration) -- POS1_CPU

(0) UR

Slot	Module	Order number	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 321-7BH80-0AB0		0...1		
5	DO16xDC24V/0.5A	6ES7 322-1BH81-0AA0			4...5	
6	CP 342-5	6GK7 342-5DA02-0XE0	3	288...303	288...303	
7						
8						
9						
10						
11						

Press F1 to get Help. Chg

.6 .3

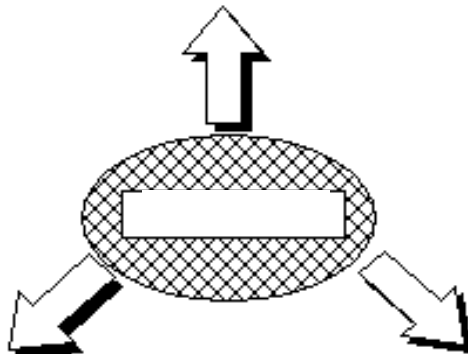
.DIN 19 239.

:

A	I	0.0

.1 .6 .3

: DIN 19 239



:

() Load L

() Transfer T


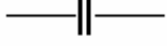

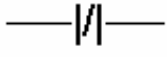

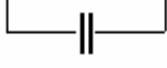


() Larger than integer >I

(/) Equal to counter/timer ==R

.

:

DIN 19 239

FBD	LAD	STL	
		A	AND
		N	NOT
		O	OR
		=	EQUAL

:

() Condition call CC

() Unconditional call UC

() Open a data block OPN

() Jump unconditional JU

(RLO=1) Jump if RLO=1 JC

() Block end unconditional BEU

() Block end conditional BEC

.

.2 .6 .3

()Input	I
()Output	Q
()Memory bit	M
Local data (internal block variables)	L
()-(
()Timer	T
()Counter	C
()Organization block	OB
()Function block	FB
()Function	FC
()Data block	DB
()System functions block	SFB
()System function	SFC
()32 (32-Bit-constant	L#



.7 .3

.1 .7 .3

BOOL I 0.0 END_STOP
(symbol editor)

.SIMATIC manager

.2 .7 .3

:STEP 7

-
-
-

:

:

. () RLO : result of logic operation	1	SET
.ACCU 1.	.ACCU 2	ACCU 1	+D

:

:

.I 0.0.	AND	A I 0.0
.ACCU 1.	IB 0	L IB 0
.Q 4.0.	RLO	= Q 4.0

:

:

.(DB)

(C)

(T)

•

.(FB)

(FC)

•

.(L)

(IDB)

(DB)

(M)

:

MD3	.	AND	A I [MD 3]
	.ACCU 1		L IB [DID 4]
			.DID4
.MW2	.		OPN DB [MW 2]

.8 .3

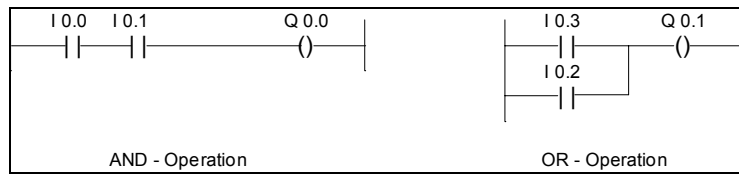
: LAD/STL/FBD

STE 7

- LAD •
- FBD •
- STL •

LAD .1 .8 .3

DIN 19 239



(STEP 7 VERSION 3.x) FBD .2 .8 .3

DIN 19 DIN 40 700

.239



stL

.3 .8 .3

()

(DIN 19 239)

mnemonic

:		:	
A	0.0	I	AND- Operation
A	0.1	I	
=	4.0	Q	OR- Operation
O	0.2	I	
O	0.3	I	
=	4.1	Q	

.STL

FDB LAD

.() STL

.9 .3

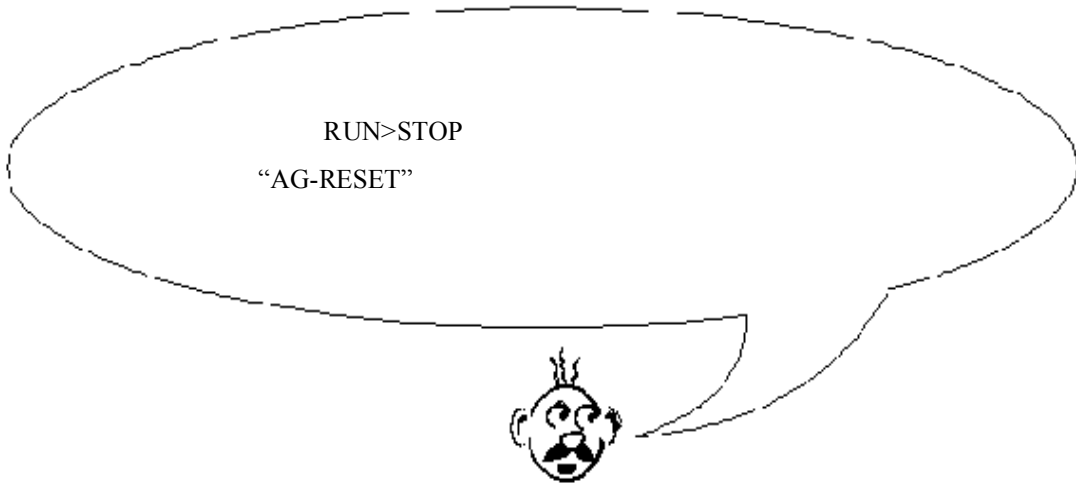
1)

(R-S)

PLC .(0

.1 .9 .3

.()



.S7 Configuration CPU

.2 .9 .3



."NET 1" . "RUN>STOP"