

# Symbolic Addressing

Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]

Symbol Table Edit Insert View Options Window Help

All Symbols

Status	Symbol	Address	Data type	Comment
1	L_Veicht_invalid	Q 4.0	BOOL	Indicator light - weight invalid
2	L_SYSTEM	Q 4.1	BOOL	Indicator light System ON
3	L_MAN	Q 4.2	BOOL	Indicator light MAN mode
4	L_AUTO	Q 4.3	BOOL	Indicator light Automatic mode
5	L_Restart_man	Q 4.5	BOOL	Indicator light for manual warm restart
6	L_Restart_aut	Q 4.6	BOOL	Indicator light for automatic warm restart
7	L_Conv_Fault	Q 5.0	BOOL	Indicator light Conveyor fault
8	L_Fault1	Q 5.1	BOOL	Indicator light Fault 1
9	L_Fault2	Q 5.2	BOOL	Indicator light Fault 2
10	L_Fault3	Q 5.3	BOOL	Indicator light Fault 3
11	L_S4_Mill	Q 5.4	BOOL	Indicator light Milling at Bay 3
12	L_S5_3->LB	Q 5.5	BOOL	Indicator light Transport Bay 3 -> Light barrier bay
13	L_S6_Final_Check	Q 5.6	BOOL	Indicator light Final check at LB bay
14	L_Bay1	Q 8.1	BOOL	Indicator light Bay 1
15	L_Bay2	Q 8.2	BOOL	Indicator light Bay 2
16	L_Bay3	Q 8.3	BOOL	Indicator light Bay 3
17	L_Bay-LB	Q 8.4	BOOL	Indicator light Light barrier bay
18	K_Conv_RIGHT	Q 8.5	BOOL	Run conveyor RIGHT
19	K_Conv_LEFT	Q 8.6	BOOL	Run conveyor LEFT
20	Horn	Q 8.7	BOOL	Horn
21	QB_Simulator-LED	QB 5	BYTE	lower Simulator LEDs
22	QW_DigDisp	QW 6	WORD	BCD digital display
23	QW_Control_MM420	QW 42	WORD	Control word for MM420
24	QW_Setp_MM420	QW 44	WORD	Setpoint speed for MM420
25	DB_Instance_FB20_F...	DB 2	FB 20	Instance DB for FB20, Evaluation of Fault 2
26	DB_Instance_FB20_F...	DB 3	FB 20	Instance DB for FB20, Evaluation of Fault 3
27	DB_FB11_RunningLight	DB 11	FB 11	Instance DB for FB11_RunningLight
28	DB_FB17_Fault	DB 17	FB 17	Instance DB for FB17 Fault evaluation

Press F1 to get Help.

## Objectives

**Upon completion of the chapter the participant will ...**

- ... know the difference between absolute and symbolic addressing
- ... know the difference between local and global symbols
- ... be able to edit a global symbol table
- ... be able to use the Block Editor to edit global symbols



# Absolute and Symbolic Addressing

## Absolute Representation

A	I0.0
=	Q8.0
A	I0.4
=	Q20.5
Call	FC18

## Symbolic Representation

A	"SYSTEM_ON"
=	"SYSTEM_ON"
A	"M_FORW"
=	"MOTOR_FOR"
Call	"COUNT"

Symbol	Address	Data Type	Comment
MOTOR_FOR	Q20.5	BOOL	Motor moves forward
COUNT	FC18	FC18	Count bottles
SYSTEM_ON_SW	I0.0	BOOL	Switch system on
SYSTEM_ON_LT	Q8.0	BOOL	Indicator: System is "On"
M_FORW	I0.4	BOOL	Pushbutton: Motor forward

(max. 24 characters)

(max. 80 characters)

## Symbolic Addressing

Where are symbols used?	Where are they stored?	With what are they created?
<b>Global Data:</b> <ul style="list-style-type: none"> <li>- Inputs</li> <li>- Outputs</li> <li>- Bit mem., timers, counters</li> <li>- Peripheral I/O</li> </ul>	Symbol Table	Symbol Editor
<b>Local Block Data:</b> <ul style="list-style-type: none"> <li>- Block parameters</li> <li>- local / temporary data</li> </ul> Jump Labels	Declaration part of the block   Code section of the block	Program Editor   Program Editor
<b>Block Names:</b> <ul style="list-style-type: none"> <li>- OB</li> <li>- FB</li> <li>- FC</li> <li>- DB</li> <li>- VAT</li> <li>- UDT</li> </ul>	Symbol Table	Symbol Editor
<b>DB Components</b>	Declaration part of the DB	Program Editor

# The Symbol Table

The screenshot shows the SIMATIC Manager interface. The main window displays a project tree on the left and a workspace with 'Sources', 'Blocks', and 'Symbols' icons. A red arrow points to the 'Symbols' icon. An inset window titled 'Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]' shows a table of symbols. The 'Status' column for the 'T\_Ackn\_Fault' symbol (row 49) is highlighted with a red circle.

	Status	Symbol	Address	Data type	Comment
41		T_System_ON	I 0.0	BOOL	Momentary contact System ON
42		T_System_OFF	I 0.1	BOOL	Momentary contact System OFF (NC contact)
43		T_Jog_RIGHT	I 0.2	BOOL	Jog conveyor RIGHT, momentary contact
44		T_Jog_LEFT	I 0.3	BOOL	Jog conveyor LEFT, momentary contact
45		S_M/A_ModeSelect	I 0.4	BOOL	Switch - Operating Mode Preselect: '0'=MANUAL, '1'=AUTO
46		T_M/A_Accept	I 0.5	BOOL	Momentary contact, confirm operating mode
47		S_Weight/Quantity	I 0.6	BOOL	0 = Display quantity, 1 = Display weight
48		T_Ackn_WarmRestart	I 0.7	BOOL	Momentary contact to acknowledge warm restart display
49	▶	T_Ackn_Fault	I 1.0	BOOL	Momentary contact Fault acknowledgement
50		S_Fault1	I 1.1	BOOL	Simulate Fault 1, 0=OFF/1=ON
51		S_Fault2	I 1.2	BOOL	Simulate Fault 2, 0=OFF/1=ON
52		S_Fault3	I 1.3	BOOL	Simulate Fault 3, 0=OFF/1=ON
53		LB	I 8.0	BOOL	Light barrier
54		T_Bay1	I 8.1	BOOL	Momentary contact Bay 1
55		T_Bay2	I 8.2	BOOL	Momentary contact Bay 2
56		T_Bay3	I 8.3	BOOL	Momentary contact Bay 3
57		T_Bay-LB	I 8.4	BOOL	Momentary contact Light barrier bay
58		BAY1	I 8.5	BOOL	Proximity sensor Bay 1
59		BAY2	I 8.6	BOOL	Proximity sensor Bay 2
60		BAY3	I 8.7	BOOL	Proximity sensor Bay 3
61		MW_Thumbw	MW 2	WORD	BCD thumbwheel
62		MW_State_MM420	MW 42	WORD	State word of MM420

# Edit: Find and Replace

Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]

Symbol Table | Edit | Insert | View | Options | Window | Help

	Status		data type	Comment
41		Undo	OOL	Momentary contact System ON
42		Redo	OOL	Momentary contact System OFF (NC contact)
43		Cut	OOL	Jog conveyor RIGHT, momentary contact
44		Copy	OOL	
45		Paste	OOL	
46		Delete	OOL	
47		Select	OOL	
48		Undo Selection	OOL	
49	▶	Find and Replace...	OOL	
50		Continue	OOL	
51		Go To Row...	OOL	
52		Add Default Symbols	OOL	
53		Generate SDB	OOL	
54		Special Object Properties	OOL	
56		T_Bay3	BOOL	
57		T_Bay-LB	BOOL	
58		BAY1	BOOL	
59		BAY2	BOOL	
60		BAY3	BOOL	Proximity sensor Bay 3
61		MV_Thumbw	WORD	BCD thumbwheel
62		MV_State_MM420	WORD	State word of MM420

Looks for text or replaces text in the current symbol table.

### Find and Replace

Find what: Q8.1      Replace with: Q4.1      << Less

Search Range

From cursor down       From cursor up       All       Selection

Options

Find whole words only       Search with Wildcards

Match case

Find Next    Replace    Replace All    Close    Help

# View: Filter

The screenshot shows the SIMATIC S7 Symbol Editor interface. The main window displays a table of symbols with columns for Status, Symbol, Address, Data type, and Comment. A 'Filter' dialog box is open, allowing users to define filter criteria. The dialog includes a 'Filter List' section with a 'No.' field (set to 0) and a 'Filter name' dropdown (set to 'All Symbols'). Below this are buttons for 'New filter', 'Save', and 'Delete'. The 'Display Symbol with Property...' section contains checkboxes for Name, Address, Data Type, and Comment, each with a '\*' button, and dropdown menus for Monitoring, Op. Ctrl. + Monitoring, Message, Communication, and Control at contact. The 'Display Symbol with Status...' section has checkboxes for 'Valid' and 'Invalid (non-unique, incomplete)'. A 'Filter' button is located at the bottom of the dialog. A yellow arrow points from the 'Filter...' menu item in the Symbol Editor to the dialog box. Another yellow arrow points from the 'Filter' button in the dialog to the filtered symbol table below.

**Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]**

Status	Symbol	Address	Data type	Comment
119	OB_Cycle			
120	OB_Cyclic_In			
121	OB_I/O_FLT1			
122	OB_SlaveFail			
123	OB_WarmRe			
124	PMV_AI1			
125	PMV_AI2			
126	L_Weight_inv			
127	L_SYSTEM			
128	L_MAN			
129	L_AUTO	Q 4.3	BOOL	Indicator light AUTO
130	L_Restart_man	Q 4.5	BOOL	Indicator light for r
131	L_Restart_aut	Q 4.6	BOOL	Indicator light for s
132	L_Conv_Fault	Q 5.0	BOOL	Indicator light Conv
133	L_Fault1	Q 5.1	BOOL	Indicator light Fault
134	L_Fault2	Q 5.2	BOOL	Indicator light Fault
135	L_Fault3	Q 5.3	BOOL	Indicator light Fault
136	L_S4_Mill	Q 5.4	BOOL	Indicator light Millir
137	L_S5_3->LB	Q 5.5	BOOL	Indicator light Tran
138	L_S6_Final_Check	Q 5.6	BOOL	Indicator light Fina
139	L_Bay1	Q 8.1	BOOL	Indicator light Bay

**Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]**

Symbol Table Edit Insert View Options Window Help

< Filtered view >

Status	Symbol	Address	Data type	Comment
1	LB	I 8.0	BOOL	Light bar
2	T_Bay1	I 8.1	BOOL	
3	T_Bay2	I 8.2	BOOL	
4	T_Bay3	I 8.3	BOOL	Momenta
5	T_Bay-LB	I 8.4	BOOL	Momentary contact Light barrier bay
6	BAY1	I 8.5	BOOL	Proximity sensor Bay 1
7	BAY2	I 8.6	BOOL	Proximity sensor Bay 2
8	BAY3	I 8.7	BOOL	Proximity sensor Bay 3

Number of symbols: 8/172

# View: Sort

Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]

Symbol Table Edit Insert View Options Window Help

Status	Symbol				
37	FC_MM420				
38	FC_Sequenc				
39	FC_Command				
40	FC_Scale				
41	T_System_O				
42	T_System_O				
43	T_Jog_RIGHT				
44	T_Jog_LEFT				
45	S_M/A_Mode				
46	T_M/A_Accept				
47	S_Weight/Quantity	I	0.6	BOOL	0 = Display quantit
48	T_Ackn_WarmRestart	I	0.7	BOOL	Momentary contact
49	T_Ackn_Fault	I	1.0	BOOL	Momentary contact
50	S_Fault1	I	1.1	BOOL	Simulate Fault 1, 0=
51	S_Fault2	I	1.2	BOOL	Simulate Fault 2, 0=
52	S_Fault3	I	1.3	BOOL	Simulate Fault 3, 0=
53	LB	I	8.0	BOOL	Light barrier
54	T_Bay1	I	8.1	BOOL	Momentary contact
55	T_Bay2	I	8.2	BOOL	Momentary contact
56	T_Bay3	I	8.3	BOOL	Momentary contact
57	T_Bay-LB	I	8.4	BOOL	Momentary contact Light barrier bay
58	BAY1	I	8.5	BOOL	Proximity sensor Bay 1
59	BAY2	I	8.6	BOOL	Proximity sensor Bay 2
60	BAY3	I	8.7	BOOL	Proximity sensor Bay 3

Sorts the display according to specific criteria.



# Editing Symbols in the LAD/STL/FBD Editor

FC1 : System  
Network 1: System ON/OFF

"T\_System\_ON" "L\_SYSTEM" SR  
S Q  
"T\_System\_OFF" R

Context Menu:  
Cut Ctrl+X  
Copy Ctrl+C  
Paste Ctrl+V  
Delete Del  
Insert Network Ctrl+R  
Insert Empty Box Alt+F9  
Insert Symbol Ctrl+J  
Go To  
Edit Symbols... Alt+Return  
Special Object Properties

Symbol Table:

Address	Symbol	Data type	Comment
Q 4.1	L_SYSTEM	BOOL	Indicator light System ON

Buttons: Add to Symbols, Delete Symbol, OK, Apply, Close, Help

# Symbol Information in the LAD/STL/FBD Editor

FC1 : System  
Network 1: System ON/OFF

"T\_System\_ON" "L\_SYSTEM"  
S SR Q

"T\_System\_OFF"  
IO.1 / T\_System\_OFF / Momentary contact System OFF (NC contact)

**Symbol information:**

T_System_ON	I0.0	-- Momentary contact System ON
T_System_OFF	I0.1	-- Momentary contact System OFF (NC contact)
L_SYSTEM	Q4.1	-- Indicator light System ON

1: Error 2: Info 3: Cross-references 4: Address info 5: Modify 6: Diagnostics

Press F1 to get Help. offline Abs < 5.2 Nw 1

FC1 : System  
Network 1: System ON/OFF

IO.0 IO.1 Q4.1  
Momentary contact Momentary contact light  
System ON System ON  
"T\_System\_ON" "L\_SYSTEM"  
ON" SR Q

IO.1  
Momentary contact  
System  
OFF (NC  
contact)  
"T\_System\_OFF"  
R

1: Error 2: Info 3: Cross-references 4: Address info 5: Diagnostics

Press F1 to get Help. offline Ab

# Symbol Selection in LAD/FBD

The screenshot shows the SIMATIC Manager interface with a ladder logic diagram for Network 1. The title of the network is "Indicator light Bay 1". The diagram contains three parallel normally open contacts: "L\_AUTO", "K\_Conv\_RIGHT", and "M\_Flash\_2Hz". The output coil is "L\_Bay1".

The symbol selection dialog box is open, displaying a list of symbols. The selected symbol is "M\_Flash\_2Hz".

Symbol Name	Symbol Type	Symbol Address	Symbol Description
M_Aux_Left	BOOL	M 14.0	Aux. me
M_Aux_Man_ON	BOOL	M 15.2	Edge at
M_Aux_System_ON	BOOL	M 15.1	Edge at
M_Bay1_occup	BOOL	M 14.1	Memory
M_Bay2_occup	BOOL	M 14.2	Memory
M_Bay3_occup	BOOL	M 14.3	Memory
M_Bays_occup_HMI	BOOL	M 33.0	all Bay
M_Conv_Fault	BOOL	M 17.0	Memory
M_Conv_Fault_HMI	BOOL	M 33.1	Memory
M_Conv_Jog_LE...	BOOL	M 30.3	Memory
M_Conv_Jog_RI...	BOOL	M 30.2	Memory
M_Edge_Aux	BOOL	M 101.0	Auxilis
M_Fault1	BOOL	M 17.1	Memory
M_Fault2	BOOL	M 17.3	Memory
M_Flash_1Hz	BOOL	M 10.5	Memory
M_Flash_2Hz	BOOL	M 10.3	Memory
M_InitialState	BOOL	M 101.1	Memory
M_Jog_LEFT	BOOL	M 16.3	Memory
M_Jog_RIGHT	BOOL	M 16.2	Memory
M_M/A_Accept_HMI	BOOL	M 30.5	Memory
M_M/A_ModeSel...	BOOL	M 30.4	Memory

At the bottom of the window, a status bar indicates "Missing or incorrect bit address" and "1: Error 2".

# Symbol Table: Export

Symbol Editor - [S7 Program(2) (Symbols) -- My\_Project\SIMATIC 300(1)\CPU 315-2 DP]

Symbol Table Edit Insert View Options Window Help

Open... Ctrl+O  
Close Ctrl+F4  
Save Ctrl+S  
Properties...  
Import...  
Export...  
Print... Ctrl+P  
Print Preview...  
Page Setup...

1 My\_Project\SIMATIC 300(1)\CPU 315-2 DP\...\Symbols  
2 My\_Project\S7\_300\_Station\CPU 315-2 DP\...\Symbols  
3 SERV2\_S\S7\_300\_Station\CPU 315-2 DP\...\Symbole  
4 SERV1\_S\S7\_300\_Station\CPU 315-2 DP\...\Symbole

46	T_M/A_Accept	I	0.5	BOOL	Momentar
47	S_Weight/Quantity	I	0.6	BOOL	0 = Displ
48	T_Ackn_WarmRestart	I	0.7	BOOL	Momentar
49	T_Ackn_Fault	I	1.0	BOOL	Momentar

Copies the selected symbol table or parts of it to a file (of a different format).

Export

Speichern S7\_Courses

- LueftungInitialisierungsTest
- My\_Proje
- PRO3\_Loe
- SERV1\_A
- SERV1\_L
- SERV2\_B

Dateiname: Symbol\_Table Speichern

Dateityp: System Data Format (\*.SDF) Abbrechen

Where do you want to store the table?

In which format do you want to store the table?

# Symbol Table: Import

The screenshot shows the Symbol Editor interface with the 'Import' dialog box open. The dialog box is titled 'Import' and shows the current directory as 'S7\_Courses'. The file list contains several folders and one file, 'Symbol\_Table.sdf', which is highlighted. The 'Dateiname' field is filled with 'Symbol\_Table.sdf' and the 'Dateityp' dropdown is set to 'System Data Format (\*.SDF)'. A yellow arrow points from the 'Import...' menu item to the dialog. Three blue callout boxes with arrows point to the directory path, file name, and file format fields.

**Select directory path**

**Enter file name**

**Select file format**

## Exercise 1: Importing a Symbol Table

Symbol Editor - [My\_program (Symbols) -- My\_project\_ch3\_ch8\test station\CPU 315-2 DP]

Symbol Table Edit Insert View Options Window Help

All Symbols

	Symbol	Address ▲	Data type	Comment
1	Counter_faults	C 17	COUNTER	Counts conveyor belt faults in Auto mode
2	Counter_Parts	C 18	COUNTER	S5 counter function for parts in AUTO mode
3	Instance_FB20_Call_2	DB 2	FB 20	Instance DB for FB20
4	Instance_FB20_Call_3	DB 3	FB 20	Instance DB for FB20
5	Instance_FB20_Call_4	DB 4	FB 20	Instance DB for FB20
6	DB_Parts	DB 18	DB 18	Data block stores actual quantity and both auxiliary edge memory bits
7	HMI_Interface	DB 99	DB 99	Transfer interface for HMI System in general
8	FB_Fault	FB 20	FB 20	Evaluation of process faults
9	FC_Signalizing	FC 14	FC 14	Signalizing during conveyor movement
10	FC_Modes	FC 15	FC 15	System ON and OFF, Mode_Man; Mode_Auto
11	FC_Conveyor	FC 16	FC 16	Control logic for conveyor belt
12	FC_Faults	FC 17	FC 17	Evaluation of process faults
13	FC_Count	FC 18	FC 18	Count parts
14	FC_Statistic	FC 19	FC 19	Function for counting parts with Arithmetic
15	FC_Evaluate_Fault	FC 20	FC 20	Evaluation of Fault 1 (2)
16	FC_Edge_Detection	FC 28	FC 28	Example for using digital word instructions
17	FC_MM420	FC 42	FC 42	Test for MM420
18	FC_MM420_synchron	FC 44	FC 44	Like FC42 + additional synchronism Conveyor / MM420
19	FC_Scaling	FC 105	FC 105	Scaling block for analog value
20	T_System_ON	I 0.0	BOOL	System ON
21	T_System_OFF	I 0.1	BOOL	System OFF (NC contact)

Press F1 to get Help.