

RS423-USB Adapter

For the Acorn/BBC series of Microcomputers

User Manual



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Description

This device facilitates the connection of a vintage BBC Microcomputer or Master 128 to a PC or any other computer with standard USB ports.

From here on the vintage micro's will simply be referred to as 'BBC' or 'Beeb' unless there is a distinction to be made between the BBC Micro and the Master 128.

This gives the ability to transfer files direct from your PC to the BBC and vice versa, take control of the BBC from the PC (using suitable, freely downloadable software) and more.

Designed and built in the UK, it comes with approximately 500mm cable terminated with a 5-pin "domino" DIN plug for the BBC end, and a mini-USB socket at the other end of the module to receive a standard USB cable from the PC.

The adapter works with the full range of speeds available on the RS423 port, including 19200 baud. *Be aware, though, that 19200 baud transmission was not guaranteed by Acorn (the company that designed and sold the BBC series of microcomputers), so may be a limitation of your particular machine.*

Connection and Use

Connection of the adapter is straight forward: simply insert the 5-pin DIN plug into the RS423 port of the BBC and connect the adapter to the PC using a standard USB to mini USB cable. Note that it is possible to insert the DIN plug in two orientations: the correct way is with the gap in the metal shield uppermost or, in the case of plugs with no gap, there is a dimple in the shield which should face towards the UHF and Video sockets of a **BBC Micro**, or the cassette port of the **Master 128**. No harm will be done to either the adapter or the Beeb if the plug is inserted upside down – it will simply not work.



Machine Setup

At the BBC Microcomputer

Issue the necessary *FX commands to enable the BBC to communicate over the RS423 port. By default, the port is set to send and receive at 9600 baud, so if that's a suitable speed simply typing the following will suffice in order to redirect input and output streams via the RS423 port:

*FX3,7 [Return] (sends output to RS423 instead of screen)
*FX2,1 [Return] (receives input from RS423, keyboard disabled)

If you wish to set up a different transmission speed, *FX7,x and *FX8,x can be used **before** issuing the *FX3 and *FX2 commands. Transmission speeds available to the BBC are in the table on the next page.

At a Master 128

The commands are the same, but note that the transmission speed can be preconfigured to default to a different speed within the configuration settings of the CMOS RAM – see page C.5-2 of the Master Reference Manual Part 1 for the command *CONFIGURE.

Serial transmission rates

*FX7 - Receive rate

*FX7,1	75 baud receive
*FX7,2	150 baud receive
*FX7,3	300 baud receive
*FX7,4	1200 baud receive
*FX7,5	2400 baud receive
*FX7,6	4800 baud receive
*FX7,7	9600 baud receive
*FX7,8	19200 baud receive

*FX8 - Transmit rate

*FX8,1	75 baud transmit
*FX8,2	150 baud transmit
*FX8,3	300 baud transmit
*FX8,4	1200 baud transmit
*FX8,5	2400 baud transmit
*FX8,6	4800 baud transmit
*FX8,7	9600 baud transmit
*FX8,8	19200 baud transmit

At a Windows PC

Your Windows PC may already have the necessary drivers installed that will work with this adapter, in which case connection of the adapter will cause the operating system to create a “virtual” serial (com) port, the ID of which will vary but can be found by doing the following:

1. Go to **Settings** -> **Device Manager**
2. Click **Ports**
3. Find your Serial USB Adapter in the list

If the adapter is not recognised, you will need to install a driver. There are two versions of the adapter, one based on the 28-pin FTDI FT232 chip and the latest based on a 16-pin CH340.

- **FT232 variant**

Drivers for the FT232 can be downloaded from the FTDI website:

<https://ftdichip.com/drivers/>

A direct link to the Windows drivers installation software is here:

https://ftdichip.com/wp-content/uploads/2021/02/CDM21228_Setup.zip

Alternatively, a driver and detailed installation instructions can be obtained from this site:

<https://www.usb-drivers.org/ft232r-usb-uart-driver.html>

- **CH340 variant**

Drivers for the CH340 can be obtained from the manufacturer's website here:

http://www.wch-ic.com/downloads/CH341SER_ZIP.html

Terminal emulation software

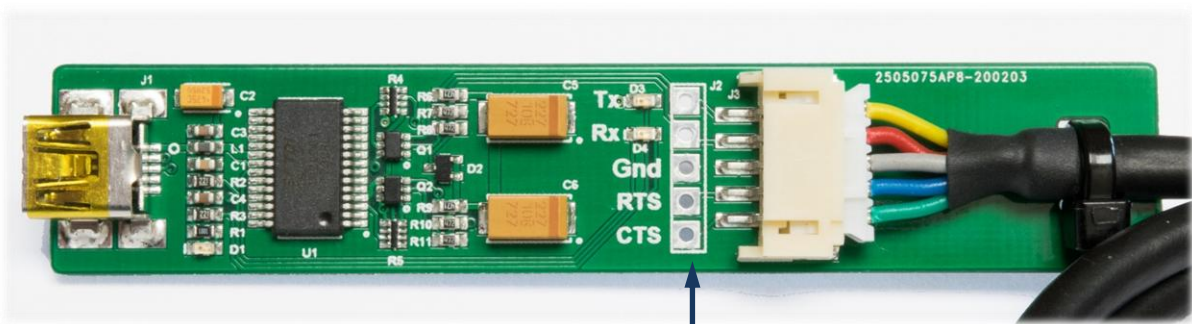
If you don't already have a terminal emulation package on your PC, now's the time to get it. Two examples of such terminal emulation software are "PuTTY" and "RealTerm" which can be downloaded from <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html> and <https://sourceforge.net/projects/realterm/> respectively.

Having installed your terminal software you can now open it, select the com port, set it for the data speed to match that to be set up at the BBC, and set hardware handshaking to RTS/CTS.

If all settings are correct, the transmission speeds and hardware handshaking/flow control set at the BBC and the PC Terminal software match, you should now be able to communicate between the two machines.

Alternative installation

This adapter can be mounted inside the BBC's case. To make this easier, from revision 4 the cable is connected to the adapter with a small plug allowing it to be easily removed, and separate solder points to allow the user to solder his/her own wires to connect directly to the BBC's circuit board. The labelling next to the solder points indicate the data direction at the adapter, so the pad marked "Tx" should be wired to the BBC's "Rx" terminal, and so on.



Solder points for user's own cable

Troubleshooting

If after setting everything up you are not able to communicate between machines, there are a few things to check.

1. Is the red LED on the adapter illuminated? If not, check the connection to the PC's USB port. Until that LED is lit the adapter will not work.
2. Is the RS423 DIN plug at the BBC is the correct way round? If the plug has a gap in the metal shroud, it should be uppermost, if there is no gap there will be a dimple which should be on the side nearest the RGB connector on a BBC Micro, and nearest the cassette port on a Master 128
3. Have the correct ***FX** commands been issued and accepted? Try pressing <Break> and typing ***FX3,7** [Return] and ***FX2,1** [Return] again. Note that after you type ***FX3,7** you will not see anything on the BBC's screen whilst you type ***FX2,1** as that will be being sent to the RS423 port. Don't forget the [Return] keystrokes!
4. Having completed suggestion (3), the BBC Micro will be at its default transmission speed of 9600 baud, so check that your PC Terminal software is also set to send and receive at 9600 baud.
5. If you are connecting to a Master 128, check its CMOS configuration settings for the default transmission speed, or use ***FX7** and ***FX8** commands to set the required speed for the session. If using the ***FX** commands, remember that the speed will be reset to that held in the CMOS configuration when you press <BREAK> or otherwise reset the machine. See page C.5-2 of the Master Reference Manual Part 1 for the command ***CONFIGURE**.
6. Is the flow control (hardware handshaking) correct? There is nothing to set at the BBC end as it's done by default, but the terminal software at the PC should be set to **RTS/CTS**. If it is, but still nothing is happening, try setting flow control to **none**. This will cause the software to ignore handshaking signals and send data regardless of whether the BBC is ready or not. Check the next step...
7. Is the PC Terminal program sending to the correct virtual serial port? With the terminal software set for no flow control (as in step (5)), sending keystrokes through the terminal software should cause the "Rx" LED of the adapter to flash. If it doesn't it's likely that the terminal software is not "talking" to the correct port.
8. If you still cannot get things working, please feel free to contact me via my website or directly at: colin@circuitsurgery.co.uk

