📁 UK Vintage Radio Repair and Restoration Discussion Forum > Specific Vintage Equipment > Vintage Computers

📁 **Gemini 80-Bus System**

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📄 9th Aug 2019, 6:21 pm   #**201**

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North
Yorkshire, UK.
Posts: 131

🟢 ⚠️

📄 **Re: Gemini 80-Bus System**

Does anyone have any documentation for GEMDEBUG ?

Quote 💬 ✏️

📄 10th Aug 2019, 1:16 pm   #**202**

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex,
UK.
Posts: 434

⚫ ⚠️

📄 **Re: Gemini 80-Bus System**

I while ago I downloaded a scan of the manual... see attached.

┌─ Attached Files ──────────────────────────┐
│ 📄 gem-debug.pdf (1.26 MB, 14 views)   │
└──┘

Quote 💬 ✏️

📄 10th Aug 2019, 3:41 pm   #**203**

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 131

📄 **Re: Gemini 80-Bus System**

Thanks John that is amazing.

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 131

📄 **Re: Gemini 80-Bus System**

Just an update should anyone still be interested in my Winchester updates to the Gemini CP/M bios, I am making good progress.

Targets achieved:

- I have learnt Z80 assembler, still honing my skills but all OK so far.
- I have been through the Gemini V1.4 bios in detail and understand pretty much most of it.
- I have read the SASI spec and swallowed the XEBEC 1410 manual.
- I have started coding the changes to the Gemini Bios...

I am reasonably happy with my progress and to be honest would be quite disappointed if someone turned up with a Winchester version of the bios as I am having quite a lot of fun with it all. My aim has to have a light a touch as possible to the original code and this seems to be fairly easy given one compromise. i.e.

The Gemini bios supports SD and DD disks and auto senses, the density for the 4 possible floppy disks is stored in the upper nibble of a memory location with the lower nibble indicating the drive. The bios uses one bit to identify the drive (lower nibble) and one bit to identify SD (upper nibble) this means that a maximum of 4 drives is supported. If I accept the compromise (which I have) of supporting only two floppy drives I can then add two further Winchester drives (possibly 4 when emulating a Xebec 1410) with very little change to the Gemini bios code whilst at the same time, using 90% of it. This I am very happy with.

So far the only real change to the existing Gemini routines has been to prevent the density check for the Winchester and adapt the buffer-dma and dma-buffer code to support different sector sizes for Winchester and floppy. This last change was important to me as I wanted the bios to be able to support real period hardware, it turned out to be a very simple change. Naturally there will be additional code to control the Xebec and that is what I am working on as I write.

As usual, full story and progress is here; https://glasstty.com/wiki/index.php/...ni_80-Bus_Saga

john_newcombe

Pentode

Join Date: Apr 2019
Location: Skipton, North
Yorkshire, UK.
Posts: 131

📑 **Re: Gemini 80-Bus System**

Could do with your expertise...

I have just been given the backup copy of the GM925 machine featured in the YouTube video here (https://www.youtube.com/watch?v=lMnQ...&index=3&t=17s). This includes several files relating to the multi-Format Bios as well as an interesting binary file called CPM64W.

Converting the file to hex rows 512 bytes wide I can see what looks like a boot sector, BDOS/CCP and a BIOS. However, there are four rows (2K) at the beginning of the file that I don't recognise. Disassembling this data doesn't seem to produce valid code so I am left wondering what it is.

If I create a disk using the boot sector, BDOS/CCP and BIOS and ignore the initial 2K, it fails to boot producing a system Halt, this could be unrelated of course. Viewing the BIOS part as text shows it to be the Gemini Multiboard 3.4 BIOS.

Below is the file contents with my interpretation marked. Any ideas?

Code:

```
b3 6f 7c b2 67 c9 c1 d1 c5 7d ab 6f 7c aa 67 c9 c1 d1 c5 7d a3 6f 7c a2 67 c9 7c
21 80 36 34 e1 c3 e3 36 e1 36 ff 23 36 ff 2a 80 36 e5 21 82 36 e5 cd 72 02 2a 9c
00 00 00 00 99 d5 bd d5 e1 d5 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 20 21
20 d0 cd aa 3a 21 32 39 19 7e 21 01 39 19 19 4e 23 46 b9 7b c0 06 00 70 2b 70 48

Boot Sector ?
47 47 31 00 01 b7 20 01 3c 3d 28 02 3e 20 32 38 00 08 3e 0f d3 bc cd 27 00 b7 28

BDOS/CCP ?
c3 04 d6 c3 00 d6 50 20 3b 45 78 74 65 6e 64 65 64 20 43 43 50 20 32 38 74 68 20
00 0e 1a 18 02 0e 0d c3 05 00 5f 0e 0e 18 f8 af 32 bb d5 11 9b d5 0e 0f cd 05 00
40 47 13 1a fe 3a 28 07 1b 3a 5f d7 77 18 06 78 32 dd d8 70 13 06 08 cd 45 d9 06
d5 d5 cd 37 d7 d1 cd 40 d7 28 3e af 32 bb d5 f1 6f 26 00 e5 cd 2f d8 13 e1 fe 53
f8 16 00 00 0a 04 c3 11 dd 99 dd a5 dd ab dd b1 dd eb 22 43 e0 eb 7b 32 d6 ea 21
c1 df fe 08 c2 16 df 78 b7 ca ef de 05 3a 0c e0 32 0a e0 c3 70 df fe 7f c2 26 df
0f e1 79 95 78 9c da 0f e1 eb e1 23 c3 fa e0 e1 c5 d5 e5 eb 2a ce ea 19 44 4d cd
ff 22 ea ea c9 2a c8 ea eb 2a ea ea 23 22 ea ea cd 95 e2 d2 19 e3 c3 fe e2 3a ea
20 d5 06 00 2a 43 e0 09 eb cd 5e e2 c1 cd 4f e0 cd c3 e0 c3 c6 e2 cd 54 e2 0e 0c
32 d5 ea 3e 00 32 d3 ea cd 54 e2 2a 43 e0 cd 47 e2 cd bb e1 3a e3 ea fe 80 d2 05
e9 73 2b 70 2b 71 cd 2d e4 c3 e4 e8 e1 c9 2a 43 e0 11 20 00 cd a5 e8 21 21 00 19

BIOS ?
c3 73 f7 c3 d1 ed c3 8f f4 c3 99 f4 c3 a3 f4 c3 e5 f4 c3 b7 f4 c3 ad f4 c3 38 ee

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

```
0a f0 18 5f 79 cd 6a f4 cb 86 fa cc ee ca 0e f0 3a 9d f7 fe 02 20 12 3a 8a f7 3c
28 fc d3 e3 fa fb f0 3e 01 cd a7 f1 18 1a 0f 3e 80 30 04 3e c0 18 01 b0 d3 e0 18
0b f3 cd b8 f3 cd 99 f4 3e 01 c9 0d 0a 58 65 62 65 63 20 45 72 72 6f 72 2c 20 63
3a 50 eb 83 47 18 13 fe 0a 20 b6 35 20 b3 3a 4f eb 77 b7 28 ac 3a 50 eb 3c 47 0e
4f cd 5f f7 3e 0d c9 00 00 00 0e 3f cd 58 f7 cd 68 f7 67 cd 68 f7 6f cd 68 f7 c9
21 f1 f9 01 26 00 ed b0 11 e6 ed 21 17 fa 01 16 00 ed b0 3c c9 cd af f9 21 81 00
```
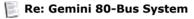

#**206**

john_newcombe

Pentode

Join Date: Apr 2019
Location: Skipton, North
Yorkshire, UK.
Posts: 131

Re: Gemini 80-Bus System

Here is the actual binary.

Attached Files
📁 CPM64W.zip (9.5 KB, 3 views)

#**207**

JohnBHanson

Hexode

Join Date: Aug 2009
Location: Worthing, Sussex,
UK.
Posts: 434

Re: Gemini 80-Bus System

Interesting - I have not got the whole answer but somethings helpful (maybe).

I cannot identify the first 4 sectors. After that it looks like a gemini boot sector and
ccpz/bdosz/bios.

This bios is for the xebec controller and also hard disk. The bios issues a init_drive_characteristics command to the
xebec controller. This was not included in the emulator so I have added it - although the parameters are ignored!.
What this command is used for is to specify the mapping between logical blocks in the scsi world to CHS format in
the hard disk world.

Having added this extra command I discovered that a ram-disk card is also required a gm833 so this has been added
along with a serial port.

I suspect that it is not booting now because I don't have a hard disk image. However below is the config file I have
used to get this far.

#verbose

cpuclock 4

board 0xfe gm813_mmu

board 0xb0 gm832 Gemini green
board 0xb8 serial_8250 trace tty tty /dev/ttyS0

board 0xe0 gm849_scsi ~/beaver/disks/gem925.dsk
board 0xfb gm833
board 0xe0 gm849_floppy -geometry S35.2.10.0.512

binload cb00 ./beaver/network/cpm64w.bin

byte 0 c3 00 eb

I hope that helps a little. PS - you need to download the latest xbeaver with command 0x0c added.

Last edited by JohnBHanson; 14th Sep 2019 at 12:15 pm.

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john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North
Yorkshire, UK.
Posts: 131

Re: Gemini 80-Bus System

Thanks John. Having further trawled the backup I now have the GENSYS.COM command, SYSTEM.CFG, CPM.SYS and a few of the BIOS files (e.g. BIOSSF.SYS, BIOSW.SYS etc). I recognise these from the description of BIOS 3.2 published in 80-BUS news. I wonder if CPM64W is the output from GENSYS.COM.

I have tried running GEMSYS.COM with a simple SYSTEM.CFG but it fails with a ***SYNCHRONISATION ERROR***.

I have popped these files onto a DMP disk in case they are of any interest.

┌─ Attached Files ────────────────────────────────
│ 📁 GEMBIOS34.80.DMP.zip (41.0 KB, 4 views)
└──

Re: Gemini 80-Bus System

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 131

I downloaded xbeaver from the site (http://81.105.120.101/download/xbeaver.tgz) is this the correct version or do you have a GIT repo somewhere.

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 434

Re: Gemini 80-Bus System

That is the correct version.

Note ***SYNCHRONISATION ERROR***. means that the CP/M serial number is miss-matched. Having t-net loaded will also cause this error.

My guess is that CPM64W is the winchester disk 64K CP/M version.

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 434

Re: Gemini 80-Bus System

Here is a useful "trick" for xbeaver.

xbeaver supports mulltiple named io buses. The default bus the processor uses is called "io". However peripherals can be placed on a different bus. The internal bus extender can be used to map these io ports through to the "io" bus with various mappings. The internal bus extender also has the ability to trace bus cycles.

Looking at the gem925.cfg below - the "trace" bus is used for io and the bus bridge is used to map these to the io bridge. This gives the ability to selectively trace bus cycles.
Best shown by example....

#verbose

cpuclock 4

board 0x00 intbus 0 0xfb xrw trace
board 0xfb intbus 0xfb 2 xrwt trace
board 0xfd intbus 0xfd 3 xrw trace

bus trace

board 0xfe gm813_mmu

board 0xb0 gm832 Gemini green
board 0xb8 serial_8250 trace tty tty /dev/ttyS0

board 0xe0 gm849_scsi ~/beaver/disks/gem925.dsk
board 0xfb gm833
board 0xe0 gm849_floppy -geometry D35.2.10.0.512 ~/beaver/gm512/GM512_ORIGINAL.DMP

bus io

binload cb00 ./beaver/network/cpm64w.bin

byte 0 c3 00 eb

By running this it is clear that the bios is looping writing to all tracks with sector=0. I would guess this is sizing the ramdisk.

Unfortunately the emulator works by allocating more memory to the ramdisk as required (upto MByte). I suspect the gemini software is just looping trying to find the end of the ramdisk and failing.

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 434

Re: Gemini 80-Bus System

I have added a -maxtrack option to he gm833 command line. You need yet another version of xbeaver.
Looks like your software likes a 2MByte ramdisk. Still needs the disk images gem925.dsk for hard disk and possibly the floppy image as well..

configuration file is as follows

cpuclock 4

#miss out these two lines to inhibit tracing
board 0x0 intbus 0x0 0xff xrwt trace
bus trace

board 0xfe gm813_mmu

board 0xb0 gm832 Gemini green
board 0xb8 serial_8250 trace tty tty /dev/ttyS0

board 0xe0 gm849_scsi ~/beaver/disks/gem925.dsk
board 0xfb gm833 -maxtrack 0x3f
board 0xe0 gm849_floppy -geometry D35.2.10.0.512 ~/beaver/gm512/GM512_ORIGINAL.DMP

#miss out this as well to inhibit tracing.
bus io

binload cb00 ./beaver/network/cpm64w.bin

byte 0 c3 00 eb

This does at least boot the system with M drive (ram drive).

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 434

Re: Gemini 80-Bus System

I have to add (implement) READ ADDRESS command for the floppy disk controller. This returns the track/sector header.

Also changed controller type to 829 rather than 849. This seems to work although I would have thought that the 849 would have been the better choice as it allows more floppy drives.

This is the latest config file. Note -o t on the command line enables tracing of IO

#verbose

cpuclock 4

if T board 0x0 intbus 0x0 0xff xrwt trace
if T bus trace

board 0xfe gm813_mmu

board 0xb0 gm832 Gemini green
board 0xb8 serial_8250 trace tty tty /dev/ttyS0

```
board 0xe0 gm829_scsi ~/beaver/disks/gem925.dsk
board 0xfb gm833 -maxtrack 0x3f
board 0xe0 gm829_floppy -geometry D35.2.10.0.512 &
~/beaver/gm512/GM512_ORIGINAL.DMP

if T bus io


binload cb00 ./beaver/network/cpm64w.bin

byte 0 c3 00 eb

PS - remember to download latest xbeaver.
```

Quote

#**214**

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North
Yorkshire, UK.
Posts: 131

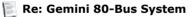**Re: Gemini 80-Bus System**

Thanks for this, do you have the GM925.dsk file?

Quote

#**215**

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex,
UK.
Posts: 434

Re: Gemini 80-Bus System

No - where would I get gem925.dsk from?

Quote

#**216**

JohnBHanson
Hexode

Re: Gemini 80-Bus System

Adding READ ADDRESS command broke early gemini bios versions (eg 1.4).

The problem was the bios issued a READ ADDRESS and just polled the BUSY flag
in the status register to see if the command had completed. It *did not* read the
floppy disk controller data register to recover the data from the READ ADDRESS command. Because of this the
emulator did not complete the READ ADDRESS command as the data had not been read by the Z80.

Changed the code so that after 100 reads of the status register without reading the data register the FDC BUSY flag
is cleared if it is set.

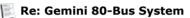Yet another version - very sorry.

15th Sep 2019, 8:05 am   #217

john_newcombe

Re: Gemini 80-Bus System

I did have trouble booting my gemini config after the changes but the new version works fine. Thanks.

15th Sep 2019, 8:08 am   #218

john_newcombe

Re: Gemini 80-Bus System

As I have to modify the Makefile to build it on Arch Linux, I have attached it in case it helps anyone.

Attached Files
Makefile.zip (2.0 KB, 2 views)

15th Sep 2019, 3:29 pm   #219

JohnBHanson

Re: Gemini 80-Bus System

I have added your makefile into the distribution. In addition I have fixed another problem in the gemini SCSI driver
in that the xebec controller did not de-select after the message state.

Again download the latest version to get the fix. Now the GM925 gets to the M> prompt and you can do directories of A and B (Hard disk) M (Memory Disk) and C (floppy) although I have the wrong type of floppy in the config file. I hope that helps you.

With the correct hard disk image and fingers crossed this should now work.

As you probably worked out - I have not run gemini software on my emulator - But would be greatful if you have a copy of the GM925 hard disk image you could post it on your resources website.

Thank you.

15th Sep 2019, 4:04 pm   #**220**

JohnBHanson

Re: Gemini 80-Bus System

One point very worthy of note. The gemini hardware inverts the data that is stored on the disk. This is true for both the hard disk file the emulator uses and also the actual disk used in a gemini computer. It will of course also be true for you SCSI/SD device on the gemini hardware.

You may need to invert the bits that are stored if you receive the data from a third party depending on how it is retrieved.

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