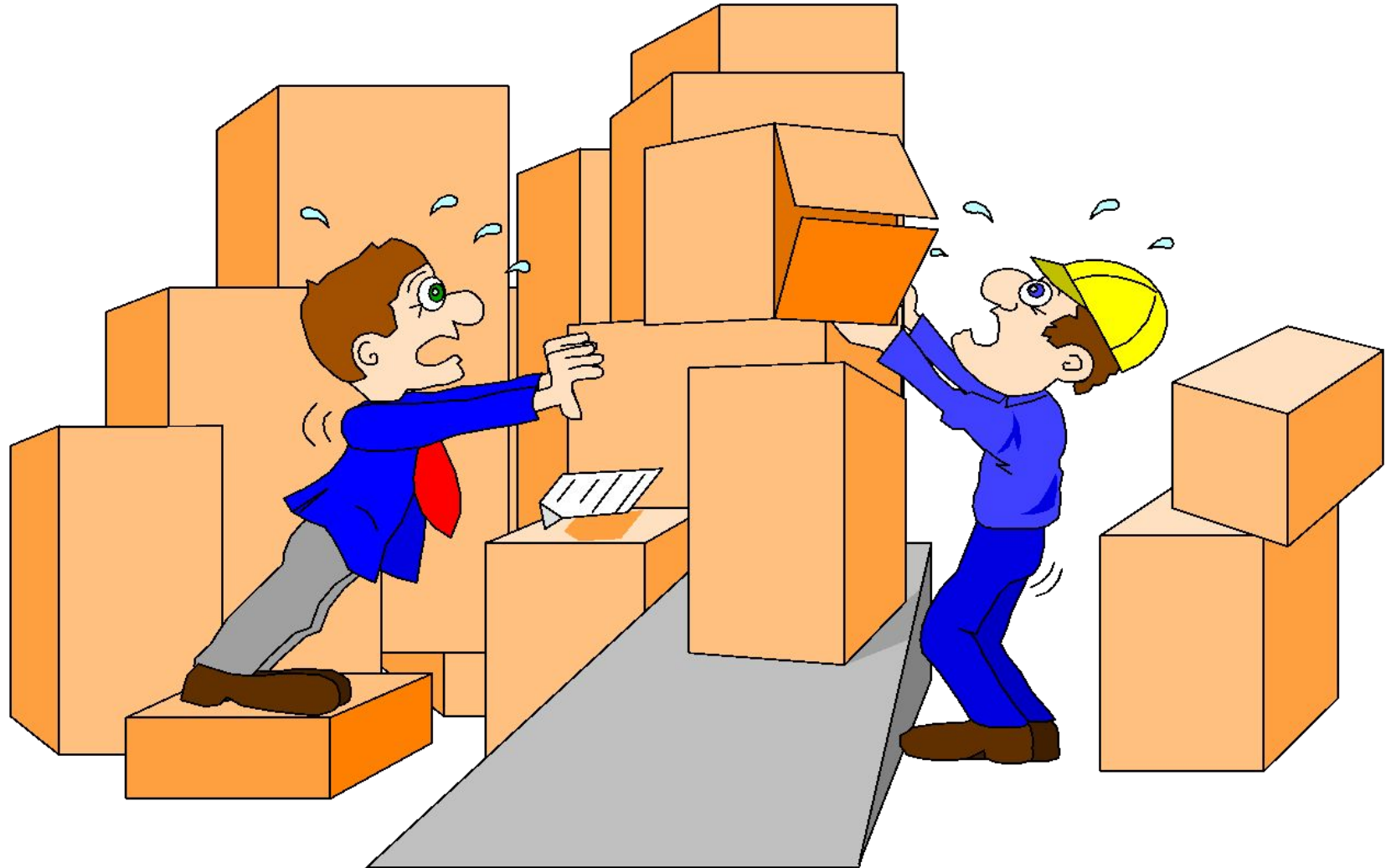
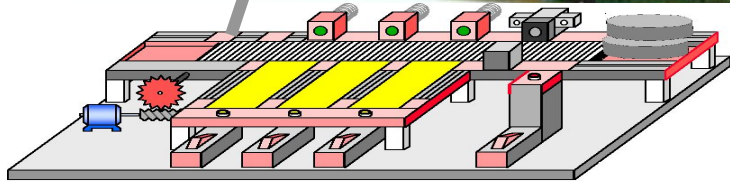
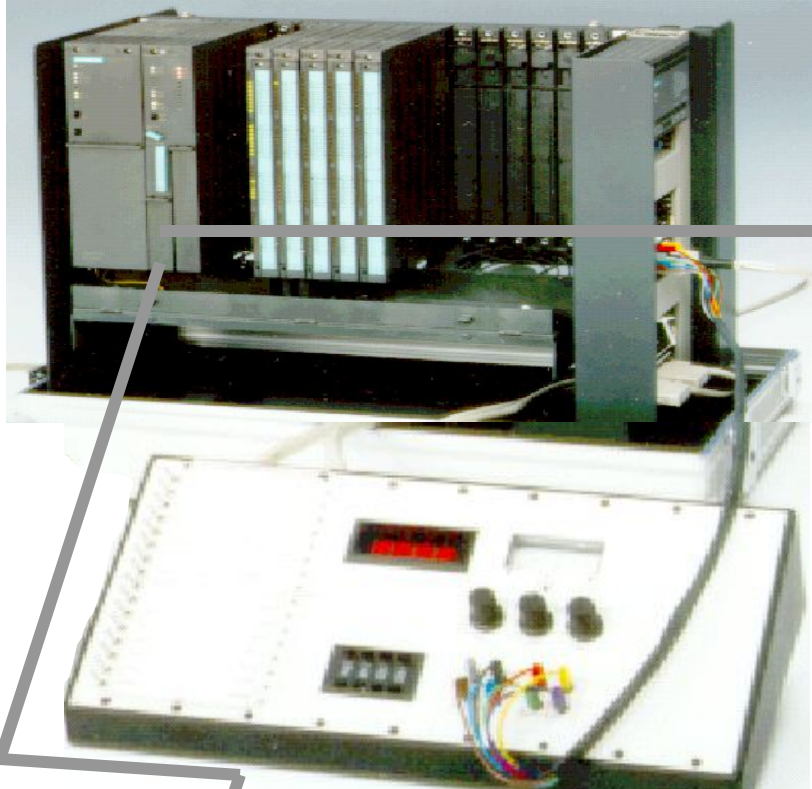


Отладка и пуск



Отладка и пуск : Цель



Страница Compile / Save (Компиляция/Сохранение) (1)

The screenshot shows the SIMATIC Manager software interface. The main window displays a ladder logic diagram for a sequencer block, titled "Sequencer Assembly Line (Example)". The diagram consists of four states (S1, S2, S3, S4) and three transitions (T1, T2, T3). State S1 is "Ground_State", S2 is "Part_finished", S3 is "Conveyor_right", and S4 is "Remove_part". Transitions T1, T2, and T3 are labeled "ini_occupied", "acknowledged", and "Final_Ass..." respectively.

The "Block settings" dialog box is open, showing the "Compile / Save" tab. The dialog has three tabs: "Compile / Save", "Messages", and "Process Diagnostics". The "Compile / Save" tab contains the following settings:

- FB Parameters:**
 - Minimum (<=V4.x)
 - Standard (<=V4.x)
 - Maximum (<=V4.x)
 - User-defined (V5.x)
- Interface Description:**
 - Structure arrays
 - Individual structures
 - Download to PLC
- Executability:**
 - Full code
 - Standard FC required (>=V4.x) (V5.x: FC72; V4.x: FC70, 71, 72)
 - FC number:
- Warnings:**
 - None
 - All
- Use as defaults for new blocks
- Sequencer Properties:**
 - Criteria analysis data in DB
 - Skip steps
 - Acknowledge errors
 - Synchronization (>=V4.x)
 - Permanent processing of all interlocks in manual operation
 - Lock operating mode selection (V5.x)

The dialog box has "OK", "Cancel", and "Help" buttons at the bottom. The status bar at the bottom right shows "modified".

Страница Compile / Save (Компиляция/Сохранение) (2)

The screenshot shows the SIMATIC Manager interface with the 'Block settings' dialog box open. The main window displays a ladder logic diagram for a sequencer assembly line. The diagram consists of four sequencer steps (S1, S2, S3, S4) connected by transition times (T1, T2, T3). Step S1 is 'Ground_State', S2 is 'Part_finished', S3 is 'Conveyor_right', and S4 is 'Remove_part'. Transition times T1, T2, and T3 are labeled 'ini_occupied', 'acknowledged', and 'Final_Ass...' respectively.

The 'Block settings' dialog box is open, showing the 'Compile / Save' tab. The dialog has three tabs: 'Compile / Save', 'Messages', and 'Process Diagnostics'. The 'Compile / Save' tab is active and contains the following settings:

- FB Parameters:**
 - Minimum (<=V4.x)
 - Standard (<=V4.x)
 - Maximum (<=V4.x)
 - User-defined (V5.x)
- Interface Description:**
 - Structure arrays
 - Individual structures
 - Download to PLC
- Executability:**
 - Full code
 - Standard FC required (>=V4.x) (V5.x: FC72; V4.x: FC70, 71, 72)
 - FC number:
- Warnings:**
 - None
 - All
- Use as defaults for new blocks
- Sequencer Properties:**
 - Criteria analysis data in DB
 - Skip steps
 - Acknowledge errors
 - Synchronization (>=V4.x)
 - Permanent processing of all interlocks in manual operation
 - Lock operating mode selection (V5.x)

Buttons at the bottom of the dialog are 'OK', 'Cancel', and 'Help'. The status bar at the bottom of the main window shows 'Press F1 for help.' and 'PLC Symbolic Online Source file Interface modified'.

Страница Compile / Save (Компиляция/Сохранение) (3)

The screenshot shows the SIMATIC Manager software interface. The main window displays a ladder logic diagram for a sequencer assembly line. The diagram consists of four steps: S1 (Ground_State), S2 (Part_finished), S3 (Conveyor_right), and S4 (Remove_part). The steps are connected by transitions T1, T2, and T3. A blue arrow points to the 'Compile / Save' tab in the 'Block settings' dialog box.

The 'Block settings' dialog box is open, showing the 'Compile / Save' tab. The dialog has three tabs: 'Compile / Save', 'Messages', and 'Process Diagnostics'. The 'Compile / Save' tab is active and contains the following settings:

- FB Parameters:**
 - Minimum (<=V4.x)
 - Standard (<=V4.x)
 - Maximum (<=V4.x)
 - User-defined (V5.x)
- Interface Description:**
 - Structure arrays
 - Individual structures
 - Download to PLC
- Executability:**
 - Full code
 - Standard FC required (>=V4.x) (V5.x: FC72; V4.x: FC70, 71, 72)
 - FC number:
- Sequencer Properties:**
 - Criteria analysis data in DB
 - Skip steps
 - Acknowledge errors
 - Synchronization (>=V4.x)
 - Permanent processing of all interlocks in manual operation
 - Lock operating mode selection (V5.x)
- Warnings:**
 - None
 - All
- Use as defaults for new blocks

The dialog box has 'OK', 'Cancel', and 'Help' buttons at the bottom. The status bar at the bottom of the window shows 'IEC', 'Symbolic', 'Offline', 'Source file', and 'Interface modified'.

Страница Compile / Save (Компиляция/Сохранение) (4)

The screenshot shows the SIMATIC Manager software interface. The main window displays a ladder logic diagram for a sequencer assembly line. The diagram consists of four sequencer steps (S1, S2, S3, S4) connected by transitions (T1, T2, T3). S1 is labeled 'Ground_State', S2 is 'Part_finished', S3 is 'Conveyor_right', and S4 is 'Remove_part'. Transitions T1, T2, and T3 are labeled with their respective conditions: 'ini_occupied', 'acknowledged', and 'Final_Ass...'. The 'Block settings' dialog box is open, showing the 'Compile / Save' tab. The dialog has several sections:

- Compile / Save:**
 - FB Parameters:
 - Minimum (<=V4.x)
 - Standard (<=V4.x)
 - Maximum (<=V4.x)
 - User-defined (V5.x)
- Interface Description:**
 - Structure arrays
 - Individual structures
 - Download to PLC
- Executability:**
 - Full code
 - Standard FC required (>=V4.x) (V5.x: FC72; V4.x: FC70, 71, 72)
 - FC number:
- Warnings:**
 - None
 - All
- Use as defaults for new blocks
- Sequencer Properties:**
 - Criteria analysis data in DB
 - Skip steps
 - Acknowledge errors
 - Synchronization (>=V4.x)
 - Permanent processing of all interlocks in manual operation
 - Lock operating mode selection (V5.x)

Buttons: OK, Cancel, Help.

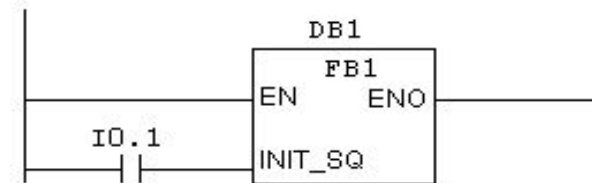
Press F1 for help.

TEC | Symbolic | Outline | Source file | Interface modified

Интеграция в OB1, типы вызова FB (1)

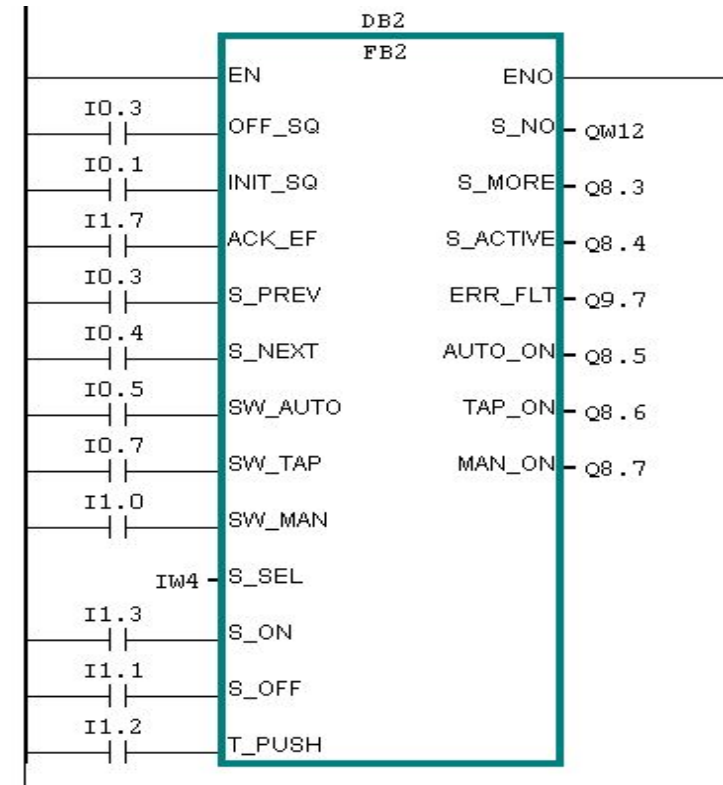
□ Минимум параметров вызова

- 1 input parameter for sequencer control



□ Параметры стандартного вызова

- 12 input parameters for sequencer control
- 7 output parameters for displaying operating states
- Input/output parameters do not need to be set (default values)

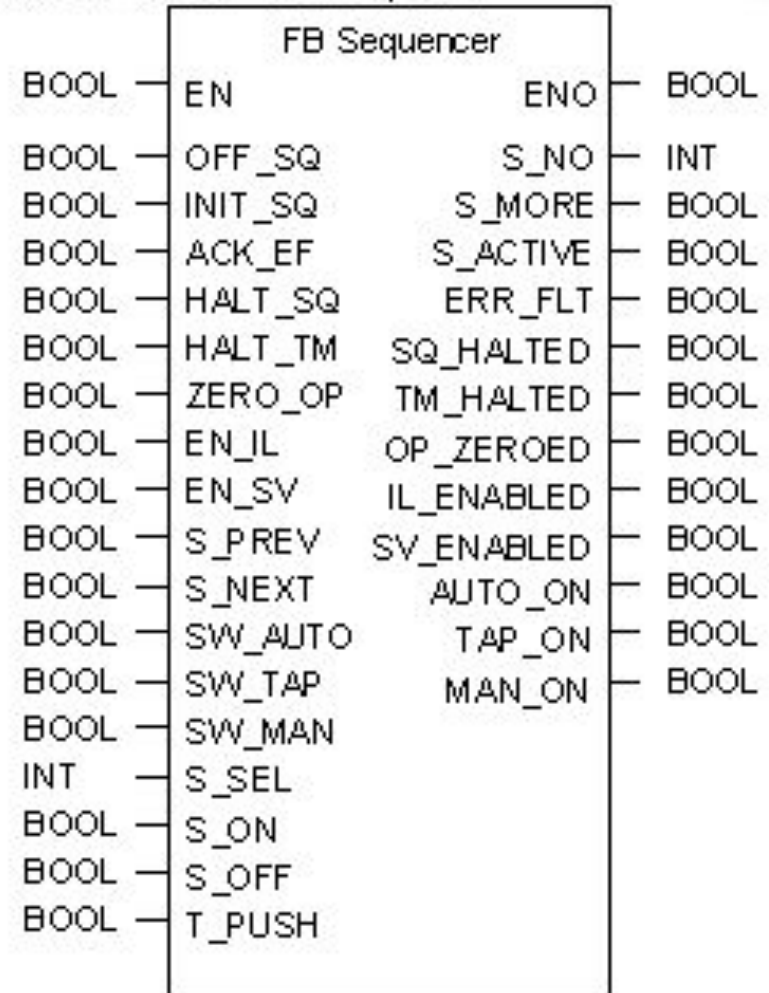


Типы вызова FB (2)

• Maximum call parameters

- 17 input parameters for sequencer control
- 12 output parameters for displaying operating states
- Parameters do not need to be set (default values)

Maximum \leq V4 DB Sequencer



Типы вызова FB (3)

Maximum V5

(user-defined)

- 29 input parameters for sequencer control
- 32 output parameters for displaying operating states
- Parameters need not be set
- Parameters that are not required can be deselected
- Additional parameters can be custom-defined

Interface	Name	Data Type
IN	OFF_SQ	Bool
	INIT_SQ	Bool
	ACK_EF	Bool
	REG_EF	Bool
	ACK_S	Bool
	REG_S	Bool
	HALT_SQ	Bool
	HALT_TM	Bool
	ZERO_OP	Bool
	EN_IL	Bool
	EN_SV	Bool
	EN_ACKREQ	Bool
	EN_SSKIP	Bool
	DISP_SACT	Bool
	DISP_SEF	Bool
	DISP_SALL	Bool
	S_PREV	Bool
	S_NEXT	Bool
	SW_AUTO	Bool
	SW_TAP	Bool
	SW_TOP	Bool
	SW_MAN	Bool
	S_SEL	INT
	S_SELOK	Bool
	S_ON	Bool
	S_OFF	Bool
	T_PREV	Bool
	T_NEXT	Bool
	T_PUSH	Bool
OUT		
IN_OUT		
STAT		

Interface	Name	Data Type
IN		
OUT	S_NO	INT
	S_MORE	Bool
	S_ACTIVE	Bool
	S_TIME	TIME
	S_TIMEOK	TIME
	S_CRITLOC	DWORD
	S_CRITLOCE	DWORD
	S_CRITSUP	DWORD
	S_STATE	WORD
	T_NO	INT
	T_MORE	Bool
	T_CRIT	DWORD
	T_CRITOLD	DWORD
	T_CRITFLT	DWORD
	ERROR	Bool
	FAULT	Bool
	ERR_FLT	Bool
	SQ_ISOFF	Bool
	SQ_HALTED	Bool
	TM_HALTED	Bool
	OP_ZEROED	Bool
	IL_ENABLED	Bool
	SV_ENABLED	Bool
	ACKREQ_ENAB	Bool
	SSKIP_ENABLE	Bool
	SACT_DISP	Bool
	SEF_DISP	Bool
	SALL_DISP	Bool
	AUTO_ON	Bool
	TAP_ON	Bool
	TOP_ON	Bool
	MAN_ON	Bool
IN_OUT		
STAT		

Установка пользовательских параметров (V5.0 и выше)

Input parameter set:

Interface	Name	Data Type	Initial Value	Comment
OFF_SQ	OFF_SQ	Bool	FALSE	Turn sequencer off (OFF_SEQUENCE)
INIT_SQ	INIT_SQ	Bool	FALSE	Set sequencer to initial state (INIT_SEQUENCE)
ACK_EF	ACK_EF	Bool	FALSE	Acknowledge all errors and disturbances (ACKNOWLEDG)
SW_AUTO	SW_AUTO	Bool	FALSE	Set automatic mode (SWITCH_MODE_AUTOMATIC)
SW_TAP	SW_TAP	Bool	FALSE	Set inching mode 'T and T_PUSH' (SWITCH_MODE_TRAN)
SW_MAN	SW_MAN	Bool	FALSE	Set manual mode (SWITCH_MODE_MANUAL)
S_SEL	S_SEL	INT	0	Select step for display in S_NO (STEP_SELECT)
S_ON	S_ON	Bool	FALSE	Activate step displayed in S_NO (STEP_ON)
S_OFF	S_OFF	Bool	FALSE	Deactivate step displayed in (STEP_OFF)
T_PUSH	T_PUSH	Bool	FALSE	Enable transition to switch in SW_TAP and SW_TOP (PUS)
anal_addr	anal_addr	int	0	
frequency	frequency	Bool	FALSE	
upper_limit	upper_limit	Real	0.000000E+0	
threshold_high	threshold_hig	int	0	
threshold_low	threshold_lo	int	0	

Output parameter set:

Interface	Name	Data Type	Initial Value	Comment
S_NO	S_NO	INT	0	Step number (STEP_NUMBER)
ERR_FLT	ERR_FLT	Bool	FALSE	Group error interlocks or supervisions (IL_ERROR_OR_S)
AUTO_ON	AUTO_ON	Bool	FALSE	SW_AUTO mode is active (AUTOMATIC_IS_ON)
TAP_ON	TAP_ON	Bool	FALSE	SW_TAP mode is active (T_AND_PUSH_IS_ON)
MAN_ON	MAN_ON	Bool	FALSE	SW_MAN mode is active (MANUAL_IS_ON)
weight_bcd	weight_bcd	word	W#16#0	
trash	trash	int	0	
trash				

Определенные пользователем статические и временные переменные (V5.0 и выше)

Статические переменные

	Name	Data Type	Initial Value	Comment
Interface				
IN				
OUT				
IN_OUT				
STAT				
AuxFI_GrSt	AuxFI_GrSt	Bool	FALSE	Auxiliary flag ground state
AuxFI_Loc1	AuxFI_Loc1	Bool	FALSE	Auxiliary flag location 1
AuxFI_Loc2	AuxFI_Loc2	Bool	FALSE	Auxiliary flag location 2
AuxFI_Loc3	AuxFI_Loc3	Bool	FALSE	Auxiliary flag location 3
weight_int	weight_int	int	0	weigth stored as integer number
S_DISPLAY	S_DISPLAY	INT	0	Internal S_NO display (STEP_DISPLAY_INTERNAL)
S_SEL_OLD	S_SEL_OLD	INT	0	Last S_SEL value (S_SEL_PREVIOUS_VALUE)
S_DISPIDX	S_DISPIDX	BYTE	B#16#0	Index of the step displayed in S_NO (STEP_DISPLAY_I
T_DISPIDX	T_DISPIDX	BYTE	B#16#0	Index of the transition displayed in T_NO (TRANSITION
MOP	MOP	STRUCT		Mode (MODE_OF_OPERATION)
TICKS	TICKS	STRUCT		Clock speed (TIME_TICKS)
SQ_FLAGS	SQ_FLAGS	STRUCT		Sequencer flags (SEQUENCE_FLAGS)
MOP				

Временные переменные

	Name	Data Type	Comment
Interface			
IN			
OUT			
IN_OUT			
STAT			
TEMP			
dummy1	dummy1	word	clipboard
dummy2	dummy2	dint	reserved

Состояние при обзоре и выводе отдельной страницы

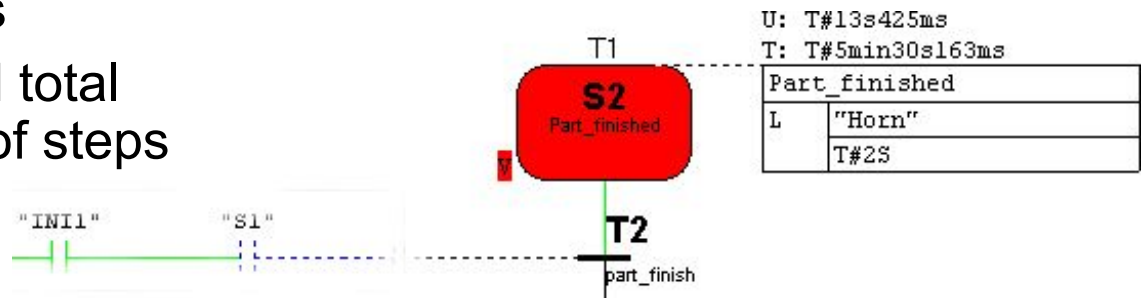
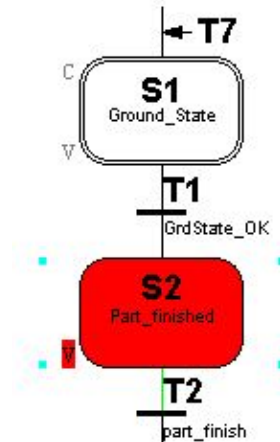
The **test function** visualizes **evolution** and **disturbances** of the sequencer.

□ Overview

- Active and disturbed steps
- Valid and satisfied transitions
- Skipped steps and transitions

□ Single Page

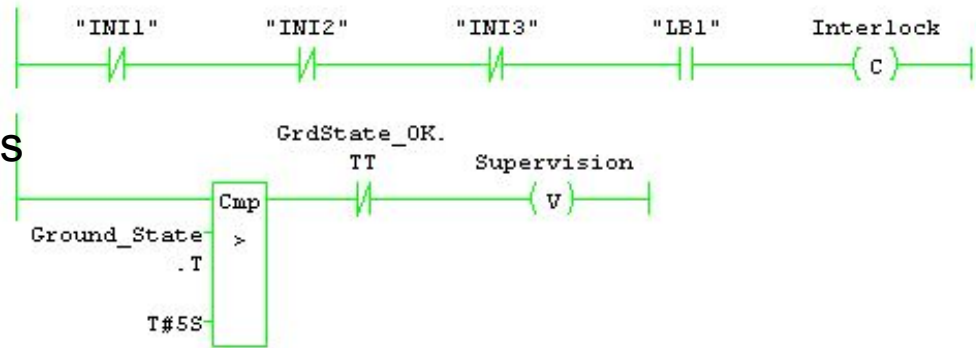
- Overview display
- Program status of transitions
- Status of actions
- Undisturbed and total activation time of steps



Состояние при наблюдении отдельного шага (детальный вид)

Single step display

- ▣ Active and disturbed steps
- ▣ Valid and satisfied transitions
- ▣ Skipped steps and transitions

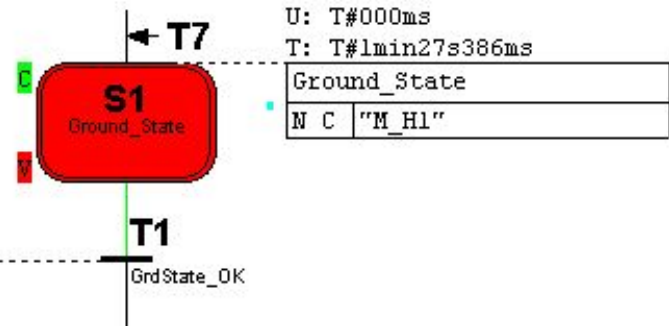


Состояние программы в LAD/FBD для

- ▣ Супервизора, блокировки, transition

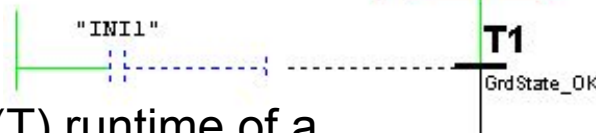
Status of actions

- ▣ Action block



Timers

- ▣ Undisturbed (U) and total (T) runtime of a step



Активация тестовых функций

1. S7-GRAPH FB+DB in CPU identical with S7 project (accessible nodes without S7 project)

2. Activate

3. Status of sequencer for FB x is active in all open windows

The screenshot displays the SIMATIC Manager interface for an S7-GRAPH project. The top window shows the 'Monitor' menu with 'Control Sequencer...' selected. The main workspace is divided into two windows. The left window shows a ladder logic diagram with a 'Cmp' block and 'GrdState' variable. The right window shows a similar diagram with a red 'S1' sequencer block and a data table for its parameters. A blue arrow points from the 'Monitor' menu to the 'Cmp' block, and another blue arrow points from the text '3. Status of sequencer...' to the 'S1' block.

U:	T#000ms
T:	T#8min55s797ms
Ground_State	
N C	"M_H1" 1

Состояние последовательности и режим программирования

The screenshot displays the SIMATIC Manager interface for a Step 7 Sequential Control System. The main window shows a ladder logic diagram with the following elements:

- Interlock:** A normally closed contact labeled (C).
- Supervision:** A normally closed contact labeled (V).
- Step S7:** A green rounded rectangle labeled "S7 Step7".
- Timer T6:** A timer block connected to Step S7, with parameters:

U:	T#26s737ms
T:	T#26s737ms
Remove_raw_piece	
R:	AuxFl_Locl
	0
- Transition T7:** A transition labeled "T7" with a normally open contact labeled "INI1".
- Step S1:** A transition labeled "S1" leading from T7.

A context menu is open over Step S7, showing the following options:

- Monitor (Ctrl+F7)
- Control Sequencer...
- Synchronization

The status bar at the bottom indicates the system is in "Automatic" mode.

Состояние последовательности, наблюдение и изменение переменных

The screenshot displays the SIMATIC Manager interface for a S7 Sequential Control System. The main window shows a ladder logic diagram for Step S5, which is currently active. The diagram includes an interlock (C), a comparison instruction (Cmp) comparing the variable 'Put_raw_piec' to a timer 'T#15S', and a supervision signal (V). A blue arrow points from the 'Supervision' signal in the diagram to the 'Monitoring and Modifying Variables' window.

The 'Monitoring and Modifying Variables' window shows a table of variables:

	Address	Symbol	Displ	Status value	Modi
1	Q 20.4	"H4"	BOOL	false	
2	Q 20.5	"K1_CONV"	BOOL	false	
3	Q 20.6	"K2_CONVL"	BOOL	false	
4	I 16.0	"LB1"	BOOL	true	
5	PIW 304		DEC	0	

The variable 'LB1' is highlighted in green, indicating it is active. The status bar at the bottom shows the system is in 'RUN' mode.

Управляющая последовательность(1)

The screenshot displays the SIMATIC Manager interface for a Sequential Control System. The main window shows a ladder logic diagram with a sequence of steps (S1 to S10) and various interlocks and synchronization elements. A blue arrow points to the 'Control Sequencer...' option in the 'Monitor' menu. A dialog box titled 'Sequencer Control: FB100,DB100' is open, showing the following settings:

- Mode: Acknowledge, Initialize, Disable
- Automatic (AUTO):
- Manual (MAN):
- Inching (TAP):
- Automatic or switch to next (TOP):
- Step number: 1
- Buttons: Activate, Deactivate, Continue
- Error display: Interlock: Supervision:
- Buttons: More >>, Close, Help

The ladder logic diagram shows a sequence of steps: S1 (Ground_State), S2, S9, and S10. Transitions T1, T7, T11, and T10 are shown. Interlocks are labeled 'KI_CONVR' and 'CONVL'. A synchronization element is labeled 'Interlock'. The status bar at the bottom shows 'Manual' mode selected.

Управляющая последовательность(2)

The screenshot displays the SIMATIC Manager interface for a Sequential Control System. The main window shows a ladder logic diagram with a sequencer control block (S1) and various transition elements (T1, T7, T11, T10). A dialog box titled "Sequencer Control: FB100,DB100" is open, showing control parameters such as Mode (Manual selected), Step number (1), and Interlock status (checked).

Sequencer Control: FB100,DB100

Mode: Acknowledge Initialize Disable

Automatic (AUTO) Step number: 1

Manual (MAN) Activate Deactivate

Inching (TAP) Continue

Automatic or switch to next (TOP)

Error display: Interlock: Supervision: More >>

Close Help

U: T#8min38s326ms
T: T#9min36s806ms
Ground_State

Interlock: "R1_CONV" "R2_CONVL" (C)

Trans1, Trans11

IEC Symbolic **Manual** Status FB

Управляющая последовательность(3)

The screenshot displays the SIMATIC Manager interface for a Sequential Control System (S7). The main window shows a ladder logic diagram with steps 1 through 10. Step 1 is highlighted in green, indicating it is the current active step. A dialog box titled "Sequencer Control: FB100,DB100" is open, allowing for manual control of the sequencer.

Sequencer Control: FB100,DB100

Mode:

-
-
-

Automatic (AUTO) Step number:

Manual (MAN)

Inching (TAP)

Automatic or switch to next (TOP)

Error display:

Interlock: Supervision:

Parameters:

- Skip steps
- Acknowledge errors
- Stop sequencer
- Stop timers
- Always process interlocks
- Always process transitions
- Actions active
- Supervision active
- Interlocks active

The background diagram shows a sequencer with steps S1 through S10 and transitions T1 through T11. Step S1 is currently active and is labeled "Ground_State". Transitions T1, T11, and T7 are visible. The status bar at the bottom indicates the system is in "Manual" mode.

Compile: @S7Graph\SIMATI... 00 - <Offline>

IEC Symbolic Manual Status FB

Управляющая последовательность (4)

The screenshot displays the SIMATIC Manager interface for a S7 Sequential Control System. The main window title is "GRAPH: S7 Sequential Control System - [FB100,DB100 (Step S1) -- S7Graph\SIMATIC -MPI2\CPU 412-2 DP\... ONLINE]". The menu bar includes File, Edit, Insert, PLC, Debug, View, Options, Window, and Help. The toolbar contains icons for file operations, monitoring, and debugging.

The central focus is the "Sequencer Control: FB100,DB100" dialog box. It features the following sections:

- Mode:** Includes buttons for Acknowledge, Initialize, and Disable. Checkboxes for Automatic (AUTO), Manual (MAN), Inching (TAP), and Automatic or switch to next (TOP). The Manual (MAN) checkbox is checked. A "Step number" field is set to 1. Buttons for Activate, Deactivate, and Continue are present.
- Error display:** Includes Interlock and Supervision status indicators, both shown as green squares. A "<< Reduced" button is located below.
- Parameters:** A list of checkboxes for Skip steps, Acknowledge errors, Stop sequencer, Stop timers, Always process interlocks, Always process transitions, Actions active, Supervision active, and Interlocks active. The last three are checked.

Buttons for "Close" and "Help" are at the bottom of the dialog. The background shows a ladder logic diagram with steps 1-10. Step 1 is highlighted in green. A detailed view of step 1 shows transition T7 leading to step 1, and transition T11 leading to step 9. Timers T1 and T11 are also visible. The status bar at the bottom indicates "Manual" mode.

Compile: @S7Graph\SIMATIC
 Displays a dialog box for controlling the sequencer.

Синхронизация (1)

The screenshot displays the SIMATIC Manager interface for a SIMATIC S7 PLC. The main window shows a ladder logic diagram with several steps (S5, S6, S8) and transitions (T5, T8, T9). Step S5 is highlighted in yellow, indicating it is a synchronization point. A dialog box titled "Synchronization" is open, providing instructions on how to use the synchronization feature. The dialog box contains the following text:

Synchronization

The steps shown in yellow are synchronization points proposed by the system. Select a step (or several steps in simultaneous branches). The steps do not need to be yellow.

With "Activate", you change from the currently active steps to the selected steps. With "Update", you can refresh the proposed steps.

Buttons: Update, Activate, Cancel, Help

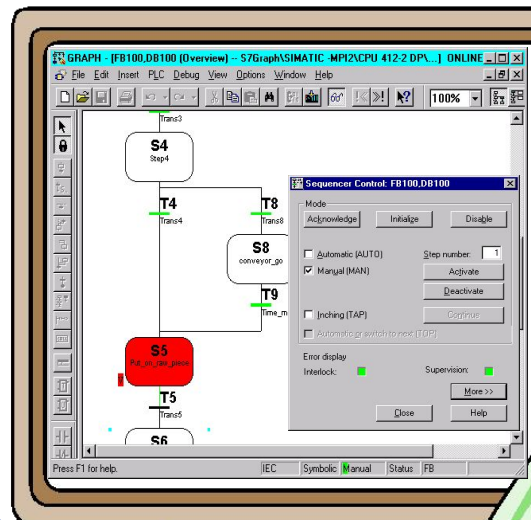
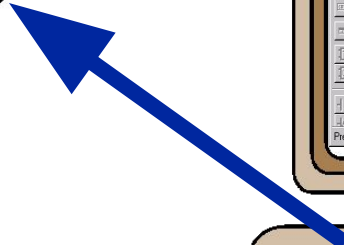
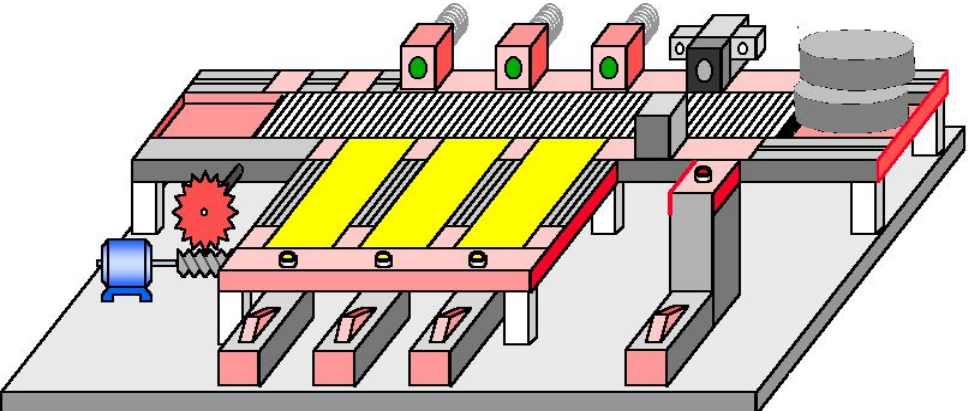
The background diagram includes the following elements:

- Step S5:** Put_on_raw_piece (highlighted in yellow)
- Step S6:** conveyor_left
- Step S8:** conveyor_go
- Transition T5:** Trans5
- Transition T8:** Trans8
- Transition T9:** Trans9
- Timers:** U: T#000ms, T: T#000ms, U: T#15s002ms, T: T#1min45s997ms, U: T#000ms, T: T#000ms, T#1S
- Labels:** "K1_CONVR", "LB1", "K2_CONVL"

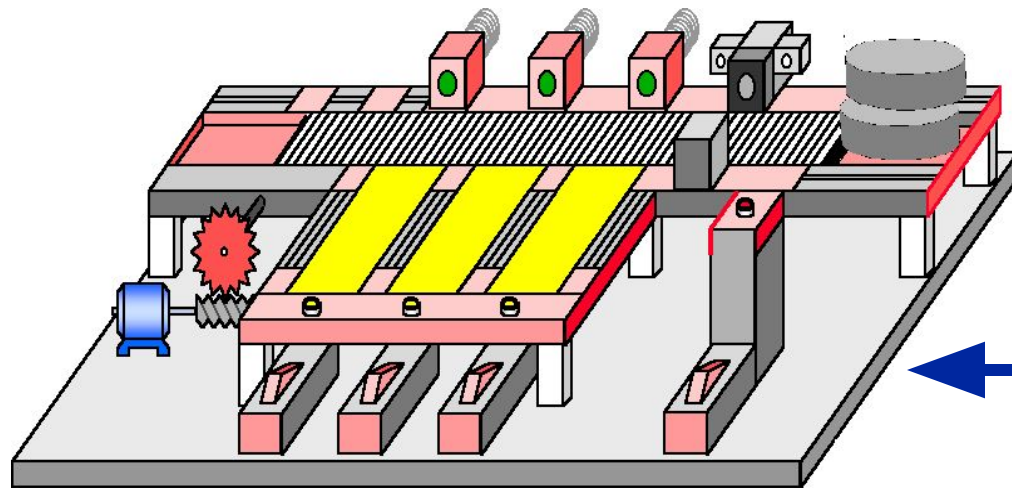
Синхронизация (2)

The screenshot displays the SIMATIC Manager interface for a ladder logic program. The main window shows a sequence of steps: S5 (highlighted in yellow), S6, and Step7. Step S5 is labeled 'Put_on_raw_piece' and includes a timer T9 with settings U: T#15s002ms and T: T#1h5min6s102ms. Step S6 is labeled 'conveyor_left' and includes a timer T5 with settings U: T#000ms and T: T#000ms. A 'Synchronization' dialog box is open in the foreground, providing instructions on how to use the yellow highlighting and the 'Activate' button. The dialog text reads: 'The steps shown in yellow are synchronization points proposed by the system. Select a step (or several steps in simultaneous branches). The steps do not need to be yellow. With "Activate", you change from the currently active steps to the selected steps. With "Update", you can refresh the proposed steps.' The dialog has buttons for 'Update', 'Activate', 'Cancel', and 'Help'. The software title bar indicates the project is 'GRAPH - [FB100,DB100 (single page) -- S7Graph\SIMATIC -MPI2\CPU 412-2 DP\...] ONLINE'.

Упражнение (1): Запуск функции 'Control Sequencer'



Упражнение (2): Start-Up Using Self-Defined Parameter Set



DB100		FB100	
..	EN		
..	OFF_SQ		
.1	INIT_SQ		
..	ACK_EF		
.5	SW_AUTO		
..	SW_TAP	S_NO	...
..	SW_TOP	ERR_FLT	Q5.7
.7	SW_MAN	AUTO_ON	Q4.5
..	S_SEL	TAP_ON	...
..	S_ON	TOP_ON	...
..	S_OFF	MAN_ON	Q4.7
..	T_PUSH	ENO	