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# MNT ZZ9000AX R-1 Quickstart Manual

Dear MNT Customer,

Thank you for purchasing the MNT ZZ9000AX Audio Expansion for the MNT ZZ9000 multifunction graphics card for Commodore Amiga computers.

# **Package Contents**

- MNT ZZ9000AX Card
- Stainless steel slot bracket
- Bag containing 2× M2 mounting screws and 2× M2 nuts
- Data Cable (complicated cable for connecting ZZ9000AX to ZZ9000)
- Internal Audio Cable (3 leads)
- This manual

#### Warranty

MNT Research covers the warranty to the extent required by law for the unmodified product. Warranty does not cover user supplied firmware or any modifications made to the card, nor does it cover any damage by inserting it into a computer or other user supplied device. Use at your own risk!

# **Declaration of Conformity**

MNT ZZ9000AX may only be operated in a shielding steel enclosure. MNT Research assures that the included product complies with the requirements of the following European Directives and DIN standards:

EMC Directive 2014/30/EU, Low Voltage Directive 2014/35/EU RoHS Directive 2011/65/EU

DIN EN 55022:2011-12 DIN EN 55024:2016-05 DIN EN 61000-6-1:2007 DIN EN 61000-6-3:2007/A1:2011/AC:2012 DIN EN 61000-3-2:2014 DIN EN 61000-3-3:2013

Lukas F. Hartmann, Managing Director MNT Research GmbH March 16th, 2022

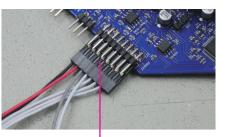


Get updates and source code at: https://mntre.com/zz9000

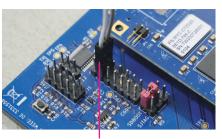
Need help? Write to support@mntre.com

Join our IRC channel #mnt-amiga on irc.libera.chat

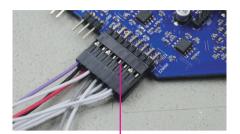
# Hardware Installation: Cables



Connect the first half (8 pins, black/ red/gray/white) of the Data Cable to the bottom row of ZZ9000 header on ZZ9000AX as pictured.



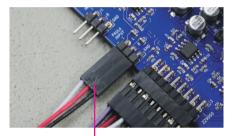
Connect white and gray leads to the second column of the MIO header on ZZ9000. Make sure to skip the first two pins of the header!



Connect the second half (8 pins, only 1 purple and 2 white leads) of Data Cable to the **top row** of ZZ9000 header on ZZ9000AX as pictured.



Connect the second half (7 pins) and the single purple lead of Data Cable to the EXPANSION header on ZZ9000 as pictured. Black and red go near the EXPANSION label.



Connect one end of the Internal Audio Cable to the PAULA INPUT header on ZZ9000AX as pictured.



Connect the other end of the Internal Audio Cable to the AAUD header on ZZ9000 as pictured. The 2 pins close to the AAUD label are left open.

# Hardware Installation

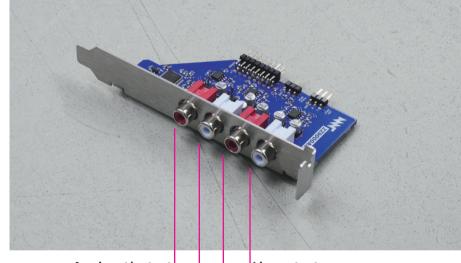
- 1. Remove the protective tape from the steel slot bracket. Use a cloth to wipe away any residue from the bracket.
- 2. Mount the slot bracket to ZZ9000AX with 2× supplied M2 screws and nuts. The nuts go on the bottom side as pictured.



- 3. Connect ZZ9000AX to ZZ9000 using the Data and Internal Audio Cables as described in the "Hardware Installation: Cables" section of this manual.
- 4. Mount ZZ9000AX above ZZ9000 in your Amiga 2000/3000/4000.

#### Software Installation

- 1. Install the AHI system version 4.18. We recommend not to use AHI version 6, as it has significantly higher CPU usage and can cause audio stuttering.



Aux input/output (Right channel)

Line output (Left channel)

Line output

(Right channel)

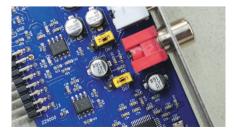
Aux input/output (Left channel)

- AHI on Aminet: http://aminet.net/package/driver/audio/ahiusr\_4.18
- 2. Download and install the ZZ9000AX drivers that are included in the ZZ9000 driver package. Power cycle your Amiga. Then, configure ZZ9000AX in AHI Preferences.
- ZZ9000AX drivers and tools: https://mntre.com/zz9000

# **SigmaDSP**

The audio chip on ZZ9000AX—Analog Devices ADAU1701—features a 28-/56-bit, 50 MIPS SigmaDSP (digital audio processor). The DSP program determines the signal flow to and from ZZ9000AX, including digital mixing and optional effects. The default program (which mixes AHI and Amiga Paula sound) is included in the ZZ9000 firmware, but can be changed with the free SigmaStudio software from Analog Devices and an upcoming tool from MNT Research. Visit the ZZ9000 website for tools and updates.





#### Jumpers and Headers

ZZ9000AX has two IN/OUT headers that you can use to set the direction of the two auxiliary audio channels. When the jumpers are in the IN position, you can input or sample stereo audio through these channels. In the OUT position, the channels can be used as additional outputs.

Please note that if you change the jumpers, you also need to set up the DSP program accordingly. By default, the DSP program is configured for audio input on the auxiliary channels.

Rev: R-1 Id: 1/1 DJ5 A FOUT2R Fourzt 6Г ХФЛДЗЕГК С 81 81 81 81 C18 FOUTIR 1 0 J3 3.3nF 049.9k 0 FOUTIR Secondary output or input selector C11 FOUT1L 1 0 J1 C11 R4 P0UT1L 2 C011L 
 Size: A3
 Date: 2022-03-16

 KiCad E.D.A. eeschema 5.99.0+really5.1.10+dfsg1-1
Primary line out C33 F0012R C33 F0499k C23 F 0012L 49.9k License: CERN OHL-S 2.0 https://mntre.com/zz9000 Engineer: Lukas F. Hartmann MNT Research GmbH Sheet: / File: zz9000ax.sch Title: MNT ZZ9000AX NR ₽ ₽ -→ g R23 604 C16 R7 47uF 604 - R3 R15 C9 47uF C21 47uF C31 47uF 100R26 148 0PA1692 Analog Input Mixer C19 470pF C30 470pF U1B PA1692 U1A 0PA1692 C15 470pF C8 470pF 100 G C42 R31 47uF 100 150pF 0012L 4.75k 4.75k 5 0012L 150F 5 150pF 7 رد 150pf \_\_\_\_\_ 150pf –⊳ gng R22 4.75k XAUDR R6 4.75k AMIR R2 4.75k + + 0PA1692 0.1uF R1 4.75k 0UT1L ∞ ⇒ U1C → OPA1692 GND R21 4.75k 0UT2R R5 4.75k ∞ ⇒ 14c → 0.1uF → 0.1uF → 0.1uF -⊳ g C28 47uF 6ND 6ND + 3V3 1k 1k +1V8 PWR\_FLAG 01 3 H1 H2 Mount Mount +3V3 +3V3 +1VB O H4 Badge O Logo C36 L C37 L 0UT1L 0UT1R 0UT2L 0UT2L +3V3 MP1 0 11 MP1 0 11 MP2 229 MP2 229 MP2 14 MP2 VOUT0 VOUT1 VOUT2 VOUT2 VOUT3 <u>4</u> FILTD Ω ADAU1701 VDRIVE J10 GPJ0 <u>2 SDATA OUT2</u> A SDATA OUT3 GND 47uF: 865080342006 DСИD ВСИD ЬСИD ∀СИD ADDR0 ADDR1/CDATA/WB LCATCH/WP ECLATCH/WP SSDA/COUT SSC/CCLK SCC/CCLK SELFBOOT LETLBOOT CFLTA & GWD CFLTA & GWD ZFLTA JUVD +3V3 PLL\_MODE0 ADC\_RES PLLLF 0SC0 MCLKI U3 C13 C14 10uF 0.1uF R11 18k 18k 18k 18k 14 76ND 18k R16 76ND 18k R16 -⊳ d R33 4.75k R32 INPUT\_LRCLK<u>CD</u> ADAU outputs LRCLK and consumes it as well 3V3 ₽g -⊳ g

