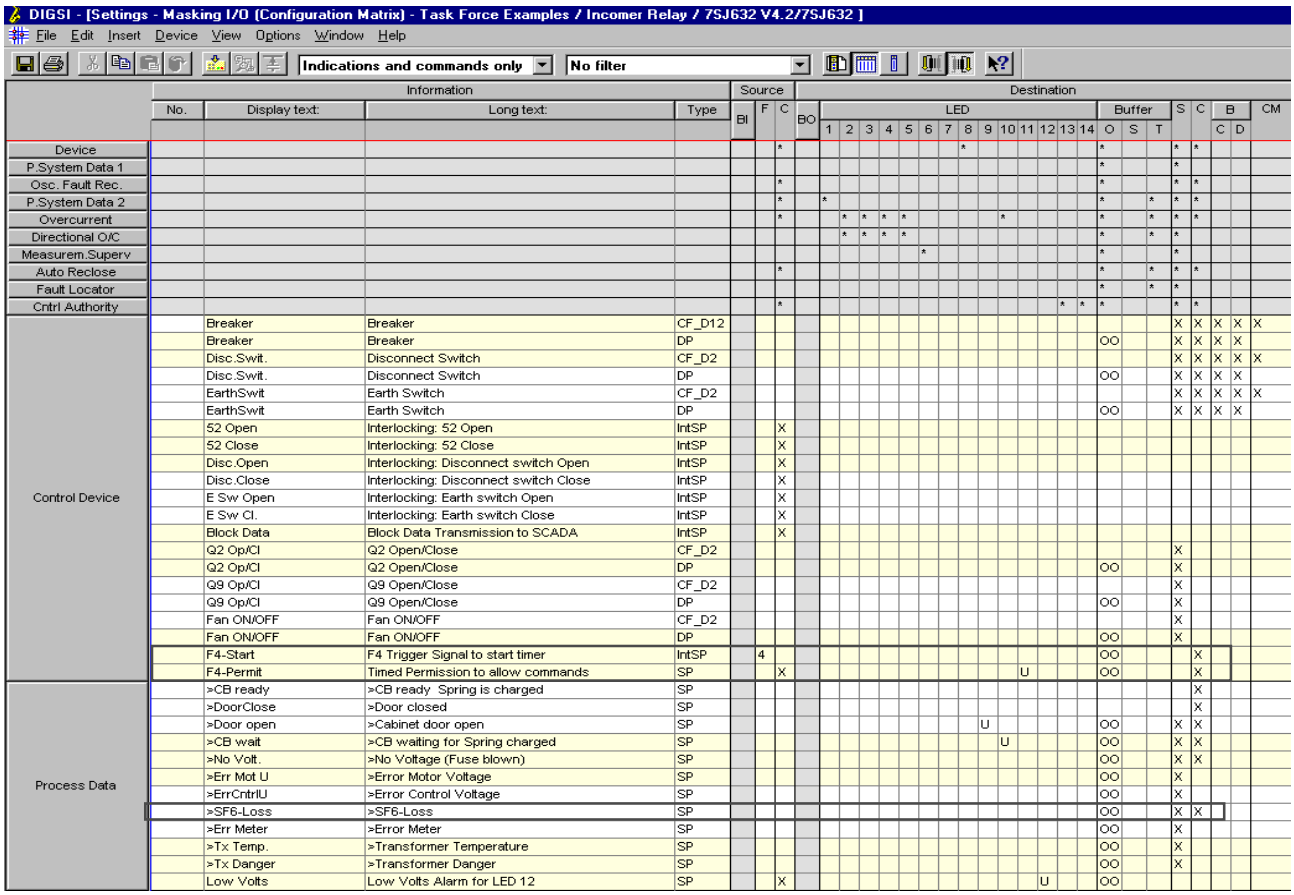
Interlocking & SF6 loss

This application will combine the application for „SF6 loss“ with interlocking realised as in the file „Easy interlocking“:

Requirement:
All command operations for circuit breaker, disconnector switch and earth switch should be permitted to switch only when no SF6 loss alarm is present. Additionally only within a time window of 20 seconds triggered by the function key 4 command operations are allowed.
The active command shall be indicated on LED.



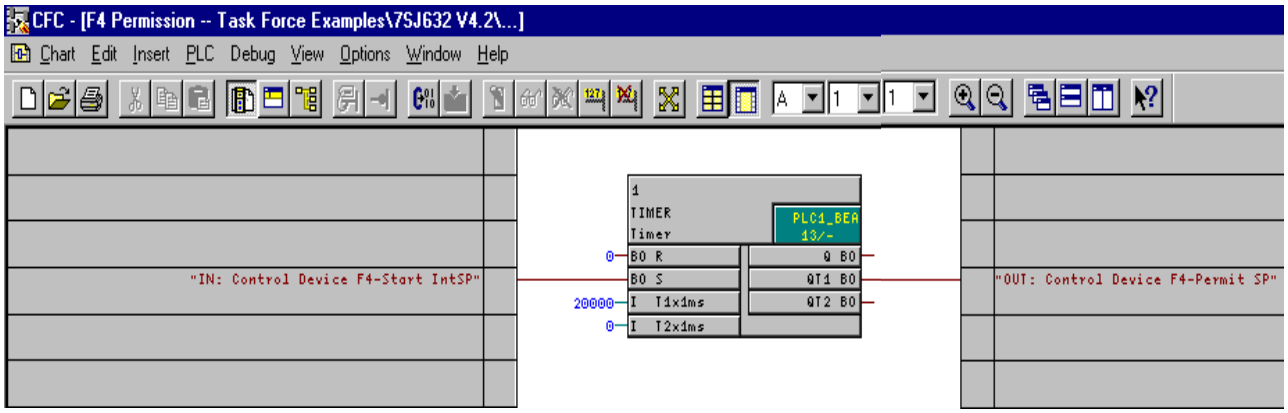
	No.	Display text:	Long text:	Type	Source BI	Source F	Source C	Source BO	Destination LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8	LED 9	LED 10	LED 11	LED 12	LED 13	LED 14	Buffer O	Buffer S	Buffer T	S	C	B C	B D	CM
Device							*									*							*			*	*			
P.System Data 1																							*			*				
Osc. Fault Rec.							*																*			*	*			
P.System Data 2							*		*														*		*	*	*			
Overcurrent							*			*	*	*	*					*					*		*	*	*			
Directional O/C										*	*	*	*										*		*	*				
Measurem.Superv														*									*			*				
Auto Reclose							*																*		*	*	*			
Fault Locator																							*		*	*				
Cntrl Authority							*														*	*	*			*	*			
Control Device		Breaker	Breaker	CF_D12																						X	X	X	X	X
		Breaker	Breaker	DP																			OO			X	X	X	X	
		Disc.Swit.	Disconnect Switch	CF_D2																						X	X	X	X	X
		Disc.Swit.	Disconnect Switch	DP																			OO			X	X	X	X	
		EarthSwit	Earth Switch	CF_D2																						X	X	X	X	X
		EarthSwit	Earth Switch	DP																			OO			X	X	X	X	
		52 Open	Interlocking: 52 Open	IntSP			X																							
		52 Close	Interlocking: 52 Close	IntSP			X																							
		Disc.Open	Interlocking: Disconnect switch Open	IntSP			X																							
		Disc.Close	Interlocking: Disconnect switch Close	IntSP			X																							
		E Sw Open	Interlocking: Earth switch Open	IntSP			X																							
		E Sw Cl.	Interlocking: Earth switch Close	IntSP			X																							
		Block Data	Block Data Transmission to SCADA	IntSP			X																							
		Q2 Op/Cl	Q2 Open/Close	CF_D2																						X				
		Q2 Op/Cl	Q2 Open/Close	DP																			OO			X				
		Q9 Op/Cl	Q9 Open/Close	CF_D2																						X				
		Q9 Op/Cl	Q9 Open/Close	DP																			OO			X				
		Fan ON/OFF	Fan ON/OFF	CF_D2																						X				
		Fan ON/OFF	Fan ON/OFF	DP																			OO			X				
		F4-Start	F4 Trigger Signal to start timer	IntSP		4																	OO				X			
		F4-Permit	Timed Permission to allow commands	SP			X												U				OO				X			
Process Data		>CB ready	>CB ready Spring is charged	SP																							X			
		>DoorClose	>Door closed	SP																							X			
		>Door open	>Cabinet door open	SP													U						OO			X	X			
		>CB wait	>CB waiting for Spring charged	SP														U					OO			X	X			
		>No Volt.	>No Voltage (Fuse blown)	SP																			OO			X	X			
		>Err Mot U	>Error Motor Voltage	SP																			OO			X				
		>ErrCntrlU	>Error Control Voltage	SP																			OO			X				
		>SF6-Loss	>SF6-Loss	SP																			OO			X	X			
		>Err Meter	>Error Meter	SP																			OO			X				
		>Tx Temp.	>Transformer Temperature	SP																			OO			X				
		>Tx Danger	>Transformer Danger	SP																			OO			X				
		Low Volts	Low Volts Alarm for LED 12	SP			X													U			OO							

Picture 1 : input-output matrix

In picture 1 you can see in the group *Control device* the new defined annunciations *F4-Start* (via function key 4) and *F4 Permit*. From the group *Process Data* the signal SF6 loss will be used.

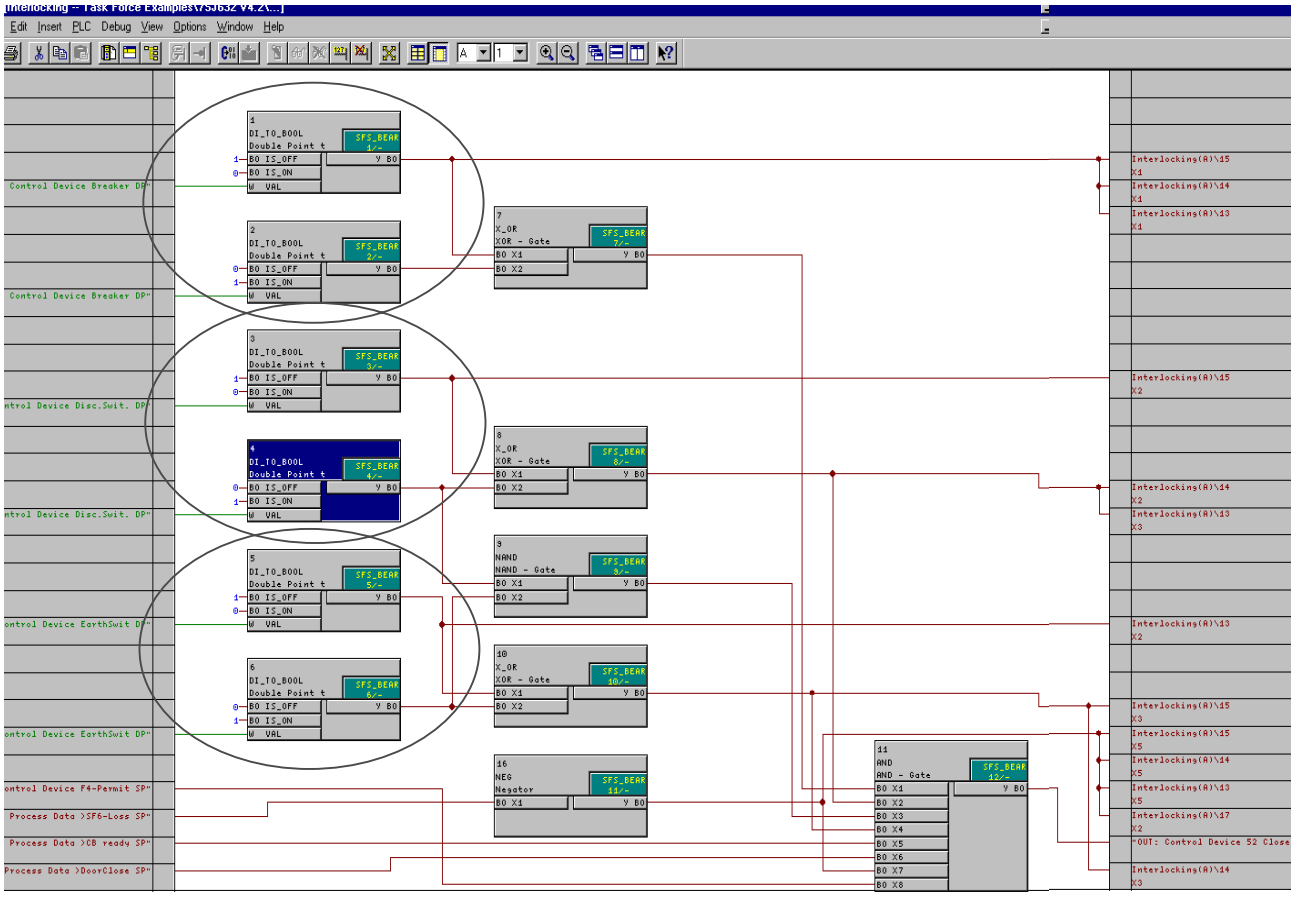
SIEMENS
siemens-russia.com

In the first CFC chart a timer is implemented to prolong the *F4-Start* status for 20 sec. Within this 20 sec the permission runs to allow control (*F4-Permit*). The timer must be positioned in the run sequence PLC1_BEARB or PLC_BEARB.



Picture 2 : first CFC chart with timer

The main part of the program will be realised in the run sequence PLC_BEARB. Therefore we have a second CFC chart with two worksheets (see picture 3 and 4).

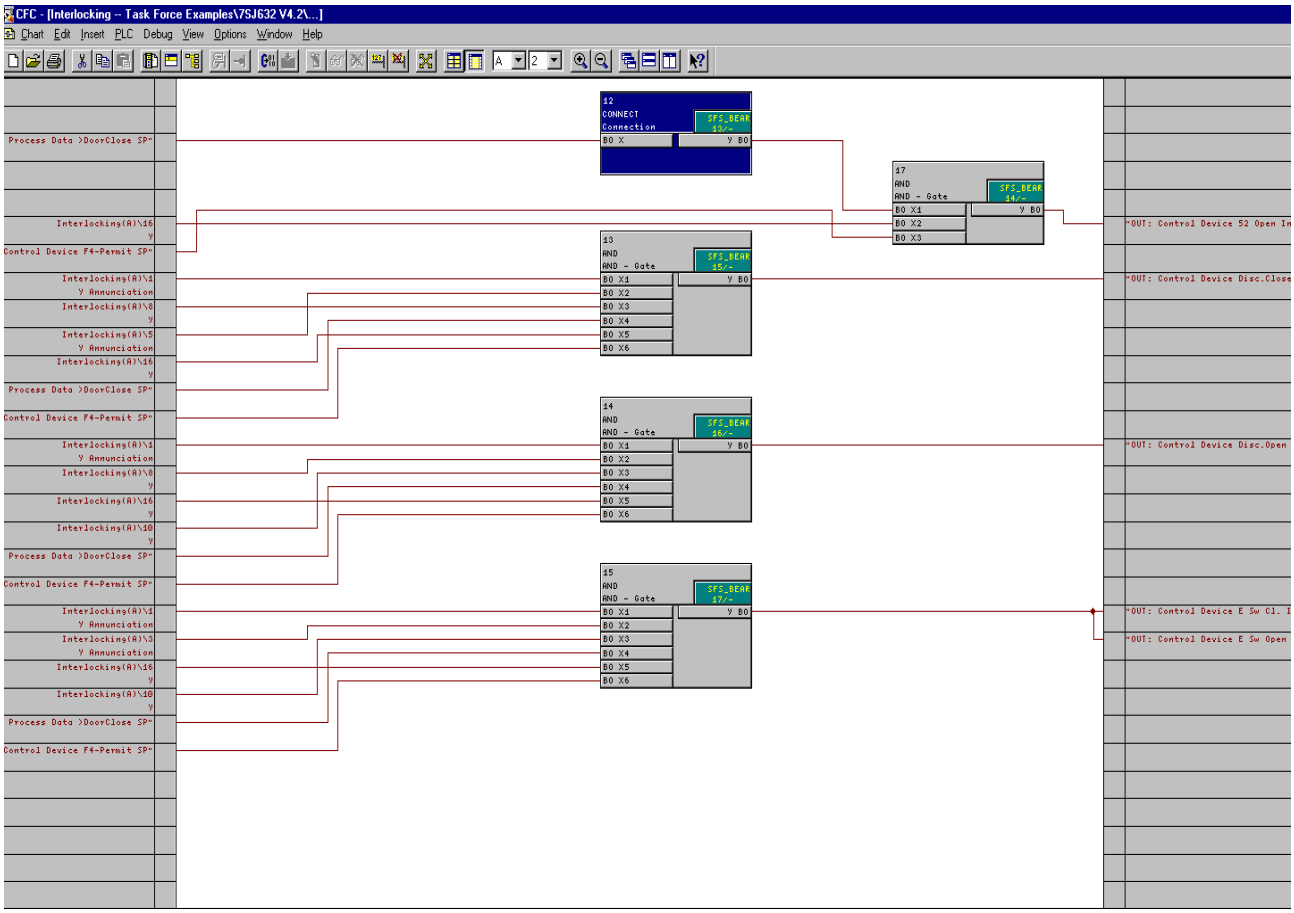


Picture 3: main part realized in SFS_BEARB, worksheet 1

SIEMENS
siemens-russia.com

The three red circles of picture 3 shall indicate that through the DI_TO_BOOL gates inside the circles the position of the circuit breaker, disconnector and ground switch are checked.

Every status of the switching devices will be connected to different AND gates (see picture 4). The AND gates have as inputs besides the switching positions also signals for *Process Data > Door Close* and especially the *F4-Permit* for command permission (you can see in picture 2 how this F4-Permit signal was generated). Before any Interlocking – Release signal will leave the CFC chart the command permission *F4-Permit* will be checked. The output signals of the AND gates signify the release signals for interlocking. As the last step these release signals have to be connected with each switching device in the input/output matrix (via object properties).



Picture 4: main part realised in SFS_BEARB, worksheet 2

SIEMENS
siemens-russia.com