



# CREATING THE FIRST PROJECT in **mikroPascal PRO** for AVR

 **MikroElektronika**

SOFTWARE AND HARDWARE SOLUTIONS FOR EMBEDDED WORLD ...making it simple

## Project

The mikroPascal PRO for AVR organizes applications into projects consisting of a single project file (extension .mppav) and one or more source files (extension .mpas). The mikroPascal IDE allows you to manage multiple projects (see *Project Manager*). Source files can be compiled only if they are part of a project.

A project file contains the following information:

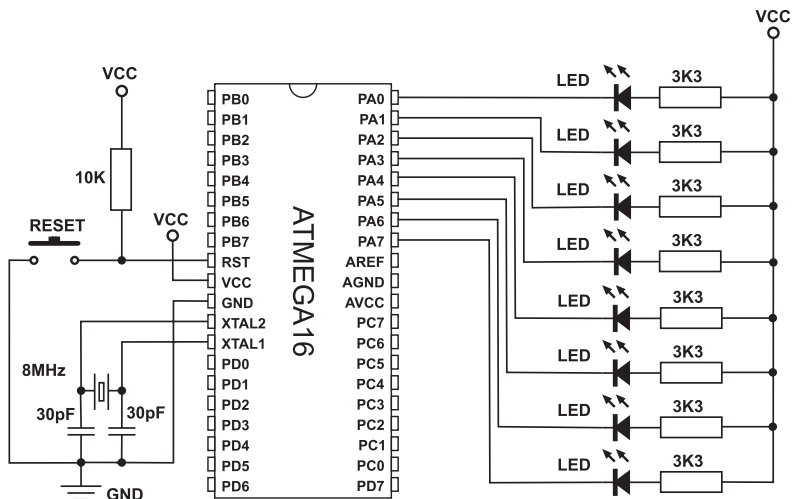
- ▶ Project name and optional description;
- ▶ Target device;
- ▶ Device clock;
- ▶ List of the project source files;
- ▶ Binary files (\*.mcl);
- ▶ Image files; and
- ▶ Other files.

In this manual we will create a new project, write code, compile it with the *mikroPascal PRO for AVR* and test the results. Our example will make LED diodes blink and it will be easy to test it on AVR microcontrollers.

Note that the project does not include files in the same way as preprocessor does. For more information, see *Add/Remove Files from Project* and *mikroPascal Reference Guide*.

## Hardware Connection

The connection schematic shown below is needed for testing the code for AVR microcontroller. LED diodes are connected to PORTA. In this example you can use any other port because this simple program will change the state of all ports in the same way.



Prior to start, you have to go through the following steps:

### Step 1: Install the compiler

Insert the product CD, CD:\zip\mikropascal\_avr and install the *mikroPascal PRO for AVR* compiler. Desktop shortcut and start menu shortcuts will be created.

### Step 2: Run the compiler

Run the *mikroPascal PRO for AVR* compiler. The *mikroPascal IDE* (Integrated Development Environment) will appear.

After these two steps you are ready to create a new project.

## New Project

The process of creating a new project is very simple. Select **New Project** from the **Project** menu as shown in Figure on the right. The *New Project Wizard* window appears. This window can also be open by clicking the *New Project* icon from the *Project* toolbar.



Click here to start a new project →

## New Project Wizard

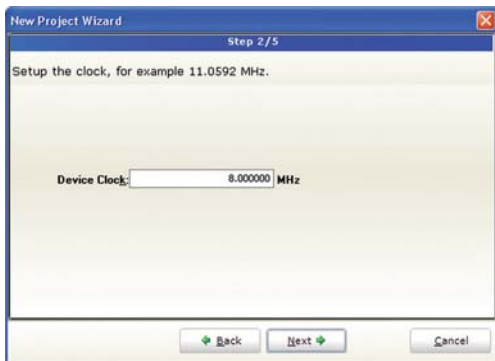
The first *New Project Wizard* window provides basic information on the project settings which will be applied in the following steps.



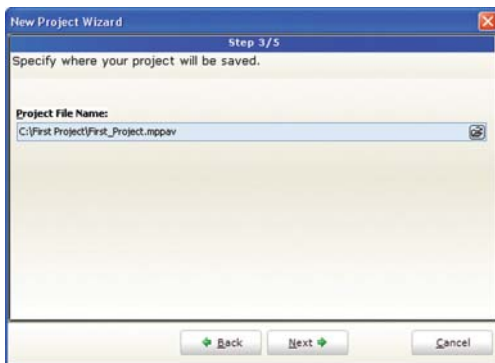
**Step 1:** From the *Device* drop-down list, select the microcontroller you want to write a code for.



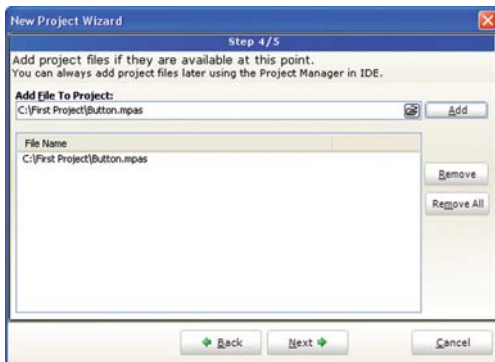
**Step 2:** Enter the oscillator frequency value in the *Device Clock* field.



**Step 3:** Specify the name of the project and location to save the project in.



**Step 4:** Add project files to the project if they are available at this point. You can always add project files later using *Project Manager*.



**Step 5:** Click *Finish* and IDE will create all necessary project files.



A new empty source file will be automatically opened in the *Code Editor* so you can start writing a source code.



This is the source code that is to make all microcontroller's I/O pins to change their logic state once per second. The change of the microcontroller's port state can be seen on LEDs.

```
LedBlinking.mpas
(*
 * Project name:
 *   LED_Blinking (Simple 'Hello World' project)
 * Copyright:
 *   (c) Mikroelektronika, 2008.
 * Revision History:
 *   20080930:
 *     - initial release;
 * Description:
 *   This is a simple 'Hello World' project. It turns on/off diodes connected to
 *   PORTA.
 * Test configuration:
 *   MCU:           ATmega16
 *   Dev.Board:     EasyAVR5A
 *   Oscillator:    External Clock 08.0000 MHz
 *   Ext. Modules:  -
 *   SW:           mikroPascal for AVR PRO
 * NOTES:
 *   - Make sure you turn ON the PORT LEDs at SW6. (board specific)
 *)

program LED_Blinking;
begin
  DDRA := 0xFF;           // set direction to be output

  while TRUE do
  begin
    PORTA := 0x00;        // Turn ON diodes on PORTA
    Delay_ms(1000);      // 1 second delay

    PORTA := 0xFF;        // Turn OFF diodes on PORTA
    Delay_ms(1000);      // 1 second delay
  end;
end.
```

## Compilation

Once you have created the project and have written the source code, it's time to compile it. Choose one of the build options from the **Project** menu:

- ▶ To create a HEX file select **Build** (Ctrl+F9) from the **Project** menu or click the *Build* icon from the *Project* toolbar.
- ▶ If more than one project is open it is possible to compile them all at once by selecting the **Build All** option from the **Project** menu, or click the *Build All* icon from the *Project* toolbar.
- ▶ The **Build+Program** (Ctrl+F11) option is very useful. After the code is compiled mikroPascal PRO will load .hex file in the AVRflash programmer and it will program your microcontroller.

If there are errors, you will be notified in the *Message Window*. If no errors are encountered, the *mikroPascal Pro for AVR* will generate output files.

## Output Files

Upon successful compilation, the *mikroPascal* will generate output files in the project folder containing the project file .mppav. The output files are summarized in the table below:

Format	Description	File Type
Intel HEX	Intel style hex records. Use this file to program AVR MCU.	.hex
Binary	mikro Compiled Library. Binary distribution of application that can be included in other projects.	.mcl
List File	Overview of AVR memory allotment: instruction addresses, registers, routines and labels.	.lst
Assembler File	Human readable assembly with symbolic names, extracted from the List File.	.asm

## Assembly View

After compiling the program in the mikroPascal PRO for AVR, you can click the *View Assembly* icon or select **View Assembly** from the **Project** menu to review the generated assembly code (.asm file) in a new tab window. Assembly language uses symbolic names and is easy to understand.

## Customizing Projects

### Edit Project

You can change the project settings such as type of chip and oscillator frequency in the *Project Settings* window. Any change in this window affects only currently active project. If more than one project is open, make sure that the right project is set as the active one in the *Project Manager*.

### Managing Project Group

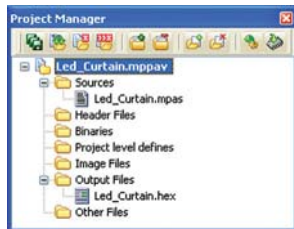
The mikroPascal PRO for AVR IDE provides a convenient option which enables several projects to be opened simultaneously. If you have several projects being related in some way, you can create a project group.

The project group may be saved by clicking the *Save Project Group* icon in the *Project Manager* window. It may also be reopened by clicking the *Open Project Group* icon. All relevant data about the project group is stored in the project group file (extension .mpgroup).

### Add/Remove Files from Project

The project can contain the following file types:

- ▶ .mpas additional source files;
- ▶ .mcl binary files;
- ▶ .pld project level defines files;
- ▶ image files;
- ▶ .hex, .asm and .lst files, see output files. These files cannot be added or removed from the project; and
- ▶ other files.



The list of relevant source files is stored in the project file (extension .mppav).

To add a source file to the project, click the *Add File to Project* icon. Each added source file must be self-contained, i.e. must have all necessary definitions after preprocessing.

To remove file(s) from the project, click the *Remove File from Project* icon.

#### Note

See Units section of mikroPascal PRO for AVR Help.

## Source Files

Source files containing Pascal code should have extension `.mpas`. The list of source files relevant to the application is stored in the project file with extension `.mppav`, along with other project information. You can compile source files only if they are part of the project.

### Creating new source file

To create a new source file, do the following:

Select **New Unit** from the **File** menu, or press `CTRL+N`, or click the *New File* icon from the *File* toolbar.

A new tab will open. It is a new source file. Select **Save** from the **File** menu, or press `CTRL+S`, or click the *Save File* icon from the *File* toolbar and name it as you want.

If you use *New Project Wizard*, a blank source file, named after the project with extension `.mpas`, will be created automatically. The *mikroPascal PRO for AVR* does not require you to have a source file named the same as the project, it's just a matter of convenience.

### Opening an existing file

Select **Open** from the **File** menu, or press `CTRL+O`, or click the *Open File* icon from the *File* toolbar. In the *Open* dialog browse to the location of the file that you want to open, select it and click the *Open* button.

The selected file is displayed in its own tab. If the file is already open, its current *Editor* tab will become active.

### Printing an open file

Make sure that the window containing the file you want to print is active.

Select **Print** from the **File** menu or press `CTRL+P`.

In the *Print Preview Window* set a desired layout of the document and click the **OK** button. The file will be printed on the selected printer.

## Saving file

Make sure that the window containing the file that you want to save is active. Select **Save** from the **File** menu, or press **Ctrl+S**, or click the **Save File** icon from the *File Toolbar*.

## Saving file under different name

Make sure that the window containing the file that you want to save is active. Select **Save As** from the **File** menu. The *New File Name* dialog will be displayed. Browse to the folder in which you want to save the file. In the *File Name* field modify the name of the file you want to save. Click the *Save* button.

## Closing file

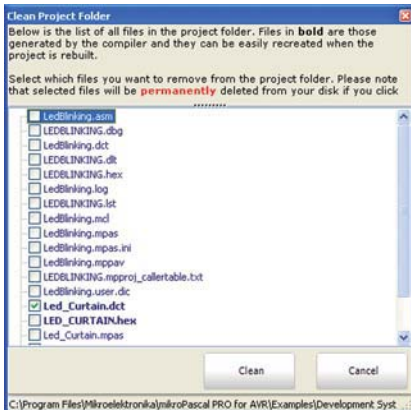
Make sure that the tab containing the file that you want to close is active. Select **Close** from the **File** menu, or right click the tab of the file that you want to close and select the *Close* option. If the file has been changed since it was last saved, you will be prompted to save your changes.

## Clean Project Folder

This menu gives you a possibility to choose the files that you want to delete from your current project.

Select the files you want to remove from the project and click *Clean*. Please note that only files in bold are generated by the compiler and can be recreated after the process of compilation.

“Cleaning” the project folder means that the selected files will be deleted permanently.



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