a2fpga

TECHNOTE: UPDATING THE A2N20-V2 FPGA FIRMWARE
17 August 2024 UPDATE

FOR ALL SYSTEMS: Getting The Firmware And Choosing The Right Build

The wiki site for the a2fpga a2n20-v2 at ReactiveMicro hosts the latest and all previous versions of the firmware for the board organized by date. You can stay up to date by visiting https://wiki.reactivemicro.com/A2FPGA. Additionally, the GitHub project repository for A2FPGA contains additional information about the board, features, etc. You can access it directly by following this link: https://github.com/a2fpga/a2fpga_core.

Within each .ZIP archive file available at ReactiveMicro, there are THREE (3) versions of the firmware:

The DEFAULT version enables ALL features and requires that no card be present in Slots 4 and 7 of your Apple II. This is due to the Mockingboard and SuperSprite occupying the I/O memory space of these two slots (Mockingboard on Slot 4, SuperSprite on Slot 7). There is presently no way to disable the Mocking board functionality in slot 4, however, the NOSPRITE7 version of the firmware disables the Synetix SuperSprite functionality in Slot 7 thus freeing up Slot 7 for use by any arbitrary expansion card. If you do not require Mockingboard and SuperSprite Functionality at all and simply wish to use A2FPGA for high quality video output to HD monitors and TVs, the VIDEO-ONLY version of the firmware is included in the .ZIP archive. You should identify which build you wish to use based on your individual needs and system configuration.

If you are NOT planning on using or experimenting with the Synetix SuperSprite functionality, we recommend programming your a2n20-v2 MultiCard using the NOSPRITE7 build of the firmware contained within the ZIP file as it supports all functionality minus the SuperSprite and frees up Slot 7 for other uses and can help prevent I/O conflict.

Release Notes (08-17-2024):
- All boards purchased from ReactiveMicro are programmed with the DEFAULT firmware. If you wish to use a different version, instructions are provided below. Please read them completely before attempting to upgrade your firmware.

- We have successfully tested Slot 7 functionality using the NOSPRITE7 build of the firmware with a Reactive Microdrive (DMA Mode Enabled) in Slot 7 with no problems.

- GBBS employs a highly customized super serial card device driver and it has been confirmed that GBBS will only function properly with the VIDEO-ONLY version of the firmware at this time.

- This latest version of all three firmware builds now includes full support for Double High Resolution Graphics thus completing the full range of support for standard Apple II video modes available on all Apple II machines. A beta release of the upcoming "Undead" game has been used to test support for DLRG mode.

- Apple //e Users who install ROMXce -AND- A2Heaven FastChip //e Accelerators have reported issues when used in combination with A2FPGA. While we hope to identify what is causing these issues, at this time, this combination is **UNSUPPORTED**. Please note that no issues have been reported with Transwarp-based accelerators, this issue only manifests with the FastChip //e. At this time, ROMX, ROMXce, and ROMX+ all appear to operate correctly with the A2FPGA. It is simply not possible to account for all possible combinations of option cards available for the Apple II, but we do the best we can.

- We continue to work on new functionality for A2FPGA. Although we do not have a published timeline, we are focused on delivering Apple II Super Serial Card support in the Slot 2 I/O space via the USB Type C connector on the back of the Tang Nano 20K FPGA used with A2FPGA. This will be useful for data transfer with ADTPro / VDrive as well as with various Terminal programs. Beyond this, we hope to be able to deliver Ensoniq audio over the HD connector for Apple IIgs users. As always, we welcome contributors to the project as it is open source and available on GitHub:
  https://github.com/a2fpga/a2fpga_core

Staying Up To Date With New Firmware: As new updates are made to the repository, they will be made available on the wiki page for the A2FPGA at ReactiveMicro which is linked at the top of this document. Simply download the .ZIP file that contains the version you wish to install and repeat the appropriate steps outlined above for your system.

FOR MACOS AND LINUX SYSTEMS

1. **Download the version of firmware you wish to program.** See above.

2. **Unpack the ZIP file containing the firmware.** Remember this location!

3. **Install openfpgaloader.** You can find it on GitHub here:
   https://github.com/trabucayre/openFPGALoader

Instructions for installing on various platforms is located here:
https://trabucayre.github.io/openFPGALoader/guide/install.html

If you have a Mac, probably the easiest path is to use HomeBrew:

```
brew install openfpgaloader
```

If you have a Linux system, follow the instructions for installing openfpgaloader for your specific distribution located in the link above. If you want or need to build openfpgaloader by hand, the instructions for doing so are also available in the link above.

4. **Reprogram the Firmware of the Tang Nano 20K Module:** Connect either a USB-A to USB-C or USB-C to USB-C cable to your computer followed by connecting the other end (USB-C) to the Tang Nano 20K module that is mounted on the a2n20-V2 Multicard.

   You can now reprogram the firmware of your a2n20-V2 Multicard by issuing the following command:

   ```
   openfpgaloader -b tangnano20k \
   -f <UNZIPPED_DIRECTORY>/a2n20v2-<MMDDYYYY>-<BUILD>.fs
   ```

   Where **<UNZIPPED_DIRECTORY>** is replaced by the directory name or fully qualified path where you unpacked the zip file containing the version of firmware you wish to install, **MMDDYYYY** is the date stamp of the firmware, and **<BUILD>** can be DEFAULT, NOSPRITE7, or the VIDEO-ONLY build of the firmware.

   EXAMPLE: The following example will flash the NOSPRITE7 build of the firmware that enables the use of other peripherals in Slot 7 and disables Synetix SuperSprite functionality on the a2n20-v2 Multicard:

   ```
   openfpgaloader -b tangnano20k \
   -f <UNZIPPED_DIRECTORY>/a2n20v2-04252024-NOSPRITE7.fs
   ```

   To use the DEFAULT firmware, simply replace the word "NOSPRITE7" in the above command line with the word "DEFAULT" and the default build will be used instead.

   To use the VIDEO-ONLY firmware, simply replace the word "NOSPRITE7" in the above command line with the word "VIDEO-ONLY" and the default build will be used instead

FOR WINDOWS SYSTEMS

1. **Download the version of firmware you wish to program.** See above.

2. **Unpack the ZIP file containing the firmware.** Remember this location!

3. **Install the Gowin programmer or the full GoWin IDE and tools** by following this link in your browser:

   https://cdn.gowinsemi.com.cn/Gowin_V1.9.9Beta-4_Education_win.zip

4. **Attach a USB cable from your PC to the Tang Nano 20K USB-C socket.**

5. **Launch the Gowin Programmer you installed in step 2**. The Cable Setup dialog will appear and should detect the USB cable and the Tang Nano 20K device. The FPGA will appear in the device list as GW2AR-18C.

6. If any device appears in the device list with anything other than GW2AR-18C then click on it and hit the Delete Device button. If there are no devices showing after doing this, click Scan Device and it will say "Multi-device found", select GW2AR-18C.

7. **Right click on the device and select "Configure Device"**

8. **Select External Flash Mode, choose Generic Flash in External Flash Options, leave address at 0x000000. Select the a2n20v2-<MMDDYYYY>-<BUILD>.fs file in Programming Options where <MMDDYYYY> is the date stamp and <BUILD> is the build of the firmware you wish to flash to your a2n20-v2 Multicard. The DEFAULT, NOSPRITE7, and VIDEO-ONLY firmware builds are included in the .ZIP archive file. SEE "For All Systems" on page 1 of this document above for more information. Click Save.**

9. **Click Program/Configure.** The device will now be programmed with the firmware.

10. **Disconnect the USB cable and proceed with installing your A2FPGA into your Apple II.** You are ready to go!

APPLE II FOREVER!!!