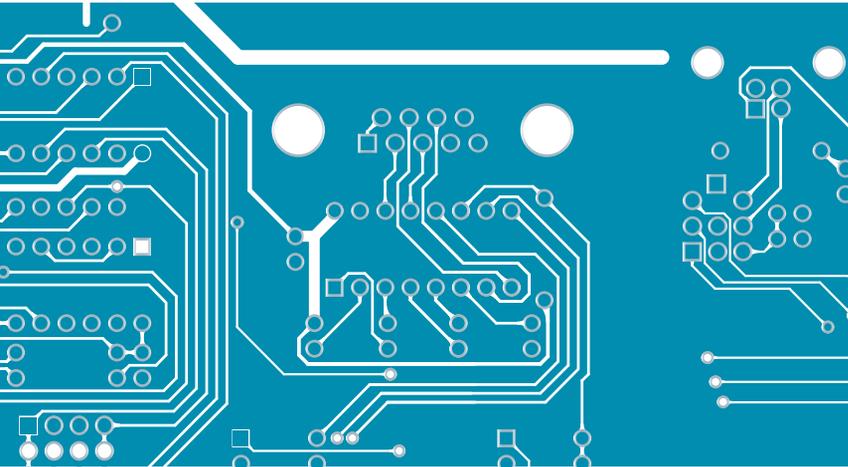


8051prog



8051prog is a high performance programmer for 8051 microcontroller family. It is connected to the target device through IDC10 connector and acts as ICSP (In-Circuit Serial Programmer). This manual contains a detailed description of this device. It also guides you through the 8051flash software installation.



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Nebojsa Matic
General Manager

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8051PROG PROGRAMMER

Along with complementary software, *8051prog* programmer represents an irreplaceable tool for all those working with 8051 microcontrollers. By means of this programmer, it is possible to program almost any 8051 microcontroller, including those embedded (soldered) in printed circuit board. The *8051prog* programmer is connected to the microcontroller via seven lines. Two of them are +5V and GND, while others are used for device selection, signal transmission (SPI protocol) and reset:

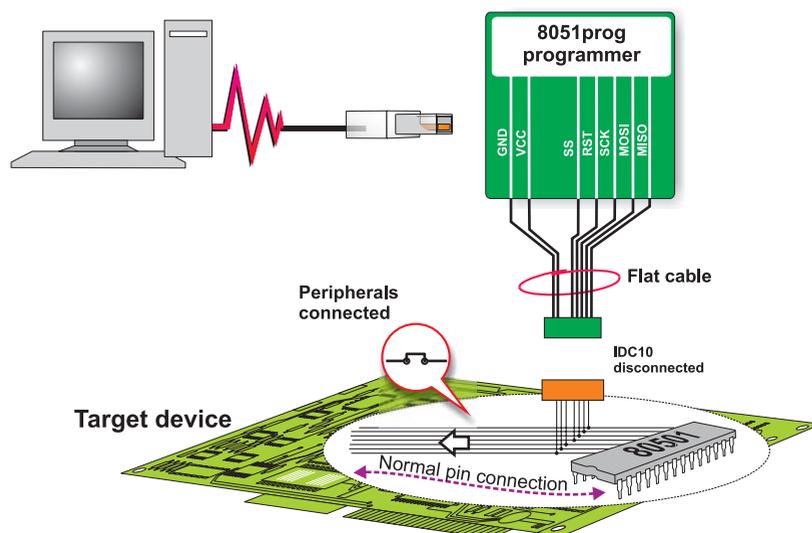
SS	(Slave Select)
MISO	(Master In - Slave Out)
MOSI	(Master Out - Slave In)
SCK	(Serial Clock)
RST	(Reset)

These lines are contained within a *flat* cable ending with an IDC10 female connector. While designing a target device, the appropriate 10-pin male connector with 2.54 mm space between pins should be placed on it. Connector pins should be connected to the microcontroller pins. Their position varies depending on the microcontroller's type and package. Appropriate connection schematics are provided at the end of this manual.

Note: If a target device uses MCU programming pins for the operation of some other peripherals, then it should be enabled to these peripherals to be disconnected during programming. Jumpers are commonly used for disconnecting the MISO, MOSI, SCK, SS and RST programming pins.

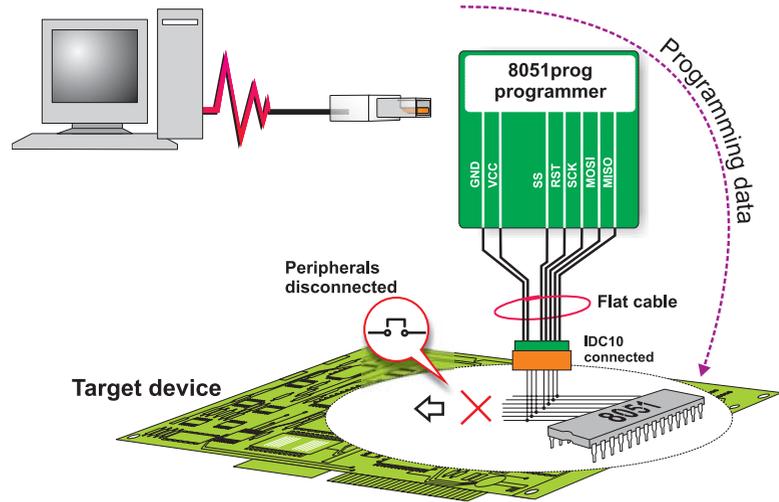
Programmer is inactive

During normal operation of the target device, the programmer should be disconnected, while peripherals should be normally connected to the MCU pins as per project. Connection is made by means of four jumpers.



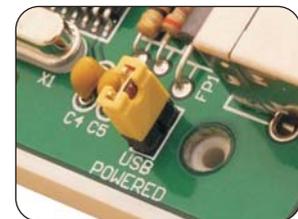
Programmer is active

During programming a device with built-in 8051 microcontroller, the programmer should be connected to the MCU programming pins via IDC10 connector. At the same time, any peripheral using the same pins should be disconnected by means of jumpers.



If the target board has its own 5V power supply, then it can be also used for powering the *8051prog* programmer. In that case, it is necessary to open programmer's plastic case and remove the jumper for power supply selection. Otherwise, if the target board does not have its own power supply source, then the jumper should not be removed. In that case, the programmer, the microcontroller and the whole electronics are powered via programmer's USB cable which connects the programmer to a PC. Any other on-board power supply must be suspended.

This picture illustrates the position of jumper when the target board and the programmer are powered via USB cable.



This picture illustrates the programmer with no jumper for power supply selection. In this case the programmer is powered by the target board which has its own power supply.



8051FLASH SOFTWARE INSTALLATION

In order to enable programming microcontrollers using 8051prog programmer, it is necessary to install the *8051flash programmer* program (“8051flash”) on your PC. The same program is used for programming 8051 microcontrollers using Easy8051 development board.

Step 1: Start Installation

Insert the product CD into a PC drive. A list with all MikroElektronika’s products appears. Click the setup icon to start software installation:

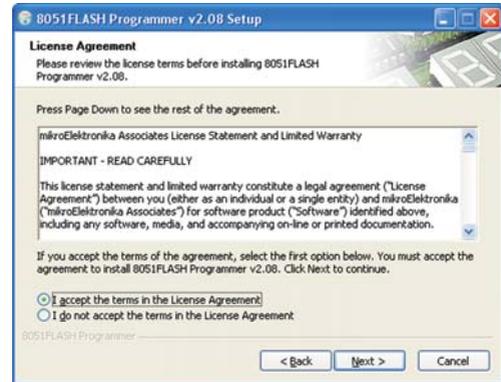
8051flash software for Windows

8051flash_setup.exe may be also downloaded free of charge from our web site. Then you have to start the installation from your hard drive. A welcome window appears. Click ‘Next’.



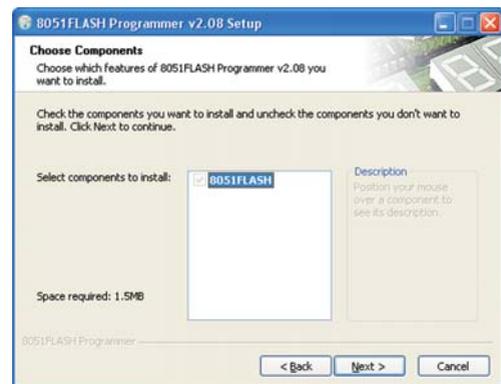
Step 2: Licence Agreement

Prior to start the installation, please review the License terms. If you accept them, select the option ‘I accept the terms in the License Agreement’ and click ‘Next’ afterwards.



Step 3: Choose Components

To make it as simple as possible, this step does not requires you to choose components to install. Click ‘Next’ to continue.



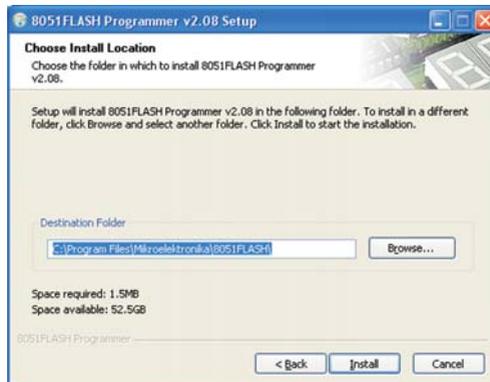
Note: Make sure that *8051prog* programmer is not connected to the PC during software installation.



Step 4: Installation Location

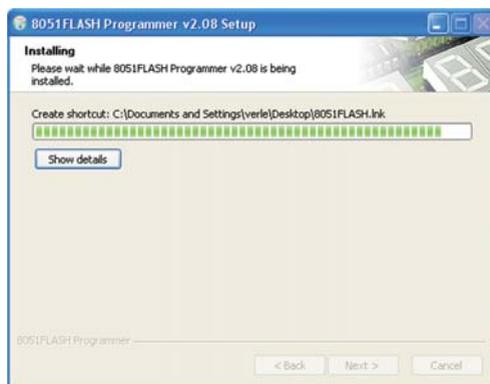
This step is intended for choosing destination folder. If you want to install the program to the folder different from default, click 'Browse' and select another folder on hard disc. Then click 'Next'. If you choose default folder, the program will be installed on the following destination:

C:\Program Files\Mikroelektronika\8051flash



Step 5: Installation Details

8051flash installation starts here and its progress will be shown on the screen. If you are interested in details of the installation click the 'Show details' button.



Step 6: Finish

Windows will notify you of successful installation of 8051flash, by showing the window from the picture on the right. To complete the installation process click 'Finish'.



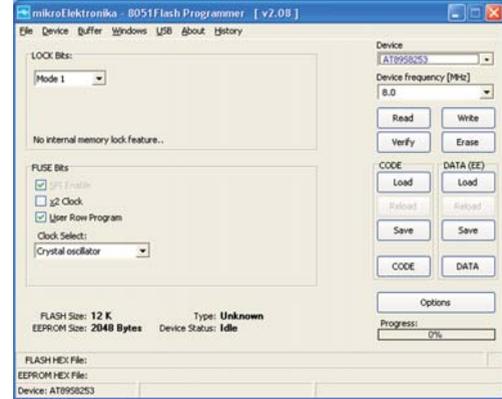
Driver installation

After installing 8051flash, it is necessary to install the appropriate drivers on your PC. They enable programmer's hardware to operate properly. For information on their installation, please refer to 'Installing USB drivers' manual.

8051flash SOFTWARE

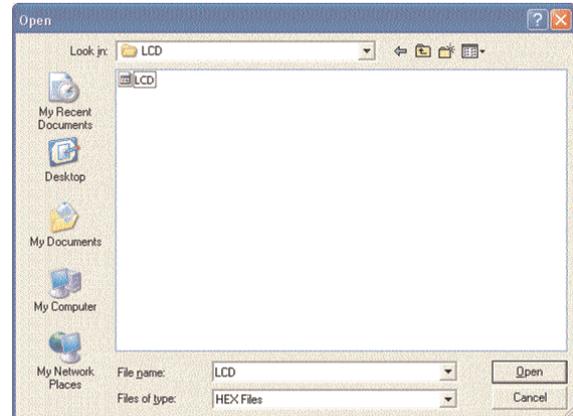
Step 1: Run 8051flash

Run *8051flash* from your PC. Click the *Device* option and select the appropriate microcontroller to program. *8051flash* will automatically set parameters to work with the specified microcontroller.



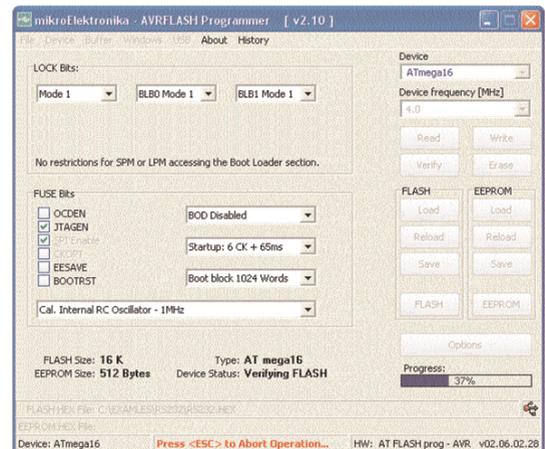
Step 2: Load HEX File

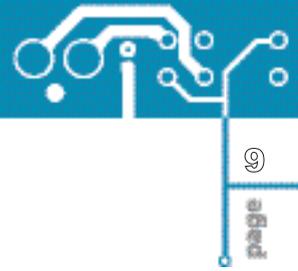
Click the *Load* option which opens the window shown on picture on the right. Select the appropriate executable file (having extension .HEX in its name) and click the *Open* option. *8051flash* will do all necessary settings on the basis of control bits stored in the HEX file.



Step 3: Write Program

Click the *Write* option in the up-right corner of the working window to start programming the microcontroller. The progress of programming will be shown in the right bottom corner of the working window.





KEYBOARD SHORTCUTS AND COMMAND LINE PARAMETERS

Keyboard Shortcuts

Alt-E	Erase
Alt-W	Write
Alt-V	Verify
Alt-R	Read
Alt-D	Change MCU
Ctrl-S	Save
Ctrl-O	Open (Load)
Ctrl-R	Reload

Command Line

Alternatively, you can activate the *8051flash* from the command line. It also enables you to use *8051flash* from some other software, compiler etc. Here is the list with the command line parameters:

-w	Write to 8051
-v	Verify
-e	Erase 8051
-r	Read from 8051
-p	8051 name (for example AT89S8253)
-f	Hex code file name (must be enclosed with “ ”)
-fc	File name of the hex code to be written to program memory (name must be enclosed with “ ”)
-fd	File name of the hex code to be written to EEPROM memory (name must be enclosed with “ ”)
-c	Device frequency [Hz]
-q	Close program when the operation is finished

Example 1 `8051prog.exe -w -pAT89S8253 -v -f"C:\somefile.hex"`

This command programs the 8051 using C:\somefile.hex and verifies written data.

Example 2 `8051prog.exe -r -pAT89S8253`

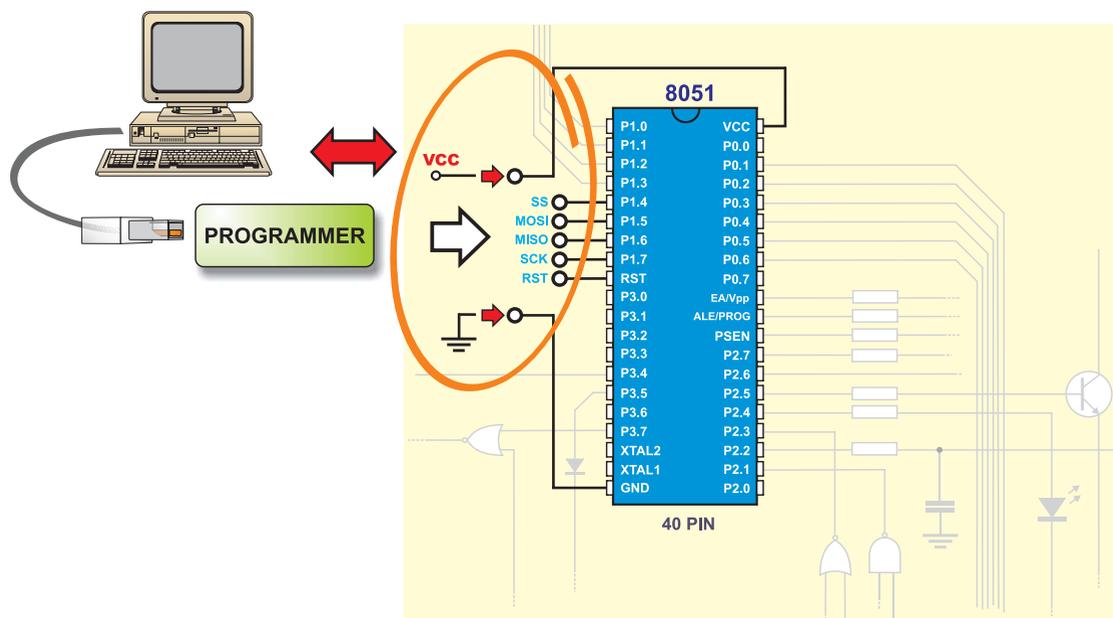
This command reads the 8051.

Example 3 `8051prog.exe -e -pAT89S8253`

This command erases the 8051.

PROGRAMMER'S OPERATION

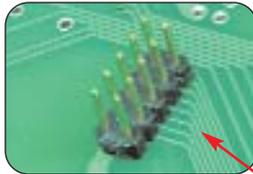
The programming of 8051 microcontroller is performed by using signals RST, MISO, MOSI and SCK from the *8051prog* programmer. They are brought to the appropriate reset and SPI communication pins. In order to enable programming to run without errors, it is necessary to make sure that these pins are not connected to other electronic components. Otherwise, during normal operation, these pins must be connected to the other components as per project.



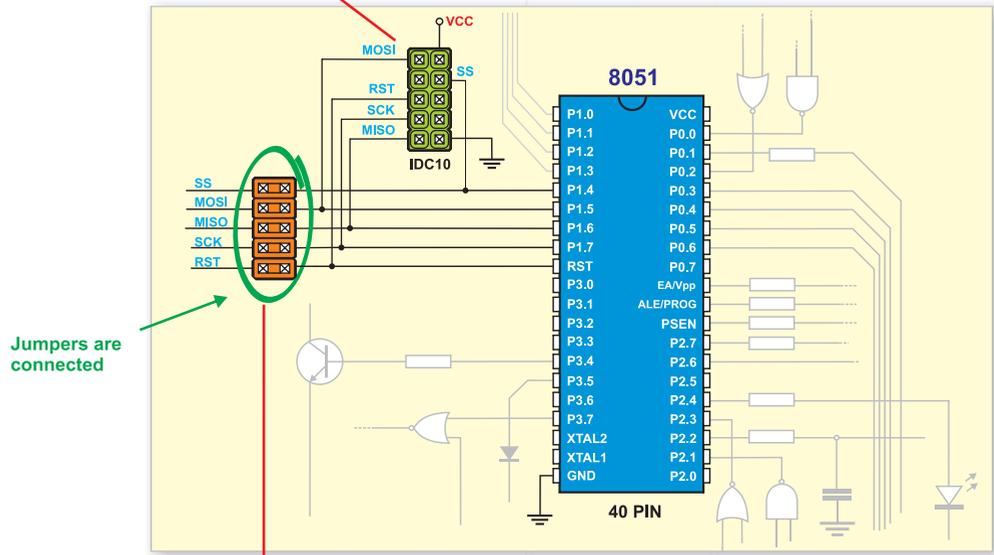
Since the microcontroller is soldered on the printed circuit board (with no use of socket), it is necessary to enable these pins to be connected to/disconnected from the rest of electronics by using jumpers. Because of that, do not forget to embed 4 jumpers while designing a device.



At the end of the programmer's flat cable, there is an IDC 10 female connector which fits into an on-board IDC10 male connector with 2.54mm space between pins. During normal operation of the target device, it should be left disconnected as shown in figure below. In that way, the microcontroller pins will be connected to the rest of on-board electronics via four jumpers.



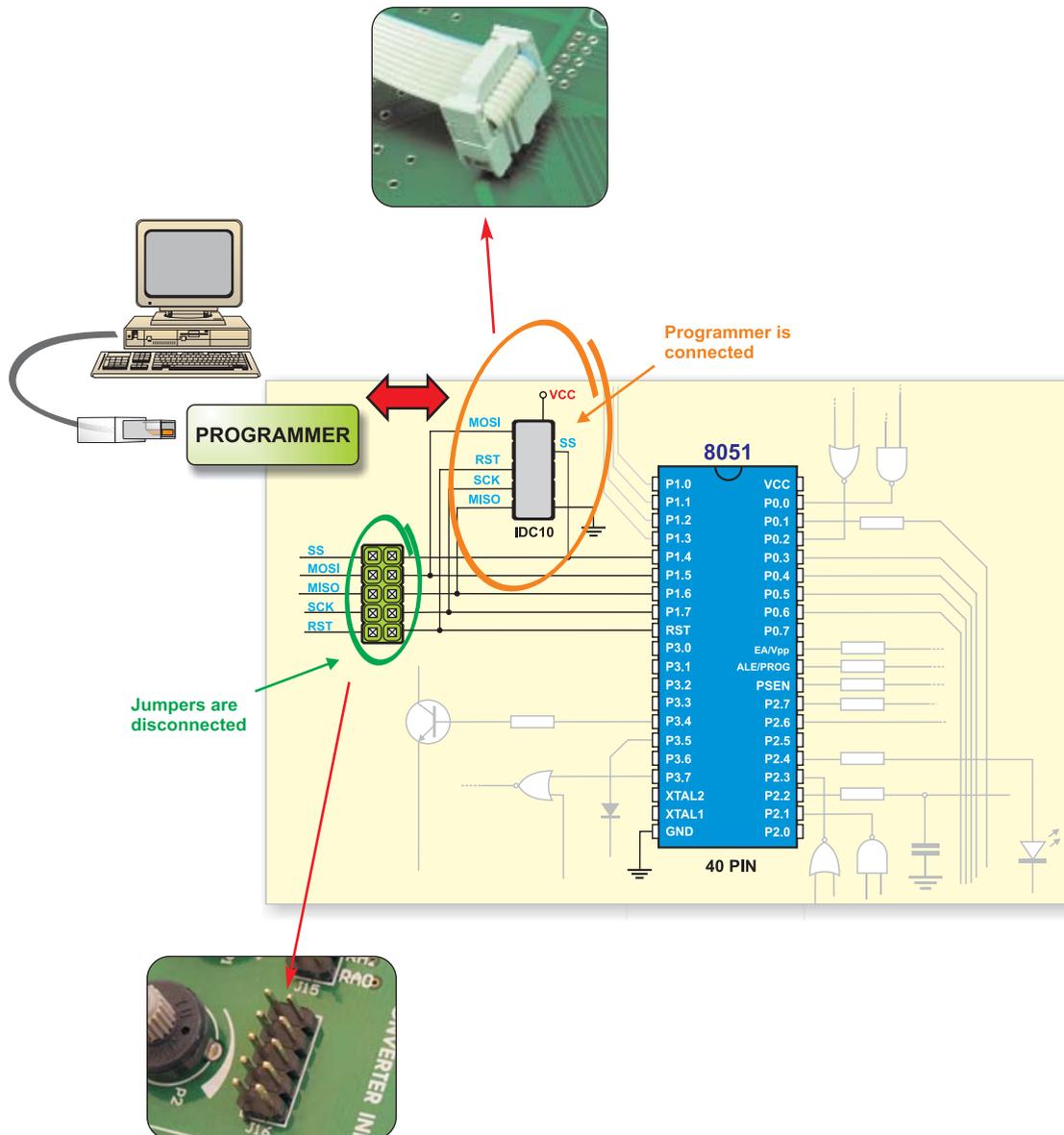
On-board IDC10 male connector



Jumpers are connected

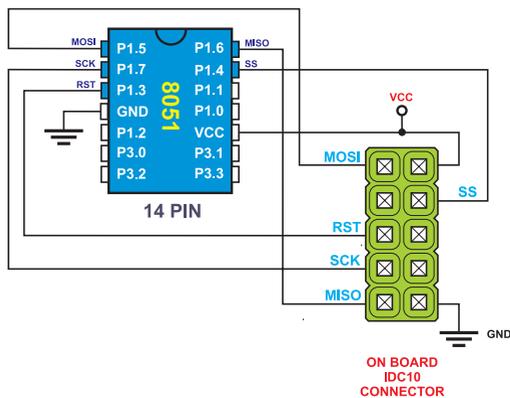


During programming, the IDC 10 male connector is used to bring signal from the programmer. To enable it, it is necessary to remove jumpers and plug the programmer's connector into the on-board connector.



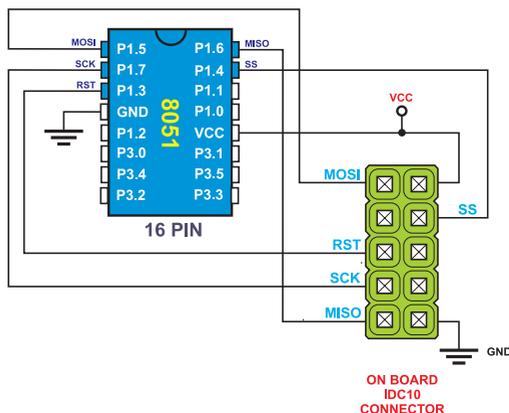


8051PROGammer CONNECTION SCHEMATICS

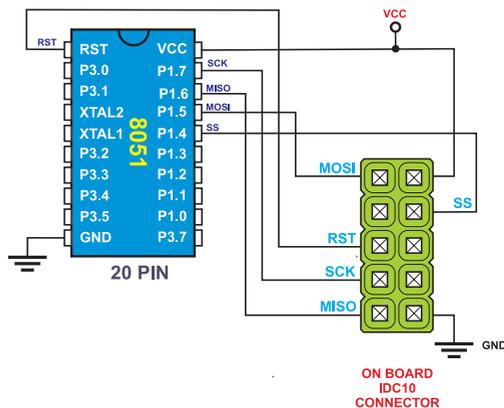


Connection between on-board male IDC 10 connector and 14-pin 8051 microcontroller such as:

AT89LP213, 214...



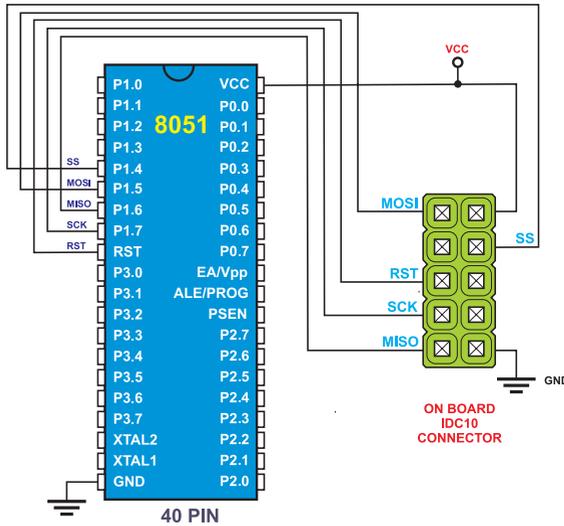
Connection between on-board male IDC 10 connector and 16-pin 8051 microcontroller such as **AT89LP216**.



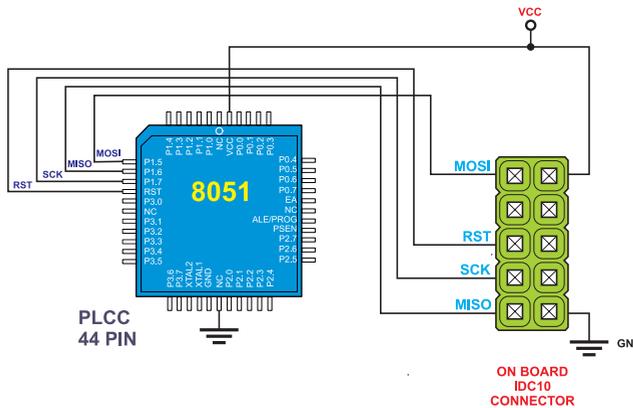
Connection between on-board male IDC 10 connector and 20-pin 8051 microcontrollers such as:

AT89LP2052, 4052...

AT89S2051, 4051...



Connection between on-board male IDC 10 connector and 40-pin 8051 microcontrollers such as:
AT89S51, 52, 53...
AT89S8252, 8253...



Connection between on-board male IDC 10 connector and 8051 microcontrollers in PLCC44 case, such as:
AT89S51, 52, 53...
AT89S8252, 8253...

After programming, the programmer's IDC10 female connector must be unplugged and jumpers must be placed. It enables the RST, MISO, MOSI and SCK pins to be connected to the rest of on board electronics, which further enables device to operate normally without being affected by the *8051prog* programmer. If needed, the jumpers can be removed and *8051prog* can be reconnected in order to reprogram the chip.



Note: Target board must not have electrolytic capacitors between the microcontroller pins and embedded IDC10 male connector if the power supply voltage is controlled by the *8051prog* programmer.

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