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[News](#)

[Projects](#)

[Tutorials](#)

[Shop](#)

[About Us](#)

Navigation

► [Forums](#)

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Username *

Password *

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- [Request new password](#)

[Log in](#)

[Home](#) » [CGA2RGB](#) - Digital RGBI to analog RGB for Commodore 128 and IBM PC CGA

CGA2RGB - Digital RGBI to analog RGB for Commodore 128 and IBM PC CGA

Submitted by GG on Wed, 02/01/2017 - 20:40

Project Status: released



GBS-8200 VGA converter.

The 80 column output of the Commodore 128 is the same digital RGBI used by the original IBM CGA graphics adapter. Unfortunately nowadays is quite difficult to find a monitor with the suitable RGBI input. The CGA2RGB adapter will convert the TTL RGBI to analog RGB suitable to be connected directly to a 15KHz capable RGB monitor or to the popular Gonbes

Similarly to the older [CGA2RGB-A00](#), the basic circuit is a triple 2-bit digital to analog converter. The main improvement is the addition of an analog video buffer to allow driving longer video cables with minimal signal degradation. A VGA connector has also been added to simplify the connection to the monitor of the scan converter.

U1 decodes the 4-bit RGBI input to the full 2-bit per color component and generates the composite sync needed for the GBS-8200.

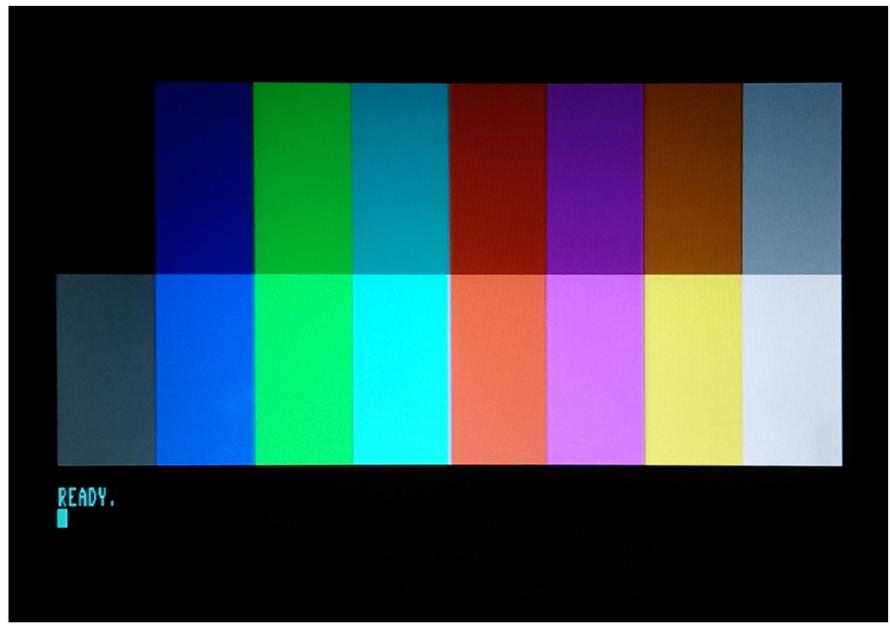
The decoding follows the standard CGA color table which includes a special case for color 6.

Commodore Color Number	CGA Color Number	RGBI	Color	R	G	B
1	0	0000	Black	00	00	00
7	1	0010	Blue	00	00	10
6	2	0100	Green	00	10	00
12	3	0110	Cyan	00	10	10
3	4	1000	Red	10	00	00
9	5	1010	Magenta	10	00	10
10	6	1100	Brown	10	01	00
16	7	1110	Light Grey	10	10	10
13	8	0001	Grey	01	01	01
15	9	0011	Light Blue	01	01	11
14	10	0101	Light Green	01	11	01
4	11	0111	Light Cyan	01	11	11
11	12	1001	Light Red	11	01	01
5	13	1011	Light Magenta	11	01	11
8	14	1101	Yellow	11	11	01
2	15	1111	White	11	11	11

The resistor network R1,R2,R7 forms a simple R2R D/A converter. The output impedance of the converter is however too high to directly drive the 75ohm video cables. U2 buffers the signals and thanks to R12,R13,R15 provides a perfectly matched 75ohm impedance.

The board requires a 5V power supply. It can be powered directly from the GBS-8200 or using an external power supply.

Jumper J4 allow to select between composite sync (pin 1-2) suitable for the GBS-8200 and separate sync (pin 2-3) suitable for 15KHz capable monitors.



Performance Notes

The image quality of the GCA2RGB, like all analog video connections, heavily depends on the cable used. A high quality 75ohm coaxial cable is recommended for the video signals. The standard multi colored cable included in the GBS-8200 is not an optimal choice.

The following images show the difference between the standard cable and a good quality coaxial cable. In the first image is easy to note the large signal reflection due to impedance mismatch. The issue is compounded with additional discontinuities due to sub optimal grounding on the GBS-8200 PCB. The second picture shows a significant improvement.

For best quality we recommend to keep the wiring between the CGA2RGB and the GBS-8200 as short as possible.



▼ Design Files

Schematics:  [cga2rgb-B00_sch.pdf](#)

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