ARRI Cinematic Multicam
for AMIRA and ALEXA Mini
Multi Camera Setup

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1 Introduction

This white paper describes how to integrate the ARRI AMIRA camera into a multi camera setup.

The AMIRA can be remote controlled with standard Sony remote control panels (RCPs), allowing video engineers to use the tool they are typically familiar with. Other RCPs like the Skaarhoi RCPv2 supporting the Sony SSCP and/or the ARRI CAP standard can also be used. With the CAP interface many more camera parameters can be controlled with the RCP.

The Sony RCP is connected with a SSCP device like the Sony CNA-1 or the DTS ERI, converting RCP-proprietary commands into the SSCP Sony Simple Camera Protocol and interfacing with the AMIRA camera. The Skaarhoi RCPv2 or other RCPs supporting the SSCP or CAP protocol can be connected directly to the AMIRA.

RCPs compatible with SSCP devices like the Sony CNA-1 (or other tools), are expected to work in the described configuration. Explicitly tested have been the Sony RCP-1500, Sony RCP-750 and the Skaarhoj RCPv2.

2 Typical Multicam configurations

2.1 Simple Small Scale Setup

For small installations, it may be suitable to directly connect the video input and output to a vision mixer/switcher with standard HD-SDI cables and an additional Ethernet cable for remote control.
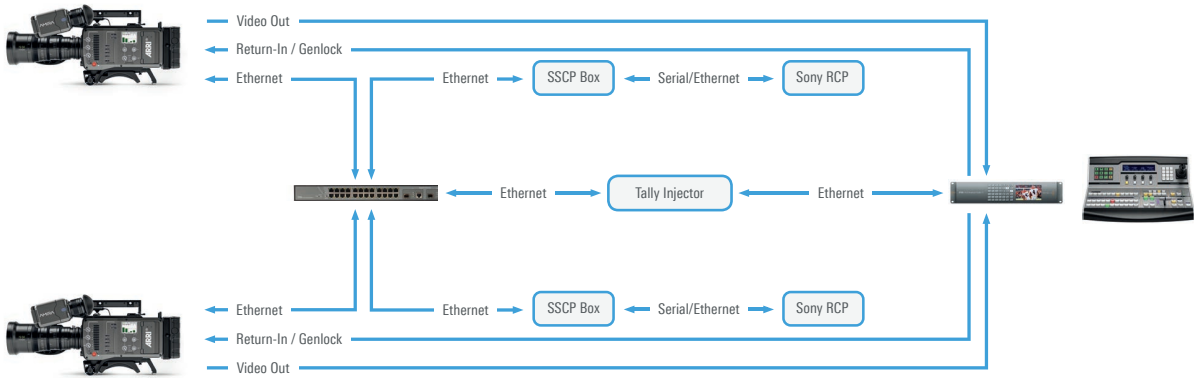
The tally command is part of the Ethernet network for camera remote control (see Chapter Tally Control below).

2.2 Fiber based Setup SMPTE 311

In larger setups, a fiber based transmission can be used, allowing to transport all video and data signals over a single SMPTE-311 fiber cable, which does also provide power.
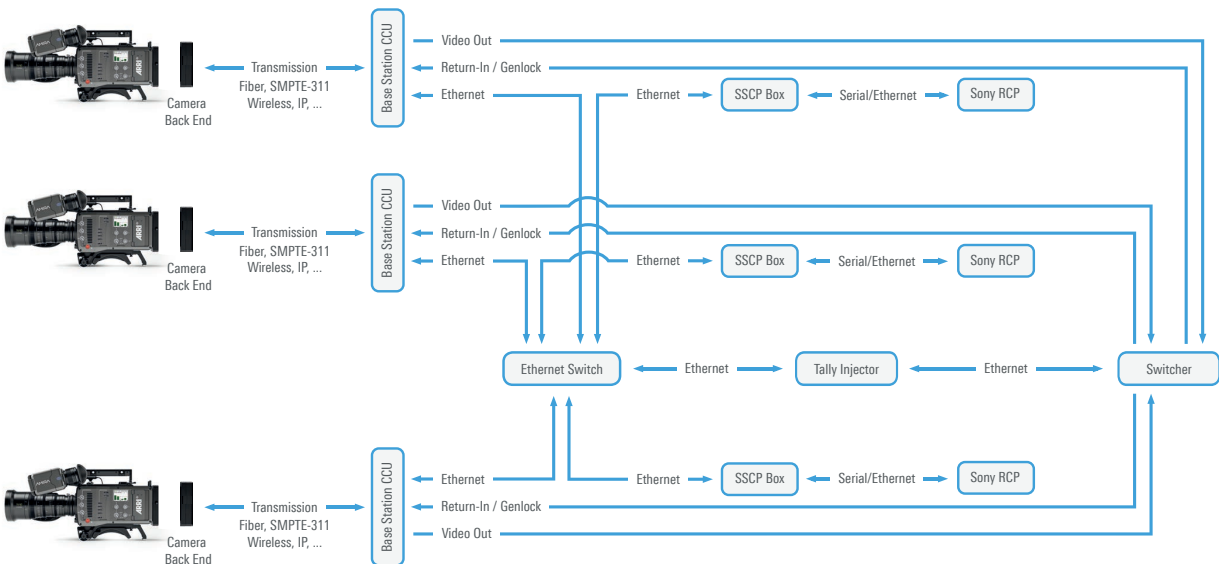
The tally command is part of the Ethernet network for camera remote control (see Chapter Tally Control below).

2.3   Workflow configuration with DTS fiber system

Headset 1
PGM
PROD
+
ENG

Headset 2
PGM
PROD
+
ENG

SDI OUT,
SDI Return
Audio Embeded

Genlock
Timecode
Camera-Control
(Ethernet)

Intercom

Intercom

DATA   RS232 / RS485

Analog Video   CVBS IN/OUT

**DTS FCA
Fibre Camera
Adaptor**

Fiber Cable / SMPTE 311

Remote Control Panel
(RCP)

Ethernet or serial

**DTS FBS Fibre Base
Station**

Video OUT:	HD Mode:	2x 1,5G/3G
	UHD Mode:	4x 3G/2SI plus configurable
		1x 12G/2SI or 2x 6G/2SI or 1x 6G/2SI
	Mon Out:	2x 1,5G 1080i
	Analog Video:	1x CVBS OUT
Video IN:	Video Ret.	1x 1,5G 1080i
	Analog Video:	1x CVBS IN
	Genlock:	1x BB or Tri-Level Sync Loop through
Intercom:	1x PROD IN / PROD OUT	
	1x ENG IN / ENG OUT	
Tally:	Red Tally IN	
	Green Tally IN	
Data:	1x RS485	
	1x RS232	
	1x Ethernet	

2.4   HDR HLG workflow configuration & components

RCP
CCU 1
RCP
CCU n

CG HDR

Switcher

Camera 1
Look = HLG

SMPTE
fibre

DTS
CCU
1

HDR HLG*

IN 1

PGM

PGM HDR HLG

External DSK

HLG

HLG
REC
709

PGM SDR/
REC 709

External DSK

Camera n
Look = HLG

SMPTE
fibre

DTS
CCU
n

HDR HLG*

IN n

CG SDR

Multiviewer Monitoring Gallery

Playback

SDR/
REC 709

REC
709
HLG

HDR HLG

IN

MV

HLG

PGM	PVW

CAM 1	CAM n	PLAY	CG

Graphics

SDR/
REC 709

REC
709
HLG

HDR HLG

IN

AUX

Switcher Panel

HLG

HLG

HLG
REC
709

SDR/ REC 709

SDR Rec 709
Monitor

HDR HLG
Monitor

HLG*   HLG painted (RCP)

HLG
REC
709

Converter/LUT box
(e.g. AJA FS.HDR)

2.4.1   Components

Camera:

- AMIRA or ALEXA Mini cameras
- selected look: "ARRI 2100 HLG 1K 200"
- Output Color Space for SDI: "Rec. 2020"

RCP:

- Sony RCP 1500, Skaarhoj RCPv2 (or compatible) for camera matching and painting.

External Sources:

- Character generator (lower thirds, graphics):
  content may need to be converted from SDR to HLG, using a converter like AJA FS-HDR
- Video feeds:
  SDR Rec. 709 sources need to be converted using a converter like AJA FS-HDR
- AJA FS-HDR converter:
  for converting SDR Rec. 709 sources to a HLG signal or,
  for converting HLG PGM to SDR PGM output in SDR Rec. 709

Switcher:

- No specific requirements for the switcher in this workflow
- No specific settings are needed on the switcher compared to SDR Rec. 709
- Switcher PGM output is a HDR HLG signal
- For a SDR Rec. 709 signal, the switcher PGM output is converted to SDR by a converter box like AJA FS-HDR
- Multiviewer signal is provided in HLG (SDR)

Monitoring:

- Professional HDR Studio monitor like Sony X 300, Eizo CG 3145, TV Logic LUM-310R or others
- SDR Studio monitor supporting Rec. 2020 (HLG SDR signal requires a Rec. 2020 capable monitor)
- Consumer HDR (or SDR) monitor for Multiviewer Monitoring

2.5 HDR LogC workflow configuration & components for PQ and HLG

AMIRA Multicam Workflow for PQ and Log C based alternative Workflow for HLG
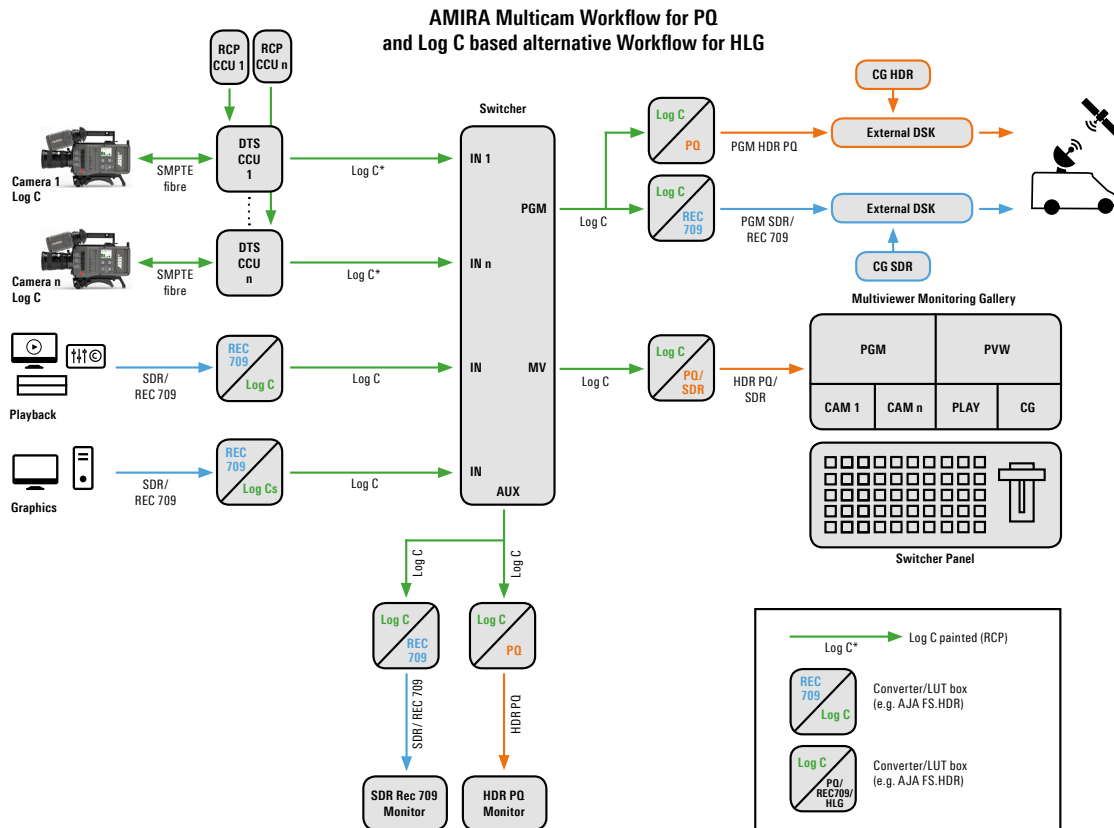
2.5.1 Components

Camera:

- AMIRA or ALEXA Mini cameras
- selected look: "ARRI 2100 PQ 1K 200" (or other PQ look depending on target nits)
- Output Color Space for SDI: "Rec. 2020"

RCP:

- Sony RCP 1500, Skaarhoj RCPv2 (or compatible) for camera matching and painting.

External Sources:

- Character generator (lower thirds, graphics):
  content needs to be converted from SDR Rec. 709 to Log C, using a converter like AJA FS-HDR
- Video feeds:
  SDR Rec. 709 sources need to be converted using a converter like AJA FS-HDR
- AJA FS-HDR converter:
  for converting SDR Rec. 709 sources to Log C or,
 for converting Log C to SDR Rec. 709 or PQ

Switcher:

- No specific requirements for the switcher in this workflow
- No specific settings are needed on the switcher compared to SDR Rec. 709

- Switcher PGM output is a Log C signal
- For a SDR Rec. 709 signal, the switcher PGM output is converted to SDR by a converter box like AJA FS-HDR
- Multiviewer signal is provided in SDR Rec. 709 or PQ

Monitoring:
- Professional HDR Studio monitor like Sony X 300, Eizo CG 3145, TV Logic LUM-310R or others
- SDR Studio monitor
- Consumer HDR (or SDR) monitor for Multiviewer Monitoring

3 Supported RCP Parameters

AMIRA and ALEXA Mini camera products support remote control with Sony RCPs. With SUP 5.0 (or higher), the following parameters are supported. With other RCPs different parameters may be supported.
With devices supporting CAP like Skaarhoj RCPv2, additional camera control parameters are supported.

- Iris Control:
  ENG style PL lenses and ENG style B4 lenses via the Hirose 12/20 pin connection
  EF lenses via the lens contact on the mount and
  Cinestyle lenses using the CMotion Broadcast camin as interface between the Hirose connector and the lens motor
- Auto Iris
- Black R/G/B
- Master Black
- White R/G/B
- 5600K Override
- Auto White Balance
- ND filter selection
- Detail
- Master Gain
- Gamma R/G/B
- Master Gamma
- Master Black Gamma
- Master Knee
- Saturation
- Scene Files
- Call
- Color Bars
- Shutter
- ECS Shutter
- White Balance

Note:
Specific behavior for „Auto White Balance":
In the AMIRA color processing signal flow, the „Auto White Balance" function is processed before the RGB white or black processing. This is different to typical 2/3' cameras, and needs to be considered when using „Auto White Balance" for „neutralizing" the image. With AMIRA, after performing „Auto White Balance", the RGB setting is still set and not „neutralized".

Look support
Please make sure you have a look loaded which is editable, and not a „factory default" look included in the camera. These looks cannot be edited. Please use the ARRI 709 Multicam look, or make a copy of a look (within the look section of the camera menu) or select an imported individual look. If a look is not editable, the RCP controls of parameters affecting the look (all color or gamma related parameters), will not change.

4   General System Setup

4.1   Required Devices

In addition to the AMIRA camera, the following hardware is required to allow remote controlling the camera by an RCP:

- RCP: Sony RCP 1500 or Skaarhoj RCPv2
- For Sony RCPs: SSCP device: Sony CNA-1 or DTS1840 Ethernet Remote Interface or equivalent
- Skaarhoj RCPv2 does not require a SSCP device
- Ethernet connection cables

For a serial RCP to SSCP device connection:

- Serial cable for connecting RCP and SSCP device

For an Ethernet RCP to SSCP device or direct connection:

- Ethernet switch supporting PoE (or PoE injector for powering SSCP device and RCP)

Optional components

- When using AMIRA SUP 5.0 (or higher) with the single or dual 6G output for UHD up to 60p, please make sure to update your camera at an ARRI service station with the latest SDI output board (IAOX RevH) to ensure best 6G or dual 6G Performance.
- A modified input board (IAOXM) is available which allows a separate genlock input, see details in the genlock chapter.
- A modified AMIRA media door is available as spare part, allowing the Ethernet cable connected while the door is closed
  Alternatively a flat Ethernet cable and connector may be used when using the standard media door.
- Camera On-board monitor with optional yoke for camera top back mounting position
  (The on-board monitor is not an essential requirement, but typically used for a studio-like setup, where the operator is located behind the camera and controls zoom and focus with rear camera controls.)
- AMIRA Multicam Monitor mount for Sony 740/741 monitors (K2.0010247), adapters are available for the TV Logic 7' monitors
- Lens controls for Zoom and Focus, depending on the used lens type, or ARRI Master Grips

4.2   Camera Setup

- SUP version:
  It is strongly recommended to have the latest AMIRA or ALEXA MINI SUP 5.4 (or higher) installed.

- Activate Genlock: to synchronize the HD-SDI outputs by the studio clock, go to MENU > SYSTEM > SENSOR > GENLOCK SYNC and set to SYNC IN.
  Use GENLOCK SHIFT to compensate for a phase shift between the studio clock and the HD-SDI outputs.
  With the modified IAOXM board (see details below in the Genlock chapter), the genlock is connected to the TC I/O connector, and can be synchronized separately.

  Note: This function is not available on ALEXA Mini, please get back to ARRI for a potential custom modification

- SDI Configuration:
  Go to MENU > MONITORING > SDI and make sure that the HD-SDI outputs are configured matching to your setup.

- Video paths configuration:
  Select HOME > COLOR to configure the image processing for each video path.
  Set SDI to LOOK for the color adjustments by the RCP being baked in into the SDI output signals.
  Note: Make sure the SDI 1/2 processing is not set to ALEXA Classic 709.

Set REC to LOOK if you want the color adjustments by the RCP to be baked in into the internal recordings on the CFast card.
Select Log C for recordings or SDI outputs not having the looks been baked into the signal, but the look parameters being carried in the metadata.

- Framerate and Shutter
  Select HOME > FPS to set the desired sensor frame rate, and HOME > SHUTTER to set the desired shutter or exposure time.
  Make sure the SDI output framerates are set accordingly.

- Static IP address:
  To enter a static camera IP address, please go to MENU > SYSTEM > NETWORK / WIFI > LAN static IP.

- Multicam mode:
  Go to: MENU > SYSTEM > MULTICAM:
  Set the IP address and port of the corresponding SSCP device.
  Note: when using a CNA-1, the port must be the same as the one configured on the CNA-1, under Gateway Configuration > Transport Select > LAN Port Configuration.
  Enable the Multicam mode checkbox.

- Set Look:
  You can select any look including HDR looks for multicam remote control. Please make sure the look can be modified. Just copy the selected look if you want to use a factory default look.

- Power level warning in home screen
  Depending on the provided power level by the transmission system, set the power warning settings accordingly: MENU > SYSTEM > POWER.

Note: Camera functions which are part of the RCP remote control, are not available on the camera, when the camera is in Multicam mode.

4.3   Lens Iris Control

- ENG style lenses PL and B4 (with an attached lens servo unit):
  The lens servo needs to be connected to the Hirose connector on the AMIRA PL mount.
- Cine Style PL lenses:
  a lens motor needs to be attached to the iris ring on the lens. The motor is controlled by the Broadcast Camin box from CMotion. The box is connected to the Hirose connector on the AMIRA PL mount.
  The Broadcast Camin3M must be connected with the RVI 9 cable, supporting the serial protocol.
  Note: Camin3M firmware version 3.11.20 is required, sw version 3.11.25 is not working, please use 3.11.20 or a version higher than 3.11.25.
- EF lenses:
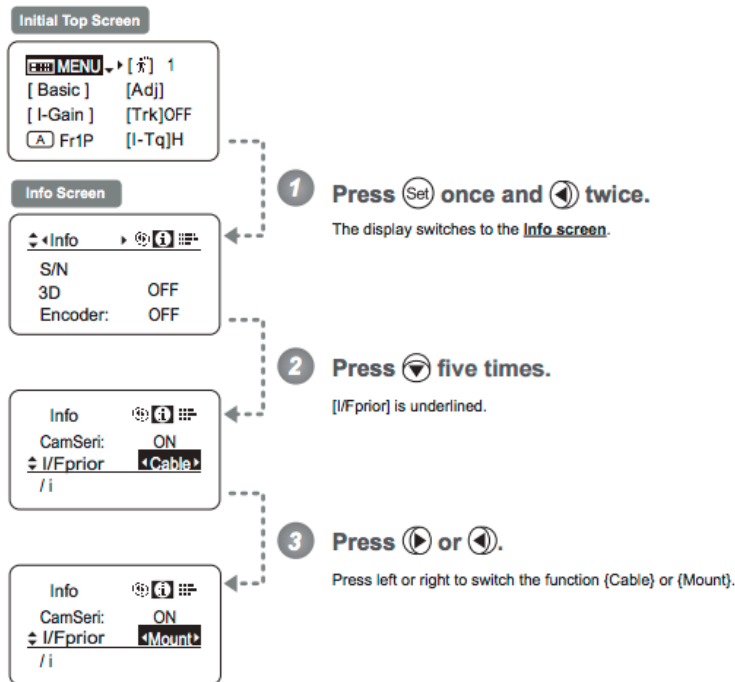 The iris control is supported by the EF mount included interface.

4.4 Lens settings for Canon CN 7x17 lens

In case the lens iris control does not work correctly, please check the following instructions (from the lens manual). For iris control with the RCP, the input route for the command signals needs to be set to "Cable".

Specifying the Input Route for Command Signals from the Camera ————

There are two input routes for command signals from the camera: via the mount and via the 12-pin cable. This setting specifies the input route for command signals from the camera. The default setting is "Mount," and in this case command signals received via the mount are given priority.

However, the command signals via the 12-pin cable are received automatically if no command signals are input via the mount. When the "Cable" setting is selected, only command signals received via the 12-pin cable are used.

Initial Top Screen

MENU → [ ] 1
[Basic]   [Adj]
[I-Gain]   [Trk]OFF
[A] Fr1P   [I-Tq]H

① **Press (Set) once and (◄) twice.**
The display switches to the **Info screen**.

Info Screen

↕ ◄Info   → ⊛ [i] ▦
S/N
3D   OFF
Encoder: OFF

② **Press (▼) five times.**
[I/Fprior] is underlined.

Info   ⊛ [i] ▦
CamSeri: ON
↕ I/Fprior ◄Cable►
/ i

③ **Press (►) or (◄).**
Press left or right to switch the function {Cable} or {Mount}.

Info   ⊛ [i] ▦
CamSeri: ON
↕ I/Fprior ◄Mount►
/ i

4.5 Lens settings for Fujinon Cabrio lenses

Fujinon Cabrio zoom lenses can be operated in three different modes:

1. Operation by cable
   - Zoom control
   - Iris control (auto iris)
   - VTR (record start/stop)
   - RET (RET user button)
   - Full lens control via Master Grips and WCU-4
2. Operation by lens mount (LDS protocoll)
   - Zoom control
3. Operation by lens mount (Cooke /i protocoll)
   - Zoom control
   - VTR (record start/stop)
   - RET (RET user button)

NOTE: Operation via lens mount is not possible with a connected cable

Fujinon Cabrio dip switches:
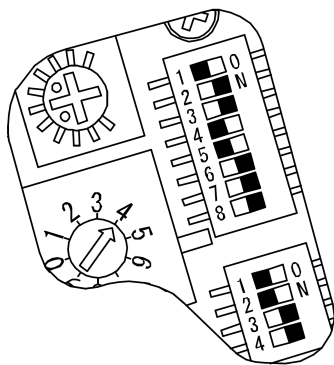
1: QuickZoom ON/OFF Switch
2: VTR -> QuickZoom Select Switch
3: Return -> QuickZoom Select Switch
4: Auxiliary Switch
5: Auto Cruising Zoom ON/OFF Switch
6: Auxiliary Switch
7: Iris A-M Position Change Switch
8: Auxiliary Switch

1: Camera Communication ON/OFF Switch
2: LDS, /i Select Switch
3: Analog Zoom Demand
4: Auxiliary Switch

For full functionality with AMIRA, we recommend to use the following dip switch settings:

QuickZoom:	ON	enables QuickZoom button
VTR -> QuickZoom:	OFF	use VTR button for recording, not for QuickZoom
Return > QuickZoom:	OFF	use RET button as user button, not for QuickZoom
Iris A-M Position change:	OFF	do not invert iris button settings, M = manual, A = auto
Camera Communications:	ON	mandatory for camera communication
LDS, /i switch:		use ON for LDS protocoll, OFF for Cooke /i protocoll

For further information on Fujinon dip switch settings please refer to the corresponding Fujinon operation manual.

4.6   Compatible Fujinon ELH Large Lens Adapters

"yes" is compatible.

ELHonSAP_Sheet1[1]

Model Name	w/ Switch for Serial Comm.
ELH-112A-01AA	
ELH-112A-01AB	YES
ELH-112A-08A	
ELH-112A-34A	
ELH-112A-34AE	YES
ELH-112A-34AG	
ELH-112A-35A	YES

5   Network setup

Note: It is recommended to always proceed a factory reset before starting the setup

5.1   Settings for the RCP connected by Ethernet:

IP addresses used in the following configuration sample:

SSCP device	192.168.1.1	CNA-1 standard after reset
Sony RCP-1500	192.168.1.2	
AMIRA	192.168.1.3	
Computer	192.168.1.99	
Subnet mask for all: 255.255.255.0		

Note: Please make sure that all IP addresses are in the same client address space, like: 192.168.1.xxx.

5.2   Network Configuration

Instructions below are referring to Apple OS

1.   System settings > Network > Ethernet (select in left column)
2.   Enter these settings:
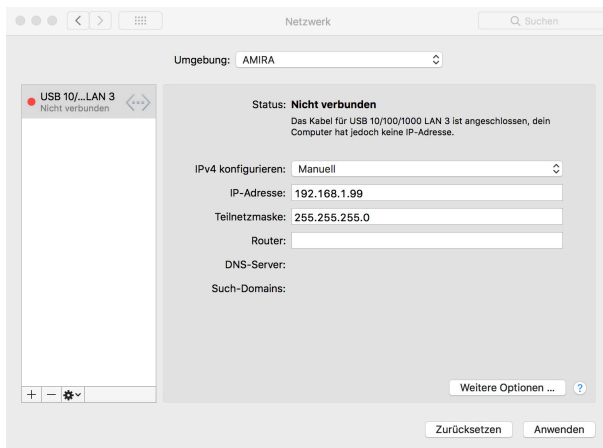
Network settings on Apple OS

3.   Confirm your settings

6   SSCP device setup

6.1   CNA-1 Basic Setup

With the standard setting after a factory reset, the IP address 192.168.1.1 is used by the CNA-1. This allows the configuration using a regular web browser and this credentials:

Login: admin
PW: password

1.   To proceed a reset: push the reset button on the frontside for about 10 sec.
2.   Open the browser and enter the IP address (192.168.1.1)
3.   Enter Login and password
4.   Click CNS tab

Note: You can configure a different IP address on the System tab.

6.2 CNA-1 Serial Cable Connection

Please use these settings for connecting the RCP with the CNA-1 by a serial connection (and not the Ethernet connection):

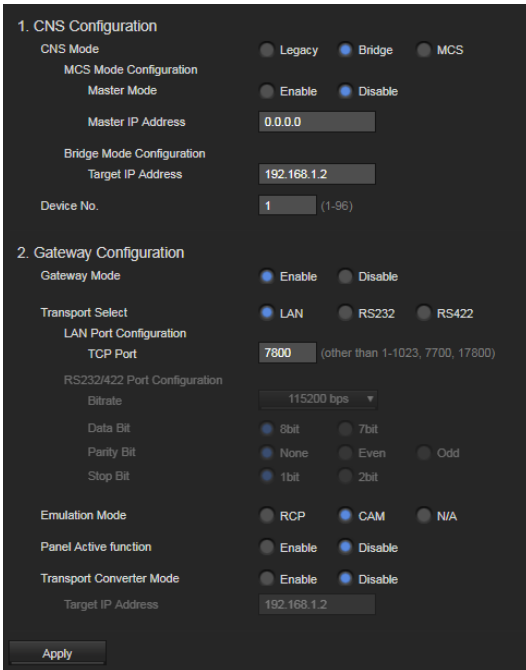|	
CNS Mode	Legacy
MCS Mode Configuration	
Master Mode	Disable
Master IP Address	*not relevant*
Bridge Mode Configuration	
Target IP Address	*not relevant*
Device No.	*not relevant*
Gateway Mode	enable
Transport Select	LAN
LAN Port Configuration	
TCP Port	7800
Emulation Mode	CAM
Panel Active function	Disable
Transport Converter Mode	Disable
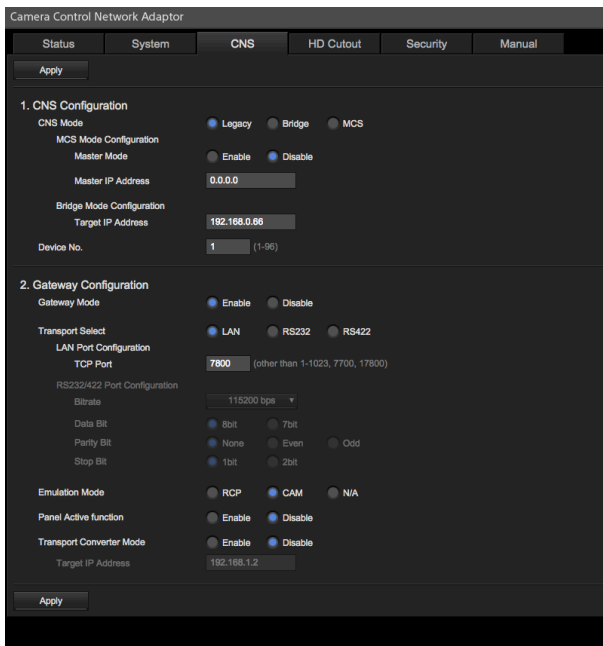
Sony CNA-1 web configuration interface with RCP connected with serial cable

6.3 CNA-1 Ethernet Cable Connection

Please use these settings for connecting the RCP with the CNA-1 by an Ethernet connection (and not the serial connection):

CNS Mode	Bridge
MCS Mode Configuration	
Master Mode	Disable
Master IP Address	*not relevant*
Bridge Mode Configuration	
Target IP Address	RCP IP Address

Device No.	*not relevant*
Gateway Mode	enable
Transport Select	LAN
LAN Port Configuration	
TCP Port	7800
Emulation Mode	CAM
Panel Active function	Disable
Transport Converter Mode	Disable

Sony CNA-1 web configuration interface with RCP connected with Ethernet cable

6.4 CNA-1 –Master Control Unit (MCU) setup

Please use these settings for connecting the MCU with the CNA-1 by a serial connection:

CNS Mode	MCS
MCS Mode Configuration	
Master Mode	Disable
Master IP Address	MCU IP address
Bridge Mode Configuration	
Target IP Address	RCP IP address
Device No.	as desired
Gateway Mode	enable
Transport Select	LAN
LAN Port Configuration	
TCP Port	7800
Emulation Mode	CAM
Panel Active function	Disable
Transport Converter Mode	Disable

6.5 DTS 1840 Ethernet Remote Interface setup

Please proceed likewise, following the DTS manual instructions (available separately).

Note:
A RCP Ethernet connection with the DTS 1840 ERI is only available with the appropriate ERI option, please make sure you have this installed.
You may also use a CNA-1 instead of the DTS ERI, together with the DTS fiber system.

7   Sony RCP-1500 Setup

The following settings are required to setup the RCP with an Ethernet (not serial) connection:

7.1 Firmware version

Functionality is tested with fw version 2.91. It is recommended to update a previous RCP firmware version to this version. The actual firmware can be found here: https://www.servicesplus.sel.sony.com/sony-software-model-RCP1500.aspx
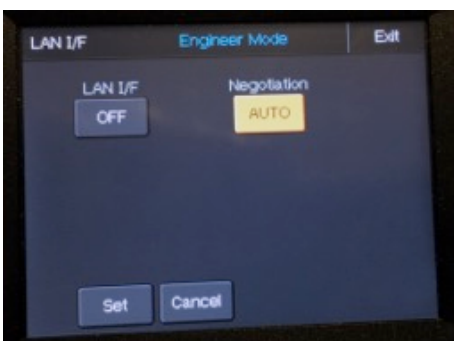
7.2 Activate Engineer Mode
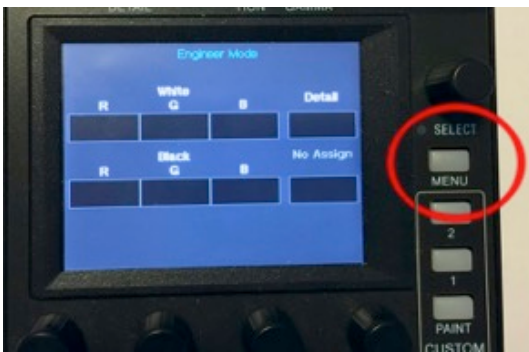
Sony RCP-1500 – Home Menu

Push **MENU** button > push **Config** button > push **RCP** button > push **Security** button > push **Engineer Mode** button: Orange for ON > push **Exit** button push > **Network** button

7.3 LAN I/F Menu Settings

Push **LAN I/F**" button

LAN I/F	OFF (grey, not orange)
Negotiation	Auto (orange)

Screenshot of Sony RCP-1500 – LAN I/F Menu

Push „**Set**" button > push **Exit** button
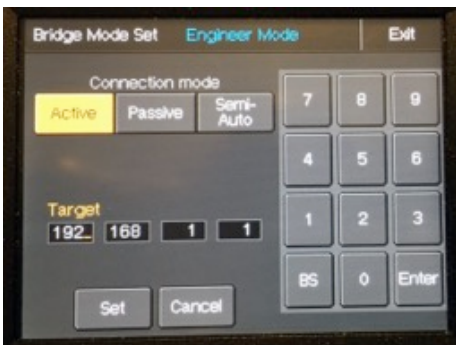
7.4 Settings CNS Menu

Push **CNS**" button > push **Bridge** > push **Edit** and enter these settings:

Connection mode	Active	
Target	192.168.1.1	SSCP device IP Address

Screenshot of Sony RCP-1500 – CNS Menu

Screenshot of Sony RCP-1500 – CNS- Bridge Mode Set Menu

Push **Set** button > push **Exit** button

7.5 Settings TCP/IP Menu

Push **TCP/IP** button and enter this settings and confirm each with enter

IP Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0.

Screenshot of Sony RCP-1500 – TCP/IP Menu

Push **Set** button > push **Exit** button

Push **Menu** button to exit the settings

7.6 Operational RCP settings

7.6.1 PANEL ACTIVE, IRIS/MB ACTIVE and ABSOLUTE buttons

Please make sure you have the PANEL ACTIVE buttons activated for all RCP operation.
For iris and master black control you need to activate the IRIS/MB ACTIVE button.
The ABSOLUTE button for RGB white and black should be set to the intended mode.
Please note: the manual Kelvin dial for white balance cannot be adjusted with the ABSOLUTE button active.

7.6.2 Activation of the extended Pain Menu:

In order to get access to all paint parameters available (22 pages), e.g. like manual White Balance setting, the RCP must be configured accordingly:
- Activate the engineering mode (see further above) and go to MENU > CONFIG > RCP > CUSTOMIZE > CUSTOM MENU SW:
- Push one of the CUSTOM buttons 1 or 2 above the PAINT button.
- Select „Paint" with the left rotary control below the menu display and confirm by pushing "Enter" on the touchscreen
- On the touchscreen display push „Save"
- You will find the extended paint menu when pushing the selected CUSTOM button

7.6.3 SHUTTER OFF behavior

In SHUTTER OFF mode, the exposure time is referring to the SDI 1 Output framerate and is 1/double framerate (where possible).

Progressive formats:

25fps -> 1/50 or 30fps -> 1/60

50fps -> 1/100 or 60fps -> 1/120

Interlaced format behave adequate (even though the sensor runs on double framerate):

50i or 50psf -> 1/50,

60i or 60psf -> 1/60.

Please note: the reference for the framerate is the framerate set at the SDI 1 output.

7.6.4 AUTO IRIS mode

When AUTO IRIS is active, the iris cannot be changed with the joystick on the RCP

7.6.5 Shutter On/Off

~~When changing framerates on the camera, the shutter will only be updated on the RCP after the Shutter on the RCP has been switched Off and On.~~

➔ Fixed with SUP 6.1

7.6.6   Master Gain - ASA

With the selected gain levels on the RCP, the equivalent ASA levels are set in the camera

-6 dB	=	400 ASA
-3 dB	=	640 ASA
0 dB	=	800 ASA
+3 dB	=	1280 ASA
+6 dB	=	1600 ASA
+9 dB	=	2560 ASA
+12dB	=	3200 ASA

8   Skaarhoj RCPv2 setup

Skaarhoj RCPv2 does support direct Ethernet connection and does not need an additional tool. For general configurations please follow the Skaarhoj manual instructions (available separately).

Default password for the CAP interface is "skaarri".

9   Camera Remote Control by CAP

The camera can be fully remote controlled with the CAP interface available through Ethernet or WiFi connection. Amongst all typically required camera control functions, CAP also supports the tally command and the return switch trigger.

Access to the CAP protocol is available through the ARRI partner program. Please contact the ARRI service or an ARRI sales representative for further information.

10 Synchronization (Genlock)

The AMIRA by default has a single BNC connector for return-in and genlock. When syncing to a studio clock, the return in (PGM) signal is used to sync the camera to the studio clock, so that the HD-SDI outputs of the AMIRA are in sync to the studio clock.

The input for the sync input signal can be selected in the camera menu: MENU > SYSTEM > SENSOR > GENLOCK SYNC.
The AMIRA provides a genlock phase shift, so that the output signal can be adjusted to the studio clock.

10.1 Separate genlock input

For specific requirements, the AMIRA can be modified with a specific (IAOXM-A1, K3.0016910) input board, which provides a separate genlock input at the TC I/O connector. This allows for a separate sync shift without affecting the return input.

To modify an existing camera with this board, please contact ARRI service for the modification. For new cameras, please order the board with your camera order.

The input for the sync input signal can be selected in the camera menu: MENU > SYSTEM > SENSOR > GENLOCK SYNC > SYNC IN or TC IN or REF IN/ANALOG. The REF IN/ANALOG option is available in the menu, if an IAOXM-A1 board is included in the camera. The naming label of the connector shows (TC IO / REF IN) accordingly.

The latest generation of the IAOXM board includes a 75Ohm terminating resistor on the TC IO/REF IN connector. This improves the reliability of a Trilevel Sync input, but limits the TC input on the other side (see next chapter for details).

10.1.1 Timecode synchronization with the IAOXM board:

With the IAOXM board included, the timecode sync is not fully supported, you will see the error message "LTC signal is missing". Nevertheless, the timecode values are taken over which you may use for syncing your CFast card recordings.

Please connect the timecode source directly to the camera, as timecode signals connected through the fiber system may not work. Preferably just use a timecode generator with steep amplitudes, like models from Ambient Recordings.

In order to support timecode synchronized recordings on the CFast card, the following "jam-sync style" workflow is suggested.
Connect the timecode source, on home screen click TC > OPTIONS > TC BNC MODE and set to TC IN, then click (TC > OPTIONS >) MODE > REGEN.

After completion, disconnect the TC source
and connect the genlock source to the TC I/O connector, and make sure it is set to: MENU > SYSTEM > SENSOR > GENLOCK SYNC > REF IN/ANALOG.

Note:

Please contact the ARRI service or an ARRI sales representative for further information.

11 Tally support

In addition to modify image parameters with an RCP, AMIRA can also receive green and red tally information. The AMIRA displays the tally by lighting up the integrated tally lights on the EVF (red only) and on the camera back (red only), plus a red and green tally overlay in the lower third part of the MVF is displayed as well as on the SDI outputs (if configured to "processed").
There are two ways to send a tally command to the camera:

11.1 Tally by CAP

The Tally commands are included in the CAP protocol, starting with SUP 5.2. CAP is a protocol interface for remote access to the camera, and it is available within the ARRI partner program.
The Ereca CAM Racer supports this function.

11.2 Tally by Telnet command

A second path for the tally commands are telnet commands:
To display the tally on an AMIRA, the AMIRA provides a telnet interface on port 40000 that can be accessed via Ethernet or WiFi. The command "tallyengage <parameter>" controls the tally output on the AMIRA, where <parameter> may be 1 to activate tally, and 0 to deactivate tally.

As an example, the communication with an AMIRA with IP address 192.168.0.104 is given below. The bold texts are entered by the commanding system, the regular texts show the responses sent by the camera.

First, a connection to the camera is established. Then the command "tallyengage 1" is sent, which activates the red tally on the AMIRA. Next, the command "tallyengage 0" is sent, which disables the tally on the AMIRA.
The command "tallyengage 2" activates the green tally.

```
$ telnet 192.168.0.104 40000
Trying 192.168.0.104...
Connected to 192.168.0.104.
Escape character is '^]'.
tallyengage 1
Response: TallyEngage
Result: 0 "Done."
tallyengage 0
Response: TallyEngage
Result: 0 "Done."
```

```
tallyengage 2
Response: TallyEngage
Result: 0 "Done."
```

A tally injector is available as a reference model from ARRI. This is connected to the mixer (providing a close contact command) on the one end, and to the Ethernet on the other end, providing a Tally command for the camera by Ethernet. Other providers (like DTS) or system integrator may provide their own solution here.

A tally injector can be easily done:
Just connect the inputs of an Arduino or Rasberry Pie with the outputs of the mixer, program some lines of code for the telnet command triggering the camera tally (see details above, please contact ARRI if more info is requested), and use the Ethernet network to send the command to the camera.

The DTS1840 Ethernet Remote Interface supports this function.

12 Web Remote

It may be useful to have a laptop attached to the Ethernet network. This allows using the web remote interface (with a web browser) of each camera to check and modify camera parameters, and to e.g. trigger internal recording on cameras.

The web remote can be accessed with a web browser by entering the IP address of the camera and is also available by WiFi access.

Alternatively, the AMIRA can be remote controlled with the CAP protocol.

13 Contact

If you have any questions regarding AMIRA Multi Camera Setups, please feel free to contact your local ARRI sales representative or the ARRI camera service.