

lamaPLC: Simatic Automation!

Preface Instead

In this book, I aim to explain the basics of automation with Simatic as if I were speaking to a friend or acquaintance. I use straightforward language to describe or paraphrase complex topics, like the REAL type, when needed. Automation can be pretty complicated, but I will try to help the reader navigate the many technical details with a simple, practical approach.



Initially, I intended to write this as a book, but I abandoned that plan for several reasons. Firstly, since the information base is constantly growing and evolving, managing it through online documentation is much simpler. Secondly, I doubt there would be enough interest in the topic for yet another published book. Therefore, I chose this format, which doesn't prevent you from occasionally buying a coffee if you find this helpful document or want to support it. If you have any questions, insights, or notice any errors related to this document, don't hesitate to get in touch with me using the details in the imprint.

PLC

The first question that comes to mind is: what exactly is a PLC? Is it just a PC, a microcontroller, or a trendy but temporary device?

It's unlikely to categorize PLCs as modern and short-lived devices. The term PLC stands for programmable logic controller, and in German, it's called SPS, short for *speicherprogrammierbare Steuerung*.

In 1968, GM Hydramatic, the automatic transmission division of General Motors, was seeking a solution to replace fixed wiring relay systems. The winning bid was submitted by Bedford Associates in Bedford, Massachusetts. The result of this project was the first PLC, built in 1969 and designated as 084, named after Bedford Associates' eighty-fourth project. Interestingly, the first industrial communication protocol, Modbus, was developed simultaneously with the first PLC. Despite being over half a century old, it remains one of the most widely used protocols today (see Modbus RTU/TCP).

Instead of fixed relays, the PLC can perform control dynamically through software, and it must load the following tasks to do so:

- The processor (CPU) interprets inputs, executes the control program stored in memory, and sends output signals
- Power supply
- Memory unit (and data carrier), which stores the contents of inputs and outputs, as well as the programs to be executed by the processor

- Input and output interfaces, where the controller receives and sends data from and to external devices
- Communication interface for receiving and transmitting data over communication networks

Simatic

SIMATIC is a series of programmable logic controllers and automation systems created by Siemens. First launched in 1958, the series has evolved through four major generations, with the most recent being the SIMATIC S7 series. It is designed for industrial automation and manufacturing processes.



The name SIMATIC is a registered trademark of Siemens. It combines the words “*Siemens*” and “*Automatic*.”

In 1959, the Simatic G was introduced, a system designed to replace relay logic with a hard-wired programmable logic controller that used Germanium transistors. It was marketed as the “*Building-Block System for Solid-State Controls*.”

In 1964, the Simatic N was launched, featuring a hard-wired programmable logic controller based on Silicon transistors. 1973 saw the release of the Simatic S3, the first system with a microprocessor that enabled programmable logic.

In 1979, the Simatic S5 series was introduced and remained in use until 2000, with systems still operational worldwide. Programming was done using STEP 5 software. The S5 U (universal) controllers were introduced in 1984.

In 1994, the Simatic S7 series was launched, mainly consisting of the S7-200 for simple automation, S7-300 for general use, and S7-400 for large-scale projects, all supporting networking via Profibus or Industrial Ethernet.

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