HELO Plus Approved Media

Introduction

While HELO Plus supports standard USB and SD card media and encodes content to relatively low bitrates (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, as 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 WebUI. This may result, eventually, in the recording being aborted.

Listed below are USB thumb drives whose performance has been verified by AJA along with some general information on drive parameters that have significant bearing on system performance.

Media and Configuration Information for USB Drives

Supported USB Thumb Drives

Media Formatting

For the best results, AJA Video Systems recommends formatting all media to exFAT prior to use with HELO Plus, due to file size constraints with other formats.

In some cases, drives ship formatted as NTFS. Those drives MUST be reformatted to exFAT prior to use, and this is indicated with Notes in this document.

Transcend JetFlash 780

- Transcend JetFlash 64GB = TS64GJF780
- Transcend JetFlash 128GB = TS128GJF780
- Transcend JetFlash 256GB = TS256GJF780

Transcend JetFlash 910

- Transcend JetFlash 128GB = TS128GJF910
- Transcend JetFlash 256GB = TS256GJF910

Transcend JetFlash 920

- Transcend JetFlash 920 128GB = TS128JF920
- Transcend JetFlash 920 256GB = TS256JF920

Transcend JetFlash 930C

Transcend JetFlash 930C 128GB = TS128GJF930C



Published April 18, 2025

• Transcend JetFlash 930C 256GB = TS256GJF930C

Corsair Flash Voyager GTX

- Corsair Flash Voyager GTX128GB = CMFVYGTX3C-128GB
- Corsair Flash Voyager GTX256GB = CMFVYGTX3C-256GB
- Corsair Flash Voyager GTX512GB = CMFVYGTX3C-512GB
- Corsair Flash Voyager GTX1TB = CMFVYGTX3C-1TB

NOTE: These drives MUST be formatted as exFAT before use.

OWC Envoy Pro Mini

- OWC Envoy Pro Mini 500GB = OWCENVPMCA05
- NOTE: OWC drives ship pre-formatted in Apple's APFS format. To be able to be used with a HELO Plus or Windows PC, they must be re-formatted as ExFAT volumes. This is accomplished on a Mac via Apple's Disk Utility or through the use of the free "OWC Drive Guide" plug-in available for Windows availible from OWC. See <u>OWC</u> <u>Drive Formatting for Non-Apple OS Platforms</u>.

General Recommendations

HELO Plus supports Extended File Allocation Table (exFAT) file systems on USB thumb drives and SD cards. USB and SD media can also be formatted as exFAT by the 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

AJA recommends that you delete EFI system partitions that are on your media because they offer 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.

See "Eliminating the EFI Partition on macOS using Terminal" on page 5 and "Eliminating the EFI Partition on Windows with the DiskPart Utility" on page 5 for EFI removal procedures on macOS and Windows.

exFAT Preferred over FAT

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.

Supported Formatting of Storage Media

The HELO Plus is designed to only recognize FAT or exFAT (preferred) volumes for storage media. Attempting to use unsupported volume formatting such as Apple File System (APFS) or Windows NTFS will result in system warnings or improper functionality.

NOTE: When a USB or SD device is formatted on a Mac using the Apple File System (APFS), a small FAT volume is also created on the storage device. The HELO Plus will correctly ignore the APFS volume, but the FAT volume will be recognized and mounted for recording. As the FAT partition is only 200MB, it will quickly be filled and recordings will fail without any messages to users as to the cause.

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.

Internal		+ - Qa Volume First A xFAT Il Physical Volume • Ex	ی id Partition E FAT	⊖ 5 irase Restore	⊜ Unmount 8 GB	(3) Info
External C AJA-ExFAT	Used 40.9 MB		Free 7.96 GB			
	Mount Point:	/Volumes/AJA-ExFAT	Туре:	USB Extern	al Physical Volur	ne
	Capacity:	8 GB	Owners:		Disabl	ed
	Available: 7.97	GB (9.1 MB purgeable)	Connection:		U	SB
	Used:	40.9 MB	Device:		disk3	s1

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.

Erasing "A can't undo	JA-ExFAT" will permanently erase a this action.	ll data stored on it. You
Name:	AJA-ExFAT	
Format:	ExFAT	0
Scheme:	Master Boot Record	\bigcirc
Security Options		Cancel Frase

- 6. Select "ExFAT" format (and Master Boot Record for 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.

Format HELO USB (F:)	>
Capacity:	
28.6 GB	~
File system	
exFAT	~
Allocation unit size	
Default allocation size	~
Restore device defaults	
Restore device defaults Volume label HELO USB	
Restore device defaults Volume label HELO USB	
Restore device defaults Volume label HELO US8 Format options Quick Format	
Restore device defaults Volume label HELO US8 Format options Quick Format	

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.

There may be instances in which there is a hidden EFI volume that the standard macOS formatting process described above doesn't eliminate. In those cases, use the macOS Terminal CLI with specified commands.

WARNING: Use extreme caution when attempting to delete the EFI volume using Terminal. Selection of the wrong disk or volume for deletion may render your system inoperable. Examples that follow refer to included screenshots but your values will be different.

- 1. Insert your USB media into your macOS machine.
- 2. From the Applications menu, under Utilities select Terminal. Enter **diskutil** *list* then press Return.
- 3. This will display a list of available storage devices for your system. Identify your USB storage device. In the examples below, the USB device is listed as *disk4*.
- 4. If your USB media is improperly formatted, there will be an entry for EFI. This volume, in this example indicated by the number 1, must be removed.

•••	🚞 tho	mas.mays — -zsh — 82×2	27	
[thomas.may	s@8tm4800 ~ % diskutil	list		
/dev/disk0	(internal, physical):			
#:	TYPE	NAME	SIZE	IDENTIFIER
0:	GUID_partition_scheme		*2.0 TB	disk0
1:	Apple_APFS_ISC	Container disk1	524.3 MB	disk0s1
2:	Apple_APFS	Container disk3	2.0 TB	disk0s2
3:	Apple_APFS_Recovery	Container disk2	5.4 GB	disk0s3
/dev/disk3	(synthesized):			
#:	TYPE	NAME	SIZE	IDENTIFIER
0:	APFS Container Scheme	-	+2.0 TB	disk3
		Physical Store disk0s2		
1:	APFS Volume	Macintosh HD - Data	178.1 GB	disk3s1
2:	APFS Volume	Macintosh HD	10.2 GB	disk3s3
3:	APFS Snapshot	com.apple.os.update	10.2 GB	disk3s3s1
4:	APFS Volume	Preboot	6.2 GB	disk3s4
5:	APFS Volume	Recovery	939.8 MB	disk3s5
6:	APFS Volume	VM	20.5 KB	disk3s6
/dev/disk4	(external, physical):			
#:	TYPE	NAME	SIZE	IDENTIFIER
0: 📕	GUID_partition_scheme		*8.0 GB	disk4
1:	EFI	EFI	209.7 MB	disk4s1
2:	Microsoft Basic Data	Untitled 2	7.8 GB	disk4s2
thomas may	s@8±m4800 ~ % →			

- In Terminal, prepare to erase the EFI volume by specifying the disk/partition to remove. For the screenshot above (see underlined examples), you would enter the following *diskutil eraseVolume free free disk4s1* then press Return.
- 6. Allow the process to complete. Run *diskutil list* again to verify that the EFI volume is no longer present.



Eliminating the EFI Partition on Windows with the DiskPart Utility

There may be instances in which there is a hidden partition that the standard Windows 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 then press Enter.



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



6. From the DISKPART prompt enter *list disk* then press Enter. The disks on your machine are listed.

C:\Window	/s\System32\diskpart.ex	ĸe			
Microsoft D	iskPart version	10.0.143	93.0		
Copyright (On computer	C) 1999-2013 Mi : 8JF4225	crosoft C	orporatio	n.	
DISKPART> 1	ist 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.
 - 7. From the DISKPART prompt, enter *select disk 2* then press Enter. The message "Disk 2 is now the selected disk" displays.
 - 8. From the prompt, enter *clean* then press Enter. The message "DiskPart succeeded in cleaning the disk" displays.

C:\Windows	s\System32\diskpart.ex	e			
Microsoft Di	iskPart version	10.0.143	93.0		
Copyright ((On computer:	C) 1999-2013 Mic : 8JF4225	crosoft C	orporatio	n.	
DISKPART> li	ist disk				
Disk ###	Status	Size	Free	Dyn	Gpt
Disk Ø Disk 1 Disk 2	Online Online Online	238 GB 238 GB 28 GB	5120 KB 0 B 0 B		
DISKPART> se	elect disk 2				
Disk 2 is no	ow the selected	disk.			
DISKPART> c]	lean				
DiskPart suc	ceeded in clear	ning 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

- 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** and click Start. A Warning message displays.
- 3. Click OK. The message "Format Complete" displays.
- 4. Click OK.

Format for exFAT

- 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** and click Start. A Warning message displays.
- 3. Click OK. The message "Format Complete" displays.
- 4. Click OK.

Solid State Media

SD Cards

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 Attached Magnetic Drives

AJA does not recommend the use of magnetic hard drives with HELO Plus.

NFS Servers

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

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.

Contacting AJA Support or Sales

Please have all pertinent information at hand prior to contacting AJA support or sales.

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