

TECHTIP 03.12.01

Using USB to RS-232 “serial port” converters to communicate with legacy RS-232 devices

INTRODUCTION

The once standard RS-232C serial communications port is quickly disappearing from today’s new computer systems. Most newly purchased computer systems will be lacking the familiar 9-pin serial I/O connector in favor of having one or more USB ports used for PC to peripheral serial communications. USB serial communications offers many technological improvements over the aging RS-232 technology which has led to the industry transition to USB over the past several years. Laptops are most affected by this technology shift because PC manufacturers can now eliminate the RS-232 support circuitry and connections to make space for newer technology options and features.

An additional problem that users of legacy RS-232 communications devices face is the increasing amount of computers that still include a standard RS-232 communications port, but do not support the original full signal voltage level specification of the RS-232C standard. The increased popularity of portable, low power, and battery powered electronic devices has led to an increased number of RS-232 ports that have signal levels of only ± 5 volts instead of the nominal ± 10 volt levels that are most common for this communications port. The actual specification calls for ± 12 volt signal levels and this is often referred to as “true RS-232C levels”. Some legacy RS-232 communications devices may encounter problems interfacing with PC ports that have the lower signal levels. Long cable lengths and extremely noisy electrical environments can also aggravate communications between systems that have lower signal level RS-232 ports.

This tech note discusses using commonly available “USB to RS-232” converters to add an RS-232 port to a laptop or desktop PC. This allows for the continued use of legacy RS-232 peripherals and instruments such as RS-232 based data logging devices and can also be used as a means of providing a serial port which has “true” RS-232 signal levels on a computer that has a built-in serial port which is exhibiting communications problems due to lower RS-232 signal levels.



The Iotech ChartScan™ data recorder connected to a laptop PC using a USB to RS-232 converter

DISCUSSION

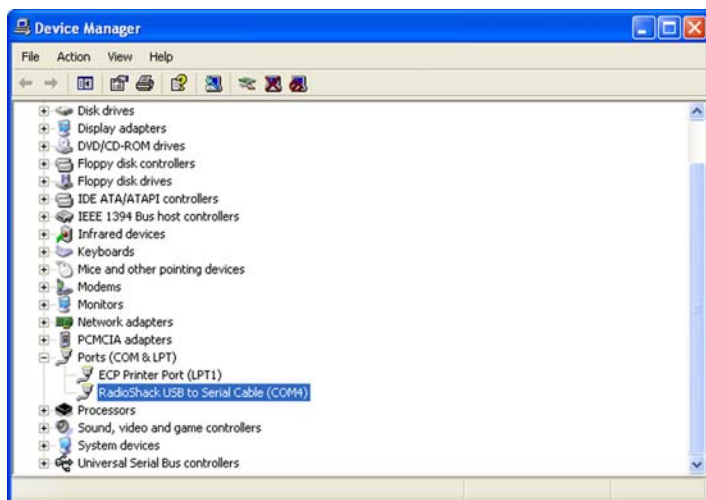
Widely available converters make it easy to add a standard RS-232C compatible communications port to a PC that only has USB communications built in.

The following graphics show examples of popular converters which can vary in shape and size, but provide the same standard conversion from USB to RS-232. All of these converters are supplied with a Windows® “device driver” that gets installed on your PC. The device driver software causes the PC to treat the USB to RS-232 converter as if it were an actual RS-232 serial port installed in the PC and allows Windows-based software to connect to external devices through the program’s original serial communications port configuration settings. The device driver software runs transparently in the background and does not require any further setup after the initial installation.

INSTALLATION & SETUP

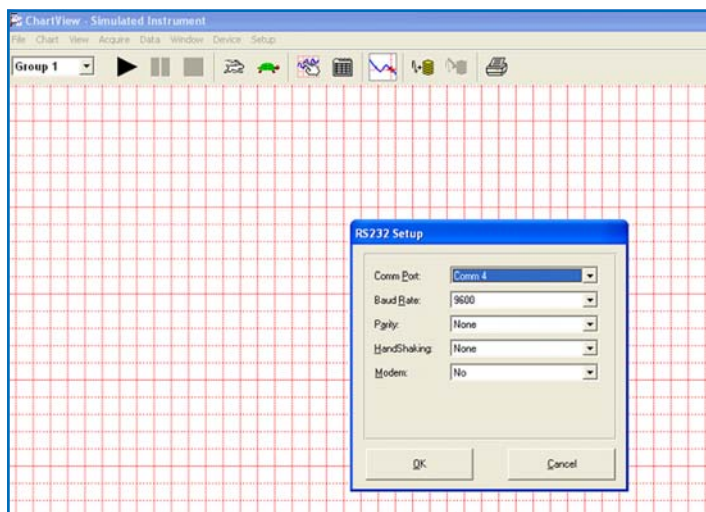
Installation for most of these devices involves plugging in the USB connector which will cause the Windows "found new hardware wizard" to launch. In most cases you then point the wizard to the driver file for the device by browsing to the CD or disk that contains the driver files that were included with the converter.

After installing the device, the converter can be physically unplugged and plugged back in at any time and the driver will load automatically. You can check for your newly installed Communications Port in the Windows device manager screen under the Control Panel.



USB to RS-232 converter is installed and shows up as COM4 in the Windows device manager

At this point you are ready to run your device application software and configure its RS-232 settings as if you had an actual RS-232 port built into the PC.



Iotech ChartView™ software being configured to communicate with a ChartScan data recorder using COM4 provided by a USB to RS-232 port converter



The U232-P9 manufactured by Magic Control Technology Corp. guarantees "full" RS-232C signal voltage levels in its specifications
www.mct.com.tw



Radio Shack's model number 26-183 converter
www.radioshack.com



The model UC232A converter from B&B Electronics
www.bb-elec.com

The new virtual RS-232 communications port will show up in the Windows® Device Manager screen under PORTS and will occupy the next available open communications port, i.e. COM4.

One such port converter was recently used to establish serial communications between the IOtech ChartScan™ voltage and temperature data recorder and a laptop computer. After thorough inspection and troubleshooting of both the PC, interface software, cabling, and the ChartScan RS-232 port settings, it was determined that all settings were correct and that the problem was related to the RS-232 port on certain models of Laptop computers. Closer investigation revealed that the RS-232 signal levels on these laptops was in the range of only ± 5 volts. After installing and configuring a USB to RS-232 converter on the same laptop computer, communications was successfully established with the ChartScan recorder. Full device functionality was available using the standard Windows-based interface software package that was setup for serial communications using COM4.

Typical requirements for installing one of these converters (consult individual converter device requirements for more details).

- Windows-based PC system with at least one built in and fully configured USB port
- Windows 98 or higher, Windows 2000 or XP recommended
- DOS application programs and some older Windows software applications that require direct communications with the RS-232 hardware port will not work properly with these converters
- Insure that the converter that you select has all of the RS-232 control signals that your external device requires for proper communications
- Select a converter that has guaranteed RS-232C signal levels in its specifications if you will be using the converter to interface to older legacy RS-232 devices