



TECHNICAL BULLETIN

CODEX ONBOARD RECORDER
RECORDING IN STEREO 3D

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Codex Onboard Recorder – Stereo 3D Recording

The "Codex Onboard Recorder Getting Started Guide" concisely covers most functions of the Codex Onboard recorder, including how to use the remote handset to interact with the menu system. The "...Getting Started..." document can be downloaded from the Support section of the Codex website (<http://www.codexdigital.com>).

1. Shooting stereo ARRIRAW

This document describes how to configure the Codex Onboard Recorder to record stereo ARRIRAW images from a pair of ARRI Alexa cameras.

We assume the following hardware/software versions:

- ARRI Alexa EV camera, firmware 3.0 final release [released 14 Feb 2011]
- Codex Onboard recorder, software 2011-r1-2902 [released 21 Apr 2011]

Note: The Alexa firmware version can be viewed using the menu system on the side panel of the camera; press the "INFO" button, then the multipurpose button labelled "SYSTEM".

To view the software version on a Codex Onboard Recorder, use the remote handset to navigate to the "SETUP->System" page. The version number will be shown at the top of the screen. If the Codex needs to be updated, installation packages and instructions can be found at <http://www.codexdigital.com/software>

2. Menu settings on the Alexa camera

The Alexa's [MENU->RECORDING->REC OUT] page should be configured as follows:

Frame rate: **<your choice>**
HD-SDI format: **ARRIRAW 1.5G DL**
Scan format: **p**
Output range: **Raw**
REC OUT fps sets sensor fps:

- **Enabled** [when shooting standard HD rates 23.98, 24.00, 25.00]
- **Disabled** [when shooting off-speeds/variframe]

SDI Remote: **On**
Variflag: **On**

The HD-SDI format should be set first, and most other listed settings will be automatically filled in.

If you intend to send TC to the Codex recorder via HD-SDI, the Alexa's [TIMECODE->OPTIONS] menu should be configured as follows:

Source: **Int TC** or **Ext LTC** (depending on user requirements)
Mode: **Free Run**

Note: When recording stereo ARRIRAW to a Codex Onboard the maximum framerate is 25fps.

3. Camera cabling and configuration

The Codex Onboard Recorder has 4x BNC ports for video input which are labelled "1", "2", "3", and "4".

Inputs "1" and "2" should be used for the LEFT eye camera.
Inputs "3" and "4" should be used for the RIGHT eye camera.

Both cameras must be configured to the same video format and frame rate.

It is essential that the video outputs of the camera are in sync, so that each image pair (one image from each camera) arrives at the recorder at the same time instant. The shutters and video outputs of the two Alexa cameras should be synchronised using the proprietary ethernet link cable. Refer to the Alexa user manual for information on how to do this.

The HD-SDI cabling requirements for stereo ARRIRAW are:
1: LEFT eye link A
2: LEFT eye link B
3: RIGHT eye link A
4: RIGHT eye link B

The Onboard Recorder will automatically swap the A and B links within a pair if they are misconnected, and a warning message to indicate this will be shown on the user interface.

4. Menu parameters for Codex Onboard Recorder

2011.r1.2902

The majority of menu settings on the Codex Onboard recorder can be set at the start of a shoot and left as-is for the duration of the project. We will cover these menu items first, then move on to the settings that a camera crew might interact with on a day-to-day basis.

4.1 Quick review on how to enter the SETUP menu using the remote handset

Press the [ARROW] button. The root menu "Back | 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 rotary dial. Press the centre of the rotary dial to select a particular setup page.

4.2 Before a shoot: Project-wide settings

Menu: STORAGE

Rolls must be created as RAID-0 to allow the bandwidth required for stereo ARRIRAW recording. If a Roll is created as RAID-1 then once all the format settings have been done and the unit is in Live mode you will see a message "INVALID VIDEO FORMAT FOR PACK" and will not be able to record.

Menu: SETUP->PROJECT ("PROJECT SETUP")

The "PROJECT SETUP" menu allows you to set global metadata fields that are applied to recorded clips. When a recording is made, the current values of these fields are associated with the new clip. The default field values are shown below (most are blank).

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

The "Production" metadata field 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.

Menu: SETUP->SOURCE ("SOURCE SETUP")

The Source ID field allows you to assign a unique identifier to the camera pair. This is usually a single uppercase letter, the default value being "A".

It is important that each Onboard on a production uses a different "Source ID", so that Editorial can differentiate between footage from the different stereo rigs.

Source Name: **ARRI Alexa**
Source ID: **A**

Setting the "Source Name" as "ARRI Alexa" is essential to make sure the Exposure Index and White Balance metadata is used to correctly produce deliverables from Alexa ARRIRAW recordings.

For stereo recordings it is **critical** that each video channel is given a unique channel identifier. It is typical to use the channel identifiers "L" and "R".

After a clip has been recorded these channel identifiers can be used to augment the roll names of file deliverables. For example, a 2-channel video clip with the roll name "A001" could be presented as two image sequences; left eye mapping to roll name "A001L" and right eye to "A001R".

Codex Lab and Transfer Station products employ the Codex Virtual File System (VFS) to present clips on a Datapack as image/movie files for use in Post Production. VFS configuration and usage is outside the scope of this document, but needless to say the channel identifiers are vital to creating sensible file deliverables from stereo clips.

Channel ID V1: **L**
Channel ID V2: **R**

Note: The value of the "SETUP->VIDEO->Channels" menu item dictates how many "Channel ID V?" fields are shown on this page. In the case of stereo recording it is possible to define two channel identifiers.

Menu: SETUP->SLATE ("SLATE SETUP")

This menu defines the naming conventions for a production. These rules are usually decided in advance of a shoot, in consultation with Editorial and Post Production departments. Expert users may choose to customise these rules, but the default rules have been carefully crafted to be suitable for the vast majority of shoots and are suitable for both 2D and S3D shooting.

Shot Naming Rule: "{Scene}-{Take}_{r}"
Roll Naming Rule: "{SourceID}{Diskpack}"

When creating a roll on a Datapack, it is common practice to name it with 3 numerical digits, e.g. "001" for the first roll.

When the default Roll Naming Rule is used the {Diskpack} name is prefixed by the {SourceID} metadata, resulting in roll names like "A001".

Menu: SETUP->GPI ("GPI SETUP")

Set "Record Trigger" to "SDI" if you wish to trigger recording directly from the camera, to "GPI" if you wish to use a custom electrical trigger (e.g. Preston control), or "None" if you intend to use the RECORD/STOP buttons on the recorder to start/stop recording.

Note that a formatted SxS card must be loaded in the Alexa in order for the RECORD button on the camera to be functional. The video feed from the LEFT eye camera is monitored for SDI trigger signals.

Record Trigger: **SDI** or **GPI** or **None**

The other menu items are specific to "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 "None" or "SDI".

Menu: SETUP->SYSTEM ("SYSTEM SETUP")

The Codex Onboard has an ethernet port which allows it to be connected to standard computer network infrastructure. 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**

It is necessary to configure the network port if you wish to use the remote user interface (UI) software to control the Codex Onboard Recorder. The software is currently available for Mac OSX and Windows, but its use is outside the scope of this document.

The "System control" setting determines whether remote 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 remote handset's 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**

If the Onboard recorder receives power from the Alexa's 24V regulated RS power output, then there is no benefit in enabling a shutdown voltage level:

Shutdown volts: **Disabled**

4.3 During a shoot: Video/Audio/Timecode settings

Here we describe the menu pages that are likely to be used on a day-to-day basis during a shoot; VIDEO, AUDIO, and TIMECODE.

Menu: SETUP->VIDEO ("VIDEO SETUP")

The Codex Onboard supports the following ARRIRAW formats for stereo:

Dual link 1.5Gb:

ARRIRAW-1620p@[23.98, 24.00, 25.00]

The user should set the "Format" field first, which causes the "Storage", "Fps", and "Quality" options to be limited to supported values.

Format: **ARRIRAW-1620p**

Storage: **12-bit Bayer**

Fps: **23.98, 24.00, 25.00**

Quality: **1:1**

Channels: **2** [for stereo recording]

Aspect: **Square** [for spherical lenses]

The Alexa V3.0 firmware supports variframe flags over the HD-SDI outputs, so it is now possible to record ARRIRAW at non-HD speeds such as 27fps. When shooting variframe you must ensure that:

- The Onboard Recorder's "**SETUP->VIDEO->Variframe**" setting is set to "**On**".
- The Alexa's "**MENU->RECORDING->REC OUT->Variframe flags**" setting is set to "**On**".
- The camera's REC OUT is set to a frame rate that is equal to or higher than the frame rate you wish to capture.

For example, to capture 27fps you would have to set the camera REC OUT to 29.97 or 30.00, and configure the recorder to match.

IMPORTANT NOTE: The Alexa will not warn you if the REC OUT is not set to a high enough frame rate or if the variframe flags are disabled, so be extremely careful when using the variframe function. Audio capture on the Onboard Recorder is disabled when in variframe recording mode, so it is good practice to set the Onboard recorder's variframe setting to "Off" when shooting at standard HD frame rates (23.98, 24.00, 25.00).

Variframe: **Off** or **On**

Remaining settings:

Input: **Default**

Output: **4:2:2** [forces both monitoring video outputs to be 4:2:2 single link]

Play Sync: [Choose a genlock source for playback. Default setting: **Internal**]

Note: the Onboard provides a 1440x810 debayered output for ARRIRAW-1620p. In live mode Output 1 is for the left camera and Output 2 is for the right camera. In playback mode only Output 1 is active and switches between showing the left and the right cameras each time stop is pressed during playback.

Menu: SETUP->TIMECODE ("TIMECODE SETUP")

Select the timecode source to use for all video channels. Note that HD VANC timecode is read from the LEFT camera and applied to all channels.

When shooting Variframe from Alexa the Onboard is able to record valid timecode from the camera using the HD VANC setting, but only if "Fix TC Breaks" is set to "No". When using a Codex Transfer Station/Digital Lab to deliver files from the VFS this must be set up so the "TC Rate" matches the project timecode rate in order that the timecode of deliverables is correct.

TC source: **HD VANC, LTC, TCG**

AUX source: **None, HD VANC UB, LTC UB, TCG UB**

Metadata: **None**

Fix TC break: **No**

It is possible to define the delay present in the video and timecode inputs. These settings define how many image or timecode samples should be discarded from the beginning of a captured clip in order that they sync with the audio input.

Video delay: **None**, [1, 2, 3, 4] frames

TC delay: **None**, [1, 2, 3, 4] frames

Menu: SETUP->AUDIO ("AUDIO SETUP")

Configure the audio settings to your projects' requirements. The Onboard Recorder supports:

Up to 8 channels of embedded digital audio (HD AiV)

Up to 4 channels of AES digital audio

Up to 2 channels of analog line-level audio

Input: AES, HD AiV, **Line**

Channels: **None**, 1, 2, 4, 6, 8 [Number of channels. Set to "None" if no audio is required]

Input Level: [22, **18**, 15, 12, 8] dBu [Only applicable to analog sources]

AES SRC: **On**, Off [Only applicable to AES sources, and should be "On" if the audio feed is not genlocked to the video]

Bits: **24**

If no audio is to be recorded to the Onboard recorder then the user should disable audio capture by setting "Channels" to "None". None of the other items in the AUDIO menu have any effect when audio is disabled. Note that audio input is ignored if "SETUP->VIDEO->Variframe" = "On".

4.4 During a shoot: Playback settings

When on the TRANSPORT screen (for E-E, PLAYback or REC), the "Options" button is available on the left-most button under the screen.

Menu: TRANSPORT->Options ("TRANSPORT OPTIONS")

The following are sensible defaults:

LUT: **<off>**

Volume: **15**

Play loop: **Repeat**

Play range: **All**

Play rate: **Default**, 23.98, 24.00, ...

Play chans: **Single video** [play one video channel at a time through HD-SDI output #1. Press the STOP button on the control handset to toggle between video channels]

TC source: **TC**

TC type: **Standard**

Note that it is possible to force a particular playback rate. It is typical to set this to 23.98 or 24.00 for most film productions, so that off-speed/varispeed clips are always played back at the intended projection rate.

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