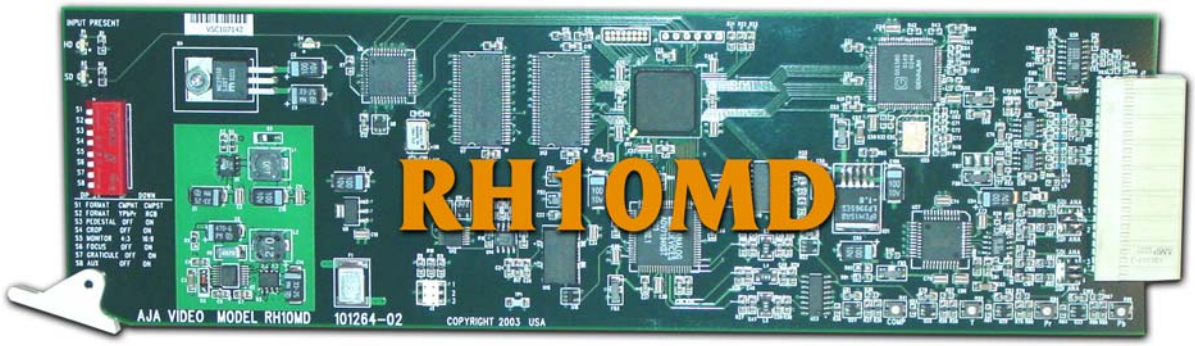
RH10MD

HD Down Converter and Re-clocking Distribution Amplifier (dual-rate) R-series Card Module

User Manual



AJA VIDEO SYSTEMS INC

September 21, 2006 P/N 101647-00

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by AJA Video can effect emission compliance and could void the user's authority to operate this equipment.

Contacting Support

To contact AJA Video for sales or support, use any of the following methods:

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 RH10MD is a 10-bit broadcast quality HD down converter and HD-SDI distribution amplifier. Provided are 4 re-clocked HD-SDI outputs, and four down-converted SD outputs. The SD outputs can be individually configured as analog or SDI—and the analog outputs can be component or composite.

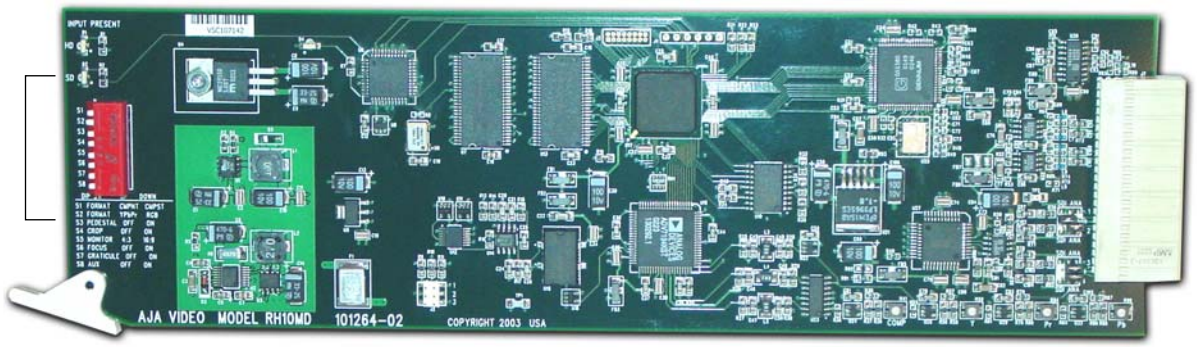
All HD formats are supported by the RH10MD, including 24p/psf with 3:2 pulldown. The input format suppled to the RH10MD is auto-detected—no configuration is necessary.

Serial digital output can be formatted for either 4:3 or 16:9 monitors. When used with 4:3 monitors, both Letterbox and Crop modes are supported.

The RH10MD is dual-rate (HD/SD) and supports SDI inputs. Four-channel AES embedded audio is passed through to the SDI outputs.

The RH10MD is compatible with AJA's FR1 and FR2 frames.

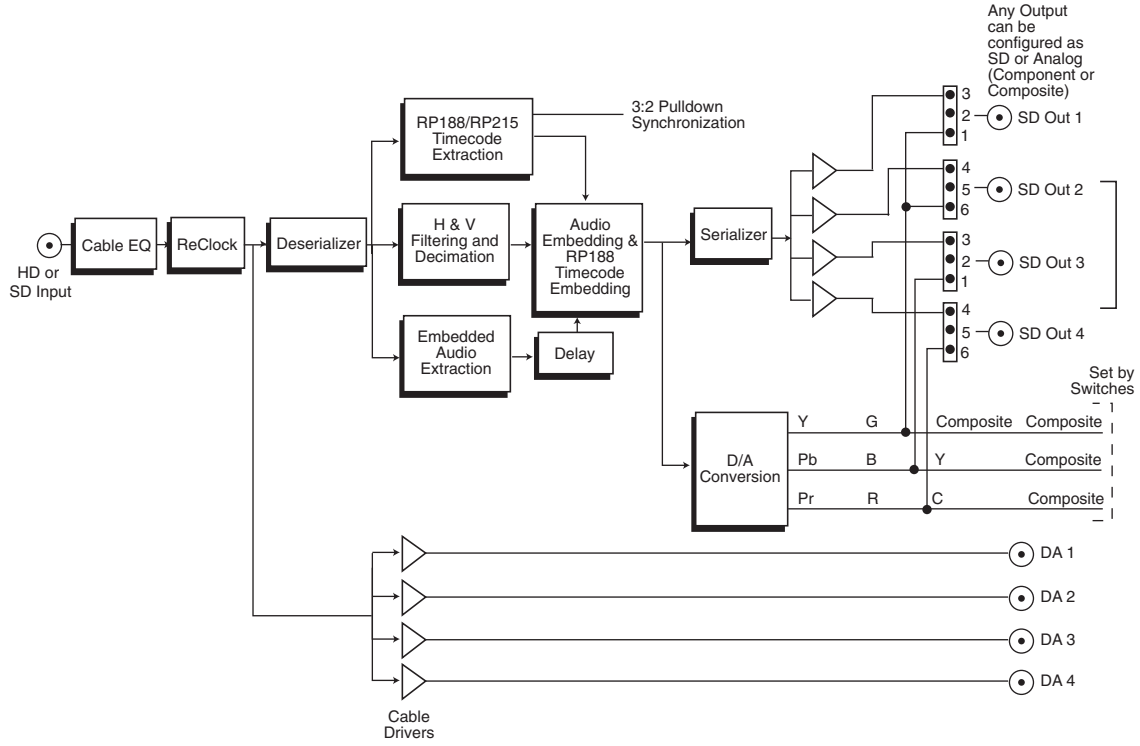
Features



RH10MD Card Module, Side View

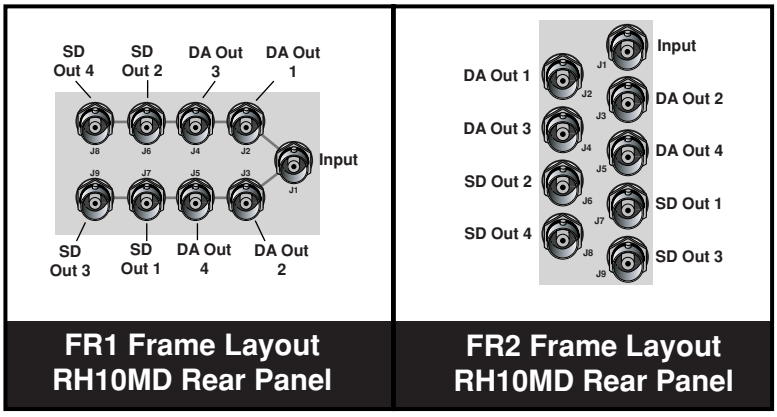
- Broadcast quality 10-bit HD to SD down conversion
- Broadcast quality 10-bit SDI and analog output
- 4 Equalized, Re-clocked DA outputs—HD-SDI or SDI (outputs follow input)
- Multi-Standard input, including 1080p24sf (3:2 pulldown)
- Configurable for 16:9 or 4:3 monitor
- Crop Mode or Letterbox Mode
- 4:3 Safe Zone graticule
- Supports 4-channel embedded audio (passed to SDI output)
- Audio features high quality 10-bit encoding and 4-times oversampling

Block Diagram



RH10MD, Block Diagram

I/O Connections

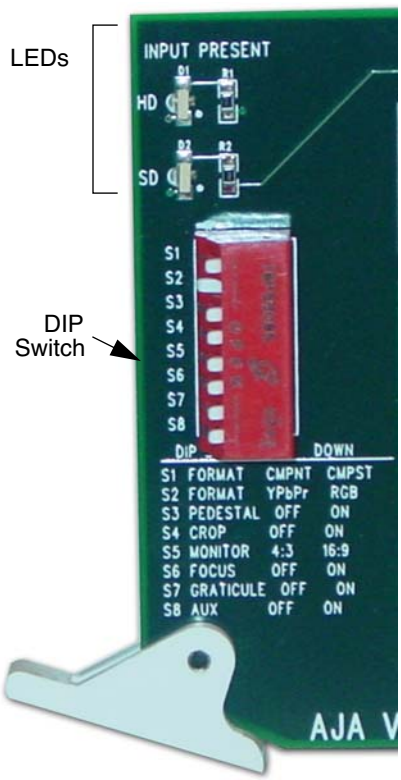


FR1 and FR2 BNC Connector Assignments, RH10MD Card Module

When the RH10MD 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 RH10MD.

Output configuration is discussed next in *User Controls*.

User Controls

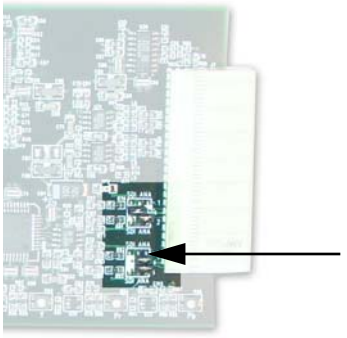


The user interface for configuring the RH10MD and selecting output formats is a dipswitch at the front of the card and some jumpers at the back of the card. Two LEDs at the front card additionally show the type of input present (HD or SD).

The four outputs labeled *DA Out* 1-4 are always serial digital, either HD or SD, depending on the input format detected. They are cable-equalized, and reclocked. The four outputs labeled *SD Out* 1-4 may be configured as either SDI or analog via 4 jumpers on the circuit board. These jumpers are located at the end of the board next to the large backplane connector where the card plugs into an FR1/FR2 chassis. These jumpers are labeled as “1”, “2”, “3”, or “4”, corresponding to the four SD output BNCs. This arrangement supports any combination of SDI or analog output. For example, 4 SDI, 4 composite, 2 SDI and 2 composite, etc. If a jumper is set for analog, then the corresponding output is defined by the dipswitch settings of S1, S2, and S8 as shown in the table below.

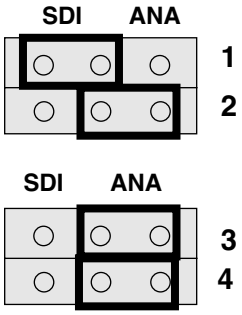
A jumper (J2) on the card allows you to select further options described later.

	S1 = Component (UP)	**S1 = Composite (Down)**
SD Out 1	Y if S2 = YPbPr (up) G if S2 = RGB (down)	Composite
SD Out 2	Y if S2 = YPbPr (up) G if S2 = RGB (down)	Composite
SD Out 3	Cb if S2 = YPbPr (up) B if S2 = RGB (down)	Composite if S8 = up Y of YC pair if S8 = down
SD Out 4	Cr if S2 = YPbPr (up) R if S2 = RGB (down)	Composite if S8 = up C of YC pair if S8 = down



Jumpers to Select Output Format

This example shows SDI selected for output 1 BNC, analog output for 2 BNC, and analog for 3 and 4 BNCs.



Control Functions

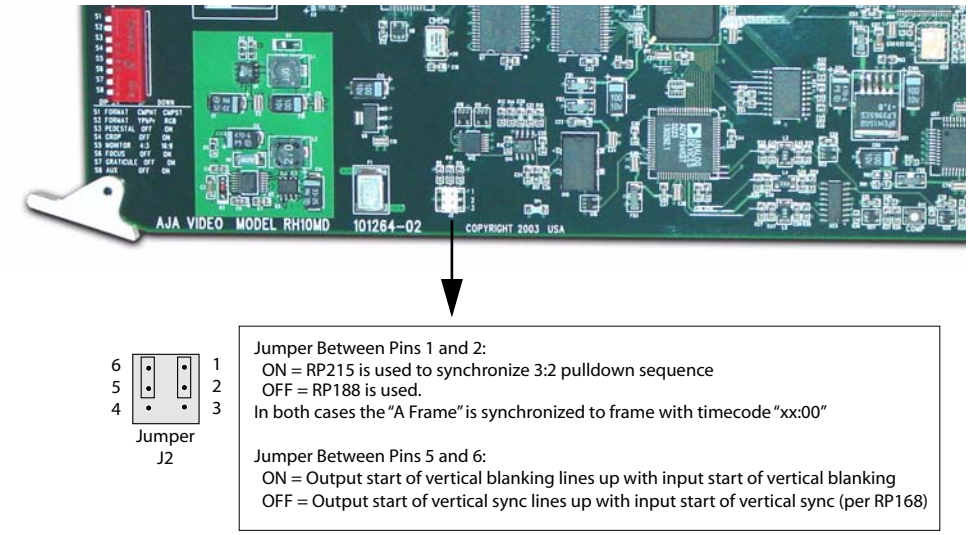
In addition to selecting output format, the 8-position dipswitch also controls many other configuration settings of the RH10MD card. These are described in the following table.

Switch Number	Description	Details
1	Analog Format	UP = Component DOWN = Composite
2	Component format	UP = YPbPr DOWN = RGB
3	Pedestal	UP = Pedestal Off DOWN = Pedestal On
4	Crop	UP = Horizontal Edges cropped off from input lines; all output lines are used DOWN = Black Bars top and bottom; all of input line is visible horizontally
5	Monitor	UP = 4:3 monitor; S4 selection in effect DOWN = 16:9 monitor; S4 has no effect; uses all input lines and pixels to make a full screen raster
6	Focus	UP = not in focus mode DOWN = Focus mode; overrides S4 & S5. Passes the middle 720 pixels and 486 lines with no filtering
7	Graticule	UP= Graticule Off DOWN = Display Graticule showing safe area for 4:3 material on the 16:9 raster
8	Composite All	UP = Composite on all analog outputs. S l must be down for this switch to take effect DOWN = Do not force composite on all outputs

* For Betacam 525 levels, select *Component*, *YPbPr*, and set *Pedestal* to “On.”

Jumper J2 Settings

Jumper J2 is located at the bottom of the card (shown in the photo below). The meaning of the jumper settings is detailled in the illustration:



Installation

Typically, RH10MD installation consists of the following:

1. disconnect power from the frame (remove line cord)
2. remove the FR1/FR2 front panel
3. install RH10MD card module
4. 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.*

Specifications

Item	Specification
Input Formats:	1035i/1080i/1080psf/1080p/720p SMPTE 292/296, or 525/625i SMPTE 259M 23.98/24/25/50/59.94/60 Hz Frame Rates 23.98 -> 525/59.94 (3:2 pulldown) 24 -> 525/59.94 (3:2 pulldown) (drop frame) 25 -> 625/50 50 -> 625/50 59.94 -> 525/59.94 60 -> 525/59.94 (drop frame)
Delay:	1 frame, audio and video
Outputs:	SDI, SMPTE, 259M, 10-bits, BNC HD-SDI SMPTE, 292/296, 10-bits, BNC YPbPr- (SMPTE, EBU-N10, Betacam) RGB, NTSC, PAL, YC (S-Video), 10-bits
Power Consumption:	6 watts