

Imaging Mac computer drives with the Forensic Falcon[®]-NEO

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1.0 Introduction

This document provides guidance on the different ways to access a Mac computer's internal drive to be used as a Source drive on the Falcon-NEO. This document applies to the Mac line of computers.

Different Macs have different available ports. Depending on the ports available on the Mac, there may be more than one way to image a Mac drive. This document outlines the different ports available on Macs and the different ways (if possible) to image the drive depending on the available ports.

There are different ways a Mac can be imaged with the Falcon-NEO depending on the Mac computer. Most Macs have one or more of the following:

- USB-C / Thunderbolt 3
- USB 2.0 / USB 3.0
- A removable drive (HDD or SSD)
- Thunderbolt / Thunderbolt 2
- FireWire
- Built-in Ethernet

Depending on the Mac model, there may be multiple ways of imaging the drive.



Logicube does not sell any of the adapters or hubs mentioned in this document. However, most third-party adapters or hubs should work.

For the optimal speeds, anytime "Ethernet" is mentioned, it is recommended to use Gigabit Ethernet for optimal speeds.

1.1 Macs with the Apple T2 Security Chip

Mac computers with the Apple T2 Security Chip have added layers of security that may limit certain ways the drive can be imaged. At this time, there are two ways to image a Mac computer with the Apple T2 Security Chip:

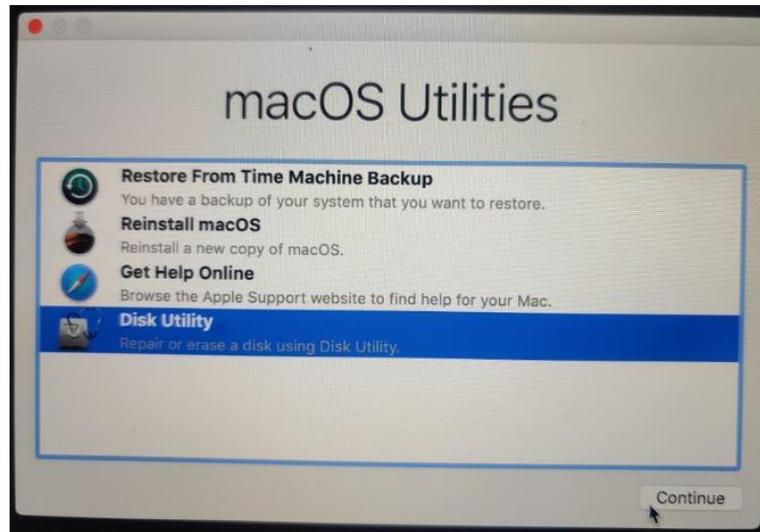
1.1.1 Using the Mac's Disk Utility

1. Connect a formatted external drive to the Mac. The external drive needs to be formatted using a file system compatible with the Mac OS (e.g., APFS, HFS+, exFAT, etc.).
2. Boot the Mac in Recovery Mode by turning on the Mac and immediately press and hold Command (⌘)-R on the keyboard. Continue holding until you see the Apple logo or a spinning globe.

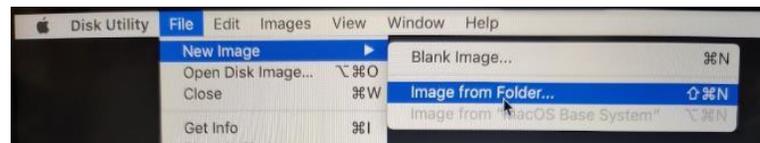


If a login window or the desktop appears, the keyboard combination was not pressed early enough. Restart the Mac and try again.

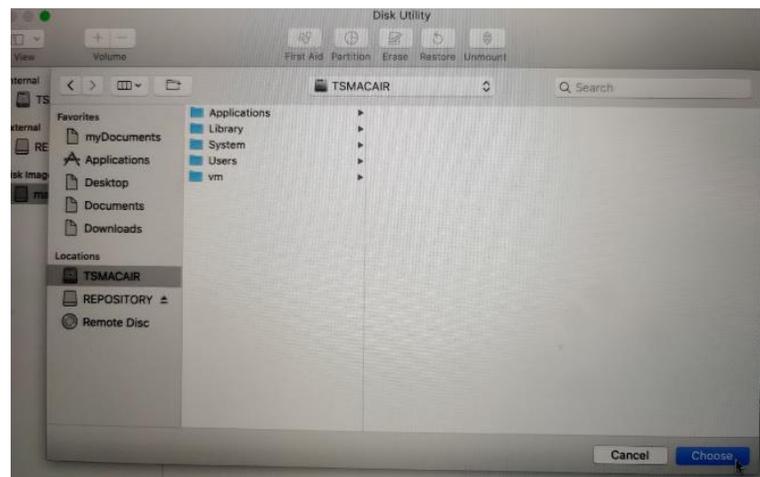
3. The Mac OS Utilities screen will appear.
4. Choose Disk Utility. The Disk Utility app will open.



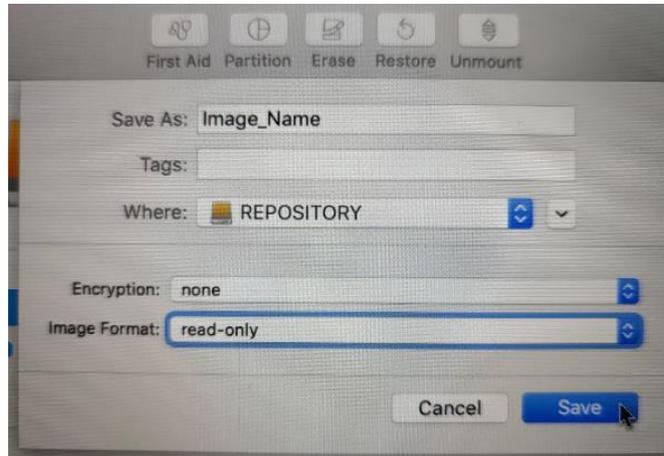
5. In the Disk Utility app, choose **File**, then **New Image**, then **Image from Folder**.



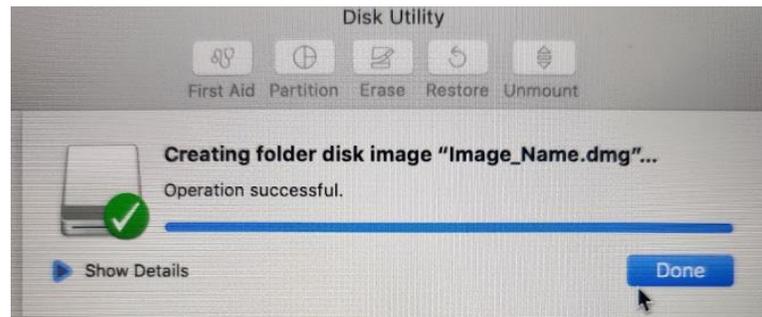
6. Select the local Mac drive in the **Locations** section of the Disk Utility, then click **Choose**.



7. A new window will appear. In this new Window:
 - a. In the **Save As** field, type the name of the image file to create and save the image to.
 - b. In the **Where** field, select the connected external drive.
 - c. In the **Image Format** field, select **read-only**.
 - d. Click **Save**. Disk Utility should start creating the folder disk image.



8. When the image finishes, click **Done**. The image file should be in DMG format and can be opened with any forensic workstation or software that can read DMG files.



If the external drive was formatted with the HFS+ or APFS, the workstation and software must also support these file systems in order for the drive to be recognized.

1.1.2 Use Targeted/Logical Imaging (File to File)

The following are required for this method:

- Access to the Mac's Operating System through a user account with Administrative rights.
- The Mac and Falcon-NEO connected to the same network (or directly to each other with an Ethernet cable).
- Folders/directories on the Mac will need to be shared so the Falcon-NEO can access them.
- The shared folder(s) will need to be setup in the Manage Repositories screen on the Falcon-NEO.
- File to File imaging mode must be used. See Chapter 4 – Imaging, in the Falcon-NEO user's manual.

1.2 Apple File System (APFS)

Mac computers with the Apple File System (APFS) can be imaged using any of the supported methods mentioned in this AppNote. However, Windows does not natively support APFS. Please check with your software analysis company to see if your analysis software supports APFS.

Drive contents with the APFS cannot be viewed using the Falcon-NEO's File Browser feature.

1.3 Fusion Drives

The type of drive used by the Mac is not dependent on any of the methods in this document. One exception is the Fusion drive. A fusion drive is a hybrid drive that combines a Hard Disk Drive (HDD) with a Solid State Drive (SSD) that is typically seen as a single drive on a Mac. Fusion drives can be imaged one of two ways:

- Using the USB Boot Client, or
- Using Target Disk Mode

Refer to the the section that corresponds to the type of Mac being used for details on how to use the USB Boot Client or Target Disk Mode.

When using the USB Boot Client, the Fusion drive will appear as two separate drives (the HDD and the SSD are shown as two separate drives). Fusion drives can still be imaged using the USB Boot Client but cannot be restored (using the Image to Drive method).

When using Target Disk Mode with Fusion drives, the Fusion drive will be seen as a single drive.

2.0 USB-C / Thunderbolt 3

For Macs that have one or more USB-C / Thunderbolt 3 ports, there are a few possible solutions that vary depending on how many USB-C / Thunderbolt 3 ports are available.

2.1 Only one USB-C / Thunderbolt 3 Port

Macs that have the USB-C / Thunderbolt 3 port typically require this port for charging. For Macs that have only one USB-C / Thunderbolt 3 port, the only recommended method is by using the following:

- **USB Boot Client** – Please see the following document for full details on the USB Boot Client: http://updates.logicube.com/manuals/USB_Boot_Client.pdf.
- **A USB-C hub** – The hub must have the following:
 - Power Delivery – So that the Mac can be plugged in to a power source.
 - At least one USB-A 2.0 or 3.0 port – Also for use with the USB Boot Client.
 - OPTIONAL: An Ethernet Port – For use with the USB Boot Client.



If the hub does not have an Ethernet port, a USB-A to Ethernet adapter is required.



Target Disk Mode is not recommended if there is only one USB-C / Thunderbolt 3 port because the same port is required for charging the Mac.

2.2 Only Two USB-C / Thunderbolt 3 Ports

Since Macs typically require one of the USB-C ports for charging, if the Mac has two USB-C / Thunderbolt 3 ports, there are two possible methods:

2.2.1 Target Disk Mode

Target Disk Mode can be used along with a USB 3.0 male type A to USB 3.1 male type C cable. Connect the cable to one of the available USB-C ports on the Mac. Connect the other end of the cable to the Falcon-NEO's USB Source port. Boot the Mac using Target Disk Mode (TDM) and the drive should appear as a Source on the Falcon-NEO.



Logicube has qualified a USB 3.0 male type A to USB 3.1 male type C cable that is included with each Falcon-NEO.

For support on how to boot into Target Disk Mode, or to find out if the specific Mac supports Target Disk Mode with USB-C / Thunderbolt 3 ports, please contact Apple Support.

2.2.2 USB Boot Client

Since there are two available USB-C / Thunderbolt 3 ports, the USB Boot Client can be used along with a USB-C hub. Since there is a second USB-C / Thunderbolt 3 port, the hub required does not need to have power delivery. Please see the following document for full details on the USB Boot Client:

http://updates.logicube.com/manuals/USB_Boot_Client.pdf. The USB Boot Client is required along with the following:

- **A USB-C hub with the following:**

- OPTIONAL: An Ethernet Port – For use with the USB Boot Client.



If the hub does not have an Ethernet port, a USB-A to Ethernet adapter is required.

- At least one USB-A 2.0 or 3.0 port – Also for use with the USB Boot Client. At least two ports are required if a USB-A to Ethernet adapter is used.
- OPTIONAL: Power Delivery – So that the Mac can be plugged in to a power source. This is not required since there is a second port available for power.

2.3 More than two USB-C / Thunderbolt 3 Ports

For Macs that have more than two USB-C / Thunderbolt 3 ports, there are several different methods:

2.3.1 Target Disk Mode

Target Disk Mode can be used along with a USB 3.0 male type A to USB 3.1 male type C cable. Connect the cable to one of the available USB-C ports on the Mac. Connect the other end of the cable to the Falcon-NEO's USB Source port. Boot the Mac using Target Disk Mode (TDM) and the drive should appear as a Source on the Falcon-NEO.



Logiccube has qualified a USB 3.0 male type A to USB 3.1 male type C cable and is included with each Falcon-NEO.

For support on how to boot into Target Disk Mode, or to find out if the specific Mac supports Target Disk Mode with USB-C / Thunderbolt 3 ports, please contact Apple Support.

2.3.2 USB Boot Client

Since there are more available ports, there are different combinations of items that may work with Macs that have more than two USB-C / Thunderbolt 3 ports when using the USB Boot Client.

Please see the following document for full details on the USB Boot Client: http://updates.logiccube.com/manuals/USB_Boot_Client.pdf. The USB Boot Client is required along with one of the following:

2.3.2.1 A USB-C Hub

A USB-C hub with the following:

- OPTIONAL: An Ethernet Port – For use with the USB Boot Client.



If the hub does not have an Ethernet port, one of the following is required:

- A USB-A to Ethernet adapter, or
- A USB-C to Ethernet adapter (to connect directly to an on-board USB-C / Thunderbolt 3 port.

- At least one USB-A 2.0 or 3.0 port – Also for use with the USB Boot Client. At least two ports are required if a USB-A to Ethernet adapter is used.
- OPTIONAL: Power Delivery – So that the Mac can be plugged in to a power source. This is not required since there are more than 2 ports available for power.

2.3.2.2 Two USB-C Adapters

Rather than using a USB-C hub, two separate adapters can be used:

- A USB-C to Ethernet adapter, and
- A USB-C (male) to USB-A (female) adapter (for use with the USB Boot Client).

3.0 USB 2.0 / USB 3.0

For Macs that have at least one USB 2.0 (Type A) or USB 3.0 (Type A) port, the USB Boot Client can be used. Target Disk Mode is not supported with USB 2.0 or USB 3.0 ports. Please see the following document for full details on the USB Boot Client:

http://updates.logicube.com/manuals/USB_Boot_Client.pdf.

3.1 Only One USB 2.0 / USB 3.0 Port

If the Mac has only one USB 2.0 or 3.0 port, the The USB Boot Client is required along with one of the following:

A USB hub with the following:

- OPTIONAL: An Ethernet Port – For use with the USB Boot Client.



If the hub does not have an Ethernet port, a USB-A to Ethernet adapter is required.

- At least two or more USB 2.0 or 3.0 ports.

3.2 Two or More USB 2.0 / USB 3.0 Ports

If the Mac has two or more USB 2.0 or 3.0 ports, the USB Boot Client is required along with the a USB-A to Ethernet adapter.

4.0 A Removable Drive

Some Macs have drives that can be removed. These drives can be Hard Disk Drives or Solid State Drives and the drive's connector can vary. Some may have standard SATA connectors while others have proprietary connectors.

The Falcon-NEO supports drives with standard SATA connectors using the SAS/SATA cables that are included with the Falcon-NEO.

Some drives that do not have the standard SATA connector, may still work with the Falcon-NEO, but may require additional third-party adapters, while other drives that do not have the standard SATA connector may not work.

Contact Logicube Technical support (support@logicube.com) to see if a third party adapter might work. When contacting Tech Support, please include the following information:

- A clear picture of the entire drive (front and back) which should include the connector pins.
- The Mac Model Identifier. For example, as a reference, please see the following pages:

Application Note

- MacBook (<https://support.apple.com/en-us/HT201608>)
- MacBook Pro (<https://support.apple.com/en-us/HT201300>)
- MacBook Air (<https://support.apple.com/en-us/HT201862>)

5.0 Thunderbolt / Thunderbolt 2

For Macs that have the older Thunderbolt or Thunderbolt 2 ports, Target Disk Mode is not possible. Macs that have the older Thunderbolt or Thunderbolt 2 ports typically have other ports that can be used to image the drive (e.g. USB Type A port). Please see the other sections in this document for other ports that may apply to the specific Mac being used.

6.0 FireWire

For Macs that have a FireWire port, Target Disk Mode is not possible. Macs that have a FireWire port typically have other ports that can be used to image the drive (e.g. USB Type A port). Please see the other sections in this document for other ports that may apply to the specific Mac being used.

7.0 Built-in Ethernet Port

For Macs that have a built in Ethernet port, the USB Boot Client can be used as long as the Mac also has an available USB 2.0 or USB 3.0 port. Please see the following document for full details on the USB Boot Client: http://updates.logicube.com/manuals/USB_Boot_Client.pdf.

Technical Support Information

For further assistance please contact
Logicube Technical Support:
by phone: **(+1) 818.700.8488 8 a.m. – 5 p.m. PT, M-F**
(excluding US legal holidays)
or by email: techsupport@logicube.com

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