

# HELO Plus

## Media Recommendations

### Introduction

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While HELO Plus supports standard USB and SD card media and encodes content to relatively low bit-rates (up to 20 Mbps), the instantaneous performance requirements of the media are significantly higher than that. This is especially true for longer file segment durations. Longer duration files have larger headers, which require much higher burst performance during the beginning of each file.

During recording, when HELO Plus detects that the media is unable to keep up with recording speed requirements, a "Media Too Slow" alarm is shown on the web UI. This may result, eventually, in the recording being aborted.

Therefore, we recommend that you use high performance media. Below are some general recommendations for managing media on HELO Plus.

### General Recommendations

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HELO Plus supports Extended File Allocation Table (exFAT) file systems on USB thumb drives and SD cards. Inserted USB and SD media can be formatted as exFAT by HELO Plus. AJA recommends that all USB thumb drives and SD cards should be freshly formatted according to these specifications:

- Master Boot Record (MBR) scheme
- exFAT file system
- No EFI system partition

#### No EFI Partition

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AJA recommends that you delete any EFI system partition that is on your media because it offers no value for HELO Plus. Some media come pre-formatted with EFI system partitions that HELO Plus does not recognize.

The EFI partition is a FAT system for making a bootable disk. It is part of the globally unique identifier (GUID) partition scheme whenever GUID is chosen during partitioning.

#### exFAT Preferred over FAT

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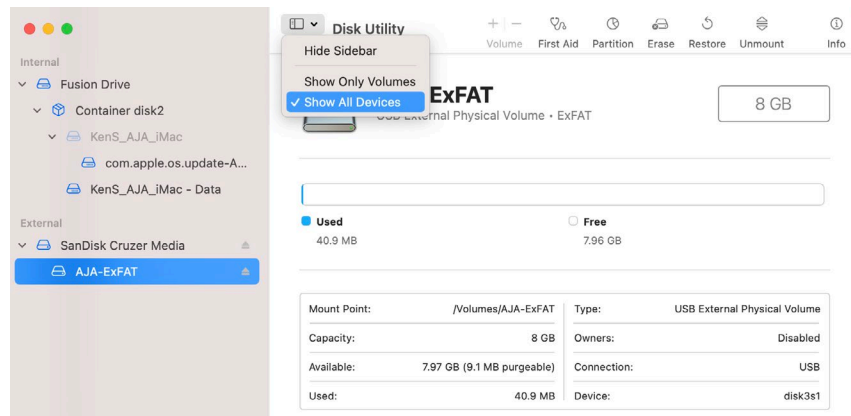
HELO Plus operates best using exFAT formatted media. HELO Plus formats media as exFAT internally. While it is possible for HELO Plus to use FAT media that has been formatted externally, performance is not guaranteed. FAT file systems also have a maximum file size limit of 4 GB, whereas exFAT file systems do not put any limit on file size.

# Media Formatting Instructions

## Mac Procedure

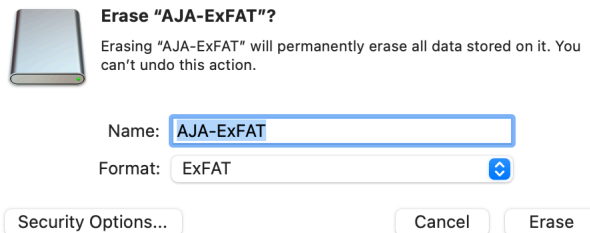
On the Mac, media must be formatted as exFAT with MBR, not GUID.

1. Insert media into your Mac.
2. From Applications, open the Utilities folder.
3. Launch Disk Utility.
4. From the View drop-down control, select Show All Devices.



5. Select the device, then click the Erase button. A window displays with formatting options.

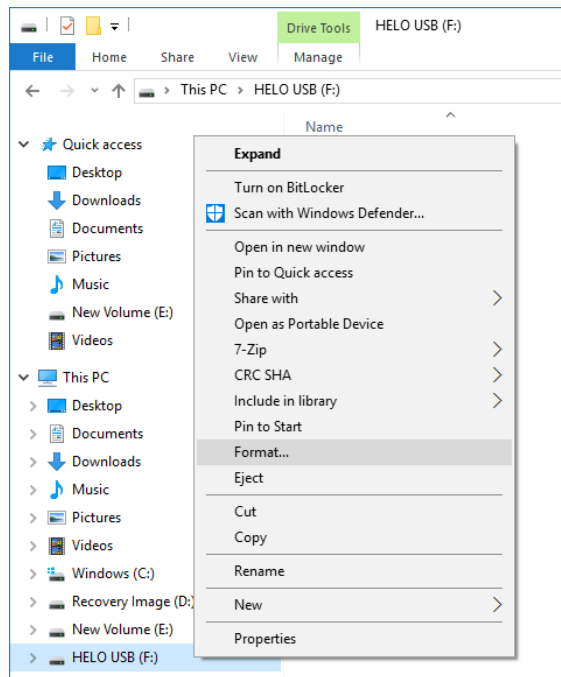
**WARNING:** To avoid losing data, make sure that you identify the correct device that corresponds to the media you intend to format.



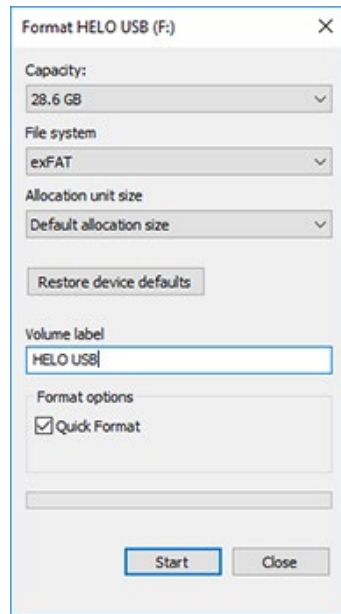
6. Select "ExFAT" format (and Master Boot Record scheme if visible), then click Erase. Disk Utility erases the content of the media, and the media will now be formatted as MBR exFAT.
7. Close Disk Utility and eject the media from your Mac. The media is now ready to use with HELO Plus.

## Windows Procedure

1. Insert media into your Windows machine.
2. From File Explorer, right-click on the volume, and select "Format" from the pop-up menu.



3. From the File system menu, select exFAT.
4. From the Allocation unit size menu, select "Default allocation size."
5. Enter a name for Volume label.
6. Make sure that the Quick Format checkbox is selected.



7. Click Start. A Warning window displays.

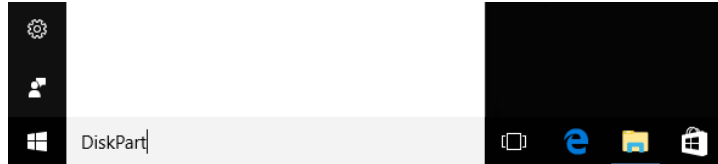
**WARNING:** To avoid losing data, make sure that you identify the correct device that corresponds to the media you intend to format.

8. If you are certain that you are working with the correct media volume, select OK.
9. A message window displays "Format Complete." Click OK. The media is now ready to use with HELO Plus.

## Eliminating the EFI Partition with the DiskPart Utility

There may be instances in which there is a hidden partition that the standard formatting process described above doesn't eliminate. In those cases, use the Windows "DiskPart" utility.

1. Insert media into your Windows machine.
2. From the Search Windows field, enter "DiskPart." A DiskPart run command prompt displays.



3. Click on the prompt to launch DiskPart. A message displays asking if you want to allow DiskPart to make changes to your device.
4. Select Yes. The DiskPart console window opens.

```
C:\Windows\System32\diskpart.exe

Microsoft DiskPart version 10.0.14393.0

Copyright (C) 1999-2013 Microsoft Corporation.
On computer: 8JF4225

DISKPART>
```

5. From the DISKPART prompt, enter "list disk", then press Enter. The disks on your machine are listed.

```
C:\Windows\System32\diskpart.exe

Microsoft DiskPart version 10.0.14393.0

Copyright (C) 1999-2013 Microsoft Corporation.
On computer: 8JF4225

DISKPART> list disk

   Disk ###  Status              Size               Free              Dyn  Gpt
   -----  -
   Disk 0    Online              238 GB             5120 KB           *
   Disk 1    Online              238 GB              0 B              *
   Disk 2    Online              28 GB              0 B

DISKPART>
```

**WARNING:** To avoid losing data, make sure that you identify the correct disk that corresponds to the media you intend to format. A common scenario is that Disk 0 and Disk 1 are internal disks. Carefully note the size of each disk to determine which disk is the media you want to format. In this example, we are formatting Disk 2.

6. From the DISKPART prompt, enter "select disk 2", then press Enter. The message "Disk 2 is now the selected disk" displays.
7. From the prompt, enter "clean". The message "DiskPart succeeded in cleaning the disk" displays.

```
C:\Windows\System32\diskpart.exe
Microsoft DiskPart version 10.0.14393.0
Copyright (C) 1999-2013 Microsoft Corporation.
On computer: 8JF4225

DISKPART> list disk

   Disk ###  Status       Size      Free      Dyn  Gpt
   -----  -
   Disk 0    Online      238 GB    5120 KB
   Disk 1    Online      238 GB     0 B
   Disk 2    Online      28 GB     0 B

DISKPART> select disk 2

Disk 2 is now the selected disk.

DISKPART> clean

DiskPart succeeded in cleaning the disk.

DISKPART>
```

*NOTE: In Windows, you cannot format an "unallocated" clean disk immediately to an exFAT format. You must first format the disk as FAT32 before reformatting it for exFAT. Use the following procedures to do this.*

#### Format for FAT32

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1. Right-click on the volume from File Explorer and select "Format." The Format Drive menu displays.
2. Select the file system FAT32. For Allocation unit size, select "Default allocation size." Click Start. A Warning message displays.
3. Click OK. The message "Format Complete" displays.
4. Click OK.

#### Format for exFAT

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1. Right-click on the volume from File Explorer and select "Format." The Format Drive menu displays.
2. Select the file system exFAT. For Allocation unit size, select "Default allocation size." Click Start. A Warning message displays.
3. Click OK. The message "Format Complete" displays.
4. Click OK.

## Solid State Media

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When using solid state media—USB thumb drives or SD cards—AJA recommends that the media be less than half full. The performance of solid state media deteriorates rapidly as it gets full, and this may result in aborted recordings.

### SD Cards

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When using SD cards, AJA recommends that you use class U3 or faster. Specifically, AJA has tested and found the following SD cards have sufficient performance for all HELO Plus modes of operation:

- SanDisk Extreme

- SanDisk Extreme Pro
- Lexar Professional 633x (class U1, but reliable)

## USB Thumb Drives

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When using USB thumb drives, AJA recommends that the media be rated for write speeds of 90 MB/s or higher. Specifically, AJA has tested and found the following USB solid state media to have sufficient performance for all HELO Plus modes of operation:

- SanDisk Extreme USB SDCZ80
- Transcend JF 780

Certain high performance USB thumb drives, such as Kingston HyperX, will require external power via a powered USB hub as they draw more current than standard USB media.

## USB Attached Magnetic Drives

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When using USB media, traditional spinning magnetic hard drives are found to have overall lower degradation in performance as they get full compared to solid state media. These drives will require external power or a powered USB hub when connected to the HELO Plus USB port.

## NFS Servers

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When using NFS servers, AJA recommends ensuring the server is configured to support an NFS block size limit of 1 MB (1,048,576 bytes). Some servers may have a setting to configure the block size manually, such as NetApp ONTAP 9, but it is typically calculated automatically based on the amount of physical RAM in the server. In these cases, which include modern Linux kernels, it may be necessary to ensure there is adequate physical RAM in the server. If the server does not have adequate RAM, the NFS server will automatically select a smaller block size limit, which is found to result in insufficient performance.

On Linux, 16 GB of RAM should be sufficient to ensure a 1 MB block size.

AJA has found that the following Linux distributions have NFS servers with the maximum block size set to 1 MB when provisioned with 16 GB of RAM or greater:

- CentOS 7
- Ubuntu 12.04 LTS
- Ubuntu 14.04 LTS
- Ubuntu 16.04 LTS
- Ubuntu 18.04 LTS
- Ubuntu 20.04 LTS
- Ubuntu 22.04 LTS

Some older NFS servers support only smaller block sizes. This may result in performance issues with HELO Plus. For example, NFS servers running on CentOS 6 may have a maximum block size of 64 KB, potentially resulting in aborted recordings due to performance issues.

Older versions of NFS are both slower at writing and have a smaller maximum block size. NFSv2 has a maximum block size of only 8 KB (8,192 bytes). AJA recommends using NFSv3 or higher.

Older Linux-based servers may have small hard-coded maximum block sizes, or may not be configured to support NFSv3. In these cases, it will be necessary to recompile the kernel, or update to a more modern kernel that supports both a 1 MB maximum block size, and NFSv3.

# Network Attached Storage

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The speed of the Ethernet connection on Network Attached Storage does not reflect the actual recording capacity of the media in it. Network Attached Storage with 1 Gbps Ethernet connections may have much lower read/write speeds.