nanoFlash™
HD/SD Portable Recorder/Player
User Manual

For Firmware Version 1.1.154,   4 – Dec - 2009

Convergent Design

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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: support@convergent-design.com
2. Sales E-Mail: sales@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/conf/convergent-design-flash-xdr/

The Essentials (Quickstart)

1. **Please Register your nanoFlash** by sending a simple e-mail to support@convergent-design.com with your name and the serial number off the right side of the nanoFlash. You will get automatic notification of firmware updates and service bulletins. Please take a moment to do this, in order to help provide a better user experience with the nanoFlash.

2. *Use only the qualified Compact Flash cards for the specified bit rates:*
    1. SanDisk Extreme 3 32/16/8 Gb CF cards *for bit rates up to and including 180 Mbps*
    2. SanDisk Extreme 4 16 Gbyte CF cards *for bit rates up to and including 280 Mbps*
    3. SanDisk Extreme 32 Gbyte CF cards *for bit rates up to and including 280 Mbps*
    4. SanDisk Extreme Pro 64/32 Gbyte CF cards *up to and including 280 Mbps*
    5. Delkin UDMA 16 Gbyte CF cards *for bit rates up to and including 180 Mbps*
    6. Lexar 8/16 Gbyte 300x CF cards *for bit rates up to and including 280 Mbps*
    7. PhotoFast 64/32 Gbyte 533x CF cards *for bit rates up to and including 220 Mbps*
    8. PhotoFast Plus 32 Gbyte 533x CF cards *for bit rates up to and including 280 Mbps*

3. 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 short 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. Update your NLE to the latest version and check compatibility (page 19)

6. Connect a power source to the 4-pin Hirose and press the red power button on the nanoFlash.

7. Set the time and date (page 11)

8. Set the video input (System->Vid Src) as SDI or HDMI

9. Set the file format to Quicktime (MAC) or MXF (PC) (page 11)

10. Select the Record Trigger Source (page 11)

11. Select the Time-code source and set the initial value (if needed) (page 11)

12. Set the compressed bit-rate and choose I-Frame or Long-GOP CODEC (page 13)

13. Set the PSF In and PSF Out options, depending on your video format (page 13)

14. Set up the audio source, line/microphone input and gain (page 15)

15. Connect a valid HD-SDI or HDMI source and time-code source (as appropriate). Connect the HD-SDI or HDMI output to a compatible monitor. You should see valid video output.

16. 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!

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 500Gbyte Backup Drive for this purpose (see accessories, page 21).

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 options, page 18).

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
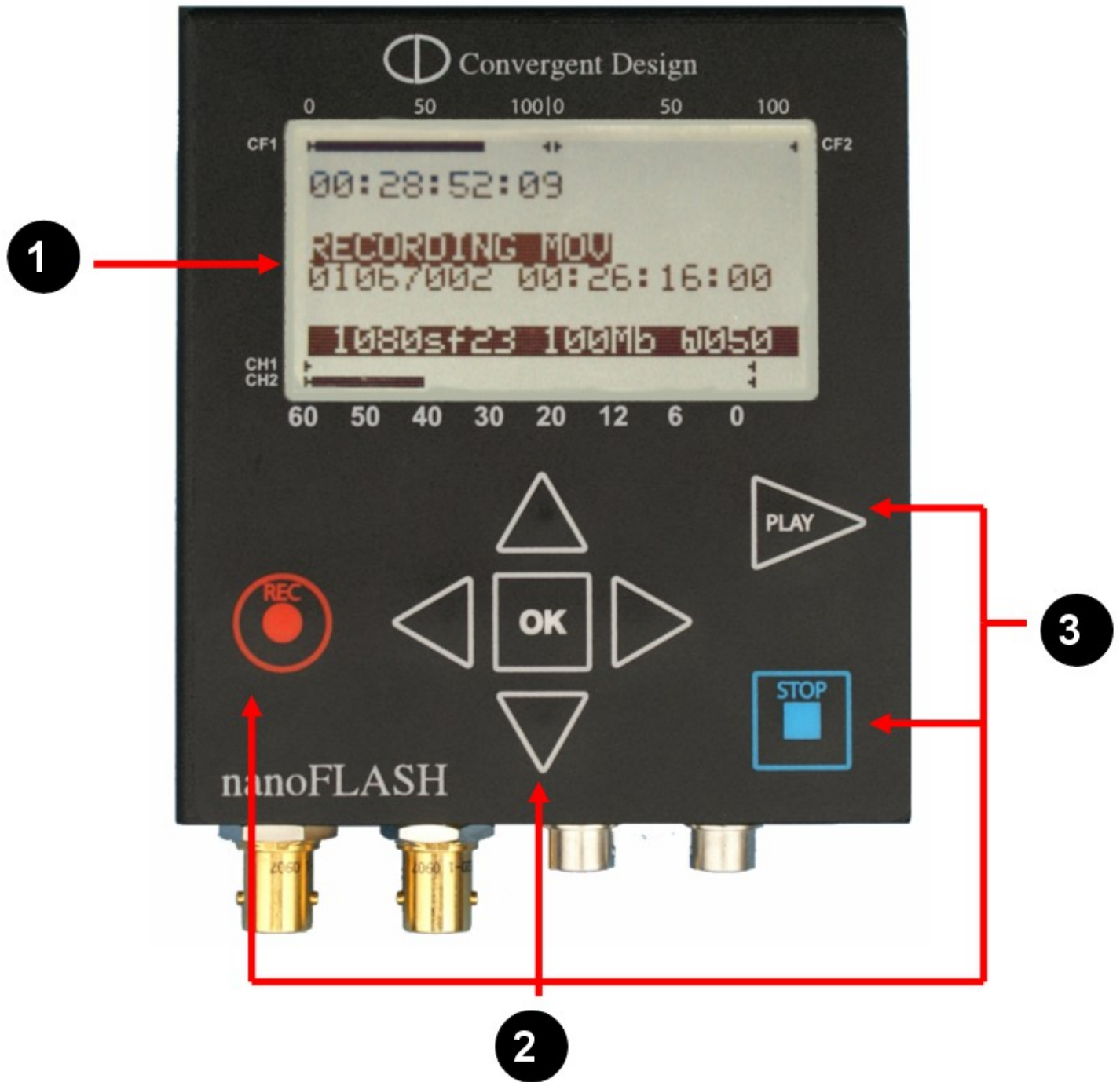

Bottom Connectors

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. Close the switch once for record trigger and once again for record stop (see page 27 for pin-out). Also can be used for Linear Timecode input.

- **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 only) .

- **HDMI Out**: non-locking mini-HDMI output (HD only) .

- **SDI/ASI In:** SDI or ASI video source for recording.

- **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).

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

- **Headphone Out**: 3.5 mm headphone out. There is no delay in Headphone Out from a live source.

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.

2. **Navigation Buttons**: Allows the user to navigate the menu.

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 will always record to CF slot one til full and then proceed 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.
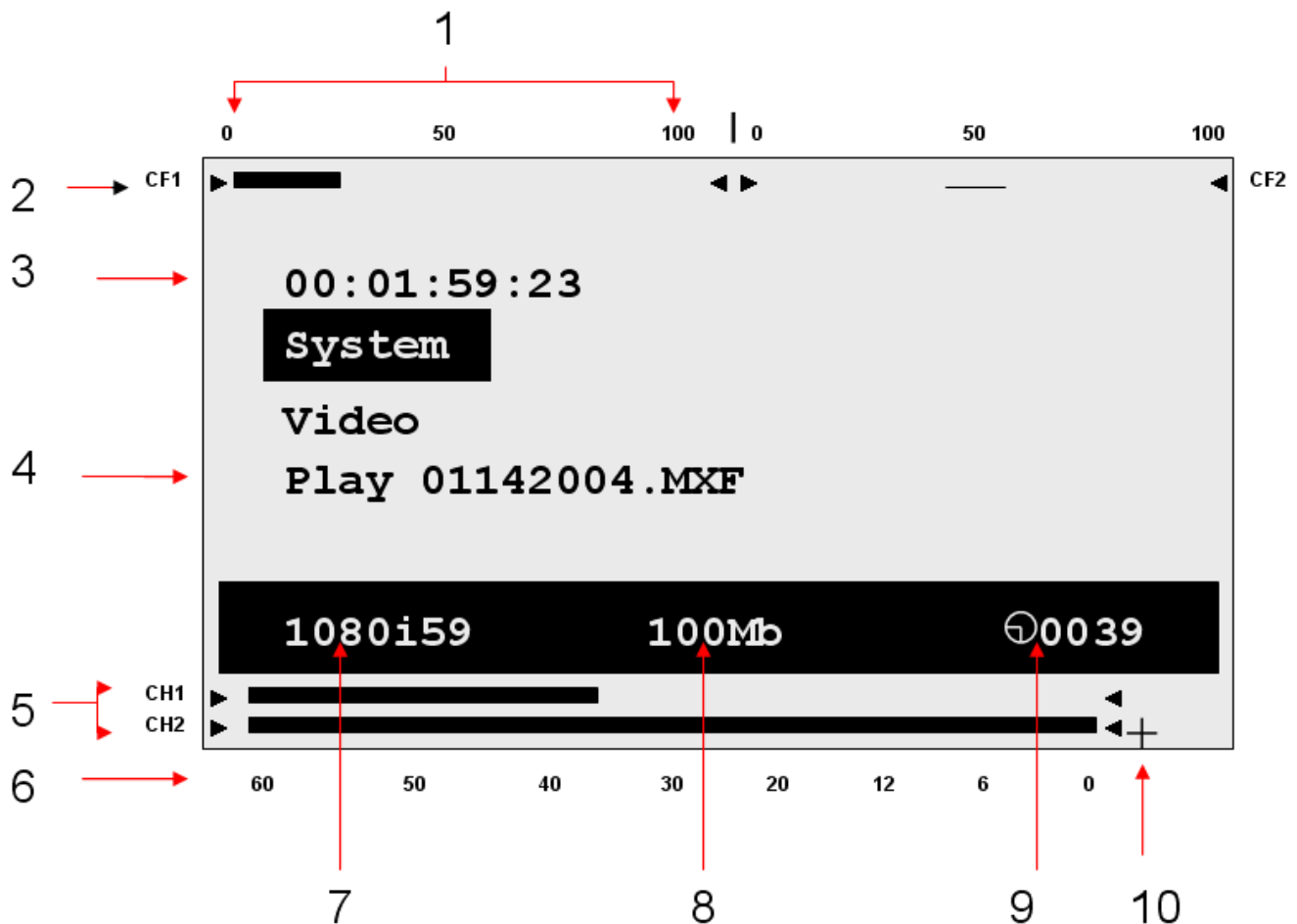   Note: the STOP button is immediately responsive upon being pressed. To prevent accidentally stopping a record, see alternative record trigger options (timecode trigger, remote trigger)(page 11), which de-activate the REC and STOP buttons.

   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.

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 (in degrees C)

Date (YYYY MM DD)
Sets the current Year Month Day

File Format (QT/MXF/MPG/)
Sets the file format: QT (Quicktime / .mov file), MXF (.mxf file format), or MPG. See Software Accessories and NLE Compatibility for playing / editing files.

Max File Size (100% to 20%)
File size to use during long records. Default is 100% (~ 3.5 Gbytes each file).
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 to 100% - 2%.

Unit ID (01 to 99)
Allows the user to uniquely identify a nanoFlash unit in a multi-unit video shoot. This 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.

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 100 Mbit bit rate, 4 seconds @ 140 Mbit bit rate)

> The record will begin 4-7 seconds in the past and then will catch up to the present moment over the course of 10 to 30 seconds recording. When the recording is stopped, there may be a delay of up to 25 seconds, particularly for very short clips on slower CF cards, while the internal buffering is being cleared out. This delay is minimized by using a faster CF card or recording for a minimum of 20 to 30 seconds.
> 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.
> 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 Flash XDR is in idle (non-recording) mode when using pre-record buffer. There will be no effect on power consumption during record.
> It is suggested to turn off Pre-Record Buffer when playing back off the CF cards out of the nanoFlash.

Trigger (None, Timecode, Remote, Record)

Selects the record/ stop trigger source. Note that 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.

- **None** – Unit will not record. Formatting is also disabled. (useful for playback only)
- **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.

        Note that time-code increment may also take place on some cameras when inserting or ejecting a tape or powering on/off the camera, causing the recording of very short unexpected clips in these cases.
- **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.
- **Power up** – Recording is automatically started by applying power and video source, Record is stopped by removing video source.

Duration HH:MM:SS

If this feature is enabled, each record session will last for the specified HH:MM:SS duration.

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 –** provide momentary timecode jam sync (via the LTC input port) while unit is in idle mode with a valid input source. If video source is lost, timecode must be re-sync'ed after video source returns.

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.
Power Saving
> **Auto Sleep**
> 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.

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.
> **HD Bit Rate (Quicktime, MXF)**
> 1. 18/35 Mbps = Full-Raster (1920x1080/1280x720) 4:2:0 Long-GOP (XDCAM EX)
> 2. 50/100/140/180 Mbps = Full-Raster (1920x1080/1280x720) 4:2:2 Long-GOP (XDCAM 422) (100 Mbps and above = Master Quality)
> 3. 100/140/180/220/280 Mbps = Full-Raster (1920x1080/1280x720) 4:2:2 I-Frame (XDCAM 422) (180 Mbps and above = Master Quality)
>
> **SD Bit Rate (Quicktime, MXF)**
> 1. for Standard Def: 50 Mbit IMX 4:2:2 (720x486/720x576)
>
> **Note that not all NLE's support every bit rate. See NLE support section.**
>
> **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 is the standard, and 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). I-Frame codec compresses each frame separately.

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
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. SDI or
HDMI source. Be sure this feature is turned off if the source does not have 3:2 pulldown.

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 that we write a
frame.
> 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 220 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.
> 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.
> Pre-Record Buffer (System->PreBuffer) can not be used in time-lapse mode.

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.

Audio

Source
1. **Embedded**: Audio is accepted over SDI (2 channels).
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.

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

Select the file to begin play.
Note: you 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:
> File Skipping: press the right key to jump to the next file, press the left key to jump to the previous file. Jumping between files using the arrow keys will cause a very brief distortion of the video output.
> 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:
>> to 50 Mbit bit rate: max rate = 6x (SanDisk Extreme 3: 4x)
>> 100 Mbit: max rate = 4x   (SanDisk Extreme, Extreme 3: 2x)
>> 140 / 180 Mbit: max rate = 2x (SanDisk Extreme 3: 1x)
>> 220 / 280 Mbit: 1x only
Fast forward beyond a tolerable rate can result in distortion, play may need to be re-started.

Play proceeds forward to the last file on the last card, and then loops back to the 1st file on the 1st card (unless Loop (below) is turned off).

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 "None" - 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.

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

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!
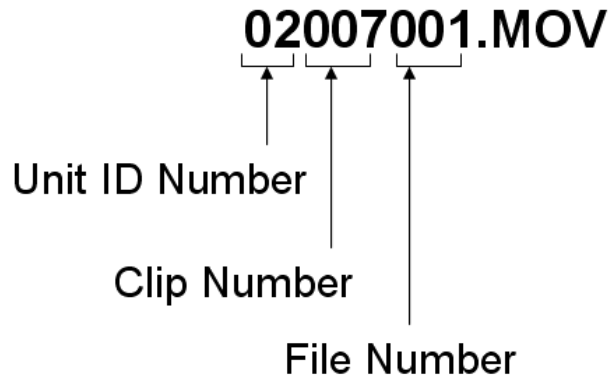
Important Operating Notes
- Use only the **qualified Compact Flash Cards**: see pg 4 for a complete list.
- The Compact Flash card levels (0 to 100% full) are displayed on the upper line of the LCD. The total remaining capacity across all cards (in minutes) is shown in the lower right corner.
- NEVER 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
1 16 GB Card	36	18	10
1 32 GB Card	71	36	20
2 32GB Cards	142	72	40

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 .

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:
       https://servicesplus.us.sony.biz/sony-software-model-PDZKP1.aspx
       http://calibratedsoftware.com/QXD.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:
       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 only) 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.

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 Support, below, for more viewing options.

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/downloads/FileConverter.zip

Free MXF → QT Converter (XDCAM 422 .MXF Files only, 50 Mbit and above) (Mac version only): Sony XDCAM Transfer 2.10.0 or better (combined with Final Cut Pro 6.0.3+ or Calibrated XD Decode, see link above) – also for importing MXF files into Final Cut Pro:
       https://servicesplus.us.sony.biz/sony-software-model-PDZKP1.aspx

NLE Support

Note: All 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.

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.

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.
Long-GOP 100 Mbit and above is not yet supported.
Standard Def is supported.

Sony Vegas (8.0c or better):
All Long-GOP formats are supported (MXF files).
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.)

Edius 5: Likely all MXF files play in Edius.

Matrox Axio: Likely all MXF files play on Matrox Axio systems.

Adobe Premiere CS4 / CS3: with MainConcept MPEG Pro XDCAM plug-in (4.1.0 or better), supports all nanoFlash MXF files:
http://69.15.88.17/downloads/MainConcept.pdf
http://www.mainconcept.com/site/prosumer-products-4/xdcam-22351/information-22391.html
Please note that for MPEG Pro XDCAM Plug-in 4.1.0 only, you must use nanoFlash version 1.0.112 or older for compatibility (see System->About in the nanoFlash menu). MPEG Pro XDCAM Plug-in 4.1.1 or better works with all versions of nanoFlash firmware.

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
Limited to full support in Nero, Final Cut Pro's DVD Studio, Adobe Encore.

Firmware Update Procedure

The current updating procedure is to go to http://www.convergent-design.com, proceeding to download the firmware update file. The update file will come in a .zip format, simply extract this zip to a directory. In this file set there will be some user guide .pdf's, and a folder called "}UPD{". Copy that folder only directly onto a formatted CompactFlash card, and insert into any card slot in nanoFlash. nanoFlash will automatically detect the update file and ask you to press OK to begin update. If you do not wish to proceed with the update, simply press the "Stop" button.

During the update, you will see two distinct operations: Erase and Programming. The Erase operation requires about one minute, while programming requires several minutes. Do not remove the CF card or power-down the unit until you see a specific message indicating that the update is complete.

Note: You will need to manually remove the firmware update file on your PC/MAC before reusing this CF card in the nanoFlash. Format the card in the nanoFlash before usage.

Note: be sure to connect the nanoFlash to a stable power supply capable of supplying power for at least 10 minutes. A fully charged battery or an AC power source, preferably with built-in UPS backup power, is acceptable.

Run a short test after every firmware update, capture 1 minute of audio / video and play back out of the nanoFlash and on a computer.

Beginning with firmware version 1.0.64, the nanoFlash has built-in boot code which will help the unit survive in the event of a failed firmware update (if the power is lost, for example) . This boot code is part of the update from version 1.0.19 . If you are updating from version 1.0.19 (see System->About), a 2-step update process is required. See the update documentation for full details.

Hardware Accessories

(available via 3rd party, unless otherwise noted)

Compact Flash Cards (Use only the qualified Compact Flash cards at specified bit rates)*:
see pg 4 for qualified cards.

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.mydigitaldiscount.com/SPD/nexto-500gb-extreme-nd-2700-portable-storage-unit-500gb-nexto-extreme-nd-2700--80000885-1221116877.jsp
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)

Batteries 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
1. swivel shoe mounts: http://www.nebtek.com/

Portable Field Monitors (HDMI)
1. http://dolgin.net/HD_Field_Monitors.htm
2. http://www.bhphotovideo.com/c/product/599808-REG/Marshall_V_LCD70P_HDMI_SM_V_LCD70P_HDMI_SM_7_LCD_Field.html

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. **Allow 5 seconds after stopping a record and after changing any menu settings before beginning next record**: The nanoFlash needs a bit of time to reset the codec in these cases. If a record is initiated immediately after a menu setting or a previous record/stop, the record will take a few seconds to begin. Otherwise the record start will be immediate.

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. 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.
8. 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.
9. 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.
10. 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**
3. **SlotDpc**
4. **DMA WR**
5. **DMA RD**
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) Never connect a wireless microphone to the nanoFlash while the +48V Phantom Power is turned on, as this may harm your microphone.
13) 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 Hz
- 720x486 @ 29.97 Hz
- 720x576 @ 25 Hz

** Note: NLE support for true frame rates (exactly 60, 30, or 24 frames) is limited – test your NLE for compatibility at true frame rates 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: 50/100/140/180 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: 19/25 Mbps VBR, 4:2:0, Long GOP, 1440x1080i
- 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

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: -20º C to 80º C (See System menu for temperature readout).

- External Operating: approximately -40º C to 60º C (direct exposure to sunlight or placing the unit in a cover or enclosed environment can influence the internal temperature)
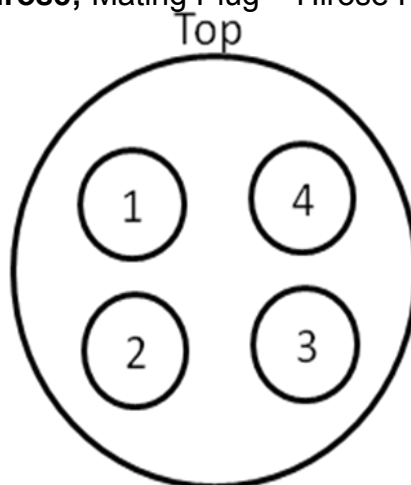
Humidity

- Operating Less than 80% (non-condensing)
- Storage: Less than 90% (non-condensing)
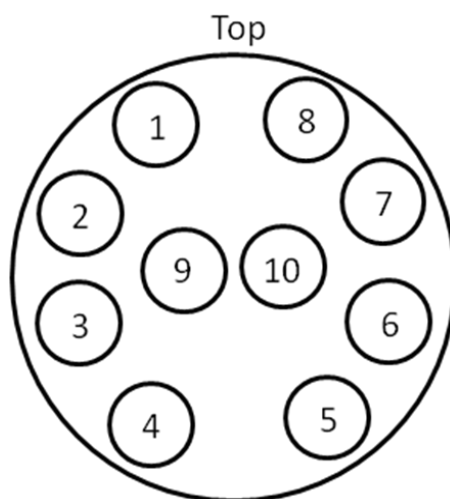
User Connector Pin-Outs
(looking into the connector on the nanoFlash, top-side up)

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

Top

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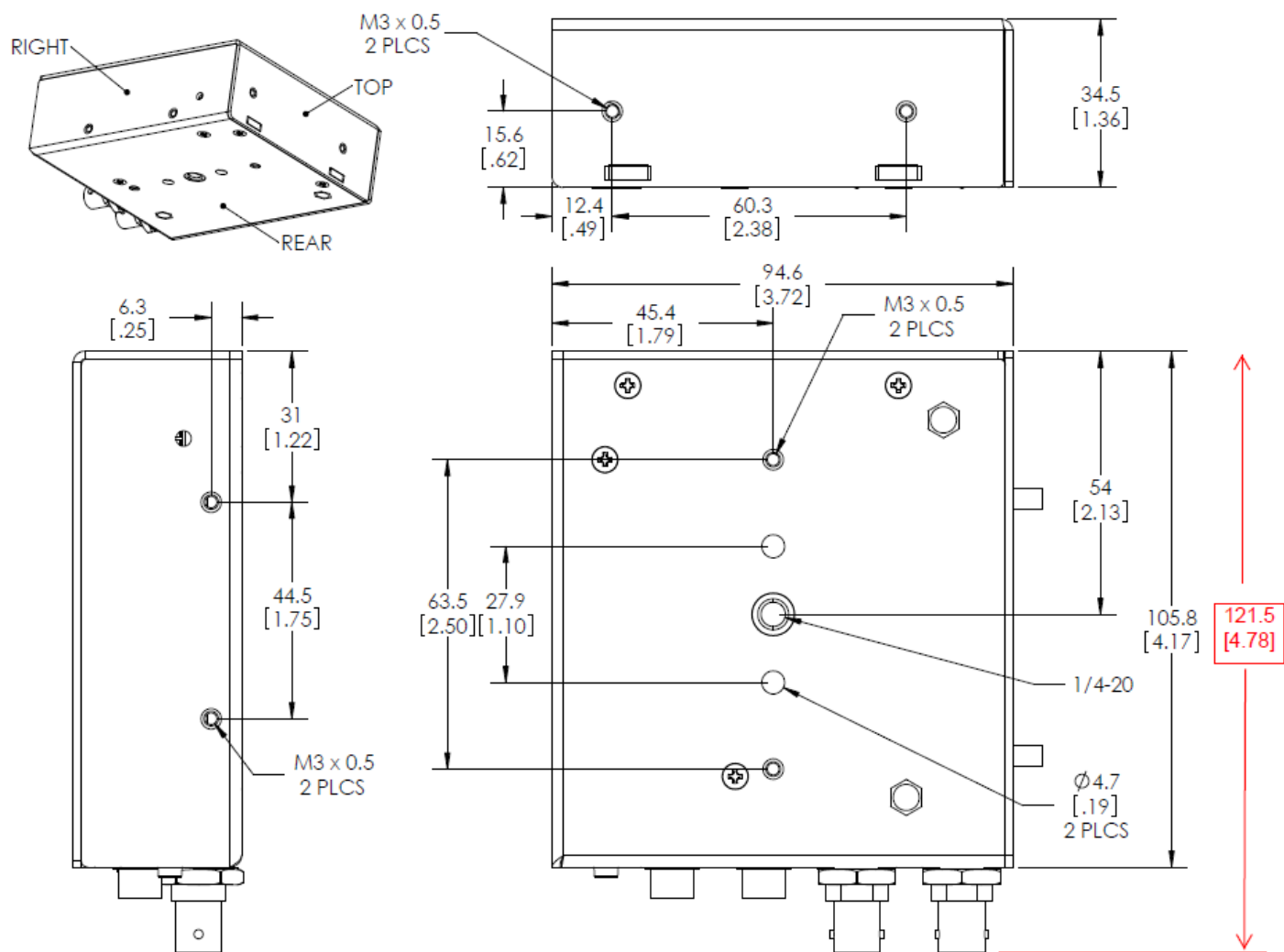3. Ground
4. Ground

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

Top

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 two-day delivery service within the continental United States, only if the product is under warranty and subsequently found to be faulty. Out-of-warranty repaired products are shipped at customer's expense. Turnaround time for warranty repairs normally will not exceed 48 hours (excluding shipping time), unless extraordinary fault conditions exist.

Labor and defects are covered for the warranty period of 2 years 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:

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, such as jamming the CF card into the card slot.

5. 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.

6. Unexpected loss/ corruption of video/audio data recorded on 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 support@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.

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