



## TECHNICAL BULLETIN

ONBOARD S RECORDER

RECORDING 4K CANON CINEMA RAW

REVISION 11.05.2012

**Canon**



## Safety Warnings

Please observe any warnings and follow all instructions.

- Do not use this equipment near water and clean only with a dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produce heat.
- Do not expose to excessive vibration, or drop this product.
- Do not defeat the safety purpose of the polarised or grounding-type plug. A polarised plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade, or the third prong, is provided for your safety.
- If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched, particularly at plug ends, convenience receptacles, and the point where they exit from the equipment.
- Only use attachments/accessories specified by the manufacturer.
- Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the equipment.
- Unplug this equipment during lightning storms or when not in operation for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the equipment has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the equipment, has been exposed to rain or moisture, does not operate normally, or has been dropped.
- To reduce the risk of fire or electric shock, do not expose equipment to rain or moisture.
- To avoid electrical shock, do not attempt to open this equipment. Refer servicing to qualified personnel only.

## Disclaimer

Codex products are continually developed to remain at the forefront of the industry, and as such the information in this guide is subject to change without notice. Whilst Codex endeavour to ensure that all documentation provided is correct at the time of writing, this document is not guaranteed to be error-free.

Codex does not assume responsibility for issues or losses due to misinterpretation of the information in this document, errors in this document, or incorrect configuration or installation of the equipment described herein.

Please report any errors found in this document to [support@codexdigital.com](mailto:support@codexdigital.com)

## Support and Servicing

For assistance with your Codex Onboard S Recorder please contact [support@codexdigital.com](mailto:support@codexdigital.com)

For servicing please contact [service@codexdigital.com](mailto:service@codexdigital.com)

## 1. Shooting 4K Canon Cinema RAW (2D camera)

This document describes how to configure the Onboard S to record 4K Canon Cinema RAW images from a single Canon C500 camera.

There is a **Quick Settings Guide** for configuring the C500 and Onboard S available from [www.codexdigital.com/support/recorders](http://www.codexdigital.com/support/recorders)

The **Codex Onboard S Getting Started Guide** covers the general functions of the Codex Onboard S Recorder (Onboard S), including how to use the Control Panel to interact with the menu system. It is available from here:

[http://www.codexdigital.com/assets/downloads/Codex\\_Onboard\\_S\\_Getting\\_Started\\_Guide\\_r29.05.12.pdf](http://www.codexdigital.com/assets/downloads/Codex_Onboard_S_Getting_Started_Guide_r29.05.12.pdf)

## 2. Software versions

We assume the following software versions:

Canon C500 camera - 1.0.1.1.00

Codex Onboard S Recorder - 2012.r2.2609

To view the software version on a Onboard S use the Control Panel to navigate to the "Setup->System" menu screen. The version number will be shown at the top of the screen. If the Onboard S needs to be updated, installation packages and instructions can be found at

<http://www.codexdigital.com/software>

## 3. Connecting the C500 to the Onboard S

Connect a BNC cable from the 3G-SDI 1 connector on the C500 to IN 1 on the Onboard S, and from the 3G-SDI 2 connector on the C500 to IN 2 on the Onboard S.



Whilst some formats only require the first cable, for simplicity both cables can always be connected.

**WARNING:** The two cables must be connected in the correct order. If they are connected incorrectly (i.e. 3G-SDI 1 to IN 2, and 3G-SDI 2 to IN 1) then this will result in corrupt recordings. The Onboard S cannot detect if the cables are connected incorrectly and no warning will be displayed.


## 4. Menu settings for the Onboard S

The majority of menu settings on the Onboard S can be set at the start of a shoot and kept for the duration of the project. We will cover these menu items first, then move on to the settings that a camera crew might change on a day-to-day basis.

**NOTE:** Recommended settings will be highlighted, like **THIS**

### 4.1 Quick review on entering the Setup menu using the Control Panel

Press the  **Main Menu** button. The main menu options of "Monitor | Play | Setup | Storage" will be displayed at the bottom of the screen.

Press the  Setup button. The list of all Setup pages will be displayed. You can scroll through the page titles using the wheel on the Control Panel. Press the centre of the wheel to select a particular Setup page.

### 4.2 Before a shoot: Project-wide settings



This menu allows you to set global metadata that is applied to recorded clips. When a recording is made, the current values are stored with the new clip. The default values are shown below (most are blank).

► Production:	CODEX
Production Company:	
Unit:	
Director:	
DP:	
Location:	
Codex Operator:	

The "Production" metadata is the only significant field. Here you should enter the name of your production (usually in UPPERcase). MXF file deliverables will use this to set the Avid Bin name.



This menu defines how the shot and roll names are applied to recordings. These settings are usually decided in advance of a shoot - often in consultation with Editorial and Post Production departments. There are presets that are suitable for the vast majority of shoots. (However, expert users may choose to customise these settings.)

Press the 'Next' button of the Control Panel to move through the presets for 'Shot Naming Rule' and 'Roll Naming Rule' on the Setup->Slate menu.

If using an Onboard S only workflow then all deliverables will be generated from the same source, and these naming rules may be used:

► Shot Naming Rule:	"{Scene}-{Take}_{r}"
Roll Naming Rule:	"{SourceId}{Datapack}"



For a typical 2D camera shoot, the most important setting on this page is "Source ID". This is usually set to be the camera identification letter, the default being "A". It is important that each Onboard S on a production uses a different "Source ID", so that Editorial can differentiate between them.

The other fields such as "Source Name" and "Serial No" can be filled out for information and tracking purposes.

► Source Name: C500  
Source ID: A  
Serial No: Enter camera serial number



This menu controls how recording is triggered.

► Record Trigger: None or SDI or GPI

Set "Record Trigger" to "None" if you intend to use the RECORD/STOP buttons on the Onboard S to start/stop recording.

It is possible to start/stop the Onboard S using the C500's "START/STOP" button – to do this set the C500 [4K 2K]->[Rec Command] to "On" and the Onboard S Setup->GPI->Record Trigger to "SDI".

**WARNING:** the "Hold" button on the Control Panel should be engaged when using the SDI record trigger from the C500, otherwise the "Stop" button on the Control Panel will still be active during recording and takes could be cut by accident.

Set "Record Trigger" to "GPI" if you wish to use a custom electrical trigger connected to the GPIO socket of the Onboard S.

The other menu items only affect "GPI" triggering:

► GPI Polarity: Low or High  
GPI Type: Latching or Momentary  
GPI Polarity: Low or High

These should describe the type of electrical GPI trigger that is being used. These items are ignored if "Record Trigger" is set to "SDI" or "None".



The Onboard S has a network port for remote control and software updates. The network IP configuration can be set here:

► IP: 10.82.95.101  
Mask: 255.255.255.0  
Gateway: 10.82.95.1  
DNS: INVALID

The "System control" setting determines whether remote Codex UI software is allowed to take control of the recorder. This can be set to "Locked" to prevent a network user from taking control of the recorder.

► System control: Unlocked

The next three settings determine the brightness level of the Codex light rings and the Control Panel LCD display. The user can pick a level in the range 0 (dim/off) to 15 (bright), and the default level is 12.

► Screen contrast: 12  
Control ring bright: 12  
Main ring bright: 12

The Onboard S recorder can take an input voltage from 12-34V (24V or above is normally used). By default it will shut down if the voltage drops below 10V. You can increase the voltage level at which the recorder shuts down in order to protect some types of battery, but this is not commonly done:

► Shutdown volts: | **Default**

### 4.3 During a shoot: Video/Audio/Timecode settings

Here we describe the menu settings that are likely to change during a shoot; Video, Audio, and Timecode, along with the corresponding video settings on the C500.

There is a Quick Settings Guide available from [www.codexdigital.com/support/recorders](http://www.codexdigital.com/support/recorders)

First we will deal with the video settings on the C500 and the Onboard S.

#### 4.3.1 C500 - General settings in the [4K 2K] menu

The [4K 2K] menu of the C500 should be configured as follows:

[  4K/2K/MXF Setup ] ► [System Priority] : **4K**

Next set the [System Frequency], which affects the available frame rates:

[  4K/2K/MXF Setup ] ► [System Frequency]: **24.00Hz**, or **50.00Hz**, or **59.94Hz**

Here are the [Frame Rate] settings available for the different [System Frequency] settings:

**24.00Hz** – 24FPS

**50.00Hz** – 25 FPS, 50 FPS


**59.94Hz** – 23.98 FPS, 29.97 FPS, 59.94 FPS

**Note:** Frame Rates above 59.94, such as 100FPS and 120FPS, only exist in S&F frame rates.

#### 4.3.2 C500 – Standard frame rates up to 60fps: setting the [4K 2K] menu

Standard frame rates up to 60fps are - 23.98, 24.00, 25.00, 29.97, 50.00, 59.94. Any other frame rate is classified as non-standard.

Set the mode and desired resolution:

[  4K/2K/MXF Setup ] ► [4K (4096/3840)] ► [Mode]: **RAW**

[  4K/2K/MXF Setup ] ► [4K (4096/3840)] ► [Resolution]: **4096/3840**

In 4K RAW mode the picture height is always 2160.

The [System Frequency] setting will determine the selectable frame rate(s):

[4K (4096/3840)] ► [Frame Rate]: **23.98, 24.00, 25.00, 29.97, 50.00, 59.94**

#### 4.3.3 C500 – Non-standard frame rates up to and above 60fps: setting the [4K 2K] menu

The C500 has special recording modes to allow slow and fast motion recording, and depending on the [System Frequency] setting the frame rate can be set from 1-120fps.

For shooting offspeed generally either 50.00Hz or 59.94Hz would be used. A [System Frequency] of 50.00Hz allows for 1-100fps recording, whilst 59.94Hz allows for 1-120fps recording.

Up to 60fps the C500 can output in RAW mode. Above 60fps the C500 must output in HRAW (half-raw) mode, where the picture height is 1080. Set the mode and desired resolution:

[4K (4096/3840)] ► [Mode] **RAW** or **HRAW**

[4K (4096/3840)] ► [Resolution] **4096** or **3840**

[4K (4096/3840)] ► [Frame Rate] **50.00** or **59.94**

The C500 must also be put into a special recording mode:

[Special Rec]: **Slow & Fast Motion**

The [System Frequency] setting will determine the selectable frame rate(s):

[S & F Frame Rate]: **1-120fps**

**Note:** any [S & F Frame Rate] that is displayed in square brackets e.g. [100], requires a dual cable Setup to the Onboard S.

#### 4.3.4 Onboard S – settings for Video, Audio, and Timecode



To configure the Onboard S for CanonRAW, first set the format to match the resolution from the C500:

► Format: | CANON-4096x2160p, CANON-3840x2160p, CANON-4096x1080p, CANON-3840x1080p  
Storage: | 10-bit Bayer

The [Fps] setting on the recorder should match the [Frame Rate] setting on the camera for standard frame rates up to 60fps. When [Special Rec]: Slow & Fast Motion is used and the [S & F Frame Rate] setting is displayed in square brackets - e.g. [100] - the [Fps] on the Onboard S should be set to double the [Frame Rate] setting from the C500:

► Fps: | 23.98, 24.00, 25.00, 29.97, 30.00, 50.00, 59.94, 100.00, 119.88\*  
Quality: | 1:1 (Uncompressed) or SQ (Standard Quality)  
Channels: | 1  
Aspect: | Square (for spherical lenses)

**Note:** when the C500 [System Frequency] is 59.94, all [S&F Frame Rates] should be divided by 1.001 for the true frame rate. For example, [120]/1.001 = 119.88.

► Variframe: | Off (for standard frame rates) or On (for non-standard frame rates)

**Note:** It is important to only enable the Variframe setting when recording non-standard frame rates.

► Input: | 3G  
Output: | 422  
Play Sync: | Internal



If you require that the timecode for the Canon Cinema RAW footage exactly matches the timecode recorded in in-camera CF media, or you would simply like to use the camera as a timecode source, then set "TC source: HD VANC".

If you do not require that Canon Cinema RAW timecode matches CF recordings, then feel free to choose any "TC source" or "AUX source".

When using the "TC source: HD VANC" setting it is important to set "Fix TC Breaks" to "No":

► TC source: | HD VANC  
AUX source: | HD VANC UB  
Metadata: | Canon  
Fix TC break: | No  
Video delay: | None  
TC delay: | None

**Note:** In Variframe mode the Onboard S is able to record timecode which can be matched back to the CF media, but only if "Fix TC Breaks" is set to "No".



Main Menu



Setup

Audio



Configure the audio settings to your projects' requirements. The Onboard S recorder supports up to 8 channels of embedded digital audio (HD AiV):

▶ Input:	HD AiV
Channels:	None, 1, 2, 4, 6, 8 [Number of channels. Set to "None" if no audio is required]
Bits:	24

#### 4.4 During a shoot: Monitor and Play settings

When on the Monitor and Play screens the "Options" button is available on the left button under the display.



Options

The following are sensible defaults:

▶ LUT:	<off>
Volume:	15
Play loop:	Repeat
Play range:	All
Tc/Play rate:	Default, 23.98, 24.00, 25.00, 29.97, 30.00, 47.95, 48.00, 50.00, 59.97, 60.00
Play chans:	All
TC source:	TC
TC type:	Standard

It is possible to force a particular Tc/Play rate. It is recommended to set this to the correct rate for your project, which will mean that:

1. The Timecode displayed on the Onboard S matches the timecode displayed on the C500 when shooting off-speed.
2. Off-speed / varispeed clips are always played back at the intended projection rate.

**Note:** when shooting high frame rates the timecode will count faster than real-time. For example, if shooting 100fps for a 25fps project, the timecode will count up at 4 times real speed.



## Notes

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