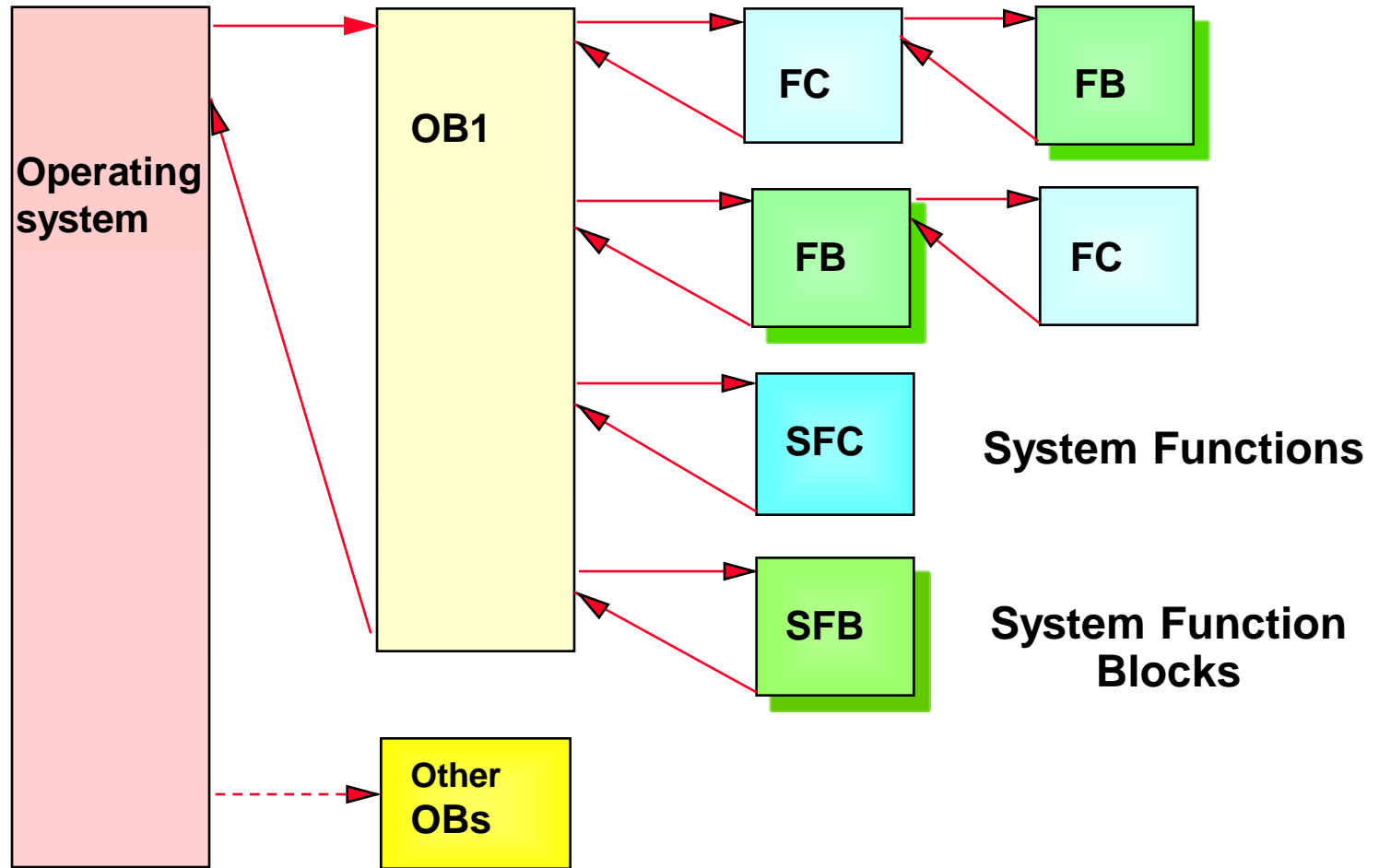


Organization Blocks (1)



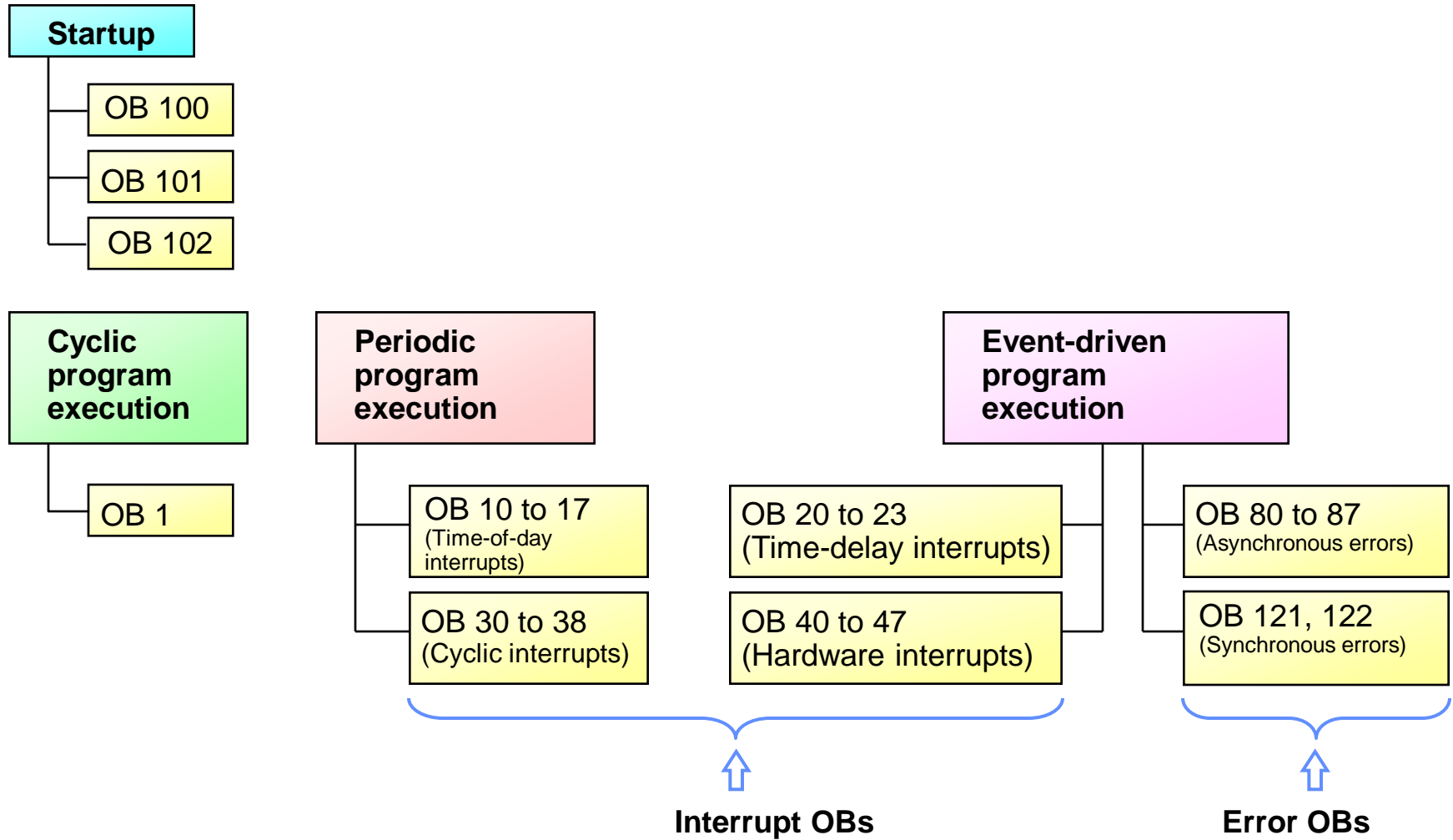
Objectives

Upon completion of the chapter the participant will ...

- ... know the purpose of temporary variables
- ... know the organization blocks that are available
- ... understand the difference between "Warm Restart", "Hot Restart" and "Cold Restart"
- ... be able to explain the principle of interrupt processing
- ... know the "Time-of-day Interrupt", "Cyclic Interrupt", "Hardware Interrupt" and "Diagnostic Interrupt"
- ... know and be able to use the error OBs
- ... be able to interpret the OB start information



Overview of the Organization Blocks



Startup OBs for Warm Restart and Hot Restart

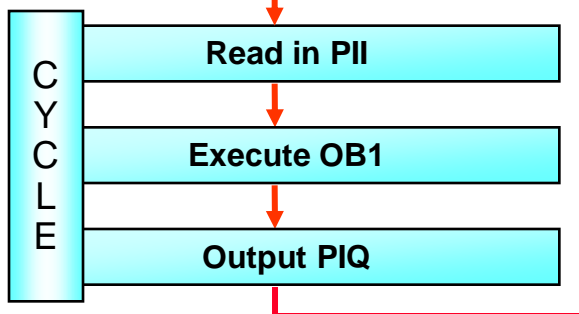
CPU in the STOP state
(Peripheral modules have switched all outputs to the save state)

Warm Restart		
automatic	manual	
S7-300 / 400	S7-300	S7-400
Power ON	STOP→RUN	STOP→RUN + CRST

Delete the process images, Non-retentive M, T, C

Execute OB 100

Output PIQ Enable outputs

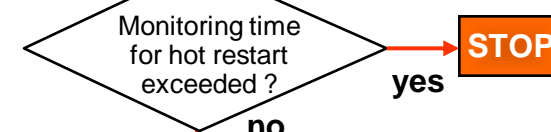


Hot Restart (only S7-400)	
automatic (→ HW Config)	manual
Power ON	STOP→RUN+WRST

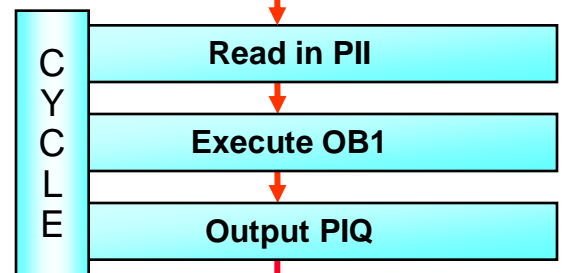
Execute OB 101

Process residual scan cycle

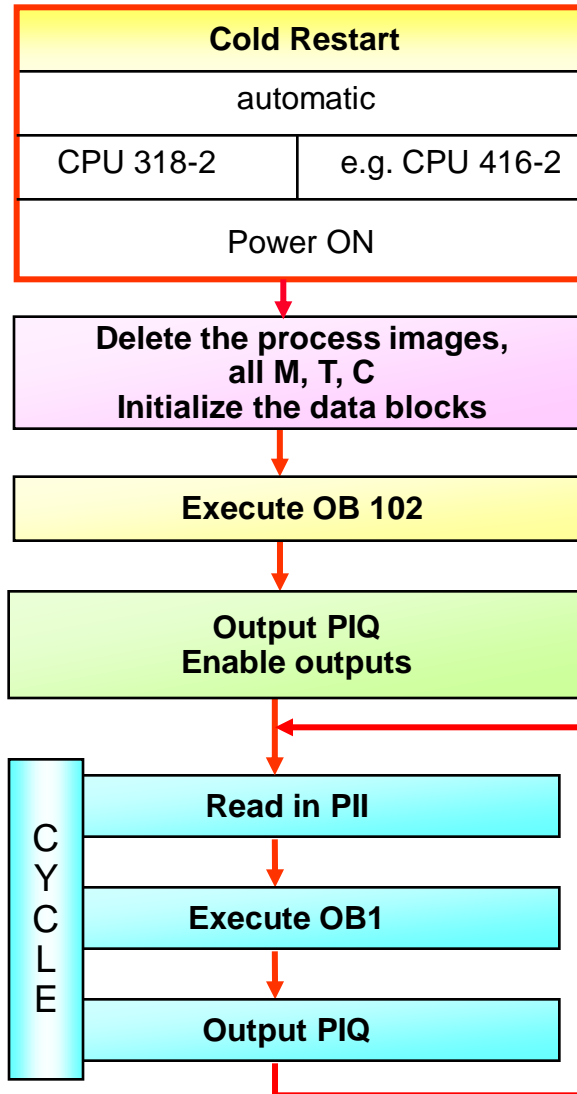
Delete PIQ (parameter-assignable)



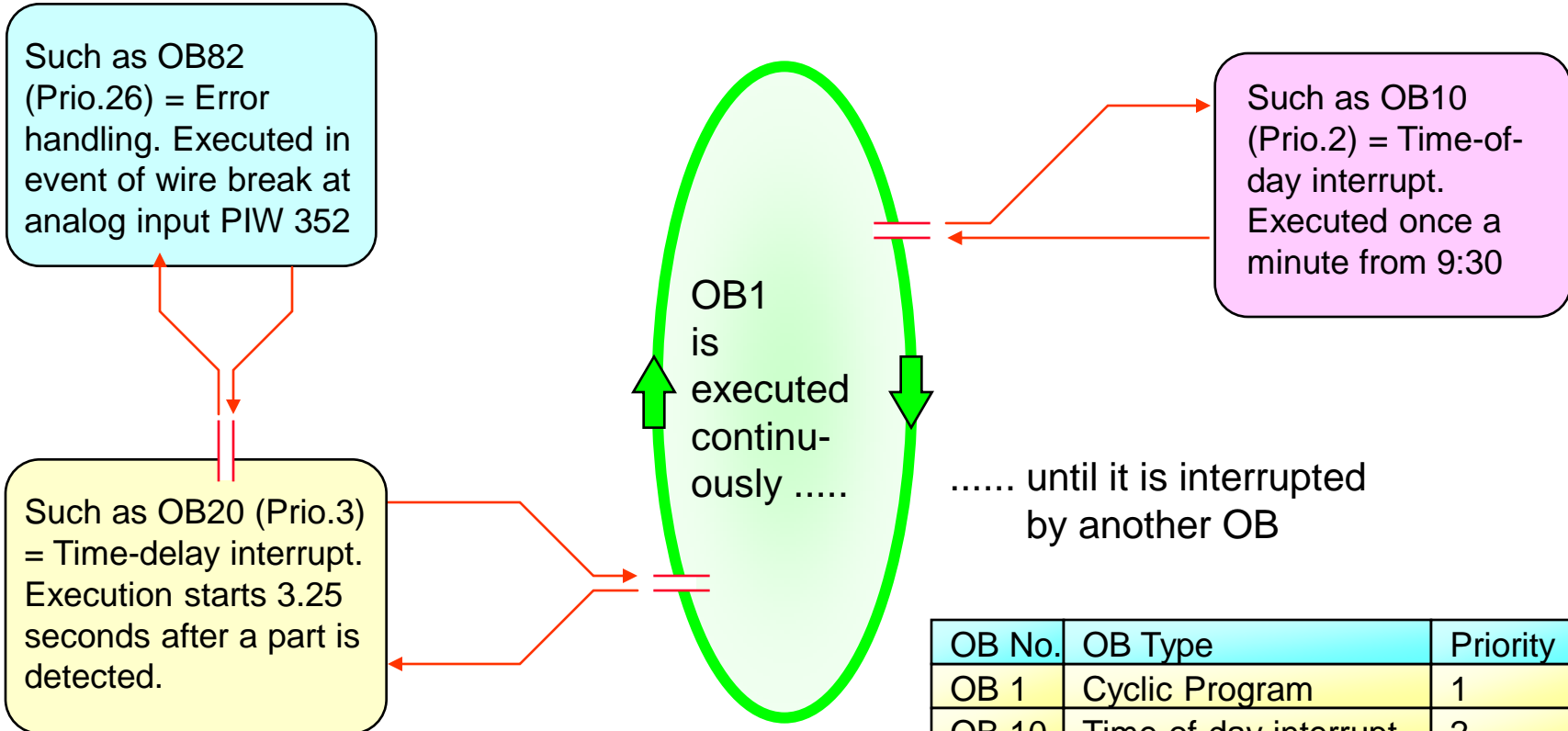
Output PIQ Enable outputs



Startup OB for Cold Restart



Interrupting the Cyclic Program



OB No.	OB Type	Priority
OB 1	Cyclic Program	1
OB 10	Time-of-day interrupt	2
OB 20	Time-delay interrupt	3
OB 35	Cyclic interrupt	12
OB 40	Hardware interrupt	16
OB 82	Error handling	25 / 28

Time-of-Day Interrupt (OB 10)

Properties - CPU 315-2 DP - (R0/S2)

General | Startup | Cycle/Clock Memory | Retentive Memory | Interrupts

Time-of-Day Interrupts | Cyclic Interrupt | Diagnostics/Clock | Protection | Communication

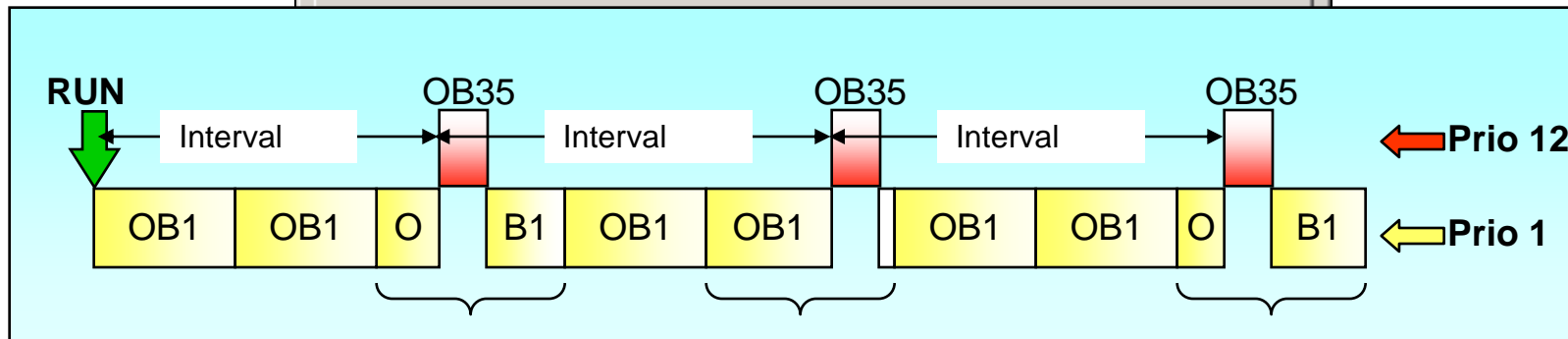
	Priority	Active	Execution	Start date	Time of day	Process image partition
OB10:	2	<input checked="" type="checkbox"/>	Every day	27.04.04	12:00	OB1-PA
OB11:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB12:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB13:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB14:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB15:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB16:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA
OB17:	2	<input type="checkbox"/>	None	01.01.94	00:00	OB1-PA

OK Cancel Help

Cyclic Interrupt (OB 35)

Properties - CPU 315-2 DP - (R0/S2)

General	Startup	Cycle/Clock Memory	Retentive Memory	Interrupts
Time-of-Day Interrupts	Cyclic Interrupt	Diagnostics/Clock	Protection	Communication
				Process image partition
	Priority	Execution (ms)	Phase offset (ms)	
OB30:	7	5000	0	OB1-PA
OB31:	8	2000	0	OB1-PA
OB32:	9	1000	0	OB1-PA
OB33:	10	500	0	OB1-PA
OB34:	11	200	0	OB1-PA
OB35:	12	1000	0	OB1-PA
OB36:	13	50	0	OB1-PA
OB37:	14	20	0	OB1-PA
OB38:	15	10	0	OB1-PA



Hardware Interrupt (OB 40)

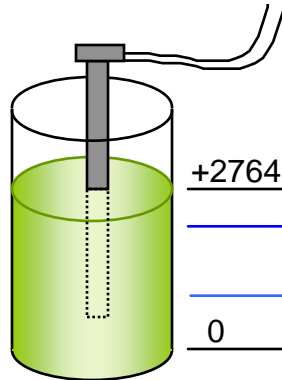
Hardware Configuration



Analog input properties

CPU properties

Analog input module



+27648
Upper limit value
Lower limit value
0

Properties - AI2x12Bit - (R0/S7)

General | Addresses | Inputs

Enable
 Diagnostic Interrupt Hardware Interrupt When Limit Exceeded

Input: 0 - 1

Diagnostics
 Group Diagnostics:
 with Check for Wire Break:

Measuring
 Measuring Type: E
 Measuring Range: +/- 10 V
 Position of Measuring Range Selection Module: [B]
 interference frequency: 50 Hz

Trigger for Hardware Interrupt Channel 0
 High Limit: 8.000 V
 Low Limit: 2.000 V

OK

Properties - CPU 315-2 DP - (R0/S2)

Time-of-Day Interrupts | Cyclic Interrupt | Diagnostics/Clock | Protection | Communication

General | Startup | Cycle/Clock Memory | Retentive Memory | Interrupts

Hardware Interrupts

Priority:	Process image partition:
OB40: 16	OB1-PA
OB41: 17	OB1-PA
OB42: 18	OB1-PA
OB43: 19	OB1-PA
OB44: 20	OB1-PA
OB45: 21	OB1-PA
OB46: 22	OB1-PA
OB47: 23	OB1-PA

Time-Delay Interrupts

Priority:	Process image partition:
OB20: 3	OB1-PA
OB21: 4	OB1-PA
OB22: 5	OB1-PA
OB23: 6	OB1-PA

Interrupts for DPV1

Priority:
OB55: 24
OB56: 24
OB57: 24

Async. Error Interrupts

Priority:
OB81: 26
OB82: 26
OB83: 26
OB84: 26
OB85: 26
OB86: 26
OB87: 26
OB70: 25
OB72: 28
OB73: 0

OK Cancel Help

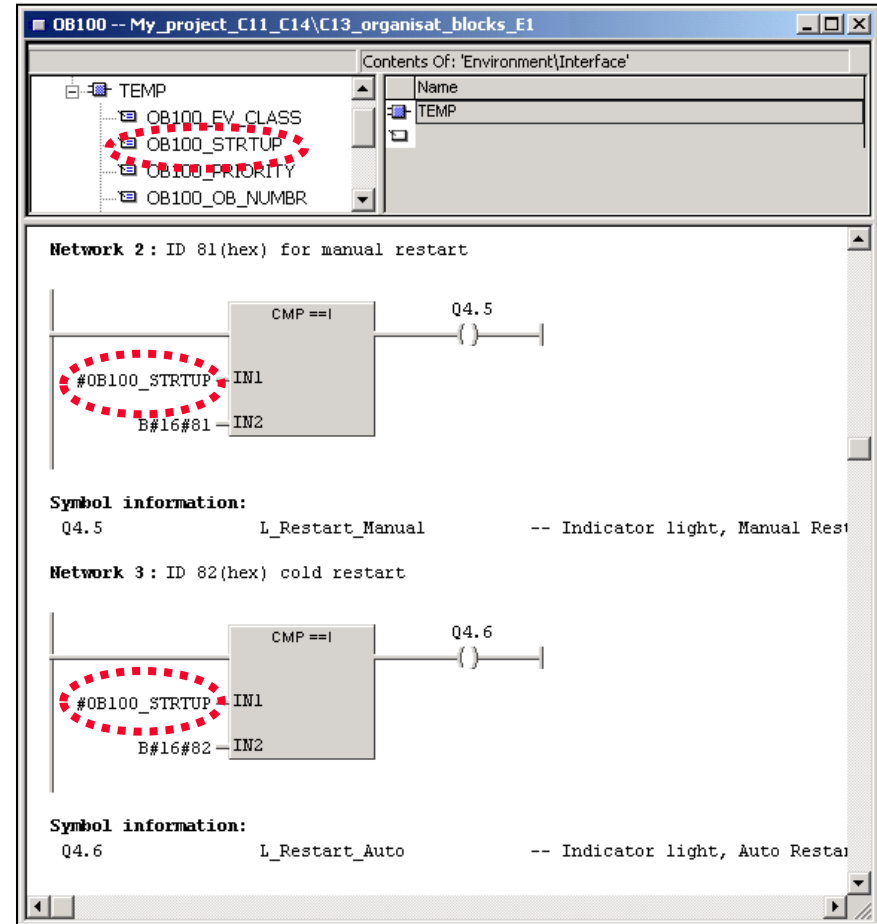
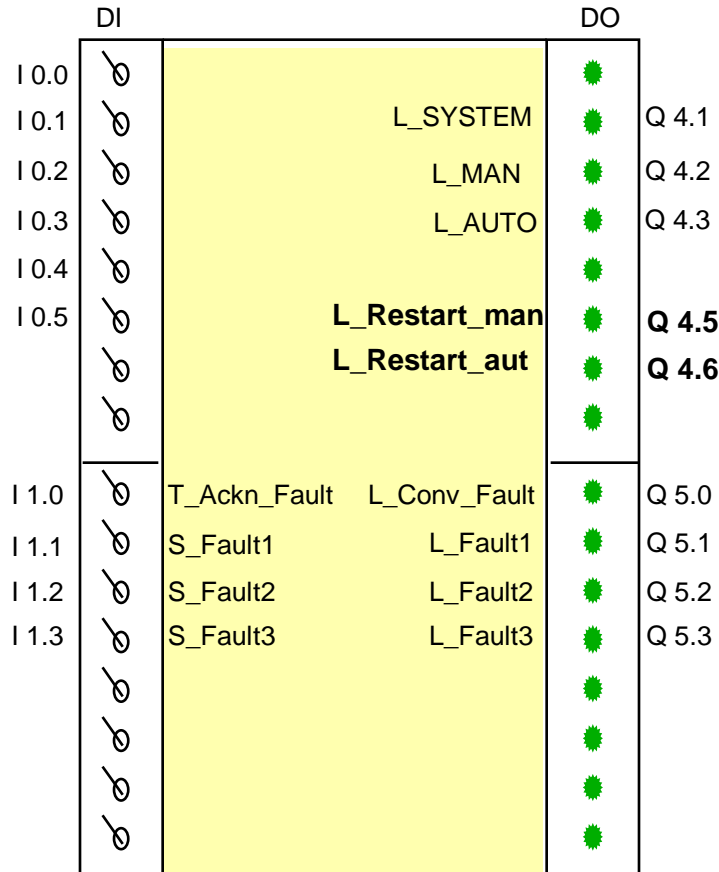
OB Start Information using OB100 as an Example

Address		
0 / 1	Start event	Start-up request
2 / 3	Priority	OB No.
4 / 5	Reserved	
6 / 7	Number of the event that caused the CPU to go into STOP	
8 / 9	Additional information on the current startup???	
10 / 11		
12 / 13	Year	Month
14 / 15	Day	Hours
16 / 17	Minutes	Seconds
18 / 19	1/10 seconds, 1/100 seconds	1 /1000 seconds, weekday

The screenshot shows the SIMATIC Manager interface with a table of OB100 start information. The table has the following columns: Name, Datentyp, Adresse, and Kommentar. The 'OB100_STARTUP' entry is highlighted in blue.

Name	Datentyp	Adresse	Kommentar
OB100_EV_CLASS	Byte	0.0	16#13, Event class 1, Entering event state, Event logg...
OB100_STARTUP	Byte	1.0	16#81/82/83/84 Method of startup
OB100_PRIORITY	Byte	2.0	Priority of OB Execution
OB100_OB_NUMBR	Byte	3.0	100 (Organization block 100, OB100)
OB100_RESERVED_1	Byte	4.0	Reserved for system
OB100_RESERVED_2	Byte	5.0	Reserved for system
OB100_STOP	Word	6.0	Event that caused CPU to stop (16#4xxx)
OB100_STRT_INFO	DWord	8.0	Information on how system started
OB100_DATE_TIME	Date...	12.0	Date and time OB100 started

Ex. 1: Displaying the Startup Type (OB100) and Acknowledging It



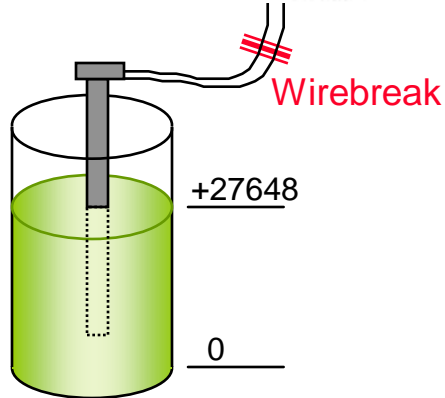
Asynchronous Errors

Type of error	Example	OB	Priority
Time error	Maximum scan cycle time exceeded	OB80	25
Power supply fault	Backup battery failure	OB81	25 / 28
Diagnostic interrupt	Wirebreak at input of diagnostics-capable module	OB82	
Insert / remove interrupt	Removal of a signal module during operation of an S7-400™	OB83	
CPU hardware fault	Incorrect signal level at the MPI interface	OB84	
Program execution error	Error in updating the process image (module defective)	OB85	
Rack fault	Failure of an expansion device or a DP slave	OB86	
Communication error	Error in reading message frame	OB87	

Diagnostic Interrupt (OB 82)

Hardware Configuration:

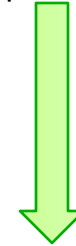
Analog input module



Analog input properties



CPU properties



Properties - AI2x12Bit - (R0/S7)

General | Addresses | Inputs

Enable
 Diagnostic Interrupt Hardware Interrupt When Limit Exceeded

Input: 0 - 1

Diagnostics
 Group Diagnostics:
 with Check for Wire Break:

Measuring
 Measuring Type: 2DMU
 Measuring Range: 4..20 mA
 Position of Measuring Range Selection Module: [D]
 interference frequency: 50 Hz

Trigger for Hardware Interrupt: Channel 0
 High Limit:
 Low Limit:

OK

Properties - CPU 315-2 DP - (R0/S2)

Time-of-Day Interrupts | Cyclic Interrupts | Diagnostics/Clock | Protection | Communication
 General | Startup | Cycle/Clock Memory | Retentive Memory | Interrupts

Hardware Interrupts

OB	Priority	Process image partition
OB40:	16	---
OB41:	17	---
OB42:	18	---
OB43:	19	---
OB44:	20	---
OB45:	21	---
OB46:	22	---
OB47:	23	---

Time-Delay Interrupts

OB	Priority	Process image partition
OB20:	3	---
OB21:	4	---
OB22:	5	---
OB23:	6	---

Interrupts for DPV1

OB	Priority
OB55:	2
OB56:	2
OB57:	2

Async. Error Interrupts

OB	Priority
OB81:	26
OB82:	26
OB83:	26
OB84:	26
OB85:	26
OB86:	26
OB87:	26
OB70:	25
OB72:	28
OB73:	0

OK Cancel Help

Synchronous Errors

Type of Error	Example	OB	Priority
Programming error	A block that is not present in the CPU is called in the program	OB121	Same as that of the OB interrupted as a result of the error
Access error	A module that is either defective or not present is addressed in the program (such as direct access to a non-existent I/O module)	OB122	

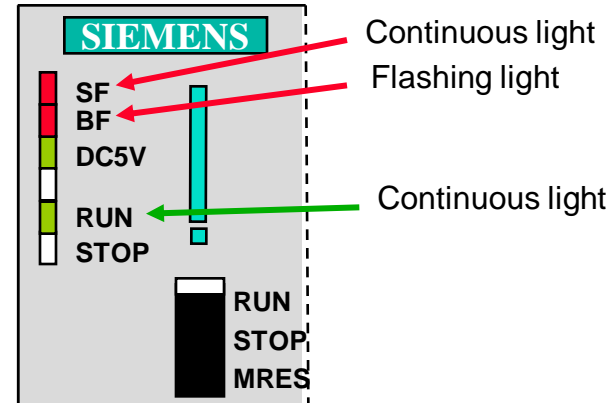
Exercise 2: Response when a Slave Fails

PROFIBUS slave failed

Asynchronous error

CPU response...

...with OB 86



PROFIBUS slave failed

Asynchronous error

...without OB 86

