

## C47 quick start article, with reference to the parent project WP43

### Introduction

If you're reading this, you're probably aware that SwissMicros is planning to release another calculator based on the DM42 hardware. This calculator is known as the WP43 (after an earlier calculator, the WP34S; the WP34S firmware was written by a small group of enthusiasts and ran on the HP20b and HP30b calculators.) The aim is to make the most of the vastly superior hardware of the DM42 platform to produce something "...pretty close to the ultimate RPN scientific calculator". Anyone who loves calculators must be excited by this!

To start, install the new firmware on the DM42 calculator that (I presume) you already own. Thanks to the excellent design of the DM42 it is easy to swap back and forth between the usual "Free42" and the experimental WP43S firmware: nothing you do is irreversible. By trying out the new code you not only get a taste of what the final calculator will be like, but by finding and reporting bugs you can actively help the developers.

### WP43 and C47

There is, however, one important point. The keyboard layouts of the WP43 and DM42 are almost completely different. Even the arithmetic keys are in different places! This is deliberate: a poll of prospective users found that having the arithmetic keys on the left, as per the HP35, HP41C, etc., was the popular preference. Because of this, a fork of the WP43 project (known as C47) was started. This uses the WP43 code but with the changes necessary to map its functions to the DM42 keyboard. (Those of you familiar with the previous WP34S will be relieved to hear that absolutely no keyboard stickers are required!).

### Loading and running the C47 firmware

This is how to load and run the C47 firmware on your DM42.

- First, make sure that your DM42 is fully updated. The DMCP version should be at least 3.15.
- Download the file containing the C47 firmware to your computer. This file will have a name like C47.pgm, with an accompanying C47\_qspi and testPgms.bin files. It is advisable to also copy the PROGRAMS folder.

Next, you should save your DM42/Free42 calculator's current state. This includes all your programs and variables and will be lost if not backed up. To do this:

- Press shift-0 (SETUP) and select option 2 (Calc State), followed by option 2 (Save State).
- You can either type in a new filename (just press ENTER with New File highlighted, followed by the file name) or choose an existing state file to overwrite (if there are any).
- When you've typed the name, press ENTER. The calculator state is saved, and you are returned to the usual stack display.

```
Setup
1. File >
2. Calc. State > [none]
3. Printing >
4. Settings >
5. System >
6. About >
```

```
Calculator State
1. Load State
2. Save State
3. Load Clean State
```

The next thing to do is to connect your calculator to your computer as a USB Disk, so that its flash drive can be backed up to the computer and the C47 firmware file copied to the calculator.

- Connect your DM42 to your computer with a USB cable.

```
Setup
1. File >
2. Calc. State > [none]
3. Printing >
4. Settings >
5. System >
6. About >
```

- Turn on your DM42 and activate the USB disk. You've probably done this before, but to remind you:
  - Press shift-0 (SETUP) and select option 1 (FILE).
  - Then select option 3 (Activate USB disk).
- You should now be able to access the flash memory of the DM42 through the file manager of your computer. For example, on my Windows 10 machine it comes up as Drive F. (Ignore any message about this drive being corrupt.)
- To be certain that your calculator state is safe, you **MUST** make a back-up of the state file **to your computer**. In fact, since the calculator flash memory is so tiny (8 MB) you might as well back up the whole of flash memory to your computer.
- Now, copy the C47 firmware files mentioned, that you have already downloaded into the DM42's flash memory. Don't put it into a folder; just put it in the top level. (You've probably already got a DM42 / Free42 firmware file (extension ".pgm") there from your previous update.)
- Disconnect the calculator from your computer – eject / unmount from the computer first, and then exit the USB drive on your calculator. Pressing EXIT a couple of times brings you back to the usual DM42 / Free42 stack display.

```
File
1. Load Program >
2. Save Program >
3. Activate USB Disk >
4. Show Disk Info >
```

The WP43C firmware is now on your calculator, but it's not yet running. Your calculator is still running Free42, and nothing will change until you actively decide to run the new firmware.

## Now it's time to run that new firmware! Follow these steps.

- Press shift-0 (SETUP) and select option 5 (System).
- You then get a scary message, but you don't have to worry because you've already backed up your calculator state. Right?
- Select option 2 (Enter System Menu).
- Select option 4 (Reset to DMCP menu).
- Select option 4 (Load QSPI from FAT). Follow instructions to press any key, then EXIT, then any key to continue. It will restart and may hang due to the new qspi file being incompatible with the currently running pgm file. If it does, press F1 while at the same time keeping the RESET button pressed via the hole in the back of the calculator.
- Select option 3 (Load Program). This displays the files in flash memory. The C47.pgm file should be visible. Use the arrow keys to highlight the C47.pgm file, and press ENTER. Then press ENTER again to confirm.

```
Setup
1. File >
2. Calc. State > [none]
3. Printing >
4. Settings >
5. System >
6. About >
```

```
System Warning
You can lose all your data
in system menu. Please, run
'Save Calculator State' in
'File' menu first to preserve
data over potential RESET
1. Exit
2. Enter System Menu
```

```
System
1. Flash firmware from FAT
2. Bootloader
3. Program Info
4. Reset to DMCP menu
5. Format FAT Disk >
6. FAT Disk Media Test >
7. Power OFF mode: 3
8. Self Test
```

```
DMCP
1. Program Info
2. Run Program
3. Load Program
4. Load QSPI from FAT
5. Settings >
6. Activate USB Disk >
7. Enter System Menu
8. About >
```

```
Load DMCP Program /
DATA DIR
LIBRARY DIR
offimg DIR
PROGRAMS DIR
SAVFILES DIR
SCREENS DIR
C47.pgm 693K
DM42-3.22.pgm 683K
```

- Things happen. HASH is displayed; then ERASING; then WRITING along with a percentage progress. Each stage takes several seconds. In the end you should see the message “Loading OK; Press a key to start”.
- Press a key!
- Press the EXIT key when asked to do so. After a short delay the WP43C stack display will appear. You’re in!

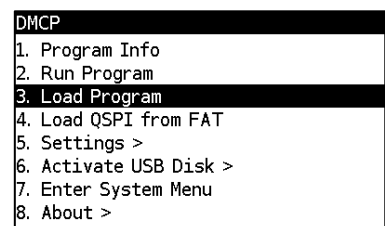
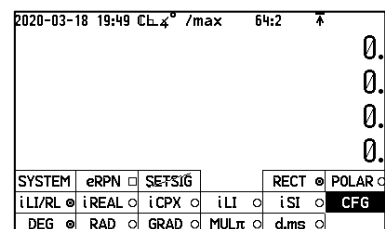
## What can you do now?

- Other documents describe the available functions in great detail. Here are some basic pointers.
- The number, arithmetic, ENTER, and scientific function keys work in the expected way.
- Pressing **shift-shift-7** brings up a three-line menu called the **HOME** menu. Other keys (e.g., BASE or PROB) may also bring up menus with up to three rows.
  - To select a menu function in the bottom row, just press the function key below it.
  - To select a menu function in the middle row, press “shift” (an “f” appears in the display when you do this) followed by the function key.
  - To select a menu function in the top row, press “shift” twice (a “g” appears in the display when you do this) followed by the function key.
- With the HOME menu displayed, the up- and down-arrow keys cycle through a range of different menus.
- The keyboard layout (see the diagram elsewhere in many documents) shows that each key has a yellow- and a blue-shifted function. The yellow function comes from a single shift press; the blue function from a double shift press.
- If you have no bezel template, you can’t see the blue shifted functions on the keyboard but they are all available from menus.
- You can get a **lot** more information from the main C47 documentation and the WP43 manuals. Even without these you should be able to get a lot done.
- If / when you do find a bug I suggest you report it to the C47 thread.

## Returning to DM42 / Free42

Eventually, you may want to go back to the DM42 / Free42 application.

- Press shift-[+/-] to bring up the MODES menu. The SYSTEM menu is reached from this by pressing “shift”, and then the leftmost function key.
- Download from SwissMicros the latest DM42 firmware comprising the DM42-3.22.pgm and DM42\_qspi\_3.x.bin files.
- Select option 4 (Load QSPI from FAT). Follow instructions to press any key, then EXIT, then any key to continue. It will restart and may hang due to the new qspi file being incompatible with the currently running pgm file. If it does, press F1 while at the same time keeping the RESET button pressed via the hole in the back of the calculator.



- Select option 3 (Load Program). As before, this displays the files in flash memory. One of these files should be called DM42-3.22.pgm, or something similar.
- Use the arrow keys to highlight this file, and press ENTER. Then press ENTER again to confirm.
- Once again, HASH is followed by ERASING and then WRITING. In the end you should see the message “Loading OK; Press a key to start”.
- Press a key!
- Press the EXIT key when asked to do so. The Free42 stack display should appear, just as it was when you left it (assuming that you backed up the calculator state).
- There are two ways to backup your C47 status: (1) using SYSTEM will automatically save and re-load your configuration; (2) you can use in the I/O menu SAVEST to save the calculator state.

Load DMCP Program	
HELP	DIR
OFFIMG	DIR
PROGRAMS	DIR
SCREENS	DIR
43C_27L2.pgm	525K
DM42-3.14.pgm	633K

If the DM42 .pgm file isn't on your calculator's flash drive, don't despair. Press EXIT to return to the DMCP menu. From here you can either select option 2 (to restart the C47) or option 6 (Activate USB Disk). Once the disk is active you can connect the calculator to your computer, download the latest DM42-3.22.pgm and DM42\_qspi\_3.x.bin files from the SwissMicros website, and copy it across to the calculator. Then you can try the above procedure again and this time it will work.

### But is this fair?

There's one final point to make. You might wonder whether getting the C47 calculator “free” like this is legal. Don't worry; it is. The WP43 firmware is open source and so is the DMCP library from SwissMicros. Forking it is explicitly allowed, and the DM42 explicitly allows other firmware to be loaded.

You might still feel that doing this is unfair to SwissMicros. Perhaps fewer people will buy the physical DM42 if they can run the C47 firmware on the DM42 which they already have? But then quite possibly the ability to do this will lead to increased sales of the DM42! In any event, it is quite likely that people who intend to use the WP43 will want a calculator entirely devoted to it whilst at the same time keeping their DM42 to run the Free42 firmware. If you want those operators on the left, nothing else will satisfy you. You'll probably get a DM41X as well while you're at it!

In any case there is surely a real benefit to the project in having as many people as possible using the calculator even at this early stage. Bugs will be found more quickly and there will be more suggestions and feedback on design decisions. None of this requires the ability to code. You should be involved!

**Original article 2020-03 by [Nigel \(UK\)](#), adapted 2023-06 by Jaco Mostert due to several name changes and project changes.**

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