

Application Note



Disable temporal dithering on Apple Macs

Temporal dithering is a technique graphics cards use to generate intermediate colours, by rapidly alternating a pixel between two adjacent colour values. The effect is not perceptible to the human eye. For any compression algorithm, such as that used by PCoIP, this results in a significant overhead when dealing with the increased pixel colour activity.

Enabling temporal dithering on a machine using PCoIP can result in high bandwidth usage and poor performance, even when the display is seemingly static. To resolve this, you must disable temporal dithering on the computer where the PCoIP host card is installed.

Temporal dithering is enabled by default on Apple Macs, with no user-visible option to disable it.

To disable temporal dithering, you must install an appropriate OS X Kernel Extension ('kext'). The kext disables temporal dithering on the local graphics card by changing internal driver settings.

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OS X and GPU compatibility

Use the kext files in [Table 1](#) to disable temporal dithering on AMD GPUs. The kext files are contained within disk image (.dmg) files.

Select the appropriate disk image from [Table 1](#) depending on the OS X version:

Disk image	Disk image MD5 Hash	GPU	Signed?	For OS X
AHKinject_ECN491.dmg	8091178e67c01fee6d80326be8073d47	AMD/ATI	No ¹	10.9 (Mavericks) or earlier
AHKinject_SCN078.dmg	52fee517ffaa632edd4b55c254ce9b0e	AMD/ATI	Yes ¹	10.9 (Mavericks) or later

Table 1: Disk image files

Version compatibility is as follows:

- **AHKinject_ECN491** will load but cause a non-fatal error on Macs running OS X 10.9. It will not load on Macs running OS X 10.10 (Yosemite);
- **AHKinject_SCN078** will not load on Macs running OS X 10.8 (Mountain Lion) or earlier;
- Temporal dithering will not be disabled if an incorrect kext is installed. For example, this situation may arise after installing the kext if the graphics card is later swapped for a different model.

Warranty

Amulet Hotkey provides these kext files 'as is'. Limited testing has been successfully conducted. No adverse effects have been observed through use, non-use or incorrect use of these kext files, including the subsequent use of a local monitor instead of a remote PCoIP monitor. See the full [Disclaimer](#) on page 6.

How to install the disk image

Install the disk images as follows:

- To install the **AHKinject_ECN491**, see the section [Install AHKinject_ECN491](#);
- To install the **AHKinject_SCN078**, see the section [Install AHKinject_SCN078](#).

¹ OS X 10.9 introduced code signature verification but still allows unsigned kexts to load. From OS X 10.10 (Yosemite) onwards, as a security precaution, only kexts with verified code signatures are permitted.

Install AHKinject_ECN491

1. Download the disk image file **AHKinject_ECN491.dmg** from the Amulet Hotkey website to your Mac.
2. Mount the disk image file and accept the software licence.
3. After the image mounts, the Finder automatically opens the folder containing the image. See [Figure 1](#).
If it does not open, open it manually from the Mac desktop.

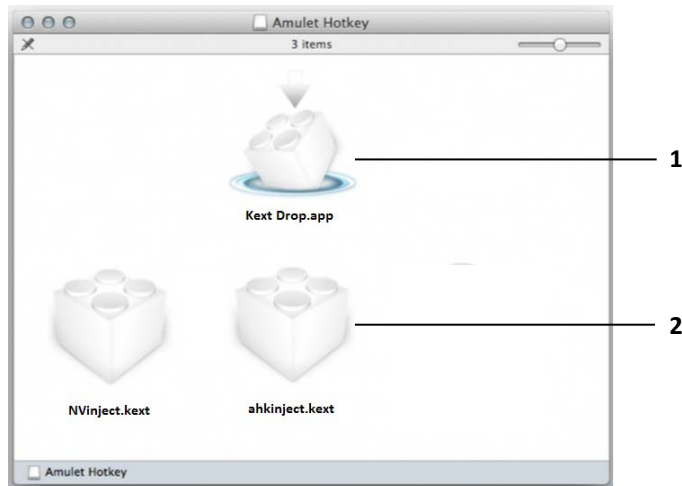


Figure 1: Select disk image file in the Finder. 1 Kext Drop utility. 2 Kext files

4. Double-click the **Kext Drop** app to launch it.

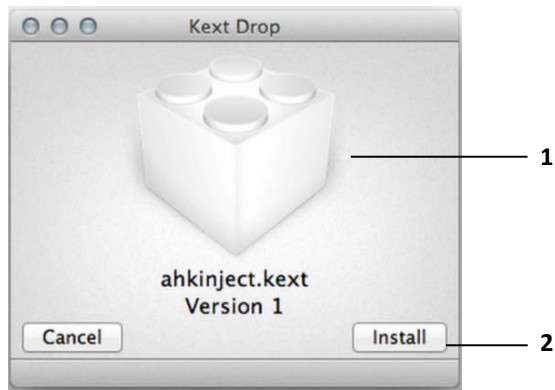
This utility installs kexts in the correct location with the correct permissions.

5. Drag the correct kext into the **Kext Drop** window. See [Figure 2](#).
 - for Macs with AMD graphics cards, select the **ahkinject** kext;
 - for Macs with NVIDIA graphics cards, select the **nvinject** kext.



Figure 2: Kext Drop window

- Click the **Install** button in the Kext Drop window. You may be prompted for administrator credentials.



Kext Drop utility. 1 ahkinject.kext ready to be installed. 2 Install button.

- When the 'Installation Successful!' message appears, restart the Mac to complete the kext installation.
- Temporal dithering should now be disabled. If it is not, see the section, [What to do if temporal dithering is still not disabled](#) on page 6.

Install AHKinject_SCN078

The developer of KextDrop has not yet updated the software for the change in third party kext locations in later versions of OS X. For this reason, you must install **AHKinject_SCN078** through the command line.

1. Mount the disk image.
2. Open a terminal window.
3. Copy the kext file from the disk image to the location from which it will run. Enter the command:

```
sudo cp -r /Volumes/AHKinject_SCN078/ahkinject.kext /Library/Extensions
```

4. Move to the directory that contains the kext file. Enter the command:

```
cd /Library/Extensions
```

5. Verify that the kext was copied. Enter the command:

```
ls | grep ahkinject
```

6. Examine the output and make sure the necessary files are there.
7. Change the permissions and ownership of all the files in the kext bundle. Enter the commands:

```
sudo chmod -R 755 ahkinject.kext  
sudo chown -R root:wheel ahkinject.kext
```

8. Restart the Mac.
9. Temporal dithering should now be disabled. If it is not, see the section, [What to do if temporal dithering is still not disabled](#) on page 6.

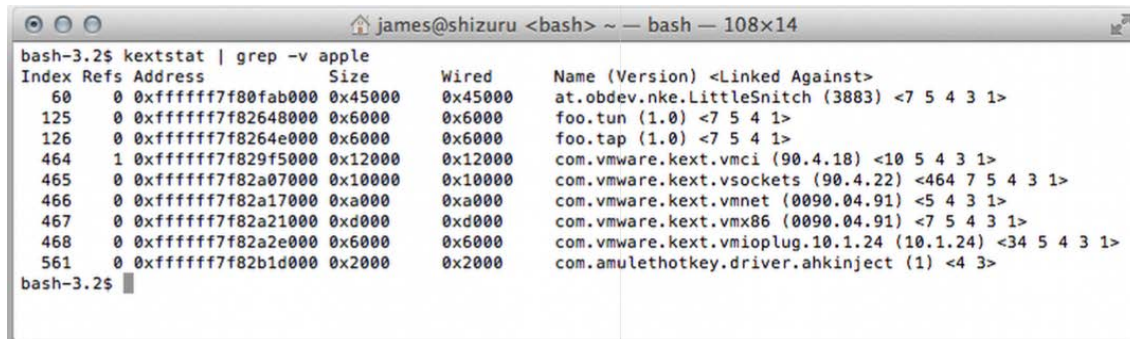
What to do if temporal dithering is still not disabled

If, after you install the kext, this does not disable temporal dithering, make sure the kext is loaded.

Enter the following command in Terminal:

```
kextstat | grep -v apple
```

This command lists all non-Apple kexts loaded into the kernel. This list should include **ahkinject** or **nvinject**. If none are listed, they have failed to load. Contact Amulet Hotkey support for assistance.



```

bash-3.2$ kextstat | grep -v apple
Index Refs Address          Size      Wired      Name (Version) <Linked Against>
  60    0 0xffffffff7f80fab000 0x45000  0x45000  at.obdev.nke.LittleSnitch (3883) <7 5 4 3 1>
 125    0 0xffffffff7f82648000 0x6000   0x6000   foo.tun (1.0) <7 5 4 1>
 126    0 0xffffffff7f8264e000 0x6000   0x6000   foo.tap (1.0) <7 5 4 1>
 464    1 0xffffffff7f829f5000 0x12000  0x12000  com.vmware.kext.vhci (90.4.18) <10 5 4 3 1>
 465    0 0xffffffff7f82a07000 0x10000  0x10000  com.vmware.kext.vsockets (90.4.22) <464 7 5 4 3 1>
 466    0 0xffffffff7f82a17000 0xa000   0xa000   com.vmware.kext.vnet (0090.04.91) <5 4 3 1>
 467    0 0xffffffff7f82a21000 0xd000   0xd000   com.vmware.kext.vmx86 (0090.04.91) <7 5 4 3 1>
 468    0 0xffffffff7f82a2e000 0x6000   0x6000   com.vmware.kext.vmioplug.10.1.24 (10.1.24) <34 5 4 3 1>
 561    0 0xffffffff7f82b1d000 0x2000   0x2000   com.amulethotkey.driver.ahkinject (1) <4 3>
bash-3.2$

```

Figure 3: List of non-Apple kexts in the Terminal

Note: The screenshot in [Figure 3](#) may list some kexts that are not present on your Mac. This will depend on the software you have installed.

How to re-enable temporal dithering

To re-enable temporal dithering, you must uninstall the kext by running a command in Terminal.

For example, to uninstall **ahkinject**, enter the command:

```
sudo kextunload ahkinject.kext
```

Disclaimer

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