

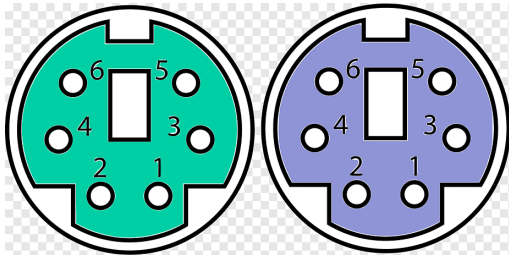
RAVEN **LOGO**

Raven 68060, rev.A1
(c)2024 Anders Granlund

This computer and accompanying software is open source.

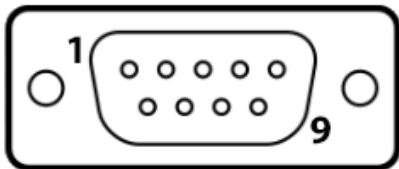
Disclaimer: This computer was designed as a learning experience and for my own enjoyment.
Hardware and software sources are provided as-is and for free but with any functional guarantees or promise of support.

Ports



1 : Mouse data
3 : Mouse GND
4 : Mouse +5V
5 : Mouse clock

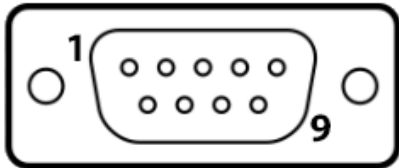
1 : Keyboard data
3 : Keyboard GND
4 : Keyboard +5V
5 : Keyboard clock



1 : JOY0 Up
2 : JOY0 Down
3 : JOY0 Left

4 : JOY0 Right
5 : nc
6 : JOY0 Fire

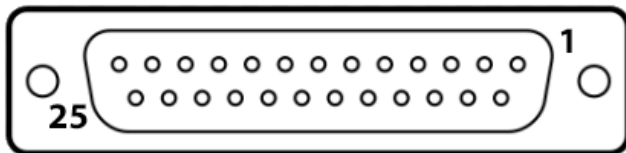
7 : JOY0 +5V
8 : JOY0 GND
9 : nc



1 : JOY1 Up
2 : JOY1 Down
3 : JOY1 Left

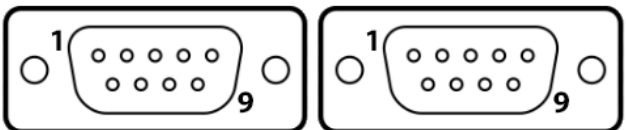
4 : JOY1 Right
5 : nc
6 : JOY1 Fire

7 : JOY1 +5V
8 : JOY1 GND
9 : nc



1 : LPT1 Strobe
11 : LPT1 Busy

2-9 : LPT1 Data
18-25 : LPT1 GND



1 : COM1 DCD
2 : COM1 RX
3 : COM1 TX
4 : COM1 DTR
5 : COM1 GND
6 : COM1 DSR
7 : COM1 RTS
8 : COM1 CTS
9 : COM1 RI

1 : COM2 DCD
2 : COM2 RX
3 : COM2 TX
4 : COM2 DTR
5 : COM2 GND
6 : nc
7 : COM2 RTS
8 : COM2 CTS
9 : COM2 RI

LPT1 : Atari parallel
COM1 : High speed UART
COM2 : Atari serial

Audio ports

Upper : Midi-OUT

Lower : Midi-IN / YM-OUT

The function of the lower port is selected using jumpers J602:J604 on the motherboard.
Non-selected function can be still be used through the exposed header.

YM-OUT is outputted in stereo with channel A=left, B=both, C=right

TRS-Tip : Left

TRS-Ring : Right

TRS-Sleeve : GND

Midi-OUT is outputted on the TRS connector as Midi Standard Type-A

TRS-Tip : MIDI5 (Sink)

TRS-Ring : MIDI4 (Source)

TRS-Sleeve : MIDI2 (Shield)

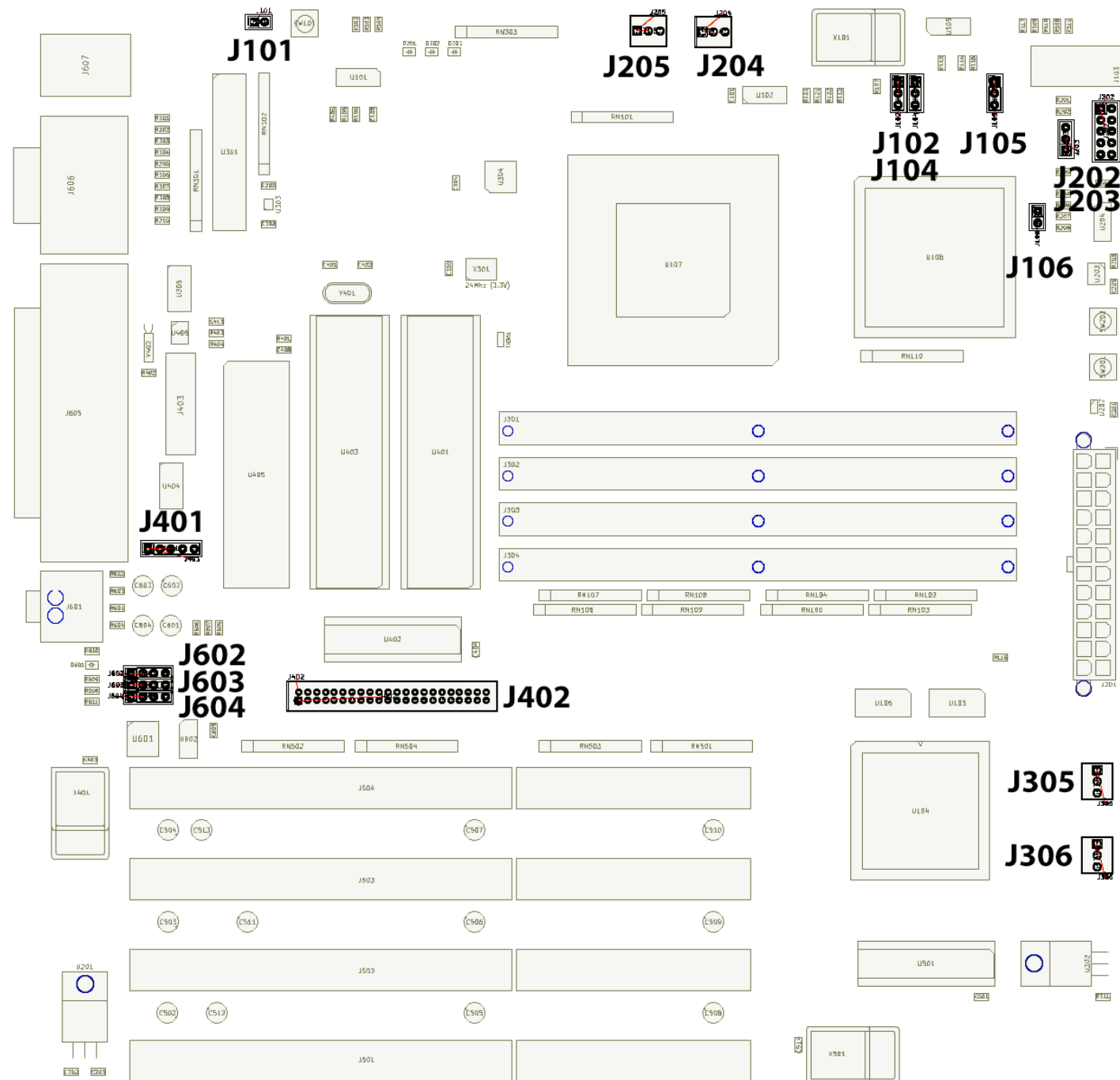
Midi-IN is inputted from the TRS connector as Midi Standard Type-A

TRS-Tip : MIDI5 (Sink)

TRS-Ring : MIDI4 (Source)

TRS-Sleeve : nc

Motherboard connectors and jumpers

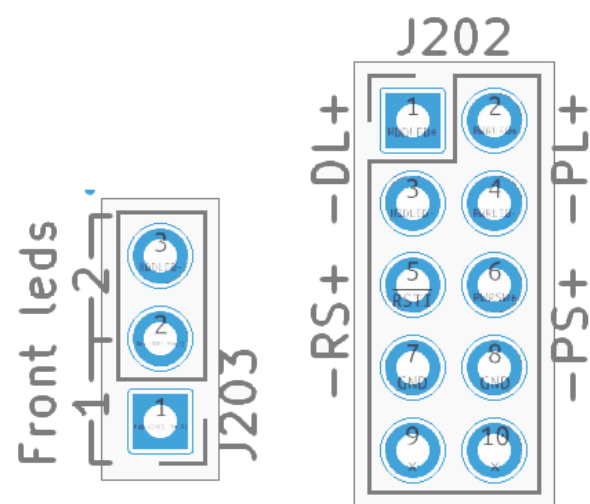


J101 : NMI trigger
 J102,J104 : CPU x1/x2 multiplier selector
 J105 : RAM speed selector (not yet implemented)
 J106 : Reserved
 J202 : Front panel connector
 J203 : Front panel configuration
 J204 : Always on fan +3.3V
 J205 : Always on fan +5V
 J305 : Always on fan +12V
 J306 : Eiffel controlled fan +12V [On:40°C, Off:30°C] (Silkscreen pinout is mislabeled)
 J401 : I2C/GPO expansion connector
 J402 : 44pin IDE interface
 J602,J603,J604 : Lower TRS port feature select.

Connect all pins of either J602 or J604 to the middle J603 using 4 jumpers.

The unused feature can still be used through the unconnected header.

J602=YM-Out, J604=Midi-In



J203 : LED configuration.

1 = Shared Disk and Power LED

2 = Separate Disk and Power LEDs

J202 : Frontpanel connector

1 : DL+ : Disk LED+

2 : PL+ : Power LED+

3 : DL- : Disk LED-

4 : PL- : Power LED-

5 : RS+ : Reset switch+

6 : PS+ : Power switch+

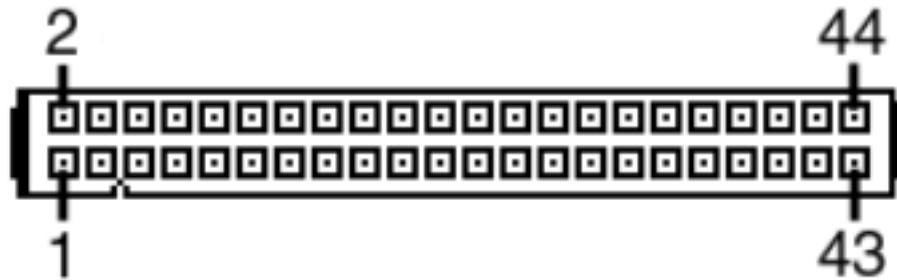
7 : RS- : Reset switch-

8 : RS+ : Power switch-

9 : nc

10 : nc

IDE Interface



The IDE interface is byte swapped little endian like Amiga and PC, but unlike Atari which is normally big endian.

Register access using A2-A4 same as Amiga and Atari

Connector is IDC male with an orientation that assumes the male-pin drive is connected with a cable or suitable adapter.

1 : /Reset		2 : GND
3 : D31		4 : D16
5 : D30		6 : D17
7 : D29		8 : D18
9 : D28		10 : D19
11 : D27		12 : D20
13 : D26		14 : D21
15 : D25		16 : D22
17 : D24		18 : D23
19 : GND		20 : KEY (nc)
21 : DMARQ (nc)		22 : GND
23 : /IOW		24 : GND
25 : /IOR		26 : GND
27 : /RDY		28 : CSEL (gnd)
29 : /DMACK (+5v)		30 : GND
31 : IRQ		32 : /IOCS16 (nc)
33 : A3		34 : /PDIAG (nc)
35 : A2		36 : A4
37 : /CS0		38 : /CS1
39 : /DASP (1ed)		40 : GND
41 : +5V		42 : +5V
43 : GND		44 : GND

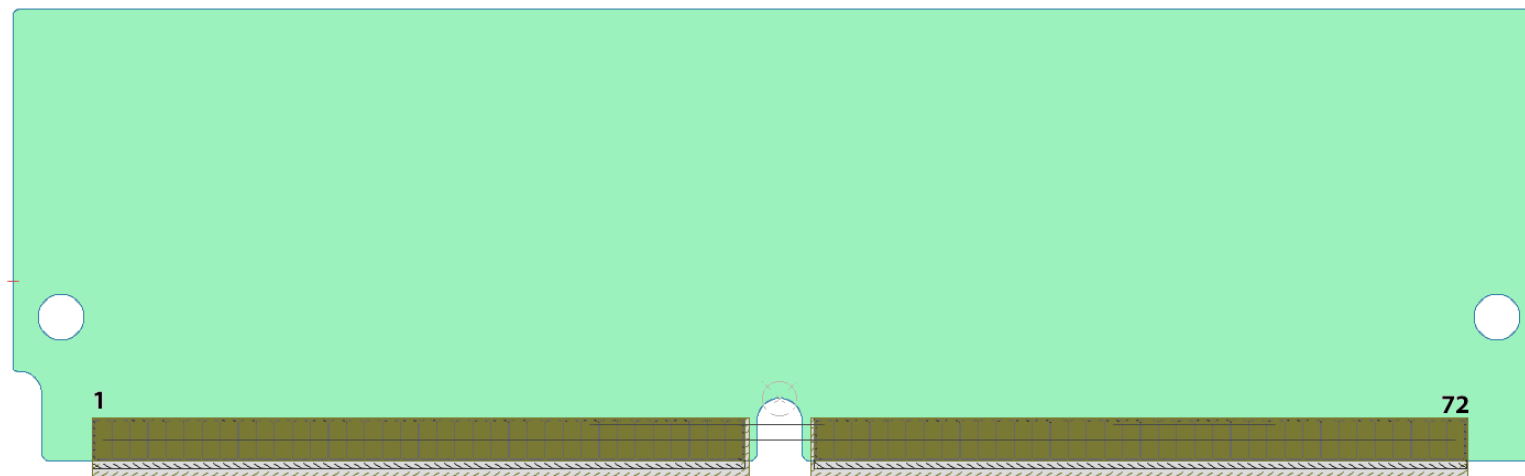
SIMM modules

RAM must be populated from first to last slots. Eg; if you only have one Simm, then it must go in the first (RAM0) slot.
ROM must be place in the fourth (ROM) slot.

This may change in the future.

Eg; a combo ROM+RAM Simm module could be made possible with only software / cpld changes.

All Simms modules regardless of type share the exact same pinout:



1	: +3.3V	47-52	: A21-A16
2-9	: A0-A7	53	: GND
10	: GND	54-61	: A15-A8
11-18	: D31-D24	62	: GND
19	: GND	63-66	: BS0-BS3
20-27	: D23-D16	67	: nc
28	: GND	68	: /OE
29-36	: D15-D8	69	: /WE
37	: GND	70	: nc
38-45	: D7-D0	71	: nc
46	: GND	72	: +3.3V

Todo: 10ns vs 55ns RAM

Expansion slots

todo: ISA interrupts

todo: ISA DMA

todo: LELS wiring

Physical memory map

Raven CPLD can only decodes address bits 31,30,29,25,24,10,9,5 and relies on PMMU to provide an Atari compatible logical memory map.

\$00000000 - \$00FFFFFF : SIMM0

\$01000000 - \$01FFFFFF : SIMM1

\$02000000 - \$02FFFFFF : SIMM2

\$40000000 - \$40FFFFFF : SIMM3

\$20000000 - \$20FFFFFF : UART

\$A0000000 - \$A00001FF : IDE

\$A0000200 - \$A00003FF : MFP2

\$A1000800 - \$A10009FF : YM

\$A1000A00 - \$A1000BFF : MFP1

\$A1000C00 - \$A1000DFF : ACIA emulation

\$80000000 - \$80FFFFFF : ISA RAM

\$81000000 - \$81FFFFFF : ISA IO

\$82000000 - \$82FFFFFF : ISA RAM16 (*)

\$83000000 - \$83FFFFFF : ISA IO16 (*)

(*) Subject to changes, \$82x/\$83x map may be removed in the future.

Logical memory map

\$00000000 - \$00xxxxxx : ST-RAM (1-4MB)

ST-RAM is followed by 1MB bus error

\$00500000 - \$0050FFFF : bios unused

\$00510000 - \$0051FFFF : bios acia emu

\$00520000 - \$0057FFFF : bios stack

\$00580000 - \$005EFFFF : bios bss

\$00600000 - \$007FFFFFFF : bios reserved

\$00E00000 - \$00EFFFFFFF : TOS

\$00F00000 - \$00FFFFFFF : Atari hardware registers

\$01000000 - \$03FFFFFFF : TT-RAM (48MB)

\$04000000 - \$040FFFFFFF : bus error

\$41000000 - \$41FFFFFFF : ST-Emulation

\$FF000000 - \$FFFFFFFFF : 24bit mirror

// todo: ISA bus

Hardware Interrupts

Autovector interrupts

VBR+\$64 : IRQ1 : –
VBR+\$68 : IRQ2 : –
VBR+\$6C : IRQ3 : –
VBR+\$70 : IRQ4 : –
VBR+\$74 : IRQ5 : UART
VBR+\$78 : IRQ6 : MFP1+MFP2
VBR+\$7C : IRQ7 : NMI

Vectored interrupts

VBR+\$100 : MFP1 : LPT1 Busy	VBR+\$140 : MFP2 : ISA 2/9
VBR+\$104 : MFP1 : COM2 CarrierDetect	VBR+\$144 : MFP2 : ISA 3
VBR+\$108 : MFP1 : COM2 ClearToSend	VBR+\$148 : MFP2 : ISA 4
VBR+\$10C : MFP1 : <masked>	VBR+\$14C : MFP2 : ISA 5
VBR+\$110 : MFP1 : TimerD	VBR+\$150 : MFP2 : TimerD
VBR+\$114 : MFP1 : TimerC	VBR+\$154 : MFP2 : TimerC
VBR+\$118 : MFP1 : UART	VBR+\$158 : MFP2 : ISA 7
VBR+\$11C : MFP1 : HDD	VBR+\$15C : MFP2 : ISA 10
VBR+\$120 : MFP1 : TimerB	VBR+\$160 : MFP2 : TimerB
VBR+\$124 : MFP1 : COM2 TxError	VBR+\$164 : MFP2 : Midi TxError
VBR+\$128 : MFP1 : COM2 TxBufferEmpty	VBR+\$168 : MFP2 : Midi TxBufferEmpty
VBR+\$12C : MFP1 : COM2 RxError	VBR+\$16C : MFP2 : Midi RxError
VBR+\$130 : MFP1 : COM2 RxBufferFull	VBR+\$170 : MFP2 : Midi RxBufferFull
VBR+\$134 : MFP1 : TimerA	VBR+\$174 : MFP2 : TimerA
VBR+\$138 : MFP1 : COM2 Ring	VBR+\$178 : MFP2 : ISA 11
VBR+\$13C : MFP1 : <masked>	VBR+\$17C : MFP2 : ISA 14

Logical Interrupts

Raven Bios moves the VBR to get first dibs on all interrupts.

It normally jumps directly to the equivalent vector at base \$0 but it can use this feature to hide or emulate interrupts for compatibility.

This works because all, or most, Atari software assumes vectors start at \$0 without checking VBR.

\$70 : IRQ4 : VBL emulation (from MFP2:TimerB)

\$7C : IRQ7 : intercepted and will never trigger (used by bios)

\$10C : MFP1 : intercepted and will never trigger (used for i2c)

\$118 : MFP1 : ACIA emulation

\$13C : MFP1 : intercepted and will never trigger (used for i2c)

Debug monitor

Enter debug monitor by pressing NMI button SW101 or closing jumper J101.

The default monitor connection is COM1, 750000 baud, 8 data bits, no parity, 1 stop bit with CTS/RTS flow control.

Commands:

Todo:

- ATF1508AS / ATV22V10C / Eiffel programming
- Hard disk setup
- NOVA driver
- ISA_BIOS
- ISA programming example
- Ethernet driver
- GUS driver
- I2C information and programming
- J402 Expansion header
- J105 RAM speed select

Resources

Raven: <https://github.com/agranlund/raven>

ST Emulator: <https://github.com/agranlund/castaway>

Eiffel: <http://didier.mequignon.free.fr/eiffel-e.htm>

NOVA: <https://silicon-heaven.org/atari/nova>

