

AI-Delta Technical User Guide

Product Name: AI-Delta

AI-Delta Technical User Guide

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Revision history

Date	Revision	Version	Comments
12/8/2017	A	0	Initial baseline version.
4/5/2018	B	0	Added and "Environmental ranges."
5/11/2018	C	0	Added "Status indicator lights."
8/3/2018	D	0	Added "Network configuration" content for new Discover application.
9/28/2018	D	1	Updated "Status indicator lights."
3/21/2019	D	2	Added missing space between Go to variable and cross reference in "Status indicator lights."
9/10/2019	E	0	Removed references to the Discover application and added "Add an AI-Delta hardware client." Removed redundant "Ports, Protocols, and Services" section.
12/6/2019	F	0	Deleted "Network configuration" and moved "Add an AI-Delta hardware client" to the <i>Voisus Client User Guide</i> .
1/27/2020	G	0	Added "Bottom mountingMounting plate diagram" and "Install the AI-Delta's mounting plate."
10/26/2020	G	1	Updated the restricted rights in the front matter.
9/27/2021	G	2	In "Specifications," added "IEEE 802.3af ,Class 0" to Power Source .
3/9/2022	G	2	Added Port Speed/Duplex requirements to "Specifications."
3/21/2022	G	3	Further clarified the RJ-45 port and cabling requirements.
6/9/2022	G	4	Fixed incorrect pinout in "Audio interface pinout."
7/8/2022	H	0	Removed duplicate information from "Control inputs." Made minor updates to grammar and style.
12/5/2022	I	0	Added P/N: AI-DT-4 and AI-DT-5 information to "Specifications" and "Memory devices." Separated "Status indicator lights" from "Control inputs."
6/13/2023	I	1	Added CE safety warning to "Specifications."
12/12/2023	I	2	Changed slow blue flash to solid green in "Status indicator lights."

Date	Revision	Version	Comments
10/29/2024	J	0	Added potentiometer description, diagram, and warning to "Analog input for resistance." In "Analog inputs," changed 250 k Ω to 1 k Ω in "Analog input circuitry" diagram.

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1.0 ASTi Interface-Delta (AI-Delta)

The AI-Delta is a compact audio and I/O distribution device that connects local or remote operator headsets, speakers, control panels, and other peripherals to the network via Ethernet. The ASTi server routes audio, control, and I/O data to and from each AI-Delta over a local area network (LAN) or wide area network (WAN). Depending on the user's or program's needs, the AI-Delta can connect to a variety of endpoints:

- Simulated radio panels
- Live radios
- Press-to-talk (PTT) devices and headsets
- Microphones
- Powered speakers

Figure 1, "AI-Delta hardware diagram" below shows an example of an AI-Delta network configuration:

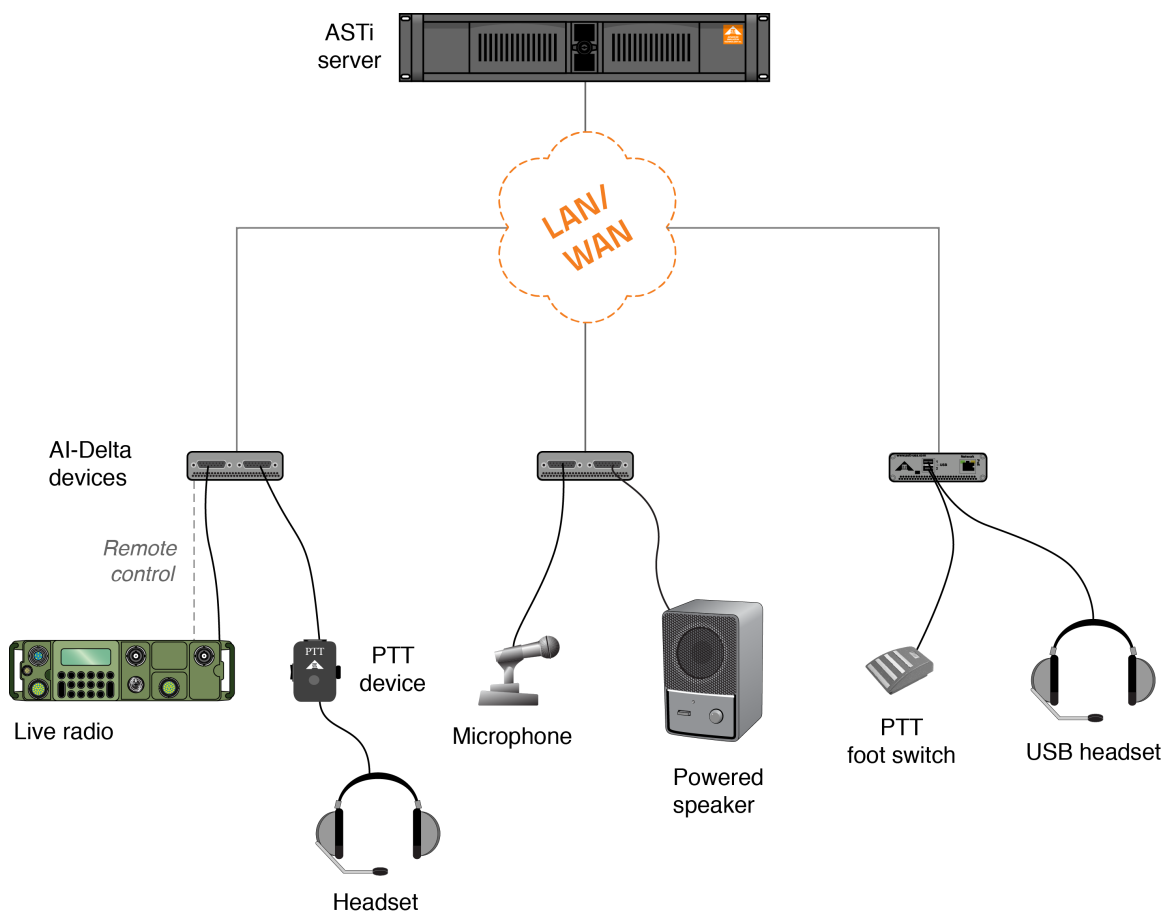


Figure 1: AI-Delta hardware diagram

The AI-Delta includes the following features:

- *Stereo support*: supports stereo operation (i.e., independent left and right output) on a single connector, reducing cabling complexity.
- *Reduced footprint*: takes up little space and fits easily on a desktop.
- *Software-configurable*: includes adjustable preamplifier gains and sidetone for easy, direct connection to a variety of audio or communications systems and peripherals.
- *Routable*: supports IPv4 and IPv6 LAN and WAN topologies.
- *Integrated I/O*: includes configurable digital and analog I/O for direct connection of PTT units, volume controls, switch detection, radio PTT activation, and other control applications.
- *Dual USB ports*: provides ability to connect USB peripherals based on need (e.g., USB headset and foot switch).

2.0 Specifications

The AI-Delta (P/N: AI-DT-1, AI-DT-2, AI-DT-3) includes the following weight, power, and Ethernet specifications:

Compatible With	Voisus (AI-DT-1), SERA (AI-DT-3)
Weight	14 oz.
Power Source	Ethernet port via Power over Ethernet (PoE) IEEE 802.3af, Class 0
Power Consumption	<12.5 W at 56 VDC
Mean Time Between Failure (MTBF)	32,552.67 hours (COTS) 27,150.44 hours (MIL)
Ethernet Port Speed/Duplex	100 BASE-TX, full duplex; RJ-45 port; CAT5e or better cabling requirement

Table 1: AI-Delta (P/N: AI-DT-1, AI-DT-2, AI-DT-3) specifications

The AI-Delta (P/N: AI-DT-4, AI-DT-5) includes the following specifications:

Compatible With	Voisus (AI-DT-4), SERA (AI-DT-5)
Weight	14.5 oz.
Power Source	Ethernet port via Power over Ethernet (PoE) IEEE 802.3af, Class 0
Power Consumption	<12.5 W at 56 VDC
Mean Time Between Failure (MTBF)	988,992.51 hours (COTS) 61,490.14 hours (MIL)
Ethernet Port Speed/Duplex	100 BASE-TX/1000 BASE-T, full duplex; RJ-45 port; CAT5e or better cabling requirement

Table 2: AI-Delta (P/N: AI-DT-4, AI-DT-5) specifications



Caution: This equipment is not suitable for use in locations where children are likely to be present.

On the front panel, the AI-Delta has two DB-15 connectors:

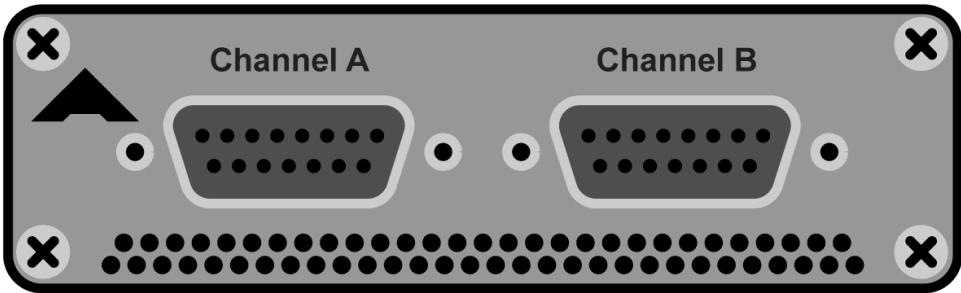


Figure 2: AI-Delta front panel

On the rear panel, the AI-Delta has two USB ports and a Power over Ethernet (PoE) port:

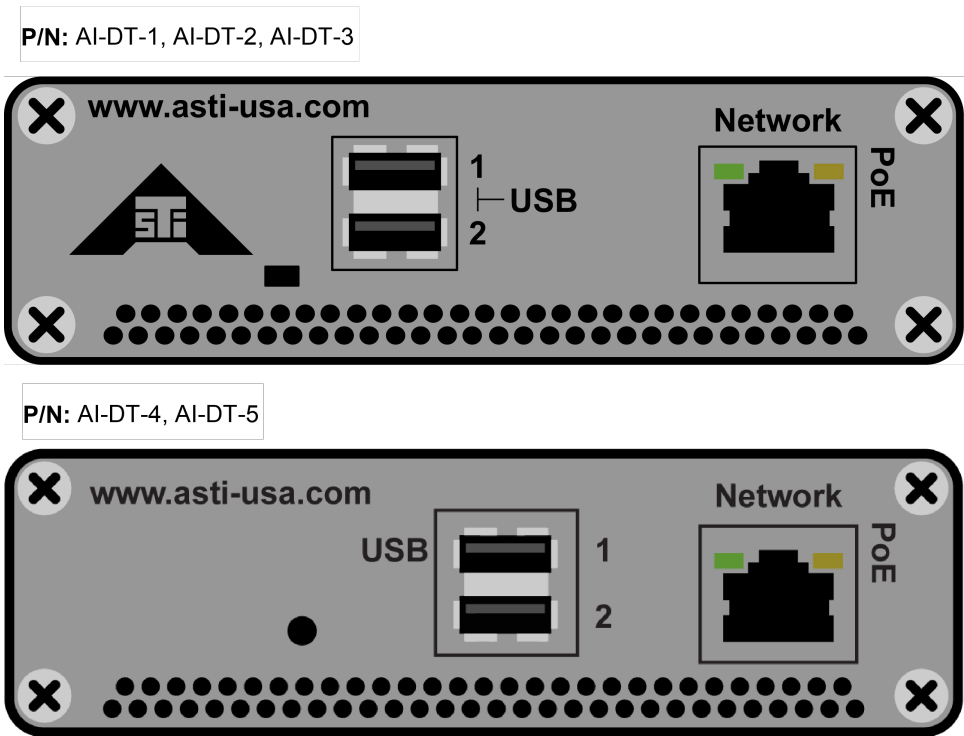


Figure 3: AI-Delta rear panel

The AI-Delta's dimensions are 6.56" L × 4.18" W × 1.33" H, as shown in Figure 4, "AI-Delta dimensions" below:

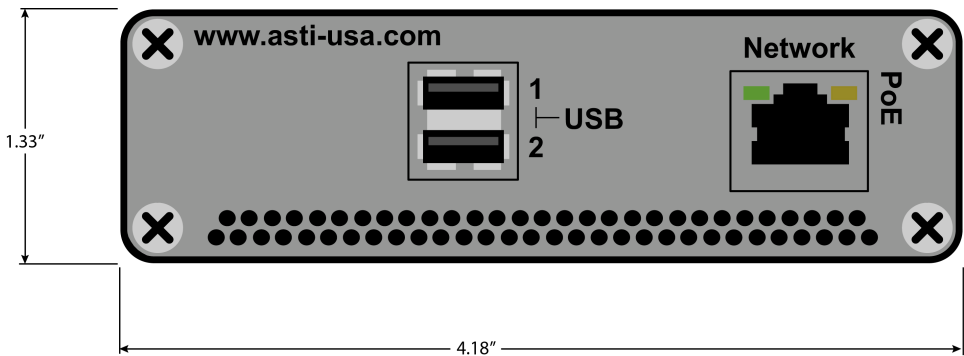


Figure 4: AI-Delta dimensions

3.0 Audio input and output

The AI-Delta supports two types of audio I/O:

- 2 USB ports
- 2 DB-15 connectors

Table 3, "Audio input values" below shows the audio input values for Channels A and B:

Characteristic	Value
Input impedance	1.65 k Ω
Input level	4.5 V _{PP} max (2.2 V _{PP} differential)
Input gain	0 dB, +10 dB to +65 dB, software configurable (go to note below)

Table 3: Audio input values



Note: The AI-Delta gain covers a total range of 65 dB. You can set the range of 10–65 dB in 1 dB steps; however, you cannot choose the range of 1–9 dB as a function of design.

Table 4, "Audio output values" below shows the audio output values for Channels A and B:

Characteristic	Value
Impedance	10 Ω
Max. power	150 mW at 32 Ω
Max. output signal	3.75 V _{PP} at 150 Ω 2.4 V _{PP} at 8 Ω
Frequency response	20 Hz to 20 kHz

Table 4: Audio output values

3.1 Audio interface pinout

Figure 5, "Interface connection DB-15 female" below shows a DB-15 pinout for the AI-Delta audio interface:

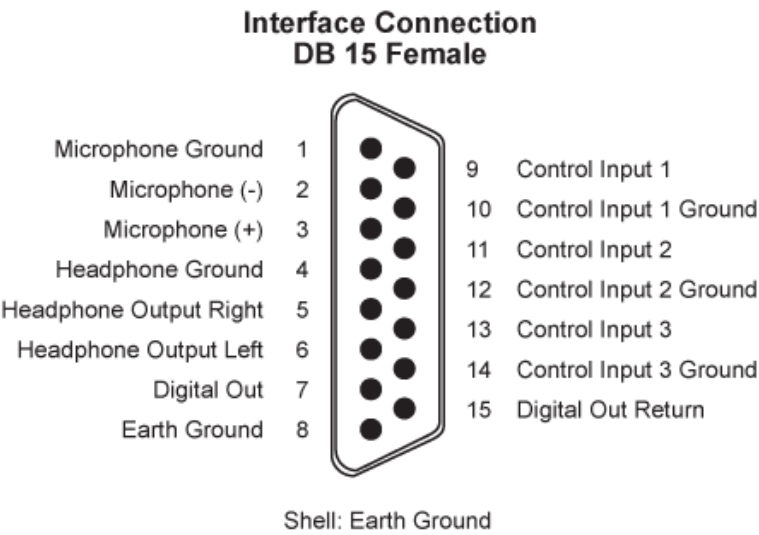


Figure 5: Interface connection DB-15 female

4.0 Control inputs and digital outputs

The AI-Delta's DB-15 connectors also function as control inputs and digital outputs. The following sections describe the AI-Delta's control inputs and digital outputs, explaining how to use the control input as a digital input, an analog input, or a digital output.

4.1 Control inputs

Figure 6, "Control input circuitry" below shows the AI-Delta's control input circuitry. The control input can logically function as either a digital or an analog input.

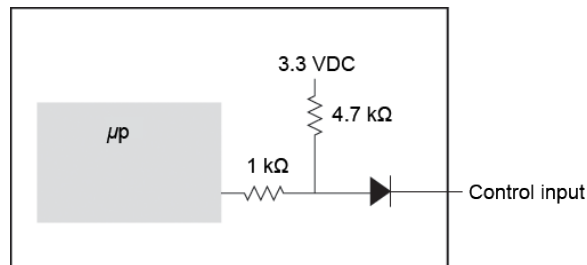


Figure 6: Control input circuitry

4.1.1 Control input as digital input

To use the control input as a digital input, simply short or open the required pins. For example, if you short Pins 9 and 10 on the audio I/O interface, Control Input 1 is True. If the pins are open, Control Input 1 is False. In this example, the control input acts like an on and off switch.

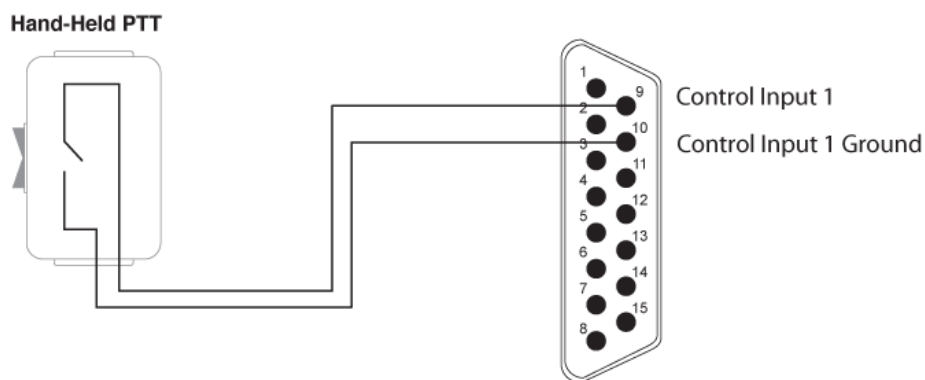


Figure 7: Digital In

4.1.2 Control input as analog input

To use the control input as an analog input, insert a resistance between the control input and control input ground pins. The four-channel selector knob contains a switch that changes the resistance between the control input and control input ground pins, as shown below:

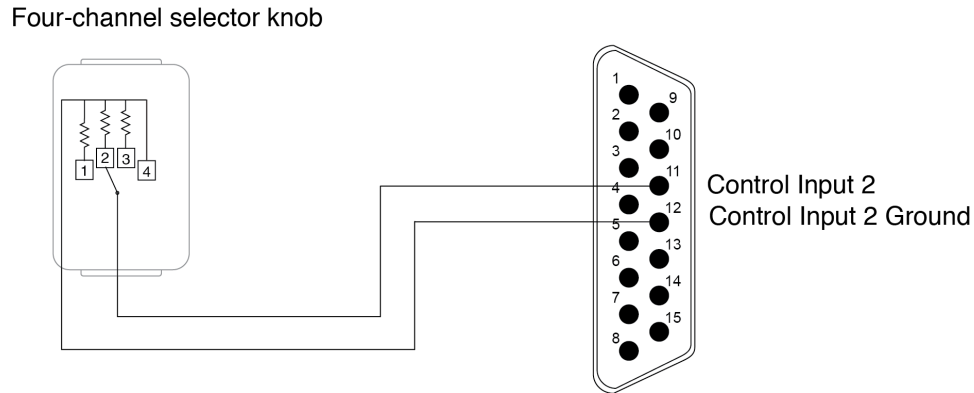


Figure 8: Analog In

You can also connect the AI-Delta to a potentiometer for various control applications. Connect the wiper to the control input and the low side to the corresponding ground pin, as shown in Figure 9, "Potentiometer connection to the AI-Delta" below.

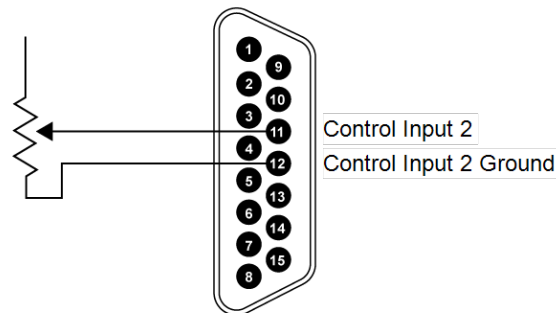


Figure 9: Potentiometer connection to the AI-Delta



Important: Do not connect the potentiometer to an external voltage source, which may cause incorrect readings. The AI-Delta already includes internal BIAS voltage.

4.2 Digital output

The digital output circuitry consists of an opto-isolated, solid-state relay for switching power to external loads. Table 5, "Digital output rating and dissipation" below summarizes the AI-Delta's digital output opto-isolated field effect transistor (FET) values:

Type	Opto-isolated FET
Maximum continuous current rating	120 mA
Maximum power dissipation	300 mW

Table 5: Digital output rating and dissipation

Figure 10, "Digital output circuitry" below shows the AI-Delta's digital output circuitry:

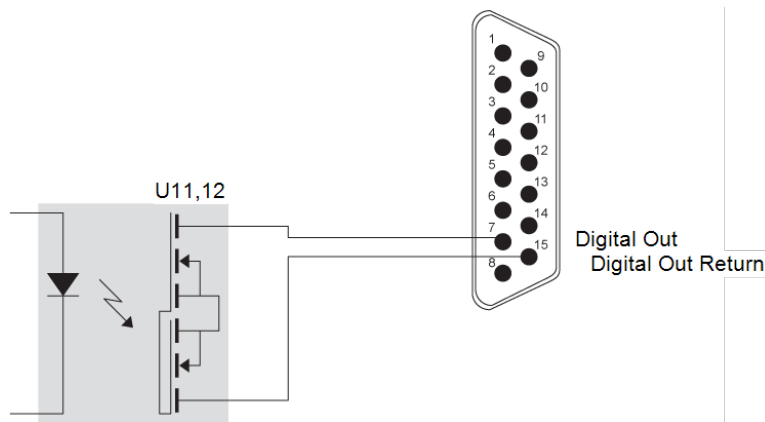


Figure 10: Digital output circuitry

5.0 Status indicator lights

The LED status indicator light displays the AI-Delta's status:

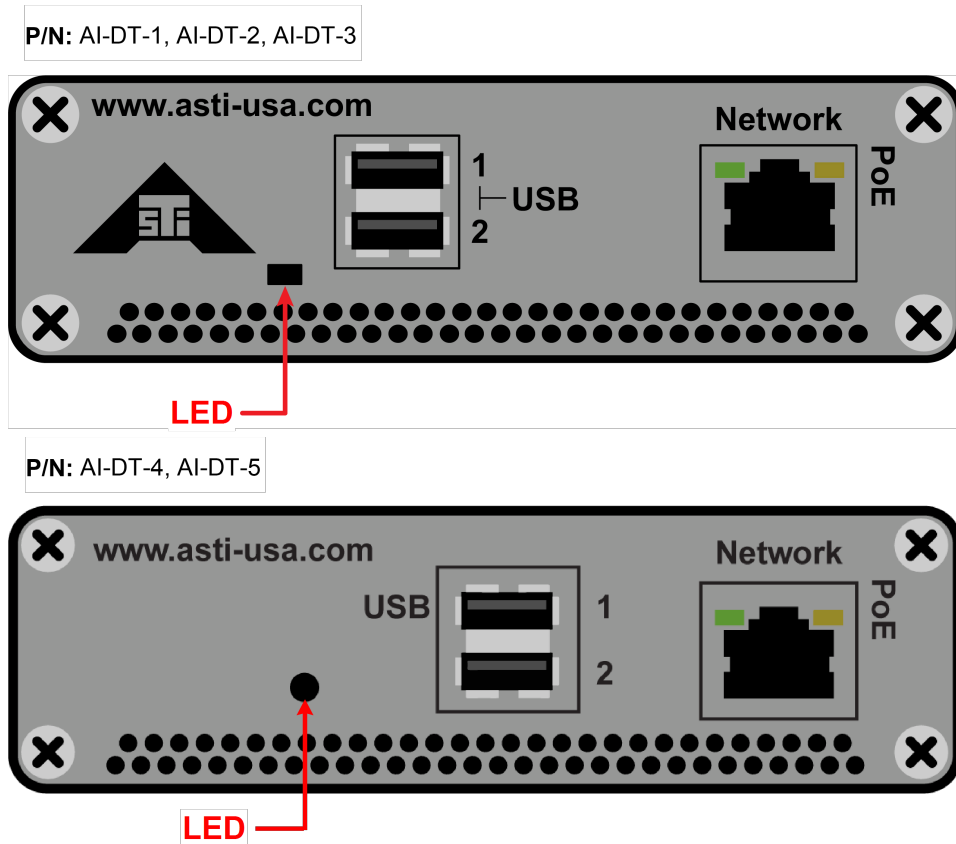


Figure 11: AI-Delta status indicator lights

Table 6, "AI-Delta status indicator lights" below defines each status indicator light for the AI-Delta:

LED Light	Status
White solid	This light indicates the AI-Delta's default "Power On" state. If solid white displays for over two minutes, remove power, count to 10, and reapply power, or contact support@asti-usa.com .
Yellow flashing	The AI-Delta is updating. Do not turn off the device.
Red solid	Hardware Error #1: failed to find device; remove power, count to 10, and reapply power, or contact support@asti-usa.com .
Red flashing	Hardware Error #2: analog-to-digital converter (ADC) chip not found; remove and reapply power, or contact support@asti-usa.com .
Purple flashing	Find Me is enabled. This feature can identify an AI-Delta.
Blue solid	No network link exists.
Blue flashing	The AI-Delta cannot find any Voisus servers on the network.
Green solid	The AI-Delta has detected one or more Voisus servers on the network, but a server is not actively using it.
Green flashing	A Voisus server is actively using the AI-Delta.
Teal solid	Firmware Error #1: remove and reapply power, or contact support@asti-usa.com .
Off	Firmware Error #2: remove and reapply power, or contact support@asti-usa.com .

Table 6: AI-Delta status indicator lights

6.0 Memory devices

Table 7, "AI-Delta (P/N: AI-DT-1, AI-DT-2, AI-DT-3) memory" below summarizes the types of memory devices in the AI-Delta (P/N: AI-DT-1, AI-DT-2, AI-DT-3):

Type	Size	User Modifiable	Function	Process to Clear
Volatile				
CPU internal cache	512 kB	No	Internal cache for CPU	Remove power Count to 30 Restore power
Internal cache	128 kB	No	Internal cache	Remove power Count to 30 Restore power
RAM	1 GB	No	RAM	Remove power Count to 30 Restore power
Nonvolatile				
eMMC	4 GB	Yes	Application	Contact ASTi for more information.

Table 7: AI-Delta (P/N: AI-DT-1, AI-DT-2, AI-DT-3) memory

Table 8, "AI-Delta (P/N: AI-DT-4, AI-DT-5) memory" below summarizes the types of memory devices in the AI-Delta (P/N: AI-DT-4, AI-DT-5):

Type	Size	User Modifiable	Function	Process to Clear
Volatile				
CPU cache	1 MB	No	Internal cache for CPU	Remove Power Count to 30 Restore Power
RAM	2 GB	No	RAM	Remove Power Count to 30 Restore Power
Nonvolatile				
eMMC	8 GB	Yes	Application	Contact ASTi for more information.
EEPROM	512 kB	No	Bootloader	None
EEPROM	32 kB	No	Device ID	None

Table 8: AI-Delta (P/N: AI-DT-4, AI-DT-5) memory

7.0 Environmental ranges

Table 9, "AI-Delta environmental ranges" below summarizes the AI-Delta's environmental ranges:

Range Type	Suggested Range
Operating temperature	0°C to +32°C (32°F to 90°F)
Operating maximum temperature gradient	20°C (68°F) per hour
Operating humidity	10–70 percent noncondensing
Storage temperature	-10°C to 55°C (14°F to 135°F)
Storage maximum temperature gradient	30°C (86°F) per hour
Storage humidity	5–95 percent
Maximum altitude	2,000 meters

Table 9: AI-Delta environmental ranges

8.0 Typical headset settings

The AI-Delta supports a mono or stereo headset connection for the DB-15 connector. Figure 12, "Mono headset connection" below shows a typical mono headset connection for the AI-Delta:

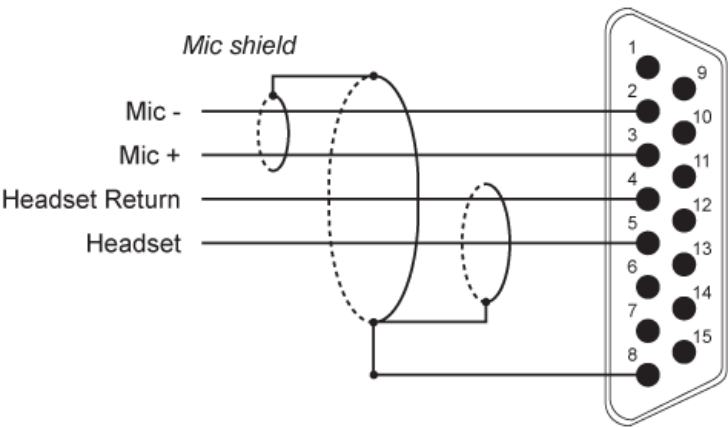


Figure 12: Mono headset connection

Figure 13, "Stereo headset connection" below shows a typical stereo headset connection for the AI-Delta:

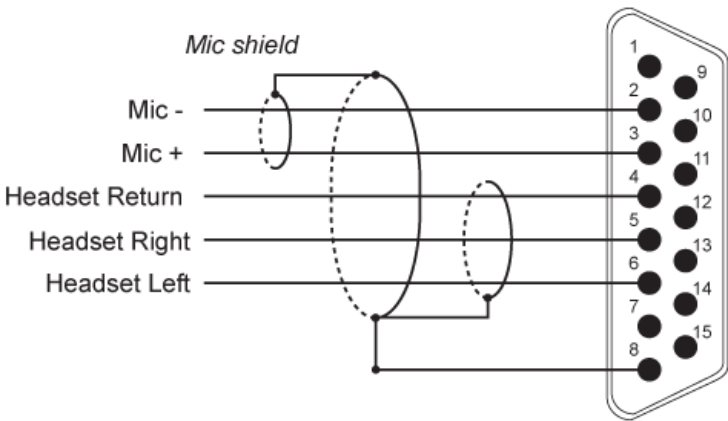


Figure 13: Stereo headset connection

9.0 Mounting plate

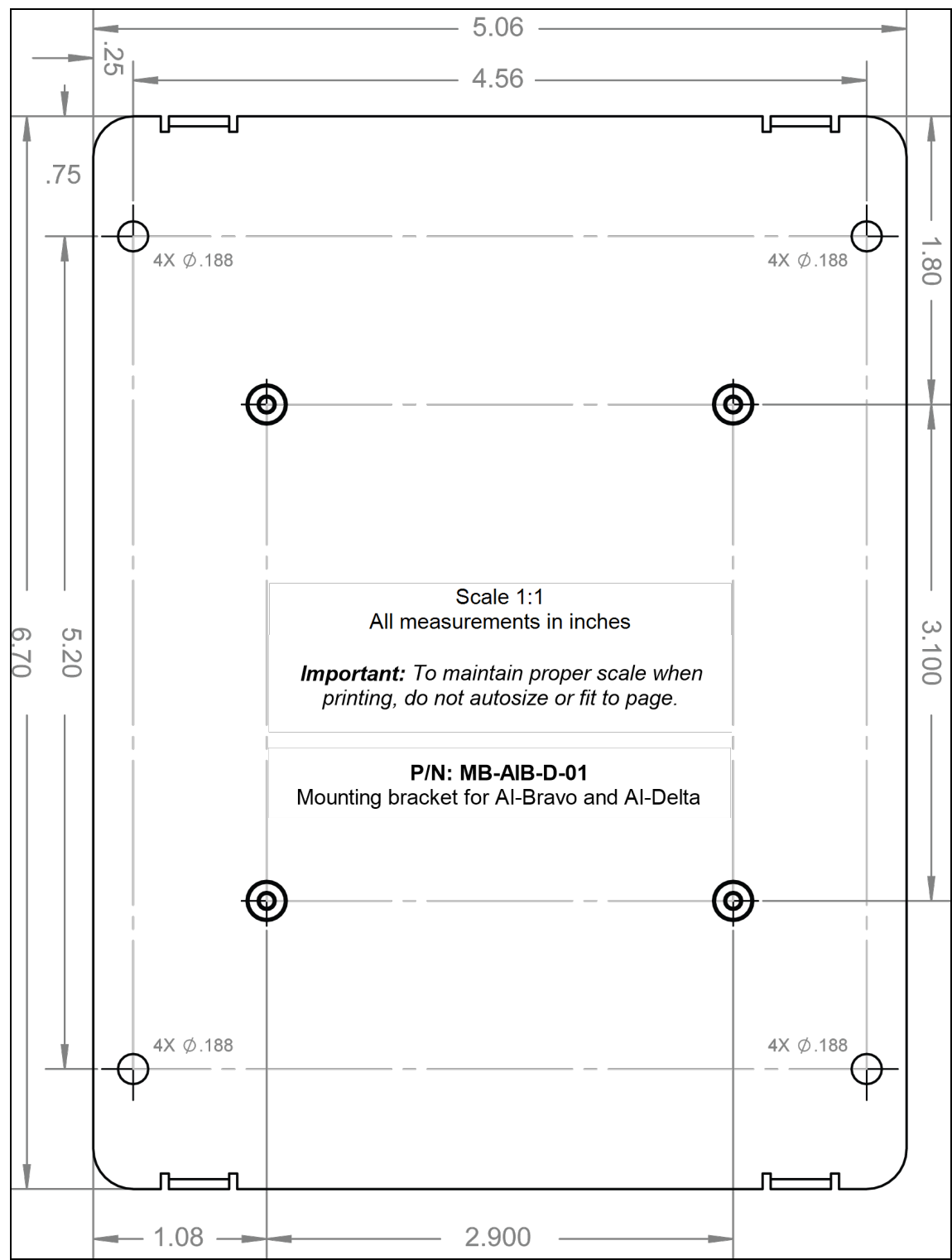


Figure 14: AI-Delta mounting plate diagram

9.1 Install the AI-Delta's mounting plate

To attach the mounting plate to the AI-Delta, follow these steps:

1. Using a Phillips-head screwdriver, remove the AI-Delta's four bottom screws.
2. Place the AI-Delta on top of the plate.

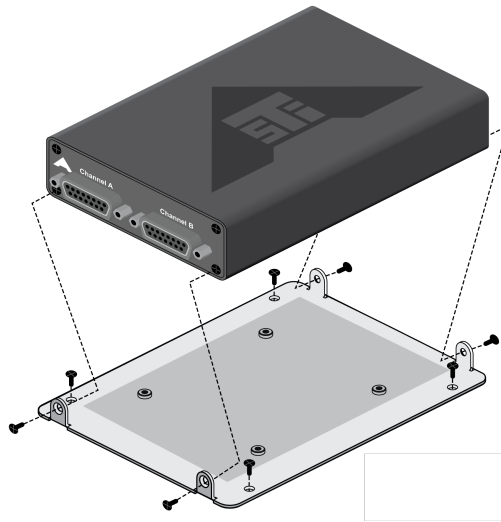


Figure 15: Mounting plate installation

3. To secure the device to the plate, insert the screws that you removed in Step 1, and tighten them.



Figure 16: Mounting plate screws

Appendix A: Warranty information

To view ASTi's warranty, go to “Standard Terms and Conditions” at www.asti-usa.com/legal/terms.html.



Important: *This device does not contain any user-serviceable components. Opening the ASTi Server chassis voids the warranty. ASTi does not support board-level repair; therefore fuses in the device are not user replaceable.*

A-1 Repairs and returns

To return equipment to ASTi, observe the following procedures:

1. Request a Return Material Authorization (RMA) number through the form on the RMA User Account at rma.asti-usa.com/rma. ASTi's Production department cannot receive a repair without an RMA number. The shipping label must also include the RMA number. Any items received from customers without RMA numbers or appropriate contact information will not be tested. After 60 days, ASTi reserves the right to scrap all hardware received in this condition.
2. When packaging the equipment in question, make sure it is well-protected. Failure to properly package the equipment during shipping could void the warranty.
 - Always double-box the device.
 - The inner container should employ some semi-rigid, contour-fitting foam, while the exterior container should use a more pliant, shock-absorbing material, such as styro-foam peanuts.
 - To prevent possible Electrostatic Discharge (ESD) damage, properly enclose the device in an antistatic bag.
3. Do not send accessory pieces, such as rack mount kits, power supplies, or software. Only include items that do not work.
4. Describe the problem, noting the following information:
 - Serial number for the unit in question
 - Point of contact information (i.e., name, telephone number, and equipment return address)

Failure to include this information could extensively delay the return of equipment.

5. If you are an international customer, include the correct product value on all shipping documents. For proper harmonized tariff codes, contact ASTi. The customer is responsible for duties, taxes, and fees incurred during shipment.

ASTi evaluates equipment free of charge and will not start work without prior customer approval.

You are responsible for shipping charges to ASTi for warranty and non-warranty repairs. If equipment is not under warranty, a purchase order is required to cover any repairs. ASTi will provide a quote for all nonwarranty items, including return shipping. The customer is responsible for return shipping charges on nonwarranty equipment. ASTi ships equipment still under warranty back to the customer via FedEx, unless otherwise directed. ASTi is responsible for return shipping charges on domestic items under warranty.

If ASTi does not receive the equipment 30 days after the RMA was issued, ASTi closes the RMA and designates it as unused.