RAVEN OGO

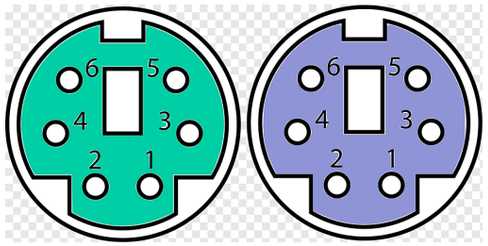
REV.A1

Raven 68060, rev.A1

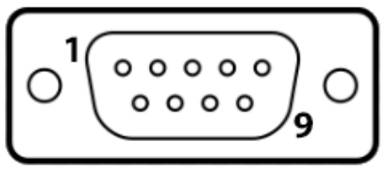
This computer and accompanying software is open source.

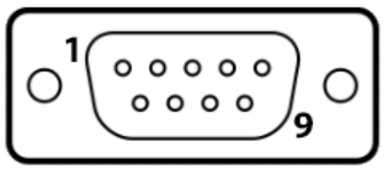
Disclaimer: This computer was designed as a learning experience and for my own enjoyment.
Hardware and software sources are provided as-is and for free but with any functional guarantees or promise of support.

Ports



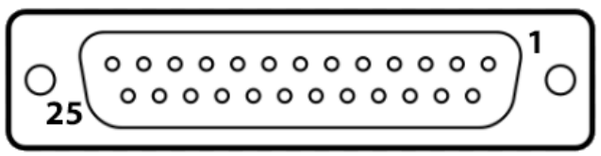

```
1 : Mouse data          1 : Keyboard data
3 : Mouse GND           3 : Keyboard GND
4 : Mouse +5V           4 : Keyboard +5V
5 : Mouse clock         5 : Keyboard clock
```



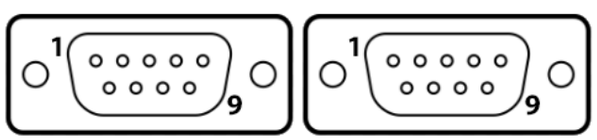



```
1 : JOY0 Up             4 : JOY0 Right          7 : JOY0 +5V
2 : JOY0 Down           5 : nc                  8 : JOY0 GND
3 : JOY0 Left           6 : JOY0 Fire           9 : nc

1 : JOY1 Up             4 : JOY1 Right          7 : JOY1 +5V
2 : JOY1 Down           5 : nc                  8 : JOY1 GND
3 : JOY1 Left           6 : JOY1 Fire           9 : nc
```




```
 1 : LPT1 Strobe        2-9 : LPT1 Data
11 : LPT1 Busy          18-25 : LPT1 GND
```




```
1 : COM1 DCD            1 : COM2 DCD
2 : COM1 RX             2 : COM2 RX
3 : COM1 TX             3 : COM2 TX
4 : COM1 DTR            4 : COM2 DTR
5 : COM1 GND            5 : COM2 GND
6 : COM1 DSR            6 : nc
7 : COM1 RTS            7 : COM2 RTS
8 : COM1 CTS            8 : COM2 CTS
9 : COM1 RI             9 : COM2 RI
```

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

Audio ports

Upper : Midi-OUT
Lower : Midi-IN / YM-OUT

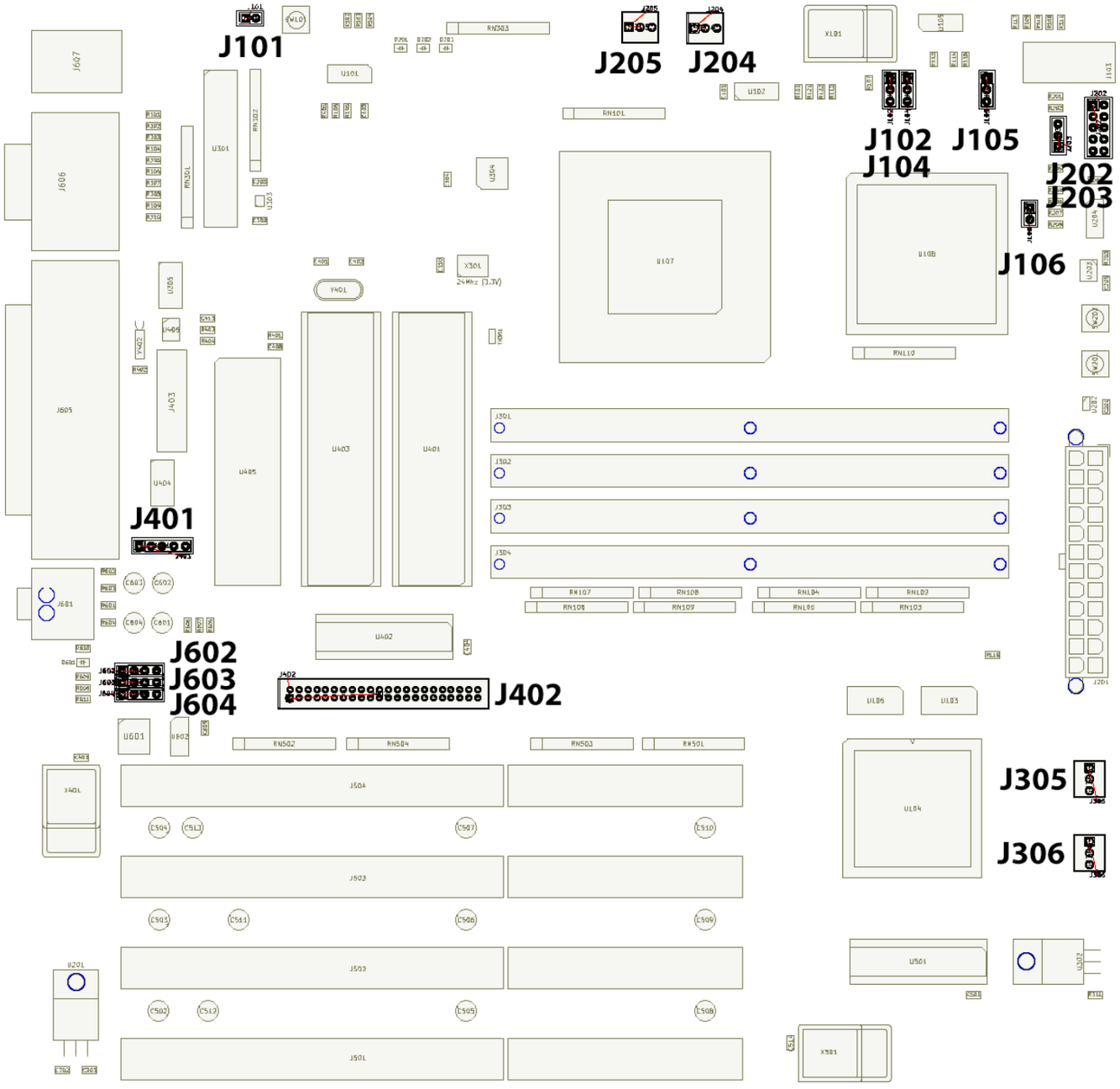
The function of the lower port is selected using jumpers J602:J604 on the motherboard.
Non-selected function can be still be used through the exposed header.

YM-OUT is outputted in stereo with channel A=left, B=both, C=right
TRS-Tip   : Left
TRS-Ring   : Right
TRS-Sleeve : GND

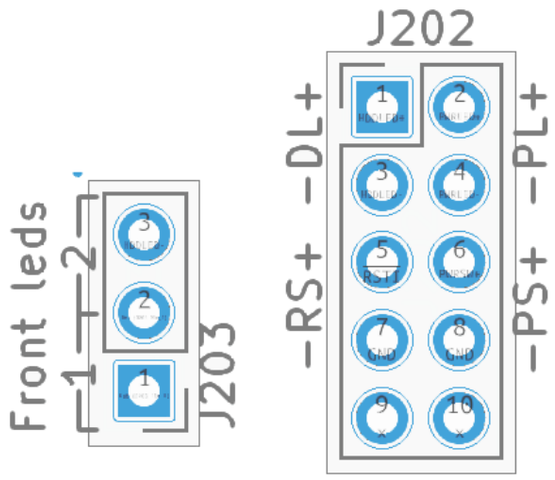
Midi-OUT is outputted on the TRS connector as Midi Standard Type-A
TRS-Tip   : MIDI5 (Sink)
TRS-Ring   : MIDI4 (Source)
TRS-Sleeve : MIDI2 (Shield)

Midi-IN in 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



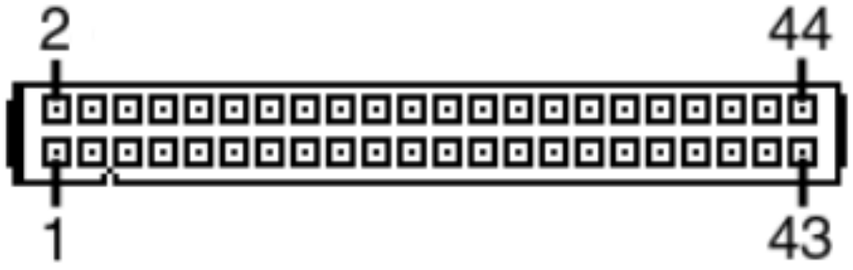
```
J101           : NMI trigger
J102,J104      : CPU x1/x2 multiplier selector
J105           : RAM speed selector (not yet implemented)
J106           : Reserved
J202           : Front panel connector
J203           : Front panel configuration
J204           : Always on fan +3.3V
J205           : Always 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.

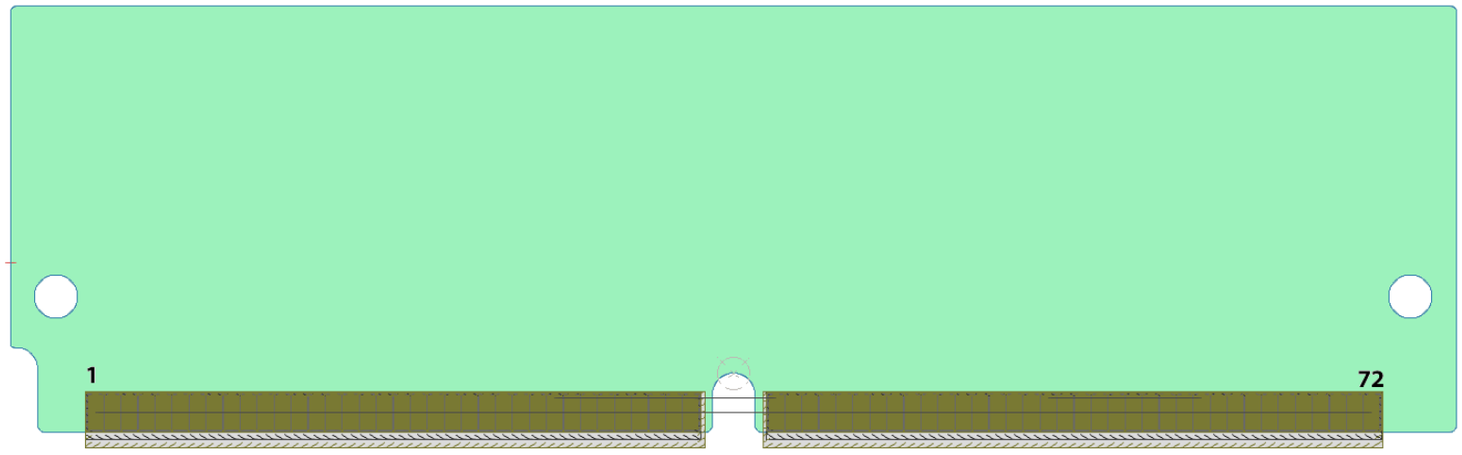
```
 1 : /Reset          2 : GND
 3 : D31             4 : D16
 5 : D30             6 : D17
 7 : D29             8 : D18
 9 : D28            10 : D19
11 : D27            12 : D20
13 : D26            14 : D21
15 : D25            16 : D22
17 : D24            18 : D23
19 : GND            20 : KEY      (nc)
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   (led)  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
2-9    : A0-A7
10     : GND
11-18  : D31-D24
19     : GND
20-27  : D23-D16
28     : GND
29-36  : D15-D8
37     : GND
38-45  : D7-D0
46     : GND
47-52  : A21-A16
53     : GND
54-61  : A15-A8
62     : GND
63-66  : BS0-BS3
67     : nc
68     : /OE
69     : /WE
70     : nc
71     : nc
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 - $810FFFFF : ISA IO
$82000000 - $82FFFFFF : ISA RAM16 (*)
$83000000 - $830FFFFF : 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+$104 : MFP1 : COM2 CarrierDetect
VBR+$108 : MFP1 : COM2 ClearToSend
VBR+$10C : MFP1 : <masked>
VBR+$110 : MFP1 : TimerD
VBR+$114 : MFP1 : TimerC
VBR+$118 : MFP1 : UART
VBR+$11C : MFP1 : HDD
VBR+$120 : MFP1 : TimerB
VBR+$124 : MFP1 : COM2 TxError
VBR+$128 : MFP1 : COM2 TxBufferEmpty
VBR+$12C : MFP1 : COM2 RxError
VBR+$130 : MFP1 : COM2 RxBufferFull
VBR+$134 : MFP1 : TimerA
VBR+$138 : MFP1 : COM2 Ring
VBR+$13C : MFP1 : <masked>
```

```
VBR+$140 : MFP2 : ISA 2/9
VBR+$144 : MFP2 : ISA 3
VBR+$148 : MFP2 : ISA 4
VBR+$14C : MFP2 : ISA 5
VBR+$150 : MFP2 : TimerD
VBR+$154 : MFP2 : TimerC
VBR+$158 : MFP2 : ISA 7
VBR+$15C : MFP2 : ISA 10
VBR+$160 : MFP2 : TimerB
VBR+$164 : MFP2 : Midi TxError
VBR+$168 : MFP2 : Midi TxBufferEmpty
VBR+$16C : MFP2 : Midi RxError
VBR+$170 : MFP2 : Midi RxBufferFull
VBR+$174 : MFP2 : TimerA
VBR+$178 : MFP2 : ISA 11
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
NOVA:	https://silicon-heaven.org/atari/nova