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

MODULE D5

PROFIBUS DP with

Master CPU 315-2DP / Slave ET 200S

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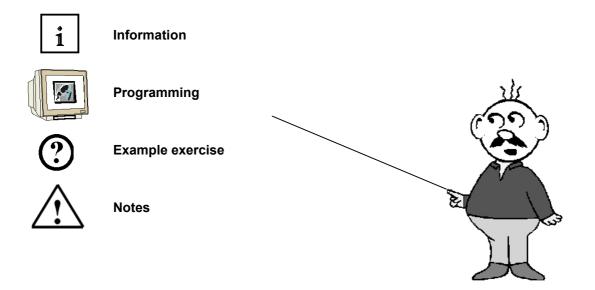
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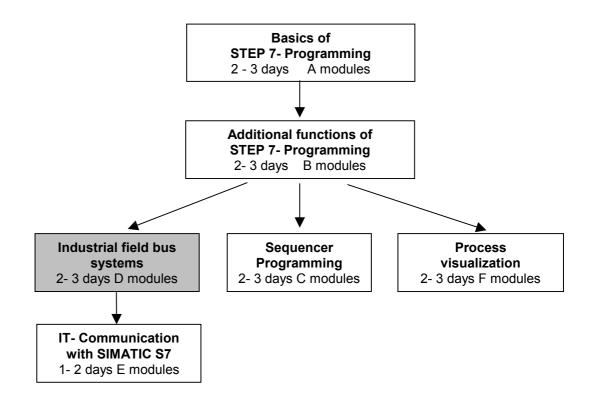
The following symbols stand for the specified modules:



1. FORWARD

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The module D5 is assigned content wise to **Industrial field bus systems**.



Learning goal:

In this module, the reader should learn how the PROFIBUS DP is taken into operation with the CPU 315-2DP as a master and the ET 200S with the integrated CPU as a slave. The module shows the principle procedure by means of a short example.

Requirements:

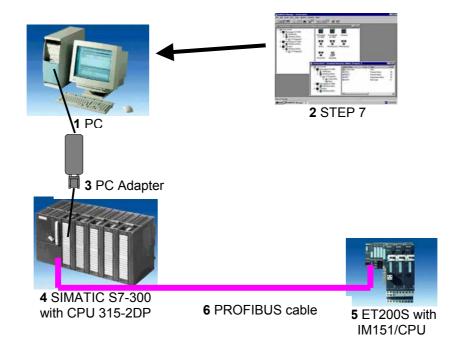
For the successful use of this module, the following knowledge is assumed:

- 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)
- Basics of the PROFIBUS DP (e.g. Appendix IV Basics of field bus systems with SIMATIC S7-300)

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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. 65 MB free hard disk space
- 2 Software STEP 7 V 5.x
- 3 MPI- Interface for the PC (e.g. PC- Adapter)
- 4 PLC SIMATIC S7-300 with the CPU 315-2DP with at least one digital in- and output. Example configuration:
 - Network: PS 307 2A
 - CPU: CPU 315-2DP
 - Digital inputs: DI 16x DC24V
 - Digital outputs: DO 16x DC24V / 0.5A
- **5** Distributed I/O ET 200S with integrated CPU and with at least one digital in- and output. Example configuration:
 - PROFIBUS connection with integrated CPU: IM 151/CPU
 - Power supply: PM-E DC24V
 - Digital inputs: 4 DI DC24V
 - Digital outputs: 4 DO DC24V / 0.5 A
- 6 PROFIBUS cable with 2 PROFIBUS slots



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2. NOTES FOR THE OPERATION OF THE CPU 315-2DP

The CPU 315-2DP is a CPU that is made available with an integrated PROFIBUS DP interface. For the CPU 315-2DP, the following PROFIBUS protocol profiles are available at your disposal:

DP- Interface as a master or slave in accordance with EN 50170. PROFIBUS-DP (Distributed I/O) is the protocol profile for the connection of distributed I/O/Field equipment with fast reaction time.

A further characteristic is that the addresses of the in- and output modules can be parameterized by this CPU.

The CPU capability is given with the following data:

- 16K statements. 48Kbyte RAM (integrated) 80Kbyte RAM
- 1024 Byte DI/DO
- 128 Byte Al/AO
- 0.3 ms / 1K Instructions
- 64 Counters
- 128 Timers
- 2048 memory bits



Note: The CPU 315-2DP is appointed here on the PROFIBUS as a master.

3. NOTES TO THE OPERATION OF ET 200S/CPU



The ET 200S/CPU is a distributed I/O system with a modular configuration and an integrated CPU. The ET200S/CPU functions as a slave to the PROFIBUS DP.

The PROFIBUS address is adjusted by a binary coded DIL- switch block.

Another possible adjustment of the PROFIBUS address is with the power recovery. Therefore, the ET 200S must be turned off and then back on.

The CPU capability is given with the following data:

- 8K Statements. 24Kbyte RAM (integrated) 40Kbyte RAM
- 128 Byte DI/DO
- 128 Byte AI/AO
- 0.3 ms / 1K Instructions
- 64 Counters
- 128 Timers
- 2048 Memory bits

| Forward | Notes | Commission | |
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4. COMMISSIONING THE PROFIBUS (MASTER CPU315-2DP / SLAVE ET200S/CPU)



In the following example, the commissioning of a mono master system with the CPU315-2DP as a master and an ET 200S as a slave is described.

For the testing of the configuration, a program will be written in which a display lamp H1 is triggered by the simultaneous activation of the switch S0 by the CPU 315-2DP and the switch S1 by the ET 200S/CPU.

Assignment list CPU 315-2DP:

| 10.0 | S0 | Switch S0 |
|-------|---------|---------------------------|
| Q10.0 | Comm_Q1 | Output communication Bit1 |

Assignment list ET 200S/CPU:

| 110.0 | Comm_I1 | Input communication Bit1 |
|-------|---------|--------------------------|
| l1.0 | S1 | Switch S1 |
| Q2.0 | H1 | Display lamp |



 The central tool in STEP 7 is the SIMATIC Manager, which is opened here with a double click (→ SIMATIC Manager).



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2. STEP 7- Programs are administered in projects . Such a project will be created (\rightarrow File \rightarrow New).

| Ite PLC View Options Window Help New. Ot/I+N Ot/I+N New Project' Wigard Ot/I+O Open Open Ot/I+O Open Ot/I+O Open Version 1 Project Ot/I+O Open Version 1 Project S7 Memory Card > P Memory Card File > P Delete Regraphice P Manage Archive P Archive P P P Page Setup P P P Labeling fields P P P Pint Setup I tester (Project) C:\Siemens\Step7\S7proj\tester P 1 tester (Project) C:\Siemens\Step7\S7proj\tester Z P P 2 Convert (Project) C:\Siemens\Step7\S7proj\tester Z P P 3 Testproject_FB (Project) C:\Siemens\Step7\S7proj\tester] Alt+F4 P | SIMATIC Manager | |
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| Dpen Dtrl+D Open Versjon 1 Project * S7 Memory Card * Memory Card Eile * Delete * Rgorganize * Manage * Archive * Retrieve * Page Setup * Labeling fields * Print Setup * 1 tester (Project) - C:\Siemens\Step7\S7proj\Convert 3 Testproject_FB (Project) - C:\Siemens\Step7\S7proj\Convert 4 Testproject_DB (Project) - C:\Siemens\Step7\S7proj\Testproj | | Ctrl+N |
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| Reorganize Manage Archive Retrieve Page Setup Labeling fields Print Setup 1 tester (Project) - C:\Siemens\Step7\S7proj\tester 2 Convert (Project) - C:\Siemens\Step7\S7proj\testp7\S7proj\Testp7\S7proj\Testp7\S7proj\Testp7\S7proj\Testp7\S7proj\Testp7\S7proj\Testp7\S7proj\Testp7\S7proj\S7p | _ | + + |
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| Labeling fields Print Setup 1 tester (Project) C:\Siemens\Step7\S7proj\tester 2 Convert (Project) C:\Siemens\Step7\S7proj\Convert 3 Testproject_FB (Project) C:\Siemens\Step7\S7proj\Testpr_1 4 Testproject_DB (Project) C:\Siemens\Step7\S7proj\Testproj | | |
| 2 Convert (Project) C:\Siemens\Step7\S7proj\Convert 3 Testproject_FB (Project) C:\Siemens\Step7\S7proj\Testpr_1 4 Testproject_DB (Project) C:\Siemens\Step7\S7proj\Testproj | Labeling fields | |
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| | E <u>x</u> it | Alt+F4 |
| | Creates a new project or a new library. | |

3. Give the Name ET200S to the project (\rightarrow ET200S \rightarrow OK).

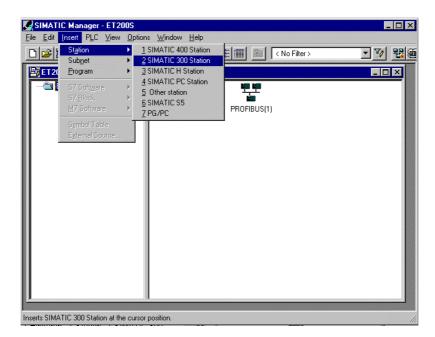
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| User projects Librar | ies | |
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| Na <u>m</u> e: | | <u>T</u> ype: |
| ET200S | | Project 💌 |
| , <u>S</u> torage location (path) [C:\Siemens\Step7\S7 | | Browse |
| ОК | Cancel | Help |

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4. Highlight your project and insert a **PROFIBUS Subnet** (\rightarrow ET200S \rightarrow Insert \rightarrow Subnet \rightarrow PROFIBUS).

5. Then insert a **SIMATIC 300-Station** (\rightarrow Insert \rightarrow Station \rightarrow SIMATIC 300-Station).



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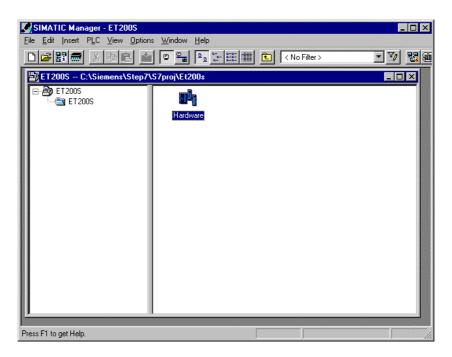
6.



Modify the name of the station to **ET200S** (\rightarrow ET200S).

| SIMATIC Manager - ET200S File Edit Insert PLC View Options Image: State Stat | | - 📰 🏢 📖 🔇 No | ı Filter > | |
|--|--------|--------------|------------|--|
| ET200S C:\Siemens\Step7\S | MPI(1) | PROFIBUS(1) | ET2005 | |
| Press F1 to get Help. | | | | |

7. Open the configuration tool for the **Hardware** with a double click (\rightarrow Hardware).



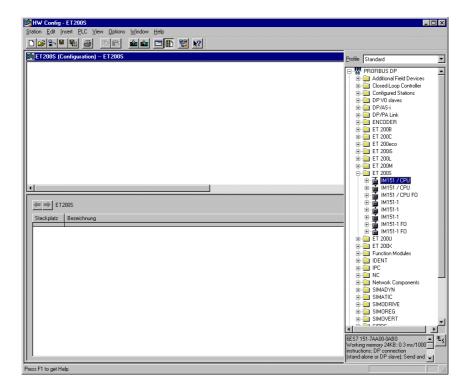
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8. Open the hardware catalog with a click on the symbol $(\rightarrow \square)$. There you will see the directories are divided into the following:

- PROFIBUS-DP, SIMATIC 300, SIMATIC 400 and SIMATIC PC Based Control, all module racks, modules and interface modules for the projection of your hardware configuration are made available.

Insert IM151/CPU with a double click (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151/CPU).



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9. By the entering of the slave, the following window appears, in which you assign a PROFIBUS address. This address must be adjusted identical with the address by the ET200S (\rightarrow 3 \rightarrow OK)

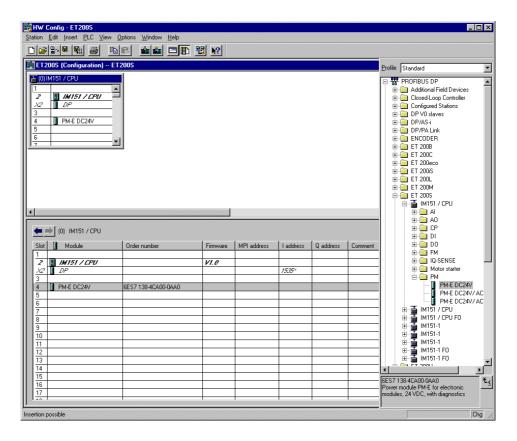
| Properties - PROFIBUS interface DP (R0/S2.1) | × |
|--|---------------------|
| General Parameters | |
| Address: 3 | |
| Transmission rate: 1.5 Mbps | |
| <u>S</u> ubnet: | |
| not networked PROFIBUS(1) 1.5 Mbps | <u>N</u> ew |
| | P <u>r</u> operties |
| | Delete |
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| OK Abb | rechen Hilfe |



10. Now all modules can be chosen out of the hardware catalog and inserted into the configuration table and are also inserted into your real ET200S.

To insert, you must click on the name of the respective module, hold the mouse button and Drag & Drop the module into a line of the configurations table.

We begin with the power module **PM-E DC24V**, which is dropped into slot 4. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151/CPU \rightarrow PM-E DC24V)





Note: If your hardware differs from what is shown above, then you must select the appropriate modules from the catalog and insert them into the rack. The part numbers of the individual modules, which are found on the components, are indicated in the footer of the catalog.

| Forward | Notes | Commission |
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In the next step, we dorp the digital input module 4 DI DC24V into the fifth slot. There the order number and version of the module can be read (→ PROFIBUS-DP → ET 200S → IM151/CPU → 4 DI DC24V).

| Image: Head Config - ET200S Station Edit Image: Head Config - ET200S Station Edit Image: Head Config - ET200S Image: Head Config - ET200S <th>(iew Options Window Help ■ 📄 🏜 🏜 🗖 🏗</th> <th>98 N2</th> <th></th> <th></th> <th></th> <th></th> <th></th> | (iew Options Window Help ■ 📄 🏜 🏜 🗖 🏗 | 98 N2 | | | | | |
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| ET200S (Configuration | | | | | | | Profile Standard |
| 1 1 2 1 2 0 2 0 3 0 4 PM-E DC24V 5 4 DI DC24V 6 7 | | | | | | | |
| Slot Module | Order number | Firmware | MPI address | l address | Q address | Comment | 2 DI AC 120V |
| 1 2 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. | | V1.0 | | | | | - 2 DI DC24V |
| X2 DP 3 | | | | 1535* | | | 2 DI DC24V High |
| 4 PM-E DC24V | 6ES7138-4CA00-0AA0 | | | | | | 4 DI DC24V High |
| 5 4 DI DC24V | 6ES7 131-4BD00-0AA0 | | | 1.01.3 | | | - 📄 🗖 |
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| 13 | | | | | | | - M151-1 |
| 14 | | | | | | | |
| 16 | | | | | | | ES7 131-4BD00-0AA0 Digital input module DI 4x24 VDC, |
| | | | | 1 | 1 | - | standard |
| Insertion possible | | | | | | | Chg / |

Forward Notes Commission



12. In the next step, we dorp the digital output module **4 DO DC24V/0.5A** into the sixth slot. There the order number and version of the module can be read. The configuration table is saved and

compiled now with a click on 🖼. Then the hardware configuration is closed with a click on 🛛

 $(\rightarrow \text{PROFIBUS-DP} \rightarrow \text{ET 200S} \rightarrow \text{IM151/CPU} \rightarrow 4 \text{ DO DC24V/0.5A} \rightarrow \blacksquare \rightarrow \square$

| IW Config - ET200S | | | | | | | |
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| ion <u>E</u> dit Insert <u>P</u> LC ⊻iew | Options Window Help | | | | | | |
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| ET200S (Configuration) | ET200S | | | | | | Profile Standard |
| (0) M151 / CPU 2 3 4 4 4 5 4 5 5 5 1 2 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 | 1 | | | | | | RDFIBUS DP Additional Field Devices Conduced Controller Conjugued Stations DP V0 stations DP VA stations DP/AS i DP/AS i ENCODER ET 2006 ET 2007 |
| | | | | | | | - 斎 IM151 / CPU |
| | | | | | | | |
| (0) IM151 / CPU | | | | | | | AI A0 CP CP CP DI |
| Slot 🚺 Module | Order number | Firmware | MPI address | I address | Q address | Comment | Al - CP - CP - DI - DI - DO |
| Slot Module | Order number | | MPI address | I address | Q address | Comment | ⊕ AI ⊕ AI ⊕ AI ⊕ CP ⊕ DI ⊖ DI ⊖ DI □ DI |
| Slot Module 1 2 Module 2 DP | Drder number | Firmware | MPI address | I address | Q address | Comment | |
| Slot Module 1 2 3 0 0 0 0 0 1 0 0 1 0 0 | | | MPI address | | Q address | Comment | G Al B CP B D0 B D0 C D0 C 200 AC 120/230V /1A C 200 DC24V/05A C 200 DC24V/05A C 200 DC24V/05A C 200 DC24V/05A |
| Slot Module Module 1 2 IM151 / CPU X2 DP 3 4 PM-E DC24V | 6ES7138-4CA00-0AA0 | | MPI address | 1535* | Q address | Comment | Al Al B Al CP CP C C D C D C D |
| Slot Module | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | | | Comment | a A b A b CP b D c D c 200 0 C24V/054 |
| Stot Module 1 | 6ES7138-4CA00-0AA0 | | MPI address | 1535* | Q address | Comment | Al Al CP Al CP CP CP D D |
| Image: State Module 2 Image: State Image: State 2/2 Image: State Image: State 3 Image: State Image: State 4 Image: State Image: State 5 Image: State Image: State 6 Image: State Image: State 7 Image: State Image: State | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | a A b A b CP b D c D c 200 0 C24V/054 |
| Josephilie Module 2 MISSI / CPU 3 Josephilie 4 PM-E DC24V 5 4 40 DC24V 6 2 200 DC24V/0.5A 7 8 | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | |
| Image: State Module 2 Image: State Image: State 2/2 Image: State Image: State 3 Image: State Image: State 4 Image: State Image: State 5 Image: State Image: State 6 Image: State Image: State 7 Image: State Image: State | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | B AI B AD B CP B DI C DO D DO |
| Module Module 1 2 Mulsi J CPU 2/2 Mulsi J CPU 2/2 3/4 PM-E DC24V 4 5 4 D DC24V 6 6 2 DD DC24V/05A 7 9 10 11 | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | B AI B AD B CP B CP B D C D D D |
| Module Module 1 Δ 2 M/157 / CPU ×2 Δ 4 PMEDC26V 5 4 DI DC26V 6 2 DD DC24V/05A 7 8 9 10 11 12 | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | B AI B AO B CP B DI C DO D DE C DO D DO |
| Module Module 1 2 M/157 / CPU 2/2 0/P 0/P 3 4 PME DC24V 5 4 01 DC24V 6 6 2 0D DC24V/0.5A 7 8 9 10 10 11 12 13 3 14 | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | B AI B AD B CP B CP B D C D D D |
| Image: Weight of the second | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | a) a) b) a) b) c) b) c) c) < |
| Module Module 1 2 Mr157 / CPU X2 0P 3 4 4 PM-E DC24V 5 4 D1 DC24V 5 4 D1 DC24V 5 4 D1 DC24V 6 2 DD DC24V/05A 7 8 9 10 10 11 12 13 14 15 | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment Comment | |
| Image: Weight of the second | 6ES7 138-4CA00-0AA0 6ES7 131-4BD00-0AA0 | | MPI address | 1535* | | Comment | Al Al Al Al CP Al CP Al CP Al CP Al CP CP Close Mist / CPU Mist / CPU Close Mist / CPU Mist / CPU |

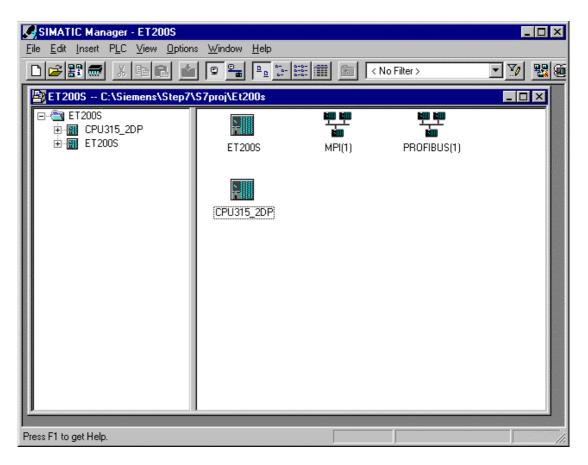
13. In the **SIMATIC Manager** a further **SIMATIC 300 Station** is inserted for the CPU 315-2DP $(\rightarrow \text{SIMATIC Manager} \rightarrow \text{Insert} \rightarrow \text{Station} \rightarrow \text{SIMATIC 300-Station}).$

| SIMATIC Manager | | -1- | | |
|---|--|-------|------------------------------|-----|
| Elle Edit Insett PLC Station Subpet PTC D T ETC Source S7 Software S7 Block M7 Software Symbol Telt Egternal So | re <u>5</u> Uther station <u>6</u> SIMATIC S5 <u>7</u> PG/PC | ation | < No Filter > PROFIBUS(1) | |
| , Inserts SIMATIC 300 Static | on at the cursor position. | | | li. |

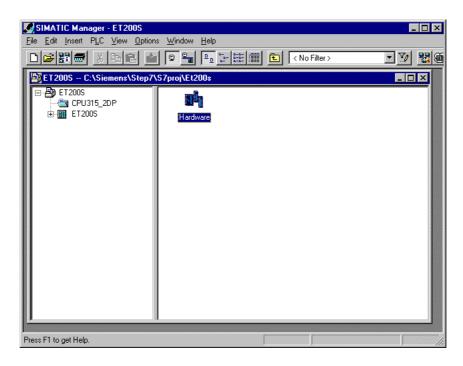
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14. Modify the name of the station to CPU315_2DP (\rightarrow CPU315_2DP).



15. Open the configuration tool for the **Hardware** with a double click (\rightarrow Hardware).



| | Forward | Notes | Commission | |
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| | | | | |
| TIA Training document | | Page 16 of 34 | | Module DF |



16. Open the hardware catalog with a click on the symbol $(\rightarrow \square)$. There you will see the directories are divided into the following:

- PROFIBUS-DP, SIMATIC 300, SIMATIC 400 and SIMATIC PC Based Control, all module racks, modules and interface modules for the projection of your hardware configuration are made available.

Insert a **Rail** with a double click(\rightarrow SIMATIC 300 \rightarrow RACK-300 \rightarrow Rail).

| Stat | IW Config - CPU315_2DP ion Edit Insert PLC View Q ☞ ≌~ ♥ ♥ ● ● ● | | al 50 | | | | | |
|------|--|--------------|----------|-------------|-----------|-----------|---------|--|
| _ | denomination de la constitución de | | | | | | | |
| | CPU315_2DP (Configuration) | ET200S | | | | | | Profile Standard |
| | | | | | | | | PROFIBUS DP PROFIBUS PA SIMATIC 200 P SIMATIC 200 P SIMATIC PC Station |
| lΓ | Slot Module 1 2 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| F | 1 2 3 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| | 1 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| | 1 2 2 3 3 4 5 6 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| | 1 2 2 3 3 4 5 6 7 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| | 1 2 2 3 3 4 4 5 5 6 6 7 7 8 | Order number | Firmware | MPI address | I address | Q address | Comment | |
| | 1 | Order number | Firmware | MPI address | address | Q address | Comment | |
| | 1 2 2 3 3 4 4 5 5 6 6 7 7 8 | Order number | Firmware | MPI address | address | Q address | Comment | |
| | 1 | Order number | Firmware | MPI address | laddess | Q address | | BES7 330.17??0-0AA0 Available in Various lengths |

After the insert, a configurations table for the configuration of the Rack 0 appears automatically.

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| | | |
| | | |



17. Now all modules can be chosen out of the hardware catalog and inserted into the configuration table and are also inserted into your rack.

To insert, you must click on the name of the respective module, hold the mouse button and Drag & Drop the module into a line of the configurations table. We will begin with the power supply **PS 307 2A** (\rightarrow SIMATIC 300 \rightarrow PS-300 \rightarrow PS 307 2A).

| HW Config - CPU315_2DP | _ 🗆 🗙 |
|--|---|
| Station Edit Insett ELC View Options Window Help | |
| | |
| CPU315_2DP (Conliguration) ET200S | Polie Standard |
| Image: Point of the second | □ ■ |
| Sist Module Older number Firmware MPI address | I address Q address Comment |
| 1 PS 307 2A 6ES7 307-18A00 0AA0 | |
| 2 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 9 | |
| 10 | |
| 11 | |
| | 8557 307-18400 0440 Land supply-voltage 120/230 VAC: 24 VDC / 2A |
| Insertion possible | Chg 🦽 |



Note: If your hardware differs from what is shown above, then you must select the appropriate modules from the catalog and insert them into the rack. The part numbers of the individual modules, which are found on the components, are indicated in the footer of the catalog.

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| | | | |
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18. In the next step, we drop the CPU 315-2DP into the second card location. This allows for the part number and version of the CPU to be read off. (\rightarrow SIMATIC 300 \rightarrow CPU-300 \rightarrow CPU 315-2DP \rightarrow 6ES7 315-2AF03-0AB0 \rightarrow V1.1).

| Image: How Config - CPU315_2DP Station Edit Image: Imag | Options Window Help | <u>₩</u> | | | | | |
|---|-------------------------------------|----------|-------------|-----------|-----------|---------|--|
| CPU315_20P (Configuration 1 PS 307 2A 2 3 3 - 4 - 5 - 6 - 7 - 8 - 9 - |) ET2005 | | | | | | Potile Standard ▼ ● |
| (0) UR Slot Module 1 PS 307 2A 2 3 | Drder number 6ES7 307-1BA00-0AA0 | Firmware | MPI address | I address | Q address | Comment | |
| 4 5 5 6 7 8 9 10 11 11 | | | | | | | |
| Press F1 to get Help. | | | | | | | Charlen of the second |

By the entering of the CPU, the following window appears, in which you assign a PROFIBUS address to the CPU 315-2DP and must already choose the first PROFIBUS net. When you want to alter the parameter of the PROFIBUS net, you must highlight it and then click on **Properties** (→ Properties).

| Properties - PROFIBUS interface DP (R0/S2.1) | × |
|--|---------------------|
| General Parameters | |
| Address: | |
| Highest address: 126 | |
| Transmission rate: 1.5 Mbps | |
| <u>S</u> ubnet: | |
| not networked PROFIBUS(1) 1.5 Mbps | <u>N</u> ew |
| | P <u>r</u> operties |
| | Delete |
| | |
| | |
| | |
| ОК | rechen Hilfe |

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20. Now you can choose the **Highest PROFIBUS Address** (here \rightarrow 126), the **Transmission Rate** (here \rightarrow 1,5 Mbit/s) and the **Profile** (here \rightarrow DP). (\rightarrow OK).

| Properties - PROFIBUS | E |
|------------------------------|--|
| Highest PROFIBUS Address: | 126 Change |
| Iransmission Rate: | 45.45 (31.25) Kbps 93.75 Kbps 187.5 Kbps 500 Kbps 1.5 Mbps 3 Mbps |
| <u>P</u> rofile: | DP Standard Universal (DP/FMS) User-Defined <u>Bus Parameters</u> |
| OK | Abbrechen Hilfe |

 In the next step we see the input module for 16 inputs on fourth slot place. There the order number of the module is read off the front (→ SIMATIC 300→ DI-300 → SM 321 DI16xDC24V).

| HW Config - CPU315_2 | | | | | | | | | × |
|--|----------------------|----------------|-------------|-----------|-----------|---------|------------------------|---|---------------|
| Station Edit Insert PLC V | | | | | | | | | |
| | | | | | | | | | |
| CPU315_2DP (Configu | ation) ET200S | | | | | | <u>P</u> rofile | Standard | - |
| CPUB CPU 315-2 DP CP CPU 315-2 DP CP CP | |): DP master s | ystem [1] | | | | PS-30 RACK SM-31 | 300 90 90 91 92 93 93 90 93 93 93 93 93 93 93 93 93 93 93 93 93 | * |
| Slot Module | Order number | Firmware | MPI address | I address | Q address | Comment | | SM 321 DI16xDC24V | |
| 1 PS 307 2A | 6ES7 307-1BA00-0AA0 | | 1 | | | | | SM 321 DI16xDC24V | |
| 2 CPU 315-2 DP | 6ES7 315-2AF03-0AB0 | V1.1 | 2 | | | | | SM 321 DI16xDC24V SM 321 DI16xDC24V | |
| X2 DP | | _ | | 1023" | | | | SM 321 DI16xDC24V SM 321 DI16xDC24V | |
| 3 4 DI16xDC24V | 6ES7 321-1BH82-0AA0 | - | | 01 | | | 1 | SM 321 DI16xNAMUR | |
| 5 | 6E37 321110H02104040 | | | 01 | | - | l | SM 321 DI16xUC24/48V | |
| | | | | | | | [| SM 321 DI32xAC120V | |
| 7 | | | | | | | [| SM 321 DI32xDC24V | |
| 8 | | | | | | | | SM 321 DI32xDC24V | |
| 9 | | | | | | | | SM 321 DI4xNAMUR, Ex | |
| 10 | | | | | | | | SM 321 DI8xAC120/230V | |
| 11 | | | | | | | | SM 321 DI8xAC120/230V | |
| | | | | | | | | SM 321 DI8xAC230V SM 321 DI8xAC230V | |
| | | | | | | | h 🚗 👸 | UD0 300 . | _ |
| | | | | | | | • | | • |
| | | | | | | | Digital i | 21-18H82-0AA0 nput module D116 24 V, grouping ended environmental conditions | ₹ <u>≺</u> |
| Insertion possible | | | | | | | | | 19 <i>//.</i> |



Note: Slot number 3 is reserved for interface modules and remains empty. The order number of the module is displayed in the footer of the catalog.

Forward Notes Commission



 In the next step we see the output module for 16 outputs on fifth slot place. There the order number of the module is read off the front (→ SIMATIC 300→ DO-300 → SM 322 DO16xDC24V/0.5A).

| HW Config - CPU315_2DP | | | | | | | | | |
|--|---|-----------------|-------------|-----------|-----------|---------|----------|--|--------|
| Station Edit Insert PLC ⊻iew | <u>0</u> ptions <u>W</u> indow <u>H</u> elp | | | | | | | | |
| | | 12 | | | | | | | |
| CPU315_2DP (Configuration | on) ET200S | | | | | | Profil | e Standard | 1 |
| OUR PS 307 2A PS 307 2A OPU 315-2 DP A2 OPU 315-2 DP A2 OPU 315-2 DP A OPU 315-2 DP OPU 315- | | I): DP master s | ystem (1) | | | | | SM 322 D016xAC120V/0.5A SM 322 D016xAC120V/230V SM 322 D016xDC24V/0.5A | 230V |
| | Order number | Firmware | MPI address | I address | 0 address | Comment | | | × |
| Slot Module | 6ES7 307-1BA00-0AA0 | rimware | MFI address | 1 address | Q address | Comment | | | 4 |
| 2 CPU 315-2 DP | 6ES7 315-24E03-04B0 | ¥1.1 | 2 | - | | | - | SM 322 D08xAC230V/2A | |
| X2 DF | | | - | 1023* | | | - | | |
| 3 | | | | | | | 1-0 | SM 322 D08xDC24V/0,5A | |
| 4 DI16xDC24V | 6ES7 321-1BH82-0AA0 | | | 01 | | | | | |
| 5 D016xDC24V/0.5A | 6ES7 322-1BH01-0AA0 | | | | 45 | | | SM 322 DO8xDC24V/2A | |
| 6 | | | | | | | | SM 322 D08xDC24V/2A | . |
| 7 | | | | | | | | SM 322 D08xDC48-125V/1.5 SM 322 D08xBEL AC230V | ۹ |
| 8 | | | | | | | -1111 | SM 322 DU8xHEL AC230V SM 322 D08xRel AC230V | |
| 9 | | _ | | | | | - | | |
| 10 | | | | | | | - | SM 322 D08xRel AC230V SM 322 D08xRel AC230V/84 | 、 、 |
| 11 | | | 1 | | <u> </u> | 1 | - | SM 322 D08xRel, AC230V/84 SM 322 D08xRel, AC230V/84 | |
| | | | | | | | | SM 322 DOBxRelav | |
| | | | | | | | | | i el |
| | | | | | | | <u> </u> | | 11 |
| | | | | | | | Digit | 7 322-18H01-0AA0 al output module D016 24 V / 0.9 ouping 8 | 5 _ |
| Insertion possible | | | | | | | - | | Chg |



Note: The order number of the module is displayed in the footer of the catalog.

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23. Then a bar chart for the Master system is shown to the right of the CPU315-2DP, in which you can arrange the PROFIBUS. This happens by clicking the desired module (Here the ET200S/CPU as Configured Stations) from the hardware catalog in path ET200S/CPU. By Drag & Drop click with the mouse, it can be dropped into the master system (→ PROFIBUS DP → Configured Stations → ET 200S/CPU).

| 🔣 HW Config - CPU315_2DP | | | | | | | |
|---------------------------------------|-------------------------------------|---------------|------------------|-----------|-----------|---------|---|
| <u>Station Edit Insert PLC View 0</u> |]ptions <u>W</u> indow <u>H</u> elp | | | | | | |
| | E 🛍 🛍 🗖 🖪 | ₩ | | | | | |
| CPU315_2DP (Configuration) | ET200S | | | | | | Profile Standard |
| (0) UR (0) UR (0) UR | | IBUS(1): DP m | aster system [1] | | | | PROFIBUS DP Additional Field Devices Closed-Loop Controller Consed-Loop Controller CrU 31x CPU 31x PC station as DP Slave PC station as DP Slave |
| Slot Module | Order number | Firmware | MPI address | I address | Q address | Comment | 🗄 💼 ET 2005 |
| 1 PS 307 2A | 6ES7 307-1BA00-0AA0 | | | | | | 🛉 🖶 🛅 ET 200U 🚽 |
| 2 🚺 CPU 315-2 DP | 6ES7 315-2AF03-0AB0 | V1.1 | 2 | | | | |
| X2 DP | | | | 1023* | | | E- Function Modules |
| 3 | | | | | | | |
| 4 DI16xDC24V | 6ES7 321-1BH82-0AA0 | | | 01 | | | |
| 5 D016xDC24V/0.5A | 6ES7 322-1BH01-0AA0 | | | | 45 | | Horizon NC Horizon NC Horizon NC Horizon NC |
| 6 | | | | | | | |
| 8 | | | | | | | |
| 8 | | | | | | | |
| 10 | | + | | | + | | |
| | | | 1 | | | | SIMOVERT |
| | 1 | 1 | 1 | 1 | 1 | 1 | 🗄 🧰 SIPOS |
| | | | | | | | 😟 🧰 Switching Devices 📃 |
| | | | | | | | |
| | | | | | | | Long Long Long Long Long Long Long Long |
| | | | | | | | ET 200S basic module with programmable preprocessing as DP slave |
| Press F1 to get Help. | | | | | | | Cha // |

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24. By the entering of the ET 200S/CPU as a slave, the following window is displayed in which you must **Connect** the already projected slave (PROFIBUS- Address 3) to the CPU 315-2DP (master) (→ Connect).

| DP slave properti | ies | | | × |
|--|---|----------------|---------------|-------------|
| General Connec | tion Configuration | | | |
| Configured Sla | ve Controllers | | | |
| | we controllers can be c and click "Connect": | connected to t | he PROFIBUS m | aster. |
| Slave | PROFIBUS | Address | in Station | Slot |
| IM151 / CPL | J PROFIBUS(1) | 3 | ET200S | 0/2/1 |
| | | | | |
| - Active Connec | tion | | | |
| <no connecti<="" td=""><td></td><td></td><td></td><td>Disconnect</td></no> | | | | Disconnect |
| ОК | | | | Cancel Help |

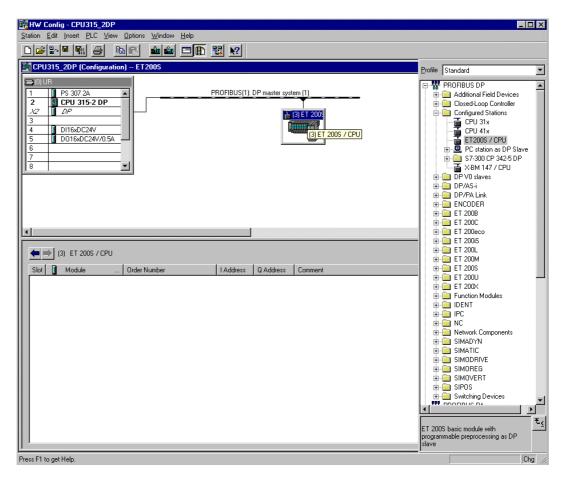
25. After the connection, the ET 200S is entered as an active connection. This connection is then accepted with **OK** (\rightarrow OK).

| slave properti | 6.5 | | | | |
|------------------|--|-----------------|----------------|--------------------------------|---|
| eneral Connec | tion Configuration | | | | |
| – Configured Sla | ve Controllers | | | | |
| | ve controllers can be co and click "Connect": | onnected to t | he PROFIBUS ma | ster. | |
| Slave | PROFIBUS | Address | in Station | Slot | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| • | | | | | Þ |
| • | | | | Conn | |
| - | | | | Conn | |
| Active Connec | tion | | | Corn | |
| Slave ET200S | tion : / CPU PROFIBUS Add | dr.=3 in Statio | n=ET200S Slot | Com | |
| | | dr.=3 in Statio | n=ET200S Slot | <u>C</u> onn <u>D</u> iscon | |
| Slave ET200S | | dr.=3 in Statio | n=ET200S Slot | | |
| Slave ET200S | | dr.=3 in Statio | n=ET200S Slot | | |

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25. With a double click, the entered (3) ET200S/CPU by the master system is selected (\rightarrow (3) ET200S/CPU).





27. In the following dialog, the data range can be adjusted for the communication between the ET200S/CPU and the CPU 315-2DP.

From CPU 315-2DP to ET200S/CPU:

Mode: Master/Slave

Output range CPU 315-2DP: Q10; Length 1 word; Consistency by the unit of a word Input range ET 200S/CPU: I10; Length 1 word; Consistency by the unit of a word **From ET200S/CPU to CPU 315-2DP:**

Mode: Master/Slave

Output range ET 200S/CPU: Q10; Length 1 word; Consistency by the unit of a word Input range CPU 315-2DP: I10; Length 1 word; Consistency by the unit of a word This adjustment is then accepted with **OK** (\rightarrow OK).

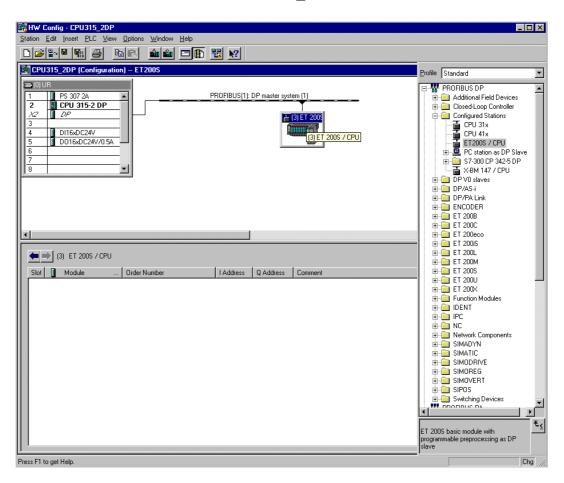
| SIGAG | propertie | es | | | | | | |
|----------------------|------------------------------|-----------|------------------|--------------|----------------|------------------|--------------|---|
| eneral | Connecti | ion Cor | figuration | | | | | |
| Row | Mode | | rDPa | Partner addr | Local addr | Length | Consiste | |
| 1 2 | MS MS | 2 | | 0 10 | l 10 O 10 | 1 Word 1 Word | Unit Unit | |
| | | | | | | | | |
| | | | | | | | | 1 |
| | | | | | | | | Ť |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | _ | | | | | | |
| | <u>N</u> ew | | <u>E</u> dit | | Delete | | | |
| | | e configu | | | Delete | | | |
| | aster-slave | e configu | | | Delete | | | |
| -MS M Mas Stat | aster-slave ster: ion: | e configu | ration | | <u>D</u> elete | | | |
| -MS M Mas Stat | aster-slave ster: | e configu | ration (2) DP | _2DP | Delete | | <u>^</u> | |
| -MS M Mas Stat | aster-slave ster: ion: | e configu | ration (2) DP | | Delete | | * * | |
| -MS M Mas Stat | aster-slave ster: ion: | e configu | ration (2) DP | _2DP | Delete | | × y | |

| DP slave propertie | s - Configuration · | Ro | w 1 | | | × |
|-----------------------|---------------------|--------------|-------------------------|--------|---------|------|
| Mode: | MS 💌 | | Master-slave configurat | ion) | | |
| DP Partner: Master | | | Local: Slave | | | |
| <u>D</u> P address: | 2 🔻 | | DP address: | | 3 | |
| Name: | DE | | Name: | | DP | |
| Address type: | Output 💌 | | Address type: | | Input | • |
| <u>A</u> ddress: | 10 | | Addr <u>e</u> ss: | | 10 | |
| "Slot": | 4 | | "Slot": | | 4 | |
| Process image: | OB1 PI 💌 | | P <u>r</u> ocess image: | | OB1 PI | - |
| Interrupt OB: | Y | | Diagnostic address: | | | |
| Length: | 1 | <u>C</u> omr | nent: | | | |
| <u>U</u> nit: | Word 💌 | | | | | |
| C <u>o</u> nsistency: | Unit 💌 | | | | | • |
| OK | Apply | | | Cancel | + | lelp |

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28. The configuration table should first be saved and compiled with a click on \mathbb{R} . Then the hardware configuration is closed with a click on \mathbb{R} ($\rightarrow \mathbb{R} \rightarrow \mathbb{R}$).



29. From the **SIMATIC Manager**, open the block **OB1** for the **ET200S** with a double click (\rightarrow OB1).

| SIMATIC Manager - ET200S File Edit Insett PLC View Options D 2 27 11 11 11 11 11 11 11 11 11 11 11 11 11 | | E < No | o Filter > | |
|--|-------------|--------|------------|--|
| E T2005 - C:\Siemens\Step7X E T2005 Sources Sources Blocks | System data | : | | |
| Press F1 to get Help. | | | | |

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30. Optional: Enter the properties of the OB1 for documentation and accept with OK (\rightarrow OK).

| Properties - Organization | n Block | | | × |
|---------------------------------|--------------------------------|--------------------|----------|------|
| General - Part 1 General | - Part 2 Calls Attributes | | | |
| <u>N</u> ame: | OB1 | | | |
| <u>S</u> ymbolic Name: | | | | |
| Symbol <u>C</u> omment: | | | | |
| Created in Language: | STL | | | |
| Project path: | | | | |
| Storage location of project: | C:\Siemens\Step7\S7proj\Et200s | | | |
| Date created: | Code 26/09/2002 01:42:55 | Interface | | |
| Last modified: | 07/02/2001 03:03:43 | 15/02/1996 04:51:1 | 2 | |
| C <u>o</u> mment: | "Main Program Sweep (Cycle)" | | <u>^</u> | |
| | | | _ | |
| | | | ~ | |
| OK | | | Cancel | Help |
| | | | | |

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| | | | |

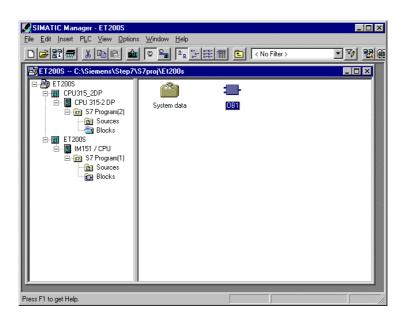


31. With LAD, STL, FBD: Program blocks, you now have an editor which gives you the possibility to generate your STEP 7- Program. Here the organization block OB1 was already opened with the first network. In order to generate your first logical operation, you must highlight the first network. Now you can write your first STEP 7- Program. Several programs can usually be

divided into networks. Open a new network by clicking on the network symbol The STEP 7- Program to be tested can now be saved with \square (\rightarrow \square).

| Ele Edit Insert PLC Debug View Options Window Help D D D D D D D D D 661 I I I I I I I I | | |
|---|---------|--|
| OB1 ET200S\ET200S\IM151 / CPU OB1 : "Main Program Sweep (Cycle)" Comment: Network 1: Title: A I 10.0 A I 1.0 = Q 2.0 | | New network FB blocks FC blocks FF blocks FF blocks FF blocks FF blocks Libraries |
| Image: Constraint of the second sec | offline | Abs Nw 1 Ln 4 |

32. From the SIMATIC Manager, open the block OB1 for the CPU315_2DP with a double click $(\rightarrow OB1).$



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33. Optional: Enter the properties of the OB1 for documentation and accept with OK (\rightarrow OK).

| Properties - Organization Block | | | | | | |
|---------------------------------|--------------------------------|-----------------|--------|------|--|--|
| General - Part 1 General | - Part 2 Calls Attributes | | | | | |
| <u>N</u> ame: | OB1 | | | 9 | | |
| <u>S</u> ymbolic Name: | | | | | | |
| Symbol <u>C</u> omment: | | | | | | |
| Created in <u>L</u> anguage: | STL | | | | | |
| Project path: | | | | | | |
| Storage location of project: | C:\Siemens\Step7\S7proj\Et200s | | | | | |
| Date created: | Code 26/09/2002_02:38:11 | Interface | | | | |
| Last modified: | 07/02/2001 03:03:43 | 15/02/1996 04:5 | 1:12 | | | |
| Comment: | "Main Program Sweep (Cycle)" | | * * | | | |
| ОК | | | Cancel | Help | | |

- 34. With LAD, STL, FBD: Program blocks, you now have an editor which gives you the possibility to generate your STEP 7- Program. Here the organization block OB1 was already opened with the first network. In order to generate your first logical operation, you must highlight the first network. Now you can write your first STEP 7- Program. Several programs can usually be divided into networks. Open a new network by clicking on the network **H**).

symbol 💾 The STEP 7- Program to be tested can now be saved with

| Ele Edt Inset PLC Debug View Options Window Help D E E S E S E S E Image: S E S E S E S E E Image: S E Image: S E Image: S E Image: S E <th>2 8</th> <th></th> | 2 8 | |
|--|-----------|---|
| OB1 - ET200S\CPU315_2DP\CPU 315-2 DP OB1 : "Main Program Sweep (Cycle)" Comment: Metwork 1: Title: Comment: A I 0.0 = 10.0 | | Image: New network Image: FE blocks Image: FE blocks |
| Press F1 to get Help. | 9 offline | Abs Nw1 Ln 3 |

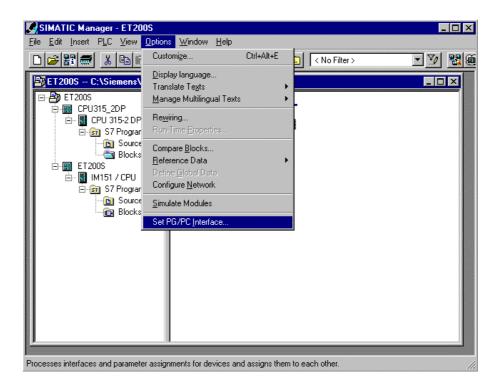
Note

After the transferring of the hardware configuration, the master CPU315-2DP searches for your slave and also the slave ET200S awaits the master call. It is important to generate the organization blocks OB82 and OB86 in both CPUs.

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|---------|-------|------------|--|
| | | | |



35. In **SIMATIC Manager**, the **Set PG/PC Interface** controls the download of the data into the CPU 315-2DP (\rightarrow Options \rightarrow Set PG/PC Interface).



36. Chose the **Properties** of the interface parameterization for the **PC Adapter(MPI)** (→ PC Adapter(MPI) → Properties).

| Set PG/PC Interface | × |
|---|---------------------|
| Access Path | 20° |
| Access Point of the Application: | |
| S70NLINE (STEP 7)> PC Adapter | (MPI) |
| (Standard for STEP 7) | |
| Interface <u>P</u> arameter Assignment Used: PC Adapter(MPI) | P <u>r</u> operties |
| ISS <none> ISS PC Adapter(Auto) ISS PC Adapter(MPI) ISS PC Adapter(PROFIBUS)</none> | Copy Dejete |
| (Parameter assignment of your PC adapter for an MPI network) | |
| ⊢ Interfaces | |
| Add/Remove: | Sele <u>c</u> t |
| | Cancel Help |

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|---------|-------|------------|--|
| | | | |
| | | | |



37. Choose the setting of the local connection.

| Properti | es - PC Adapter(MPI) | | × |
|-------------|----------------------|--------|------|
| MPI | Local Connection | | |
| | | | |
| <u>_</u> 0 |)M Port: | | |
| <u>I</u> ra | nsmission Rate: | 19200 | 3 |
| L | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| 0 | <u>D</u> efault | Cancel | Help |

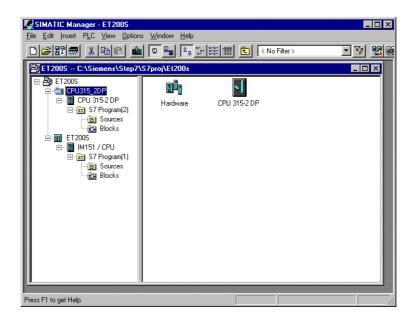
38. Choose the MPI setting and accept with $\text{OK} \ (\rightarrow \text{OK} \rightarrow \text{OK}$).

| Pro | perties - PC Adapter(MPI) | | × |
|-----|-------------------------------------|------------|------|
| M | PI Local Connection | | |
| | Station Parameters | | |
| | FG/PC is the only master on the bus | | |
| | Address: | 0 | |
| | <u>T</u> imeout: | 30 s | • |
| | Network Parameters | | |
| | Transmission <u>R</u> ate: | 187.5 Kbps | • |
| | Highest Node Address: | 31 | |
| | OK <u>D</u> efault | Cancel | Help |

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|---------|-------|------------|--|
| | | | |



39. In **SIMATIC Manager**, load the station **CPU315_2DP** into the PLC The mode switch of the CPU must be on STOP and the PC-Adapter must be connected with the MPI-Interface of the CPU 315-2DP! (\rightarrow CPU315_2DP \rightarrow).



40. In **SIMATIC Manager**, the **Set PG/PC Interface** changes for the downloading of the data into the ET 200S/CPU on to the PROFIBUS (→ Options → Set PG/PC Interface).

| Customize Cutl+Alt+E Image Multilingual Texts Im |
|---|
| |

| Fo | rward | Notes | Commission |
|----|-------|-------|------------|
| | | | |



41. Choose the **Properties** of the interface parameterization for the **PC Adapter(PROFIBUS)** (\rightarrow PC Adapter(PROFIBUS) \rightarrow Properties).

| Set PG/PC Interface | | × |
|---|--------------|--------------|
| Access Path | | <i>.</i> # |
| Access Point of the Application: S70NLINE (STEP 7)> PC Adapte (Standard for STEP 7) | er(PROFIBUS) | |
| Interface Parameter Assignment Used: PC Adapter(PROFIBUS) | P_rop | erties |
| ISS <none> ISS PC Adapter(Auto) ISS PC Adapter(MPI) ISS PC Adapter(PROFIBUS)</none> | | IPY |
| (Parameter assignment of your PC adapter for a PROFIBUS network) | | |
| _ Interfaces | | |
| Add/Remove: | Sel | e <u>c</u> t |
| | Cancel | Help |

42. Choose the setting of the local connection.

| Properties - PC Adapter(PROFIBUS) | | × |
|-----------------------------------|---------|------|
| PROFIBUS Local Connection | | |
| <u>C</u> OM Port: | | |
| Iransmission Rate: | 19200 💌 | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| OK <u>D</u> efault | Cancel | Help |

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|---------|-------|------------|--|
| | | | |
| | | | |

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43. Choose the **PROFIBUS** setting and accept (\rightarrow OK \rightarrow OK).

| Properties - PC Adapter(PROFIBUS) | × |
|-------------------------------------|--|
| PROFIBUS Local Connection | |
| Station Parameters | |
| PG/PC is the only master on the bus | |
| Address: | 0 |
| <u>⊥</u> imeout: | 30 s |
| Network Parameters | |
| Transmission <u>R</u> ate: | 9.6 Kbps 💌 |
| Highest Node Address: | 126 💌 |
| <u>P</u> rofile: | DP Standard Universal (DP/FMS) User-Defined |
| | <u>B</u> us Parameters |
| Network Configuration | |
| Master: 1 📑 Sia | yes: 0 |
| OK <u>D</u> efault | Cancel Help |

44. In **SIMATIC Manager**, download the station **CPU315_2DP** into the PLC . The switch on the ET200S/CPU must be on STOP and the PC-Adapter must be connected with the PROFIBUS interface of the CPU 315-2DP! Also the CPU 315-2DP must be connected again over the

| SIMATIC Manager - ET200S <u>File</u> Edit Insert PLC View Options | | | |
|---|----------|-------------|----|
| | | | |
| ET2005 C:\Siemens\Step7\ ET2005 CPU315_2DP CPU315_2DP GPU315_2DP Blocks ET2005 CPU315_2DP GPU35_2DP GPU35_ | Hardware | IM151 / CPU | |
| Press F1 to get Help. | | | 1. |

PROFIBUS with the ET 200S/CPU (\rightarrow ET200S \rightarrow).

45. Now switch the ET200S/CPU to RUN. If it starts up, then the program can be started through the switching of the mode switch on the CPU 315-2DP to RUN.

| Forward | Notes | Commission | |
|---------|----------|------------|--|
| | | | |
| | 5 64 664 | | |