

# **USB Backgrounder**

**by Robert Boys Keil Software**

## **Introduction**

This article provides some useful and hard-to-find information. These are some tidbits I wish I knew upfront when I first started looking at USB.

## **Some Marketing Stuff**

USB promises to become very important in the United States. As I travel to various Embedded Computer Shows, I hear of more engineers looking at implementing USB in their products. California seems to have much of the interest with some in the Midwest. There is a lot of CAN (Controller Area Network) interest in the Michigan and Texas areas.

I find that these engineers are interested in using the USB to provide a connection between their own products as well as applications terminating to a PC. I see perhaps 80% using a PC as a host with 20% looking for a network within their own product lines. Many people are now evaluating the USB (as of August 1997). These are not scientific statistics but rather a rough feel for the market.

## **New Products Coming Out**

The last part of 1997 and 1998 should prove interesting for USB parts. There will likely be some more 8 bit USB micros and peripheral parts released during this time. Look under [www.keil.com/usb](http://www.keil.com/usb) or [www.keil.com/~market](http://www.keil.com/~market) for the latest information. I intend to keep up with announcements and will post the more interesting ones there. More code examples will be available free on these websites.

You should notice that Siemens are announcing at the ESC West show their two new 8 bit USB microcontrollers. The data sheets are included in the Keil USB CD-ROM.

These microcontrollers contain 8051 CPU cores from the Siemens C500 series. An evaluation board will be available from Phytex and a photo of it is in the Keil USB CD. Preliminary data sheets are included in the CD. For the latest information concerning the C540U and C541U:  
[www.siemens.de/Semiconductor/products/ICs/34/index.htm](http://www.siemens.de/Semiconductor/products/ICs/34/index.htm)

See also an article [usb\\_art1.pdf](#) by Fulvio Famularo. It is in the Siemens directory on the Keil CD as well as their Web site in Germany.

Don't forget the Intel 8x930AX and 8x930HX 251 based microcontrollers with an integral USB peripheral. Intel also manufactures an excellent evaluation board using these parts. This is described in the next section. This is the board I have been working with. It works well with Version 2.1 of the Keil C251 C Compiler and dScope Simulator and Debugger. Intel now has the new 8x931Ax and 8x931HX 8051 based USB parts.

See [www.keil.com/~market](http://www.keil.com/~market) for more information.

## **Peripherals**

If you plan on making a peripheral - i.e. a mouse, keyboard or like device, there are many USB microcontrollers and peripheral chips available. The CD contains data sheets for many of them. Web site URLs are listed. The latest USB information can be found on these Web sites.

If your peripheral will have other devices plugged into it, you will need a Hub device such as the Intel 8x930Hx or the 8x931Hx.

An evaluation module is the fastest way to obtain a working peripheral. Intel makes one for the 8x930AX. By adding an optional daughterboard, the Hub device 8x930HX is supported. There are two versions of the board - a 3 Port and 4 Port. The 3 Port is the older and has been superseded by the 4 Port. Look under "Evaluation Modules" on the Keil USB CD-ROM for photos of these boards.

Keil provides free example software, a tutorial and application notes for this board. Enumeration code is also available from Keil. This data is all available on the CD-ROM and the Keil Web site. Later information is on [www.keil.com/usb](http://www.keil.com/usb) and [www.keil.com/~market](http://www.keil.com/~market).

## **Host - Windows 95 B**

A host is also a Hub. The fastest way to get a host is with a PC motherboard with one or two USB ports installed and running Windows 95 B. The B version of Windows 95 is sold at present only (September 1997) to OEMs of PCs. It cannot be purchased separately. It can be identified by checking the version of Windows by right clicking on "My Computer" and selecting properties. The general tab

will show the Windows version. If it lists the system as 4.00.950 B then USB can be supported. A floppy disk should come with the computer labeled "USB Supplement for Windows 95". This is called "OSR 2.1". This disk must be installed on your system. At this point, the Keil enumeration code can be run on the Intel 930 board and the PC.

## **Keil Software Demos**

The Keil USB CD contains copies of the latest demo software from Keil. The date is September 1997. This includes the 8051, 251 and C166. The 8051 and 251 are limited in code length of 2k and the C166 to 4k. They produce usable object code for your evaluation purposes.

## **Enumeration Code**

USB devices are hot-pluggable. When a device is connected to a PC, the peripheral is detected and certain communication occurs between it and the host. The appropriate drivers will be selected and the peripheral will be installed on the host (the PC). This process is called "*enumeration*". Sample enumeration source code is available free from Keil.

## **First Time USB Design ?**

Check out the article form Anchor Chips under Kick Starting USB on the Keil CD or [www.anchorchips.com](http://www.anchorchips.com). Also see the article by Fulvio Famularo, the Intel Web site and on the industry site [www.usb.org](http://www.usb.org) as well as [www.keil.com](http://www.keil.com). There is a mailing list available on [www.usb.org/developers](http://www.usb.org/developers).

## **Conclusions**

I believe the USB market will be substantial in North America. Get the Keil USB CD. We will be making an updated version of the disk early 1998. Check out the Keil Web sites: [www.keil.com/usb](http://www.keil.com/usb) and [www.keil.com/~market](http://www.keil.com/~market) for the latest information on USB.