



# **Xdrive**

**Apple ][, ][+, IIe, IIGS**

Installation and User Guide

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## Thank You!

Firstly, thank you for supporting MacEffects and JD Micro by purchasing an Xdrive card - we hope that you enjoy using it as much as we enjoyed making it!



Xdrive was designed exclusively for MacEffects by Jeff Mazur and Dean Claxton at JD Micro.

Thank you to Unicorn Software for licensing the original firmware (which has since been extensively modified for Xdrive) and thank you to our Beta testers who's feedback was invaluable during development.

Utility software and documentation will be shared at <https://jdmicro.com> - be sure to check the site regularly for updates.

Before removing your Xdrive card from the ESD compliant packaging, please study the following [ESD Prevention](#) section of this guide, then read the [Introduction](#) to familiarise yourself with the Xdrive hardware before installation.

## ESD Prevention

Whenever you open an Apple II or other electrical device, you are exposing its internal components to potential damage from the static electricity that builds up in your body through normal activity. Electrostatic discharge (ESD) occurs when static electricity is discharged from one conductor (such as your finger) to another conductor (such as an integrated circuit).

Ideally, installation should be carried out on a static-safe surface such as a grounded anti-static mat, while wearing an anti-static wristband. If you have these available, be sure to use them.

Following the guidelines below will reduce the risk of ESD damage to both your computer and the Xdrive card at installation time:

- Leave the Xdrive card in the ESD-compliant packaging until you are ready to install it.
- Ensure that the computer is turned off but leave the power cord connected to a grounded outlet. Even with the power turned off, the power cord acts as a ground for the computer system, protecting it from static electricity.
- Before removing the card from the ESD-compliant packaging, touch the metal case of the Apple II power supply to discharge static electricity that may have accumulated on your body.
- When handling the Xdrive card, avoid touching any components on the PCB, or the gold “fingers” of the edge connector.

## Introduction

Xdrive offers easy mass storage for the Apple II via block device emulation. It allows you to mount up to 8 images from USB or micro SD card, and can be installed in Apple II, II+, IIe and IIGS – essentially any Apple II machine that has physical slots.

Supported file extensions for images are .po, .dsk, .2mg, .iso, .hdv, .do.

---

**NOTE:** .dsk and .do are supported ONLY if they are ProDOS ordered AND if the operating system supports block devices.

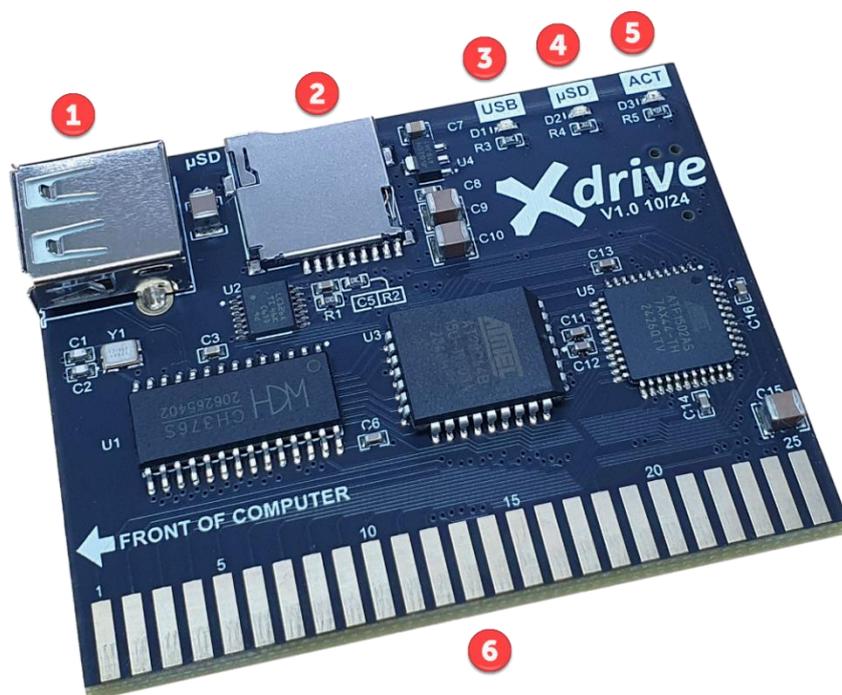
---

Two operating modes are supported by the Xdrive card: Block and SmartPort.

Block mode is limited to 65535 blocks of 200h bytes each for a total of 32 MB storage and up to eight devices can be used in ProDOS, and is somewhat slower than SmartPort mode.

SmartPort mode uses SmartPort firmware calls and offers up to eight devices in both ProDOS and GS/OS. In GS/OS, the size of a device is limited to 8GB provided you use either an HFS volume or an ISO image.

Major components of Xdrive are as follows:



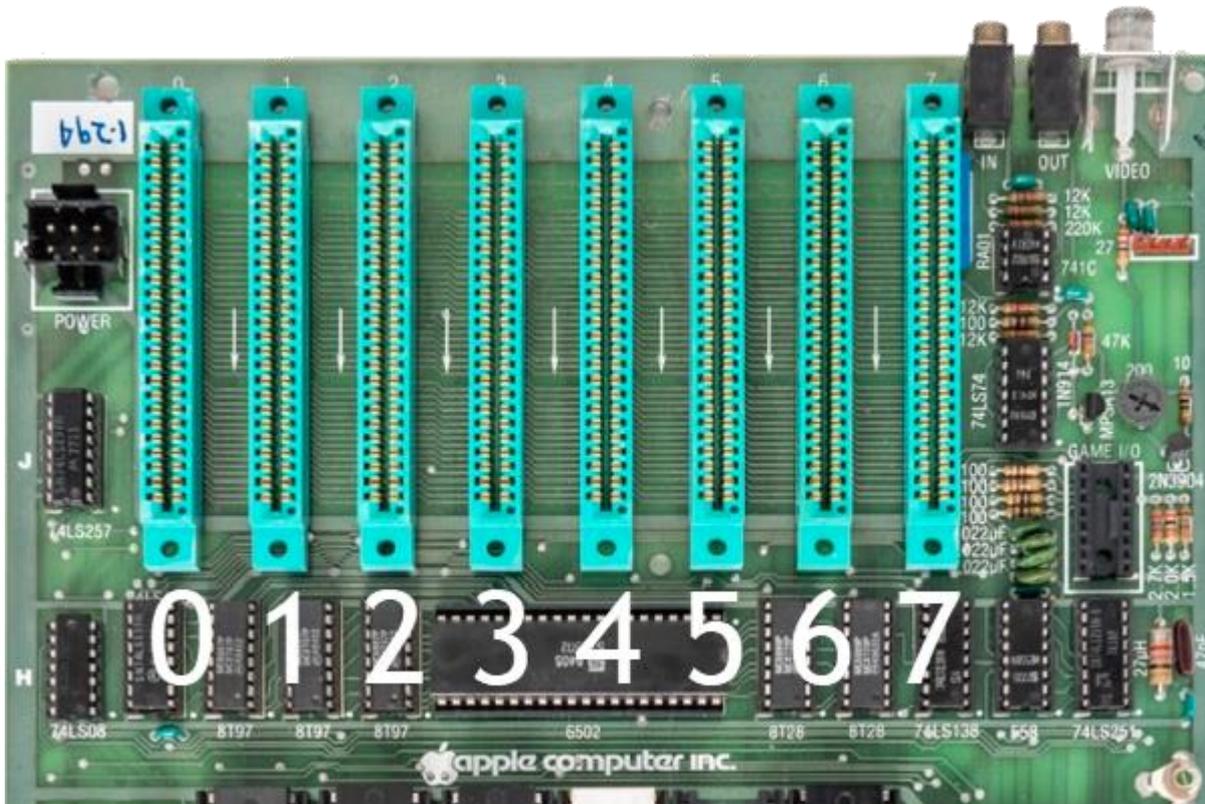
1. USB port – supports hot swap.
2. Micro SD card slot – supports hot swap.
3. USB mode LED (green when USB mode is enabled).
4. MicroSD mode LED (amber when SD mode is enabled).
5. Activity LED (red when card is being accessed).
6. Edge connector.

## Installation

### Step 1 : Determine the Installation Slot

To automatically boot from Xdrive, it must be installed in a higher priority slot than other disk controllers in the system.

Apple II slots are numbered as below (Apple //e and IIGS motherboards do not include slot 0) with slot 7 having the highest boot priority:



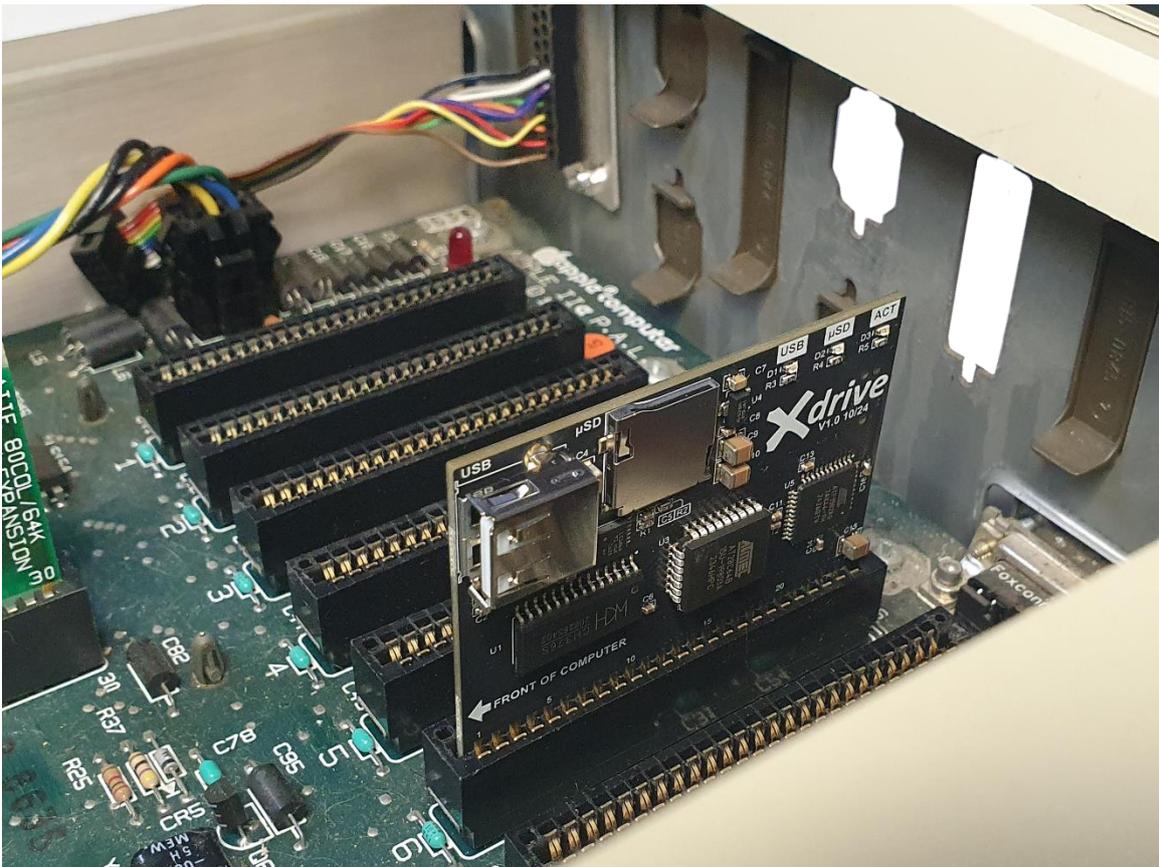
- If an Apple Disk II controller is installed in Slot 6, then install Xdrive in slot 7.
- If no other disk controllers are installed, then install Xdrive in slot 6.
- If Xdrive is in a lower slot than an existing controller, you can still boot Xdrive from BASIC by typing **PR#n** where n is the Xdrive slot.

An Xdrive firmware feature allows you to skip Xdrive and boot from a lower priority slot, allowing it to co-exist with other disk controllers.

## Step 2 : Install the Card

Switch off the computer and remove the top cover.

1. Touch the case of the power supply to discharge any static electricity that may have accumulated on your body.
2. Visually locate the desired installation slot as per Step 1 above.
3. Install the card ensuring that the arrow markings face towards the front of the computer (the component side of the PCB should face **AWAY** from the power supply).
4. Double check the installation – the USB port should face toward the keyboard as shown below:



**WARNING : Incorrect installation will damage the Xdrive and void your product warranty. You may also damage your computer!**

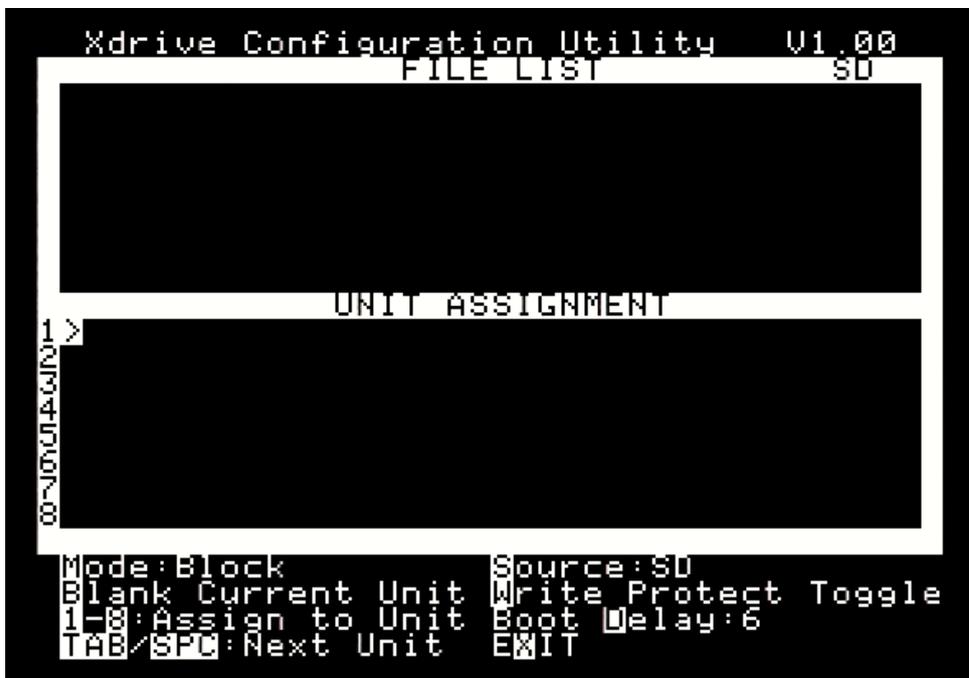
Triple-check your installation before powering on your computer.

## Step 3 : Post Installation Test

Power on the computer. You should see a boot delay countdown box at the top left corner of the screen:



When the counter reaches 0, the Xdrive Configuration Utility screen should be displayed:



If you see the above, then Xdrive has been successfully installed. If you do not see the above, then please check your monitor power and video connection before checking the Xdrive card installation.

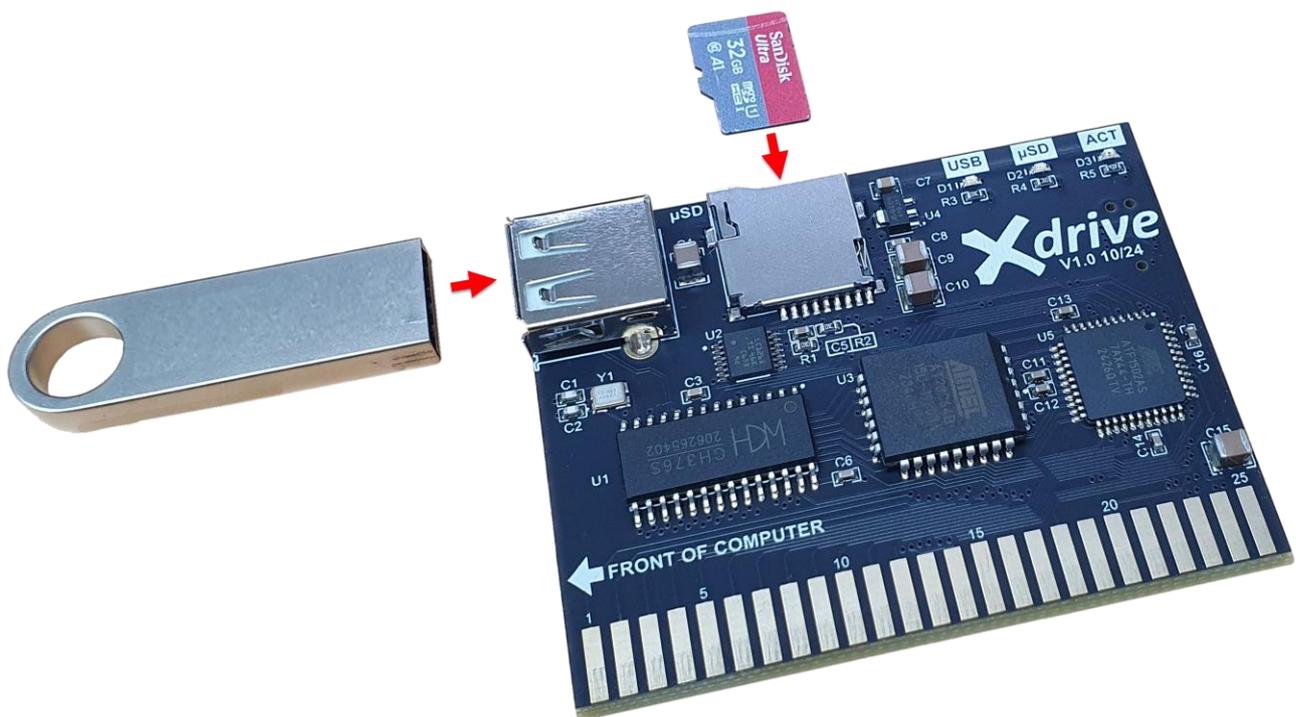
## Overview

### Inserting Media

The USB port and microSD card slots on Xdrive are hot swappable, meaning that you don't have to turn off the computer to remove/insert USB flash drives or microSD cards.

To prepare USB and microSD cards for use in Xdrive, they should be formatted using the FAT32 file system. FAT16 is also supported. Image files must be copied to the root of the drive.

The microSD card socket is a push-push type, meaning that you push the SD card into the socket (it will latch in), and then push on the card again to eject it – note the orientation of the card as per below :



Take care when inserting/removing USB drives – if the drive is a little tight in the socket, then you would be advised to hold the Xdrive card when inserting/removing the USB drive to ensure you don't accidentally pull the Xdrive card from the slot!

## Xdrive Configuration Utility

The Xdrive Configuration Utility is used to assign block device file images from USB and/or microSD card into a list of up to 8 device units which will then be available for use by the system.

It is invoked by pressing the **C** key when the Xdrive boot countdown is displayed, and will also be displayed automatically at the end of the boot delay if there is no media present, or if there is no image selected for unit 1.

The Xdrive Configuration Utility screen is shown below. It is divided into two panes - the FILE LIST pane and the UNIT ASSIGNMENT pane. There are some other items of interest however:

```

Xdrive Configuration Utility  V1.00
                                FILE LIST
                                SD
>ADTPRO-2.1.0.PO
Total Replay v5.2.hdv

                                UNIT ASSIGNMENT
1>Total Replay v5.2.hdv          SD
2>XDrive.po                    USB
  Pitch-Dark-20230503.hdv      USB
  Wizard Replay v1.1.hdv       USB
  Total Replay II v1.0-alpha.4.hdv USB
  ADTPRO-2.1.0.PO              SD

Mode:Block                      Source:SD
Blank Current Unit             Write Protect Toggle
1-8:Assign to Unit             Boot Delay:6
TAB/SPC:Next Unit              EXIT
  
```

1. FILE LIST pane. This displays a list of valid block device image files from the selected source media. The source is displayed at the top right of this pane. E.g. In the image above, the FILE LIST shows valid image files from the SD card. Filenames are sorted alphabetically, and case is preserved for Apple //e and IIGS. Filenames longer than 32 characters are shortened to show just the first 22 and last 8 characters.
2. UNIT ASSIGNMENT pane. This displays the list of currently assigned device units. The source media for each image (USB or SD) is displayed to the far right of the file name.
3. Command Key list. A list of valid command keys. The key is highlighted. Eg. The **S** key is used to change the source media. Not shown here are the Arrows and V key (see Command Key section).
4. Firmware version. This is the version of Xdrive firmware currently installed on the card. Keep an eye out at <https://jdmicro.com> for updates. The firmware is in-system programmable through a handy ProDOS image that you can boot directly from the Xdrive!

When booted from *any* device (even something other than Xdrive), all of the units in the UNIT ASSIGNMENT pane will be mounted and available to ProDOS or GS/OS.

---

*NOTE:* For GS/OS to see all of the assigned images, Xdrive must be operating in SmartPort mode (which is also somewhat faster than Block mode).

---

You can also use programs like COPY ][ PLUS to manage files on both the SD and USB media along with any other drives in the system!

## Command Keys

### *Source*

Pressing **S** will toggle the media source between USB and micro SD card. The FILE LIST pane will be updated accordingly. The current source is displayed beside the **S** command text, and top right of the FILE LIST pane.

When media is inserted/removed for the respective source, the computer will emit a tone and the FILE LIST pane will update automatically. e.g. If USB source is selected and you remove the USB drive, a tone will be heard, and the FILE LIST will be blanked. When re-inserted a tone is heard and the FILE LIST refreshed with the contents of the current drive.

### *Arrow keys*

Left/Right (and Up/Down for //e, IIGS) arrow keys are used to navigate the FILE LIST. The selected image file will be displayed with an inverse > sign to the left.

### *V (hidden option)*

Press **V** to toggle between long and short (8.3) filenames.

### *1-8:Assign To Unit*

Use the number keys **1** to **8** to assign the selected image file in the FILE LIST pane to the corresponding unit (1-8) in the UNIT ASSIGNMENT pane. Any setting change is saved immediately. There is no need to blank a unit before assigning an image to it – the new assignment will overwrite the previous.

### *Mode*

The **M** key toggles the device access mode between Block and SmartPort. Up to 8 units are available to the operating system in either mode, however Block mode units are limited to 32 MB maximum image size.

While ProDOS units are still limited to 32 MB, in SmartPort mode the actual limit for a unit is 8GB. Units larger than 32 MB can only be used under GS/OS with HFS.FST for HFS volumes or HS.FST for ISO images. This is a limitation of ProDOS and not of the card or firmware.

Please note that in SmartPort mode, the number of available units reported by the firmware is equal to the last non-empty unit number. If there are holes in the unit list, the firmware will report NO DEVICE CONNECTED for those units.

### *TAB/SPC:Next Unit*

The **TAB** key and **Space** bar are used to select a unit in the UNIT ASSIGNMENT list. This is used in conjunction with the Blank Current Unit command below.

### *Blank Current Unit*

The **B** key is used to blank the selected unit in the UNIT ASSIGNMENT list. Blank units will report a NO DEVICE CONNECTED status in ProDOS unless they are last in the list. Use **TAB** or **Space** to select a unit (see above).

### *Write Protect Toggle*

Pressing **W** will toggle WRITE PROTECT for the currently selected unit. Write protected units will be displayed with a **W** to the far right of the corresponding unit.

### *Boot Delay*

Use the **D** key to set the Xdrive boot delay. Valid range is 1 to 9 seconds, with default of 6 seconds. When the boot delay is higher than 1, a countdown is displayed in the upper left corner of the screen during boot. During the countdown you can use one of the boot keys discussed in the [Boot Keys](#) section of this document.

*Copy File (new in firmware V1.10)*

Press **CTRL-C** to copy a file from one media to the other. Start by selecting the image that you want to copy in the FILE LIST pane. Pressing **CTRL-C** will copy that image to the other media (e.g. from USB to SD or from SD to USB).

A progress counter will show the blocks copied (140K disk = 118 blocks, 800K = 640 blocks, and 32M image = FFFF blocks). You can also hit **CTRL-C** again to abort the copy.

NOTE: Although copying 140K images should only take about 20 seconds, a 32M image will take over 40 minutes to complete.

This is useful if you use the SD card for your main storage on the Xdrive. The USB port can be extended to outside the computer for easy access. When you want to add images, you can just copy from the USB to SD card.

*Exit*

Press **X** to exit the Xdrive Configuration Utility and reboot the system.

## Boot Keys

The following keys are available for use whilst the Xdrive firmware is in the boot delay phase (when the boot delay countdown is displayed at the top left of the screen).

Pressing a key other than those shown below will stop the countdown and boot from unit 1 if available, else the Xdrive Configuration Utility will be displayed.

### *B - Boot to Applesoft BASIC*

Press the **B** key to boot to Applesoft Basic.

### *C – Xdrive Configuration Utility*

Press the **C** key to invoke the Xdrive Configuration Utility.

### *1-8 Boot Selected Unit*

Press a key **1-8** to temporarily boot from the respective unit as assigned in the UNIT ASSIGNMENT units list. By default, the card boots unit 1. The temporary boot unit is not preserved across reboots. From a technical point of view, the selected unit is swapped with unit 1. So, if you select 3 as a temporary boot device, unit 1 becomes unit 3 and unit 3 becomes unit 1.

### *N – Boot Next Slot*

Press the **N** key to attempt to boot from a lower priority bus slot. For example, if the Xdrive is installed in slot 7, and an Apple Disk ][ controller card is installed in slot 6, pressing the **N** key will result in the system attempting to boot from the Disk ][ controller.

The Xdrive firmware will scan through the slots (skipping over slot 3) to find a lower priority card to boot from. If no bootable card is found it will exit to Applesoft Basic.

## Walkthrough

The following walkthrough details how to configure a new Xdrive card to boot Total Replay in unit 1, ADTpro in unit 2, and an Xdrive firmware update image in unit 3.

After following this walkthrough you should have a good understanding of how to go about setting up your Xdrive with other images.

### Prerequisites

- Xdrive card installed and working as per the installation section.
- USB drive and micro SD card – both formatted as FAT32 filesystem.
- Total Replay hard disk image file *Total Replay v5.2.hdv* from <https://archive.org/details/TotalReplay>  
**Copy this image to the SD Card.**
- ADTPro ProDOS image file *ADTPRO-2.1.0.PO* from <https://adtpro.com/> (download and extract the zip file – the .PO disk image is in the *disks* folder).  
**Copy this image to the SD Card.**
- Xdrive Firmware V1.00 (Xdrive-FW-V1.00.po) <https://jdmicro.com>  
**Copy this image to the USB drive.**

### Assigning Units from SD Card

1. Boot the system and press the **C** key to invoke the Xdrive Configuration Utility.
2. Insert the microSD card into the Xdrive microSD card slot and press the **S** key to toggle the source media to SD. The SD card contents should be displayed in the FILE LIST pane:

```

Xdrive Configuration Utility   U1_00
                                FILE LIST   SD
>ADTPRO-2.1.0.PO
  Total Replay v5.2.hdv

                                UNIT ASSIGNMENT
1-8:
00-~0000040001
Mode:Block      Source:SD
Blank Current Unit Write Protect Toggle
1-8:Assign to Unit Boot Delay:6
TAB/SPC:Next Unit EXIT

```

- Use the Arrow keys to move the selection (>) to the *ADTPRO-2.1.0.PO* image (it should be selected by default) and press the **2** key to assign this to unit 2.

```

Xdrive Configuration Utility      U1.00
                                FILE LIST      SD
>ADTPRO-2.1.0.PO
  Total Replay v5.2.hdv

                                UNIT ASSIGNMENT
1-ADTPRO-2.1.0.PO                SD
2-

Mode:Block                      Source:SD
Blank Current Unit              Write Protect Toggle
1-0:Assign to Unit              Boot Delay:6
TAB/SPC:Next Unit              EXIT

```

- Use the arrow keys to select the *Total Replay v5.2.hdv* image and press the **1** key to assign this to unit 1 (default boot).

```

Xdrive Configuration Utility      U1.00
                                FILE LIST      SD
ADTPRO-2.1.0.PO
>Total Replay v5.2.hdv

                                UNIT ASSIGNMENT
1-Total Replay v5.2.hdv          SD
2-ADTPRO-2.1.0.PO                SD

Mode:Block                      Source:SD
Blank Current Unit              Write Protect Toggle
1-0:Assign to Unit              Boot Delay:6
TAB/SPC:Next Unit              EXIT

```

## Assigning Units from USB

1. While still in the Xdrive Configuration Utility, insert the USB drive into the USB socket on the Xdrive (it's recommended that you hold the card whilst doing so to ensure you don't dislodge it from the slot) and press the **S** key to set the source media to USB. The USB contents should be displayed in the FILE LIST pane:

```

Xdrive Configuration Utility  V1.00
                               FILE LIST  USB
>Xdrive-FW-V1.00.po
[Empty File List]

                               UNIT ASSIGNMENT
1>Total Replay v5.2.hdv      SD
ADTPRO-2.1.0.PO             SD
[Empty Unit Assignment]

Mode:Block                   Source:USB
Blank Current Unit          Write Protect Toggle
1-8:Assign to Unit         Boot Delay:6
TAB/SPC:Next Unit          EXIT

```

2. Use the Arrow keys to select the Xdrive-FW-V1.00.po image (it should be selected by default) and press the **3** key to assign it to unit 3.

```

Xdrive Configuration Utility  V1.00
                               FILE LIST  USB
>Xdrive-FW-V1.00.po
[Empty File List]

                               UNIT ASSIGNMENT
1 Total Replay v5.2.hdv      SD
ADTPRO-2.1.0.PO             SD
3 Xdrive-FW-V1.00.po        USB
[Empty Unit Assignment]

Mode:Block                   Source:USB
Blank Current Unit          Write Protect Toggle
1-8:Assign to Unit         Boot Delay:6
TAB/SPC:Next Unit          EXIT

```

## Testing Assigned Units

Once the unit assignment has been completed, we can test our handy work. Press **X** to exit the Xdrive Configuration Utility.

### *Boot Total Replay*

After exiting the Xdrive Configuration Utility the system should automatically boot Total Replay once the boot delay timer reaches zero as Total Replay was loaded into Unit 1 – the default boot unit.



This should also be loaded if you reboot the computer and press **1** when the boot delay timer is displayed, or if you press a non-boot key (**space** bar for example).

### *Boot ADTPro*

Reboot the machine, and during the boot delay press the **2** key – ADTPro should load.



*Boot Firmware Utility*

Reboot the machine, and during the boot delay press the **3** key – the Xdrive Firmware Update Utility should load.

```
XDRIVE FLASH UTILITY                               V0.3
NEW FIRMWARE: 01/10/25    7:42:54 PM

S1:NO XDRIVE CARD
S2:NO XDRIVE CARD
S3:NO XDRIVE CARD
S4:NO XDRIVE CARD
S5:NO XDRIVE CARD
S6:01/10/25    7:42:54 PM
S7:NO XDRIVE CARD

(G)0
(ESC) EXIT
```



## Updating the Firmware

Maintaining current firmware on your Xdrive card is important and it is quick and easy to do – firmware updates are distributed as ProDOS images that can be assigned as units on the Xdrive card itself! Check <https://jdmicro.com> for the latest release.

The firmware update process is as follows:

1. Copy the latest firmware .po file to the USB or microSD card and insert it into the Xdrive unit.
2. Assign the firmware file to a unit number as per the walkthrough above.
3. Boot the system and select the unit number that contains the firmware update image.
4. Once booted, the XDRIVE FLASH UTILITY will report the date/time of the NEW FIRMWARE and identify your Xdrive card and current firmware date/time.

If the NEW FIRMWARE is different to the current firmware, then the > symbol will appear to the left of the slot number, marking the card for update. This mechanism also allows for firmware downgrade.

```
XDRIVE FLASH UTILITY                                U0.3
NEW FIRMWARE: 01/10/25    7:42:54 PM

S1: NO XDRIVE CARD
S2: NO XDRIVE CARD
S3: NO XDRIVE CARD
S4: NO XDRIVE CARD
S5: NO XDRIVE CARD
>S6: 01/04/25    2:50:30 PM
S7: NO XDRIVE CARD

(G)0
(ESC) EXIT
```

---

**NOTE:** If the NEW FIRMWARE date/time matches the firmware date/time of the Xdrive card then the card will not be selected for update – it will be displayed without the selection symbol > to the left.

To force a re-write of the firmware you can press the **Return** key to select the card for update. It should then display with the > symbol.

---

- To update the firmware simply press the **G** key to (G)O. The utility will cycle through the firmware banks with status FLASHING:

```

XDRIVE FLASH UTILITY                               U0.3
NEW FIRMWARE:01/10/25    7:42:54 PM

00000001:NO XDRIVE CARD
00000002:NO XDRIVE CARD
00000003:NO XDRIVE CARD
00000004:NO XDRIVE CARD
00000005:NO XDRIVE CARD
>00000006:01/04/25    2:50:30 PM FLASHING
00000007:NO XDRIVE CARD

                                S4680
                                DCE80(40)
                                B00

(G)O
(ESC) EXIT

```

- Once complete it should display status FLASH OK.

```

XDRIVE FLASH UTILITY                               U0.3
NEW FIRMWARE:01/10/25    7:42:54 PM

00000001:NO XDRIVE CARD
00000002:NO XDRIVE CARD
00000003:NO XDRIVE CARD
00000004:NO XDRIVE CARD
00000005:NO XDRIVE CARD
>00000006:01/04/25    2:50:30 PM FLASH OK
00000007:NO XDRIVE CARD

                ALL DONE : PRESS ANY KEY

                                S5FC0
                                DCFC0(3C)
                                B03

(G)O
(ESC) EXIT

```

- Press a key and the firmware date/time of the installed card should update to match the NEW FIRMWARE date/time:

```

XDRIVE FLASH UTILITY                                V0.3
NEW FIRMWARE: 01/10/25    7:42:54 PM

S1:NO XDRIVE CARD
S2:NO XDRIVE CARD
S3:NO XDRIVE CARD
S4:NO XDRIVE CARD
S5:NO XDRIVE CARD
S6:01/10/25    7:42:54 PM
S7:NO XDRIVE CARD

ALL DONE : PRESS ANY KEY

S5FC0
DCFC0(3C)
B03

(G)O
(ESC) EXIT

```

- Reboot your system and press **C** to invoke the Xdrive Configuration Utility to confirm the new firmware has been installed successfully.

Note : There may be previous firmware releases on the distribution disk. If you wish to downgrade the firmware to a previous release:

Press **ESC** to exit the Xdrive flash utility

**BLOAD** <firmware file>

**BSAVE FIRMWARE**

**- XDRIVEFLASH**

Press the **G** key to (G)O.