How to Upgrade Firmware by Bootloader

Many JYE Tech products (like DSO 062, DSO 082, DSO 096, BD081, etc.) are bootloader pre-installed. This offers a convenient way to upgrade firmware without programmer. In order to use the bootloader certain tools are required and some specific procedures must be followed. This article is aim to help reader to understand what these tools are and how to use them. Firstly, we explain briefly what bootloader is and what it does.

Usually bootloader is a compact firmware that resides in micro-controller's ROM memory. It has the ability to communicate with a host and program the micro-controller itself. Once this firmware takes control it checks a specific interface (usually a serial connection) for connecting request from host. It will keep doing so for a certain short time (about 1 – 2 seconds). If request is not received during the period bootloader will pass control to main firmware and system will start normally. If request is received it will try to establish connection and accept commands from host. The host then will send data (codes) to bootloader and command it to program the data into micro-controller's flash ROM. Once the programming is done the bootloader will reset micro-controller and re-start the system.

Apparently in order to use the bootloader three conditions must be met:

1) The micro-controller to be programmed must contain a working bootloader and the bootloader can take control when required.

2) A serial connection between the micro-controller to be programmed and host.

3) An application running on host that can communicate with the bootloader.

Prepare a Working Bootloader

Usually bootloader is pre-programmed in manufacture. Users do not need to touch it. In case that bootloader is damaged it can be re-programmed with appropriate programmer, just like programming an ordinary firmware. Bootloader HEX files for JYE Tech products are available at JYE Tech's web site www.jyetech.com. Users are reminded that most AVR micro-controller fuse setting affects bootloader behavior. It is strongly encouraged to read micro-controller datasheets before carrying out programming.

Serial Connection

Most micro-controllers come with one or more UART ports which can be connected to serial ports on host. Due to signal level and protocol difference the connection needs a converter in-between to make them compatible. Fig.1 and Fig.2 describe two typical converters we may use.
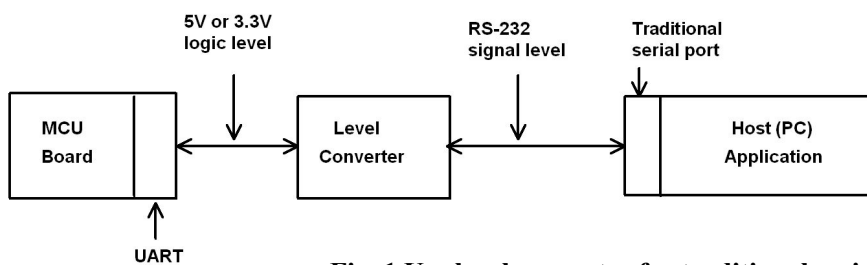

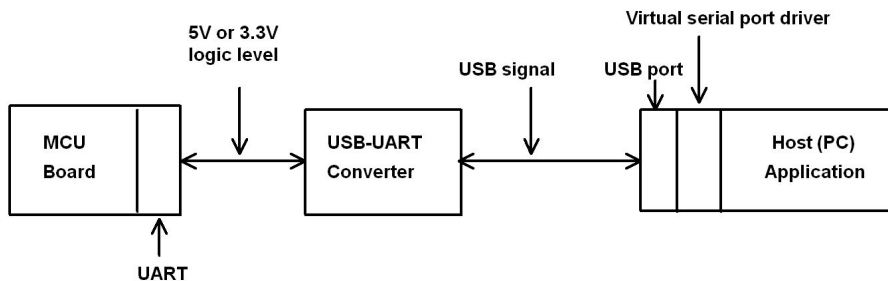**Fig. 1 Use level converter for traditional serial port**

Fig. 2 Use USB-UART converter USB port

Because USB is getting more and more popular USB-UART converter is more frequently used today. There are a lot of standalone USB-UART converters available at market. JYE Tech offers these converters too, like PN: 08101 and PN: 07301. Please visit JYE Tech website for details about these products. Many JYE Tech products also have the USB-UART converter built-in, such as DSO082, DSO096, and BD081.

Please note that most USB-UART converters need appropriate drivers installed to function. JYE Tech products use CP2102 as converter. The driver for this chip can be downloaded from link below.

http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx.

Follow the instructions enclosed with the driver package to install the driver.

Host Application

The host application we used is call "AVRUBD.exe". It is for Windows only and was developed by _Shao Ziyang_ (http://blog.ednchina.com/shaoziyang/). It can be downloaded from the JYE Tech web site (http://www.jyetech.com/Products/LcdScope/avrubd.rar). AVRUBD does not need installation. Just put it to where you find convenient.

Firmware Upgrading Instructions

Download firmware to be upgraded from JYE Tech website and follow steps below.

1) Connect MCU board to host by USB or serial port.
2) Launch AVRUBD.EXE. Click "Language" and select "English".
3) Click at "Options" on the main menu. Change settings on the tab "AVR" as per Fig. 3. The Connect key has to be set to HEX 64. Flash size should be 64K.
4) Change settings on tab "System" as per Fig. 4. Communications protocol should be set to "Lite Xmodem". Increase "Maximum connection count" to 50 or 100. This will make connection easier.
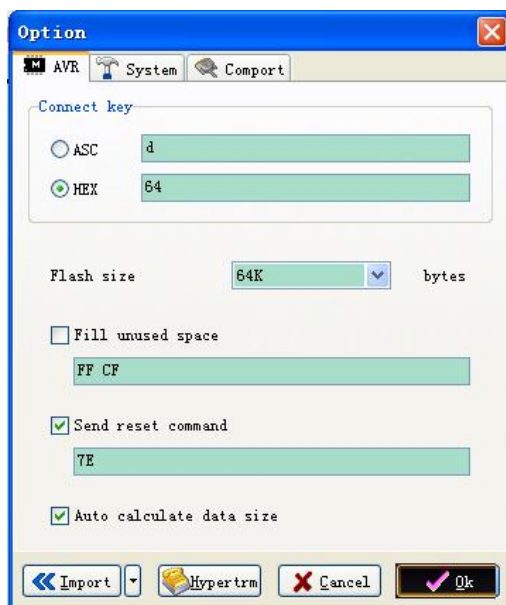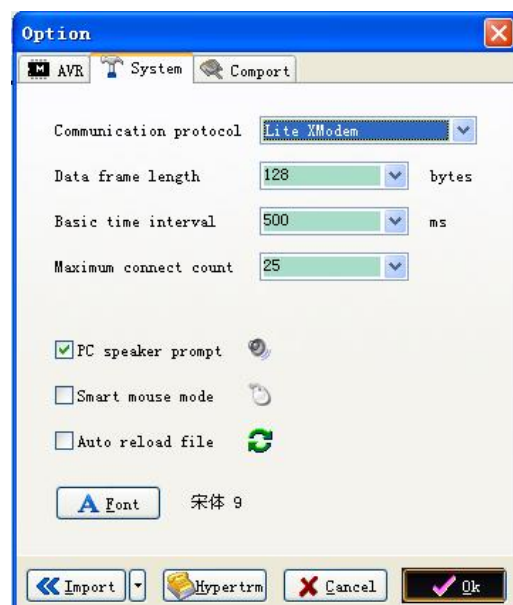
Fig. 3	Fig. 4

5) Change settings on tab "Com Port" as per Fig. 5. Com port number should be chosen to match actual port used. **This is important**. Communication format must be set to **9600 bps, 8N1 with no parity and flow control**.
6) Load the firmware (HEX file) to AVRUBD by clicking "File – Load" and choosing file (the firmware to be flashed).
7) Click at "Dn" icon (see Fig. 6, or you can click at "Operate – Download" from the main menu) and immediately make the micro-controller board enter bootloader. **Different**

boards may have different means to enter bootloader. Refer to respective manual to find out. Usually it is by powering-up the board or by software/hardware resetting. It can also be done the other way around. That is first entering bootloader (by powering-up or resetting) and then clicking the "Dn" icon right away. You will see AVRUBD is attempting to communicate with bootloader. If the attempt is failed you will see a screen like Fig. 7.

8) Otherwise, it will start upgrading and you will Fig. 8 if success.

After successful upgrade micro-controller board will re-boot right away.
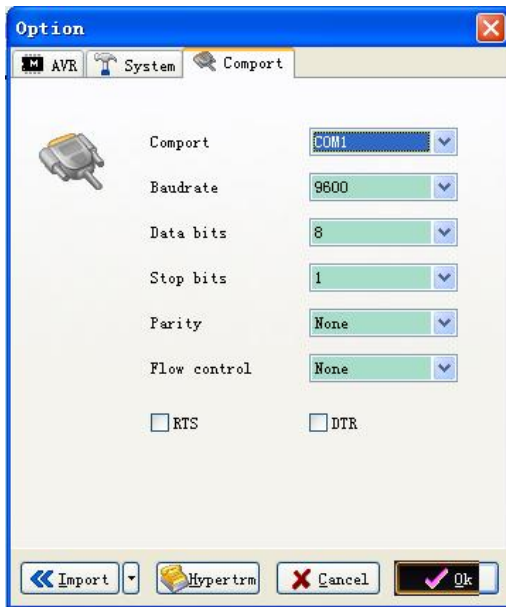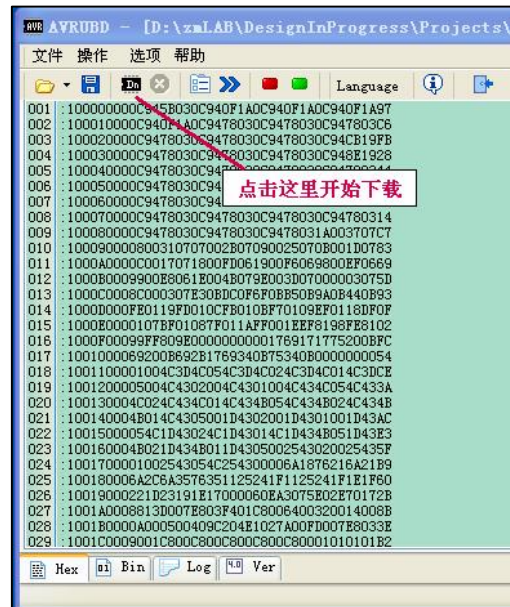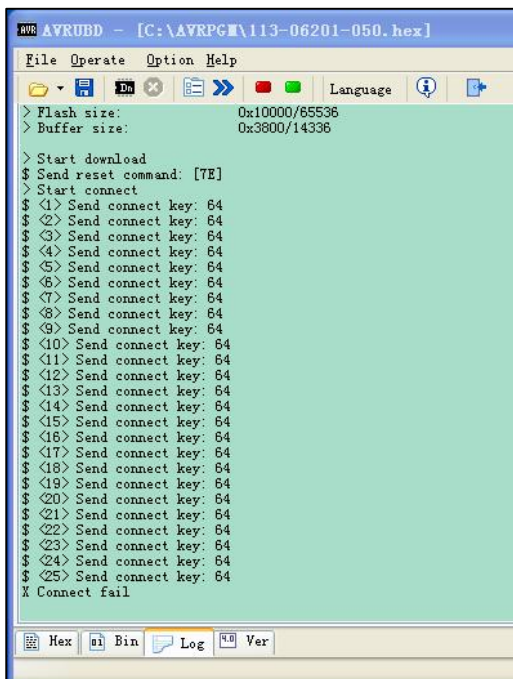

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Revision History

Version	Date	Descriptions
01	2012.01.02	First draft