

# Sharp PC-G850VS Gadget

## Overview

This gadget attached to the 11 pin socket on the PC-G850Vs and allows data sent over the serial data connection to be stored on SD cards. Files on the SD card can also be sent to the PC-G850VS. This provides a non-volatile storage system for the P-G850VS, and also a way to transfer files from a PC to the P-G850VS that doesn't rely on a serial cable of some sort.

The PC-G850VS 11 pin connector is actually a versatile port that can operate in a number of modes. The gadget handles two of these modes:

SIO mode  
PIO Mode

SIO mode is used for file transfer.

In PIO mode the gadget can display the state of the digital lines when set as outputs on the PC-G850VS as either a line graph or a number. To make some use of these signals, the firmware of the gadget would have to be adjusted. The source code is available on GitHub.

There is an English manual available on the internet for the PC-G850VS, this contains information about the 11 pin interface.

## Gadget Hardware

The gadget is based around a 'Blue Pill' board. This is a small PCB with an STM32F103C8 microcontroller on it. It is programmed using the Arduino IDE. The STLINK V2 USB programming adapter is used to download code to the microcontroller.

Attached to the STM32F103C8 is an SD card adapter. The firmware reads and writes text to and from files on this SD card into a buffer in the microcontrollers RAM. This buffer of fixed size and this limits the largest file that can be transferred. This limit could be removed if the handshaking is enabled on the Sio interface, the code does not use this at present.

There is a small prototype area on the PCB that can be used to add hardware to the microcontroller, that can then be driven by the PC-G850.

An OLED display is used to display a menu system and also data from files and status messages.

Three buttons are used to control the menu and information screens. The red button is an ENTER, the black and white buttons are UP and DOWN.

## Jumper J7

The 11 pin interface can power the gadget, or it can be powered from the USB port on the Blue Pill. The best power option when attached to the PC-G850 is the 11 pin interface, there is no danger of feeding USB power into the 5V supply of the PC-G850, which could damage it, but this does put an extra load on the batteries in the PC-G850. Jumper J7 controls the connection of power to the gadget:

J7 with jumper in position: gadget powered from PC-G850

J7 with no jumper: gadget powered from Blue Pill USB

Do not operate the gadget with the USB attached and the jumper in position. This will connect the 5V from the Blue Pill to the 5V on the 11 pin interface and could damage the PC-G850.

## Gadget Firmware

The gadget firmware is in the github repository:

<https://github.com/blackjetrock/pcg850vs-sd-gadget>

It uses the Arduino IDE and framework. Programming is done using an STLINK V2 dongle attached to the programming connections on the Blue Pill. Power is not connected and the Blue Pill is powered from either the gadget or, preferable when programming, from USB. The STLINK V2 doesn't have a large power supply capability and the gadget probably takes too much power when the OLED display is displaying a large number of pixels.

## Gadget Startup

On startup (or reset) the gadget checks the SD card and displays either 'SD OK' if a working card is found, or 'SD Fail' if no card is found. Obviously, if SD Fail is displayed then no files can be read or written, but all other functions will work.

## Gadget Menu

### Transferring a file to the SD card

The gadget is always ready to receive data from the 11 pin interface. Before sending a file to the gadget:

Put whatever file is required to be sent in the TEXT buffer. (This can be done using the TEXT mode options such as Basic->Text)

Set SIO mode on the gadget  
( 'SIO' menu option)  
( 'Set SIO Mode' menu option)

Clear the receive buffer in the gadget  
( 'Clear' menu option)

Set the correct SIO parameters in the PC-G850

These are:  
( 'TEXT' button)  
( 'Sio' option)  
( 'Format' option)  
( 'baud rate' 9600)  
( 'data bit' 8)  
( 'stop bit' 1)  
( 'parity' none)  
( 'end of line' CR LF)

(‘end of file’) 1A  
(‘line number’ yes)  
(‘flow’ none)

Use Sio menu to send the file

(‘TEXT’ button)  
(‘Sio’ option)  
(‘Save’ option)

When transfer completes, the contents of the buffer can be displayed

(‘Display’ menu option)

The bytes of the buffer should be displayed in ASCII and hex. UP and DOWN to page the data and the RED button to exit

Write the buffer to the SD card

(‘Write’ menu option)

The filenames are automatically chosen by the gadget. You can rename them in a computer if needed. The gadget doesn’t have the capability to rename files at present. The files are written to the root directory of the SD card.

The name of the file written and the number of bytes written are displayed for a few seconds

## Transferring a file from the SD card

Set SIO mode on the gadget

(‘SIO’ menu option followed by ‘Set SIO Mode’)

SIO mode only needs to be set once. It remains in force until another mode (such as PIO mode) is set.

List the files and select the one to send to the PC-G850.

(‘List’ menu option)

UP and DOWN are used to select the filename of the file to read. This menu option does not read the file, it just selects the file by name.

Clear the buffer

(‘Clear’ menu option)

Read the file

(‘Read’ menu option)

The name of the file and number of bytes read are displayed for a second or two. (There is a strange problem that sometimes happens whereby the number of byte read is 1. If this happens, read the file again).

Set the SIO parameters on the PC-G850 as above.

This only needs to be done once on the PC-G850, it retains SIO settings while off. A reset of the PC-G850 may reset the settings.

Set receive mode on the PC-G850

(‘TEXT’ button)  
(‘Sio’ option)  
(‘Load’ option)

Send the buffer

(‘Send’ menu option)

the file will transfer and the PC-G850 menu should change to the Sio menu. The file that was sent should now be in the TEXT buffer on the PC-G850

## Scoping the PIO outputs

Load the SCOPE.BAS example program into the PC-G850 TEXT buffer. This program counts in binary on the PIO outputs of the PC-G850.

Set PIO mode on the gadget, and GPIOs to all be inputs

(‘PIO’ menu option)

(‘PIO All Inputs’ menu option)

Enter run mode on the PC-G850

Select the Scope PIO menu option on the gadget just before RUNing the BASIC program.

(‘PIO’ menu option)

(‘Scope PIO’ menu option)

You should see the PIO lines counting in binary.

The RED button starts a new trace. There is no trigger facility and the GPIO lines are only sensed as high or low, not as analogue values. The UP and DOWN keys exit.

## Example Files

The github repository has a directory that contains example files. If these are placed on an SD card that is then inserted into the gadget, they can be used as a starting point for using the gadget.

## Supported Machines

I have used the gadget on these machines:

PC-G850VS

PC-G850V

It may work on other variants of the PC-G850 series, please let me know if you have tried other variants.