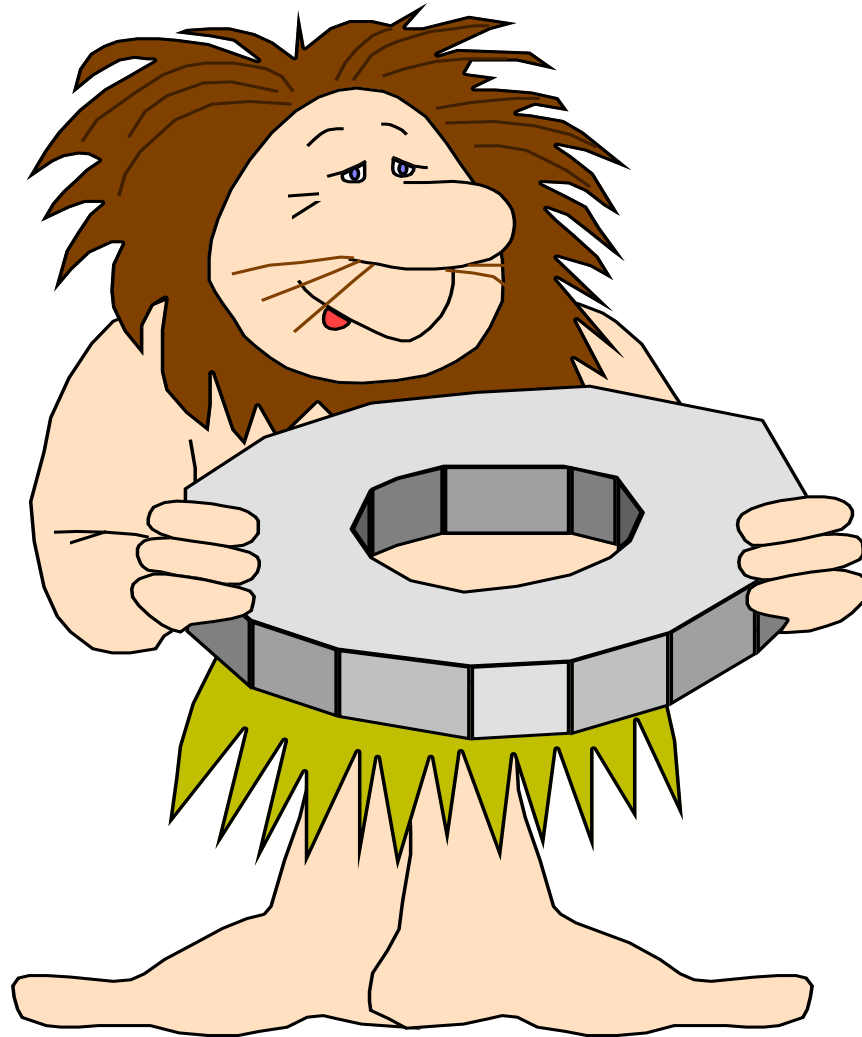


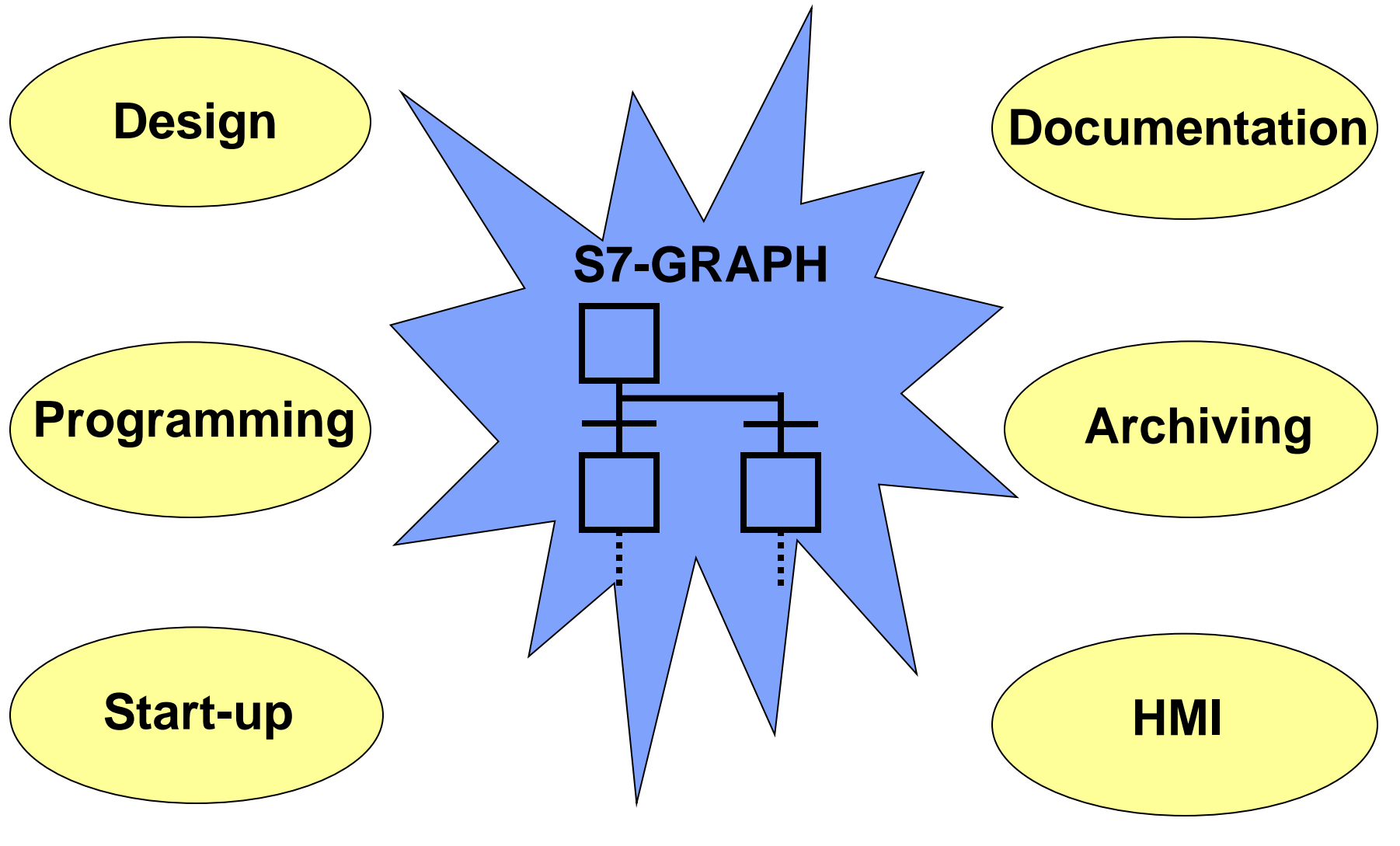
Introduction



Course Contents / Course Aims

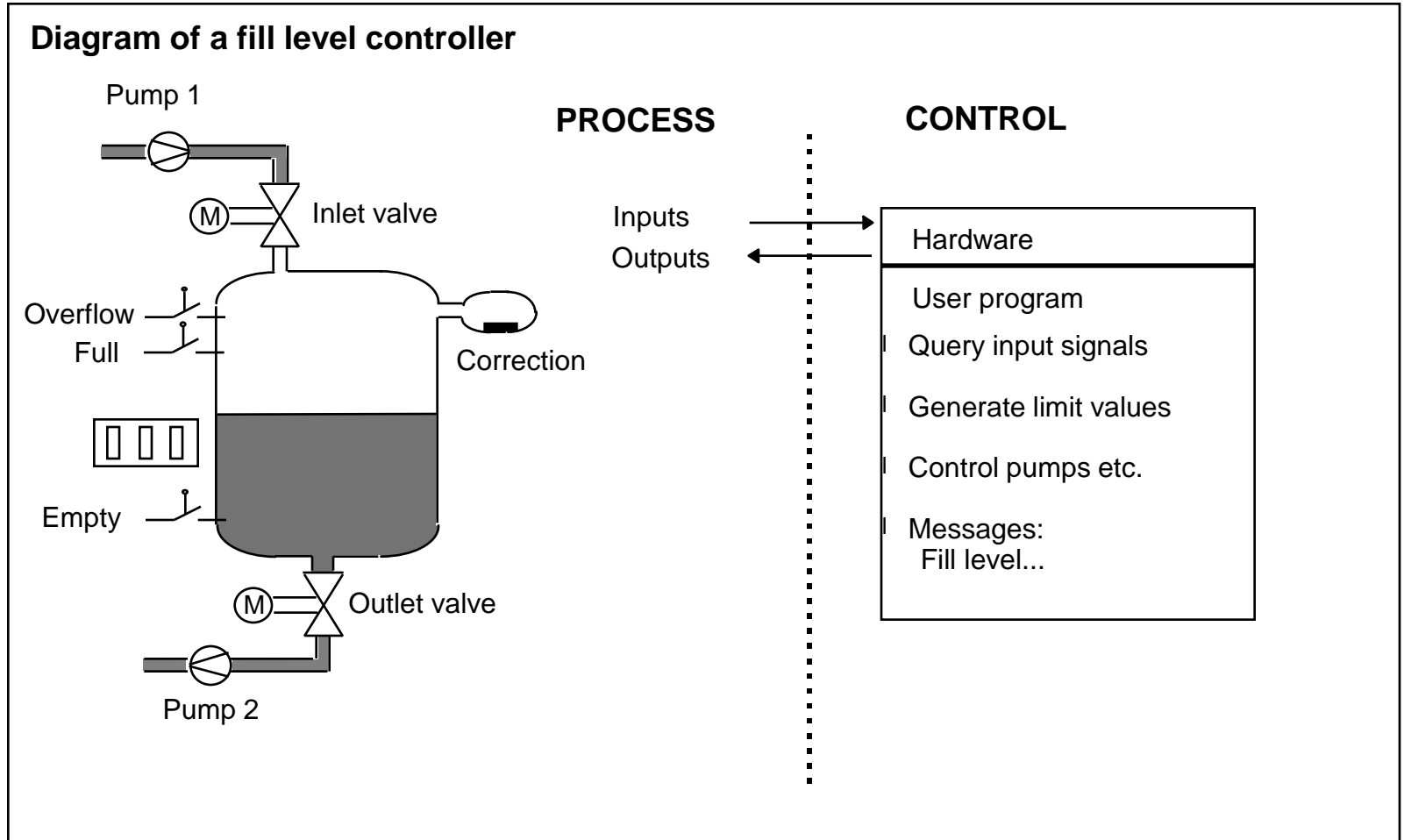


S7-GRAPH: Tool for Graphics Support for Sequencers IEC 1131-3-Compliant



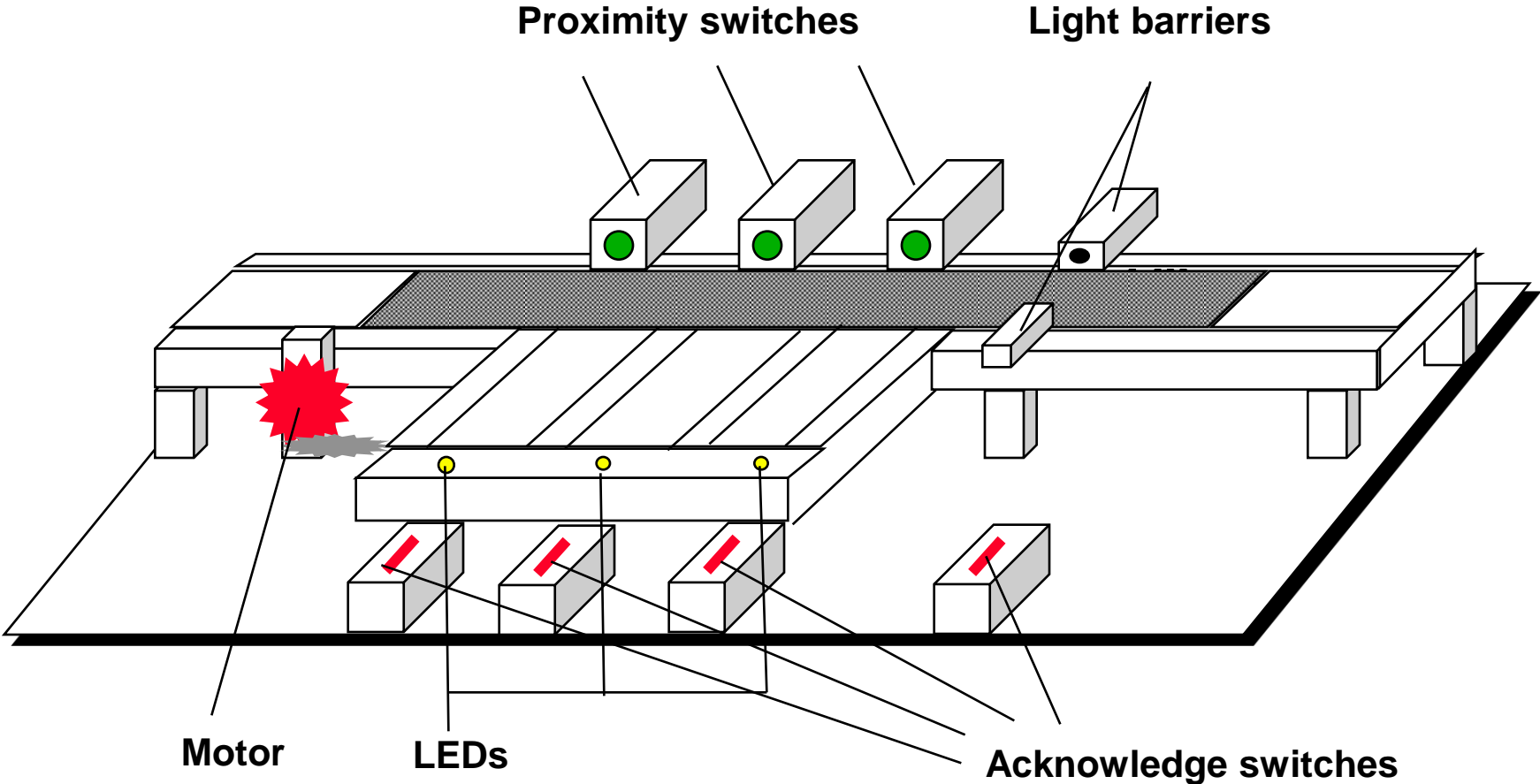
Principle of a Logic Control System Program

Example of fill level controller



Principle of a Sequential Control System Program

Example of an assembly line



Decision Support for Sequential Control System (Sequencer)

Process	
Step-by-step execution of the process	
No	Yes
<p>Control program: Programmed as logic control system (with STEP 7)</p> <p>Examples:</p> <ul style="list-style-type: none"> - Fill level controller - Lift controller 	<p>Control program: Programmed as logic control system (with S7-GRAPH)</p> <p>Examples:</p> <ul style="list-style-type: none"> - Assembly line - Car wash - Traffic light control - Production processes - Machine processes - Process engineering

Differentiation from Other Tools

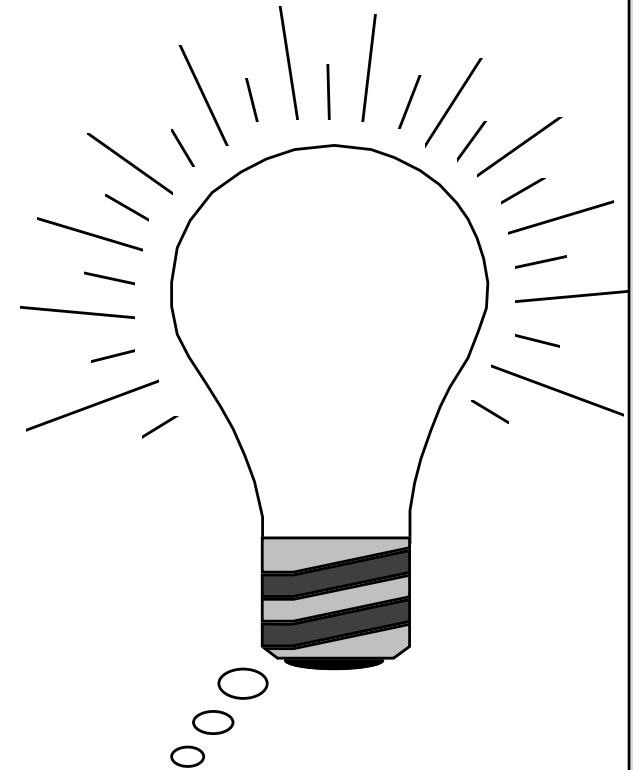
❑ What applications are sequential control systems suitable for?

- **Sequential processes: Tasks controlled by signals or timers**
- **Time-critical processes that are susceptible to faults**
 - Methodical procedure improves transparency
 - Program is easier to understand
 - Maintenance, servicing, diagnostics

Advantage: Fast error removal

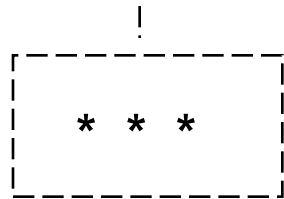
❑ Application examples

- Car wash
- Assembly line
- Assembly conveyor
- Machine tools
- Transfer line
- Presses
- Process engineering
- Packaging technology
- Process control and monitoring



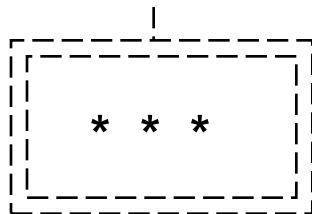
Structural Elements of a Sequencer: Steps

Basic elements of a sequencer to comply with IEC 1131-3



Step : Graphic representation with directed links

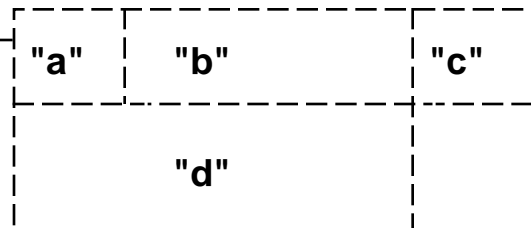
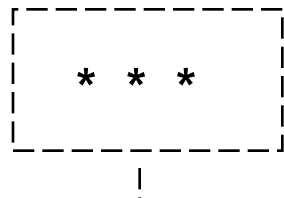
" * * * " = Step name



Initial step: Graphic representation with directed links

" * * * " = Initial step name

Action block with actions



"a": Identifier character (operation e.g. S)

"b": Action name (e.g. MOTOR 1)

"c": Boolean "display" variable

"d": Action in: (e.g. declaration + STL code)

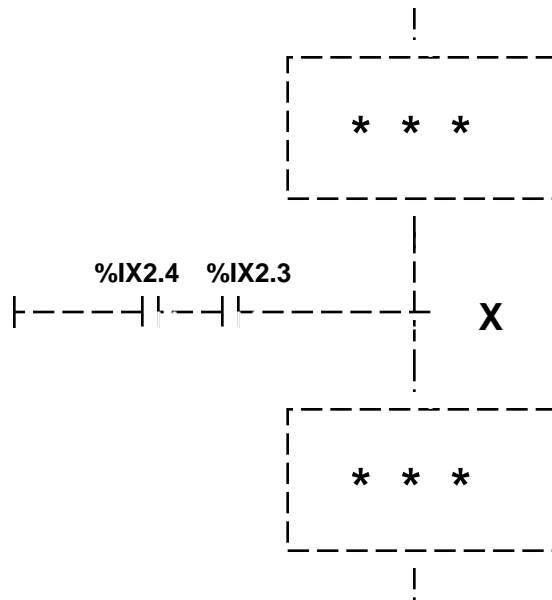
Actions are controlled according to specific rules that are described in detail in the IEC1131-3 standard.

In general, they are:

1. Action block for activation
2. Enable / interlock of individual actions
3. Step switching

Structural Elements of a Sequencer: *Transition*

Basic elements of a sequencer to comply with IEC 1131-3



Extract from IEC 1131-3:

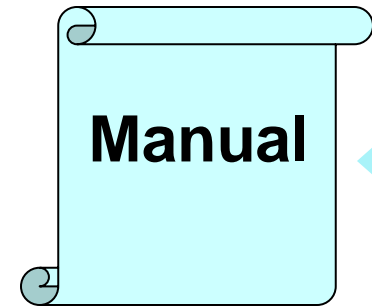
Transitions

A transition represents the condition whereby control passes from one or more steps preceding the transition to one or more successor steps along the corresponding directed link. The transition shall be represented by a horizontal line across the vertical directed link. The direction of evolution following the directed links shall be from the bottom of the predecessor step(s) to the top of the successor step(s). Each transition shall have an associated transition condition which is the result of the evaluation of a single Boolean expression.

Angaben %IX2.4 und %IX2.5 stehen für entsprechende absolute oder symbolische Operanden
Verbindung mit der Kettenstruktur : Ein Netzwerk in der Sprache KOP

Additional graphical elements, such as branches (alternative, simultaneous), jumps and loops are described in subsequent chapters of this manual.

S7-GRAPH Software Package (Multilingual)

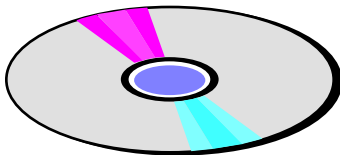


Manual

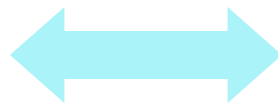


incl. ex.

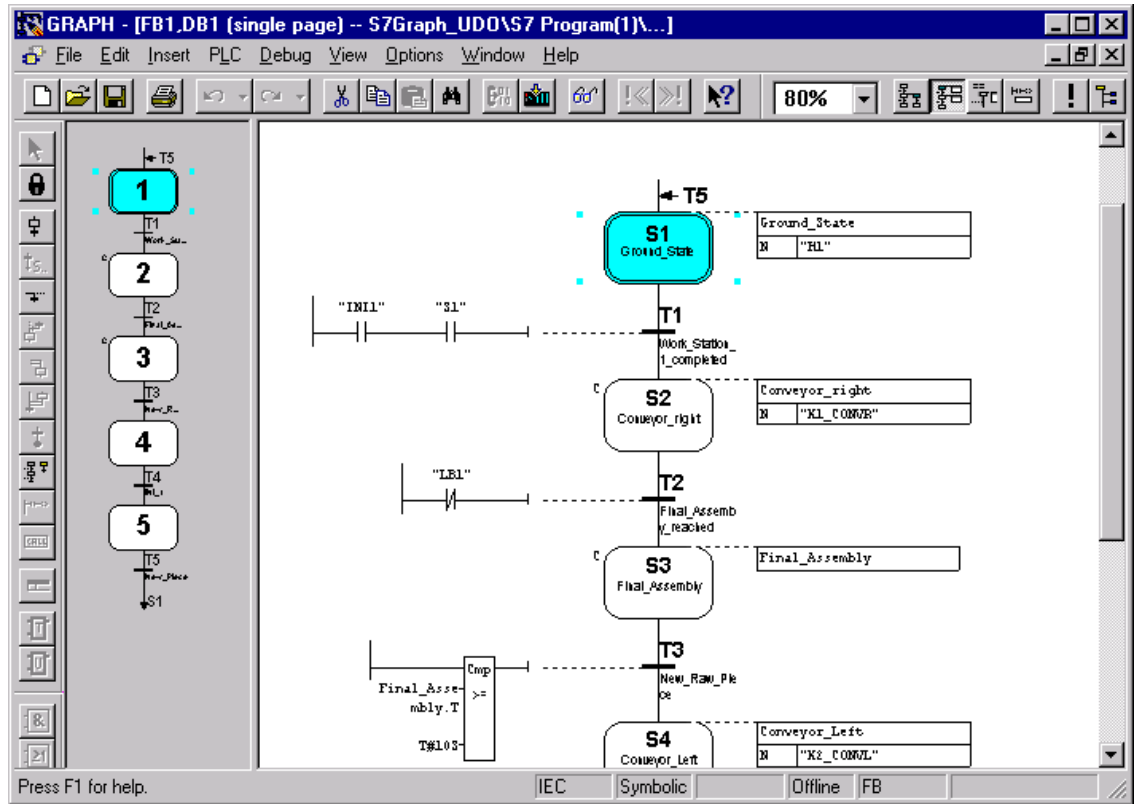
LAD, FBD



Tool



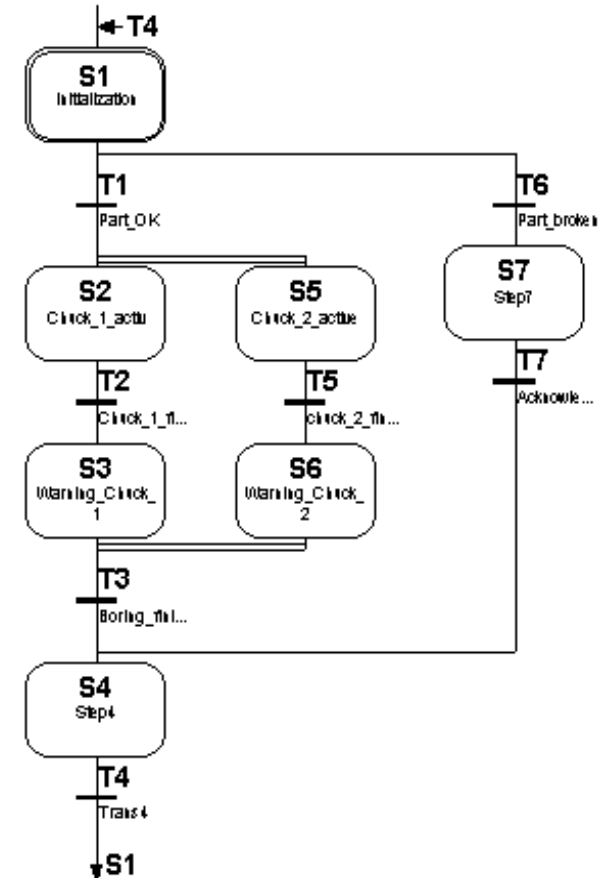
incl. ex.



Basis: SIMATIC Manager with STEP 7 in LAD, FBD, STL

Characteristics of S7-GRAPH

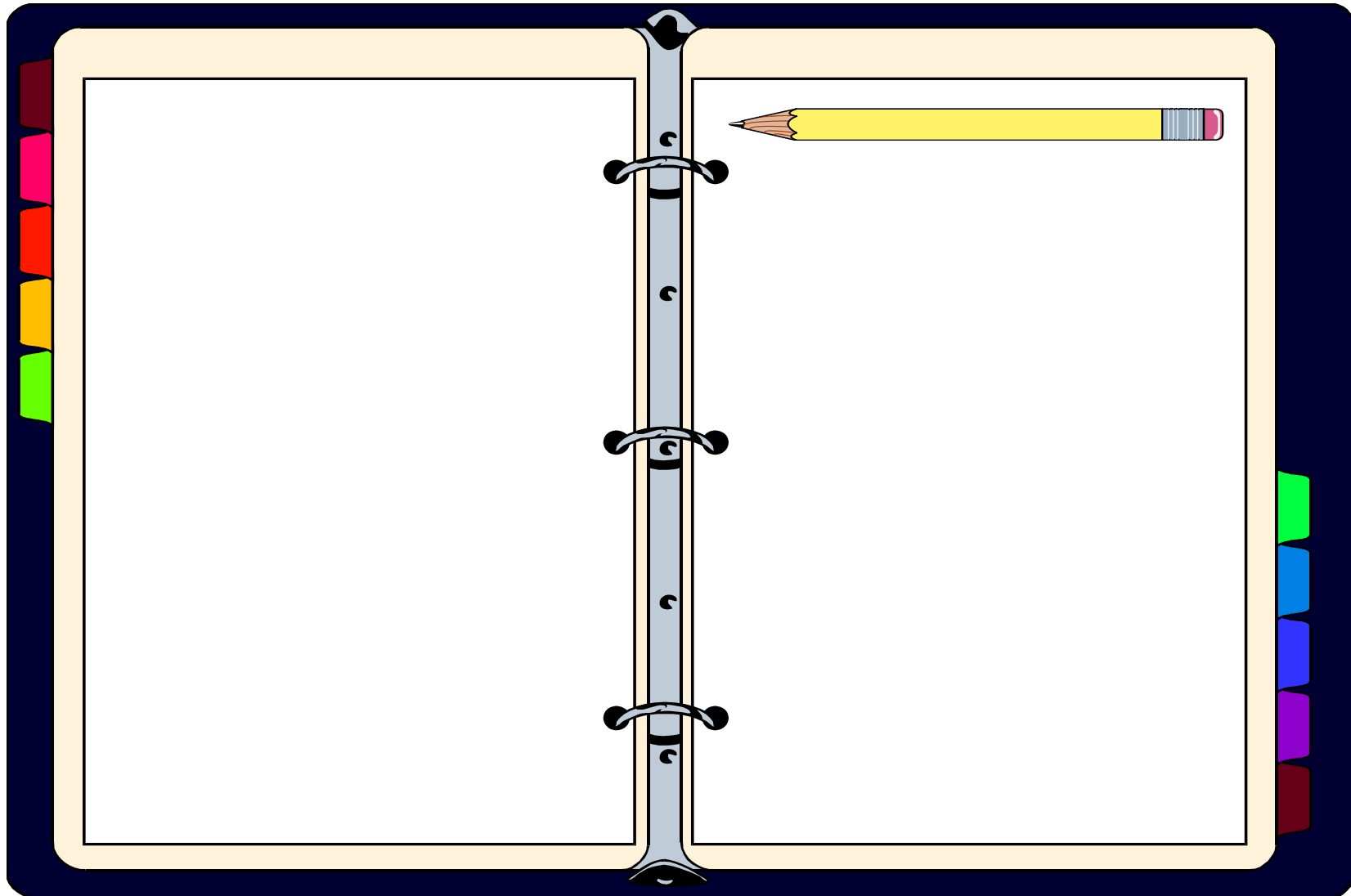
- **Simple, user-friendly description of sequential processes**
 - Programming sequencers to DIN EN 6 1131 (corresponds to IEC 1131-3)
 - Can be used for S7-300 (CPU314 and higher) and S7-400
 - Simple configuration (full graphics, windows technology, zoom functionality)
 - Processing speed independent of the sequencer length
 - Easy interfacing with process visualization and diagnostics
 - > "ProAgent for OP" (OP25...OP37)
 - > "ProAgent for WinCC" (OP47, FI25 or PCs/PGs)
 - > "ProDiag" (Transline 2000)
 - Process synchronization can be activated in S7-GRAPH



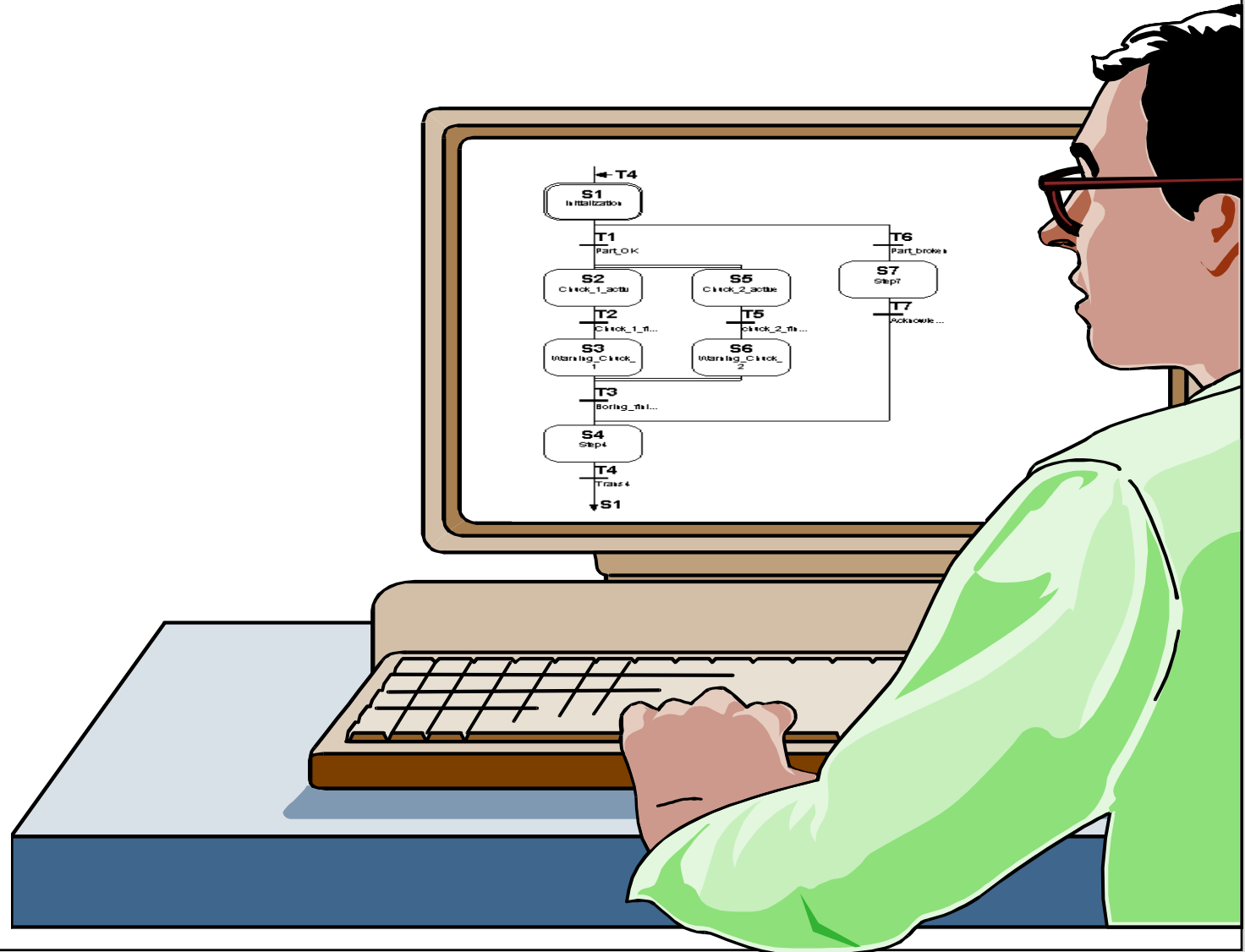
Exercise: S7-GRAPH Example of a Drill (1)



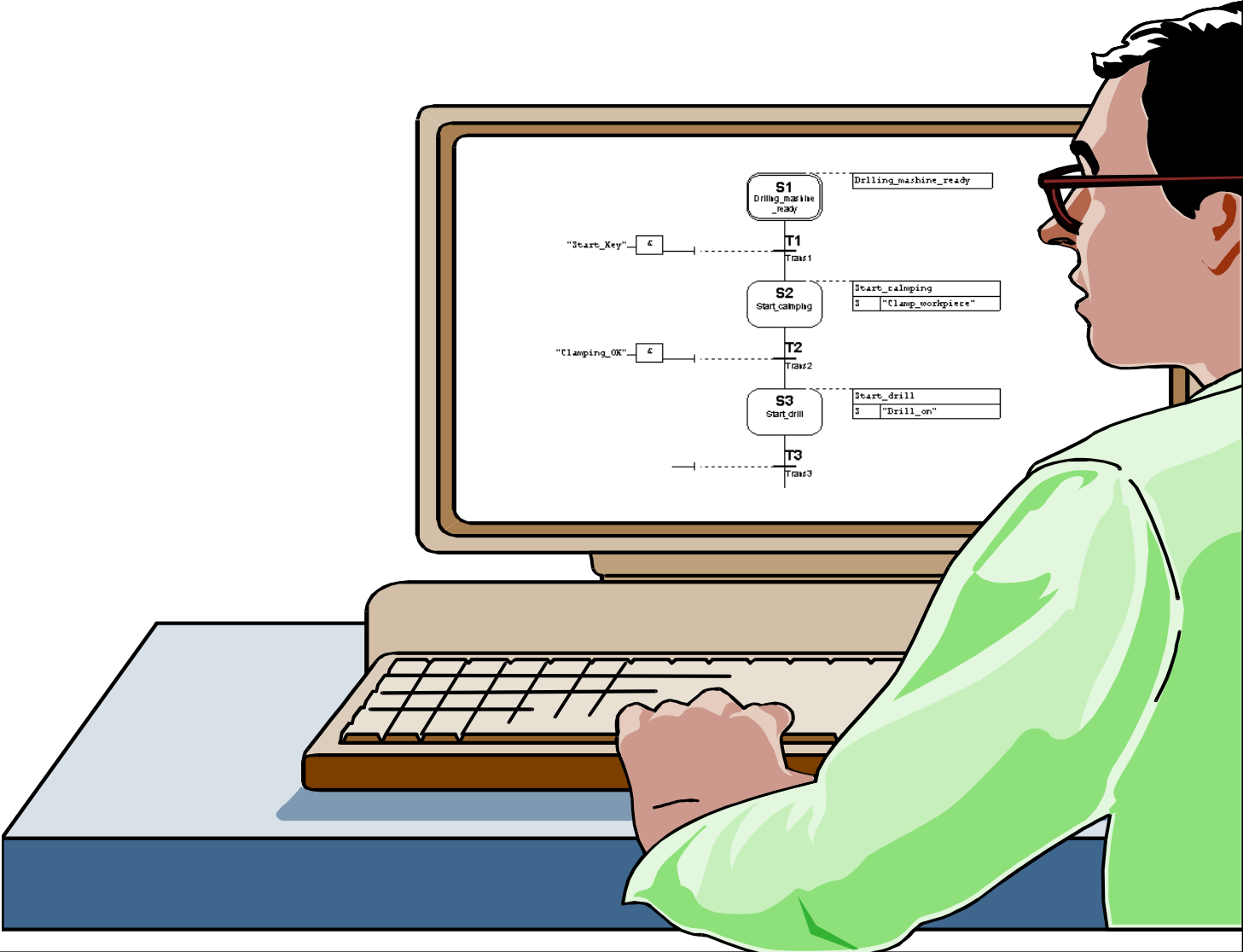
Exercise: S7-GRAPH Example of a Drill (2)



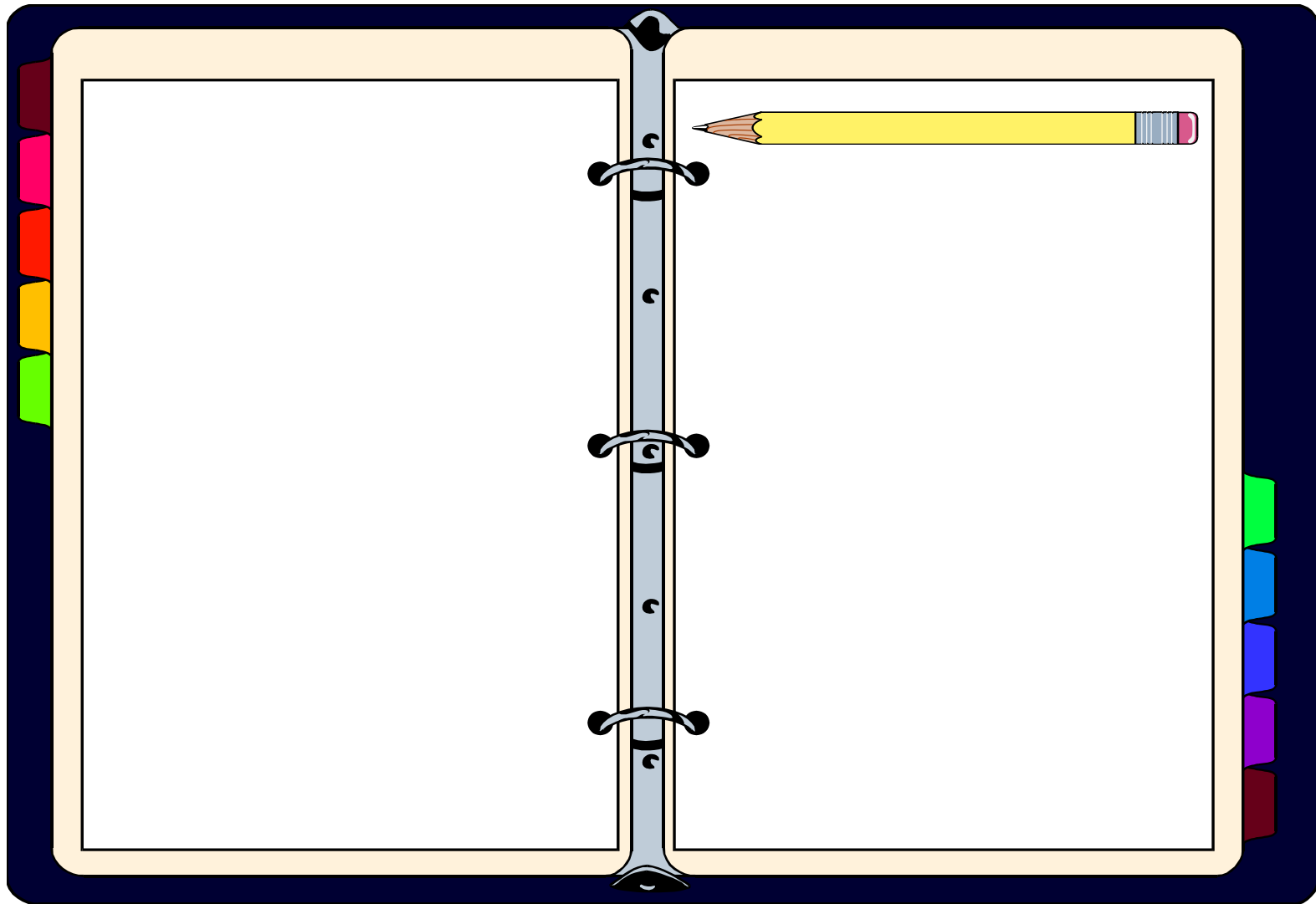
Exercise: S7-GRAPH Example of a Drill (3)



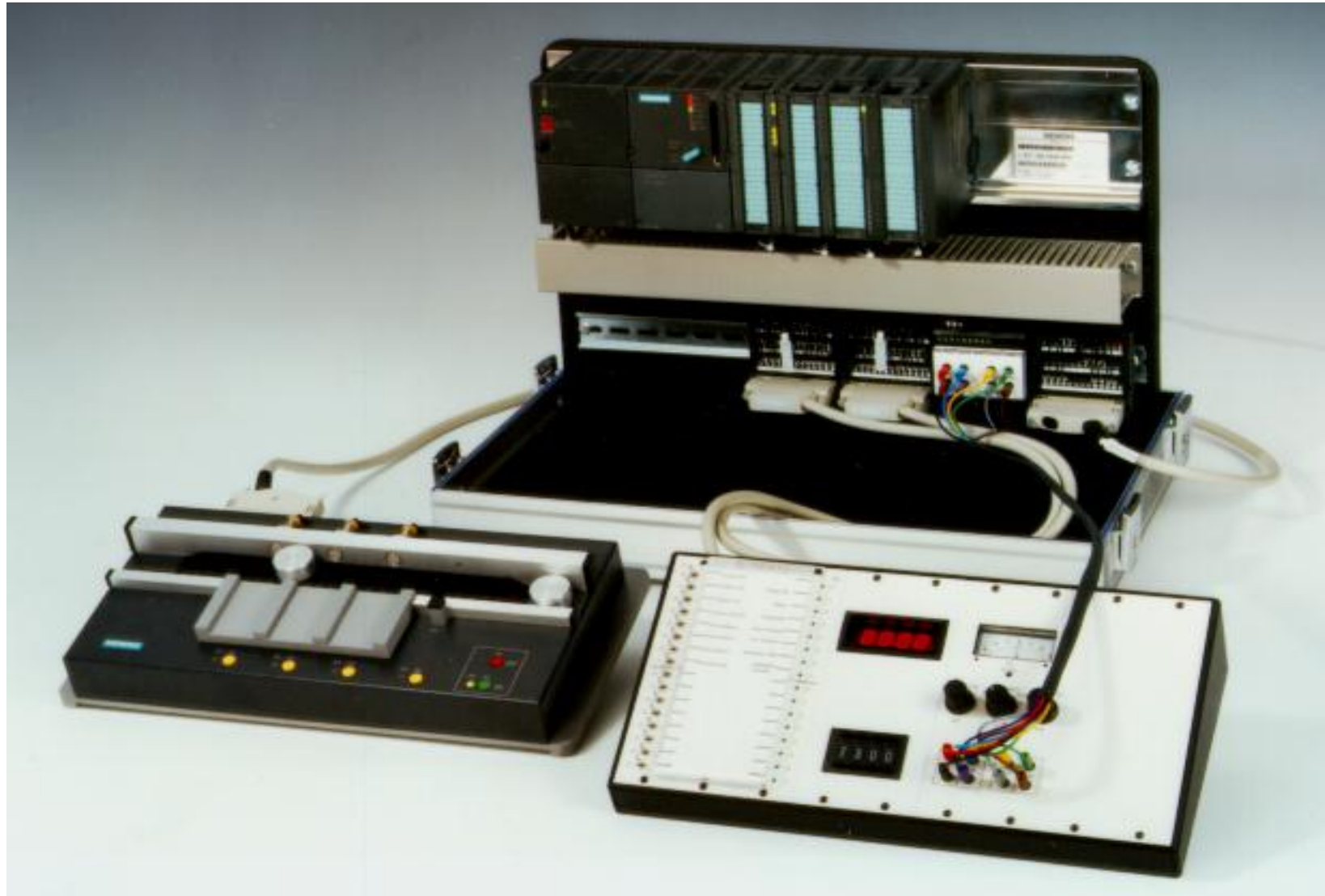
Exercise: S7-GRAPH Example of a Drill (4)



Exercise: S7-GRAPH Example of a Drill (5)



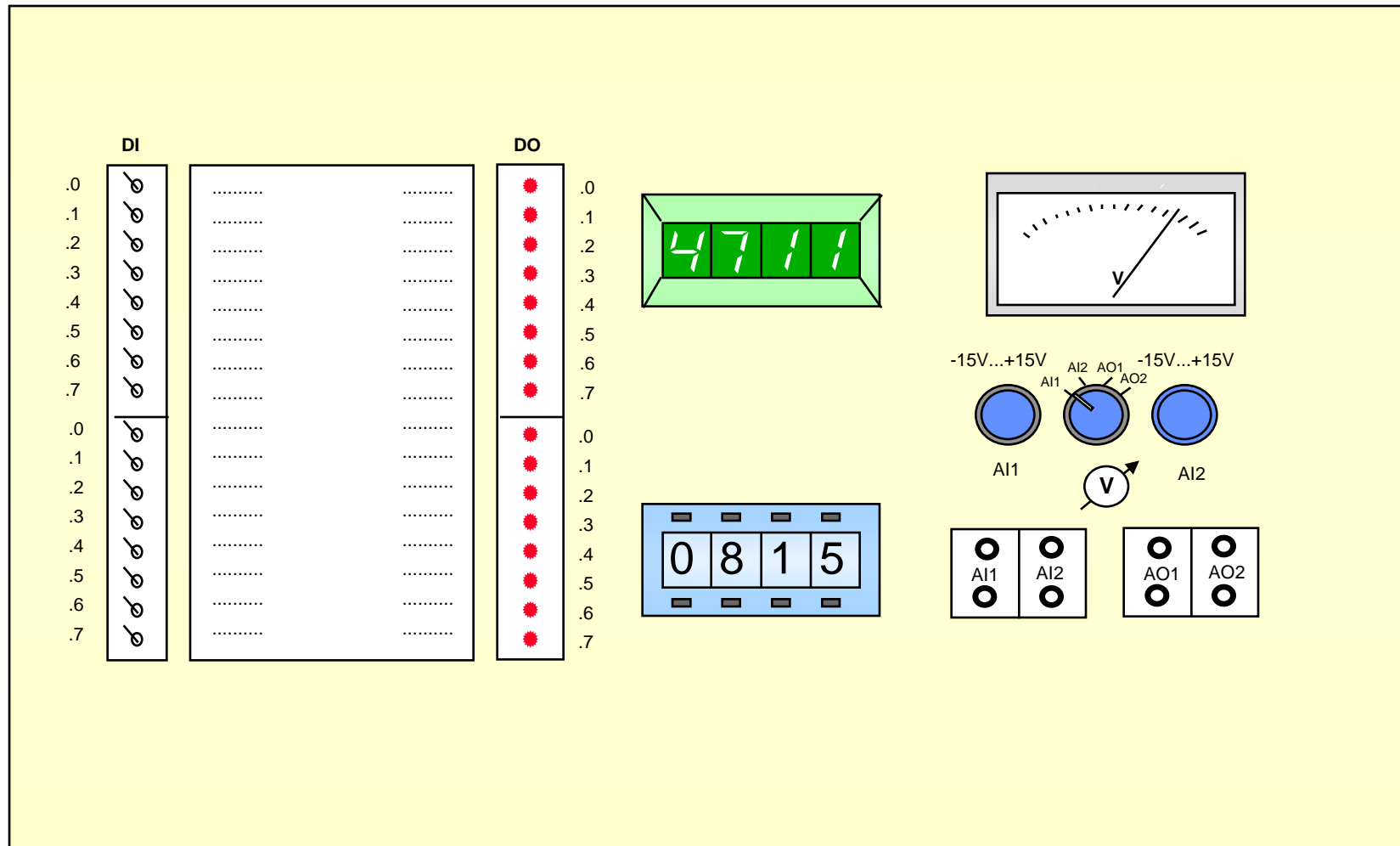
Components of a Training Station with S7-300



Components of a Training Station with S7-400



Layout of Simulator



Layout of the Assembly Line

