Flash XDR FAQ's
Firmware Release 0.0.193

Features that are discussed in these "Frequently Asked Questions" (FAQ's), are currently implemented in the Flash XDR, in firmware release 0.0.193 or later.

Upcoming features are cleared identified by the statement "in a future release" or similar wording.

Availability and Most Frequently Asked Questions

1. Are the Flash XDR's shipping, if I order one today, when can I receive it?

    This is our most frequently asked question.

    Yes, the Flash XDR is currently shipping.

    We have greatly increased our monthly production to meet demand. We currently have stock on-hand for immediate delivery, but this may change on a daily basis.

    If you have an urgent need, or just want to know when we can delivery, please call us at ++720 221-3861 or you can email us at sales@convergent-design.com. Our Fax number is ++720 227-9296 and our website is www.convergent-design.com

2. Is the Flash XDR completely finished, or fully developed?

    No. We are developing new features on an on-going basis.

    Before the first Flash XDR was released, we developed a process that would allow new features, as well as fixes, to be added to the units in the field, in a quick and easy manner.

    We are continually developing new features, some that were announced in our preliminary specifications, and others that are completely new. These may originate with our own ideas, or come from suggestions submitted by our users.

    Our website, www.convergent-design.com, prominently displays new firmware releases.

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Firmware is similar to software, but it is intended for one specific product, such as the Flash XDR and is embedded within the device itself.

    A. We regularly update the firmware and publish the latest firmware releases on our website.

    B. Our users, at their convenience, download the latest versions and install it on their Flash XDR's.

    C. The updated Flash XDR immediately has all of the benefits of the new features and problem fixes.

By publishing new Firmware releases, we can respond quickly to any problems reported by one or more users in the field as well as implement new features for the Flash XDR.

As soon as a problem can be identified and fixed, we can publish a new firmware release.

Then all users, regardless of where they are in the world, as long as they have internet access, can immediately download the new release and install it into their Flash XDR in under five minutes. In addition, previous firmware releases can be reinstalled on the Flash XDR, if necessary.

3. **Have you meet all of your published schedules for the development of the Flash XDR and individual features.**

No. We were overly optimistic in our published schedules. While we believe that we have made many breakthroughs in creating the Flash XDR, our published schedules were not met in many cases.

While we are striving to meet all of our published schedules, we are now much more reluctant to publish a schedule unless we are reasonably certain to meet that schedule.

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Description / Compatibility / Advantages

4. **Can I get a brief description of Flash XDR?**

   Flash XDR is a portable HD recorder/player designed to mount on the back of a camcorder. It is also suited for use in a studio environment.

   The Flash XDR is designed to record higher quality images than the camera itself is capable of recording using the camera's HD-SDI output.

   Flash XDR accepts an incoming HD-SDI video signal, with embedded audio and timecode, and accepts external audio and timecode via a menu option.

   The Flash XDR records the video/audio as MPEG2 at user selected bit-rates. This allows the user to choose, for every shoot, an appropriate image quality, file size, and maximum available length of recording.

   The data is then stored on CompactFlash cards, in either Quicktime or MXF file formats.

   In a future release, the Flash XDR will also fully support Asynchronous Serial Interface (ASI) for both input and output, as an extra cost option.

   ASI is a streaming data format for the broadcast industry. ASI has many applications, but is commonly used by mobile units to get their video and audio signal back to the station via microwave.

5. **What are your image quality options?**

   At this time, we offer two options, 50 Megabit per second (Mbps) bit-rate and 100 Mbps.

   Our 50 Mbps gives you a high quality image, one better than many cameras.

   The 100 Mbps option offers stunning video, and in our testing, has been shown to be visually indistinguishable from full uncompressed. The file sizes of our 100 Mbps option are very manageable compared to full uncompressed High Definition (HD) video.

   In the future, we plan on offering, as an extra cost option, the ability to record full uncompressed video. With this option, we will support 10-bit color.

6. **Where can I download or view some sample videos recorded on the Flash XDR.**

   We have links to Flash XDR footage on our website, www.convergent-design.com.

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7. **Will the Flash XDR work with my camera?**

   If your camera has an HD-SDI output, then the answer is yes.

   In addition, there are "Component Video to HD-SDI adapters", so that non-HD-SDI cameras can still benefit from using the Flash XDR.

   In the future, we will be supporting SD-SDI cameras also.

8. Will the Flash XDR improve the image quality of my existing camera?

   In most all cases, yes.

   HD video produces a large amount of data, more than most all magnetic tape drives, or laser recording media, can handle.

   > For example, the MiniDV tape format typically records at 25 Megabits per second (Mbps). The HD-SDI signal is at 1.485 Gigabits per second, or 1,485 Megabits per second.

   > The HD video must be highly compressed to fit on the existing tape drives or other recording media. While this compression works very well most of the time, under certain demanding conditions, it produces a less than perfect image. Also, some of the chroma (color) data is not recorded to achieve the necessary image compression.

   The great thing about HD-SDI cameras is that the camera's image goes through minimal processing, then out the HD-SDI output without going through compression.

   HD-SDI is the best possible signal from your camera, and this signal is dramatically better than what is recorded on tape or other media. The highest of high-end cameras can also record without any, or very minimal, compression.

   Difference between what is recorded to tape, or other media, and the uncompressed HD-SDI signal is very dramatic. If you have only been recording via your camera's internal recording mechanism, in most all cases, you are losing a great degree of the quality that your existing camera can deliver.

   For many cameras, the image recorded is 4:2:0, while the HD-SDI signal is 4:2:2, which is dramatically and visually better.

   The difference between 4:2:0 and 4:2:2 is beyond the scope of these FAQ's. For reference, please visit the "Chroma Subsampling" article in www.wikipedia.org,

   http://en.wikipedia.org/wiki/Chroma_subsampling

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- What is the cost of the CompactFlash media?

  The cost of CompactFlash media varies daily. At the time of this writing, the cost for our qualified and recommended CompactFlash cards is approximately:

  Transcend 32 GB 133x   approximately $ 77
  Transcend 16 GB 300x   approximately $149
  Lexar 16 GB 300x UDMA   approximately $219

  As with most electronics, it is easy to predict that these prices will drop, and the capacity of CompactFlash cards will increase in the future. There will be almost daily fluctuations in these prices.

  However, it is most important to note that CompactFlash cards are widely used, by professionals, for professional work, on a daily basis.

  These Transcend memory cards are truly bargains; just compare the amount of memory, and the price, to any other professional video/audio media. We predict that the price of these cards will remain more than competitive with any other professional memory.

  Use <u>only</u> approved CompactFlash cards from the following list:

  Transcend brand 133X CompactFlash Card, any capacity.
  Transcend brand 300X CompactFlash Card, any capacity.
  Lexar brand 300x UDMA CompactFlash Card, any capacity.

  These are only a CompactFlash cards fully qualified for use with the Flash XDR at this time.

  The Transcend 133x cards can be used for recording at bit-rates up to and including 100 Mbps. The write speed of these cards is 133x and the read speed is 300x.

  The Transcend 300x cards are faster for write operations and can be used for any current and envisioned recording bit-rates. The write and read speed of these cards is 300x.

  Both of these Transcend card series have been proven in the lab, and in the field, to be reliable and highly reusable. These cards have a lifetime warranty from Transcend.

  We expect 64 GB cards to be on the market soon, and we will quality other cards as they become available.

  The use of non-qualified CompactFlash cards is not recommended and not supported. There is a large difference, in quality, speed, and endurance, in CompactFlash cards.

9. Do the CompactFlash cards need special care?

   We have found the CompactFlash cards to be field proven.

   Reasonable care is expected.

   We recommend returning the cards to their protective case when appropriate.

   They should not be immersed in water. Also, it is reasonable to protect the contacts from sand and dirt. The protective cases provided with the cards provide reasonable protection. Even more secure cases are available for a reasonable cost.

10. What is the recording time?

    Using **four** Transcend 32 GB 133x CompactFlash cards, the approximate recording time is:

Video Format	720p50@ 50 Mbps	1080i60 @ 50Mbps	1080i60 @ 100 Mbps	1080p24 4:2:2 10-bit Uncompressed
Record Time	4 Hours 44 minutes	4 Hours 44 minutes	2 Hours 22 Minutes	17

    Using **one** Transcend 32 GB 133x CompactFlash cards, the approximate recording time is:

Video Format	720p50@ 50 Mbps	1080i60 @ 50Mbps	1080i60 @ 100 Mbps	1080p24 4:2:2 10-bit Uncompressed
Record Time	71 minutes	71 minutes	35 Minutes	17

11. How reusable are the CompactFlash cards?

    The endurance of the Transcend CompactFlash cards is substantial.

    For the Transcend 16 GB 300x card the endurance is greater than 1,000,000 erase/write cycles and 10,000 insertion/removal from CompactFlash card slot cycles.

    http://www.transcendusa.com/Products/ModDetail.asp?ModNo=203&SpNo=3&LangNo=0

    For the Transcend 32 GB 133x card the endurance is less than the 300x card but entirely adequate for repeated use as a Video/Audio recording medium.

    While it is fully expected to be able to reuse a Transcend CompactFlash card for well over 50,000 times, compare this to how many times one can reuse a video tape.

    In addition, quality CompactFlash cards are essentially dropout free.

    Yes, there are stories of individuals that had problems with CompactFlash cards, but modern premium quality cards, from reputable manufacturers such as Transcend are extremely durable.

    While we have not seen counterfeit Transcend brand CompactFlash cards, counterfeit cards using other brand names are common. The reliability, capacity, endurance and performance of counterfeit cards are suspect.

    Always purchase your CompactFlash cards from a reputable source.

    In a future release, the Flash XDR will be able to record to two CompactFlash cards simultaneously. In essence, then this option is enabled, you are creating two original master recordings.

    With two masters, with even the remote possibility of one CompactFlash card failing, your footage will still be safe on the other master.

12. Can you record seamlessly from one CompactFlash card to another?

    Yes, as the remaining record capacity on the current CompactFlash card reaches a critical level, the Flash XDR automatically closes the current clip (file), and then opens a new clip on the next card.

    This process is completely transparent to the user, for both record and playback. No frames of video or audio are lost during this process.

    This means that you are not limited, in length of recording, to the amount of footage that will fit onto one CompactFlash card.

13. Can you hot-swap the CompactFlash cards?

    No, not at this time. This is planned for a future firmware release.

    At this time, with four 32 GB cards, we can record 4 hours and 44 minutes, using 50 Mbps, and two hours 22 minutes at 100 Mbps, without hot-swapping.

    When 64 GB cards become available these times will be doubled.

14. Do you use FAT32 file structure?

    Yes, this allows the CompactFlash media to be easily used on both the Apple Macintosh and PC.

    With FAT32, the maximum file size for an individual file (clip) is limited to around 4 GB.

    This would normally be a problem, but the Flash XDR seamless closes one file (clip) and starts another, even if the next file is on another CompactFlash card. A recording is not limited to the length of one clip. One can record continuously until all of the cards are full.

    When editing, the individual clips can be easily put adjacent to each other on the timeline. The limited size of each clip is also desirable if one wishes to archive the clips on DVD's or other medium which is limited in size.

15. Can the Flash XDR be transferred from one camera to another?

    Yes, this is one of the best parts.

    The Flash XDR is easily transported to another camera.

    The Flash XDR is an investment in the long-term. The image quality is stunning; in our tests, it is visually indistinguishable from uncompressed.

    If you upgrade to a new camera, you do not lose your investment in the Flash XDR.

    There are no mechanical parts to wear out, there is no maintenance, under normal circumstances, and the unit is repairable if the need ever arises.

16. What recording options and formats will you support in the future?

Today we support 50 Mbps and 100 Mbps MPEG2 Long-GOP modes. These are the Master Quality and High Quality modes in the following table.

The following options are planned:

Interlaced / Progressive Formats: 1080i60/50, 1080psf30/25/24, 720p60/50, 480i/576i

Bit Rate	Compression	Audio Format	Subsampling	Raster	Comments
160 Mbps	I-Frame Only VBR	PCM 24-Bit 48K	4:2:2	1920 x 1080 / 1280 x 720p	
100 Mbps	I-Frame Only VBR	PCM 24-Bit 48K	4:2:2	1920 x 1080 / 1280 x 720p	
100 Mbps	Long-GOP CBR	PCM 24-Bit 48K	4:2:2	1920 x 1080 / 1280 x 720p	Master Quality
50 Mbps	Long-GOP CBR	PCM 24-Bit 48K	4:2:2	1920 x 1080 / 1280 x 720p	High Quality
35 Mbps	Long-GOP VBR	PCM 24-Bit 48K	4:2:0	1440 x 1080	XDCAM HD
18 Mbps	Long-GOP VBR	PCM 24-Bit 48K	4:2:0	1440 x 1080	XDCAM HD
18 Mbps	Long-GOP VBR	PCM 24-Bit 48K	4:2:0	1440 x 1080	Proxy Recording
	Streaming Only	Not for Recording			
25 Mbps	Long-GOP CBR	MPEG1 Layer 2	4:2:0	1440 x 1080	HDV-2
19.7 Mbps	Long-GOP CBR	MPEG1 Layer 2	4:2:0	1280 x 720p	HDV-1
18 Mbps	Long-GOP CBR	MPEG1 Layer 2	4:2:0	1440 x 1080 / 1280 x 720p	ASI

17. Does the Flash XDR require routine maintenance?

No. There are no moving parts, no fans, no tape path to clean, etc.

There is no fan in the unit for two reasons,

1) To ensure that the unit is absolutely silent.

2. To ensure that sand, dust, and dirt are not pulled into the unit.

Exposure to extreme conditions, such as a sand or dust storm, may require some cleaning.

All connectors, regardless of quality and manufacturer, have a finite life. Only the highest quality connectors are used in the Flash XDR, and we have a method of minimizing the wear on the connectors.

The elimination of routine and expensive maintenance of cameras and tape decks is a distinct advantage of the Flash XDR. Over time, the elimination of these expenses can easily pay for the Flash XDR.

18. Can I really convert my existing camera to tapeless workflow?

Yes, while your camera may be designed for tape-based recording, the Flash XDR converts it instantly to a tapeless workflow with all the benefits therein.

For example, with tape, many film producers and crew are very reluctant to rewind a tape to review the recorded clips.

This is for many reasons, foremost is the more a tape is handled (rewound, played, fast forwarded), the more likely a dropout is to occur. Secondly, repositioning the tape after playback must be done precisely. If done incorrectly, existing footage could be overwritten.

But with the tapeless workflow, in the Flash XDR, the last clip may be played back instantly at the press of one button. Then, even while playing back a clip, the unit is ready to record instantly, and no existing footage will be overwritten.

Even more importantly, is the elimination of the capture process. Capturing takes place in real time, with the camera or tape deck playing the footage, while the computer "captures" the digital data.

With a tapeless workflow, the Flash XDR creates individual clips for each take or recording. These individual clips can be copied in bulk, faster than real-time, to your computer system. In addition, you can choose to only transfer the good takes, if preferred, without spending any time repositioning the tape.

If you have a fast CompactFlash card reader, such as the Lexar Firewire 800 unit, then you can actually play or edit the clips directly from the CompactFlash Card. Also, these readers can be daisy-chained together, so you can start a process to transfer up to four CompactFlash cards without further attention.

However, unless one is really pressed for time, we recommend copying the clips to your computer's hard drive first, prior to editing.

Other advantages of a tapeless workflow:

a. No tape dropouts.
b. No cleaning of the tape heads and tape path.
c. CompactFlash cards are reusable thousands of times, dramatically reducing media costs. But, of course, for some applications, the media still must be archived on some medium.
d. No maintenance of the tape mechanism.
e. No expensive tape deck is necessary.
f. No rewinding or positioning a tape to find a clip.
g. Each clip has a name, timestamp, and metadata information making it easy to document and find a clip.

h. Long-Form recordings are easily achievable as a recording can go from one CompactFlash card to another seamlessly.

Just four 32 GB CompactFlash cards can hold 2 hours and 22 minutes of 100 Mbps 1080i60 footage.

At 50 Mbps, this increases to 4 hours and 44 minutes.

19. **What cameras / camcorders are compatible with Flash XDR?**

a. Sony PMW-EX1, PMW-EX3
b. Canon XL-H1, XL-H1s, G1
c. Iconix HR-1
d. Hitachi HV-HD30 and DK-H32
e. Ikegami HDL-20D
f. Camera Corps HD MiniZoom
g. Sony F900, XDCAM HD, XDCAM EX
h. Sony EVI-HD1
i. JVC GY-HD250, GY-HD251
j. Panasonic GP-US932
k. Toshiba IK-HD1
l. Any HD camcorder with analog component outputs + HD-SDI converter
m. Any HDV / AVCHD camcorder with HDMI + Convergent Design nanoConnect
n. **Any HD-SDI source with compatible frame rates.**
   Dual-Link HD-SDI is not supported.

20. **What were the design goals in developing this box?**

a. Provide videographers / cinematographers, and others, with a tool to obtain master quality recording, at a higher quality than achievable using their internal recording subsystems.
b. Enable direct attachment to camcorder (for "run and gun" applications).
c. Provide a wide range or image quality / file size / recording length options.
d. Enable pull-down removal (inverse telecine) for true 24p support.
e. Provide a tapeless workflow.
f. Provide low power consumption, capable of using battery power, small size, and lightweight recording solution.
g. Provide rugged design and construction, operational over a wide temperature range.
h. Provide ASI I/O for connectivity to satellite uplink or ASI ↔ IP converters.

21. **How can I connect Flash XDR to the Canon XL H1?**

    Simply connect the HD-SDI and time-code outputs from the XL H1 directly into the corresponding inputs on Flash XDR.

    Since the audio is not embedded in the original Canon XL H1's HD-SDI stream, you need to connect either balanced line or microphone level stereo inputs directly into Flash XDR.

    If using microphone inputs, + 48V phantom power can be enabled.

    The external balanced audio input's, microphone inputs, are adjustable from 0, then over a range of 10 dB to 65 dB in one dB increments.

    The balanced analog audio outputs can then be connected to the corresponding inputs on the Canon XL H1. This allows redundant recording of both the video and audio to the HDV tape in the camcorder, in addition to the recording to the CompactFlash cards in Flash XDR.

22. **Can I really get 1080i recording from the JVC GY-HD250 camcorder?**

    Yes, the GY-HD250 can be switched to output either 720p or 1080i HD-SDI. Internally, only 720p HDV data can be recorded to tape. However, Flash XDR accepts and records in either 720p or 1080i formats.

23. **Which HD-SDI Switchers are compatible with Flash XDR?**

    Flash XDR works with any HD-SDI switcher with a compatible output format (see recording option and formats section). This makes Flash XDR an ideal live event recorder.

24. **How does Flash XDR compare to other HD Portable recorders?**

    Flash XDR redefines portable HD Recorders in terms of weight, size, power, and price. It is also completely silent.

    Compared to portable PC based recorders, tape decks, or laptop + converter box, the Flash XDR, uses far less power, produces no noise, is more rugged and can be mounted on the back of a camcorder.

    It also costs considerably less than most of these alternative solutions.

Video I/O

25. **Which video input formats are supported?**

    Interlaced / Progressive Formats: 1080i60/50, 1080psf30/25/24, 720p60/50, 480i/576i

26. **Can Flash XDR auto-detect the incoming HD-SDI stream?**

    Yes, auto-detect is the default setting.

27. **Are component analog and / or HDMI I/O included?**

    No, in designing Flash XDR we made some tradeoffs of connectivity and physical size.

    We included HD-SDI with embedded audio and time-code support, but left off analog video and HDMI inputs to conserve space and power.

    Analog video → HD-SDI converters are available from several manufacturers, while HDMI → HD-SDI conversion can be accomplished using our low-cost nanoConnect converter.

28. **Does Flash XDR perform cross / down conversions?**

    No, Flash XDR does not perform 1080i ↔ 720p or HD ↔ SD type conversions.

    Our design goals limited the power and size of the box. Also, cross / down conversion was deemed unnecessary, as most HD-SDI sources already provide this functionality.

    So, the resulting MPEG2 stream always matches the HD-SDI input format (except when pull-down removal is enabled).

29. **Can Flash XDR remove the pull-down (inverse telecine) and record in 1080p24/23.98?**

    This will be provided in a future firmware release.

    Assuming the 1080i60/59.94 HD-SDI input was created from a 24/23.98p frame rate, then Flash XDR a menu option will be available to remove the extra frames/fields.

    The HD-SDI monitor output will be the 1080p24/23.98 rate, but the video will be delayed 2 frames. The MPEG2 stream, as recorded, will be at the 1080p24/23.98 frame rate also.

30. **Is the timecode input needed in order to remove the inverse telecine?**

    No, Flash XDR does not use the time-code to remove the extra frames.

31. **Can Flash XDR flip the image from the Red Rock Micro, P+S Technik, or other 35 mm adapters?**

    In a future release, a menu option will be provided to flip the frame to accommodate many 35mm lens adapters. The HD-SDI monitor output will show the corrected image, but delayed two frames.

32. **I have two (or more) cameras; can I synchronize the capture on a frame by frame basis (for 3-D, for example)?**

    Yes, if all video sources are frame synchronized using a blackburst generator to each camera, then all the video captures to each Flash XDR box will be synchronized.

    If the various cameras are not frame synchronized then the captures will be accurate to +/- 1 frame.

33. **Does Flash XDR have a pre-record buffer?**

    In a future release, the Flash XDR will allow for a pre-record buffer of approximately 8 seconds at 100 Mbps rate and16 seconds at 50 Mbps.

34. **Can I record continuously, overwriting the oldest footage?**

    Not at this time. We are considering this for a future firmware update.

35. **Do you plan to support SD-SDI?**

    This is planned for a future release. However, video and audio will still be recorded in MPEG2 format, not DV.

36. **How can I monitor the video?**

    Flash XDR has two HD-SDI outputs, which are active during record (loop-thru), as well as playback. One output can go to the monitor and the other can be used for another purpose.

37. **Is a color bar generator included?**

    This is planned for a future release. Our plans are to automatically output a SMPTE color bar pattern if no incoming HD-SDI signal is detected (while the box is operating in record mode).

    Additionally, we plan a menu option to output a color bar pattern through the HD-SDI outputs.

Audio Inputs and Outputs

38. **What are the audio input choices?**

    Flash XDR offers two audio input sources:

    a. 2 channels of audio embedded in the HD-SDI stream.
       In a future release, we plan on supporting up to 8-channels of embedded audio.

    b. 2-channel line / microphone level analog balanced (XLRs). The microphone inputs
       include a menu selectable +48V phantom power and a programmable gain,
       0, and10 to 65 dB gain in one dB steps.

39. **What about AES audio I/O?**

    Flash XDR does not include AES audio I/O, simply because most field production uses
    analog audio.

    However, using an external box, AES audio can be embedded into the HD-SDI stream.

40. **How does Flash XDR handle the audio from the Canon XL H1?**

    Balanced stereo line / microphone level analog audio is fed directly into Flash XDR, then
    balanced stereo line-level outputs from Flash XDR are fed into the XL H1 XLR inputs.

41. **How is the audio sampled?**

    The incoming analog audio is sampled at 24 bits per sample at 48,000 samples per
    second.

    Flash XDR utilizes a high-quality, low noise, fully differential audio design.

42. **How can I monitor the audio?**

    Flash XDR has two balanced analog audio output channels which are active during
    recording and playback sessions. These are output via a 5-Pin XLR Neutrik connector.

    We have available a 5-Pin XLR to two 3-Pin XLR pigtail cable.

    In a future release, audio level meters will be displayed on the LCD panel.

43. **Can the audio be delayed / advanced relative to the video?**

In a future release, the audio will be adjustable by up to +/- 4 frames relative to the video.

The granularity of the adjustment has not yet been determined.

44. **How is the audio written to the Flash card?**

Uncompressed 24 bit PCM, 2 channels.

In a future release, up to 8 channels will be supported.

45. **Can I record analog audio on channels 3-4 and embedded audio on channels 1-2?**

For technical reasons, this is not planned at this time.

46. **How is audio sent in the ASI stream?**

MPEG1 Layer II compressed to 384 Kilobits/second, stereo.

MPEG2 Compression

47. **Why was MPEG2 chosen?**

MPEG2 offers very good quality video at relatively low data-rates. It is widely supported by Non-Linear Editors.

At this time, we are only supporting Long-GOP mode.

In a future release we will also support I-Frame Only. Long-GOP gives a better much image for a given bit-rate, but I-Frame Only is better for quick editing.

In the future release, the Flash XDR will other both Long-GOP and I-Frame only recording modes, allowing the user to make trade-offs between recording efficiency and ease of editing.

Compared to JPEG2000, MPEG2 is substantially faster to decode (improved playback performance) and has been widely adopted for broadcast industry (ASI requires MPEG compression).

The MPEG2 hardware CODEC can provide much greater compression efficiency compared to strictly I-Frame based CODECs such as ProRes 422 or DNxHD CODEC. MPEG2 is also supported by a much wider range of NLE programs.

H.264 / AVC CODECS are not widely supported in NLE programs or by hardware manufacturers at this point in time.

48. **Does Flash XDR support DV or DVCProHD?**

No, Flash XDR only supports MPEG2 compression.

49. **How is the MPEG2 compression performed?**

Flash XDR utilizes a very high quality MPEG2 hardware CODEC module from Sony, which is capable of both 4:2:0 and 4:2:2 sampling, in both Long-GOP and I-Frame Only modes. Long-GOP mode is available for data-rates up to 100 Mbps, while I-Frame Only can support data-rates up to 160Mbps.

50. **Does Flash XDR really record at higher quality levels than HDCAM?**

Yes, HDCAM resizes 1080i video from 1920x1080 → 1440x1080 and then applies 3:1:1 sampling.

Flash XDR retains the full 1920x1080 raster and samples in 4:2:2.

Flash XDR also has a slightly higher compressed data-rate. See chart below.

HDCAM SR records at a higher quality level than the Flash XDR.

51. **How does the bit-rate compare with other formats?**

The table below summarizes the bit compression formats, sampling, quantization and bit-rates of the major formats.

HD Video Format Comparisons
(Approximate Increasing Quality)

Manufacturer	Sony, JVC, Canon	Panasonic	Sony	Sony	**Convergent Design**	Sony
Format	HDV	DvcPro HD	XDCAM HD	HDCAM	Flash XDR	HDCAM SR
Compression	MPEG2-GOP	DV	MPEG2-GOP	MPEG2-I	MPEG2-I	MPEG4-I
Sampling	4:2:0	4:2:2	4:2:0	3:1:1	4:2:2	4:2:2 / 4:4:4
Resolution - 1080	1440 x 1080	1440 x 1080	1440 x 1080	1440 x 1080	1920 x 1080	1920 x 1080
Resolution – 720	1280 x 720	960 x 720	1280 x 720	1280 x 720	1280 x 720	1280 x 720
Quantization	8-Bit	8-Bit	8-Bit	8-Bit	8-Bit	10-Bit
Max Data Rate (Mbps)	19.7-25	100	35	112 - 142	160	440

52. **What are the bit-rate options available on Flash XDR?**

Currently only 50 and 100 Mbps, Long-GOP, 4:2:2 sampling are supported.

In a future release, 100 and 160 Mbps, I-Frame, 4:2:2 sampling will be supported.

Also, in a future release, the following will be supported for data streaming only, not for recording to the CompactFlash cards:

18, 19, 19.7, 25 and 35 Mbps in Long-GOP, 4:2:0 sampling

53. **Do the Flash XDR clips work natively in FCP, Avid or Adobe?**

The Flash XDR currently supports Apple Quicktime and a Convergent Design's own format called CDV.

Both the 50 Mbps and 100 Mbps Quicktime formats can be edited in the latest versions of Final Cut Pro, version 6.0.4 or higher. This is seamless; just drop the files onto the timeline and start editing.

The CDV format may be used in the Flash XDR, selectable by a menu option. The CDV format is very handy when the files are to be recorded by the Flash XDR, and then played back, through the HD-SDI, into the HD-SDI input, using proper adapters, into various Non-Linear Editors (NLE's).

Using the above technique, the Flash XDR can be used with most any editor. For many, this is not an ideal situation, as the resulting uncompressed files are very large.

The preferred options are Quicktime and MXF.

In a future release, MXF will be supported. Convergent Design is currently acquiring a suite of different editing systems so that we can test the various NLE programs.

We currently have Final Cut Pro, Sony Vegas, and Avid. We will have Edius shortly.

Furthermore, some NLE's either directly or indirectly (through a translator program) support MXF, which will be, in a future release, one of the Compact Flash data-file format used by Flash XDR. Other programs support Quicktime.

54. **Can I transcode to ProRes 422, DNxHD or another CODEC?**

Yes, the transcode can either be performed in software or by placing Flash XDR in playback and capturing via an HD-SDI input.

55. **Can I see some sample footage?**

    Please see our website for sample footage and image comparisons:

    www.convergent-design.com.

ASI

56. **What is ASI and what advantages does it offer?**

    In a future release, the Flash XDR will also fully support Asynchronous serial interface (ASI) for both input and output, as an extra cost option.

    ASI is a streaming data format for the broadcast industry. ASI has many applications, but is commonly used by mobile units to get their video and audio signal back to the station via microwave.

    ASI is MPEG2 mapped onto an SDI transport stream. ASI allows direct connection to satellite uplink as well as internet connectivity via an ASI → IP converter.

57. **What video and audio formats are supported for ASI?**

    ASI uses long-GOP 4:2:0 MPEG2 video and MPEG1 Layer II compressed stereo audio.

58. **What ASI stream parameters can be programmed?**

    The complete list is still being defined, but video, audio PMT, and PCR PIDs, as well as the PAT TS ID are planned. These parameters can be saved and recalled for later use.

Recording and Playback

59. **Can the box be set up for time-lapse (interval) recording?**

Yes. Flash XDR has an internal clock / calendar, so interval recording over a wide range of time increments will be available. This is accomplished by recording the desired frames using I-Frame Only option. Long-GOP is not suitable for time-lapse recording.

60. **What are the record trigger (start / stop) options?**

Record start / stop can be triggered by one of 3 selectable events:

1. Incrementing time-code (Usually requires Record Run timecode)
2. Record Start/Stop button on the Flash XDR box
3. External Remote Control (GPI trigger)

61. **Do you have protection against accidentally pressing the "Stop" button during a recording?**

Yes, the Stop button must be continuously held down for three seconds before the recording will be stopped.

62. **Can I trigger multiple cameras to start simultaneously?**

Yes, the simplest approach is to connect the GPI triggers from all cameras together to one master start/stop switch.

63. **Does Flash XDR support fast-forward, rewind, and single-step playback control?**

Initially, Flash XDR will only support normal playback.

These advanced modes may be supported in the future.

Compact Flash

64. **What is Compact Flash?**

Compact Flash (CF) is an industry standard memory card widely used in digital cameras.

CF utilizes solid-state NAND Flash memory, which are extremely rugged (no moving parts), consume very little power, and are very reliable.

At this time the Convergent Design has fully qualified two CompactFlash cards:

Transcend 32 GB 133x   approximately $77
Transcend 16 GB 300x   approximately $149

As other promising cards come on the market, we will full test them for compatibly with the Flash XDR. We are expecting 64 GB cards soon.

65. **Can I write the same data to two cards simultaneously (for auto back-up)?**

This is planned for a future release. This will allow you to create two original masters simultaneously.

The same data will be written to two cards simultaneously.

Writing the video/audio to two cards simultaneously creates an automatic backup; so one card could then be safely stored away, while the second card is handed off to the editor.

66. **How many Compact Flash card slots on Flash XDR?**

Flash XDR supports four CF cards. Users can enjoy very long record times, as the Flash XDR will automatically close one clip and start another on the next available CompactFlash card. This is seamless across both record and playback.

67. **Can I hot-swap the cards and continue recording indefinitely?**

At this time no. This is planned for a future release.

68. **When the CF card in one slot is full, will the Flash XDR automatically switch to a card in the next slot? How do I know it's time to remove the first card?**

    Flash XDR automatically closes the clip (file) and switches to the next CF card when the current card is filled to capacity.

    There are LEDs, next to each CompactFlash card slot, which indicate the current status of the card (idle, writing data to the card, ready to eject, etc).

    The overall remaining capacity of the card will be displayed on the LCD panel.

69. **What are typical read / write speeds and capacities for Compact Flash cards?**

    The read / write speeds of CF is based on the old Compact Disk standard of 1X = 150 KB/s. So, a 133X CF card is rated at 133 x 150 KB/s ≈ 20 MB/s or 160 Mb/s.

    Note: At this time only two CompactFlash cards are qualified for use in the Flash XDR:

    Transcend 32 GB 133x for bit-rates up to and including 100 Mbps.

    Transcend 16 GB 300x for all current bit-rates.

    Two notes of caution on CF cards:

    a. There have been some reports of fake CF cards on the market, so be very careful about your source for the cards.

    b. Some card manufacturers' rate their cards based on the read speed only.

       For example, one CF card manufacturer boasts 300X performance, which sounds great until you check the fine print and find it's 300X read and 133X write. .

70. **Does Compact Flash have sufficient read/write bandwidth for HD video?**

    Yes, CF has sufficient bandwidth and storage capacity for MPEG2 HD Video, provided you use the recommended CompactFlash cards, cards which we have thoroughly tested and fully qualified.

71. **Why Compact Flash instead of SxS cards?**

CompactFlash cards have been proven in professional applications, as have the SxS cards.

Our testing showed, that with the proper CompactFlash cards, we could provide safe, convenient, reliable, and highly reusable memory for the Flash XDR.

In addition, the CompactFlash cards, even the highest quality, highest speed versions are significantly less expensive than SxS cards.

The Transcend cards come with a lifetime warranty.

Finally, low-cost high-performance Firewire-800 readers are widely available for CF cards.

Four of the Lexar UDMA (US $60) readers can be daisy chained using Firewire-800, providing access to 128 GB (four 32-GB cards) of video data for editing or download.

72. **What advantages /disadvantages does Compact Flash offer over disk or tape-based storage systems?**

Compact Flash is based on solid-state NAND FLASH memory. There are no moving parts, tapes to stretch or break, no dropouts and they are completely silent. Here's a brief comparison of Compact Flash vs hard-disk drive:

	Compact Flash	Hard Disk Drive
Mechanism	Solid State NAND FLASH	Magnetic Rotating Platters
Weight	15 g	100 g
MTBF	> 1 million hours	< 300 K Hours
Shock Resistance	2000G / 2ms	300G /2ms
Operating Temp	-25 to 85 C	5 to 55 C
Acoustics (Bels)	0	2.7
Power	0.2W	2W

Compared to tape based systems, Compact Flash offers true random access to any data file or video frame. The transfer time to your NLE is typically 2X to 6X faster (file transfer vs 1:1 video capture).

Also, Compact Flash does not exhibit dropouts like tape and has an extremely long shelf life.

73. **How fast can I transfer the files to my NLE?**

For 50 Mbps recordings, the files will transfer approximately 6 times faster than real-time. Stated differently, the transfer will take $1/6^{th}$ the amount of time it takes to record, playback, or capture using tape.

For 100 Mbps recordings, the files will transfer approximately 3 times faster than real-time. Stated differently, the transfer will take $1/3^{rd}$ the amount of time it takes to record, playback, or capture using tape.

> The above assumes that a Lexar Firewire 800 card reader is used with the Transcend 133x card or the Transcend 300x card. The "read speeds" for both of these CompactFlash cards is approximately 300x.

> The transfer times will be longer with a USB 2.0 card reader.

74. **Can the Nexto device be used for temporary storage of the recorded clips?**

Yes, our testing has shown that the Nexto DI eXtreme ND2700 device is an excellent device for the temporary storage of your clips. The 500 GB Nexto is great for off-loading your footage onto another medium, especially when a laptop or other computer is not present.

The clips on a CompactFlash card can be transferred to the Nexto's hard drive at approximately 25 megabytes per second (MBps).

When extracting the clips to another computer, via the built-in ESATA interface, the transfer speed is approximately 60 MBps.

We recommend purchasing the extra battery with the Nexto, as the internal rechargeable battery power is limited to a transfer of approximately 80 Gigabytes.

Caution: It is risky, at any point in your production, to have your footage on any single device.

For important shoots, we highly recommend that you always have your footage on at least two devices, be they CompactFlash cards, hard drives, Nexto devices, or any other medium. This advice still applies, no matter how reliable the storage media is.

If you want to transfer your footage to the Nexto, then erase your CompactFlash cards immediately, we recommend first transferring the footage to two separate Nexto devices.

75. **What is your recommended CompactFlash card reader?**

Sandisk Extreme Firewire 800/400 CompactFlash card reader or the
Lexar UDMA Firewire-800 (each approximately US $60).

The SanDisk FireWire 800/400 reader can also operate at the older 400 (1394a) rate.
The FireWire 400 read performance is similar to USB 2.0.

76. **Is Compact Flash reliable enough for professional video?**

Compact Flash has been widely adopted by professional photographers who demand the same reliability and data integrity as professional videographers.

CF card manufacturers typically specify 100,000 write cycles and 10,000 card insertion / removals (well beyond typical expected usage).

The Transcend 16 GB 300x card is rated at over 1,000,000+ write cycles, which is higher than the rating for the Transcend 32 GB 133x card. In either case, there are more write cycles than one can expect to reach.

Each write cycle applies to individual memory cells, not to the device as a whole. Thus one can easily record well over 50,000 events.

The operating temperature range for the Transcend cards is -25 to 85 degrees C, with excellent shock and vibration characteristics. Transcend offers a limited lifetime warranty.

With an all solid-state construction, and mean time between failure of greater than 1,000,000 hours (Transcend figures), Compact Flash is arguably one of the most reliable mediums available to store your video.

77. **How can I be sure that the CF card I just loaded is working properly?**

Flash XDR will automatically read the card ID parameters to ensure it has sufficient I/O performance to match the current selected bit-rate.

Additionally, a small file will be written to and read from the card to ensure basic operation each time the card is inserted into the Flash XDR.

78. **Can the CF cards be formatted on the Flash XDR?**

Yes, up to four CompactFlash cards can be formatted simultaneously.

The formatting process takes under 15 seconds for four 32 GB cards.

Be certain to remove all cards with footage before formatting any cards, as the formatting process formats all cards in the Flash XDR.

79. **In what file format is the MPEG2 data stored on Compact Flash?**

In the current release, you have the option of Quicktime format, or Convergent Design's own "CDV" format, which is similar to MXF, but without all of the header information.

In a future release, we will support MXF, OP-1A, in which the video and audio information is interleaved (same as Sony XDCAM HD)

80. **Can I record to the internal tape on the camera (for backup) and to Compact Flash simultaneously?**

Yes, but as this is a camera function, it depends on the camera.

81. **Can I erase the last clip?**

This is planned for a future release, but we are not guarantying that this feature will be released. If we find that this feature is workable, without causing negative side effects, we will release it.

82. **Will Convergent Design publish a list of qualified cards?**

As mentioned above, we have qualified the Transcend 133x and 300x cards, and the Lexar 300x UDMA CompactFlash cards.

Other promising cards will be qualified when they are released and pass our internal tests.

Transcend is a high quality card, with great performance, a good warranty, and a low price. The CompactFlash card market is very dynamic. We intend to test other promising cards in the future.

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HDV Support

83. **Can I stream HDV to a Sony M25U / JVC HD50 deck?**

In a planned future release, you will be able to connect the Flash XDR and stream HDV video to a Sony M25U deck (1080i only), or to a JVC HD50 deck (720p only), or to other HDV recording devices.

When streaming data out the IEEE 1394a (4-pin) port, the data can not be recorded to the Flash XDR's CompactFlash cards at the same time.

84. **Can I stream HDV to a Firestore / Citidisk?**

We plan to test and qualify these HDV storage devices in the future.

85. **Will the box stream to an external HDV device and record to Compact Flash simultaneously?**

No.

As an alternative, in a future release, you will be able to create two original masters simultaneously, thus creating an automatic backup.

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Time-Code / Real-Time Clock

86. **Does Flash XDR have an internal clock?**

   Yes, a high-precision real-time clock is included.

87. **Does Flash XDR have a time-code input?**

   Yes.

   Multiple boxes can be jam-synced to a master time-code generator.

   Also, using a low cost BNC "T" (or "Tee") connector, one timecode source can be easily feed to multiple Flash XDR units. The Flash XDR is specifically designed for this purpose.

88. **Can Flash XDR act as a time-code generator?**

   In a future release, we plan on generating timecode internally. Thus the Flash XDR will be capable of acting as a Master time-code generator.

File Transfer / NLE Support

89. **How do I transfer the video to my NLE for editing?**

   You can use a USB 2.0 or FireWire-800 reader to transfer the video files directly to your NLE. See Compact Flash section for more details.

90. **Can I import the captured video directly into Final Cut Pro, Avid, Adobe or Vegas?**

   Yes. Quicktime files can be imported directly into Final Cut Pro, version 6.0.4 or higher.

   In a future release, the MXF files will be supported by multiple Non-Linear Editors (NLE's).

User Interface / Updates / Control

91. **How is the box configured?**

   In a future release, we plan on supporting User profiles.

92. **What about metadata?**

   Flash XDR will support metadata in a future release. The complete list is still under development, but information such as time-of-day, location, shoot number, event, DP, etc are planned.

93. **How are field updates performed?**

New firmware can be downloaded from our website, unzipped, and written to a Compact Flash card.

The card can be inserted into Flash XDR and the firmware updated using a built-in utility.

It is imperative, that during this update process, that the Flash XDR not lose power. We recommend on using a fully charged battery during the update process.

The XDR Quick Start Guide, and the XDR Update, provided with each release documents this procedure.

Mechanical / Power / Environmental

94. **How long does it take to boot up Flash XDR?**

Under 5 seconds.

95. **What is the size and weight of Flash XDR?**

The Flash XDR is camera mountable: 8" (L) x 6" (W) x 2.5"(D), (203 x 152 x 63 mm), and weight approximately 2.7 lbs (1.3 kg)

96. **Does Flash XDR have an internal fan?**

No, Flash XDR utilizes substantial internal heat sinks to dissipate the heat to the aluminum case. Fans were deemed too noisy and an added reliability issue.

97. **What material is used for the cabinet?**

Aluminum is the primary material, since it is both lightweight and has excellent heat conduction characteristics.

98. **Can I mount Flash XDR to the back of my camcorder?**

We are working on several different mounting options with IDX and Anton Bauer batteries. We plan to offer numerous mounting options for many popular cameras.

99. **Does Flash XDR include a battery or any power supply?**

Flash XDR has a standard 4-pin XLR power jack for battery power, or for DC power supplied from the supplied 110/220V AC power supply.

The Flash XDR does not include a battery.

100. **Can I mount Flash XDR to an Anton Bauer / IDX battery?**

Yes, we have a mounting plate, on the bottom of the Flash XDR with screw holes for various plates.

Note: We are currently working with Anton Bauer so we can supply an Anton Bauer Gold Mount that will attach directly to the bottom of the Flash XDR.

We have recently learned that our pre-drilled holes in the bottom plate do not match up with certain Gold Mounts. We are working to correct this situation.

101. **How much power does Flash XDR consume?**

The Flash XDR consumes from 14 to 16 watts, depending on which functions are active.

External audio, when in use, consumes more power, as does phantom power.

102. **Can Flash XDR operate off the 7.4V Lithium Ion battery on my camcorder?**

No. An external battery is generally required.

If your camera has a power output, in the appropriate voltage range and current capability, we may be able to supply a power cord.

For small 7.4 V Lithium Ion camera batteries, it is not appropriate to use one battery to power your camera and the Flash XDR.

The Flash XDR is designed to operate off a wide range of power supply voltages, +6.0 to +20 VDC.

103. **Can Flash XDR be used in high vibration applications (race cars, airplanes, helicopters, etc)?**

The Flash XDR has been field proven in a limited number of these applications.

104. **What is the operational temperature range?**

    The exact temperature range is not currently known. We have internal temperature monitoring in the Flash XDR.

    We are trying to maximize this range as we expect Flash XDR will be used in the Artic as well many of the hottest areas of the world.

    The Transcend cards are rated for -25 to 85 degrees C, but we'll need more testing before we know if Flash XDR can operate over this range (or wider).

    However, we do expect Flash XDR to operate over a much wider range than tape or disk-drive based systems.

105. **What humidity levels are acceptable?**

    The exact humidity range is not currently known.

    We do request that reasonable precautions be taken when going from warm environments to very cold environments and the reverse. In general, one should take precautions by conditioning the Flash XDR when condensation is likely.

    However, we expect the acceptable humidity range will be much greater than tape-based systems.

106. **What happens if I lose power during a record session?**

    The last sub-clip will be corrupted and thus will be lost.

    During a long recording session, the overall recording is broken down into files (sub-clips) under 4 Gigabytes each. Only the last sub-clip will be corrupted.

107. **Does Flash XDR have internal temperature sensors?**

    Yes, if the temperature approaches a maximum operating level, then a warning message will be displayed on the LCD screen. If the temperature exceeds safe levels, the box will automatically close open files and power down to prevent damage.

General Questions

108. **What's included in the shipping package?**

The Flash XDR, a 110/220V universal power supply, USB CompactFlash card reader, an Important Points document and the Quickstart Guide are included.

109. **What is the availability of Flash XDR?**

The initial Flash XDR units were shipped in August of 2008.

As of this writing, we have units in-stock for immediate delivery, but this varies on a day by day basis, according to the number of orders we receive on each day.

We are currently manufacturing the Flash XDR in volume and shipping on a daily basis.

110. **How long is the warranty?**

24-Months limited warranty, or 24 minutes of video, whichever comes first.

Yes, we do have a sense of humor; the Flash XDR has a 24-month warranty.

Congratulations for reading our Frequently Asked Questions.

We hope you now have a good understanding of the capabilities of the Flash XDR.

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Glossary of Terms

ASI – Asynchronous Serial Interface, a standard for transmitting compressed MPEG2 data over the physical 270 Mbps SD-SDI coax cable.

Compact Flash – A small non-volatile memory device, currently available in a wide range of capacities and speeds, from numerous manufacturers.

GPI – General Purpose Interface.

HD-SDI – High Definition Serial Device Interface, a professional interface for video and audio interchange between professional equipment.

Interframe Compression – A compression scheme that uses information from multiple frames to achieve a high degree of compression, as there frequently is a high degree of similarity among sequential frames. Long-GOP, Long Group of Pictures, is an example of Interframe Compression.

Intraframe Compression (I-Frame Only) – A compression scheme in which each individual frame can stand alone, no data from other frames is necessary to decompress the frame.

HDV – A Tape based video and audio standard that uses Long-GOP compression. HDV can use the same tape, and tape drive mechanism developed for MiniDV. There are two major types of HDV: HDV-1, mainly JVC; and HDV-2, Mainly Canon, Sony, etc.

File Based Workflow -Tapeless Workflow – With Tapeless workflow, the audio and video is recorded as computer files.

These may be a single large file, or commonly many smaller files which make up a single recording. The audio and video is recorded as data in a computer like system and can be easily transferred to another computer faster than real-time.

One of the side benefits of tapeless workflow is that the recording medium is generally free of tape type dropouts.

Tape based workflow is limited by the sequential nature of tape, which must be positioned to the desired location before recording, playback, or capture.

Mbps – Megabits per second, a measure of speed

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Metadata – Extra data added to a recording, user or camera supplied. Examples could include date, time, camera number, camera position, scene/take numbers, etc.

NAND Flash – A specific type of non-volatile memory, used for long term data storage. This is typically the type of memory used in CompactFlash cards.

Non-Volatile – A category of memory in which the data is preserved when the power is off.