

SMD2000 BUSHFIRE

Mini DTX version of Amiga 2000

By Gazzmaniac

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NOTES

Read the readme file!

You will also need to build a CPU card and an Agnus card.

Serial Port and Mouse Port are the same shape. Be extra careful to not connect mouses to the serial port and serial devices to the mouse port! I know why Commodore used a 25 pin port hahaha. Recommend using DB9 protector for serial port e.g.: <https://www.thingiverse.com/thing:2121877>

DISCLAIMER:

This is an experimental hobbyist project which may not work. There are probably design flaws and faults. Constructors will require equipment including soldering and rework, test gear, oscilloscope, and advanced soldering, electronics, and troubleshooting skills.

If you choose to construct this project please assume there will be no support available to help you get it working. You are on your own. If you can't get it working or break your Amiga chipset or something else do not blame anyone but yourself. You were warned!

No person or organisation associated with this project accepts any liability or responsibility for damages or injury as a result of someone using this board.

You agree to these terms if you have the board fabricated or you obtain a fabricated board.

That said, remember it is a hobby and the whole point is to enjoy making it and to get satisfaction from having made a unique piece of hardware. Remember to have fun. If you start cracking the shits walk away and finish it another day.

LICENSING

Design is open source hardware.

1. Any and all derivative designs must also be open source.
2. No person, business, or other entity associated with this design shall be liable for any damages incurred by anyone as a result of using this design. If you do not accept this condition do not build the project.
3. Free for private use by anyone.
4. Free for anyone to make for sale, except people associated with A1200.net keycaps. You guys suck.
5. CERN Open Hardware Licence Version 2 – Strongly Reciprocal CERN-OHL-S) license applies, subject to conditions 1–3 above.
6. Any portions of this design from other projects shall be licensed according to their respective licenses if their licenses are not compatible with CERN-OHL-S or the conditions above.
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REFERENCES

Commodore Amiga References:

Commodore Amiga A500/A2000 Technical Reference Manual
Commodore schematics for A2000 Rev 4 & Rev 6.2, A500 Rev 6 & Rev 8 (A500+), and A1200 R1D4 schematics. Scanned originals and amigawiki.org rebuilds referenced.
Coprocessor Expansion and 86 Pin Signals on Amiga Computers by Dave Haynie; this is presumably a Commodore document

Other References:

DTX Mechanical Interface Specification rev 1.0
ATX Specification v2.1 & v2.2
Intel ISA Bus Specification and Application Notes
Silverstone (r) ML109 case datasheet, www.silverstonetek.com

Other Projects incorporated into this one:

RGB2HDMI:
<https://github.com/c0pperdragon/Amiga-Digital-Video>
<https://github.com/Bloodmosher/Amiga-VideoSlot-RGBtoHDMI>

Video Output:
https://www.pcbway.com/project/shareproject/Commodore_Amiga_DB23_RGB_External_Video_Buffer_V6_Compatible_with_GBS_8200_822_00cf763f.html

Datasheets:

Symbols and footprints for most parts were downloaded from Mouser/Samacsy, and many were modified to make the schematics more readable. Samacsy parts probably aren't covered by the Open Source license. Links to datasheets are in the symbol metadata.
Footprints and symbols for generic parts e.g. jumpers/headers use Kicad libraries.

Other Referenced Datasheets:

VGA Pinout Guide, https://pinoutguide.com/Video/VGA15_pinout.shtml
M27C400 & M27C800 EPROM data sheets
SPC Multicomp DSub9 to DSub25 adapter, <http://www.farnell.com>

Technical Guides:

CTS Corporation Application Note: Crystal Basics, CTS Corporation
A Guide to Debouncing by Jack G. Ganssle © 2004 The Ganssle Group
555 timer in monostable mode:
<https://todbot.com/blog/2010/01/02/momentary-button-as-onoff-toggle-using-555/>

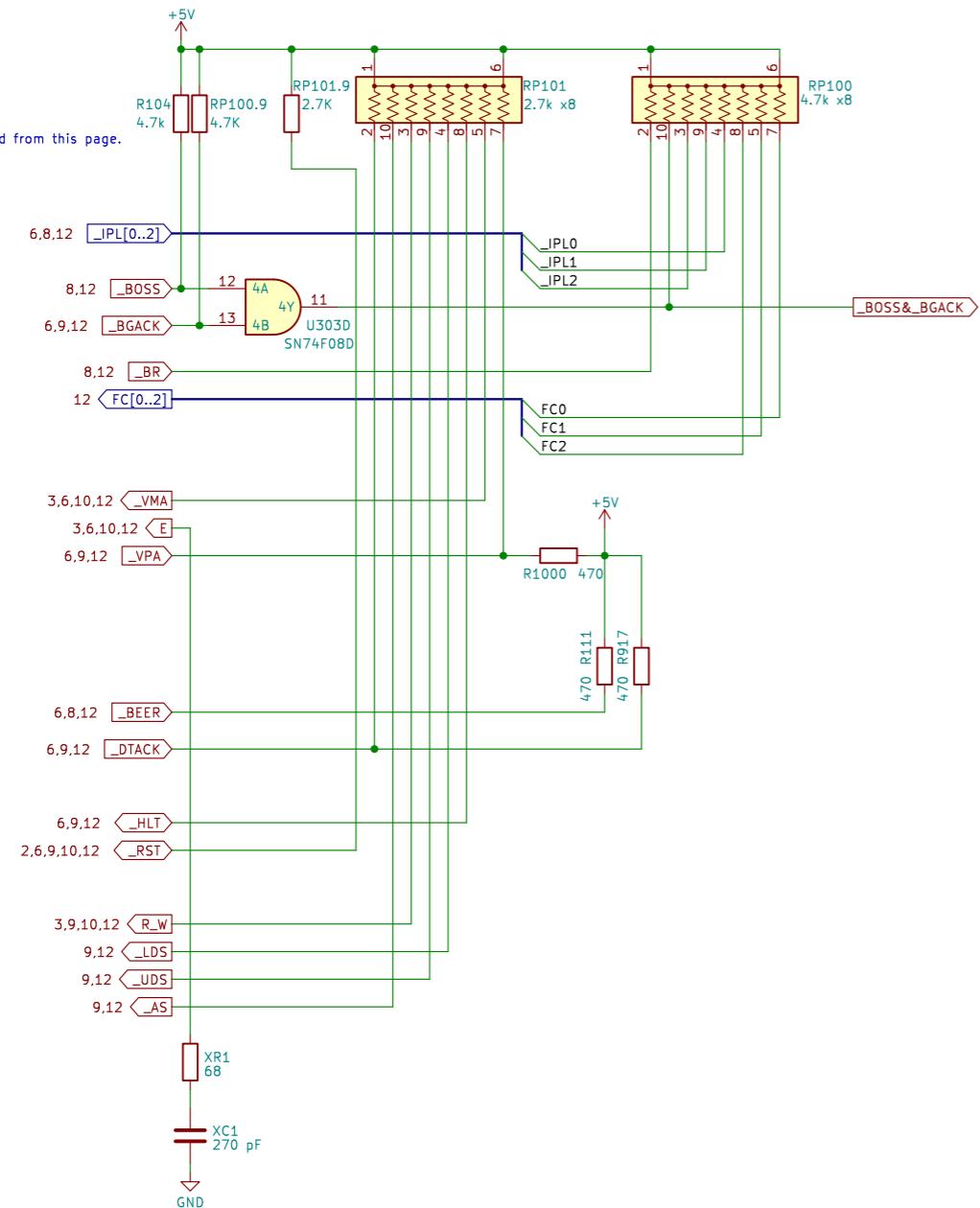
Sheet: /
File: SMD2000_Motherboard.kicad_sch

Title: SMD 2000 Bushfire

Size: A3 Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10

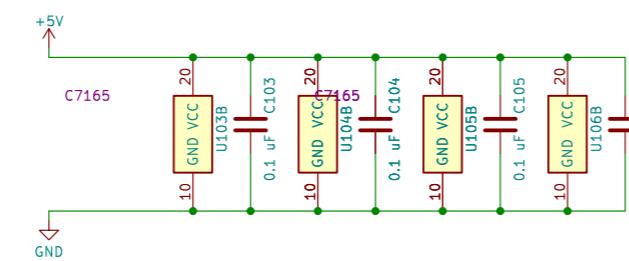
Rev: 1.02
Id: 0/14

7M & BG signals removed from this page.



XR1 and XC1 are not present on A500
It is likely that these components may be left unpopulated.
They were populated on the prototype and it works fine.

CPU has been removed from motherboard, use CPU slot.



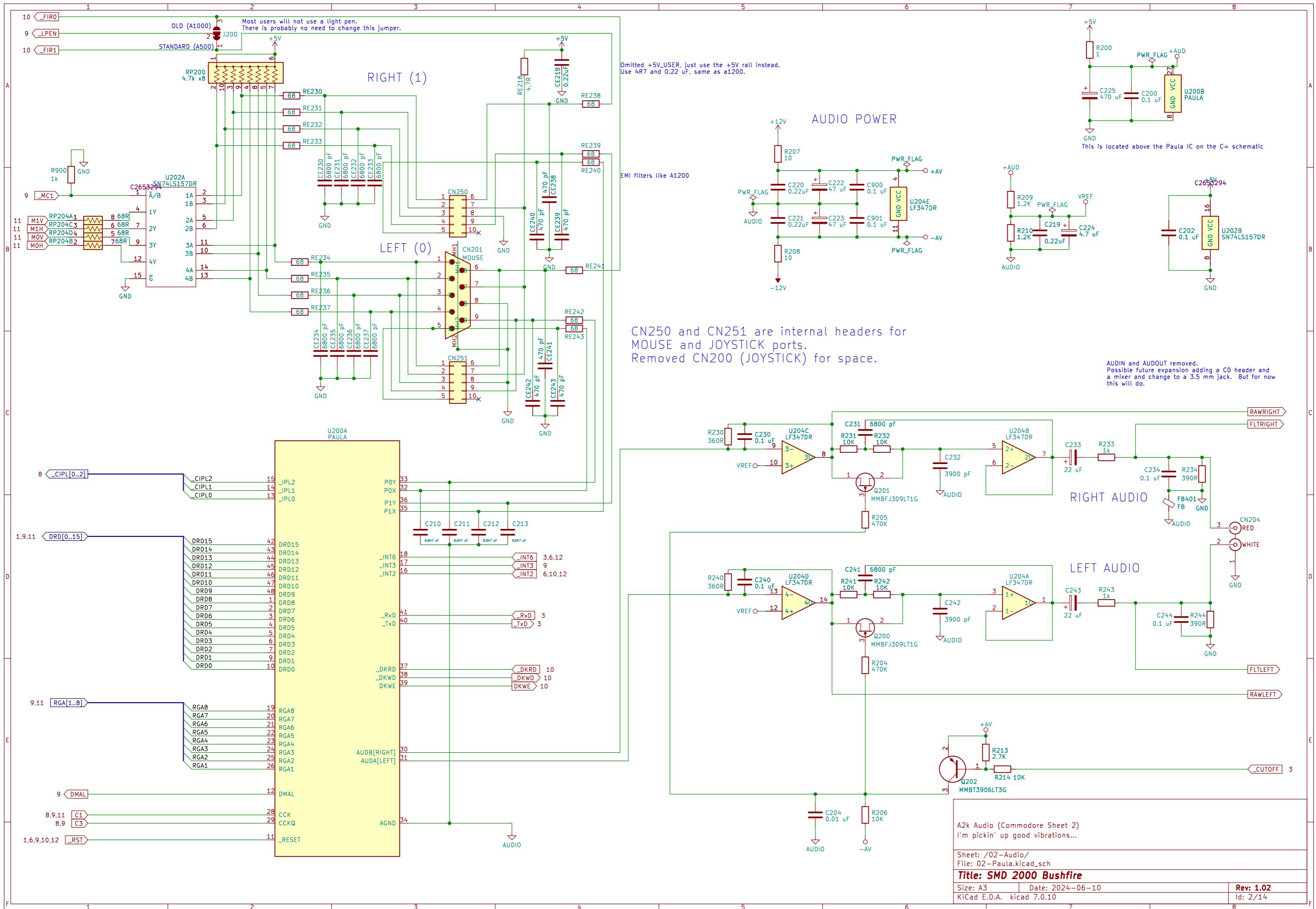
A2k CPU (Commodore Sheet 1)
Something in the way she moves...

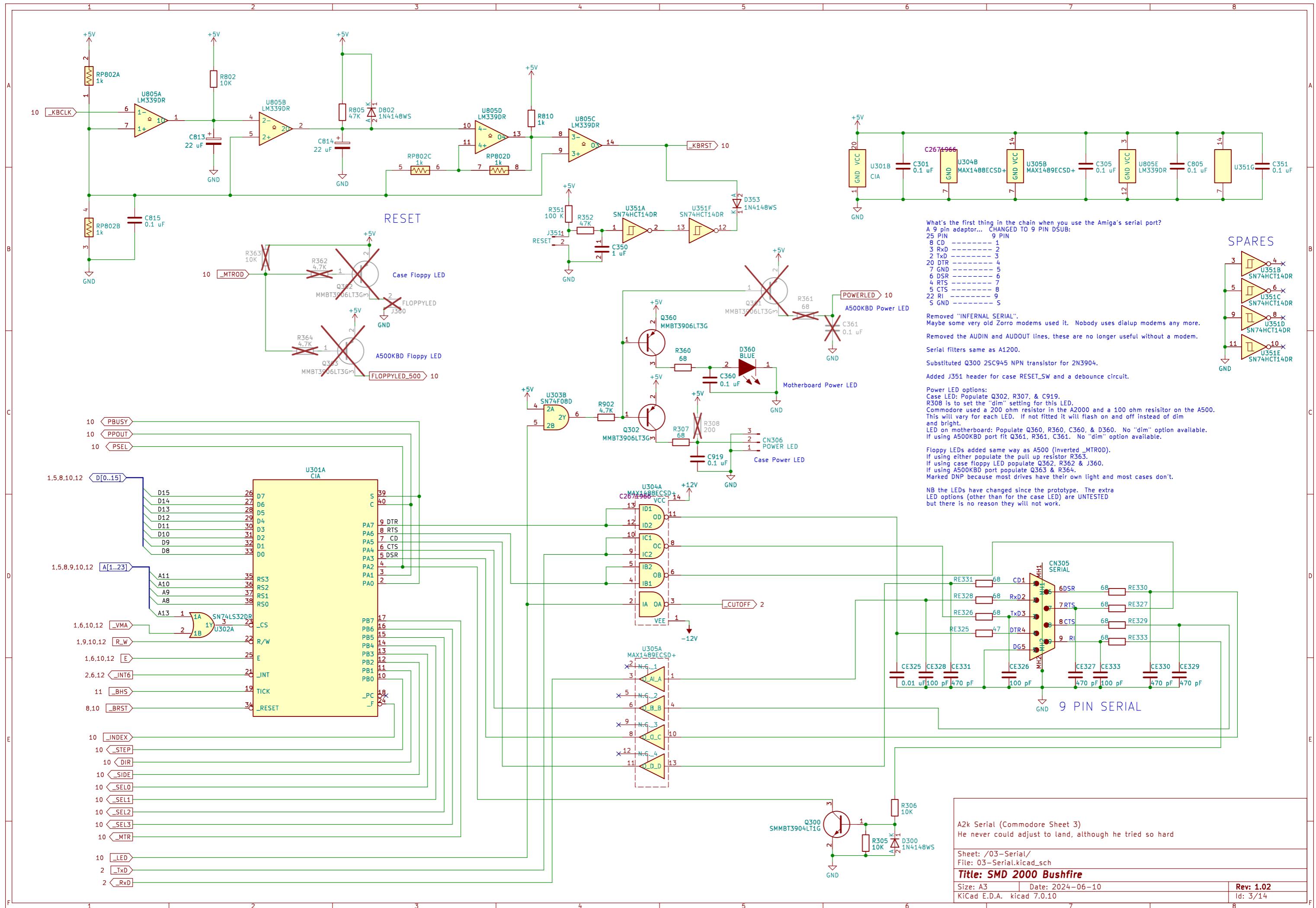
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File: 01-CPU.kicad_sch

Title: SMD 2000 Bushfire

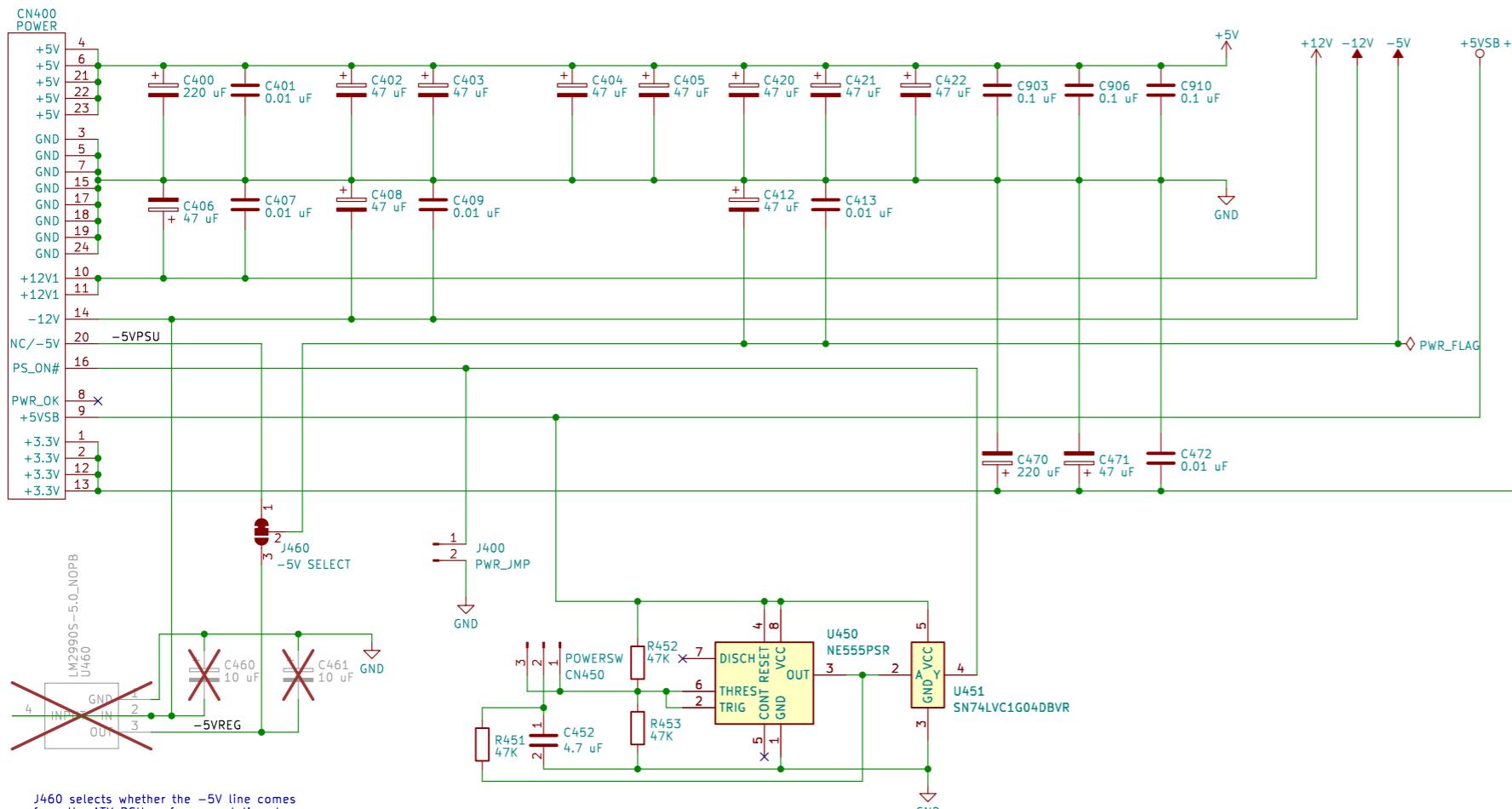
Size: A3 Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10

Rev: 1.02
Id: 1/14





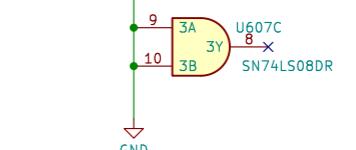
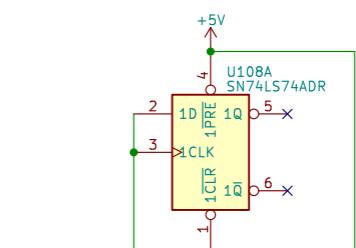
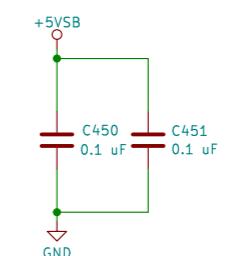
Power Supply Notes



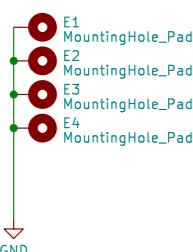
+5V_USER, +12V_USER, -12V_USER have been omitted.
These were used by the mouse, serial video, and centronics ports. The redesigned serial and video ports don't need it, and the parallel and mouse ports can be fed from +5V rail instead.

Added a -5V regulator in case the ATX PSU does not have a -5V rail.
Removed the TICK line. J300 is also removed on sheet 10. The TICK input of U300 is connected to the _VSYNC line (like in the A500).

U450 555 timer change the pushbutton on the case (J450) from momentary action to toggle for the ATX PSU. The power is supplied from the +5V standby line. Also have J400 in case it fails.
555 input starts of LOW so there's also a single NOT gate so the computer doesn't start when the power is connected.
Future development – maybe do a software controlled power-off?



Mounting Holes



Chip ram on Agnus board. Memory power is there.

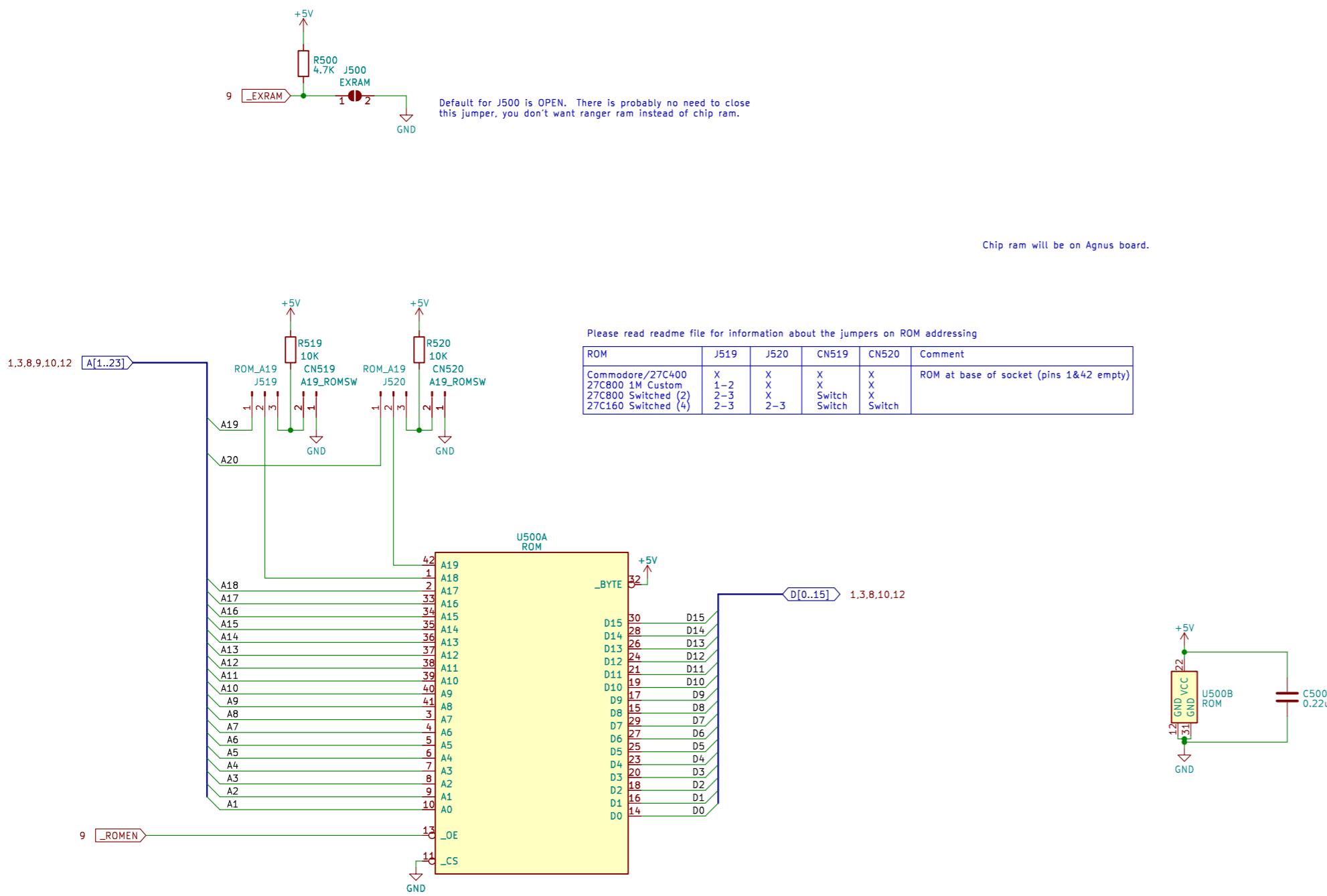
A2k Power (Commodore Sheet 4)
Baby, we were born to run...

Sheet: /04-Power/
File: 04-Power.kicad_sch

Title: SMD 2000 Bushfire

Size: A3 | Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10

Rev: 1.02
Id: 4/14

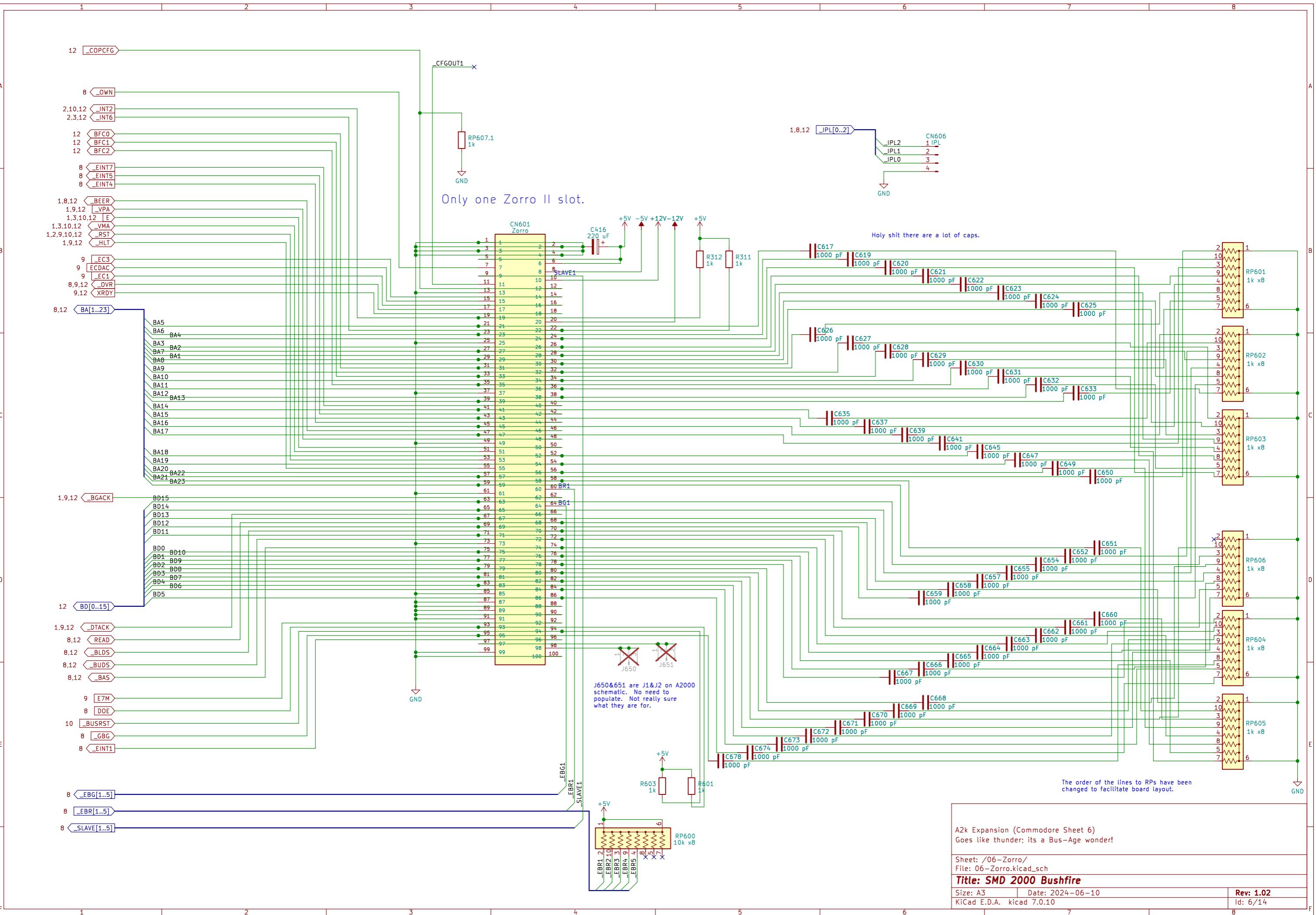


A2k Memories (Commodore Sheet 5) Memories (all alone in the moonlight)

Sheet: /05-Memory/
File: 05-Memory.kicad_sch

Title: SMD 2000 Bushfire

Size: A3 Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10



A

A

B

B

C

C

D

D

E

E

F

F

The ISA bus is removed because bridgeboards are retarded.

Amiga could stand on its own two feet, it didn't need to be a PC too.
What the fuck were they thinking?

If you want a to use a bridgeboard build a different project.

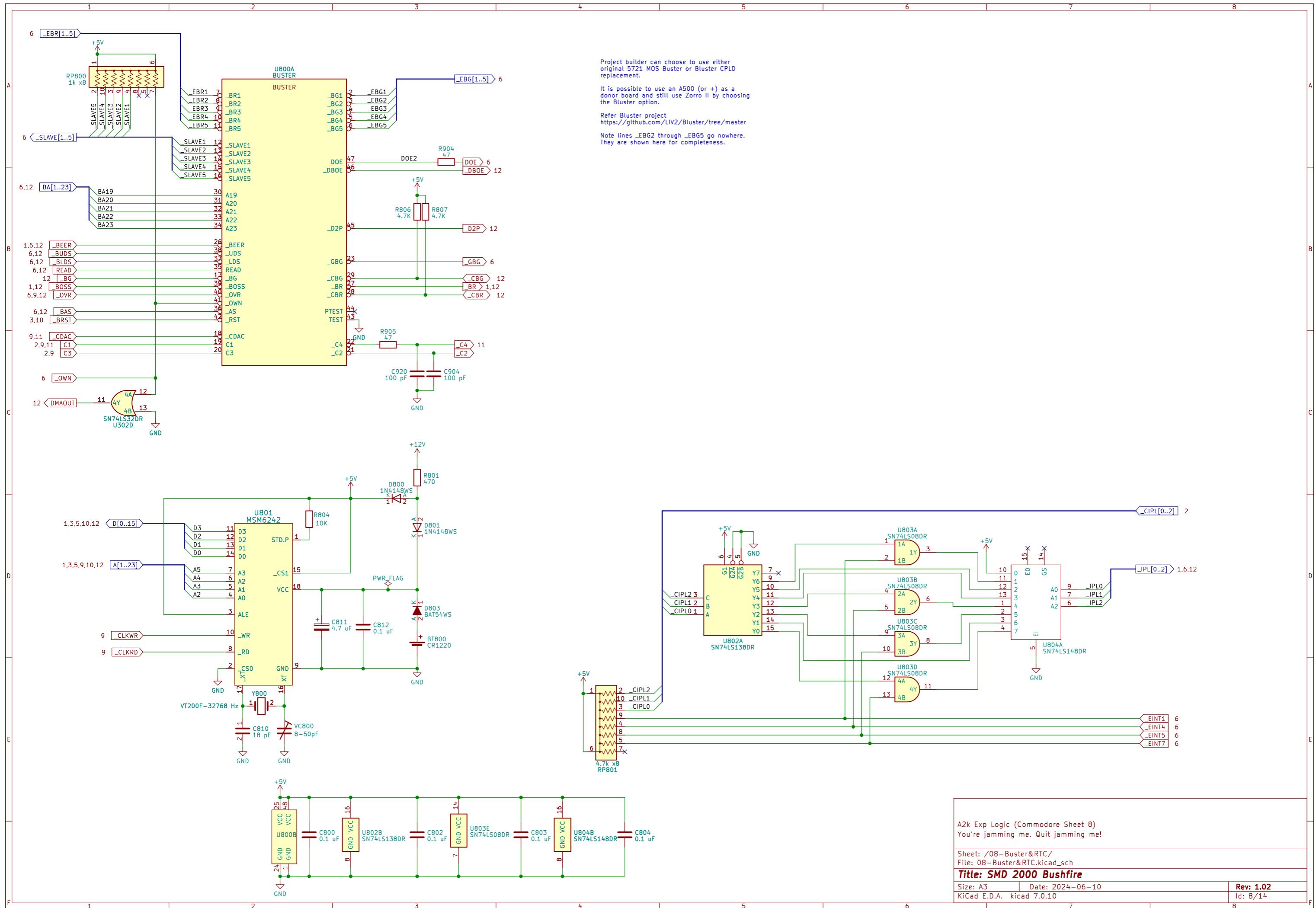
A2k IBM Bus (Commodore Sheet 7)
I wait in this place, where the sun never shines

Sheet: /07-ISA/
File: 07-ISA.kicad_sch

Title: SMD 2000 Bushfire

Size: A3 Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10

Rev: 1.02
Id: 7/14

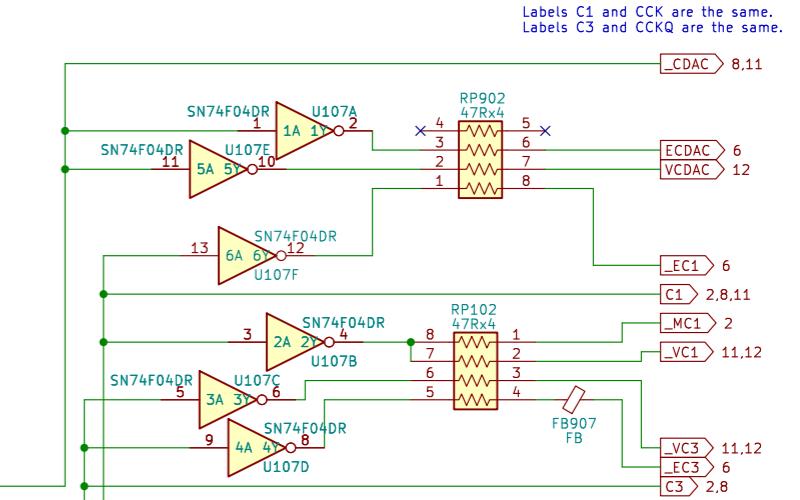


Signals for Agnus board

N.B. DRA bus and _RAS0, _RAS1, _CAS0, _WE lines are only used for chip ram. These lines have been excluded because chip ram is on the Agnus board.

28 MHz oscillator is also on Agnus board.
N.B. no data sheet for X1.

Labels C1 and CCK are the same.
Labels C3 and CCKQ are the same.



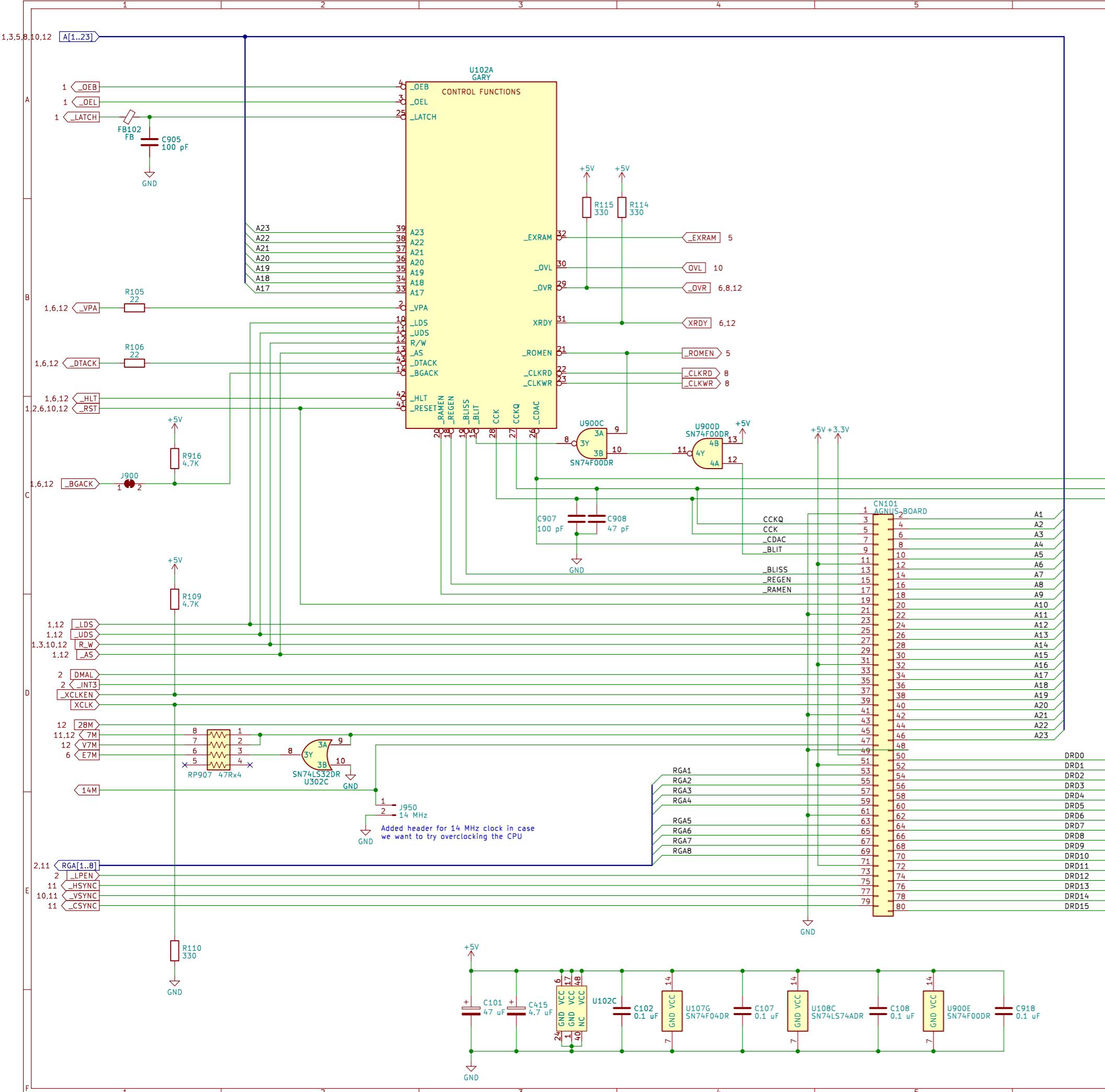
A2k Agnus (Commodore Sheet 9)
Deep down inside, I've got a Rock-n-Roll heart

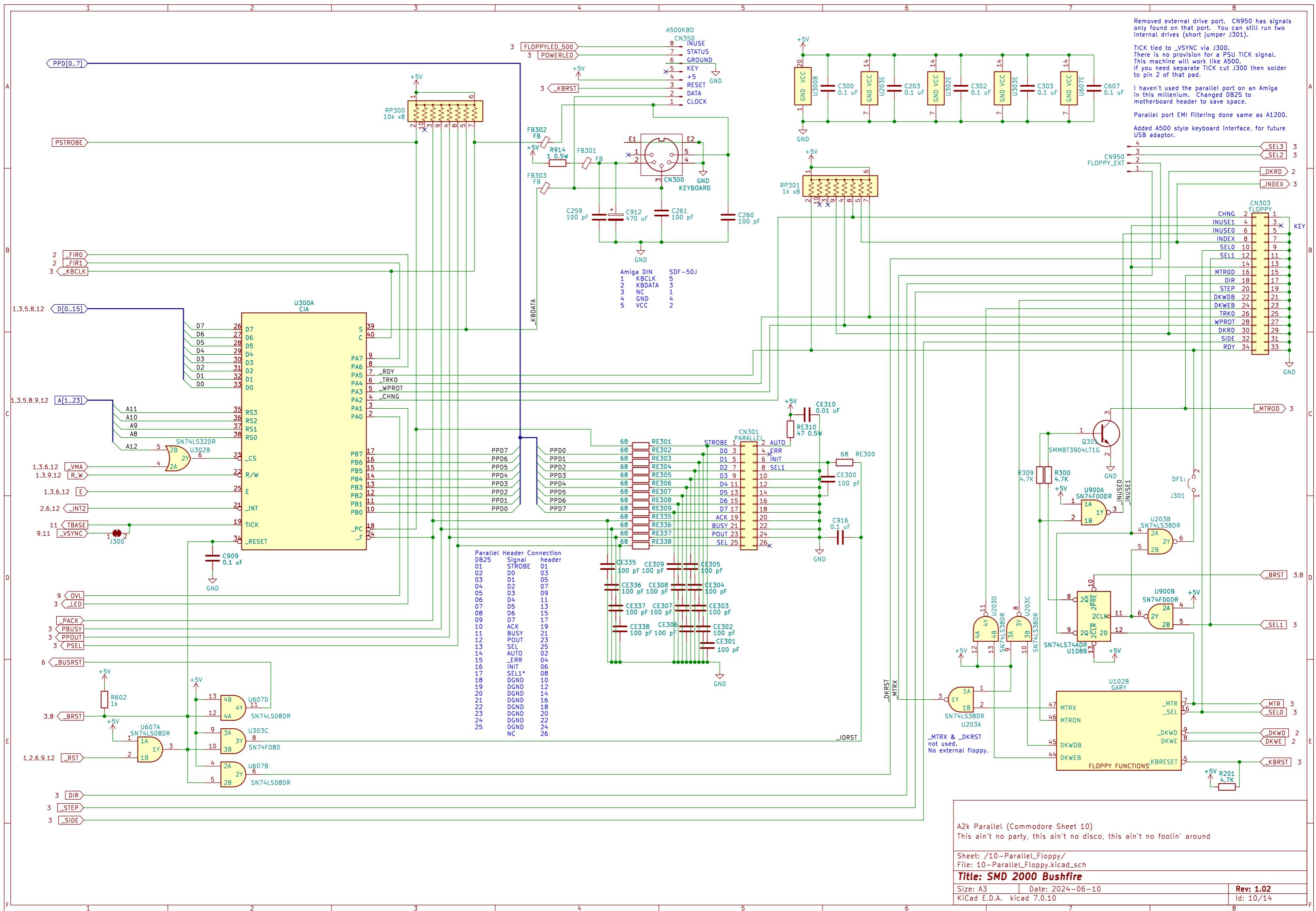
Sheet: /09-Agnus/
File: 09-Agnus.kicad_sch

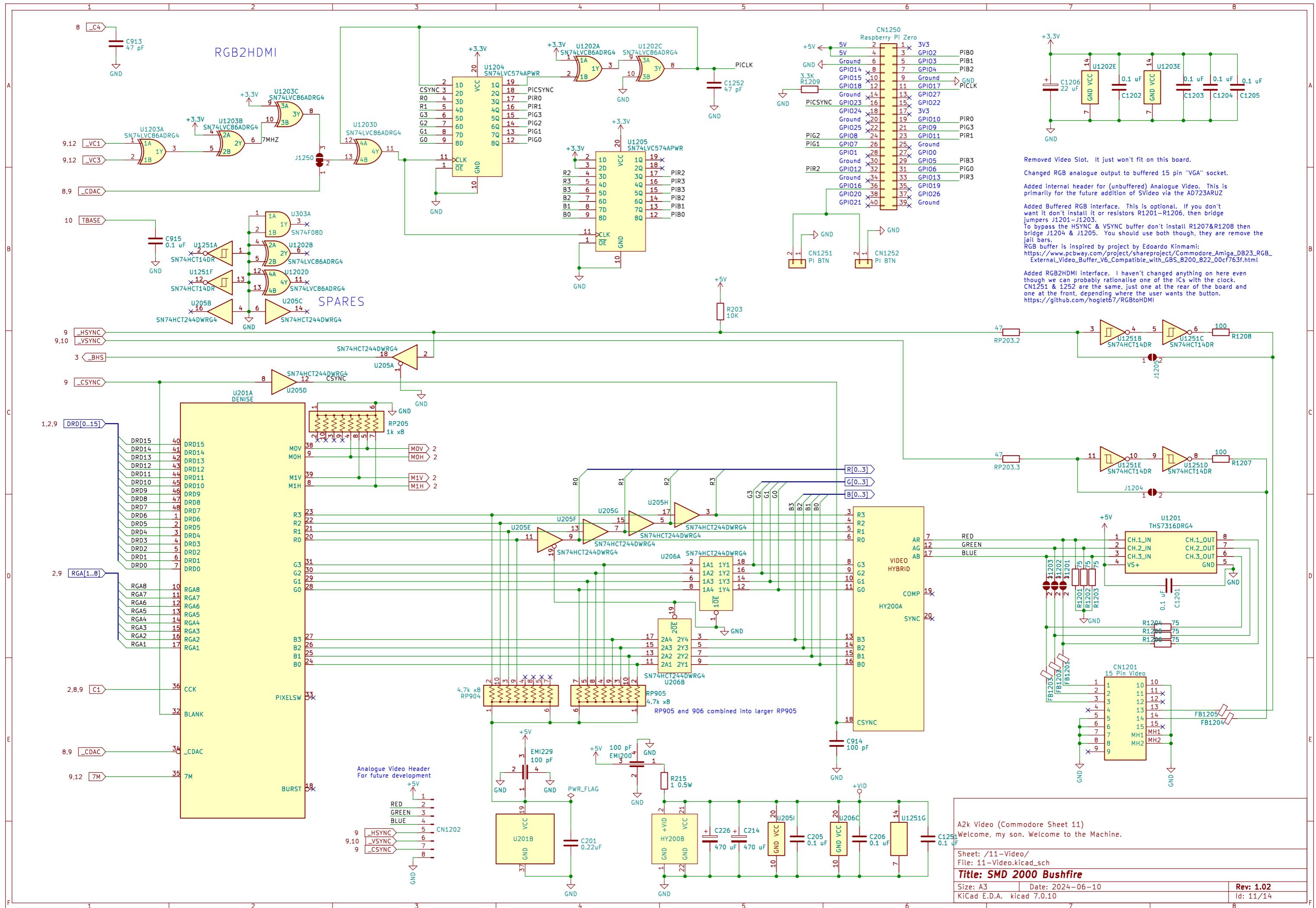
Title: SMD 2000 Bushfire

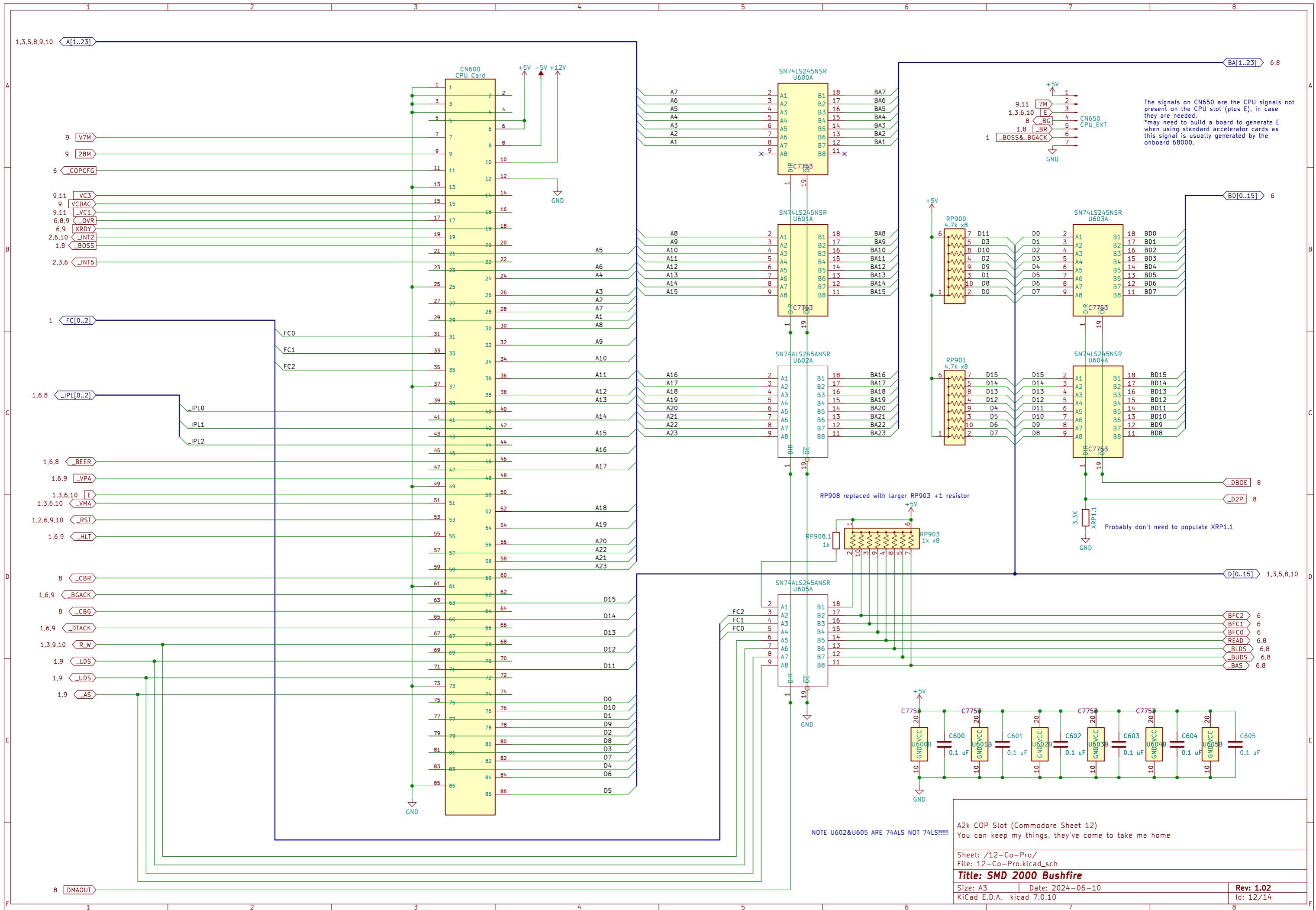
Size: A3 Date: 2024-06-10
KiCad E.D.A. kicad 7.0.10

Rev: 1.02
Id: 9/14









JUMPERS

Ref.	Value	Sheet	A2000	Default	Description
J101	1M CHIP	Agnus Card	J101	A19	Connects Agnus A19 signal to either CPU A23 (1-2) or A19 (2-3). Maps second 512 kb ram on Agnus card at \$C00000 (ranger ram, 1-2) or \$0800000 (chip ram, 2-3). Change to 1-2 if using a 512 kb Agnus (8370 or 8371).
J102	PAL/NTSC	Agnus Card	J102	PAL	Choose PAL (open) or NTSC (closed) for certain Agnus revisions. See Agnus card.
J200	LPEN	2	J200	PORT1	Selects which port the light pen is in.
J300	TICK	3	J300	_VSYNC	Selects where the TICK signal comes from. _VSYNC is the only option; J300 has been retained for completeness.
J301	DF1:	10	J301	OPEN	Close this jumper if DF1 is present.
J460	-5V SELECT	4		PSU	Selects whether -5V rail is from the ATX PSU or from the regulator*.
J500	EXRAM	5	J500	OPEN	If closed GARY expects ranger RAM exists at \$C00000. Close if J101 is changed to A23.
J519	ROM_A19	5		OPEN	Selects whether ROM A19 is from CPU or external switch (CN519). 1-2 for custom 1 MB kickstart, 2-3 for switch.
J520	ROM_A20	5		OPEN	Selects whether ROM A20 is from CPU or external switch (CN520). 2-3 for switch. Not sure if 2 MB kickstart possible.
J900	BGACK	9	J900	CLOSED	If open the _BGACK signal is always high for GARY. I don't know why this jumper exists.
J1201	RED	11		OPEN	Close jumpers J1201–J1203 to bypass the RGB amplifier
J1202	GREEN	11		OPEN	
J1203	BLUE	11		OPEN	
J1204	VSYNC	11		OPEN	Close jumpers J1204 & 1205 to bypass the _Hsync and _Vsync buffer
J1205	Hsync	11		OPEN	
J1250	PICLK	11		CDAC	Select between _CDAC or clock calculated from _VC1 & _VC3 for RGB2HDMI

*-5V rail only needed if an expansion requires -5V. Most don't.

NEW HEADERS

Reference	Value	Sheet	A2000	Function
J351	RESET_SW	3		Header for reset switch.
J360	FLOPPYLED	3		Header for floppy LED on case
J400	PWR_JMP	4		Jumper to ground _PS_ON signal (bypasses latching power switch).
J650	Z98	6	J1	Connects to Zorro pin 98. Not sure what the point is.
J651	Z97	6	J2	Connects to Zorro pin 97. Not sure what the point is.
J950	14 MHz	9		Header with 14 MHz clock (if generated on Agnus board)
CN306	POWER LED	3		Header for case power LED (centre positive)
CN450	POWERSW	4		Header for case power switch.
CN451–CN453	3.3 v	4		Headers with 3.3v power rail and GND
CN519	A19_ROMSW	5		Header to switch ROM A19 (using eprom as switchable kickstart)
CN520	A20_ROMSW	5		Header to switch ROM A20 (using eprom as switchable kickstart)
CN606	IPL	6		Header with _IPL[0-2] signals, only found on CPU socket on the A2000.
CN650	CPU_EXT	12		Other signals from the A2000 CPU socket (plus E)
CN950	FLOPPY_EXT	10		Signals only found on the external floppy port
CN1202	ANALOGUE VIDEO	11		Header with internal analogue video signals
CN1251, CN1252	PI BTN	11		The button for RGB2HDMI