



Tutorial for learning assembly language for the
AVR-Single-Chip-Processors
 (AT90S, ATmega and ATtiny) from ATMEL with practical examples.

The Single-Chip-processors of [ATMEL](#) are excellent for homebrewing every kind of processor-driven electronics. The only problem is that assembly has to be learned in order to program these devices. After having done these first steps the assembly language provides very fast, lean and effective code, by which every task can be accommodated. These pages are for beginners and help in learning the first steps.

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Learning Assembler



[Beginner's introduction to AVR assembler language](#). Also available as complete PDF-document for printing the whole course ([Download, 1.1 MB](#))



Four simple programming examples with extended comments as first steps of a practical introduction to assembler programming: [Sense and requirements](#), [Simple programming examples](#)



[Software-Know-How](#), special assembler commands: LPM, stack jumps, macros

Tools for programming in assembler



A command line assembler with extended error checking and commenting, free for [download](#)



For convenient operation of the command-line assembler: a window caller including editing the source and include files, viewing the list file, finding errors and editing erroneous lines, etc., for free [download here](#)

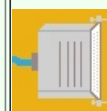


[Windows software for generating assembler source code files with a standard structure](#)

Advanced assembler programming

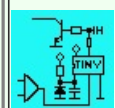


[Binary multiplication, division, conversion of number formats and fixed decimals in detail, hardware multiplication](#)

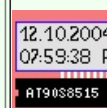


Programming and testing of the [hardware of the STK200-Board: EEPROM, external RAM, LCD-display, SIO-interface](#)

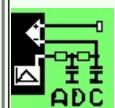
Applications in assembler



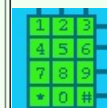
[Small applications: IR remote control devices, an 8-by-8-LED matrix, a DCF77 synchronized clock, a PCM-to-PWG-decoder, a terminal-controlled frequency generator, a digital signal generator with frequency/pulse-width adjust and LCD, an egg timer as a gift, a stepper motor controller/driver, a tumbling dice, a LED sequencer and intensity regulator](#)



[Connecting a two-line-LCD with a four-line connection to the STK500 programming board with base routines for driving the LCD and a small clock application](#)



Converting an [analog voltage to digital using the STK500 board, the on-board analog comparator and timer/counter 1 as pulse width generator](#)



Connecting a [4*3 keypad to an AVR](#) and sensing using [Port connections](#) or with a [resistor matrix and an AD converter](#). An improved version of a resistor matrix encoder is [here](#). A graphical software tool is [here](#).

Converting a digital value to an analog voltage using a [buffered](#)

[Accu loader applying an](#)



[R/2R network](#), including wave generation like sawtooth, triangle, sinewave forms and a small tone player application.



[ATmega16](#)

Zipped webpage for offline reading



[The whole webpage for download, ca. 8.8 MB packed, ca. 11 MB unpacked. After download unzip this file in a separate directory, keeping the pathes.](#)

AVR-Webring

The AVR webring provides hundreds of links to AVR related webpages. Please have a look at these if you search for more informations on AVR.

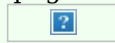
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