

# GBS-USBR1 USB Relay Manual

## Rev 1.2

### Revision history

17<sup>th</sup> July 2003    *PMD*    *Initial draft.*  
 21<sup>st</sup> July 2003    *MDW*    *Added intro text.*  
 12<sup>th</sup> Feb 2004    *MDW*    *Revised with instructions for use with Apple Mac OS X*

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## GBS-USBR1 USB Relay interface

### **Description**

The GBS-USBR1 allows a PC with Microsoft Windows 98, Windows 2000 or Windows XP, or an Apple Mac running OS X to control a single external device using a relay contact. On the PC this device is simple for the programmer to use, since it appears as an additional COM port. On the Mac it appears as an additional network device whereby a TCP/IP stream can be used to communicate with it.

The relay is controlled by issuing commands to the COM/network port, no technical knowledge of USB is required and no new driver interfaces need to be learnt.

The GBS-USBR1 is available as a PCB, or in an enclosure, and is supplied with a USB and external power cable. Device drivers and documentation are available on-line.

The relay can be powered off the USB bus (bus powered) or from an external 12v supply (self powered)

### **Key benefits**

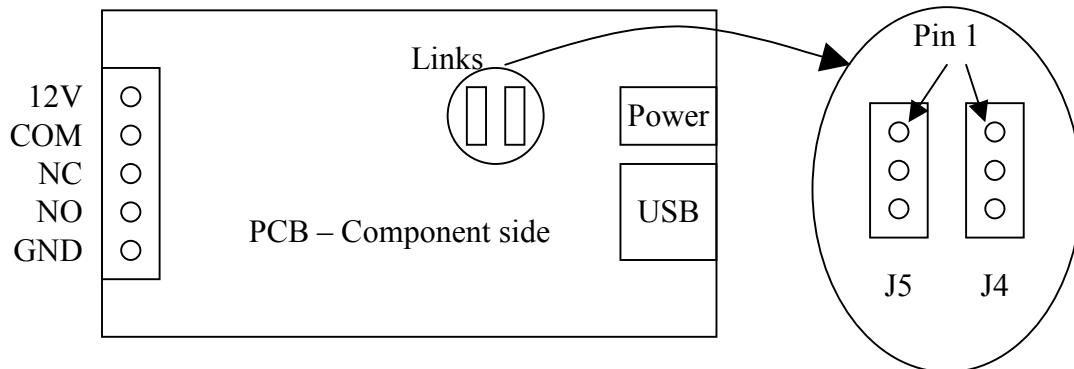
- Low cost.
- Bus- or self-powered for flexibility.
- N.O or N.C. contacts.
- Programmable watchdog monitors application and/or USB.
- Screw terminals for easy connection.
- Screw terminals also carry 12V power (when self-powered).
- Appears to programmer as additional COM port.
- Choice of command sets.
- Available in enclosure or as PCB only.

### **Specifications**

Power supply	(Self-powered, relay off) 12V nominal, <30mA (Self-powered, relay on) 12V nominal, <70mA (Bus powered) NONE.
Operating temperature	TBA
Relay contact type	N.O. and N.C.
Max contact current	3A @ 5V DC 2A @ 30V DC 0.4A @ 125V AC
Max contact voltage	250V AC 220V DC

## PCB Link options

Links J4 and J5 allow the board to be switched between bus-powered (power taken from the USB port) and self-powered (power obtained from the external 12V



connection). The position of the links is shown in the diagram below:

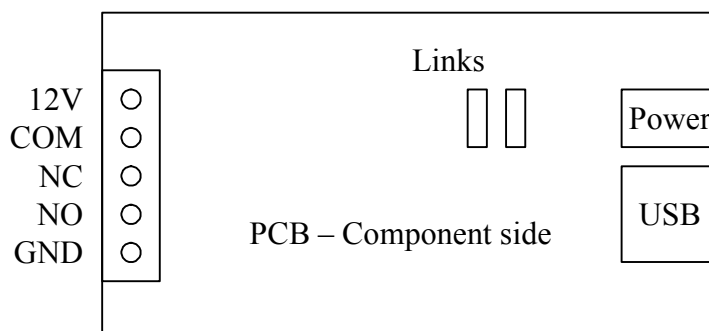
J4	J5	Operation
1-2	1-2	Self-powered. The relay contacts will maintain their state if the USB bus goes down. The relay <i>may</i> switch itself off after a delay if the unit has been configured for this.
1-2	2-3	Bus-powered, but allowing the relay to hold its state. The device is powered from the USB bus. If the USB bus goes down, the device will hold the state of the relay, provided that the USB power remains present. Note that this does not conform to the USB specifications, since the device may draw a significant amount of power from a suspended USB bus.
2-3	1-2	Self-powered, but will not hold the relay state. The relay will be switched off if the USB bus is suspended.
2-3	2-3	Bus-powered. The relay will be switched off when the USB bus is suspended.

Normally, J4 and J5 will be set the same as each other. Under exceptional circumstances, the second setting (J4/1-2, J5/2-3) may be used.

Note – the addition jumper J7 should be left alone and not connected unless under instruction from GBE.

### Connecting devices to the relay

If the USB relay is boxed, the top of the box needs to be removed to gain access to the relay contacts that are available on the screw terminals at one end of the PCB. The connections on the screw terminals are as follows:



It is important to note that the 12V output at the screw terminals is taken directly from the external power input to the PCB. If the unit is to be bus-powered, i.e. the 12V jack socket is not used there will be no power available on the 12V screw terminal connection.

When external power is used on the 12V power jack, **a suitable fusing arrangement MUST be used to protect the 12V supply.**

It is recommended that a fuse is fitted inline on the 12V output and that the external power supply source connected to the 12V power jack also meets safety and fusing requirements.

## Driver and hardware installation

### **Microsoft Windows 2000 and Windows XP**

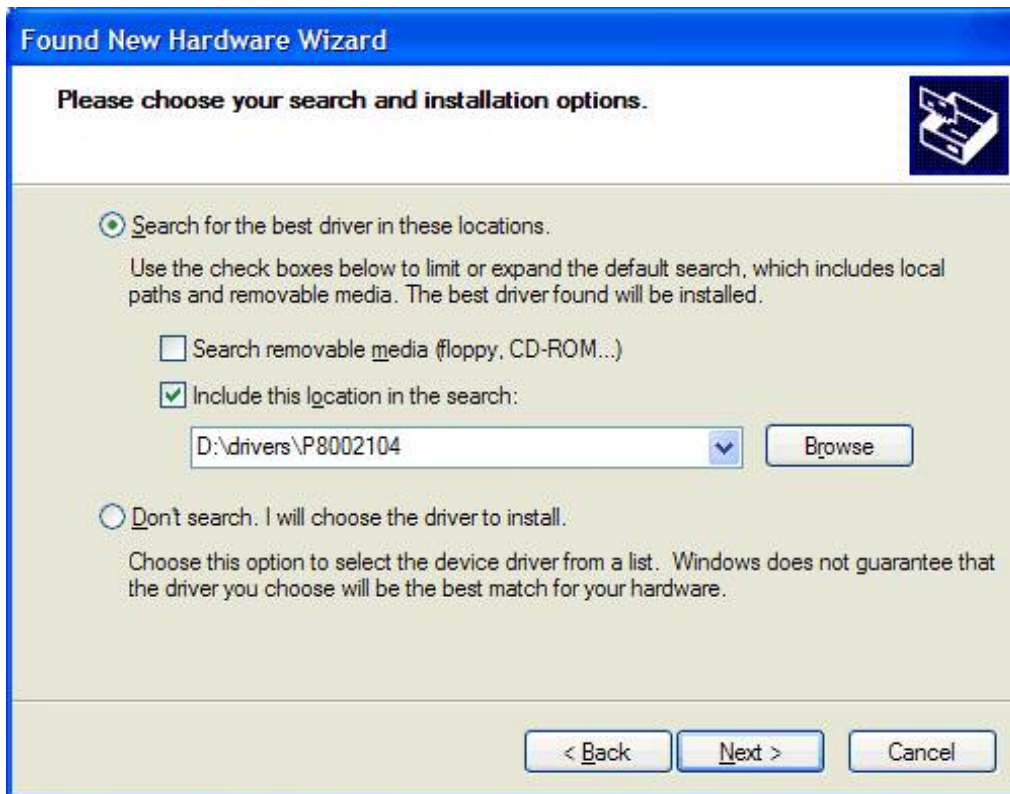
These steps apply to Windows XP systems. The steps for Windows 2000 will be similar.

The following instructions are fairly brief, and assume that the reader is reasonably familiar with installing hardware devices and their drivers.

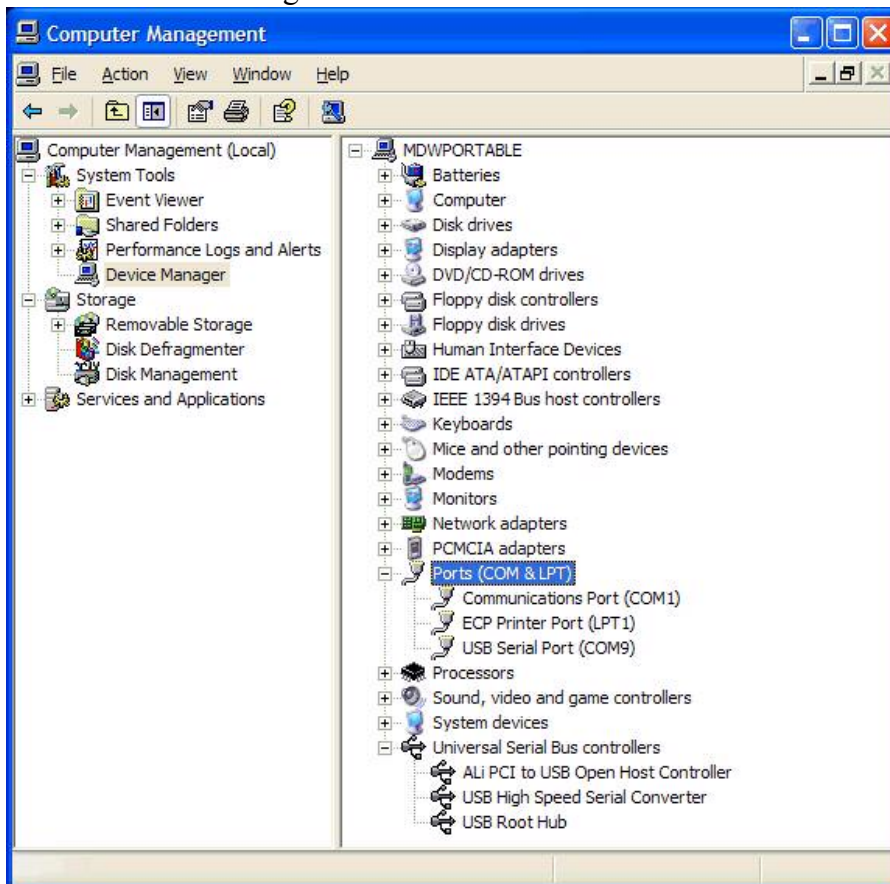
1. Ensure that the device driver files are accessible from the target machine. The files may be on a floppy disk or CD, or on a shared directory on the network.
2. Open the device manager (right click My Computer, and select “Manage”). Select “Device Manager” in the left-hand panel. Expand “Ports (COM & LPT)” by clicking the plus sign. The Computer Management window should look similar to that shown in stage 7 below.
3. Connect the USB relay device to any of the target machine’s USB ports.
4. Windows will display the “Found new hardware” wizard. Select the “Advanced”



option, which allows you to browse for the drivers yourself, and click “Next”.

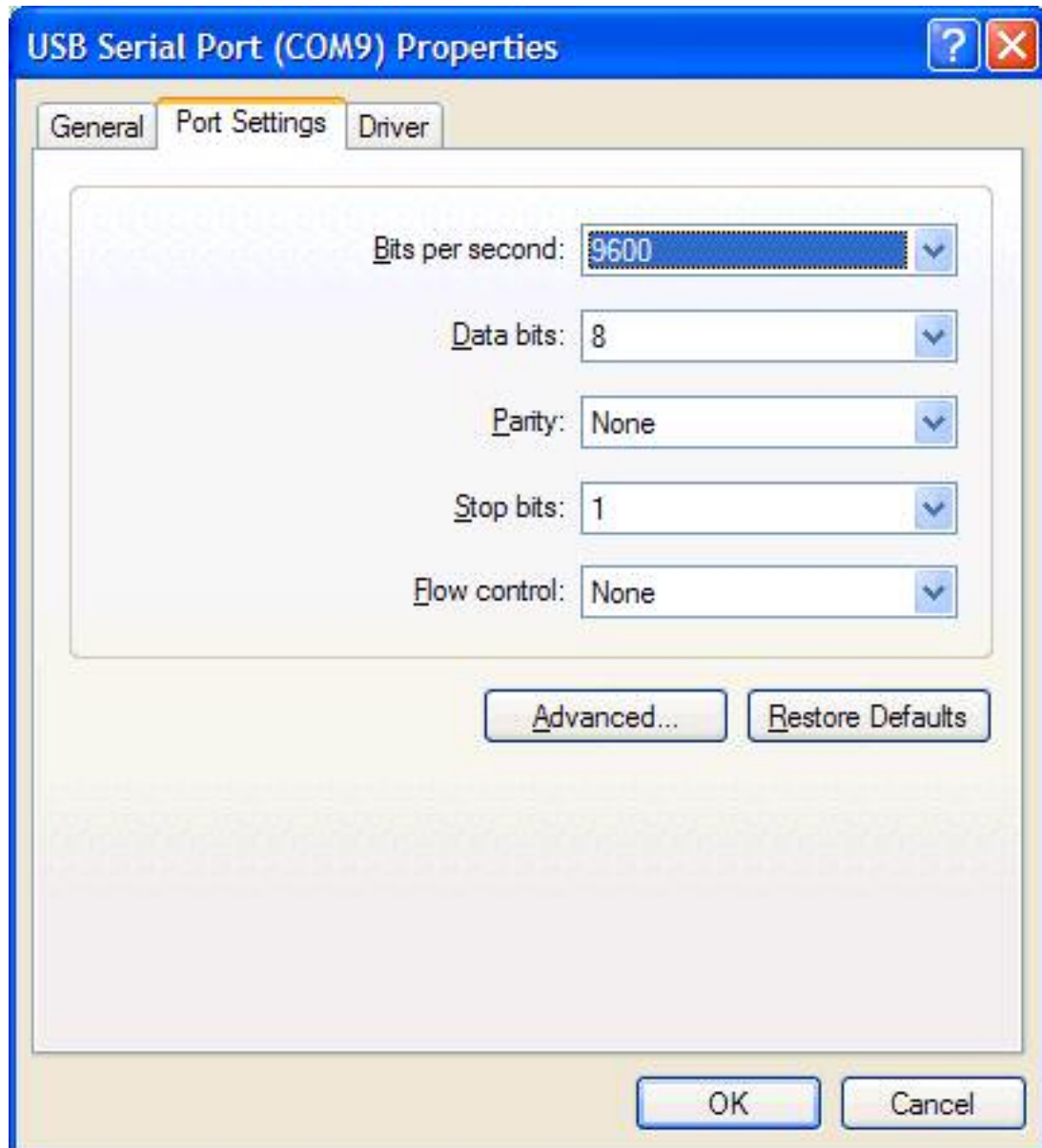


5. Select the P8002104 directory from the set of driver files.
6. Windows will install the virtual COM port drivers. A new COM port should appear in the device manager.

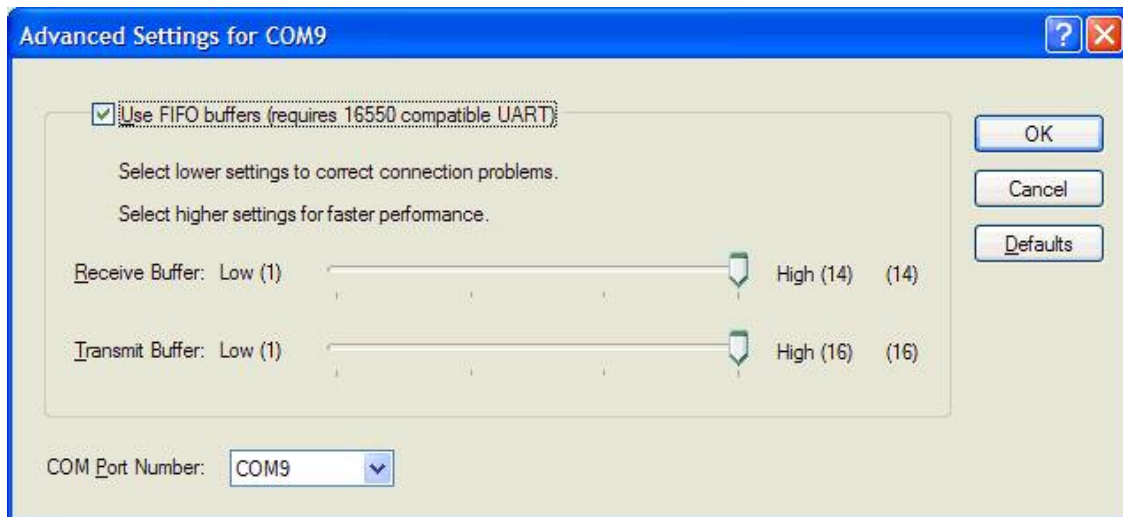


If the number of the new COM port is satisfactory, then the installation is complete. COM ports with numbers greater than 9 may be inaccessible to some Windows application software – to correct this follow these instructions

7. To change the number of the COM port, double click the device within the device manager. The device properties will be displayed.
8. Select the “Port Settings” tab.



9. Click the “Advanced” button.



10. Select a new COM port name using the drop-down list provided.

**Macintosh OS X**

Expand the relay inst.zip archive (it is compressed in PKZip format).

Run the installer by double clicking on the 'Relay Inst' icon. The Mac may ask for the computer's administrator password in order to install the driver.

When the installation is complete, reboot the computer.

Once the computer has rebooted, plug-in the USB relay device into the Mac's USB port. **Do not** use the USB ports that are on the sides of the Mac keyboard as these do not appear to supply sufficient power for driving the relay.

If the device is installed properly, you will see entries in the Mac's /dev directory:

```
/dev/cu.usbserial-xxxxxxx  
/dev/tty.usbserial-xxxxxxx
```

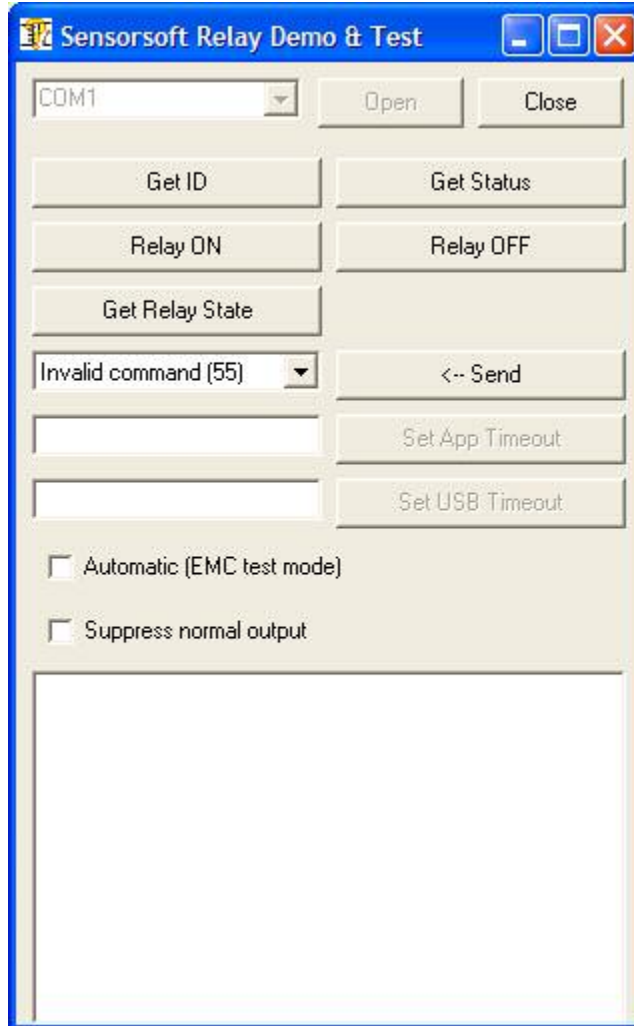
where xxxxxxxx is the device's serial number beginning with GB.

If you run Application | SystemPreferences and select Network, you should see the text "New Port Detected" and "usbserial-gbxxxxx-port".

## USB Relay application

A control/test and setup program is supplied with the USB relay. On a windows system this can be run from the CD or copied to a folder. For the Macintosh this application is installed into the Mac's hard drive | applications folder.

Both OS versions provide the same functionality and GUI, the screen shot below shows the application under Windows XP. Double click the icon to start the app.



### **Connect Open & Close**

At the top of the application the drop-down box allows the selection of the USB relay to control with the program.

Under Windows this will list the COM ports available on the PC (to which the USB relay is mapped). On the Mac each USB device is listed via its network device ID (as shown by the network connections window).

Open and close will connect and disconnect respectively the program from the USB relay. Note that only one application at once can connect and talk to the relay, and the close button should be used before the device is unplugged.

### **On & Off**

These two buttons allow manual control to switch the relay on (closed) and off (open) respectively.

### **Set App Timeout**

A value of 0 to 255 can be written to the relay's non-volatile memory to set how many seconds the relay is held on from the issue of an 'on' command via the USB port. Enter the required value in the text box and press 'Set App Timeout' to set this up.

So for example writing '3' to this register will then hold the relay on (closed) for 3 seconds before it switches off (open).

The 'app timeout' can be used in conjunction with a specific application to provide a watchdog function in the event of the host computer crashing. For example, if the timeout is set to 20 seconds the control application should repeatedly send an 'on' command via the USB port within that 20 seconds time in order to keep the relay on (closed), else it will revert back to off (open).

Writing a value of '0' – zero – to the register will remove the app timeout function. Put 0 in the text box and press the 'Set App Timeout' button.

### **Set USB timeout**

When the relay is self powered (i.e. using the 12V power jack) then the relay can be programmed to hold the relay on (closed) for 0 to 255 seconds after the USB port has been disconnected or shut down. This allows for the computer to be rebooted (hot or cold) without affecting the relay's state.

Put the required value into the text box and press the 'Set USB Timeout' button to set up the relay. A value of 0 will remove the function.

Note – using this function when the USB relay is bus powered depends on the host computer. Some computers remove the power from the USB port during a reset, others do not. Similarly when a computer is switched off using the front panel button it may still provide power on the USB port. Obviously the USB relay will be powered down if the mains supply is removed to the computer.

### **Get ID, Get Status, Get Relay Status, register read/write drop-down box**

These are for development and/or advanced programming and will only be used for future revisions of the USB relay that may have some advanced functions. These also can be used for testing when creating a specific application to control the unit.

### **Automatic (EMC test mode)**

Activating this tick box will cause the application to toggle the relay state on/off every other second. This is useful for doing EMC (Electromagnetic Conformity) tests in a system.

### **Suppress normal output**

The output and status changes that are reported in the text box can be switched off by checking this box.

### **Control protocol**

The protocol used to control the relay via the USB port is available on request.