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

MODULE D12

PROFIBUS DP with

Master CP 342-5DP / Master CP 342-5DP

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

PAGE:

1.	Forward	4
2.	Notes for the Operation of CP 342-5DP	6
3.	Commissioning the Profibus (Master CP 342-5DP / Master CP 342-5DP)	7

The following symbols stand for the specified modules:



1. FORWARD

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Learning goal:

In this module, the reader should learn how a FDL connection to a PROFIBUS DP with two SIMATIC S7-300 with the communication processor CP 342-5DP as a master is taken into operation. 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)

Forward	Notes	Commission

Required hardware and software

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- 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 with option NCM S7 PROFIBUS
- 3 MPI- Interface for the PC (e.g. PC- Adapter)
- 4 PLC SIMATIC S7-300 with the CP 342-5DP Example configuration:
 - Power supply: PS 307 2A
 - CPU: CPU 314IFM
 - PROFIBUS- Communication processor: CP 342-5DP
- 5 PLC SIMATIC S7-300 with the CP 342-5DP Example configuration:
 - Network: PS 307 2A
 - CPU: CPU 314IFM
 - PROFIBUS- Communication processor: CP 342-5DP
- 6 PROFIBUS cable with 2 PROFIBUS slots



6 PROFIBUS cable

Forward	Notes	Commission

i

2. NOTES FOR THE OPERATION OF THE CP 342-5DP

The PROFIBUS communication processor CP 342-5DP makes it possible to attach to itself the SIMATIC S7-300 by the PROFIBUS with the protocol profile distributed I/O (DP).

The parameterizing of the PROFIBUS parameters for the PLC, such as the configuration of the PROFIBUS network, takes place with the software STEP 7. The requirement is the CP342-5DP and additionally the software "NCM S7 PROFIBUS " (Contained already in STEP 7 V5.x!), so that the user has a uniform configuration tool for centralized and distributed configuration.

For the SIMATIC S7-300 with the CP342-5 as a Combimaster, the following protocol profiles are at your disposal:

- DP- Interface as master or slave according to EN 50170. PROFIBUS-DP (Distributed I/O) is the protocol profile for the connection of the distributed I/O/field equipment with a quick reaction time.
- SEND/RECEIVE- Interface (AG/AG) according to the SDA-Service (Layer 2 of the PROFIBUS). SEND/RECEIVE (FDL- Interface) offers functions with which the communication between SIMATIC S5 and S7 are under one another and they can simply and quickly be realized to the PC.
- S7-Functions. These offer optimal communication in the SIMATIC S7/M7/PC-connection.

On the part of the user program, the transmission of the data range for the DP and FDL communication is activated through programmed FC-Block calls and monitoring of effective execution monitored. The block calls for the important communication FC blocks are found in the library **"SIMATIC_NET_CP"**. In order to use these functions, the function must be copied into the project.



Note: Here 2 SIMATIC S7-300 with the CP 342-5DP are appointed to a PROFIBUS. Both should be masters on the network and should communicate with each other over a

FDL connection.

It would also be possible to assign each master a pair of slaves at the same time.

The FDL connection enables a program controlled communication between 2 stations by the PROFIBUS with the following properties:

- The data transfer is bi-directional, e.g. it can send and received on the AG/AG connection simultaneously.
- Both stations are asynchronous, e.g. each station can activate a send and receive operation which is result dependent.
- The CP342-5 can operation a maximum of 16 connections. It can send and receive 240 bytes pro job.

Forward	Notes	Commission

3. COMMISSIONING THE PROFIBUS (MASTER CP 342-5DP / MASTER CP 342-5DP)



In the following example, the commissioning of a multi master system with two SIMATIC S7-300 with CP 342-5DP as a master is described.

For the testing of the configuration, a program will be written in which an input (SET) can be preset in each PLC. This byte is transferred over the PROFIBUS to the other PLC and can then be displayed over a display byte (DISPLAY).

Assignment list Master- CPU1:

IB 124	SET	Input byte
IB 40	Comm_IB1	Input communication Byte1
QB 124	DISPLAY	Display byte
QB 40	Comm_QB1	Output communication Byte1

Assignment list Master- CPU2:

IB 124	SET	Input byte
IB 40	Comm_IB1	Input communication Byte1
QB 124	DISPLAY	Display byte
QB 40	Comm_QB1	Output communication Byte1

For the connection of the two CPU342-5DP, whereby one is set as a master and the other as a slave, the following steps must be followed.



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



Forward	Notes	Commission	

2.



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

SIMATIC Manager					
<u>File</u> PLC <u>V</u> iew <u>Options</u> <u>W</u> indow <u>H</u> elp					
<u>N</u> ew	Ctrl+N				
'New Project' Wigard	CMLO				
Open Version 1 Project	CUI+O				
67 Marray Card					
Memory Card File					
Delate		-		-	
<u>D</u> elete Beorganize					
Manage					
Archive					
Retrieve					
Page Setup					
Labeling fields					
P <u>r</u> int Setup					
1 tester (Project) C:\Siemens\Step7\S7proj\tester					
<u>2</u> Convert (Project) C:\Siemens\Step7\S7proj\Convert					
3 Testproject_FB (Project) C:\Siemens\Step7\S7proj\Testpr_1					
4 Testproject_DB (Project) U:\Siemens\Step7\57proj\Testproj			- 1		
Exit	Alt+F4				4
Creates a new project or a new library.					

3. Give the Name CP342_FDL to the project (\rightarrow CP342_FDL \rightarrow OK)

ew		×
User projects Librar	ies	
Name	Storage path	▲
Abschervorrichtung Convert CP342_CP342 CP342_CP342 CPU315_CPU315 Cutting apparatus Cutting apparatus Cutting apparatus ET200L	C:\Siemens\Step7\S7proj\ABS C:\Siemens\Step7\S7proj\Cp3 C:\Siemens\Step7\S7proj\Cp3 C:\Siemens\Step7\S7proj\Cp3 C:\Siemens\Step7\S7proj\Cp4 C:\Siemens\Step7\S7proj\Cu4 C:\Siemens\Step7\S7proj\Cu4 C:\Siemens\Step7\S7proj\Cu4 C:\Siemens\Step7\S7proj\Cu4	SCHERV nvert 342_cp 342_1 J315_c ting_2 ting_ test 00I ▼
Na <u>m</u> e:		<u></u>
CP342_FDL		Project 💌
torage location (path) C:\Siemens\Step7\S7	: 'proj	<u>B</u> rowse
OK	Cance	Help

Forward	Notes	Commission



4. Highlight your project and insert a **PROFIBUS Subnet** (\rightarrow CP342_FDL \rightarrow Insert \rightarrow Subnet \rightarrow PROFIBUS).

SIMATIC Manager - CP3	42_FDL	_ 🗆 ×
<u>File Edit Insert</u> PLC <u>V</u> iew	Options Window Help	
D 🗃 Station	No Filter >	💽 🏏 🔡 🗟
Subnet		
	3 Industrial Ethernet	
S7 Software	4 PTP	
NZ Software	MBI(1)	
Symbol Lable External Source		
Egenaroodios	-	
, Inserts PROFIBUS at the cursor p	osition.	

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



Forward	Notes	Commission

6.



Change the name of the station to **Master1** (\rightarrow Master1).

SIMATIC Manager - CP342_FDI	- Nündenu Hele			
			lo Filter >	<u> </u>
CP342_FDL C:\Siemens\Ste	p7\S7proj\Cp342	_fd		
⊞-∰ CP342_FDL	MER MER MPI(1)	PROFIBUS(1)	Master1	
Press F1 to get Help.				

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

SIMATIC Manager - CP342_FDI File Edit Insert PLC View Optior	s <u>W</u> indow <u>H</u> elp	
	. 🗣 📲 🔚 📰 💼 < No	Filter > 🔽 🎦
EP342_FDL C:\Siemens\Ste	p7\\$7proj\Cp342_fd	
□-∰ CP342_FDL └-∰ Master1	Uû j Herdware	
Press F1 to get Help.		

Forward	Notes	Commission



8. Open the hardware catalog with a click on the symbol (\rightarrow) . 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 configuration of your hardware configuration are made available.

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

🖳 HW Config - Master1									_ 🗆 ×
Station Edit Insert PLC View O	ptions <u>W</u> indow <u>H</u> elp								
		i 🖭 🛛							
Master1 (Configuration) CP:	342_FDL						Profile S	Standard	•
(0) UR (1	Drder number	Firmware	MPI address	l address	Q address	Comment 		ROFIBUS DP ROFIBUS-PA INATIC 300 C7 CP-300 CPU-300 Gateway IM-300 M-7-EXTENSION M-7-EXTENSION RACK-300 RACK-300 IMATIC PC Based Control IMATIC PC Station	1 300/400
							6ES7 390 Available	0-1???0-0AA0 in various lengths	₹₹
Insertion possible									Chg //

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

Forward	Notes	Commission



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

₽ H₩ Config - Master1									_ 🗆 ×
Station Edit Insert PLC View	v Uptions Window Help	981 M21							
Master1 (Configuration)	CP342_FDL						Profile	Standard	
Image: constraint of the second sec	Order number 6ES7 307-1BA00-0AA0	Firmware	MPI address	I address	Q address	Comment		Standard PROFIBUS DP PROFIBUS PA SIMATIC 300 C7 C7-300 CPU-300 FK-500 Gateway IM-300 PS-300 PS-300 PS-300 PS-300 PS-307 2A PS-307 2A PS-307 5A SIMATIC 400 SIMATIC PC Based Contro SIMATIC PC Station	1 300/400
9							1		
							6ES7 3 Load st VDC / 3	07-18A00-0AA0 upply voltage 120/230 VAC 2 A	: 24 £ <u></u>
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.

Forward	Notes	Commission	



10. In the next step, we drop the CPU 314IFM 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 314IFM \rightarrow 6ES7 314-5AE03-0AB0 \rightarrow V1.1).

larterT (Configuration)	CP342_FBL						Dette Served
DO 34He							MOMPAULOP MOMPAULOP MANULOP MANULOP
- 22							
<u></u>	Incom	- 16	Last server	Tum	10 atten	1-	657 314 54800 - 10 V18
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	2016 0.000 0012 30 3640-0440 0012 70 5640-0440	(11)	kill admire	Latine 101 TR	(Kather Re.ux	Connet	H G G T 314 (420)
An an Anana An Anana An A	206 0.000 011 32 3640.000 012 21650.00020	10000	ANT admos	Lation: 131-138	U. athen Die . UR	Conner	H REFTANCE
energi eta seni la fos seri fos la fos seri fos la fos seri fos republicada estas	ETS STATUTORS	(firmes	All admor	latine 11/12) (Lather Dá (13)	Const	
en in an I to array (Post areas	Enternanter 9117373600000 9127373600000	(m	All admos) 4489-00 0.11-11-12	li ather Dá 125	Connet	ETT 314 SEC0 VID
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	200 outer 901730 Stational 901723 Stational	france.	All admor	father 13.12	U4,13	Connet	 EST 314 SE20 V10 V10 EST 314 SE20 <
	Sciences (C1) 35 (Editoria) (C1) 25 (Editoria)	frees.	All almor) attern 132-128	Rather Ug.tab	Connet	E37314 9420 V10 V12 U12 U
	Schemather 921132354200441 92273554200488	frees.	Alf attract	lation 13172	(K attac		E37314 9420 V10 V10 V10 V10 E37314 9420 E 237314 9420 E 237314 9420 E 237314 9420 E 237314 9420 E 207314 9420 E 207316 E 20731 E 2073 E 20731 E 2073 E 2073 E 20731 E 2073 E 207 E 2073 E 2073 E 2073 E 207 E



Note:

The addresses of the integrated in-/outputs by the CPU314IFM can be read into the hardware configuration. However, they are directly on the CPU. They are the digital inputs IB124 and IB125 such as I126.0-I126.3. The digital outputs have the addresses QB124 and QB125. The analog inputs are found on PIW128, PIW130, PIW132 and PIW134. The analog output is found on PQW128.

Forward	Notes	Commission



11. Then we drag the communication processor for the PROFIBUS **CP 342-5DP** onto the fourth slot. Now the order number and version of the model can be read off the front (\rightarrow SIMATIC 300 \rightarrow CP-300 \rightarrow PROFIBUS \rightarrow CP 342-5DP \rightarrow 6GK7 342-5DA01-0XE0 \rightarrow Product Version 2).

HW Config - Master1							
<u>Station Edit Insert P</u> LC <u>V</u> iew <u>O</u> ptio	ns <u>W</u> indow <u>H</u> elp						
) 🔬 🛍 🗖 🖺 🐮	▶?					
Master1 (Configuration) CP342	_FDL						Profile Standard
Image: CPU 314 IFM Image:	rder number \$7 307-18A00.0AA0 \$7 314-5AE03.0AB0	Firmware V1.1	MPI address 2	1 address 124135	Q address 124129	Comment 	Image: Statute of the statute of th
							x
							6GK7 342-5DA01-0XE0 PROFIBUS CP: DP protocol with Sync/Freeze, SEND-RECEIVE interface, S7 communication ↓
Press F1 to get Help.							Chg //,



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



12. By the entering of the communication processor, the following window appears, in which you assign a PROFIBUS address to the CPU 342-5DP 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** (→ 2 → PROFIBUS(1)).

Properties - PROFIBUS	interface CP	342-5 (R0/S4)	×
General Parameters			
<u>A</u> ddress:	2 💌	If a subnet is selected the next available add	l, Iress is suggested.
Highest address: 126			
Transmission rate: 1.5 M	bps		
Subnet: not networked IPROFIBUS(1)		1.5 Mbos	<u>N</u> ew P <u>r</u> operties Dejete
OK		Abbr	echen Hilfe

13. 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			×
General Network Settings			
Highest PROFIBUS Address:	126 🔽 🗖	<u>Opt</u>	ions
Iransmission Rate:	45.45 (31.25) Kbps 93.75 Kbps 187.5 Kbps 500 Kbps 1.5 Mbps 3. Mbps		
Profile:	DP Standard Universal (DP/FMS) User-Defined	<u>B</u> us Pa	rameters
OK		Abbrechen	Hilfe

Forward	Notes	Commission	



 Now the addresses of the communication processor in the I/O address space of the CPU are noted (Here: PI 256...271 / PQ 256..271). Choose the properties of the communication process through a double click on the 'CP 342-5DP' (→ CP 342-5).

Master1 (Cardigeration)	- 69962,100						Failer Streited	- 2
	- 		È				PROFESSION PROFESSION	ADD-DIE ADI DE Wears 1 Webbel ADD-D-E
Shi C Rona	Contra manifest	Treese	1 and address	Tablers	I mathews	Deret	HTESTENSEN	
1 PS 307 26	10 57 207 10400 DAAD	1.1.5	1	154.134	114.119	1	E 1 F1-300 E 1 FACX-300	
100 - 100 -	AND THE OWNER AND A MARKED AND A		1	144.146	101.101		# 1 5W 300	
COUSIANN				the second se			2 2 P P P P P P P P P P P P P P P P P P	
00305	HAT KEENITALE		9	24.57	in m	5	EINATIC PE Baned Lone to B	10400
10030H	NAT NET AN ALL		9/	24.57	er n		SIMILIC PE Sand Lower 3	17400
	NAT NET AT ALL		2/	25.37	P=-01		SMATIC PC Band Evenu 3 SMATIC PC Sales	17400
2 200 marin 3 4 2 07 marin 5 5 10	1947 X 2 447 A43		97 	24.57	PRD1		SHATICPC Band Loves a	15/40)

15. Set the Operation Mode to DP master and accept with OK (\rightarrow Operation Mode \rightarrow DP master \rightarrow OK).





16. The configuration table is saved and compiled now with a click on \square . Then the hardware configuration is closed with a click on \mathbf{x} ($\rightarrow \square \rightarrow \mathbf{x}$).

۵Ļ	H₩ Config - Master1							
<u>S</u> t	ation <u>E</u> dit <u>I</u> nsert <u>P</u> LC ⊻ie	w <u>O</u> ptions <u>W</u> indow <u>H</u> elp						
) 🚅 🔓 🖳 🚇		뫲 💦					
	Master1 (Configuration)	CP342_FDL						Profile Standard 💌
				aster system (180)				PROFIBUS DP PROFIBUS PA PROFIBUS PA SIMATIC 300 P - C7 C - C7
	Slot Module	Order number	Firmware	MPI address	address	0 address	Comment	
1	1 PS 307 2A	6ES7 307-1BA00-0AA0						🗄 🚞 PS-300
1	2 CPU 314 IFM	6ES7 314-5AE03-0AB0	V1.1	2	124135	124129		⊞ RACK-300
1	3 4 484 CP 2425	CCK7 242 ED A01 (MED	_	2	25C 271	256 271		SIMATIC 400
11	5	OUNY 342-30 AOTHOREO	_	5	230271	230271		SIMATIC PC Based Control 300/400
1	6							- 🖳 SIMATIC PC Station
1	7							
11	8							
11	3 10							
11	11							
								SGK7 342-5DA01-0×E0 PROFIBUS CP: DP protocol with Sync/freese, SPIO-PECEVE interface, S7 communication
Ins	ertion possible							Chg //

Forward	Notes	Commission	



17. Now in **SIMATIC Manager** enter an additional **SIMATIC 300-Station** (\rightarrow SIMATIC Manager \rightarrow Insert \rightarrow Station \rightarrow SIMATIC 300-Station).

SIMAT	IC Manager - CP3	42 FDL			
<u>File</u> <u>E</u> dit	Insert PLC View	<u>O</u> ptions <u>W</u> indow <u>H</u> elp			
nei	Station	1 SIMATIC 400 Station		< No Filter >	V 186
	Sub <u>n</u> et	2 SIMATIC 300 Station			
E CP342	<u>P</u> rogram	<u>3</u> SIMATIC H Station <u>4</u> SIMATIC PC Station			
	S7 Soft <u>w</u> are	5 Other station			
±	S7 <u>B</u> lock M7 Software	6 SIMATIC S5			
		<u>7</u> PG/PC	MFI(I)	FNUFIBUS(I)	
	Symbol Table				
	Egremai source				
Inserts SIM/	ATIC 300 Station at th	e cursor position.			

Forward	Notes	Commission



18. Change the name of the station to **Master2** (\rightarrow Master2).



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



Forward	Notes	Commission	



20. Open the hardware catalog with a click on the symbol (\rightarrow) 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 configuration of your hardware configuration are made available.

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

HW Con Station Edi	fig-Master2 t Insert PLC View C	lations Window Help						
		R M M R 7	8 № ?					
Master	2 (Configuration) CP	342_FDL						Profile Standard
■ 0 UR 1 2 3 4 5 6 7 8 9 10 10 10 10 10 10 10 10 10 10	(0) UR Module	Dider number	Firmware	MPI address	address	Q address	Comment	(14) USA DATE (14) US
5								
<u>6</u> 7								
8								
10								
						I		
								EES7.390-1???00AA0 Available in various lengths
ľ.								

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

Forward	Notes	Commission



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

	HW Config - Master2									_ 🗆 ×
St	ation <u>E</u> dit <u>I</u> nsert <u>P</u> LC <u>V</u> iew I	<u>0</u> ptions <u>W</u> indow <u>H</u> elp								
) 🗲 🐂 🖉 🗎 🖻		58 №							
	Master2 (Configuration) CF	9342_FDL						Profile	Standard	•
	(0) UR (0) U	Order number EES7 307-18A00-0AA0	Firmware	MPI address	1 address	Q address	Comment		Table BUS DP PROFIBUS-PA IMATIC 200 CP-0300 CPU-300 Geteway IM-300 Geteway IM-300 FN-300 Geteway IM-300 PS 307 5A PS 307 7A PS 307 7A PS 307 7A RACK-300 SM-300 SMATIC 400 IMATIC PC Station	300/400
	6									
	7							1		
	9									
	10									
								6ES7 30 Load sup VDC / 2	7-18A00-0AA0 ply voltage 120/230 VAC: A	24 ح ز



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



22. In the next step, we drop the CPU 314IFM into the second slot. This allows for the part number and version of the CPU to be read off the front (\rightarrow SIMATIC 300 \rightarrow CPU-300 \rightarrow CPU 314IFM \rightarrow 6ES7 314-5AE03-0AB0 \rightarrow V1.1).

Inga.	- CP-342_F04						Billio Standard
0.023489							= 100ATC 300 = 20 CT = 20 0000
							응
							⇒ QPU 201 (1) → QPU 202 (1) → QPU 202 (2) → QPU 201 (2) → QPU 201 (2
							0 - CPUSAL 0 - CPUSA 0 - CPUSA 0 - CPUSA 0 - CPUSA 0 - ST 0 - ST
fiilitii							815731#5 815731#5 00 515731#5
Hobe	Onder russien	Ferries	NO antisis	(manaliz	Q summer	(Correct)	
and the second s	HES7 XX IS AN OAAII HES7 XX A SETTOATO	V1.1	1	36.12	120.129		# 🔁 8257 3145
CPU N4FW		-					H 2 8557 3145
CPU 314 FM							E CPUINDIDE
CAR N 1 EW		-	-	-			The second
CAT 114 EW				-			E CFU 2/5
CATA SU							3 (1) CPU30520P 3 (1) CPU30520P 3 (1) CPU30520P
CPU 314 EM							3) (20) CFU205 3) (20) CFU20520F 3) (20) CFU20520F 3) (20) CFU20520F 3) (20) CFU20520F 3) (20) CFU20520F 3) (20) CFU20520F 3) (20) CFU20520F
CPU 314 EM							 a) a) OU35 b) a) OU3520F b) a) OU3520F c) OU354
CPU TA EM							3 (2) CFU 3/5 3 (2) CFU 3/5 3 (2) CFU 3/5 20/ 3 (2) CFU 3/5 3



Note: The addresses of the integrated in-/outputs by the CPU314IFM can be read into the hardware configuration. However, they are directly on the CPU. They are the digital inputs IB124 and IB125 such as I126.0-I126.3. The digital outputs have the addresses QB124 and QB125. The analog inputs are found on PIW128, PIW130, PIW132 and PIW134. The analog output is found on PQW128.

	Forward	Notes	Commission



23. Then we drag the communication processor for the PROFIBUS **CP 342-5DP** onto the fourth slot. Now the order number and version of the model can be read off the front (\rightarrow SIMATIC 300 \rightarrow CP-300 \rightarrow PROFIBUS \rightarrow CP 342-5DP \rightarrow 6GK7 342-5DA01-0XE0 \rightarrow Product Version 2).

	HW Config - Master2							
<u>S</u> t	ation <u>E</u> dit Insert <u>P</u> LC ⊻iew <u>O</u> p	ptions <u>W</u> indow <u>H</u> elp						
			22					
	Master2 (Configuration) CP3	42_FDL						Profile Standard
-	0) UR 1 PS 307 2A 2 Fl CPU 314 IFM 3 4 5 6 7 7 8 9 9 10 10 10 10 10 10 10 10 10 10	Order number EES7 307-18A00-0AA0	Firmware	MPI address	I address	Q address	Comment	Value Value <td< th=""></td<>
11	2 CPU 314 IFM	6ES7 314-5AE03-0AB0	V1.1	2	124135	124129		H- RAUK-300
11	3							SIMATIC 400
11	5							SIMATIC PC Based Control 300/400
11	6							SIMATIC PC Station
11	7							
11	8							
11	9							
	11							·
								GSK7 342-5DA01-0XE0 PROFIBUS CP: DP protocol with Symc/Freeze, SEND-RECEIVE interface, S7 communication ✓
Pre	ess F1 to get Help.							Chg //



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	



24. By the entering of the communication processor, the following window appears, in which you assign a PROFIBUS address to the CPU 342-5DP and must already choose the first PROFIBUS net ($\rightarrow 4 \rightarrow \text{PROFIBUS}(1)$).

Properties - PROFIBUS interface CP 342-5 (R0/S4)	×
General Parameters	
Address: 4	
Highest address: 126	
Transmission rate: 1.5 Mbps	
Subnet	
not networked	New
PROFIBUS(1) 1.5 Mbps	
	Delete
	Abbrechen Hilfe

Forward	Notes	Commission



25. Now the addresses of the communication processor in the I/O address space of the CPU are noted (Here: PI 256...271 / PQ 256..271). Choose the properties of the communication process through a double click on the 'CP 342-5DP' (→ CP 342-5).

dustant.	21						
P 29304	4		1				Honorov H
200 49 500	up concern		1	12.52			= 1 N-303
HIS MIC DA	9-17-32-1640U0441	Tremen	MT attract	Later	St athen	Canad	E 2 P3.000
CPU 314944	97 47 214 5x505-Qub0	AU3.	1	124,128	104,108	-	H ALCE 300
1 17 14 1	NEET NORTHING OT		1	256.271	251.271		SHATE RO
		-				-	SAMATICPC Parent
		_		-	-	-	
			-		1	-	
60 L			-	-	-	-	
1							

26. Set the Operation Mode to DP master and accept with OK (\rightarrow Operation Mode \rightarrow DP master \rightarrow OK).



Forward	Notes	Commission	



27. The configuration table is saved and compiled now with a click on \square . Then the hardware configuration is closed with a click on $\boxed{\mathbf{x}}$ (\rightarrow \square).

	HW Config - Master2							
<u>S</u> t	ation <u>E</u> dit <u>I</u> nsert <u>P</u> LU ⊻iew Nia⊇l≅~, IBIIB oil ∠≣xI B	Uptions Window Help	<u>88</u> N 2					
	Master2 (Configuration) C							
	(i) (i) (i) (i) (i) (i) (i) (i) (i) (i) (i) (i) (i) (i) (i)				1	10.000	1.5	totele Standard Image: Standard Image: Standard Image
	Slot Module	6ES7 307-1BA00-0AA0	Firmware	MPI address	I address	Q address	Comment	main M7-EATENSION main PS-300
	2 CPU 314 IFM	6ES7 314-5AE03-0AB0	V1.1	2	124135	124129		E = E RACK-300
	3 4 CP 342-5	6GK7 342-5DA01-0XE0		3	256271	256271		I I I I I I I I I I I I I I I I I I I
	5							SIMATIC PC Based Control 300/400
	6 7							
	8							
	9							
	11							
	utico possible							GGK7 342-5DA01-0×E0 PROFIBUS CP: OP protocol with Sync/Freeze, SEND-RECEIVE interface, S7 communication
Ins	ertion possible							Chg //

Forward	Notes	Commission



28. So that both CPUs can be exchanged over the PROFIBUS and the FDL connection data, one must first open the folder **Connections** in either of the stations (here **Master1**) with a double click in **SIMATIC Manager** (→ SIMATIC Manager → Connections).



29. Then the tool **NetPro** is opened. Here we have a good summary about the linking network of the available components from the MPI and PROFIBUS. One of the CPUs is already chosen so now we must click on the menu command **Insert New Connection** (→ Insert → New Connection).

NetPro - [CP342_FDL	(Network) C:\Sier PLC ⊻iew Options	nens\Step7\S7pro	j\Cp342_fd]	×
🖻 🖬 🎒 🥭 Netv	ork Objects Ctrl+G	/ 🖉 🗈 !	▶?	
MPI(1)	Connection Ctrl+N	-	1	<u> </u>
	laster system			
PROFIBUS(1) PROFIBUS				
Master1		Master2		
CPU CP 314 IF 342-5		CPU CP 314 IF 342-5		
		M .		
2 2		2 4		
•				▼
Local ID	Partner ID	Partner	Туре	<u> </u>
				▼ ▶
Inserts a new connection in t	ne connection table.			0 from 0 selected Insert Chg //

Forward	Notes	Commission



30. The other station Master2 is chosen as a connection partner with the other inserted CPU 314IFM. The connection type is **FDL connection** (\rightarrow Master2 \rightarrow CPU 314 IFM \rightarrow FDL connection \rightarrow OK)

In	sert New Connect	tion 🗙					
	Connection Partner						
	<u>S</u> tation:	Master2					
	<u>M</u> odule:	CPU 314 IFM					
	Connection						
	<u>T</u> ype:	FDL connection					
	Display properties dialog						
	OK	Apply Cancel Help					

31. Out of the connection table, the ID of both connection partners is read off (Here both are set to 1). Now save and compile the connection table with a click on (\rightarrow) ($\rightarrow)$).

NetPro - [CP342	_FDL (Network)C nsert PLC View Op	<mark>\Siemens\Step7\S7</mark> p ions Window Help	oj\Cp342_fd]		_ 🗆 ×
		Ø Ø Ø 🗈 !	<u></u>		
MPI(1) <mark>Save an</mark> MPI	nd Compile		1		-
PROFIBUS(1	1)				
PROFIBUS	•				
Mast	ter1	Master2			
SIIII CPU 314 IF	CP 342-5	CPU CP 314 IF 342-5			
2	2	2 4			
					•
Local ID	Partner ID	Partner	Туре		
0001 A000	0001 A000	Master2 / CPU 31	FDL connection		
					_
•					
Saves and generates s	ystem data for the curren	t network.		X 70 Y 1	Insert Chg //

For	ward No	otes	Commission





32. Choose the compile option **Compile and check everything** (\rightarrow Compile and check everything \rightarrow OK).

Save and Compile	×
Compile	
Compile and ch	ieck <u>e</u> verything
C Compile change	es <u>o</u> nly
ΠΚ	Cancel Help

33. The following windows with the warning and error messages is closed with \mathbf{x} (\rightarrow \mathbf{x}).



Forward	Notes	Commission	



34. From the **SIMATIC Manager**, open the block **OB1** for the **Master1** with a double click (\rightarrow OB1).

SIMATIC Manager - CP342_FD	-		
<u>File Edit Insert PLC View Option</u>	is <u>W</u> indow <u>H</u> elp		
		📘 🔄 🛛 🕹 🕹	
CP342_FDL C:\Siemens\Ste	p7\S7proj\Cp342_fd		
CP342_FDL Master1 CPU 314 IFM Sources Blocks CPU 342-5 Master2 Master2 Master2 CPU 314 IFM CPU 314 IFM CPU 314 IFM CPU 314 IFM CPU 314 IFM	System data	061	
Press F1 to get Help.			

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

Properties - Organization	Properties - Organization Block 🛛 🗙						
General - Part 1 General	- Part 2 Calls Attributes						
<u>N</u> ame:	081						
<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\Cp342_fd						
	Code	Interface					
Date created: Last modified:	07/02/2001 03:03:43	15/02/1996 04:5	i1:12				
C <u>o</u> mment:	"Main Program Sweep (Cycle)"		<u></u>				
			7				
OK			Cancel	Help			

Forward	Notes	Commission	

i

On part of the user program, the transmission of the data range for the FDL ommunication is activated through the programmed FC block call and the effective execution is monitored.

The block calls for the important communication FC blocks are found in the library "SIMATIC_NET_CP". In order to use these functions, the functions must be copied into the project.

The FC block **AG-SEND** assigns data to the PROFIBUS-CP for the transmission over a configured FDL connection.

The indicated data range can be an I/O range, a bit memory address area, or a data block area.

The error free execution is signaled when the whole FDL data range is transferred over the PROFIBUS DP.

For the calling of the FC block AG-SEND, the following parameters must be entered:

Name	Туре	Range of values	Comment		
ACT	BOOL	0, 1	By ACT=1, LEN bytes are sent out of the given FDL data		
			range with the parameter SEND.		
			By ACT=0, the status display updates DONE, ERROR		
			and STATUS.		
ID	INT	1, 2,16	Connection number of the FDL connection		
LADDR	WORD		Module start address (can be withdrawn from the		
			configuration table in STEP 7).		
SEND	ANY		Indication from the address and length of the FDL send		
			range (The address can refer to PA ranges, bit memory		
			address areas and data block areas).		
LEN	INT	1, 2,240	Display of the bytes, that should be sent with the job from		
			the FDL data range.		
DONE	BOOL	0: -	State parameters displayed if the execution is handled		
		1: New data	error free.		
ERROR	BOOL	0: -	Error display		
		1: Error			
STATUS	WORD		Status display		

Forwa	ard Note	s Commission	



The FC block **AG-RECV** accepts transferred data from the PROFIBUS-CP over a configured FDL connection.

The indicated data range can be an I/O range, a bit memory address area or a data block area. The error free execution is signaled, when the whole FDL data range is transferred over the PROFIBUS DP.

By the call of the FC block AG-RECV, the following parameters must be entered:

Name	Туре	Range of values	Comment		
ID	INT	1, 2,16	Connection number of the FDL connection		
LADDR	WORD		Module start address (Can be withdrawn from the configuration table in STEP 7).		
RECV	ANY		Indication from the address and length of the FDL send range (The address can refer to PA ranges, bit memory address areas and data block areas).		
LEN	INT	1, 2,240	Display of the bytes that would be accepted from the PROFIBUS-CP in the FDL data range.		
NDR	BOOL	0: - 1: New data	The mode parameter is displayed if new data is accepted.		
ERROR	BOOL	0: - 1: Error	Error display		
STATUS	WORD		Status display		

For	ward No	otes C	Commission



36. 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

Here the received data is read into network 1 as inputs from Master2 with the block AG_RECV. You can drop this block into your network from the Libraries of blocks in the catalog (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC6 AG_RECV)

In network 3, the sent data is written as outputs to the Master2 with the block AG_SEND. You can drop this block into your network from the Libraries of blocks in the catalog (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC5 AG_SEND)

Now save the OB1 block \fbox (\rightarrow \fbox).

le Edk Insert PLC Debug View Options	Window Help	نلج
) 🚅 🐂 🛃 🥶 🕹 👪 🎧 🗠 🗠	86월 🗇 66 전지 🚯 🛱 대상 이름다그는 🕺	
		A Jew rehurde
1 : "Main Program Sweep (Cycle)"		-B blocks
		FC blocks
ament:		SFB blocks
		SFC blocks
twork 1: Received data read in as i	nputs from Master2	Hubple instances
		ibraries
aaent:		🌌 🚺 Standard Library
		SIMATIC_NET_CP
CALL FC 6		🔅 🔁 CP 300
ID t=1	//ID of the connection to Master2(from Net-Pro)	- FB2 IDENT
LADDR :=W#16#100	//Module start address from the CP342-5DP	- 🖨 FB3 READ
RECV :=P#I 40.0 BYTE 1	//Address range for the inputs of Master2	- FB4 REPORT
NDR := M99.0	//Control bit	FB5 STATUS
ERROR := N99.1	//Error bit	
5141051=8095	//status word	
LEN :=Hugy	//Length of the received data in bytes	FBS UHLV
		Ch CD13 BHLY
twork 2 : User program		
anent:		
		- Ch FF2 DP PEC
L IB 40	//Download communication byte 1	FC4 DP CTB
T UB 124	//Itansfer into display byte	- CE FES AG SEN
5 10 144 T 08 40	//Load input byte	- FCS AG REC
1 QD 40	// Hanster to output communication byte 1	FC7 AG LOC
		FCB AG_UNL
	the backback Western	- 🚍 FC40 FTP_C0
twork s: sent data written as outpu	its to the master2	- FC41 FTP_S1
ament:		- 🕀 FC42 FTP_RI
		FC43 FTP_DI
CALL RC 5		- FC44 FTP_QU
ACT - TRUE		FC50 AG_6.SI
ID :=1	//ID of the connection to Master2(from Net-Pro)	
LADDR :=W#16#100	//Nodule start address of the CP342-5DP	
SEND := P#0 40.0 BYTE 1	//Address range for the outputs to the Master2	1 CP 400
LEN := 1	//Length of the data to be send in bytes	GRAPH?
DONE := M99.0	//Status bit	
ERROR := M99.1	//Error bit	89
STRTUS:=R095	//Status word	
		A6_SEND 7 CP_300
1: Error 2 Info		
1 to get Help.		Soffine Abs Nw 3 Ln 9 Inset D

Forward	Notes	Commission



Note: Here the master is connected with 1 byte input data and 1 byte output data over a CP342-5DP on slot 5 (Module start address decimal: 256/Hexadecimal 100). The input data should be in input byte IB40. The data should be written into the other master from output byte QB40.

1	
11	
41	12000
	The second

Interface of the CPU! (\rightarrow SIMATIC Manager \rightarrow Master1 \rightarrow)

SIMATIC Manager - CP342_F	DL				_ 🗆 ×
<u>File E</u> dit <u>I</u> nsert P <u>L</u> C <u>V</u> iew <u>O</u> pti	ions <u>W</u> indow <u>H</u> elp				
	🛍 🔍 💁 🖭		No Filter >	• 🏹 🔡 🕅 🕅	
CP342_FDL C:\Siemens\Sto	Download pj\Cp342_	fd			_ 🗆 🗡
CP342_FDL GPU 314 IFM GPU 314 GPU 314	Hardware	CPU 314 IFM	CP 342-5		
C Downloads current object to the PLC.					





38. From the **SIMATIC Manager**, open the block OB1 for the 'Master2' with a double click(\rightarrow OB1).

SIMATIC Manager - CP342_FI)L				_ 🗆 ×
<u>File Edit Insert PLC View Opti</u>	ons <u>W</u> indow <u>H</u> elp				
		🔄 🧱 🎹 🕒 🛛 🗠 No Filter	> <u>•</u>	<u> 7 20 10 10 10 10 10 10 10 10 10 10 10 10 10</u>	
CP342_FDL C:\Siemens\Ste	p7\S7proj\Cp342_	fd			_ 🗆 🗡
CP342_FDL		:			
E CPU 314 IFM	System data	081			
	-				
E I III CPU 314 IFM					
S7 Program(2)					
Blocks					
Press F1 to get Help.					

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

Properties - Organization	1 Block			×
General - Part 1 General	- Part 2 Calls Attributes			
<u>N</u> ame:	081			
<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\Cp342_	,fd		
D		Interface		
Date created: Last modified:	07/02/2001 03:03:43	15/02/1996 04:5	1:12	
C <u>o</u> mment:	"Main Program Sweep (Cycle)"		×.	
ОК			Cancel	Help



40. 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

Here the received data is read into network 1 as inputs from Master 2 with the block AG_RECV. You can drop this block into your network from the Libraries of blocks in the catalog (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC6 AG_RECV)

In network 3, the sent data is written as outputs to the Master2 with the block AG_SEND. You can drop this block into your network from the Libraries of blocks in the catalog (\rightarrow Libraries \rightarrow SIMATIC_NET_CP \rightarrow CP 300 \rightarrow FC5 AG_SEND)

Now save the OB1 block \fbox (\rightarrow \fbox).

LAD/STL/FBD - [OB1 CP342_FDL\Master2	ACPU 314 IFM]		_ [
$\underline{F}ile \underline{E}dit \underline{I}nsert P\underline{L}C \underline{D}ebug \underline{V}iew \underline{O}ptions$	<u>W</u> indow <u>H</u> elp		_16
		New network	
Bl : "Main Program Sweep (Cycle)"		FB blocks	
omment:		FC blocks	
		SFB blocks	
		E SFC blocks	
twork 1: Received data read in as i:	nputs from Masterl	Multiple instar	nces
mment:		Libraries	Libraru
			NET CP
CALL PC C			00
TD ·=1	(/ID of the connection to Masterl(from Net-Pro)		B2 IDENT
LADDR :=W#16#100	//Module start address of the CP342-5DP	F	B3 READ
RECV :=P#I 40.0 BYTE 1	//Address range for the inputs from Masterl		B4 REPO
NDR :=M99.0	//Control bit	- 🗗 Fi	B5 STAT
ERROR :=M99.1	//Error bit		B6 WRIT
STATUS:=MW95	//Status word		B8 USEN
LEN :=MU97	//Length of the received data in bytes		B9 URCV
			B12 BSE
			B13 BHC
work 2:User program			DIE DUT
ment:			615 FUI C1 ND C
			C2 DP B
I TD 40	Alter damme annunder einen hunten h		C3 DP D
L 15 40 T 0B 124	//Load input communication byte 1 //Transfer to display byte	F	C4 DP_C
L IB 124	//Load input byte		C5 AG_SI
T QB 40	//Transfer to output communication byte 1	- 🗗 FI	C6 AG_R
			C7 AG_U
			C8 AG_U
twork 3: Sent data is written as ou	tputs to Masterl		C40 FTP_
	•		C41 FTP_
mment:			042 FIP <u>.</u> 040 FTP
			C43 FIF_ C44 ETP
CALL FC 5			C50 AG I
ACT :=TRUE		P	C60 AG I
ID :=1	//ID of the connection to Masterl(from Net-Pro)	P La P	C62 C C
LADDR :=W#16#100	//Module start address of the UP342-5DP	🗄 💼 CP 40	00 -
LEN :=1	//Length of the data to be sent in bytes	B-M GBAPH7	
DONE :=M99.0	//Status bit		
ERROR :=M99.1	//Error bit		
STATUS:=MW95	//Status word		
		AG_SEND / CP	_300
-		<u> </u>	
		<u> </u>	
1: Error 2: Info			
			Income Let
 1 to get meip. 		Soffline Abs Nw 3 Ln 9	Jinsert JCh

Forward	Notes	Commission



Note: Here the master is connected with 1 byte input data and 1 byte output data over a CP342-5DP on slot 5 (Module start address decimal: 256/Hexadecimal 100). The input data should be in input byte IB40. The data should be written into the master from output byte QB40.

1	1	5
1		1
41	12000	1
	-	-m

41. The STEP 7- Program must now be downloaded into the PLC. In our case, this can be done from the SIMATIC Manager. There, highlight the folder Master2 and then click on download . The mode switch must be on STOP and the program equipment must be connected with the MPI-Interface of the CPU! (→ SIMATIC Manager → Master2 →)

Newson Without 1: Personnel fait lead in as fights fait Wattall Tagents Main K 2 D (4) (4) (4) (4) (4) (4) (4) (4) (4) (4)	C. Martin (44) Sector
Addment 1: Performed faits load in the ingents fills Barteni Tanana Tanana DD 01 // D of the summarities in Bartenilding Mod-des DD 00 // D of the summarities in Bartenilding Mod-des Main of Models (1997) (1997) (1997) Main (1997) (1997) (1997) (1997) (1997) Main (1997) (1997) (1997) (1997) (1997) (1997) Main (1997) (1997	Character Character Starster Shrap Starster Shrap Shart Character Shart Charac
All Andrew Constraints of the Constraint of Section 2010 (19) Addition of the Constraint of Section 2010 (19) Addition of the Constraint of the	Stanberlikkep
Hill K 1 (/D of the summation or Restalistics 200 (0) Mann (wWGAN100 (/DMANN process affords of the C/(4)-50 Marr (wWGAN100 (/DMANN process for the Sample for Restar) Marr (wWGAN100 (/DMANN process))	5 AV 17 100
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emick 9 i faur grogian	- 0 MH 80 - 0 MH 80
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L H H Pland light immediation light i 0 66 552 Pland light immediation light light i 1 16 554 Pland light immediation light light i 2 16 554 Pland light light immediation light light i 2 2 44 Pland light in light light immediation light light i	
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aantit .	
CALL PC 3 ACT > 100000 DC > 101000 ACD > 1010000 ACD > 1010000 ACD > 101000000000000000000000000000000000	

42. Through the switching of the mode switch to RUN, the program is started.

Forward	Notes	Commission