Note: leaving most of this first post intact for historical reasons, but please see the bottom section for new information

Years ago, back when a TRS-80 Model 4D with 320K (by way of a memory mod) was a Reasonable Home Computer, I dreamed of having one based on a Z280, as the original Model 4 did indeed have provisions for a Z800-on-DIP extension to the Z80 socket.

Now that retrobrewing is a 'thing' I've revisited the practicality of going back and building what would have been my dream machine in 1992. That would be a Z280 with 1MB of RAM, running in the Model 4's basic hardware. Yeah, that also means software, meaning a port of LS-DOS and/or CP/M, as the Model 4 can run both.

I've read up on the CPU280 from years ago, and I am curious if anyone here has any interest in recreating that system or one similar to it.

Since Z280 chips are a bit rare, it would be even nicer to do up an FPGA implementation, maybe based on the Y80e core, which already does some eZ80 stuff. The Z280 would be rather a challenge due to the very cutting edge features (for its day).

Anyone out there other than me interested in such a thing?

Updated September 16th, 2017: There was and is interest; we successfully revived interest in the Tilmann Reh CPU280, and several have been built. The board's wiki page is here.

Updated September 7, 2018: Forum member plasmo has designed, built, and ported CP/M to three new-design Z280 SBCs that are substantially less expensive than the CPU280, which uses some hard-to-find and relatively expensive parts; a CPU280 could cost you over $250 to build, using new parts and getting the hard-to-find pieces on eBay, but any of plasmo's designs will be much less than that; the ZZ80RC I would guess could be built for less than $30 and in about an hour's time, depending upon your source for the RAM chip. Two use the 16-bit Z-Bus mode and have surface-mount components; one uses the Z80-bus mode and is totally through-hole. You can read all about them on his Builder's Page on this wiki. While I still have CPU280 stock and will order parts and fill orders as demand requires for those who want the more 'vintage' feel of the CPU280, if your desire is simply to have a Z280 machine to play with then I recommend you look into one of plasmo's designs. Work is ongoing to port Fuzix to the Z280 (thanks, etchedpixels!), and this work is happening on plasmo's ZZ80RC, which is designed to be compatible with the 'RC2014' bus system. I would imagine an ECB adapter board to allow these modules to be used in an ECB system would not be hard to make, thanks to the Z80 heritage of both buses. Now, I do intend to work on setting up an easy-to-install UZI280 image and/or a Fuzix image and port for the CPU280, since I have a working board and want to use it as well.
Well, the overwhelming responses....

Anyway, I scored a quantity of ten Z280's, looks like all 12MHz ones. Date codes run from 93 to early 96, although I seem to remember reading that the end of 95 was the end of production. The lot of ten has no duplicate date codes, they are not obvious blacktops, and many even look like pulls (with puller marks on the corners like a pulled PLCC should have). Perhaps Nixdorf, who used the Z280 in a Point-of-Sale terminal (POS 2000/10) had Zilog keep the line going for a few months into 1996.

Anyone here know the actual last date of production on a Z280? Anyone know if the Reh CPU-280 layouts were ever made public? The schematic is pretty easy to find, but it would be interesting to me at least to get three or four boards made at OSHpark or similar.....

Anyone know a good way of testing a Z280?

EDIT: Have made contact with a gentleman on comp.os.cpm who has a fresh Z280 design and has done recent work on it.....

Also, right now there are several Z280's on eBay for low money if anyone is interested.

Hi,

Yes, I would enjoy building a board with a Z280. Cannot contribute much in the design stage, though.

--Jonas

I bought three z280, 12 MHz, just in case

Jonas
Now I'm really on the spot, yes?

I'm looking at the Reh CPU280 for inspiration, but within the spirit of the RetroBrew group's goals I'll probably look at building something similar to the SBC 180 MK IV in terms of functionality. Porting UZI280 shouldn't be hard, but I have no idea about CP/M. I'm porting something completely different, though.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 10 Dec 2016 14:18:43 GMT

Ok, an update: I'm possibly going to be able to get a run of the Reh CPU280 boards made. I'm still shopping around for prices, but Tilmann sent me the gerbers and gave me permission to use them to get boards made. The schematic is out there in TCJ 77, and so it shouldn't be hard to go through and do some modifications while looking at the known stable layout of the CPU280.

There are some parts that are likely going to be difficult to find. I know UTSource has Z280's in quantity (I bought another ten, so I have 20 12.5MHz Z280's on hand), so the Z280 isn't the hard part to get. I'll update this thread as I find out how easy or how difficult some of the other hard-to-find-new chips are going to be.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Mon, 12 Dec 2016 17:06:20 GMT

Great news! I have read the articles in TCJ #77 and #53 with interest.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 13 Dec 2016 02:52:39 GMT

Update: I have found the COM81C17, the LT1134, the FDC (GM82C765BPL is equivalent), and the RAM (both the 514256 and TC514400AZ-60 ZIP chips; I ordered 10 pieces of the 514400AZ chips, which will give me two spares). Looking for the DS1287 NVRAM replacement (it's a common chip and easily found on eBay, but they are all over 20 years old and not long for battery life; really needs to have a good replacement... the DS12887 might work, and there are a number of 'rework' articles out there).

The GAL16V8's aren't hard to find, either, so I think all of the chips are available.
lowen wrote on Mon, 12 December 2016 18:52

Update: I have found the COM81C17, the LT1134, the FDC (GM82C765BPL is equivalent), and the RAM (both the 514256 and TC514400AZ-60 ZIP chips; I ordered 10 pieces of the 514400AZ chips, which will give me two spares). Looking for the DS1287 NVRAM replacement (it's a common chip and easily found on eBay, but they are all over 20 years old and not long for battery life; really needs to have a good replacement.... the DS12887 might work, and there are a number of 'rework' articles out there).

The GAL16V8's aren't hard to find, either, so I think all of the chips are available.

Subject: Re: Interested in a Z280 SBC
Posted by pbirkel on Tue, 13 Dec 2016 05:35:16 GMT

Good progress! Are you now "accepting orders" :-}?
discussed, and in the software manual where bugs in the Z280 are discussed. The hardware manual contains the schematics. The zip of the manuals is attached.

File Attachments
1) CPU280-Doc.zip, downloaded 469 times

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Tue, 13 Dec 2016 19:26:34 GMT
View Forum Message <> Reply to Message

Thank you!

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 15 Dec 2016 16:41:40 GMT
View Forum Message <> Reply to Message

Another small update: PCBCART has processed the order with no questions, and the boards are supposed to ship 12/19. An original CPU280 is in transit to me now for testing and comparison purposes to the bare boards and the first one I build up from bare board. Having a known working board in-hand is going to be key to making sure everything is ok with the new boards and with my GAL and EPROM programming. According to Tilmann there were only about 50 CPU280's made.

But the design is a textbook-ready study on how to design a stable single-board system as well as how to make a fully synchronous DRAM timing chain. The CPU280 is a very straightforward design, and now that the English manuals are out there I hope more people appreciate the way Tilmann squeezed every ounce of power from the Z280. The CPU280 has an I/O port only 8-bit (two row) ECB interface; I haven't dug deeply enough to make sure it's fully compatible with the retrobrew ECB bus for I/O (not memory-mapped) devices.

I am so looking forward to building one and getting it up and running!

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Fri, 16 Dec 2016 22:39:16 GMT
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A quick and not at all thorough look tells me that the CPU280 should be able to use more than a few of the retrobrew I/O boards. DiskIO, Dual SD, BUS Monitor, Dual IDE, CVDU et cetera. I'm looking forward to hear more news about your projects, especially about the CPU280.

Subject: Re: Interested in a Z280 SBC
Posted by w9gb on Sat, 17 Dec 2016 18:10:49 GMT
I am aware that Peter Ray of Anitek Software Products created a 280 prototype motherboard (TRX-280) for Tandy/Radio Shack -- but never realized it reached production.

Bartlett Labs attended the VCF Midwest show this past September, and had good attendance (and interest).  
http://bartlettlabs.com/M3SE/

Highly suggest you work with Maxim / Dallas for a modern substitute to the DS1287 -- especially for new design/boards.  
Older legacy computers have to resort to innovative solutions and surplus supplies.  
http://dgmag.in/N1/Online/advanced/48629.pdf

---

Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Sun, 18 Dec 2016 11:19:27 GMT  
View Forum Message <> Reply to Message

How about the MC146818A? Not a modern substitute to the DS1287 but it is available at futurlec.com for $3.90.

File Attachments  
1) DS1287.pdf, downloaded 128 times  
2) MC146818.pdf, downloaded 143 times

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Subject: Re: Interested in a Z280 SBC  
Posted by Wayne W on Sun, 18 Dec 2016 17:06:07 GMT  
View Forum Message <> Reply to Message

Maxim specifically specifies the DS12887 as a drop-in replacement for the DS1287 and is currently produced and available from Mouser as new stock.

-Wayne

---

Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Sun, 18 Dec 2016 18:22:10 GMT  
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Yes, the DS12887 is a better, more modern choice. The DS1287 was a drop-in replacement for the MC146818. I bought ten DS12887 at eBay a while ago for almost nothing. They were a few years old but fully functional. It's tempting to buy a new one though.
Wayne noted the current production Maxim models (you actually have 5 choices).
There are subtle differences in the versions, and I have not reviewed against the Tilmann Reh
Z280 design assumptions.

It was fortunate that the DS1287 was used by PC motherboard mfg. (large installed base),
that Maxim offered modern replacement for the original Dallas part.
I have been on the "other side" of those decisions, a few times, and it's not enjoyable.

greg

Wayne W wrote on Sun, 18 December 2016 09:06Maxim specifically specifies the DS12887 as a
drop-in replacement for the DS1287 and is currently produced and available from Mouser as new
stock.

I asked Tilmann about the compatibility, and he confirmed that DS12887A should work. I've
ordered two new units from Mouser; they're not exactly cheap, but they're new.

w9gb wrote on Sat, 17 December 2016 10:10I am aware that Peter Ray of Anitek Software
Products created a 280 prototype motherboard (TRX-280) for Tandy/Radio Shack --
but never realized it reached production.

Did it? There are a couple of boards for the TRS-80 Model 4 I'd love to see retroengineered: The
Xlr8er (HD64180, Hi-Tech and later Misosys); The Anitek memory boards. Would be neat to see
the TRX-280 prototype.
Quote:
Bartlett Labs attended the VCF Midwest show this past September, and had good attendance
(and interest).
http://bartlettlabs.com/M3SE/

Yeah, I have one of them; built from his kit. Nice board, but not open design.

Back to the CPU 280, realize that this board was produced in 1990 or thereabouts. Many pieces
were pretty close to state of the art, if you go back and look at where PC's were in the same time
frame, like the ability to have 4MB on-board. Zilog dropped the ball, though, and never sunk the
resources required into the Z280 to get it up to speed; a 33MHz Z280 would have been superior
to the highest-end 286's. Once you get a 386, thought, even a 386SX, the 32-bit code advantage
is too great.

While the Z380 does do some 32-bit things, it never made it to a hobbyist SBC as far as I know (only being available in fine-pitch quad flat packs was part of that problem, although the P112 proves that 4 layers and QFP can be a hobbyist-built design).

The CPU280 is also of note in that it is a 2-layer board design and easy on the fab budget.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 24 Dec 2016 00:10:43 GMT

Update: Boards from PCBCART have arrived and look good. I will want to test build one before putting any of the others up for sale, though.

Update: pics attached but not inlined.

File Attachments
1) 20161224_180818.jpg, downloaded 369 times
2) 20161224_180854.jpg, downloaded 242 times

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Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 03 Jan 2017 17:45:23 GMT

Further updates: the assembled CPU280 arrived, but I think the EPROMs have been corrupted (no stickers over the windows). So I'll be setting up a toolchain, using YAZE-AG and the CPU280 files from http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280/info.html and burning new ROMs. I found some genuine SST27SF512 12V flash chips, which should work fine, but putting together the toolchain is going to be fun. I have yaze-ag built and running, and now to get the 1.13 system over to it and assembled.

Here's a couple of images of the assembled board (do note that the PLCC68 socket is not oriented properly, but the Z280 is). Note that the version I had fabbed does not have the bounding-deer (or is it a greyhound) REHDesign logo like this one does.

File Attachments
1) 20161227_090945.jpg, downloaded 359 times
2) 20161227_090957.jpg, downloaded 335 times

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Thank you for the update and good luck with the EPROMS! Are you sure they are corrupted? A few years ago I tried to erase some EPROMS without an UV-eraser. After one week outdoors in the sun (and in the summer) they were blank. It was impossible to erase the EPROMS indoors behind a window or with strong fluorescent light - at least within reasonable time. I experimented with UV solar lamps as well but gave up after a few days and bought a chinese UV-eraser for $10.

--Jonas

Well, something is corrupted or set up wrong, ...

EDITED: Since these ROM images aren't workable, I've removed the attachments. I'll later attach some working images.

Thank you! Rebuilding the ROMs makes sense of course.

Hello,

I've been looking at your dump and I don't really see partial erasure of the data. Some of the text seems to contain corrupted data, but that is only the special German characters like ö, ü and ß (Speichergröße == Speichergröße, zurück == zurück). all the areas with zero's are pristine (with some repeating patterns), and the areas with all FF are where one would expect them.

With partial erasure I would expect at least some scattered data in the OO-regions or at least one corrupted text string, but I don't see any.

Just my two cents

Rienk
Subject: Re: Interested in a Z280 SBC  
Posted by lowen on Thu, 05 Jan 2017 13:57:51 GMT  

Rienk,

Thanks for taking a look. There are a few random characters in areas that are otherwise zeroed, and that made me suspicious. That's why I posted both the re-interleaved binary as well as the individual odd and even binaries; patterns might show up easier in one of the split binaries.

It's probably a configuration issue, but next opportunity I get I'm going to put the board on the bench and hook up the Salae logic analyzer to it and sniff the Z280's UART (and the UART clock) along with other signals to see if it's just a misconfiguration or if something deeper is wrong. I'm also going to clone the GAL16V8's while I'm at it; while the PALASM equation source is available the JEDEC files are not for the four GAL16V8's.

Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Thu, 05 Jan 2017 22:08:08 GMT  

Have you checked the IC-sockets? Judging from the pictures they are machine tooled and that should be a good thing. This may sound trivial, but I have had problems with a few batches of IC-sockets, especially machine tooled. It took me some time to identify the problems via studying the schematic, measuring, testing other chips and pressing the ICs harder into the sockets. I had soldered the dodgy sockets in several boards. Not fun at all to desolder. Finally I pressed new sockets (with some quality control I guess) into the old ones and then the ICs. Not elegant but fully functional. The boards are still alive.

Subject: Re: Interested in a Z280 SBC  
Posted by jcoffman on Fri, 06 Jan 2017 00:35:48 GMT  

RE: machine tooled sockets

The main use for these sockets is for chips that may be interchanged. For EPROM/Flash chips that are interchanged frequently during s/w development, I use an Aries ZIF socket plugged into a double wipe socket that is plugged into the soldered double wipe socket.

Never have I had a problem with AMP gold-plated m.t. sockets. I did have a major problem with an m.t. socket for a 68030 that had a different finish. A couple of the pins had corroded in storage and would not take solder. This was only discovered after the 68030 CPU was installed. Pulling the CPU and working with an ohmmeter the bad pins were discovered one at a time, scraped, and securely soldered.

RE: double wipe sockets
Very cheap solution for IC’s that are not likely to be swapped. Excellent when circuit changes are to be make: pulling an IC pin and bending it outward disconnects it. Soldering to IC pins with #30 wire and stuffing into the d.w. socket where it needs to be connected completes a new connection. This way, boards can be updated with no trace cutting, and the d.w. sockets are BETTER in this situation than m.t. sockets because they accommodate the #30 wire connections readily.

--John

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 12 Jan 2017 00:46:56 GMT

lowen wrote on Tue, 03 January 2017 09:45Further updates: the assembled CPU280 arrived, but I think the EPROMs have been corrupted (no stickers over the windows). So I'll be setting up a toolchain, using YAZE-AG and the CPU280 files from http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280/info.html and burning new ROMs. I found some genuine SST27SF512 12V flash chips, which should work fine, but putting together the toolchain is going to be fun. I have yaze-ag built and running, and now to get the 1.13 system over to it and assembled.

I hacked together a toolchain to generate the ROM binary. It seems to be working, but I have no way to test it. This toolchain uses SLR180, but runs under a Windows command prompt using a CP/M emulator I hacked together based on zxcc. You can try the "Build.cmd" command file. All tools are in the directory. I did not modify the source files. I am pasting the output of the build process below.

-Wayne

Assembling "loader" ...

PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de

No Error(s), No Warning(s)
889 Line(s)
419 Mnenomic(s) (Z280: 49, Z80: 370)
  1 file(s) copied.

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

loader/ur
Assembling "kernel" ...

PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
315 Line(s)
139 Mnenomic(s) (Z280: 10, Z80: 129)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

lkernel/ur

Assembling "intrpt" ...

PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
666 Line(s)
334 Mnenomic(s) (Z280: 40, Z80: 294)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

lintrpt/ur

Assembling "diskio" ...

PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

+off [2]   (157)    cp    A,(ix)
+off [1]   (197)    ld    (ix),a
No Error(s), No Warning(s)
1214 Line(s)
661 Mnenomic(s) (Z280: 50, Z80: 611)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

Idiskio/ur

End of file Pass 1
0 Error(s) Detected. 24 Program Bytes. 1271 Data Bytes.
295 Symbols Detected.

Assembling "halbl" ...

PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de

No Error(s), No Warning(s)
570 Line(s)
226 Mnenomic(s) (Z280: 11, Z80: 215)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

Ihalbl/ur

End of file Pass 1
0 Error(s) Detected. 34 Program Bytes. 487 Data Bytes.
239 Symbols Detected.

Assembling "hard" ...

PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de

No Error(s), No Warning(s)
356 Line(s)
89 Mnenomic(s) (Z280: 4, Z80: 85)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

Ihard/ur

End of file Pass 1
0 Error(s) Detected. 34 Program Bytes. 324 Data Bytes.
271 Symbols Detected.
Assembling "chario" ...

PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de

No Error(s), No Warning(s)
622 Line(s)
257 Mnenomic(s) (Z280: 19, Z80: 238)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

ichario/ur

End of file Pass 1
0 Error(s) Detected. 65 Program Bytes.
205 Symbols Detected.

Assembling "setup" ...

PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de

No Error(s), No Warning(s)
719 Line(s)
375 Mnenomic(s) (Z280: 17, Z80: 358)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #SB3028

setup/ur

End of file Pass 1
0 Error(s) Detected. 2570 Program Bytes.
254 Symbols Detected.

Generating (linking) "loader.cim" ...

SuperLinker Copyright (C) 1983-86 by SLR Systems Release 1.31 #AB1234

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<th>Address Range</th>
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<td></td>
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<td>S</td>
<td>PROG AREA 14CC-150C</td>
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</table>
Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 12 Jan 2017 13:58:11 GMT

Wayne,

That's fantastic. I'm putting my older already assembled CPU280 on the bench probably Saturday; I'll take a look at what you've built, split it, and burn into the SST27SF512's I have for the purpose. And then I'll try to boot with that. I'll let you know. I've still got to build a board from the beta batch, though.

Everyone else:

A status update: A select group of individuals are getting boards right now to help out with the beta-testing of this first run. These individuals are proven in their abilities to do this kind of beta-testing and troubleshooting. Once we have a confirmed usable board, I'll get more run and then I'll open for public orders. If you are interested in beta-testing and have a proven record in the community doing this kind of thing (like John Coffman, for instance, who has requested and received two boards) drop me a PM.

I am still figuring out what price point and options are going to be available, so bear with me as I work the math. I want to make sure you have a successful build, and so I might want to make sure you get certain parts that I will test prior to shipment (once I get a known fully working board to test each chip, especially the Z280's).

If you want a board or even a full kit, but aren't willing or able to do beta-testing, drop me a PM so I can gauge the demand to size the production board run properly as well as the size of orders that might need to be made for other parts, like the Z280's and the COM81C17's, which are the two most difficult chips to get (the FDC as originally specified has been very hard to find, but the SST second-source is plentiful, and John for one thinks it will work just fine, and maybe even better). This would also include the four GAL16V8's, preprogrammed.

And lastly, here's a note from Tilmann:
Quote:For me it's OK to distribute all of the CPU280 stuff (including the gerber files, the PDFs and the software) freely - as long as the design is not modified without my expressed permission.
Interestingly enough that there is some kind of revival for the CPU280.

I'm gathering an archive of all of the CPU280 materials, including the JEDEC files and the gerbers, for redistribution, and will post to this thread once they are ready; I'd like to see a running board from the beta lot, since Tilmann did say he made a couple of small adjustments to the design before he sent the gerbers to me (the original design violated some of his current design rules for layout, so he updated that, and so a working board needs to be demonstrated before we can say we have good gerbers; I've looked over the boards I had fabricated versus the older assembled board, and I haven't found the differences yet, but I think it had to do with the clearance of a couple of vias that were easy to short out during construction; the assembled board I have has a couple of blue wire patches due to shorts, one of which was in the actual board). Then if you so chose you could get a board fabricated yourself. But do note his restriction on it being unmodified when redistributed.

He's a really nice guy; if we find errors in the gerbers or need to modify in some way I'm sure he'll be fine with it, he will just want to be in the loop. So for now I'll distribute the unmodified gerbers as needed to folks who get a board, until at least one board is confirmed working, then I'll put them up publicly.

Tilmann is rather impressed that people are still interested in his CPU280 design, and is glad to see this interest.

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Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 12 Jan 2017 19:09:37 GMT

OK, well my prior post with the build toolchain for the CPU280 ROM turns out to have been incomplete. It did not include the CP/M OS image portion of the ROM. I am attaching a revised version that builds everything including the loader, OS, and CCP. It also splits the ROM into even and odd at the end. Everything is being done with the exact tools originally used including PRE208 (Z280 -> Z80 conversion), SLR180, SLRNK, LINK, GENCPM, GENEPR, and SPLIT16.

You can unpack the .zip file on any modern Windows computer (XP or above) and run the batch file "Build.cmd" and it should just work because all tools required are included. The final files will be system.evn and system.odd. There is nothing checking the results of all the steps, so you will need to review the execution to ensure no errors are reported.

I have done nothing to configure the build. If you look at loader.mac and system.mac, you will find all the configuration options. These files must be kept in sync manually. At present, the language is set to German, but you will see that it is trivial to switch to English.

-Wayne

File Attachments
1) SYS113.zip, downloaded 119 times
Great work, Wayne. Now I need to get that on Linux instead of Windows... (I don't run Windows; my primary desktops and laptops are all CentOS). Maybe under DOSBox.....

Would you mind churning one out for floppy only and English messages?

I will send you a ROM image customized as you ask later today.

Porting my work to Linux should be pretty straightforward. The CP/M emulator tool I use (zx.exe) was something I hacked together from zxcc which is a package for Linux. So you should be able to convert my DOS batch file to a shell script and use zxcc instead of zx.

I think DOSBox should run my stuff directly. IF you try it, let me know how it goes.

The latest 0.5.7 version of zxcc on John Elliot's webpage (http://seasip.info/Unix/Zxcc/index.html) compiles fine on Ubuntu. I believe build-essentials and ncurses-devel were the only required packages beyond a base installation. Should work fine on CentOS as well.

With this tool it's very easy to maintain a build environment for CP/M-based programs that works in either Windows or Linux.

Oh, that's sweet. Thanks Andrew! The zxcc package is building now.....

And after a bit of work, changing a DOS batch file to a simple shell script.... (build.sh attached), I have a set of ROMs to burn. Time to dig out the TL866A and see if the SST27SF512 really is supported....

Oh, if it's at all interesting, the complete build run looks like this:
[lowen@dhcp-pool170 lro-cpu280-113-20170112]$ time ./build.sh
Assembling loader ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
889 Line(s)
419 Mnenomic(s) (Z280: 49, Z80: 370)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

loader/ru
End of file Pass 1
0 Error(s) Detected. 1811 Program Bytes.
286 Symbols Detected.

Assembling kernel ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
315 Line(s)
139 Mnenomic(s) (Z280: 10, Z80: 129)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

lkernel/ru
End of file Pass 1
0 Error(s) Detected. 1220 Data Bytes.
218 Symbols Detected.

Assembling intrpt ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
666 Line(s)
334 Mnenomic(s) (Z280: 40, Z80: 294)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

lintrpt/ru
End of file Pass 1
0 Error(s) Detected. 124 Data Bytes.
195 Symbols Detected.

Assembling diskio ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)
+off [2] (157) cp A,(ix)
+off [1] (197) ld (ix),a

No Error(s), No Warning(s)
1214 Line(s)
661 Mnenomic(s) (Z280: 50, Z80: 611)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

ldiskio/ru
End of file Pass 1
0 Error(s) Detected. 24 Program Bytes. 1242 Data Bytes.
295 Symbols Detected.

Assembling halbl ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
570 Line(s)
226 Mnenomic(s) (Z280: 11, Z80: 215)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

lhalbl/ru
End of file Pass 1
0 Error(s) Detected. 17 Program Bytes. 357 Data Bytes.
224 Symbols Detected.

Assembling hard ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
356 Line(s)
89 Mnenomic(s) (Z280: 4, Z80: 85)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

lhard/ru
End of file Pass 1
0 Error(s) Detected.
201 Symbols Detected.

Assembling chario ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
Assembling setup ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
719 Line(s)
375 Mnenomic(s) (Z280: 17, Z80: 358)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

setup/ru
End of file Pass 1
0 Error(s) Detected. 2563 Program Bytes.
254 Symbols Detected.

Linking loader.cim ...
SuperLinker Copyright (C) 1983-86 by SLR Systems Release 1.31 #AB1234

LOADER    S  PROG AREA 0000-0712
LKERNL    S  DATA AREA 0713-0BD6
LINTRPT   S  DATA AREA 0BD7-0C52
LDISKIO   S  PROG AREA 0C53-0C6A  DATA AREA 0C6B-1144
LHALBL    S  PROG AREA 1145-1155  DATA AREA 1156-12BA
LHARD     S
LCHARIO   S  PROG AREA 12BB-12CB
SETUP     S  PROG AREA 12CC-1CCE
LDOS      S  PROG AREA 1CCF-243F  5 Nov 90 22:13
0000-243F (2440)A6D3 Left
0000-243F (2440)A6D3 Left
FINISH - NON-STANDARD OUTPUT 023D

Assembling kernel ...
PRE280 V1.12  11-Feb-91  Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
315 Line(s)
139 Mnenomic(s) (Z280: 10, Z80: 129)
SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

kernel/mu
End of file Pass 1
0 Error(s) Detected. 168 Program Bytes. 342 Data Bytes.
237 Symbols Detected.

Assembling intrpt ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
666 Line(s)
334 Mnenomic(s) (Z280: 40, Z80: 294)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

intrpt/mu
End of file Pass 1
0 Error(s) Detected. 950 Data Bytes.
280 Symbols Detected.

Assembling boot ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
287 Line(s)
149 Mnenomic(s) (Z280: 19, Z80: 130)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

boot/mu
End of file Pass 1
0 Error(s) Detected. 59 Program Bytes. 450 Data Bytes.
228 Symbols Detected.

Assembling clock ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
147 Line(s)
118 Mnenomic(s) (Z280: 3, Z80: 115)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234
Assembling chario ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
622 Line(s)
257 Mnenomic(s) (Z280: 19, Z80: 238)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

cario/mu
End of file Pass 1
0 Error(s) Detected. 19 Program Bytes. 498 Data Bytes.
253 Symbols Detected.

Assembling diskio ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)
+off [2] (157) cp A,(ix)
+off [1] (197) ld (ix),a

No Error(s), No Warning(s)
1214 Line(s)
661 Mnenomic(s) (Z280: 50, Z80: 611)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234
diskio/mu
End of file Pass 1
0 Error(s) Detected. 75 Program Bytes. 3571 Data Bytes.
356 Symbols Detected.

Assembling halbl ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
570 Line(s)
226 Mnenomic(s) (Z280: 11, Z80: 215)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

halbl/mu
End of file Pass 1
0 Error(s) Detected. 17 Program Bytes. 681 Data Bytes.
207 Symbols Detected.

Assembling hard ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
356 Line(s)
89 Mnenomic(s) (Z280: 4, Z80: 85)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

hard/mu
End of file Pass 1
0 Error(s) Detected.
201 Symbols Detected.

Assembling form ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
386 Line(s)
220 Mnenomic(s) (Z280: 20, Z80: 220)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

form/mu
End of file Pass 1
0 Error(s) Detected. 568 Data Bytes.
254 Symbols Detected.

Assembling scb ...
PRE280 V1.12 11-Feb-91 Copyright (c) 1988-91 by A.Zinser (fifi@hiss.han.de)

No Error(s), No Warning(s)
38 Line(s)
0 Mnenomic(s) (Z280: 0, Z80: 0)

SLR180 Copyright (C) 1985-86 by SLR Systems Rel. 1.31 #AB1234

scb/mu
End of file Pass 1
0 Error(s) Detected.
24 Symbols Detected.
Linking bnkbios3.spr ...
LINK 1.31

BOOT 070C BUFFER 02D6 CO 0231 COA 0230
CTBL 00E5 CURDPH 02CB DBNK 02D5 DMA 02D2
DPHA 128F DPHB 12BC DPHC 12E9 DPHD 1316
DPHE 1A52 DRIVE 02CD DTBL 02AB HEXADR 021A
HEXBYT 021F HOME 0255 MLTCNT 02D4 MOVE 00CF
PDEC 023C PMSG 0211 READ 029C RESIOP 0206
SECTOR 02D0 SECTRN 0270 SELDSK 027A SELMEM 00B8
SETBNK 0267 SETDMA 0262 SETSEC 025D SETTRK 0258
SIZOUT 024E TRACK 02CE WBOOT 00A8 WBOOTE 0003
WRITE 0297 XMOVE 00C8 @MEDIA FE54 AUXIN 0B73
AUXIST 0B37 AUXOST 0ABA AUXOUT 0A95 CNT10 0693
CONIN 0B78 CONOST 0ABF CONOUT 0A9A CONST 0B3C
CURTKS 127F DELAY 068E DEVINI 09C6 DMASET 087A
FDCCO1 0E8A FDGROD 069B ITVT 069C LIST 0A90
LISTST 0AB5 LOGMSK 069A MOTFLG 068D MOVEX 07AA
REBOOT 0781 RESULT 00F6 RETBIOS 03B3 SCB FE00
SYSCAL 0356 TIME 08CE USERF 1C54 USRMU 0802
XSTACK 070C @CIVEC FE22 @MXTPA FE62 C1BD 00EC
C1H 00E4 C2BD 00F4 C2H 00E3 CLCADDR 07E5
CLCDMA 07DF SYSSMU 07FE @DATE FE58 @HOUR FE5A
@MIN FE5B @SEC FE5C @IVALC FE26 @AOVEC FE28
@COVEC FE24 @LOVEC FE2A BRKFLG 0B95 @ERMDE FE4B
ACTDPB 0C9C CHKBUG 0EA1 CHKDR 1129 CHKDEN 110B
CLIST 126F CMDADR 126D DENSE 127E DRVTP 127C
DSKIO 0EB2 DSKPOS 0F9D DSKRD1 0D55 DSKWR1 0DBA
EOT 1275 ERCHKP 1146 ERRCHK 1134 FDCCOM 0E87
FDCE 1274 HEAD 1272 HEXLS 11BC INTCO1 0EE5
INTCOM 0ED8 LDFLAG 127D MOTOFF 0D98 MOTONW 10F0
PDRIVE 1270 PSECT 1273 PTRACK 1271 QUIET 127A
RDLEN 0F22 RETRY 118C SEEK 106A SETCLK 108F
SETHD 1098 SETLD 10A1 SETLN1 10D6 TIMERR 1195
WRDMPB 0F26 WRL 0F2D

ABSOLUTE 0000
CODE SIZE 0152 (0000-0151)
DATA SIZE 1C8C (0200-1E8B)
COMMON SIZE 0000
USE FACTOR 30

Generating CP/M System cpm3.sys ...

CP/M 3.0 System Generation
*** CP/M 3.0 SYSTEM GENERATION DONE ***
Generating composite ROM image system.epr ...

Boot-EPROM-Generator V1.2, TR 271090

Loading LOADER.CIM
Loading CCP.COM
Loading CPM3.SYS

SYSTEM.EPR Generation done

Splitting ROM image into system.evn and system.odd ...

SPLIT16 Program Splitter V1.0  TR 050290

real 0m0.925s
user 0m0.848s
sys 0m0.064s

Yeah, 0.925 seconds from hitting Enter to it completely building the whole system....

The build.sh I used is attached.

File Attachments
1) build.sh, downloaded 125 times

Subject: Re: Interested in a Z280 SBC
Posted by Andrew B on Thu, 12 Jan 2017 21:22:21 GMT
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Wayne really made my day when I was looking through the RomWBW github and found zx.

I had been doing a whole bunch of juggling to compile my ZSOS CP/M 3 distribution inside SIMH
and now it’s just a few simple bash/batch files. It simplified things soooo much to be able to run
the original DRI build tools from a modern OS command line.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 12 Jan 2017 21:34:58 GMT
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Yeah, that is the easy way to do it; Wayne, you made my day, too. I was going to put everything in YAZE-AG, etc. Now I think I'm going to pull the HiTech C that Andreas distributed with YAZE-AG that has been modified to generate Z280 code and make it the compiler that zxcc can use (in the form of zxc).

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Fri, 13 Jan 2017 04:29:56 GMT

RE: TO-92 transistors on the CPU280 board

The silkscreen on the board for T1 and T2 is misleading. The emitters of the transistors should connect to GND. AFAIK, most small signal NPN & PNP transistors in the TO-92 package use the pin assignment on p.1 of the PDF. Here are pix of my mounting of 2n3904's on the board.

If you have mounted one backwards, leave it alone. Bi-polar transistors work fine backwards, at slightly reduced gain, which doesn't matter in a digital circuit.

--John

File Attachments
1) 2N3904.pdf, downloaded 137 times
2) IMG_0816.JPG, downloaded 201 times
3) IMG_0820.JPG, downloaded 196 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 13 Jan 2017 12:27:53 GMT

Ah, the old TO-92 footprint "standard" issue rears its ugly head once again! As the most egregious example, the 2N2222's TO-92 version is available with two different and opposite pinouts; reference the Wikipedia article on the 2N2222 here. I'll have to be extra careful to document this properly; would a change in the silkscreen to show emitter, base, and collector connections (using E, B, and C) be better, or do you think just good documentation of the issue would be enough? As you say, with most NPN small-signal transistors and in this circuit it's not going to make a huge difference.

I'm very tempted to just include a couple of transistors with the matching pinout with any boards I ship from the production run. I'll have to see what I can find. 2N2222 is by far the most common and easy-to-find small-signal NPN, and if I'm careful I can get the right pinout and buy in bulk. Thanks for the reminder of this issue that I have seen before but had forgotten about.....

EDIT: BC547B is the part Tilmann calls for in his BOM, and that's probably the part I'll put in my Mouser project. It has the reverse pinout that matches the silkscreen, CBE instead of the 2N3904's EBC. In quantities of 100 Mouser lists the BC547 at $0.06; QTY of 1 it's $0.18. So I'll
document the pinout differences in my assembly document that I'll send with the board, and I'll provide the BC547 for any kits.

Further EDIT: While what John says about digital circuits and NPN small-signal transistors being just about reversible is strictly correct, it is not recommended. The reverse breakdown voltage (VBE) of the base-emitter junction is typically very low relative to the much larger base-collector junction. The 2N3904 should be able to handle it, with a 6 volt VBE, but if a partsbox-generic NPN is used it might be one of the ones with a very high HFE (forward gain) but a very low VBE. If VBE for the chosen transistor is less than 5V it is possible to permanently destroy the base-emitter junction (without letting loose the magic smoke) even with very low currents. For a deeper discussion of this, with some graphics, see this EEVblog post. Also, depending upon the exact geometry, the gain might not be high enough to switch with reversed connections. Caveat installer. And if you're interested in such things at a deeper level, also see: this post on the electrical engineering portion of stackexchange.

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Fri, 13 Jan 2017 16:09:07 GMT
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IMHO, the EBC order of the pins, reading L-R with the flat side of the transistor facing you, and the pins pointing downward, is the most common orientation for plastic parts. AFAIK, the board would be correct for a part in a TO-18 or TO-5 case.

File Attachments
1) Fig66.JPG, downloaded 184 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 13 Jan 2017 16:54:31 GMT
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Oh, I agree, John, but the BC547 is one of the exceptions and has a CBE pinout. If the BC547 were a rare, old, uncommonly-used part.... but it's not. It's current production by On Semiconductor, and is used on several Arduino sample sketches. Datasheet, courtesy of the arduino project.

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Sat, 14 Jan 2017 00:35:05 GMT
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RE: BC547

The CBE vs EBC arrangement of pins on the TO-92 plastic transistors is a revelation to me. You learn something every day.
On the TO-92 pinout, that bit me once before back in the early '90's when I was repairing a piece of gear, but then it was the difference between the PN2222A and the P2N2222A (one is EBC and the other CBE). I think the rationale was for one to match the already common 2N3904 pinout and the other to provide a plastic replacement for the TO-18 original. That piece of gear was analog, and the original part was pinned CBE. The circuit was using the '2222A near its voltage and current limits; I dropped the wrong one in and blew the transistor immediately. It took me way too long to figure out that the transistors I bought had the wrong pinout (a plastic case 2N2222A is just like another one, right? NOT!). Not a lesson I'm going to forget any time soon!

There is one other real caveat with building the CPU280 that you've probably already figured out but I'll mention it just in case. Tilmann cautions to make sure spacers are used for the crystals; if the crystal case is seated all the way to the board there is a possibility of shorting out some of the vias that are either really close to the crystal case or in one instance under the crystal case. The CPU280 is near or at the limit for a two-layer board in complexity. (I'm compiling a list of these gotchas for my assembly document.)

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 14 Jan 2017 21:06:31 GMT

Project Update: Old revision assembled board.

Build notes:
1.) SST27SF512 does not work properly, need to check and see why. Pulled a couple of NM27C256Q's from an old board, erased, and programmed. LED's blink, nothing else.
2.) Traced the code, guessing at what some of the German comments mean.....
3.) Found the problem: the default ldrio.mac is the ldrio.hgt version, which sets the console device to the unobtainium REH-ECB-HGT Hercules Graphics Terminal. Hmmm. Looked at ldrio.crt and found the droids I was looking for; this is the UART console version. Copied ldrio.crt over top of ldrio.mac, rebuild, erased, burned.

IT'S ALIVE!

Cold Loader Program V1.13 TR 950314
Press DEL to run SETUP.
4096k RAM ok

1. Disk Drives
actual values:
A: 5.25" HD 300/360, 80 tracks, double-sided
B: 5.25" HD 300/360, 80 tracks, double-sided
C: 5.25" HD 300/360, 80 tracks, double-sided
D: 5.25" HD 300/360, 80 tracks, double-sided

1. Disk Drives
2. Interfaces
3. Other
0. Exit (Reboot)
--> 0

CP/M-3 Loader V1.13
Booting system file from EPROM

62K TPA

CP/M-3 BIOS V1.13 TR 950314
E: MDrive 3840k
Error: Harddisk not installed

The UART cable is seriously weird, but I'll fix that for the kit. Now that I have a known working board, I can test Z280's and the other chips while I build up one from one of my beta boards.

---

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sun, 15 Jan 2017 09:00:54 GMT
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Impressive work! Congratulations!

---

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sun, 15 Jan 2017 09:14:53 GMT
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Re: The CBE vs EBC arrangement & You learn something every day.

Thank you for this piece of information! I guess I could have asked my father but he's 88 years
old and his memory is failing. He is or rather was a guru in the analog world of electronics. He's still a reliable source if I want to build an amplifier with tubes, though!

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 16 Jan 2017 14:42:32 GMT

Tubes.... GlassFET's..... Firebottles..... Valves.....

Now we're talking classy stuff. In my broadcast engineering career (27 years, now), I've found many radio stations, especially AM ones, still running tube or hybrid (solid-state exciter, tube PA) transmitters. So I'm familiar. Working with tubes is almost exactly like working with modern MOSFETs, with the major exception being that a tube's output impedance is typically much higher than modern power MOSFET's output. The MOSFET is a voltage-controlled current source; the tube is a voltage-controlled voltage source; bipolars are current-controlled current sources, although IGBT's (insulated-gate bipolar transistors) blur that line.

I've worked with small tubes, like the ubiquitous 12AX7, and large stuff, like the $3,000+ 4CX15000A of which a Continental 316F had two; a page showing these: Old Radio 316 archive.

No tubes yet for the CPU280, though. Although if I ever made an audio interface for it I might be tempted to pop a couple of 12AX7s in the output just for kicks.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Mon, 16 Jan 2017 19:35:18 GMT

My father may have a few ECC83 somewhere...

Subject: Re: Interested in a Z280 SBC
Posted by w9gb on Wed, 18 Jan 2017 03:57:13 GMT

Transistor Identification
https://youtu.be/KGcoOETCaEQ

I remember when one was inserted backwards into a transistor socket (1960s radio), it launched from the PC board .... melted white silicon.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 18 Jan 2017 21:16:38 GMT
Another short update:
We have a testing assembler for the Z280 from Anders in Sweden. This is based on the ASxxxx cross-assembler series. The code hasn't yet been upstreamed, but it is being looked at. This is the first step to having SDCC available for Z280. The developer working on this is also working on a Z280 emulator, but is not ready to release that code, which is still in very early development. The ASxxxx Z280 assembler from him is already very complete, with just a couple of known issues.

The Z280 is quite a different beast from the Z180; while both the Z280 and the Z180 are supersets of the Z80, they have a different superset of instructions.

This dates from the Z280 as being the actual silicon for the Z800; the Z800 design predates the Hitachi HD64180 and thus the Z180. The Z180 is a later, and more streamlined, design. So the Z280 has none of the Z180's added instructions, but adds different (a whole bunch more different) instructions.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 21 Jan 2017 15:06:46 GMT

Update for 1/21/17:
My attempts at making a pair of ZIF sockets easily work for the two ROMs have not yet been successful. In order to fit the design on a 100x160mm eurocard, Tilmann really packed it tight; the two ROM sockets's pins are spaced 2.54mm apart (0.1 inch, standard IC pin spacing), and the space between the ROM sockets and the ECB buffers is just as tight. The ROM sockets on my board are virtually touching. I was attempting to extend the sockets upwards using SIL socket strips, and the one on the side of the ODD ROM towards the ECB buffers won't even go in straight. I'll need to find some of the shorter-packaged ACT245s and ACT244s (the plastic part of the package; some manufacturers have narrow end pins and a package that's 1.252mm (0.05 inch) shorter on each end); that type of package will be required to extend the ROM sockets upwards. So I'm still working on a ZIF socket solution for the two ROMs. Once I get it to where I can extend straight up I can use a small PC board to spread the spacing between the two ROMs enough to allow a pair of ZIF sockets to fit. This will be important to me for testing EPROMs that I might send out as part of a chip kit, as well as important for testing and development of the boot code.

On a good note, I can confirm that the DS12887A works just fine as a replacement for the DS1287 for this particular board. I also have ordered four NOS DS1285's, which take an external battery and crystal, to test them and future-proof the RTC section of the circuit. While the DS12887A is available new right now from Mouser, with a sealed-in battery it's going to die some time or another. To use the DS12887A, though, you will need to reset it prior to booting into the setup in the ROM. There is a jumper on the board for this purpose; you short this jumper while the power is off, leave it there for a bit, then remove the jumper and power up. Once you complete SETUP the values are saved, and subsequent boots will use those values.
Upcoming items and roadmap:
I'm working with three proven builders right now that I have sent two boards apiece. Their experiences will inform my building document and the build process, and I have already gotten very useful feedback, especially from John.

I'm working with a few other individuals on the software side; I need to make a workable set of floppy images from the software archives that are out there (a special thanks to Fritz and the oldcomputers.dyndns.org rechner archive of the Z280 stuff!) so the boards will be more useful; right now you can boot the board out of EPROM, but the EPROM isn't really a drive letter and so you get things like my error above about not having a hard disk.

Once a good CP/M plus disk is available, I'm wanting to get an IDE interface built and UZI280 running. At that point I'll feel comfortable enough with the board to do the LS-DOS Z280 port that I have wanted to do for 30 years.

It is very good to see all the interest. I will try to keep everyone updated as things develop, because I know that I am not alone in very much wanting a running Z280 machine.

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Sun, 22 Jan 2017 15:31:29 GMT
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RE: ZIF sockets on the CPU280 board

It can be done! See pix attached.

The process starts with the pair of machine-tooled (mt) sockets installed on the board, and the 20-pin bus interface chips re-installed to make room for the next layer of sockets. Another pair of mt sockets is installed as the first riser to get above the CPU socket. The next riser is a pair of double wipe (dw) sockets, installed with a 0.025" separator between them. This achieves half of the clearance needed by the ZIF sockets. For a separator, which is not retained, I used a single-row snappable header with 27 mil pins. It is retained long enough to bend the leads on the dw sockets to give the first 25 mil clearance. Finally, with the separator removed, the ZIF sockets are installed with their pins bent slightly outward, the two sockets touching one another in the middle, and pressed carefully into place into the dw sockets. The extra separation on the ZIF sockets is another 25 mils, accounting for their 0.750" width, just 50 mils too much to fit without some tom-foolery.

The socket nearest the CPU is inserted in the wrong orientation to mark pin 1, but this provides clearance for the pin 1 address jumper seen to the left in the pix. One must just remember that the right ZIF socket represents the orientation of the ROM chips.

--John
Subject: Re: Interested in a Z280 SBC  
Posted by Wayne W on Sun, 22 Jan 2017 19:20:04 GMT  
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Iowen wrote on Sat, 21 January 2017 07:06 Update for 1/21/17: Once a good CP/M plus disk is available, I'm wanting to get an IDE interface built and UZI280 running. At that point I'll feel comfortable enough with the board to do the LS-DOS Z280 port that I have wanted to do for 30 years.

Lamar, you mention the IDE interface. I was wondering about this as well. Are design files or gerbers available for the original IDE interface board that works with the CPU280?

John, have you looked at whether it would be possible to achieve any interoperability with existing RBC boards?

Thanks, Wayne

---

Subject: Re: Interested in a Z280 SBC  
Posted by jcoffman on Mon, 23 Jan 2017 00:33:06 GMT  
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Wayne,

RE: inter-operation with other ECB boards.

Any board with the Kontron reset should be good. Dual IDE, Disk I/O v2/v3, Dual SD, MF/PIC, & Quad UART come immediately to mind.

I'll likely be trying the MF/PIC soon, since I'm having Serial I/O woes at the moment.

--John

---

Subject: Re: Interested in a Z280 SBC  
Posted by Iowen on Mon, 23 Jan 2017 14:17:43 GMT  
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Wayne W wrote on Sun, 22 January 2017 14:20
Lamar, you mention the IDE interface. I was wondering about this as well. Are design files or gerbers available for the original IDE interface board that works with the CPU280?

Wayne, Tilmann has offered to provide those once he finds them. The German manual for the IDE board is online, but he is looking for the English translation. He has been very busy with work, so it may take several days to weeks.

EDIT: I have these files in hand, but have not looked at them.

Quote: John, have you looked at whether it would be possible to achieve any intero

I would actually like to try with the PropIO. This would give some nice things including a local display and keyboard interface. A driver would need to be written, but the CPU280 loader software is so modular that it should not be very difficult to write, especially with some Z80/Z180 code to look at.

The Dual SD board would also be a suitable target, again with it needing a driver written. But the source for the CPU280's loader, BIOS, and formatter is all out there, and in fact Fritz has added quite a bit to his archive on oldcomputers.dyndns.org.

EDIT: The link to the information on Fritz' site can be found by going directly to This Link. Thanks Fritz!

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 23 Jan 2017 18:08:25 GMT

jcoffman wrote on Sun, 22 January 2017 16:33 RE: inter-operation with other ECB boards.

Any board with the Kontron reset should be good. Dual IDE, Disk I/O v2/v3, Dual SD, MF/PIC, & Quad UART come immediately to mind.

Very happy to hear that John. I was hoping that was the case and it opens up a wealth of ECB peripheral support.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 23 Jan 2017 18:13:32 GMT

Iowen wrote on Mon, 23 January 2017 06:17 Tilmann has offered to provide those once he finds them. The German manual for the IDE board is online, but he is looking for the English translation. He has been very busy with work, so it may take several days to weeks.
Great news Lamar.

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Mon, 23 Jan 2017 21:05:42 GMT

RE: RetroBrew ECB boards with CPU280

The boards I mentioned before are all good, with one caveat: interrupt controller on the MF/PIC board will not be programmable since it requires the BC register to address its internal registers. The CPU280 only exports the C register as the device code. AFAIK, no other EBC I/O peripheral uses the 16-bit I/O space. The DS1302, 8255, and 16c550 on the MF/PIC are addressed by only 8-bits, and are fully usable.

--John

[P.S. I wish the interrupt controller were usable; it would make for some interesting experimentation with mixed IM2/IM3 interrupts on the Z280.]

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 25 Jan 2017 13:56:16 GMT

Update for Tuesday January 24:

I had been using the AMD PALCE16V8 chips in my assembled original CPU280 exactly as received from Tilmann.

No longer.

I can confirm that Lattice GAL16V8B's (and presumably 16V8A, 16V8C, and 16V8D) work fine when programmed with the JEDEC files sent to me by Tilmann. These files are available on Fritz' oldcomputers.dyndns.org site as linked in an above message in this thread.

I did run into an oddity. I have five device programmers available to me. One is a Pro-Log M980 with PM9066 MMI Type 2 adapter, the next oldest is an Advin Pilot U44+, the next a generic LPT "Enhanced Willem" knock-off, the next a Genius G540, and the last an Autoelectric TL866A. While there is usable Linux software for use with the TL866A, that software's support of JEDEC files is questionable, so I planned to use my Windows 7 virtual machine under CentOS 7. The CentOS 7 qemu-ev packages support full USB pass-through from the host to the VM.
Now, for various reasons I started with the G540. Be very careful about the chip placement in the programming socket with this one, as it does not line pin 1 up with pin 1 for programming the GAL16V8. I was able to program the SYS, I/O, and RAM GAL16V8's with the G540, but the G540's software did not like the JEDEC files for the two CAS options (CAS, and CAS4; I am not supplying the 256Kx4 RAM so I'm only going to be programming the CAS4 which is for use with the 1Mx4 RAMs). An attempt to read the PALCE16V8 that was already programmed as CAS4 didn't work, either. Manual inspection of the JEDEC files for CAS4 didn't show anything obviously wrong. However, two of the GAL16V8Bs required multiple attempts at programming to get a good verify; not sure what is going on there.

So I pulled out the TL866A, and its software read the JEDEC fine, and programmed the CAS4 GAL16V8B just fine. So I'll probably use the TL866A in the future. Its software, as poor as it is, is still better than the G540's software. One day I'll get something better; until then, if I hit a device the TL866A won't handle I'll punt to the Advin Pilot U44+ and my old XP laptop with parallel port.

I swapped in my freshly programmed GAL16V8Bs one at a time, starting with CAS4, going to RAM, then I/O, and last SYS. I booted the CPU280 after each swap, and everything works great. So I'm running with my own programmed GAL16V8s. I've ordered a small quantity of GAL16V8Ds to test.

For builders who are planning to program their own GAL16V8s, the speed isn't terribly critical; Tilmann's article in TCJ #77 states that the common 25ns parts should work fine. I'm buying 15 ns, and the four GAL16V8Bs I tested are 10ns.

I intend to test Atmel ATF16V8 chips as well, since they are still available new. Programmer support is questionable; I might have to resort to the Advin Pilot U44+, which really will program basically everything. The PDS files call out PALCE16V8, but Tilmann's JEDEC files work properly in my GAL16V8Bs.

---

Subject: Re: Interested in a Z280 SBC
Posted by ab0tj on Wed, 25 Jan 2017 15:42:39 GMT
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lowen wrote on Wed, 25 January 2017 06:56
So I'll probably use the TL866A in the future. Just don't bother trying to use it on 22V10's - my TL866A either errors out or thinks it programmed the chip but produces an unusable chip.

---

Subject: Re: Interested in a Z280 SBC
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Re: don't bother trying to use it (TL866) on 22V10's
I can confirm that. The programming algorithm is wrong somehow. The chip is only partially programmed. The TL866 can program a GAL16V8 or ATF16V8 though. Despite the awful software I use a Genius G540 if I have to program a GAL22V10.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 25 Jan 2017 18:26:01 GMT
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The cases of programming a 22V10 or anything else that the TL866A won't handle are why I keep the Advin Pilot U44+ around. The G540 probably would work, but with several tries required for one of the chips to get a good verify I have to admit to being a bit leery of the G540.

As I understand it there is some work being done on the 22V10 issue.

EDIT: John reports that the version of ASxxxx for which we have a Z280 assembler is much newer than the version used as the base for the SDCC assembler, and so the resulting asz280 assembler isn't directly usable for SDCC.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Thu, 26 Jan 2017 09:12:04 GMT
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Re: being a bit leery of the G540
Yes, the G540 (or rather it's software?) is quite capable of destroying some chips. So far I've been lucky I guess.

Re: work being done on the 22V10 issue
For the TL866?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 26 Jan 2017 21:12:49 GMT
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I seem to remember reading somewhere that someone was working on the TL866 firmware to get better support for 22V10... EEVBlog, maybe?

Anyway, I've ordered some NOS Lattice GAL16V8D-15's for testing, and have a line on a quantity of them. If those work out well, I'll be able to provide pre-programmed GAL16V8's as part of the 'kit' of special parts. Which brings me to a question to ask the group: what options would you like to see for the production run? Board only? Board+hard-to-find parts (Z280, LT1134, COM81C17, 1Mx4 RAMs, FDC, four programmed GAL16V8's, programmed EPROMs)? Full kit with everything? (Like the P112 kits) Is there any demand for fully assembled and tested units?
lowen wrote on Thu, 26 January 2017 13:12 what options would you like to see for the production run? Board only? Board+hard-to-find parts (Z280, LT1134, COM81C17, 1Mx4 RAMs, FDC, four programmed GAL16V8's, programmed EPROMs)? Full kit with everything? (Like the P112 kits) Is there any demand for fully assembled and tested units?

Hi lowen,

I'm in need of a fully assembled and tested units as my last work with the solder iron is long ago and last year soldering a wire for my bike was no big exercise.

-fritz

Subject: Re: Interested in a Z280 SBC
Posted by pbirkel on Fri, 27 Jan 2017 11:02:45 GMT

lowen wrote on Thu, 26 January 2017 13:12 Which brings me to a question to ask the group: what options would you like to see for the production run? Board only? Board+hard-to-find parts (Z280, LT1134, COM81C17, 1Mx4 RAMs, FDC, four programmed GAL16V8's, programmed EPROMs)? Full kit with everything? (Like the P112 kits) Is there any demand for fully assembled and tested units?

Board+hard-to-find parts for me please :-).
module can be reset.

Also, a nice video, shot in 2013, of a REHCPU 280 booting, with some discussion (including insight in the REH Design bounding-deer logo!) is available on youtube here. EDIT: note that there are a few uses of words that might not be safe for work, or around kids. I didn't create the video; just mentioning it.

EDIT: Fritz has been busy adding documents and organizing his Z280 section of oldcomputers.dyndns.org; it's worth a look! And I want to mention that had it not been for documents and software being available from Fritz, I might not have ever gone the extra step of contacting Tilmann, getting the gerbers from him, and having a beta run of boards fabricated; thanks Fritz!

EDIT: For everyone’s benefit, I'm attaching my currently running ROM binaries here. These are for 27C256; to use in a 27C512 zero-pad out to 64K if your programmer requires it. These are built with REH-ECB-IDE support; if you don't have that board or a workalike just ignore the 'hard disk not found' error.

File Attachments
1) 32k--english-uart-odd.bin, downloaded 114 times
2) 32k--english-uart-even.bin, downloaded 113 times

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Fri, 27 Jan 2017 15:39:22 GMT
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Board only for me, please, but alternatives is a good thing!

--Jonas

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Fri, 27 Jan 2017 18:14:58 GMT
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In order of preference
1. Assembled and tested ;-) 
2. Full kit 
3. Board and awkward stuff (hard to get bits, pre-programmed ROM / GALs etc)

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 30 Jan 2017 14:55:54 GMT
Update for January 30:

One of the beta boards is fully assembled and booting to CP/M via the EPROM, and a second one is nearing completion. So we're getting really close to being able to say that the board run PCBCART fabricated for me is GOOD, and that means I'll be placing the second run order sometime in the next couple of weeks.

I really appreciate those who are beta-building!

---

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Mon, 30 Jan 2017 15:42:15 GMT

RE: my thoughts on the CPU280 board

Good: it works; it talks to the ECB bus.

1. The board requires other boards to use the Kontron reset option. This precludes the use of VERY old boards without the Reset jumper.
2. The DIN connectors use only 64 pins. This limits its usefulness with the full range of RetroBrew boards. Specifically, any thoughts of using a 16-bit bus are out.
3. Only 8 address lines are exported to the BUS. At least 16 should be exported; and probably all 24 for completeness.
4. The board is so full, that it took major forcing to mount ZIF sockets for the EPROM. Software development is ridiculous without the use of ZIF sockets.
5. The COM81C17 UART chip is very hard to find, and rather pricey.
6. The 50-pin floppy drive connector is virtually obsolete. A 34-pin connector would be a better choice; and the FDC chip should use the IBM PC-AT wiring. This limits the number of floppy drives to 2; but I do not intend to connect any floppies. I prefer SD cards or CF cards.

Reason to keep the existing board design: It works; no setup charge for manufacture. Good board for the really retro-folks who want to use floppies.

--John

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 30 Jan 2017 16:07:17 GMT

John, thanks for the efforts and the great feedback!
Updated September 7, 2018: Please note than plasmo's designs linked in the updated first post address many of the points raised by John above, and are what I consider to be the logical continuation of the Z280 SBC designs.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 30 Jan 2017 17:01:52 GMT
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Only my personal remarks.

First thanks to all who helped Lamar with this rebuild.

jcoffman wrote on Mon, 30 January 2017 07:42
#1. The board requires other boards to use the Kontron reset option. This precludes the use of VERY old boards without the Reset jumper.
Yes, but why will you use very old boards with this one?

jcoffman wrote on Mon, 30 January 2017 07:42
#2. The DIN connectors use only 64 pins. This limits its usefulness with the full range of RetroBrew boards. Specifically, any thoughts of using a 16-bit bus are out.
Yes, but these thoughts have never been there as the board was designed.

jcoffman wrote on Mon, 30 January 2017 07:42
#3. Only 8 address lines are exported to the BUS. At least 16 should be exported; and probably all 24 for completeness.
Yes, but see #2

jcoffman wrote on Mon, 30 January 2017 07:42
#4. The board is so full, that it took major forcing to mount ZIF sockets for the EPROM. Software development is ridiculous without the use of ZIF sockets.
Yes, but it seemed in 1995 those problems did not existing. Maybe at that time the programmers did their job in another way as today. Maybe Tilmann Reh can tell us the answer

jcoffman wrote on Mon, 30 January 2017 07:42
#5. The COM81C17 UART chip is very hard to find, and rather pricey.
Yes, that's a bad point today.

jcoffman wrote on Mon, 30 January 2017 07:42
#6. The 50-pin floppy drive connector is virtually obsolete. A 34-pin connector would be a better choice; and the FDC chip should use the IBM PC-AT wiring. This limits the number of floppy
drives to 2; but I do not intend to connect any floppies. I prefer SD cards or CF cards.
Yes mabe, but a 34 pin connector only precludes virtually the use of VERY old floppy disk drives.
For PC like floppyconnectors why don't use a PC ?  If everybody will write what he prefer we got a
lot of answers.

jcoffman wrote on Mon, 30 January 2017 07:42
# Reason to keep the existing board design: It works; no setup charge for manufacture. Good
board for the really retro-folks who want to use floppies.

Yes, and what was the question ?

I think the question was 'Is there someone who wants to build the "Reh CPU280" board'.
The question was not to built a new board with Z280.

I first was amazed about your writing but if a new board is to be designed and build your remarks
are correct and you are right in any way.

So I hope the rebuild of the REH CPU280 boards go well.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 30 Jan 2017 17:53:55 GMT
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Thanks for the comments, Fritz.

The CPU280 is the only known semi-mass-produced Z280 CP/M board (to the best of my
knowledge) and is known working, both from a hardware standpoint and, most importantly, from a
software standpoint. Known working for the Z280 is a difficult task, given all of the bugs that
plague it. See Tilmann's software document and the CPU280 sources for more information on
some of the huge otherwise undocumented bugs in the chip.

Now, having said that, as the thread starter I will clarify that while I am pleased with the CPU280
and plan to support it as long as I have one, my original post was indeed meant to look at
potentially a new design, with the CPU280 as inspiration. Seeing what the CPU280 brings to
bear, I personally am willing to work within its limitations for the core of my own development,
taking advantage of the ECB backplane and peripherals on that backplane to modernize it.

I originally wanted to design and build my own SBC based on the Z280, and I think I've sparked a
bit of interest in doing such a modernized Z280 single-board (SD card mass storage, 16-bits on
the ECB, and all of the things John mentions, as I believe he is looking at a newer board design
too). So I have both the desire to fully support a revival of the CPU280 as-is as well as to support
a general Z280 revival. But honestly having a CPU280 in hand means that while I am happy to
contribute to a more modern design I have a much less urgent need to roll a new design myself.
So I don't look at John's feedback as being a negative criticism or complaint about what Tilmann designed, but rather I look at his list as being a roadmap for a possible new Z280 design. And it is an honest critique of a 1990 state-of-the-art Z280 design in the light of what can be done in 2017. Correct me if I'm wrong, John.

EDIT: Just adding the note that I recognize that the CPU280 fills two different niches simultaneously. One of those niches is the 'vintage' niche where people who love restoring old hardware using original parts (even trying to find the correct lot of, for example, 4K DRAMs for an Apple I replica). That niche is adequately addressed in the vcfed.org vintage forums. The retrobrew niche is a bit different; the CPU280's main utility for the retrobrew niche is as a great and working example of a real Z280 single-board. I am in both niches, incidentally.

---

Subject: Re: Interested in a Z280 SBC
Posted by Fritzeflink on Mon, 30 Jan 2017 19:20:27 GMT

lowen wrote on Mon, 30 January 2017 09:53

Thanks for the comments, Fritz.

So I don't look at John's feedback as being a negative criticism or complaint about what Tilmann designed, but rather I look at his list as being a roadmap for a possible new Z280 design. And it is an honest critique of a 1990 state-of-the-art Z280 design in the light of what can be done in 2017. Correct me if I'm wrong, John.

Hi Lamar,
Hi John,

As English isn't my first language I may interpret something wrong or maybe sitting on the false chair. Seeing the CPU design in the light of today and for building a new board John remarks are fully correct and are right in any way.

Do not take my words so hard - I've done a lot of work so the text looks good.

My answer should not be negative. In terms of a new design, John was right, of course, and I had not thought of it.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 30 Jan 2017 19:41:22 GMT
Thanks Fritz. Language barriers can be difficult, especially in technical subjects, and most certainly with English. And thank you, Fritz, for your personal encouragement to me in this project, for showing excitement about the project, and for your wonderful oldcomputers.dyndns.org archive, which I have used for several years.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Tue, 31 Jan 2017 10:03:50 GMT

jcoffman wrote on Mon, 30 January 2017 07:42RE: my thoughts on the CPU280 board

Good: it works; it talks to the ECB bus.

1. The board requires other boards to use the Kontron reset option. This precludes the use of VERY old boards without the Reset jumper.
2. The DIN connectors use only 64 pins. This limits its usefulness with the full range of RetroBrew boards. Specifically, any thoughts of using a 16-bit bus are out.
3. Only 8 address lines are exported to the BUS. At least 16 should be exported; and probably all 24 for completeness.
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5. The COM81C17 UART chip is very hard to find, and rather pricey.
6. The 50-pin floppy drive connector is virtually obsolete. A 34-pin connector would be a better choice; and the FDC chip should use the IBM PC-AT wiring. This limits the number of floppy drives to 2; but I do not intend to connect any floppies. I prefer SD cards or CF cards.

Reason to keep the existing board design: It works; no setup charge for manufacture. Good board for the really retro-folks who want to use floppies.

--John

Excellent feedback John! I would love to build the board ASAP with the existing design since it’s working and with the possible use of many existing retrobrew IO-boards. It would of course be nice with a new four-layer design with 16-bit bus, 16 or 24 address lines, no 50-pin floppy drive connector and another UART (I do have two COM81C17 but they are indeed pricey).

Jonas
If it talks to some of the cards so it's got IDE or SD, and some other options then it seems fine to me. Even video graphics ought to be doable nicely on that board using the MSX style video chips that just use two I/O ports.

---

Subject: Re: Interested in a Z280 SBC
Posted by will on Thu, 02 Feb 2017 13:28:35 GMT

Has anyone run any tests to compare how the CPU280 performs against Z80/Z180 running the same code? I'd be very curious to know how much of an improvement is yielded by the pipelined CPU, on-chip cache and wider memory bus.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Feb 2017 15:05:27 GMT

The short answer? It's complicated. A few benchmarks were run, with some mysterious results. We now have hardware available again to answer this burning question.

The long answer? It's complicated.

This is one of the several reasons I wanted to do a Z280 SBC in the first place; I mentioned the biggest reason in the first post so I won't repeat that here.

Having a well-tested 'maximum mode,' to use an x86-ism, Z280 board design already made and available makes it much easier to pursue this question. And I believe we hobbyists can learn a great deal from the investigation of this question!

In theory, the Z280 should be faster, clock-for-clock. Pipelining, caching, burst-mode transfers, 16-bit data bus; how could it not be faster?

The reality is going to be far more complicated, and promises to be a really good study on optimization and the actual effects of optimizations. The reality is that the Z280 has a multiplexed bus, and that costs a clock for every bus transaction. Will the 256-byte cache make up the difference? Would the 256-bytes of the cache be better suited as application as the stack? Will the burst-mode 8-byte transfer from RAM fill the cache fast enough? Will the pipeline bestarved by cache and/or RAM access timings? Does a 2:1 or a 1:1 bus mode work the pipeline and the cache most efficiently? There are numerous opportunities for learning by experimenting, using Tilmann's design!

But in order to know, clock-for-clock, benchmarks need to be run, and it's a bit difficult to run
benchmarks on hardware that isn't readily available. So, the CPU280 is available once again, and those who are inclined to study this can use actual hardware to find out.

So I want to try to answer this question myself: take a 12MHz Z80, a 12MHz Z180, and the 12MHz Z280 and run identical Z80 code (first) and take a preliminary comparison. Then, optimize the Z180 code to the Z180 instruction set; make sure multiplies and divides are included to let the Z180 shine (at least on the multiplies)! Do the same with the Z280 code, and pull out all the tricks of optimization (T-state counting, etc) that Z80 programmers have done for ages with Z80 code. Be sure to use Z280 features and see just how much they help or hurt performance, both processor and programmer. And I have to wonder just how overclockable the late Z280s might be; the late-model 33MHz Z8S180's are insanely overclockable. But, again, the Z180 is a much later design than the Z280.

Of course, I would guess that a Z180 at 33MHz, such as the one on John's SBC Mark IV, will run rings around a Z280 at 12MHz, but I'm more interested in clock-for-clock comparisons. There will be certain use cases where the Z280 instruction set is going to be a big help; fully position-independent code, for instance, can be written with the Z280 instruction set without any weird work-arounds. And there are likely cases where the Z280s instruction set will actually hurt performance.

You also have to remember that the Z180 is a newer design than the Z280, which started life as the Z800, and that certain compromises were made, and there were lost opportunities for further optimizations for the Z280.

I'd like to see a really optimized open Z280 core in VHDL or Verilog so that we could have fun with it like Will's socz80 does with the T80 core. But having a real Z280 board on which to compare code results is needed, and that's part of why I started this CPU280 revival.

In my correspondence with Tilmann, he expressed to me his disappointment in the differences between what was promised for the Z280 versus what the Z280 actually delivered, and how quickly the plug was pulled on it. And I can sympathize; he really poured a lot of effort in the design, and a lot of pie-in-the-sky promises were made (like a 25MHz version) that were never delivered.

The Z280 was a mainstream general-purpose PC-type processor in an embedded systems world, and the Z280 is not a great embedded processor design. Embedded systems need some machine-cycle determinism; the Z180 is a fantastic embedded processor and has really succeeded in that space, but the very features that made the Z280 so cool are the features that make it suboptimal for embedded designs. Had it seen actual silicon, as the Z800, five years before it actually did, as the Z280, the story would be different.

Some of the eZ80 early adopters had a similar experience; however, with the eZ80, having one of the TI calculators using the eZ80 will make a great difference.

The eZ80 is the subject for a whole different thread, though.

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The Z280 was also not particularly intended to run hand optimised assembler at perfect speeds. The instruction set tried to fix the worst of the compiler unfriendly nature of the original Z80. In the mini computer space for which it was first imagined how fast it ran random C, Pascal etc compiler output was far more important. Hence the attempt to regularize the instruction set a bit, the presence of sign extension instructions, stack relative loads/stores, increment of a memory target (important for C) and lda (effective address) instructions.

That's going to be hard to assess given modern C compilers now simply throw at the time unimaginable amounts of CPU power at the problem and can actually write quite decent Z80 code.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Feb 2017 21:04:12 GMT

Update for 2/2/2017:
We have a successful second build. I'm ready to say, unless further testing shows otherwise, that we have a good board run, and I will be placing the second run order within two weeks. If you haven't already chimed in on the thread, now is the time to let me know if you want a board. Pricing is a bit fluid right now, but a bare board with no parts is probably going to be $25 plus shipping and handling. I'm still working the math on the other parts to make sure I break even on the costs.

Subject: Re: Interested in a Z280 SBC
Posted by pbirkel on Fri, 03 Feb 2017 06:57:30 GMT

Still in for a PCB plus basic-parts-kit, please.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Fri, 03 Feb 2017 22:22:34 GMT

Still in for PCB only, but two boards, please.

Jonas
I am up for a board and any special parts

Subject: Re: Interested in a Z280 SBC
Posted by trick-1 on Sat, 04 Feb 2017 09:57:46 GMT
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I'd be in for a board & "hard to find" parts.

Subject: Re: Interested in a Z280 SBC
Posted by tlink on Sun, 12 Feb 2017 13:24:28 GMT
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Hi..

just for information only.

I placed a source of the makefile we use for make the OS here:


Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sun, 12 Feb 2017 13:42:30 GMT
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Status Update 2/14/2017:

I just ordered 10 more boards. Once they arrive I'll start notifying those who expressed interest in the production run in the order in which I heard from them. I am still working on the pricing, since some of the parts have become more expensive since I bought my current stock. I do have plenty of 1Mx4 RAM chips and Z280s and am getting sufficient GAL16V8 and 27C512 EPROMs, and I have sufficient LT1134s for ten boards, but I am very low on COM81C17's and the FDC chips. I actually ordered 27C256 EPROMs, but the seller was out of them and sold the '512's for the same price, which was a fantastic deal for New-old-stock EPROMs still in the manufacturer's tubes.

We have made great progress, with two beta boards built and running, and one at least reading floppies correctly. I am confident the board is solid; that's why I ordered 10 more using the same artwork.
And I have yet to build a Mouser project for the rest of the parts..... but I'll get there.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 20 Feb 2017 15:46:45 GMT
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Status update for 2/20/2017:

We have a third CPU280 built and running. This third one, built by Wayne, seems to have verified that the CPU280 is really picky about which FDC it will work with. Wayne's seems to work properly with the SMC FDC37C65C; Terry's seems to not work properly with the ST second-source AIC37C65CL; John to the best of my knowledge hasn't tried the floppy system as yet.

I also want to thank those who have done so much work on this project. First of course would be Tilmann Reh, as he designed and originally built the whole thing. Fritz Chwolka kept all those CPU280 files around all those years, and his archive of CPU280 files is a big part of the reason I got started on this whole project. John, Terry, and Wayne: thanks so much for being willing and capable guinea pigs for the boards, and providing financial support!

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Mon, 20 Feb 2017 16:27:52 GMT
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I tried connecting 2 3.5" 1.44Mb IBM floppies via a 34-pin connector. The floppies select, but CP/M reports errors from both of them. I have the SMC chip installed. I will try again with the WD37C65BJM chip.

--John

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 20 Feb 2017 16:35:23 GMT
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John, what format are you using on the disks themselves? The CPU280 needs a special 'FPB' in the first sector of the disk to decipher the format. Booting from floppy on the CPU280 with the Reh boot ROM is quite different from most others; since the full CP/M 3 BDOS is in ROM, the boot loader uses those calls to boot CPM3.SYS from the drive, and uses the directory on the floppy for the purpose. There is no bootloader on the floppy, but there is the FPB.

Terry and Wayne have been working with using their P112's to write disks that the CPU280 can read. Wayne sent me an IMD.....but I was in the basic editor to reply, so now here it is.

We're going to work on getting a 512-byte format that is more easily interchanged once we get a
reliable floppy system running. Mine has issues (probably bad solder joints from its original assembler back in 1992), Terry's has issues that we think are related to the AIC37C56C, but Wayne's is working.

Wayne, once you get the Reh FORMAT.COM and FORMAT.DAT over to a working floppy, let's format a Reh 3.5 1770K as well as something more compatible and get .IMDs of those. When I get the disks from Tilmann I'll make IMDs of them.

Terry's FPB (as a PDF) is attached, as is Tilmann's FPB from a photo of his terminal screen.

EDIT: Also, here is the cpmtools stanza for the Reh format, as well as the 22disk definition:

cpmtools:
# Reh CPU280 3.5 HD 1770K disk
diskdef reh1770
  seclen 1024
  tracks 160
  sectrk 22
  blocksize 2048
  maxdir 256
  skew 2
  bootitrk 0
  os 3
end

22Disk, from ZNode51:
BEGIN REH3 REH CPU280 11x1024 - HD 135 tpi 3.5" 1770K Disk
DENSITY MFM,HIGH
CYLINDERS 80
SIDES 2
SKEW 2
SECTORS 11,1024
SIDE1 0 1,3,5,7,9,11,2,4,6,8,10
SIDE2 1 1,3,5,7,9,11,2,4,6,8,10
ORDER SIDES
BSH 5  BLM 31  EXM 1 DSM 439  DRM 255 AL0 0C0H   AL1 0    OFS 0
END

But the FPB must be in the first 128 bytes or the CPU280 will error the disk.

File Attachments
1) CPU280-ww.IMD, downloaded 111 times
2) FPB for P112 CPU280 1K Disk.pdf, downloaded 103 times
3) DSC_7201s.jpg, downloaded 123 times

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Mon, 20 Feb 2017 17:55:14 GMT

Sounds like this may be the reason I am having trouble.

I am running Linux, so I could easily put a 1.44mb floppy image file on a diskette.

Wayne, Lamar, who could send me a floppy image file? (direct to my gmail address, please)

--John

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 20 Feb 2017 18:05:19 GMT

Hi John,

I am in the best position to help you right now as I think I am the only one with a functional system.

At the moment, the disk I have working is in Tilmann's 1024 byte sector format. The IMD capture of that image is in the post above by Lamar -- attachment called CPU280-ww.IMD. I can send you a raw byte image of this. However, you would need to format the floppy with a specific sector encoding including sector size of 1024 bytes. Probably not easy to do under Linux unless you have some tools I don't know about. The only tool I know of that can easily handle this is IMD which is a native DOS program.

I am working on trying to generate a DOS-like formatted disk today. If I can achieve that, then it should be easy to blast a generic byte image file onto a standard 1.44M floppy with Rawwrite (Windows) or dd (Linux).

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 20 Feb 2017 18:16:01 GMT

Wayne, that would be ideal. While the 1024-byte sector format is cool and it had its place, it does make interchange a bit difficult. However, as Fritz mentioned to me in an email a while back, most 3.5 drives, including USB ones, are able to do a 1024-byte sector 77 track 1.2MB format using the 'mode 3' 360RPM spindle setting. This format was fairly common in Japan; my USB-connected TEAC FD05PUB can do this format. Now, whether I can format it to those specs under Linux or not I don't know; John, I'm also under Linux, so I have the same problem. I do know that a standard floppy controller under Linux can be made to handle these oddball sector
formats, and libdsk's dsktrans and dskdump can do the writing to physical media at any sector size the controller and media support. I have written a libdsk stanza for the Reh 3.5 HD format, but I haven't had opportunity to test it, since I don't know if I can do that with a USB floppy. I have a desktop I can try, but it's packed away at the moment (it has a Catweasel MK4 in it, and if the native controller can't do it the CW can).

EDIT: libdsk's Web page

You want libdsk 1.4 and cpmttools 2.20.

---

Subject: Re: Interested in a Z280 SBC
Posted by tor on Mon, 20 Feb 2017 20:17:09 GMT

Wayne W wrote on Mon, 20 February 2017 19:05
However, you would need to format the floppy with a specific sector encoding including sector size of 1024 bytes. Probably not easy to do under Linux unless you have some tools I don't know about.

Shouldn't be a problem. Check out the 'fdutils' package. I use it for the various formats used by an old minicomputer I work with, including 1024-byte sectors.

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 20 Feb 2017 20:33:27 GMT

I can't help instead I have 2 dos computers with catweasel and AHA1520 for converting floppydisks in the basement.

Formats for 22disk

http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /my_old_Z280/rehdisk.def

Formats my REH 280 could use

http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /my_old_Z280/z280form.txt

I hope ist functional:
http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /my_old_Z280/boottdisk/diskette/format.com
http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /my_old_Z280/boottdisk/diskette/format.dat
if your system run

http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280
/my_old_Z280/bootdisk/diskette/msdos.com
http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280
/my_old_Z280/bootdisk/diskette/msform.com

some of the files are in
http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /my_old_Z280/bootdisk/disi_g/
too.

Here are the old source for the format manager and msdos-tool

http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280
/my_old_Z280/floppy_and_hd/index.html

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 20 Feb 2017 20:42:02 GMT

Wayne W wrote on Mon, 20 February 2017 19:05
However, you would need to format the floppy with a specific sector encoding including
sector size of 1024 bytes. Probably not easy to do under Linux unless you have some tools I
don't know about.
Shouldn't be a problem. Check out the 'fdutils' package. I use it for the various formats used by an
old minicomputer I work with, including 1024-byte sectors.
I was not aware of this... will check it out. However, it looks like I have just been able to create a
valid CPU280 disk with the old MS-DOS 1.44MB track/sector standard. That should be easiest
for everyone for the moment.

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 20 Feb 2017 20:55:54 GMT

Attached to this post is a 1.44MB image file that you can use with Rawwrite or dd to create a valid
CPU280 disk. The general process would be to do a normal format of a 3.5" floppy (DS/HD)
resulting in a standard MS-DOS type 1.44MB floppy. Then use either Rawwrite or dd to write the
attached image to the floppy. The resulting floppy will be usable in a 3.5" HD floppy drive
attached to the CPU280.

To reiterate what Lamar has mentioned a couple times... The CPU280 firmware relies upon a
special 128 byte record at the start of a floppy disk to understand its format. The image posted here has that in place.

Notes:
The DPB has a very limited number of directory entries (128). Although there is "space" on the disk, there are only about 5 directory entries left. You are likely to run out of space if you start adding files. If so, just delete other stuff. The DPB is probably not compatible with other CP/M systems. It is not likely that you can just put this in a different CP/M system to move files between systems. The files on the disk are a subset of the files from Rechner website. I have done nothing to determine what the files are and so I don't know which ones are useful or even functional.

-Wayne

File Attachments
1) CPU280_144.img, downloaded 124 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 20 Feb 2017 21:16:34 GMT
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Wayne, minor addition for you: 'Rechner' is German for 'computer.' If that is the oldcomputers.dyndns.org 'rechner' archive, that's Fritz' work; the same Fritz who posts here.

Ok, this image gives me a directory listing, using a standard PC 3.5 drive with a straight-through cable, on B:. Nice. Thanks!

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 20 Feb 2017 21:19:09 GMT
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lowen wrote on Mon, 20 February 2017 13:16Wayne, minor addition for you: 'Rechner' is German for 'computer.' If that is the oldcomputers.dyndns.org 'rechner' archive, that's Fritz' work; the same Fritz who posts here.

Very sorry Fritz! Your work has been extremely helpful in this process. Thanks!!!

Clearly my German needs some work.

-Wayne
Ok, this image works fine in my HxC emulator; none of the others have. That's good news.

Now, before I look through the FPB to see what the parameters are for interchange purposes, what were the parameters you used, for whatever interchange program you used? I want to get the newest FORMAT.COM on it, among other things, and get the terminal type set correctly so that FORMAT.COM will actually work. Not sure what the codes are set for right now.

Wayne W wrote on Mon, 20 February 2017 12:55
[*]The files on the disk are a subset of the files from Rechner website. I have done nothing to determine what the files are and so I don't know which ones are useful or even functional.[/list]

-Wayne

I had installed as I made this floppy for boot:

F: ctram equ true ; ct 1 MB RAM-Disk as drive F:
G: ctsolid equ true ; ct 768KB was mine(256KB) Solid-State-Disk as drive G:
H:I:J:K: ide equ true ; REHdesign IDE-Interface (HD from H:

Some of the files were written after boot to F: and then ZCPR3 started. Please deny the submit during start - you can delete or change the file profile.sub and I don't now if these are all files I used for floppyboot as I had a static ramdisk G: I normaly used for boot. Of course if I got a Z280 board I will test all the files just in time ;-)

I added some informations at:


Well, I'm having a really odd problem. FORMAT works; I can format B: and as long as I don't enable time stamps it completes without error. But as soon as I try to grab a directory, I get a disk
I/O error. Now, I am not a CP/M expert, by any means, but sector 1 or track 0 looks ok in the HxC track analyzer; screenshots attached.

AND, on top of that, after a reboot of the board:
Cold Loader Program V1.13 TR 950314
Press DEL to run SETUP.
4096k RAM ok

CP/M-3 Loader V1.13
Booting system file from EPROM

62K TPA

CP/M-3 BIOS V1.13 TR 950314
E: MDrive 3840k
Error: Harddisk not installed

CP/M Error On B: Disk I/O
BDOS Function = 15  File = SUBMIT .COM
H>dir b:

CP/M Error On B: Disk I/O
BDOS Function = 17  File = ?????????,.???
H>a:
A>dir 
A: !DOS     100 : 17DEC91      : ALIAS    BAK : ALIAS CMD : ARC     COM 
A: DAT  COM : DDTZ COM : DEFAULT NDR : DEFAULT Z3P : DEFAULT Z3T 
A: DEFAULT BZ0 : DEV COM : DRIDIR COM : DU COM : DU34 COM 
A: ERAHD SUB : EXL COM : FCH Z3T : FCP LBR : FILTW COM 
A: FIND COM : FINDBAD COM : FORMAT COM : FORMAT DAT : FORMMERG BAS 
A: MP4  COM : MS COM : MSD COM : MSDOS COM : MSFORM COM 
A: PDTINS COM : PDTINS DTA : PIP COM : PKXARC ZEX : PROFILE SUB 
A: PUT COM : QL COM : QT102 Z3T : QT102 Z3T : QTERM COM 
A: RCP LBR : REL2PAS PAS
A>era profile.sub
A>dir 
A: !DOS     100 : 17DEC91      : ALIAS    BAK : ALIAS CMD : ARC     COM 
A: DAT  COM : DDTZ COM : DEFAULT NDR : DEFAULT Z3P : DEFAULT Z3T
So it erased A:PROFILE.SUB just fine, but won't read a directory on B: after a successful format (verified by looking at the raw disk data using the HxC track analyzer)? I'm missing something basic here.

File Attachments
1) lowen-cpu280-tracks-b-drive-20170220-1.png, downloaded 124 times
2) lowen-cpu280-tracks-b-drive-20170220-2.png, downloaded 119 times
3) lowen-cpu280-tracks-b-drive-20170220-3.png, downloaded 117 times

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Mon, 20 Feb 2017 22:59:06 GMT
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Wayne,

The CPU280...img file 'dd's to floppy fine (under Linux).

My 2 drives (standard IBM 3.5" 1.44mb floppies, presumably jumpered as Drive 1). Their activity lights come on and they spin as drives B: and C:

Booting from ROM, I can list the directory of B: (after several re-tries from CRC errors). Looks like a full CP/M disk. I cannot execute any of the .COM files.

Booting from drive B: usually fails, but twice I have been able to get:

BNKBIOS3 SPR FD00 0300
BNKBIOS3 SPR B700 3900
RESBDOS3 SPR F700 0600
BNKBDOS3 SPR 8900 2E00
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?
Drive B: not ready, Abort/Retry?

the number of re-tries does not matter, drive B: never comes back.

Drive C: is always "not ready".

One definite problem is the formatting mis-match between the floppies (pre-formatted, and new) and the drives. This accounts for the CRC errors, and the multiple tries before I could get to the above coherent boot info.

The "not ready" has me a bit baffled. These 2 drives have been used very successfully on the SBC-188 as A: and B:. But the WD37C65B chip is run not as a NEC-765 or as an Intel-8272, but in PC-AT mode, which is more compatible with the cable with a twist. (No pun intended)

I have doubts about whether the 34-pin connector wiring is totally compatible with the IBM drives. The schematic would indicate that the drives are attached to a vanilla 8272 controller. Has anyone modified the 34-pin wiring connection on the board?

I'm going to do a low level format of another diskette, and see if the CRC errors go away. Pre-formatted disks have been known to need a low level format just out of the box.

Well, getting ahead one stumble at a time... ;-) 

--John

Subject: Re: Interested in a Z280 SBC
Posted by fritzealink on Mon, 20 Feb 2017 23:28:05 GMT
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Ilowen wrote on Mon, 20 February 2017 13:31Ok, this image works fine in my HxC emulator; none of the others have. That's good news.

Now, before I look through the FPB to see what the parameters are for interchange purposes, what were the parameters you used, for whatever interchange program you used? I want to get the newest FORMAT.COM on it, among other things, and get the terminal type set correctly so that FORMAT.COM will actually work. Not sure what the codes are set for right now.

My last posts linking to my old Z280 sytem have to be ignored as (yes I'm old) all is in
the sourcefiles.

http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280
/source_from_tilmann_reh/CPU280-files/PMARC_4_DOS/extract.txt

Tilman has his REHdesign HGT, Text/Grafik-Terminal (HGT) installed. I don't now what
terminalemulation he used - we should ask hin.

As the format.com is made with Borland Turbopascal you can compile it with your Turbopascal
installed with TBINST for your terminal.

I used QUME102 with my bootdisk as defined in fch.z3t or qt102.z3t (Z3 terminaldescriptor)

And reading from drive a: can you execute some con file say nswp.com (newsweep) ?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 20 Feb 2017 23:37:04 GMT
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jcoffman wrote on Mon, 20 February 2017 17:59...

I have doubts about whether the 34-pin connector wiring is totally compatible with the IBM drives.
The schematic would indicate that the drives are attached to a vanilla 8272 controller. Has
anyone modified the 34-pin wiring connection on the board?
...

No doubts; the 34-pin connector on the CPU280 is NOT PC/AT compatible. It is a 4-drive Shugart
layout. If you run one drive on a straight cable it's B:. I'm running an HxC emulator in 2-drive
mode on a straight cable; the HxC is designed to be usable on either PC/AT-compatible or vintage
4-drive Shugart and doesn't require two motor-on signals; each 'half' of the HxC can be jumpered
for drive 0,1,2, or 3 on the straight Shugart interface, and it is software configurable for several
varieties of usage of pins 2 and 34.

You need jumperable drives (certain Teac FD235HF submodels are fully jumperable; the A700,
A529, C529, and 3217 submodels are known fully-jumperable) or an adapter cable/board. Terry
has made a board that adapts the 4-drive Shugart interface to two PC/AT interfaces.

The disk I successfully wrote from Wayne was written by a USB FD05-PUB onto Imation
preformatted media, and I didn't need to reformat.

Yeah, it will be NICE when we can get off the floppy on it.....
lowen wrote on Mon, 20 February 2017 13:31

Ok, this image works fine in my HxC emulator; none of the others have. That's good news.

Now, before I look through the FPB to see what the parameters are for interchange purposes, what were the parameters you used, for whatever interchange program you used? I want to get the newest FORMAT.COM on it, among other things, and get the terminal type set correctly so that FORMAT.COM will actually work. Not sure what the codes are set for right now.

Not sure if this answers your question, but I picked entry #56 when I used FORMAT.COM. The FORMAT.COM came from the FMT102 directory of the archive because it had English (format-e.com). I have not had time to dig into the DPB portion of the FPB that wound up on the disk.

Here is the entry I used:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Name</th>
<th>Siz</th>
<th>Trk</th>
<th>SecGr</th>
<th>Sec</th>
<th>Dense</th>
<th>SMod</th>
<th>Hd0</th>
<th>Hd1</th>
<th>Psk</th>
<th>Iv</th>
<th>Ms</th>
<th>TT</th>
<th>Skw</th>
<th>Bls</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>IBM 1.44 MB</td>
<td>3&quot;</td>
<td>80</td>
<td>512</td>
<td>18</td>
<td>HD</td>
<td>Sec</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>128</td>
<td>0</td>
</tr>
</tbody>
</table>

I have also not determined what terminal type is expected by this program. It is not pretty on my VT-100 emulator.

-Wayne

---

Subject: Re: Interested in a Z280 SBC

jcoffman wrote on Mon, 20 February 2017 14:59

Booting from drive B: usually fails, but twice I have been able to get:

```
BNKBIOS3 SPR FD00 0300
BNKBIOS3 SPR B700 3900
RESBIOS3 SPR F700 0600
BNKBOS3 SPR 8900 2E00
```

61K TPA

Drive B: not ready, Abort/Retry?
My image is not expected to boot. I am surprised it gets as far as it does. When I try to boot from B:, I also get stuck at "Drive B: not ready". All of my successful testing has been from booting from ROM and simply read/write B: as a data disk.

Quote:
Drive C: is always "not ready".

I would expect this. As indicated by Lamar, the interface on the CPU280 is shuggart. I am using a straight-thru 34 pin cable and only have drive B: working (as expected). Will be trying an adapter from Terry tomorrow (assuming the mailman brings it to me).

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzelflink on Tue, 21 Feb 2017 00:01:49 GMT
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Wayne W wrote on Mon, 20 February 2017 13:19
lowen wrote on Mon, 20 February 2017 13:16
Wayne, minor addition for you: 'Rechner' is German for 'computer.' If that is the oldcomputers.dyndns.org 'rechner' archive, that's Fritz' work; the same Fritz who posts here.

Very sorry Fritz! Your work has been extremely helpful in this process. Thanks!!!

Clearly my German needs some work.

-Wayne

That's me and the nice thing is that I didn't know about this help until lowen posted in vcfed.

Best Regards

fritz

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Tue, 21 Feb 2017 00:04:55 GMT
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jcoffman wrote on Mon, 20 February 2017 08:27
I tried connecting 2 3.5" 1.44Mb IBM floppies via a 34-pin connector. The floppies select, but CP/M reports errors from both of them. I have the SMC chip installed. I will try again with the WD37C65BJM chip.

--John
I just completed some floppy controller chip testing.

SMC chips marked as "SMC FDC37C65CLJ P D9150" work fine -- I have 4 of them and they all work flawlessly.

I have a couple WD chips that fail in different ways.

One is marked "WDC '87 WD37C65BJM 00-02 8931" and causes the system to hang while loading CP/M from ROM. It hangs at different points in the signon message, so suspect errant interrupt of some kind.

The other is marked "WDC '87 WD37C65BJM 00-02 8823" and allows the system to boot from ROM. However, any attempt to access the floppy drive results in an error:

  BIOS R-Error on B: T-0, S-1
  Command: 46 01 00 00 01 03 01 04 FF, Result: 21 04 00 00 00 01 03

I conclude that the SMC chips are generally working and that the WD rev-B chips are generally problematic.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Tue, 21 Feb 2017 00:10:12 GMT

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A more recent boot from ROM allows me to execute .COM files on B:

Only 1 signal is missing on the 34-pin connector. /READY on pin 22 (of the 50-pin connector), Supposedly DiskChanged/Ready share the connection on pin 34 (34-pin conn., which is pin 50 (of 50) shorted to pin 12 (of 50).

BTW: I installed the WD37C65B controller. Exact same results. I'd say this is a 3rd disk controller that is identical to SMC & (was it? ST.

--John

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 21 Feb 2017 00:21:39 GMT

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John, have you tried one of the new ST AIC37C65C's I sent? (Terry is having problems with his CPU280, and all he has there is the AIC37C65C). Reads ok, but doesn't write ok.
format-d.com and format-e.com are for
televido-950 ... terminal ( TVI 950/912/920/)

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 21 Feb 2017 00:32:46 GMT

The FDC chips in question were targeted to IBM PC-AT’s. There have been no troubles with 2 of
the controllers on SBC-188, the WD and ST (I think that was the alternate). I wonder who did the
original silicon that others may have licensed. It all goes back to NEC 765 --> Intel 8272 (IBM PC)
--> newer AT-mode chips.

I figured the SMC chip was the same as the other two when I saw the /LDOR, ... I just spotted an
error on Tilmann’s schematic:

/DS4 out of the controller is correctly connected to DS3 (difference in numbering 1..4 vs 0..3) on
the connector; however, DS3 on the connector is marked as pin 22 (of 50). This should be pin 32
(of 50), completing the sequence DS0(pin 26), DS1(pin 28), DS2(pin 30), to DS3(pin 32), which
would be the correct connection. I have buzzed out my unpopulated board, and this error is, in
fact, present.

Pin 22 is the FD->FDC /READY line on the 50-pin connector. DS0 and DS3 become the
motor-control lines on the PC-AT, with DS1/DS2 becoming the only drive selectors. Wires 10-16
are involved in the twist on the IBM floppy cable.

(attached is a capture of the connections used on the SBC-188. DS1/DS2 are known to be
backwards, allowing a cable without a twist to be used on a single-drive system.

File Attachments
1) FDC-on-SBC-188.png, downloaded 117 times
Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Tue, 21 Feb 2017 00:58:44 GMT

ST AIC37C65C chips have not arrived yet.

--John

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 21 Feb 2017 01:13:13 GMT

jcoffman wrote on Mon, 20 February 2017 19:58:ST AIC37C65C chips have not arrived yet.

--John
I thought I sent you one in the parts kit along with the two SMC chips.... I know I sent Terry two of them, and I have two of them here, and I bought 5. It was in factory-new reel packaging, just one compartment but still with the sprocket holes.

And it seems that my problem is possibly due to a version skew between the FORMAT program on Wayne's image and the BIOS in the ROM; I can read and write to the disks that Wayne formatted, but when I attempt to format a disk it formats it seemingly correctly but the disk is no longer readable by the CPU280 (the screenshots of the sector 1 data is above). What would be another good write test other an ERAsing a file? Wouldn't that cover the sector write capability OK?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 21 Feb 2017 01:38:56 GMT

jcoffman wrote on Mon, 20 February 2017 19:56...
I figured the SMC chip was the same as the other two when I saw the /LDOR, ... I just spotted an error on Tilmann's schematic:

/DS4 out of the controller is correctly connected to DS3 (difference in numbering 1..4 vs 0..3) on the connector; however, DS3 on the connector is marked as pin 22 (of 50). This should be pin 32 (of 50), completing the sequence DS0(pin 26), DS1(pin 28), DS2(pin 30), to DS3(pin 32), which would be the correct connection. I have buzzed out my unpopulated board, and this error is, in fact, present....

Good detective work, John, but, in fact, DS3 is not where one would think it should be in the original Shugart pinout. The TRS-80 Model I systems have to deal with the same issue; the original interface only had 3 drive selects. The fourth drive select does not follow in the sequence but appears on a lower number pin on the connector. Reference: Floppy Drive Pinouts. Hmm, this means that the HxC cannot actually be jumpered for DS3. Some drives did in fact use the motor on signal for drive select.
EDIT: Fritz, thanks for the pointer on the terminal type.

EDIT: I have confirmed that the ST AIC37C65C has some kind of problem in the CPU280. I can take Wayne’s disk image and do an ERA *.* on it with an SMC controller in the board, and, after a bit, it completes. I cannot do the same with the ST AIC37C65C; after a certain amount of data is transferred, the message 'DIOerror' comes up and the machine in hardlocked with the drive LED flashing. I haven't had time to really rigorously test to make sure the SMC controller succeeds with ERA *.* every time, but the AIC37C65C fails every time.

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Tue, 21 Feb 2017 02:31:39 GMT
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The chips from you that came with the boards were SMC chips. I have WD37C65B and -C chips. The -C chip supports 2.88mb floppies, which never caught on.

My bible on floppy disks & controllers is the Intel AP-116 and AP-121. Appendix A. of the latter has a PL/M listing of an 8272 device driver. It is built to be just about bullet-proof. The App Notes are contained in the Intel Microsystem Components Handbook, Peripherals Volume II, 1986.

AP-116 is an 8086 system with 8272 controller. Lots of good stuff on 8" & 5" disk formats. AP-121 is a lengthy discussion of using the 8272, and includes the multi-page s/w listing.

As an aside, was anyone aware that a 3.5" HD floppy is exactly equivalent to a double-sided 8" disk? The only difference is the number of tracks, 80 vs. 77. Data rates and all formatting options used on 8" disks may be used on 3.5" HD floppies. I've often been tempted to try formatting with 128 byte sectors, but nowhere else would that format be usable.

--John

File Attachments
1) AP-121.pdf, downloaded 114 times

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Tue, 21 Feb 2017 04:07:07 GMT
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jcoffman wrote on Mon, 20 February 2017 16:10
BTW: I installed the WD37C65B controller. Exact same results. I'd say this is a 3rd disk controller that is identical to SMC & (was it? ST.

Interesting that you got the WD37C65B to work John. I have tried three of them and all fail
completely (locking up my system). There must be something about the combination of the WD rev-B chips and my hardware that is an issue.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Tue, 21 Feb 2017 05:43:50 GMT
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fritzeflink wrote on Mon, 20 February 2017 16:32
format-d.com and format-e.com are for televido-950 ... terminal (TVI 950/912/920/)

Thank you Fritz, good to know since I didn't recognize the escape sequences. Do you know what it takes to change the terminal type? Is it hard-coded in the program?

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 21 Feb 2017 07:47:02 GMT
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Wayne W wrote on Mon, 20 February 2017 21:43
fritzeflink wrote on Mon, 20 February 2017 16:32
format-d.com and format-e.com are for televido-950 ... terminal (TVI 950/912/920/)

Thank you Fritz, good to know since I didn't recognize the escape sequences. Do you know what it takes to change the terminal type? Is it hard-coded in the program?

-Wayne

The format programm is a turbo-pascal source from:
(sad I can't post my ASCII text formatted correct

Archive file = FORM102.PMA

Filename Original Packed Ratio Date Time
============== ======== ======== ======= ======== ========
FORMAT  .PAS  3328  1391  41.7%  92-10-03 23:03:00
FORMAT-E.PAS  3328  1391  41.7%  95-02-16 21:14:00

/*--------------------------------*/
Howto setup turbopascal:
Here from my MYZ80 in OS/2 DOS
/*--------------------------------*/

8:25 C1:TPASCAL>dir t.*

Drive C1 [TPASCAL]    Files: 7/224k   Free: 6924k
TINST  .COM  28k : TINST  .MSG   4k : TURBO  .COM  32k : TURBO  .OVR   4k
TINST  .DTA   8k : TPASCAL .LBR 144k : TURBO  .MSG   4k :

## run TINST

8:25 C1:TPASCAL>tinst.com

   TURBO Pascal installation menu.
   Choose installation item from the following:

[S]creen installation   |   [C]ommand installation   |   [Q]uit

Enter S, C, or Q:

>S

Choose one of the following terminals:

1) ADDS 20/25/30  17) Otrona Attache
2) ADDS 40/60  18) Qume
3) ADDS Viewpoint-1A  19) RC-855 (ITT)
4) ADM 3A  20) Soroc 120/Apple CP/M
5) Ampex D80  21) Soroc new models
6) ANSI  22) SSM-UB3
7) DEC Rainbow, 8 bit  23) Tandberg TDV 2215
"8)" Hazeltine 1500  24) Teleray series 10
9) Hazeltine Esprit  25) Teletex 3000
10) Kaypro with hilite  26) Televideo 912/920/92 #### or what you have ####
11) Kaypro, no hilite  27) Texas Instruments
12) Lear-Siegler ADM-20  28) Visual 200
13) Lear-Siegler ADM-22  29) Wyse WY-100/200/300
14) Liberty  30) Zenith
15) Morrow MDT-20  31) None of the above
16) Osborne 1  32) Delete a definition

Which terminal? (Enter no. or ^Q to exit):
26
Do you want to modify this definition before installation? (Y/N)?None

Hardware dependent information

Operating frequency of your microprocessor in MHz (for delays): 20 Change to:
> Hardware dependent information

TURBO Pascal installation menu.
Choose installation item from the following:

[S]creen installation | [C]ommand installation | [Q]uit

Enter S, C, or Q: Q

8:23 C1:TPASCAL>

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 21 Feb 2017 08:21:04 GMT
View Forum Message <> Reply to Message

Wayne W wrote on Mon, 20 February 2017 21:43
fritzeflink wrote on Mon, 20 February 2017 16:32
format-d.com and format-e.com are for televido-950 ... terminal ( TVI 950/912/920/)

Thank you Fritz, good to know since I didn’t recognize the escape sequences. Do you know what it takes to change the terminal type? Is it hard-coded in the program?

-Wayne

Here is a short VIDEO

http://oldcomputers.dyndns.org/public/test/TurboPascal_Setup .webm

and for the files:

http://www.retroarchive.org/docs/software/turbodoc.html

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Tue, 21 Feb 2017 16:41:53 GMT
View Forum Message <> Reply to Message

fritzeflink wrote on Tue, 21 February 2017 00:21
Here is a short VIDEO

http://oldcomputers.dyndns.org/public/test/TurboPascal_Setup .webm
and for the files:

http://www.retroarchive.org/docs/software/turbodoc.html

Thank you Fritz. Very helpful! I will try this later today.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 21 Feb 2017 22:49:13 GMT

Update for 2/21/2017

I received a package of three copies of Tilmann's current system disk from Tilmann today.

Since I only have a USB floppy drive on my laptop, and since it really doesn't like a 1.77MB 1024-byte sector format, I decided to use the CPU280 to do a conversion copy. Thanks to Wayne, I have a working 512-byte sector image; I cloned that image, put both on my HxC emulator (even the slim version, which I have, can do two-drive emulation), booted from EPROM, and successfully ran ERA B:*.*. Then, I shut it down, crimped a second 34-ping connector on the straight cable, and set up the HxC and a 3.5 floppy drive like this:

A: HxC first image (DSKA0000.HFE on the SD card);
B: 3.5 floppy drive, PC-style (no jumpers);
C: HxC second image (DSKB0000.HFE on the SD card).

I restarted the CPU280, entered setup, and set up all three drives as 3.5 HD double-sided 80 cylinder.

I put one of Tilmann's disks in B:. The boot from EPROM automatically sets up the extra RAM as and MDrive named E:.

So I ran:

PIP E:=B:*.*
which was pretty fast.

Since C: was empty, I then tested disk writes with:

PIP C:=E:*.*

Which ran to completion without error.

Now that I had a known good FORMAT-E.COM of version 1.04 from Tilmann, I tried a format of a blank 3.5 HD floppy in B: using format 56 (IBM 1.44MB, a 512-byte-per sector format). For the first time my CPU280 successfully formatted a disk. A good sign! Then a

PIP B:=E:*.*
and I have a populated disk image that is readable by USB floppy drives. That image is attached, and should be suitable for use with RAWRITE or dd.
EDIT and NOTE: Wayne has prepared a better image. I'm going to leave this one up since it contains everything from Tilmann just as he sent it, other than being in a 512-byte sector format. Wayne's image will be much better, but we're going to give it a good shakedown before it's posted. Wayne, when you're satisfied with it feel free to post.

File Attachments

1) cpu280-system-treh-20170221-512-byte-sectors.img, downloaded 130 times

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 22 Feb 2017 09:04:56 GMT

Terminal description in programs made by turbo pascal.

If you have not the source by hand of a third party compiled programm to change its terminal settings you can use TINST.com to setup the terminal definition of the program.com file.

The following description was translated from german as I don't want to reinvent the wheel

!!REH280 and format.com... You can rename FORMAT.COM to turbo.com and then use tinst.com to setup the terminal descriptions. !!

( thanks to hucki. From http://hc-ddr.hucki.net/wiki/doku.php/cpm:turbo_pascal:tinst is in german language
but the definitions are in english so mostly useful. As this is an old knowledge I know it from the past in 198x but I have had to remember there will be the similar information in the web)

TINST.COM

program and also by Turbo itself.

These control codes are initially set up with TINST.COM. TINST also installs the clock frequency as well as editor commands. TINST, by the way, is written in Turbo Pascal. The program but only patches the program TURBO.COM, no own. To customize third-party compiled Pascal programs, the program must first be renamed to TURBO.COM before TINST can be used to change the terminal settings. (that's the trick)

control codes is 125 bytes long and goes for Turbo 2.xx or 3.xx from 0153h-01EFh. This section is explained below.
To read the data from existing compiled programs, I (hucki) wrote a short Perl program (s.u.). As in Pascal, the strings are usually long-termed (1st byte = length). Length 00 indicates an empty string.


Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 22 Feb 2017 14:00:21 GMT
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jcoffman wrote on Mon, 20 February 2017 21:31...

My bible on floppy disks & controllers is the Intel AP-116 and AP-121. Appendix A. of the latter has a PL/M listing of an 8272 device driver. It is built to be just about bullet-proof. The App Notes are contained in the Intel Microsystem Components Handbook, Peripherals Volume II, 1986....

John, thank you for this excellent information!

Quote:
As an aside, was anyone aware that a 3.5" HD floppy is exactly equivalent to a double-sided 8" disk? The only difference is the number of tracks, 80 vs. 77. Data rates and all formatting options used on 8" disks may be used on 3.5" HD floppies. I've often been tempted to try formatting with 128 byte sectors, but nowhere else would that format be usable.

This does bear repeating; thanks for the reminder, John.

Some 3.5 floppy drives can even do the 360RPM speed, which apparently was common in Japan.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 22 Feb 2017 15:51:14 GMT
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lowen wrote on Wed, 22 February 2017 06:00
Quote:
As an aside, was anyone aware that a 3.5" HD floppy is exactly equivalent to a double-sided 8" disk? The only difference is the number of tracks, 80 vs. 77. Data rates and all formatting options used on 8" disks may be used on 3.5" HD floppies. I've often been tempted to try formatting with 128 byte sectors, but nowhere else would that format be usable.
This does bear repeating; thanks for the reminder, John.

Some 3.5 floppy drives can even do the 360RPM speed, which apparently was common in Japan.

Just for more information about drives please goto

http://www.retrotechnology.com/herbs_stuff/drive.html#threefive

all:

http://www.retrotechnology.com/herbs_stuff/drive.html

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 22 Feb 2017 16:34:53 GMT
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Thanks, Fritz!

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Wed, 22 Feb 2017 21:11:08 GMT
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fritzeflink wrote on Wed, 22 February 2017 01:04

Terminal description in programs made by turbo pascal.

If you have not the source by hand of a third party compiled programm to change its terminal settings you can use TINST.com to setup the terminal definition of the program.com file.
The following description was translated from german as I don't want to reinvent the wheel

!!REH280 and format.com... You can rename FORMAT.COM to turbo.com and then use tinst.com to setup the terminal descriptions. !!

This was very helpful Fritz. Thank you!

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 24 Feb 2017 16:22:25 GMT
Update for 2/24/2017

If you are collecting parts for a bare board, I need to make you aware of something very important. You must use an SMC FDC37C65C for this board. We have been looking for successful second-sources, but none of the alternative chips are working correctly. Tilmann wrote me a few days ago in a reply to a message I sent to him, and this is what he had to say:

Quote:lowen wrote:Quote:I have found that the CPU280 is quite picky about non-SMC controllers; I have a second-source AIC37C65 made by ST, and I get DIOerrors after just a few writes. The SMC chip does not error.Yes, we observed that as well - however we never found out why. I think I checked all timings and parameters, but they all are compliant to the datasheets - yet still some chips don’t work reliably here. That's why I finally explicitly put SMC onto the part list...

Sorry to have to require this; I know the SMC chips in PLCC44 are more difficult to find than the others.

For those who are getting hard-to-find chip kits from me, I will be providing SMC chips that will be tested as working in my CPU280. Right now my delay is having time to test the chips.

EDIT: And I don't want it to sound like I found this by myself; Terry in particular has done a huge amount of legwork verifying that the ST AIC37C65 for one does not operate well in this board, and even tried to see if some delays in status register reads would consistently allow it to work. John and Wayne have verified as well that WD chips have issues. So for now the SMC FDC37C65CLJ is the only supported chip. I have two available and 10 more on the way from a supplier.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Mar 2017 14:01:24 GMT

Update for 3/2/2017:

Good news and bad news:

The Good news: My order of 100 GAL16V8D's came in. Haven't tested, but will soon. The Bad news: My order of what were supposed to be ten SMC FDC37C65's came in. They sent me Western Digital WDC37C65s. Great; these are known to not work correctly. I only have one FDC37C65 at the moment, and so any parts kits I ship out that are not already paid will be without this chip, unfortunately. I have one kit to ship out that is paid for, and that person will get my last FDC37C65 other than the one in my working CPU280. So if you are ordering SMC FDC37C65's, double-check with your supplier that they are really SMC chips. These ten came from the same supplier where I had purchased the previous five SMC chips, so buyer beware. I'll be on the lookout for another supplier. And, yes, we need to figure out why the Adaptec AIC-37C65 (and the ST second-source) doesn't work, and maybe this bottleneck can be removed.
I am behind on programming GAL16V8’s and the EPROMs due to a heavy load at the day job, but I haven't forgotten anyone. Once the day job load goes down I'll start contacting everyone who has expressed interest with order details. Thank you for your patience.

---

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Thu, 02 Mar 2017 17:50:57 GMT

I believe the problem with the FDC chips is not so much the chip as it is the connection & the driver s/w. The WD chip and one other (I forget which) work 100% on the SBC-188. The connection is PC/AT, and the driver s/w is derived from the Intel PL/M code. Even with the SMC chip, drive C: has never even spun on my CPU280, so the chip can hardly be said to be working.

--John

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 02 Mar 2017 19:02:36 GMT

I agree with John that it is probably connectivity/software that is inhibiting the non-SMC chips.

I will mention that using Terry's adapter (34-pin Shugart -> PC/AT), I can access all 4 drive letters without errors when the SMC chip is installed.

Unfortunately, given current software available, only the SMC seems to be functional.

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Mar 2017 19:03:25 GMT

I agree in principle, John.

So how do we change the way the FDC is connected without major surgery? What changes are needed to make the driver software work with these other chips? I haven't been able to find any documentation on the Adaptec AIC-37C65, but there are several WD37C65 documents out there (the ones I have are WD37C65C and thus are more recent than the SMC chips), and I have the SMC documents. But I need a real expert in these controllers to tell me what the difference is, since the SMC controller is working for me, Wayne, and Terry, where the others are not. (If this were the WD 17xx series I know many of those differences, and how the 1791, 1793, and 2797 differ, not just from the hardware view but also from software, but this is not the FDC line with which I am most familiar).
Wayne, since you mention Terry's adapter, would you mind posting a photo of that?

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 02 Mar 2017 19:13:15 GMT
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I attach a few pictures. One is my full test rig with adapter connected.

The other two are close-ups of the adapter. The short cable still attached to it goes to the CPU-280. On the other side are the two connectors for the A/B and C/D floppies which are attached via standard PC/AT "twist" cables.

-Wayne

File Attachments
1) IMG_0587.JPG, downloaded 246 times
2) IMG_0588.JPG, downloaded 256 times
3) IMG_0589.JPG, downloaded 261 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Mar 2017 19:15:57 GMT
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Wayne, thanks for posting the photos! Oh, and I love your test jig!

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Thu, 02 Mar 2017 21:03:16 GMT
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Wayne,

That adapter looks like it just crosses some lines, so the surgery required can probably be done on the CPU280 board. Is there a circuit diagram of that adapter board?

--John

BTW: the PC/AT mode of operation limits the drives to 2. The MotorON and and DriveSelect signals originate from the Operations Register (not a part of the NEC765 chip), accessed via the "LDOR" select. This register was a 74LS273/373/374 or similar on the IBM PC. Its advantage is it gives separate motor control for each of the two drives. It looks like the IBM designers gave
weight to keeping the motors spinning, especially nice to avoid the start-up time, if one was doing a diskette to diskette operation.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 02 Mar 2017 21:44:25 GMT

I don't have the schematic, but as far as I know it's pretty simple; DS0, DS1, and MOTORON got to the first connector, DS3, DS4, and MOTORON go to the second connector; all other lines straight-through. MOTORON gets duplicated to both MOTORON signals on each of the first and second connectors (four-way split, in other words), and the pinout is translated to AT-compatible. One MOTORON signal to all four drives. Too bad there are three MOTOFF signals on the 50-pin connector instead of MOTON, as the split could be totally done with cabling otherwise. I'm been looking at datasheets a bit today, and comparing signal timing specifications for the various 37C65 chips, and thus far I haven't found a significant difference in the chips from a specification point of view. But Tim Olmstead made this statement a long time ago:

Quote: I don't reccomend the 37C65 as it requires some nasty components; two sryctals, one of which is an odball freq., and four silver/mica caps. Also, you need to put 100ohm resistors in series with the TC, and IRQ lines that drive the bus. These pins have 48ma drivers on them, and they generate a LOT of ground bounce.

Now, in my opinion, an issue with IRQ or TC should manifest in reads as well as writes. But I do note that the TC timing is different between the two, according to the spec sheets. It might be interesting to scope some of the FDC-to-Z280 interface lines and see what is going on here.

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 02 Mar 2017 23:52:02 GMT

jcoffman wrote on Thu, 02 March 2017 13:03 That adapter looks like it just crosses some lines, so the surgery required can probably be done on the CPU280 board. Is there a circuit diagram of that adapter board?

Yes, it just routes the signals as needed to break them out for PC/AT cables. Yes, it could be done on board, but would be a little messy. This adapter came from Terry, so please contact him regarding schematic. I am hoping he will make some more available to CPU280 builders.

Quote: BTW: the PC/AT mode of operation limits the drives to 2. The MotorON and and DriveSelect signals originate from the Operations Register (not a part of the NEC765 chip), accessed via the "LDOR" select. This register was a 74LS273/373/374 or similar on the IBM PC.
Its advantage is it gives separate motor control for each of the two drives. It looks like the IBM designers gave weight to keeping the motors spinning, especially nice to avoid the start-up time, if one was doing a diskette to diskette operation.

You are certainly correct about the motor control. Terry made the expedient decision to route the one motor control line exposed by the Shugart interface to all 4 of the motor control lines required for the PC/AT cables. He warned me about that. In theory, could cause higher than desired current draw. In practice, if you are using a real ATX power supply like I am, it is no issue at all.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 03 Mar 2017 02:10:08 GMT

Further Update, 3/2/2017
Andrew B has pointed me to another supplier, and I've also messaged UTsource through eBay about the SMC FDC (as well as the COM81C17 in 20-pin DIP form). I've ordered a few from the supplier Andrew pointed me to, and I'll report back as to the results.

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Fri, 03 Mar 2017 16:46:21 GMT

RE: Terry's FDC adapter board

Lamar, what you described is pretty much what I figured out last evening: Each 34-pin connector connects 2 drives, each of which is then PC/AT connected.

RE: CRC errors

Wayne's comments about the timer made me wonder if the MotorON delay is a full 500ms. 8" drives start up a lot faster than the later "mini-floppies", and trying to read before the motor is up to full speed could be a possible cause. Wayne looks like the one who is on to the timer issues.

--John
CRC errors...

maybe if a harddisk is setup as installed but isn't available there may be some problem as using a harddisk the motor off delay is reduced..

V1.12 of 21 November 1994:
- Added second method for disk change recognition (DCHG signal processing); also added option for method selection in SYSTEM.LIB.
- Added free-running 16-bit counter (10 ms per increment) at fixed address FFFFeH (last two bytes of CPU address space) for application timing purposes.
- Reduced default motor-off delay of floppy drive to 5 seconds if hard-disk is present (if not, still 15 seconds).

only my thought

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Fri, 03 Mar 2017 20:23:20 GMT

According to the code, the motor on delay is one second. But note that the loader code just turns the floppy motor on and leaves it on so there is no motor on/off processing going on at all. The OS driver code fully implements motor on and off delays. As Fritz mentioned, the motor off delay varies based on whether you have a hard disk in the system. If you do, the motor off delay is shortened to 5 seconds. Otherwise 15 seconds. The motor on delay remains at one second regardless.

The bug I found that trashes the timer 0 counter register would cause the motor on/off delays to be radically shortened. However, that bug only manifests itself in a floppy boot scenario. If you boot to EPROM, then access a floppy, that bug is never encountered.

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeftink on Sat, 04 Mar 2017 22:22:42 GMT

Hi...
today I meet Axel Zinser who gave me a box with some ECB cards, including his Reh280. As Axel wrote the pre280 we use to build the system I hoped the 2 given floppy disks have some of the code from Axel.

Sadly I found only some of the earlier software from Tilmann and Axel says he hasn't anything more from the past.

Thanks to Axel for the parts and I had similar of them in the past. I got a c't solid disk (with eprom) and will change it to the static ram I had. Good that this solid state has only eprom and no bad batterie for the static rams. (this was my solid state used as drive g:
http://oldcomputers.dyndns.org/public/pub/rechner/conitec/dis/i/dis_i_solid-state.jpg

Pictures of the Reh 280 from Axel are here and I'm glad that I got a new one.


Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 10 Mar 2017 14:07:27 GMT
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Update for 3/10/2017

I have finally gotten ten more SMC FDC37C65C chips. I have been rearranging my work area, but I hope to be ready to test GAL16V8's, EPROMs, FDC's, and Z280's by middle of next week.

I apologize for the delays, but it has been extremely busy at work and I've been working quite a bit of overtime in the past three weeks.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Tue, 21 Mar 2017 20:10:46 GMT
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Yes! Finally two more boards are running Not without some trouble, though. The LEDs were flashing at reset but no signs of life on the screen (Hyperterminal on a laptop) and the second LED stayed shining. Empty battery in the real-time clock? I think so. I have hoarded quite a few DS12887, DS12887+ and at least one DS12887A, not at all new stock. On the third attempt, with a DS12887 from 2002, I was sucessful. I have ordered a few, less vintage DS12887A chips.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 23 Mar 2017 14:03:21 GMT
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Excellent, Jonas!
Update for 3/23:

The original vendor who sent me WDC floppy controllers made good on sending SMC chips; it just took a while to get them from Poland. My work schedule has been really tight the last month, and probably will be for at least another week, but next week I'll be able to fill one outstanding order and begin contacting those who have expressed interest with pricing and ordering info. Sorry for the holdup; it couldn't be helped.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Thu, 23 Mar 2017 21:39:24 GMT

lowen wrote on Fri, 27 January 2017 06:04
I'm recommending that most people buy new DS12887A modules for this board, since a reset is known to be required for it, and the 'A module can be reset.

Yes, I agree. After several failures with a lot of DS12887 and DS12887+ (five years old NOS) modules I was really frustrated. My one and only DS12887A is 20+ years old and it is certainly dead. Finally I found two DS12887 from 2002 alive and working but without the reset option. I have ordered a few DS12887A modules and also some DS12885S (SOIC) for use with an external crystal and a battery.

Subject: Re: Interested in a Z280 SBC
Posted by mscane on Fri, 24 Mar 2017 07:18:33 GMT

Are you planning a redesign to use more common parts (ie. RAM etc)?

Perhaps a Z280 based Mark V?

Cheers!

Max

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 25 Mar 2017 14:08:45 GMT

A redesign would be a fun project, but it's not on my immediate radar. See, the Z280 is not an upgrade from the Z180, but is actually slower. Now, a Z380 design, or an eZ80 design, would definitely be an upgrade.

If you're interested, start another thread about it so that we can track a new design there. I'll be
glad to participate in the discussions, but I'm satisfied at the moment with the CPU280 design as-is.

RAM is one of the easiest parts to find, incidentally. I have 72 pieces in stock (other than the COM81C17 I have chips enough in stock to do 18 hard-to-find parts kits; I just have to get the time now to burn and test GAL16V8's and EPROMs and to test Z280's and FDCs). The ZIPS I have are new in the OKI packaging, but I do want to test one full bank to make double sure that the OKI chips work OK. It is my goal to send out tested parts when I ship.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sun, 26 Mar 2017 18:14:48 GMT

My adapter. Tested today.

Edit: Booting from A, B, C and D is working with cp/m 3. Problems/errors with two, three or four drives connected simultaneously.

File Attachments
1) adapter.jpg, downloaded 177 times
2) adapter solder side.jpg, downloaded 181 times

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Mon, 27 Mar 2017 13:52:47 GMT

The Z280 has a couple of features that no other Zilog processor of the Z80 family has: system/user mode, and a nice MMU supporting memory protection. For multitasking, multi-user operating systems these are a must if you are concerned with stability and security. In addition, memory access violation traps can be used to implement things like page load on-demand, etc. In that respect, both the Z380 and the eZ80 are quite a downgrade.

The Z280 also has some unique niceties like hardware single-step support, break-on-halt, a 'system call' instruction, separate data/code space, integrated DMA and counters (OK, Z180 has this too), multi-processor support, etc.

Subject: Re: Interested in a Z280 SBC
Posted by fritzefflink on Wed, 29 Mar 2017 21:46:08 GMT

Jonas wrote on Tue, 21 March 2017 21:10:Yes! Finally two more boards are running Not without some trouble, though. The LEDs were flashing at reset but no signs of life on the screen
(Hyperterminal on a laptop) and the second LED stayed shining. Empty battery in the real-time clock? I think so. I have hoarded quite a few DS12887, DS12887+ and at least one DS12887A, not at all new stock. On the third attempt, with a DS12887 from 2002, I was successful. I have ordered a few, less vintage DS12887A chips.

I now got the ram for the old Reh280 sbc I got from A. Zinser.

I inserted the rams, a new FDC (this was missed) and looked at the dallas chips I got some years ago for my old assus txp4 boards.

The used dallas is a DS1287A - I have DS12887a+, please ignore the plus. Using my glasses I saw a different between the chips.
On the old dallas PIN 21 is available and used in the REH280 SBC for Clear the NVRAM. On the DS12887A+ PIN 21 (RCLR) is not available so I must get some other dallas clock or use my minidrill and ad an external battery to the old 1287a which was on the sbc board.

I just want to give the old REH280 a new life but look for the new SBC from lamar so I have time to play with old hardware.

File Attachments
1) hc_1991.jpg, downloaded 720 times
2) hc_1992.jpg, downloaded 730 times

Subject: Re: Interested in a Z280 SBC
Posted by Andrew B on Thu, 30 Mar 2017 05:16:13 GMT

I'm not sure why you would think that /RCLR is not available when it is clearly listed on the DS12887A datasheet.

The DS12887A should be a completely compatible replacement for the DS1287A.

It is the DS12887 (no 'A') part that doesn't have /RCLR - see http://datasheets.maximintegrated.com/en/ds/DS12885-DS12C887 A.pdf

All the + means is RoHS compliance (lead free).

Subject: Re: Interested in a Z280 SBC
Posted by fritzealink on Thu, 30 Mar 2017 10:05:25 GMT
Andrew B wrote on Thu, 30 March 2017 07:16 I'm not sure why you would think that /RCLR is not available when it is clearly listed on the DS12887A datasheet.

The DS12887A should be a completely compatible replacement for the DS1287A.

It is the DS12887 (no 'A' part that doesn't have /RCLR - see http://datasheets.maximintegrated.com/en/ds/DS12885-DS12C887 A.pdf

All the + means is RoHS compliance (lead free).

Thanks for your post and it seems as if there some variations of the DS12887A in the world .


The Dallas with the written text on it is the old one from the Z280 SBC.

File Attachments
1) PIC-1.JPG, downloaded 612 times
2) PIC-2.JPG, downloaded 630 times
3) PIC-3.JPG, downloaded 654 times
4) PIC-4.JPG, downloaded 683 times
5) sheet.jpg, downloaded 719 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 30 Mar 2017 14:17:33 GMT

Hmm, this is interesting information. The three DS12887A's that I recently purchased new from Mouser all have the /RCLR pin. The 'A parts are all supposed to have /RCLR per the data sheet, but yours obviously does not, whether from the factory that way or modified somewhere by someone.
Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Thu, 30 Mar 2017 17:27:37 GMT  

Yes, it's odd. The /RCLR pin is internally pulled up, so I can see no reason to modify the module.

Subject: Re: Interested in a Z280 SBC  
Posted by fritzeblink on Fri, 31 Mar 2017 15:57:28 GMT  

I found 2 DIN A4 piece of paper with the CPU280 layout printed on it. As I have some problems with the old CPU280 I got from axel these printed layout will help me repairing bad solder points.


Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Tue, 04 Apr 2017 19:18:03 GMT  

Adapter problems solved - at least for two drives.

From Cpu280 to adapter:
DS0 to DS B (pin 12)
DS1 to DS A (pin 14)
Motor On to Motor Enable A & B (pins 10 & 16)
Straight-through cable, no twist
Ignoring DS2 and DS3. I am more than happy with two drives!

Using 3,5 inch HD floppy drives, both hardwired as drive B

From adapter to floppy drives:
Normal floppy cable with a twist, drive A connected before the twist and drive B after the twist.

Subject: Re: Interested in a Z280 SBC  
Posted by Jonas on Sat, 08 Apr 2017 18:43:19 GMT  

I just had to test a few of my 5,25 inch HD drives. I formatted the media with format #47 and tested copying from drive a: (3,5 inch) to drive b: (5,25 inch). No problems at all, only the normal
Hi Guys,
I'm interested in building a Z280 board. Is there an extra PCB available. I started reading this thread from the beginning and reached Page 2 When I realized I have to go to bed so I thought I would ask. Also is there a wiki page on this project or do I need to continue downloading all the attachments. The Z280 seems to be of interest to a lot of builders. I'll continue to read. Take care my friends.

Andrew B wrote on Wed, 19 April 2017 23:53:There's no wiki page on this since the CPU280 is a legacy non-RBC design, but if the people testing these new CPU280 boards would like a wiki page to collect up all of the information in one place - I'd be happy to create one and put an appropriate note at the top regarding the history of the design.

Andrew, that would be fantastic. I have intended for a while to create a wiki page for it, but work and family have conspired to reduce my time availability since early March.

I have some boards and parts; PM me and I'll get you on the list.

Status Update:
Work and family commitments have been overwhelming since early March. I plan to burn and test several sets of GAL16V8s and 27C512 EPROMs Saturday. I'm using '512s because that is what I have available in quantity. I will be setting my test bench back up after an office remodel that started the last week of February, and will be testing Z280s and FDCs. At that point I'll be able to start filling orders again.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sat, 06 May 2017 20:48:32 GMT

Hi...

I just managed to get CP/M+ (CP/M 3.0) running with MYZ80 under OS/2. In this case it is the OS/2 version ECS 2.1 running under VirtualBox on Win8.1/64. After printing the "Using CP/M 3.0 with MYZ80" I changed my mistakes and wanted to make the CPU280 system files. I send the old original CPU280 to Tilmann for repairing but don't know if this is possible. When I get the card from Lamar I want to be "up to date" with the system as it's long ago I had one and so I had some interesting hours.

File Attachments
1) MAKECPM.LOG, downloaded 117 times
2) MYZ8_under OS2.jpg, downloaded 181 times
3) hc_2041.jpg, downloaded 870 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 08 May 2017 17:00:34 GMT

Status update, 5/8/2017:

I am caught up on paid-for orders. I would like to verify 27C512 operation with my CPU280 before opening up to orders again, and I expect to work on that next week while I'm on vacation. If
you've expressed interest already, I have your name and will start getting with you soon. I am so sorry for the delays, but we had an unforeseen change here at work that dramatically increased my work hours for a while. I can also report that we have another builder who has his board built, but not yet fully operational, who is waiting for forum access and who will likely have questions. I'm trying to contact people in the order that they originally contacted me, by the way.

So, I thank you for your patience!

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 09 May 2017 20:33:41 GMT

The owner of that newly-built board is me. Hello, all! At this point, I only know that the magic smoke didn't come out of it when I powered up. It's drawing about 430 ma, but that's unfortunately the only sign of life at present. All three LEDs remain on, so it's not initializing properly. I have several things to address, I believe:

- I used 27C512 EPROMs, but Lamar later told me these were not known to work.

- The Dallas 1287 came out of my parts drawer and it's probably 25+ years old and likely dead. Not sure if that would prevent it from running.

- I'm running a Z280 that was purchased from UTSource in China. I picked up a half-dozen, so probably worth swapping it out in case this one's a dud.

- I followed what I thought Tillman was suggesting in terms of building the console serial cable: Crimping 2x 9-pin D connectors on to a 20-pin ribbon. This is probably wrong. But, not an issue at present since the unit isn't showing proper LED status.

Any other suggestions for troubleshooting would be appreciated. I'm sure it will start cooperating sooner or later

-

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 09 May 2017 21:50:30 GMT

Please add an external battery to the dallas if you have non running. I did it and was a short work. There are several instructions how to do that.

From:
http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280
The boot loader consists of three modules: One is the basis for cold starting (initialization and RAM test) and the actual booting, the other two contain disk-I/O subroutines and the setup.

clock frequency (in multiples of 614 kHz), using the real time clock. After that the console port is initialized (according to the values stored in the setup; the default is 8+n+1 bits, 9600 baud, no handshake) and a message is output to the console port. Next follows the RAM test, which examines the whole addressable memory for writeability (nondestructive). The available memory capacity is determined in the same step. If there were no errors in the RAM test, then the boot loader is copied into RAM and started there. Further and more detailed hardware diagnostics are planned, but not implemented yet.

During these operations the three LEDs display the current status. The hardware reset enables all three LEDs. Immediately off after successfully measuring the clock frequency, and the third one after the RAM test.

**** here I didn't know if your non-exist setup makes problems
If the battery in the real-time clock
is empty, the second LED stays on while the third is turned off.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 10 May 2017 00:41:19 GMT

I'm pleased to report that it's alive to large degree! I replaced the 27C512s with 256s and swapped the CPU out while I had a clear shot with the PLCC puller. Then I studied the serial pinout and realized that the D-Sub 9pin was setup for direct connect with a PC serial port. Fired up ProComm on the shop machine and plugged it in pin for pin. This time it did what it was supposed to with the on-board LEDs and started to sign on at the console. It counts memory to '0320' and dies with an error message about not having enough RAM. How should I interpret this? Based on that address, is it seeing DRAM at all?

A lot of things have to be working right to get this far, so I'd call it progress.

Subject: Re: Interested in a Z280 SBC
It sounds like the memory test is getting to 320K, then failing.

What type of memory did you use?

Make sure that you programmed IC21 (RAM GAL) appropriately for the type of memory you used.

-Wayne

I installed (4) 512k x 4 ZIPs that came from Lamar and used the Z280CAS4.JED file to program the RAM GAL. My assumption was that ‘4’ meant 4-bit wide memory. Is that not correct?

You can use 256K x 4 or 1M x 4 - I think 512 x 4 is not possible. Lamar can tell more but if this was used before the Z280CAS.JED and Z280CAS.PDS maybe right.

Hmm.. 4 was written for 4 megabyte chips type.

The core memory of the CPU280 consists of the dynamic RAMs IC11 through IC18. Several different configurations are possible, using 1 MB and 4 MB chips, organized as 256K x 4 or 1M x 4 (part numbers 514256 or 514400). For space reasons, and due to the availability of pin-compatible types, RAM chips in ZIP packages are used. The smallest configuration contains four 514256 (IC11 through IC14), which yields a capacity of 512 KB. The standard increased to 2 MB and 4 MB by using four or eight 514400 chips. When changing between 256Kx4 and 1Mx4 chips, the programming of IC22 has to be
I hope I did not misinterpret this.

The Z280CAS4.JED and Z280CAS4.PDS are for 4MB RAM types.

TITLE		CPU280 4-MB-CAS-DECODER IC22
PATTERN         01
REVISION	01
AUTHOR		TILMANN REH
COMPANY		REHDESIGN
DATE		20.09.1992

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 10 May 2017 11:59:10 GMT
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I was mistaken on the DRAM size. There are (4) TC514400 60ns (1M x 4) chips for a total of 2MB. Since that's not 4MB, would Z280CAS4 still be the correct JEDEC file? Further, 320k seems like an odd place for the count to stop. Can someone with working knowledge of the circuit offer any advice on further debugging?

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Wed, 10 May 2017 12:16:38 GMT
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I think that is the right JEDEC file. I am not sure what would cause it to stop at that point, but definitely check solder joints on the RAM chips.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Wed, 10 May 2017 12:23:58 GMT
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Are the DRAMs in sockets or have you soldered them? Contact problem maybe?

I use single-in-line machine tooled strips instead of the hard-to-find sockets. I actually bent one of the pins on one of the chips by accident. Everything is working now, though.
As Wayne W wrote - I think that is the right JEDEC file too.

As Tilmann wrote:

Memory space can be increased to 2 MB and 4 MB by using four or eight 514400 chips. When changing between 256Kx4 and 1Mx4 chips, the programming of IC22 has to be

Have you installed them like JCoffman showed in his picture?  

Are this 2MB?

File Attachments
1) hc_2048.jpg, downloaded 727 times

Wayne W wrote on Tue, 09 May 2017 18:14
Make sure that you programmed IC21 (RAM GAL) appropriately for the type of memory you used.

Sorry, it is IC22 (CAS GAL) that needs to be switched for the memory chip type (not IC21 RAM GAL).

-Wayne

Thanks, all! I have installed the DRAM modules as shown in the photo. They are inserted into socket strips. I had some nice wipe-contact SIP strips from another project that appear to make very positive contact with the ZIP package pins. I'll take a very close look at how they are seated and examine the socket strips for cold solder joints. I suppose it's possible that one of the chips is bad, but let me rule out the obvious first.
Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 10 May 2017 17:39:53 GMT

I'll be glad to send four more ZIP chips your way as exchange for the four you have now if the obvious things don't check out.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Thu, 11 May 2017 00:32:44 GMT

I found something that doesn't look right. After carefully checking for bent pins, cold solder joints, etc. I measured the CAS pulse width at, e.g. pin 19 of the CAS GAL and found it to be 80ns. This really looks off. The timing cap on my board is a 120pf/50V polystyrene cap (the only one of that value I had). Now I'm wondering if that type of capacitor is appropriate for this application. Could the 4x too long pulse width cause the problem I'm seeing?

Update: I accidentally discovered that touching the bottom of the board in the area of C8 (timing cap) would sometimes enable it to get through the entire memory test and present the firmware boot menu before freezing up. Really appears something is wrong with CAS generation.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 11 May 2017 12:35:54 GMT

snhirsch_gmail.com wrote on Wed, 10 May 2017 20:32 I found something that doesn't look right. After carefully checking for bent pins, cold solder joints, etc. I measured the CAS pulse width at, e.g. pin 19 of the CAS GAL and found it to be 80ns. This really looks off.

80ns CAS would definitely be a problem.

80ns CAS would definitely be a problem.

Quote:
Update: I accidentally discovered that touching the bottom of the board in the area of C8 (timing cap) would sometimes enable it to get through the entire memory test and present the firmware boot menu before freezing up. Really appears something is wrong with CAS generation.

I would double-check R8 and the solder connections at R8 and C6. I can't imagine a poly cap developing a really large series resistance, but it's possible. If R8 and the solder connections for R8 and C6 (and the trace to NCLK to IC21 and IC22) check OK I would change C6 for a 120pF ceramic.

However, it is odd that you're getting exactly 4x 20ns here; can you double-check the timing of the CLK signal at IC22 pin 1 to make sure it's the full-speed clock (jumpers should be set for a 1:1 bus clock)? I don't think it is the problem, especially since you're getting an odd 'gimmick' effect when touching the board, but it can't hurt to check.
The fact that you get text and the firmware setup later is a really good sign; get the CAS timing nailed and I think you'll have it running. But if it looks like bad RAM let me know.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Thu, 11 May 2017 18:53:58 GMT

I'm using Panasonic ECQB 120pF 50V polyester caps without any issues on two boards. I don't know how polyester caps cope with excessive heat. I was careful and fast when I soldered them.

Edit: After some reading in several soldering guidelines covering film capacitors (polyester, polystyrene et cetera) I found several warnings about excessive heat for prolonged periods. I guess it's quite easy to cause permanent damage or changed parameters including the capacitance.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Thu, 11 May 2017 23:12:18 GMT

I continued probing around with the scope. IC22 (CAS GAL) is getting the full clock speed on pin 1 and I have the divider jumpers correct for 1:1. Here's the interesting part: I'm seeing an inverted pulse that's about 20ns wide at pin 3 of IC30 (Q), but only sporadic noise at pin 2 (Q). Same thing for pins 10 and 11: 11 shows output, but 10 has only random bursts. The only way I can reason for one complementary output to be dead is if something is loading down the dead outputs. I pulled both IC21 and 22, read them back in the programmer and both of them show the correct checksum. At this point, I'm stumped.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 12 May 2017 01:35:01 GMT

Hmm. IC30 and part of IC4 are the core of the memory timing chain for burst mode, and are critical. Which part are you using for this? The parts list calls for a 74ACT175 or a 74AS175; what part are you using? Q and /Q should be complementary, for sure, but to load that down should show up as extra heat or abnormally high supply current spikes. Can you scope the power supply and see if the supply voltage shows spikes, to see if it's heavily loaded? What about pins 6 and 7 of IC30, and pins 8 and 9 of IC4?

The waveforms should look like what is shown on page 22 of the German z280_reh.pdf I sent (and am attaching to this reply for everyone else's benefit).

It's possible you have a short or two somewhere; are IC4 and IC30 socketed? You could, very carefully and on the lowest range of you meter, check the resistance of those pins to ground and
Vcc (with the IC21 and IC22 out of their sockets). I say the lowest range of your meter, since that is where the typical ohmmeter puts out the lowest voltage. It's possible that the short is in the board itself, or a very small solder bridge is lurking. Tilmann's original run of boards had a few with shorted traces and vias, and mine certainly could have similar issues. I am not in my office to where I can check right now to see, but next week I'll spend some quality time with a few of the bare boards and my USB microscope and see if I see anything amiss in the trace running between IC4, IC30, IC21, IC22, and the RAM array.

EDIT: And if this wasn't a new 74ACT175 you might want to try another one, just in case. I have had new chips be bad before, but I have run into many more parts box dead chips in my experimenting.

Hope that helps.

File Attachments
1) z280_reh.pdf, downloaded 92 times

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Fri, 12 May 2017 12:08:51 GMT
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Thanks, Lamar. I'll check the items you suggest. I'm using an ACT175 and have already swapped parts for both that IC and the '74.

I looked closely at the waveform diagram. The /CAS waveform on my board is what appears as "refresh" on that sheet. I have never seen the narrow positive-going pulses shown in the burst-mode section. Clearly my problems center on the burst-mode subsystem. I'm actually surprised the board shows as much life as it does given how far off the timing is.

If nothing turns up from probing the power supply connections, I'll put my logic analyzer on it and try to capture a complete picture with all the timing signals. As you can probably see, I have a lot of nice tools here but not necessarily the hardware smarts to match.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 13 May 2017 00:27:12 GMT
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At worst I see perhaps 40mv of ground bounce, nothing visible on 5V rail. Checked the /CAS waveform again, stretching it out to make burst pulses more obvious. Watching carefully during the abbreviated memory test I see none. The only activity on /CAS is a train of 80ns wide negative-going pulses as shown in the 'reset' diagram.

Tomorrow I'm going to start checking continuity point to point between sockets. Verifying that something is connected from point A to point B is the easy part. Checking to see if it's accidentally
shorted to other points presents more of a challenge. Somewhere I have a software tool that can print Gerber files on a laser printer. If I had the layout next to me on the bench I could narrow the search for shorts quite a bit. Is it possible someone on the list already has a PDF of PCB front and rear?

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sat, 13 May 2017 05:19:22 GMT
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snhirsch_gmail.com wrote on Sat, 13 May 2017 02:27  If I had the layout next to me on the bench I could narrow the search for shorts quite a bit. Is it possible someone on the list already has a PDF of PCB front and rear?

Here I have a scan from an old printed layout.

Parts side: please load the file from this link
  http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280/my_old_Z280/pictures/CPU280_A_layout_A4_print.jpg

Solder side: please load the file from this link

EXAMPLE:

CPU280_A_layout Parts side

CPU280_B_layout Solder side

File Attachments
1) hc_2056.jpg, downloaded 534 times
2) hc_2058.jpg, downloaded 511 times

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 13 May 2017 13:20:43 GMT
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Thanks, Fritz! That is a big help.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeeflink on Sat, 13 May 2017 14:48:57 GMT

snhirsch_gmail.com wrote on Sat, 13 May 2017 15:20

Thanks, Fritz! That is a big help.

I hope but that's an old print.

Please load the files from the link in my post - the pictures shown in the post are small and for information only..

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 13 May 2017 16:58:40 GMT

snhirsch_gmail.com wrote on Fri, 12 May 2017 20:27...

Somewhere I have a software tool that can print Gerber files on a laser printer. If I had the layout next to me on the bench I could narrow the search for shorts quite a bit. Is it possible someone on the list already has a PDF of PCB front and rear?

You can grab the gerbers I used for fabrication from Fritz's OldComputers archive

Subject: Re: Interested in a Z280 SBC
Posted by fritzeeflink on Sat, 13 May 2017 20:28:14 GMT

lowen wrote on Sat, 13 May 2017 18:58

snhirsch_gmail.com wrote on Fri, 12 May 2017 20:27...

Somewhere I have a software tool that can print Gerber files on a laser printer. If I had the layout next to me on the bench I could narrow the search for shorts quite a bit. Is it possible someone on the list already has a PDF of PCB front and rear?

You can grab the gerbers I used for fabrication from Fritz's OldComputers archive

Thanks for the hint..

Adding:
Gerber - files where mystery for me ...

but now I found gerbv - A Free/Open Source Gerber Viewer and yes...it works with my Debian Linux 8 / XFCE. GREAT.

As I don’t know what is the best look for printing snhirsch may please post me his printings .

File Attachments
1) hc_2061.jpg, downloaded 483 times

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 13 May 2017 21:39:54 GMT
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Thanks for the tip on gerbv! That's very convenient. I wish it had the smarts to illuminate nets like the Cadence tool where I used to work, but you get what you pay for with free software .

Subject: Re: Interested in a Z280 SBC
Posted by davetypeguy on Sun, 14 May 2017 00:22:59 GMT
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I usually use the free gerber viewer at EasyEDA https://gerber-viewer.easyeda.com. It lets you plot individual layers as well as combine all layers, and you can export pictures for download. It is a really nice gerber viewer.

They used to also give stats on the board, like number of vias, smallest trace size, etc, but they stopped doing that for some reason. You just upload the .zip file and it takes a best guess on layers. You can change that as well if it gets it wrong, but if it has problems, your gerber files are probably not ready for production.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sun, 14 May 2017 16:15:15 GMT
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After spending about 10 hours on my board over the last day, here's where I have arrived:

Something is right on the hairy edge with regard to timing. If I apply power cold, it counts to 320k (usually, sometimes less) and hangs with the last LED on. Then, I walk away for about 10 minutes with the board powered up. When I come back, a hardware reset will get it to count past 320k (usually to 820k, but sometimes to 500-something k) and end up in the configuration dialog.
From that point on the board continues to run without crashing. I can reset any number of times and have it come up (albeit with short memory count). Even a quick power-cycle will work (although more than about 10 seconds and it’s back to the failed 320k count).

If I select ‘Q’ as the boot, it goes through all the correct motions before complaining about no hard disk and dumping me to a prompt. It remains responsive to keyboard input at this point.

With a floppy cable plugged in and my HxC SD unit (or real 1.44M 3.5 drive) on the end, it will try to access the disk but cannot read it. (This may be unrelated, since I did not have a 15pf cap and used a 10pf in the 16Mhz. tuned circuit).

Once the board is warmed up and decides to function no amount of bending, twisting, heat, cold or dropping several inches to the bench will cause it to glitch. From that evidence it's hard to see how this is a mechanical problem with the PCB or a solder bridge. I believe my earlier observation about bringing it to life by touching the board is a red-herring. It's more likely that I was accidentally moving the negative supply alligator clip far enough to hit the reset pin on the Euro connector.

Lamar, if you can send me another set of ZIP modules I will sub them in and see if that's the issue. Everything is pointing in that direction.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 20 May 2017 01:22:08 GMT

The diskette subsystem is working! Swapped in the correct 15pf cap and all is well. I can access drives A and B on my HxC emulator, copy files, format, etc. The odd "warm up" behavior persists, but once it decides to work it's rock solid.

---

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sat, 20 May 2017 08:50:51 GMT

Congratulations! I would change the timing capacitor C6 for a 120pF ceramic, just in case.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 20 May 2017 12:16:51 GMT

Yes, I'm planning to do that. Lamar is sending me some replacement memory to try. Hopefully that's the cause of my flaky startup behavior and short memory count.

Am I correct in assuming that there's currently no support for booting from diskette? I currently
have it setup to boot from EPROM, which doesn't automatically make A: the home drive. It times out trying to log a non-existent hard disk and I have to manually move to drive A:.

Subject: Re: Interested in a Z280 SBC
Posted by fritzelink on Sat, 20 May 2017 12:36:37 GMT

snhirsch_gmail.com wrote on Sat, 20 May 2017 14:16: Yes, I'm planning to do that. Lamar is sending me some replacement memory to try. Hopefully that's the cause of my flaky startup behavior and short memory count.

Am I correct in assuming that there's currently no support for booting from diskette? I currently have it setup to boot from EPROM, which doesn't automatically make A: the home drive. It times out trying to log a non-existent hard disk and I have to manually move to drive A:.

The support for boot device is in the setup option.

Please look into the software manual for the setup programm which is part of the bootloader.
The source code is called setup.280 -> title 'CPU280 System Configuration Setup'

This are the menu text...

if english

h_msg: defmcr, lf, '1. Disk Drives'   
defmcr, lf, '2. Interfaces'   
defmcr, lf, '3. Other'   
## for changing boot drive ##
defmcr, lf, '0. Exit (Reboot)'   
defzcrl, lf, '-->'

d_msg: defmcr, lf, tab, '1. Drive A:'
defmcr, lf, tab, '2. Drive B:'
defmcr, lf, tab, '3. Drive C:'
defmcr, lf, tab, '4. Drive D:'
defmcr, lf, tab, '0. back'
defzcrl, lf, tab, '-->'

s_msg: defm println'   
defmcr, lf, tab, '1. Hardware Parameters CRT1'
defmcr, lf, tab, '2. Hardware Parameters CRT2'
defmcr, lf, tab, '3. Baud Rate CRT1'
defmcr, lf, tab, '4. Baud Rate CRT2'
defmcr, lf, tab, '5. Declarations after Reset'
defmcr, lf, tab, '0. back'
defzcrl, lf, tab, '-->'
With the setup you can change the system defaults even where your system will boot from.

....

3. Use of the setup programm

One module of the boot loader is the setup program. It modifies various settings of the CPU280. The setup program is designed hierarchically, and currently offers three areas to be setup:

2. Interfaces All settings of the two serial ports on the CPU280, plus the device assignment after reset.

The setup program is always used through single key strokes; usually numeric input (one digit selects from the options offered). Most menu items are self-explanatory, so the following will only explain some less clear points.

---

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sat, 20 May 2017 12:44:18 GMT
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Are you using Tilmann Reh's version 1.13 or Wayne's updated and bugfixed version 1.2?
https://github.com/wwarthen/CPU280/releases

More info here:
https://github.com/wwarthen/CPU280/blob/master/SYSTEM/system.his

---

Subject: Re: Interested in a Z280 SBC
Jonas wrote on Sat, 20 May 2017 14:44
Are you using Tilmann Reh's version 1.13 or Wayne's updated and bugfixed version 1.2?
https://github.com/wwarthen/CPU280/releases

More info here:
https://github.com/wwarthen/CPU280/blob/master/SYSTEM/system.his

Great, thanks for this link and thanks to wwarthen for his help. I added this to my

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 20 May 2017 23:36:42 GMT

Before I get into building one from scratch, I see these in the software I downloaded:

CPM3 Master 20170221.img
CPU280_144.img

I understand they are for a 1k sector physical format, so it's a little unclear how to get them on to a diskette. I'll try converting them to an HFE image for the HxC emulator.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 20 May 2017 23:41:20 GMT

Jonas wrote on Sat, 20 May 2017 05:44
Are you using Tilmann Reh's version 1.13 or Wayne's updated and bugfixed version 1.2?
https://github.com/wwarthen/CPU280/releases

More info here:
https://github.com/wwarthen/CPU280/blob/master/SYSTEM/system.his

Are you referring to systems that get written into the EPROM, or are these for diskette? The only way I can get the system booted now is to select the EPROM (option Q), so is that what would be 1.13 or 1.2? I didn't build anything - just programmed the EPROMs from an image Lamar sent me.

Sorry if I'm asking naive questions, but even after many reads of the documentation I'm having a bit of trouble grasping the big picture.
Hi Steven,

The GitHub repository has both the latest EPROM images as well as a couple variations of boot diskettes. Download the CPU280-v1.20.zip file from the latest release. In that zipfile you will find "system.evn" and "system.odd". These are the binary images to program onto your EEPROMs. Version 1.2 refers to the EEPROMs. The primary reason to upgrade to the v1.2 ROM is that diskette boot will work. It will not work with v1.3.

The CPU280-v1.20.zip file includes two diskette images. You can use RawWriteWin to write these images onto a 1.44MB formatted diskette using any PC that still has a diskette drive. These two diskette images are bootable meaning that you could change your config to boot directly to the A drive.

Good luck,

Wayne

Thanks very much for putting all the pieces together! That's exactly the information I needed to makes sense of the situation.

I reprogrammed the EPROMs with v1.2 software and created HFE files from the diskette images. This seems to have done the trick! I'm able to boot either the CPM3 or ZPM3 master disks. Thanks again for filling in the missing details.

It appears the CPM3 master expects drive C to exist, is that correct? I get a repeatable error on startup complaining of a read error on that drive (which I do not have connected). Couple more questions:

The 'tcselect' utility is missing, so I cannot create a new z3t file. I'm not getting proper arrow key operation from the terminal program and would like to try other terminal emulations.

Why was ZPM3 selected over Z3PLUS?

Lastly, is anyone working on Tillman's IDE controller board for Eurobuss? Would be great to have
a hard drive connected to the CPU280.

I'm impressed with this system. Nice work everyone!

---

Subject: Re: Interested in a Z280 SBC
Posted by fritze flink on Sun, 21 May 2017 18:10:53 GMT

Here you'll find the TCSELECT and other too...


The Z3PLUS is here

and of course a lot of more is collected here

I used the default CP/M3 in 1990 and installed Z3PLUS on drive G: (I patched Z3PLUS for this drive).

The ZPM3 and ZCCP are nice but for myself I got the full power of Z-System with Z3plus (and NZCOM on other hardware). You may edit the default.z3p file for your system.

Today I have no running CPU280 but hopefully will get one.

It will be good if we may have a wiki as told about some weeks ago and even post what we do with our CPU280. I believe Z3PLUS may be new for someone and reading the documents can't explain all questions.

---

File Attachments
1) default.z3p, downloaded 110 times

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Sun, 21 May 2017 18:18:31 GMT

snhirsch_gmail.com wrote on Sun, 21 May 2017 09:28

It appears the CPM3 master expects drive C to exist, is that correct? I get a repeatable error on startup complaining of a read error on that drive (which I do not have connected).

Hmmm, that should not happen. Typically, this would happen if the CPM3 drive search settings included the C drive. The CPU280 ROM setup includes a place to set the search drives. How is that configured?
The 'tcselect' utility is missing, so I cannot create a new z3t file. I'm not getting proper arrow key operation from the terminal program and would like to try other terminal emulations. I assume you are referring to the ZPM3 OS. I should have included TCSELECT and will take a look. However, understand that ZPM3 itself is only the core OS. It is intended to be Z3 compatible so that you can use whatever Z3 tools you want (there are thousands of them). Ultimately, you may want to get familiar with finding Z3 tools that you like on the "net".

Why was ZPM3 selected over Z3PLUS?

No idea. It was included in the CPU280 project files, so I included it in my distribution to be complete. I would personally prefer Z3PLUS and had intended to do the work to create a Z3PLUS diskette. Have not found the time for that yet. It should be really easy, so feel free to pursue that!

This is a community project and there are probably a few rough edges. I am sure Lamar would welcome any contributions.

-Wayne

Fritz just contacted me and pointed out that the line endings in the GitHub repository https://github.com/wwarthen/CPU280 were not consistently CR LF. GitHub was translating files to Unix LF convention behind the scenes. I have generate v1.20.1 to correct this. A .gitattributes file has been added to force GitHub to never play with text files in the future, so this should not recur.

There are absolutely no functional differences. In fact, the binary distribution with the EPROMs and diskette images is literally the same file. So don't upgrade your EPROMs or diskette images if you are already using v1.20.

-Wayne

Wayne W wrote on Sun, 21 May 2017 11:18: snhirsch_gmail.com wrote on Sun, 21 May 2017 09:28
It appears the CPM3 master expects drive C to exist, is that correct? I get a repeatable error on
startup complaining of a read error on that drive (which I do not have connected).

Hmmm, that should not happen. Typically, this would happen if the CPM3 drive search settings included the C drive. The CPU280 ROM setup includes a place to set the search drives. How is that configured?

Yes, that's probably the issue. I wanted to specify "AB" for the search path, but it insisted upon four characters being entered (thus, ABCD). Wouldn't accept spaces after A and B, so how do I terminate the list with only two characters?

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Sun, 21 May 2017 20:58:36 GMT
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snhirsch_gmail.com wrote on Sun, 21 May 2017 13:35
Yes, that's probably the issue. I wanted to specify "AB" for the search path, but it insisted upon four characters being entered (thus, ABCD). Wouldn't accept spaces after A and B, so how do I terminate the list with only two characters?

I ran into the same issue. I think it is a bug in the setup code, but never took the time to resolve it. Suggest you just plug in the RAM drive for the last two positions. So the string would be "ABEE". Since the RAM drive is always there and it is fast, should cause no harm. In fact, many people include the RAM drive at the start of the search path so they can place frequently used tools there and they will be found and run much faster.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sun, 21 May 2017 22:37:09 GMT
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That worked perfectly, thanks!

Subject: Re: Interested in a Z280 SBC
Posted by fritzeblink on Sun, 21 May 2017 23:03:24 GMT
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snhirsch_gmail.com wrote on Sun, 21 May 2017 22:35
Wayne W wrote on Sun, 21 May 2017 11:18
snhirsch_gmail.com wrote on Sun, 21 May 2017 09:28
It appears the CPM3 master expects drive C to exist, is that correct? I get a repeatable error on
startup complaining of a read error on that drive (which I do not have connected).

Hmmm, that should not happen. Typically, this would happen if the CPM3 drive search settings included the C drive. The CPU280 ROM setup includes a place to set the search drives. How is that configured?

Yes, that's probably the issue. I wanted to specify "AB" for the search path, but it insisted upon four characters being entered (thus, ABCD). Wouldn't accept spaces after A and B, so how do I terminate the list with only two characters?

Didn't 'x' exit the menu and stores your input?

Option for this: 'Search Chain: A..P=Drives, *=Default, x=Exit'

from the setup.280

sbootm:...defz cr,lf,tab,tab,'Boot Drive: A..P (Q=EPROM) --> '
schnm:....defm cr,lf,tab,tab,'Search Chain: A..P=Drives, *=Default, x=Exit
..........defz cr,lf,tab,tab,'input max. 4 characters --> '

Bad, I didn' have a monospace font...

File Attachments
1) hc_2076.jpg, downloaded 596 times

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 22 May 2017 17:36:28 GMT
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Wayne W wrote on Sun, 21 May 2017 11:18
snhirsch_gmail.com wrote on Sun, 21 May 2017 09:28
The 'tcselect' utility is missing, so I cannot create a new z3t file. I'm not getting proper arrow key operation from the terminal program and would like to try other terminal emulations. I assume you are referring to the ZPM3 OS. I should have included TCSELECT and will take a look. However, understand that ZPM3 itself is only the core OS. It is intended to be Z3 compatible so that you can use whatever Z3 tools you want (there are thousands of them). Ultimately, you may want to get familiar with finding Z3 tools that you like on the "net".
A couple more notes on this after refreshing my memory...

I realized that you are probably looking for TCMAKE, not TCSELECT. TCSELECT just allows choosing from a set of predefined terminal types. TCMAKE will allow you to create new ones.

More importantly, I doubt you are going to get your keyboard arrow keys to work by using a custom Z3 TCAP file. The TCAP file contains entries for moving the cursor. It has no concept of defining incoming keyboard key sequences.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 22 May 2017 17:59:45 GMT
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Quote:

A couple more notes on this after refreshing my memory...

I realized that you are probably looking for TCMAKE, not TCSELECT. TCSELECT just allows choosing from a set of predefined terminal types. TCMAKE will allow you to create new ones.

More importantly, I doubt you are going to get your keyboard arrow keys to work by using a custom Z3 TCAP file. The TCAP file contains entries for moving the cursor. It has no concept of defining incoming keyboard key sequences.

-Wayne

Wayne your right and out of curiosity I like to know what terminal snhirsch has.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 23 May 2017 11:42:37 GMT
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fritzeflink wrote on Sun, 21 May 2017 16:03
snhirsch_gmail.com wrote on Sun, 21 May 2017 22:35
Wayne W wrote on Sun, 21 May 2017 11:18
snhirsch_gmail.com wrote on Sun, 21 May 2017 09:28

It appears the CPM3 master expects drive C to exist, is that correct? I get a repeatable error on startup complaining of a read error on that drive (which I do not have connected).

Hmmm, that should not happen. Typically, this would happen if the CPM3 drive search settings included the C drive. The CPU280 ROM setup includes a place to set the search drives. How is that configured?
Yes, that's probably the issue. I wanted to specify "AB" for the search path, but it insisted upon four characters being entered (thus, ABCD). Wouldn't accept spaces after A and B, so how do I terminate the list with only two characters?

Didn't 'x' exit the menu and stores your input?

Option for this: 'Search Chain: A..P=Drives, *=Default, x=Exit'

Yes, 'x' worked properly. My mind interpreted 'x=Exit' as meaning "exit the entire menu" so I never tried it. A better wording for that might be 'x=Complete Entry'.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 23 May 2017 11:47:19 GMT

fritzeflink wrote on Mon, 22 May 2017 10:59Quote:

A couple more notes on this after refreshing my memory...

I realized that you are probably looking for TCMAKE, not TCSELECT. TCSELECT just allows choosing from a set of predefined terminal types. TCMAKE will allow you to create new ones.

More importantly, I doubt you are going to get your keyboard arrow keys to work by using a custom Z3 TCAP file. The TCAP file contains entries for moving the cursor. It has no concept of defining incoming keyboard key sequences.

-Wayne

Wayne you're right and out of curiosity I like to know what terminal snhirsch has.

I am using ProComm 32 with VT220 emulation on my ancient Win98 shop computer. I was able to fix the problem by redefining the arrow keys to send the rather odd sequence expected by the current tcap. I would have expected the classic "Wordstar" diamond of Ctrl-S,D,E,X for L,R,U,D, but the tcap seemed to expect (from memory, not in front of the machine) Ctrl-J,K,E,X. Anyway, it's all working now.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 23 May 2017 11:53:09 GMT
Lamar sent me four new DRAM ZIPs to try. The warmup issues persist, although nowhere near as severe as with the first parts. If I let it run for five minutes and/or lower supply voltage to 4.9V, it counts all 2048k of memory and runs reliably. I suspect the 7ns 16V8 parts I used are fast enough to trigger a race in the timing logic (Lamar is using 15ns parts on his board). I've ordered a handful of 15 and 25ns parts and will see if slower is better.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 23 May 2017 13:55:03 GMT

Wayne W wrote on Sun, 21 May 2017 14:18...
This is a community project and there are probably a few rough edges. I am sure Lamar would welcome any contributions.

Yes, indeed! I am very happy to see the involvement, especially in the areas where my knowledge is thin (CP/M in general, as I never really did much CP/M work; I have other plans for my CPU280 eventually that includes getting UZI280 running, which is something I can really sink my teeth into). I was hoping to stir up some interest, and I am hoping to see that grow as I get more of these shipped out.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeeflink on Tue, 23 May 2017 16:01:36 GMT

lowen wrote on Tue, 23 May 2017 15:55
Wayne W wrote on Sun, 21 May 2017 14:18...
This is a community project and there are probably a few rough edges. I am sure Lamar would welcome any contributions.

Yes, indeed! I am very happy to see the involvement, especially in the areas where my knowledge is thin (CP/M in general, as I never really did much CP/M work; I have other plans for my CPU280 eventually that includes getting UZI280 running, which is something I can really sink my teeth into). I was hoping to stir up some interest, and I am hoping to see that grow as I get more of these shipped out.

Hi...

I know UZI from Stephan Nitschke I meet years ago and who was a member of the german club-80 who was a conclusion of club-bremerhaven and club-muenchen in germany.

Information about UZI280 are at znote 51 and oldcomputers.dyndns.org. There are some links you can find with google but most are dead links.
There is a interesting adaption for the P112 and some older by Dough Braun. Looking around you
can find more about UZI or similar like Fuzix OS in the net.

Some years ago as I made a remake of oldcomputers I called Stefan Nitschke if he has more or new about UZI280 and on oldcomputers is all I have.

As we will have time to build an idee controller card - like the gidee from Tilmann and will be able to use CP/M+ and UZI280 like a dual boot I'm interested. I like to play with it too but I'm a mechanic - not a programmer...

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 23 May 2017 17:55:56 GMT
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Does UZI 280 use any sort of memory protection or supervisory mode?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 23 May 2017 18:06:32 GMT
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I've not dug deeply enough to know for sure about UZI280's use of the memory protections. The CP/M 3 BIOS by Tilmann does use some of the protection features as far as I recall, but I don't remember where I read that......

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 23 May 2017 19:22:01 GMT
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snhirsch_gmail.com wrote on Tue, 23 May 2017 19:55:Does UZI 280 use any sort of memory protection or supervisory mode?

from here ?

NOTE: UZI280 [*] is based on UZI for z80 by Doug Braun, but will not run on z80, z180 or z380 based systems because the architecture of the mentioned CPU's is far to simple for the current implementation. (yes even the z380 is a much to simple CPU. The design of the Zilog CPU's of the 80's was much more complex and innovative than that of their 90's designs. Maybe time runs backwards at some locations... UZI280 is like U*IX edition 7 a full multiuser, multitasking system and has support for binaries with separate I&D, code sharing, process paging, hard-disc cache ... The kernel is mostly written in c
and fits
into a single 64K memory segment (code size is less than 30KB).

There are over 200 binaries like less, bc, vi, vsh, battleship, tetris ... available for UZI280 at the moment
(without any warranty). The default UZI280 login shell is a striped down version of the clam shell
(no alias handling and termcap support just to get it fit on a 16 bit machine).

UZI280 is written to run on a REH-CPU280 card (ECB-bus) with 1 or 2MB of ram, together with
the REH-IDE-interface
and a bus terminal like the REH-HGT or any serial Terminal.
It could be adapted to any (16 bit bus) z280 hardware by rewriting the low level IO drivers and the
memory address tables.

Version 1.12 includes the following bug fixes (seems to be bug free now):

exec of type 1 binaries (no sep. I&D) now works properly.
modified interrupt handling -> Fixed system stack overflow error.

Improvements:

the UART serial line driver is optimised for modem connection.
file attributes now work in the usual U*IX way.
almost U*IX edition 7 compatible c-library with some extensions.
ncurses like library.
init/login with support for /etc/rc, utmp, passwd, ttytab, termcap.

Limits:

single file system size is limited to 2^16*512 byte (32MB).
argv and exported environ are limited to 512 bytes each.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 23 May 2017 20:01:13 GMT
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Nice! I would be very interested in putting together both the IDE and HGT boards.

Is there a native C compiler and linker, or does one need to cross-compile on another host?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 23 May 2017 20:06:25 GMT
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IDE we can do; HGT isn't likely at all due to at least one of the chips used. Better would be support for the ECB ProplO with a VGA output. That also gets us some other very nice features.

Subject: Re: Interested in a Z280 SBC  
Posted by fritzeflink on Tue, 23 May 2017 20:25:24 GMT  
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fritzeflink wrote on Tue, 23 May 2017 21:22

snhirsch_gmail.com wrote on Tue, 23 May 2017 19:55

Does UZI 280 use any sort of memory protection or supervisory mode?

from here?

NOTE: UZI280 [*] is based on UZI for Z80 by Doug Braun, but will not run on Z80, Z180 or Z380 based

Yes... I quote myself...

As I just didn't managed to ungzip, untar, un..something else the uzi-280 files on my harddisk I remembered a saved link.

https://unixarchive.tliquest.net/local/unix/tmp/cpm/uzi-102/

here you will have some readme files about the older uzi280 version.

File Attachments
1) hc_2080.jpg, downloaded 499 times

Subject: Re: Interested in a Z280 SBC  
Posted by etchedpixels on Tue, 23 May 2017 20:56:03 GMT  
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The original Doug Braun UZI 280 (http://www.dougbraun.com/uzi.html used a commercial compiler based upon Small C (but much improved) and various bits of V7 userspace that were most certainly not at the time sharable (nor shared). The compiler has afaik never been officially released to the public by its rights owners although bootleg sources roam the internet freely. There isn't an off the shelf open Z280 toolchain at this point in time, instead there are some hacks and mods (Z280 optimiser etc) for the ANSI-ish Hitech C compiler and wrappers for it. Usable but not to modern standards. I have had a poke at getting SDCC to generate Z280 code but not really
had time to look into it.

UZI280 is quite neat although it's V6/V7ish and missing a lot of modern Unixisms and even some very old ones (eg /dev/tty, controlling tty and sessions) and UZI180 which is derived from it certainly feels Unixish

Plenty of tools, but many of them have "interesting" licencing questions, and a lot of it is only distributed in binary (a fair amount of the matching sources are on znode51 but not all).

Alan

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 24 May 2017 15:45:15 GMT

Only an idea..

If we have an HxC SD floppyemulator (I have the REV F SD Floppy Drive Emulator) we may be able to use a bigger floppy definition.


One of the formats in diskdefs is for example

```
diskdef 4mb-hd
  seclen 128
  tracks 1024
  sectrk 32
  blocksize 2048
  maxdir 256
  skew 1
  boottrk 0
  os p2dos
end
```

For the HxC the format has nearly no limit and we can use the disktools for make a 4MB format, the CPU280 format manager may easily identify and integrate that format so we can use it.

I don't have a CPU280 for testing but maybe somebody can make a try.
lowen wrote on Tue, 23 May 2017 13:06IDE we can do; HGT isn't likely at all due to at least one of the chips used. Better would be support for the ECB PropIO with a VGA output. That also gets us some other very nice features.

Actually it is possible to source all components if someone would like to build the HGT, but is it worth the effort? I prefer VGA. PropIO or a real VGA board. John Coffman wrote about a possible board based on the HD6445CP4 combined with the VIA 82C42 a while ago (topic: ECB VDU).

Three of us have the prototype VGA3 boards running. A fourth tester in Europe just received his board, so we will have input from another tester in a week or two. I'll post to the RetroWiki when the board is ready for prime time.

--John

lowen wrote on Wed, 23 May 2017 13:06IDE we can do; HGT isn't likely at all due to at least one of the chips used. Better would be support for the ECB PropIO with a VGA output. That also gets us some other very nice features.

Actually it is possible to source all components if someone would like to build the HGT, but is it worth the effort? I prefer VGA. PropIO or a real VGA board. John Coffman wrote about a possible board based on the HD6445CP4 combined with the VIA 82C42 a while ago (topic: ECB VDU).

John, is the VGA3 port-mapped or memory-mapped?

lowen wrote on Wed, 24 May 2017 12:53John, is the VGA3 port-mapped or memory-mapped?
Both.

Subject: Re: Interested in a Z280 SBC  
Posted by Andrew B on Fri, 26 May 2017 15:34:05 GMT
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I've created a wiki location for the CPU280 revival project using the standard 'board' template here - 

Feel free to fill in this start page and add additional sub-pages as needed.

Subject: Re: Interested in a Z280 SBC  
Posted by fritzeeflink on Fri, 26 May 2017 15:55:18 GMT
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Andrew B wrote on Fri, 26 May 2017 17:34:
I've created a wiki location for the CPU280 revival project using the standard 'board' template here -

Feel free to fill in this start page and add additional sub-pages as needed.

Thanks...

but as german is my favorite language I will not write the first words in the wiki...

Question: with my account logged in here I can't write in the wiki as I tested. Must I have a 'wiki' account?

Subject: Re: Interested in a Z280 SBC  
Posted by Andrew B on Fri, 26 May 2017 16:08:35 GMT
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You have to login to the wiki and the forum each on its own, they are 2 different software packages. There are 2 different passwords, but you should be set up with both with the same username.

Subject: Re: Interested in a Z280 SBC  
Posted by lowen on Fri, 26 May 2017 17:36:56 GMT
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Andrew, thanks. I'm uploading some initial files now. I'm going to put Wayne and John's photos that are posted in the forum up in the Gallery section, and the photo of a bare board as well.
EDIT: Preliminary introduction information and some of the board files uploaded. Need to still get the gallery up, and the build information.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 27 May 2017 13:55:28 GMT

FYI: It does appear that fast GAL parts can be problematic. I originally used Lattice 16V8 7ns parts in all four locations and found that the board was unable to count the full memory complement until it had been on for about 10 minutes or was run at reduced voltage. Suspecting a race condition, I replaced the CAS GAL with a National 16V8 15ns part. The problem is gone. It now counts all 2048k from a cold start at full voltage. It's possible my unit is an outlier, but it might be worth advising future builders to stick with 15 ns devices. Digikey and Mouser don't appear to stock the slower devices, but they are available from Unicorn Electronics. I've found Unicorn to be a great source for ICs. They stock all but one of the parts on the CPU280 BOM (I had to pickup the 74AS158s from DigiKey).

Thanks to all who have offered troubleshooting advice. It's good to have this solved once and for all.

Subject: Re: Interested in a Z280 SBC
Posted by Jonas on Sat, 27 May 2017 14:22:19 GMT

Congratulations and good troubleshooting! You nailed it down at last. Yet another argument for "not faster than absolutely needed", at least when timing is critical. I was lucky I guess. I had only 15 ns parts in stock. If they had been 7ns I had used them without hesitation.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sat, 27 May 2017 15:12:04 GMT

snhirsch_gmail.com wrote on Sat, 27 May 2017 15:55: FYI: It does appear that fast GAL parts can be problematic. I originally used Lattice 16V8 7ns parts in all four locations and found that the board was unable to count the full memory complement until it had been on for about 10 minutes or was run at reduced voltage. Suspecting a race condition, I replaced the CAS GAL with a National 16V8 15ns part. The problem is gone. It now counts all 2048k from a cold start at full voltage.

Great, you did it. It's hard to believe so how can this behavior be explained?
fritzeflink wrote on Sat, 27 May 2017 08:12

It does appear that fast GAL parts can be problematic. I originally used Lattice 16V8 7ns parts in all four locations and found that the board was unable to count the full memory complement until it had been on for about 10 minutes or was run at reduced voltage. Suspecting a race condition, I replaced the CAS GAL with a National 16V8 15ns part. The problem is gone. It now counts all 2048k from a cold start at full voltage.

Great, you did it. It's hard to believe so how can this behavior be explained?

Disclaimer: I am not an electrical engineer, just a hobbyist with 50 years of electronics tinkering and do-it-yourself activities behind him. That said, it appears that the memory timing logic has a feedback path involving the SYS and CAS GALs. I can only guess that the fast parts cause a hold violation somewhere (output not staying stable long enough on one or more gates). Whatever it is, it's right on the hairy edge. Internal heating and lower supply voltage slowed things down enough to get over the threshold. The 15 ns CAS GAL puts it in operational territory even when cold.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 27 May 2017 18:23:03 GMT

I finally figured out how to convert a CPU280 diskette IMG file to HFE (for HxC diskette emulator) with a sector interleave of 2. Use the 'Load Raw Image' option in the GUI tool and set things thusly:

Then read in the image file and export as an HFE.

---

File Attachments
1) hxc_cpu280.gif, downloaded 315 times

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sat, 27 May 2017 20:28:20 GMT

snhirsch_gmail.com wrote on Sat, 27 May 2017 20:23

I finally figured out how to convert a CPU280 diskette IMG file to HFE (for HxC diskette emulator) with a sector interleave of 2. Use the 'Load Raw Image' option in the GUI tool and set things thusly:
Great work. So you can define your own format I believe.

I, in my case, did mostly the easier way reading a floppy disk with IMD or Teledisk as the HxC tool can work with those images.
As I use the HxC seldom I must read the documentation again.

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Sat, 27 May 2017 20:52:28 GMT

snhirsch_gmail.com wrote on Sat, 27 May 2017 06:55FYI: It does appear that fast GAL parts can be problematic. I originally used Lattice 16V8 7ns parts in all four locations and found that the board was unable to count the full memory complement until it had been on for about 10 minutes or was run at reduced voltage. Suspecting a race condition, I replaced the CAS GAL with a National 16V8 15ns part. The problem is gone. It now counts all 2048k from a cold start at full voltage. It's possible my unit is an outlier, but it might be worth advising future builders to stick with 15 ns devices. Digikey and Mouser don't appear to stock the slower devices, but they are available from Unicorn Electronics. I've found Unicorn to be a great source for ICs. They stock all but one of the parts on the CPU280 BOM (I had to pickup the 74AS158s from DigiKey).

Different PLD speeds could certainly make a difference, but note that I have been using 7.5ns Atmel devices from the start and my system has always been rock solid. No doubt a combination of tolerances, but I would not conclude that 15ns PLDs are the answer as a general rule.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sun, 28 May 2017 15:11:01 GMT

fritzefflink wrote on Sat, 27 May 2017 13:28snhirsch_gmail.com wrote on Sat, 27 May 2017 20:23I finally figured out how to convert a CPU280 diskette IMG file to HFE (for HxC diskette emulator) with a sector interleave of 2. Use the 'Load Raw Image' option in the GUI tool and set things thusly:

Great work. So you can define your own format I believe.

I, in my case, did mostly the easier way reading a floppy disk with IMD or Teledisk as the HxC tool can work with those images.
As I use the HxC seldom I must read the documentation again.
No, I did not define my own format. The issue was this: The simple path for creating an HxC "HFE" file from one of the IMG files results in 1:1 physical sector interleave. While this functions properly, it is extremely slow since the CPU280 cannot keep up and wastes a full virtual revolution between sector reads. The approach I documented ensures that the image file has an every-other-sector interleave. With the new arrangement an entire track can be read in a total of two revolutions rather than 18.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sun, 28 May 2017 15:13:29 GMT

Wayne W wrote on Sat, 27 May 2017 13:52snhirsch_gmail.com wrote on Sat, 27 May 2017 06:55FYI: It does appear that fast GAL parts can be problematic. I originally used Lattice 16V8 7ns parts in all four locations and found that the board was unable to count the full memory complement until it had been on for about 10 minutes or was run at reduced voltage. Suspecting a race condition, I replaced the CAS GAL with a National 16V8 15ns part. The problem is gone. It now counts all 2048k from a cold start at full voltage. It’s possible my unit is an outlier, but it might be worth advising future builders to stick with 15 ns devices. Digikey and Mouser don’t appear to stock the slower devices, but they are available from Unicorn Electronics. I’ve found Unicorn to be a great source for ICs. They stock all but one of the parts on the CPU280 BOM (I had to pickup the 74AS158s from DigiKey).

Different PLD speeds could certainly make a difference, but note that I have been using 7.5ns Atmel devices from the start and my system has always been rock solid. No doubt a combination of tolerances, but I would not conclude that 15ns PLDs are the answer as a general rule.

-Wayne

As I said, I'm not an electrical engineer nor a computer designer. All I know is that my symptoms were characteristic of a timing violation and the slower parts solved it. Just out of curiosity, what brand and speed of memory are you using on your board?

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Sun, 28 May 2017 16:07:40 GMT

snhirsch_gmail.com wrote on Sun, 28 May 2017 08:13
As I said, I'm not an electrical engineer nor a computer designer. All I know is that my symptoms were characteristic of a timing violation and the slower parts solved it. Just out of curiosity, what brand and speed of memory are you using on your board?

Toshiba, 60ns
Wayne W wrote on Sun, 28 May 2017 09:07

As I said, I'm not an electrical engineer nor a computer designer. All I know is that my symptoms were characteristic of a timing violation and the slower parts solved it. Just out of curiosity, what brand and speed of memory are you using on your board?

Toshiba, 60ns

Ah, that may be why your board works with 7 ns. parts! My original memory was 80 ns, resulting in a machine that barely would boot after considerable warmup. Lamar sent me 70 ns. memory, which worked quite a bit better although still required warmup to recognize all the memory. Moving to the slower GAL brought the 70 ns parts to full life. If I had 60 ns it might have been fine with the 7 ns GALs.

---

Ok, I have sent a couple of PMs to some who expressed interest in building a CPU280 once the beta period was complete. I honestly was a bit concerned with the troubles Steven was having, but his eventual success, as well as the successes by all the others who have built and collaborated on the CPU280, and with Wayne's github hosting working and usable EPROM and disk images, I believe we're ready to be in more of a production mode. Of course, for the hobbyist, 'production' has a different definition than it would for a commercial manufacturer, and I'm still getting docs and stuff together, especially the build notes that have accumulated in this thread.

If those who I PMed get a board apiece, I will have 4 boards available for sale (but I can get ten more within about a week). PM me if you're interested in purchasing a bare board or a board plus the harder-to-find parts and/or the programmable parts.

---

As I said, I'm not an electrical engineer nor a computer designer. All I know is that my symptoms were characteristic of a timing violation and the slower parts solved it. Just out of curiosity, what brand and speed of memory are you using on your board?
Ah, that may be why your board works with 7 ns parts! My original memory was 80 ns, resulting in a machine that barely would boot after considerable warmup. Lamar sent me 70 ns memory, which worked quite a bit better although still required warmup to recognize all the memory. Moving to the slower GAL brought the 70 ns parts to full life. If I had 60 ns it might have been fine with the 7 ns GALs.

More hints about this problem here:


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Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 30 May 2017 12:07:52 GMT
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I became sidetracked with my operational issues and never posted any feedback on construction. So, a few high points:

Do not use disk capacitors for power supply bypass. They create clearance issues in several locations due to their height. Even if they don't directly interfere, they make it next to impossible to work a screwdriver under the adjacent chip for extraction. The BOM (spreadsheet) called for SIL six pin resistor networks at RN2 and RN6 with a note to "Cut off extra pin / resistor". Cutting the resistor off fractures the ceramic package and cutting the pin leaves enough length to create significant clearance issues. If a five pin package is not available I suggest fabricating the networks from individual parts. Ditto for RN5. Jury is still out on the wisdom of using machined pin IC sockets. Their footprint is just enough larger to create clearance issues for bypass caps between sockets. I had to stack a second socket under both EPROMs and the Dallas DS1287 to lift them over the bypass caps and/or adjacent chips. A 34-pin header should be used for the floppy connection. I didn't think this through and mounted a 50-pin header on mine. A detail drawing is needed to explain polarity for both the tantalum caps and the LEDs. The screened symbols were hard to read and are not familiar (perhaps DIN standard). Must use 15 ns GALs (discussed in a recent thread of notes). Suggest socketing the ZIP DRAM packages.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 03 Jun 2017 20:15:10 GMT
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Update for 6/3/2017:

New pics! Here's what I'm shipping as the board+hard-to-find+programmables kit, and a new pic
of my older CPU280 with newer EPROM and GAL16V8D's (please note that yes, I am aware that the Z280 socket is rotated 90 degrees; the Z280 is oriented correctly for the board, though not for the socket, which makes swapping Z280's for testing a bit fun).

The Brother P-Touch PT-P700 PC-connected label printer does nicely, with the 3.5mm-wide TZe-N201 working well for labelling the GAL16V8's and the regular 12mm TZe-2312 tape working well for the EPROMs. Note that the checksum I'm printing on the EPROM is the negated checksum in big-endian form. (generated with srec_cat's checksum-neg-b-e function. A simple shell script I use to generate the checksum is attached, and it requires the SRec tools).

Also, the four RAM's came back from Steve; they are actually 60ns parts, not 80. So now I'm really confused, as they aren't too slow. I'm running OKI 60ns RAMs in mine with 15ns Lattice GAL16V8Ds. All kits from this point (including the three I put together today) will be shipping with OKI 60ns parts that are new-old-stock in OKI factory sealed tubes..

Steve, thanks for the pointers on the construction!

EDIT: Tested and packaged for shipment three kits today. I programmed five sets of GAL16V8s and 27C256 EPROMS, so I have one set of programmables left and ready to ship (one is running in my CPU280). I had one GAL16V8D out of 21 fail programming (programmer told me it went into current limit, short circuit), but no other tested parts failed. All three Z280's tested ok; all three SMC FDC’s tested ok; all EPROMs booted and ran. To test the RAM and the FDC I use a utility disk image in A: on my HxC, and run 'PIP E:=A:*.*' and let it run to completion. C: is a scratch drive, and testing FDC writes is accomplished by 'PIP C:=A:*.*' running to completion.

File Attachments
1) cpu280-board-20170603.jpg, downloaded 139 times
2) cpu280-kit-20170603.jpg, downloaded 146 times
3) checksum.sh, downloaded 118 times

Dang. Sorry about that. My eyesight is not as good as it used to be! Not sure we'll ever completely understand the failure mode on my board. It's unlikely to be the CPU or EPROMs, since those were changed out (several times in the case of the CPU). All the tolerances here must have added up in the wrong direction. I'm pleased at how smoothly it runs now. Biggest surprise is a DS1287 from my parts drawer (with date code in 1992) that's still ticking 25 years down the road.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 03 Jun 2017 22:58:19 GMT
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Dang. Sorry about that. My eyesight is not as good as it used to be! Not sure we'll ever completely understand the failure mode on my board. It's unlikely to be the CPU or EPROMs, since those were changed out (several times in the case of the CPU). All the tolerances here must have added up in the wrong direction. I'm pleased at how smoothly it runs now. Biggest surprise is a DS1287 from my parts drawer (with date code in 1992) that's still ticking 25 years down the road.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 26 Jun 2017 16:03:06 GMT
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Alright, I've gotten a few requests to see about getting the REH-ECB-IDE, the companion IDE board for the CPU280, re-produced. I do have the raw gerbers from Tilmann, and if there is enough interest (if I can get commitments and preferably payment for seven boards) I'll get a run of ten (or more, if more than ten are wanted) made. I already know of five, including one for myself.

I'm very much interested in getting both the PropIO and the VGA3 workable as consoles, and ideally I'd like it to be auto-selectable or configurable with configuration stored in the DS1287 RTC (default to serial on the Z280's UART). I'd like to see a driver for other IDE/SD/CF devices, too, especially the PropIO's SD card.

But to be vintage-accurate, the REH-ECB-IDE needs to be re-produced anyway, though.

Thoughts?

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 26 Jun 2017 16:54:02 GMT
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I can commit to two of the REH-ECB-IDE boards. I am also interested in ultimately porting PropIO to the CPU280, but would like to have the original vintage boards as well.

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Mon, 26 Jun 2017 18:52:33 GMT
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Hopefully I'm one of the five, but if not please write me in for an IDE board. Also very interested in a VGA solution.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 26 Jun 2017 19:05:24 GMT
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Ok, I've ordered a run of ten IDE boards. I'll update once they arrive; PCBcart typically takes a week. I'm attaching a ZIP file with the manual, PAL source, and JEDEC files for four different port address ranges to this post so you can start gathering parts and program the GAL20V8 needed.

If you want to prepay, send me a PM, otherwise wait until I get the boards and do a bit of QC. Tilmann's gerbers are good, and PCBcart has done me well in the manufacturing end, but there's always a possibility of an issue.

File Attachments
Subject: Re: Interested in a Z280 SBC  
Posted by pbirkel on Mon, 26 Jun 2017 19:09:37 GMT  
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snhirsch_gmail.com wrote on Mon, 26 June 2017 11:52: Hopefully I'm one of the five, but if not please write me in for an IDE board. Also very interested in a VGA solution.

Please add me to the list for an REH-ECB-IDE board; I think that gets us (you) to the magic ten?

And register my interest in a VGA solution, also :-).  

Thanks!

Subject: Re: Interested in a Z280 SBC  
Posted by lowen on Mon, 26 Jun 2017 19:29:08 GMT  
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Unless I've miscounted, I get to nine including Paul. I had posted on comp.os.cpm about it, and got a couple of replies, with interest in three IDE boards in those two replies; then one for me, one via PM here, snhirch and wayne together with three here, and Paul. I'd like to limit the initial order to ten so that if something is wrong with the first batch it's not too hard to get and pay for a second batch of ten. If there's more interest beyond this first ten, we'll take that as it comes...... . $25 for a bare board, just like with the CPU280. There aren't any hard to find parts on the IDE board, and just one GAL to program. I don't have any 20V8s in stock, nor do I have a way of verifying them until I build my own IDE, so I'm initially not going to offer anything but the bare board for the IDE.

Subject: Re: Interested in a Z280 SBC  
Posted by tlink on Mon, 26 Jun 2017 21:24:36 GMT  
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If still available I would definitely be interested in the IDE board.

Subject: Re: Interested in a Z280 SBC  
Posted by trick-1 on Mon, 26 Jun 2017 21:25:39 GMT  
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I would like to get a CPU280 + the IDE board please. Let me know details via PM.

Also please register my interest in the vga solution.
Ok, the first ten IDE boards are all reserved. I have the first three of a second batch reserved as well. Once I see how the first batch works out I'll get a second batch made. This also generated enough interest to finish out the second batch of ten CPU280 boards, and if there's any interest I'll probably get a third batch of ten of them made.

PCBcart has notified me that the boards should ship July 4. So that means the IDE gerbers passed their in-house sanity check (they looked good here before I sent them) and they had no questions.

Hi All,

The good news: I've got my CPU280 board put together! The bad news: it needs a little debugging...

The first problem I had was getting ANYTHING to show up on the serial port. Using a logic probe, I could see a little burst of data coming out of IC29 on power up, so I figured it was just the usual getting-the-serial-port-to-talk stuff, which turned out to be the case. In case it saves somebody a little time:

Serial Port Related Issues

0. I used two lengths of 9-pin ribbon cable, both attached to a 20 pin IDC connector at one end (but be sure to skip pins 10 and 20), and two DB9 IDC connectors on the other ends. I think this is more or less what the hardware manual was suggesting...

1. The ROM I have is indeed set to talk at 9600 8-N-1 like it says in the documentation.

2. As the CPU280 has two serial ports on its 20-pin connector, it's important to use the right one. The port used at startup is the one with TXD1 and RXD1 on it. For extra credit, verify that you're actually using the connector that's wired to those pins! My brain assumed that the "top" connector was the "first" one. It isn't. The first one is the one that starts with pin 1, which on my cable is the connector that's closer to the ECB bus connector, i.e. "the bottom one" in my brain... this one little
thing took way too long for me to discover. Use the right connector!

3. I'm testing on Linux. I used picocom -b 9600 -f n -p n -d 8 /dev/ttyUSB0; you may need to run it with sudo depending on how the permissions are set on your serial port.

4. The cabling configuration I'm using: USB to serial adapter, then 9-pin gender changer (but NOT null modem adapter), then the DB9 IDC connector.

With all that sorted out, the board powers up, and outputs:

CPU280 Boot Loader V1.2 RBC 8-Mar-2017
http://www.retrobrewcomputers.org
based on Cold Loader Program V1.13 TR 950314
Press DEL to run SETUP.

Fatal Error: not enough RAM

Additional Information

The board is drawing about 380mA.

The third LED stays lit, I assume because the RAM test doesn't pass.

I'm not 100% sure what kind of EPROMs lowen sent me, so I'm not 100% sure how J5 should be set. I've tried it in both the 27C256 and 27C512 positions and both produce the same results.

I'm not sure how to set the wait states for the EPROM either, but I tried setting J3/J4 for both 0 and 3 wait states and both give the same results.

J1/J2 is set for 1:1.

I did use J10 to briefly reset the RTC, which is a DS12887A recently from DigiKey. It does have the /RCLR pin installed.

The board is completely populated except for Q3, which is the 9.6 MHz crystal for the floppy controller. It's still "on the way"; DigiKey didn't have one so it's from a random eBay vendor instead. There's no floppy drive installed at the moment. There's no connector installed on CN2 yet.

The other three crystals are installed and all have insulators under them.

RAM is in IC11/IC12/IC13/IC14, and is 514400-60 supplied by lowen, installed in machined SIP sockets. I think they're installed in the right orientation; the writing on the chips faces the ECB connector and the little inset dot in the lower left corner corresponds to the cut corner on the board outline. I've visually inspected to make sure all pins are in place in the sockets, and checked all
I've attached a picture of the mostly-completed board, but that image was taken before first powerup, so the jumpers might not be what I've described above.

I also tried to measure the /CAS pulse as the documentation suggested, using my analog scope; a picture of that is attached too. Sorry for the quality; wrong time of day and not enough hands. It looks like about 20ns, though, doesn't it? Is it clean enough? Square enough? There's also a /RAS pulse that's a bit wider than the /CAS pulse; I didn't get a picture of that one.

So... any thoughts on where I should start trying to debug this? I've poked around the DRAM refresh circuitry with both the scope and a logic probe, but I don't really know what I'm looking for. There's definitely a lot of "stuff" happening; most of the pins are changing state.

Suggestions welcome!

Thanks,

Sarah
the 280 setup menu as a result. I've encountered this before with certain terminal emulation settings on ProComm. A solution or workaround would be great, since the Pocketerm is otherwise very convenient.

Hi,

i have no pocketerm but at the website you got the firmware. Sadly the pocketerm is out of production and I too would like to have a "small terminal". I'll take my Toshiba Libretto but the keyboard is very small too.

In CPU280.mac are the ASCII definitions and DEL = 7FH. With a RS232 skimmer you'll see what the pocket term sends. Otherwise in loader.280 there is the check if user jumper UJ1 is set or if the checksum changed and then -> call setup.

I took a look at http://www.brielcomputers.com/files/PTfirmware.zip and found (looking in PocketTermV.905.SPIN) that the VT100 code is Esc[valueP (Delete one character).

This are only my thoughts and I used Filelocator Pro for easy searching.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 04 Jul 2017 15:14:30 GMT

Thanks, Fritz. I was able to to hack the Propellor code to emit a 7FH and get into the setup screen successfully.

Unfortunately, I seem to have shot myself through the foot after that. I setup the CPU280 for hardware handshaking and reset it. And... It's dead. I see no memory test anymore and the third status LED stays lit. Something appears to have gone very wrong with the NVRAM setup in the Dallas clock chip. I tried installing jumper J10 (with power off), but that does not seem to work. Tillman's documentation does imply that only the 'A' version of the 1287 has that feature and I'm using an original 1287.

Does anyone know how I can recover from this?

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 04 Jul 2017 15:34:46 GMT

snhirsch_gmail.com wrote on Tue, 04 July 2017 17:14: Thanks, Fritz. I was able to to hack the Propellor code to emit a 7FH and get into the setup screen successfully.

Unfortunately, I seem to have shot myself through the foot after that. I setup the CPU280 for
hardware handshaking and reset it. And... It's dead. I see no memory test anymore and the third status LED stays lit. Something appears to have gone very wrong with the NVRAM setup in the Dallas clock chip. I tried installing jumper J10 (with power off), but that does not seem to work. Tillman's documentation does imply that only the 'A' version of the 1287 has that feature and I'm using an original 1287.

Does anyone know how I can recover from this?

So it's like my full day work installing any software on a igel 5/3 - nothings works like it should today.

Maybe a fake null modem will help.

https://www.lammertbies.nl/comm/info/RS-232_null_modem.html# loop

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 04 Jul 2017 15:40:50 GMT

Hi, Fritz.

How will a null-modem help towards clearing/resetting NVRAM? The CPU280 will not come up at all (third LED stuck on). Unless there's something I'm missing, the original DS1287 cannot be cleared easily. It's possible my current problems are unrelated to the CMOS setting (maybe the board just decided to drop dead on its own), but looks like I'll have to order a 12887A and give that a try.

UPDATE: Found a stash of DS12xxxx chips that I'd totally forgotten about! After a slight diversion with a DS12287 that caused the '280 to use some bizarre baud rate, I located another working DS1287 and am back in action. Very strange and more than a bit scary. I ordered a new DS12887A+ from Digikey so I'll have a means for recovery using the jumper if this happens again.

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 04 Jul 2017 16:33:17 GMT

Hi, Fritz.

snhirsch_gmail.com wrote on Tue, 04 July 2017 17:40

How will a null-modem help towards clearing/resetting NVRAM? The CPU280 will not come up at all (third LED stuck on). Unless there's something I'm missing, the original DS1287 cannot be cleared easily. It's possible my current problems are unrelated to the CMOS setting (maybe the
board just decided to drop dead on its own), but looks like I'll have to order a 12887A and give that a try.

###
From my old CPU280 years ago I believe I remember that the 3rd LED even stays on if the terminal wasn't connected. Can somebody test this or take a look into the source if I'm right?
###

From the doc but but my remember is left.

2. Boot loader

During these operations the three LEDs display the current status. The hardware reset enables all three LEDs. Immediately after reset the first one is turned off. The second one is turned off after successfully measuring the clock frequency, and the third one after the RAM test. If the battery in the real-time clock is empty, the second LED stays on while the third is turned off.

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 04 Jul 2017 18:07:24 GMT
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snhirsch_gmail.com wrote on Tue, 04 July 2017 17:40
Hi, Fritz.

UPDATE: Found a stash of DS12xxxx chips that I'd totally forgotten about! After a slight diversion with a DS12287 that caused the '280 to use some bizarre baud rate, I located another working DS1287 and am back in action. Very strange and more than a bit scary. I ordered a new DS12887A+ from Digikey so I'll have a means for recovery using the jumper if this happens again.

You are lucky again...

will you please disconnect your terminal cord and tell me what the CPU280 leds do after reboot?

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 04 Jul 2017 19:50:00 GMT
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Problems with your DALLAS - use your universal memory programmer
In the past I got some DS12887A+ without the pins for reset and just looked onto my memprog programmer. The memprog is a small programmer but he can be used to program the DALLAS too.

So if you have a programmer and some unusable DALLAS give them a try.

---

File Attachments
1) hc_480.jpg, downloaded 505 times
2) hc_479.jpg, downloaded 520 times

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 05 Jul 2017 01:16:34 GMT

fritzeflink wrote on Tue, 04 July 2017 11:07
You are lucky again...

will you please disconnect your terminal cord and tell me what the CPU280 leds do after reboot?

It does not need a terminal to boot. At at least, it doesn't when hardware handshake is not being used. I'm not about to do that experiment again until I have a clock / NVRAM chip I can clear with a jumper.

---

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 05 Jul 2017 01:17:50 GMT

fritzeflink wrote on Tue, 04 July 2017 12:50
Problems with your DALLAS - use your universal memory programmer

In the past I got some DS12887A+ without the pins for reset and just looked onto my memprog programmer. The memprog is a small programmer but he can be used to program the DALLAS too.

So if you have a programmer and some unusable DALLAS give them a try.

I have several programmers here and none of them can speak to a Dallas chip.
Sorry for the delay in replying; I had a wisdom tooth extracted Friday, so I took it easy over the long weekend.....

sarah wrote on Sun, 02 July 2017 21:09

Hi All,

The good news: I've got my CPU280 board put together! The bad news: it needs a little debugging... :)

...

First, great that it is together and a portion of the board is working fine (otherwise you wouldn't get any text at all). Thanks for the good writeup on your experiences with the serial ports; no, they aren't 9-pin AT standard (they are actually designed to line up with a 25-pin connector's first 10 pins according to the docs). I need to write that up better and put it on the wiki, along with a wiring diagram.....

Quote:
With all that sorted out, the board powers up, and outputs:

CPU280 Boot Loader V1.2 RBC 8-Mar-2017
http://www.retrobrewcomputers.org
based on Cold Loader Program V1.13 TR 950314
Press DEL to run SETUP.

Fatal Error: not enough RAM

:(

Additional Information

The board is drawing about 380mA.

The third LED stays lit, I assume because the RAM test doesn't pass.

Current draw is good, and yes the third LED doesn't go out because the RAM test didn't pass.

The good news is that the Z280's bus is good, the system and I/O address decode is good, the lower 16 bits of the address is properly latched, the EPROMs are good, the DS12887A is good, the clocking is good, and you have good UART and LT1134 RS-232-TTL shifters.

Now, the areas that could be bad:

1.) The RAM itself. I'll be glad to swap you four more chips. This is the easiest thing to
troubleshoot and is the most likely culprit.

2.) IC21 (GAL16V8-RAM). I tested this chip prior to shipping, but it's always possible that it could have lost some of its programming.

3.) IC22 (GAL16V8-CAS4). I tested this chip prior to shipping as well. IC21 and IC22 together produce the majority of the DRAM control.

4.) IC30 and IC4. Together these chips provide the synchronous timing chain that drives the critical DRAM timing, with the base CAS pulse width being determined by R8 and C6.

5.) R8 and C6. Your scope's trace at 50ns/div makes the CAS pulse look a tad long, but it also looks pretty smeared; what bandwidth scope is that? CAS is supposed to be about 20ns.

6.) IC19 and/or IC20. The mux is the heart of any DRAM circuit.

The first step would be to swap RAM, and I'll be glad to send you four from my working CPU280 in exchange for those four.

Quote:  
I'm not 100% sure what kind of EPROMs lowen sent me,...

I sent 27C256's that work at zero wait states.

Quote:  
I've attached a picture of the mostly-completed board, but that image was taken before first powerup, so the jumpers might not be what I've described above.

I also tried to measure the /CAS pulse as the documentation suggested, using my analog scope; a picture of that is attached too. Sorry for the quality; wrong time of day and not enough hands. It looks like about 20ns, though, doesn't it? Is it clean enough? Square enough? There's also a /RAS pulse that's a bit wider than the /CAS pulse; I didn't get a picture of that one.

So... any thoughts on where I should start trying to debug this? I've poked around the DRAM refresh circuitry with both the scope and a logic probe, but I don't really know what I'm looking for. There's definitely a lot of "stuff" happening; most of the pins are changing state.

Suggestions welcome!

The German CPU280 handbuch includes a nice set of timing diagrams. It is on my to-do list to set my CPU280 up with my Saleae logic-16 analyzer and get a fresh set of waveforms from a running CPU280. I think the German CPU280 handbuch with the timing diagrams is already linked in the thread, but if you can't find it I'll put a copy on the wiki, if it isn't already there.
snhirsch_gmail.com wrote on Tue, 04 July 2017 11:40

Hi, Fritz.

How will a null-modem help towards clearing/resetting NVRAM?

With hardware handshaking, the code will block all output, including the banner that is printed prior to the memory test. The third LED won't get cleared until the memory test is complete, but it won't even start while the UART is stalled. The CPU280 code implements straight RTS/CTS handshaking; a true null modem will cross RTS/CTS as well as RXD/TXD and DTR/DSR/DCD (DTR on each end to both DSR and DCD on the other end). Without RTS/CTS crossed, you get a stalled UART. Simply connecting RTS to CTS on the CPU280 end should unstall the UART and let output proceed, which should let you rescue your DS1287 (this is what Fritz was correctly suggesting you do with a null modem).

lowen wrote on Wed, 05 July 2017 07:31

Sorry for the delay in replying; I had a wisdom tooth extracted Friday, so I took it easy over the long weekend.....

Ouch. I hope you are feeling better now!

Quote:
Thanks for the good writeup on your experiences with the serial ports; no, they aren't 9-pin AT standard (they are actually designed to line up with a 25-pin connector's first 10 pins according to the docs).

Actually, the dual DB-9 approach as Sarah described works just fine. That's how I built my adapter, and the first port connector interfaces directly to the COM port on a PC with no fiddling.

Quote:

snhirsch_gmail.com wrote on Tue, 04 July 2017 11:40

Hi, Fritz.

How will a null-modem help towards clearing/resetting NVRAM?

With hardware handshaking, the code will block all output, including the banner that is printed prior to the memory test. The third LED won't get cleared until the memory test is complete, but it won't even start while the UART is stalled. The CPU280 code implements straight RTS/CTS handshaking; a true null modem will cross RTS/CTS as well as RXD/TXD and DTR/DSR/DCD (DTR on each end to both DSR and DCD on the other end). Without RTS/CTS crossed, you get a stalled UART. Simply connecting RTS to CTS on the CPU280 end should unstall the UART and let output proceed, which should let you rescue your DS1287 (this is what Fritz was correctly suggesting you do with a null modem).
Ah, ok. Thanks for the clarification. This experience scared the daylights out of me (thought the board had dropped dead). There really needs to be a "failsafe" jumper to force the firmware back to defaults and allow graceful recovery from such mistakes. Fritz mentioned something about "User jumper", but I am not sure what that refers to. I tried shorting the first jumper at the bottom edge of the board but that didn't accomplish anything.

I now know that (a) the Pocketerm does not support hardware handshake and (b) whatever specific signaling the CPU280 expects for hardware handshake is not compatible with ProComm Plus on a PC. The only reason I even tried handshaking is because the Pocketerm drops characters very badly at 38.4k baud.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 05 Jul 2017 15:00:20 GMT
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If there are any other Pocketerm users on this forum, here's a quick patch to make it emit a 7FH character when the DELETE key is pressed. This takes care of both standalone and keypad keys:

@@ -535,7 +535,7 @@
    word $0000   '50
    word $0000   '51
    word $0027   '52             '
-   word $0000   '53
+   word $007F   '53             Delete
    word $005B   '54             [ 
    word $003D   '55             =
    word $0000   '56
@@ -565,7 +565,7 @@
    word $0000   '6E
    word $0000   '6F
    word $CAE0   '70     Insert (0)
-   word $C9EA   '71 Delete (.)
+   word $7FEA   '71 Delete (.)
    word $C3E2   '72     Down (2)
    word $00E5   '73     (5)
    word $C1E6   '74     Right (6)
snhirsch_gmail.com wrote on Tue, 04 July 2017
There really needs to be a "failsafe" jumper to force the firmware back to defaults and allow graceful recovery from such mistakes. Fritz mentioned something about "User jumper", but I am not sure what that refers to. I tried shorting the first jumper at the bottom edge of the board but that didn't accomplish anything.

What I have written: Otherwise in loader.280 there is the check if user jumper UJ1 is set or if the checksum changed and then -> call setup.

From the loader.280

; Pruefen, ob waehrend RAM-Test eine Taste betaetigt wurde.    ## Test if during RAM-Check a key is pressed
; Bei DEL (oder geaenderter Checksum): Setup-Menue aufrufen.    ## if DEL or changed checksum call setup-menue

iopageboardp
ina,(gpi); User-Jumper lesen  # read user jumper
bitb$uj1,a

#####################
  jpz, boots1; UJ1 gesteckt: ins Setup gehen (Defaults!)  ## if user jumper 1 is set goto setup
#####################
ldhl,(ChkSum)
inl,(CheckLo)
cpl; Low-Bytes vergleichen  # compare low-bytes
jnz.BootS; verschieden: Setup!  # different -> setup
ina,(CheckHi)
cph; High-Bytes vergleichen # compare high-bytes
jnz.BootS; verschieden: Setup!  # different -> setup
inchar; inzwischen Taste betaetigt?  # was a normal key pressed?
jrc.Boot; nein: normal booten     # no: normal boot

Jumper:
J7 to J9 are user setable jumpers read by gpi
J10 internal reset of RTC (use only when power off)

From the manual:
J6-J9 Header 2x4, FDC-Precomp and User-Jumpers
----

so Jumper 7,8,9, are User-Jumpers and J7 must be the first user-jumper.
and if J7 is set the system should restore the default setup and boot to the configure menu. You must after that replace the J7
The time we got the Reh280 we had contact to each other and little problems were solved by phone calls or visits. The manual doesn't include every little information we had worked out and even it maybe that I'm wrong as I have no REH280 available to test.

File Attachments
1)  hc_2199.jpg, downloaded 408 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 05 Jul 2017 18:28:56 GMT
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fritzeflink wrote on Wed, 05 July 2017 13:00
snhirsch_gmail.com wrote on Tue, 04 July 2017
There really needs to be a "failsafe" jumper to force the firmware back to defaults...

What I have written: Otherwise in loader.280 there is the check if user jumper UJ1 is set or if the checksum changed and then -> call setup...

Useful information; thanks Fritz! It looks like J7 is connected to data bus bit 0, and the file 'cpu280.mac' defines b$uj1 as being bit 0, so it does indeed look like the code will do this with J7 closed at boot.

EDIT: Just got an email from PCBcart that the IDE boards have been delayed a few days; they are slated to ship July 8 at this point.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 05 Jul 2017 19:06:10 GMT
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From: Historie translated with google as I'm in a hurry

Was: searching for Jumper 7 to initialize setup

History file for the bootloader to the CPU280
------------------------------------------
(First release V1.0 on 17.11.90)

V1.01 from 16.12.90:
- Change: between OUT / JP now IN or 4xNOP instead of NOP due Latest Errata Sheet.
- Change: Status detection 'Startup' via J7 instead of RTC reset.
- Change: save new checksum after exiting the setup.
- [Change: Default diskette format 'Reh 3.5 "HD" (1760k), Buffer increases up to 512 directory entries, 880 blocks.
- Change: DMA in single byte mode instead of burst mode.

V1.02 of 19.01.91:
- Expansion: The loader also now supports the new track translation As well as the explicit header numbers from the parameter block.
- Extension: The RAM disks are not generally deleted, but rather The possibly already existing label is examined. If the label is intact Nothing is deleted, with up to 5 faulty bytes is asked whether And only 5 errors are mercilessly cleansed.
- Extension: The data required for the system start will be for the most part Has already been created in the loader and sent in a global parameter block to the BOOT routine of the BIOS.
- Change: In addition to J7, also for RTC reset 'Startup'.
- Change: Date of RAM disk DirLabels generally version date loader.

14.06.92 (still V1.02): added english messages (conditional assembly).

V1.02a of 27 June 1994:
- Changed Initialization of MDrive Directory to 32k (1024 Entries).

V1.13 of 15 February 1995:
- Completely rearranged loader structure to make use of the modular Device driver sources of the CP / M-3 system BIOS. Most of the BIOS Modules are now used within the loader, too. The version number of The loader is the same as the system release With the matching BIOS modules.
- Added support for booting the system file CPM3.SYS from every Existent drive, including all pseudo-disks. Expanded setup to Allow for appropriate selection of the boot drive.
- During boot, the RAM disks are now initialized with 1024 directory Entries each.
- In the setup menu, the I / O device names are now listed to make Selectioniting. However, it has been noted that the CPM3.SYS file To be loaded might contain other definitions! The device names and Their numbering is done from the LOADER portion within the EPROM only.

V1.13 of 14 March 1995:
- Fixed a bug in the auto-configuration code for MDrive directory size. (The bug only with more than 1 MB of RAM.
Subject: Re: Interested in a Z280 SBC
Posted by sarah on Wed, 05 Jul 2017 19:19:51 GMT
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lowen wrote on Wed, 05 July 2017 07:31:Sorry for the delay in replying; I had a wisdom tooth extracted Friday, so I took it easy over the long weekend.....
Ow. Sorry to hear that. I’ve been to the dentist six or seven times this year, so I definitely sympathize. :-(

lowen wrote:First, great that it is together and a portion of the board is working fine (otherwise you wouldn’t get any text at all). Thanks for the good writeup on your experiences with the serial ports; no, they aren’t 9-pin AT standard (they are actually designed to line up with a 25-pin connector’s first 10 pins according to the docs). I need to write that up better and put it on the wiki, along with a wiring diagram.....
Oh, is that what the docs were getting at? I found the wording about the 25 pin connectors a little perplexing.

lowen wrote:Current draw is good, and yes the third LED doesn’t go out because the RAM test didn’t pass.

The good news is that the Z280’s bus is good, the system and I/O address decode is good, the lower 16 bits of the address is properly latched, the EPROMs are good, the DS12887A is good, the clocking is good, and you have good UART and LT1134 RS-232-TTL shifters.

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3.) IC22 (GAL16V8-CAS4). I tested this chip prior to shipping as well. IC21 and IC22 together produce the majority of the DRAM control.

4.) IC30 and IC4. Together these chips provide the synchronous timing chain that drives the critical DRAM timing, with the base CAS pulse width being determined by R8 and C6.
5.) R8 and C6. Your scope's trace at 50ns/div makes the CAS pulse look a tad long, but it also looks pretty smeared; what bandwidth scope is that? CAS is supposed to be about 20ns.

6.) IC19 and/or IC20. The mux is the heart of any DRAM circuit.

The first step would be to swap RAM, and I'll be glad to send you four from my working CPU280 in exchange for those four.

I'll take you up on that RAM swap offer if necessary, but let me poke around a little bit first. I'm hoping it's going to turn out to be something relatively simple, like a bad joint/bad socket/etc.

The bandwidth on the scope is advertised as 100MHz, but I rarely use it for high speeds so I can't really say how good it is for high speed work. I can probably get a better image of that pulse with a little more attention to detail. Sadly I don't have a logic analyzer available at the moment. Hmm, come to think of it, my first try at capturing that pulse was much more square than the current image; but after going off to find the iPad to take a picture, and some more random poking around looking at other signals, by the time I was ready to take the picture and got back to the CAS pulse, that's what it looked like. More likely poor technique on my part than any sort of electrical issue.

How critical is the over/under on the width of that pulse? The data sheet for the RAM said that CAS needed to be something like 13ns-10,000ns... but I have no idea how the width of the CAS pulse will affect the rest of the circuit. I thought about trying to replace my 120pf C6 with 100pf, or maybe 82pf, just to see what might happen, but figured I should get some feedback and do some more careful checking before I start ripping apart the board...

I'll see if I can find the German version of the docs with the timing diagram. A copy on the wiki would also be nice at some point.

I'll fiddle with the board some more when I get a chance and let you know what I discover.

Thanks for the help!

Sarah
Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 05 Jul 2017 19:47:54 GMT
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Diagramm added from the german manual

You only need to load the added picture I believe.

This please added:
Maybe lamar can add (and rename) this picture to the wiki so we have not to search.

File Attachments
1) hc_484.jpg, downloaded 96 times

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Thu, 06 Jul 2017 10:57:12 GMT
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I made a little sheet for the jumper configuration please download the
Z280_Jumper_Information.zip

File Attachments
1) preview.jpg, downloaded 1032 times
2) Z280_Jumper_Information.zip, downloaded 91 times

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Thu, 06 Jul 2017 13:14:57 GMT
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Thanks, Fritz. That's extremely helpful.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Mon, 10 Jul 2017 14:43:04 GMT
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Does anyone have a theory for why my CPU280 believes disk volumes on an HxC diskette emulator are read-only? This seems to have come out of nowhere. I have CP/M A: and C: mapped to the A & B drives on the emulator and CP/M B: mapped to a physical 3.5" HD floppy. I can write to the floppy without problems but not to either of the HxC volumes. Definitely was
snhirsch_gmail.com wrote on Mon, 10 July 2017 10:43

Does anyone have a theory for why my CPU280 believes disk volumes on an HxC diskette emulator are read-only? This seems to have come out of nowhere. I have CP/M A: and C: mapped to the A & B drives on the emulator and CP/M B: mapped to a physical 3.5" HD floppy. I can write to the floppy without problems but not to either of the HxC volumes. Definitely was working a few weeks ago.

Ok, obvious question, and not meant to be insulting: is the write protect slider engaged on the SD card? I have had those fail write-protected before. I'm running just about the same configuration as you are, but I haven't seen that happen to mine.

On another note, the first batch of REH-ECB-IDE boards are here, and I don't see anything obviously wrong with them. I will definitely be ordering a second batch, once I get enough return on the first batch to pay for it. Note that the REDH-ECB-IDE can be built without the Centronics parallel printer interface if you're so inclined.

Heh, no offense taken. If I had a dime for every time I missed something that essential I'd be a wealthy man! But, in this case that does not seem to be the issue. It's probably worth my swapping the MicroSD holder out for another unit just in case the protect switch has gone flaky.

UPDATE: The good news is that I had the protect switch in the correct position. The bad news is that it had apparently failed per your comment! I subbed in another MicroSD holder and all is well. I think these things are built as cheaply as possible.

RE: IDE board. All the parts have rolled in and I'm anxiously awaiting a PCB so I can build it up.

I can borrow a Euro backplane from my YASBEC system but really should pickup another unit. Does anyone have a source / part number for a suitable backplane assembly?
Will just released a nice 3 slot ecb backplane a couple of months ago. It’s listed on the wiki.

If you’re looking for a full up backplane in a card cage, then I can’t help you. Those always seemed way more expensive than they should be. Or I really should say: way more expensive than I wanted to pay!

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Mon, 10 Jul 2017 19:59:37 GMT

mikemac wrote on Mon, 10 July 2017 11:29
Will just released a nice 3 slot ecb backplane a couple of months ago. It’s listed on the wiki.

If you’re looking for a full up backplane in a card cage, then I can’t help you. Those always seemed way more expensive than they should be. Or I really should say: way more expensive than I wanted to pay!

A 3 slot free-standing backplane is fine. But, for some reason I’m not seeing that on the Wiki page. Do you have a link?

Subject: Re: Interested in a Z280 SBC
Posted by mikemac on Mon, 10 Jul 2017 23:44:54 GMT

Here:

And 4 are listed as available on the inventory page, $5 each for the PCBs:
https://www.retrobrewcomputers.org/doku.php?id=boardinventory#eurocard_bus_ecb_boards

Subject: Re: Interested in a Z280 SBC
Posted by sarah on Thu, 13 Jul 2017 03:02:15 GMT

I’m pleased to report that my Z280 board now powers up properly and gets all the way through the RAM test!

My first attempt to find the problem was to pull all the chips, clean the board really well (to get all the "no clean flux" crud off), and inspect it very very carefully with a big magnifier. Then I used the schematic and a continuity checker to test all the connections in the DRAM circuitry. I didn't find any unexpected open circuits. Then I put the whole thing together again very, very carefully. And
when I powered it up: same problem as before.

Okay, so probably not a PCB issue, probably not a solder joint problem. Maybe a bad logic chip? And... then I ran out of weekend, and started to think about what I might need for the following weekend's debugging session.

I vaguely recalled that one of the logic chips had come out of my "junk pile", but didn't remember which one it was. I decided to order a couple extra spares of each of the logic chips in the DRAM area just in case I needed to try swapping them, and because they're easier to get than the GALs or the DRAM. So I hit Digi-Key and started searching.

When I searched for the 74ACT158s... the multiplexer chips for the DRAM refresh... hmm, that's odd, they don't stock that one as DIP. I guess I must have ordered the 74AS158 instead? ...no, minimum quantity 250 for that one. That's weird. What's in my board? ... IC19 and IC20 are both... 74HCT158!?!? Hmm, maybe HCT isn't fast enough here? I checked the data sheets... yeah, that seems really plausible, the HCT part is much slower. How did the 74HCT158's end up in there?!?!?

What I think happened was that the first time I was searching for the part, I couldn't find it, so I added the HCT version to my shopping cart, meaning to go back later and sort it out... and then promptly forgot about it. And then as I was putting the board together I just assumed I had already sorted all that out ahead of time, and just plugged the '158s in the right places, not checking for the appropriate logic families or considering any speed or timing issues.

Oops. It probably didn't help that I often wind up shopping for parts at 3am when I can't sleep.

This time around, I looked at the situation in a little more detail, checked the data sheets, and ordered a couple candidates that looked like plausible substitutes for the 74ACT158, one of which was the 74AS258.

The package arrived today, and this evening I pulled out the 74HCT158's and replaced them with 74AS258s... and the board came up on the first try, and passes the RAM test.

Sadly, all is not yet perfect in my Z280 world. While the serial output seems perfect, the serial input seems to be dropping 90% to 99% of the characters I type... which makes it quite challenging to get through the setup program! A quick check with a logic probe seems to suggest that the data isn't always getting from the LT1134 to the CPU; I'm not consistently seeing pulses when I type a character in the terminal program. I am seeing blinking lights on the USB to serial adapter, though, which suggests to me that the character is getting transmitted by the adapter but not being received at the CPU. I did try swapping USB to serial adapters, which didn't help. Hopefully, the serial cable I made is just a little flaky.

Once the serial port starts behaving itself, the next step will be to figure out how to wire up the floppy connector, I guess? One step at a time.

sarah wrote on Sun, 02 July 2017 21:09
Hi All,
The good news: I've got my CPU280 board put together! The bad news: it needs a little debugging...
lowen wrote on Wed, 05 July 2017 07:316. IC19 and/or IC20. The mux is the heart of any DRAM circuit.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Thu, 13 Jul 2017 20:42:40 GMT

Glad you got things going, Sarah! 74AS158s are listed as an alternative in Tillman's hardware documentation, and that's what I used in my board. Interestingly, I also had problems with the memory subsystem. In my case, moving to slower GALs (15ns - were originally 7.5) did the trick. I'm not a logic design expert, but my sense is this part of the circuit has a race condition that's triggered with certain component combinations.

Question for anyone on the forum using 7.5 ns GALs successfully: Does your board have ACT158 or AS158 parts?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 13 Jul 2017 20:56:23 GMT

My board has ACT158's in it, but it is one of the original run built in the early 90's. Glad the RAM isn't the problem, Sarah!

Nice to know that 258's can be subbed-in. I need to investigate that a bit better.

Let us know how the troubleshooting of the serial port goes.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Fri, 14 Jul 2017 10:15:47 GMT

Quote: Nice to know that 258's can be subbed-in. I need to investigate that a bit better. The main difference between '158 and '258 is that the outputs of the '258 go into high-Z state when pin 15 is high, while for the '158 the outputs are forced to high level. That's not a problem for the CPU280, since pin 15 is always grounded. Timing parameters are similar, if not identical.
snhirsch_gmail.com wrote on Thu, 13 July 2017 13:42: Question for anyone on the forum using 7.5 ns GALs successfully: Does your board have ACT158 or AS158 parts?

I am using 7.5ns GALs (Atmel) along with 74AS158's very successfully.

-Wayne

snhirsch_gmail.com wrote on Fri, 14 July 2017 16:48: Thanks for the data point, Wayne. While I'm happy that my board is functional I hate a mystery. Would be great to understand why the fast GALs proved so problematic in my case.

Yeah, I am curious too...

-Wayne
Update for 7/29/2017. All's quiet on the Western front.... (sorry, I couldn't resist).

I've been researching more (or maybe I should write 'moore') of the backstory on hobbyist-buildable or usable Z280 designs, and have come across a few real gems in the Google groups archives of comp.os.cpm, written by a man named Scott Moore. Scott Moore actually worked at Zilog on the Z280, and is as close to an expert on the chip that you will find. I have reached out to him to see if he's willing, after all these years, to write up some moore about the Z280 and his own experiences with the bugs of the chip. In the meantime, here are some subjects to put into your favorite comp.os.cpm archive search engine (Google groups or whatever) where Scott weighed in with very interesting information:

1.) March 7, 2001, subject line "ay REAL Altair users out there?" My favorite quote from one of Scott's posts: "You have of course asked for a story, which is a very dangerous thing to do when face to face with an old timer." Love it.

2.) November 11, 2006, subject line "Of interest: Project to put CP/M / Altair system on a single FPGA." This sounds remarkably like the socz80, but an Altair instead. Many good tidbits in that thread.

3.) December 10, 1987, subject line "CP/M Plus, Banked ZRDOS, Z280." We see a reference to Zedux, where much development on Z280 things was done by none other than Scott Moore.

If Scott replies to me and allows me to repost anything, I will do so. I want to hear (or read) what he has to say. I hope all of you reading the thread find this information useful and interesting.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 29 Jul 2017 16:47:47 GMT

I always wondered what happened to Zedux. IIRC, they put out advertising referring to a family of OS components and development tools targeted at Z280, but disappeared off the face of the earth without shipping anything. If Mr. Moore has any of this stuff still in his collection it would be great to have.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 29 Jul 2017 18:17:15 GMT

snhirsch_gmail.com wrote on Sat, 29 July 2017 12:47I always wondered what happened to Zedux. IIRC, they put out advertising referring to a family of OS components and development tools targeted at Z280, but disappeared off the face of the earth without shipping anything. If Mr. Moore has any of this stuff still in his collection it would be great to have.

I got a great reply, but I don't yet have permission to re-post anything. Suffice to say that the bugs in the chips along with some difficult timing issues prevented the product from seeing the light of day.

Likewise the TRX-280, I'm sure. The big bug that kept a
Z80-in-an-otherwise-unmodified-Z80-system from working is what has been called the OUTJMP bug; Tim Olmstead wrote on comp.os.cpm the following: Quote: After an I/O instruction, if there was a branch instruction within three instructions (the time it took to flush the pipeline) then the address that made it to the package pins would actually be the I/O address, not the instruction address. Naturally that lead to a very dramatic crash. They never did fix that one, but it was pretty easy to avoid if you watched that. (From the March 2001 comp.os.cpm thread referenced above)

Of course, any Z80 code wouldn’t be expecting this to happen, and so an OUT instruction of any kind with any branching instruction following would reliably crash the whole system. Tilmann’s BIOS works around this.

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Sat, 29 Jul 2017 18:27:06 GMT
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It should be possible to write software to automatically scan for problematic sequences and patch in a JP to a safely reformulated stub that jumps back when done.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 29 Jul 2017 18:44:22 GMT
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Tilmann references an ’OUTJMP’ program in his software manual..... but I have not located this program. It’s certainly not in any of the files I received from Tilmann, nor do I find it on Fritz’ oldcomputers.dyndns.org archive. Sounds like an opportunity.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 31 Jul 2017 07:19:51 GMT
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Ilowen wrote on Sat, 29 July 2017 20:44 Tilmann references an ’OUTJMP’ program in his software manual..... but I have not located this program. It’s certainly not in any of the files I received from Tilmann, nor do I find it on Fritz’ oldcomputers.dyndns.org archive. Sounds like an opportunity.

I added the OUTJMP.ZIP here

Greetings from Tilmann, I contacted him and he send me the program. He will be on holiday for some weeks.

Here I made some translation but didn’t add this on oldcomputers
program Out_Jump_Check;

(* 300391 Tilmann Reh *)

const signon = ^m^j'OUT/JMP-Tester V1.0  TR 300391'^m^j;


Translated by google and fritz (maybe not always correct).

This program looks for command sequences in CP/M programs (.COM) From an output command and a 'Program Flow Change' command (eg CALL / JMP).

According to Errata Sheet to the Z280 errors can occur if after a 'External write with wait states', a command executing the command is executed Pipeline of the processor. In the case of the CPU280 the former is only at I/O-Write (i.e., OUT). Except for CALL and JMP is the pipeline also deleted with PCACHE and LDCTL, whereby LDCTL is privileged and so it does not have to be checked here (comes only in BIOS). Return-Commands are not critical in the case of an external stack (ie, CPU280 in general).

The OUTJMP program scans files for the occurrence of such 'forbidden' Sequences and displays these as well as their address. To be investigated only programs with direct I / O control, ie i.A. programming software for EPROMs / PALs and the like as well as communication programs. Not all
Displayed, the corresponding commands must actually be (For example, data fields may have been misinterpreted).

If sequences are found, first check whether they are correct. Were interpreted. If this is the case, the program should be so Be patched between the two commands 'Normal' command, preferably an IN command. In most cases this is only done by outsourcing the sequence into a mini-Subroutine.

(*)

(* Tabellen aller denkbaren OUT-Befehle (ausser D3xx) *)
(* Table of all possible OUT-Commands (without D3xx) *)

type bs = set of byte;
const out_ec : bs = [$41,$49,$51,$59,$61,$69,$79,$83,
$8B,$93,$9B,$A3,$AB,$B3,$BB,$BF];
out_dd : bs = [$49,$51,$59,$61,$69];
out_dd_n : bs = [$41,$79];
out_fd : bs = [$61,$69];
out_fd_n : bs = [$41,$49,$51,$59];

(* Tabellen aller denkbaren CALL/JUMP-Befehle (ausser E9) *)
(* Table of all possible CALL/JUMP-commands (without E9) *)
calljump : bs = [$CD,$C4,$CC,$D4,$DC,$E4,$EC,$F4,$FC,
$C3,$C2,$CA,$DA,$E2,$EA,$F2,$FA];
cj_dd : bs = [$CD,$C4,$CC,$D4,$DC,$E4,$EC,$F4,$FC,
$C2,$CA,$DA,$E2,$EA,$F2,$FA];
jumrel : bs = [$10,$18,$20,$28,$30,$38];
jafjar : bs = [$20,$28];

(* vorbelegte Variablen *)
(* defined variables *)

    start : integer = $100; (* Startadresse *)
    ende : integer = 1023; (* letzes zu untersuchendes Byte *)

(* Variablen des Programms *)
(* program variables *)

var filnam : string[20];
    f : file;
    buf : array[0..1151] of byte; (* 9 records *)
    i,j,secs : integer;

(* Ausgabe von Bytes und Worten hexadezimal *)
(* output of Bytes and words in hex *)
procedure hex_byte(b:byte);
const nyb : array[0..15] of char = '0123456789ABCDEF';
begin
  write(nyb[b shr 4],nyb[b and 15]);
end;

procedure hex_word(w:integer);
begin hex_byte(hi(w)); hex_byte(lo(w)); end;

(* ALARM: Ausgabe von Adresse und Objektcode der gefundenen Sequenz *)
(* ALARM: Output from address and object code found sequence *)

procedure alarm(laenge:integer);
var x : integer;
begin
  if eof(f) and (pred(j+laenge)>ende) then
    if j<=ende then write('begonnene ') else exit;
  write('Sequenz bei '); hex_word(i+start);
  write(' :');
  for x:=i to pred(j) do begin write(' '); hex_byte(buf[x]); end;
  write(' -');
  for x:=j to pred(j+laenge) do begin write(' '); hex_byte(buf[x]); end;
  writeln;
end;

(*--------- MAIN----------*)
begin
  writeln(signon);
  if paramcount=0 then begin
    writeln('Aufruf: OUTJMP filename (Default Extension .COM)');
    halt; end;
  filnam:=paramstr(1);
  i:=pos('.',filnam); if i=0 then filnam:=filnam+'.COM';
  assign(f,filnam);
  {$I-} reset(f); {$I+}
  if ioresult<>0 then begin
    writeln('Datei ',filnam,' kann nicht geöffnet werden!');
    halt; end;
  blockread(f,buf,9,secs);
  if secs<8 then ende:=pred(secs shl 7);
  repeat
    for i:=0 to ende do begin
      j:=-1;
      if buf[i]=$D3 then j:=i+2 else
if (buf[i]=$ED) and (buf[succ(i)] in out_ed) then j:=i+2 else
if (buf[i]=$DD) and (buf[succ(i)]=$ED) then begin
  if (buf[i+2] in out_dd) then j:=i+3 else
  if (buf[i+2] in out_dd_n) then j:=i+5 end else
if (buf[i]=$FD) and (buf[succ(i)]=$ED) then begin
  if (buf[i+2] in out_fd) then j:=i+3 else
  if (buf[i+2] in out_fd_n) then j:=i+5 end;
if j>=0 then begin
  if buf[j] in calljump then alarm(3) else
  if buf[j] in jumprel then alarm(2) else
  if buf[j]=$E9 then alarm(1) else
  if (buf[j] and $DF=$DD) and (buf[succ(j)]=$E9) then alarm(2) else
  if (buf[j]=$FD) and (buf[succ(j)] in calljump) then alarm(4) else
  if (buf[j]=$DD) then begin
    if buf[succ(j)] in cj_dd then alarm(2) else
    if buf[succ(j)] in jafjar then alarm(3) end else
  if (buf[j]=$ED) and (buf[succ(j)]=$65) then alarm(2);
end;
move(buf[1024],buf[0],128);
blockread(f,buf[128],8,secs);
if secs<7 then ende:=127+(secs shl 7) else ende:=1023;
start:=start+1024;
until ende<128;
end.

File Attachments
1) OUTJMP.zip, downloaded 72 times

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Mon, 31 Jul 2017 13:53:08 GMT
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Automatic scan and patch isn't as easy as it sounds because some programs use code as data,
or checksum themselves, or hardcode where there is space.

For a Z280 however you also don't need to do it.

Firstly no app on a processor with proper security and MMU model should be doing I/O, and
secondly you can set the MMU and permissions to prevent this outside of CP/M itself, so any OUT
instruction will trap, which in itself will break the pipeline, emulate the out (if allowed) in the CP/M
code, and then jp to the instruction afterwards.

So IMHO you don't need to patch anything if you use the CPU features properly

Alan
Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 31 Jul 2017 14:15:19 GMT

I believe that the OUTJMP.COM has to be used for existed .com files which hung the CPU280. I added the OUTJMP for completing the sources and don't believe that we will need it but it's an interesting discussion.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Tue, 29 Aug 2017 10:26:10 GMT

Just finished my board last weekend (well, almost: still is missing the 9.6MHz xtal which should arrive mid-September). Since the crystal is not needed except apparently for some 5.25" drives, I decided to do a quick test and powered up the board. It worked immediately, no RAM or communication issues!

Attached a 3.5" drive with a straight-through cable (selected by DS1, thus B:), and it worked too after booting from ROM:

I used the CPU280_144.img posted here some time ago and works fine, although is missing most of CP/M 3 utilities like STAT and SHOW.

OTOH, the image posted here seems to be corrupted, as some (most?) programs crash (e.g. SD.COM, STAT.COM). A dump of SD.COM reveals part of a text file instead of binary code. Format mismatch?

File Attachments
1) CPU280_disk_access.jpg, downloaded 641 times
2) CPU280_initial_boot.jpg, downloaded 629 times

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Tue, 29 Aug 2017 11:19:58 GMT

Hi, nice that your CPU280 runs well and YES - you got the files from my old bootfloppy where the full system stays on a static ramdrive and even on a 210MB harddiskdrive. The bootdisk has tools for Z3PLUS like ALIAS. ARUNZ, DEFAULT... and most DRI CP/M+ tools
where on the static ramdrive.

As I have no running CPU280 at the moment you should use the well made system generating tools and source from WWarthen and you can even download them zipped.

---

Subject: Re: Interested in a Z280 SBC  
Posted by **lowen** on Tue, 29 Aug 2017 13:56:27 GMT

hperaza wrote on Tue, 29 August 2017 06:26: Just finished my board last weekend (well, almost: still is missing the 9.6MHz xtal which should arrive mid-September). Since the crystal is not needed except apparently for some 5.25" drives, I decided to do a quick test and powered up the board. It worked immediately, no RAM or communication issues!...

Excellent! Another running CPU280.

Fritz' advice about using wwarthen's images and tools is sound, and I again thank Wayne for putting that together, and Fritz for holding on to all the files for all these years.

Glad it's working for you!

---

Subject: Re: Interested in a Z280 SBC  
Posted by **Wayne W** on Tue, 29 Aug 2017 18:13:29 GMT

hperaza wrote on Tue, 29 August 2017 06:26: Just finished my board last weekend (well, almost: still is missing the 9.6MHz xtal which should arrive mid-September). Since the crystal is not needed except apparently for some 5.25" drives, I decided to do a quick test and powered up the board. It worked immediately, no RAM or communication issues!...

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---

Subject: Re: Interested in a Z280 SBC  
Posted by **hperaza** on Thu, 31 Aug 2017 08:27:17 GMT

hperaza wrote on Tue, 29 August 2017 06:26: Just finished my board last weekend (well, almost: still is missing the 9.6MHz xtal which should arrive mid-September). Since the crystal is not needed except apparently for some 5.25" drives, I decided to do a quick test and powered up the board. It worked immediately, no RAM or communication issues!...

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Subject: Re: Interested in a Z280 SBC  
Posted by **Wayne W** on Tue, 29 Aug 2017 18:13:29 GMT

hperaza wrote on Tue, 29 August 2017 06:26: Just finished my board last weekend (well, almost: still is missing the 9.6MHz xtal which should arrive mid-September). Since the crystal is not needed except apparently for some 5.25" drives, I decided to do a quick test and powered up the board. It worked immediately, no RAM or communication issues!...

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Glad it's working for you!

---
Thanks. Downloaded the disk images, tried the CPM3 one and is working OK, only the FDC access seems very slow. Anybody else got the same feeling? Even my old P112 when clocked a half speed (8 MHz) copies files faster. Disks are formatted with 2:1 interleave, formatting the floppy with the P112 makes no difference.

hperaza wrote on Thu, 31 August 2017 10:27

As I remember the system makes a read after write so it may be slower compared to other systems. As I mostly used a static ramdisk and a harddisk I can't remember slow floppy speed compared with other systems.

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 31 Aug 2017 18:44:28 GMT

I kind of felt the same way, so you are not alone. Fritz is probably right about the reason -- I have not personally looked at that part of the code at all and have not modified it's behavior. I would just add that Tilmann considered the preferred format to be a 1024 byte sector format. I have tried that and feel like it is much faster. Using 1024 byte sectors is problematic for making disk images on a PC, so that is why the disk images you see on GitHub are all in standard IBM 1.44MB format which is 512 byte sectors.

You could easily copy the files from the standard image to the RAM disk, then insert a new floppy disk, format at 1024 byte sectors, and copy the files back to that.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 31 Aug 2017 20:41:03 GMT
hperaza wrote on Thu, 31 August 2017 04:27 Thanks. Downloaded the disk images, tried the CPM3 one and it is working OK, only the FDC access seems very slow. Anybody else got the same feeling? Even my old P112 when clocked a half speed (8 MHz) copies files faster. Disks are formatted with 2:1 interleave, formatting it with the P112 makes no difference.

It is excellent that you have it all working. Yes, the disk I/O is a bit slow; Helmut Jungkunz wrote about it in this article on ZNode51, quote:

Quote:
At first, I was a bit disappointed about the relatively slow disk performance, there are faster BIOSes, yes, but then I agreed to Tilmann's arguments of absolute data integrity, which resulted in a double verify. After switching off the copy verifies in ZFILER and other copy programs, I found the speed to be equivalent to disk I/O on my 386SX.

So, yes, the disk I/O relatively slow speed is a known thing. The hard disk interface is much faster.

Part of the issue with writes being slow is a Z280 bug that causes weird hangs on DMA output; while there is a workaround implemented in the BIOS code, a read-after-write is still done. This is definitely more efficient at 1K sector sizes, but, as Wayne mentions, that makes it more difficult for a PC to read and write the disks.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Fri, 01 Sep 2017 10:05:45 GMT

Ilowen wrote on Thu, 31 August 2017 13:41 Part of the issue with writes being slow is a Z280 bug that causes weird hangs on DMA output; while there is a workaround implemented in the BIOS code, a read-after-write is still done. This is definitely more efficient at 1K sector sizes, but, as Wayne mentions, that makes it more difficult for a PC to read and write the disks. Just looked at the code, and indeed there is a 'VerTry' equate in diskio.280 that controls the number of verify-after-write operations, and which is set by default to 1. That probably made more sense back in time when floppies were not known for being reliable; they got much better after the introduction of the 3.5" disks with their hard shell and sliding door mechanism that protected the magnetic surface against bend damage, fingerprints and dust.

Note that the verify-after-read has nothing to do with the Z280 DMA bug, as there is a separate check for that. And, if I understand well the code, once the bug happens then the workaround is always applied; the 'cure' consisting of writing 4 null words to the non-existing I/O address FFxxE8. With such a short code, I wonder if further write operations will be slowed down at all.

I will change my copy of the BIOS and test again the performance. Perhaps it will make sense to release the standard distribution with verify-after-read disabled? After all, PIP has already a switch to force verify-on-copy.
hperaza wrote on Fri, 01 September 2017 06:05
Just looked at the code, and indeed there is a 'VerTry' equate in diskio.280 that controls the number of verify-after-write operations, and which is set by default to 1. That probably made more sense back in time when floppies were not known for being reliable; they got much better after the introduction of the 3.5" disks with their hard shell and sliding door mechanism that protected the magnetic surface against bend damage, fingerprints and dust.

A good analysis overall, but I will mildly disagree with the assertion that 3.5 HD media is more reliable than older media; I typically have more trouble reading old 3.5 HD disks than I do reading some really old 5.25 DD disks, and 8-inch disks have the best reliability record of all.

But I'm using an HxC emulator anyway these days.

Quote:
Note that the verify-after-read has nothing to do with the Z280 DMA bug, as there is a separate check for that. And, if I understand well the code, once the bug happens then the workaround is always applied; the 'cure' consisting of writing 4 null words to the non-existing I/O address FFxxE8. With such a short code, I wonder if further write operations will be slowed down at all.

Perhaps I was mistaken as to the cause of the need to verify after write. It seemed reasonable to me that if the DMA error interfered more with HD writes than with other things that such an error could be cause to verify those writes. Realize also that up until the Z280 was discontinued this BIOS was under development; if I were the person developing such a BIOS with a CPU that was known buggy I probably would have turned verify on by default too. It would be nice if some of these options could be rolled into a configuration setting or could be jumper-selectable; just some code for someone to write.

Quote: I will change my copy of the BIOS and test again the performance. Perhaps it will make sense to release the standard distribution with verify-after-read disabled? After all, PIP has already a switch to force verify-on-copy.

I’ll have to think about whether I want to distribute EPROMs with verify turned off. I for one am more concerned about data integrity than performance, but I respect the fact that others may have different priorities. You are of course free to rebuild with any options you want. Wayne is of course free to distribute the code from github with the options enabled that he wants, too.

How does the rest of the group who are running CPU280’s feel about this?
I'll have to think about whether I want to distribute EPROMs with verify turned off. I for one am more concerned about data integrity than performance, but I respect the fact that others may have different priorities. You are of course free to rebuild with any options you want. Wayne is of course free to distribute the code from github with the options enabled that he wants, too.

How does the rest of the group who are running CPU280's feel about this?

I don't have a strong opinion, but will just note that the GitHub repository includes all of the source and tools needed to easily build a custom ROM image. Most builders are likely to have their own goals for the ideal system, so it is hard to create a single image to do that. Instead, the goal has been to make customization very easy.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Mon, 04 Sep 2017 07:45:15 GMT

lowen wrote on Fri, 01 September 2017 05:33A good analysis overall, but I will mildly disagree with the assertion that 3.5 HD media is more reliable than older media; I typically have more trouble reading old 3.5 HD disks than I do reading some really old 5.25 DD disks, and 8-inch disks have the best reliability record of all.
Interesting... Not a single of my 5.25" disks survived to this day, and the 360K SD were the ones to go bad first. Of the 3.5" disks, about 80% survive and are still readable. I suspect in my case environmental conditions played a role (I used to live next to the sea where moisture/corrosion was an issue for both disk and drives).

Quote: Perhaps I was mistaken as to the cause of the need to verify after write. It seemed reasonable to me that if the DMA error interfered more with HD writes than with other things that such an error could be cause to verify those writes.
By looking at the code, the verify-after-write seems to be just a paranoia check for floppies. The Z280 DMA bug can be reliably detected by a status bit of the FDC controller, it affects equally reads and writes and the operation is always retried when the bug is triggered, independently of the verify-after-write setting. The hard disk (GIDE) code, for example, also uses the DMA and no verify-after-write is ever made, and not even provided for in the code as IDE transfers are not time-critical (the DMA bug is not about data corruption).

Quote: It would be nice if some of these options could be rolled into a configuration setting or could be jumper-selectable; just some code for someone to write. That would be nice indeed, and not that difficult to implement (at least via jumper). That would be a relief for those users who do not have an UV eraser and/or an EPROM programmer.

Subject: Re: Interested in a Z280 SBC
Posted by tor on Mon, 04 Sep 2017 11:57:38 GMT
hperaza wrote on Mon, 04 September 2017 09:45

lowen wrote on Fri, 01 September 2017 05:33

A good analysis overall, but I will mildly disagree with the assertion that 3.5 HD media is more reliable than older media; I typically have more trouble reading old 3.5 HD disks than I do reading some really old 5.25 DD disks, and 8-inch disks have the best reliability record of all.

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1.44MB 3.5" floppies can't really handle their own density. I have systematically converted all my old media (CCT and various floppy types) to images, and my experience mirrors hperaza's. When focusing on 5 1/4" and HD 3.5" media, the difference is extreme - of the large numbers of old HD 5 1/4" floppies I converted I found two that didn't work at all (must have been degaussed at some point), and a small number of floppies with read errors - most could be recovered by retries, except for a couple. On the other hand, not a *single one* of the old 3.5" floppies are readable. Not one. I have lots of floppy drives, nothing can read HD 3.5" floppies from the previous century. (The exception is factory-written floppies - they're somewhat better). All my old media were stored in the same room under the same (optimal) conditions.

Subject: Re: Interested in a Z280 SBC
Posted by rhkoolstar on Mon, 04 Sep 2017 13:24:18 GMT

I've been doing the same... converting my floppies to images on harddisk. My experience is that most disks (both 5.25 and 3.5) were readable, BUT I had to clean the floppy heads often. Sometimes after just one read. Anyway, I got most of my disks converted. I had the most trouble with my 5.25 Sierra disks (originals) like Kings Quest and Larry.

Rienk

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Mon, 04 Sep 2017 17:52:36 GMT

hperaza wrote on Mon, 04 September 2017 00:45

lowen wrote on Fri, 01 September 2017 05:33

It would be nice if some of these options could be rolled into a configuration setting or could be jumper-selectable; just some code for someone to write.

That would be nice indeed, and not that difficult to implement (at least via jumper). That would be a relief for those users who do not have an UV eraser and/or an EPROM programmer.
I would suggest that such a configuration option would be ideally placed in NVRAM and managed via the setup code. I will not have time to look at this for a while, so perhaps someone could contribute such an enhancement to the GitHub repository...

-Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 11 Sep 2017 20:59:25 GMT
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Update for 9/11/2017

Just sold the last available CPU280 board. I would want at least five interested individuals before getting a third run made. I am preparing to make modifications to the layout files for the IDE board, and will be notifying people once I get those manufactured, hopefully within the next month (couple of weeks to do the edits, given my current workload, and a week to get the boards made).

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sat, 16 Sep 2017 16:18:46 GMT
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Update for 9/16/2017.

As we approach the first anniversary of this thread, I look back over the past year with more than a little awe at what has been done. So I want to thank some folks publicly for making it possible for me to make my Z280 dreams come true, at least the hardware part of those dreams.

Number one, and top of all the lists, is Tilmann Reh. I will never forget that Tilmann designed the CPU280 and did all of the hard work. I will never forget that the reason we could have a CPU280 revival at all is due to Tilmann’s extreme generosity in sharing the designs and his knowledge.

Number two is Fritz Chwolka. Fritz kept his CPU280’s files, and made them publicly available, and I found them. Had I not found Fritz’ archive I would have never begun the CPU280 revival.

Next in line are Helmut Jungkunz, Gaby Chaudry, ZNode51, and many who attended various ZFests.

I want to thank members of this group, especially John Coffman, Wayne Warthen, Steven Hirsch (his comp.os.cpm posts longing for a Z280 also gave me motivation!), as well as Terry Gulczynski, and all the others who have successfully built CPU280’s and given feedback and encouragement. Wayne deserves extra kudos for getting a github setup and building software, as well as patching said software. Many times it is easy to overlook all who have helped in some way, and if I’ve not mentioned anyone who contributed please let me know so I can update this
post, since I don't want to leave anyone out. Jonas, almost forgot you; your early encouragement in this thread was exactly what I needed to keep going in a couple of instances.

And many thanks to Andrew B and Andrew Lynch, for working to get this group of people together in the first (and second) place.

Stay tuned for some feedback from Tilmann on this thread once I get it reformatted and get his OK to post.

---

Subject: Re: Interested in a Z280 SBC
Posted by zenxyzzy on Tue, 10 Oct 2017 00:31:00 GMT

The big win (IMHO) for the z280 over the z80 is the split I+D. as far as I have seen, there is no compiler available for the z80 family that knows about this. I've started porting pcc (yep, that crusty old thing) to the z280 for my 2.11 bsd project, as that's the sticking point. I want the thing to be self-hosting, as I know that the pdp-11 managed it with a 64kb address space. the z280 has a nice (sp+disp) addressing mode, it looks pretty good so far. this addressing mode frees up a lot of register jigger-y-pokery, so I get ix, iy, de, as register variables, with hl, bc, and a as temps.

not sure what to do with the alternate hl, de, bc, or a. might allow me to save register pushes in leaf functions in an optimizer pass.

anybody know of a z280 simulator with source code for unix? if not, It looks like I'll end up building one of them too.

--curt

---

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 10 Oct 2017 11:27:26 GMT

I have yet to find a usable Z280 emulator - or indeed a usable Z280 (as opposed to Z80) C compiler (the UZI280 one is a hacked up small C with some questionable licensing as well).

I did look at the current ANSI pcc (http://pcc.ludd.ltu.se/ but all the bizarre Z280 rules about register allocation put me off even trying. SDCC can generate good Z80 and Z180 code (very good for a compiler given what a mess the architecture is), and the linker can be adjusted to do split I & D very easily (I've previously hacked it to do banked code/overlays as well). The alternate registers are tricky. In discussions in the past they are very useful internal to floating point and the like, but for the compiler the best use we could think of was to store longs in HL'HL DE'DE BC'BC
as that stops them clogging up the precious register space. SDCC at the moment doesn't use them and sometimes as a result gets itself tied in knots trying to generate good code with longs in it.

My own gut feeling was that it would be easier to use SDCC for Z280, because even as it it outperforms the UZI280 compiler. Teaching it the SP relative operations and a few of the other new ops would probably get most of the goodness of the newer processor. SDCC already has some very clever graphing techniques to get everything in registers as much as possible while PCC really at heart assumes an architecture that is reasonably sane and by modern standards doesn't really have any optimization support.

Unless I get cloned a few times however I don't have time

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Tue, 10 Oct 2017 12:40:02 GMT
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etchedpixels wrote on Tue, 10 October 2017 04:27 I have yet to find a usable Z280 emulator - or indeed a usable Z280 (as opposed to Z80) C compiler (the UZI280 one is a hacked up small C with some questionable licensing as well).
Did I UZI280 use the Hi-Tech compiler? IIRC Small-C does not support structures, so I doubt it can be used to compile UZI.

An accurate Z280 emulator would be nice to have, as it would be the first step towards a FPGA implementation. I've been playing with the idea of writing one as well, if I ever get the time. Right now I'm working on a native Z280 assembler (not happy with pre280+slr180).

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 10 Oct 2017 12:57:31 GMT
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UZI180 uses Hi-Tech C. UZI280 used a commercial compiler that's actually a hacked up Small C so has been somewhat extended.
UZI isn't written in a full C, while it has structs it avoids multi-dimensional arrays and also "long", "float" and "double" types.

(Confusingly there are two different UZI280's. Doug released the original UZI for Z80 into the public domain. There's a fork someone did of that with a non-commercial licence - so basically useless, and the version Doug himself did which he released). Doug used Q/C 3.2 ('Quality Computer Systems' commercial compiler which is recognizably extended from the public domain small C compiler.

http://www.dougbraun.com/uzi.html
Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 10 Oct 2017 13:15:21 GMT

Alan, UZI280 is a different beast EDIT: with several different branches /EDIT; as of v1.12 it required the hacked-up HiTech C to compile at least the kernel. The archives are at http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280 /uzi280/download.html. One of the tarballs contains the hacked-up HiTech C with the C source code for cc itself (but not any of the other files).

Stefan Nitschke took Doug Braun's original and did quite a bit of work on it, including to HiTech C piece, as far as I know. I think V1.12 is the latest, but I reserve the right to be wrong. I haven't had time to trace all the threads about it in comp.os.cpm as yet, but as of 1996 and V1.02 of Stefan's UZ1 280 version he was using the HiTech C v3.09 CP/M compiler with some Z280 library code and optimizations.

Once I get my IDE board built I'll be able to try this out; all it takes is time!

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 10 Oct 2017 19:20:13 GMT

Please try reading what I wrote. There are two different Z280 UZI projects

Doug Braun's UZI280 uses QC/3.2 and is self hosting with split I/D Z280 binaries and is public domain (see http://www.dougbraun.com/uzi.html if you'd like to grab a copy but note that the C compiler while included isn't distributable and at the moment afaik nobody has managed to figure out who owns the QC rights to ask nicely)

Other people took Doug:'s original Z80 UZI port and forked it into a whole pile of projects including UZIX (MSX) , UZI180, UMZIX (Sharp MZ), MAPUX (68000) and a different UZI280 project which is the one that uses HiTech C and comes with a non commercial use licence.

Make sense ?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 10 Oct 2017 21:16:50 GMT

Page 163 of 338 ---- Generated from RetroBrew Computers Forum
etchedpixels wrote on Tue, 10 October 2017 15:20

Please try reading what I wrote. There are two different Z280 UZI projects

Well, I actually did read what you wrote. Just expanding on it a bit, sorry for the confusion.

Quote: ...and a different UZI280 project which is the one that uses HiTech C and comes with a non-commercial use licence.

Make sense?

It does; Stefan's UZI280, which is the one I pointed to, is probably the one you're talking about that used HiTech C. Is it the HiTech license that makes it non-commercial use only? I don't see any other notice in the tarballs I have. For my own purposes I'm ok with non-commercial use only, but I do understand your point of view and would much prefer something Free.

sorry for not making that clear earlier.

---

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 10 Oct 2017 22:01:50 GMT

Stefan's uses HiTech C. The copy of Stefan's UZI280 I have has 'No commercial use' and he's held that position since he first announced it (and I commented on that then although it was another 20 years before I had time to follow up on my plot to run a Unix on an Epson PX-4... that bit is still a work in progress, but I have my PX-4 with 128K RAM expansion waiting

http://www.verycomputer.com/74_36e1b611beb1dfe1_1.htm

HiTech C isn't the problem for that. In fact Hi Tech said of the CP/M version when they freed up the binaries

"The HI-TECH Z80 CP/M C compiler V3.09 is provided free of charge for any use, private or commercial, strictly as-is. No warranty or product support is offered or implied.

You may use this software for whatever you like, providing you acknowledge that the copyright to this software remains with HI-TECH Software.'

I suspect 'for any use' even covers disassembling it and all sorts of stuff like that. For it's time it's a pretty decent compiler, and for a 64K machine it's a miracle of engineering. SDCC code is frequently multiple times faster but the compiler takes a fast x86 processor and 2-4GB of RAM to do the same job!

Hi-tech is still around (it's now part of Microchip - the folks who make PIC controllers).

Doug's UZI280 code is interesting to read - it's very close to the original UZI but implements a full
paging virtual memory subsystem underneath lightly modified task switching/swapping logic so that you get a true virtual memory system with page aging and proper kernel protections with few touchpoints in the original codebase.

Subject: Re: Interested in a Z280 SBC

Alan, as always I thank you for your insights and experienced wisdom. I had read the thread you linked to about a year ago, but the detail of non-commercial use wasn't top-of-mind for me. Ideally I guess we would want to start with Doug's code, then, for a version that is Free, and anyone who doesn't have an issue with the non-commercial-use-only licensing can use Stefan's code. I would suspect most here would be ok with that, but I understand and respect your position.

Further, given the licensing of Fuzix as GPL, you can't use any of Stefan's code as it stands, given the licensing incompatibility.

While I personally would like to see a bit more coordination of efforts especially in the area of the C compiler, assembler, and emulator, I know of several efforts by several people already underway. I am very interested in the emulation side of things, and even going as far as a VHDL or verilog core that could be used in an FPGA. With the annoying bugs fixed, of course!

To all who are involved in doing a compiler, assembler, or emulator: I know you've probably posted before, but I would like to get a list together of all of these efforts and see what coordination might be possible. I know, for instance, that John Coffman has done some work on the Z280 assembler for sdcc, and I know that Curt is looking at porting 2.11BSD (and, honestly, I want to encourage that effort, as a ported 2.11BSD, even with pcc as the base, would give an 'air' to the Z280 that very few other things will).

I want to see a fully working Fuzix on Z280 as well, and Doug's version of UZI280, with a few fixes for bugs that are documented in the CPU280's CP/M3 BIOS routines, could be a reasonable start.

All depends on a good C compiler, of course. And while I personally would like a self-hosting system, I'm not married to that idea. Thanks also for digging out the HiTech C release statement.

I have my own, other, lower-level porting projects I want to do, and I am well aware that everyone's time is pretty limited for the Z280 hobby, as a Z280 port of anything is a really niche thing (almost as niche as a port I have on the back burner of LS-DOS 6.3.1 to the Lobo Max-80; I know of only three Max-80's around these days, and I have one of those on loan for the port).

On the board production side of the house, I have one person so far interested in a board out of a possible third run of boards. I have a couple interested in fully-assembled units, and I have a pretty good idea of costs, and a proven assembler has stepped forward expressing interest in assembling CPU280 and REH-ECB-IDE boards for other people; if you're interested in a fully-assembled CPU280 please PM me and we'll talk further, as the costs vary based on current parts availability and price, and it's not exactly cheap. The CPU280 is not an inexpensive
minimalist design, and several parts run over $10 (the DS12887A is one; the COM81C17 is another).

I have not yet ran the second run of IDE boards, but should be able to this month.

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Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Wed, 11 Oct 2017 14:05:18 GMT
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FYI: I have a functional Lobo MAX-80, complete with SASI hard disk and 8" drives.

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Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 11 Oct 2017 15:24:28 GMT
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snhirsch_gmail.com wrote on Wed, 11 October 2017 10:05FYI: I have a functional Lobo MAX-80, complete with SASI hard disk and 8" drives.

Four!

Given your long CP/M involvement I should have guessed.....

---

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Thu, 12 Oct 2017 11:26:53 GMT
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etchedpixels wrote on Tue, 10 October 2017 05:57(Confusingly there are two different UZI280's. Doug released the original UZI for Z80 into the public domain. There's a fork someone did of that with a non-commercial licence - so basically useless, and the version Doug himself did which he released). Doug used Q/C 3.2 ('Quality Computer Systems' commercial compiler which is recognizably extended from the public domain small C compiler.

http://www.dougbraun.com/uzi.html

Thanks for the link!

Indeed that one uses Q/C, which was sold by Code Works and advertised as a "mayor extension to Ron Cain's Small-C". I didn't know that Doug ever made a Z280 version of UZI!
lowen wrote on Wed, 11 October 2017 06:44
While I personally would like to see a bit more coordination of efforts especially in the area of the C compiler, assembler, and emulator, I know of several efforts by several people already underway. I am very interested in the emulation side of things, and even going as far as a VHDL or verilog core that could be used in an FPGA. With the annoying bugs fixed, of course!
Some of the bugs could even be emulated (if they are not of erratic nature, of course). That could be useful in case someone wants to test a program on the FPGA version that is intended to work on the real iron as well. The "compatibility" mode could be controlled by a bit in an additional CPU control register.

Which brings up another question: is there any updated list somewhere of the known Z280 bugs? So far the information available is rather fragmented and incomplete.

Quote: To all who are involved in doing a compiler, assembler, or emulator: I know you've probably posted before, but I would like to get a list together of all of these efforts and see what coordination might be possible.

OK, here is my list:
- native Z280 (macro)-assembler, preferably M80 or SLR compatible (currently working on that)
- debugger (e.g. like DDTZ, but using the single-step capabilities of the chip) get UZI280 working (haven't even looked at it yet) and add more utilities, etc. same for Fuzix port of MP/M better hard disk support (e.g. via FDISK utility like the one for the P112, with automatic recognition of partitions in CP/M and UZI so one will not have to change the BIOS every time partitions change)
- better ROM setup? again taking the P112 as an example (i.e. adding disk timing parameters to the NV RAM, if possible add a simple embedded debugger?) a Verilog or VHDL Z280 core, perhaps taking T80 as the base. And if I really get the time, would like to make something like this, so it could be plugged directly into the CPU280 CPU socket. and like Lamar I also have my own, other niche project - a port of a multitasking, RSX-11M-like OS I wrote many years ago for the Z80 (now ported to the Z180). The PDP-11 always was my favorite machine, and the Z280 has many PDP-ish features, including a similar MMU, so for me is an interesting hobby project.

etchedpixels wrote on Fri, 13 October 2017 21:36:
Emulating bugs with a warning generated when you hit one is really useful for debugging. The problem being I don't think we know most of the Z280 bugs - same problem with 8086 and 80286. For stuff like Fuzix I've always booted the platform on an emulator before real hardware - it's so much easier to debug the nasty stuff like bootup and task switching with an instruction trace!
Subject: Re: Interested in a Z280 SBC  
Posted by hperaza on Mon, 30 Oct 2017 11:03:53 GMT

Got the assembler working. I'm now finishing the macro support and polishing some details, so is close to release. Any beta testers?

Subject: Re: Interested in a Z280 SBC  
Posted by zenxyzzy on Mon, 30 Oct 2017 19:26:12 GMT

I'd beta your z280 assembler.

I've got a pretty strong disassembler already with z280 support, which I wrote from scratch. It's retargetable to any reasonable architecture via a machine description file. I've got ones for sparc64, z180, z280, z80.

where did you start from for your assembler?

--curt

Subject: Re: Interested in a Z280 SBC  
Posted by hperaza on Tue, 31 Oct 2017 13:33:24 GMT

zenxyzzy wrote on Mon, 30 October 2017 12:26I've got a pretty strong disassembler already with z280 support, which I wrote from scratch. It's retargetable to any reasonable architecture via a machine description file. I've got ones for sparc64, z180, z280, z80.

Would like to try it if you have a working version.

Quote:where did you start from for your assembler?
I used the old Z80ASM UK (AKA ZSM) from the CP/M UK UG as starting point, since 1) it is a free public domain Z80 assembler that worked rather well (provided you wrote good code to start with - syntax check was not its stronger point), 2) source code was available, and 3) the source was reasonably well documented. I ended heavily modifying it:

most (all?) of the original bugs are fixed (I hope), so it no longer crashes or outputs wrong code when encountering invalid syntax.
the assembler now outputs REL files instead of the original HEX; all REL segments are supported: ASEG, CSEG, DSEG and COMMON, as are PUBLIC and EXTERNAL symbol types.
.PHASE/.DEPHASE was added as well.
the syntax is much more relaxed (e.g. spaces can be used before/after commas, labels do not have to start at column 1), and follows more closely the RMAC/M80 rules.
the expression evaluator was modified in order to use operator precedence, apply relocation rules, allow parenthesis to group operands, etc.
the code generator can output code for Z80, Z180 or Z280 CPUs (selectable via pseudo-op). All Z280 instructions are supported following the syntax from the Zilog manual; long/short form for the ambiguous cases is selected automatically according to operand size and/or reloc type.

The listing format was enhanced as well, and now includes all the generated code bytes (originally only the first 4), addresses are followed by a tag char indicating segment type much like M80, etc. INCLUDE files are supported, and can be nested.

MACROS were added, including the REPT/IRP/IRPC variants.

The set of conditional operators was expanded to include IFT, IFF, IF1, IF2, IFB, IFNB, IFDEF, IFNDEF, IFIDN and IFDIF.

Many other pseudo-ops were added: DC, DEFC, DEFL, DEFM, DEFZ, SUBTTL, .PRINTX, .REQUEST, .RADIX, etc.

Command line syntax changed to be more M80-like (or MACRO-11-like, hehe...)

The idea was that it could take an existing program written for M80 or RMAC and compile it with a minimum or no changes.

Note that not all of the above features are fully implemented at this point: e.g. COMMONs, some of the IF variants, nested MACROS, special chars % and & in MACRO expansions, LOCAL vars, and DEFL statement are only half-done at this point. But the program can already compile itself and generates the same executable as when compiled with M80 (REL files do differ, but that's to expect). The assembler also compiles correctly most other code I've thrown at it.

At this point I need help with testing especially the Z280 code generation part - because of the extra instructions and the additional addressing modes is rather difficult to test for all possible cases and operands. I wrote a test reference file with all the Z280 instructions, and the assembler seems to generate the correct opcodes for it. Still, bugs may be hiding.

Some of the CP/M 3 BIOS files from the CPU280 archives do compile (I haven't tried a full build yet), provided that EXTRN declarations are added for the corresponding external symbols (the sources assume that all undefined symbols are external - not a good practice, IMHO).

Later today I will post the binary I have so far for you and others to test (sources will follow are on GitHub).

Edit: Attached.

File Attachments
1) zsm41.tgz, downloaded 34 times

Subject: Re: Interested in a Z280 SBC
Posted by zenxyzzy on Wed, 01 Nov 2017 20:28:39 GMT

hi,

I'm modifying my disassembler to emit code that your assembler can consume directly, and so that it can chew on .rel files.
this will mean that it can be a regression test for the assembler, and vice-versa.

the disassembler is written in C, and has not been tested on cp/m yet. what toolchain did you use for this assembler?
please tell me it's not written in assembly.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by zenxyzzy on Wed, 01 Nov 2017 20:37:37 GMT
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yay! finally got the reh280 card fully built (sourcing parts via china is a PITA - everything counterfeit)
so, I plugged it in to my 8 slot ecb mobo, and 2 tantalum caps promptly explode. (both the input filters).
I mis-read the polarity markings. no board damage, but I get to desolder and double check everything to make sure no traces got fried.

--curt

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Wed, 01 Nov 2017 22:36:47 GMT
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Just updated the link with a newer version.

zenxyzzy wrote on Wed, 01 November 2017 13:28the disassembler is written in C, and has not been tested on cp/m yet. what toolchain did you use for this assembler?
The assembler is written in Z80 assembly, and to compile it I use M80 and DR LINK under John Elliott's zxcc CP/M emulator.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by lowen on Thu, 02 Nov 2017 15:52:38 GMT
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zenxyzzy wrote on Wed, 01 November 2017 16:37yay! finally got the reh280 card fully built (sourcing parts via china is a PITA - everything counterfeit)
so, I plugged it in to my 8 slot ecb mobo, and 2 tantalum caps promptly explode. (both the input filters).
I mis-read the polarity markings. no board damage, but I get to desolder and double check everything to make sure no traces got fried.
Ouch. The board silkscreen isn't terribly clear for polarity; I'm open to suggestions for improvements. I do have the files for the CPU280, but haven't had much time lately to do anything with it. Glad to see some traction in the assembler/disassembler department! The last couple of weeks I've been a bit under the weather; as soon as I get the chance to do so I'm doing the mods for the IDE board and getting a second run made; I'll try to keep everyone informed in a timely fashion.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by hperaza on Sat, 04 Nov 2017 13:15:12 GMT

Beta version 3 just released (link in message above).

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by hperaza on Sun, 05 Nov 2017 14:44:05 GMT

Beta version 4 released (link above). This one adds the features that were still missing, and fixes a small bug in the expression evaluation routine. The assembler is pretty much complete by now, and closer to its final release.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by hperaza on Tue, 28 Nov 2017 00:58:37 GMT

Beta version 5 released (link above). Fixes a regression bug in 'INC (ix/iy+dd)' instructions, adds .COMMENT pseudo-op, and NAME pseudo-op now accepts the ('name') argument form.

BTW, how's the beta testing going?

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by plasmo on Thu, 04 Jan 2018 14:19:27 GMT

Z280 has a 256-byte cache. It also has the ability to bootstrap off its internal serial port (asserting nWAIT & AD6 during reset) which will store 256 bytes of instructions from serial port starting at 0x0 and then jump to it after 256 bytes of data are successfully received. At the same time, the 256-byte cache is also enabled so I'm curious whether the bootstrap code is in fact running from the cache? Another word, does it need real memory in first 256 bytes of location since the instructions are already stored in cache as the result of UART bootstrapping? If true, this can...
open up interesting ways to use Z280. Can someone try this on their CPU280?

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by lowen on Fri, 26 Jan 2018 15:57:38 GMT

Plasmo, sorry for the delay.

Early in my investigations on the various Z280 designs, I came across a post on (I think) comp.os.cpm about a Z280 design by a Bruce Mardle that did the boot from serial-port thing. (search groups.google.com for the subject "You know you've been studying an instruction set too long when..." for contact information). I contacted him, and he sent me some information about the design and a photo of the board. I didn't secure permission to share those items, but please feel free to contact him directly. It is a bog-simple Z80-bus design with the Z280, a Zeropower RAM module, the address/data latch, and a breakout for the Z280's built-in UART.

EDIT: Forgot to include that, no, by default the 256-byte cache starts up on RESET as an instruction cache only. It can be switched into a mode where it becomes statically-mapped RAM in the 24-bit address space, but the setup to do that is a bit tedious. So for boot-from-UART you need real RAM at address 0.

For everyone:

I hit a stall point with my free time back early last fall, and so I'm way behind where I wanted to be at this time. I've not forgotten that I have a second run of the IDE boards to fab, after a couple of modifications, and I actually have a couple of people interested in CPU280 boards, so I may get a third run of those made. Plasmo's Tiny68K project has me thinking about some more interesting options as well.

I was contacted by an individual a couple of weeks ago about the stability of the available Z280 chip supply before he designed another Z280 SBC, and as part of my reply to him I found that UTSource claims to have over 33,000 in stock at a great price point (I ordered another 20 of them, and they have shipped to me but have not arrived yet). My gut feel is that this stock is almost entirely made up of pulls from one of Specialix' smart serial cards (the SI/XIO ISA card; interesting aside that the Linux kernel drivers for this card include the 32K BLOB for the firmware, meaning that the Linux driver for this card puts Z280 binary code inside the Linux kernel!) and/or some point-of-sale terminals.

Also, Fritz has asked me about an assembled CPU280, and so I'm going to pass this along to those who have built a CPU280, have another board, and would like to help Fritz with his quest to get a running CPU280. Please remember that this project really would not have been possible without Fritz' archive at oldcomputers.dyndns.org! So, if anyone can help Fritz (I can't right at the moment) please contact him directly (he's participated in this thread).

I'm hoping that the main time sink that has prevented me from finishing the mods to the IDE board
and from doing some other items related to the CPU280 will be easing off in the next few weeks and I'll be able to get the second run of the IDE boards fabbed soon.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by plasmo on Fri, 26 Jan 2018 17:26:46 GMT

I wish I knew about Bruce Mardle's work. It'd save me a good bit of work, especially since Z280's documentation on UART bootstrapping is incorrect (FYI, AD7 MUST be low, not high as described in Chap11, RESET).

I did build a Z280 pathfinder board that has 4 different ways of booting up (UART bootstrap, Flash memory, CF, and serial EPROM) and 2 different combination of RAM (16-meg DRAM, static RAM). I even throw in the DS12887 & COM81C17 just in case they are needed. After figuring out the correct UART bootstrap sequence, I pared down a small Z80 monitor from glitchworks (http://www.vcfed.org/forum/showthread.php?61685-Small-Z80-monitor&p=495667#post495667) so it will fit in 256 byte. From that I'm able to load a bigger monitor and start to explore the Z280. This is where I am right now.

To answer my own question above, Z280 needs RAM in location 0, it won't run off the 256-byte cache.

My goal is to build a small Z280 (TinyZZ) that has Z280, 2 meg of DRAM, CPLD, RTC, and CF interface. No flash, it will boot off CF. Yes to CP/M but I'm more interested in the multiprocessing feature of Z280. Question about memory size: 16meg DRAM is only $1 more expensive than 2 meg DRAM, but can anyone really use 16 meg DRAM?

I must've bought Z280 chips from the same source in UTSource. It was $2.14 each and I ordered 5. They look used and all have different date code. I tried 2 and both work so I ordered 10 more.

Can you have the individual who is working on another Z280 SBC contact me? My contact information is in the board inventory wiki page.

I started a project log on Hackaday about TinyZZ, I should also start a wiki page here as well.

Read your EDIT just now. I agree and it conforms to my experiment. I think it is configured as a write-thru cache, so writing data out to 0-FF does not cause them to be cached.

EDIT--EDIT--EDIT--EDIT
I don't want to hijack the topic on CPU280, so here is a new topic about TinyZZ: https://www.retrobrewcomputers.org/forum/index.php?t=msg&th=255&goto=4158#msg_4158
Plasmo, you rock. That is a sweet-looking little Z280 board. You know, while 16meg sounds big, I would say, 'Why not?' All of the CP/M3 code for the CPU280 is open and in github, and can be used for inspiration if nothing else.

--

lowen wrote on Fri, 26 January 2018 16:57
Plasmo, sorry for the delay.

Also, Fritz has asked me about an assembled CPU280, and so I'm going to pass this along to those who have built a CPU280, have another board, and would like to help Fritz with his quest to get a running CPU280. Please remember that this project really would not have been possible without Fritz' archive at oldcomputers.dyndns.org! So, if anyone can help Fritz (I can't right at the moment) please contact him directly (he's participated in this thread).

Thanks you for the flowers..
I just got the CPU280 from Tilmann using the old parts from one of the first build from the 90th together with the board you send to me.

At the moment the CPU280 starts and then it doesn't recognize any keystroke. If I got some time I'll see what goes wrong with my RS232. With this CPU280 board I'll enough to play so there is no hurry for an other working CPU280 board.

The console output but none input keystroke is possible:

New board with old hardware:

This was the old bad board the parts are coming from.
Subject: Re: Interested in a Z280 SBC (reh280)
Posted by lowen on Fri, 26 Jan 2018 21:58:08 GMT

Fritz, glad you got it built!

On first look at your board, IC30 looks like it is a 74HCT175. The parts list calls out needing either a 74ACT175 or 74AS175. This is a speed-critical part, and an HCT is on the edge of being fast enough. It's in the RAM timing chain, and so the memory test hanging at 1024K is definitely a memory symptom. Another thing that can cause it to hang at the end of the memory test is a non-reset DS1287/DS12887. Reset that with the jumper at J10 (with the power off) and see if that helps any.

Hope this helps!

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by snhirsch_gmail.com on Sat, 27 Jan 2018 15:29:18 GMT

From my experience, the RAM timing chain is quite sensitive to race conditions - in both directions. For example, my CPU280 will not run with 7 ns GALs but works fine with 15 ns parts. Would be nice to get to the bottom of the issue, but my hardware design skills are not up to the challenge.

Subject: Re: Interested in a Z280 SBC (reh280)
Posted by fritze@link on Sat, 27 Jan 2018 17:13:05 GMT

lowen wrote on Fri, 26 January 2018 22:58Fritz, glad you got it built!

On first look at your board, IC30 looks like it is a c. The parts list calls out needing either a 74ACT175 or 74AS175. This is a speed-critical part, and an HCT is on the edge of being fast enough. It's in the RAM timing chain, and so the memory test hanging at 1024K is definitely a memory symptom. Another thing that can cause it to hang at the end of the memory test is a
non-reset DS1287/DS12887. Reset that with the jumper at J10 (with the power off) and see if that helps any.

Hope this helps!

Thanks to Tilmann who did the work and thanks for your look over the board.

Yes, the IC30 is a 74HTC175 as it was written in the first parts list from 1990. The old board we get the parts from was the 1st made in 1990.
As Tilmann has less time he didn't had time to make a full test and it's on my way to get the board running. I ordered a 74ACT175 and 74AS175 IC for replacement as a Reset didn't help. I will see next week if it help.

# 1990 #

# 1992 #

File Attachments
1) hc_906.jpg, downloaded 1220 times
2) hc_907.jpg, downloaded 1214 times

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Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Thu, 08 Feb 2018 18:51:17 GMT

Hi..
I changed the 74HTC175 to the correct one and did a new build for the roms.

Sadly there is the same problem and I have to ask a friend of mine for help. He has the right devices to measure on the board.
So that's not fine but I'm not in a hurry - here's enough other to play with.

This is the screen during booting and a no reply for the DEL-key
I have no floppydisk connected but that should make no problem.
Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 19 Mar 2018 18:32:05 GMT
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I looked into my PDFs from the Z280 manual and saw that I didn't make identical favorites. Now these 4 have full favorites for better reading and searching. Nobody told me


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File Attachments
1) hc_2954a.jpg, downloaded 1069 times
2) hc_2953.jpg, downloaded 1085 times

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Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 19 Mar 2018 18:43:31 GMT
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Thanks, Fritz!

Fritz, on your CPU280, have you reset the DS12887A yet? Which ROM image do you have? Do you have the ability to burn new EPROMs?

---

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 19 Mar 2018 19:14:28 GMT
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lowen wrote on Mon, 19 March 2018 19:43 Thanks, Fritz!

Fritz, on your CPU280, have you reset the DS12887A yet? Which ROM image do you have? Do you have the ability to burn new EPROMs?

Hi lowen,
I had reset the dallas I believe but I can do it again.
I have a memprog programmer which can program NVRAM: Dallas DSxxx, SGS/Inmos MKxxx, SIMTEK STKxxx, XICOR 2xxx, ZMD U63x series.

The ROM Images are the one I made (hopefully without mistakes) from https://github.com/wwarthen/CPU280/releases/tag/ some older one I believe, Looking remote onto my basement workstation I see that I made the rom at June. I'll build new rom with wwarthen 1.20.2 and will make a new try.

Bootdisplay:

CPU280 Boot Loader V1.2 RBC 8-Mar-2017
http://www.retrobrewcomputers.org
based on Cold Loader Program V1.13 TR 950314

Subject: Re: Interested in a Z280 SBC
Posted by ale500 on Wed, 25 Apr 2018 10:07:41 GMT
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I was wondering, is there an instruction exerciser for the Z280 ?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Thu, 03 May 2018 14:16:11 GMT
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ale500 wrote on Wed, 25 April 2018 06:07 I was wondering, is there an instruction exerciser for the Z280 ?
Not that I know of. I would love to see one or write one, but my time has been too limited to do a proper job. For the Z80 there is ZEXDOC and ZEXALL, and it would be useful to expand those to the Z280 instructions.

Fritz, sorry for the delay. There are several things that could happen to cause the RAM count to stop at 1MB. Which RAM chips do you have? If you have the 1Mx4 chips, do you have the matching CAS4 GAL16V8? The CAS GAL16V8 and the RAM chips have to match; the 256Kx4 and the 1Mx4 RAM chips must match the CAS generator GAL.

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 07 May 2018 22:36:09 GMT
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UPDATE for 5/7/2018

Ok, the second run of the REH-ECB-IDE board is back, and I have eight boards available. See
the REH-IDE construction thread for more details.

The third run of CPU280 boards is here, and nine are available if any one is interested. I have parts on hand for five kits of hard-to-find parts, but I don't currently have any EPROMs in stock, and will be getting some. Once those are in stock I'll be able to take kit orders again. If you're interested, let me know via private message and I'll send you the complete current price list. Bare boards are $25 plus shipping and handling; US Postal Server Priority is about $10 for US shipping and $35 for international. I've had good results using Priority Mail and I have supplies in-hand for that.

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 21 May 2018 02:56:24 GMT

Has anyone tried to overclock the Z280? I have a version of Z280 SBC that plugs into the RC2014 backplane. The system clock of RC2014 is 7.37MHz and I loath to lower Z280 CPU clock from 24MHz to 14.7456MHz in order to to have a compatible bus clock of 7.37MHz. Then it occurred to me that I can increase the Z280 CPU clock to 29.49MHz from the nominal 24MHz and set the Bus clock divider to 4 to generate 7.37MHz bus clock. It can make up the slow bus with cache & burst memory access. 24MHz to 29.49MHz is about 20% overclocking, well within one speed grade so that should be OK assuming nominal supply voltage and room temperature. I did a quick experiment and raised the CPU clock to 34.5MHz and the board appears to pass diagnostics and CP/M is working OK. The current consumption increased by about 40mA and the chip feels a bit warmer, but not hot. I love to hear others' experiences with Z280 overclocking.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Wed, 23 May 2018 20:34:51 GMT

New version of the Z280 assembler just released (beta 6, download link above).

Changes and additions:
Fixed load instructions that use half-index registers on both sides (e.g. ld ixh,ixl): the prefix was being output twice. Those instructions are undocumented on the Z80, but legal on the Z280. suppress all code output for false conditionals (EQU was still getting into listing.) colons are now required after labels that are not followed by an opcode (in other words, when the label is the only thing on the line besides a comment); this was done in order to detect errors like the following:

```
ld   a,5
stc ; zsm4b5 sees 'stc' as a label,
     ; zsm4b6 flags the statement as error
ret
```

added .LIST and .XLIST pseudo-ops for compatibility with M80. added signed LESS relational operator from ZSM 2.9. assembly date and time now shown on listing if the feature is supported by the OS. added MACROS, NOMACROS and XMACROS option to the LIST command, as well as the M80-compatible shortcuts .LALL, .SALL and .XALL. nested < > in MACRO arguments are
now properly propagated to nested MACROs (one pair of < > removed for each nesting level). the PAGE statement can be followed by an expression argument to set the page length.

Subject: Re: Interested in a Z280 SBC
Posted by ale500 on Fri, 25 May 2018 04:07:46 GMT
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The only thing missing now is the emulator and or a verilog/VHDL implementation, and a C compiler.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Thu, 07 Jun 2018 13:39:38 GMT
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New version of the Z280 assembler just released (beta 7, download link above).

Fixes, changes, etc:
EQU/DEFL processing should be correct now (EQU no longer gives an M error if value and mode of a symbol is the same, DEFL will generate an error when redefining a value defined with EQU).
LIST options are now reset before each pass. ADD, SUB, AND without an argument did not produce an error message. Unterminated macros and conditionals now produce a T error at the end. New command line syntax (see below)
The assembler is now initiated by typing:
ZSM [command]
Where command is optional and has the following format:
[relfile],[prnfile]=srcfile[/option][/option...]
If no command is specified, the assembler will enter an interactive command mode and prompt for the next command to be executed. relfile, prnfile and srcfile are valid CP/M file specifications and may contain a drive specification and extension. The default extensions are the following:
relfile: REL prnfile: PRN srcfile: MAC
The following device names can be used as well in place of a file specification (normally to redirect the output of the listing):
LPT: or LST: (line printer) CON: or TTY: (user's console)
Options are a single char preceded by a slash. Some options require an argument. If several options are specified, each one must be preceded by a slash:
/L (force generation of a listing file)/Dsymboll=value] (define symbol, optionally assigning value to it. The value is a numeric constant following the standard format (i.e. nnnn, nnnnH, etc.) If no value is specified, 0 is assumed)/Sn (set the maximum symbol name length in the REL file, allowed value of n is 5..8 and defaults to 6)/M (initialize block data areas defined by DS to zeros)/U (treat all undefined symbols as externals)
See also the readme.txt included in the package.
Forgot to mention, I have successfully assembled the CPU280 ROM code using zsm4b7. Mostly thanks to the new /U option, as the source files assume that all undefined symbols are External. Still, minor modifications were necessary:

Replaced ++ and -- in Z280 instructions by + and - (the ++ and -- were used as hints for the pre280 preprocessor to generate long versions of some Z280 instructions; they are not an official Zilog syntax. ZSM4 can determine the operand size automatically). The 'defb' instructions generated by pre280 were removed from the include (*.mac) files and the original Z280 instructions restored (a limitation of pre280 is that include files needed to be processed separately, and the top module has to include the modified copy and not the original). Relational operators such as =, >, <=, etc. in conditionals were replaced by eq, gt, le, etc. respectively (the = > <= forms are an extension of the SLR180 assembler and were not implemented in ZSM4 because they conflict with the syntax of Z280 mnemonics) The diskio.280 contains the following lines:

TransA: defb1,3,5,7,9,11,2,4,6,8,10,
...
TransB: defb1,3,5,7,9,11,2,4,6,8,10,
...
TransC: defb1,3,5,7,9,11,2,4,6,8,10,
...
TransD: defb1,3,5,7,9,11,2,4,6,8,10,
note the extra comma at the end. The comma is superfluous and was removed, as it triggers a syntax error in ZSM4. In the ldrio.* files there are a couple of macro definitions that end like this:
exit: endm
a label before 'endm' is accepted by SLR180, but not by ZSM4/M80/RMAC; 'endm' is now simply moved to the next line. In loader.280 the following statement can be found:
ldb,ValNum
where ValNum is an external variable. The problem is that the standard REL file format does not allow external 8-bit values. The instruction was therefore modified:
ldbc,ValNum
ldbc
Again in loader.280, 'Boot' must be declared as PUBLIC (e.g. by using a double-colon), as it is referenced by the kernel.280 module. Renamed ldos.mrl to ldos.rel (old ldos.rel deleted, as it was meant for SLRNK and therefore was not in the standard REL format)
Linking of both the loader and the BIOS is now done with Digital Research's LINK. That means that pre280 is no longer necessary, neither are SLR180 nor SLRNK.

The Windows Build scripts were modified and Linux scripts were added.

The diff file is attached, as well as a zip file containing the new source tree (BTW, who's the official maintainer of the package?). Once you unzip it, cd to the SYSTEM directory and run the Build script, it should compile cleanly without error messages and produce the system.env and system.odd ROM images (note that the zxcc Linux binaries are not included, they are assumed to be somewhere in your shell's PATH).

I tried the ROMs in my CPU280 and they work with no problems. In fact they are the ones I use
now.

File Attachments
1) CPU280.diff, downloaded 68 times
2) CPU280-1.20.3.zip, downloaded 71 times

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Thu, 07 Jun 2018 17:45:38 GMT
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hperaza wrote on Thu, 07 June 2018 07:20:
The diff file is attached, as well as a zip file containing the new source tree (BTW, who's the official maintainer of the package?). Once you unzip it, cd to the SYSTEM directory and run the Build script, it should compile cleanly without error messages and produce the system.env and system.odd ROM images (note that the zxcc Linux binaries are not included, they are assumed to be somewhere in your shell's PATH).

Well, I hesitate to think of myself as the official maintainer, but I did create the GitHub repository and developed the existing build scripts. The intent was really just to have someplace where everyone could always find the latest code.

Over the next couple days, I will just confirm that the new build script and toolset creates byte identical output. I would also invite comments from anyone else involved with CPU280 concerning switching the build toolset.

If there are no concerns, then the repository could be updated. I could take your archive and do it for you or you could fork the current trunk in GitHub and submit the changes. Using GitHub to submit the changes would ensure you are credited for all the updates.

One last question. I may have missed it, but I have not seen the source code to your assembler. Are you planning to make that public?

Thanks,
Wayne

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Thu, 07 Jun 2018 23:29:02 GMT
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Wayne W wrote on Thu, 07 June 2018 10:45:
Over the next couple days, I will just confirm that the new build script and toolset creates byte identical output. I would also invite comments from anyone else involved with CPU280 concerning switching the build toolset. You will not get byte-identical output, at least not compared to the previous 1.20.2 version. That's because: 1) an instruction was changed in loader.280 (see pt. 6 in my previous message); 2)
ZSM4 and Pre280 may disagree on the operand size of certain Z280 instructions; 3) DR LINK is now used to build the loader (DR LINK is unique in that it groups code and data segments from different modules together; while ZLRNK is like L80 where modules are simply chained after each other unless explicit /P and /D options are specified, which results in fragmented code and data segments); and 4) the date string in the sign-on message was changed as well.

Quote: If there are no concerns, then the repository could be updated. I could take your archive and do it for you or you could fork the current trunk in GitHub and submit the changes. Using GitHub to submit the changes would ensure you are credited for all the updates. I'm not familiar with GitHub, but I can try (I normally use SourceForge).

Quote: One last question. I may have missed it, but I have not seen the source code to your assembler. Are you planning to make that public?

The source code has not been released yet, but yes, I'm planning to make it public. I just want to add first all the features I have in my TODO list and fix some pending issues (very few remain).

Also I would like to write some documentation for it, but since English is not my native language it can take some time (thus, any help will be very much appreciated!).

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Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Fri, 08 Jun 2018 20:06:52 GMT
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hperaza wrote on Thu, 07 June 2018 16:29: You will not get byte-identical output, at least not compared to the previous 1.20.2 version. That's because: 1) an instruction was changed in loader.280 (see pt. 6 in my previous message); 2) ZSM4 and Pre280 may disagree on the operand size of certain Z280 instructions; 3) DR LINK is now used to build the loader (DR LINK is unique in that it groups code and data segments from different modules together; while ZLRNK is like L80 where modules are simply chained after each other unless explicit /P and /D options are specified, which results in fragmented code and data segments); and 4) the date string in the sign-on message was changed as well. Right, sorry, that makes sense. I will just run the new build script and confirm it works on my CPU280.

Thanks,

Wayne

---

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Sun, 17 Jun 2018 12:54:45 GMT
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Wayne W wrote on Fri, 08 June 2018 13:06: You will
not get byte-identical output, at least not compared to the previous 1.20.2 version. That's because:
1) an instruction was changed in loader.280 (see pt. 6 in my previous message); 2) ZSM4 and
Pre280 may disagree on the operand size of certain Z280 instructions; 3) DR LINK is now used to
build the loader (DR LINK is unique in that it groups code and data segments from different
modules together; while ZLRNK is like L80 where modules are simply chained after each other
unless explicit /P and /D options are specified, which results in fragmented code and data
segments); and 4) the date string in the sign-on message was changed as well.
Right, sorry, that makes sense. I will just run the new build script and confirm it works on my
CPU280.

Thanks,
Wayne

Hi Hector,

I did run the revised build script and it seemed to work fine on Windows. Unfortunately, I did not
get a chance to get out my CPU280 and test the ROM image that was created before I had to go
out of town. I will be out of pocket for about 3 weeks and will try it when I return.

Thanks,
Wayne

Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Tue, 19 Jun 2018 09:00:07 GMT
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Hi,

Stefan Nitschke here, please let me clarify some points about my fork of UZI280 for the REH
CPU280 board.

First of all about the license, I had to set the license to non-commercial only (temporarily) because
i was in progress to make a full-blown Z280 ANSI like C compiler available for UZI280.
Unfortunately none of the deals worked out and as a result i lost interest in the project. And, more
important, i forgot to change the license back to a MIT license as originally intended, lazy me !

Actually my version of the UZI280 kernel is under a MIT license. BTW this is not really new, many
uncounted moons ago i informed Harald Brower, when he worked on his UZI180, that he can use
my code without any restrictions.
In case this statement is not sufficient for you i can send the kernel sources with an MIT license to
Fritz who is hosting my version. Well i am better going to send him the archive anyway while i am
on it.
@Alan, Doug Braun’s original UZI280 had no support for split I/D. Please have a look at machdep.c initmmu(): The MMU is initialized with 0x8800 means no split I/D for user and system space. Somehow i have the feeling of a Deja vu while writing this...

It was me who beefed up the linker and the UZI280 kernel to support split I/D (besides several other things) but i gave up on it due to a questionable QC compiler license. BTW the quality and reliability of the code generated by the compiler was questionable as well.

Therefore I switched to the HiTech C compiler for my fork of UZI280, while keeping binary compatibility for user space applications for both split- and non-split I/D. The available archive with the compiler binaries is based on the original HiTech compiler files patched with the provided CPM emulator to make them directly executable on UZI280. This way i was able to use the HiTech C compiler to compile and link the kernel and applications on the target system.

Reaching my initial goal: A self-hosting system without any questionable license issues!

But without the possibility to link binaries with split I/D. Maybe the HiTech linker can be modified for that but i never tried. AFAIK the sources of the HiTech C compiler have never been made available. If i recall correctly HiTech told me the sources got lost (its a shame, i never came along any other ANSI like C compiler with such a small foot print on memory usage). The archives also contain the source for the modified CC and the Z280 optimizer written by Alexander and me.

The sources with the modifications to the HiTech runtime libs (UZI280 adaption and some manual Z280 code optimizations for floating point calculations, etc) got lost due to a partly HD crash. Same happened to the sources of mostly all UZI280 utilities. There is a very small chance that at least the sources for the modified HiTech runtime libraries are still on one of my old CPM partitions but for checking that i first have to find my old CPU280 system. It is still around somewhere i just don't recall where i put it.

- Stefan

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 19 Jun 2018 13:11:47 GMT
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Stefan: thanks for the update, and the licensing situation is really useful to have confirmed.

The only other reasonable C compilers I know of with similar footprint of any kind I know of are the Manx compiler (targetting 6502), and MISOSYS C for the TRS80 (K&R). Whether Roy Soltoff still has a copy of, could or would release the source to that compiler I don't know. Tim Mann might. I've also been pondering just disassembling the whole of the Hi Tech compiler and reconstructing it. As I read the permissions that's not outside the licence granted and it's old enough that it wouldn't hurt Hi Tech (or whoever now owns them).

I've done the native Fuzix assembler for Z80 at least, and the linker (which can do split I/D even if the Z80 target can't). The compiler is proving a challenge!
There's also an interesting little project here: https://github.com/k0gaMSX/scc

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 19 Jun 2018 14:41:12 GMT
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stefan_n wrote on Tue, 19 June 2018 05:00Hi,

Stefan Nitschke here, please let me clarify some points about my fork of UZI280 for the REH CPU280 board....

Stefan, welcome!

Quote:In case this statement is not sufficient for you i can send the kernel sources with an MIT license to Fritz who is hosting my version. Well i am better going to send him the archive anyway while i am on it.

Sharing with Fritz is ideal. I'll reply a bit more later; really busy day today.

It is great to see you here, Stefan!

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Tue, 19 Jun 2018 17:08:49 GMT
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stefan_n wrote on Tue, 19 June 2018 03:00Hi,

Stefan Nitschke here, please let me clarify some points about my fork of UZI280 for the REH CPU280 board.

Stefan,
Welcome! Very glad to see another member of the original CPU280 team joined the discussions on Z280.

At forum member lowen's encouragement, I've designed a Z280-based SBC using newer technology components. The result is Z280RC (https://www.retrobrewcomputers.org/doku.php?id=builderpages:plasmo:z280rc). During the course of exploring the Z280, I ran across a bug called SNC (Stefan Nitschke Chaos)
Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Tue, 19 Jun 2018 18:40:26 GMT
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Quote: There were some speculations about the causes and possible fixes here:
https://www.retrobrewcomputers.org/forum/index.php?t=msg\&\;th=255&goto=4477\#msg_4477
Could you comment on the causes and fixes of SNC?

Huh, well the name says it all ;-) There had been some random problems with FloppyDisk IO and by accident i found that writing to the IO ports seems to fix the issue. I had not been involved in the hardware aspects of the REH CPU280 so i send the code to Tilman Reh for further investigation. Thats all i can tell you.
I was more interested in UZI280 and since UZI280 did not even had a FD driver, and since i did boot directly from EPROM into UZI280, i never run into that problem.

Quote: I would love to see UZI280 ported to Z280RC!

Theoretical all that has to be done is to write a HD driver or any other mass storage driver for it. Besides some adaption to memory size and location in the config file.

Subject: Re: Interested in a Z280 SBC
Posted by fritzealink on Tue, 19 Jun 2018 18:40:52 GMT
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Quote: I ran across a bug called SNC (Stefan Nitschke Chaos)
https://www.retrobrewcomputers.org/forum/index.php?t=msg\&\;goto=4410\&\;srch=chaos#msg_4410
Hey Fritz you are fast. Thank you!

The UZI280 kernel sources with a MIT license can be downloaded from Fritz's server at http://oldcomputers.dyndns.org/public/pub/rechner/zilog/z280/uzi280/index.html

that's why I'm called fritzeblink on some planets in the universe.

File Attachments
1) UZI280.jpg, downloaded 103 times
2) hc_3277.jpg, downloaded 721 times

New version of the Z280 assembler just released (beta 8, download link same as before).

Fixes, changes, etc:
- sending listing directly to the printer (LPT: device) should work correctly now. nested < > s allowed in IRPC macros. new command-line options /Z0, /Z1 and /Z2 to set the initial target CPU type to Z80, Z180 and Z280 respectively. fixed a bug in IFIDN/IFDIF string comparison. fixed 'ldw ix,(ix+n)' and 'ldw (ix+n),ix' instructions, where n is a 8-bit constant: they no longer produce a syntax error and the expected object code is generated. Thanks to Tony Nicholson (the only beta tester?) who found the bug. added .LFCOND and .SFCOND as shortcuts for LIST COND and LIST NOCOND respectively, for compatibility with M80.
New version of the Z280 assembler just released (beta 9, download link same as before).

Fixes, changes, etc:
implemented NUL operator for compatibility with RMAC and M80.% in MACRO arguments can be followed by an expression, not just a variable name.force output of label value (current PC address) to the listing if the label is the only thing on a line. The label also appears in MACRO expansions in .XALL mode even if no object code is generated (M80 does the same).EXITM restores conditional level to the state before MACRO invocation.errors in arguments of IF statements were detected but not indicated on the listing.fixed processing of DEFS statements and External references inside a .PHASE/.DEPHASE block (the relevant segment information is now correctly output to the REL file).IRPC bug fix: if the argument was not enclosed in angle brackets <>, the first char of the string was being forced to uppercase.fixed processing of LOCAL statements inside nested MACRO definitions.

hperaza wrote on Tue, 10 July 2018 05:55

Nice work. Can't beleive 40 year old software is still evolving. Have you considered speaking to Wayne W about using this as the assembler for ROMWBW so that it gets some production use?

Regars Phil

Hi all,

I have attempted to enter the original CPU280 schematics from the CPU280 hardware manual into KiCad (Eeschema). I would appreciate it if someone would have a look at it. Note that I did not convert the original Eagle files, I drew the design anew.
I also made a board layout in Pcbnew and ran it though freerouter, mainly to catch mistakes I
made.
The Gerbers are included, but don't use them for production please.

The custom library parts and footprints are included in the 'lib' folder. Please make sure the library is at the top of your list, as some designs are corrected from the original library, in particular the ECB bus connector C64AC.

Happy bughunting
Rienk

File Attachments
1) CPU280.zip, downloaded 64 times

Subject: Re: Interested in a Z280 SBC
Posted by Andrew B on Tue, 10 Jul 2018 15:53:07 GMT
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I have a little bit of a request for someone with the CPU280. I haven't had time to build a CPU280 myself, but this is one of my favorite threads on the forum. I love that the community has come together to bring back a historic homebrew computer design. Especially with the Z280, because I frequently wonder what would have happened in the modern CPU space if Zilog has been successful with CPUs after the Z80.

For a while now I have wanted to update the image on the front page of the wiki - perhaps even rotate it every 1-3 months to highlight a different project. The random cell phone picture of my Zeta is kind of sad in my opinion.

Would one of the CPU280 owners be able to take a suitable 'promotional' picture of their CPU280 running, (preferably with a terminal setup and as much other associated hardware as possible) that I could use for the front page of the wiki? Really go nuts and show off your work. We can make it the '3rd quarter 2018' image from July-September

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Wed, 11 Jul 2018 01:18:08 GMT
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Hello all!

I'm currently tinkering with one of Bill Shen's Z280RC boards and porting software with the aim to get a banked-memory CP/M-Plus running. I've been using Hector Peraza's new ZSM4 and
building software natively.

[To get around restrictions on posting URLs for this message (my first posting here), I'll put the rest of the details in the next message]

---

Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Wed, 11 Jul 2018 01:20:08 GMT

[Continued - my second posting here can have URLs (I hope)]

For the past few days I have spent the cold(ish) Australian winter evenings translating the comments in the CPU280 SYSTEM source files at https://github.com/wwarthen/CPU280 from German into English! Studying this source-code is giving me a better idea of what's involved with running CP/M-Plus using System/User modes on the Z280!

I thought these files might be of interest to other Z280 tinkerers - so they're available on Github at

https://github.com/agn453/cpu280-english

---

Subject: Re: Interested in a Z280 SBC  
Posted by plasmo on Wed, 11 Jul 2018 02:55:52 GMT

Tony,
I downloaded the files from your github, xmodem them into my Z280RC. Downloaded Hector Peraza's latest (beta 9) zsm4. Ran the build.sub and everything assembled correctly in my native Z280RC CP/M2.2 environment. Cool! What's the next step?

Bill

BTW, welcome to RetroBrew Computer Forum!

---

Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Wed, 11 Jul 2018 05:37:50 GMT

Bill,

The resulting .REL files can be linked according to the procedures outlined at https://github.com/wwarthen/CPU280/ and in section 5 of the cpu280_software-manual_en.pdf
from the CPU280 project page at

My interest in translating the original sources into English was so that I could examine the
System-mode and User-mode techniques in the CPU280 CP/M-Plus banked memory BIOS. This
is the only example that I have found online for a Z280 MPU.

It is not for your Z280RC board.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 11 Jul 2018 17:17:01 GMT
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Wow, so many replies, so little time....

Tony, just wow! Those translated comments are going to be so nice. Thank you!

Rienk, thanks so much for taking the time to redraw in kicad. I haven't had time to look through
the files as yet, but I will be doing so as soon as I can.

Andrew, my CPU280 isn't really photogenic right now, but Wayne posted a nice photo of his setup
upthread, but I believe you're looking for a bit more than what's in that photo. I'm glad you're
enjoying the thread!

Bill, again, just wow! Your enthusiasm for the Z280 is so very gratifying to me.

Hector, the assembler is coming along nicely I see! I'm looking forward to the source being
available.

All, this has been a team effort, for sure, and I thank you all for all of your help!

Subject: Re: Interested in a Z280 SBC
Posted by b1ackma1er on Thu, 12 Jul 2018 13:57:40 GMT
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rhkoolstar wrote on Tue, 10 July 2018 08:35
Happy bughunting
Rienk

Data lines appear to be swapped here:
Well spotted!

I'm not sure however. I used the pin names (and the system), not the pin numbers. One of them is wrong. I have to check the original Gerber to see which one was intended.

Thanks anyway, I will let you know.

Rienk

The pin number version is correct. I corrected the schematics.

I wonder however if that is what Tilmann Reh intended. There seems to be no benefit to routing the design with those pins swapped. Both versions will work.

Rienk

There was something I was meaning to ask:
The schematics are version 130192
The Gerber is version 130192a
Is this significant?

Rienk

Subject: Re: Interested in a Z280 SBC
Posted by ale500 on Sat, 14 Jul 2018 13:17:52 GMT
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I'd like to build one Z280 SBC too. I got 2 Z280s from aliexpress, they are the 10 MHz variant. VCC and GND pins seem to be at the right position, I mean there is continuity between them...
I just want to use some SRAMs and maybe a uC as ROM emulator.

Subject: Re: Interested in a Z280 SBC
Posted by b1ackmai1er on Sun, 15 Jul 2018 05:35:45 GMT
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rhkoolstar wrote on Tue, 10 July 2018 08:35
Happy bughunting
Rienk

Incorrect Data line here:

File Attachments
1) CPU280-2.png, downloaded 492 times

Subject: Re: Interested in a Z280 SBC
Posted by rhkoolstar on Sun, 15 Jul 2018 06:55:31 GMT
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Oops, thanks.

is D3 now.

I realize I neglected to include a .pdf version of the design. people without a working KiCad are being left out, sorry about that
also corrected.
Subject: Re: Interested in a Z280 SBC  
Posted by Wayne W on Mon, 06 Aug 2018 03:14:01 GMT  

Hi Folks,

Sorry for the delay, but I have finally gotten caught up on the work to integrate changes into the CPU280 GitHub repository at https://github.com/wwarthen/CPU280. For now, I have added a temporary branch called "zsm" while all of the changes are confirmed/tested. I will merge this temporary branch back into the master branch at some point in the future.

In the zsm branch, I integrated the ZSM4 work from Hector Peraza. The ZSM4 binary was updated to the latest beta 9 release.

Also in the zsm branch, I integrated the English language conversion of comments from Tony Nicholson. I confirmed that Tony’s changes resulted in exactly the same byte-for-byte binary output.

Everything seems to be working fine for me at this point, but I was hoping that some others could confirm this.

Note that I updated the version number to 1.21. Please be certain that you retrieve files from the zsm branch for testing.

Thanks!

Wayne

Subject: Re: Interested in a Z280 SBC  
Posted by lowen on Tue, 28 Aug 2018 12:41:40 GMT  

It's been a little bit since I last posted parts status on the thread, so here goes:
I have four IDE boards available, and nine CPU280 boards. I think I have enough parts on-hand to send out three or four hard-to-find parts kits, limited primarily by my stock of COM81C17 chips (I tend to keep a small amount on-hand of these chips and order only when needed). I do have over 20 Z280 CPUs on-hand, so if you need a Z280 for a different project (such as building one of Plasmo's neat RC2014-compatible boards) I can help out with that.

I've put my CPU280 in storage for a bit as I work on my home computer lab room relocation, but I...
can pull it out if needed on relatively short notice, and will be setting it up semi-permanently in my lab once I'm done with the work on the lab space, and then I'm going to get back on the UZI280 items that I've had on my list for quite some time.

Do I owe anyone a set of boards or a kit at this time? I think I got everyone's stuff shipped out, with no outstanding orders, but I want to make sure.

Also, I want to just mention how wonderful it has been to see all the interest in the Z280, particularly from hperaza and plasmo, and now that etchedpixels has a Z280 in-hand I really look forward to a FUZIX for Z280.....

Andrew B, did anyone get a set of photos to you?

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Tue, 28 Aug 2018 19:42:39 GMT

lowen,
Thank you for bringing back Z280 from the grave and introducing this interesting processor to me. I've been working with it for the last 9 months or so and I believe it is a rock solid CPU packed with numerous modern features. It is readily available from UTSource at a very good price. It can be reliably overclocked to 29.49MHz beyond the nominal 24MHz and most of them works at 33MHz. In 8-bit mode it is fully compatible with Z80, but retain just about all its extended instructions and enhanced features. The UART bootstrap is a really interesting feature, it really help me bring up new designs with nothing more than Z280, clock and RAM. I've incorporated the UART bootstrap as a feature for all my three Z280 designs. It serves as a backdoor to diagnose the board and a mechanism to load/reload core software.

I just registered on Z88dk forum and put in a request for Z280 version of Z88dk. I hope etchedpixels is working on the Z280 version of FUZIX and I'm certainly very interested in UZI280. I also believe (haven't tried it yet) that MP/M and CP/net should work very well on Z280 as well as other multiprocessing ideas. May Z280 lives long and prosper!

Bill

PS, What do you think of selling Z280 on eBay with nominal markup for S&H and eBay fee? It is a way to advertise the availability of the device and faster shipping to USA destinations.

PPS, I still have 5 blank ZZ80RC pc boards. The offer to mail a complimentary board to USA address is still valid.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 28 Aug 2018 19:49:36 GMT

lowen,
Thank you for bringing back Z280 from the grave and introducing this interesting processor to me. I've been working with it for the last 9 months or so and I believe it is a rock solid CPU packed with numerous modern features. It is readily available from UTSource at a very good price. It can be reliably overclocked to 29.49MHz beyond the nominal 24MHz and most of them works at 33MHz. In 8-bit mode it is fully compatible with Z80, but retain just about all its extended instructions and enhanced features. The UART bootstrap is a really interesting feature, it really help me bring up new designs with nothing more than Z280, clock and RAM. I've incorporated the UART bootstrap as a feature for all my three Z280 designs. It serves as a backdoor to diagnose the board and a mechanism to load/reload core software.

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Bill

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PPS, I still have 5 blank ZZ80RC pc boards. The offer to mail a complimentary board to USA address is still valid.
plasmo wrote on Tue, 28 August 2018 15:42

Thank you for bringing back Z280 from the grave and introducing this interesting processor to me.....

You're welcome; it has been very encouraging to me to watch you run with it like you have!

Quote:....May Z280 lives long and prosper!

Indeed! If Z88dk and thus sdcc get a good port, we'll really be one our way.

Quote:PS, What do you think of selling Z280 on eBay with nominal markup for S&H and eBay fee? It is a way to advertise the availability of the device and faster shipping to USA destinations.

If you throw in 'tested' into the mix I think it would be well worthwhile, for a moderate markup plus S&H.

Quote:PPS, I still have 5 blank ZZ80RC pc boards. The offer to mail a complimentary board to USA address is still valid.

I've been waiting to see if others want them first, but if you don't get any takers put me in for one, and you have my address. I'm a sucker for another Z280 machine, especially if etchedpixels ports FUZIX to it.. (hi, Alan!... but I want others to have first dibs, since I have running Z280 systems, just not the RC2014-compatible one.

lowen wrote on Tue, 28 August 2018 13:49

I've been waiting to see if others want them first, but if you don't get any takers put me in for one, and you have my address. I'm a sucker for another Z280 machine, especially if etchedpixels ports FUZIX to it.. (hi, Alan!... but I want others to have first dibs, since I have running Z280 systems, just not the RC2014-compatible one.

OK, I'll mail one out to you tomorrow. It is a single board computer, so it doesn't really need the RC2014 backplane. You don't need to populate the RC2014 connector or you can wire it for other type of expansion.

Bill

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Tue, 28 Aug 2018 21:14:00 GMT

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I've been waiting to see if others want them first, but if you don't get any takers put me in for one, and you have my address. I'm a sucker for another Z280 machine, especially if etchedpixels ports FUZIX to it.. (hi, Alan!... but I want others to have first dibs, since I have running Z280 systems, just not the RC2014-compatible one.

OK, I'll mail one out to you tomorrow. It is a single board computer, so it doesn't really need the RC2014 backplane. You don't need to populate the RC2014 connector or you can wire it for other type of expansion.

Bill
I've started scoping the work. Much of the hard stuff is in the two Z280 UZIs.

First need though is to get the assembler with SDCC to do Z280 as well as the current stuff. The compiler is less pressing as Z80 code while not as efficient isn't that much worse the way SDCC generates it.

MP/M should work fine on that board. Now the crazy hack would be to virtualize it given the CPU can I think do that sufficiently well and run multiple copies of CP/M and MP/M at once. That one is not on my TODO list!

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Tue, 28 Aug 2018 23:27:53 GMT
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etchedpixels wrote on Tue, 28 August 2018 14:14 First need though is to get the assembler with SDCC to do Z280 as well as the current stuff. The compiler is less pressing as Z80 code while not as efficient isn't that much worse the way SDCC generates it.

John Coffman implemented a complete Z280 version of the SDCC assembler.

-Wayne

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 29 Aug 2018 00:42:45 GMT
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etchedpixels wrote on Tue, 28 August 2018 15:14 I've started scoping the work. Much of the hard stuff is in the two Z280 UZIs.

First need though is to get the assembler with SDCC to do Z280 as well as the current stuff. The compiler is less pressing as Z80 code while not as efficient isn't that much worse the way SDCC generates it.

Exciting!

etchedpixels wrote on Tue, 28 August 2018 15:14 MP/M should work fine on that board. Now the crazy hack would be to virtualize it given the CPU can I think do that sufficiently well and run multiple copies of CP/M and MP/M at once. That one is not on my TODO list!
My first version Z280 has 16 meg of memory, so it is conceivable to have 8 virtual MP/M in memory, each having 2 meg of memory (each have 1.5meg+ of RAMdisk). It can have fun talking to each others. It is Z280 with Multiple Personality Disorder!

Bill

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Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 29 Aug 2018 01:46:43 GMT

lowen wrote on Tue, 28 August 2018 13:49plasmo wrote on Tue, 28 August 2018 15:42PS, What do you think of selling Z280 on eBay with nominal markup for S&H and eBay fee? It is a way to advertise the availability of the device and faster shipping to USA destinations.

If you throw in 'tested' into the mix I think it would be well worthwhile, for a moderate markup plus S&H.

Put one on eBay with 10-day auction format so to advertise it longer. Shipping is almost as expensive as the part, sigh!
https://www.ebay.com/itm/302862233411

---

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Wed, 29 Aug 2018 10:29:28 GMT

I saw mention of that assembler last November but even Google couldn't find me any actual link to it.

Alan

---

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Wed, 29 Aug 2018 15:22:49 GMT

The Z280 assembler (Linux/64-bit) version is here:

https://drive.google.com/file/d/12Jla5GowASWdi7sQprKJOLB1zRB ap5cU/view?usp=sharing

It is compiled with sdcc-3.6.0. "sdasz280" should be a replacement for "sdasz80".
The zip file contains the Linux executable, source code, and (PDF) manual.

--John

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Wed, 29 Aug 2018 16:05:27 GMT
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RE: sdasz280

Wording clarification: "sdasz280" is compiled as part of sdcc-3.6.0. The previous message could be mistaken to read that "sdcc" compiles the code. The assembler is a cross-assembler running on a larger host to compile/assemble for the Zilog chips.

BTW: sdasz280 may be used as a back-end for the C-compiler; however, the C-compiler does not produce Z280 opcodes.

--John

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Wed, 29 Aug 2018 16:51:57 GMT
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Thanks, John!

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Wed, 29 Aug 2018 17:49:43 GMT
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Thanks a lot. That helps hugely. Is there any reason I shouldn't merge this into my sdcc hacking tree on github so I can start hacking on some of the more basic compiler changes? I've done some bits of sdcc hacking so I'm fairly sure I can get some of the more basic improvements for Z280 into it.

Alan

Subject: Re: Interested in a Z280 SBC
Posted by jcoffman on Wed, 29 Aug 2018 20:21:09 GMT
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The Z280 assembler "sdasz280" is released under the GPL 3.0. Do with it what you wish.

BTW: the source must be compiled within the SDCC-3.6.0 folder hierarchy, since SDCC general assembler components are used. The "asz280" folder needs to be in the same source folder as "asz80", folder "sdas" I believe.

--John

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 31 Aug 2018 18:04:05 GMT
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etchedpixels wrote on Tue, 28 August 2018 17:14I've started scoping the work. Much of the hard stuff is in the two Z280 UZIs....

Nice to see some code for Z280 entering git for FUZIX!

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sun, 02 Sep 2018 20:32:14 GMT
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I was having a lot of fun trying to get any sense out of the disk interface or the supplied card. Then I realised what was going on. The interface is byteswapped. Everything on it is backwards - the words are byteswapped.

Unfortunately I now have a different question. The CP2102 USB serial widget connecting it went pop. The system was just minding its own business not even plugged into a bus when poof, USB disconnects saying the adapter is no longer responding - and that USB adapter is indeed terminally dead even if unplugged from the board and plugged into different machines. The Z280RC also isn't talking to me over any other USB adapters either now (although it's not blown any more up)

I've tried the obvious things. I've rewritten the CF card, I've tried loadngo in serial mode. Any diagnostic recommendations to work out wtf happened?

Alan

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 02 Sep 2018 21:43:14 GMT
Alan,
Yes, the upper byte & lower byte of CF interface are swapped. I finally realized that a couple months ago when trying to make sense out of CF manufacturer ID. When I designed the hardware I naively connected Z280's D0-D7 to CF interface's D0-D7 and Z280's D8-D15 to CF interface's D8-D15. It took me a long while to realize that Z280's D8-D15 is the least significant byte of a word access while D0-D7 is the most significant byte. It is all very confusing, but as long as you don't transfer data between PC and Z280RC by physically moving the CF disk between the two machines, the byte-swap-ness is not a problem. It appears, however, you are moving CF disk between PC (sorry, I believe you are a Linux guy), and Z280? If so, I need to think more about the byte swap issue.

However, the immediate problem is your Z280RC not working starting with a non functioning CP2102. How was the Z280RC powered when CP2102 died? Did you have a separate power supply via the 2.1mm x 5.5mm power plug? If you can measure the current, the nominal current when running at standalone mode is 300mA-350mA. Make sure your voltage is between 4.8V to 5.3V. There is a voltage supervisor on-board that'll force a reset when voltage is below 4.6V. When initially powered on (or pressing the reset button), you should see a brief flash of CF activity LED indicating CF is bootstrapping (this is assuming bootstrap jumper, T5, is inserted).

The serial port only needs ground, Transmit and Receive. So that's all you need to connect when using a different USB-to-serial adapter.

That's all for now. I'll go think about this problem more...

Bill

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 02 Sep 2018 22:13:54 GMT

Alan,
Here is a close up of the Z280RC serial connector. When the board is working, you should see a short flash on the LED and quick burst of activity on the TX pin which is when the Z280 send out the sign-on message. RX, TX and Ground are all you need to hook up to a new USB-to-serial adapter. If Z280RC is not powered via the USB adapter, disconnect the 5V jumper, T3 (the jumper block is not installed in this picture). If Z280RC is powered via the USB adapter, measure the voltage to make sure it is between 4.8V and 5.3V.

What kind of trouble-shooting instrument do you have?

Bill

File Attachments
1) Z280RC_serial_conn.jpg, downloaded 94 times
It was powered by the CP2102 that went phut.

I've tried it with a couple of other adapters including another CP2102. When it powers on I see no serial output and the blue light on the CF stays on but I can't remember if that was what it always did.

Instruments - basic logic analyzer, voltmeter, frequency meter.

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 03 Sep 2018 01:07:00 GMT
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Alan,

The CF activity light (the blue or red LED on the small CF adapter board) should not stay on very long. When power up or manual reset, the hardware state machine in CPLD keeps Z280 in reset while issuing a CF read command to boot sector of the CF. It waits for the CF data to be ready (that's when CF activity light turns on), remaps the CF read register to 0x0 and releases Z280 reset. Z280 executes the data stream coming out of the CF data FIFO (a tricky piece of code) and completes the bootstrapping process and clean up the mess created by the hardware state machine, if all goes correctly.


When the CF activity light stays on, it most likely means the CPLD state machine is able to set up the boot sector of CF in read mode but Z280 can't execute the code correctly, possibly because the bootstrap code is corrupted. So we need to rewrite the boot sector in UART bootstrap mode:


It is important to add 1 ms delay to every line and enable transmission of binary data to send "loadnrun.run".

Before you try that, I like you to power Z280RC with a separate 5V power supply (be sure to remove the 5V jumper, T3). This is because while the nominal current of Z280RC is 300-350mA, but peak current when read/write CF disk may be higher. The USB-to-serial adapter may not be able to source that much current or not able to keep 5V in good regulation even if it can source the current. Powering Z280RC with USB-serial adapter only works for me intermittently, I don't trust it.

Bill

PS, "loadnrun.run" is a bit of magic. I will dig out the two files that were combined to make
loadnrun.run and attach them later.

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 03 Sep 2018 01:38:55 GMT
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Alan,
If for some reason the 'loadnrun.run' won't load & run, I want you to try the slightly different version
of the two separate files that make up loadnrun.run. It is not necessary to set the terminal line
delay to 1ms when loading these two files separately. You do need to be able to send binary file
for the first file.

Tinyload.bin is a binary file that contains the 256 bytes of Z280 instructions for UART
bootstrapping. Your terminal is set to 115200, odd parity, 8 data bit, 1 stop bit and no handshake
(this is the normal terminal setting for Z280RC) and you send it as binary data. You should see
this response:

TinyLoad 1
G xxxx when done

At this point send 'ZZMon.hex' as text file. you'll see this:

............................................................................................................................................................
.............UX

then type 'Gb400' <-- capital 'G', you will NOT see 'b400' echo back. You'll see this response:

TinyZZ Monitor v0.99 6/9/18

>

type 'c0' to copy bootstrap software into the boot sector:

>copy to CF
0--boot,
1--User Apps,
2--CP/M2.2,
3--CP/M3: 0 press Return to execute command

>

You can now insert the bootstrap jumper, T5, and boot normally.

Good luck!
Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Mon, 03 Sep 2018 15:54:31 GMT

Thanks I will give this a go. I'm going to wait a few days so I can finish adding the regulator and
bits to my backplane then set up a proper power supply and eliminate that.

I did try loadngo but I didn't have the delays.

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Mon, 03 Sep 2018 15:58:42 GMT

plasmo wrote on Sun, 02 September 2018 14:43
 Alan,
 Yes, the upper byte & lower byte of CF interface are swapped. I finally realized that a couple
 months ago when trying to make sense out of CF manufacturer ID. When I designed the
 hardware I naively connected Z280's D0-D7 to CF interface's D0-D7 and Z280's D8-D15 to CF
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 byte of a word access while D0-D7 is the most significant byte. It is all very confusing, but as long
 as you don't transfer data between PC and Z280RC by physically moving the CF disk between the
 two machines, the byte-swap-ness is not a problem. It appears, however, you are moving CF disk
 between PC (sorry, I believe you are a Linux guy), and Z280? If so, I need to think more about
 the byte swap issue.

I can byte swap in software. I'd rather do that than have a world where we have a mix of swapped
 and not swapped boards, that way lies madness.

It's far from unique. A lot of the older 68000 adapters were byteswapped for some reason (eg on
 the Amiga)

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Wed, 05 Sep 2018 09:43:52 GMT
etchedpixels wrote on Mon, 03 September 2018 08:58I can byte swap in software. I'd rather do that than have a world where we have a mix of swapped and not swapped boards, that way lies madness

I'd get that right on the hardware side, especially since the Z280RC design is not fully mature yet.

Byte swapping can be done at the Linux/Windows side or at the Z280RC side, and both cases have disadvantages:
- If done at the Linux side, then the disks will not be compatible with e.g. CPU280 or P112 (more madness.)
- If at Z280RC side, then you'll lose performance and all the advantages that Z280 16-bit transfers provide. The byte-swapping operation itself can get complicated if you are using DMA transfers to a memory page that is out of the current context.

One other thing that the Z280RC needs is handshake lines for the serial port. The default 115200 rate is way too fast to be usable without handshake, especially by CP/M applications. Since the Z280 UART lacks a FIFO, many characters tend to get lost to the point that e.g. XMODEM does not work, and text editors cannot process terminal arrow keys that generate multi-character escape sequences. Even when using interrupt mode, buffer overrun will happen rather quickly. Lowering the speed down to a more manageable 9600 baud will still lead to occasional character loses.

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Wed, 05 Sep 2018 14:18:44 GMT

I guess it depends how many more will exist. If we do get both endian though can we please have a way to tell whether to use byteswap/8bit mode or just direct?

For the UART you don't need a FIFO and the Z280 doesn't have one because it supports DMA mode. While you might ultimately want some flow control anyway (and you can always do XON/XOFF if needed) the overruns from things like escape sequences are just a software setup thing. In DMA mode it'll not be an issue unless you run out of DMA space. The DMA goes to physical addresses so the uart buffers don't even need to live in the normal address space, so even crazy stuff like 4 or 8K buffers ought to be doable.

Alan

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 05 Sep 2018 19:30:25 GMT

I checked my record and there are 18 Z280 boards out there. So I need to provide a reasonably software-only CF compatible solution for the existing Z280 boards. I think doing byte swapping
using Z280 is a reasonable fix. The current BIOS only have 4 CF drives, so it can be easily expand to 8 CF drives such that the new CF drives F: to I: are byte swapped. To transfer the files between Z280RC & PC, you can copy the drives from A-D to F-I and access drive F to I as CPU280/P112 compatible images.

I'll do some testing with byte-swapping by Z280. My feeling is the penalty of byte swap is not really that noticeable.

As far as hardware handshake for the UART goes, Alan is quite right that the UART is supported by DMA. Of the 4 internal DMA channels, two are designed for DMA of UART transmit & receive. Of the existing 2 meg memory, 1.5 meg is for RAM disk, 256K is reserved for banked CP/M3 and there are 256K of spare memory I don't know what to do. So UART DMA can use some of the 256K spare memory. I'm not using DMA for UART right now because I didn't think there is a need. The XMODEM program in drive A: does a good job of file transfer at 115200 baud (the command I use is a:xmodem filename /r/c/z1). For large number of files or an entire disk image, I use CPMTOOLS to put together a disk image for the RAM disk and use the file load function of ZZMon to load the disk image into RAMdisk.

Please let me know if there is a specific CP/M software that is problematic with Z280's UART. I would like to work on a solution for it.

Bill

hperaza wrote on Wed, 05 September 2018 03:43etchedpixels wrote on Mon, 03 September 2018 08:58I can byte swap in software. I'd rather do that than have a world where we have a mix of swapped and not swapped boards, that way lies madness

I'd get that right on the hardware side, especially since the Z280RC design is not fully mature yet.

Byte swapping can be done at the Linux/Windows side or at the Z280RC side, and both cases have disadvantages:

If done at the Linux side, then the disks will not be compatible with e.g. CPU280 or P112 (more madness. If at Z280RC side, then you'll lose performance and all the advantages that Z280 16-bit transfers provide. The byte-swapping operation itself can get complicated if you are using DMA transfers to a memory page that is out of the current context.

One other thing that the Z280RC needs is handshake lines for the serial port. The default 115200 rate is way too fast to be usable without handshake, especially by CP/M applications. Since the Z280 UART lacks a FIFO, many characters tend to get lost to the point that e.g. XMODEM does not work, and text editors cannot process terminal arrow keys that generate multi-character escape sequences. Even when using interrupt mode, buffer overrun will happen rather quickly. Lowering the speed down to a more manageable 9600 baud will still lead to occasional character loses.
Subject: Re: Interested in a Z280 SBC  
Posted by etchedpixels on Wed, 05 Sep 2018 21:03:48 GMT  
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I saw the overrun problem with things like VDE, simply because anything that uses VT100/ANSI cursor keys the arrow keys etd send 3 bytes. On the RC2014 Z80 it's fine because the CPU can't keep up but the UART has a 3 byte FIFO and it can read the FIFO content before I can hit another button.

Incidentally my experience is that handshaking alone won't fix it because by the time most modern systems respond to a handshaking signal they have sent at least one more byte that goes down the bit bucket.

Alan

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Subject: Re: Interested in a Z280 SBC  
Posted by hperaza on Fri, 07 Sep 2018 09:11:35 GMT  
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I'm aware that the Z280 UART supports DMA, but the problem is that the UART DMA mode is more suitable for packet-type transfers (e.g. network communications) than for the character-by-character transfers that applications normally use. It can also be tricky to program, and still it does not solve the problem: the buffer can get full before you have the time to process all the characters, and once again you are left with no way to tell the remote end to stop sending data.

Yes, you have the software XON/XOFF flow control, but unfortunately it can conflict with existing software (e.g WordStar) and you cannot use it with DMA mode anyway. It does not work either in the middle of a multi-byte escape sequence sent by a terminal.

Remember also that the lack of handshake lines affects the communication both ways. Thus, if you use a real VTxx terminal, you can also easily overflow its internal buffer (try e.g. the D DDT or SID command and see what happens).

I believe that two additional I/O lines are much easier to implement and to use for handshake than any DMA or XON/XOFF solution.

etchedpixels wrote on Wed, 05 September 2018 14:03:Incidentally my experience is that handshaking alone won't fix it because by the time most modern systems respond to a handshaking signal they have sent at least one more byte that goes down the bit bucket. If you use interrupts, you can have a circular buffer and lower the CTS line when the buffer is e.g at 75% then raise it again when the buffer is at 50%. On the CPU280 and the P112 that works like a charm.
plasmo wrote on Wed, 05 September 2018 12:30: I checked my record and there are 18 Z280 boards out there. So I need to provide a reasonably software-only CF compatible solution for the existing Z280 boards. I think doing byte swapping using Z280 is a reasonable fix. The current BIOS only have 4 CF drives, so it can be easily expand to 8 CF drives such that the new CF drives F: to I: are byte swapped. To transfer the files between Z280RC & PC, you can copy the drives from A-D to F-I and access drive F to I as CPU280/P112 compatible images. That could only add to the confusion. Personally, I'm contemplating desoldering the CF interface and adding a narrow adapter PCB that swaps the data bytes.

Quote: The XMODEM program in drive A: does a good job of file transfer at 115200 baud (the command I use is a:xmodem filename /r/c/z1).

Please let me know if there is a specific CP/M software that is problematic with Z280's UART. I would like to work on a solution for it. XMODEM is actually the first program that failed for me. I could make it work only after I modified the Linux sources to add a delay after every single char sent. Other affected programs are VDE, WordStar, etc.

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Fri, 07 Sep 2018 10:42:31 GMT

DMA isn't actually very hard to use for normal serial I/O, providing you use flip buffers rather than try and be too clever.

Basically every timer interrupt you flip the DMA back and forth between different buffers and empty the other one. If there's no room to empty it you assert flow control. At 115,200 it's sufficiently hard to hit the needed back to back timings that I think you pretty much have to use DMA mode. It also saves you an awful lot of CPU cycles.

The point I was trying to make about the flow control is that you have to have something buffering. You can't receive a byte, instantly jam on flow control and then process it. Which means you have to buffer, which means you have to meet back to back byte timings which for a Z280 at 115,200 means you really need to be doing DMA.

Your point about output is a good one.

I've been playing with the byteswapping on a different afflicted platform and it seems that for CF at least you can reliably detect a byteswapped interface. Classic IDE is harder because IDENTIFY is an optional command and you can't use 8bit mode there to see which byte the data appears on as that's a CFA feature.
Subject: Re: Interested in a Z280 SBC  
Posted by will on Fri, 07 Sep 2018 11:04:07 GMT  
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Just a quick comment about DMA for serial I/O -- I use the RS-422 port on the Mark IV SBC in DMA mode with FATPIPE and I can reliably achieve baud rates of 576,000bps. Once nice thing about DMA serial is that you can overlap I/O, ie be reading/writing a block of data to the disk interface with the CPU while the serial port is receiving another block of data in the background.

Subject: Re: Interested in a Z280 SBC  
Posted by plasmo on Fri, 07 Sep 2018 12:12:11 GMT  
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hperaza wrote on Fri, 07 September 2018 03:31  
XMODEM is actually the first program that failed for me. I could make it work only after I modified the Linux sources to add a delay after every single char sent. Other affected programs are VDE, WordStar, etc.

I need to try VDE and WORDSTAR and see what I can do to fix the buffer problem.

I'm puzzled by your problem with XMODEM. I'm a Windows user and unfamiliar with Linux version of XMODEM. I can see if XMODEM won't work or is very slow, then file transfer via CF is the fall back solution and that's why CF byte swap problem becomes a serious issue. I have not encountered problem with XMODEM so I was blinded to the CF byte swap issue. I always thought it is a big hassel to move CF disks around and use CPMTOOLS to add/extract the desired file from the disk image.

I assume you are using the XMODEM already installed on drive A? For receiving, be sure to include the /Z1 option that will wait for 15 seconds before start file transfer which give you more time to look for software. For large collection of files, I use Grant Searle's binary-to-CPM package program (it is a Windows program) to aggregate multiple files, transfer it via XMODEM (normally to RAMdisk, drive E:), and then use depkg.com to restore the individual files. The transfer rate is quite decent--I just did a transfer of zork123.pkg and the date rate is 8.5KB/second, so it takes about 60 seconds to transfer a half meg file.

Bill

Edit: Played with XMODEM options a bit. It turns out including the /z1 option is quite important. Without it, you need to be very quick starting the file upload or the program will hang; furthermore, it would work with file size up to 56K, but will hang for file larger than 56K.
Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Fri, 07 Sep 2018 12:48:37 GMT

[quote title=hperaza wrote on Wed, 05 September 2018 02:43]etchedpixels wrote on Mon, 03 September 2018 08:58
Even when using interrupt mode, buffer overrun will happen rather quickly. Lowering the speed down to a more manageable 9600 baud will still lead to occasional character loses.

Occasional character loss at 9600 baud in interrupt mode? Sounds strange to me. IIRC with UZI280 i used the UART in interrupt mode up to 38400 baud without any character loss from a VT100 like terminal with multi-character escape sequences.

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Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Fri, 07 Sep 2018 12:49:26 GMT

The Linux serial drivers are banging bytes out back to back at 115,200. I guess the Windows xmodem you are using isn't quite so efficient. Xmodem can't cope if at least one byte is lost every block transferred which seems to be the case. The RC2014 Z80 struggles a bit too - I've likewise got a 'slow download' tool I use with it.

Alan

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Subject: Re: Interested in a Z280 SBC
Posted by lowen on Fri, 07 Sep 2018 13:20:26 GMT

Back in the day, with a 4MHz Z80 and straight IRQ-based serial on a TRS-80 model 4, we considered ourselves fortunate if we could sustain 9600, and a few people were able to get the communications routines fast enough that 19200 was just barely doable. As I recall that was the max the UART used by the TRS-80 Model 4 could go, and it was a reasonable fit for the TRS-80's speed.

I'm just seriously impressed that the Z280 can do 115,200 at all, much less reasonably well. I would think either 57,600 or 38,400 would be a reasonable speed, and the CPU280 defaults to 9600.

In update news, I'm getting ready to update the first post to include some information on plasmo's
Z280 builds as well as more current CPU280 information. And, inspired a bit by plasmo's work, I'm looking at finally actually doing what I had dreamed of and begun prototyping in 1990: a Z280, in Z80-bus mode, as an accelerator for a TRS-80 Model 4P. I'm looking a a clock-tripler circuit using a multitap digital delay line plus some XOR gates to do a completely synchronous multiplication, and using the Z280's direct clock input option, running the Z280 at 3x the TRS-80's bus speed and set up for two wait states for the lower 8MB and external I/O, and putting some local RAM on the board above 8MB at full speed. Thanks to the Z280's multiplexed bus, a 3x multiplier is actually a really good fit with either one or two wait states driving a 4MHz bus.

And, by all means, continue with the discussion of all things Z280 as you like; this thread is by no means CPU280-specific, even though it went that direction for quite a while. It's hard to believe it's been nearly two years, but plasmo did put together a new design Z280 SBC just like I was looking for in the first post.

That would certainly be a fascinating TRS80 addition. Even with the wait states is that going to be sufficient? The XLR8R had to jump through hoops to get a Z180 usable because of things like the really slow keyboard interface logic.

I am pondering something of the reverse. As the Z280 can fault supervisor instructions it's possible to use it as a virtualized Z80 platform so given the right software it ought to be possible to emulate a TRS80 on a Z280RC board by faulting any IN and OUT instructions to emulate them, and accesses to the 12-16K range ...

Alan

XLR8er did its thing well because the HD64180 had so many automatic wait states by default; in fact, the HD64180 with the default waits and running at 6.144MHz had trouble keeping up with disk I/O during boot. The chip that sometimes needed replaced was a 74LS245P, replaced with 74HCT245P, on the Model 4P it was U117 (specified as 74F245 on the schematic), and was the DRAM data bus buffer, not really having to do with the keyboard (the keyboard read was done by 74LS240, U58 on the non-gate-array 4P); the XLR8er manual even says that it has something to do with the keyboard (page 4 in the XLR8er manual).

With Z280, waits can be programmed at boot via jumper.
I think even at 12MHz and 1:1 bus speed, it should be possible to run with two waits; I always reserve the right to be wrong, of course, and the automatic waits can be programmed up to three. If that proves to be too fast, the Z280 can run at a 2:1 bus rate easily enough. The CPU280 has some pulse stretcher functionality for the ECB interface (along with Mode 2 IRQ RETI fetch support), and I may look at adapting that. It might just be simpler to run 2:1, of course!

Alan, your idea of the 'VZ80' mode is something I've been thinking about, and what I had actually been pondering for quite a while is a TRS-80 DOS emulation shim that could run under fuzix; it should be possible to emulate any of the I/III/4 line fairly easily. The keyboard could be trapped by using the MMU's Valid bit, but even in the 4K page mode the trap would be for anything from 3000H to 3FFFH; this would get 'ROM C' and the video, too, which might not be a bad thing. But I would probably do an emulation of the Model 4 LS-DOS first, since most routines in LS-DOS are accessed using a supervisor call mechanism

LD A,@SVCNUM
RST 28H

and trapping RST 28H would be easy. Then I could even run more than one LS-DOS emulator at a time..... and a port of LS-DOS to Z280 is something I'm going to do one of these days. I'm far better at Z80 assembler than at C, but it sure would give me a fun reason to beef up on my C.

Thanks, Alan, now I'm even more hungry to build this thing!

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Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sat, 08 Sep 2018 01:49:41 GMT
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etchedpixels wrote on Fri, 07 September 2018 06:49: The Linux serial drivers are banging bytes out back to back at 115,200. I gues the Windows xmodem you are using isn't quite so efficient. Xmodem can't cope if at least one byte is lost every block transferred which seems to be the case. The RC2014 Z80 struggles a bit too - I've likewise got a 'slow download' tool I use with it.

Alan

I looked at the data traffic and couldn't spot obvious delay in back-to-back serial data.

I set up the scope so it will repeatedly measure the duration of XMODEM packets. It is surprisingly consistently, the starting of a packet to the end of the packet is consistently 12.57ms with a jitter of about 35µS which is about 4 bit time at 115200 baud. This works out to be 132-bytes packet which correspond to the 3-bytes header, 128-byte data and 1 byte checksum of a XMODEM data packet. Some of the 'jitter' may in fact be the checksum values that looks like the stop bit. Based on the scope observation, I'd say the PC is able to transmit 132 bytes of serial data back-to-back without idling at 115200 baud. My serial data format is 1 start bit, 8 data bits, 1 parity (odd), and 1 stop.
Why can Z280RC handles 132 data packet from PC but not the same data packet from Linux machine is puzzling.

Bill

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sat, 08 Sep 2018 11:23:39 GMT
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etchedpixels wrote on Fri, 07 September 2018 03:42
The point I was trying to make about the flow control is that you have to have something buffering. You can't receive a byte, instantly jam on flow control and then process it. Which means you have to buffer, which means you have to meet back to back byte timings which for a Z280 at 115,200 means you really need to be doing DMA.
It was never my intention to use the handshake lines on a byte-by-byte basis without some sort of buffering. UART hardware handshake is often overlooked when designing a new system, but IMHO is something that always ought to be there, as is part of the protocol, albeit optional: if you don't need it then you can always disable it; but if you need it and you didn't implement the handshake lines, then you're in trouble. Putting it another way: it doesn't hurt to have it and I think the Z280RC will benefit from having one.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sat, 08 Sep 2018 11:34:59 GMT
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plasmo wrote on Fri, 07 September 2018 18:49
Why can Z280RC handles 132 data packet from PC but not the same data packet from Linux machine is puzzling.
Just did a quick test: switched the terminal program to use 2 stop bits (8O2) instead of 1, and XMODEM now works without having to insert any additional inter-character delays. Back to 1 stop bit and all I get is a bunch of "Retry 0: NAK on sector" as before. I guess that 115200 is just at the edge of what XMODEM+CP/M can handle. Minor variations of the clock frequency could explain why it works with your PC but not with mine.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sat, 08 Sep 2018 12:05:16 GMT
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stefan_n wrote on Fri, 07 September 2018 05:48
Occasional character loss at 9600 baud in interrupt mode? Sounds strange to me. IIRC with UZI280 i used the UART in interrupt mode up to 38400 baud without any character loss from a VT100 like terminal with multi-character escape sequences.
Depends on what you are doing. A text editor, for example, is not the most demanding sort of application. But if you are using a RT OS (UZI280 is not), then you know that any task can be
blocked by a higher priority one; and if the lower priority task was receiving data from the UART, then chances are that the input buffer will overflow if the task is blocked for too long, resulting in characters lost unless hardware handshake is used.

As for the terminal, my VT520 starts missing characters at 9600 baud when scrolling in 132x50 mode.

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Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sat, 08 Sep 2018 15:46:34 GMT
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Using a bigger power supply direct to the jack makes no difference

I've also verified the CF card bit for bit matches the original image. I've dumped and checked the first blocks match the expect asm source (byteswapped) and they do.

If I boot with the jumper off then nothing happens even if I use loadngo and run it slowly with gaps between each byte.

If I boot with the jumper on then I see a short pause and then the blue light but no other activity.

Alan

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Subject: Re: Interested in a Z280 SBC
Posted by wsm on Sat, 08 Sep 2018 16:34:15 GMT
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With all this discussion about data rates, I'm going to be a bit of a devil's advocate. The default speed I use on my Z180's is 115,200 to/from Win7/HyperTerm and I've never had an issue. That got me thinking about how fast a very basic 4MHz Z80 could handle XMODEM data. My conclusion is that 115,200 should NOT be a problem nor should 230,400. The 10MHz SIO should support 115,200 and I'd have to look at other UARTs for 230,400. The only assumption is that the UART has both a data register and a receive register i.e. addtional data can be received while valid data is still pending a read.

The real key is the software. While the original XMODEM certainly works it is "FAR" from optimized code with a subroutine call and extra logic PER BYTE. By definition, the XMODEM protocol has a built-in handshake to limit data flow and the sender should not be sending any additional data after a packet until it receives an ACK or NAK. The only real timing issue is with the receipt of a 132 byte packet.

The following snippet shows how a 4MHz Z80 can get a serial data byte in 15.5uS or 23us if the status check just misses the change and causes an extra loop. By my calculation, that equates to
43,478 Bytes/sec worst case. At 8,N,1 that’s 434,782 baud!

Perhaps someone can show me why my theoretical calculations are wrong.

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sun, 09 Sep 2018 00:07:52 GMT

Your loop JR is being taken so takes 12 clocks not 7. You should use JP for normally taken conditional loops as its 10 either way which would stabilize the worst case. The JP cases also let you test more bits directly (JP P/M etc). The timing then depends which bits you need to check, and if RLCA etc can be used (4 clocks not 7)

You also need a box where you have a timer interrupt (Z280 does but standard RC2014 does not), and to know how to mask any other interrupt sources.

The moment you do any of this your code isn’t portable. Some of the xmodem’s actually had overlays as did kermit - precisely for this kind of stuff.

The 6809 folks do even more insane things with drivewire. After all if your clocks are reasonably accurate then you can simply count tstates and do a mix of nop and fetches for the block transfer! For the SIO you’ve got a 3 byte input buffer which means you’ve got more timing play as well.

Alan

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 09 Sep 2018 01:45:49 GMT

etchedpixels wrote on Sat, 08 September 2018 09:46 Using a bigger power supply direct to the jack makes no difference

I’ve also verified the CF card bit for bit matches the original image. I’ve dumped and checked the first blocks match the expect asm source (byteswapped) and they do.

If I boot with the jumper off then nothing happens even if I use loadngo and run it slowly with gaps between each byte.

If I boot with the jumper on then I see a short pause and then the blue light but no other activity.

Alan
Alan,
Since the board survived the shipping process and was working, I don't think it needs a full visual inspection. However, I like you to look over the board carefully in the nook & cranny for possible trapped conductive particles. Does flexing and tapping on the board make any difference in its behavior?

I don't know what terminal software you are using, but I know I need to check the 'binary' option when sending TinyLoad file in TeraTerm or Z280 won't respond.

The CF LED turning on and staying on suggests the CPLD state machine is able to issue read command to CF, but Z280 can't finish the bootstrap task. Since you've verified the CF data is intact, I think Z280 is now the prime suspect. UART bootstrap is a different process that does not involve CF disk and the more complex part of the CPLD, but does require Z280 to respond to serial data stream and write data to DRAM. If you have a logic analyzer, I like you take off the bootstrap jumper and instrument two points and observe their behavior. In the first picture, channel 1 (probe on the left, closest to the CP2102 USB-serial adapter) is on the serial receive line and channel 2 is on Z280's Address Strobe. When sending TinyLoad file, you should see picture 2 & 3. Picture 2 shows the beginning of serial data stream upon receiving TinyLoad file; at the end of every byte of serial data received (channel 1), an Address Strobe (channel 2) pulse is generated which write data into memory. Picture 3 shows the end of the 256-byte serial stream and Z280 executes bootstrap instructions when Address Strobe is rapidly toggling. If you are able to see these pictures, then Z280 is at least responding to bootstrap stream and we can move on to next step.

Bill

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File Attachments
1) DSC_37700908.jpg, downloaded 119 times
2) DSC_37710908.jpg, downloaded 108 times
3) DSC_37720908.jpg, downloaded 147 times

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Subject: Re: Interested in a Z280 SBC
Posted by wsm on Sun, 09 Sep 2018 01:54:23 GMT

Alan: Good catch on the second JR timing.

I don't use this code myself as the 33MHz Z8S180 is fine with extra overhead at 115,200 and has a four byte buffer. After the various comments this was just a quick-n-dirty curiosity wander to see what the maximum XMODEM baud rate on a 4 MHz Z80 MIGHT be and whether 115,200 could be supported.

As to JP versus JR: I'm showing my bias since I haven't used a basic Z80 for a LONG time. It also points out some of the differences between Z80, Z180 and Z280.

Z80 - JR = 7/12 T's, JP = 10T
Z180 - JR = 6/8 T's, JP = 6/9 T's
Z280 - JR & JP both appear to be the same at 3/4

I fully understand the portability issue. There’s an inherent problem with it since XMODEM is supposed to have timeouts for various things. Rightly or wrongly, I think most high speed serial programs need a little tweaking to take advantage of the available hardware. At some point they all need a low-level driver customized for unique U[SI]ARTs.

I'm not trying to be argumentative. When I see that people have had trouble getting less than 3% of the theoretical speeds it certainly makes me wonder why. Through the years I've seen a LOT of inefficient code and lots of bloat that lead people to believe there are hardware limitations when in fact it's software.

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Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 09 Sep 2018 02:32:14 GMT

hperaza wrote on Sat, 08 September 2018 05:34plasmo wrote on Fri, 07 September 2018 18:49

Why can Z280RC handles 132 data packet from PC but not the same data packet from Linux machine is puzzling.
Just did a quick test: switched the terminal program to use 2 stop bits (8O2) instead of 1, and XMODEM now works without having to insert any additional inter-character delays. Back to 1 stop bit and all I get is a bunch of "Retry 0: NAK on sector" as before. I guess that 115200 is just at the edge of what XMODEM+CP/M can handle. Minor variations of the clock frequency could explain why it works with your PC but not with mine.

Running XMODEM with 2 stops is interesting. I tried that and measured the serial data stream from PC to Z280RC; each packet is now 13.75ms and there are hardly any jitters in the duration of the data packet. 13.75ms is exactly the time for 132 bytes of data at 115200 802 and PC seems to be able to send all data without any idling between characters.

For next experiment, I kludged in a 1.84MHz clock to the UART so I can change the CPU clock without affecting the serial baud clock. I lower the CPU clock from 29.5MHz to 24MHz and I still can transfer data with XMODEM without any problem. So I don't think Z280RC is barely fast enough to run XMODEM at 29.5MHz.

There is something different about XMODEM on Linux but 2 stops may be an interim fix.

Bill

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Subject: Re: Interested in a Z280 SBC
Posted by lowen on Sun, 09 Sep 2018 02:42:17 GMT

hperaza wrote on Sat, 08 September 2018 05:34plasmo wrote on Fri, 07 September 2018 18:49

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There is something different about XMODEM on Linux but 2 stops may be an interim fix.

Bill
Now, I did start my statement with "back in the day" or at least words to that effect.

For the TRS-80 case specifically, the limits had as much to do with the IRQ setup in that hardware as anything else. That and floppy I/O, which was NMI driven programmed I/O. For direct text to the screen, the frame buffer was memory mapped and required software scrolling and remapping. Oh, and the software-scanned keyboard, with timer IRQ driven typeahead....

So, while the Z80 might have been able to run those speeds, it only could do that if it had nothing else to do, at least in the TRS-80 case. I don't remember any of the file transfer programs doing RAM buffering of downloads, but I do remember doing downloads into RAMdisk to keep the transfer rates up. But the keyboard scan task alone used up many cycles, and that would be present just to be able to hit the BREAK key to interrupt the transfer....

These modern Zx80's are much nicer machines, and leave the TRS-80's in the dust in many ways.

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 09 Sep 2018 03:03:31 GMT

wsm wrote on Sat, 08 September 2018 10:34:With all this discussion about data rates, I'm going to be a bit of a devil's advocate. The default speed I use on my Z180's is 115,200 to/from Win7/HyperTerm and I've never had an issue. That got me thinking about how fast a very basic 4MHz Z80 could handle XMODEM data. My conclusion is that 115,200 should NOT be a problem nor should 230,400. The 10MHz SIO should support 115,200 and I'd have to look at other UARTs for 230,400. The only assumption is that the UART has both a data register and a receive register i.e. additonal data can be received while valid data is still pending a read.

The real key is the software. While the original XMODEM certainly works it is *FAR* from optimized code with a subroutine call and extra logic PER BYTE. By definition, the XMODEM protocol has a built-in handshake to limit data flow and the sender should not be sending any additional data after a packet until it receives an ACK or NAK. The only real timing issue is with the receipt of a 132 byte packet.

The following snippet shows how a 4MHz Z80 can get a serial data byte in 15.5uS or 23us if the status check just misses the change and causes an extra loop. By my calculation, that equates to 43,478 Bytes/sec worst case. At 8,N,1 that’s 434,782 baud!

Perhaps someone can show me why my theoretical calculations are wrong.

The XMODEM is version 2.7 by Martin Eberhard.
https://groups.google.com/forum/#!searchin/comp.os.cpm/xmode
m%7Csort:date/comp.os.cpm/qLgOkknsnO8/zZZhO7L_AwAJ

The source code is attached below. Alas, it is in 8080 assembler and I'm afraid to read it because
it will surely muddle my already tenuous grasp of Z80 assembler.

Bill

Edit: This is Martin Eberhard's comment when he released version 2.6 of XMODEM:
https://groups.google.com/forum/#!searchin/comp.os.cpm/xmode
m$202.6%7Csor$;date/comp.os.cpm/XVjRHuzT5jc/L1ogAJXjCQAJ

Version 2.6 is a pretty significant rewrite, focused on speeding up transfers. By far the biggest speedup came from changing the CRC calculation to a table-driven algorithm. But I also flattened the code a bit, eliminating several layers of subroutine calls, as well as a few other speed enhancements. The resulting code can now send and receive at 76.8K baud with a 2 MHz 8080. It can theoretically go twice as fast with a 4 MHz Z80. However, I was only able to test it at 115.2K baud on my 4 MHz Z80 machine, since this is the maximum baud rate for the Z80-DART. (Still this is more than 3 times as fast as version 2.5!)

File Attachments
1) XMODEM_27.zip, downloaded 48 times

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 09 Sep 2018 03:58:31 GMT
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Circling back to hperaza's original comments that started this flurry of conversation:
1. CF byte-swap is still a problem although if XMODEM transfer at 115200 can be reliably achieved, the need of moving CF disk back and forth between PC & Z280RC may not be so pressing. In view of the number of existing Z280RC hardware out there, I want to find a software solution. I'm still thinking about byte swapping in Z280 software or use CF interface in 8-bit mode and enable DMA to make up for the lost performance.
2. The discussion on UART hardware handshakes are instructive. Initially I thought about bring out two discrete I/O from CPLD as hardware handshakes, but they are interrupt driven and if the lower priority console task is preempted by higher priority task, the interrupt driven hardware handshake won't work. Since I do have 256K of uncommitted memory, I'll pin my hope on massive size DMA buffers base on the argument that if 64K of DMA buffers are still not sufficient, perhaps the problem is too big for Z280RC to solve.
3. There is a chicken way out: Z280RC is RC2014 compatible, so if the problems can't be solved with the resources on-board, perhaps it is time to utilize the numerous RC2014 I/O modules.

In all cases, a lot of things for me to try...

Bill

PS, you guys may not know this, but September is wine-making time in New Mexico. I have about 70 gallons from my vineyard and need to bottle up 50 gallons of last years' wine to free up carboys. One can write seriously wicked codes with the help of 50 gallons of wine--or not.
wsm wrote on Sat, 08 September 2018 18:54

I don't use this code myself as the 33MHz Z8S180 is fine with extra overhead at 115,200 and has a four byte buffer. After the various comments this was just a quick-n-dirty curiosity wander to see what the maximum XMODEM baud rate on a 4 MHz Z80 MIGHT be and whether 115,200 could be supported.

You'll gain some additional speed if you leave out the test for error flags and rely on XMODEM's packet validation capabilities (CRC).

Quote: Through the years I've seen a LOT of inefficient code and lots of bloat that lead people to believe there are hardware limitations when in fact it's software.

You can always achieve the best and most impressive performance if your program talks directly to the hardware while the CPU does nothing else (e.g. no interrupts, no DMA), but as Alan mentioned, your code will not be portable. If you are targeting your application for an existing OS, then you may have no other option than to use the OS services, and that means lots of overhead.

And if the OS is a multi-tasking one (MP/M, UZI, etc.) then you have to take into account also additional factors like context switching, time-slices, preemption, concurrent interrupts, DMA, etc. Those are the factors that set in practice the upper limit of the character rate your application can handle. Note character rate and not baud rate; as nothing stops you from using e.g. a mega-bit baud rate (except, perhaps, the quality of the transmission line) if there is enough delay between characters or if you have a way to control the data flow, the last being the reason all this discussion started. You can use the baud rate as a way to control the character rate, but without flow control you can't guarantee that no characters will be lost.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sun, 09 Sep 2018 09:15:33 GMT

Iowen wrote on Sat, 08 September 2018 19:42

For the TRS-80 case specifically, the limits had as much to do with the IRQ setup in that hardware as anything else. That and floppy I/O, which was NMI driven programmed I/O. For direct text to the screen, the frame buffer was memory mapped and required software scrolling and remapping. Oh, and the software-scanned keyboard, with timer IRQ driven typeahead....

Those were the days! I loved those little systems where the CPU really did everything. Don't forget the cassette I/O: bit-banged, FM- or phase-modulated by the same CPU... I guess that's showing my age

My first machine was a home-brewed 8080 system, also with software-scanned keyboard (via 8255 PPI) and memory-mapped video (8275 CRT + 8257 DMA), 8259 interrupt controller and 8253 timer for sound. The CPU was able to handle all that and in addition could run a simple multitasking OS with decent performance!
plasmo wrote on Sat, 08 September 2018 19:32 For next experiment, I kludged in a 1.84MHz clock to the UART so I can change the CPU clock without affecting the serial baud clock. I lower the CPU clock from 29.5MHz to 24MHz and I still can transfer data with XMODEM without any problem. So I don't think Z280RC is barely fast enough to run XMODEM at 29.5MHz.

There is something different about XMODEM on Linux but 2 stops may be an interim fix. I haven't had the time to hook up a scope here to see what's happening, but I don't think is an XMODEM thing. In any case, there may be a difference between the way Windows and Linux talk to the USB dongle, or there may be timing differences from one dongle to another? After all, is the dongle the one that converts the USB packets into serial data.

plasmo wrote on Sat, 08 September 2018 20:58. CF byte-swap is still a problem although if XMODEM transfer at 115200 can be reliably achieved, the need of moving CF disk back and forth between PC & Z280RC may not be so pressing. In view of the number of existing Z280RC hardware out there, I want to find a software solution. I'm still thinking about byte swapping in Z280 software or use CF interface in 8-bit mode and enable DMA to make up for the lost performance. How about the idea of the small PCB in-between? Existing Z280RCs could be upgraded that way.

As one of my P112s has a CF adapter and my CPU280 will have one too, it will be nice if I could move the CF card from one machine to another without having to byte-swap anything. Right now I'm working on modifying the CPU280 ROM code so it will recognize dynamically (and boot from) the different disk partitions like the P112 does.

Quote: 2. The discussion on UART hardware handshakes are instructive. Initially I thought about bring out two discrete I/O from CPLD as hardware handshakes, but they are interrupt driven and if the lower priority console task is preempted by higher priority task, the interrupt driven hardware handshake won't work. Since I do have 256K of uncommitted memory, I'll pin my hope on massive size DMA buffers base on the argument that if 64K of DMA buffers are still not sufficient, perhaps the problem is too big for Z280RC to solve. Not sure I understand the above well. Two simple I/O lines should do the job, and they don't have to interrupt the CPU. The DMA solution still looks to me like shooting a fly with a cannon.

Quote: 3. There is a chicken way out: Z280RC is RC2014 compatible, so if the problems can't be solved with the resources on-board, perhaps it is time to utilize the numerous RC2014 I/O modules. I've been considering that, specially since my main interest is multi-terminal multitasking, and for that the Z280RC will need more communication channels anyway.
Quote: PS, you guys may not know this, but September is wine-making time in New Mexico. I have about 70 gallons from my vineyard and need to bottle up 50 gallons of last years' wine to free up carboys. One can write seriously wicked codes with the help of 50 gallons of wine--or not.

Second that!

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sun, 09 Sep 2018 12:26:25 GMT

You need the DMA because you don't have any FIFO. The DMA + RAM is the FIFO on the Z280 systems so avoids any overrun problems when the CPU is required to disable interrupts for something else like floppy disk I/O. On two however or GPIO lines are fine. You can control the CTS/RTS handshaking based upon how much DMA buffer space you have left and just check it on timers.

A lot of the old multiuser systems actually didn't have serial interrupts, but big FIFOs/DMA queues and each timer tick polled the queues. Some of the fancier ones offloaded the entire line editing so that in non character by character mode you got one interrupt and handed a line of data. All of this helped reduce the amount of time stolen by serial I/O.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sun, 09 Sep 2018 14:26:34 GMT

etchedpixels wrote on Sun, 09 September 2018 05:26:You need the DMA because you don't have any FIFO. The DMA + RAM is the FIFO on the Z280 systems so avoids any overrun problems when the CPU is required to disable interrupts for something else like floppy disk I/O. Other DMAs taking place (e.g. disk DMA) could preempt UART DMA as well. Likewise, if you disable interrupts for too long, or at a critical moment, then you'll not be able to flip the DMA buffers either, and you are back to square one. Unless you lower the CTS line before disabling interrupts, which brings us back to the original point: we need handshake lines.

At the end, we don't have to use 115200 baud if the system can't handle it, but handshake lines are always desirable, even at low speeds.

Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Sun, 09 Sep 2018 17:25:43 GMT

hperaza wrote on Sat, 08 September 2018 05:05: Depends on what you are doing. A text editor, for example, is not the most demanding sort of application. But if you are using a RT OS (UZI280 is

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not), then you know that any task can be blocked by a higher priority one; and if the lower priority task was receiving data from the UART, then chances are that the input buffer will overflow if the task is blocked for too long, resulting in characters lost unless hardware handshake is used.

As for the terminal, my VT520 starts missing characters at 9600 baud when scrolling in 132x50 mode.

Just a note, the 38400 baud limit was under heavy system load running several processes like:
- cat dumping out characters at full speed to an ECB bus connected parallel terminal
- compiling the UZI kernel
- file copy from one HD partition to another partition
- and so on...
and receiving escape sequences send from a hardware terminal.

But you are right UZI280 is no RT OS so there is no guaranty this works under all circumstances, even it never failed for me. On a non RT OS handshake lines are the only way to warrant non character losses on serial IO.

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Wed, 26 Sep 2018 21:46:51 GMT

UZI280

I got 2 floppy disks from Alexander who found the sources I asked for.
I don't know if the content of the disks is helpful but will collect all I get.

@stefan_n please take a look.

As I have a workaround for my website please cry if there are problems.

http://oldcomputers-ddns.org/public/pub/rechner/zilog/z280/uzzi280/floppydisks_found_by_alex/readme.txt
http://oldcomputers-ddns.org/public/pub/rechner/zilog/z280/uzzi280/floppydisks_found_by_alex/UZI280.ZIP
http://oldcomputers-ddns.org/public/pub/rechner/zilog/z280/uzzi280/floppydisks_found_by_alex/UZI280_1.12.zip

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Thu, 27 Sep 2018 11:23:07 GMT

I knew I had seen that somewhere. Just searched for 'stevie.taz' from UZI280.zip and found this on znode51. Is it the same thing?
hperaza wrote on Thu, 27 September 2018 13:23 I knew I had seen that somewhere. Just searched for 'stevie.taz' from UZI280.zip and found this on znode51. Is it the same thing?

Hi hperaza,

I don't know if it's identical as I'm not a programmer, stefan_N may take a look. The znode51 is well known and there is a long friendship with the owner of the website. znode51 is a part of www.gaby.de and the contact goes back into the 90th.

As the owner of znode51 belongs to the CPU280 users it may be that he got a copy for preservation.

stefan_N told me that he send the source for UZI280 to Alex who even had a CPU280 at that time.
I even mailed the zip files to Stefan_N as I don't know if he got information about new posts.

Thanks for your hint.

---

stefan_n wrote on Thu, 27 Sep 2018 12:21:20 Yes those are most likely the same files. I gave them to Alexander and Helmut who obviously uploaded them to Znode. BTW the sources for the HiTech C UZI280 c-library are still missing

---

lowen wrote on Fri, 05 Oct 2018 18:17:07 etchedpixels wrote on Sun, 02 September 2018 16:32...

I've tried the obvious things. I've rewritten the CF card, I've tried loadngo in serial mode. Any diagnostic recommendations to work out wtf happened ?

Alan

Alan, were you ever able to get your Z280RC working again?
Nope. Even tried changing the CPU. My existing one is somewhere between the UK and US and a replacement just arrived here. It will be interesting to learn what happened to the poor thing and get back to Fuzix and maybe MP/M and CP/M 3 hacking for it.

Bill btw has the most excellent customer service I've met

Alan

---

It is the first failure of Z280RC in the field. I'm quite interested in finding out what has failed. I'll start with a careful visual inspection, observe activities of key signals, and hopefully CPLD is alive that I can reprogrammed it with diagnostic logic to help me locating the failure.

etchedpixels wrote on Fri, 05 October 2018 17:46

Nope. Even tried changing the CPU. My existing one is somewhere between the UK and US and a replacement just arrived here. It will be interesting to learn what happened to the poor thing and get back to Fuzix and maybe MP/M and CP/M 3 hacking for it.

Bill btw has the most excellent customer service I've met

Alan

Thank you, that's quite a compliment, indeed. When legal liability and profit motive are removed, this is just one enthusiast talking to another enthusiast wanting to get the most out of this hobby.

Bill

---

Does anyone have a copy of Super Micro Magazine issue #2 that should have an article featuring detailed design of a Z280 on S100 card? George Warner is the designer.

Bill
Subject: Re: Interested in a Z280 SBC
Posted by zenxyzzy on Mon, 15 Oct 2018 18:41:17 GMT

wow. where to begin. yes.

find attached the article from supermicro, which I got from the library of congress after a long search.
you'll find that he designed the board with the 8 bit bus, so it will be a bit slow compared to what the chip is capable of.

I've started on the board, but have so many irons in the fire that it never got beyond getting the reset right and redoing the bus for 16 bits, which is very different, since the z80 bus and zbus have variant pin definitions.

good luck.

--curt

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File Attachments
1) Supermicro-z280.pdf, downloaded 71 times

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Subject: Re: Interested in a Z280 SBC
Posted by zenxyzzy on Mon, 15 Oct 2018 18:57:23 GMT

so, my first and second prototypes of the s100-z280 board. strange build method, I know...

build notes, as far as it goes:

the buffered proto board has drivers that make pretty strong assumptions that you are building a bus slave, with the address lines using 244's in the wrong direction, so I can't use them.

the switching reg is pretty good, but has a highish cutoff. I have to run switchers in my power supply at 7.5 volts, and when I was using 2940's, I could get away with 6.8V.

the z280 clock is a mess, with a bare rock I couldn't get it stable, so I used a socketed oscillator.

all these pins on the front mean I don't get confused about pin numbers when I wire wrap; i used to do it on the back and kept getting bit by mixing up the pin numbers.

also, makes plugging in the logicport much nicer. I wish intronix would finally release a linux
version or some way of plugging in protocol analyzers.  
the sigrok stuff isn't quite ripe enough with respect to triggering.

The power on clear is still broken; that's the cap on the top right.  gotta break out the scope on 
that one.  probably I'll just lift the circuit from John M's many cpu's.

and a few questions that might be germane to getting a high quality mod:  
1) none of the 16 bit recent boards do the serial byte transfer if sxtn isn't answered from xtrq. is 
that because of the tight timing or just the circuit complexity?

2) how is the clock (phi) switching supposed to work?  this is not in the S100 spec, but there's 
been a few different implementations. do we have a spec for this?  
I'm happy just grabbing the circuit from known good designs, but which is the best, as in 
robust?

3) does anybody know how the later compupro 80286 cpu did their 2-cycle memory access?  this 
is definitely outside the spec.

4) cromemco supposedly did some bizarre double speed stuff with the XXU to move 32bits over 
the s100.  anybody have details on this?

my deadend first prototype:

my second prototype, much better

yellow is address bus, blue is data, green is wait, orange is clock and strobes, red is reset.  
white is ground and black is +5, except on the cpu, where it is breakout on the back.  If I add it,  
purple will be dma/master/slave logic.  
almost everything is wire wrap on short headers. i can get 2 wraps per post, but this almost never 
a problem.

and the back:

maybe I'll finish it this weekend. we'll see. then I need to transcribe it to kicad. ugh.

--curt

File Attachments
1) old-z280-front.jpg, downloaded 395 times  
2) new-z280-back.jpg, downloaded 389 times  
3) new-280-front.jpg, downloaded 387 times
Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 17 Oct 2018 17:49:28 GMT

Thank you very much for the article. The author, George Warner, has purchased a Z280RC board and mentioned the SuperMicro article but was not able to find it. He still has the S100 Z280 hardware but is reluctant to power up the S100 chassis due to the aging power supply. I'm sure he appreciates having a copy of the article. I hope he'll join the retroprew forum and shares his knowledge of Z280.

I'm unfamiliar with S100 bus so can't answer your questions, but I'm very interested in your progress. Please keep us updated.

Bill

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sat, 27 Oct 2018 16:21:47 GMT

MOOF!
Just read thru all 12 pages... lots of good stuff here...

I've very much been enjoying plasma's z280rc board... trying to get banked CP/M plus running on it... so close... everything boots, cpmldr runs, on cold BOOT ccp.com loads then WBOOT's... ... and then hangs somewhere... I put trace statements on all my BIOS entry points... boot non-banked (on bank zero) works; try booting non-banked on bank one and... hangs after it jumps to ccp.

I've pored over the code multiple times and I'm just not seeing the problem... Probably something really stupid... ;-)

Anyway, I've got a quick question: Did the zsm sources ever get uploaded anywhere (GitHub?? For some reason it doesn't support the "SET" directive. It's like EQU but allows the value to change; it's useful in REPT, IRPC & IRP groups to count iterations, etc. (See the MAC documentation at www.cpm.z80.de/manuals/mac.pdf section 4.4 (IIRC).

zenxyzzy: Looking at your "first prototype"... 1st thing I noticed was the LM7805 (linear) voltage regulator... and thought "Why didn't he use a switcher?"... then saw prototype #2... Yep, smart guy! ;-) Loved the color coded wire-wrap wires. Back when I did the Z280 S-100 board they sold IC labels called BugBacks™. Little plastic tabs that fit over the wire-wrap pins to label (number) them. Help'd a lot with mis-counting. IIRC they were from "down under". Can't find them now...

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sat, 27 Oct 2018 20:47:26 GMT

Did you remember to write the jump vectors etc into bank 1 so that when CCP loads and runs it
actually calls back into CP/M rather than oblivion?

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 28 Oct 2018 00:04:39 GMT
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Yep... (I assume you mean the BIOS WBOOT at zero and the BIOS entry at 5?)

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 28 Oct 2018 00:07:07 GMT
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Looks like somethings is wack with the DMA code... it works fine three times and then doesn't; call it again and it's good... Yet everything looks golden... I'm tempted to post it to plasmo's GitHub suppository and let someone else stare at it...

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 28 Oct 2018 00:26:37 GMT
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geowar1,
Welcome, good to see you here.

Please do post your code on my GitHub (https://github.com/Plasmode/Z280RC. I can take a look as well, but I ran into difficulties porting CP/M 3 to Z280 4-5 months ago and never completed the job. I just started using GitHub so I'm not exactly sure how to review/add your change to my master branch. Do save a copy just in case I screwed it up!

Bill

---

Subject: Re: Interested in a Z280 SBC
Posted by b1ackma1er on Sun, 28 Oct 2018 01:27:28 GMT
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"plasmo's GitHub suppository"

Oooh that sounds like a good resource for some back end coding.
Subject: Re: Interested in a Z280 SBC
Posted by b1ackmai1er on Sun, 28 Oct 2018 01:35:46 GMT

geowar1 wrote on Sat, 27 October 2018 09:21

I've pored over the code multiple times and I'm just not seeing the problem... Probably something really stupid... ;-) 

I'm playing with some SBCV2 banking stuff at the moment.

The two things that caught me out ...
Overwriting running code when moving between banks.
Overwriting the stack when moving between banks.
What helped me ...
Some debug code that output verification that the first couple of bytes of transferred code were the same as the source.

Regards Phil.

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 28 Oct 2018 03:20:46 GMT

CP/M Plus tends to assume that XMOVE isn't implemented... It BIOS:MOVE's FCB's and any write data from banked memory to non-banked; switches banks; does it BIOS stuff; switches back to original bank and then BIOS:MOVE's the FCB and any read data back to the banked memory area. All that work to get XMOVE & Z280 DMA working and it never does an interbank BIOS:XMOVE, BIOS:MOVE. I'm tracing all stacks and memory areas and there doesn't seem to be any overlap... I know what the CCP.com starts with... If I do the BIOS:XMOVE, BIOS:MOVE to copy it to the TPA and it's wrong I immediately try again... and it works. WTF?

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 28 Oct 2018 05:34:01 GMT

My bad for writing C-R-A-P-P-Y code... ;-)

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sun, 28 Oct 2018 09:06:37 GMT
Anyway, I've got a quick question: Did the zsm sources ever get uploaded anywhere (GitHub?)? For some reason it doesn't support the "SET" directive. It's like EQU but allows the value to change; it's useful in REPT, IRPC & IRP groups to count iterations, etc. (See the MAC documentation at www.cpm.z80.de/manuals/mac.pdf section 4.4 (IIRC)).

SET is a Z80 instruction (set bit, like in "set 7,a") and therefore cannot be used as a pseudo-op. What you want is DEFL and is supported by ZSM4. For compatibility with M80, ASET is also implemented, which does the same thing.

Remember that MAC is an 8080 assembler, while ZSM4 is a Z80 relocatable assembler, and thus there are subtle differences between the two (I would suggest using the M80 documentation instead as a guide). When I get some free time I'll prepare some docs, perhaps using the M80 manual as starting point.

---

Excellent! Just what I needed to know. ;-) (Thou I'm trying to keep my machines Micro$oft clean... ;-)
Greetings fellow Z280 tinkerers.

Having put aside my Z280RC for a few months, it resurfaced last week and I thought I'd try to iron out the remaining bugs in my CP/M-Plus BIOS routines.

I'm still having problems with the Banked version - which loads and lets me run programs, but blows up (technical term for "hangs" or exhibits "memory corruption") when I (for example) try to copy large files with CP/M 3 PIP - but it works fine if I use SWEEP (NSWEEP 2.07 from the public domain archives).

I suspect either a typo somewhere in my source-code, a stack overflow, or an issue with the way CP/M is handling data buffers (old GENCPM bug perhaps? Wink.

Anyhow, I've uploaded my BIOS280 source files to my GitHub repository for your perusal. You'll find them at

https://github.com/agn453/Z280RC

in the system/bios280 subdirectory.

If you've got time to look at them and see something wrong - let me know.

In the mean-time - I'm about to try hard-coding the disk parameter blocks / allocation headers / buffer control blocks (away from using the macros in my CPM3M80.LIB)...

Tony

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Tue, 06 Nov 2018 00:13:08 GMT

I've been working on the same project off and on for about six weeks...
I've gone over every line of code multiple times and added tons of logging (set "TRACE EQU 2"). I was hanging on boot somewhere in DOS...
Until I realized that the cpmldr in the system tracks wouldn't load the CPM3.SYS built with banked BIOS.
But I could boot into CP/M 2.2 and then run the CPMLDR built with the banked BIOS.
It doesn't appear to have any problems with large files but...
I sent my sources (attached) to BillS to try on his hardware he noticed issues with uninitialized memory.
When I get a chance I'll take a look at your sources and see if I notice anything amiss. ;-)
Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Tue, 06 Nov 2018 03:02:44 GMT

Tony,
I downloaded your files and assembled them on my Z280RC without errors. When I run the banked software using the test.sys/test.com method or cpm3.sys/cpmldr3.com method, I got lots of diagnostic messages (a sample of the message below), but I am not able to issue CP/M commands. How can I work around these diagnostic messages?

   Bill

?BNKSL Select Bank 01
?BNKSL Select Bank 01
DMAXFR using DMA2 from P000100 to P010100 count 3200
MOVE from 010D6A to 01F12A 36
DMAXFR using DMA3 from P010D6A to P00F12A count 36
?BNKSL Select Bank 00
?BNKSL Select Bank 01
MOVE from 010392 to 01F12A 36
DMAXFR using DMA3 from P010392 to P00F12A count 36
?BNKSL Select Bank 00
?BNKSL Select Bank 01
?BNKSL Select Bank 00
MOVE from 00DCA1 to 00DBA5 252
DMAXFR using DMA3 from P00DCA1 to P00DBA5 count 252
MOVE from 00D8B5 to 00D7BD 248
DMAXFR using DMA3 from P00D8B5 to P00D7BD count 248
?BNKSL Select Bank 01
?BNKSL Select Bank 00
?BNKSL Select Bank 01
?BNKSL Select Bank 00

?BNKSL Select Bank 01
?BNKSL Select Bank 00A
?BNKSL Select Bank 01
?BNKSL Select Bank 00>
?BNKSL Select Bank 01
MOVE from 010DF4 to 01F12A 234
DMAXFR using DMA3 from P010DF4 to P00F12A count 234
?BNKSL Select Bank 00

Subject: Re: Interested in a Z280 SBC
plasmo wrote on Tue, 06 November 2018 14:02
Tony,
I downloaded your files and assembled them on my Z280RC without errors. When I run the banked software using the test.sys/test.com method or cpm3.sys/cpmldr3.com method, I got lots of diagnostic messages (a sample of the message below), but I am not able to issue CP/M commands. How can I work around these diagnostic messages?
Bill

[snip]

?

BNKSL Select Bank 01
BNKSL Select Bank 00A
BNKSL Select Bank 01
BNKSL Select Bank 00>
BNKSL Select Bank 01
MOVE from 010DF4 to 01F12A 234
DMAXFR using DMA3 from P010DF4 to P00F12A count 234
BNKSL Select Bank 00[/code]

I can see the A> prompt

As I said, I left full debug messages on - and they come out interspersed with console output. To disable the Kernel debug messages, edit the CONFBANK.LIB file and set KRNL$DEBUG to FALSE, then rebuild with BANKBIOS.SUB

With debugging on - you can type commands and they should echo (maybe with more debugging mixed in). I find that using Simeon Cran's ZCPM3 replacement BDOS works better (and does far less bank selection). To use this, do a USE-ZPM3.SUB to load this instead of the standard CP/M 3 BDOS.

Tony

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Tue, 06 Nov 2018 04:01:59 GMT

geowar1 wrote on Tue, 06 November 2018 11:13
I've been working on the same project off and on for about six weeks...
I've gone over every line of code multiple times and added tons of logging (set "TRACE EQU 2"). I was hanging on boot somewhere in DOS...
Until I realized that the cpmldr in the system tracks wouldn't load the CPM3.SYS built with banked BIOS.
But I could boot into CP/M 2.2 and then run the CPMLDR built with the banked BIOS.
It doesn't appear to have any problems with large files but...
I sent my sources (attached) to BillS to try on his hardware he noticed issues with uninitialized memory. When I get a chance I'll take a look at your sources and see if I notice anything amiss. ;-)

Thanks for this. I'm seeing double right now - having gone through and checked the assembled output for possible errors in the machine-code. I can almost execute Z280 binary code in my head now by looking at hexadecimal op-codes! I'm pretty sure ZSM4 is doing the right things now!

That CPMLDR issue of not loading images that were larger than the first extent was a well known problem way back when! There are numerous fixes around - including the CPMLDR3.MAC source I put on my GitHub.

Tony

Tony

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Tue, 06 Nov 2018 19:52:17 GMT
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Ok, I've had a chance to review your BIOS sources... and I don't see any issues that would prevent banked CP/M Plus from working.
And I tried my (version of BillS's) z280rc BIOS with CPMLDR3.MAC... same results.
I also tried my (version of BillS's) z280rc BIOS with the BNKBDOSS.SPZ & RESBDOS3.SPZ files... and got the same result.
--
Gerrrrrr...
--
I've also crawled thru the CPU280 BIOS that Tony Nicholson translated from German to English...
And other than doing some things via system traps... everything looks kosher.
--
Gerrrrr...

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 07 Nov 2018 01:31:21 GMT
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Tony,
I set KRNL$DEBUG to false and rebuild. I can verify that cpm3 will boot up but pip with verify won't work for file size of 24K or greater. Even if files are smaller than 24K, and while pip can successfully copy & verify individual files, pip a collection of such files are not successful. e.g., pip
c:=a:*.com[v] will not run to completion.

George,
I also tried your CPM Plus again. I've mentioned that memory contents need to be initialized with memory test patterns for your cpmldr to successfully boot CPM Plus. It turns out the magical locations are from 0x8-0xA (RST 08). They need to have the values 0x8F, 0x82, 0x06. These are pseudo random test patterns of my memory test, other values may also work. Once your CPM Plus is successfully booted, pip works just fine with any size files.

If we can just combine George & Tony's software...

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Wed, 07 Nov 2018 01:47:56 GMT
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>>magical locations are from 0x8-0xA (RST 08). They need to have the values 0x8F, 0x82, 0x06.

Weird, AFAIK those locations aren't used for anything in CP/M Plus... (It is a Z80 Restart vector... but not used by (AFAIK) any CP/M).

Drat... poking those didn't change anything for me... still hangs after jumping to CCP.

008 08F   ADC A,A
009 082   ADD A,D
00A 006   LD B,nn

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 07 Nov 2018 02:16:59 GMT
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George,
I'm surprised that changing location 0x8-0xA to 8F 82 06 did not work for you. What I did was changing to memory locations with ZZMon before issuing 'b2' command to boot up CP/M2.2 and then type 'cpmldr' to boot up CP/M Plus:

TinyZZ Monitor v0.99 6/9/18

>e 0008
0008 : 00 8f 8f
0009 : 00 82 82
000A : 00 06 06
000B : 00 x
Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Wed, 07 Nov 2018 02:47:19 GMT

geowar1 wrote on Wed, 07 November 2018 06:52 Ok, I've had a chance to review your BIOS sources... and I don't see any issues that would prevent banked CP/M Plus from working. And I tried my (version of BillS's) z280rc BIOS with CPMLDR3.MAC... same results. I also tried my (version of BillS's) z280rc BIOS with the BNKBDOS3.SPZ & RESBDOS3.SPZ
files... and got the same result.

--
Gerrrrr...
--
I've also crawled thru the CPU280 BIOS that Tony Nicholson translated from German to English... And other than doing some things via system traps... everything looks kosher.
--
Gerrrrr...

Thanks George ?? (Sorry if I guessed your name incorrectly).

I did find a missing save of AF in the bank selection routine (SELMEM aka ?BNKSL) only when I tried to clear the RAMDISK using my BIOS debugger's Z9 command (which writes E5's over the first 56KB of physical address 080000h - the directory groups of drive M:).

I'm beginning to suspect a problem with the way CP/M 3 PIP copies files (perhaps it uses Multi-sector I/O?). I can do a B:PIP M:=C:\*[G1V] to copy all my BIOS working files from C1: without errors (using CP/M 2.2 PIP).

I've also noticed that on the Z280RC using any version of CP/M 3 (Non-banked or Banked - including Bill's original supplied CPM3.SYS) that I cannot initialise a disk with time-stamping enabled using

A>initdir m: ! set m: [name=ramdisk,create=on,update=on] ! show m:[label]

(My S100 system and the SIMH AltairZ80 simulator have no problem doing this exact command). Now this is weird!

Tony

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar 1 on Thu, 08 Nov 2018 00:51:02 GMT
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>> Thanks George ?? (Sorry if I guessed your name incorrectly).

It is George... but you may call me anything but late to dinner... ;-)

>> I did find a missing save of AF in the bank selection routine (SELMEM aka ?BNKSL) only when I tried to clear the RAMDISK using my BIOS debugger's Z9 command (which writes E5's over the first 56KB of physical address 080000h - the directory groups of drive M:).
I didn't see AF saved in any of the other CP/M Plus BIOS's I have (CPU280 probably being the best one). BC/DE/HL yes... but not AF.

>> I'm beginning to suspect a problem with the way CP/M 3 PIP copies files (perhaps it uses Multi-sector I/O?). I can do a B:PIP M:=C:*.*[G1V] to copy all my BIOS working files from C1: without errors (using CP/M 2.2 PIP).

I'm skeptical that a BIOS mistake would mess up pip's greater than any specific size... BIOS really doesn't know about anything at the file system level... only drives, tracks and sectors.

>> I've also noticed that on the Z280RC using any version of CP/M 3 (Non-banked or Banked - including Bill's original supplied CPM3.SYS) that I cannot initialise a disk with time-stamping enabled using

I didn't have any problem with Bill's original BIOS or my version with...

A>initdir m: ! set m: [name=ramdisk,create=on,update=on] ! show m:[label]

BTW: I did notice that some of Bill's files may be corrupted... I had an error with GENSYS that I fixed by downloading a copy from the web. You might try pulling down a different PIP.

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Thu, 08 Nov 2018 01:33:55 GMT

Quick note: I very well may have corrupted the GENSYS.COM file on my system... and I could have re-installed Bill's CPM3DSTR.HEX and that may have fixed the issue... so...
(no slight meant toward Bill! ;-)

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Thu, 08 Nov 2018 02:40:15 GMT

George,

geowar1 wrote on Thu, 08 November 2018 11:51
>> Thanks George ?? (Sorry if I guessed your name incorrectly).

>> I did find a missing save of AF in the bank selection routine (SELMEM aka ?BNKSL) only when I tried to clear the RAMDISK using my BIOS debugger's Z9 command (which writes E5's over the first 56KB of physical address 080000h - the directory groups of drive M:).
I didn't see AF saved in any of the other CP/M Plus BIOS's I have (CPU280 probably being the best one). BC/DE/HL yes... but not AF.

I had removed the "push af/pop af" when I was reviewing the register usage of each routine (grasping at straws). My BIOSDBG module, however, relied on no registers being changed when a different user-mode bank was selected. It was either re-instate it in the BIOS - or add the push/pop in BIOSDBG.

In any event, the effect on the file verification error didn't change.

Quote:

[snip]
>> I've also noticed that on the Z280RC using any version of CP/M 3 (Non-banked or Banked - including Bill's original supplied CPM3.SYS) that I cannot initialise a disk with time-stamping enabled using

I didn't have any problem with BillS's original BIOS or my version with...

A>initdir m: ! set m: [name=ramdisk,create=on,update=on] ! show m:[label]

BTW: I did notice that some of BillS's files may be corrupted... I had an error with GENSYS that I fixed by downloading a copy from the web. You might try pulling down a different PIP.

I think I replaced all of Bill's supplied CP/M Plus files with the Y2K fixed ones. I have a build environment and the CP/M 3 sources on my Mac Mini that allows me to recompile them (cpm3src_unix.zip from http://cpm.z80.de/source.html + zxcc-0.5.7 + thames-0.1.1). I've rebuilt PIP.COM with a larger stack (it was 100 bytes and I increased it to 150) - but this had no effect!

I have even tried the files from my Digital Research original 8-inch CP/M-Plus floppy distribution disks!

Tony

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Thu, 08 Nov 2018 04:38:34 GMT
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From the CP/M PlusTM (CP/M Version 3.0) Operating System System Guide, page 66:
Quote:
BIOS Function 27: SELMEM
Select Memory Bank
Entry Parameters: A=Memory Bank Returned Values; None
The SELMEM entry point is only present in banked systems. The banked version of the CP/M 3 BDOS calls SELMEM to select the current memory bank for further instruction execution or buffer references. You must preserve or restore all registers other than the accumulator, A, upon exit.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Thu, 08 Nov 2018 05:59:29 GMT
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dawar1 wrote on Thu, 08 November 2018 15:38From the CP/M PlusTM (CP/M Version 3.0) Operating System System Guide, page 66:
Quote:
BIOS Function 27: SELMEM
Select Memory Bank
Entry Parameters: A=Memory Bank Returned Values; None
The SELMEM entry point is only present in banked systems. The banked version of the CP/M 3 BDOS calls SELMEM to select the current memory bank for further instruction execution or buffer references. You must preserve or restore all registers other than the accumulator, A, upon exit.

new Mac mini (2018); six-core 3 GHz Intel Core i5... it's a screamer; Now if only they'd update my MacPro (2013).

George

I saw that in my fine set of paper original second edition CP/M-Plus manuals dated July 1983 - so I might just change it back again!

Lucky you with the new MacMini!

I'll be keeping my MacMini6.2 (Late 2012) with 2.6 GHz 16MB quad-core i7 going for a few more years yet! I looked at the new one and was stunned at the price in Australian Dollars (the 16GB i5 six-core with 1TB SSD is almost AU$3000). My current similarly configured one was about half that price over 5 years ago!

What I really need is a really good development toolset/debugger for the Z280! I'm at the stage where I might "blame the hardware" and put this aside again! I started reading the CP/M source code today to get to grips with what should be happening under the covers!

Tony
>>Lucky you with the new MacMini!

Yeah, it wasn't cheap... but if history is any indication there won't be a new one for another 5 years...
I cringe to think what the new MacPro will cost... (if it ever ships).
All I can say is that I really miss my employee discount. ;-)

--
Back on topic... I'm currently plagiarizing the CPU280 sources... Moving stuff behind system calls.
Gonna see if I can get the non-banked (shared) area down to the last 4K page... ;-)

---

Just an update regarding the BIOS source files for Bill Shen's Z280RC on my GitHub at
https://github.com/agn453/Z280RC ...

I changed the disk I/O modules to manually define the disk parameter headers, disk parameter blocks and define Allocation Vector storage (rather than use the CPM3M80.LIB macros and rely on GENCMP to set up the double-bit allocation vectors correctly). This hasn't fixed the Banked version's CP/M 3 PIP file verification errors though.

Tony

---

Ok, I found one issue: I was setting the MMU MCR without the I/O page set correctly... (I restored the previous I/O page before setting the MCR)... So that's getting me further now...

---

tried using the banked ZP/M (BNKBDO3.SPDZ & RESBDOS3.SPDZ) files... but they hung at WBOOT... so I switched back to the DRI .spr files and... they're hanging at WBOOT also now...
Subject: Re: Interested in a Z280 SBC
Posted by rhkoolstar on Sat, 10 Nov 2018 08:48:18 GMT
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I've had similar issues with pip.com in a Z80 CP/M system. I am using PPIP.com now and never had any troubles anymore.

There seem to have been vague problems with PIP.COM, mainly with large or multiple files, to others too. Maybe PIUP.COM is at fault and PPIP.COM is something to try?

Rienk

File Attachments
1) ppipl8.lbr, downloaded 29 times

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sat, 10 Nov 2018 16:41:45 GMT
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Is that for CP/M 2.2 or 3.x? We're trying to bring up CP/M Plus on a Z280 board.

Subject: Re: Interested in a Z280 SBC
Posted by rhkoolstar on Sat, 10 Nov 2018 20:18:43 GMT
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Both.

I am using PPIP for all my CP/M versions

Do Z80 binaries run on the Z280 implementation?

Rienk
Subject: Re: Interested in a Z280 SBC  
Posted by geowar1 on Sun, 11 Nov 2018 00:54:28 GMT

> I am using PPIP for all my CP/M versions  
Does it support all the CP/M Plus features? (archive, date & time, etc.

> Do Z80 binaries run on the Z280 implementation?  
Yes. It's Z80 backwards compatible. ;-) 

Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Sun, 11 Nov 2018 00:57:29 GMT

Another update for my BIOS for the Z280RC at https://github.com/agn453/Z280RC ...

I've added DEBUG capability to enter the debugger upon CTRL-P being typed at the console. Providing that the system is waiting for input, this allows me to get in to display the contents of memory.

Also I made a special banked configuration (BANKED1.DAT input to GENCPM) that supports only two banks (bank 0 and 1) with directory hashing disabled and only a single directory and data buffer for each drive in bank 0. The resulting CPM3BNK1.SYS appears to be NOT WORKING (and I'm now NOT convinced there's a problem with CP/M 3 PIP corrupting buffers).

Now on a mission to further debug the buffer corruptions when they are in banks 2 and 3...

Tony

Edit: There's still file corruptions (I tried to extract the PPIP18.LBR file and UNCR created garbage on the banked version, but correctly expanded the compressed files under the Nonbanked system).

Subject: Re: Interested in a Z280 SBC  
Posted by geowar1 on Sun, 11 Nov 2018 01:18:25 GMT

>> Also I made a special banked configuration (BANKED1.DAT input to GENCPM)  
Would you email me that? (or attach to reply? I'm < geowar 1 @ mac dot com > (without spaces).

I've been playing with different gencpm.dat's because some seem more stable than others.

On my current build if I zero memory then it runs until it tries to copy something to 00:0000h... if I fill (with 0FFh) memory instead it runs until it tries to copy something to 00:FFFF...
Based on that (and BillS's earlier input) it really looks like uninitialized memory is causing my issue... but it's not in the BIOS (I've tried using defb & defw instead of defs with no change in behavior... it really looks like a BDOS issue...

Then again it could be the SCB not being initialized properly?

Probably just a short between my headsets... ;-)
BTW - I also found the attached program useful to walk the CP/M-Plus data structures and dump out the DPHs and DPBs on a running system (and to get buffer addresses generated by GENCPM).

Tony

Updated to the one I patched with DPB and DPH header information.

File Attachments
1) CPM3ADD2.MAC, downloaded 30 times

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 11 Nov 2018 02:00:01 GMT
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I'm trying to catch up, you guys are way ahead of me. I was unsuccessful with banked CPM Plus on Z280 six months ago, but recently I built a ROMless Z80 SBC similar to Z280RC but with simplified hardware bank selects and was successful porting banked CP/M Plus to it (relying on GENCPM to generate data, directory buffers, hash tables, and ALV). That was my stepping stone to Z280 so I'm ready to tackle CP/M Plus for Z280 now!

Bill

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 11 Nov 2018 02:31:51 GMT
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Nice! Here's my boot with your gencpm.dat file:

3--CP/M3: 3 press Return to execute command

Boot LDRBIOS

CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.

BNKBIOS3 SPR EF00 0B00
BNKBIOS3 SPR CC00 1400
RESBDOS3 SPR E900 0600
BNKBDOS3 SPR 9E00 2E00

58K TPA
Copyright 1979 (c) by Digital Research
CP/M Plus for z280rc 11/09/2018
8x 8 MByte CF disks and 1x 1.5 MByte RAM disk
A>dir
A: CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! :
A: CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! :
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A: CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! : CONSOLE OU : "+"n9 "2! :
So I don't know what's going on with "dir"... a:date isn't Y2K... but the one on D: is...
I'm too paranoid to try any destructive commands (pip, save, etc.); show & ws4 hang...
I'll turn all the TRACE stuff back on and see what it's doing... Thanks for the genccpm.dat! ;-)
Looks like symptoms of... I/O Page is for UART, then it's changed (or not changed to the CF I/O page) to read the next directory entry from the CF drive and is not restored back to UART to print the next directory entry.

[The CCP built-in DIR command interleaves console output with disk I/O to access the directory]

Tony

PS. I updated the CPM3ADD2.MAC program with the correct source-code (one that I had changed to print column headings for the DPH and DPB bytes)

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 11 Nov 2018 07:49:56 GMT
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>>Looks like symptoms of... I/O Page is for UART, then it's changed (or not changed to the CF I/O page) to read the next directory entry from the CF drive and is not restored back to UART to print the next directory entry.

I could believe that except that it works fine when unbanked; my BIOS doesn't depend on the I/O page being set to any default value... it always sets it and then restores it to whatever it was previously... but I'll double check it tomorrow just to be sure. (At this point I'll just be happy if it would start working... ;-)

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sun, 11 Nov 2018 08:58:19 GMT
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The UART routines assume the UART I/O page is set... but I wrote wrappers to set/restore the UART I/O page around those calls... didn't make any difference.

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sun, 11 Nov 2018 12:16:21 GMT
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New version of the Z280 assembler just released (beta 10, download link same as before).

Fixes, changes, etc.: SUBTTL no longer forces a page break. bug fix: a line containing a label inside a false conditional
section was mistakenly being output to the listing when false conditionals were suppressed if list 
xmacros was active. bug fix: IF statements with undefined arguments were displayed with a 
missing 'U' error flag. An attempt to a documentation is included in the package, using the M80 
docs as starting point.
At this point the assembler is nearly complete (only a couple of small details need polishing), and 
virtually bug free (at least the Z80/Z180 code generation). In fact, this is the assembler I use 
nowadays for all my Z80/Z180/Z280-related projects, replacing my old trusty M80.

Subject: Re: Interested in a Z280 SBC
Posted by b1ackmai1er on Sun, 11 Nov 2018 14:34:17 GMT
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Nice work and especially well done for taking the effort puts some docs together,

Would love to see how much of ROMWBW this will assemble.

Suggest adding to the front on the manual the intended platform. It may not be immediately 
obvious to people that this is intended to run on CP/M rather than DOS.

Regards Phil

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Sun, 11 Nov 2018 19:49:12 GMT
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geowar1 wrote on Sun, 11 November 2018 00:58 The UART routines assume the UART I/O page 
is set... but I wrote wrappers to set/restore the UART I/O page around those calls... didn't make 
any difference. :(

Just had a quick look at your BIOS source code noticed that you define an 'outjmp' macro that expands to 3 NOPs. Should be 4. Not sure if the bug is triggering in your case, but is certainly something to watch out for. Tony Nicholson's BIOS has the same problem.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Sun, 11 Nov 2018 20:30:35 GMT
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hperaza wrote on Mon, 12 November 2018 06:49

Just had a quick look at your BIOS source code noticed that you define an 'outjmp' macro that expands to 3 NOPs. Should be 4. Not sure if the bug is triggering in your case, but is certainly
something to watch out for. Tony Nicholson's BIOS has the same problem.

Thanks for taking a look at this Hector. Much appreciated.

I have just re-built my BIOS with the extra NOP in the outjmp macro - and tried it. My tests of a banked memory configuration are still failing.

The OUTJMP Pascal source file suggests that at least one "normal" op-code be inserted between an OUT and a JP-style instruction. Telmann Reh also suggests re-coding to a subroutine CALL/RET or using an IN instruction.

I have also tried setting the Z280's cache-mode off to circumvent this possible issue to no effect!

I know a banked system works on the CPU280 hardware - so I'm going to look closely at its BIOS routines again for any other quirky work-arounds.

Does anyone have a copy of the actual Zilog Errata-sheets for the Z280? I have a scanned copy of the August 1987 one that only talks about cache-corruption while in Z80-bus compatible mode. The Z280RC board is using 16-bit Z-BUS mode so this shouldn't apply.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 12 Nov 2018 01:18:50 GMT

I have not encountered the OUTJMP bug. From what I've read, it has to do with the insertion of many wait states in I/O access AND older mask of Z280. Z280RC has no wait state in the I/O accesses and uses Z280 with date code of 1992 or later. If you've found occurrences of OUTJMP bug on Z280RC, please send me samples of software.

Since I have no prior experiences with banked version of CP/M Plus, I want to 'sneak up' on it one step at a time. I'm starting with my non-banked version of CP/M Plus and relied on GENCPM as much as possible. I have a mostly-working banked version that relies on GENCPM to generate ALV, HASH table, DIRBCB, DTABCBB, and XMOVE. It is rather slow because there is no XMOVE function. It has problems with RAMdisk but seems to work well with CF drives. I'm going to work on the XMOVE routine next. The BIOS is attached, you may notice it has no OUTJUMP workaround.

Bill

File Attachments
1) z280rc_minimal_banked_cpm3.jpg, downloaded 122 times
2) cbios3.zip, downloaded 31 times
Hey BillS!,
The CBIOS3B.280 that I'm modifying (that originally came from you) has the outjmp macro (to insert 3 nop's) and uses them... but if you say they're not needed...
AFAIK it doesn't have any RAMdisk issues that I know of...

Looking thru your sources...
What's all the work you're doing in selmem instead of just "cp a,(curBank)? Why? Hmmm...
are you not using ZSM4? (so no Z280 instructions?)
Everything else looks pretty much the same as mine...

---

plasmo wrote on Sun, 11 November 2018 17:18 I have not encountered the OUTJMP bug. From what I've read, it has to do with the insertion of many wait states in I/O access AND older mask of Z280. Z280RC has no wait state in the I/O accesses and uses Z280 with date code of 1992 or later. If you've found occurrences of OUTJMP bug on Z280RC, please send me samples of software.

Since I have no prior experiences with banked version of CP/M Plus, I want to 'sneak up' on it one step at a time. I'm starting with my non-banked version of CP/M Plus and relied on GENCPM as much as possible. I have a mostly-working banked version that relies on GENCPM to generate ALV, HASH table, DIRBCB, DTABCB, and XMOVE. It is rather slow because there is no XMOVE function. It has problems with RAMdisk but seems to work well with CF drives. I'm going to work on the XMOVE routine next. The BIOS is attached, you may notice it has no OUTJMP workaround.

Bill

Hey BillS!,
I just built this (with ZSM4b10)... this is what I get on boot:

3--CP/M3: 3 press Return to execute command

Boot LDRBIOS
.
.
.
.
CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.
BNKBIOS3 SPR F900 0700
BNKBIOS3 SPR C000 0000
RESBDO3 SPR F300 0600
BNKBDO3 SPR 9200 2E00

60K TPA

### BIOS has bad sector in CCP.COM
### BIOS has bad sector in CCP.COM
### BIOS has bad sector in CCP.COM
.
.
.

Note the BNKBIOS3.SPR addresses & sizes are different... Can you post the GENCPM.DAT file you used?
I don't know how it can say "bad sector"; your BIOS::READ: function only returns zero (xor a).

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 12 Nov 2018 03:49:04 GMT
View Forum Message <> Reply to Message

George,
In the early stage of my Z280 development, I was worried about the OUTJMP bug and whenever I had I/O problems, I'd insert a string of NOP's but that had never made any differences. I no longer worry about the OUTJMP issue, whether it is configured in the 16-bit ZBus mode or the 8-bit Z80-compatible mode.

I have not used ZSM4 except to assemble your code and Tony's (agn453) code. I normally use ZMAC on my PC and XMODEM the .rel file to Z280RC where it is linked and GENCPM-ed. Link command is:

link bnkbios3[b]=cbios3,scb

Attached is the genccpm.dat

Bill

File Attachments
1) genccpm.dat, downloaded 30 times

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Mon, 12 Nov 2018 05:49:17 GMT
Some progress with my BIOS for the Z280RC...

The DMA transfer routine (DMAXFR) seemed to be spuriously ignoring to transfer random 128-byte blocks between memory banks.

I re-worked the interbank memory move to use the memory management unit instead of DMA and this showed up the issue. Subsequently I re-coded the DMAXFR routine according the the procedure outlined in the preliminary Z280 technical manual (page 9-15 section 9.5.7) and added code to make sure the DMA Transaction Descriptor had no ENable bit while setting it up.

All this has fixed the Banked version that uses just bank 0 and 1 - see below (except for CP/M 3 PIP's verify error). The multi-bank version is still not working though.

Tony

PS: Updated sources are at https://github.com/agn453/Z280RC

C>test
A:TEST COM

Z280RC LDRBIOS 12-Nov-2018

CPMLDR3 - CP/M V3.0 Loader
Copyright (C) 1982, Digital Research

RESBIOS3 SPR F400 0C00
BNKBIOS3 SPR CB00 1500
RESBDOS3 SPR EE00 0600
BNKBDOS3 SPR 9D00 2E00

59K TPA

Z280RC Banked BIOS 12-Nov-2018

BIOSDBG active.
Use (C)ontinue to enter CP/M.
Typing <CTRL-P> re-enters BIOSDBG from console input.

Display Bank 01
@C

C>; C:PROFILE.SUB
C>d:setdef * d: c: a: [order=(com,sub) display page uk]

Drive Search Path:
1st Drive - Default
2nd Drive - D:
3rd Drive - C:
4th Drive - A:

Search Order - COM, SUB
Console Page Mode - On
Program Name Display - On
Date format used - UK

C>date
D:DATE COM
Mon 12/11/2018 16:31:17
C>m2:
2M>era *.*
ERASE *.* (Y/N)? y
2M>nulu c:ppip18
A:NULU COM (User 0)
NULU 1.52 (07/12/87)
Copyright (C) 1984, 1985 & 1987 by Martin Murray
Bug fixes in version 1.52 by Mick Waters

TYPE -H FOR HELP

Drive M: Total 1520k, Used 0k, Free 1520k

Library C2:PPIP18.LBR open.
(Buffer size: 309 sectors)
Active entries: 18, Deleted: 0, Free: 2, Total: 20.
-READY M2>:e *.*
Extracting...
PPIP .COM to M2:PPIP .COM
PPIP .DZC to M2:PPIP .DZC
PPIP-0 .ZZ0 to M2:PPIP-0 .ZZ0
PPIP-1 .ZZ0 to M2:PPIP-1 .ZZ0
PPIP-2 .ZZ0 to M2:PPIP-2 .ZZ0
PPIP-3 .ZZ0 to M2:PPIP-3 .ZZ0
PPIP-4 .ZZ0 to M2:PPIP-4 .ZZ0
PPIP-5 .ZZ0 to M2:PPIP-5 .ZZ0
PPIP-5ZD.ZZ0 to M2:PPIP-5ZD.ZZ0
PPIP-7 .ZZ0 to M2:PPIP-7 .ZZ0
PPIP-8 .ZZ0 to M2:PPIP-8 .ZZ0
PPIP-9 .ZZ0 to M2:PPIP-9 .ZZ0
PPIP-Z.COM to M2:PPIP-Z .COM
PPIP-ZD.COM to M2:PPIP-ZD .COM
PPIP18 .FOR to M2:PPIP18 .FOR
PPIP18 .ZZ0 to M2:PPIP18 .ZZ0
READ .MZ to M2:READ .MZ
-Extract members M2->x

Closing C2:PPIP18.LBR...

2M>uncr *.*
A:UNCR COM (User 0)
GEL Uncruncher Version 2.8
----
M2:PPIP.DZC ==> M2:PPIP.DOC
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       74 / 154  208%  4096  1986 ( 10k -->  20k)
----
M2:PPIP-0.ZZ0 ==> M2:PPIP-0.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       62 / 126  203%  4096  1205 (  8k -->  16k)
----
M2:PPIP-1.ZZ0 ==> M2:PPIP-1.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       32 /  68  213%  3161     0 (  4k -->    9k)
----
M2:PPIP-2.ZZ0 ==> M2:PPIP-2.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       47 / 102  217%  4096   271 (  6k -->   13k)
----
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       55 / 128  233%  4096   733 (  7k -->   16k)
----
M2:PPIP-4.ZZ0 ==> M2:PPIP-4.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       14 /  26  186%  1630     0 (  2k -->    4k)
----
M2:PPIP-5.ZZ0 ==> M2:PPIP-5.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
       36 /  76  211%  3471     0 (  5k -->   10k)
----
M2:PPIP-5ZD.ZZ0 ==> M2:PPIP-5ZD.Z80
    in    out   rat   ca    cr
    ====  ====  ====  ====  ====
5 / 7 140% 679 0 (1k --> 1k)
----
in out rat ca cr
==== ==== ==== ==== ====
37 / 77 208% 3554 0 (5k --> 10k)
----
in out rat ca cr
==== ==== ==== ==== ====
42 / 86 205% 4022 0 (6k --> 11k)
----
in out rat ca cr
==== ==== ==== ==== ====
17 / 32 188% 1851 0 (3k --> 4k)
----
M2:PPIP18.ZZ0 ==> M2:PPIP18.Z80
in out rat ca cr
==== ==== ==== ==== ====
43 / 79 184% 4096 9 (6k --> 10k)
----
M2:READ.MZ ==> M2:READ.ME
in out rat ca cr
==== ==== ==== ==== ====
7 / 11 157% 962 0 (1k --> 2k)

13 files processed.
2M>type ppip.doc

PPIP.DOC 07/15/88 Page 1

------------------------------------------------------------------------
Documentation for the PPIP program
------------------------------------------------------------------------

OVERVIEW
-------

PPIP is a file copy program for use with CP/M 80. It was written to
supplement, not replace, SWEEP, NSWP or PIP. If you want to copy or
backup just a few files, you can do so with PPIP and you won't have to
wait for SWEEP, VFILER, etc. to load and start. In addition, PPIP can
be included in SUBMIT files. PPIP.COM occupies less than 4K.

PPIP has the ability, unlike most copy programs, to PUSH or PULL files
between user areas. Areas from 0 to 31 are supported.

Wildcards are accepted for BOTH the source and destination file names.
This is another feature that gives you flexibility not offered by most other copy programs.

Press RETURN to Continue

2M>m1:
1M>dir
No File
1M>pip m:=c:*.*[v]
D:PIP COM (User 0)

COPYING -
@BIOS280
CRCKLIST.CRC
BANKBIOS.LOG
BANKBIOS.SUB
BANKED.DAT
BANKED1.DAT
BDOS3.SPD
BDOS3.SPR
BIOS3.SPR
BIOS3.SYM
BIOSDBG.LST
BIOSDBG.REL
BIOSDBG.MAC
BIOSDBG.PR1
ERROR: VERIFY - M:BIOSDBG.$$$

1M>

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Mon, 12 Nov 2018 06:27:23 GMT

>>> The DMA transfer routine (DMAXFR) seemed to be spuriously ignoring some random 128-byte block transfers between memory banks.

Is your source online somewhere? I'd like to see if I'm doing it the same way... I've beat on my DMA code... ran DMA/MMU tests overnight with very paranoid error checking... without errors... (or so I thought... ;-)

I've attached my (very modified version of BillS's) cbios3c.280 and the files necessary to build it (excluding those from the DRI distribution).

bs.sub builds non-banked.
b.b.sub builds banked.
bl.sub build cpmldr (non-banked)

Note: I'm using zsm4 (beta 10) on the z280rc system... (booted in non-banked mode).

File Attachments
1) Archive.zip, downloaded 30 times

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Mon, 12 Nov 2018 06:42:24 GMT
View Forum Message <> Reply to Message

geowar1 wrote on Mon, 12 November 2018 17:27>>> The DMA transfer routine (DMAXFR) seemed to be spuriously ignoring to transfer random 128-byte blocks between memory banks.

Is your source online somewhere? I'd like to see if I'm doing it the same way... I've beat on my DMA code... ran DMA/MMU tests overnight with very paranoid error checking... without errors... (or so I thought... ;-)

See attached source-code snapshot in a zip file.

They're on github too at https://github.com/agn453/Z280RC in the system/bios280 directory.

Tony

File Attachments
1) bios280.zip, downloaded 33 times

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 12 Nov 2018 14:45:42 GMT
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A quick aside: I am thrilled to see all this activity! I personally haven't done the banked CP/M Plus porting (I have just worked on the hardware side thus far) but I'm following closely and learning a few things as I read. Thanks guys!

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 12 Nov 2018 15:05:06 GMT
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I have coded up XMOVE using DMA and it is running. I still use GENCPM to take care of HASH, ALV, DIRBCB and DTABCB. I now ran into the same problem Tony has, i.e., when pip large file (help.hlp is my test file), it can't verify. However, I can pip small files without any issue. The one
GENCPM option that seems to solve the problem is answering 'N' to the question 'Allocate buffers outside of Common (Y) ?'. I set up the disks with different combination of directory buffers, data buffers, and allocate buffers outside of common. Only the disks that have outside allocated buffers failed write verify. I'm using 3 banks of memory.

Bill

PS, I'm going to port the same software (slightly modified) to Z280 running in 8-bit Z80-compatible bus (https://github.com/Plasmode/ZZ80RC and see if it has the same problem.

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Mon, 12 Nov 2018 17:22:20 GMT

FYI: While debugging last night I ran across a case where pip failed also... playing with it it appeared that everything was fine until the 3rd 128-byte (sub?)sector... then the rest of the file was... just wrong. (do a pip without the verify and then compare the results. diffs start at offset 768. Rest of file is bad.
I verified this on both the CF and RAM disks. This was unbanked CP/M Plus (but using full banked bios with ccp DMA'd to TPA in bank one). Tried it with w/wo out jmp nog's; cache on/off... still failed...

This morning I've been unable to reproduce... I haven't a clue how I "fixed" it.

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Mon, 12 Nov 2018 17:27:43 GMT

I think I got it working. I need to check for common memory when doing XMOVE and adjust the DMA address registers appropriately. In GENCPM I allocate 2 data buffers and 2 directory buffers and put buffers outside of common. That gives me a TPA of 60K. Everything is still in CSEG, I hope someone can show me how to move some of the code into DSEG.

Bill

PS, RAMdisk is still not working. I'm long way from done.

File Attachments
1) cbios3.zip, downloaded 35 times
2) gencpm_dat.zip, downloaded 36 times
3) cpm3_Z280RC_with_XMOVE.jpg, downloaded 417 times

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Mon, 12 Nov 2018 17:34:57 GMT

plasmo wrote on Mon, 12 November 2018 07:05I have coded up XMOVE using DMA and it is
I am using GENCPM to allocate ALV and have had a problem when I copy very large file (1 meg) without verifying (it hangs, but if copy with verify it works), but that somehow went away in the latest version. I need to figure out how to allocate ALV by hand.

Alan Cox had warned me about Z280 cache problem in Z80-compatible mode. I had ZZ80RC for several months now, porting CP/M2.2, non-banked version of CP/M3, Wordstar, MBASIC, PTx music player, and had not encountered strange behaviors. I think the cache bug is fixed in later mask of Z280. It is getting to be my favorite board now.

Bill

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Mon, 12 Nov 2018 21:48:28 GMT

agn453 wrote on Sun, 11 November 2018 21:49 All this has fixed the Banked version that uses just bank 0 and 1 - see below (except for CP/M 3 PIP's verify error). The multi-bank version is still not working though.

I remember running into a similar problem when I was first developing a banked CP/M 3 BIOS for my P112: PIP corrupted files larger than a certain size during copy, and very large programs (e.g. HiTech C compiler) used to crash unexpectedly.

The problem had to do with the fact that in CP/M 3 the TPA extends above the application bank partially into the common area (unlike e.g. MP/M). Since the application bank is normally on bank 1 and the common area on bank 0, that means that the TPA is not contiguous in physical memory.
PIP apparently uses all the available memory as copy buffer, and when copying large files a file sector will land sooner or later within the crossing area between the two banks. Since the Z180 DMA can transfer data between physical addresses only, it could not copy such a sector correctly.

Since your BIOS is using DMA transfers, I suspect you may be running into the same problem.

One solution is to check for that particular case and then do two DMA transfers (the Z280 can chain two DMA channels for that purpose). A simpler (but slower) fix is to do a byte-by-byte copy from one bank to another (the Z280 ldup instruction will become handy here).

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Mon, 12 Nov 2018 22:14:23 GMT

hperaza wrote on Tue, 13 November 2018 08:48

I remember running into a similar problem when I was first developing a banked CP/M 3 BIOS for my P112: PIP corrupted files larger than a certain size during copy, and very large programs (e.g. HiTech C compiler) used to crash unexpectedly.

The problem had to do with the fact that in CP/M 3 the TPA extends above the application bank partially into the common area (unlike e.g. MP/M). Since the application bank is normally on bank 1 and the common area on bank 0, that means that the TPA is not contiguous in physical memory.

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One solution is to check for that particular case and then do two DMA transfers (the Z280 can chain two DMA channels for that purpose). A simpler (but slower) fix is to do a byte-by-byte copy from one bank to another (the Z280 ldup instruction will become handy here).

Hector - you've hit the nail on the head!

This is exactly what is happening to PIP - it tries to write a sector that crosses the common memory fence (in our case the 00E000h address). I'm coding up a quick fix which makes sure the interbank move is done with the TPA bank in-context (MMU move) - and the DMAXFR routine will need to check this too (Note-to-self: Physical memory addresses are not the same as Logical addresses! ...}

Tony
All this has fixed the Banked version that uses just bank 0 and 1 - see below (except for CP/M 3 PIP's verify error). The multi-bank version is still not working though.

I remember running into a similar problem when I was first developing a banked CP/M 3 BIOS for my P112: PIP corrupted files larger than a certain size during copy, and very large programs (e.g. HiTech C compiler) used to crash unexpectedly.

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Since your BIOS is using DMA transfers, I suspect you may be running into the same problem.

One solution is to check for that particular case and then do two DMA transfers (the Z280 can chain two DMA channels for that purpose). A simpler (but slower) fix is to do a byte-by-byte copy from one bank to another (the Z280 ldup instruction will become handy here).

That's a great explanation to why PIP with verify of small files works, but not large files.

I do check the source & destination addresses of xmove to make sure it is not in the common memory. In fact that was the fix that solved the PIP-with-verify error. But do I need to check whether a single xmove call can have address started in banked memory but finished in the common memory?

Bill
Yes. For RAM disk, you need to check that reads/writes are using a buffer that is in bank 0 - and if it isn't then check if the buffer is straddling the common memory fence and take appropriate action to read/write below and above the fence.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Tue, 13 Nov 2018 06:35:07 GMT

Success!!

My BIOS for the Z280RC now works for Banked memory (and no more CP/M 3 PIP verification errors).

Thanks to Hector for the hint about common memory boundary symptoms. I changed the BIOS to use the Z280's memory management to copy data between banks.

A zip file containing a snapshot of the source files is attached - or you can get the latest from https://github.com/agn453/Z280RC as I intend updating things some more (including enhancing the DMAXFR routine to cater for memory bank boundary defect).

Tony

TinyZZ Monitor v0.99 6/9/18

>boot CP/M
1--User Apps,
2--CP/M2.2,
3--CP/M3: 3 press Return to execute command

Boot LDRBIOS

CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.

RESBIOS3 SPR F700 0900
BNKBIOS3 SPR C500 1B00
RESBDOS3 SPR F100 0600
BNKBDOS3 SPR 9700 2E00

60K TPA
Z280RC Banked BIOS 13-Nov-2018
Built with Cache MOVE-w/MMU Cont.-DMA Alloc-CVS
Drives CompactFlash A...D: RamDisk M:

C>; C:PROFILE.SUB
C>d:setdef * d: a: c: [order=(com,sub) display page uk]

Drive Search Path:
1st Drive       - Default
2nd Drive       - D:
3rd Drive       - A:
4th Drive       - C:

Search Order     - COM, SUB
Console Page Mode - On
Program Name Display - On
Date format used  - UK

C>date
D:DATE   COM
Tue 13/11/2018 17:31:44
C>m1:
1M>pip m:=c:.*[v]
A:PIP   COM (User 0)

COPYING -
@BIOS280
CRCKLIST.CRC
BANKBIOS.LOG
BANKBIOS.SUB
BANKED.DAT
BANKED1.DAT
BDOS3.SPD
BDOS3.SPR
BIOS3.SPR
BIOS3.SYM
BIOSDBG.REL
BIOSDBG.MAC
BIOSDBG.PRB
BNK1BIOS.LOG
NBNKBIOLOG
IDEHD.MAC
BIOSKRNL.MAC
BIOSKRNL.REL
SCB.REL
LDRBIOS.LOG
SCB.PRN
BIOSKRNL.PRB
Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Tue, 13 Nov 2018 14:42:51 GMT
Tony,
Congratulation! Very cool, I'll download it and try it out on my hardware.
Bill

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Tue, 13 Nov 2018 16:23:34 GMT
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Tony,
It seems to work well except xmodem is not working. It will start up and waiting for data but will not start data transfer. The hardware will hang, some of the time (ctrl C does not get hardware's attention). Otherwise it runs MBASIC80 (StarTrek works! and Zork. I even commented out OUTJMP and reassembled it and it works the same.
Bill

Subject: Re: Interested in a Z280 SBC
Posted by b1ackmai1er on Tue, 13 Nov 2018 21:52:05 GMT
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With xmodem, try forcing checksum i.e.

XM RC file.com

Regards Phil

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Tue, 13 Nov 2018 22:45:05 GMT
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Tony, just installed your banked BIOS on my Z280RC and so far is working perfectly!

The XMODEM problem is again the serial port speed, which was already on the edge. Very likely the new conin BIOS routine has an extra overhead which causes the next character to be missed. If the serial speed is lowered, or if the sending application on the PC side adds a small per-character delay, then the transfer will succeed.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Tue, 13 Nov 2018 23:13:36 GMT
plasmo wrote on Wed, 14 November 2018 03:23

Tony,

It seems to work well except xmodem is not working. It will start up and waiting for data but will not start data transfer. The hardware will hang, some of the time (ctrl C does not get hardware's attention). Otherwise it runs MBASIC80 (StarTrek works! and Zork. I even commented out OUTJMP and reassembled it and it works the same.

Bill

Bill,

You may remember our private e-mail discussion back in early July - shortly after I received the Z280RC board from you.

At that time I was having difficulties receiving files using the XMODEM 2.7 you supplied on the system image. At the time I was using a Raspberry Pi with minicom (and I even tried Kermit too with the rz/sz programs installed). Sending files was not a problem. I suspected a timing issue and the fact that there was no-flow control on the 115200bps console port - possibly causing data-overruns on receive.

To work around this I had to use Tera Term 4.99 running under Windows 10 (presumably since the USB drivers in Windows better handle the USB console adapter) and boot the Z280RC into CP/M 2.2 to receive files with XMODEM successfully. The timing in XMODEM when it receives a data packet (128 bytes encapsulated in an xmodem header and checksum/crc at full speed) is time critical. The simple polling used by the CP/M 2.2 BIOS for console input and output can handle this. My experience with your orginal Non-banked CP/M 3 CBIOS3 was just too erratic - sometimes it would work, othertimes it would not.

My new BIOS has more code in the Console routines - and this probably pushes out the timing issues further.

I have the source-code for XMODEM 2.7 and intend trying to manually configure it to write directly to the Z280's UART I/O ports. This will be an interim solution though - since once I get an interrupt system working there will be additional overheads which mean XMODEM cannot touch the console UART ports.

I think the only way to fix this properly is to add a separate UART (like a Z80 SIO which has a fifo and modem control lines) for file transfer. I'm going to breadboard one up - however, interrupts under mode 3 on the Z280 will likely raise more issues (Z280 doesn't recognise the Z80 IM 2 style return from interrupt op-code - which looks at the bus M1 signal and the RETI instruction opcodes on the bus).

Tony

---

Subject: Re: Interested in a Z280 SBC
hperaza wrote on Wed, 14 November 2018 09:45

Tony, just installed your banked BIOS on my Z280RC and so far is working perfectly!

The XMODEM problem is again the serial port speed, which was already on the edge. Very likely the new conin BIOS routine has an extra overhead which causes the next character to be missed. If the serial speed is lowered, or if the sending application on the PC side adds a small per-character delay, then the transfer will succeed.

That's great Hector - and I agree the XMODEM issues are related to the port speed and time critical issues with console I/O in the BIOSKRNL and CHARIO bios routines.

On another matter - last night I was trying to compile the source-code for Simeon Cran's ZPM3 BDOS with your ZSM4 beta 10. It throws up some M and D errors (long symbol names) that M80 doesn't. Perhaps you'd like to take a look at it. Probably it's too much work to make ZSM4 handle longer symbols - but you'd know best!

(The attached zpm3s.arc is from the Tesseract RCPM+ Volume 93)

Tony

File Attachments
1) zpm3s.arc, downloaded 32 times

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Tue, 13 Nov 2018 23:49:32 GMT

plasmo wrote on Wed, 14 November 2018 03:23..snip..
The hardware will hang, some of the time (ctrl C does not get hardware's attention).
..snip.

Bill

Bill,

I meant to comment on this too.. CTRL-C won't get XMODEM's attention when using the BIOS CON: port for file transfer. If it is in the middle of receiving a packet then the only easy way out is to hit RESET. (The data transfer might have an 03h byte in the data it transfers via the console UART - so it can't see your CTRL-C until the protocol gets to a "start-of-packet" state).

Tony
Tony,
I simplified your conin routine to check out the timing issue associated with XMODEM.

```
conin:
    ; console char into reg A
    in a,(RxStat);;;; read on-chip UART receiver status
    and 10h		; data available?
    jp z,conin
    in a,(RxData); get it in Reg A
    ret
```

XMODEM works with the simplified console input (this is the same routine in my CPM2.2) and I have experimentally verified that I can insert up to 15 NOP and it still works, but failed with 20 NOPs. That's not very much time to do anything significant in the conin routine.

This is useful because it checks out your CP/M3 implementation is good, that XMODEM failed only because of the console input delay, not because of other potential CP/M3 bugs.

Hector had raised a couple issues with the Z280RC and they are actually interconnected. The CF byteswap issue due to hardware design error can be fixed with software with about 5% performance penalty. The lack of hardware handshakes for console I/O is more difficult to fix and I have not spent much time on it. XMODEM is a critical capability so if XMODEM won’t work because of more complex console I/O and lack of hardware handshake, then CF byte swap need to be fixed so files can be transferred from PC to Z280RC. It may be a good time to fix the CF byte order in CP/M3.

Bill

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Wed, 14 Nov 2018 05:45:07 GMT

Adding the /z1 flag has always solved my xmodem issues on the z280rc. IIRC that makes xmodem think you're running on a 1 MHz Z80 and slows down some delay loops that are otherwise too fast on the Z280.

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Wed, 14 Nov 2018 05:46:54 GMT

Page 271 of 338 ---- Generated from RetroBrew Computers Forum
You can add /s8 to force zsm4 to support 8 character symbol names.

Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Wed, 14 Nov 2018 10:21:13 GMT
View Forum Message <> Reply to Message

plasmo wrote on Wed, 14 November 2018 14:14
Tony,
I simplified your conin routine to check out the timing issue associated with XMODEM.

conin:
; console char into reg A
in a, (RxStat); read on-chip UART receiver status
and 10h ; data available?
jp z, conin
in a, (RxData); get it in Reg A
ret

XMODEM works with the simplified console input (this is the same routine in my CPM2.2) and I have experimentally verified that I can insert up to 15 NOP and it still works, but failed with 20 NOPs. That's not very much time to do anything significant in the conin routine.

This is useful because it checks out your CP/M3 implementation is good, that XMODEM failed only because of the console input delay, not because of other potential CP/M3 bugs.

..snip..

I've modified the XMODEM 2.7 source to include Z280 UART character I/O routines internally.

Attached in a ZIP file containing the modified source code XM27Z280.MAC, a configuration file XMZ280RC.CFG with default configuration switches for the Z280RC, a submit file to build it from source using Hector's ZSM4 and pre-built binary XMZ280.COM.

To use it you can copy the XMZ280.COM to XM.COM (or XMODEM.COM) onto a drive in your search-path and place the XMZ280RC.CFG file in your current directory; then -

XM filename,ext /S will send a file from the Z280RC system,
or
XM filename,ext /R will receive a file to the Z280RC system.

If you don't have XMZ280RC.CFG in the current directory, you should add the command line switch /X3 to select the built-in I/O routines and /Z9 to set timeouts appropriately for the CPU speed -
The Z280 UART is designed to be driven via a DMA channel. So you don't need to breadboard up a new UART so much as fix up the CP/M BIOS to use the DMA functionality at least on receive.

Not enough. With the BIOS overhead, fetching a char from the DMA buffer will take nearly as many CPU cycles as fetching it from an I/O port. Thus, when receiving a large block of data the buffer can overflow anyway before XMODEM has time to collect all bytes.

Yes, one can optimize the DMA buffer size for XMODEM's particular case, but sooner or later you'll come across an application that needs that additional byte...
Tony,
Thank you! XM27Z280 works great on your CP/M3. XMODEM is my most used tool, I wouldn't know what to do if it doesn't work. Just as importantly, I read your comments about using XIZ, wow, what a time saver!

Bill

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Wed, 14 Nov 2018 16:37:05 GMT

agn453 wrote on Tue, 13 November 2018 15:34 On another matter - last night I was trying to compile the source-code for Simeon Cran's ZPM3 BDOS with your ZSM4 beta 10. It throws up some M and D errors (long symbol names) that M80 doesn't. Perhaps you'd like to take a look at it. Probably it's too much work to make ZSM4 handle longer symbols - but you'd know best!

I see what you mean. Internally, ZSM4 has a limit of 12 characters for the identifier length even when the REL format has capacity for only up to 8 chars. That allows using better names for local labels, but the ZPM3 disassembly pushed that limit!

I just uploaded a new version (beta 11) that increases the max identifier length to 15 chars, and that's the maximum it can handle without changing the symbol table structure. It appears to assemble the ZPM3 BDOS correctly now.

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Wed, 14 Nov 2018 17:47:54 GMT

hperaza wrote on Wed, 14 November 2018 08:18 etchedpixels wrote on Wed, 14 November 2018 06:47 The Z280 UART is designed to be driven via a DMA channel. So you don't need to breadboard up a new UART so much as fix up the CP/M BIOS to use the DMA functionality at least on receive.

Not enough. With the BIOS overhead, fetching a char from the DMA buffer will take nearly as many CPU cycles as fetching it from an I/O port. Thus, when receiving a large block of data the buffer can overflow anyway before XMODEM has time to collect all bytes.

Yes, one can optimize the DMA buffer size for XMODEM's particular case, but sooner or later you'll come across an application that needs that additional byte...

No - on two counts

1. The protocol has internal flow control so the time you take to fetch the bytes is irrelevant to
reliability providing they are buffered

2. The buffer size merely has to exceed the worst case window size of the protocol permitted to the sender it does not have to be 'tuned to the protocol'.

Don't let me stop you wire wrapping yourself a UART but your worst case for a command to the CF card is 7 seconds so don't forget that detail either because even at 9600 baud thats 7000 characters of buffering so you might need to try 110 baud to be safe ;-) 

In the real world however the protocols (X/Y/Z and everyone else) are all flow controlled so if your DMA buffer is 4K there isn't anything that's going to overflow (and btw as your link is direct and low latency the performance difference between Xmodem and the later ones is minimal so the extra buffering isn't even useful). The absolute worst case scenario would be ZModem with windowing doing a disk write to your CF card that caused the CF card to have to erase blocks and do compaction. In that case you'll end up with the sender data all in your DMA buffer and the sender waiting for you without any losses. You might not get 100% wire performance but you will get your data. 

This is the same reason you can do 100Mbit ethernet with an 8bit microcontroller - providing you have at least a flow control window of reliable buffer it just works.

Alan

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Wed, 14 Nov 2018 18:01:30 GMT
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Alan, my point is that not everything is X/Y/Z modem. And that DMA alone is a brute-force approach, and as such there are many situations where it will simply fail. If you want things to work reliably at whatever speed over a RS232 link, then you need hardware handshake lines.

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Wed, 14 Nov 2018 18:17:01 GMT
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OK, I'll tackle the UART Receive DMA issue...

I also like to point out that while 115200 is hardwired in UART bootstrap mode (it is even hardwired to Odd parity), once software has the control, it can change the baud clock divider to different values such as 57600/28800, or even use the internal counter to generate wide range of serial clock and change parity to None if so desired. I leave the serial port at the hardwired 115200 Odd parity to save me the trouble of changing serial port setting between bootstrap Z280RC with a new CF disk and the normal operation. Most users seldom initialize new CF disk so different serial port setting setting at different modes of operation is not an issue.

Bill
hperaza wrote on Wed, 14 November 2018 10:01
Alan, my point is that not everything is X/Y/Z modem. And that DMA alone is a brute-force approach, and as such there are many situations where it will simply fail. If you want things to work reliably at whatever speed over a RS232 link, then you need hardware handshake lines.

I'm at this point just going to politely disagree with you and point out the internet doesn't use hardware flow control either.

Alan

hperaza wrote on Thu, 15 November 2018 03:37
I just uploaded a new version (beta 11) that increases the max identifier length to 15 chars, and that’s the maximum it can handle without changing the symbol table structure. It appears to assemble the ZPM3 BDOS correctly now.

Thank you for such a speedy response Hector. I'll grab the latest ZSM4 and give it a whirl soon!

Tony

plasmo wrote on Thu, 15 November 2018 03:35

Tony,
Thank you! XM27Z280 works great on your CP/M3. XMODEM is my most used tool, I wouldn't know what to do if it doesn't work. Just as importantly, I read your comments about using XIZ, wow, what a time saver!

Bill

The XIZ that Bill and I refer to is my favourite assembly language source code translator. It converts assembly language source files to/from 8080-style (but not all TDL/XITAN) to Zilog Z80 (suitable for M80, SLR Z80ASM, ZSM4 etc. It does a fairly good job - but the output sometimes needs to be fixed (especially op-codes starting in column 1) and some confusion with macros that produce Z80 code (e.g. JRNZ <-> JR NZ, The version I use is from a long time ago (circa April 1986) - attached is a ZIP.

If anyone has a later version (or the source-code) I'd love to modify it to output lowercase op-codes and save me from post-processing with a little TurboPascal I wrote to do this.

Tony

File Attachments
1) xiz.zip, downloaded 26 times

plasmo wrote on Wed, 14 November 2018 14:14

Hector had raised a couple issues with the Z280RC and they are actually interconnected. The CF byteswap issue due to hardware design error can be fixed with software with about 5% performance penalty.

Bill,

Have you considered a Rev 2 Z280RC board that fixes the CF 16-bit access mode byte-swap? That way the software doesn't need to change and the CompactFlash will be compatible with other systems using a similar format.

Also, I've hit the 512 directory entries limit on the CompactFlash 8MB drives a few times (particularly with timestamps enabled). I'm considering increasing it to 1024 for the optional drives E...H: that can be configured in my BIOS.

Tony
Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Thu, 15 Nov 2018 01:40:00 GMT

Tony,
I have not thought too much about rev 2 of Z280RC. I like to have reasonable solutions for the existing concerns such as UART receive DMA as well as the inability to handle Mode 2 interrupt acknowledge. A forum member, I forgot whom, pointed out Tilmann Reh's solution which I thought was very clever and at the same time fix the problem of DS1302 RTC not being accurate.

I do have a software byteswap fix that I can post on my GitHub page as an alternative for people wanting to transfer files via moving the physical CF card between PC and Z280RC. I did a disk copy benchmark and which measured 39 seconds instead of 37 seconds without software byte swap--about 5% degradation which is smaller than speed variations among different brand of CF disks. It is a simple algorithm, but affect ZZMon and CP/M and all existing data. Another word, the CF disk needs to be initialized and loaded with new set of software and files.

My original directory setting and number and size of drives were arbitrary, which is rather frightening because I have had no prior CP/M experience! With CP/M3 it is a good time to change the directory entries and number of disk drives. My smallest CF disk is 64Meg, so we can have eight 8-meg drives and more directory entries. How do you initialize each drive?

Bill

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Thu, 15 Nov 2018 03:41:39 GMT

plasmo wrote on Thu, 15 November 2018 12:40
Tony,
I have not thought too much about rev 2 of Z280RC. I like to have reasonable solutions for the existing concerns such as UART receive DMA as well as the inability to handle Mode 2 interrupt acknowledge. A forum member, I forgot whom, pointed out Tilmann Reh's solution which I thought was very clever and at the same time fix the problem of DS1302 RTC not being accurate.

Bill, I think I read somewhere that you can signal RETI by reading or writing to one of the Z80 device status registers. I'll have to dig out my old Zilog datasheets and take a look.

Quote:
I do have a software byteswap fix that I can post on my GitHub page as an alternative for people wanting to transfer files via moving the physical CF card between PC and Z280RC. I did a disk copy benchmark and which measured 39 seconds instead of 37 seconds without software byte swap--about 5% degradation which is smaller than speed variations among different brand of CF disks. It is a simple algorithm, but affect ZZMon and CP/M and all existing data. Another word, the CF disk needs to be initialized and loaded with new set of software and files.
That doesn't sound too nice. Up until now, I have made only image copies (using dd on Linux as a backup strategy) and loaded all my files to the Z280RC's drives using XMODEM (or PIP using its paper-tape era options to get Intel hex files across e.g. PIP filename.hex=CON:[HAZ] and raw-uploading .HEX files).

Quote:
My original directory setting and number and size of drives were arbitrary, which is rather frightening because I have had no prior CP/M experience! With CP/M3 it is a good time to change the directory entries and number of disk drives. My smallest CF disk is 64Meg, so we can have eight 8-meg drives and more directory entries. How do you initialize each drive?

Bill

I think it would be prudent to stick with the 512 directory entries for A: (at least). It's a common CP/M format used by many other systems with CompactFlash (e.g. other RC2014 systems).

I use disk utility (DU v8.8) You should be able to find DU88 (or DU90) on one of the CP/M public domain/shareware sites. If not I can upload it.

Just a moment ago I enabled the four extra drives with 1024 directory entries on my system. Here's the log of me "formatting" a drive -

CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.

RESBIOS3 SPR F700 0900
BNKBIO3 SPR BD00 2300
RESBDOS3 SPR F100 0600
BNKBDOS3 SPR 8F00 2E00

60K TPA

Z280RC Banked BIOS 15-Nov-2018
Built with Cache MOVE-w/MMU BigDirE-H Cont.-DMA Alloc-Csv
Drives CompactFlash A:...H: RamDisk M:

..snip..

C>show e:[dr
D:SHOW  COM

    E: Drive Characteristics
64,512: 128 Byte Record Capacity
8,064: Kilobyte Drive Capacity
1,024: 32 Byte Directory Entries
  0: Checked Directory Entries
256: Records / Directory Entry
32: Records / Block
1,024: Records / Track
256: Reserved Tracks
512: Bytes / Physical Record

C>du
A:DU       COM

DISK UTILITY v8.8
Universal Version under CP/M 3.1

Type ? for help
Type X to exit

:le				<- Login drive E

g0				<- Read Group 0
G=0000:00, T=256, S=1, PS=0

:ch0-7f,e5;w;+/256<- Change whole sector to E5, Write,
Next Sector, Repeat 256 times

0000000000000000F10000000000000000201000000
09FE
FFFEFFFF000000000000000000001301000000B0BFEFFFEFFFF00000000000000
0000
0000002401000000B0DFEFFFEFFFF000004051F01BF07FF01F000000001002030004051F01
1DF7
FF01F000000004000G=0000:01, T=256, S=2, PS=0
02030004051F01DF07FF01F0000000080002030004051F01DF07FF01F0000000C0002030004
051F
017F03FF01F000000001020363007C09500AE00C70000000000000000000000000000000
0000
0000000000031001CD08043EE2D3103E80D312D314AF32030320400213F04CD1E04310001
210300
2210102A62FE2206G=0000:02, T=256, S=3, PS=0
003EC3320003205000624215C00CDBF03215C0036012319A04010B00CD652115C000E0F
CD0500
3CCAD20110001D50E1ACD0500115C00E14CD050087D1C2CA0121800019EBC3AF01FE01
C2DB01C3
000121A504CD1E04C3010221C104CD1E04C301020E09CD05000E01CD0500C372010E34C3
F8010E39
CD1502213504CD1EG=0000:03, T=256, S=4, PS=0
0418FEB14E610C83EFC9DB14E610CA0B02DB16C9DB12E601CA150279D318C93EFFC9A
FC921000
79FE05D032E404216300FE00C8217C00FE01C8219500FE02C821AE00FE03C821C700C9010
000ED43
..snip..

:g0
G=0000:00, T=256, S=1, PS=0

:d
00 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
10 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
20 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
30 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
40 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
50 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
60 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*
70 E5E5E5E5 E5E5E5E5 E5E5E5E5 E5E5E5E5 *eeeeeeeeeeeeeee*

:x

C> initdir e:
A:INITDIR COM

INITDIR WILL ACTIVATE TIME STAMPS FOR SPECIFIED DRIVE.
Do you want to re-format the directory on drive: E  (Y/N)?  y

C> set e: [name=ide0.p04, create=on, update=on
D:SET COM

Label for drive E:

Directory   Passwds  Stamp   Stamp   Stamp
Label       Reqd    Create   Access   Update
----------  -------  -------  -------  -------
E:IDE0 .P04 off     on       on

C> show e: [dr,lab
D:SHOW COM

Label for drive E:

Directory   Passwds  Stamp   Stamp
Label       Reqd    Create   Update   Label Created   Label Updated
----------  -------  -------  -------  --------------  --------------
IDE0 .P04 off     on       on  15/11/18 14:20  15/11/18 14:20
E: Drive Characteristics
64,512: 128 Byte Record Capacity
8,064: Kilobyte Drive Capacity
1,024: 32 Byte Directory Entries
0: Checked Directory Entries
256: Records / Directory Entry
32: Records / Block
1,024: Records / Track
256: Reserved Tracks
512: Bytes / Physical Record

C>

Tony

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Thu, 15 Nov 2018 12:27:31 GMT
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agn453 wrote on Wed, 14 November 2018 12:26 Also, I've hit the 512 directory entries limit on the CompactFlash 8MB drives a few times (particularly with timestamps enabled). I'm considering increasing it to 1024 for the optional drives E:..H: that can be configured in my BIOS. I'd go directly for 4096 directory entries - once you start copying files, assembling and/or compiling applications you will hit the 1024-entry limit very quickly (at least that was my experience with a 10MB GIDE partition on the P112). Remember that in CP/M # of dir entries <> max # of files, as large files (e.g. assembly listings) take several directory entries. Also, in CP/M 3 1/4 of the entries are used by the timestamps (when enabled).

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Thu, 15 Nov 2018 18:07:31 GMT
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The limit I hit is the one in my brain... More than 512 files in one directory is more than I can mentally keep track of... especially when file names are limited to the 8.3 and no mixed case. I find user areas less that useful (even with any/all of the z80 dos extensions) because there's always something I need that's I can't access from the user area where I'm working.

Subject: Re: 8080 to Z80 translation
There are two here: http://www.hytherion.com/beattidp/comput/z80cpm.htm
One is an awk script that you can run anywhere... you can run awk scripts... [duh!] ;-) 
The other (<ZTRANS.COM>) is (CP/M Z80) native app.

I'd be interested in how they compare with the one that you're using... I suspect they have the same issues; I find I have to double check all / manually switch "M" to '(HL)" sometimes... and re-do any 8080/Z80 macros "JRNZ", etc.

I've been tempted to disassemble ZTRANS.COM to make it output lower case... but I've been xmodem'ng up to host (macOS) and then using bbedit to convert to lower case and then xmodem'ng back down to the target (z280rc) machine.

---

Subject: Re: 8080 to Z80 translation
Posted by lowen on Thu, 15 Nov 2018 19:29:04 GMT

geowar1 wrote on Thu, 15 November 2018 14:19...
I've been tempted to disassemble ZTRANS.COM to make it output lower case... but I've been xmodem'ng up to host (macOS) and then using bbedit to convert to lower case and then xmodem'ng back down to the target (z280rc) machine.

I have to admit that I for one have difficulty reading lowercase assembler code; I write and wrote in all upper case for assembler for so long that lowercase assembler just feels Wrong.

---

Subject: Re: 8080 to Z80 translation
Posted by snhirsch_gmail.com on Thu, 15 Nov 2018 19:50:24 GMT

Here's the sources for an Intel to Zilog translator in C. I hacked it a bit to get it working on Linux.

File Attachments
1) iz45_linux.tar.gz, downloaded 30 times

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Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Thu, 15 Nov 2018 20:40:19 GMT
With CP/M 3 as with MP/M you can mark files as system files in which case they can be run/read regardless of user area and you can list them with DIRS rather than DIR

It's one of the little things that makes CP/M 3 so much more pleasant to use.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Thu, 15 Nov 2018 21:45:43 GMT
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hperaza wrote on Thu, 15 November 2018 23:27
I'd go directly for 4096 directory entries - once you start copying files, assembling and/or compiling applications you will hit the 1024-entry limit very quickly
..snip..

Hector,

Having thought about this again I've elected to use 2048 directory entries. Going higher would mean I'd need to use a block size of 8192 (BLS) and I'd rather stick with 4096 so the small files aren't chewing up a bigger allocation.

Yet another aside - I noticed reference to RSX180 in your ZSM4 distribution. A DuckDuckGo search seems to only have a reference to your P112 site for a disk image (for the P112). Is this the PDP-11 RSX system migrated to a Z180? Over 40 years ago (around the time I was getting into microcomputers) I spent too much time after work hours tinkering on RSX-11M. Is the source code available? If you'd rather respond privately - use Tony dot Nicholson at computer dot org to reach me.

Tony

Subject: Re: 8080 to Z80 translation
Posted by agn453 on Thu, 15 Nov 2018 22:28:54 GMT
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My quick-and-dirty TurboPascal program to lowercase assembly language source (and leave comments alone) is attached. The only thing to watch for is for single quotes in text strings - like DEFB "Can't open file" - or EX AF AF' - which may cause comments to be lowercased too.

Tony

File Attachments
1) LC.PAS, downloaded 38 times
yeah, that works... unfortunately it doesn't help with non-COM (or SUB) files... for example all those <WS*.OVR> files... You can tell WS4 to always get them from whatever drive they're on... but not which user area.

Weirdly HELP.com can find HELP.HLP (and *.HLP)... but a lot of other programs can't find their files unless they're in the same user area.

---

Try the ZCPM3 BDOS.

I use this feature when working in different user areas - for example, the majority of my .COM and .SUB files - including Wordstar 3.30g and it's overlays reside on disk A in user 0 - each of them marked with the SYS and RO attribute. They can be found using the search path (set-up with SETDEF in the PROFILE.SUB on boot) or (for those that don't use a search path) in user 0 of the current drive. WordStar has a WINSTALL option to specify which drive the overlays are on.

Tony

---

I wasn't aware that DU had a CP/M Plus version... not to say you couldn't boot into CP/M 2.2 to do what you did...

OTOH I did find the source to ZAP modified to work on CP/M Plus... except that it had a bug where he didn't handle more than 127 sectors per track (and z280rz uses 256 spt).

If you're interested I can post it (w/sources).

Next I want to write a "mount" command that can change the system track offsets on any but the boot drive so I can remap any logical drive (except A:) to any (64 track) partition on the CF card.

Note: while playing with your BIOS (and rebuilding, and rebuilding, and...) I decided to write a
"IFNT" tool. Sets the CP/M Plus BDOS FUNCTION 108: GET/SET PROGRAM RETURN CODE appropriately based on relative file update time(stamps).
So your BANKBIOS.SUB script can do things like this:

ifnt scb.mac scb.rel
:ZSM4 SCB,SCB=SCB/s8/u

ifnt bioskrnl.mac bioskrnl.rel
:ZSM4 BIOSKRNL,BIOSKRNL=BIOSKRNL/s8/u

ifnt idehd.mac idehd.rel
:ZSM4 IDEHD,IDEHD=IDEHD/s8/u

ifnt ramdisk.mac ramdisk.rel
:ZSM4 RAMDISK,RAMDISK=RAMDISK/s8/u

ifnt clock.mac clock.rel
:ZSM4 CLOCK,CLOCK=CLOCK/s8/u

ifnt chario.mac chario.rel
:ZSM4 CHARIO,CHARIO=CHARIO/s8/u

ifnt biosdbg.mac biosdbg.rel
:ZSM4 BIOSDBG,BIOSDBG=BIOSDBG/s8/u

ifnt BIOSKRNL.rel,BIOSDBG.rel,CHARIO.rel,CLOCK.rel,SCB.rel,RAMDISK.rel,IDEHD.rel
BNKBIOS3.spr
:LINK BNKBIOS3[B]=BIOSKRNL,BIOSDBG,CHARIO,CLOCK,SCB,RAMDISK,IDEHD

Works pretty well... (except that CP/M Plus time stamps only have one minute resolution... so sometimes something that's "newer" actually has the same date...]

Why didn't they use "seconds since 1977" instead of "days since 1977 plus hh:mm"? (no 32-bit divide? That would have lasted 136 years (or 116 years longer than CP/M did). As-is the file

---

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Fri, 16 Nov 2018 01:13:51 GMT
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Yeah, that's what I did (except everything on drive B:).
I used NZCOM right up until Joe Wright retired and moved back east (I helped him pack up)... but my zrdos foo has fled... :(
Will the ZCPM3 BDOS give me a command history longer than one entry?

Subject: Re: 8080 to Z80 translation
Posted by geowar1 on Fri, 16 Nov 2018 01:16:36 GMT
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Even back when I was doing more assembly programming (30+ years ago! I exclusively used lower case... I've never liked how Micro$oft & Intel like to YELL (UPPERCASE) everything. Still beats toggling it in via the front panel (like on the PDP-11)... ;-)

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Fri, 16 Nov 2018 01:27:44 GMT
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geowar1 wrote on Fri, 16 November 2018 12:13 Will the ZCPM3 BDOS give me a command history longer than one entry?

Yep - Wordstar like cursor keys. CTRL-X and CTRL-E for command history up/down... CTRL-Y (delete line) replaces the CP/M CTRL-U.. CTRL-S CTRL-D cursor left and right etc.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Fri, 16 Nov 2018 01:59:28 GMT
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Know of any documentation anywhere? Only thing I can find via google is some DDJ articles and <http://elitebbs.dynu.net/commodore/commodore/Commodore%20File%20Areas/8-cpm/zcpm3.html>... lots of verbiage... no actual information.

Subject: Re: 8080 to Z80 translation
Posted by geowar1 on Fri, 16 Nov 2018 02:01:36 GMT
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BTW: It annoys me that you can't use "ex hl,de" (or I guess "ex af',af" ether).
For a summary of Simeon Cran's ZPM3 BDOS features, please see the zpm3s.arc file I attached to my recent message.

It contains the disassembled source code (that Hector graciously fixed ZSM4 so it would build without throwing errors due to long symbols).

In it you will also find a ZPM3.TXT and a ZPM3FIX.TXT file that will give some help.

This copy came from Tesseract RCPM+ Volume 93 and was updated on 24-Feb-2015 by Jon Saxton. Jon changed the key mapping and command history to be "more intuitive" - so be sure to read the "fix" file.

Tony

agn453 wrote on Thu, 15 November 2018 13:45

Having thought about this again I've elected to use 2048 directory entries. Going higher would mean I'd need to use a block size of 8192 (BLS) and I'd rather stick with 4096 so the small files aren't chewing up a bigger allocation.

You're right! Just checked the P112 BIOS and I can see I settled on 2048 entries as well probably for the same reason.

Quote: Yet another aside - I noticed reference to RSX180 in your ZSM4 distribution. A DuckDuckGo search seems to only have a reference to your P112 site for a disk image (for the P112). Is this the PDP-11 RSX system migrated to a Z180? Over 40 years ago (around the time I was getting into microcomputers) I spent too much time after work hours tinkering on RSX-11M. Is the source code available? If you'd rather respond privately - use Tony dot Nicholson at computer dot org to reach me.

It is a system written from scratch, originally for the 8080. The design and look-and-feel morphed a few times before ending up like RSX-11M (my favorite OS of that era).

The few people who are testing the system also download ZSM4 from this forum, thus the task image file is now being included in the package. I'm working on a native UZI180 version of ZSM4 as well, with unix-style option switches, but because the assembler runs nicely under the embedded CP/M emulator it didn't get high priority.

As RSX180 is a bit off-topic here (except perhaps that a Z280 version is in progress), I'll give you more details via PM.
Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Fri, 16 Nov 2018 11:35:21 GMT

geowar1 wrote on Fri, 16 November 2018 12:10
Note: while playing with your BIOS (and rebuilding, and rebuilding, and... I decided to write a "IFNT" tool. Sets the CP/M Plus BDOS FUNCTION 108: GET/SET PROGRAM RETURN CODE appropriately based on relative file update time(stamps).
So your BANKBIOS.SUB script can do things like this:

\[ \text{ifnt scb.mac scb.rel} \]
\[ :ZSM4 SCB,SCB=SCB/s8/u \]

\[ \text{ifnt bioskrnl.mac bioskrnl.rel} \]
\[ :ZSM4 BIOSKRNL,BIOSKRNL=BIOSKRNL/s8/u \]

..snip..

I have used a CP/M version of 'make' that does a similar thing. My build drive didn't have time-stamping enabled until recently - and I wanted to be certain that each build was clean. This is particularly important after changing something in the configuration library - e.g. CONFBANK.LIB.

I'd be interested in a copy of your IFNT if you're happy to share it.

Tony

---

Subject: Re: Interested in a Z280 SBC  
Posted by agn453 on Fri, 16 Nov 2018 11:52:31 GMT

Oops - I cut this from my previous reply when I wanted to comment.

CP/M-Plus *does* return the seconds as a BCD value in the A register after a get time BDOS call (function code 105).
Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Fri, 16 Nov 2018 13:13:40 GMT
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That's for the BDOS/BIOS time functions... not file time stamps; they only return days since 1977
and TOD in HH:MM (no seconds).

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Fri, 16 Nov 2018 13:19:22 GMT
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Quote: I have used a CP/M version of 'make' that does a similar thing. My build drive didn't have
time-stamping enabled until recently - and I wanted to be certain that each build was clean. This is
particularly important after changing something in the configuration library - e.g. CONFBANK.LIB.

I'd be interested in a copy of your IFNT if you're happy to share it.

Yeah, I was aiming for "make" like behavior... but wasn't ready to re-invent that wheel... ;-) 
I'm not at the machine that's connected to the z280rc right now... but as soon as I am I'll post
those files.

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Fri, 16 Nov 2018 16:58:13 GMT
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I've attached three files (zipped together): IFNT.Z80, PRINT$.MAC and CPMUTIL.Z80. If you
want you could put the parts you use of the 2nd two files in the 1st to eliminate the extras...
(CPMUTIL.Z80 has turned into a "kitchen sink" of somewhat useful CP/M utility functions.
YOMV... ;-)

File Attachments
1) Archive.zip, downloaded 33 times

Subject: Re: Interested in a Z280 SBC
Posted by geowar1 on Sat, 17 Nov 2018 04:36:48 GMT
Quick note: I noticed you said that you're using WordStar 3.x... It had problems with my 132x66 monitor (terminal emulator on host machine)... so I tried ws 4.x and it seems to be working just fine.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Thu, 29 Nov 2018 06:23:57 GMT

Some more tinkering today with my CP/M-Plus BIOS for the Z280RC.

I've rearranged the memory mapping for a banked system so that the transient program area and common memory area are contiguous - see the commentary in the BIOSKRNL.MAC source file.

This means that the DMA and MMU options for memory moves between banks both now work correctly.

I've also tweaked common memory usage to give a 61KB TPA (Banked system with eight 8MB drives and RamDisk) and replaced Bill's CP/M loader with my LDRBIOS version.

I still need some more TPA to compile one of the larger UZI280 modules though...

TinyZZ Monitor v0.99 6/9/18

>boot CP/M
1--User Apps,
2--CP/M2.2,
3--CP/M3: 3 press Return to execute command

Z280RC CP/M 3 Loader 29-Nov-2018
Built with Cache Cont.-DMA
CompactFlash A:

CPMLDR3 - CP/M V3.0 Loader
Copyright (C) 1982, Digital Research

RESBIOS3 SPR  FA00  0600
BNKBIOS3 SPR  B600   2A00
RESBDOS3 SPR  F400  0600
BNKBDOS3 SPR  8800  2E00

61K TPA

Z280RC Banked BIOS 29-Nov-2018
You can fetch the lastest sources from https://github.com/agn453/Z280RC

There's a ZIP file link in the description README.md that will fetch only the files for my bios280 and not the whole GitHub repository.

Tony
stefan_n wrote on Fri, 30 November 2018 03:29

Alternatively you can split the file in question. I had to do that with some files even with a 62K TPA.

I've already tried this Stefan.

I extracted the execve routine from scall2.c into a file all by itself (with appropriate header includes). HiTech C's OPTIM can't cope -

```
E>c280 -v -c -o2 scall4.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

SCALL4.C: __execve()
  134:     p = find_zombie2();
        ^ illegal conversion of integer to pointer (warning)
        ^ find_zombie2() declared implicit int (warning)
  214:     datalen = dataptr;
        ^ illegal conversion of pointer to integer (warning)
  310:      p=make_zombie();
            ^ illegal conversion of integer to pointer (warning)
            ^ make_zombie() declared implicit int (warning)
  347:       doexec((int16 *)(ub.u_d.u_isp = nenvp - 2));
              ^ illegal conversion between pointer types ^ (warning)

optim: Out of memory in __execve
ERA E:$CTMP1.$$$
ERA E:$CTMP2.$$$
ERA E:$CTMP3.$$$
ERA E:$S$EXEC.$$$

E>
```

I tried using the RunCPM emulator with a 64K TPA on my Mac mini and it just spins cpu (perhaps there's Z280 code in the C280 compiler or OPTIMH parts of HiTech C for the Z280 that the emulator can't cope with).

Tony

Subject: Re: Interested in a Z280 SBC
Oh execve( on its own does still not fit, wow... but only 6 warnings ;-) i always had been to lazy to type all the explizit casting.

Yes C280.com and Optimh.com are compiled by me with Z280 optimization on and linked with my Z280 version of the C-lib. Sources for both files are available i guess. The other compiler related files are all original HiTech Z80 versions.

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Fri, 30 Nov 2018 00:42:57 GMT

stefan_n wrote on Fri, 30 November 2018 10:48
Yes C280.com and Optimh.com are compiled by me with Z280 optimization on and linked with my Z280 version of the C-lib. Sources for both files are available i guess. The other compiler related files are all original HiTech Z80 versions.

I'm using an updated version of HiTech C V3.09A from Tesseract Volume 91 (a release compiled by Jon Saxton in May 2014 with changes by John Elliot to fix an memset bug, wildcard commandline expansion as well as CP/M-Plus enhancements). Perhaps these fixes have reduced memory availability. I'll go looking for an older release and try it (a long time ago I think this was on the OAK or SIMTEL archives). The version of HiTech C I purchased many moons ago is too old - V1.3.

If anyone knows where these Z280 sources of C-lib etc are.. I'd like to know!

Tony

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Fri, 30 Nov 2018 03:37:46 GMT

You may also want to try version 4.11 of Hitech C which was released into public domain a couple months ago.
https://www.retrobrewcomputers.org/forum/index.php?t=msg&th=331&start=0

Bill

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Fri, 30 Nov 2018 07:19:43 GMT
plasmo wrote on Fri, 30 November 2018 14:37
You may also want to try version 4.11 of Hitech C which was released into public domain a couple months ago.

I've got this installed in a virtualbox MS-DOS 6.22 instance under macOS.

However, what I'm trying to do is use the Z280 optimiser (OPTIMH.COM) and Z280 modified compiler front-end (C280.COM). The source-code for OPTIMH.C is included in the uzi_112_kernel-src_MIT.zip distribution, and the Z280 versions of the HiTech C object libraries LIB280C.LIB and LIB280F.LIB were found in the older uzi-102.arc - but not the source-code to the C280 compiler front-end or the library routines. The cross-compiler under MS-DOS will need to be coaxed to produce Z280-binaries. I can't run the Z280 binaries under a Z80 emulator either - hence I'm attempting this on the real thing(TM).

Tony

Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Fri, 30 Nov 2018 11:52:10 GMT
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[quote title=agn453 wrote on Thu, 29 November 2018 16:42]stefan_n wrote on Fri, 30 November 2018 10:48
If anyone knows where these Z280 sources of C-lib etc are.. I'd like to know!

It seems the only place is my old CPU280 machine. I try to locate it (the worst part, as i have no clue where i put it) and hopefully it is still operational and the sources are on one of the CPM partitions.

---

Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Fri, 30 Nov 2018 13:50:55 GMT
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agn453 wrote on Thu, 29 November 2018 16:42
I'm using an updated version of HiTech C V3.09A from Tesseract Volume 91 (a release compiled by Jon Saxton in May 2014 ... 

Thats interesting. Does it mean the sources still exist and Jon has access to them? I was told by HiTech, a long time ago, that the sources for the Z80 compiler got lost.

---

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Fri, 30 Nov 2018 22:35:39 GMT
stefan_n wrote on Sat, 01 December 2018 00:50
agn453 wrote on Thu, 29 November 2018 16:42

I'm using an updated version of HiTech C V3.09A from Tesseract Volume 91 (a release compiled by Jon Saxton in May 2014 ...)

Thats interesting. Does it mean the sources still exist and Jon has access to them? I was told by HiTech, a long time ago, that the sources for the Z80 compiler got lost.

I've just confirmed the HiTech C binaries for the core Z80 compiler bits (CGEN.COM, CPP.COM, CREF.COM, DEBUG.COM, LIBR.COM, LIN[KQ].COM, OPTIM.COM, P1.COM and ZAS.COM) are identical for the original released V3.09 (taken from my WalnutCreek CD-ROM copy of the SIMTEL archive) and Tesseract versions. The main changes are with the library routines (for which source-code is provided).

Unfortunately Jon Saxton died from cancer back in June 2015. His son is maintaining the Tesseract triton web site at http://www.triton.vg/TesseractRCPM+Catalog.html but sadly various mirrors etc are being lost from the Internet as time passes.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Sat, 15 Dec 2018 13:23:24 GMT

It's late at night here in Australia - but I've just managed to boot up UZI280 on Bill Shen's Z280RC board.

E>bootuzi
E:BOOTUZI COM

UZI280 is (c) Copyright (1990-96) by Stefan Nitschke and Doug Braun

boot: 0
init: /usr/adm/wtmp: Bad file number
UZI280 version 1.12
login: root
%ls -la
total 12
rwxrwxrwx  9 root  512 Apr 19  1992 ./
rwxrwxrwx  9 root  512 Apr 19  1992 ../
rwxrwxrwx  2 root  512 Apr 19  1992 Tapes/
rwxrwxrwx  2 root  512 Apr 19  1992 bin/
rwxrwxrwx  2 root  512 Apr 19  1992 dev/
rwxrwxrwx  2 root  512 Apr 19  1992 etc/
There's still a lot of polishing to do - and loading of additional binaries etc.

You'll find my modified source-code up now on my GitHub repository at
https://github.com/agn453/Z280RC

Look in the system/uzi280-kernel and system/uzi280-xutils folder where you'll find
UZIKERNL.LBR and UZIXUTIL.LBR libraries containing the sources (that you can XMODEM
download and extract with a CP/M library utility like NULU.COM).

Here's a build log and boot transcript... Enjoy!
E>date
A:DATE     COM
Sat 15/12/2018 22:17:28
E>make
E:MAKE     COM
  c280 -v -c data.c
  c280 -v -c -o2 machdep.c
  c280 -v -c machasm.c
  c280 -v -c newuput.c
  c280 -v -c -o2 process.c
  c280 -v -c procasm.c
  c280 -v -c -o2 filesys.c
  c280 -v -c -o2 scall1.c
  c280 -v -c -o2 scall2.c
  c280 -v -c -o2 scall3.c
  c280 -v -c scall4.c
  c280 -v -c -o2 cache.c
  c280 -v -c cachasm.c
  c280 -v -c -o2 devflop.c
  c280 -v -c -o2 devio.c
  c280 -v -c -o2 devmisc.c
  c280 -v -c -o2 devtty.c
  c280 -v -c devttyas.c
  c280 -v -c -o2 devwd.c
  c280 -v -c idecf.as
  c280 -v -c -o2 ideconf.c
  c280 -v -c start.c
  c280 -v -c bcopy.c
  c280 -v -c bzero.c
  c280 -v -c outin.c
  c280 -v -c asar.as
  c280 -v -c asdiv.as
  c280 -v -c wrelop.as
  c280 -v -c idiv.as
  c280 -v -c imul.as
  c280 -v -c shar.as
  c280 -v -c shll.as
  c280 -v -c shlr.as
  c280 -v -c csv.as
  c280 -v -c -o2 kprintf.c
  c280 -v -c -o2 itob.c
mklib.sub
lkuzi.sub
lk2m80.sub
E:MAKE@@@ SUB
A:SUBMIT COM

E>c280 -v -c data.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: DATA.C M:$CTMP1.$$  
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c -o2 machdep.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: MACHDEP.C M:$CTMP1.$$  
MACHDEP.C: main()
    60:   ptab_pointer = ptab;
         ^ illegal conversion of pointer to integer (warning)
224 bytes optimized away
554 bytes replaced
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c machasm.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: MACHASM.C M:$CTMP1.$$
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$$EXEC.$$  
  
E>c280 -v -c newuput.c  
e:C280   COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU  
  
0:A:CPP -DCPM -DH1_TECH_C -Dz80 -I0:A: NEWUPUT.C M:$CTMP1.$$  
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$$EXEC.$$  
  
E>c280 -v -c -o2 process.c  
e:C280   COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU  
  
0:A:CPP -DCPM -DH1_TECH_C -Dz80 -I0:A: PROCESS.C M:$CTMP1.$$  
  
PROCESS.C: init2()  
  
85: if (d_open( 13                  ) != 0) {  
     d_open() declared implicit int ^ (warning)  
96: if (fmount(ROOTDEV,((inoptr)0))) {  
     fmount() declared implicit int ^ (warning)  
104: for (k=ub.u_d.u_page; k < (ub.u_d.u_page+16); ++k) {  
        ^ illegal conversion between pointer types (warning)  
        operands of < not same pointer type ^ (warning)  
105:     *k = ((pg_descr *)0) ;  
        ^ illegal conversion of pointer to integer (warning)  
120: }  
     ^ unused variable declaration: n_open (warning)  
  
PROCESS.C: psleep()  
153: }  
     ^ unused variable definition: dummy (warning)  
  
PROCESS.C: ptab_alloc()  
311: if ((p->p_ublk = zerobuf())==0 )
315: }
  ^ unused variable definition: i (warning)
PROCESS.C: clkint2()
395: }
  ^ unused variable declaration: in_cawrite (warning)
PROCESS.C: unix2()
483:     ub.u_d.u_usp = usp();
    ^ illegal conversion of integer to pointer (warning)
    ^ usp() declared implicit int (warning)
487:     ub.u_d.u_argn3 = ugetw(ub.u_d.u_usp+4);
    ugetw() declared implicit int ^ (warning)
492:     ub.u_d.u_retloc = ugetw(ub.u_d.u_usp);
    ^ illegal conversion of integer to pointer (warning)
FILESYS.C: newfile()
   515:       if ((getperm(pino) & 0002)==0)
          ^ getperm() declared implicit int (warning)

SCALL1.C: _link()
   344:       if(!(getperm(ino) & 0002) && !super())
          ^ getperm() declared implicit int (warning)

SCALL1.C: _unlink()
   391: }
          ^ unused variable declaration: getmode (warning)

SCALL1.C: readi()
   462: }
          ^ unused variable declaration: getmode (warning)

SCALL1.C: mknod()
   592:                         (ino->c_node.i_size.o_offset-ub.u_d.u_offset.o_offset));
          min() declared implicit int ^ (warning)

SCALL1b.c: mknod()
   117: }
          ^ unused label: nogood2 (warning)
          ^ unused variable declaration: super (warning)

SCALL1b.c: utime()
   323: if (ino->c_node.i_uid != ub.u_d.u_euid && !super())
          super() declared implicit int ^ (warning)
scall1b.c: _umount()
727: }
^ unused variable declaration: in_casync (warning)

SCALL2.C: wargs()
176: while (ptr = ugetw(argv++))
^ illegal conversion of integer to pointer (warning)

SCALL3.C: _signal()
233: retval = ub.u_d.u_sigvec[(int16)ub.u_d.u_argn1];
    illegal conversion of pointer to integer ^ (warning)
SCALL3.C: _kill()
279:     if (ub.u_d.u_ptab->p_uid == p->p_uid || super() )
        super() declared implicit int ^ (warning)
92 bytes optimized away  
210 bytes replaced  
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  
E>c280 -v -c scall4.c  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU  
SCALL4.C: _execve()  
137:     p = find_zombie2();  
        ^ illegal conversion of integer to pointer (warning)  
        ^ find_zombie2() declared implicit int (warning)  
217:     datalen = dataptr;  
        ^ illegal conversion of pointer to integer (warning)  
313:     p = make_zombie();  
        ^ illegal conversion of integer to pointer (warning)  
        ^ make_zombie() declared implicit int (warning)  
350:     doexec((int16 *) (ub.u_d.u_isp = nenvp - 2));  
        illegal conversion between pointer types ^ (warning)  
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  
E>c280 -v -c -o2 cache.c  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU  
0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: CACHE.C M:$CTMP1.$$  
 44 bytes optimized away
 90 bytes replaced
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c cachasm.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: CACHASM.C M:$CTMP1.$$$
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c -o2 devflop.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: DEVFLOP.C M:$CTMP1.$$$
 0 bytes optimized away
 0 bytes replaced
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c -o2 devio.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

DEVIO.C: bread()
   90:     if (bdread(bp) == -1)
         ^ bdread() declared implicit int (warning)
DEVIO.C: bfree()
   128:    if (bdwrite(bp) == -1)
         ^ bdwrite() declared implicit int (warning)
DEVIO.C: freebuf()
   230: }
         ^ unused variable definition: i (warning)
DEVIO.C: bdread()
   270:     if ((validdev(bp->bf_dev))==0     )
validdev() declared implicit int ^ (warning)
DEVIO.C: pageread()
   311:     swapbase = page;
         ^ illegal conversion of integer to pointer (warning)
DEVIO.C: pagewrite()
   327:     swapbase = page;
         ^ illegal conversion of integer to pointer (warning)
DEVIO.C: insq()
   421:     oldspl = spl(0);
         ^ spl() declared implicit int (warning)
0:A:CGEN M:$CTMP2.$$$
290 bytes optimized away
578 bytes replaced
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c -o2 devmisc.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CGEN M:$CTMP2.$$$
0:A:OPTIMH M:$CTMP3.$$$
14 bytes optimized away
28 bytes replaced
ERA M:$CTMP1.$$=
ERA M:$CTMP2.$$=
ERA M:$CTMP3.$$=
ERA M:$$$EXEC.$$=
E>c280 -v -c -o2 devtty.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHIL_TECH_C -Dz80 -I0:A: DEVTTY.C M:$CTMP1.$$=
0:A:P1 M:$CTMP1.$$=
M:$CTMP2.$$=
M:$CTMP3.$$=
DEVTTY.C:
  146: char *dflt_mode = 0006000| 0000020|0000010| 0000000;
       illegal conversion of integer to pointer ^ (warning)
DEVTTY.C: tty_read()
  258:       if (remq(&ttyinq[minor],&c))
            remq() declared implicit int ^ (warning)
DEVTTY.C: tty_write()
  342:             c = ugetc(ub.u_d.u_base);
                ugetc() declared implicit int ^ (warning)
DEVTTY.C: tty_open()
  420: }       ^ unused variable definition: j (warning)
DEVTTY.C: tty_close()
  443: }       ^ unused variable definition: j (warning)
DEVTTY.C: tty_ioctl()
  500:         break;
       ^ Unreachable code (warning)
DEVTTY.C: tinproc()
  528:       if (c == 0x1b & td->t_flags == dflt_mode)
            operands of == not same type ^ (warning)
  558:         if (uninsq(&ttyinq[minor],&oc))
              uninsq() declared implicit int ^ (warning)
  646:             if (insq(&ttyinq[minor],c))
                insq() declared implicit int ^ (warning)
0:A:CGEN M:$CTMP2.$$=
M:$CTMP1.$$=
M:$CTMP2.$$=
M:$CTMP3.$$=
280 bytes optimized away
602 bytes replaced
ERA M:$CTMP1.$$=
ERA M:$CTMP2.$$=
E>c280 -v -c -o2 ideconf.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0 bytes optimized away  
0 bytes replaced  
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$$EXEC.$$  

E>c280 -v -c start.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$$EXEC.$$  

E>c280 -v -c bcopy.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$$EXEC.$$
E>c280 -v -c bzero.c
E:C280  COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: BZERO.C M:$CTMP1.$$$
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c outin.c
E:C280  COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DHI_TECH_C -Dz80 -I0:A: OUTIN.C M:$CTMP1.$$$
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c asar.as
E:C280  COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OASAR.OBJ ASAR.AS
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c asdiv.as
E:C280  COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OASDIV.OBJ ASDIV.AS
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c wrelop.as  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU

0:A:ZAS -OWRELOP.OBJ WRELOP.AS
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c idiv.as  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU

0:A:ZAS -OIDIV.OBJ IDIV.AS
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c imul.as  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE  
Special version for the Zilog Z280 MPU

0:A:ZAS -OIMUL.OBJ IMUL.AS
ERA M:$CTMP1.$$  
ERA M:$CTMP2.$$  
ERA M:$CTMP3.$$  
ERA M:$$EXEC.$$  

E>c280 -v -c shar.as  
E:C280     COM  
HI-TECH C COMPILER (CP/M-80) V3.09  
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OSHAR.OBJ SHAR.AS
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$EXEC.$$$

E>c280 -v -c shll.as
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OSHLL.OBJ SHLL.AS
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$EXEC.$$$

E>c280 -v -c shlr.as
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OSHLR.OBJ SHLR.AS
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$EXEC.$$$

E>c280 -v -c csv.as
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:ZAS -OCSV.OBJ CSV.AS
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$EXEC.$$$

E>c280 -v -c -o2 kprintf.c
E:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DH1_TECH_C -Dz80 -I0:A: KPRINTF.C M:$CTMP1.$$$
33 bytes optimized away
64 bytes replaced
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>c280 -v -c -o2 itob.c
E:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0:A:CPP -DCPM -DH1_TECH_C -Dz80 -I0:A: ITOB.C M:$CTMP1.$$$
35 bytes optimized away
82 bytes replaced
ERA M:$CTMP1.$$$
ERA M:$CTMP2.$$$
ERA M:$CTMP3.$$$
ERA M:$$$EXEC.$$$

E>mklib.sub
E:MKLIB SUB
A:SUBMIT COM

E>era runtime.lib
E:libr r runtime.lib bcopy.obj bzero.obj outin.obj
A:LIBR COM

E:libr r runtime.lib kprintf.obj itob.obj asar.obj asdiv.obj wrelip.obj
A:LIBR COM

E:libr r runtime.lib idiv.obj imul.obj shar.obj shll.obj shlr.obj csv.obj
A:LIBR COM
E>lkuzi.sub
E:LKUZI SUB
A:SUBMIT COM

E>; Link new object library to UZI280.OBJ
E>era uzi280.obj
No File
E>; LINQ is the HiTech C V3.09 link program (renamed to keep
E>; the DigitalResearch linker LINK.COM on the system drive)
E>a:linq
A:LINQ COM
link> -r -ouzi280.obj
link> data.obj machasm.obj machdep.obj filesys.obj process.obj procasm.obj
link> scall1.obj scall2.obj scall3.obj scall4.obj
link> devtty.obj devttyas.obj
link> devio.obj devflop.obj devmisc.obj devwd.obj idecf.obj
link> cache.obj cachasm.obj newuput.obj
link> runtime.lib

E>lk2m80.sub
E:LK2M80 SUB
A:SUBMIT COM

E>; Link UZI280 core image with IDE parameters
E>a:linq
A:LINQ COM
link> -munix.sym -n -pdata=0,text,bss -ounix.cim -c000
link> uzi280.obj ideconf.obj
link> start.obj

E>era MAKE@@@.SUB
E>
E>; Now the CP/M Utilities

E>F:
F>make
F:MAKE COM
  c280 -c -of2 devio.c
  c280 -c -of2 xdevtty.c
  c280 -c -of2 xdevwd.c
  c280 -c -of2 xdevfio.c
  c280 -c -of2 xdevmisc.c
  c280 -c -of2 xmachdep.c
  c280 -c -of2 data.c
  c280 -c -of2 xfs1.c
  c280 -c -of2 xfs2.c
  c280 -c -of2 bcopy.c
  c280 -c -of2 bzero.c
c280 -c -of2 spl.c
c280 -c -of2 itob.c
c280 -c -of2 uput.c
c280 -c idecf.as
c280 -c -of2 bios.c
mkxlib.sub
F:MAKE@@@  SUB
A:SUBMIT   COM

F>c280 -c -of2 devio.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

DEVIO.C: bread()
   85:     if (bdread(bp) == -1)
          ^ bdread() declared implicit int (warning)
DEVIO.C: bfree()
   126:    if (bdwrite(bp) == -1)
          ^ bdwrite() declared implicit int (warning)
DEVIO.C: bdread()
   262:       if ((validdev(bp->bf_dev))==0)
validdev() declared implicit int ^ (warning)
DEVIO.C: pageread()
   303:     swapbase = page;
          ^ illegal conversion of integer to pointer (warning)
DEVIO.C: pagewrite()
   315:     swapbase = page;
          ^ illegal conversion of integer to pointer (warning)
DEVIO.C: insq()
   405:     oldspl = spl(0);
          ^ spl() declared implicit int (warning)
290 bytes optimized away
582 bytes replaced

F>c280 -c -of2 xdevtty.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

6 bytes optimized away
16 bytes replaced

F>c280 -c -of2 xdevwd.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
XDEVWD.C: wd_read()

70:     dptrlo  = swapbase;
         ^ illegal conversion of pointer to integer (warning)
77:     dptrlo  = ub.u_d.u_base;
         ^ illegal conversion of pointer to integer (warning)
84:     dptrlo  = ub.u_d.u_buf->bf_data;
         ^ illegal conversion of pointer to integer (warning)

19 bytes optimized away
40 bytes replaced

F>c280 -c -of2 xdevflo.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

XDEVFLO.C: fd_read()

143:    temp = (char)bdos(25);
         ^ bdos() declared implicit int (warning)
30 bytes optimized away
62 bytes replaced

F>c280 -c -of2 xdevmisc.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

14 bytes optimized away
28 bytes replaced

F>c280 -c -of2 xmachdep.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

69 bytes optimized away
184 bytes replaced
F>c280 -c -of2 data.c
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

0 bytes optimized away
0 bytes replaced

F>c280 -c -of2 xfs1.c
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

XFS1.C: xfs_init()
   45:   if (d_open( 6 ) != 0)
    ^ d_open() declared implicit int (warning)
   51:     if (fmount(ROOTDEV,((inoptr)0)))
    fmount() declared implicit int ^ (warning)
XFS1.C: _open()
   94:     if ((uindex = uf_alloc()) == -1)
    ^ uf_alloc() declared implicit int (warning)
   97:       if ((oftindex = oft_alloc()) == -1)
    ^ oft_alloc() declared implicit int (warning)
  105:       perm = getperm(ino);
    ^ getperm() declared implicit int (warning)
  113:         if (getmode(ino) == 040000 &&
    ^ getmode() declared implicit int (warning)
  120:             if (isdevice(ino) && d_open((int)ino->c_node.i_addr[0]) != 0)
    isdevice() declared implicit int ^ (warning)
XFS1.C: _close()
  148:     return(doclose(uindex));
    ^ doclose() declared implicit int (warning)
XFS1.C: _link()
  274:     if (getmode(ino) == 040000 && !super())
    super() declared implicit int ^ (warning)
  299:         if (ch_link(parent2,"",filename(name2),ino) == 0)
    ch_link() declared implicit int ^ (warning)
XFS1.C: _unlink()
  365: } ^ unused variable declaration: i_open (warning)
XFS1.C: _write()
  409: } ^ unused variable definition: offp (warning)
XFS1.C: readi()
  475:     (ino->c_node.i_size.o_offset-ub.u_d.u_offset.o_offset)();
min() declared implicit int ^ (warning)

504:         ub.u_d.u_count = cdread(ino->c_node.i_addr[0]);
        cdread() declared implicit int ^ (warning)

XFS1.C: writei()

584:         ub.u_d.u_count = cdwrite(ino->c_node.i_addr[0]);
        cdwrite() declared implicit int ^ (warning)

594: }

^ unused variable declaration: zerobuf (warning)
^ unused variable definition: created (warning)

XFS1.C: _stat()

932:       if ((valadr(buf,sizeof(struct stat)) && (ino = n_open(path,(inoptr*)0)))==0     )
        valadr() declared implicit int ^ (warning)

519 bytes optimized away
1166 bytes replaced

F>c280 -c -of2 xfs2.c
A:C280     COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

XFS2.C: _ioctl()

107:       if ((isdevice(ino))==0    )
        ^ isdevice() declared implicit int (warning)

113:       if ((getperm(ino) & 0002)==0      )
        ^ getperm() declared implicit int (warning)

121:       if (d_ioctl(dev, request,data))
        d_ioctl() declared implicit int ^ (warning)

XFS2.C: _mount()

139:       if ((super())==0  )
        ^ super() declared implicit int (warning)

154:       if (getmode(sino)! = 060000)
        ^ getmode() declared implicit int (warning)

168:       if ( (dev >= 4 || d_open(dev))
        d_open() declared implicit int ^ (warning)

182:       if (fmount(dev,dino))
        ^ fmount() declared implicit int (warning)

XFS2.C: _umount()

226:       if ((validdev(dev))==0    )
        ^ validdev() declared implicit int (warning)

XFS2.C: srch_dir()

399:             if (namecomp(compname,buf[curentry].d_name))
        namecomp() declared implicit int ^ (warning)

XFS2.C: i_open()

451:     static nexti = i_tab;
        ^ illegal conversion of pointer to integer (warning)

476:     j = nexti;
        ^ illegal conversion of integer to pointer (warning)
479: nexti =j;
    ^ illegal conversion of pointer to integer (warning)
XFS2.C: blk_alloc()
  866:   buf = bread(devno, newno, 2);
         ^ illegal conversion between pointer types (warning)
810 bytes optimized away
1748 bytes replaced

F>c280 -c -of2 bcopy.c
A:C280   COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

   6 bytes optimized away
  12 bytes replaced

F>c280 -c -of2 bzero.c
A:C280   COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

   6 bytes optimized away
  12 bytes replaced

F>c280 -c -of2 spl.c
A:C280   COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

    2 bytes optimized away
   4 bytes replaced

F>c280 -c -of2 itob.c
A:C280   COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

  35 bytes optimized away
  82 bytes replaced

F>c280 -c -of2 uput.c
A:C280   COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

12 bytes optimized away
24 bytes replaced

F>c280 -c idecf.as
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

F>c280 -c -of2 bios.c
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

2 bytes optimized away
4 bytes replaced

F>mkxlib.sub
F:MKXLIB SUB
A:SUBMIT COM

F>era xlib.lib
F>libr
A:LIBR COM
libr> r xlib.lib xfs1.obj xfs2.obj devio.obj xdevtty.obj xdevwd.obj xdevflo.obj
libr> xdevmisc.obj xmachdep.obj data.obj
libr> itob.obj uput.obj idecf.obj
libr> bzero.obj bcopy.obj spl.obj bios.obj

F>era MAKE@@.SUB
F>
F>

F>; Now the Utilities
F>XUTILS
F:XUTILS SUB
A:SUBMIT COM

F>c280 -c -of2 ideconf.c
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU
F>;
F>c280 -c -of2 mkfs.c
A:C280 COM
HI-TECH C COMPILER (CP/M-80) V3.09
Copyright (C) 1984-87 HI-TECH SOFTWARE
Special version for the Zilog Z280 MPU

MKFS.C: main()
    37:     dev = atoi(argv[1]);
            ^ atoi() declared implicit int (warning)
    61:     if (!yes())
            ^ yes() declared implicit int (warning)
    65:     if (d_open(dev))
            ^ d_open() declared implicit int (warning)

79 bytes optimized away
164 bytes replaced

F>;
F>; (fsck has a missing _da_read error)
F>c280 -c -of2 fsck.c
F>;
F>lkxutil mkfs
F:LKXUTIL SUB
A:SUBMIT COM

F>a:linq
A:LINQ COM
link> -c100h -oMKFS.com 0:a:crtcpm.obj MKFS.obj idecong.obj \
link> xlib.lib 0:a:lib280c.lib

F>;lkxutil fsck
F>lkxutil ucp
F:LKXUTIL SUB
A:SUBMIT COM

F>a:linq
A:LINQ COM
link> -c100h -oUCP.com 0:a:crtcpm.obj UCP.obj idecong.obj \
link> xlib.lib 0:a:lib280c.lib

F>
F>; Now make a bootable UZI volume (Starts after the 8x CP/M 8MB partitions)
F>
F>mkboot
F:MKBOOT SUB
A:SUBMIT   COM

F>mkfs 0 600 65000
F:MKFS   COM
Making filesystem on device 0 with isize 600 fsize 65000. Confirm? y

F>ucp 0
F:UCP   COM
unix: mkdir dev
unix: cd dev
unix: mknod tty 020666 5
unix: mknod tty1 020666 6
unix: mknod tty2 020666 7
unix: mknod tty3 020666 11
unix: mknod tty4 020666 12
unix: mknod tty5 020666 13
unix: mknod tty6 020666 14
unix: mknod wd0 060644 0
unix: mknod wd1 060644 2
unix: mknod wd2 060644 3
unix: mknod fd0 060644 1
unix: mknod rwd0 020444 0
unix: mknod rwd1 020444 2
unix: mknod rwd2 020444 3
unix: mknod lpr 020222 4
unix: mknod NULL 020666 8
unix: mknod kmem 020444 9
unix: mknod rmt 020444 10
unix: mknod wmt 020222 10
unix: cd /
unix: mkdir /etc
unix: mkdir /bin
unix: mkdir /usr
unix: mkdir /usr/root
unix: mkdir /Tapes
unix: cd /
unix: bget init
unix: chmod init 0755
unix: cd /bin
unix: bget clam
unix: chmod clam 0755
unix: bget sh
unix: chmod sh 0755
unix: bget setuart
unix: chmod setuart 0755
unix: bget ls
unix: chmod ls 0755
unix: bget ln
unix: chmod ln 0755
unix: bget login
unix: chmod login 0755
unix: bget mkdir
unix: chmod mkdir 0755
unix: bget rm
unix: chmod rm 0755
unix: bget rmdir
unix: chmod rmdir 0755
unix: bget touch
unix: chmod touch 0755
unix: bget mount
unix: chmod mount 0755
unix: bget umount
unix: chmod umount 0755
unix: bget uncompress
unix: chmod uncompress 0755
unix: bget sync
unix: chmod sync 0755
unix: bget tar
unix: chmod tar 0755
unix: bget kill
unix: chmod kill 0755
unix: bget ps
unix: chmod ps 0755
unix: cd /etc
unix: get rc
unix: chmod rc 0644
unix: get passwd
unix: chmod passwd 0644
unix: get group
unix: chmod group 0644
unix: get ttytab
unix: chmod ttytab 0644
unix: get termcap
unix: chmod termcap 0644
unix: bget utmp
unix: exit

F>
F>

F>e:
E>
E>; Build the boot loader
E>zsm4 =bootuzi
A:ZSM4  COM
Z80/Z180/Z280 Macro-Assembler V4.0 Beta 11
E>link bootuzi
A:LINK     COM
LINK 1.31

ABSOLUTE  0000
CODE SIZE  0183 (0100-0282)
DATA SIZE  0000
COMMON SIZE 0000
USE FACTOR  00

E>bootuzi
E:BOOTUZI  COM

UZI280 is (c) Copyright (1990-96) by Stefan Nitschke and Doug Braun

boot: 0
init: /usr/adm/wtmp: Bad file number
UZI280 version 1.12
login: root
%ls -la
total 12
rwxrwxrwx   9 root          512 Apr 19     1992 ./
rwxrwxrwx   9 root          512 Apr 19     1992 ../
rwxrwxrwx   2 root          512 Apr 19     1992 Tapes/
rwxrwxrwx   2 root          512 Apr 19     1992 bin/
rwxrwxrwx   2 root          512 Apr 19     1992 dev/
rwxrwxrwx   2 root          512 Apr 19     1992 etc/
rwxr-xr-x   1 root          9088 Apr 19     1992 init*
rwxrwxrwx   2 root          512 Apr 19     1992 usr/
%cd bin
%ls -la
total 260
rwxrwxrwx   2 root          512 Apr 19     1992 ./
rwxrwxrwx   9 root          512 Apr 19     1992 ../
rwxr-xr-x   1 root          83200 Apr 19     1992 clam*
rwxr-xr-x   1 root          8704 Apr 19     1992 kill*
rwxr-xr-x   1 root          10880 Apr 19     1992 ln*
rwxr-xr-x   1 root          9728 Apr 19     1992 login*
rwxr-xr-x   1 root          16512 Apr 19     1992 ls*
rwxr-xr-x   1 root          8064 Apr 19     1992 mkdir*
rwxr-xr-x   1 root          8192 Apr 19     1992 mount*
rwxr-xr-x   1 root          9600 Apr 19     1992 ps*
rwxr-xr-x   1 root          10752 Apr 19     1992 rm*
rwxr-xr-x   1 root          8576 Apr 19     1992 rmdir*
UZI280 version 1.12
login:

(hit reset to restart / shutdown)

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sat, 15 Dec 2018 13:35:50 GMT

WOW, Wow, wow! This is major cool! I'm dropping everything...

Edit:
I ran into two obstacles: Disk Utility does not seem to erase directories. Perhaps my version is too old (v7., I think you'd mentioned v8.8 but I'm not able to locate it. Alternatively, I can just fill a 64meg CF disk with 0xE5, but that's such a kluge...

When running make@@@.sub, it looks for $EXEC in drive A and can't find it. Is that a Hitech C file?

-------------

More Edit:

I know nothing of UZI280, so I need helps.
I did kludge up an utility to fill a 64meg CF with 0xE5, so now I have a formatted CF disk.
I used LU310.COM to extract UZIKERNL.LBR and UZIXUTIL.LBR to drive E:
I used the latest CPM3BNK8.SYS as CPM3.SYS
I used the cpm3bin-with-y2k-fixes and put them in drive A:
bootup CP/M 3 and type "bootuzi" at drive E:
typed '0' at "boot:" prompt. It hanged there.

CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.

RESBIOS3 SPR FA00 0600
BNKBIO3 SPR B600 2A00
RESBDOS3 SPR F400 0600
BNKBDO3 SPR 8800 2E00

61K TPA

%RAMDISK label missing. Initialise (Y/N) ? Y - RAMDISK initialised.

Z280RC Banked BIOS 07-Dec-2018
Built with Cache MOVE-w/DMA BigDirE-H Cont.-DMA Alloc-CSV
Drives CompactFlash A:..H: RamDisk M:
C>e:
E>bootuzi

UZI280 is (c) Copyright (1990-96) by Stefan Nitschke and Doug Braun

boot: 0

Bill

Subject: Re: Interested in a Z280 SBC
Posted by stefan_n on Sat, 15 Dec 2018 13:58:07 GMT
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Congratulations! It's so cool to see this old baby alive again

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Sat, 15 Dec 2018 15:01:20 GMT
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Very cool

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Sun, 16 Dec 2018 03:02:48 GMT
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plasmo wrote on Sun, 16 December 2018 00:35
WOW, Wow, wow! This is major cool! I'm dropping everything...

Edit:
I ran into two obstacles: Disk Utility does not seem to erase directories. Perhaps my version is too old (v7., I think you'd mentioned v8.8 but I'm not able to locate it. Alternatively, I can just fill a 64meg CF disk with 0xE5, but that's such a kluge...

I've just added DU v8.8 and NULU 1.52 to the https://github.com/agn453/Z280RC repositry in the utilities folder (DU.COM and NULU.COM). I'll have to go looking to find the original distribution kits (with documentation) for these and put them up too.

Quote:

When running make@@@.sub, it looks for $EXEC in drive A and can't find it. Is that a Hitech C file?

Yes. This is part of HiTech C Z80 V3.09 which I have installed to the A: drive in User 0 (where all my system utilities live and easily accessed via the CP/M-Plus search path). I might zip up an image of a 128KB CompactFlash with all my Z280RC stuff on it - so you can use dd to write it to an empty CF card and boot your Z280RC from it.

Quote:

---------------

More Edit:

I know nothing of UZI280, so I need helps.

I did kludge up an utility to fill a 64meg CF with 0xE5, so now I have a formatted CF disk.
I used LU310.COM to extract UZIKERNL.LBR and UZIXUTIL.LBR to drive E:
I used the latest CPM3BNK8.SYS as CPM3.SYS
I used the cpm3bin-with-y2k-fixes and put them in drive A:
bootup CP/M 3 and type "bootuzi" at drive E:
typed '0' at "boot:" prompt. It hanged there.

CP/M V3.0 Loader
Copyright (C) 1998, Caldera Inc.

RESBIOS3 SPR FA00 0600
BNKBIOS3 SPR B600 2A00
%RAMDISK label missing. Initialise (Y/N) ? Y - RAMDISK initialised.

Z280RC Banked BIOS 07-Dec-2018
Built with Cache MOVE-w/DMA BigDirE-H Cont.-DMA Alloc-CSW
Drives CompactFlash A:..H: RamDisk M:
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boot: 0

CPM3BNK8.SYS is my general working system-image for CP/M-Plus. The interrupt version I've been testing also works - but file transfers using XMODEM are flaky due to interrupt handling overheads.

Did you run the MKBOOT.SUB file from the UZIXUTIL.LBR (extracted to F:)? This writes a bootable 32MB UZI partition at a 64MB offset from the start of the CompactFlash card. Be careful with extracting the library files to different drives/user areas. There are filename clashes (and the files are different - particularly the CONFIG.INC source file).

I've also just added the binaries distribution files in a UZIBNAR.LBR file to GitHub (instructions in the README.md on the GitHub project home page). I'll probably tinker some more later today. It's hot and humid here and both myself and my border collies need a swim at the beach!

Tony

---

Subject: Re: Interested in a Z280 SBC
Posted by plasmo on Sun, 16 Dec 2018 04:33:28 GMT
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Tony,
Thanks for the instructions. The one I missed is that CF disk needs to be bigger than 64meg because UZI partition is offset above the 64meg. So I started with a new 512meg CF disk and XMODEM all the software and I think I have it working now.

Bill

E>a:submit mkboot.sub
E>mkfs 0 600 65000
Making filesystem on device 0 with isize 600 fsize 65000. Confirm? y

E>ucp 0
unix: mkdir dev
unix: cd dev
unix: mknod tty 020666 5
unix: mknod tty1 020666 6
unix: mknod tty2 020666 7
unix: mknod tty3 020666 11
unix: mknod tty4 020666 12
unix: mknod tty5 020666 13
unix: mknod tty6 020666 14
unix: mknod wd0 060644 0
unix: mknod wd1 060644 2
unix: mknod wd2 060644 3
unix: mknod fd0 060644 1
unix: mknod rwd0 020444 0
unix: mknod rwd1 020444 2
unix: mknod rwd2 020444 3
unix: mknod lpr 020222 4
unix: mknod null 020666 8
unix: mknod kmem 020444 9
unix: mknod rmt 020444 10
unix: mknod wmt 020222 10
unix: cd /
unix: mkdir /etc
unix: mkdir /bin
unix: mkdir /usr
unix: mkdir /usr/root
unix: mkdir /Tapes
unix: cd /
unix: bget init
unix: chmod init 0755
unix: cd /bin
unix: bget clam
unix: chmod clam 0755
unix: bget sh
unix: chmod sh 0755
unix: bget setuart
unix: chmod setuart 0755
unix: bget ls
unix: chmod ls 0755
unix: bget ln
unix: chmod ln 0755
unix: bget login
unix: chmod login 0755
unix: bget mkdir
unix: chmod mkdir 0755
unix: bget rm
unix: chmod rm 0755
unix: bget rmdir
unix: chmod rmdir 0755
unix: bget touch
unix: chmod touch 0755
unix: bget mount
unix: chmod mount 0755
unix: bget umount
unix: chmod umount 0755
unix: bget uncompress
unix: chmod uncompress 0755
unix: bget sync
unix: chmod sync 0755
unix: bget tar
unix: chmod tar 0755
unix: bget kill
unix: chmod kill 0755
unix: bget ps
unix: chmod ps 0755
unix: cd /etc
unix: get rc
unix: chmod rc 0644
unix: get passwd
unix: chmod passwd 0644
unix: get group
unix: chmod group 0644
unix: get ttytab
unix: chmod ttytab 0644
unix: get termcap
unix: chmod termcap 0644
unix: bget utmp
unix: exit

E>bootuzi

UZI280 is (c) Copyright (1990-96) by Stefan Nitschke and Doug Braun

boot: 0
init: /usr/adm/wtmp: Bad file number
UZI280 version 1.12
login: root
%ls -la
total 12
    rwxrwxrwx  9 root 512 Apr 19 1992 ./
    rwxrwxrwx  9 root 512 Apr 19 1992 ../

An update for UZI280 on the Z280RC...

I've implemented support for the DS1302 timekeeper chip in UZI280 to set the time-of-day and fixed an issue with I/O page selection affecting maskable interrupts in my CompactFlash device.
support routine (IDEF.AS).

You can fetch updated files (from https://github.com/agn453/Z280RC for MACHDEP.C MACHASM.C and IDEF.AS from system/uzi280-kernel/ and re-compile the kernel using MAKE - or download the UZIKERNL.LBR file again to get the complete kit of kernel build files.

Fixing the aforementioned defects has introduced another problem the the UZI280 "ps" command which was previously working but now gives a "Can't read /dev/kmem: Error 0" which I am investigating.

Next I need to find/build the C compiler libraries so I can make a "Hello world". I'm going to try making c.lib and f.lib from the HiTech C Z80 library sources...

Tony

Subject: Re: Interested in a Z280 SBC
Posted by snhirsch_gmail.com on Tue, 18 Dec 2018 14:27:59 GMT
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Perhaps I've missed the obvious, but is there a ready-to-boot version of Uzi 280 for the CPU280?

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Tue, 18 Dec 2018 15:15:16 GMT
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snhirsch_gmail.com wrote on Tue, 18 December 2018 09:27 Perhaps I've missed the obvious, but is there a ready-to-boot version of Uzi 280 for the CPU280?

Not yet; the version being discussed is for Bill's Z280RC. Getting the CPU280 version running is a very similar process, and simply having the process well-documented for one board will inform progress on the other. I have not as yet had time to assemble my REH-IDE board, but once I have the two-board system running I'm going to try my hand at building UZI280, and then I can make a disk image.

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Tue, 18 Dec 2018 21:22:23 GMT
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A note to followers of the Z280RC version of UZI280 saga...

Beware! Corrupting the UZI file system partition is easy to do if a program hangs or the system becomes unresponsive.
Make sure you use "shutdown -h now" to shut the system down - or keep backups of the CompactFlash card to allow a quick rollback should something go wrong! I'm getting good at rebuilding the UZI partition!

Now I'm looking around for working "fsck" code (that will run under a 61KB CP/M system). The UZI180 code for the P112 at http://p112.sourceforge.net/index.php?downloads#uzi180 seems to suggest quite a few bugs linger in the (older) UZI280 code.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by etchedpixels on Wed, 19 Dec 2018 10:02:54 GMT

The UZI180 code also has a few bugs I found in the Fuzix work, and I'm sure the Fuzix code has plenty more. One problem is that I've yet to find a file system stress test tool that runs in 48K.

For the fsck you should have no trouble on space. The Fuzix fsck is derived from the UZI one. It has a few small changes to reduce memory consumption but those were to get it running on a machine with 32K user space. The UZI fsck is btw also buggy. I've fixed a few things for the Fuzix one but some of the hard stuff I punt on and simply made it re-run itself when it does certain fixups that need the earlier fixes re-doing.

The Fuzix one won't run as is with an UZI fs as the Fuzix fs is slightly different (superblock changes, 30 character file names, unix compatible time stamps and file offsets) but it should be easy enough to steal the 'restart on this kind of fixup' code from it and if need be the main memory usage fixes (bitmaps not bytemaps, free a buffer once it's not needed so we have more space for pathname checking)

Alan

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Sat, 16 Feb 2019 21:00:57 GMT

As I have problems with my CPU280 I got a running one from a friend.

Today we had a meeting and while talking I looked onto both cards and saw I never thought about. :blush:
My 'bad' system has a Z280 stamped 8735 but I have 2 spare Z280 both stamped in 91.

May bee the 87 version has too much bugs I will replace it with a modern one. :d

I told about the problem by stopping to work after ram test in
Z280 from 87

spare

File Attachments
1) Z280_from_91.jpg, downloaded 217 times
2) Z280-8735.jpg, downloaded 215 times

Subject: Re: Interested in a Z280 SBC
Posted by fritzeflink on Mon, 15 Apr 2019 20:58:44 GMT
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Now as I change the old Z280 the CPU280 run into the config prompt and then booted from ROM.
I have a second CPU280 from the past and even replaced the roms as the boot rom needs an update.

I tried to connect to the floppy drives A=3.5 HD  B=5.25 HD on both boards but run into problems.

I got always a "Drive Not Ready" answer but knew that the drives work well. I used them the last weeks
with an Prof-80 and a Prof-180X board successfully. I added 2 pictures with prof boards for information only.

File Attachments
1) my_cpu280.jpg, downloaded 309 times
2) cpu280_from_the_past.jpg, downloaded 312 times
3) cpu_from_hws.jpg, downloaded 311 times
4) prof-80.jpg, downloaded 30 times
5) prof-180x.jpg, downloaded 32 times

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Fri, 19 Apr 2019 08:53:11 GMT
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fritzeflink wrote on Mon, 15 April 2019 13:58 I tried to connect to the floppy drives A=3.5 HD B=5.25 HD on both boards but run into problems.

I got always a "Drive Not Ready" answer but knew that the drives work well. I used them the last weeks with an Prof-80 and a Prof-180X board successfully. I added 2 pictures with prof boards for information only.

How did you connect the drives (which cable, adapter, etc.)? The wiring of the floppy connector of the CPU280 is not compatible with standard PC floppy cables (you may already know that). Nevertheless, with a PC cable you can connect a single drive which will appear as B:, not A:.

Also, do the motors start spinning, do the drives' light turn on, do they give any sign of life? If e.g. the motor works, then the problem could be related to the data transfer rate (wrong or bad crystal, faulty controller, etc.), else is a drive select problem (cable or even drive jumper settings). Also make sure that the drives get enough power, especially +12V.

---

Subject: Re: Interested in a Z280 SBC
Posted by hperaza on Mon, 22 Apr 2019 15:20:20 GMT

Version 4.1 of ZSM4 has been just released, which fixes the following minor issues:

A second occurrence of an ELSE inside the same IF now produces an error. Fixed a bug in COMMON segment selection. If an invalid option switch is specified on the command line, an error message is displayed and the command is aborted.

Also, a new set of conditional operators has been added: IFZ80, IFZ180 and IFZ280. They may be useful in include files that generate code or define constants depending on the processor type selected by the top-level file.

Since a promise made is a debt unpaid, the full sources have been published at GitHub and will soon be made available via SourceForge as well.

This is a final release (no longer a beta), since the assembler is now practically complete and stable. The very few minor retouches remaining here and there will be polished as time permits.

---

Subject: Re: Interested in a Z280 SBC
Posted by lowen on Mon, 22 Apr 2019 15:25:55 GMT

Page 335 of 338 ---- Generated from RetroBrew Computers Forum
Fritz:
Glad to see the CPU280 booting up from EPROM at least! That's an improvement from before.

Hector:
Glad to see the sources for ZSM4; many many thanks for all the work on it!

Subject: Re: Interested in a Z280 SBC
Posted by agn453 on Mon, 22 Apr 2019 22:57:22 GMT
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hperaza wrote on Tue, 23 April 2019 01:20
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Hector - You're a champion!

Thank you for your rather considerable efforts with ZSM4. They have greatly assisted many of us that are tinkering with the Zilog Z80/Z180/Z280 systems.

Much appreciated.

Tony

Subject: Re: Interested in a Z280 SBC
Posted by Wayne W on Wed, 24 Apr 2019 23:20:10 GMT
hperaza wrote on Mon, 22 April 2019 08:20

Version 4.1 of ZSM4 has been just released

This is a final release (no longer a beta), since the assembler is now practically complete and stable. The very few minor retouches remaining here and there will be polished as time permits.

I have updated the CPU280 GitHub repository at https://github.com/wwarthen/CPU280 with this latest release of ZSM4. Note that the repository has two branches. The "master" branch is based on the original toolset and the "zsm" branch is based on ZSM4. I ran a build with the new version and the binary results were identical, so there are no corresponding updates to resultant binaries.

-Wayne

Subject: Re: Interested in a Z280 SBC

Posted by agn453 on Tue, 11 Jun 2019 23:38:54 GMT

agn453 wrote on Sun, 16 December 2018 14:02

plasmo wrote on Sun, 16 December 2018 00:35

WOW, Wow, wow! This is major cool! I'm dropping everything...

Edit:
I ran into two obstacles: Disk Utility does not seem to erase directories. Perhaps my version is too old (v7., I think you'd mentioned v8.8 but I'm not able to locate it. Alternatively, I can just fill a 64meg CF disk with 0xE5, but that's such a kluge...
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While searching through some of my 8" floppy images today - I found the source distribution of DU v8.8 (the Ward Christensen Disk Utility - dated July 1984).

This is the one I've been using to poke around the disk sectors of any disk that's supported by the BIOS of CP/M 1.4, 2.2 and CP/M-Plus since way back when!

I've added DU-V88.LBR to my GitHub at https://github.com/agn453/Z280RC in the utilities sub-directory and attached to this message. Extract the contents with your favourite library utility.

Better late than never!

Tony

PS: I have later edits too but they're not so universal (e.g. DU V9.0 only works under CP/M Plus).
File Attachments
1) DU-V88.LBR, downloaded 12 times