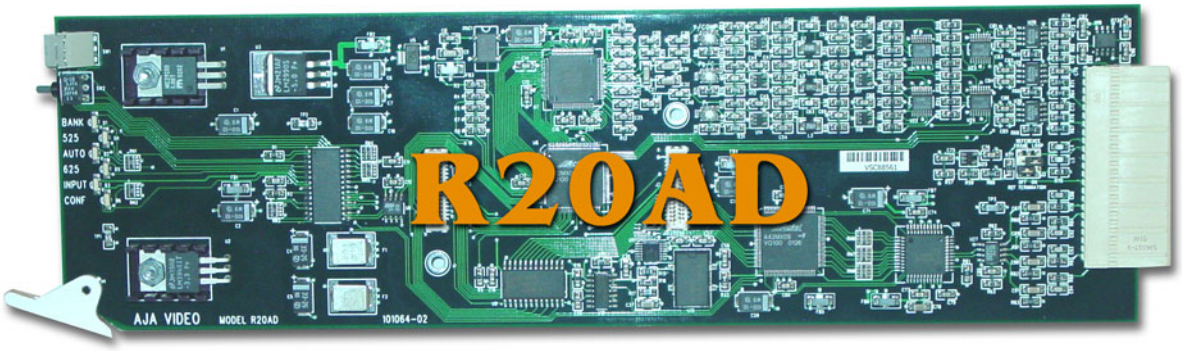
R20AD 10-bit Universal Decoder
R-series Card Module

User Manual



AJA VIDEO SYSTEMS INC

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443 Crown Point Circle, Grass Valley, CA. 95945 USA

Telephone: +1.800.251.4224 or +1.530.274.2048
Fax: +1.530.274.9442

Web: http://www.aja.com
Support Email: support@aja.com
Sales Email: sales@aja.com

When calling for support, have all information on the product (serial number etc.) at hand prior to calling.

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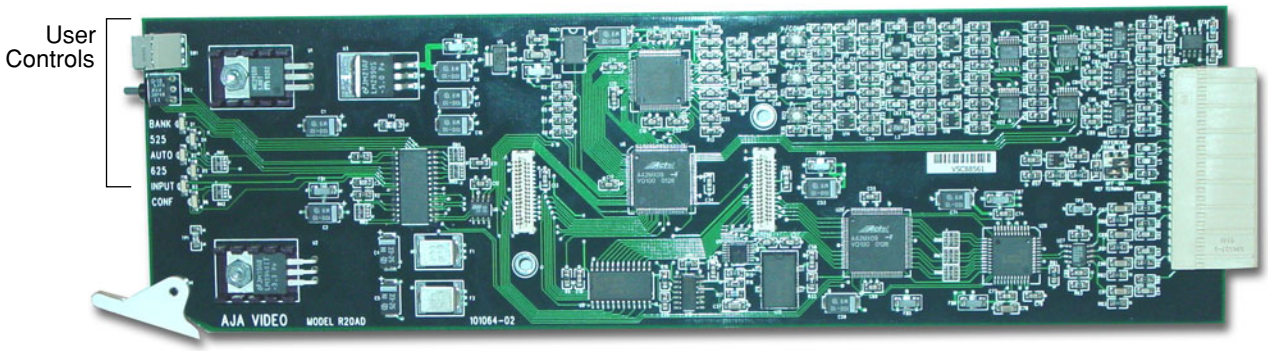
Introduction

The AJA R20AD provides excellent-quality 10-bit conversion to SDI from component or NTSC/PAL sources. The R20AD accepts YPbPr (SMPTE, EBU-N10), Betacam, or RGB component inputs and NTSC/PAL or Y/C (S-Video) composite inputs. Featured in the R20AD is a 4 Line Adaptive Comb Filter for high quality decoding of composite sources. The comb filter can be switched to 2-line, or notch modes for minimum delay requirements. The R20AD also accommodates an optional FSG card (Frame Sync) for synchronizing the output video relative to an external reference. NTSC/PAL configuration is automatic. Video format, AGC, H/V blanking, and pedestal are all user configurable.

The R20AD is a 10.3" X 3.1" card, designed to plug into The AJA Video FR1-1 RU frame and the AJA Video FR2-2 RU frame.

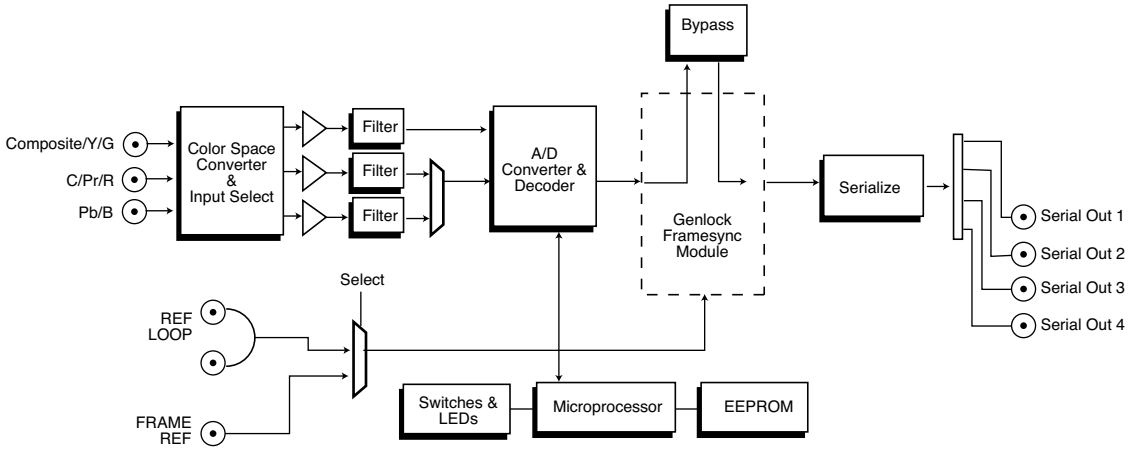
Features



R20AD Card Module, Side View

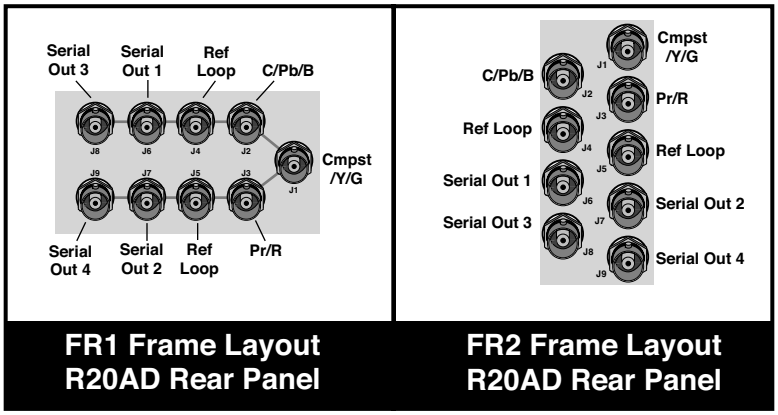
- Excellent quality 10-bit adaptive comb filter decoding
- Component (YPbPr, Betacam, RGB), PAL and NTSC Composite and Y/C (S Video) inputs
- Four serial outputs (SMPTE 259M)
- Automatic NTSC/PAL selection
- Configurable pedestal and Comb filter
- 2X Oversampling
- Frame Sync/Genlock option with external reference inputs and full timing adjustment
- Plug compatible with several other manufacturers' video frames

Block Diagram



R20AD 10-bit Universal Decoder, Block Diagram

I/O Connections

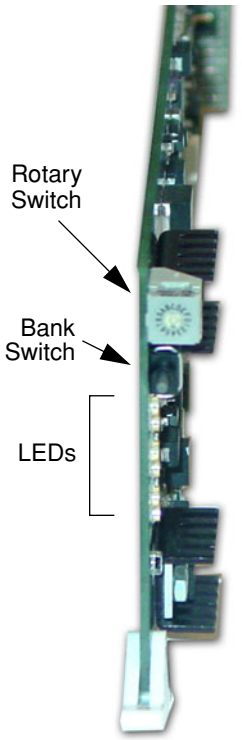


FR1 and FR2 BNC Connector Assignments, R20AD Card Module

When the R20AD module is installed in an AJA FR1 or FR2 frame, a corresponding group of 9 BNCs on the rear panel then provide I/O for the module. The illustration above shows the connector assignments for both the FR1 and FR2 when used with the R20AD.

Note: See the topic "*External Reference Information*" later in this manual for information on use of the *Ref Loop* BNCs versus the FR1/FR2 frame reference BNC when connecting an external reference video signal.

User Controls



The user interface for the R20AD consists of a 16-position hex rotary switch, a momentary action up/down toggle switch, and 6 LEDs that indicate status. The rotary switch selects a function or setting to be controlled by the toggle switch. The BANK LED (LED 1) shows which of two banks of functions are to be accessed. The LEDs are numbered 1-6 from top to bottom or left to right. The LEDs are labeled as follows:

LED	FUNCTION
1	BANK (LED OFF = Bank 0, ON = Bank 1)
2	525
3	AUTO (auto 525/625 select)
4	625
5	VID (video detected at input)
6	CONFIRM (for signaling memory load, errors, etc.)

Control Functions

The following tables describe the functions controlled by the user interface. To access a particular function, set the hex rotary switch to the appropriate function, and then use the toggle switch to adjust the selected function. For on/off type functions, such as Setup/NoSetup selection, move the switch to the UP/LEFT position to set the function or move the switch DOWN/RIGHT to clear the function. Multi-value functions such as INPUT MODE will rotate through the possible choices for the function. To control variables, such as framesync delay, the value of the function will be incremented or decremented each time the switch is momentarily moved either up, or down respectively. Holding the switch in either position causes the function to automatically increment or decrement, after a two second pause. With functions having more than two selections, the toggle switch cycles through the available selections.

Note: for input format selection, select either composite or component (function 4) before selecting between types of composite or component (function 5).

Bank 0 Functions

FUNCTION	DESCRIPTION	DETAILS
0	BANK SEL	Toggle UP/LEFT to select BANK 1 Toggle DOWN/RIGHT to select BANK 0 (Default)
1	INPUT MODE	Toggle to cycle through these selections: Auto Select (Default). **Currently, AUTO SELECT is the only selection.**
2	VERTICAL BLANK	UP/LEFT = Blank Vertical Interval DOWN/RIGHT = Pass Vertical Interval (Default) Currently, Pass Vertical Interval (narrow blanking) is the only selection
3	SETUP/PEDESTAL REMOVEL	UP/LEFT = No Pedestal on Input Video DOWN/RIGHT = Input Pedestal Present (Default) *Functions only IN NTSC*
4	COMPONENT/ COMPOSITE	UP/LEFT = Component Input (Default) DOWN/RIGHT = Composite Input
5	RGB/YPbPr/YC	UP/LEFT = YPbPr if Component selected above or YC if Composite selected above DOWN/RIGHT = RGB if Component selected above or Composite if Composite selected above
6	COMPONENT LEVELS	UP/LEFT = SMPTE/EBU-N10 Levels (Default) DOWN/RIGHT = Betacam 525/60 Levels
7	AGC	UP/LEFT = Automatic Gain Control ON DOWN/RIGHT = Automatic Gain Control OFF (Default)
8	CLEAR EEPROM and RESET	Toggle either way to clear EEprom contents, then resets
9	RESET	Toggle either way to reset
A	COMB FILTER	UP/LEFT = Comb OFF DOWN/RIGHT = Comb ON (Default)
B	COMB TYPE	UP/LEFT = Adaptive 3 line Comb DOWN/RIGHT = Adaptive 4 line Comb (Default)
C	EDH	UP/LEFT = EDH OFF DOWN/RIGHT = EDH ON (Default)
D	TEST PATTERN	UP/LEFT = Pass Input (Normal Operation) (Default) DOWN/RIGHT = Output Internal Test Pattern
E	STORE/RECALL USER SETUP	Toggle UP/LEFT to Store Register Toggle DOWN/RIGHT to Recall Register
F	RESTORE DEFAULTS	Toggle UP/DOWN to Restore Default Settings

Bank 1 Functions—Frame Sync Option Only

FUNCTION	DESCRIPTION	DETAILS
0	BANK SEL	Toggle UP/LEFT to select BANK 1 Toggle DOWN/RIGHT to select BANK 0 (Default)
1	SET DEFAULT DELAY	Toggle UP/LEFT or DOWN/RIGHT = Restores FSG to factory defaults
2	SET LINE DELAY	UP/LEFT = Increases Output Delay by lines DOWN/RIGHT = Decreases Output Delay by lines
3	SET PIXEL DELAY	UP/LEFT = Increases Output Delay by pixels DOWN/RIGHT = Decreases Output Delay by pixels
4	<reserved>	
5	<reserved>	
6	<reserved>	
7	<reserved>	
8	<reserved>	
9	<reserved>	
A	<reserved>	
B	<reserved>	
C	<reserved>	
D	<reserved>	
E	STORE/RECALL USER SETUP	Toggle UP/LEFT to Store Register Toggle DOWN/RIGHT to Recall Register
F	RESTORE DEFAULTS	Toggle UP/LEFT to Restore Default Settings

Installation

Typically, R20AD installation consists of the following:

1. disconnect power from the frame (remove line cord)
2. remove the FR1/FR2 front panel
3. install R20AD card module
4. apply external color black reference at the frame's External Reference BNC
5. apply power to the frame by connecting a north american-style power cord from the frame to mains power (90 to 260 VAC)

Instructions for removing the frame front door for module installation is discussed in the *FR1/FR2 User Manual.*

External Reference Information

The R20AD expects the External Reference to be an NTSC or PAL analog Color Black signal. The External Reference input can come from two different sources on the R20AD. There are jumpers on the R20AD (see figure below) for selecting the external reference source and for optionally terminating the selected reference source.

Looping Reference

The R20AD cell group of 9 BNCs contains two BNCs that can be used for a looping reference connection. If this method is used, then the reference select setting on the R20AD should be set to "LOOP" and the TERMINATION setting should be set to "OFF" (no termination). Optionally, if you're using only one of the looping reference BNCs, then the TERMINATION setting should be set to "ON."

Frame Reference

Alternatively, the R20AD installed in a FR1 or FR2 frame can use the frame's *frame reference input* BNC connector, which feeds an external reference video signal to all modules installed in the frame. How the signal is distributed differs for the FR1 and FR2 frames. Additionally, individual modules can usually be strapped as to whether external reference is distributed from the frame or directly to BNCs on the module's corresponding cell group (the 9 BNCs on the rear panel).

FR1 Frame: the external reference signal is distributed passively to all frame modules. If you wish to use the frame reference, the R20AD should have "FRAME" reference selected on the module strapping, and one and only one card in the frame should have "TERMINATION" set to "ON." All other cards in the frame should have TERMINATION set to "OFF."

FR2 Frame: the external reference signal is distributed by an in-frame distribution amplifier to all frame modules. This system terminates the Frame Reference input BNC and buffers the signal to all slots. If using frame reference, the R20AD installed in the FR2 frame should have "FRAME" set for reference select, and all cards should have TERMINATION set to "OFF."

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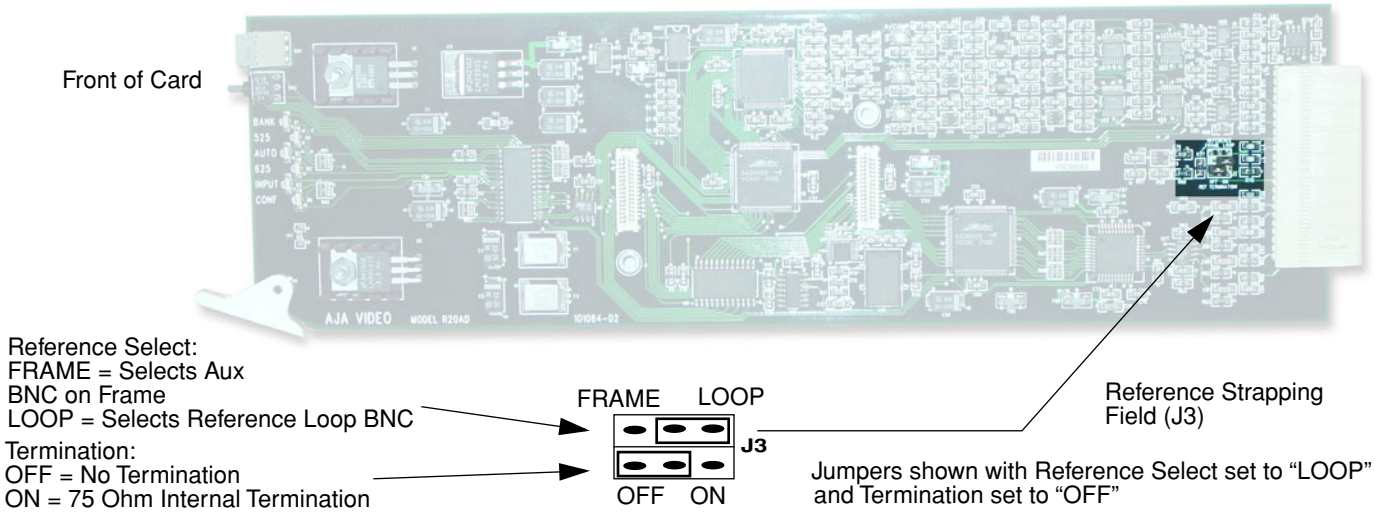

Reference Select and Termination Configuration

Output Timing Adjustment (With Model FSG Framesync/ Genlock Option

The following procedure provides instructions for output timing adjustment of the R20AD when used with the model FSG FRAMESYNC/GENLOCK option.

The R20AD has two levels of output timing adjustment:

- advance or delay by lines
- advance or delay by pixels (with l/4 pixel resolution)

And there are two modes of timing adjustment:

- Genlock
- Delay

If the board detects an external reference, it will be in Genlock mode. If there is no external reference detected, the board will be in Delay mode. In Genlock mode, the R20AD output will be genlocked to the external reference. The board can be set to Delay mode without removing the external reference by lifting the “REFERENCE SELECT” jumper J3.

Genlock Mode

1. Perform function 1 in Bank 1 “SET DEFAULT DELAY”. This will bring the output timing close to the reference’s timing.
2. Perform function 3 in Bank 1 “SET PIXEL DELAY”. This will allow adjustment to within 1/4 pixel of reference.

Delay Mode

1. Perform function 1 in Bank 1 “SET DEFAULT DELAY”. This will make the total delay through the R20AD to about 1 frame.
2. Perform function 2 in Bank 1 “SET LINE DELAY”. This will allow advancing and delaying of the output timing in Line increments.
3. Perform function 3 in Bank 1 “SET PIXEL DELAY”. This will allow advancing and delaying of the output timing in Pixel increments.

Note: In "*SET PIXEL DELAY,*" the first four increments are 1/4 pixel steps.

Specifications

Item	Specification
Input Format:	Component (YPbPr, Betacam), PAL and NTSC Composite and Y/C (S Video)
Input Level:	1Vp-p
Output:	SMPTE 259 Serial Digital Component
Reference Input Format:	NTSC or PAL Analog Color Black
Number of Outputs:	4 BNC
A/D Converters:	10-bits, 2x oversampling
Size:	Fits AJA R-Series Frames. Compatible with Leitch 6800 Series Frames.
Frequency Response:	Y +/- .15dB to 5.5MHz C +/- .15dB to 2.5MHz
Power Consumption:	7 Watts (8 watts w/Frame Sync option)