11th Jan 2020, 10:40 pm #301

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Thanks John, I will do as you suggest and report back, and yes, I certainly will run your program once something is working.

J

Quote

11th Jan 2020, 11:56 pm #302

jncoleman
Diode

Join Date: Oct 2019
Location: Carlisle, Cumbria, UK.
Posts: 7

Re: Gemini 80-Bus System

Quote:

> Originally Posted by **john_newcombe**
>
> *The SVC has been tested successfully in my rack system by replacing the rack's IVC card. So... looking at the GM813 I see no activity on the Address or Data bus.*
>
> *Investigations so far show that the clock signal when viewed at the CPU looks good and that the system is not held at reset nor in a halted state.*

I'm not sure that I completely understand the problem yet, but when you say the GM813 shows no data or address activity, do you mean no activity at the processor's address and data pins, or no activity at the card edge connector? If the former, have you tried replacing the processor chip?

Quote

Yesterday, 12:29 pm #303

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Just to recap...

There is no Address/Data bus activity when checking at the Z80 processor pins with a scope. The clock is present and looks good.

The z80 chip has been replaced with a known good one and for completeness the Z80 from the Galaxy has been shown to work fine in another system.

The Simon ROM (2716) has been swapped for a known good RP/M 2.3 (2732) along with the appropriate link change LK4/5 to support the larger ROM size. I even tried it running the system with RAM removed followed by PIO/UART removed.

The Simon ROM has now been dumped and looks OK but I have yet to compare byte for byte.

Following JBH's advice I tried the GM813 in a Gemini rack system using an IVC display card and GM829 disk controller. All that happens is that the IVC reports the IVC Rom version. For completeness I placed the rack's G811 and MAP80 RAM in the Galaxy system and the machine booted to RP/M.

I will put the Galaxy back together with just the GM813 and SVC Card with the 813 in the top slot as that way I can access the board with a scope and logic probe.

One thing I would mention is that despite owning a scope and a logic probe, I am no expert at this stuff, learning all of the time though.

JBH: If I put the 849 MFB in with the 811 and IVC (Is this combination of cards safe?) and run BASIC under RP/M (from Tape), would running your program give you what you need?

John

Quote

Yesterday, 1:45 pm #304

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 458

Re: Gemini 80-Bus System

JBH: If I put the 849 MFB in with the 811 and IVC (Is this combination of cards safe?) and run BASIC under RP/M (from Tape), would running your program give you what you need?

Yes that would be fine. However the basic output is more than one screen high so running the output to the serial port and recording it on a PC rather than manually recording the output might be easiest. To do this you may need to change the print to lprint in the program using a serial line printer.

Many thanks for doing this, would be nice to tie up this loose end.

Quote

Yesterday, 2:11 pm #305

jncoleman
Diode

Join Date: Oct 2019
Location: Carlisle, Cumbria, UK.
Posts: 7

Re: Gemini 80-Bus System

John,
I would start by looking at all the signals around the Z80 chip. Do the strobes (MREQ, IOREQ, RD, WR) look sensible? WAIT, INT, NMI, BUSREQ should all be be high. Are the power terminals OK? If this is all correct, then are the memory strobes getting to the ROM? What are its OE and CE doing? I've only just glanced at the 813 circuit diagram but I see that the 2732 CE is coming from an involved looking arrangement controlled by the high-order addresses and an RS bistable, itself controlled by reset. If CE isn't going active, then I'd trace through that next. I assume you've got all the data sheets so you can see what the waveforms should look like. My own 813 / SVC set doesn't work either, although in my case I'm getting correct outputs at the 813 edge connector, so I'm suspecting the SVC. I'll be interested to hear how you get on.
Nick.

Quote

Yesterday, 6:25 pm #306

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 458

Re: Gemini 80-Bus System

The MFB system does not use interrupts or DMA. However it is worth noting that to use software that uses these features the processor card should be in the bottom slot and all the empty slots should be at the top to maintain the DMA and interrupt chain.

Can I assume that you have checked that the reset button does not cause the 813 card to function - that is the red pushbutton on the card. Sometimes slow rise time of the power supply rail can prevent a proper reset - I have seen that with SVC cards that need an in/out to port 0b3h to reset.

Quote

Yesterday, 9:00 pm #307

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Thanks for the info, I will take some time to absorb the details and start checking things in more detail. I have the circuit diagram and the manual for the 813 so will start there and report back. I have certainly tried the reset button (many times). Pressing it seems to reset the SVC (it redisplays the SVC ROM Version) and activates the reset on the GM813s Z80, however, it doesn't help the system start.

The slow reset rise time you mentioned probably explains another symptom. When I switch the machine on for the first time after a period of rest, the SVC beeps continuously and the display flickers badly, subsequent power ups during the same session start up with single beep and steady display.

John: I am not sure I fully understand the implication of not having the GM813 at the bottom slot as I thought that all of the slots were all wired together via the backplane? In order to gain access to the board I need it to be in the top slot with the SVC below it, would you expect this to still boot (at least to the Simon ROM)?

Quote

Yesterday, 9:10 pm #308

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 458

Re: Gemini 80-Bus System

Running in the top slot will be fine - my warning does not really apply to the MFB system but was to any other readers that run other systems.

Now for some useful infomation to you. The processor reset on the SVC card is not connected to the backplane reset. The SVC reset can come from two sources the first being a power up and the second being an in/out instruction to port 0b3h.

The fact that pressing the reset button on the CPU card causes the SVC card to reset means that the GM813 is executing the instruction to reset the SVC card. This means that it can perform I/O cycles on the backplane and also execute code from the eeprom.

This is a major finding that will help in your fault diagnosis.

The next feature I would check would be the RAM on the GM813 or possibly the memory mapping hardware on the GM813- the startup sequence is covered in the GM813 manual.

Quote

Yesterday, 9:48 pm #309

jncoleman
Diode

Re: Gemini 80-Bus System

Join Date: Oct 2019
Location: Carlisle, Cumbria, UK.
Posts: 7

Yes, that's encouraging. We now know that you are, in fact, getting to the ROM, at least to start with, but this leaves the question of why you're subsequently seeing no data or address activity. When this happens, are you still getting the MREQ and RD signals, or do they freeze as well?

You mention that you have the 813 diagram and manual, but another thing you'll certainly want is the processor manual, which will show you what the signals should look like. If you don't already have it, this is available at

http://www.nascomhomepage.com/pdf/z80-mostek.pdf

Yesterday, 10:48 pm #310

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Thanks both, appreciated. However, I have been re-checking my notes.... Doh! It seems I have made a mistake in the earlier assessment of a working reset circuit, also, what I said re: SVC being reset, was inaccurate. Those tests were actually made with the working GM811. Thank goodness I keep detailed notes.

So... revisiting the reset operation on the GM813, I can see now that the CPU pin 26 is permanently high, irrespective of either reset button being pressed.

Tracing the reset signal from the button shows IC23 pin 1 going low when the button is pressed and this being inverted on pin 3 to a high as expected. This signal can be seen on IC24 pin 2 also, however, there is no activity at all on IC24 pin 13,14,15 when the reset button is pressed. I quickly checked C23 (seemed like a good idea) and it read 10nf on my meter as expected.

IC24 is an 74LS221 and having read the data sheet twice I am not quite getting it. I imagine that IC is a means to give a nice reset transition from an otherwise possibly noisy button press, but you guys will know.

To prove my theory I reset the CPU manually with a jumper and the MFB welcome message appeared, e.g...

Code:

```
***** Gemini M-F-B 2 System *****
```

... not much else happened but this is progress.

Would you guys recommend that I replace IC24 (soldered in) or is there something else I should check first. I was thinking that I might just snip pin IC24 pin 13 to isolate IC29 and check again just in case IC29 was the issue, but would really appreciate your thoughts.

Today, 12:11 am #311

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 458

Re: Gemini 80-Bus System

From the 74LS221 data sheet function table read the row that is H L ^ this is the mode that is used. On a rising edge of input B (eg reset button pressed) the output Q goes high for the timing period and then low.

The timing period will be too short for you to observe with a meter - a logic probe with pulse detection of an 'scope or logic analyser is required. So this might actually be functioning despite so be careful.

This is then fed through the 74LS74 D type flip flop which synchronizes reset with M1. This keeps the reset short and means that it does not cause memory loss by interfering with the Z80 refresh cycles.

Quote

Today, 12:13 am #312

jncoleman
Diode

Join Date: Oct 2019
Location: Carlisle, Cumbria, UK.
Posts: 7

Re: Gemini 80-Bus System

John,

Before you do anything to that chip, check that you can obtain a replacement. I don't know about that one in particular but a lot of the LS series have been withdrawn. There might be a compatible one, but do check. The '221 is a 'multivibrator' which, once triggered by the input, delivers a short pulse of a duration determined by the external R and C.

If you're sure that R22 and C23 are correct, and that all the connections to the chip are OK, then it looks as though this chip is dead. If indeed there aren't any replacements then there may be a chance you could modify the circuit to operate without it, but that would need very careful thinking about first.

Nick.

Quote

Today, 12:24 am #313

JohnBHanson
Hexode

Join Date: Aug 2009
Location: Worthing, Sussex, UK.
Posts: 458

Re: Gemini 80-Bus System

A description of the circuit is given in section 1.2 of the hardware manual.

When you get the ***** M-F-B 2 System *****

The system could well be waiting for a boot floppy or the winchester to spin up.

Note also the boot hangs if you don't use the MFB version of the GM849 - possibly with the red LED halt light illuminated.

If you can upon power up without any additional presses of the reset button check the Z80 is producing M1 cycles - eg M1 pin toggles if you can.

Last edited by JohnBHanson; Today at 12:33 am.

Quote

Today, 1:30 am #314

kan_turk
Hexode

BVWS Member

Join Date: Mar 2014
Location: Dublin, Ireland
Posts: 276

Re: Gemini 80-Bus System

Quote:

> Originally Posted by **jncoleman**
> *John,*
>
> *Before you do anything to that chip, check that you can obtain a replacement. I don't know about that one in particular but a lot of the LS series have been withdrawn. There might be a compatible one, but do check*
>
> *Nick.*

Good advice - however 74LS221 is still widely available

Rgds
John

Quote

Today, 9:33 am #315

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Quote:

> Originally Posted by **JohnBHanson**
> *From the 74LS221 data sheet function table read the row that is H L ^ this is the mode that is used. On a rising edge of input B (eg reset button pressed) the output Q goes high for the timing period and then low.*
>
> *The timing period will be too short for you to observe with a meter - a logic probe with pulse detection of an 'scope or logic analyser is required. So this might actually be functioning despite so be careful.*

This is then fed through the 74LS74 D type flip flop which synchronizes reset with M1. This keeps the reset short and means that it does not cause memory loss by interfering with the Z80 refresh cycles.

Thank you for the explanation, I was using a fairly old scope to check for the reset, I may be missing it. I will use my logic probe as it has a pulse capture option.

Quote:

Originally Posted by **jncoleman**
John,

Before you do anything to that chip, check that you can obtain a replacement. I don't know about that one in particular but a lot of the LS series have been withdrawn. There might be a compatible one, but do check.
The '221 is a 'multivibrator' which, once triggered by the input, delivers a short pulse of a duration determined by the external R and C.

Nick.

I agree, good advice, it would be just like me to race ahead with the snippers! In order to be sure, I will also check that R22 is good now that I know what it is for.

Quote:

Originally Posted by **JohnBHanson**
A description of the circuit is given in section 1.2 of the hardware manual.

*When you get the ***** M-F-B 2 System *****

The system could well be waiting for a boot floppy or the winchester to spin up.

Note also the boot hangs if you don't use the MFB version of the GM849 - possibly with the red LED halt light illuminated.

If you can upon power up without any additional presses of the reset button check the Z80 is producing M1 cycles - eg M1 pin toggles if you can.

I have been testing so far with just the CPU and display card which I think explains the lack of activity after the message. Once I am happy with the reset stuff I will re-assemble the machine. In its assembled state the Xebec is fastened within the top of the card frame with four screws and pretty much prevents access to any of the cards with a probe or whatever, so I need to be sure the CPU is running properly before assembling. I have the rack system of course but being in the top slot of the Galaxy with everything else removed gives the easiest access by far.

Thank you so much for your help guys, really appreciate it, I will keep you posted.

John

Today, 10:33 am #316

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

Good news... using the logic probe I can see the now narrowed pulse at pin 12 of IC29 but alas it was missing from pin 9. I changed C29 for one I had (which is remarkable in itself) and the system now starts as expected. I see the message as before except now it asks for a system disk in drive A.

I will now reassemble the system with the Winchester and see how far I can get. Naturally I will keep you posted. Thank you so much for all of the help, the details you have given me here have once again saved the day.

John: As soon as I can get to a Basic, I will run the program you posted.

Today, 12:26 pm #317

qazxsw123
Triode

Join Date: Nov 2016
Location: Frinton on Sea, Essex, UK.
Posts: 29

Re: Gemini 80-Bus System

Can you post a photo of the front and back of the gm 849a card, from what I can make out the difference is the addition of some straps for DMA access and would like to check for any other changes.

I'm still unable to get any files off the gotek unit, I have firmware version 2.14 and can scroll the files on the usb stick and can select the unit and see data being read and all other signal but the system either says bdos error or the system reboots after loading.

I've tried all versions of RPM and simon but the only luck I have is with the original rpm eprom and the .25 floppy disk.

time for the "Nicolet Z80 NICE".

Today, 12:51 pm #318

john_newcombe
Pentode

Join Date: Apr 2019

Re: Gemini 80-Bus System

Have a look at post 270, there is a link to the images there.

Location: Skipton, North Yorkshire, UK.
Posts: 163

Today, 12:52 pm #319

john_newcombe
Pentode

Join Date: Apr 2019
Location: Skipton, North Yorkshire, UK.
Posts: 163

Re: Gemini 80-Bus System

I will have a think about the Gotek thing when I get home.

John

Today, 4:14 pm #320

qazxsw123
Triode

Join Date: Nov 2016
Location: Frinton on Sea, Essex, UK.
Posts: 29

Re: Gemini 80-Bus System

photos of 849 and 849a dma links near the edge connector lower left, also a strange mod to the 849, it has straps over the top of ic17 connecting the input to output.

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All times are GMT. The time now is 6:31 pm.