SMD 500+ Project

NOTES

Notes for Rev 0.2

Rev 0.2 is the experimenter's board.
The sole purpose is for my own experimentation, for further development.
It is intended to be run on the bench, not as a replacement board.
If you want a new A500/A500+ board build rev 0.11 or the A500++.

No warranties given, if you build it and blow up your rare vintage chips it's not my fault.

Tidied up the schematics, it is now arranged properly with separate pages, organised same as the original Commodore schematics.
Two extra pages:
Page 2A with the second Agnus socket.
Page 4A with additional video circuitry.

Added ATX (Molex) socket for power. No longer reliant on Commodore's square DIN, which is now made from Unobtanium.

Changed the edge connector to 2x43 header socket. Turns out 86 pin edge connectors are also made out of Unobtanium.

Added jumper for 14 MHZ CPU clock hack (JP195)

Added internal headers for both mouse ports and the serial port.

Simplified Chip RAM into a single 72 pin SIMM.
To make the board tidier and save space. See Page 3 for more info.
Trapdoor expansion header still present in case I made a mistake :-).

Video Output
Added provision for the Raspberry Pi Zero HDMI output. This is instead of the Denise adapter for that project. See Page 4A for more info.

Added D15 "VGA" output (not scandoubled). See Page 4A for more info.

Removed the S-Video/Composite option. No longer useful with HDMI & VGA.

Relevant notes from Rev 0.1x

Clock battery BT9 changed to coin cell and diode.
Minor modification to allow use of RTC72421 which is still in production.

Added option for Agnus 8372. See page 2A for more info.

Added option for round DIN power socket. Copied from ReAmiga board.

Resistor packs changed for individual SMD resistors.

Replaced EMF filters for external ports with resistors, capacitors, and ferrite beads. Copied from A1200 schematics.

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CREDITS

First credit for Commodore.
A500+ (rev 8) For bulk of circuitry
A500 (rev 6) Extra schematics for Agnus and RAM (pages2a & 3)
AMIGA 1200 Schematics for EMF filtering using SMD components.

IN NO PARTICULAR ORDER:

Component Search Enging (Samacsys) for many footprints and symbols
https://componentsearchengine.com/

RGBtoHDMI Project for the Denise board (page 4A)
https://github.com/hoglet67/RGBtoHDMI
Amiga Buffered VGA adapter for VGA output
https://github.com/daleking/Amiga_to_VGA_Buffered

ReAmiga 1200 for:
Round and Square DIN plug
http://www.reamiga.info/?page_id=38

PAGE 1

Issued for Comment
Red Keg Technologies
Sheet: /
File: SMD500.sch
Title: SMD 500+
Size: A3 | Date: 2021-03-20 | **Rev: 0.20 DRAFT**
KiCad E.D.A. kicad 5.1.4+dfsg1-1bpo10+1 | Id: 1/12

Kicad is somewhat retarded with
the way it handles multiple sheets...

U1A
68000D

U12A
SN74LS244DW

U10A
SN74LS244DW

U13A
SN74LS373DW

U11A
SN74LS373DW

U5A
5719_Gary
CONTROL FUNCTIONS

U2.1A
8375_FatAgnus2MB

U37A
SN74LS32DRG4

U37B
SN74LS32DRG4

U33A
SN74F258D

X1A
ACO-28.37516MHz

JP2
J2_OUT

JP195

For Page 2A

14 MHz HACK

PAGE 2

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File: SMD500_p02.sch
Title: SMD 500+

Size: A3	Date: 2021-03-20	**Rev: 0.20 DRAFT**
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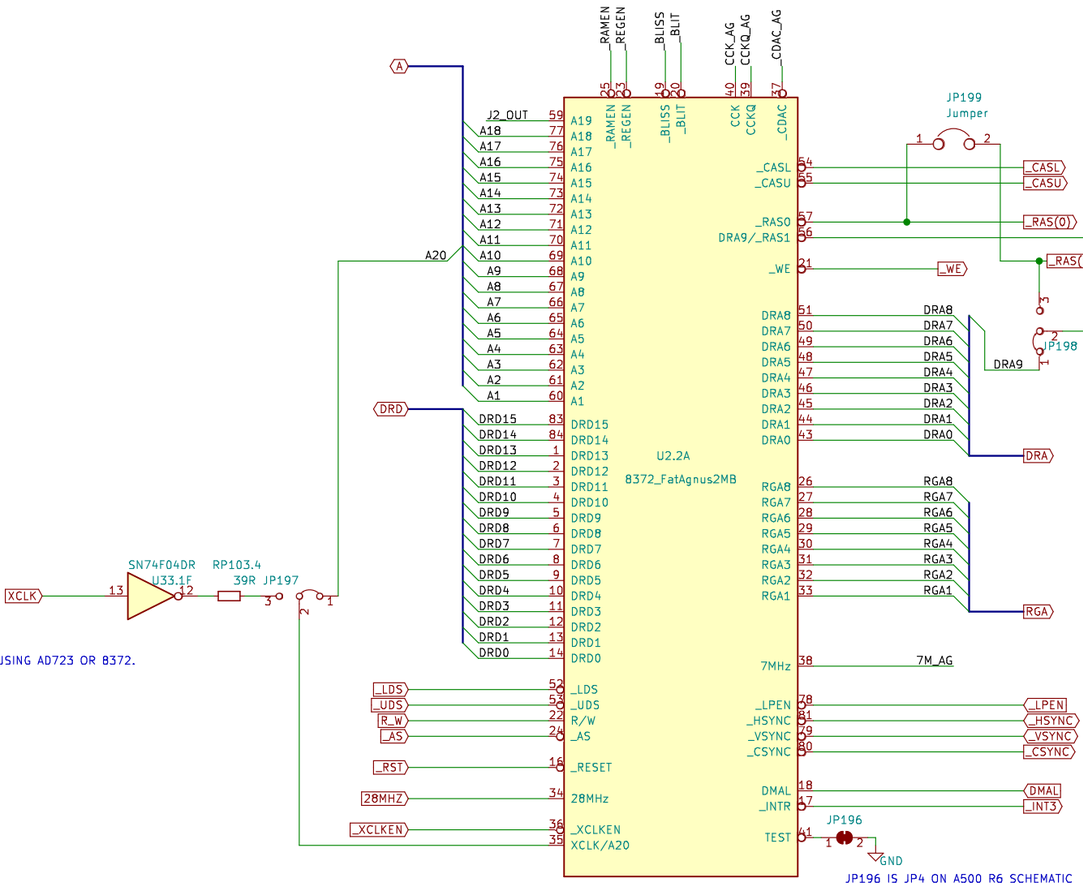


8372 AGNUS
ONLY CONNECT ONE!

AGNUS 8375

NOT ALL 8375 AGNUS ICs ARE THE SAME!
THANKS COMMODORE!
COMMODORE PART NUMBERS:
318069-16 (PAL) or -17 (NTSC)
ARE 1 MB AGNUS AND PIN COMPATIBLE WITH 8370/71/72A
USE IN U2.2 SOCKET.

COMMODORE PART NUMBERS:
318069-18 (PAL) or 318069-19 (NTSC)
ARE 2 MB AGNUS AND PIN COMPATIBLE WITH 8372AB/B
USE IN U2.2 SOCKET.

COMMODORE PART NUMBERS:
390544-01 (PAL) & -02 (NTSC)
318069-10 (PAL) & -11 (NTSC)
ARE 2 MB AGNUS AND NOT PIN COMPATIBLE WITH OLDER SERIES.
USE IN U2.1 SOCKET.

INFORMATION FROM THE AMIGA MUSEUM
http://theamigamuseum.com/?s=agnus

JUMPERS

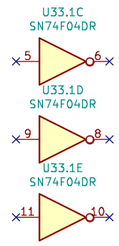
JUMPERS FOR AGNUS IN U2.2
8370/71/72A (1 MB)
JP197 2-3
JP198 2-3
JP199 OPEN

8372AB/B (2 MB)
JP197 1-2
JP198 1-2
JP199 CLOSED
(DIRECTLY ADDRESSES 2 MB CHIP RAM)

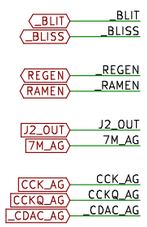
NB JP197 EQUIVALENT TO PART OF JP5 ON REV 6 BOARD

JP195 FOR 14 MHz CPU HACK
1-2 = 7 MHz
2-3 = 14 MHz

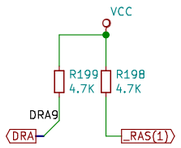
SPARES



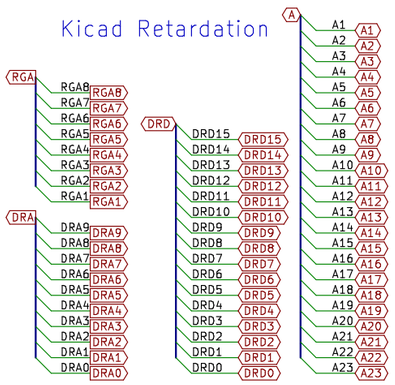
From Sheet 2



Pull-Ups For JP198



Kicad Retardation



PAGE 2A

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CHIP RAM

32 bit SIMM CONNECTED AS 2x 16 BIT BANKS

A500+ MOTHERBOARD CHIP RAM:
_BCASL(0) CONNECTED TO SIMM _CAS0.
CONTROLS SIMM DQ0-7 FOR LINES DRD0-7.
EQUIVALENT TO U16, U17, U20, U21 ON A500+ MOTHERBOARD

_BCASU(0) CONNECTED TO SIMM _CAS1.
CONTROLS SIMM DQ8-15 FOR LINES DRD8-15
EQUIVALENT TO U18, U19, U22, U23 ON A500+ MOTHERBOARD

A500+ TRAPDOOR CHIP RAM:
_BCASL(1) CONNECTED TO SIMM _CAS2.
CONTROLS SIMM DQ16-23 FOR LINES DRD0-7.
EQUIVALENT TO U1, U2, U5, U5 ON A501+ EXPANSION BOARD

_BCASU(1) CONNECTED TO SIMM _CAS3.
CONTROLS SIMM DQ24-31 FOR LINES DRD8-15.
EQUIVALENT TO U3, U4, U7, U8 ON A501+ EXPANSION BOARD.

Amiga _BRAS0 connected to SIMM RAS0 VIA JP396 & _RAS2 VIA JP398
Amiga _BRAS1 connected to SIMM RAS1 VIA JP397 & _RAS3 VIA JP399

Kicad Retardation

PAGE 3

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Size: A3	Date: 2021-03-20
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	Id: 11/12

VIDEO

U4A
8373_DeniseECS

U40A
SN74HCT245DWR

U41A
SN74HCT245DWR

HY1A
VIDEOHYBRID

JP11
SolderJumper_3_Bridged1-2

CN9
DB23
RGB

VIDEO POWER

U4B
8373_DeniseECS

U40B
SN74HCT245DWR

U41B
SN74HCT245DWR

HY1B
VIDEOHYBRID

PINS 2 & 21 OF HY1 CONNECTED INTERNALLY

AUDIO POWER

U14E
TL084HIPWR

U3B
8364_Paula

AUDIO

Kicad Retardation

Video Output Lines to Page 4a
For Extra Video Features

PAGE 4

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Sheet: /Page 4/
File: SMD500_p04.sch
Title: SMD 500+
Size: A3 | Date: 2021-03-20 | **Rev: 0.20 DRAFT**
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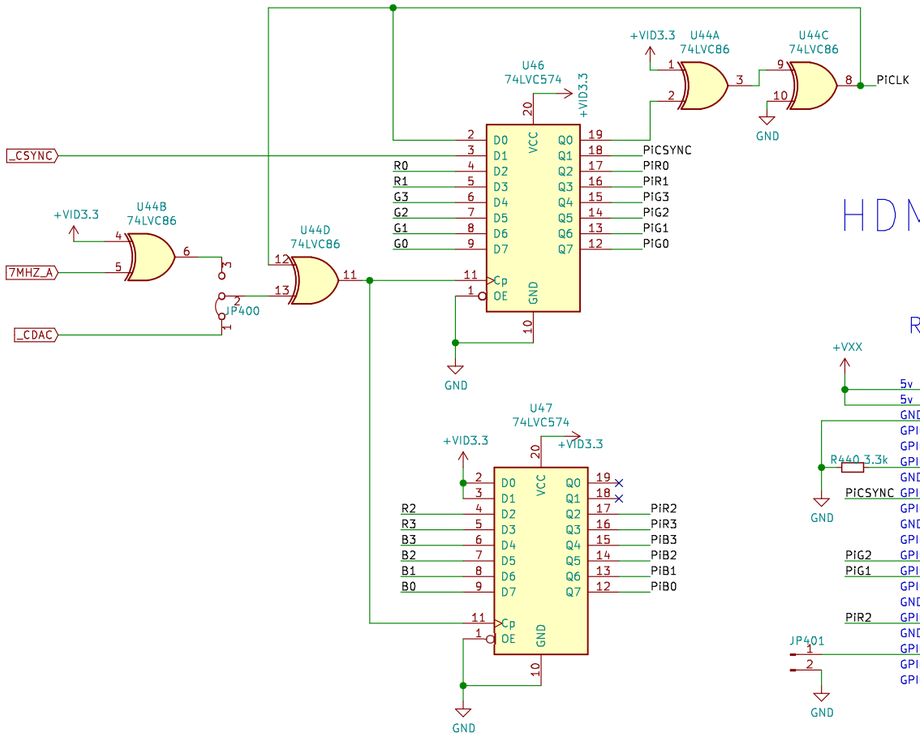
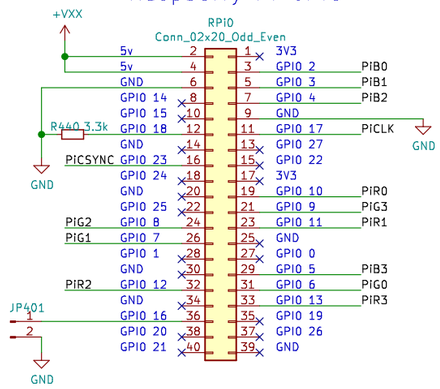
3.3V Buffers

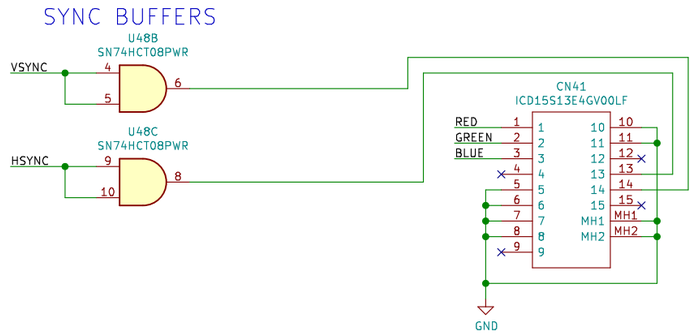


HDMI OUTPUT

Raspberry Pi GPIO



SYNC BUFFERS

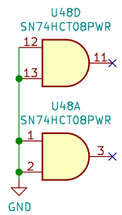


VGA/15KHz (NO SCANDOUBLER!)

SYMBOL & SIGNAL CONVERSION

RGBtoHDMI	SMD500+	Buffered VGA	SMD500+
CSYNC	_CSYNC	V_Sync	VSYNC
CDAC	_CDAC	H_Sync	HSYNC
7MHZ	7MHZ_A	VCC	+VID
+5V	+VXX	U1	U48
+3.3V	+VID3.3	C1	C48
U1/C1	U44/C44	J2	CN40
U2/C2	U46/C46		
U3/C3	U47/C47		
U4/C4	U43/C43		
R1	R440		
JP1	JP400		
JButton1	JP401		
JRaspberryPiZero1	RPi0		

SPARES



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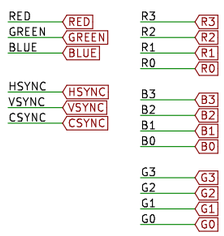
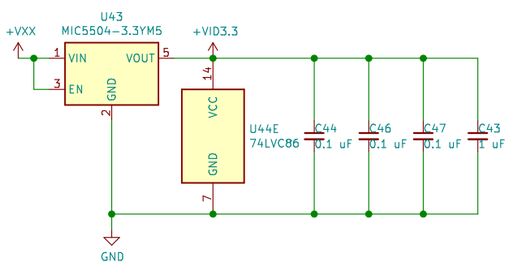
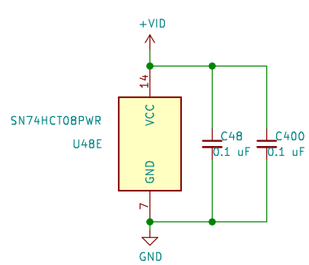


3.3V Power



5V Power



PAGE 4A
ADDITIONAL
VIDEO OUTPUTS

CREDITS

HDMI OUTPUT IS DENISE BOARD V2 FROM
RGBtoHDMI PROJECT
https://github.com/hoglet67/RGBtoHDMI

BUFFERED VGA BASED ON
AMIGA BUFFERED VGA ADAPTOR
https://github.com/daleking/Amiga_to_VGA_Buffered

VIDEO COLOURS BUFFERED WITH PNP TRANSISTORS
COPIED FROM REAMIGA 1200
http://www.reamiga.info/?page_id=38

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Size: A3	Date: 2021-03-20	**Rev: 0.20 DRAFT**
KiCad E.D.A. kicad 5.1.4+dfsg1-1bpo10+1		Id: 9/12

Kicad Retardation

MOUSE/ JOYSTICK PORTS

Use headers with RS Pro 182-8919

CN1.1

LEFT JOY CN1

CN2.1

RIGHT JOY CN2

U15A
SN74LS157DR

CN1.2 & CN2.2 INTERNAL MOUSE AND JOYSTICK HEADERS
ADDED FOR EXPERIMENTATION

AUDIO FILTERS

U3A
8364_Paula

Continue checking this sheet

U14C TL084HIPWR

U14D TL084HIPWR

U14B TL084HIPWR

U14A TL084HIPWR

Q331 PMBF4391

Q321 PMBF4391

U38A MAX1488ECSD+

Q301 MMBT3906-TP

JP10.1 SolderJumper_3_Bridged12

JP10.2 SolderJumper_2_Bridged

CN3 PJRAN1X1U03AUX(RED) — RIGHT AUDIO

CN4 PJRAN1X1U02AUX(WHITE) — LEFT AUDIO

PAGE 5

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Size: A3	Date: 2021-03-20	**Rev: 0.20 DRAFT**
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PARALLEL PORT

U7A
8520_CIA

U8A
8520_CIA

RS232

RS232 DECOUPLING

PAGE6

Kicad Retardation

Use header with RS Pro 182-8919

HEADER	SIGNAL	AMIGA
1	DCD	8
2	RXD	3
3	TXD	2
4	DTR	20
5	GND	7
6	DSR	6
7	RTS	4
8	CTS	5
9	RI	22

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Red Keg Technologies
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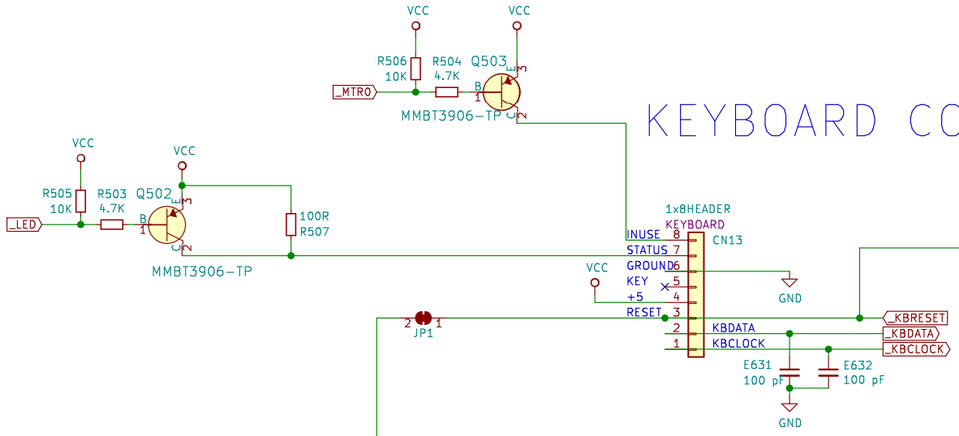
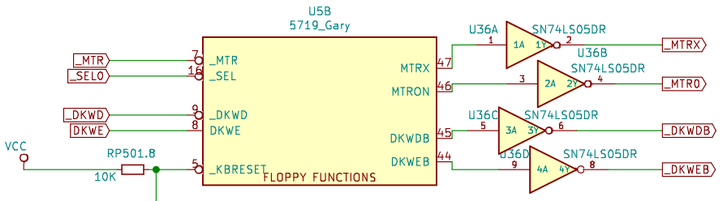
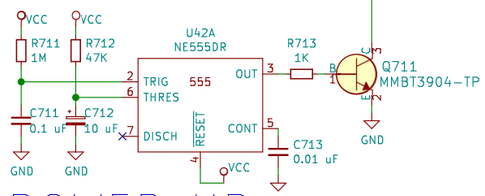
Title: SMD 500+
Size: A3 | Date: 2021-03-20 | **Rev: 0.20 DRAFT**
KiCad E.D.A. kicad 5.1.4+dfsg1-1bpo10+1 | Id: 4/12

KEYBOARD CONNECTOR

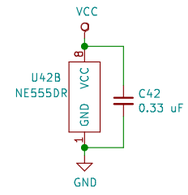




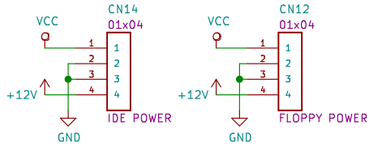
POWER UP RESET



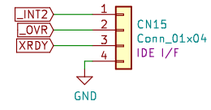
DECOUPLING



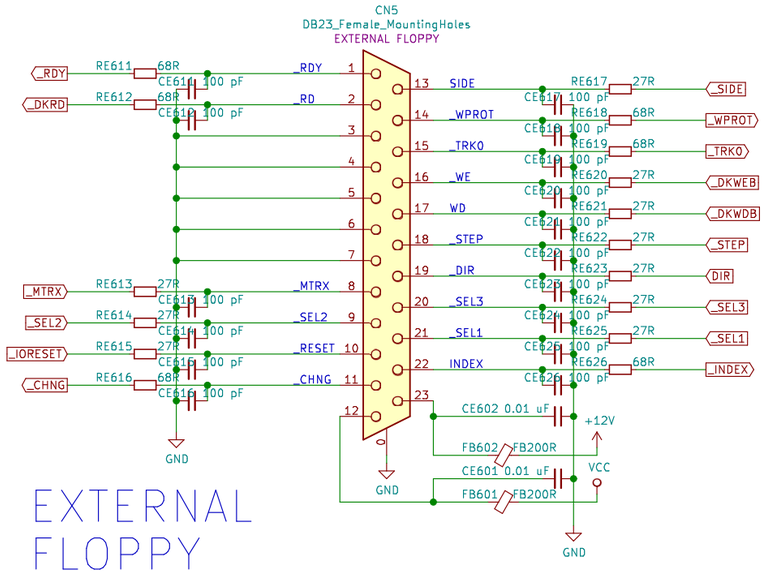
DRIVE POWER



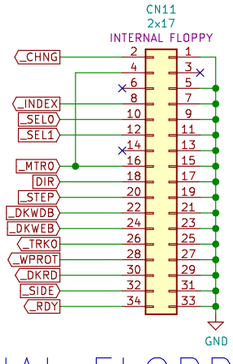
IDE I/F



EXTERNAL FLOPPY



INTERNAL FLOPPY



PAGE 7

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Red Keg Technologies

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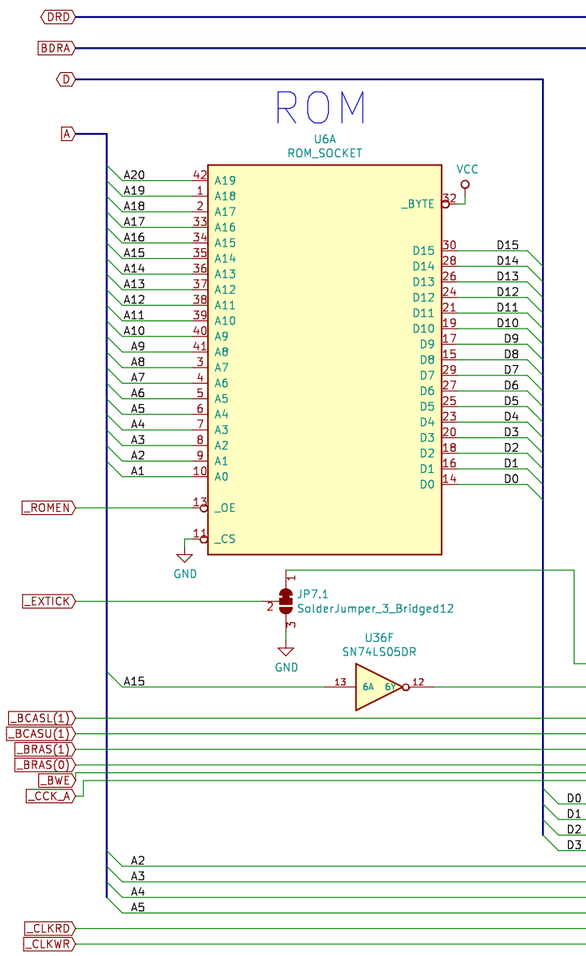
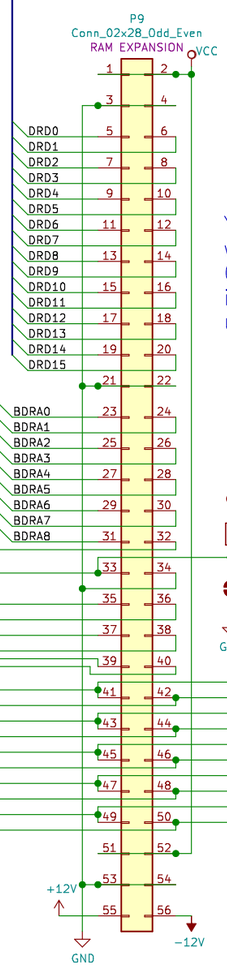
ROM

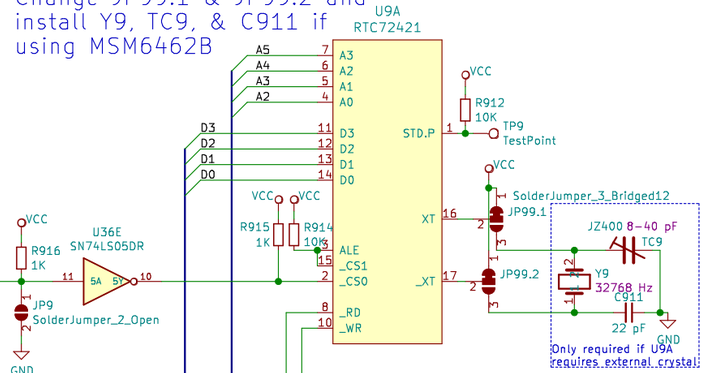


MEMORY EXPANSION

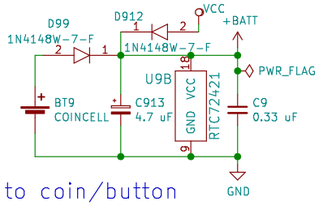


Y9, TC9, C911 not required with RTC72421.
Change JP99.1 & JP99.2 and install Y9, TC9, & C911 if using MSM6462B

REAL TIME CLOCK

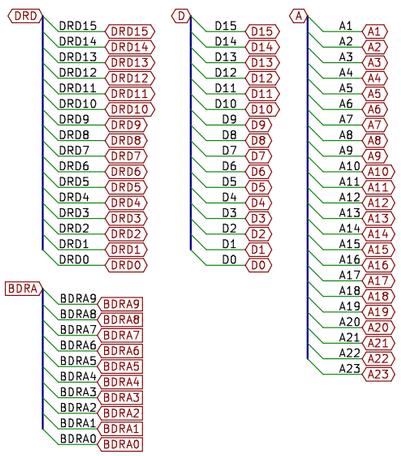


RTC POWER



BT9 changed to coin/button cell.
Removed charging circuit and added D99 to prevent charging.

Kicad Retardation



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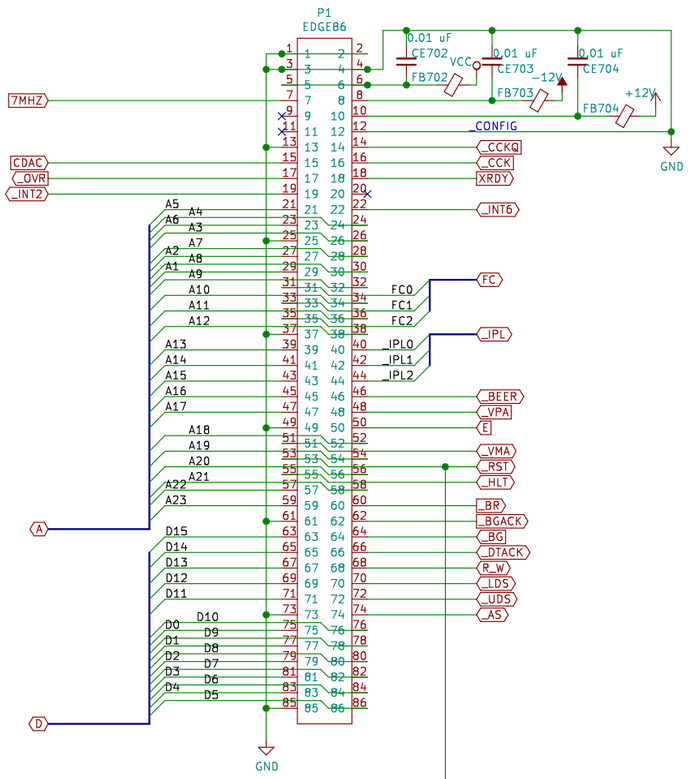
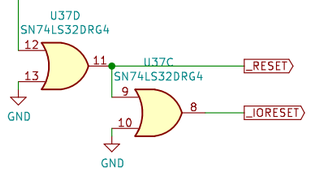
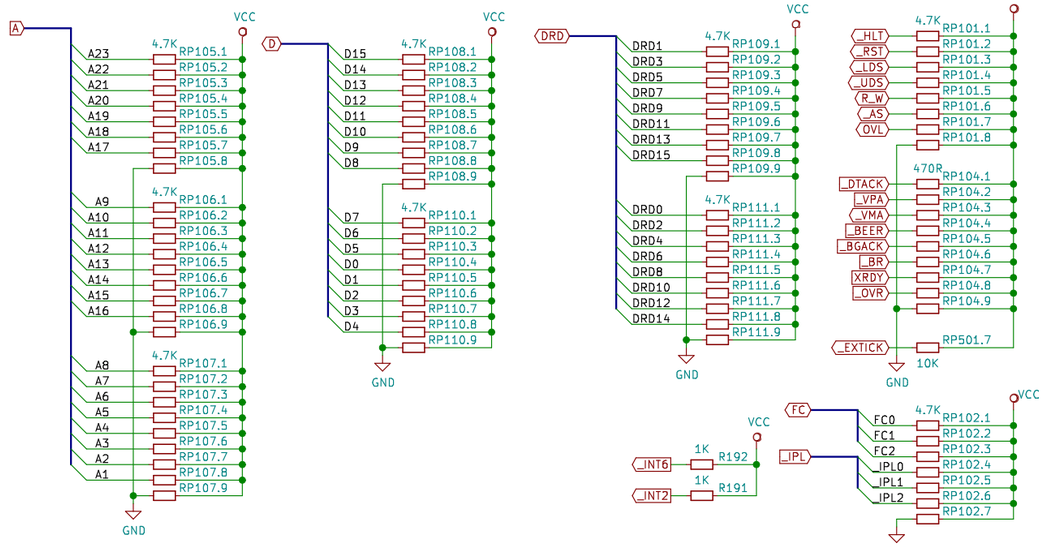
EXPANSION BUS





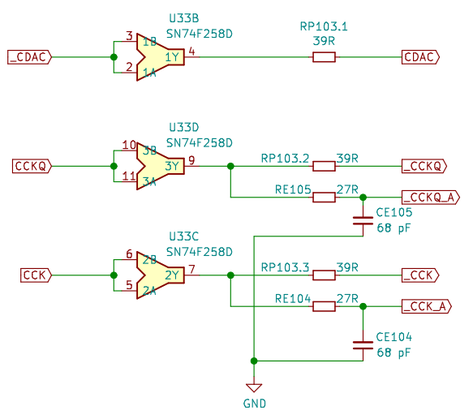
BUFFERED RESETS

EXPANSION BUS TERMINATION AND PULLUPS

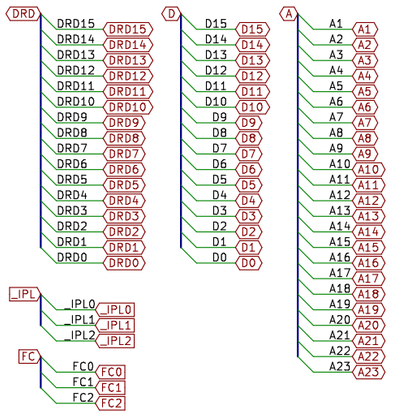


RP105–RP111 ARE OPTIONAL
FOR INTERNAL BUS

CLOCK DISTRO



Kicad Retardation



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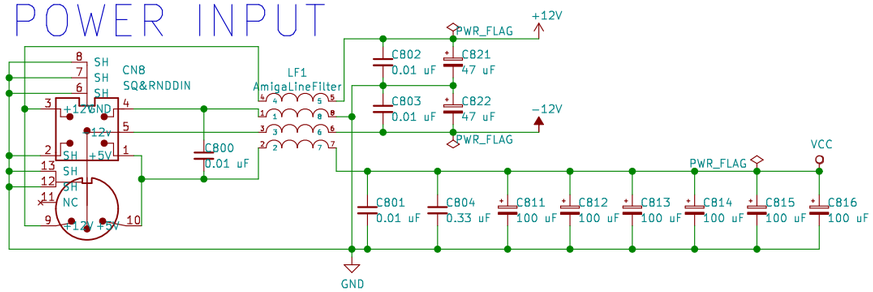
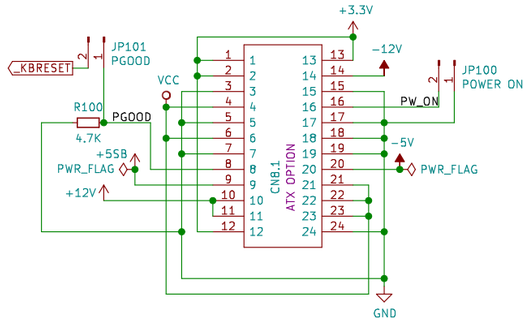
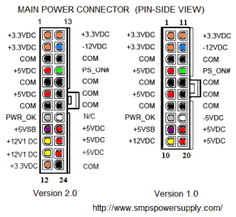
Title: SMD 500+

Size: A3	Date: 2021-03-20	**Rev: 0.20 DRAFT**
KiCad E.D.A. kicad 5.1.4+dfsg1-1bpo10+1		Id: 6/12

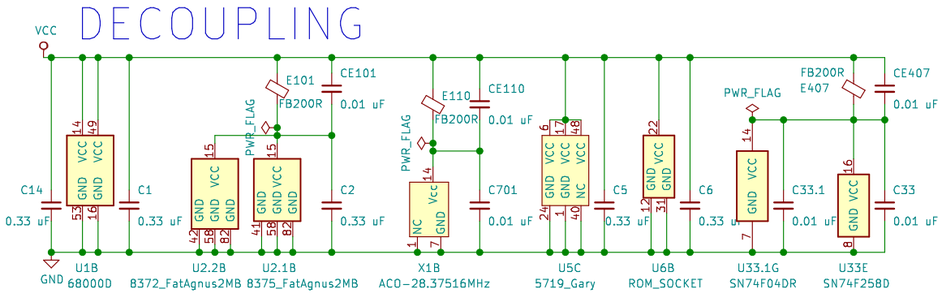
POWER INPUT

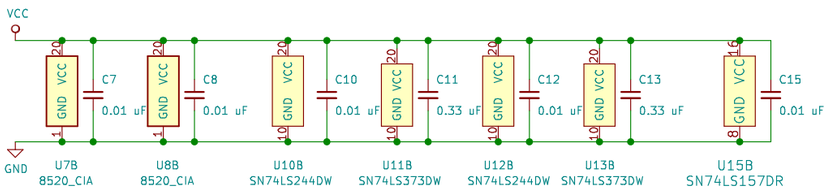


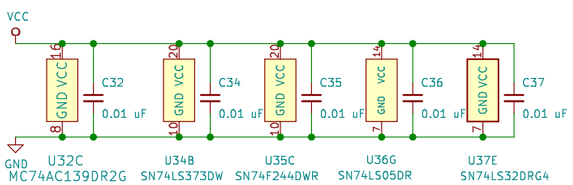




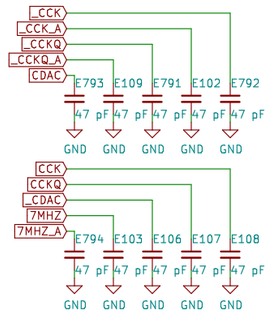
DECOUPLING





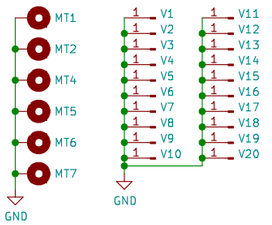


FCC GOOBERS



GROUNDED HOLES, &C.

GROUNDING HOLES FOR CN1, 2, 5, 6, 7, 9 ON CONNECTOR



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File: SMD500_p10.sch

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