

D10C 10-bit Composite Digital to Composite Analog, or SDI to YPbPr or RGB Converter

User Manual



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WARNING

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case, the user, at his own expense, will be required to take whatever measures necessary to correct the interference.

This equipment was tested using the appropriate shielded cables. Failure to use proper cables will result in radio interference outside acceptable limits.

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INTRODUCTION

The D10C serial to analog converter provides excellent quality 10 bit digital-to-analog conversion at low cost. The D10C is useful for converting analog monitors to serial digital monitors, waveform monitoring, or adding a serial input to VTRs, workstations, or other analog video equipment.

The D10C automatically works with component or composite serial digital inputs in 525 or 625 line formats. It provides component analog outputs for component serial inputs, a NTSC output for composite serial inputs, and a PAL output for 625 composite serial inputs. The composite or NTSC/PAL output works only with composite (D2, D3) inputs.

The component analog outputs are user-configurable to cover a wide range of formats including Y/R-Y/B-Y, RGB, Beta, and MII. Sync, set-up (pedestal), and blanking are also configurable. In addition, the composite analog output provides an extra "Y" output for component inputs - this feature allows multi-format/standard monitoring when using a single black-and-white monitor. This output can also be configured as a Composite Sync output (for component inputs).

Both H and V blanking are adjustable with NARROW and WIDE selections. The NARROW H blanking selection allows all 720 pixels of component digital to be displayed.

The D10C provides 2 equalized, re-clocked, and separately buffered loop-through serial outputs.

SPECIFICATIONS

Serial Interface	SMPTE 259M
Serial Input	
Return Loss	>15 db, 5 - 270 MHz
Cable EQ	0-300 meters typical, Belden 8281
Serial Outputs	
Return Loss	>15 db, 5 - 270 MHz
Risetime	600 ps typical
Jitter	±250 ps typical (w/250 ps input jitter)
Component Analog Outputs	(component serial input only)
Format	Y/R-Y/B-Y or RGB - jumper selected Sync on Y/GREEN and set-up (pedestal) selected by internal jumper Level and DC adjustable
D/A converters	10 bits
Composite Analog Output	
Format	NTSC (525 composite serial input only) PAL (625 composite serial input only) "Y" (component serial input)
D/A converter	10 bits
Frequency response	
Y	±.25 db to 5.2 Mhz
R-Y, B-Y	±.25 db to 2.6 Mhz
NTSC/PAL	±.5 db to 5 Mhz
K factor (2T)	Less than 1%
Y to C delay	±10 ns
Dimensions	5.8" x 3.1" x 1" (147 mm x 79 mm x 25 mm)
Power Requirements	5 VDC regulated, 650 ma max. See Figure 4 for power connector wiring diagram.

OPERATION INFORMATION

INPUT/OUTPUT

SERIAL INPUT	270 mb 4:2:2 component, 143 mb composite NTSC, or 177 mb composite PAL serial digital inputs conforming to SMPTE-259M.
SERIAL OUTPUT 1&2	Active serial input loop-through - equalized, re-clocked, and separately buffered.
COMPONENT OUTPUTS	Component Analog Video outputs - internally configured to Y/ R-Y/ B-Y, RGB, Betacam, or MII format. The component outputs are turned off for composite inputs.
COMPOSITE OUTPUT	Outputs NTSC for 143 mb composite serial inputs, PAL for 177 mb composite serial inputs, and "Y" or "SYNC" for component serial inputs (regardless of component output format configuration).
LOCK INDICATOR	The green LED lock indicator will light when power is applied and the serial receiver is locked to a valid input.
POWER	The D10C requires 5 volts regulated DC at 650 ma max. The power connector is a CONXALL P/N 16-282-2SG-318.

INTERNAL JUMPERS AND ADJUSTMENTS (Fig. 1 & 2)

SYNC	Jumper J9b adds sync to GRN/Y (UP position = SYNC ON)
RGB	Jumpers J10a, J10b, J9a, J8b, J7a, J7b switch the component outputs between RGB and Y/R-Y/B-Y formats. (UP position = RGB)
SYNC ONLY	Jumper J8a switches the COMPOSITE output between "Y" (w/sync) and "COMPOSITE SYNC" (2 volt) for component inputs (UP position = COMPOSITE SYNC)
SET UP	Jumper J6b adds 7.5 IRE set-up (pedestal) to the Y/GRN output (UP position = set-up ON)
VBANK	Jumper J5a selects between NARROW (line 12) and WIDE (line 22) vertical blanking (UP position = NARROW)

HBLANK	Jumper J5b selects between NARROW (720 pixels) and WIDE (normal analog blanking) horizontal blanking (UP position = NARROW)
GAIN ADJ.	Pots R5, R23, R28, and R42 set output video levels (see adjustment procedures)
DC ADJ.	Pots R14, R33, R41 set output DC levels (see adjustment procedures)
SERIAL RX VCO	Pots R49, R58, R64 set the serial receiver VCO free-run frequency (see adjustment procedures)

ADJUSTMENT PROCEDURES

CAUTION: This product contains electrical components that are susceptible to damage from static discharge. Any adjustment or maintenance should be done only at a static-free workstation by qualified personnel.

Internal format selection and adjustments are accessed by removing the top and bottom covers of the D10C. The D10C should then be oriented such that the component legends are as shown in Fig. 2. The "push-on" jumpers should be removed/replaced by gripping the top "hat" of the jumped with small needle-nose pliers. The pots require a 3/32 inch (2.4 mm) non-metallic alignment screwdriver.

VIDEO OUTPUT/FORMAT ADJUSTMENT

Y, R-Y, B-Y (SMPTE/EBU N10)

1. Connect a component serial digital test generator to the D10C input, select 100% bars.
2. Connect a waveform monitor (or terminated oscilloscope) to the D10C component outputs.
3. While power is off, set D10C jumpers **J5** through **J10** as shown in Fig. 2 for Y, R-Y, B-Y.
4. Connect power and adjust **R28**, Y GAIN, for a 700 mv Y video level between blanking and white.
5. Adjust **R42** and **R23** for a 700 mv peak-to-peak (± 350 mv) level on the R-Y and B-Y outputs.
6. Adjust **R14**, Y DC, for a Y blanking level of 0 volts.
7. Adjust **R41** and **R33** for a blanking level (midpoint) of 0 volts on the R-Y and B-Y outputs.

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Comment: Page: 4

RGB

1. First configure and adjust the video levels as described for Y, R-Y, B-Y above.
2. Set jumpers **J10a**, **J10b**, **J9a**, **J8b**, **J7a**, and **J7b** to the RGB position as shown in Fig. 2.
3. Sync may be added to the GREEN output by setting **J9b** to the "up" position.

BETA 525/60

1. Connect a component serial digital test generator to the D10C input, select 75% bars.
2. Connect a waveform monitor (or terminated oscilloscope) to the D10C component outputs.
3. While power is off, set D10C jumpers **J5** through **J10** as shown in Fig. 2 for BETA 525/60.
4. Connect power and adjust **R28**, Y GAIN, for a 714 mv Y video level between "blanking" and "white".
5. Adjust **R42** and **R23** for a 700 mv peak-to-peak level (± 350 mv) on the R-Y and B-Y outputs.
6. Adjust **R14**, Y DC, for a Y blanking level of 0 volts.
7. Adjust **R41** and **R33** for a blanking level (midpoint) of 0 volts on the R-Y and B-Y outputs.

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Comment: Page: 5

BETA 625/50

1. Connect a component serial digital test generator to the D10C input, select 75% bars.
2. Connect a waveform monitor (or terminated oscilloscope) to the D10C component outputs.
3. While power is off, set D10C jumpers **J5** through **J10** as shown in Fig. 2 for BETA 625/50.
4. Connect power and adjust **R28**, Y GAIN, for a 700 mv Y video level between "blanking" and "white".
5. Adjust **R42** and **R23** for a 700 mv peak-to-peak level (± 350 mv) on the R-Y and B-Y outputs.
6. Adjust **R14**, Y DC, for a Y blanking level of 0 volts.
7. Adjust **R41** and **R33** for a blanking level (midpoint) of 0 volts on the R-Y and B-Y outputs.

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Comment: Page: 5

MII

1. Connect a component serial digital test generator to the D10C input, select 100% bars.
2. Connect a waveform monitor (or terminated oscilloscope) to the D10C component outputs.
3. While power is off, set D10C jumpers **J5** through **J10** as shown in Fig. 2 for MII.
4. Connect power and adjust **R28**, Y GAIN, for a 647 mv Y video level between "black" and "white".
5. Adjust **R42** and **R23** for a 648 mv peak-to-peak level (± 324 mv) on the R-Y and B-Y outputs.
6. Adjust **R14**, Y DC, for a Y blanking level of 0 volts.
7. Adjust **R41** and **R33** for a blanking level (midpoint) of 0 volts on the R-Y and B-Y outputs.

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Comment: Page: 5

Composite

1. Connect a composite serial digital test generator to the D10C input, select 100% bars.
2. Connect a waveform monitor (or terminated oscilloscope) to the D10C composite output.
4. Adjust **R5**, COMPOSITE GAIN, for a 714 mv (NTSC), or a 700 mv (PAL) video level between "blanking" and "white".

NOTE: The composite video output level can be accurately set for only one video standard, either NTSC or PAL. When set for one, the other will be off by approx. 7%. If both are needed, the error can be reduced to approx. 3.5% for both by setting the NTSC level to 690 mv (PAL white will then be approx. 720 mv).

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Comment: Page: 6

SERIAL DIGITAL RX VCO ADJUSTMENT

These adjustments are accessed by removing the top cover of the D10C. The serial digital receiver VCO (voltage controlled oscillator) adjustment sets the "free run" frequency to the optimum point. These adjustments account for differences occurring in the chip manufacturing process and are not normally changed in the field.

Component serial digital - 270 mb

1. Connect a component serial digital source to the D10C input.
2. Connect a picture monitor to the D10C component outputs.
3. Adjust **R49** counter-clockwise until there is a loss of video (this indicates the VCO is unlocked, - also, the green "LOCK" LED on the D10C will go out).
4. Slowly adjust **R49** clockwise until stable video re-appears. Measure and note the LOOP FILTER VOLTAGE appearing on **pin 1 of R47** (Fig. 3).
5. By slowly adjusting **R49** clockwise, set the LOOP FILTER VOLTAGE to a point 220 mv above the value measured in step 4.

JA

Comment: Page: 6

Composite serial digital

NOTE: Both R64 (143 mb adjustment) and R58 (177 mb adjustment) have enough range to "lock" to both rates. If the proper adjustment has no effect, then the other must be "de-tuned" (adjust counter-clockwise) until the proper pot (R64 for 143 mb, R58 for 177 mb) can be set. "Locking" the D10C with the wrong pot will cause improper operation.

Composite NTSC - 143 mb

1. Connect a composite NTSC serial digital source to the D10C input.
2. Connect a picture monitor to the D10C composite output.

3. Adjust **R64** counter-clockwise until there is a loss of video (this indicates the VCO is unlocked, - also, the green "LOCK" LED on the D10C will go out).
4. Slowly adjust **R64** clockwise until video re-appears. Measure and note the LOOP FILTER VOLTAGE appearing on **pin 1 of R47** (Fig. 3).
5. By slowly adjusting **R64** clockwise, set the LOOP FILTER VOLTAGE to a point 220 mv above the value measured in step 4.

Composite PAL - 177 mb

1. Connect a composite PAL serial digital source to the D10C input.
2. Connect a picture monitor to the D10C composite output.
3. Adjust **R58** counter-clockwise until there is a loss of video (this indicates the VCO is unlocked, - also, the green "LOCK" LED on the D10C will go out).
4. Slowly adjust **R58** clockwise until video re-appears. Measure and note the LOOP FILTER VOLTAGE appearing on **pin 1 of R47** (Fig. 3).
5. By slowly adjusting **R58** clockwise, set the LOOP FILTER VOLTAGE to a point 220 mv above the value measured in step 4.