

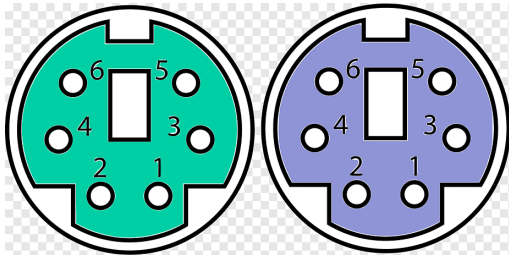
**RAVEN** **LOGO**

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

This computer and accompanying software is open source.

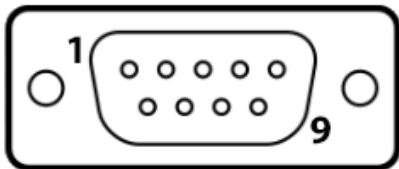
Disclaimer: This computer was designed as a learning experience and for my own enjoyment.  
Hardware and software sources are provided as-is and for free but with any functional guarantees or promise of support.

# Ports



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

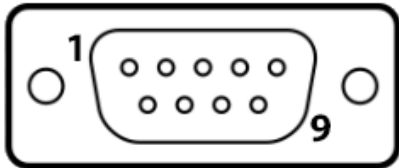
1 : Keyboard data  
3 : Keyboard GND  
4 : Keyboard +5V  
5 : Keyboard clock



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

4 : JOY0 Right  
5 : nc  
6 : JOY0 Fire

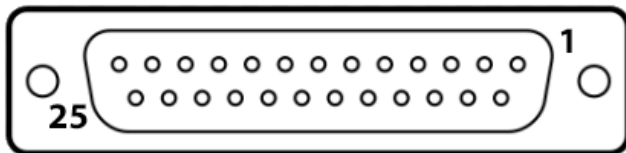
7 : JOY0 +5V  
8 : JOY0 GND  
9 : nc



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

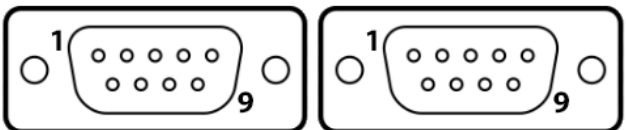
4 : JOY1 Right  
5 : nc  
6 : JOY1 Fire

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)

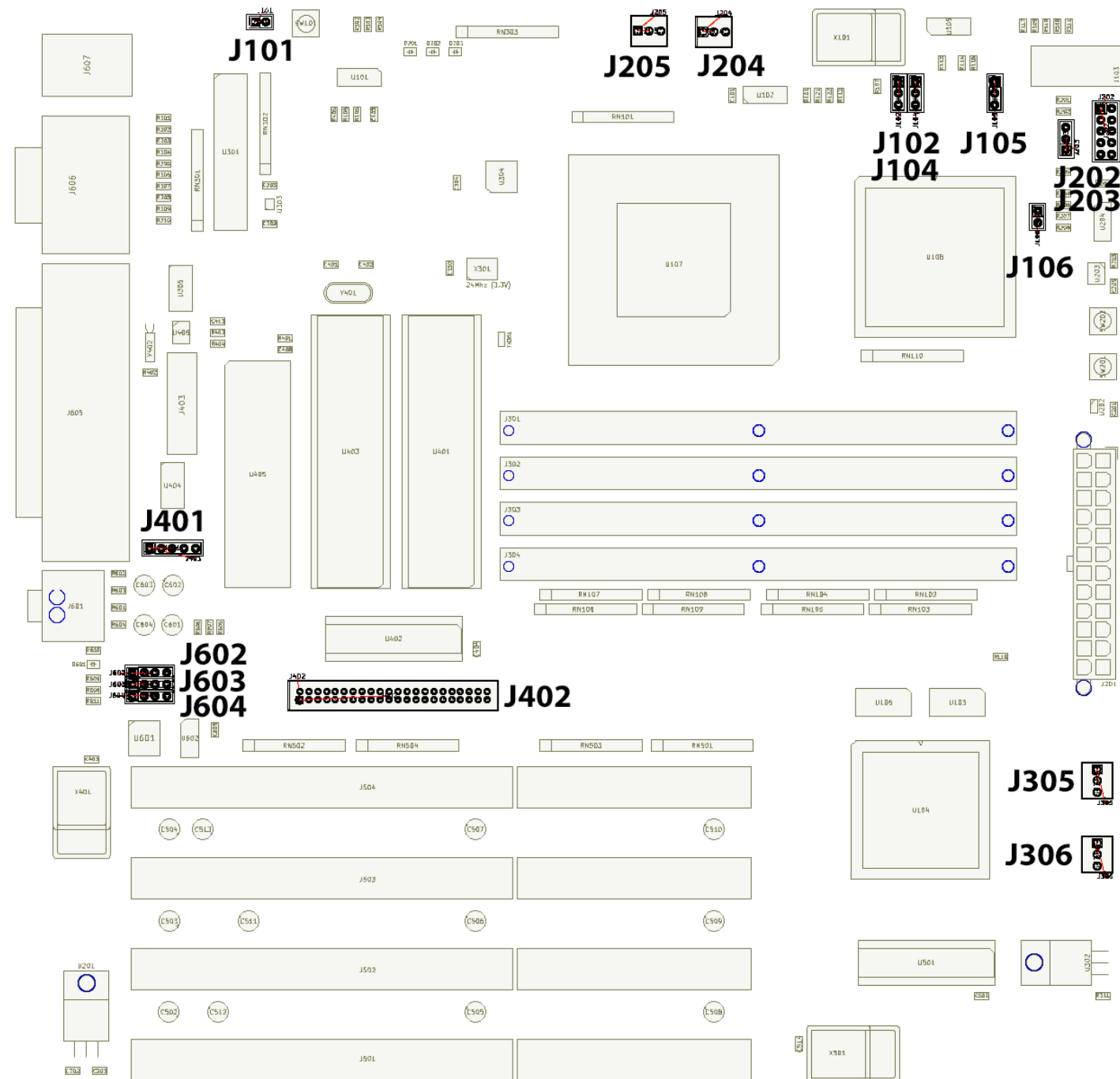
Midi-IN is inputted from the TRS connector as Midi Standard Type-A

TRS-Tip : MIDI5 (Sink)

TRS-Ring : MIDI4 (Source)

TRS-Sleeve : nc

# Motherboard connectors and jumpers

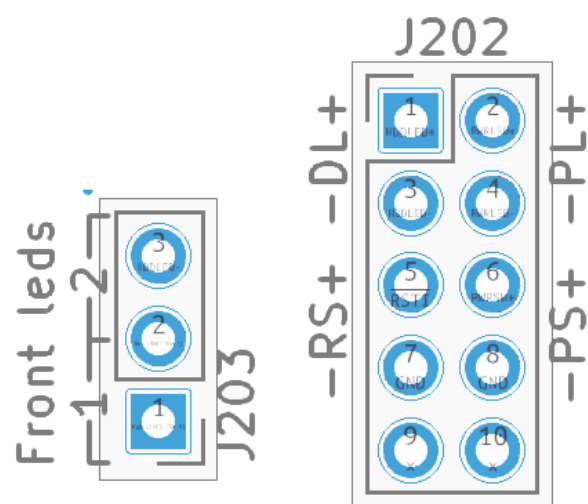


J101 : NMI trigger  
 J102,J104 : CPU x1/x2 multiplier selector  
 J105 : RAM speed selector (not yet implemented)  
 J106 : Reserved  
 J202 : Front panel connector  
 J203 : Front panel configuration  
 J204 : Always on fan +3.3V  
 J205 : Always on fan +5V  
 J305 : Always on fan +12V  
 J306 : Eiffel controlled fan +12V (silkscreen pinout 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+

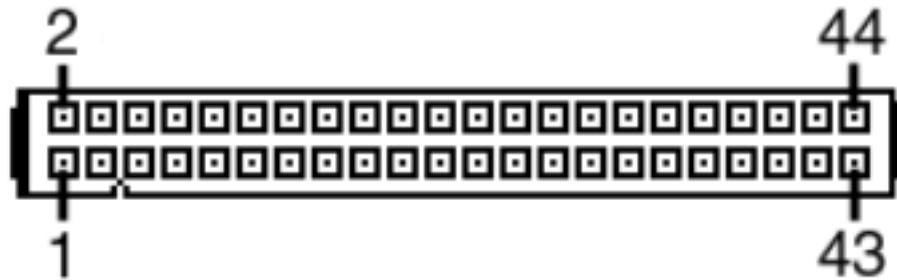
7 : RS- : Reset switch-

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          |

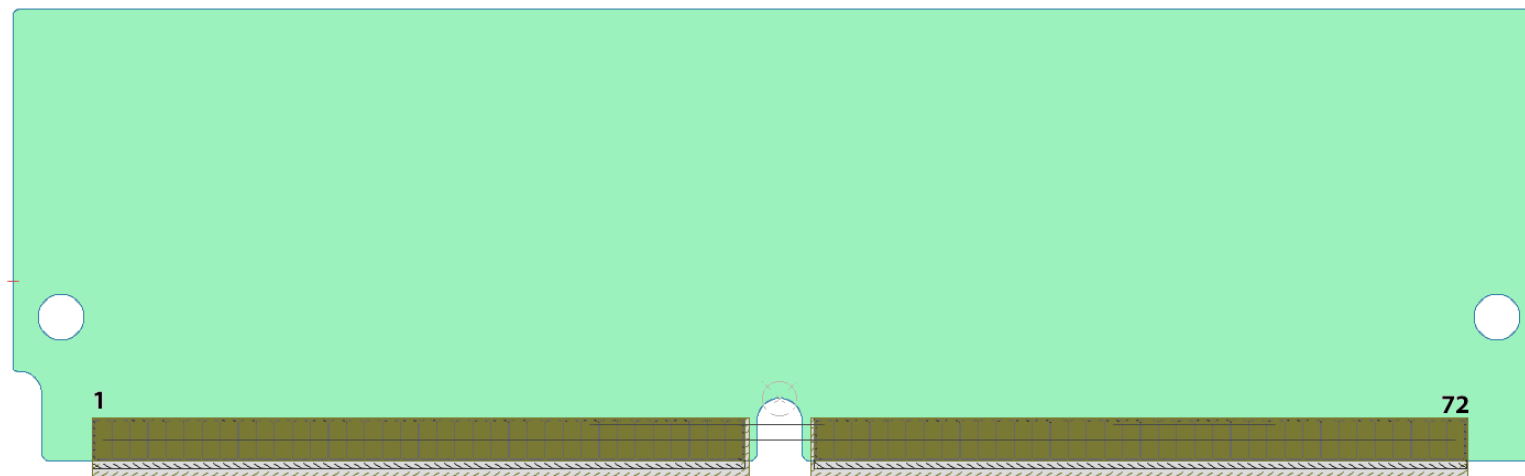
# SIMM modules

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

\$03000000 - \$03FFFFFF : 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

# 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 : Vertical Blank emulation (by 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>

Emutos: <https://github.com/agranlund/emutos/tree/raven>

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

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



