# HD10MD3 HDTV
# HD to SDI Down Converter

# User Manual



AJA VIDEO SYSTEMS INC

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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.

## Limited Warranty

AJA Video warrants that this product will be free from defects in materials and workmanship for a period of five years from the date of purchase. If a product proves to be defective during this warranty period, AJA Video, at its option, will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify AJA Video of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by AJA Video, with shipping charges prepaid. AJA Video shall pay for the return of the product to the Customer if the shipment is to a location within the country in which the AJA Video service center is located. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to any other locations.

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## Introduction

The AJA HD10MD3 is a miniature digital downconverter for converting HD-SDI video to standard definition SDI and analog component composite video. The HD10MD3 uses a full 10-bit data path and a multi-point interpolation to produce excellent quality down-converted video. In addition, the HD10MD3 converts either 23.98/24Hz 1080p23.98sf or 1080p24sf to a 59.94 Hz output video using the standard 3:2 pulidown technique. The output can be formatted for either 4:3 or 16:9 standard definition monitors. For 4:3 monitors, the output can be formatted for either the Letterbox or Crop modes. Four channel AES embedded audio is passed to the SDI output. The HD1OMD3 is also dual-rate in that SDI inputs pass to the SDI and analog outputs.
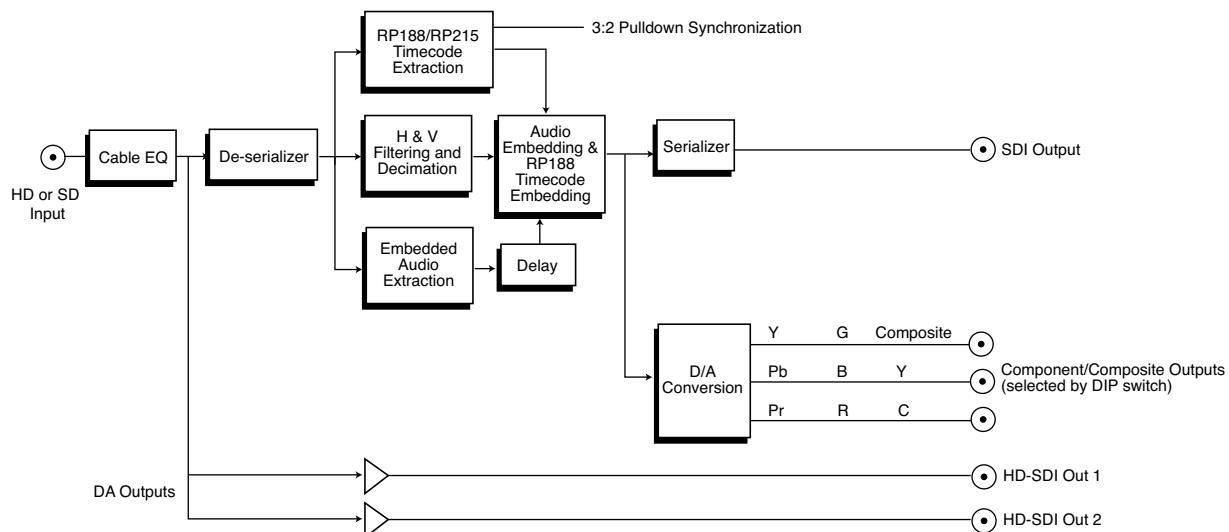
## Features

- Broadcast-Quality HD to SD down conversion
- Multi-Standard
- Dual-rate HD-SDI/SDI input
- HD-SDI/SDI outputs
- HD-SDI input: SMPTE 292/296 HD-SDI digital video
- HD-SDI outputs: Equalized and buffered copy of input
- SDI output: SMPTE 259 SDI digital video
- Analog outputs: Component or Composite video (10 bit)

- Input formats:1080i 50, 59.94, 60 Hz
    - 1080psf: 23.98, 24, 25, 29.97, 30
    - 1080p: 23.9B, 24, 25, 29.97, 30
    - 720p: 50, 59.94, 60 Hz
- External Dipswitch Configuration
- Power: 5-18V unregulated

**Note:**
The HD10MD3 automatically switches to PAL anytime the input is 1080i 50, 1080psf 25 or 1080p25. All other frames rates have an NTSC output: 60, 59.94, 30, 29.97, 24  and 23.98.

## Block Diagram



*HD10MD3 HD to SDI Down Converter, Block Diagram*

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## I/O Connections



HD/SD Input BNC

HDSD Loop Output 1 BNC

HD Loop Output 2 BNC

+ 5 to 18VDC Power Input

SDI Output BNC

Composite/ Component Output BNCs

Configuration Determined by DIP switch on other side of Converter
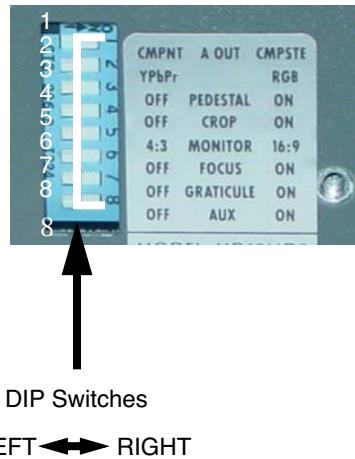
*HD10MD3, Side View*

## User Controls

The user interface for the HD10MD3 is an 8-switch DIP accessible through a cut-out in the bottom of the unit. Use the DIP switches to configure outputs, pedestal, blanking, and enable or disable noise reduction.

The exact function of each DIP switch and what it controls is described on the following pages.

A jumper accessible by removing the DIP-switch side of the case (requires removal of 4 screws) allows you to select further options described later.



DIP Switches

LEFT ◄───► RIGHT

### Switch 1—Selects Component or Composite Video on 3 Output BNCs

| LEFT | RIGHT |
|------|-------|
| Selects Component output | Selects composite video output |

### Switch 2—Selects Type of Component Video on 3 Output BNCs

| LEFT | RIGHT |
|------|-------|
| Selects YPbPr | Selects RGB |

### Switch 3—Turns Pedestal OFF/ON. In YPbPr Mode, use BETA Levels

| LEFT | RIGHT |
|------|-------|
| Pedestal Off | Pedestal On. This setting also changes analog output to BETA levels when in YPbPr mode |

### Switch 4—Format Crop Letterbox OFF/ON

| LEFT | RIGHT |
|------|-------|
| No crop | Crop On—if S5 switch *MONITOR* is set to 4:3 position |

### Switch 5—Selects Monitor Output to 4:3 or 16:9

| LEFT | RIGHT |
|------|-------|
| Selects 4:3 | Selects 16:9 |

### Switch 6—Turns Focus ON/OFF

| LEFT | RIGHT |
|------|-------|
| Turn Focus OFF | Turn Focus ON; zoom to center 720 x 486 image |
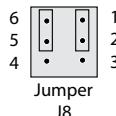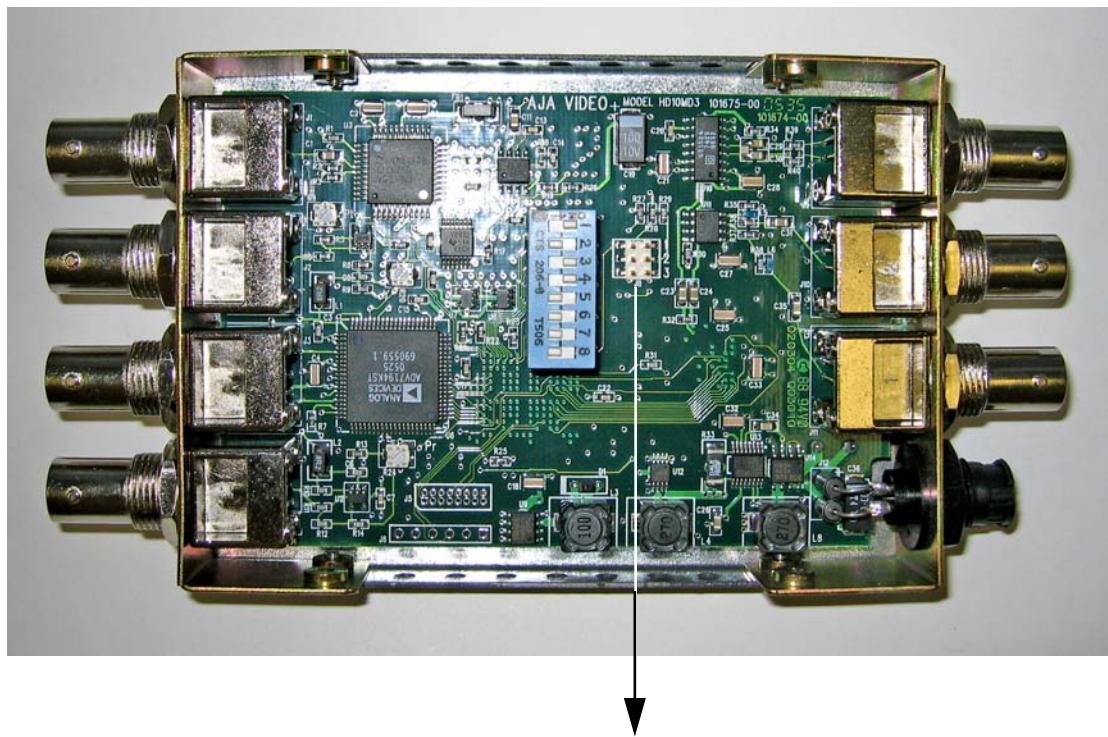
### Switch 7—Turn 4:3 Graticule ON/OFF

| LEFT | RIGHT |
|------|-------|
| Turn Graticule OFF | Turn Graticule ON (4:3 safe area) |

**Note:**  Switch 8 has no function.

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## Jumper Settings

Jumper J8 is located next to the DIP Switch. To access it, remove the back of the HD10MD3 case by first removing the 4 phillips screws that secure it. The meaning of the jumper settings is described in the illustration below:



```
6  [· ·]  1
5  [· ·]  2        Jumper
4  [· ·]  3           J8
```

Jumper Between Pins 1 and 2:
  ON = RP215 is used to synchronize 3:2 pulldown sequence
  OFF = RP188 is used.
In both cases the "A Frame" is synchronized to frame with timecode "xx:00"

Jumper Between Pins 5 and 6:
  ON = Output start of vertical blanking lines up with input start of vertical blanking
  OFF = Output start of vertical sync lines up with input start of vertical sync (per RP168)

**Output Selection Matrix For Output 3 BNCs**

The following table shows the combinations of DIP switch settings required to configure the three BNCs below the SDI Output BNC.

| Output Format | DIP Switch #1 | DIP Switch #2 | DIP Switch #3 |
|---|---|---|---|
| 1 Composite and 1 Y/C (Pedestal) | RIGHT—CMPSTE | N/A | RIGHT |
| 1 Composite and 1 Y/C (no pedestal) | RIGHT—CMPSTE | N/A | LEFT |
| RGB | LEFT—CMPNT | RIGHT—RGB | LEFT |
| RGB with pedestal | LEFT—CMPNT | RIGHT—RGB | RIGHT |
| SMPTE component (BETA625)/ EBU-N10 | LEFT—CMPNT | LEFT—YPbPr/ | LEFT |
| BETA 525 component | LEFT—CMPNT | LEFT—YPbPr/ | RIGHT |

# Installation

Typically, HD10MD3 installation consists of the following:

1. disconnect +5VDC from the convertor
2. configure the DIP switch for the desired equipment configuration and video formats
3. connect video equipment to the convertor BNCs
4. apply +5VDC power to the converter (AJA power supply model DWP)

# Specifications

| Item | Specification |
|---|---|
| Formats | 1080i 50/59.94/60Hz<br>1080p/psf 23.98/24/25/29.97/30 Hz<br>720p 50/59.94/60Hz<br>(Automatic Configuration) |
| Inputs | HD-SDI or SDI SMPTE 259/292/296, 10-bit, BNC |
| Outputs | SDI, SMPTE 259M, 10-bit, BNC<br>YPbPr - SMPTE, EBU-N10, Betacam<br>RGB, NTSC, PAL, YC (S-Video), 10-bit<br>3 x BNC |
| Down Conversion | Multi-point interpolation, 10-bit processing.<br>3:2 conversion for 23.98/24p/psf inputs |
| Frequency Response | Y +0, -.5db to 30 MHz<br>C +/- .25db to 15 MHz |

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| Item | Specification |
|------|---------------|
| User Controls | *ExternalDipswitch:*<br>Output Video Format<br>4:3/16:9 MonitorSelect<br>Letterbox/Crop<br>Pedestal (Output)<br>4:3 Safe-Zone Graticule Overlay |
| Size | 5.8" x 3.1" x 1 (147 x 79 x 25mm) |
| Power | 5-18V, 5 watts. Requires power supply. |