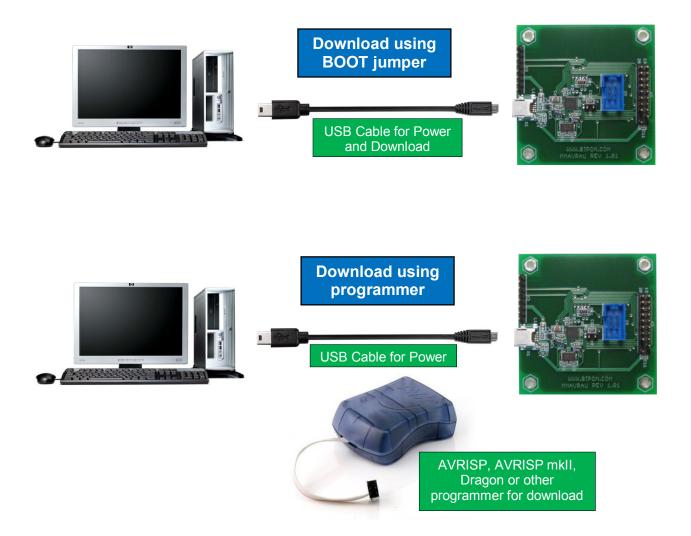
Downloading programs to BiPOM MINI-MAX/AVR-AU board

There are 2 methods to download user programs into the MINI-MAX/AVR-AU board:

- 1. Using the BOOT jumper
- 2. Using an external programmer

Using the BOOT jumper requires no external programmer. Download takes place through the board's own bootloader.

Using an external programmer requires an extra device (that is, the programmer) but it is more convenient (no need to remove and reinstall jumpers when programming).



1. Downloading using BOOT Jumper

Downloading programs to the MINI-MAX/AVR-AU board using BOOT jumper is accomplished through a program called FLIP from ATMEL. FLIP interacts with the built-in bootloader of USB-based ATMEL microcontrollers. FLIP allows downloading any AVR hex file (Intel hex format) that is generated by any software development tool (for example, WinAVR C Compiler, BASCOM AVR BASIC Compiler, Flowcode).

1.1 Downloading a program (hex) file

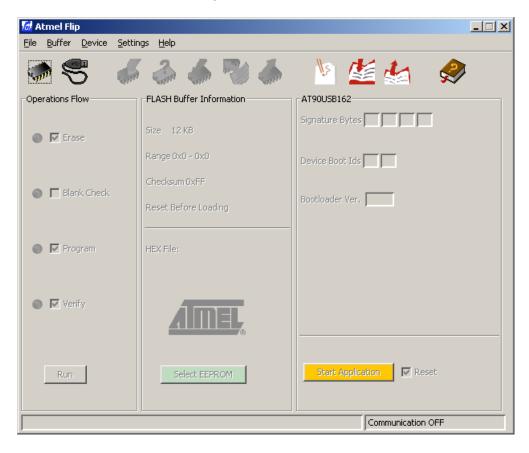
Download and install FLIP from ATMEL website:

http://www.atmel.com/dyn/products/tools_card.asp?tool_id=3886

Start FLIP from Programs menu:

🛗 Flip 3.4.1	▶ 🚟 Flip 3.4.1
Flowcode V4 for AVRs	Reset Preferences
🛅 Games	🕨 🛞 Uninstall Flip 3.4.1

FLIP will start and the following window will appear:



If you are using FLIP for the first time, select the AVR microcontroller type.

MINI-MAX/AVR-AU board has ATMEL AT90USB162 microcontroller.

From FLIP Device menu, select AT90UB162 and click OK:



Now, we will prepare the MINI-MAX/AVR-AU board for download. To do this:

Connect the BOOT jumper on the MINI-MAX/AVR-AU board as shown in Figure 1.

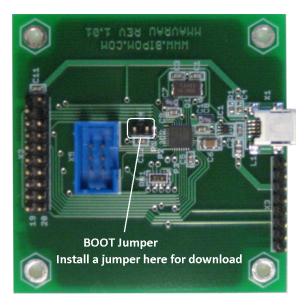


Figure 1

Connect MINI-MAX/AVR-AU board to an available USB port of your computer.

When MINI-MAX/AVR-AU is connected to the USB port of your computer for the first time, it will be detected as a USB device:



Windows will start the "Found New Hardware Wizard":



Click "No, not this time" option and click Next:

Found New Hardware Wizard			
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy		
	Can Windows connect to Windows Update to search for software? O Yes, this time only O Yes, now and every time I connect a device Ino, not this time Click Next to continue.		
	< Back Next > Cancel		

You will see the following window:

Found New Hardware Wizard	
	This wizard helps you install software for: AT90USB162 If your hardware came with an installation CD or floppy disk, insert it now.
	C Install the software automatically (Recommended)
	Install from a list or specific location (Advanced)
	Click Next to continue.
	< <u>B</u> ack <u>N</u> ext > Cancel

Select "Install from a list or specific location (Advanced)" option and click Next:

Found New Hardware Wizard			
Please choose your search and installation options.			
Search for the best driver in these locations.			
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.			
Search removable media (floppy, CD-ROM)			
Include this location in the search:			
C:\Program Files\Atmel\Flip 3.4.1\usb			
Don't search. I will choose the driver to install.			
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.			
< <u>B</u> ack <u>N</u> ext > Cancel			

Select "Search for the best driver in these locations" option. Using the Browse button, select the directory:

C:\Program Files\Atmel\Flip 3.4.1\usb

Click Next.

Windows will install the ATMEL AT90USB162 USB driver:

Found New Hardware Wizard		
Please wait while the wizard installs the	software	
AT90USB162		
ibusb0.dll To C:\WINDOWS\system32	<i>></i>	
	< <u>B</u> ack <u>N</u> ext > Cancel	

When the operation is finished, click the Finish button:

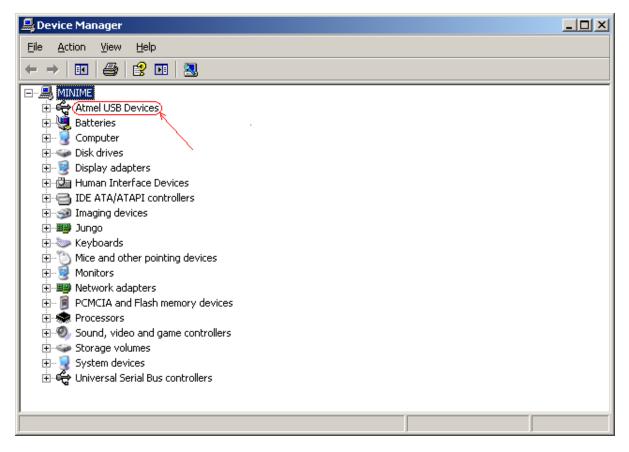
Found New Hardware Wizard		
	Completing the Found New Hardware Wizard	
	The wizard has finished installing the software for:	
	AT90USB162	
Click Finish to close the wizard.		
	< <u>B</u> ack [Finish] Cancel	

You should see the "Found New Hardware" notification at the bottom right corner of the Windows screen:

🔅 Found New Hardware	•
Your new hardware is installed and ready to use.	Ŧ
Tour new hardware is inscalled and ready to use.	
📠 Atmel 🖳 Devic 🦉 untitle 🔍 🛒 🖄 📚 😒 🔍 🖕	8:49 AM

To make sure that the board was recognized correctly, you can start Windows Device Manager under Control Panel (use Start->Control Panel->System->Hardware->Device Manager under Windows XP; the sequence to start Device Manager may be different for other versions of Windows).

You will see an entry called "Atmel USB Devices" under the Device Manager:



Click on the + sign to the left of "Atmel USB Devices" entry. This will expand the entry and show the "AT90USB162" entry:

🚇 Device Manager	
Eile <u>A</u> ction <u>V</u> iew <u>H</u> elp	
Image: Second state of the second s	

At this point, the MINI-MAX/AVR-AU board is ready to accept programs.

Id Atmel Flip File <u>B</u> uffer <u>D</u> evice <u>S</u> ettir	ngs <u>H</u> elp	
M 😪 🥔	3 6 7 6	🐚 🏄 🍲
Operations Flow	FLASH Buffer Information	AT90USB162
🔵 🔽 Erase	Size 12 KB	Signature Bytes
USB Button	Range 0x0 - 0x0	Device Boot Ids
🌒 📕 Blank Check	Checksum 0xFF	Bootloader Ver.
	Reset Before Loading	
Program	HEX File:	
🔘 🗹 Verify	AMEL,	
Run	Select EEPROM	Start Application Reset
Communication OFF		

Click the USB button on the FLIP toolbar:

In Atmel Flip File Buffer Device Settir	ngs Help	
🦛 🚝	27 🍈 🖓 🍈	🐚 🏄 🍲
Operations Flo CAN USB C LPC Erass	H Buffer Information	AT90USB162 Signature Bytes
Blank Check	Range 0x0 - 0x0 Checksum 0xFF	Device Boot Ids
	Reset Before Loading	Bootloader Ver.
Program	HEX File:	
Verify	AMEL	
Run	Select EEPROM	Start Application 🔽 Reset
Communication OFF		

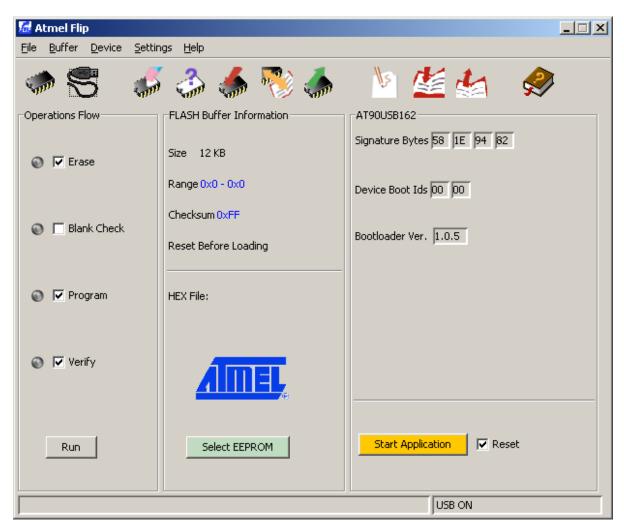
Select USB from the menu that appears. (USB may be the only option in this menu):

This will display a small window:

USB Port Connection		×	
Open	Close	Cancel	

Click Open.

The following screen will appear:



To download the hex file to the microcontroller, select File->Load Hex File:

🚮 Atmel Flip		
File Buffer Device Settin	igs Help	
Load HEX File Ctrl+L Recent HEX Files Save Buffer As Ctrl+S	FLASH Buffer Information	▶ 🏄 🏄 🔗
Exit Ctrl+X		Signature Bytes 58 1E 94 82
Erase	Size 12 KB	Signature Bytes por Jit 194 pz
	Range 0x0 - 0x0	Device Boot Ids 00 00
🕥 🥅 Blank Check	Checksum 0xFF Reset Before Loading	Bootloader Ver. 1.0.5
	HEX File:	
🕥 🔽 Verify	AMEL.	
Run	Select EEPROM	Start Application
USB ON		

Select the hex file to open:

🚮 Load HEX/A90	File					×
Look in:	🗎 My Documents			•	🦻 🖻 🛄	
My Recent Documents Desktop My Documents My Computer	My Music My Pictures Flowcode1.hex		-			
- S	File name:					ок
My Network Places	Files of type: Inte	HEX and AVR A	90 Files		¥	Cancel

Click the RUN button to download the hex file to the MINI-MAX/AVR-AU board:

	tings\oguz\My Documents\Flowco	de1.hex	×
<u>File Buffer Device Settin</u>	ngs <u>H</u> elp		
in 🖉 🐔	ि 👶 📥 🎨 🗼	🐚 🏄 🏄	
Operations Flow	FLASH Buffer Information	AT90USB162	1
🕥 🔽 Erase	Size 12 KB	Signature Bytes 58 1E 94 82	
	Range 0x0 - 0x8F	Device Boot Ids 00 00	
	Checksum 0x3176		
🕥 🔲 Blank Check	Reset Before Loading	Bootloader Ver. 1.0.5	
Program	HEX File: Flowcode1.hex		
	144 util bytes		
🕥 🔽 Verify	AMEL,		
Run	Select EEPROM	Start Application	
HEX file parsed.		USB ON	

This will erase the AT90USB162's Flash memory and download the program.

To run the program on the MINI-MAX/AVR-AU board, simply remove the BOOT jumper and remove and reinstall the USB cable. The program will start running.

1.2 Downloading from within Flowcode

A hex program file that is generated by Flowcode can be downloaded to MINI-MAX/AVR-AU using the ATMEL FLIP program as described in Section 1.1 above. This download method takes place outside of Flowcode.

Flowcode also has the ability to launch external programs to download to target microcontroller boards the hex files that are generated by Flowcode. Downloading from within Flowcode in this way makes it more convenient to download programs to the target board.

FLIP includes a command line version called **batchisp** that has most of the features of FLIP and can be executed from command line.

BiPOM offers a simple batch file called **batch_isp.bat** that helps integrate **batchisp** with Flowcode. Programs can be developed in Flowcode and downloaded to MINI-MAX/AVR-AU with a single click.

Download **batch_isp.bat** from BiPOM web site at:

http://www.bipom.com/files/mmavr/mmavr_au

and save it to the Flowcode directory:

C:\Program Files\Matrix Multimedia\Flowcode AVR V4\Tools\MX_bats

Assuming that Flowcode has already been installed, start Flowcode. Open the Flowcode program that you want to download. Select Chip->Compiler Options:

🖉 Flo	wco	de1.	.fcf_ā	avr - [M	lain]									
条 Fii		dit	View		VNe	et Ma	acro	Run	Chip	Window	w Hel	P		
D		F		Ж	Ēð	e	- KO	0	Cor	nfigure.			11	
<u>8</u>	<mark>оь</mark> а /	jects Mai	_	\$	omm	on 🗸		Inpu	Cor	mpile to mpile to mpile to	HEX		Co	omms
답 🗅 💩 🗳 🏱 🖶 🗗 🗗									Vie	w C w ASM. mpiler O				
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∲ m			5	END	Σ									
<mark></mark>														
ŏ														
Comp	oiler	Opt	ions	_										
	ompil	Lo		n: <mark>Jultim</mark> s: %t ''?							ats\avr	a.bat	Bro	owse
Li		Lo		ler: n: C:\P s: "%D'							ode AV	R V4	Bro)wse
P	rogra I	Lo	catio	n: C:\P s:(AVR	_								Bro	owse.
	Use		ernal ocatio	program n:	to se	t confi	igurati	on opt	ions	Chan	ge thi	s fiel		Wse
	ł	Para	meter	s:										
Fi	ile Vie				46053									
	I		neter	n: C:\W s:	ANDU	1827	notep	ad.exe	•				Bro)wse
?			Resto	ore Defa	ults						OK		(Cancel

Only the Location and Parameters fields in the Programmer section will be modified. All other fields will be left untouched.

Delete the contents of the Parameter field and enter:

"%D\%f.hex" %t

in the Parameters field.

Click on Browse button in Programmer section. Select:

C:\Program Files\Matrix Multimedia\Flowcode AVR V4\Tools\MX_bats\batch_isp.bat

Flowcode limits the file types to **.exe** files in the file selection window. To work around this, you can enter ***.bat** in the Filename field and see all the batch files:

Open					?	×
Look jn:	🗀 MX_bats		•	+ 🗈 💣		
My Recent Documents Desktop	 avra.bat avrafp.bat avrb.bat avrc.bat batch_isp.bat 					
My Documents						
My Network Places	File <u>n</u> ame: Files of <u>type</u> :	*.bat Executable Files (*.exe)		•	<u>O</u> pen Cancel	

Compiler Options window will now look like this:

Compiler Options	×
Compiler:	
Location: ultimedia\Flowcode AVR V4\Tools\MX_bats\avra.bat	Browse
Parameters: %t "%D\%f.elf" "%D\%f.c" "%D\%f.lst"	
Linker / Assembler:	
Location: C:\Program Files\Matrix Multimedia\Flowcode AVR V4	Browse
Parameters: "%D\%f.elf" "%D\%f.hex" "%D\%f.cof"	
Programmer:	
Location: dia\Flowcode AVR V4\Tools\MX_bats\batch_isp.bat	Browse
Parameters: "%D\%f.hex" %t	
Use external program to set configuration options	
Location:	Browse
Parameters:	
File Viewer:	
Location: C:\WINDOWS\notepad.exe	Browse
Parameters:	
? Restore Defaults OK	Cancel

Click OK to save the changes.

Put the MINI-MAX/AVR-AU board to Download mode by installing the BOOT jumper and removing and reconnecting the mini USB cable to the board.

To download the Flowcode program to the MINI-MAX/AVR-AU board, select

Chip->Compile to Chip

This will start the compiler and when the program is compiled successfully, the external batch file batch_isp.bat will be launched to complete the program download to the board:

Compiler Messages 🛛
C:\Documents and Settings\oguz\My Documents>REM "C:\DOCUME~1\oguz\MYDOCU~1\Flow
C:\Documents and Settings\oguz\My Documents>REM
C:\Documents and Settings\oguz\My Documents>REM atmega32 - Microcontroller Type, e.g. at90
C:\Documents and Settings\oguz\My Documents>REM
C:\Documents and Settings\oguz\My Documents>REM Erase
C:\Documents and Settings\oguz\My Documents>batchisp -device atmega32 -operation erase F -ł
Cancel

If the download fails for some reason, you will see messages in this window as to why the download failed. Download may fail if you forgot to install BOOT jumper on MINI-MAX/AVR-AU or if MINI-MAX/AVR-AU is not connected to the USB port of your computer.

2. Downloading with an external programmer

MINI-MAX/AVR-AU board has a 6-pin In-System Programming (ISP) connector that supports various programmers from ATMEL and other third party suppliers. Supported programmers include (but not limited to):

- AVRISP
- AVRISP mkll
- Dragon

Theoretically, any programmer that supports ISP method for AVR programming should work. Figure 2 shows the location of the ISP connector on the MINI-MAX/AVR-AU board:

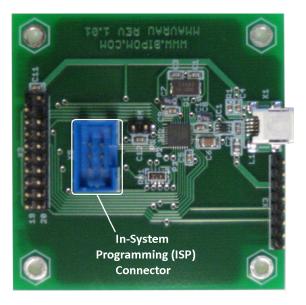


Figure 2

For our description of the download process using an external programmer, we will assume that AVRISP mkII is used. Instructions for other programmers are very similar.

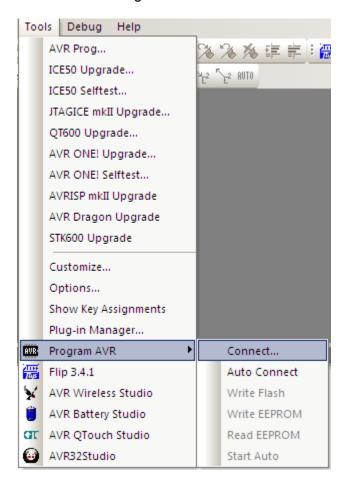
AVRISP mkII uses AVR Studio from ATMEL. AVR Studio has a built-in downloader that works with AVRISP mkII.

Download and install AVR Studio 4.16 or later from http://www.atmel.com/avrstudio. Also download any service pack for AVR Studio that may be available on ATMEL website. Service pack should be installed after AVR Studio has been installed.

AVRStudio4 - InstallShield Wiz	ard	×
	Welcome to the InstallShield Wizard for AVRStudio4 The InstallShield Wizard will install AVRStudio4 on your computer. To continue, click Next.	
Install Shield	< Back Cance	1

Start AVR Studio. If AVR Studio asks to create or open a project, click Cancel.

If you see a message like "gcc plug-in: No WinAVR installation found. The AVR GCC plug-in can still be used if you set up your own build tools." in the Output window of AVR Studio, you can ignore this message. AVR Studio is used only as a download tool; we do not need WinAVR C Compiler for this purpose.



Select Tools->Program AVR->Connect:

Select A¥R Programmer	×
Platform: Port: STK600 Image: STK500 AVRISP mkli Image: STK500 JTAGICE mkli Image: STK500 AVR Dragon Image: STK500 AVRISP Image: STK500 JTAGICE mkli Image: STK500 JTAGICE mkli Image: STK500 JTAGICE mkli Image: STK500 JTAGICE mkli Image: STK500 JTAGICE Image: STK500 JTAGICE mkli Image: STK500 JTAGICE Image: STK5000 <	Connect Cancel Baud rate: 115200 Baud rate changes are active immediately.

Select AVRISP mkII and USB as the Port. Click Connect.

Select AT90USB162 as the Device under Main tab. Click Read Signature to see if there is connection to the board. If you can read the signature of AT90USB162 and it matches, this means that the board is connected, powered and ready to accept programs:

STK500 in ISP mode with AT90USB162	
Main Program Fuses LockBits Advanced Device and Signature Bytes AT90USB162	HW Settings HW Info Auto Erase Device Read Signature
Signature matches selected device Programming Mode and Target Settings	Settings.
	ISP Frequency: 115.2 kHz

Select the Program tab. Click the Browse button to select the hex file to be downloaded:

STK500	in ISP mode with #	1T90U5B162	_ 🗆 X
Main		LockBits Advanced HW Settings HW Info Auto	
	vice Erase Device	re flash programming 🔽 Verify device after programming	,
	C Use Current Simu	ator/Emulator FLASH Memory ments and Settings\vitaliy\My Documents\MM51C2.HEX	
	Program	Verify Read	
	PROM © Use Current Simul © Input HEX File	ator/Emulator EEPROM Memory	
	Program	Verify Read	

Click the Program button to download the program to the board.

Note: Fuses tab will not be used at all. All the fuses have already been set correctly at the factory. There is no need to alter the fuse settings.

After a successful download, the program will start running on the board. There is no need to detach the AVRISP mkII programmer from the board.