
Subject: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Wed, 31 Mar 2021 11:36:01 GMT
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Does anyone have examples of Z80 MC6845 shared memory video board designs (not transparent mode)? I recall seeing some years ago but am not finding them with some searching. The only example I can come up with is the Dick Smith Super80 VDU Expansion Board (VDUEB) which is a modification to the Super80.

The reason I am asking is the Z80 MBC project allows for external bus memory and sometime down the road I'd like to experiment with it. The legacy Z80 SBC is IO only on the ECB and does not allow for external memory peripherals. So it can't use bus memory boards or shared memory video boards. Instead it uses designs like SY6545 transparent mode and TMS9918 for video solutions.

The IBM CGA and MDA are MC6845 shared memory designs but they are way too complex for what I am considering. Just would like to see what examples are available. Much appreciated, Thanks

Subject: Re: Z80 MC6845 video board examples
Posted by [b1ackmai1er](#) on Thu, 01 Apr 2021 06:25:17 GMT
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Microbee computer.

<https://www.microbee-mspp.org.au>

Membership required.

Range of historical schematics.

Subject: Re: Z80 MC6845 video board examples
Posted by [nealcrook](#) on Fri, 02 Apr 2021 19:57:22 GMT
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The Gemini Intelligent Video Controller for the 80-bus was a (commercial) design that used a Z80 and 6845 as a video controller that received commands from a host machine (usually another Z80). The IVC was decoded in the host machines i/o address space and had an "API" that allowed display and also allowed programs to be uploaded to the IVC processor for execution.

Overview and links to hardware and software manual:
<https://nascom.wordpress.com/gemini/hardware/g812-ivc/>
Schematics:

<https://80bus.co.uk.mirror.jloh.de/pages/gemini/gm812.htm>

Neal.

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Sun, 04 Apr 2021 13:53:46 GMT
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Hi
Thank you for the example. That is exactly the sort of design I am looking to find. Much appreciated!

Andrew Lynch

Subject: Re: Z80 MC6845 video board examples
Posted by [little_john](#) on Sun, 04 Apr 2021 19:31:00 GMT
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The SC84 had a memory-mapped VDU using a 6845 - for details see Wireless World July 1984, page 31 onwards.

<https://worldradiohistory.com/UK/Wireless-World/80s/Wireless -World-1984-07.pdf>

'best,
LJ

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Tue, 12 Apr 2022 14:30:03 GMT
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Hi
One of the designs I've been looking at for a long time is the ZRT-80 terminal board. I am thinking of capturing this classic design in KiCAD and having some boards made. Before I leap into it though has anyone else done a recent version of ZRT-80? I am thinking maybe two versions; one a reproduction of the original and another somewhat updated with larger memory chips, TTL oscillators, a VT82C42 PS/2 keyboard controller instead of parallel, etc.

<http://www.stipl.org/wb/pages/it/microcomputer-projekte/zrt -80.php>

http://www.stipl.org/pics/t1_hw_5.jpg

<http://www.retroarchive.org/cpm/misc/zrt80.zip>

It is practically a tiny SBC by itself not unlike the Sinclair or similar machines

Thoughts?

Subject: Re: Z80 MC6845 video board examples
Posted by [norwestrzh](#) on Tue, 12 Apr 2022 16:50:06 GMT
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Andrew --

I built the original ZRT-80, and thought it was a good approach to a video terminal. Unfortunately, I found that mine worked well for a short time, but it hung up periodically. It had to be reset constantly. I don't know if the problem was my limited build skill, or if there was a problem with the design. I do remember (I think?) that the build instructions that came with the device specified that some of the components (speed?) were critical for proper operation. Maybe it would be prudent to evaluate the original design to be sure that this hang-up/reset problem doesn't persist in a newer version?

Roger

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Tue, 12 Apr 2022 17:29:04 GMT
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Hi Roger

Yes, that sounds like a prudent idea. Probably could evaluate the schematic to some extent but even that would be easier in KiCAD since the only ones I've seen are hand drawn.

I think a physical prototype would make evaluation most effective since you could take actual measurements to compare for race conditions, etc.

Many of these video board designs have a high-speed portion associated with the dot-clock. The Z180GDC V1 has it too and it can be tricky to pick the right parts to operate at the limits of regular 74LSxx TTL. Sometimes 74F or 74S parts are needed which the Z180GDC has a few of also.

The design for ZRT-80 seems fairly complete with character ROM and monitor ROM images. I am thinking I could probably reduce the part count somewhat using slightly different design and denser components. 6116s and 2114s are pretty tiny SRAMs and takes a bunch to make any amount of RAM memory.

I think I have a ZRT-80 in the basement somewhere. I need to check on that before I launch on this project

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Tue, 12 Apr 2022 17:54:11 GMT
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Well what do you know? I *do* have one in the basement. :) An original it seems complete with documentation, a board at least partially (or nearly fully) constructed plus misc parts and an 8" floppy disk in an original box no less! The schematic is the same one as the ZIP file but twice as big and much clearer so easier to read.

I have an ASCII parallel keyboard that would be perfect for this project but I've always thought those keyboards are really delicate compared to a PS/2 keyboard. Also PS/2 keyboards are readily replaceable on eBay whereas a parallel ASCII keyboard is practically a historical artifact of long-lost era.

Subject: Re: Z80 MC6845 video board examples
Posted by [norwestrzh](#) on Tue, 12 Apr 2022 21:44:22 GMT
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Me again, Andrew ...

I too have my original ZRT-80 with documentation (but no floppy software). With regard to the ASCII keyboard I got a tiny device a while ago (forgot where) for about \$20 that converts a PS/2 keyboard to parallel out. I'm very happy with it. I use it on a VDB 8024 (SD Systems). Seems to work fine.

Roger

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Tue, 12 Apr 2022 21:55:02 GMT
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Not that I have time for another project with Z80 MBC and Z180GDC V1 both burning hot at the moment. However, would people be interested in a; exact reproduction ZRT-80, or b; a modernized ZRT-80?

I know there are plenty of less expensive and smaller alternative terminal replacement boards. I certainly have some myself but none will have the period authenticity of a ZRT-80 board

Probably can't start on a ZRT-80 project for several months but its something I've wanted to do for a while now.

Subject: Re: Z80 MC6845 video board examples
Posted by [plasmo](#) on Wed, 13 Apr 2022 02:16:53 GMT

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norwestrzh wrote on Tue, 12 April 2022 15:44 With regard to the ASCII keyboard I got a tiny device a while ago (forgot where) for about \$20 that converts a PS/2 keyboard to parallel out. I'm very happy with it. I use it on a VDB 8024 (SD Systems). Seems to work fine.

Roger,

The PS/2 converter you mentioned, does it look like this:

<https://www.ebay.com/itm/254223304851> It looks interesting and cheap, too.

Bill

Subject: Re: Z80 MC6845 video board examples
Posted by [norwestrzh](#) on Wed, 13 Apr 2022 16:30:46 GMT

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No, Bill, that doesn't look like the one I use.

See <http://www.go4retro.com/products/ps2-encoder/>

Good to hear from you!

Roger

Subject: Re: Z80 MC6845 video board examples
Posted by [plasmo](#) on Thu, 14 Apr 2022 14:22:54 GMT

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Roger,

The link you provided has some interesting products.

I'm exploring PS2 keyboard using CPLD. I'll describe it on a separate topic.

Bill

Subject: Re: Z80 MC6845 video board examples
Posted by [gkaufman](#) on Thu, 28 Apr 2022 14:51:41 GMT

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I used a ZRT-80 for years, worked really nicely. I recall it was picky about needing the Hitachi version of the 6845 (HD46505).

Wish I could find mine again, lost it one of my moves...

Subject: Re: Z80 MC6845 video board examples
Posted by [lynchaj](#) on Sat, 30 Apr 2022 12:20:13 GMT
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Hi
I am keeping the ZRT-80, a parallel ASCII keyboard, and a couple of Zenith composite green screen monitors set aside for a retirement project. Would like to make a homebrew terminal from parts but will need some space to set this up

Subject: Re: Z80 MC6845 video board examples
Posted by [etchedpixels](#) on Tue, 17 May 2022 13:09:34 GMT
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There's also the keep writing the last thing on the dead cycle approach where your video memory is write only.

CPU address and data to the video RAM are latched when they happen and the video side runs with the 6845 access half of the cycle reading, then the other half of the cycle sets write on the ram for most of the cycle, so that the last byte buffered keeps getting written into the RAM when the video memory is free. Write only but no wait states and the CPU is usually unable to write to video fast enough to need nops between updates. And of course you can shadow it with RAM if you need to.
