Training Document for Comprehensive Automation Solutions

Totally Integrated Automation (TIA)

MODULE D17

PROFIBUS DP

with

Master CP 342-5DP/Slave ET 200S

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The symbols below are provided as a guide through Module D17:



1. PREFACE

In terms of its contents, Module D17 is part of the teaching unit entitled 'Industrial Fieldbus Systems'.



Learning Objective:

In Module D17, the reader learns how the PROFIBUS DP with a SIMATIC S7-300 -with the communication processor CP 342-5DP as master and the ET 200S as slave- is started up. Module D17 illustrates the method in principle, using a short example.

Prerequisites:

To successfully work through Module D17, the following knowledge is assumed:

- Knowledge in handling Windows .
- Fundamentals of PLC programming with STEP 7 (for example, Module A3 'Startup' PLC Programming with STEP 7)
- Fundamentals of PROFIBUS DP (for example, Appendix IV Basics of Fieldbus Systems with SIMATIC S7-300)

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Hardware and software required

- 1 PC, operating system Windows 2000 Professional starting with SP4/XP Professional starting with SP1/Server 2003 with 600MHz and 512RAM, free hard disk storage 650 to 900 MB, MS Internet Explorer 6.0
- 2 Software STEP7 V 5.4
- 3 MPI interface for the PC (for example, adapter USB)
- 4 PLC SIMATIC S7-300 with the CP 342-5DP
 - Sample configuration: - Power supply: PS 307 2A
 - CPU: CPU 314
 - Digital inputs: DI 16xDC 24V
 - Digital outputs: DO 16xDC 24V/0.5A
 - PROFIBUS communication processor CP 342-5DP
- 5 Distributed periphery ET 200S for PROFIBUS with 2 digital inputs and 4 digital outputs Sample Configuration:
 - Interface Module IM151-1HF
 - Power module PM-E DC 24V ...48V/AC 24V...230V
 - Electronic module: 2DI Standard DC 24V
 - Electronic module: 4DO Standard DC 24V/0.5A
- 6 PROFIBUS cable with 2 PROFIBUS connectors



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2. NOTES ON THE USE OF CP 342-5DP

The PROFIBUS communication processor CP 342-5DP allows for connecting the SIMATIC S7-300 to the PROFIBUS with the protocol profile Decentral Periphery (DP).

The PROFIBUS parameters for the PLC are assigned and the PROFIBUS network is configured using the STEP7 software. However, for the CP342-5DP, the software "NCM S7 PROFIBUS" (already included in STEP7 V5.x!) is required. This provides the user with a uniform configuring tool for central as well as distributed configurations.

For the SIMATIC S7-300 with the CP342-5 as combi-master, the following protocol profiles are available:

- The DP interface as master or slave according to EN 50170. PROFIBUS-DP (distributed periphery) is the protocol profile for connecting distributed periphery/field devices with very fast response timing.
- SEND/RECEIVE interface (PLC/PLC) according to the SDA service (Layer 2 of PROFIBUS). SEND/RECEIVE (FDL interface) provides functions with which communication between SIMATIC S5 and S7 (with each other) and with the PC can be implemented simply and quickly.
- S7 functions. These provide optimized communication in the SIMATIC S7/M7/PC network.

With programmed FC block calls, the user program activates the transfer of the data areas for DP and FDL communication, and monitors its successful execution.

The FC blocks needed for communication are stored in the "**SIMATIC_NET_CP**" library. To use this functions, the FC blocks have to be incorporated in (copied to) your "own" project.



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Note: Here, the CP 342-5DP is used on the PROFIBUS as master.

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3. NOTES ON USING THE ET 200S WITH IM 151-1 HF



The SIMATIC ET 200S is a decentral IO device configured in a highly modular mode. It can be operated with different interface modules:

IM 151-1 BASIC, IM 151-1 STANDARD and IM 151-1 FO STANDARD for connecting a maximum of 63 IO modules (all types except PROFIsafe) to the PROFIBUS DP; alternatively, bus connection with RS 485 Sub-D connector or by means of integrated fiber-optic connection

IM 151-1 HIGH FEATURE for connecting a maximum of 63 IO modules (all types, including clocked mode for PROFIsafe) to PROFIBUS-DP; bus connection with RS485 Sub-D connector

IM 151-3 PN for connecting a maximum of 63 IO modules (all types, including the clocked mode for PROFIsafe) to PROFINET IO controllers; bus connection by means of RJ45 connector

IM 151-7/F-CPU, IM 151-7/CPU or IM 151-7/CPU FO for connecting a maximum of 63 IO modules (all types; PROFIsafe only with IM151-7/F CPU) to PROFIBUS DP; alternatively bus connection with RS 485 Sub-D connector or by means of an integrated fiber-optic connection; with integrated CPU 314 of the SIMATIC S7-300, for preprocessing process data.

The following IO modules can be used:

Power modules for individual grouping of load and encoder supply voltages and their monitoring

Digital electronic modules for connecting digital sensors and actuators

Analog electronic modules for connecting analog sensors and actuators

Sensor module for connecting IQ sense sensors

Technology modules Electronic modules with integrated technological functions, such as counting, positioning, data exchange, etc.

Frequency converters and motor starter modules

For training purposes, an integrated system is available, suitable for teaching many technologies.

Notes:

- In Module D16, the interface module IM151-1 HF (HIGH FEATURE) is used as PROFIBUS DP slave.
- The PROFIBUS address is set, binary-coded, on 8 switches at interface module IM151-HF. The lowest switch has to be on OFF. A number is assigned to each of the other switches. These numbers add up to the PROFIBUS station address. If the PROFIBUS address is changed, the new setting will be accepted only after voltage returns. Therefore, the interface module IM151-1 HF has to be switched off, and then switched on again.

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4. STARTING UP PROFIBUS (MASTER CP 342-5DP/SLAVE ET200S)



Below, the startup of a single master system with the SIMATIC S7-300 - with the CP342-5DP as master and the ET200S as slave- is described.

To test the configuration, a program is written. In this program, an indicator lamp P1 is activated when two buttons, S0 and S1, are operated simultaneously.

Assignment List:

10.0	S0	Button Selection 1
10.1	S1	Button Selection 2
O0.0	P1	Indicator lamp



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 The central tool in STEP 7 is the 'SIMATIC Manager'. Here, it is called with a double click. (→ SIMATIC Manager)



2. STEP7 programs are managed in projects. We are now setting up such a project. (\rightarrow File \rightarrow New)

SIMATIC Manager		
Datei Zielsystem Ansicht Extras Fenster Hilfe		
<u>N</u> eu Assistent 'Neues Projekt'	Ctrl+N	
Ö <u>f</u> fnen Versi <u>o</u> n 1- Projekt öffnen	Ctrl+O	
S7- <u>M</u> emory Card <u>W</u> inLC-Datei)	
Lösc <u>h</u> en <u>R</u> eorganisieren <u>V</u> erwalten		
<u>A</u> rchivieren D <u>e</u> archivieren		
Seite einrich <u>t</u> en Schrijtfelder		
Drucker einri <u>c</u> hten		
<u>1</u> testtest (Projekt) d:\Siemens\Step7\S7proj\testtest <u>2</u> Standard Library (Bibliothek) D:\\Step7\S7libs\Stdlib30 <u>3</u> Erreichbare Teilnehmer <u>4</u> Waschstraße (Projekt) d:\Siemens\Step7\S7proj\Waschstr		
<u>B</u> eenden	Alt+F4	

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The project is now assigned the 'Name' 'ET200S_CP'. (\rightarrow ET200S_CP \rightarrow OK) 3.

11	
Test_cp200S	D:\0_S7_Projekte\Testcp
In aktuelles Muli	iiprojekt einfügen
ame:	Typ:
In aktuelles Mult	iprojekt einfügen
ame:	Typ:
T2005_CP	Projekt
In aktuelles Mult	tiprojekt einfügen
ame:	Typ:
:T2005_CP	Projekt
blageort (Pfad) :	F-Bibliothek

4. Highlight your project and insert a '**PROFIBUS Subnet**'. (\rightarrow ET200S_CP \rightarrow Insert \rightarrow Subnet \rightarrow PROFIBUS).

Datei Bearbeiten
Datei Bearbeiten

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6. With a double click, open the configuration tool for 'Hardware'. (\rightarrow Hardware)

SIMATIC Manager - [ET2005_CP D:\0_57_Projekte\ET2005_C]	
🞒 Datei Bearbeiten Einfügen Zielsystem Ansicht Extras Fenster Hi	ilfe _ 문]
🗋 🗗 🎏 👹 🕹 🛍 💼 🛍 🖆 📴 🐾 🐘 🏢 🖻	🕘 🛛 < Kein Filter > 🔄 🎽 🛍
ET2005_CP SIMATIC 300(1)	
Drücken Sie F1, um Hilfe zu erhalten.	CP5611(MPI)

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7. Open the hardware catalog by clicking on the symbol $\frac{1}{100}$, (\rightarrow) There, arranged in the following directories: PROFIBUS DP, PROFIBUS PA, PROFINET IO, SIMATIC 300, SIMATIC 400, SIMATIC HMI Station, SIMATIC PC Based Control 300/400, and SIMATIC PC Station, all racks, modules and interface modules are provided for configuring your hardware. Insert 'Rail' with a double click. (\rightarrow SIMATIC 300 \rightarrow RACK-300 \rightarrow Rail)

HW Konfig - [SIMATIC 300(1) (Konfig	uration) ET2005_CP]	a para						
Cation Bearbeiten Einrugen Zieisyst	em Ansicht Extras Fenste 🏜 🋍 📳 📼 号 👷	er Hillre						
(0) UR 2 3 4						Sucher	x Standard	
							PROFIBUS-PA PROFIBUS-PA PROFINET IO SIMATIC 300 CP-300 CPU-300 FM-300 M7-EXTENSION Netzübergang	
(0) UR Steckolatz	Bestellnummer	Firmware	MPLAdresse	E.Adresse	іл. Ік		PS-300 RACK-300 FACK-300 Forfilschiene SM-300	
$ \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 5 \end{bmatrix} $							SIMATIC 400 SIMATIC HMI Station SIMATIC PC Based Control 300/400 SIMATIC PC Station	
7 8 9						6ES73	90-1???0-0AA0 chiedenen Längen lieferbar	₹ <u><</u>

After that, a configuration table for configuring Rack 0 is displayed automatically.

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8. From the hardware catalog, you can now select all modules that are also in your real rack, and insert them in the configuration table.

To this end, click on the name of the respective module, hold the mouse key and drag the module to a line in the configuration table.

We are starting with the power unit 'PS 307 2A'. (\rightarrow SIMATIC 300 \rightarrow PS-300 \rightarrow PS 307 2A)





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Note: If your hardware differs from the one displayed here, simply select the corresponding modules from the catalog and insert them in your rack. The order numbers of the individual modules -that are also indicated on the components- are displayed in the footer of the catalog.

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Next, we drag the CPU 314 to the second slot. The order number and the version of the CPU can be read off the front of the CPU. (→ SIMATIC 300 → CPU-300 → CPU 314 → 6ES7 314-1AE04-0AB0 → V1.2)



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Now, we drag the input submodule for 16 inputs to the 4th slot. The order number of the submodule can be read off the front. (→ SIMATIC 300 → SM300 → DI-300 → SM 321 DI16xDC24V).



Note: Slot No. 3 is reserved for interface modules and remains empty for that reason. The module's order number is displayed in the footer of the catalog.



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11. Next, we drag the output submodule for 16 outputs to the 5th slot. The order number of the submodule can be read off the front. (\rightarrow SIMATIC 300 \rightarrow SM300 \rightarrow DO-300 \rightarrow SM 322 DO16xDC 24V/0.5A).



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



Drücken Sie F1, um Hilfe zu erhalten.

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12. Now, we drag the communication processor for PROFIBUS '**CP 342-5DP**' to the 6th slot . The order number and the version of the submodule can be read off the front. (\rightarrow SIMATIC 300 \rightarrow CP-300 \rightarrow PROFIBUS \rightarrow CP 342-5 \rightarrow 6GK7 342-5DA02-0XE0 \rightarrow V4.0).

HW Konfig -	[SIMATIC 300(1) (Konfiguration) ET2 Zielsystem Opsicht E	2005_CP]	nster Hilfe						
L⊡ re2 ≘~ E	arbeiten Ennigen									
Comparison of the second	© \$ 307 2A ▲ PU 314 0116xDC24V 0016xDC24V							Sychen Profit Brofit Brofit	Standard PROFIBUS-DP PROFIBUS-PA PROFIBUS-PA PROFINET IO SIMATIC 300 C7 C7 C7 C7 C7 C7 PROFIBUS PROFIBUS PROFIBUS	<u>n</u> tni ▼
<u>.</u> (UR						Þ	-	□	
Steckplatz		Restellnummer	Eirmu	MPLAdree	E-Adresse	1 A.Adresse	Kommentar		v5.0	
1	PS 307 24	6ES7 307-18400-0440	7 mmwy	Mi PAdies	L'Adiesse	AMUICSSE	Koninenta		🕀 🛄 CP 342-5 FO	
2	CPU 314	6ES7 314-1AE04-0AB0	V1.2	2					E CP 343-5	
3			1	Ū					E CPU 200	
4	DI16xDC24V	6ES7 321-18H01-0AA0			01				EM.300	
5	D016xDC24V/	6ES7 322-1BH01-0AA0		8		45			IM-300	
6		-								
7								IBGK73	42-5DAU2-UXEU	_ ² ≤
8							*	SEND/ S7-Kom	RECEIVE-Schnittstelle, munikation (Server), Routing, BG-Tausch	
Drücken Sie F1. u	m Hilfe zu erhalten.									Änd //

13. When entering the communication processor, the following window appears. In this window, assign a PROFIBUS address to the CP 342-5DP and select the PROFIBUS network that has already been created. If you want to modify the parameters of the PROFIBUS network, highlight it and then click on '**Properties**'. (→ Properties)

Adresse: 2 Höchste Adresse: 126 Übertragungsgeschwindigke	Bei Anwał nächste fr it: 1.5 Mbit/s	il eines Subnetzes wird die eie Adresse vorgeschlagen
Subnetz: nicht vernetzt PROFIBUS(1)	1.5 Mbit/s	Neu
		Löschen

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- 14. Now you can select the 'Highest PROFIBUS Address' (here \rightarrow 126), the 'Transmission Rate' (here \rightarrow 1.5 Mbit/s) and the '**Profile**' (here \rightarrow DP). (\rightarrow OK \rightarrow OK)

Adresse: Höchste Adres Übertragungsg	Höchste PROFIBUS-Adresse: 12	Coptionen
Subnetz: nicht verr PROFIBUS(1	Übertragungsgeschwindigkeit: 45. 93. 18 50 1.5 3 N	45 (31.25) kbit/s 75 kbit/s 7.5 kbit/s 0 kbit/s 0 kbit/s
	Profil: Sta Un Be	indard iversell (DP/FMS) nutzerdefiniert

15. Next, first the addresses of the communication processor are noted down in the periphery address space of the CPU (here: PI 288...303/PO 288..303). Then, the properties of the CP are selected by double clicking on the 'CP 342-5DP'. The 'Operating Mode' is then set to 'DP Master' and accepted with 'OK'.

 $(\rightarrow CP 342-5 \rightarrow Operating Mode \rightarrow DP Master \rightarrow OK)$

Image:	HW Konfig - Station Be	151MATIC 300(1 arbeiten Einfügen) (Kon Ziels	ystem	Ans	icht Extras	Fenster Hilfe		Eigenschaften - CP 342-5 - (R0/56)
1 PS 307 2A 2 0 UB 3 0116x0C24V 5 0 016x0C24V 6 CP 3425 7 8 8 9 10) 🚅 🔓 🖥	\$: @ \$	8	🚵			≅ \}?		Allgemein Adressen Betriebsart Optionen Diagnose
8		S 307 2A A PU 314 I16xDC24V 016xDC24V P 342-5							C Kein DP C DP Master DP-Verzögerungszeit [ms]: 0.0
Steckplatz Baugrupp. B M E-Adresse ArAdresse Kor 1 IP S 307 2A 6E S7 Image: Comparison of the second secon	8 9 10 10								C DP Slave
Image: District of the second secon			l B	1 5	Гм	E.Adresse	Adresse	Kor	DP-Mode:
2 Image: CPU 314 6ES7 V1.2 2 Image: CPU 314 6ES7 V1.2 2 Image: CPU 314 S7-kompatibel Image: CPU 314 Abbrechen Hife S7-kompatibel Image: CPU 314 S7-kompatibel Image: CPU 314 S7-kompatibel Image: CPU 314 Abbrechen Hife S7-kompatibel Image: CPU 342-5 S6K7/V4.0 3 288303 288303 Image: CPU 342-5 S7-kompatibel Image: CPU 342-5 PROFIBUS-DP-Slaves der SIMATIC S7, M7 und CI 34 Image: CPU 342-5 Image: CPU 342-5<		PS 307 2A	6ES7	1		L'MOIGSSC	Andresse		
DI16xDC24V 6ES7 01 DK Abbrechen Hilfe D016xDC24V/06ES7 45 0K Abbrechen Hilfe I CP 342-5 66K7V4.0 3 288303 288303 PROFIBUS-DP-Slaves der SIMATIC S7, M7 und Cl (dezentraler Aufbau)		CPU 314	6ES7	V1.2	2				S7-kompatibel
OTISADC24V (6ES7) O1 OK Abbrechen Hilfe 01016x0C24V/(6ES7) 45 0K Abbrechen Hilfe 1 C018x0C24V/(6ES7) 45 0K PROFIBUS-DP-Slaves der SIMATIC S7, M7 und Cl (dezentraler Aufbau)	1		05.07			0.1		-	
Hight CP 342-5 6GK7/V4.0 3 288303 PROFIBUS-DP-Slaves der SIMATIC S7, M7 und C2 Image: Strate Str			IGES7			01	4 5		OK Abbrechen Hilfe
7 PROFIBUS-DP-Slaves der SIMATIC S7, M7 und Ci a (dezentraler Aufbau)	3	CP 342-5	GGK7	V4.0	3	288303	288303		
9	7 8 9								PROFIBUS-DP-Slaves der SIMATIC S7, M7 und C7 (dezentraler Aufbau)

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16. Then, to the right of the CP342-5DP, a bar appears -the so called '**Master system'-** where you can arrange PROFIBUS slaves. This is done by clicking on the desired module (here the '**ET 200S**' with '**IM151-1 HF**') in the hardware catalog in the path

'**PROFIBUS-DP**', and dragging it to the master system. (\rightarrow PROFIBUS DP \rightarrow ET 200S \rightarrow

IM151-1 HF \rightarrow 6ES7 151-1BA00-0AB0)

🙀 HW Konfig - [SIMATIC 300(1) (Konfiguration) ET2005_CP]		- 🗆 ×
🕅 Station Bearbeiten Einfügen Zielsystem Ansicht Extras Fenster Hilfe		- 8 ×
D 🚅 💱 🖩 🐘 🎒 🗈 🗈 🧰 🏜 👔 🖽 😫 🕺		
PROFIBUS(1): DP-Mastersystem (180) PROFIBUS(1): DP-Mastersystem (180)	Sucher: Erofit Standard Profit Standard ET 2008 ET 2005 ET 2005 ET 2005 Compact 16D1/16D0 ET 2005 ET 2005 Compact 32D1 IM151:1 Basic IM151:1 Basic IM151:1 FO Standard IM151:1 FO Standard ET IM151:1 Standard IM151:1 Standard IM151:1 Standard IM151:2 Standard IM151:2 Standard IM151:7 CPU	■ <u>nt</u> <u> </u>
	I IM151-7 CPU	
	Elektronikmodule, Sendefähigkeit für direkten Detensitiskar für direkten	₹ ₹ <u>₹</u>
) Drücken Sie F1, um Hilfe zu erhalten.		Änd //

17. When entering the slave, the following window appears. In this window, assign a PROFIBUS address to the slave. The address has to be identical with the address that you set at the switches of the IM151-1 HF (\rightarrow 3 \rightarrow OK)

Eigenschaft	en - PROFIBUS Schnittstelle L-1	16D1/16D0 DP	×
Allgemein	Parameter		
<u>A</u> dresse:	3		
Übertragur	ngsgeschwindigkeit: 1.5 Mbit/s		
<u>S</u> ubnetz:			
nicht PROFIBU	vernetzt S(1) 1.5 I	vlbit/s	<u>N</u> eu
			Eigenschaften
			Löschen
	7		
		Ab	Drechen Hilte
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18. From the hardware catalog, you can now select all additional modules that are inserted in your real ET200S and add them to your configuration table. To this end, click on the name of the respective module, hold the mouse key, and drag the module to a line in the configuration table. We are starting with the power module 'PM-E DC24V...48V/AC24...230V' that is dragged to Slot

1. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow PM \rightarrow PM-E DC24V...48V/AC24...230V)



19. Next, we are dragging the digital input submodule '2DI DC24V ST' to the 2nd slot. The order number and the version can be read off the module. (→PROFIBUS-DP → ET 200S → IM151-1 HF → DI → 2DI DC 24V ST)



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20. Now we are dragging the digital output module '4 DO DC24V/0,5A ST' to the 3rd slot. The order number and the version can be read off the module. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow DO \rightarrow 4 DO DC 24V/0.5A ST)

U <mark>W HW Konfig - [SIMATIC 3</mark> UN Station Bearbeiten Ein	00(1) (Konfiguration) ET2 ügen Zielsystem Ansicht E:	2005_CP] xtras Fenster Hilfe							_ D ×
D 😅 🔓 🖳 ঝ	🔁 🖻 🏜 🋍 🕕 🗖	⊐ 182 1€?							
[0] UR [1 PS 307 2A 2 [1 CPU 314						Suchen: Profil:	Standard	40 	= = × mt mi
3 1 D116xDC24V 5 1 D016xDC24V 6 2 CP 342-5 7 8 9 10		UFIBUS[1]; DF-Mastersystem [1a0]			×		Image: Constraint of the) AC24230V/1A DC24V/0,5A HF DC24V/0,5A ST DC24V/0,5A ST DC24V/0,5A ST DC24V/2A HF DC24V/2A HF DC24V/2A ST DC24V/2A ST DC24V/2A ST DC24V/2A ST DC24V/2A ST	
(3) IM151-1 HF				Adressen pac	ken		- 2RC) NO/NC DC241200730) NO/NC DC24120	V/5A /
Steckplatz Baugru	ppe Bestellnumm	ner E-Adresse	A-Adresse	Diagnoseadresse	К		- 4F-	D0 DC24V/2A	
1 PM-E DC	24/48V/ AC24/23U 6ES / 138-4C	B10-0460	-		-		🚺 4 F-I	DO DC24V/2A	
3 4D0 DC2	4V/0.5A ST 6ES7 132-4B	ID01-0440	0.00.3) DC24V/0,5A ST	
4								1 DC24V/0,54 ST	
5					_ 1				•
7			-		- 1	6ES713	2-48D01-0AA0		
8						Digitalau	sgabemodul DO 4xI	DC24V/0.5A, Standa	ard, <u> </u>
9					-	unterstut	20 Takisynchronitat		
Einfügen möglich						p			Änd //.

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21. The addresses of the inputs and the outputs on the ET 200S can now be noted down (here: I 0.0...0.1/O 0.0...0.3). Addresses are assigned automatically in the sequence in which the slaves were entered.

 \triangle

Note: The addresses specified here are the input and output addresses within the communication processor. These addresses can not be accessed directly in the program of the CPU. First, by means of FC blocks, the input/output areas have to be transferred to address areas of the CPU.

By clicking on ¹, and ¹, respectively, the configuration table is first saved and compiled, and

then loaded to the PLC. The key switch on the CPU should be in the STOP position! (\rightarrow) \square \square \square



Lädt aktuelle Station in Ladespeicher der aktuellen Baugruppe.

22. The CPU 314 is then confirmed as the destination module of the load process. (\rightarrow OK)

	riagei	Steckplatz
CPU 314	0	2
Alles markieren		

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23. In the dialog window below, you can '**Display**' the devices that are connected in the network. The station address of the CPU in the MPI network is then selected. If you are connected to only one CPU, accept with '**OK**'. (→ Display → OK)

augruppenträg	per: 0 픞			
ielstation:	C Über Ne	tzübergang zu er	reichen	
Anschluß an Z	Zielstation eingeber	n:		
MPI-Adresse	Baugruppentyp	Stationsname	Baugruppenname	Anlagenkennzeichen
2	CPU841-0			
Irreichbare Teil	Inehmer:			

24. After the hardware configuration is loaded, we can start generating the program. From the 'SIMATIC Manager', open 'OB1' with a double click. (\rightarrow OB1)



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25. Optional: enter the OB1 properties for documentation, and accept with 'OK'. $(\rightarrow OK)$

Eigenschaften - Organis	ationsbaustein		×
Allgemein - Teil 1 Allger	mein - Teil 2 Aufrufe Attribute		
Name:	OB1		
Symbolischer Name:			
Symbolkommentar:			
Erstellsprache:	AWL		
Projektpfad:			
Speicherort des Projekt	s: D:\0_S7_Projekte\ET200S_	C	
Erstellt am:	Code 21.08.2006 21:27:19	Schnittstelle	
∠uletzt geandert am:	07.02.2001 15:03:43	15.02.1336 16:51:12	
Kommentar:	"Main Program Sweep (Cycl	le)''	-
			×
OK		Abbrechen	Hilfe

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With programmed FC block calls, the user program activates the transfer of the data areas for the inputs and outputs of the PROFIBUS DP slaves. These FCs also monitor the successful execution. The FC blocks needed for communication are stored in the **"SIMATIC_NET_CP"** library. To use these functions, they have to be incorporated into (copied to) your "own" project.

The FC block **DP-SEND** transfers data from the user program in the CPU to the PROFIBUS CP. Depending on the operating mode of the PROFIBUS CP, DP-SEND has the following meaning:

When used in the DP Master
The black transfers the data of a specific

The block transfers the data of a specified DP output area to the PROFIBUS CP for output to the distributed IO.

• When used in the DP slave

The block transfers the data of a specified DP data area of the CPU to the send buffer of the PROFIBUS CP for transmission to the DP master.

When calling the FC block DP SEND, the following parameters have to be entered in succession:

Name	Туре	Value Range	Comment
CPLADDR	WORD		Module start address (in STEP7, is provided in the
			configuration table)
SEND	ANY		Specifies address and length of the DP send area (the
			address can refer to IO areas, flag areas, and data
			block areas)
DONE	BOOL	0: -	Status parameter indicates whether the request was
		1: New data	processed without fault.
ERROR	BOOL	0: -	Error indication
		1: Error	
STATUS	WORD		Status indication

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The FC block **DP-RECV** receives data via PROFIBUS-DP. Depending on the operating mode of the PROFIBUS-CP, the DP-RECV has the following meaning:

- When used in the DP Master The block accepts process data of the distributed IO as well as status information into a specified DP input area.
- When used in the DP Slave

The block accepts the DP data -transmitted by the DP master- from the receive buffer of the PROFIBUS CP into a specified DP data area of the CPU.

When calling the FC block DP-RECV, the following parameters have to be entered in succession:

Name	Туре	Value Range	Comment
CPLADDR	WORD		Module start address (in STEP7, is provided in the
			configuration table)
RECV	ANY		Specifies the address and the length of the DP
			receive area (the address can refer to IO areas, flag
			areas, and data block areas)
NDR	BOOL	0: -	The status parameter indicates whether new data was
		1: New data	accepted.
		accepted	
ERROR	BOOL	0: -	Error indication
		1: Error	
STATUS	WORD		Status indication
DPSTATUS	BYTE		DP status indication

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26. With 'LAD, STL, FBD – Program S7 blocks', you now have an editor with which you can generate your STEP7 program accordingly. To this end, OB1 has already been opened with the first network. To generate your initial operations, highlight the first network. Now you can write your STEP7 program. In STEP7, individual programs are usually arranged in networks. A new network is opened by clicking on the network symbol 'Jean'.

Here, in Network 1, the inputs of the DP slaves are entered with the block '**DP_RECV**'. You can drag this block, in the catalog, from the '**Library**' '**Blocks**' to your network. (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC2 DP_RECV)

In Network 3, the outputs of the DP salves are written to with the block '**DP_SEND**'. You can drag this block, in the catalog, from the '**Library**' '**Blocks**' to your network. (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC1 DP_SEND)



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STEP7 Program in OB1:

Network 1 : Enter inputs of the PROFIBUS DP slaves to the PII starting with IB64

С	ALL "DP_RECV"	-	//FC2
	CPLADDR	:=W#16#120	//Module start address of the CP from
			//hardware configuration
	RECV	:=P#E 64.0 BYTE 1	//Address area for the inputs of the DP slaves
	NDR	:=M99.0	//Control bit for request processing
	ERROR	:=M99.1	//Error bit
	STATUS	:=MW95	//Status display for diagnostic and error bit
	DP-STATUS	:=MB97	//Status byte for PROFIBUS connection

Network 2 : User Program

U	I	64.0	//Button Selection 1
U	Ι	64.1	//Button Selection 2
=	0	64.0	//Indicator lamp

Network 3 : Write to outputs of the PROFIBUS DP slaves from the PIO starting with OB64

CALL "DP_SEND"		//FC1
CPLADDR	:=W#16#120	//Module start address of the CP from
		//hardware configuration
SEND	:=P#A 64.0 BYTE 1	//Address area for the outputs of the DP slaves
DONE	:=M89.0	//Status bit for request processing
ERROR	:=M89.1	//Error bit
STATUS	:=MW85	//Status display for diagnostic and error bit



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Note: Here, an ET200S with 1 byte input data and 1 byte output data is incorporated by means of a CP342-5 DP on Slot 6 (module start address Decimal: 288/Hexa-decimal: 120).

The input data is to be located in the input area starting with IB 64; and from the output area starting with OB 64, the data is to be written to the ET200S.

It is important that the data of all DP slaves defined in the hardware configuration is incorporated in the blocks DP_RECV and DP_SEND, whereby all DP slaves are combined in a DP_RECV and a DP_SEND.

In this case, the area that is read/written to can be larger, but not smaller than the address area of the DP slaves!!

The addresses of individual submodules are provided in the hardware configuration.

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27. Now, the STEP7 program has to be loaded to the PLC. In our case, this is done from the 'SIMATIC Manager'. There, in the folder 'Blocks', highlight 'OB1' and the FCs 'FC1' and 'FC2'

and click on Load $\overset{\bullet}{\mathbf{D}}$. The key switch of the CPU should be on STOP! (\rightarrow SIMATIC Manager \rightarrow Blocks \rightarrow OB1 \rightarrow FC1 \rightarrow FC2 \rightarrow $\overset{\bullet}{\mathbf{D}}$)



28. By setting the key switch to RUN, the program is started.

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