Subject: Debugging a SBC V2-004
Posted by edzard on Fri, 09 Jul 2021 14:49:40 GMT
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Hello All,

I finished my SBC V2-004 PCB. For some reason I don't get a boot message on the terminal.

I'm wondering if I have wired the serial connector right.

In the documentation the following wiring is advised (IDC 10 to DE-9 (female):

2 -> 4
3 -> 3
5 -> 7
7 -> 6
9 -> 5

Looking at the schematic pin 2 of IDC 10 is not connected. So the above doesn't make sense (to me). Or I'm I wrong?

Right now I have wired the serial cable as follow:

3 RXA -> 2
4 RTSA -> 7
5 TXA -> 3
6 CTSA -> 8
9 GND -> 5

The 9 pin connector is a male.

Because I don't get any characters in my terminal I presume that the above is also not correct.

Can someone point me in the right direction? Or is something else wrong (jumpers?) or defect?

I programmed the SST39SF040 with ROMWBW version 3.01

Thanks for your trouble and time!

Kind regards,

Edzard

File Attachments

1) 1.jpg, downloaded 314 times
2) 2.jpg, downloaded 269 times

3) 3.jpg, downloaded 284 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Fri, 09 Jul 2021 15:56:04 GMT
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Oy, serial ports always causing problems!

skip the pin numbers for a minute, you need this connection whatever the pin numbers are:

RX -> TX
TX -> RX
RTS -> CTS
CTS -> RTS
GND -> GND

Do you have a logic probe or oscilloscope? put it on the TTL TX line coming out of the UART and press reset. You should see activity on that line as the characters stream out for the initialization screen. You really only need TX -> RX and GND -> GND working initially on your serial port. Try getting those connected properly first. 2 line serial is great for debugging. You can add the other signals later.

Also, have you checked VCC, GND, clock, reset and all the other basic connections? Normally before I insert any ICs I go through and make sure the basics are present and accounted for to ensure a good chance of working. Check the jumpers against the schematic to ensure they are doing what you intend for them to do.

I thought I read somewhere you should be hearing a start up beep on the SBC V2-004. Did you burn the right version of ROMWBW to your Flash chip? Are the jumpers configured correctly for that particular Flash chip?

Good luck! Andrew Lynch

BTW, nice looking board! Congratulations for getting this far. You are very close now

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sat, 10 Jul 2021 04:43:33 GMT
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Hi Edzard,

I think JP2 should be off. With it on it is probably outputting to CVDU or VDU.

Are you sure the machine is starting? Do you have romwbw build environment set up?

Regards Phil

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Sat, 10 Jul 2021 17:41:10 GMT
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Hello Guys,

Thanks for helping me out, it's really appreciated!

I've checked al the IC's for the right voltage. Everyone gets 5 Volts.

The Oscillators are working at 4 Mhz and 1.84 Mhz (confirmed by the oscilloscope.
The little one (X1) gives half of the frequency (according to the oscilloscope) but I'm pretty sure that the value is correct.

I noticed the following:

- Al IC's close tot the bus (74LS244/245/243/32/08 etc are getting warm
- Other IC's (ROM/RAM/CPU etc) are cold
- LED stays red all the time

I changed the ROM to a AT27C080 to be consistent with the design.

I programmed the ROM with ROMWBW version v2.9.1 (not the newest to be sure that this is not the problem).

I used the (standard) file SBC_std.rom which comes with the distribution.

Checking pin 7 (TX) of the MAX323 gives no signal (I see some spikes but no data blocks) when resetting the system). But maybe I'm doing something wrong with my Rigol.

I connected the serial port with only 2 wires (5 -> 2 and 9 -> 5).

I found in the Errata the following message:
Version V - CPU oscillator may not work due to incorrectly placed pull up resistor. A 1k resistor needs to be added between pin 12 and pin 14 of U26 74LS06.

So I placed this resistor on the back of the PCB. Not sure if this is (really) necessary.

Jumpers are as follows
K1=1/2
K6=1/2
K7=1/2
K8=1/2
K9=1/2

K10=1/2
K11=1/2
K12=1/2
K13=2/3

What's strange is that I have no output at all on the screen.

I always wished something like this to happen because al my projects (Zeta V2, easyz80, RC2014, XI8088 worked instantly. Almost boring. Now I'm not so sure anymore...:)

Thanks again!

Kind regards,

Edzard

File Attachments

1) Overview.jpg, downloaded 293 times
2) Detail serial.jpg, downloaded 287 times
3) Jumpers.jpg, downloaded 257 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Sat, 10 Jul 2021 19:27:46 GMT
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Hi Edzard,
Check for output on pin 11 of the UART or pin 10 of the MAX232. That's the TTL level UART output. You should see a brief stream of activity on that pin if it is booting the ROM after you press reset. Use your logic probe and you should see bits twiddling as the characters go by

Thanks, Andrew Lynch

PS, if that doesn't work it means your system is not booting. You need to roll back to a minimum build and pull everything not absolutely necessary out of the board sockets. Also burn a new ROM with jploop in it and start from the beginning. You need to see if the CPU is reading the ROM by looking for activity on the RD# line and also the CS_ROM# line. You can pull about half the chips out and still boot a minimum system. You don't need the UART or the PPI at all or the RAM. Just CPU, clock, ROM, & some glue logic. This is the fun part...

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Mon, 12 Jul 2021 09:54:30 GMT
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Hi Edzard,

Do you have a bicolour led installed?

Is it around the wrong way? Try grounding /halt (pin 18 z80)- it should change colour.

Image to verify orientation.

Regards Phil

File Attachments
1) sbc_led.jpg, downloaded 1267 times

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Mon, 12 Jul 2021 13:09:24 GMT
View Forum Message <> Reply to Message

Hi Edzard,

I installed 3.01 on my 004v board and it booted up ok.

As Andrew suggested, try a minimum build - you should be able to use the components list here:
https://www.retrobrewcomputers.org/doku.php?id=boards:sbc:sb c_v2:sbc_v2-005#sbc_build

Regards Phil

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Mon, 12 Jul 2021 14:04:38 GMT
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Hello Phil and Andrew,

Thanks for trying out ROMWBW 3.01.!

I installed a freshly build version 2.9.1 with the option "CRTACT" (ACTIVATE CRT AT STARTUP) set to FALSE (default it's true) but no change.

I will try to remove al unnecessary components tonight.

The LED changes colour when halting the CPU.

I'm not confidend enough with the output of the Rignol (some spikes not a real data pattern) so I will try a small logic analyzer to see if there's some output on the MAX and Uart.

Thanks again!

Kind regards,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Mon, 12 Jul 2021 15:44:04 GMT
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Hi Edzard
One key indicator your SBC is functioning is whether you see activity on the ROM chip select pin. After pressing reset you should be seeing regular activity on that pin. Also the CPU RD# pin should be active. If you are seeing those pins working, it is just a matter of finding where the problem is occurring because the CPU is booting from the ROM. Of secondary importance is whether the chip select pin on the UART is active. It is a good sign if it is active.

One thing to try is going over the solder side of the PCB with your soldering iron and remelting all the joints. Inspect thoroughly for missed joints and any cold joints. Remelting will help with the inspection process and fix any of the suspicious solder joints that may have escaped notice earlier. Also use a tooth pick or pointed plastic tool to chip away any excess solder flux to inspect the solder joints closely. It is easy to miss clues when they are covered in the gunky flux

Good luck! Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Tue, 13 Jul 2021 15:30:45 GMT
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Hello All,

I've build a new minium SBC V2-004(r) board.

Checked all voltages on the IC's sockets for 5V and then populated them.

I will burn version ROM WBW 3.01 in the EPROM and if that doesn't work something like

```
=========
org 0

loop:
   jp loop

=======
```

Can't test right now because my TL866+ is at home.

Hopefully I see some output on the port!
Keep you posted!

Kind regards,

Edzard

File Attachments

1) Front.jpg, downloaded 288 times
2) back.jpg, downloaded 316 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Tue, 13 Jul 2021 16:32:32 GMT
View Forum Message <> Reply to Message

edzard wrote on Tue, 13 July 2021 11:30Hello All,

I've build a new minium SBC V2-004(r) board.

Checked all voltages on the IC's sockets for 5V and then populated them.

I will burn version ROM WBW 3.01 in the EPROM and if that doesn't work something like

```
=========
org 0

loop:
   jp loop

=======
```

Can't test right now because my TL866+ is at home.

Hopefully I see some output on the port!
Keep you posted!

Kind regards,

Edzard
Hi Edzard, I think one of the middle solder joints on RR2 looks suspicious.

Also when you run jploop you don't need the UART, SRAM, or UART clock so I would pull those out first.

All jploop needs is CPU and ROM and chip select logic. You may need jumpers though depending on which ROM you selected

Good luck! Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 14 Jul 2021 14:58:49 GMT
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Hello All,

Here are the results of the minimum SBC V2-004 board with ROMWBW 3.01

Channels are as follow

0 -> CLK CPU (Pin 6)
1 -> CS_ROM (22)
2 -> RD CPU (21)
3 -> SOUT-TTL (11)
4 -> CS_UART (14)
5 -> CLK_UART (16)

Output is

The above is zoomed in so you can see what's going on with the UART output.

Zoomed out has this output

Best regards,

Edzard

File Attachments

1) Logic.jpg, downloaded 1153 times
2) Capture1.JPG, downloaded 1158 times
3) Capture2.JPG, downloaded 1155 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Wed, 14 Jul 2021 17:05:57 GMT
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Hi
Well this tells us something. Looks like your CPU is reading the ROM and it is in a tight polling loop. So that's good news. I am thinking your MAX232 is suspect or your serial cable.

What's coming out of the MAX232? Are the charge capacitors installed correctly?

Thanks and good luck, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 14 Jul 2021 18:42:35 GMT
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Hello Andrew,

The above output is from the (new build) minimal system, as discussed previous.

I was pleased with this outcome too. So I guess I'll continue (too!) with this second board..:)

I forgot my first (defect) board at home so I couldn't measure on that one (scope/logic analyzer are at work).

I will definitely check the max232 output. For the capacitors I used tantal ones. I think I installed them correctly although my eyesight hasn't been what it used to be..and they are small too.

Thanks,

Best regards,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Fri, 16 Jul 2021 15:59:06 GMT
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Hello All,

I added the next stage (SBC Build) of components to the second SBC V2 board as per instructions
https:// www.retrobrewcomputers.org/doku.php?id=boards:sbc:sbc_v2:sbc _v2-005

This stage revealed an error on my part and board silkscreen. Value of C28 is 10u (correect on the partlist) on the PCB it's 1 uF.
In my first build I only looked at the PCB so I soldered a 1uF tantal. So I was hopeful for a good outcome (first yahoo).

Connected the speaker too.

I removed the solder bridges on the back of the PCB. Connected the serial port with TX -> RX (2->5) and GND -> GND (5->5).

Connected power.

First observation was that the LED turned on Green. Dind't happen on the first build (so second yahoo) Fired up Teraterm: (still) no output on the screen.
When I hit de reset button: LED turns RED (and keeps that way).

The speaker doesn't give a peeps.

Bummer. Two boards with the same symptom. Strange, must be doing something very stupid.

Time to activate the logic analyzer again I guess.

Best regards,

Edzard

File Attachments

1) version PCB.jpg, downloaded 245 times
2) Overview.jpg, downloaded 1094 times

3) C28.jpg, downloaded 269 times
4) Serial.jpg, downloaded 244 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Fri, 16 Jul 2021 16:28:48 GMT
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Hi Edzard, what is coming out of the MAX232? It looks like there is TTL serial going into the MAX232 but nothing is coming out.

There is a simple Z80 assembler program called scream.asm which would be helpful here. All it does is send '0' to the serial port as fast as possible. Very helpful for debugging these kinds of problems because the UART and serial line are in a steady state of the same data flowing out. No possibility of missing a brief introduction string.

Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by norwestrzh on Fri, 16 Jul 2021 17:11:25 GMT
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>> There is a simple Z80 assembler program called scream.asm which would be helpful here.

Or my little Z80 assembler program, called SPEW, that just sends the printable character set to the serial port (followed by a CR/LF) over and over. Very useful to find the correct serial connections and to spot problems (e. g. dropped characters).

Roger

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Sat, 17 Jul 2021 11:39:38 GMT
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Hi

Whatever program you decide to use the function is very similar; to send a constant stream of repeating data to the UART so you can track down the chain of devices which have to work to produce serial output. ROM -> CPU -> glue logic -> UART -> MAX232 -> transmitting serial port -> receiving serial port

Here is the source code listing for scream.asm assembles with TASM. Not a great program but reliably does the job. It will tell you if you have basic UART functionality which is helpful

```
; UART 16C550 SERIAL
UART0:      .EQU    $68          ; DATA IN/OUT
UART1:      .EQU    $69          ; CHECK RX
UART2:      .EQU    $6A          ; INTERRUPTS
UART3:      .EQU    $6B          ; LINE CONTROL
UART4:      .EQU    $6C          ; MODEM CONTROL
UART5:      .EQU    $6D          ; LINE STATUS
UART6:      .EQU    $6E          ; MODEM STATUS
UART7:      .EQU    $6F          ; SCRATCH REG.

 .ORG $0000



 ;******************************************************** *******
;       INIT_UART                                       ;
;       Function....: Init serial port  8250, 16C450, OR 16C550  ;
;                9600 Baud, 8 bit, 1 stopbit, 0 parity      ;
;       Output......:                                   ;
;       call........: PAUSE                  test 2 Feb 2007 ;
 ;******************************************************** *******
INIT_UART:   LD     A,$AA
          OUT    (UART7),A
          IN     A,(UART7)
          CP     $AA          ; TEST IF YOU COULD STORE AA
          JP     NZ,INITUART_FAIL  ; IF NOT, THE UART CAN'T BE FOUND
          LD     A,$55
          OUT    (UART7),A     ;
          IN     A,(UART7)
          CP     $55          ;
          JP     NZ,INITUART_FAIL
          LD     A,$01
          JP     UART_OK

INITUART_FAIL:                  ; Handle if initialize UART fails
          LD     A,1
          HALT


UART_OK:
     LD     A,$80
          OUT    (UART3),A     ; SET DLAB FLAG
          LD     A,12          ; = 1,843,200 / ( 16 x 9600 )
          OUT    (UART0),A     ; Set BAUD rate til 9600
          LD     A,$00
          OUT    (UART1),A     ; Set BAUD rate til 9600
          LD     A,$03
```

```
        OUT    (UART3),A     ; Set 8 bit data, 1 stopbit


MAIN:
 LD A,$00 ; SELECT FIRST SERIAL PORT
 LD B,$30 ; LOAD "0" CHARACTER TO PRINT IN REGISTER B

TX_BUSYLP:   IN     A,(UART5)     ; READ Line Status Register
        BIT    5,A          ; TEST IF UART IS READY TO SEND
        JP     Z,TX_BUSYLP    ; IF NOT REPEAT


        LD     A,B
        OUT    (UART0),A      ; THEN WRITE THE CHAR TO UART


 JP MAIN ; REPEAT FOREVER


 .END
```

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sat, 17 Jul 2021 15:40:40 GMT
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Hi Edzard,

C28 was 1uF on the sbc-v2-003 and it was only changed to 10uF from version v onward. It shouldn't make any difference, it is only there for supply regulation.

The version R board does not have the clock divider so the additional 1k resistor is not needed.

Regards Phil

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sat, 17 Jul 2021 15:58:09 GMT
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Hi edzard,

Your serial out on your logic analyser looked like there is output. I can't help but think your issues

are related to your serial convertor or comms program.

Have you got flow control turned off?

You should be able to add a filter to your logic analyser that decodes the signal to ascii so you can see the output.

https://www.saleae.com/images/content/home/features/protocol -decoders.jpg

Try the async serial filter

Regards Phil

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sat, 17 Jul 2021 16:16:50 GMT
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Hi Edzard,

Just checked the 3.01 source code. The speaker beep is not enabled by default. Let me know if you want me to upload a rom image with it enabled.

Regards Phil.

Subject: Re: Debugging a SBC V2-004
Posted by norwestrzh on Sat, 17 Jul 2021 17:02:18 GMT
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Here's the source for SPEW. I believe that I used this version with the S100 group's serial card? (Z8530 @ 38.4k baud) Very vanilla Z80 code ... ought to assemble with just about any assembler? No calls, so stack not needed.

```
;
;   spew for the S100 group Z80
;
lf      equ     10
cr      equ     13
past    equ     0a0h
pbst    equ     0a1h
pbdt    equ     0a3h
;
        org     0f000h
;
start:  LD      C,past
        LD      B,14
```

```
        LD      HL,sinit
        OTIR
        LD      C,pbst
        LD      B,14
        LD      HL,sinit
        OTIR
        JR      loop

sinit:  db      4,44h
        db      3,0c1h
        db      5,0eah
        db      11,56h
        db      12,2
        db      13,0
        db      14,1
        db      15,0

loop:   LD      C,1FH
cinc:   INC     C
stck1:  IN      A,(pbst)
        AND     4
        JR      Z,stck1
        LD      A,C
        OUT     (pbdt),A
        LD      A,C
        CP      7FH
        JR      C,cinc
stck2:  IN      A,(pbst)
        AND     4
        JR      Z,stck2
        LD      A,cr
        OUT     (pbdt),A
stck3:  IN      A,(pbst)
        AND     4
        JR      Z,stck3
        LD      A,lf
        OUT     (pbdt),A
        JR      loop

        end
```

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Sat, 17 Jul 2021 20:42:41 GMT
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Hallo All,

Thanks for all the suggestions and code! It's a great help.

Phil, if you could upload the 3.01 version with the beep enabled it would be wonderful.

I will try all the above and let you know how it turns out.

I'm using Teraterm with the usual parameters.

Thanks again!

Best regards,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sun, 18 Jul 2021 01:44:44 GMT
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Hi Edzard, this is the development version with all external devices disabled.

Confirmed it beeps even without serial connection.

Regards Phil

File Attachments
1) SBC_std.rom, downloaded 305 times

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Tue, 20 Jul 2021 14:28:33 GMT
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Hello Phil,

I've tried out your binary.

Got a strong beep while booting! I also swapped my USB serial adapter for an other one.

I got (finaly) something on the screen , but it is not readable. Changed every possible config but no luck so far.
My standard setup is 38400 - 8 bit - none parity - 1 bit (stop) - no flow control.

Normaly changing the baudrate fixes things, but not this time. Makes no difference.

Also removed the delock serial connector and use now a regular de-9 male connector.

Tomorrow I will do some more testing with the logic analyzer and the assembler programs.

Kind regards,

Edzard

File Attachments
1) Capture.JPG, downloaded 938 times
2) serial new.jpg, downloaded 958 times

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Tue, 20 Jul 2021 15:47:20 GMT
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Hi Edzard, this is really good news. Time to use the scream program so you can determine what is happening to the serial character stream. You should be either 9600, n, 8, 1 or 38400, n, 8, 1 comm parameters. Scream or the other one will give you an idea of if problem is consistent (stuck bit) or some random corruption. Compare the bit pattern of what's making it to the screen vs. what is being sent by the program. Scream should give you a consistent string of characters. They may be wrong (other than ASCII 30 '0') but it should be the same character repeating. Good luck!

Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by coredump on Wed, 21 Jul 2021 19:50:17 GMT
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edzard wrote on Fri, 16 July 2021 17:59
Bummer. Two boards with the same symptom. Strange, must be doing something very stupid.

Not really.
To do a shoot into the blue moon:

One CPU seem to have a production date of 1935, the other of 2052.

These are surprisingly new parts.
Maybe fakes?

I don know the schematic, but does the 4 MHz oscillator mean the CPU clock is also 4 MHz?

I would make sure it is only 2MHz or test again with a known good CPU.

Best Regards
Detlef

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 21 Jul 2021 21:49:01 GMT
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Hello Detlef,

Both CPU's are bought through Mouser. I've used them (other one's) with success in a couple of Zeta V2's, EasyZ80, simple80, Z80-512K and RC2014.

https://eu.mouser.com/ProductDetail/692-Z84C0010PEG

One is a 10 Mhz version, the other a 20Mhz.

CPU Oscillator is 4MHz as the part list describes (up to 8 MHz). Some use a 10MHz version. In the Zeta V2 I use a 20MHz version oscillator without a problem.

But I will change them for a "good old" Z80 CPU just to see if that makes a difference.

Best regards,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by etchedpixels on Wed, 21 Jul 2021 22:03:43 GMT
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CMOS Z80 will run at any old speed unlike NMOS ones.

Have you checked your UART oscillators are correct and the clock into the 16550A is valid

Subject: Re: Debugging a SBC V2-004
Posted by coredump on Thu, 22 Jul 2021 18:24:45 GMT
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edzard wrote on Wed, 21 July 2021 23:49Hello Detlef,

Both CPU's are bought through Mouser.

Hello Edzard,

I clearly have to apologize.
It did not even come into my mind that it might be possible that those Z80 CPUs in DIP package are still manufactured.
So I have simply taken the wrong train.

Interestingly, the requirements regarding the voltages of the levels on the clock line are identical in the datasheet for NMOS and CMOS Z80.
(<=0.45V Low, >= VCC-0.6V High, the later maybe not exactly met by a 74LS74 output),
but the maximum allowed rise/fall time for the clock signal is 30ns for the 4MHz CPU, 10ns for the 10MHz CPU.
Not that I think the problem will be here, but maybe next time You have the oscilloscope 'on' the board, You may want to check for the levels and the rise/fall times, just for Your (and our) curiosity.

Best Regards
Detlef

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Fri, 23 Jul 2021 09:44:34 GMT
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Hi All,

A fairly decent amount of code gets executed prior to the beep sound so I think it is unlikely to be cpu, rom, or ram issue.

Regards Phil

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Fri, 23 Jul 2021 12:11:50 GMT
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Hi
Agree. If you're getting a beep code and the LED is doing what it is supposed to then all signs point to the UART, MAX232, UART clock, serial interface, etc. You may have a bad UART so I would start by swapping out the UART, UART clock, MAX232, and related glue logic with known good parts. A little swap-tronics would help a lot.

Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Wed, 28 Jul 2021 12:03:29 GMT
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Hi Edzard
Any updates on your SBC V2-004 build? Hope things are improving

Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 28 Jul 2021 12:53:44 GMT
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Hello Andrew,

I haven't start testing/debugging yet. My logic analyzer was elsewhere, I just got it back.

I also ordered some (key)parts with an other distributeur, just to be shure.

Meantime I started building the backplane and some other Z80 related PCB's so I have some reference in case it doesn't work.

Will post the progress!

Kind regards,

Edzard

File Attachments
1) Backplane.jpg, downloaded 798 times
2) Z80.jpg, downloaded 780 times
3) Z180.jpg, downloaded 792 times
4) V5.jpg, downloaded 794 times

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Fri, 06 Aug 2021 19:42:22 GMT
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Hello All,

I started debugging again. I changed the UART and MAX 232 butting nothing changed.

I burned 3 EPROMS: Beep (Phil), Spew (Roger) and Scream (Andrew).
I didn't have TASM for Spew and Scream at hand so I assembled them with RASM and burned them in a EPROM.
No error's, but both don't give any output. So I must be doing something wrong!

The "Beep" EPROM does give output (garbage on my screen) and (a decent) sound.

Ohh, and yes, the label gets black if you put the EPROM the other way around..

Thanks to the tips on the Zif thread I packed each ROM onto a DIP..

Then I connected most of the UART and Max 232 with my logic analyzer.

Output of the channels when connecting Power.

Best regards,

Edzard

File Attachments

1) ROM1.jpg, downloaded 733 times
2) ROM2.jpg, downloaded 739 times
3) Logic.jpg, downloaded 746 times
4) Power ON.PNG, downloaded 744 times
5) Power ON-2.PNG, downloaded 657 times

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Fri, 06 Aug 2021 19:46:45 GMT
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Next pictures

After resetting

When beeping I hit the reset.

Reset seem to fate out...

The Logic software give also a framing error.

Any thoughts?

Best regards,

Edzard

File Attachments

1) Power ON-3.PNG, downloaded 739 times
2) Reset.PNG, downloaded 728 times
3) Reset-reset.PNG, downloaded 765 times

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Sat, 07 Aug 2021 02:24:21 GMT
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cs looks good, output looks to be happening but be being interrupted

The multiple resets seems to be a problem.

I would try lifting reset pin 35 out of the socket and connecting the pin to 5v.

The try and track down where the resets are coming from.

I dont think there should be any activity on the int line, so perhaps uart is not being initialized correctly. Check wr and data lines.

Not understand why this is happening on both your boards though.

Do you have a minipro programmer? if so try testing all the ttl logic in the test function.

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Sat, 07 Aug 2021 15:39:33 GMT
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Hello Phil

b1ackmai1er wrote on Fri, 06 August 2021 19:24cs looks good, output looks to be happening but be being interrupted

The multiple resets seems to be a problem.
Those resets are me (doing so). Each time I hear a beep I reset again. Just to get some info on the lines. After some resets the output gets less and less.

[quote title= I dont think there should be any activity on the int line, so perhaps uart is not being initialized correctly. Check wr and data lines. [/quote]

Will do.

[quote Not understand why this is happening on both your boards though. [/quote]

Me neither. It could be one of the 74XXX is defect, because they come all from the same source (Mouser).

I've build also your latest version SBC V2005 MegaFlash. But I have still to program the Flash.

[quote Do you have a minipro programmer? if so try testing all the ttl logic in the test function.[/quote]

Will do that too.

Thanks,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Sun, 08 Aug 2021 16:42:39 GMT
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Hello Phil,

I tested all TTL Logic IC's. All are good.

There's only one (and notably the 74LS06N in the Serial I/O section) who gives an error on a test set.
With the 7406 you have 2 test sets.

- 7406 (NonStandard)
- 7406 (OC/OD)

The first (NonStandard) gives an error, the second set passes and says the IC is good.

I have a SN74LS06N.

Tonight I will look at the logic analyzer.

Thanks,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by coredump on Sun, 08 Aug 2021 22:55:03 GMT

edzard wrote on Fri, 06 August 2021 21:42
Hello All,

I changed the UART and MAX 232 but nothing changed.

Hi Edzard,

did You use only these NS16550AFN from National from the photos?
This NMOS part seems to have the requirement that
the /CS signal must be active min. 30ns before the /RD or /WR.

In the schematic, from /IORQ becoming active to /CS_UART becoming active there is an delay from U14D (SN74LS32, Tphl 14ns typ.) and
U6A (SN74LS139A, Tphl from enable 21ns typ.).

Maybe it's worth the afford to check the timing for an write access with the logic analyzer.

Just in case You find a problem here, eg. the ST16C550 from EXAR seems to be far more relaxed in this direction. It allows asserted /RD and /WR lines before (and after) /CS is asserted (and deasserted).

An other thing from Your photos: I didn't saw the minus mark on the C28.
just to be sure: Is it correctly mounted?

Best Regards
Detlef

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Tue, 10 Aug 2021 11:58:07 GMT

Hi Edzard, I tested some 74ls06n's when assembling my Andrews MBC and identified that all were bad and ordered some more.

Gone back now and tested them and they are reporting same as yours. Pulled one out of my working v2-004v and reported same as yours too.

So I think you '06 is ok - OC/OD appears to be open collector/open drain which is correct for our chip.

Regards Phil.

Edit - I now check all my logic chips before putting them into a board thanks to aliexpress counterfeiters !

Subject: Re: Debugging a SBC V2-004
Posted by lynchaj on Tue, 10 Aug 2021 17:11:19 GMT
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Hi
I had a pair of fake 74ls07s that caused a few weeks of delays hunting them down. They sort of worked but failed under load. Very difficult to locate the problem but finally revealed itself after swapping parts. Counterfeit chips are a real problem. Remember to swap from a different manufacturing lot!

Thanks, Andrew Lynch

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Tue, 10 Aug 2021 19:50:24 GMT
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Hello Phil,

b1ackmai1er wrote on Fri, 06 August 2021 19:24cs looks good, output looks to be happening but be being interrupted
I dont think there should be any activity on the int line, so perhaps uart is not being initialized correctly. Check wr and data lines.

Here are the /WR and Datalines of the UART. I see nothing special.

Output is still the same.

Best regards,

Edzard

File Attachments
1) UART Datalines.PNG, downloaded 535 times
2) Output.jpg, downloaded 526 times

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Tue, 10 Aug 2021 20:47:31 GMT
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Hello Phil,

b1ackmai1er wrote on Tue, 10 August 2021 04:58Hi Edzard, I tested some 74ls06n's when assembling my Andrews MBC and identified that all were bad and ordered some more.
Gone back now and tested them and they are reporting same as yours. Pulled one out of my working v2-004v and reported same as yours too.
So I think you '06 is ok - OC/OD appears to be open collector/open drain which is correct for our chip.
Edit - I now check all my logic chips before putting them into a board thanks to aliexpress counterfeiters !

Thank you for checking this out!

All parts (74xxx, CPU, UART, 8255, MAX and resistors/caps) are obtained from Mouser. Only the DS1210 is from utsource.

But I will order some more from others.

Kind regards,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Tue, 10 Aug 2021 21:02:29 GMT
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Hallo Detlef,

[quote title=coredump wrote on Sun, 08 August 2021 15:55]edzard wrote on Fri, 06 August 2021 21:42
did You use only these NS16550AFN from National from the photos?
This NMOS part seems to have the requirement that
the /CS signal must be active min. 30ns before the /RD or /WR.

In the schematic, from /IORQ becoming active to /CS_UART becoming active there is an delay from U14D (SN74LS32, Tphl 14ns typ.) and

U6A (SN74LS139A, Tphl from enable 21ns typ.).

Maybe it's worth the afford to check the timing for an write access with the logic analyzer.

Just in case You find a problem here, eg. the ST16C550 from EXAR seems to be far more relaxed in this direction. It allows asserted /RD and /WR lines before (and after) /CS is asserted (and deasserted).

An other thing from Your photos: I didn't saw the minus mark on the C28.
just to be sure: Is it correctly mounted?

Best Regards
Detlef

So far I use two different 16550 from TI's (Reichelt and Mouser) and one from National (obtained from utsource).
All three work in the Zeta V2 system.

The C28 is mounted correctly. It's a small one (only 10 Volts). I could swap it out, just to be sure.

I will look out for a ST16C550.

I will try to figure out the timing of the suggested IC's. Still learning the possibilities of the software of my logic analyzer!

Vielen Dank!

Gruss,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by coredump on Wed, 11 Aug 2021 11:36:00 GMT
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Hello Edzard,
edzard wrote on Tue, 10 August 2021 23:02
The C28 is mounted correctly. It's a small one (only 10 Volts). I could swap it out, just to be sure.
Since it's mounted correctly I would recommend not to waste Your time. Just leave it where it is.

Quote:

So far I use two different 16550 from TI's (Reichelt and Mouser) and one from National (obtained from utsource).
All three work in the Zeta V2 system.

This is most interesting.
Since the Zeta has a very simlar Schematic in this respect I would clearly recommend to leave any investigation here for rainy days ;-)

You have still 2 things to investigate, that might bring You to the source of trouble.
- Your LA prints showed up different behaviour after the resets.
- The simple test codes like Andrew's Scream didn't work in Your system.

If I would be faced to the problem, I would start to find out why the test programs didn't work.
Usual problems are:
The program didn't end up in the chip at all.
It did and up at the wrong address.
It is wrong relocated so the first absolute jump instruction ends up in the country side.

A quick check for that is to read out the chip you have already programmed (the first some hundred bytes from address 0 will suffice) and have a look in the file with a hex editor.

If You are a bit unsure how to do that You might want to post the file. Many helpful eyes will come to rescue...

Than You can use the logic analyzer to see what happens when You start the test program.
You may want to connect eg. to:
D0-D7
/RD
/WR
/MREQ
/M1 (not absolute required but useful)
/Reset (for reference to see when things should start and to trigger on)
A0,A1,A2

This way You can determine what the Z80 reads from memory and what it reads/writes to the UART.
You don't see all the addresses, but You know it starts at 0 and You can determine what addresses it should apply meanwhile.
Aside this it is always helpful to check the power supply of a chip of Your deliberate choice (the Z80 might be a good candidate) during operation. With an oscilloscope or an analog input of the LA, of course. Not with a DMM.

That's at least what I would do in You situation (without a familiar oscilloscope).

Have much seccess!
Best regards
Detlef

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Wed, 11 Aug 2021 14:03:09 GMT
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Hi Edzard, those data writes look good to me.

I assume that the clock signal is the uart clock not the system clock?

If you want to send one of your unpopulated boards to me, I am happy to continue troubleshooting with it. I am beginning to think this is either a design, manufacturing or construction issue.

Best Wishes Phil.

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 11 Aug 2021 19:54:07 GMT
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Hello Phil,

b1ackmai1er wrote on Wed, 11 August 2021 07:03Hi Edzard, those data writes look good to me.

I assume that the clock signal is the uart clock not the system clock?

If you want to send one of your unpopulated boards to me, I am happy to continue troubleshooting with it. I am beginning to think this is either a design, manufacturing or construction issue.

Best Wishes Phil.
The clock signal is from the UART. The CPU clock I use is 4 Mhz (10 Mhz CPU).

I don't know what to think about the issue(s?). It's the my first project (of a decent few) where multiple boards around the same design don't work.
But then again, it can't be a design flaw because all of your boards do work (even 2 or 3 different versions).

So I think I must be doing something very stupid or some components are incompatible (timing). And because I use them at all the boards the issue remains the same.

I'm going for a week away (no PC/Internet) so when I return I would gladly sent you some of the boards! A more experienced look will definitely help!

With regards to the Data signals: I've checked them on a Zeta V2 and on those boards (I have 3) the signals do look better. Not much short "spikes" like the SBC V2 of mine. I will try to post those results before I go.

All the best,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 11 Aug 2021 20:52:02 GMT
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Hello All,

Here is the serial output of a Zeta V2 board (TSR202E).

Not sure if it's possible to display/output the terminal on the right (where now the ASCII is displayed).

And here the Data lines (D0-D7)

To me it seems more "mature" then the data of the SBC V2 board.

Kind regards,

Edzard

File Attachments
1) Zeta output serial.PNG, downloaded 448 times
2) DATA UART Zeta V2.PNG, downloaded 497 times
3) ZetaV2.jpg, downloaded 263 times

Subject: Re: Debugging a SBC V2-004
Posted by b1ackmai1er on Wed, 11 Aug 2021 21:38:17 GMT
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Great comparision Edzard.

The spikes indeed look odd but without cpu clock and other signals to compare against I did'nt want to say anything since I am not that experienced understanding data sheets.

So possible next step is to try an identify what signal those spikes coinside with i.e. mreq, iorq, busrq, m1, int, nmi etc

If I have time on the weekend I will try and write a small rom program that does a resad/write test to the uart scratch register and gived and audible tone of success or failure.

Regards Phil.

Subject: Re: Debugging a SBC V2-004
Posted by edzard on Wed, 11 Aug 2021 22:36:56 GMT
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Hallo Detlef,

coredump wrote on Wed, 11 August 2021 04:36Hello Edzard,
You have still 2 things to investigate, that might bring You to the source of trouble.
- Your LA prints showed up different behaviour after the resets.
- The simple test codes like Andrew's Scream didn't work in Your system.

If I would be faced to the problem, I would start to find out why the test programs didn't work.
Usual problems are:
The program didn't end up in the chip at all.
It did and up at the wrong address.
It is wrong relocated so the first absolute jump instruction ends up in the country side.

A quick check for that is to read out the chip you have already programmed (the first some hundred bytes from address 0 will suffice) and have a look in the file with a hex editor.

If You are a bit unsure how to do that You might want to post the file. Many helpful eyes will come to rescue...

Than You can use the logic analyzer to see what happens when You start the test program.

Thanks for this great advice! After my short trip I will try the above out!

All the best,

Edzard

Subject: Re: Debugging a SBC V2-004
Posted by moritzp on Thu, 20 Jan 2022 18:55:42 GMT
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Dear Edzard! Hi all,

are there by chance any updates? I am stuck with a SBC v2 Rev. 005i board, I get no output whatsoever and the speaker is constantly on.

Unfortunately, I do not own a decent Oscilloscope and due to the global circumstances I currently do not have access to one. Therefore, I was hoping to find some inspirations here.

So, just in case there are some insights, tips and tricks to share, I would highly appreciate them.

All the best!
Moritz