

Upgrading to YFNZ-3B

Modifying the contents of Flash memory in the 41CL is not for the faint-of-heart. While the Flash Memory functions do prevent you from corrupting the Operating System of the calculator, they still allow you to erase or modify the rest of the Flash memory. You must be familiar with how Flash memory operates before attempting to use the Flash Memory functions.

FLASH PROGRAMMING

During a Flash erase or write, no other accesses of the Flash memory are allowed. This means that the Flash Memory functions must be running out of RAM to work. Both Flash Memory functions check for this, and return with an error message if they are not running in RAM. So, if you want to use either of the Flash memory functions you must copy the entire 41CL Extra Functions image to RAM and then program the MMU to use this RAM copy of these functions.

WARNINGS

Writing and erasing Flash memory requires that the 41CL circuit board draw more current than during normal operation. In addition, Flash memories are not tolerant of power disruptions during write and erase operations.

Do not start any Flash write or erase if the BATT annunciator is on. In fact it is best to have new batteries in the calculator when writing or erasing Flash memory. In addition, make sure that the 41CL circuit board is making good contact with the keyboard PC board through the flexible connectors. If there is any play between the case halves make sure to repair it before attempting a write or erase of Flash. The extra current required by a Flash write or erase operation may cause the connector to flex sufficiently to disrupt the power to the 41CL board, which in turn may damage the Flash memory. Never remove the battery during a Flash write or erase operation.

EXAMPLE

As an example of how to replace an image in Flash memory, let's go through the steps necessary to replace the YFNS image at address 0x062000 with version YFNZ-3B. We cannot update the YFNZ image at address 0x007000 because this is in the protected sector of the Flash memory.

YFNZ-3B requires that the Image Database be present in Flash, so it should be written to Flash as part of this example. 41CL boards from the first production batch were preloaded with the Image Database, but there is one error in the preloaded copy, so it is best to update it with the current version.

First, load both the Image Database and YFNZ-3B into RAM, by whatever means is most convenient. You can use the 41CL serial port, a Clonix module, an MLDL, or PILbox. For this example, I assume that the Image Database has been loaded at RAM address 0x840000 and that YFNZ-3B image has been loaded at RAM address 0x841000. If you don't have the current version of CLUTILS this is a good time to upgrade it as well, because it is located in the same Flash sector with YFNS.

Second, reprogram the MMU so that the YFNZ-3B in RAM is being used instead of the old copy in Flash. Executing the 41CL Extra Functions out of RAM necessary to guarantee that there will be no accesses of the Flash except for the erase or write operations while the Flash functions are executing. This assumes that you will use Port 1L for the YFNZ-3B image. The YFNZ-3B image is used because it is more user-friendly and automatically switches to the best Turbo mode for operations.

```
ALPHA 841-RAM ALPHA
XEQ ALPHA PLUG1L ALPHA
```

Third, we need to copy the 32K word Flash sector (eight pages) where the YFNS image is located to RAM. Any RAM will work, but I've chosen to use 0x0810000-0x817FFF. Note that I don't copy the YFNS image at 0x062000 to RAM because it's going to be replaced anyway.

```
ALPHA 060>810 ALPHA
XEQ ALPHA YMCPY ALPHA
```

```
ALPHA 061>811 ALPHA
XEQ ALPHA YMCPY ALPHA
```

```
ALPHA 063>813 ALPHA
XEQ ALPHA YMCPY ALPHA
```

ALPHA 064>814 ALPHA
XEQ ALPHA YMCPY ALPHA

ALPHA 065>815 ALPHA
XEQ ALPHA YMCPY ALPHA

ALPHA 066>816 ALPHA
XEQ ALPHA YMCPY ALPHA

ALPHA 067>817 ALPHA
XEQ ALPHA YMCPY ALPHA

Fourth, erase the two sectors of Flash that you want to reprogram. Each erase function requires about 6 seconds to complete. This step permanently destroys the contents of this sector of the Flash memory. Make sure that you really want to do this.

DO NOT REMOVE THE BATTERIES DURING YFERASE!

ALPHA 060000 ALPHA
XEQ ALPHA YFERASE ALPHA

ALPHA 0D8000 ALPHA
XEQ ALPHA YFERASE ALPHA

Fifth, write 8 pages in RAM, including the new YFNZ-3B, back to the sector that you just erased. Also write the Image Database to the second sector that was just erased. Each **YFWR** function requires about 4 seconds to complete.

DO NOT REMOVE THE BATTERIES DURING YFWR!

ALPHA 810>060 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 811>061 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 841>062 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 813>063 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 814>064 ALPHA

XEQ ALPHA YFWR ALPHA

ALPHA 815>065 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 816>066 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 817>067 ALPHA
XEQ ALPHA YFWR ALPHA

ALPHA 840>0DF ALPHA
XEQ ALPHA YFWR ALPHA

Finally, to protect yourself from accidentally writing more Flash, reprogram the MMU to use the YFNS that you just modified. Remember that you have to use the YFNS mnemonic to point to the YFNZ-3B image that you just wrote to Flash.

ALPHA YFNS ALPHA
XEQ ALPHA PLUG1L ALPHA

You're done!