nanoFlash™
HD/SD Portable Recorder/Player
User Manual

For Firmware Release Version 1.6.29,   29 – June - 2010

Convergent Design

Table of Contents

Welcome and Thank You

Congratulations on selecting Convergent Design HD/SD Portable Recorder, nanoFlash. It is manufactured in the USA and shipped from the factory in the most secure packaging available. Please inspect the contents of the package. In the unlikely event that you find any shipping damage or missing components, please contact us.

Shipping Contents

Your nanoFlash shipping container should come packaged with the following:
1. nanoFlash recorder/player
2. Power Supply (100 to 240 VAC Input; 12V DC @ 1.25A Output)
3. USB Reader (for CompactFlash cards)

nanoFlash Overview

nanoFlash is a revolutionary new solid-state HD/SD recorder/player that uniquely utilizes the very high-quality Sony XDCAM 4:2:2 CODEC to write native Quicktime, MXF (video/audio/time-code), or MPG files onto affordable Compact Flash media. nanoFlash breaks new ground in terms of weight, power, size, ruggedness and ease of use. We are confident you will agree that the video quality is indistinguishable from uncompressed (at 100+ Mbps Long-GOP or 180+ Mbps I-Frame modes).

Product Support Contacts

Please read the user manual before contacting support.
1. Support E-Mail: "cd" -- "support" -- "at" -- "convergent-design" -- ".com"
2. Sales E-Mail: "cd" -- "sales" -- "at" -- "convergent-design" -- ".com"
3. Main Telephone: ++(720) 221-3861
4. Sales Telephone: ++ (719) 930-1376
5. Web Site: http://www.convergent-design.com
6. Forum: http://www.dvinfo.net/forum/convergent-design-nanoflash/

The Essentials (Quickstart), CompactFlash Cards

1. **Please Register your nanoFlash** by sending an e-mail to "cd" "support" "at" "convergent-design.com" with your name and the serial number off the right side of the nanoFlash. You will get automatic notice of firmware updates and service bulletins.
2. *Use only the qualified Compact Flash cards for the specified bit rates:*
   1. **Lexar 32/16/8 Gbyte 300x or 600x CF cards** *up to 280 Mbps*
   2. ***Transcend 400x 64/32/16 Gbyte CF cards** *up to 180-220 Mbps* **(ver1.5.55)**
   3. **Transcend 600x 32/16 Gbyte CF cards** *up to 280 Mbps* **(ver1.6.29)**
   4. ***Delkin UDMA 64/32/16 Gbyte CF cards** *up to 180-220 Mbps*
   5. **SanDisk Extreme 32 Gbyte CF cards** *up to 280 Mbps*
   6. **SanDisk Extreme Pro 64/32 Gbyte CF cards** *up to 280 Mbps*
      *Please note that card performance may vary from card to card. The bit rate will automatically be reduced during record for under-performing cards. (ver1.5.31)
3. Check your nanoFlash firmware version in System->About. See http://www.convergent-design.com for any updates. See page 20 for details on how to update the firmware. **Use a reliable power source during updates! Run a test after every firmware update, capture 1 minute of audio / video and play back out of the nanoFlash and on a computer.**
4. ** Note: This user manual is subject to change with each firmware update. Please see the most up-to-date nanoFlash user manual at:
   http://www.convergent-design.com/downloads/nanoFlash/nanoFlash_Manual.pdf
5. Connect a power source to the 4-pin Hirose on the nanoFlash.
6. Set the time and date (page 11)
7. Set the video input (System->Vid Src) as SDI or HDMI
8. Set the file format to Quicktime (MAC) or MXF (PC) (page 11)
9. Select the Record Trigger Source (page 11)
10. Select the Time-code source and set the initial value (if needed) (page 11)
11. Set the compressed bit-rate and choose I-Frame or Long-GOP CODEC (page 13)
12. Set the PSF In and PSF Out options, depending on your video format (page 13)
13. Set up the audio source, line/microphone input and gain (page 15)
14. Connect a valid SDI or HDMI source and time-code source (as appropriate). Connect the SDI or HDMI output to a compatible monitor. You should see valid video output.
15. Insert a qualified Compact Flash card into CF slot #1 (manufacturer's logo side up) and format (System->Format). Warning: all files will be erased off the card!
16. Ensure that your camera's SDI / HDMI output has any status display information turned off, so that this is not recorded to the CF cards.
17. For a simple test, do a 60-second recording and playback from nanoFlash.
18. **Please back up your data. There is a very slight risk of damage to CF cards upon insertion and usage with a USB or Firewire CF reader attached to a computer. As a precaution to protect your video, please consider backing up your data *as a 1ˢᵗ step after recording, and before inserting CF card into a CF reader attached to a computer*. We suggest using the portable Nexto Drive for this purpose (see accessories, page 21). Nexto drives provide confirmation after a successful copy – please note this to confirm the data copy**.
19. Insert CompactFlash card with recorded video in USB or Firewire CF reader for transfer to your NLE system for review / editing. (See other viewing / NLE options, Addendum F, G).
20. Charge your batteries or use a reliable AC source to prevent loss of data.
21. **Do not remove or insert Compact Flash cards while in record or playback.**
22. Enjoy some fantastic video/audio!

Input / Output Connections

Left Side Connections


Bottom Connectors

Left Side Connections

- **CompactFlash Slots (2):** Insert (at least 1) solid-state Compact Flash card(s) face up for record and playback.

- **CompactFlash LEDs:** Compact Flash Status:
  > No Light means no card inserted or the card has not been properly recognized.
  > Solid green means card is OK and ready for use.
  > Flashing Red means card is being written to during a record session (do not remove card).
  > Flashing green means card is being read from during playback (do not remove card).
  > Solid Red means the card is full (may be removed).

Bottom Connections

- **Status:** General indicator.
    > Solid Green: cards are inserted and ready to record.
    > Solid Red: recording.

- **Remote Control / LTC input:** 10-pin hirose locking connector for external trigger and tally light control. See System->Trigger for uses, or pg 27 for pin-out. Also can be used for Linear Timecode input. Tally light flashes once a second during normal record, twice a second during record with less than 5 minutes total record time remaining, 4 times per second with less than 1 minute total record time remaining. (ver1.5.31)

- **Power:** 4-pin Hirose locking connector power input.

- **On/Off (Red):** power button. Note that units shipped after October 2009 have the power button disabled or removed, so that the nanoFlash always powers on when power is applied, and only powers off when power is removed. See System->Power Saving to help reduce power consumption.

- **HDMI In**: non-locking mini-HDMI input (HD/SD) .

- **HDMI Out**: non-locking mini-HDMI output (HD only) . Ideally, to use, do not connect this port until after the unit has been powered on. (ver1.5.31)

- **SDI/ASI In:** SDI or ASI video source for recording. (HD/SD)

- **SDI/ASI Out:** SDI re-clocked stream with embedded audio and time code, or ASI re-clocked output stream. Note there is no delay in the SDI output in E to E mode (Video->E to E) from a live source. If E to E is turned "off", there is a bit of delay (4 frames). (HD/SD)

- **Analog Audio In**: 3.5 mm consumer line level or microphone 2 channel stereo input.

- **Headphone Out**: 3.5 mm headphone audio output. There is no delay in Headphone Out from a live source.   Also, headphone out provides 2 rising beeps at record start, 2 falling beeps at record stop. (ver1.5.31)

Front Panel
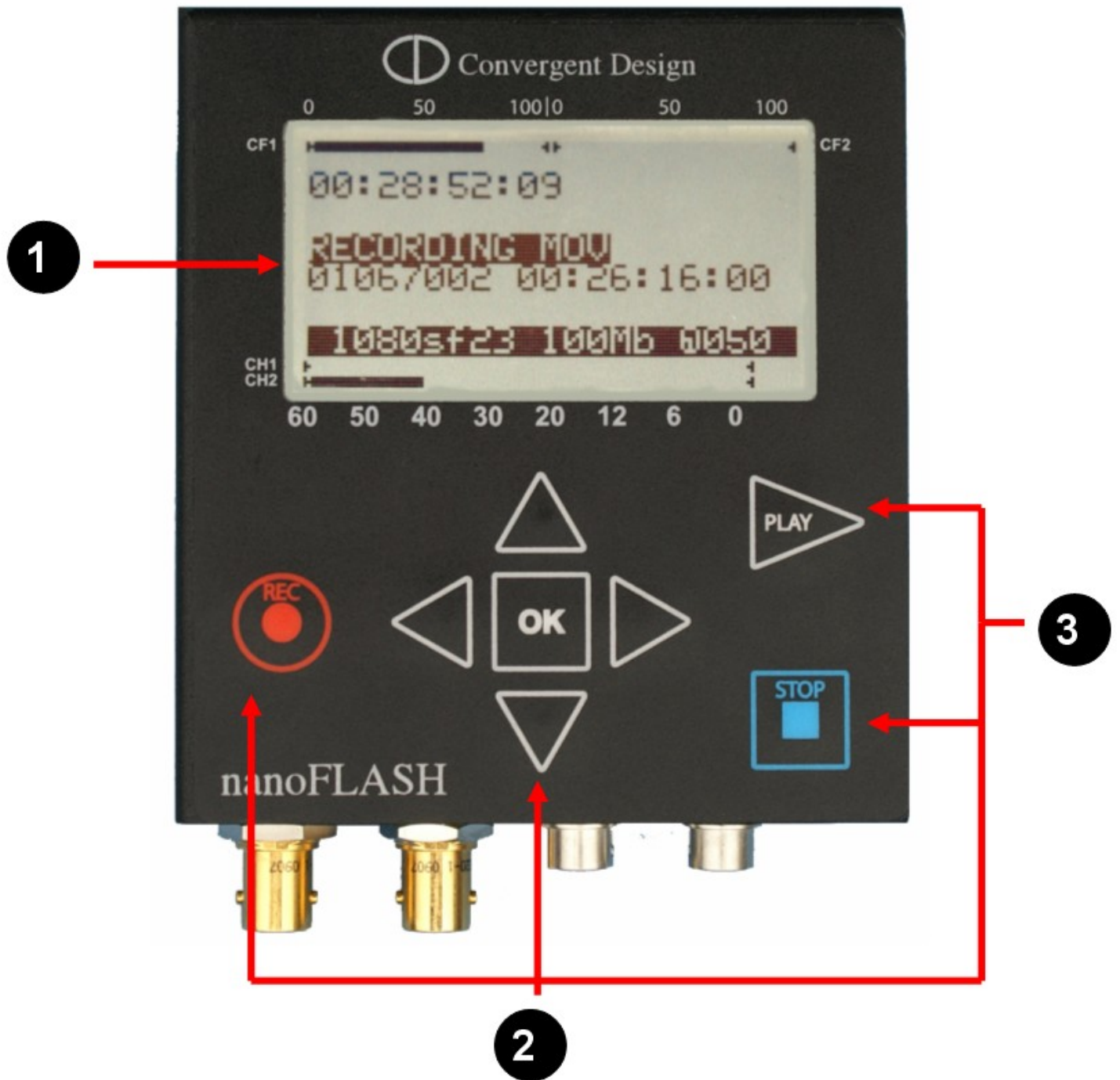
Front Panel Details

1. **LCD Display**: Shows the status of the nanoFlash in the various operating modes. Also displays warning and errors in correspondence with flashing LED error lights. (see p. 10)

2. **Navigation Buttons**: Allows the user to navigate the menu. (see p. 11)

3. **Record, Stop, Play Buttons**: <REC>, <STOP>, and <PLAY> buttons for control of respective modes. The nanoFlash, when powered on, is in a ready mode. Record or Playback can be activated by pressing the appropriate buttons, as described below:

   REC: Press <REC> to start recording a clip to the card. (This assumes that System->Record Trigger is set to "Record Button" - other Trigger modes will disable the Front Panel buttons. See Record Trigger menu description for more details.)
   The unit records to CF slot one til full and then proceeds to continue recording to card slot 2.
   During Record, the led next to the actively recording CF card slot will flash red, and a rotating hourglass will appear on the lcd screen.
   Pressing the Record button during a record session will cause the current file to be closed and a new clip started. This can be useful for marking points in the video.

   STOP: Press <Stop> button to terminate record or playback mode. Also used to cancel a card format.
   Note: the STOP button is immediately responsive upon being pressed. To prevent accidentally stopping a record, see alternative record trigger options (timecode trigger, remote trigger)(page 11), which de-activate the REC and STOP buttons.

   PLAY: Press once to enter Playback mode. By default, Play will start with the last recorded clip. Other features:
   i. Use the left and right arrow keys to advance / backup to the next / previous file. You can hold down these keys to move very quickly from file to file.
   ii.During Play, press Play button to pause, press again to resume play.
   iii.   During Play, hold Play button 1 second for fast forward 2x, hold 2 seconds for fast forward 4x, 3 seconds for 6x (see progress bar on menu for fast forward level). Fast forward performance will depend on card speed and bit rate – see Play setup for more details. Press Play again to return to Play/Pause.
   iv.   Set the Loop option in the main menu off or on to loop play.

4. **Other button functions**:
   Delete Last Clip: Press and hold the Stop key, then press left arrow key, to delete last clip off of currently inserted card which was last recorded to. (ver1.5.31)

LCD Screen Layout

The LCD screen will change in appearance depending on the operating mode. This is the essential layout information:
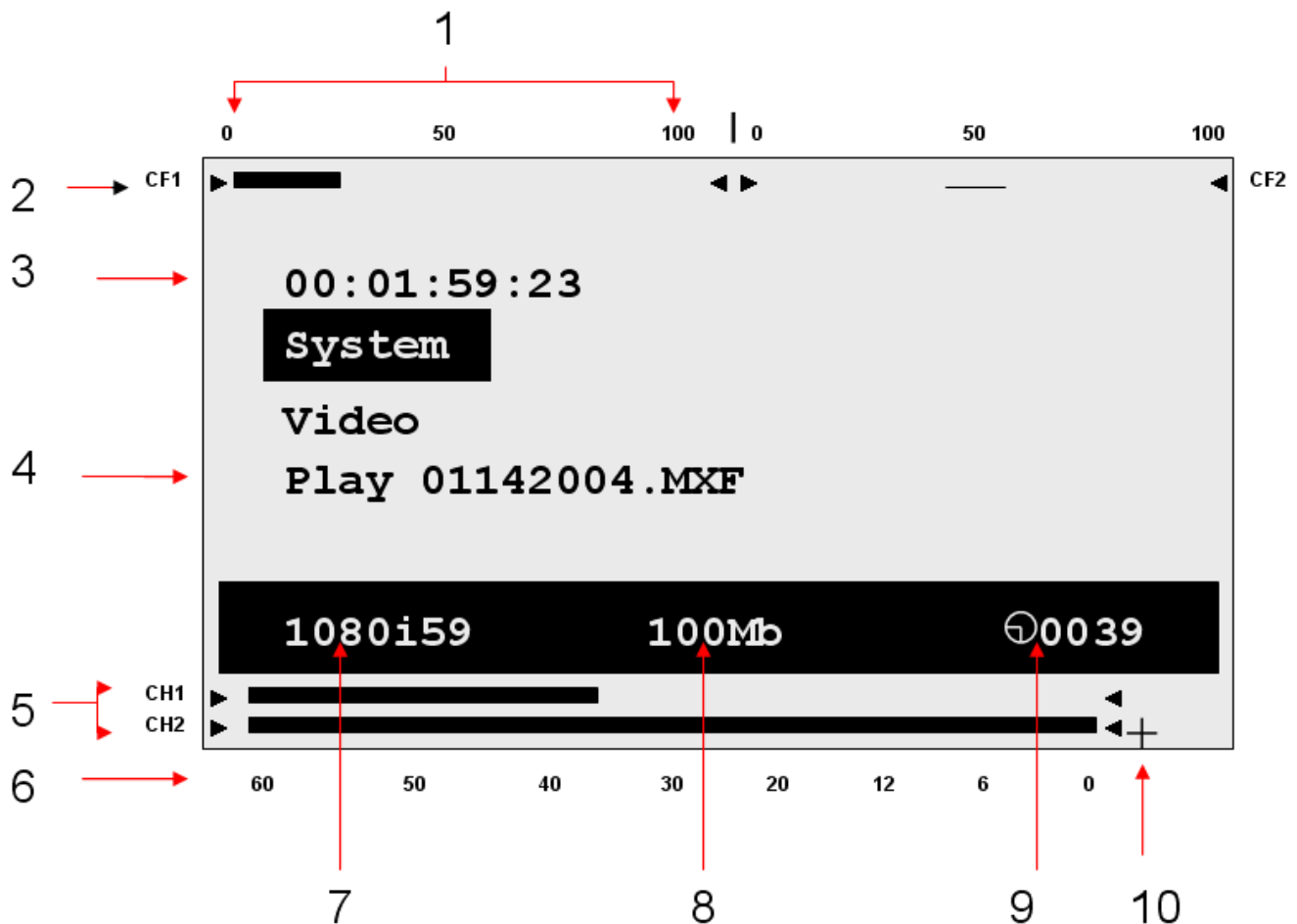
1. Compact Flash Card levels: 0 to 100% full
2. Individual Compact Flash Level Indicators
3. Time-code Display
4. Play Menu Line with current file name displayed
5. Audio Channels 1-2 Level Indicators
6. Audio level markers (-60dB to 0dB)
7. Current Video Source Format
8. Recording (compressed) bit-rate
9. Total remaining record time (minutes) across all cards
10. Audio Over-Range Indicator
11. Not shown: Record Ready Indicator |>

Menu Navigation

Use the up, down, left, right and the center (enter) buttons to navigate through the various menus on the nanoFlash. Press the right arrow button to go to the next menu level and the left arrow to ascend up to the previous menu. Use the up/down arrows to modify a selection and (very important) press the center (enter) button to apply the selection, or else your selection will not be entered.
Below is a detailed explanation of each of the menus:

System

Time (HH:MM:SS / Temperature)
Sets time in Hours: Minutes: Seconds (24 hour format only) and displays internal temperature.

Date (YYYY MM DD)
Sets the current Year Month Day
(File Format option was formerly here, please see "File=" below to set file format. (ver1.6.18)

Max File Size (100% to 20%)
Maximum file size to use during long records which will create multiple files. Default is 100% (~ 3.5 Gbytes each file). As an example, 50% setting will yield max 1.75 Gbyte files.
Not available at the bit rate of 180 Mbit or above – at this rate the file size is 100%.
In time-lapse mode, the available range is expanded, 100% to 2%.
Note that a single card can hold a maximum of about 500 files. (ver1.5.126)

File= (1st 2 digits: Unit ID, 01 to 99 or AA to ZZ) (next 3 digits: clip number, 000 to 999) (last field: File Format .MOV / .MXF / .MPG) (ver1.5.249) (ver1.6.18)
Allows the user to control file naming, to a limited degree. The unit ID is used in the first two digits of the file name. (See File Naming Conventions, pg 16.) If your shoot involves multiple nanoFlash units, this can be used to set unique IDs for each unit.
The middle 3 digits are the clip number, which can also be set. Take care not to create duplicately named files on a single CF card.
Last field sets the file format: QT (Quicktime / .mov file), MXF (.mxf file format), or MPG. See Software Accessories and NLE Compatibility for playing / editing files.

Pre-Record Buffer (for MXF, QT file formats only)
Enables 4 to 7 seconds of internal storage of video before a record session starts. When the record session is started, recording will begin 4 to 7 seconds in the past. (Pre-buffer = 7 seconds up to 80 Mbit bit rate, 4 seconds @ 100, 140 Mbit bit rate)
> When turning on the Pre-Record Buffer or changing inputs, allow at least a few seconds for the internal buffer to fill before beginning a record. Also, allow a few seconds after stopping record for remaining data to be flushed out, if record session does not immediately end.
> If this mode is used in combination with "Timecode (TC)" or "TC > Last TC" Trigger (System->Trigger), the timecodes of the camera's recording and nanoFlash's recording may not match, as the nanoFlash begins recording in the past (before the camera's record-run timecode was running), causing a potential timecode mismatch of a few seconds. Also, with "TC > Last TC" trigger used with Pre-buffer, nanoFlash will be delayed 1 to 8 seconds to start recording for similar reasons. (ver1.6.29)
> Pre-Record buffer can only be used with ***bit rates up to and including 140 Mbit***.

> An additional 1.5 Watts of power will be consumed while the nanoFlash is in idle (non-recording) mode when using pre-record buffer. There will be no effect on power consumption during record.
> Turn off Pre-Record Buffer when playing back off the CF cards out of the nanoFlash.
> Do not use Pre-Record Buffer in combination with Time-Lapse, Crank, 720p60->30/50->25, or 3:2 Pulldown Removal.(ver1.5.126)

Trigger

Selects the record/ stop trigger source (or Play source, for the "Remote Play" option). Note that unless otherwise mentioned, each trigger is ***mutually exclusive*** (i.e. only one trigger is active at a time). This means that, for example, in timecode trigger mode the Record and Stop buttons will be disabled – only the behavior of the incoming timecode will start and stop a record. The only exception to this is the "Remote & Record" option, below.

Remote Play – Unit will play (but not record). Formatting is also disabled. Use Play /Stop buttons to control play (see Play menu, below). Remote tally also becomes a Play mechanism: start (1 press) / pause (1 press) / stop (double press). (In this mode, Remote tally can also be used for Cue Play (in the main menu).) (ver1.5.31)

Timecode – Recording will start when incrementing time-code is detected from the HD-SDI input and will stop recording when time-code is not incrementing. This is particularly useful when wanting to trigger a record session from the camera's record. To use Timecode Trigger, in addition to this setting System->Trigger->Timecode :
> Set System->Timecode->Source to "Embedded" or "LTC" as appropriate.
> Set the camera's timecode to "Record Run".
> Most cameras require a tape or solid-state media within the camera to enable the record function. Also, note that when the media in your camera becomes full, the time-code will cease to increment and the nanoFlash will stop recording.
> Time-code increment may also take place on some cameras when playing back from the camera's media, or inserting or ejecting a tape or powering on/off the camera, causing the recording of very short unexpected clips in these cases. Use "TC > Last TC", below, to help minimize unexpected recordings.

TC > Last TC – Same as Timecode Trigger, above, except that the nanoFlash will only trigger to record if the incoming timecode is greater than the ending timecode of the last recorded clip. This helps to minimize unexpected recordings, for example when inserting or removing media in the camera, or playing back video off of the camera's internal media. Be aware, however, that if the camera's timecode is re-set to a smaller value, the nanoFlash may not trigger from the timecode unless the nanoFlash is then turned off and back on. (ver1.5.126)

Remote switch – Recording is triggered by a remote control tally switch. In this mode, the keypad is disabled during record. Also, the remote switch must be held down approximately 1 second to stop the recording. (See remote switch pin-out, or a cable can be purchased from Convergent Design.)

Remote level / hold – Again via remote control, except that Record is initiated by pressing and holding Remote Tally, Record is stopped by releasing Remote Tally.

Record button – Recording is started by pressing the Record Button on the unit, and stopped by pressing the Stop button.

Remote & Record button – Remote switch and Record button can be used to start / stop Record. (ver1.5.126)

Power up – Recording is automatically started by applying power and video source, Record is stopped by removing video source. Do not use in combination with Pre-Record Buffer (System->PreBuffer), Crank, 720p60->30/50->25, 3:2 Pulldown Removal, or Time-Lapse. (ver1.5.126)

Duration HH:MM:SS If enabled, each record session will last *only for the specified HH:MM:SS.* (ver1.5.31)

Timecode
Sets the time-code source, and (for internally generated timecode only) the drop-frame flag and the initial value (seed)

> **Source (Embedded, Internal, LTC)**
> 1. **Embedded** – timecode is extracted from HD/SD-SDI stream from the source
> 2. **Internal** – timecode is generated internally in the nanoFlash
> 3. **LTC** – timecode from external LTC input
> 4. **Jam Sync –** to use: provide momentary timecode jam sync (via the LTC input port) while unit is in idle mode with a valid video input source. If video source is lost or nanoFlash is placed in Play mode, timecode must be re-sync'ed after video source returns or nanoFlash returns to idle mode.
>
> **Dropframe** – [ ] enable (checked) if drop-frame time-code should be generated (only valid for internal time-code generation and 59.94/29.97 frame rates)
>
> **Seed** – initial value for *internal time-code only*:
> 1. **Set 01:00:05:19 –** Allows you to manually set the initial time code. Use the left and right arrows to navigate to the various settings (HH:MM:SS:FF) and then use the up and down arrows to increase / decrease the values.
> 2. **Time of day** – Use time of day time code, based on the System->Time setting.
> 3. **Reset** – set the initial time-code to 00:00:00:00.

Source: Selects the video input source – choose between SDI and HDMI.

Format: Format (erase) all inserted CF cards. The 1st 7 characters of the CF card Volume name are preserved. If the last 4 characters of the Volume are digits, they will be incremented automatically (to help indicate card usage). (ver1.5.31)

Power Saving

> **Auto Sleep   (temporarily disabled due to occasional difficulty waking up properly)** (1.6.29)
> If this feature is turned on, the nanoFlash will drop to low power mode after 1 minute of inactivity if no SDI input is present. (This feature does not apply for HDMI input.)
> When the unit is in low power mode, power consumption drops to 0.3 watts, and the lcd screen is active with "Low power mode" message displayed.
> In low power mode, any of the following events will bring the unit back to full power:
>> > SDI input resumes.
>> > Any of the keys on the keypad are pressed.
>> > A remote tally, if attached, is pressed.
>
> **Auto LCD Off**
> This turns off the LCD backlight after 15 seconds of inactivity. The LCD backlight consumes about 0.2 watts of power, so this provides slight power saving.

Create Settings.txt: Primarily a tech support diagnostic tool, creates a file settings.txt with all current settings. **Only use this option with a formatted, blank CF card inserted**. (ver1.5.31)

Restore Defaults: Restores factory default settings.
About: Displays the current firmware version number.

Video

Bit Rate

This option allows the user to set the compressed bit-rate of the video being recorded. Note that most NLE's place a 50 Mbit label on high bit rate files, but nevertheless accept the high bit rate files natively. The actual bit rate of a file can be seen in Quicktime Player by using Window->Movie Inspector, which has a bit rate field. For MXF, the bit rate can be seen in the XDCAM Viewer (an MXF Player, see link in Software Accessories), Product / Version fields (under View->Metadata). (ver1.5.31)

> **HD Bit Rate (Quicktime, MXF)**
> 1. *18/35 Mbps = Full-Raster (1920x1080/1280x720) 4:2:0 Long-GOP (XDCAM EX)
> 2. *18/35 Mbps = (1440x1080/1280x720) 4:2:0 Long-GOP (XDCAM HD)
> 3. 50/(80 ver1.5.31)/100/140/180 Mbps = Full-Raster (1920x1080/1280x720) 4:2:2 Long-GOP (XDCAM 4:2:2) (100 Mbps and above = Master Quality)
> 4. 100/140/180/220/280 Mbps = Full-Raster (1920x1080/1280x720) 4:2:2 I-Frame (XDCAM 4:2:2) (180 Mbps and above = Master Quality)
>
> **SD Bit Rate (Quicktime, MXF)**
> 1. for Standard Def: 50, (40, 30 ver1.5.31)Mbit IMX 4:2:2 (720x486/720x576)
>
> *** 18/35 Mbit recording depends on 35 Mbit 1080 Width setting (below) (ver1.5.31) .**
> **HD Bit Rate (MPG)**
> 1. 19/25/35 Mbps (1920x1080/1280x720) 4:2:0 Long-GOP
>
> **SD Bit Rate (MPG)**
> 1. 5/9 Mbps 4:2:0 Long-GOP

CODEC (Long GOP / I-Frame)

This option selects the XDCAM 422 CODEC format. Long GOP supports the bit rates at 18, 35, 50, 100, 140, and 180 Mbps. I-Frame only allows recording at 100, 140, 180, 220, and 280 Mbps. The nanoFlash utilizes the high quality Sony XDCAM 4:2:2 CODEC for video compression. The data rates of 100 Mbit or greater Long GOP and 180 Mbit or greater I-Frame are generally considered to be Master Quality video. In brief, long-GOP codec compresses 12 or 15 frames at a time, sharing the information between the frames, resulting in greater efficiency (in part by throwing out duplicate information), especially at bit rates of 100 Mbit and below. I-Frame codec compresses each frame separately. *The highest quality video recording from nanoFlash is 280 Mbit I-Frame.*

Record PSF->Progressive   [ ]

Turn this option "On" to record PSF input video or progressive input video as progressive. Turn "Off" to record PSF input video or interlaced video as interlaced.

Play Progressive->PSF   [ ]

Turn this option "on" to play 1080p progressive video off of a CF card as PSF video to the video outputs. (**Note: some SDI monitors only accept 1080PSF video, not progressive. In this case, turn this option "On".**)
Turn "off" to play 1080p progressive video as 1080p. (**Note: HDMI monitors do not support 1080psf23.98 . In this case turn this option "Off".)**

Remove 3:2 Pulldown (for SDI or HDMI sources)

Preserves 1080p2398 frame rate from a 1080p2398 source which is outputting as 1080i59.94 with 3:2 pulldown by removing the pulldown, such as Canon cameras in 24F mode or other

cameras in 24p mode which output with a pulldown (1080i60). Also works with 720p60 sources with pulldown (to 720p24) (ver1.5.31). The bit rate selected applies to the video *after* pulldown, meaning, for example, @ 280 Mbit setting the recorded bit rate will be the full 280 Mbits / second. Audio is preserved in this mode.
> Only use this option if the video source does indeed contain a pulldown.
> Do not use in combination with Pre-Record Buffer (System->PreBuffer), Crank, 720p60->30/50->25, or Time-Lapse. (ver1.5.126)

SD Aspect Ratio
For Standard Definition Video input only: select the pixel aspect ratio (16:9 or 4:3). This setting needs to match the camera's aspect ratio setting for SD recording.

E to E Direct (SDI Output loop-through only)
Sets the SDI loop-through output to the exact same format as the incoming video format (such as psf). This is particularly useful for looping through a PSF input. However, in E to E mode, only embedded video/audio/timecode are looped to the output (not analog audio, nor LTC/internal timecode). (**Note: some SDI monitors only accept 1080PSF video, not progressive. In this case, set E to E "On" to loop out PSF from a PSF input.**)

Time-Lapse
Records individual video frames (as I-Frame only) based on a set time interval (Hours:Minutes:Seconds). Special points to consider:
> the hour glass on the lcd screen will only change on the selected time interval.
> when a time-lapse record is stopped, there may be a delay up to the selected time interval to close the clip. In addition, the clip will end with under a half second of regular speed footage, which will need to be edited out.
> Use a reliable power source so as not to lose power and lose footage.
> Time-Lapse mode can support all bit rates (up to 280 Mbit) during record on approved CF cards (including slower CF cards), due to the lower data rate; however, not all CF cards can play back high bit rate recordings.
> Time-lapse is always I-frame only recording, audio is not preserved in this mode.
> Time-lapse is only supported in MXF and Quicktime file formats.
> System->Max File Size has an expanded range of 100% to 2% in time-lapse mode.
> At end of a time-lapse record, there may be a few extraneous video frames in the closing file.
> A minimum of 15 frames should be recorded to complete a successful record.
> Do not use time-lapse mode in combination with Pre-Record Buffer (System->PreBuffer), Crank, 720p60->30/50->25, or 3:2 Pulldown Removal. (ver1.5.126)

Crank [ ]   [Recorded Frame Rate]   [Crank Frame Rate]   (ver1.5.126)
Allows frame rate overcrank / undercrank to provide slow motion / fast motion effects. The recorded format corresponds to the incoming video format – for example, if 720p60 is the incoming format, and recorded rate is set to 24, the recorded format will be 720p24. In this example, if the crank rate is set to 60 then this provides a 2.5x slow motion effect.
> **Recorded Rate:** 24, 25, 30, 50, or 60. *Can not exceed incoming video frame rate*.
> **Crank Rate:** Frames per second to preserve from the incoming video: 1 to 60. *Can not exceed incoming video frame rate.*
> Crank is *I-Frame only recording, minimum 50 Mbit,* and the audio is not for use in this mode, only video.
> In Crank mode, incoming 720p60 can only be used with 60, 30, or 24 recorded rates (and 1080p30 with 30 or 24 recorded rates) .

> Incoming 720p50 can only be used with 50 or 25 recorded rates (and 1080p25 with 25 only).
> Press right or left arrows during record to dynamically adjust crank rate.
> The recorded bit rate of cranked recording is reduced based on the ratio of the recorded frame rate to the incoming frame rate. For example, a 720p60 incoming signal @ 280 Mbit, with record rate of 24 (yielding 720p24 recording) will adjust the bit rate by a ratio of 24/60, giving a recorded bit rate of 112 Mbits /sec. This is necessary due to the way the nanoFlash's codec handles cranking.
> 720p24 / 25 / 30 can not be played out of the nanoFlash at this time.
> For best results, set your camera to the full frame rate. For example, for cranking in 720p PAL set the camera to 720p50 (not 720p25), for cranking in 720p NTSC set the camera to 720p60 (not 720p30 nor 720p24).
> Do not use Crank mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, 720p60->30/50->25, or 3:2 Pulldown Removal.

720p60->30, 50->25   (ver1.5.126)
Cuts the frame rate in half for incoming 720p60 or 720p50 signals by throwing out every other frame. Useful, for example, with cameras with a 720p30 or 720p25 mode which then double the frame rate of the camera's SDI output. The nanoFlash bit rate in this mode is applied to the reduced frame rate. For example, @ 280 Mbit from a 720p50 source reduced to 720p25, the recorded bit rate will be the full 280 Mbit. Audio is preserved in this mode.
> Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, Crank, or 3:2 Pulldown Removal.

HDMI Rx Color (HDMI input only)
Choose between Full color and Legalized color. Most HDMI based cameras are Full color, computers and game boxes are examples of Legalized HDMI video sources.

35 Mbit 1080 Width
Choices are: 1920 (for 35 Mbit 1920x1080   4:2:0 XDCAM EX) or 1440 (for 35 Mbit 1440x1080   4:2:0 XDCAM HD). This setting only applies when Video->Bit Rate->CF HD Rate is set to 35 Mbit. Bit rates of 50 Mbit and above are always 1920x1080 4:2:2 (for 1080 sources). (ver1.5.31)

Record Tally (1.5.249)
Places a red bar on SDI output during record, as a record indicator. Also requires Video->E to E Direct to be activated.

Audio

Source
1. **Embedded**: Audio is accepted over SDI (0,2,4, or 8 channels, based on setting below).
2. **Analog**: Audio is accepted over 3.5 mm analog audio input. This can be either consumer line level or mic (1 channel balanced or 2 channel unbalanced stereo).

Analog Settings
1. **Mix In:** Choose between Mono Balanced and Stereo Unbalanced Analog Audio Input.
2. **Preamp In**: For analog audio input: set to 0 for consumer line level, set to greater than 0 for mic level input. (No phantom power for microphones.)
3. **Gain In**: Adjusts gain for analog audio input. This may also be adjusted during record, using the up and down arrow keys.
4. **Gain Out**:: Adjusts gain for 3.5 mm headphone output.

Audio Channels Recorded (HD only): 0, 2, 4, or 8 channels. SD recording is always 2 channel. Note that NLE support for 0 channel audio is limited. See NLE section. This option is for SDI input, HDMI input / output only supports 2 channels audio. (ver1.5.31)

Audio Channels Monitoring: Choose audio channels to monitor on headphone output: 1 and 2, 3 and 4, 5 and 6, or 7 and 8. (ver1.5.126)

Play (filename) (HDMI Out : HD only, SDI Out : HD or SD)

Select the file to begin play.
Note: one can mix and match file formats / bit rates / video formats on the same card for recording, but for playing back all files need to be the same video format and file format.

During play, the following navigation tools are available: (MXF, QT files only)
> File Skipping: press the right key to jump to the next file, press the left key to jump to the previous file. Press up key to jump to next clip, press down key to jump to previous clip. (ver1.5.126) File skipping will cause a very brief distortion of the video output. File skipping is also available with MPG files.
> Pause: press Play (during play or fast forward) to Pause. Press Play again to resume play.
> Fast Forward: press and hold Play for ½ second for 2x, 1 ½ seconds for 4x, 2 ½ seconds for 6x. A fast forward rate bar is displayed on the lcd screeen. Maximum fast forward rate depends on bit rate and card type. In general:
>> FF to 50 Mbit bit rate: max rate = 6x (SanDisk Extreme 3: 4x)
>> FF 100 Mbit: max rate = 4x   (SanDisk Extreme, Extreme 3: 2x)
>> FF 140 / 180 Mbit: max rate = 2x (SanDisk Extreme 3: 1x)
>> FF 220 / 280 Mbit: 1x only
Fast forward beyond a tolerable rate can result in distortion, play may need to be re-started.
> Pressing Record button during Play will place the unit back into Record mode (provided that the Record button is selected as the Record trigger). (ver1.6.29)

To play files recorded on the nanoFlash which are not on their originally recorded CF cards:
>> Format a compatible CF card on the nanoFlash. Remove and take card to computer.

> Copy the desired files into the }CLP{ folder on the card. All files must be the same video format / file format.

Note: from a Pc, you can copy from Windows Explorer. From a Mac, use the free converter /copier tool to make a non-fragmented copy of files to the card, as Mac's have more of a tendency to fragment files. See Software Accessories for a link to the tool.

> On the nanoFlash, set the trigger (System->Trigger) to "Remote Play" - during record, externally copied files are ignored by the nanoFlash and overwritten, so this prevents records from happening and overwriting your copied files.

> Insert the CF card back to nanoFlash with copied files, in the Play menu, choose the file to begin playing.

> Press "Play" - the clips will play through, and then loop back to the beginning and repeat indefinitely til stopped (unless Loop option is disabled, below).

NanoFlash can also play XDCAM EX or XDCAM 422 Quicktime files exported from Final Cut Pro, by running the files through our converter tool to make a nanoFlash compatible MXF copy of the files. See converter tool in Software Accessories for details.

Note: Play of 720p24 / 25 / 30 is not supported at this time. (ver1.5.31)

Loop Play:
For Play out of the nanoFlash, select "Loop All" for loop play or "Off" for single play to end of last inserted CF card.

Cue Play:
Allows playing from a cued frame (based on entered timecode), via Remote Tally only. Press Remote Tally once to cue to selected timecode + 1 in the play file, press Remote Tally again to continue playing from cued point. Additionally, set System->Trigger to "Remote Play". (ver1.5.31)

Loop Record:
In this mode, the nanoFlash will record continuously to card 1, then to card 2, then back to card 1 (overwriting previous contents), then back to card 2 (again overwriting previous contents), etc til stopped. The current card is completely erased before any files are written. **Do not use Loop Record mode unless willing to have older material overwritten by newer material in a record session**. "Loop Record" will appear on the screen in this mode. (ver1.5.31)

Compact Flash Capacity and Usage

Formatting CompactFlash cards
Choose System->Format to format all inserted CF cards. Note: all data will be deleted during a format operation!

Important Operating Notes
- Use only the **qualified Compact Flash Cards**: see pg 4 for a complete list.
- The Compact Flash card levels (0 to 100% full) are displayed on the upper line of the LCD. The total remaining capacity across all cards (in minutes) is shown in the lower right corner.
- NEVER remove a card while nanoFlash is in record or playback modes
- Video formats (1080p / 1080i etc), bit rates, and file formats (.mov and .mxf) may be mixed on the same card. However, cards with mixed formats will not play back properly from the nanoFlash. The files will all play from a computer.
- All CF cards must be formatted in nanoFlash before usage. After all files have been copied to another drive for safe keeping, the CF cards can be reused by performing a format operation on the nanoFlash. All data will be erased during a format operation.
- Never force the card into the CompactFlash slot. Cocking the card or forcing it in could damage the contact pins and render the slot useless.
- Typical record capacities are shown below. Note that the record capacity does not depend on the video format, only the selected bit-rate and the capacity of the CF card(s)

Compact Flash Record Capacity (Minutes)

	50 Mbps	100 Mbps	180 Mbps	280 Mbps
1 16 GB Card	36	18	10	7
1 32 GB Card	75	37	20	14
1 64 GB Card	150	75	40	28
2 32 GB Cards	150	75	40	28
2 64 GB Cards	300	150	80	56

File Naming Convention

The video/audio file naming convention is shown below. The file name follows an 8.3 format, where 8 characters identify the file name and 3 characters the extension (.mov, .mxf, .mpg)

02007001.MOV

Unit ID Number

Clip Number

File Number
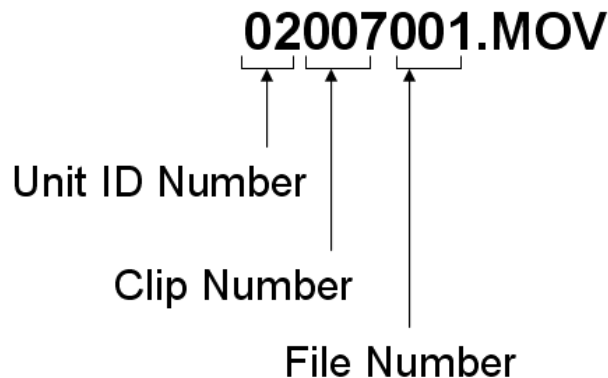
1. **Unit ID Number:** Unit ID is assigned under the System Menu, and is used to identify multiple nanoFlash units if needed. The default is 01.
2. **Clip Number:** The clip number is incremented every time a recording is started. If the Unit ID number is incremented, the clip number resets to 001.
3. **File Number:** File number is incremented whenever the file being recorded for a particular clip reaches the max file size (~3.5GB). It is reset to 001 if the clip number or Unit ID is incremented. During a record, the clip number and Unit ID will remain constant as the file number increments. This will go across several card slots if the record time is long enough.
4. **File Name Extension:** the possible extensions are .mov (Quicktime), .mxf (MXF files), .mpg .

Firmware Update Procedure

Download the update zip file from our website, http://www.convergent-design.com/
Unzip,   copy the   }UPD{   folder along with its underlying contents onto a qualified CompactFlash card (via a CompactFlash firewire or usb reader with the card inserted and the reader attached to computer), at the top level of the card.
Place update card into either CF slot of your nanoFlash.
Wait for screen prompt, you will be directed to press OK to initiate the update.
While updating, the unit can not lose power.
Also, do not remove the update card during the update process.
Wait for "Update succeeded" prompt (about 5 minutes). When this occurs, unplug the unit, remove the update card, and your unit is ready for operation.
To re-use the update card for capturing video: remove the update directory on a computer and re-format the card on the nanoFlash.

Hardware Accessories

(available via 3rd party, unless otherwise noted)

A wide range of accessories discussed below are available at http://www.nanoflash.net/, or through your dealer. (ver1.5.31)

Compact Flash Cards (Use only the qualified Compact Flash cards at specified bit rates)*:*
see pg 4 for qualified cards. CF cards are widely available on the internet.

Compact Flash Readers
1. Lexar FW-800
2. Delkin
3. PCI Express CF Readers

Remote Control / LTC Timecode
- Remote tally light button cable for 10-pin hirose   connector (available from Convergent Design), for starting / stopping record in "Remote" trigger mode. Please note that when starting record via the remote, the nanoFlash generally reacts right away. When stopping record, you must hold down the remote button for 3 to 5 seconds before the record stop is initiated, to help prevent accidentally stopping the record.
- A cable is also available to allow 10-pin hirose to bnc connector LTC timecode input.
- A combination cable can be made for both remote control and LTC Timecode into the 10-pin hirose connector.

Hard Disk Drive Backup Devices
1. NexTo Drive: 500 GB portable CF drive for intermediary offloading of footage – holds 15 32GB CF cards' worth of data. Connects to computer via USB or ESATA for transfers. **Please consider using such a drive as a backup storage device before inserting CF card with recorded video into a CF reader attached to a computer.**

http://www.nextodi.co.kr/en/product/eXtreme_en.html
http://www.cvc.de/index.asp?haupt=http://www.cvc.de/shop/asp/ArtikelDetails_sql_2.asp?Nummer=8851&Sprache=D

Batteries for powering nanoFlash
1) 2 cell lithium ion with attached 4 pin hirose connector and charger (available from Convergent Design), provides about 3 hours recording time
2) Swit : for EX1 / EX3 and nanoFlash (requires a d-tap converter cable to 4 pin Hirose power connector, available from Convergent Design)
http://dolgin.net/Battery_Charger_TC400-EX.htm#SWITS8U62
3) Anton Bauer, IDX (with d-tap to 4-pin hirose)
4) nanoFlash can also be powered from professional camera batteries with 2-pin hirose connector (with 4-pin to 2-pin hirose)

Battery Cables available from Convergent Design
1. 4-pin hirose to d-tap
2. 4-pin hirose to 2-pin hirose
3. 4-pin hirose to XLR

4. 4-pin hirose to flying leads (pigtails)

** Note: do not use nanoFlash custom cables with other devices, as the pin-out may be different and cause damage to other equipment.

Camera Mounts   (also see http://www.nanoflash.net/)
1. swivel shoe mounts: http://www.nebtek.com/

Portable Field Monitors (HDMI)
1. http://dolgin.net/HD_Field_Monitors.htm

Audio Adaptor Cable (for Canon XL-H1)

For Canon XL-H1, audio can be brought into the nanoFlash via the RCA analog audio outputs on the Canon to the 3.5 mm analog input on the nanoFlash, using an adaptor cable. Such cables are widely available. (For newer XL-H1-S, the audio can be passed to the nanoFlash via the SDI port.)

Operating Tips

1. **Never eject CompactFlash cards during record or playback**: The most critical error a user can cause is pulling out the CompactFlash card prematurely. The file structure needs special instructions from the microcontroller to properly close the files for them to be read properly. The use of the power button allows the nanoFlash to stop its current operations, close all files, and properly "shut down". Pulling out the card while recording will almost certainly cause total loss of the current file being recorded on the card. Cards that are being written to will have a solid red LED next to them, and instructions for the CompactFlash slots are silk-screened above them on the box.

2. **Be gentle with CF card insertion to CF card slots!** Jamming CF cards into the CF slot or applying excess pressure on either side of the CF card during insertion can cause bent pins inside of the CompactFlash slot. Bent CF slot pins will result in unit malfunction, and is not covered under warranty. Insert cards gently, applying modest pressure in the middle of the (edge of the) card during insertion.

3. **Only use recommended CompactFlash cards**: Use only the approved Compact Flash cards, otherwise your video footage may be corrupted.

4. **CF Card Monitoring**: Each card slot has a progress bar at the top of the LCD screen. The total record time remaining in minutes is always displayed on the status line on the right side.

5. **CF Card Erase/Formatting Procedure**: To format or erase all cards inserted into the unit, choose System->Format in the menu.

Troubleshooting Guide

1. **No Video Output over SDI / HDMI**
   1. Plug the HD-SDI or HDMI source directly into a monitor to make sure video is flowing
   2. If you are trying to connect to an SDI monitor and the output is HD-SDI, is the monitor HD capable or is it limited to SD?
   3. If the video input format is 1080psf, then nanoFlash will automatically output 1080p during loop-through and record. Check that your monitor will accept the 1080p format.
   4. If your video source is HDMI, make sure the source is not HDCP encrypted. The nanoFlash can not accept encrypted video. For example, DVD players appear to always encrypt the video out of the HDMI port, making the HDMI connection incompatible with the nanoFlash.

2. **No function of the nanoFlash**
   1. Check that the unit is powered on with the proper power adapter.
   2. Check the record trigger settings.

3. **An error message appears**
   1. Message **"Already Recording"** appears if the <RECORD> button is pressed twice.
   2. Message **"Already Playing"** appears if the <PLAY> button is pressed twice.

3. Message **"No space on card"** appears if the card (or cards) in the unit are full, or if the <RECORD> button is pressed and no cards are present.
4. Message **"No clips on card"** appears if the <PLAY> button is pressed on an empty card.
5. Message **"Already Stopping"** appears if the <STOP> button is pressed while the unit is closing the files after the first press of <STOP>.
6. Message **"NO SRC"** on the status line (no video source): there is no recognized video input.
7. "**Intermittent Src xx", "Lost Src", "Lost Source"** : video source was lost either temporarily or permanently at some point during record. Typically caused by either a faulty signal from the camera, a faulty cable, electro-static interference, or a faulty connector (on the nanoFlash or the video source). In the event of loss of source, the nanoFlash will close the current file, attempt to re-lock to the video signal, and then continue recording.
8. "**VCXO out of range"** : relates to specific hardware on nanoFlash that regulates SDI input. This may be indicative of a hardware failure; please contact technical support in the event of seeing this message. (ver1.6.18)
9. Message **"Unknown CFX"**, where X refers to slots 1-4, appears if a brand new card needs to be formatted and cannot be recorded to. This message can also occur if a CF card which has unrecognized external files copied onto the card is inserted to the nanoFlash.
10. Message **"Busy Playing"** appears if the <RECORD> or Tally control input is asserted while the unit is playing a clip. Stop playback first, in order to initiate a record session.
11. Message **"Lost Footage, Card Too Slow",** the CF card is not able to keep up with the video because its write speed is too slow (bit rate is too high for the card to handle). The bit rate will automatically be lowered and recording will continue.
12. Messages listed below are typically errors communicating with the CF cards, and are caused by one of the following conditions:
    > Multiple cards are inserted simultaneously or in rapid succession. Allow a bit of time between card insertions.
    > The card slot connector pins on your unit have been damaged, or are otherwise failing. You will likely need to return the unit for repair.
    > You've hot-swapped a CF card during record or playback. Hot-swapping is not yet supported. Insert and remove cards only when the unit is in idle mode.
    > The CF card has been corrupted. Try formatting the card on a computer. Otherwise you may need to return the card to the manufacturer.
    > The CF card is not supported. See p. 4 for a list of supported cards.

    If such a message appears, you will need to power cycle the unit.
    These messages are:
1. **ID CF Dev**
2. **ATA Idle:** ata command failed.
3. **SlotDpc:** deferred procedure call failed, no communication with card.
4. **DMA WR:** write error to card.
5. **DMA RD:** read error from card.
6. **Wrcache2000 :** This message can appear with new CF cards upon card insertion to the nanoFlash, and typically indicates an incompatible CF card.

Safety & ESD Precautions

1) Always connect the box to the specified power source: +6.5 to 19.5 V.
2) Keep the internal operating temperature between -20º C and 80º C. (The internal temperature is displayed in the System menu.)   External ambient temperature needs to be approximately within the range of -40º C and 60º C. Direct exposure to sunlight and an external cover can also effect internal operating temperature. Though not likely, overheating of the nanoFlash can potentially damage the unit, and is not covered under the warrantee. The nanoFlash will attempt to shut itself down if the internal temperature reaches 95º C.
3) Avoid operating the unit in an unprotected outdoor installation or wet areas. Do not expose this product to rain, sand, or snow. Avoid conditions which would cause moisture condensation on the outside cover, or moisture to get into the internal circuitry. Internal moisture can also potentially damage the unit, and is not covered under warrantee. ***The nanoFlash is not water proof.***
4) Do not drop the unit as this will cause significant damage to several components. Damage due to dropped units is not covered by the warranty.
5) There are no user serviceable components inside the box. Only a qualified technician should perform servicing of the unit. Opening the box may void the warranty.
6) Avoid the use of sharp objects near the box as they may scratch the LCD.
7) Clean only with water with a damp cloth.
8) CAUTION: Electrostatic Discharge (ESD) can damage components in this product. Although the unit has countermeasures to this hazard installed inside, it is always best to avoid damage by using extra caution when handling and inserting Compact Flash cards or the LCD screen and connectors. Always ground yourself (by touching an un-painted grounded metal object) prior to handling the unit.
9) Do not touch exposed connector pins and do not insert any metal objects in the connectors.
10) Ensure that all connections made to the box (including at the "other end of the cable") are made in ESD safe environments.
11) Always transport and store the box in the static protected bag included with the nanoFlash
12) Use caution when connecting the 4-pin Hirose power and 6-pin Hirose Remote/LTC ports, as the pin-outs for these types of connectors is not always standard across all toolsets. The pin-out that the nanoFlash uses is detailed on page 27, use this as a guide to ensure that proper connections are being made and damage is not done to your unit as a result of improper connections.

Specifications

HD/SD-SDI / HDMI I/O
Formats:
- 1920x1080i @ 60, 59.94, 50 Hz
- 1920x1080p @ 30, 29.97, 25, 24, 23.98 Hz
- 1920x1080psf, @ 30, 29.97, 25, 24, 23.98 Hz
- 1280x720p @ 60, 59.94, 50, (29.97, 25, 23.98 ver1.5.31) Hz
- 720x486 @ 29.97 Hz
- 720x576 @ 25 Hz

** Note: NLE support for true frame rates (exactly 60, 30, or 24 frames) and for 720p30/ 25/ 24 is limited – test your NLE for compatibility before using.

Standards:
- SMPTE 274M (1080i), 296M (720p)
- Audio: 24-bit, 48kHz, SMPTE 299M
- Time-Code: RP-188 1080i Lines: 14, 16, 577, 579

Linear Time Code
Standards:
- SMPTE RP-188 (HD)
- HD 1080i Lines: 14, 16, 577, 579

MPEG2 Profiles
- 422P@HL: 100/140/180/220 Mbps VBR 4:2:2 I-Frame Only, 1920x1080i/p, 1280x720p (XDCAM 4:2:2)
- 422P@HL: 50/80/100/140/180 Mbps VBR, 4:2:2 Long GOP, 1920x1080i/p, 1280x720p (XDCAM 4:2:2)
- MP@HL: 18/35 Mbps VBR, Long GOP 4:2:0 (XDCAM EX), 1920x1080i/p, 1280x720p
- MP@HL: 18/35 Mbps VBR, Long GOP 4:2:0 (XDCAM HD), 1440x1080i/p, 1280x720p (ver1.5.31)
- MP@HL: 19/25 Mbps VBR, 4:2:0, Long GOP, 1440x1080i (MPG files only)
- MP@ML: 50 Mbps CBR, 720x486/720x576, 4:2:2, I-Frame, IMX
- MP@ML: 5/9 Mbps VBR, 720x486/720x576, 4:2:0, Long-GOP (MPG files only)

Physical
Dimensions: 4.2" (107 mm) deep x 3.7" (94 mm) wide x 1.4" (36 mm) high

Connectors: 75Ω BNC, mini-HDMI, 4-pin hirose (power), 10-pin hirose (LTC/Remote), 3.5 mm analog audio in/out

Weight: 1 lb (400 grams)

Power   +6.5 to 19.5 VDC, 4-Pin Hirose connector, 6.5 W Active / 0.2 W standby

Temperature Range

- Internal Operating: -20° C to 80° C (See System menu for temperature readout).
- External Operating: approximately -40° C to 60° C (direct exposure to sunlight or placing the unit in a cover or enclosed environment can influence the internal temperature)
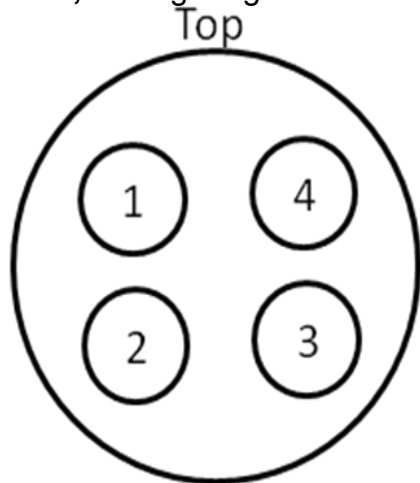
Humidity

- Operating Less than 80% (non-condensing)
- Storage: Less than 90% (non-condensing)

User Connector Pin-Outs

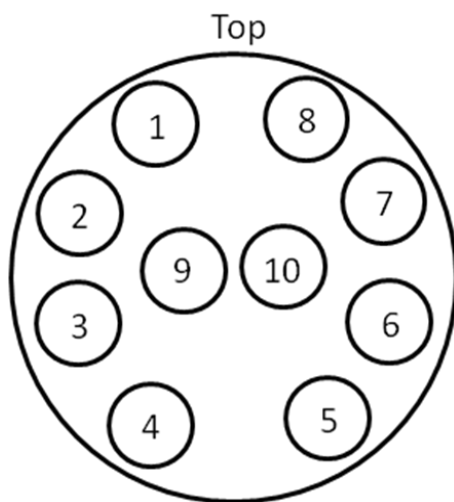## (looking into the connector on the nanoFlash, top-side up)

Power: 4-pin Hirose; Mating Plug = Hirose HR10A-7P-4S(73)

1. Power: +6.5~+20V, ~6.5W
2. Power: +6.5~+20V, ~6.5W
3. Ground
4. Ground

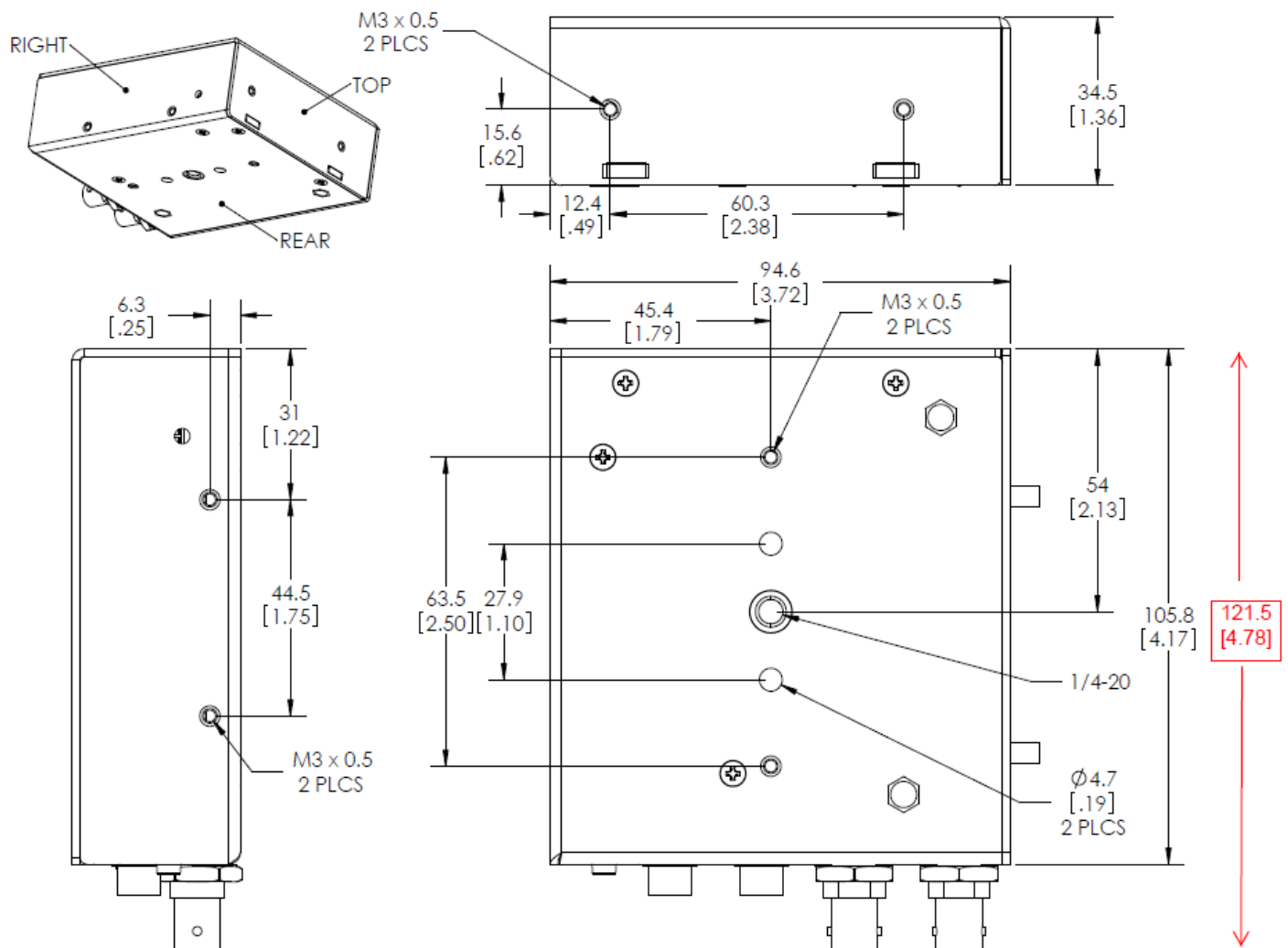**Remote Tally/LTC: 10-pin Hirose;** Mating Plug = Hirose HR10A-10P-10SC (73)

1. LTC In
2. 485D+ / 232RX
3. 485D- / 232TX
4. Record Start/ Stop
5. Tally Light
6. +5.0V
7. Ground
8. Ground
9, 10 not used

Mounting Plate Dimensions

(all dimensions shown in inches)

RMA and Warranty

Conditions of the Warranty

Convergent Design reserves the right to determine if a repair is subject to the warranty agreement. Damages caused by products being dropped or mishandled are not covered by this warranty. Also damage caused by over-voltage conditions on any of the I/O connectors is not covered by this warranty.

There are no user-serviceable parts inside the cabinet. Opening the cabinet voids the warranty. Transit damage caused by inadequate packaging also invalidates the warranty agreement. Please ship the unit in its original packaging, if possible.

All products are shipped prepaid to Convergent Design. For insurance reasons, Convergent Design cannot accept any product that is returned via U.S. Postal Service. Returns will be accepted from Federal Express, UPS, DHL, or other comparable freight carrier.

Convergent Design returns the product via a prepaid ground or 3-day delivery service within the continental United States, only if the product is under warranty and subsequently found to be faulty. The same policy applies for returns outside of the US, provided that *the unit was originally purchased through an authorized dealer from the host country or region, if such a dealer was available*.

Out-of-warranty repaired products are shipped at customer's expense. Turnaround time for warranty repairs normally will generally require 2 -4 business days (excluding shipping time), unless extraordinary fault conditions exist.

Labor and defects are covered for the warranty period of 2 years (for registered units), 1 year (for non-registered units), and 3 months (for units purchased to be used as rentals) from the original date of purchase. If you discover a defect, please refer to our Return Merchandise Policy below. The warranty covers all Convergent Design hardware defective in material or workmanship. During the warranty period, Convergent Design, at its option, will repair or replace product or product components, which in its opinion prove defective. Parts and components used in the repair process may be recycled or repaired, at Convergent Design's discretion. This warranty service will be performed at no charge to the registered owner, provided the product is shipped prepaid to Convergent Design. Convergent Design will return the repaired product via a like carrier, in the continental United States within 48 hours, shipping time excluded. Convergent Design reserves the right to determine whether a needed repair is subject to the warranty as per its provisions stated herein. Transit damage caused by inadequate packing violates the warranty. The warranty will be void if, in the opinion of Convergent Design, the product has been damaged through accident, misuse, misapplication, or as a result of service or modification performed not authorized in writing by Convergent Design.

WARNING: The following are **not** covered under warranty, and are items for which Convergent Design does not accept any responsibility:

1. Damage due to the use of a power supply other than that supplied with nanoFlash or un-certified batteries.
2. Damage due to overheating conditions. (The unit will attempt to shut down before damage can occur, in the event of overheating.)
3. Damage due to exposure to water.
4. Damage caused by dropping or otherwise roughly handling the unit.

5. Damage to the internal pins of the CF card slots, which can be caused by jamming the CF cards into the slot or applying excess pressure on either side of the CF card during insertion.

6. Damage to any of the connectors caused by rough handling. Note that the HDMI ports are non-locking ports. If using in a portable application, you will need to secure the connectors (such as with a tie-wrap) so as to have a solid connection and so as to not unduly stress the HDMI ports.

7. Any loss/ corruption of video/audio data recorded on the nanoFlash, or any loss/ corruption of data which is in any way associated with the nanoFlash.

Obtaining an RMA

It is our policy that all material and repair returns, whether in warranty or not, are only accepted if an RMA (Return Merchandise Authorization) number has been issued for the products being returned. Any unauthorized shipments may be returned, un-repaired at the customer's expense.

Damaged or defective Convergent Design products that are purchased from Convergent Design may be returned for replacement only. Convergent Design will not accept returns for any other reason. All eligible returns require a Return Merchandise Authorization (RMA) number. E-mail Convergent Design, Inc. at "cd" -- "support" -- "at" -- "convergent-design" -- ".com" to obtain an RMA number. Items must be returned within 10 days of receiving your RMA number. Returned product must be in its original packaging with all contents included and must have the RMA number clearly marked on the outside of the package.

RMA numbers and return address may be obtained from Technical Support.

Convergent Design, Inc.

4465 Northpark Drive

Suite 400

Colorado Springs, CO 80907

EMAIL: "cd" -- "support" -- "at" -- "convergent-design" -- ".com"

WEBSITE: http://www.convergent-design.com

VOICE: ++(720) 221-3861 or ++(866) 654-0080

Addendum A: Camera Notes (1.6.29)

The nanoFlash has been tested and used with a wide range of SDI and HDMI cameras.

A few cameras have special considerations for use with nanoFlash:

Canon XL-H1

For most cameras, the nanoFlash can accept the video, audio, and timecode over SDI (including the Canon XL-H1 S) . The original Canon XL-H1, however, does not place the audio and timecode on the SDI output. To record video, audio, and timecode from the camera:

> the video comes over SDI

> the audio comes from the RCA audio outputs through an adaptor cable (3rd party) to the 3.5 mm analog input of nanoFlash

> the timecode comes from the timecode out of camera to the Remote port on the nanoFlash through an LTC adaptor cable (sold separately).

Camera modes:

> "I" mode: interlaced, set nanoFlash Video->Record PSF as Progressive "Off" to record interlaced.

> "F1" mode: camera outputs PSF (progressive segmented frame, a progressive hybrid), set nanoFlash Video->Record PSF as Progressive "On" to record progressive.

> "F2" mode: camera outputs with pulldown, 1080p23.98 as 1080i59.94. Set Video->Remove 3:2 Pulldown "On" to remove pulldown and record as the original 1080p23.98 on nanoFlash.

Panasonic HDX-900 / Panasonic HPX-170

When camera is outputting *Standard Def video*, nanoFlash can not accept the timecode from the camera (camera outputs older style VITC timecode in Standard Def), only audio and video.

With HD recordings timecode is accepted, and all recording modes are compatible with nanoFlash.

See Addendum B "Special Recording Notes" for discussion of recording 720p at various frame rates.

Sony HDC-1500 CineFlex and other Sony cameras with duel SDI output

This camera has 2 SDI outputs, the nanoFlash is only compatible with port b output of the camera at this time. Also, the camera *can not* be set to 1080p50 nor 1080p60, these video formats require both SDI outputs simultaneously. The nanoFlash is compatible with all other formats from this camera.

JVC 700 / JVC 250

When outputting Standard Definition over SDI, the nanoFlash can not accept the signal at this time. All HD modes are compatible.

Panasonic Varicam F

At start record, this camera outputs a momentary blanking over SDI, which may cause nanoFlash to very briefly lose the input. This can cause a "Lost Source" message on nanoFlash screen to continuously appear, but will not effect the recording.

Other cameras / SDI sources / HDMI sources

No other known incompatibilities. *Please test camera with nanoFlash before using.*

Addendum B: Recording Notes (1.6.29)

The nanoFlash auto-detects the incoming video format, and displays this format in the lower left hand corner of the LCD screen. In many cases no special settings are required in the Video menu of nanoFlash. Please note that *with the exception of some of the cases listed below, the nanoFlash records the incoming video signal as is, the nanoFlash can not change the video format from HD to SD or from SD to HD or from 720 to 1080,* for example*.*

Some recording modes have special considerations:

Recording on nanoFlash from the camera's start / stop record

In most cases, the nanoFlash can be made to start / stop recording from the camera's start / stop mechanism. This is done by the timecode behavior of the SDI input (or LTC input) from the camera. In order to achieve this:

> Set camera's timecode to "Record Run".

> Make sure the camera has its own recording media, and that there is room on the camera's recording media (in this mode, nanoFlash *will only record while the camera is also recording*).

> Set nanoFlash System->Trigger to "Timecode (TC)" or "TC > Last TC".

> Set nanoFlash System->Timecode->Source to "Embedded" (over SDI) or "LTC" as appropriate.

> nanoFlash should then emulate the camera's record start / stop behavior. (In "TC > Last TC" mode, the camera's timecode must always be increasing from 1 record session to the next)

(Note that HDMI does not carry timecode, this method is not available with HDMI cameras.)

See pg 12 for more discussion of record trigger methods.

Recording with Pre-Buffer

The nanoFlash can begin recording 4 to 7 seconds in the past, once the record has started, using the option System->PreBuffer. See discussion on pg 11 for more details.

Recording Progressive 1080p

If you wish to record 1080 Progressive video:

> Make sure the camera is set to a 1080 progressive format.

> In the nanoFlash menu, set Video->Record PSF as Progressive "On". In many cases, cameras which are set internally to Progressive will output as PSF (progressive segmented frame, a progressive / interlaced hybrid). Setting this nanoFlash menu option will instruct the nanoFlash to record as true progressive.

720p is always recorded as progressive, regardless of the above menu setting.

Recording 1080p23.98

Many cameras, when set internally to 1080p23.98, output as 1080i59.94 (with a pulldown). To record on the nanoFlash as 1080p23.98 with the original 23.98 frames per second, set Video->Remove 3:2 Pulldown "On". The nanoFlash should display "1080pd23" (for pulldown) as the incoming format. The full bit rate quality is applied to the 23.98 frames per second.

A few cameras will actually output 1080p23.98, in which case the pulldown removal is not needed.

Note: Be sure to turn Video->Remove 3:2 Pulldown "Off" in the nanoFlash menu if the camera output does not contain a pulldown!

> Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, Crank, or 720p60/50 to 30/25.

Recording 720p23.98

Many cameras, such as the Panasonic HDX-900 and the Sony EX3, when set internally to 720p23.98, output as 720p59.94 (with a pulldown). To record on the nanoFlash as 720p23.98 with the original 23.98 frames per second, set Video->Remove 3:2 Pulldown "On". The nanoFlash should display "720pd23" (for pulldown) as the incoming format. The full bit rate quality is applied to the 23.98 frames per second.

Note: Be sure to turn Video->Remove 3:2 Pulldown "Off" in the nanoFlash menu if the camera output does not contain a pulldown!

> Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, Crank, or 720p60/50 to 30/25.

Recording 720p29.97 / 720p25

Many cameras, such as the Panasonic HDX-900 and the Sony EX3, when set internally to 720p29.97 or 720p25, output as 720p59.94 or 720p50 (by duplicating every frame). To record on the nanoFlash as 720p29.97 or 720p25 with the original 29.97 or 25 frames per second, set Video->720p60/50 to 720p30/25 "On". The nanoFlash should display "720h29" or "720h25" (for half-rate) as the incoming format. The full bit rate quality is applied to the 29.97 / 25 frames per second.

> Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, Crank, or 3:2 Pulldown Removal.

Recording OverCrank

Overcranking allows for slow motion effect. Overcranking on the nanoFlash is completely independent of any crank settings on the camera, if even set on the camera.

Here are some common examples for overcranking:

For *2.5x slow motion*, 720p24:

> set camera to 720p60

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 24

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 60

For *2x slow motion*, 720p24:

> set camera to 720p60

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 24

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 48

For *2x slow motion*, 720p25 (PAL):

> set camera to 720p50

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 25

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 50 (max allowed here)

In 1080 recording, Overcranking provides very little leverage as the maximum incoming rate is 30 frames per second. The maximum slow motion effect is 1.25x 1080p24, with the following settings:

> set camera to 1080p30

> On nanoFlash, in Video->Record PSF as Progressive, set checkbox "On"

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 24

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 30 (max allowed here)

For more details, see the discussion on Cranking on pg 15.

> Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, 720p60/50 to 30/25, or 3:2 Pulldown Removal.

Recording UnderCrank

Undercranking allows for fast motion effect. Undercranking on the nanoFlash is completely independent of any crank settings on the camera, if even set on the camera.

Here are some common examples for undercranking:

For *2x fast motion*, 720p24:

> set camera to 720p60

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 24

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 12

For 4*x fast motion*, 720p24:

> set camera to 720p60

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 24

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 6

For *5x fast motion*, 720p25:

> set camera to 720p50

> On nanoFlash, in Video->Crank, set checkbox "On"

> On nanoFlash, in Video->Crank, set Record Rate (1st setting) to 25

> On nanoFlash, in Video->Crank, set Crank Rate (2nd setting) to 5

For more details, see the discussion on Cranking on pg 15.

      > Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Time-Lapse, 720p60/50 to 30/25, or 3:2 Pulldown Removal.

Recording Time-Lapse (hh:mm:ss)

Time-Lapse allows for delayed recording effect (super fast motion). Some common examples:

To record 1 frame per second:

> On nanoFlash, in Video->Time-Lapse, set checkbox "On"

> On nanoFlash, in Video->Time-Lapse, set time to 00:00:01

To record 1 frame every 5 seconds:

> On nanoFlash, in Video->Time-Lapse, set checkbox "On"

> On nanoFlash, in Video->Time-Lapse, set time to 00:00:05

To record 1 frame per minute:

> On nanoFlash, in Video->Time-Lapse, set checkbox "On"

> On nanoFlash, in Video->Time-Lapse, set time to 00:01:00

For more details, see the discussion on Time-Lapse on pg 15.

      > Do not use this mode in combination with Pre-Record Buffer (System->PreBuffer), Cranking, 720p60/50 to 30/25, or 3:2 Pulldown Removal.

Recording Standard Definition

The nanoFlash can record a Standard Definition signal, NTSC or PAL, the signal is recorded as IMX 50, 40, or 30 Mbit in .MXF or .MOV, and is accepted by NLE's.   Standard Definition can also be recorded as .MPG at 3,5,6,7,8, or 9 Mbit.

Other Recording Modes (1080i50/60, 720p50/60)

No special settings required.

Addendum C: Monitoring Notes (1.6.29)

During Record or Idle mode, the nanoFlash sends the incoming signal back out the SDI and HDMI ports for monitoring.

Here are some points to consider for monitoring the output from the nanoFlash:

SDI output monitoring

SDI out monitoring has 2 modes:

> E to E monitoring (Video->E to E Direct): the input is sent directly to the SDI output. Use E to E:

> when going to an SDI monitor which does not support 1080 progressive. In this case the nanoFlash will output a 1080 PSF signal as PSF.

> when using any special modes on the nanoFlash such as Time-Lapse, Crank, Remove 3:2 Pulldown, or 720p60/50 to 30/25. E to E will increase the likelihood of monitor compatibility.

> when using Video->Record Tally option.

Advantages of E to E:

> No delay.

> Broader monitor compatibility.

Disadvantages of E to E:

> Only Embedded data will be sent through the output (not analog audio / internal or LTC timecode).   However, if the combination of analog audio and LTC timecode are selected, these *will be placed on the SDI output in E to E mode along with the embedded video.*

> Non- E to E monitoring: If E to E is turned off, the input is sent to the SDI output after internal processing of the video / audio / timecode.

Advantages:

> Gives a more comprehensive picture of what the nanoFlash will record as it will always include the video / audio / timecode, and the video will be in the format that is to be recorded.

Disadvantages:

> approximate 4 frame delay.

> Less monitor compatibility.

HDMI output monitoring

From an HDMI input, HDMI output is always E to E (see discussion above).

From an SDI input, HDMI output is based on the Video->E to E setting.

HDMI output does not support Standard Definition at this time.

Addendum D: Playback Notes (1.6.29)

During playback off of the CF cards, the nanoFlash sends the signal from the CF cards out the SDI and HDMI ports. Standard Definition playback is only supported out of the SDI port. Additionally, 720p24 / 25 / 30 are not supported for playback at this time.

Here are special notes to consider:

Video->Play Progressive as PSF

Use this mode:

> when playing to an SDI or HDMI monitor which does not support 1080 progressive.

Do not use this mode:

> when playing 1080p23.98 to an HDMI monitor.

> when true progressive is desired as the output.

Addendum E: Viewing Options

Recorded file format is set in System->File Format, as Quicktime (MOV), MXF, or MPG.
In general, Quicktime has wider compatibility on the Mac, MXF on the Pc.

To view nanoFlash Quicktime files on the Mac:
> from Quicktime Player with Final Cut Pro 6.0.3 or better installed. (HD/SD files)
> If Final Cut Pro is not installed: from Quicktime Player with Calibrated Software's XD Decode (HD files):   http://calibratedsoftware.com/QXD.asp

To view nanoFlash Quicktime files on the Pc:
> from Quicktime Player with Calibrated Software's XD Decode (HD files) :
        http://calibratedsoftware.com/QXD.asp
> from Quicktime Player with Calibrated Software's IMX Decode (SD files) :
        http://www.calibratedsoftware.com/QIMX.asp

To view nanoFlash MXF files on the Mac:
> Sony XDCAM Transfer software (combined with Final Cut Pro 6.0.3+ or Calibrated XD Decode):
        (international link for XDCAM Transfer) :
        http://www.sony.co.uk/biz/content/id/1166605189229
        (US link for XDCAM Transfer) :
        https://servicesplus.us.sony.biz/sony-software-model-PDZKP1.aspx
> From Quicktime Player with Calibrated MXF Import (with Final Cut Pro or Calibrated XD Decode):
        http://calibratedsoftware.com/MXFImport_Mac.asp
> VLC Media Player: http://www.videolan.org/vlc
> MXF4Mac (also for editing in Final Cut Pro) :   http://mxf4mac.com/

To view nanoFlash MXF files on the Pc:
> Free Sony XDCAM Viewer software:
        (international link for XDCAM Viewer) :
        http://www.sony.co.uk/biz/view/ShowSiteSection.action?sectiontype=BC%20Tools%20XDCAM
        (US link for XDCAM Viewer) :
        https://servicesplus.us.sony.biz/sony-software.aspx?model=PDZVX10
> VLC Media Player: http://www.videolan.org/vlc
> Open Cube: http://www.opencubetech.com/

nanoFlash MXF files (*50 Mbit HD, 50 Mbit SD only (*ver1.5.126)) are also now compatible with XDCAM Optical Equipment. The "Free" naming convention may need to be set on the XDCAM equipment to accept nanoFlash files. Note: XDCAM Optical equipment will only import files greater than 2 seconds in length.

To view MPG files on the Mac: use VLC Media Player or Quicktime Player.
To view MPG files on the Pc: use VLC Media Player.

** See NLE Compatibility (Addendum G), for more viewing options.

Addendum F: Other Software Accessories

Free QT → MXF Converter (XDCAM EX or XDCAM 422 .MOV Files only) (Mac version only) – also makes non-fragmented file copies back to CF cards:

http://www.convergent-design.com/Portals/58/Documents/FileConverter1.5.zip

Free MXF → QT Converter (XDCAM 422 .MXF Files only, 50 Mbit and above, at least 2 channels audio (ver1.5.126)) (Mac version only): Sony XDCAM Transfer (combined with Final Cut Pro 6.0.3+ or Calibrated XD Decode, see link above) – also for importing MXF files 50 Mbit and above into Final Cut Pro: (does not support 720p24 / 25 / 30) (ver1.5.126)

> (international link for XDCAM Transfer) :
> http://www.sony.co.uk/biz/content/id/1166605189229
> (US link for XDCAM Transfer) :
> https://servicesplus.us.sony.biz/sony-software-model-PDZKP1.aspx

Addendum G: NLE Compatibility

All nanoFlash recorded bit rates 50 Mbps and above will typically appear in NLE's with a 50 Mbps label. However, all files are decoded / played out from their actual recorded bit rate. At this time, rendering / re-encoding of edited footage from the timeline is always forced to 50 Mbps (within NLE's which support re-encoding of edited footage), regardless of the bit rate of the originally captured video. Also, support for true frame rates (true 24, 30, 60) is limited in most NLE's. (ver1.5.31)

Final Cut Pro (6.0.3 or better)

FCP supports decode/ playback of all nanoFlash files generated as QT files. A timeline may be created for the nanoFlash files (50 Mbps and greater) in Final Cut Pro under the Easy Setup "XDCAM HD 422". Rendering / re-encoding (to 50 Mbps only) is also supported.
See tips below for editing shortcuts with Final Cut Pro and Long-GOP MPEG2.
Standard Def video is supported as IMX 50 Mbit.
True frame rates, as well as 720p24/25/30, are supported for decode only. (ver1.5.31)

Avid Media Composer (3.1.1 or better)

I-Frame only formats are supported (MXF files).
Long-GOP formats up to 50 Mbit are supported. (Also 80 Mbit appears to be supported (ver1.5.31).)
Long-GOP 100 Mbit and above is not yet supported.
Standard Def is supported.
Video formats 720p24 / 25 / 30: not supported at 50 Mbit or above. (ver1.5.31)

Sony Vegas (8.0c or better):

All Long-GOP formats are supported (MXF files). However, *2 green frames are displayed in the timeline at the start of each long-GOP file.*
I-Frame only files are supported in version 9.0c or better.
Standard Def is supported.
(Audio is not accepted in the initial release of Vegas 9, but all other versions accept audio. Also, Vegas requires a minimum of 2 channels audio.) (ver1.5.31)

Edius 5:

all MXF files supported.

Matrox Axio:

Likely all MXF files play on Matrox Axio systems.

Adobe Premiere CS4 / CS3: (PC version)

with MainConcept MPEG Pro XDCAM plug-in (4.1.1 or better), supports all nanoFlash MXF files:
http://69.15.88.17/downloads/MainConcept.pdf
http://www.mainconcept.com/products/apps-plug-ins/mpeg-pro-hd/xdcam.html

For Mac versions of Premiere: unconfirmed support of all nanoFlash files, with Final Cut Pro installed or Calibrated Software's plug-in installed:
> http://calibratedsoftware.com/QXD.asp

Adobe Premiere CS5:

native support for MXF files, however audio and timecode incompatibility exists in the current CS5 release.

Please test compatibility with your system before using the nanoFlash.

Final Cut Pro Editing Techniques

Final Cut Pro now has a shortcut to help minimize rendering when editing MPEG2 natively. Here are the steps to achieve this with XDCAM HD 422 footage:

1. Set up a sequence / timeline as XDCAM HD 422
2. In Final Cut Pro (6.0.2 or greater) -> User Preferences -> Render Control, set the CODEC to ProRes
3. Drop your Quicktime clips directly into the timeline (you do not need to transcode first) for editing

This will render only the effects in your sequence using the I-Frame-Only ProRes 422 CODEC. Areas of the timeline which do not have effects applied are unaltered. Your sequence is not re-encoded back to MPEG2 long GOP, in this case.

MPG support

Partial to full support in Nero, Final Cut Pro's DVD Studio, Adobe Encore, Edius, Sony Vegas, Roxio Toast Titanium.

Version History

Changes in the user manual occur from version to version, with the following notations to indicate the locations of changes: (please see Release Notes for more information related to each version)

version 1.1.154 (released 4 – Dec - 2009)

"**ver1.5.31**" (beta, released 18 – Feb – 2010)

"**ver1.5.126**" (formally released 6 – April – 2010)

"**ver1.5.249**" (beta, released 27 – May – 2010)

"**ver1.6.18**" (beta, released 23 – June – 2010)

"**ver1.6.29**" (formally released 29 – June - 2010)