SC126 Single Board System How-To No. 3,
Updating RomWBW From a Hybrid SD Card
Revision 1.1:   04 Apr 2020 – David Reese

<u>0.0) Background:</u>   The SC126 holds two ROM memory modules for its operating systems, system monitor & utilities.   One of these holds <u>SCM</u> (system monitor) and the other holds <u>RomWBW</u> multi-booting firmware.   This firmware is a moving target which is under constant development and improvement.   Our objective here is to detail how to update this firmware using an SD Card on which both a FAT32 file system and CP/M slices reside.

0.1) Style Conventions

The following text conventions are applied to help draw the reader's attention to important items in this document:

```
Text displayed by the SC126 to the terminal or a Linux shell
File and folder names in this document
User Input to the SC126 from the terminal keyboard
[key presses], for example, the [ENTER] key, [Ctrl] key, etc.
Text displayed that is emphasized for special interest
```
Text in this document emphasized for special interest

<u>1.0) Getting Started</u>

The things needed to perform this task are:

>   1.1)   <u>A working SC126 single board computer with a micro SD card interface.</u>

>   1.2)   <u>A reliable source of power</u> which *will not suffer interruption during the write portion of the procedure.*   The author uses a 10,000 maH USB power cell for this purpose.   This is sufficient, on a full charge, to operate an SC126 at full load for about 100 hours.   This is more than enough time to perform this task.

>   1.3)   <u>Some means of displaying output from the SC126.</u>   This is usually either a serial terminal or a hardware solution for displaying text output on a video display.

>   1.4)   <u>A hybrid micro SD card</u>: one on which *both a FAT32 file system and CP/M slices* are present.   Creating such a card is the subject of **SC126 How-To No. 2: Preparing an SD Card to Transfer Files to/from a Linux System.**   <u>NOTE:</u> users of Windows can apply much of what is written in **How-To No. 2**, but certain things will have to be done by different means on Windows than on Linux.

>>   <u>1.41) A micro SD to SD Card adapter:</u> This may or may not be needed, depending on your hardware in item 1.5), below.

>   1.5)   <u>An internet-connected personal computer with an SD Card reader.</u>

2.0) Procedure: Do the following to accomplish the objective:

2.1) *Download and Transfer the RomWBW Image to the SD Card:* RomWBW can be found at: https://github.com/wwarthen/RomWBW/releases

We won't get into the specifics of downloading and copying files here – they vary from system to system, but are really pretty basic. Some things of note:

2.11) File Names: The typical naming convention for downloaded RomWBW image files is something like (using RomWBW 3.0 as an example):

`RomWBW-SCZ180_126-2020-03-27.rom`

When you are ready to transfer this image to a CP/M slice, this file name is not going to work. Before transferring this image, you would be well served to rename it to something like:

`ROMWBW30.rom` ← (Note: 8 "dot" three characters maximum)

so that CP/M (and you) will be able to recognize and work with it. This is a limitation of CP/M (and ZS-DOS) operating systems.

2.12) SD Card Adapters: Micro SD to SD Card adapters can be useful to facilitate reading/writing micro SD cards on a PC. One of these is usually included with micro SD cards when they are purchased.

Figure 2.12) MicroSD Adapter and Micro SD Card

2.0) Procedure: (continued)

2.2)   **Set Up the SC126 to Flash the RomWBW ROM:** With the SC126 powered OFF, do the following:

> **2.21)**   *Move the Write-protect Jumper for JP1* (RomWBW) to pins 1 & 2 of its header (shown in RED below) to enable writing to this ROM.   Note that writing DOES NOT take place until the **FLASH.COM** command is issued to do that writing.
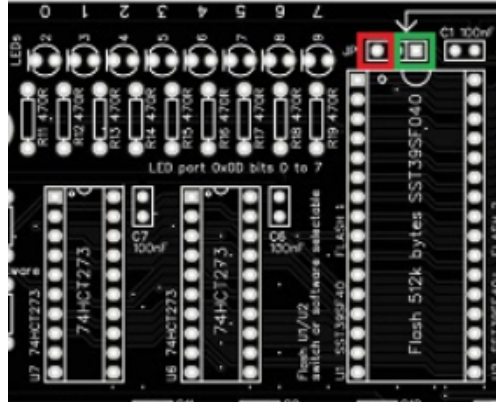

Figure 2.21, Location of RomWBW Write-Protect Jumpers (Stephen Cousins)

> **2.22)**   *Insert the Micro SD Card Into the Reader on the SC126.* This should be done with the SC126 powered down so that no write activity is taking place on the card or cards involved.
>
> **2.23)**   **Connect the SC126 to its Video Output Device or Terminal Session and Turn the SC126 ON.** When the prompt asks for **Boot Selection?** Press the **[C]** key to start CP/M.

2.3)   **Copy the RomWBW Image to a CP/M Slice:** After renaming the downloaded image as noted above, use **FAT.COM** from your hybrid SD Card to copy this renamed image to a CP/M slice. <u>In the example below</u>, we are copying to **J:**, *<u>but you should use a destination that makes sense on your system</u>*. Here we go:

Please turn to page 4 to continue...

2.0) Procedure: (continued)

2.3) Copy the RomWBW Image to a CP/M Slice: (continued)

FAT.COM uses Unit Numbers to communicate with FAT32 slices, and letters to communicate with CP/M slices. The unit number for my SD Card FAT32 partition in the examples below is **3:**, which I found by reading the drive list during startup:

```
Unit          Device      Type              Capacity/Mode
----------    ----------  ----------------  --------------------
Char 0        ASCI0:      RS-232            38400,8,N,1
Char 1        ASCI1:      RS-232            38400,8,N,1
Disk 0        MD1:        RAM Disk          384KB,LBA
Disk 1        MD0:        ROM Disk          384KB,LBA
Disk 2        IDE0:       Hard Disk         --
Disk 3        SD0:        SD Card           1910MB,LBA
```

First, log to the slice where **FAT.COM** is located (**G:** on my system prior to the update), then issue the command:

```
G>FAT COPY 3:ROMWBW30.ROM J:

Copying...

3:/ROMWBW30.ROM ==> J:ROMWBW30.ROM ... [OK]

    1 File(s) Copied

G>
```

Note the unit number **3:** above. *This unit number may be different on your SC126, depending on your present version of RomWBW!* Take note of your unit number during startup and *use what is correct for you.*

Once **[ENTER]** is pressed to start this command, LED no. 5 should begin blinking to indicate disk activity is taking place. This transfer of data should take a bit over a minute.

You are now ready to flash the ROM.

2.0) Procedure: (continued)

2.4) Flash the New Image to the ROM using the `FLASH.COM` utility.

This is where you *don't want a power interruption or reset of the SC126 until completion.*

Issue the command (*be sure to substitute your source location* for `J:` below):

```
B>FLASH WRITE J:ROMWBW30.ROM
FLASH4 by Will Sowerbutts <will@sowerbutts.com> version
1.2.3

Using RomWBW (v2.6+) bank switching.
Flash memory chip ID is 0xBFB7: 39F040
Flash memory has 128 sectors of 4096 bytes, total 512KB
Write complete: Reprogrammed 58/128 sectors.
Verify (128 sectors) complete: OK!

B>
```

NOTE: The output shown above does not all appear immediately! Writing to the ROM chip will take close to a minute. The whole process takes about two minutes to write and verify the contents of the written data against the original image. Patience is key here. *Interrupting this process can leave your RomWBW un-bootable!*

2.5) Wrap-Up

Once this operation is complete and verified, don't forget to shut down, move the write-protect jumper back to pins 2 & 3 and restart the SC126 to check how things went.

You will likely find some of your existing CP/M slices have been re-assigned to new drive letters, and that the default baud rate for comms is now 115,200 baud as opposed to the previous 38,400 baud. Don't forget to adjust for this on your terminal or video output device.