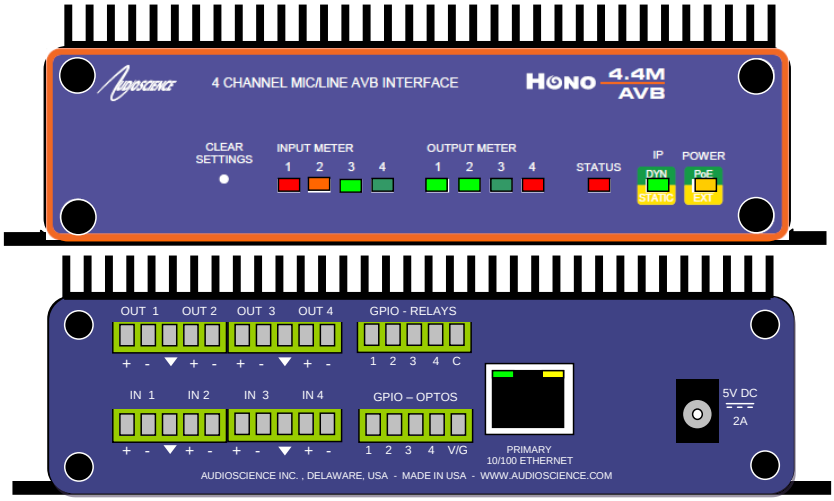
HONO™ AVB 4.4M

FOUR CHANNEL MIC/LINE AVB INTERFACE



1 DESCRIPTION

The Hono AVB 4.4M is a AVB interface in the Hono Mini series designed for use in the professional installed sound market. The Hono AVB 4.4M receives four channels of AVB and sends them to four balanced analog audio outputs, while simultaneously inputting four channels of mic/line level balanced audio and transmitting them as four channels of AVB. The Hono AVB 4.4M is perfect for applications requiring additional inputs or outputs to an existing AVB system.

2 FEATURES

Inputs
- Four balanced analog microphone/line inputs
- Software adjustable, non-volatile, input levels from –60 to +24dBu
- 100dB DNR, -90dB THD+N, -110dBu EIN
- Software selectable 48V phantom power individually available on all inputs
- 3.81mm pluggable terminal block connectors

Outputs
- Four balanced analog line outputs
- Software adjustable, non-volatile output levels from -10 to +24dBu

GPIO
- Four opto-isolated inputs
- Four normally open relay isolated outputs

DSP
- Peak and RMS meters on all audio inputs and outputs
- Mixing of any input to any output

AVB
- Protocols: IEEE1722, IEEE1722.1, IEEE802.1AS, IEEE802.1Q FQTSS, IEEE802.1Q MSRP, IEEE802.1Q MVRP
- Four channels of AVB in and out
- Media clock input and output streams

Power
- Power over Ethernet (PoE) 802.3af compliant
- External +5V power supply if POE not being used

Chassis
- Rack mountable using optional 1U front panel
- Wings allow easy mounting
- 5.25 inches W x 3.125 inches L x 1.37 inches H

Control
- All settings adjustable from ASIControl software

3 ARCHITECTS AND ENGINEERS SPECIFICATION

The AVB interface shall provide four microphone/line balanced analog audio inputs and four line level analog audio outputs on plug in terminal block connectors. 48V DC Phantom power shall be provided on each mic/line input. Analog-to-digital and digital-to-analog conversion shall be 24bit at a 48kHz sample rate. The AVB interface shall provide front panel meters to monitor the analog input and output signals. Four channels of input and output shall be provided on an RJ-45 connector. The AVB interface shall be compatible with the AudioScience ASIControl software and 3rd party IEEE1722.1 controller software for configuration and monitoring. The AVB interface shall be powered by IEEE 802.3af Power-over-Ethernet or from an external +5VDC @ 10W power supply. The AVB interface shall be compliant with CE, FCC part 48 and the RoHS directive. Warranty shall be 3 years. The AVB interface shall be the AudioScience Hono AVB 4.4M.

4 SPECIFICATIONS

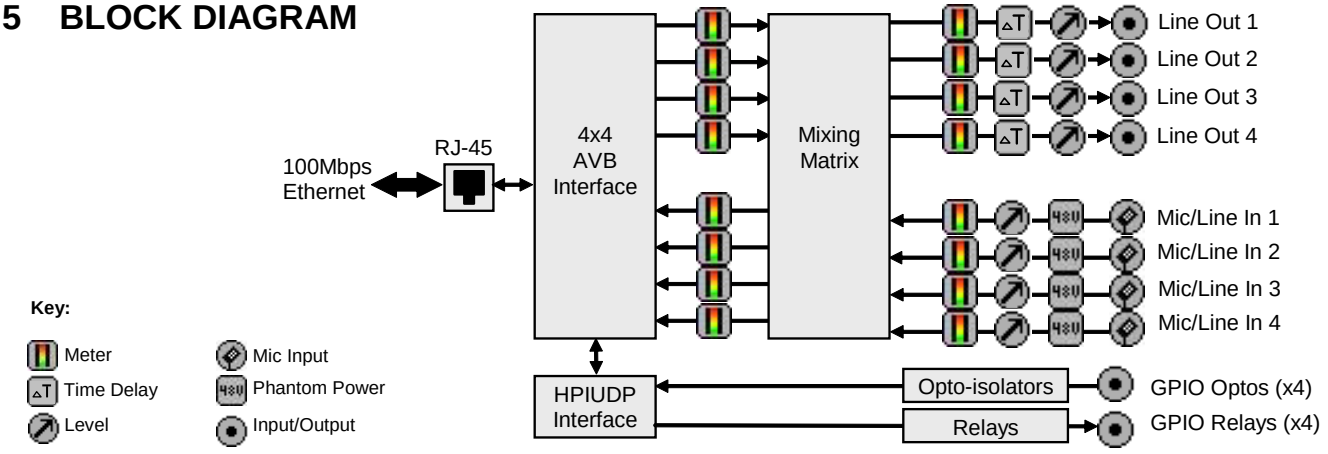
AVB INPUT/OUTPUT	
Type	100BaseT Ethernet
Connector	RJ-45
Streams	Four input and four output, Media clock stream input and output
Stream formats	IEEE 1722-2011/IEC 61883-6/AM824/MBLA mono channel
Sample Rate	48kHz (96kHz to be added in future, software updatable)
Latency	TBD
Control Protocol	IEEE1722.1 -2013 and AudioScience HPI
MICROPHONE/LINE INPUT	
Type	Balanced
Connector	Terminal block
Input Level	-60 to +24dBu in 1dB increments
Input Impedance	5KΩ balanced
Phantom Power	48V @ 5mA max per input, software selectable on each input; on and off
Dynamic Range [1]	>100dB
THD+N [2]	< -90dB
EIN [3]	–100dBu
A/D converter	24bit Over sampling
Frequency Response	20Hz to 20kHz +/-3dB
ANALOG OUTPUT	
Type	Balanced
Connector	Terminal block
Output Level	-10 to +24dBu in 1dBu steps
Load Impedance	-10 to +14dBu:600 ohms or greater 15dBu to +24dBu: 2K ohms or greater
Dynamic Range[1]	>100dB
THD+N[2]	<-90dB
Frequency Response	20Hz to 20kHz +/-3dB

LATENCY (48kHz AVB)	
Analog input across network to Analog out	TBD
AVB input to Analog Out	TBD
Analog input to AVB output	TBD
Analog input to Analog output	TBD

GP OPTO-ISOLATED INPUTS	
Isolation	2000VRMS
Input Drive	4mA typical with internal 5V supply and internal 1K current limiting resistor
Network protocol	AudioScience HPIUDP
GP RELAY OUTPUTS	
Isolation	1500VRMS between relay contacts and coil
Contact Rating	Up to 220VDC/250VAC and 2A, 60W maximum
Network protocol	AudioScience HPIUDP
GENERAL	
Dimensions	6.50"W x 3.125"D x 1.90"H (165mm x 80mm x 48mm)
Weight	24oz, 710g
Operating Temperature	0C to 45C ambient, assuming still air.
Power Requirements	IEEE 802.3af Power-over-Ethernet Class 0 or External +5VDC @ 2A power supply (supplied)
Certifications	CE: EN55103 FCC: Part 15 Subpart B Class A

[1] – Dynamic range measured with a –60dBFs sine wave and A weighting filter and 20-20kHz b/w
[2] - THD+N measured using a +20dBu 1kHz sine wave sampled at 48kHz, 20-20kHz b/w and A weighting filter
[3] - With Zs = 150ohms and Input level set to –10dBu

5 BLOCK DIAGRAM



6 REVISIONS

Date	Description
November 22 2013	Preliminary
November 26 2013	Update
December 17 2013	Created 2.2M doc
February 7 2014	Added AVB gPTP section
July 15 2014	Updated gPTP section

7 CONTENTS

8 Table of Figures

9 IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Head all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with these instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Protect the power supply cord from being walked on or pinched, particularly at plug ends, convenience receptacles, and the point where they exit from the apparatus.
10. Only use attachments/accessories specified by the manufacturer.
11. Unplug this apparatus during lightning storms or when unused for long periods of time.
12. Refer all servicing to AudioScience. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

10 NOTICES

FEDERAL COMMUNICATIONS COMMISSION (FCC) INFORMATION

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

INTRODUCTION

The Hono Mini AVB Mini series of products are AVB™ audio interfaces providing 4 channels of AVB receive and transmit.

Various models provide up to 4 channels of microphone/line in and line out or up to 4 channels of AES/EBU I/O. Each input and output is configured with a pluggable terminal block (Phoenix type) connector).

Additionally each model contains GPIO. The GPIO inputs are opto-isolated and the GPIO outputs are relay based.

The Hono Mini AVB Mini interfaces features a powerful Texas Instruments 32bit floating point DSP that allows sophisticated switching and mixing. LED displays on the unit's front panel show peak meters and AVB status.

The units maybe powered using Power-over-Ethernet (PoE) from the Ethernet port or from an external +5V power supply.

AudioScience provides application software that may be used to set up the Hono Mini AVB Mini interfaces. ASIControl can be used to set all internal features of the unit (such as levels).

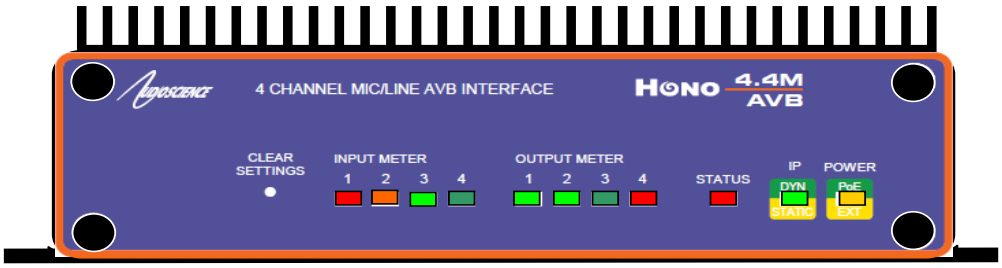
The following table lists the Hono Mini AVB Series and a description of each unit.

Model	Network Protocol	Description
Hono Mini AVB 2.2M	AVB	2 channels of balanced analog mic/line inputs, line outputs
Hono Mini AVB 4.4M	AVB	4 channels of balanced analog mic/line inputs, line outputs
Hono Mini AVB 2.2D	AVB	2 channels of AES/EBU inputs/outputs
Hono Mini AVB 4.4D	AVB	4 channels of AES/EBU inputs/outputs

11 FRONT AND BACK PANELS

11.1 Front Panel

The following diagram shows the front panel of the 4.4M. The 2.2M, 2.2D and 4.4D are similar, except that the 2.2M & 2.2D only have two input and two output meters.



11.1.1 POWER LED

- Green when running from Power over Ethernet (PoE). Note, PoE is only available from the primary RJ45.
- Orange when running from the external +5V DC source.
- Orange + Green when both present.

11.1.2 IP LED

- Green when an IP address has been obtained from a DHCP server or from autoip.
- Orange when a static IP address is configured.
- Orange Blinking when the unit does not have an IP address.

11.1.3 STATUS LED

- Green when everything is OK.
- Orange when the unit is running from its factory (backup) firmware.
- Red Blinking when there is an error.

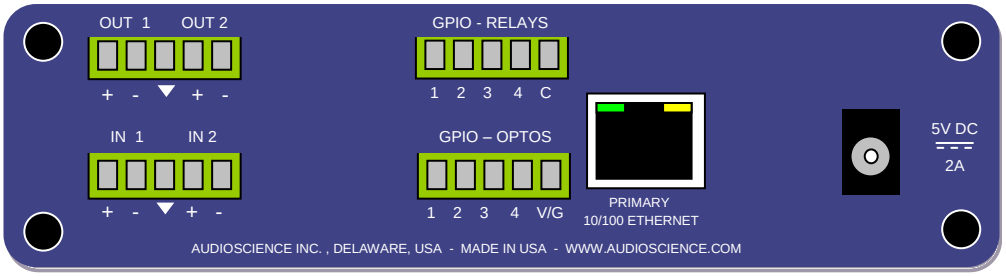
11.1.4 METER LEDS

- Normally represent the audio level at the Analog or AES/EBU inputs and outputs. Dim green represents a peak level of around -40 dBFs, while red represents -1dBFs. Bright red indicates 0dBFs or overload condition. When an overload condition occurs, the meter will remain bright red for 1 sec before resuming normal metering.

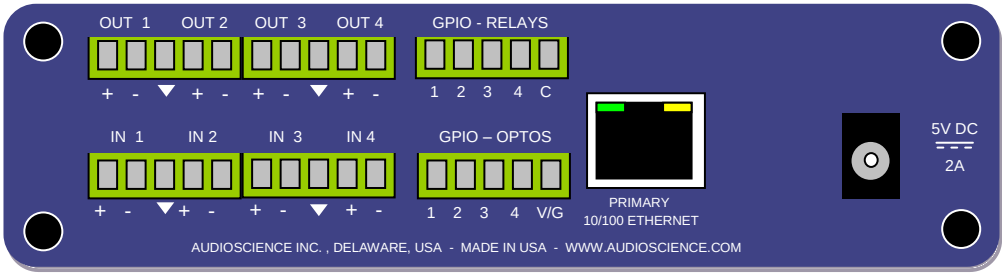
11.2 Back Panels

The following diagram shows the back panel of the 2.2M, 4.4M, 2.2D, 4.4D.

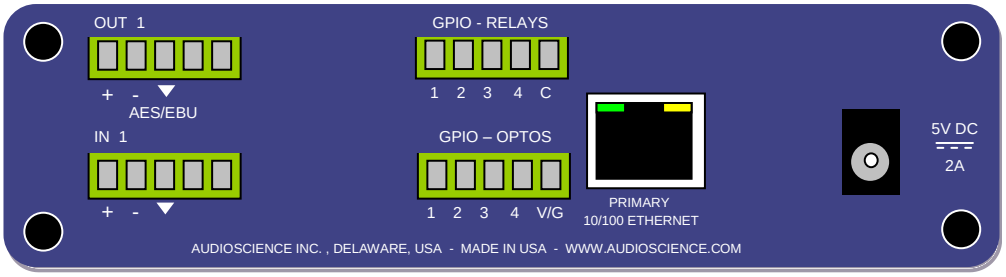
2.2M



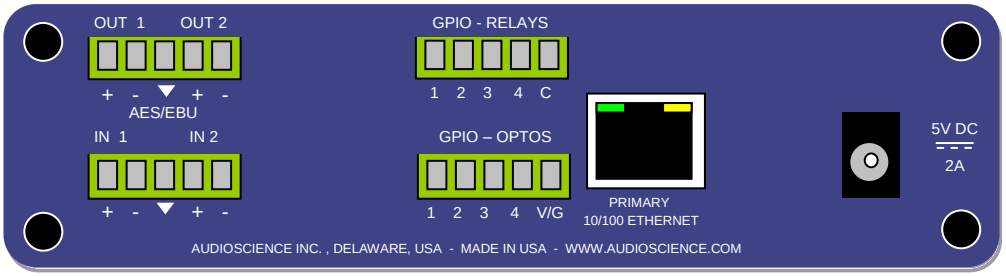
4.4M



2.2D



4.4D



11.2.1 OUT 1..4

2.2M & 4.4M:These are the balanced analog outputs. The middle pin of the 5pin terminal block is Ground
2.2D & 4.4D:These are the AES/EBU outputs. The middle pin of the 5pin terminal block is Ground

11.2.2 IN 1..4

2.2M & 4.4M:These are the balanced analog inputs. The middle pin of the 5pin terminal block is Ground.
2.2D & 4.4D:These are the AES/EBU inputs. The middle pin of the 5pin terminal block is Ground.

11.2.3 GPIO – RELAYS

These are the four GPIO Output relays

11.2.4 GPIO-OPTOS

These are four GPIO opto-isolated inputs. V/G is used to power the optos from either internal or external power.

11.2.5 RJ45 – PRIMARY+PoE

The primary network connection. Also provides PoE power input.

11.2.6 5V DC Jack

Provides input for an external +5V @ 2A power supply (supplied with the unit)

12 HARDWARE INSTALLATION

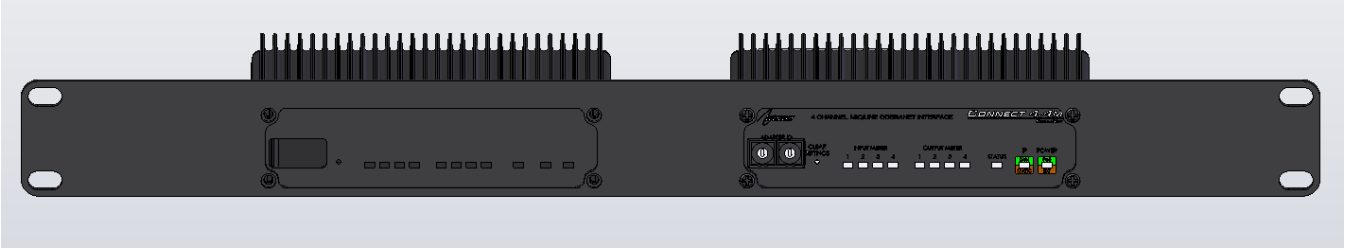
12.1 Mounting

12.1.1 Flange Mounting

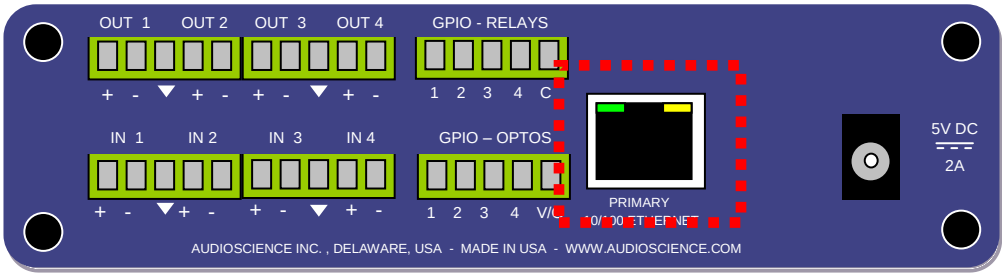
The Hono Mini AVB interface mounts using the flanges on the side of the unit

12.1.2 Rack Mounting

The Hono Mini AVB interface can be rack mounted using the optional rackmount bracket (p/n ENC2305). This bracket can mount up to two Hono Minis.



12.2 Ethernet Connection



A CAT-5 or better (CAT-5e, CAT-6 etc) network cable is required for 100baseT Ethernet operation. The cable length between the Hono Mini interface and a network switch should not exceed 100 meters (328 feet)

12.2.1 PoE Power

If your network provides power-over-ethernet (PoE) capability, then you can use it to power the Hono Mini.

12.2.2 External +5V Power

The Hono Mini AVB interface can use external +5V power, supplied using a 2.5mm DC plug. This power takes priority over the PoE power if both are supplied at the same time

13 OPERATION

13.1 Power up sequence

This section describes the power up sequence.

13.1.1 Power

Apply power to the unit by either using a PoE enabled network on the primary RJ45 jack or by plugging in the external +5V power supply. You may apply both at the same time, but the external power supply will take priority.

13.1.2 Firmware images

The Hono Mini AVB interface boots from a firmware image stored in flash memory. There are two independent firmware images stored in every unit. The two images are named “Factory” and “Update”. The “Factory” image is a reference image that is in place should a “bad” image be downloaded to the device. The “Update” image is the image that can be updated in the field if required.

13.1.3 Firmware loading sequence

When first powered up, each Hono Mini AVB interface performs the following sequence:

1. Checks for a valid “Update” firmware image.
2. Loads the Update image and starts running it.
3. Loads any control settings that may have been stored to flash.

In the case where the “Update” image is determined to be corrupt, the Factory image is loaded. This situation is noted by the STATUS LED being lit as orange.

13.1.4 Loading the factory firmware image

The Hono Mini AVB interface can be forced to load the factory firmware image by depressing the CLEAR SETTINGS button on front panel as power is applied to the device. Keep the button depressed while power is applied. The STATUS LED will be lit as orange

14 CONFIGURATION

14.1 ASIControl Configuration

ASIControl is a Windows application that is installed along with the AudioScience drivers. If you are using an AudioScience AVB adapter or an AudioScience non-AVB audio adapter in the PC, download and install the combo driver, taking care to correctly select the 32bit or 64-bit version based on your operating system.

Run the driver .exe to install the driver components and be sure to select the second install option: “Standard PCI + Network Driver’.

After driver installation, ASIControl can be run from either the desktop icon or from Start → All Programs → AudioScience → ASIControl.

If there is more than one NIC in the PC, upon startup, ASIControl will first prompt the user for which network interface to use to communicate with AVB devices.

To preserve control changes made to the Hono Mini AVB interface, ASIControl must be shut down. This will save control settings to the unit’s flash memory, allowing the settings to be restored after a power cycle.

14.1.1 ASIControl Layout

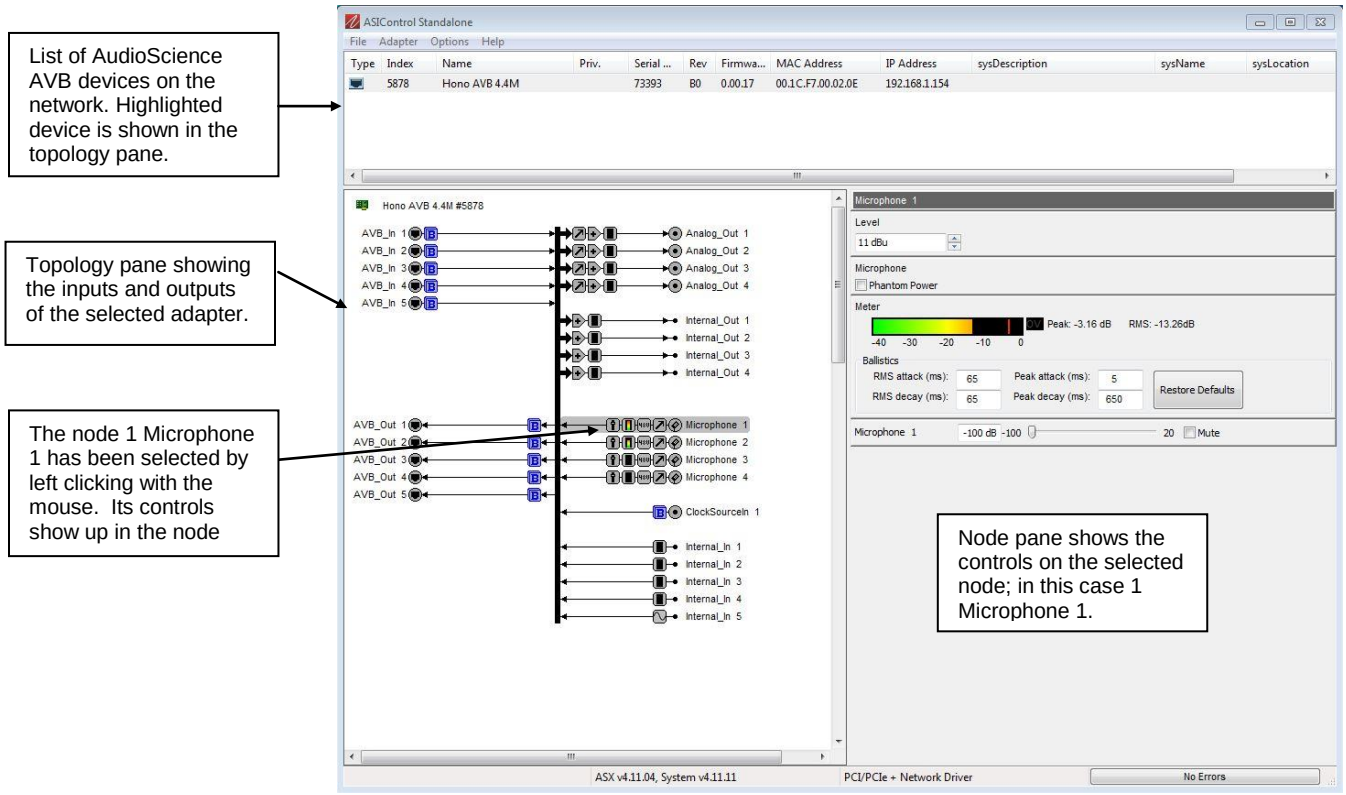


Figure 1. ASIControl layout

14.1.2 About

This control displays information about the installed Hono AVB.

14.1.2.1 Interface

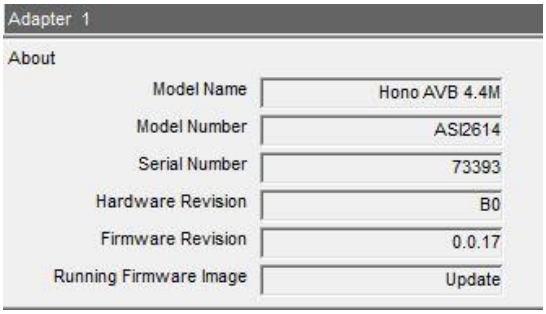


Figure 2. Adapter About information seen in right side of ASIControl.

Model Name:
The model name is displayed here.

Model Number:
The model number is displayed here.

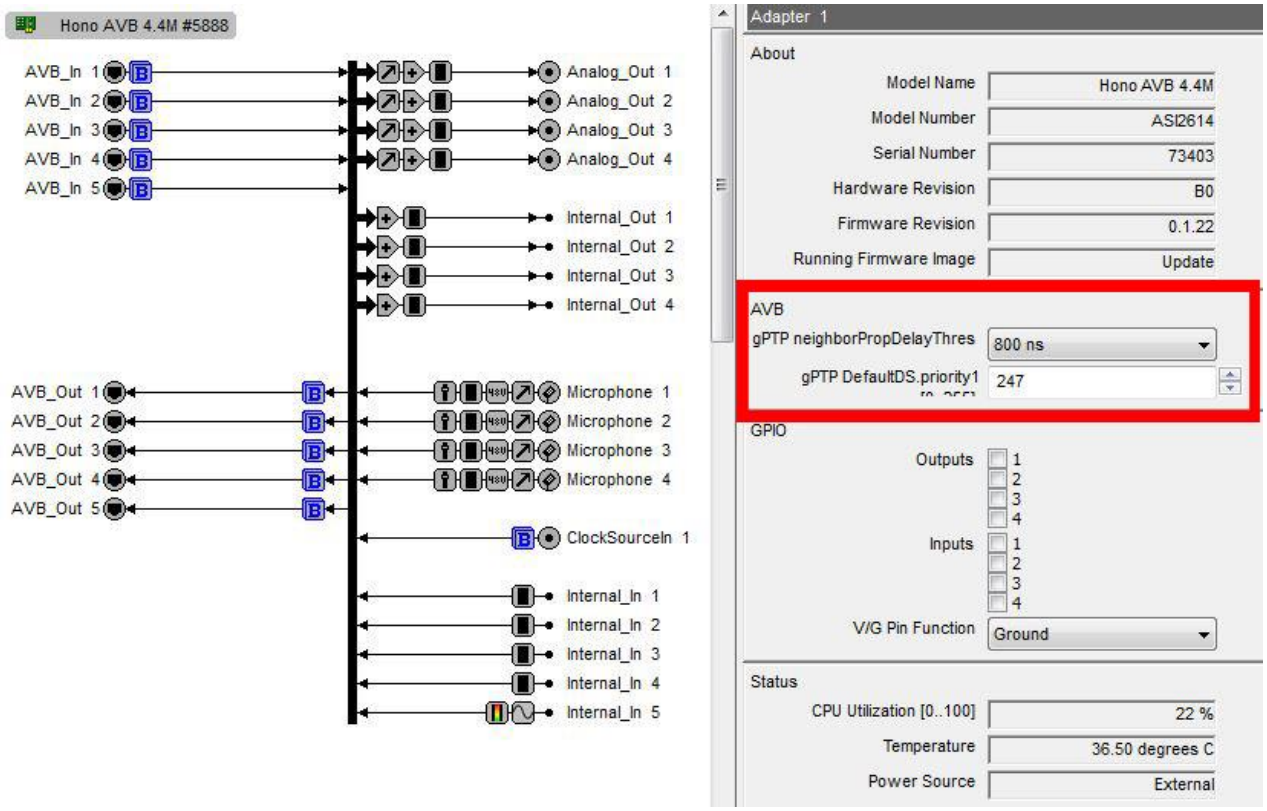
Serial Number:
The serial number is displayed here.

Hardware Revision:
This lists the hardware revision.

Firmware Revision:
The firmware version is displayed; usually the same as the driver version installed.

14.1.3 AVB

14.1.3.1 gPTP Configuration settings



neighborPropDelayThres:
The Hono AVB's port's AScapable flag is set to false when the measured pDelay to its neighbor exceeds a specified threshold. The can be set to either 800ns (default) or 4 s. After changing the value the "Status" LED on the front of the unit will flash while changes are saved. Do not reset the device while the "Status" LED is flashing or your changes will not be stored.

DefaultDS.priority1:
You can also set the DefaultDS.priority1 in this section (value range 0-255), changes to this value will also cause the "Status" LED to flash while changes are saved. Do not reset the device while the "Status" LED is flashing or your changes will not be stored.

14.1.4 Status

This control displays information on various dynamic parameters.

14.1.4.1 Interface

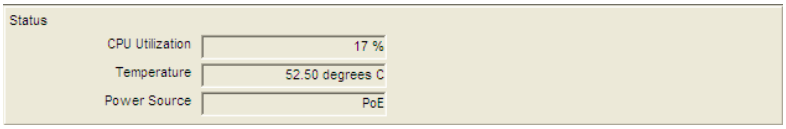


Figure 3. The Status user interface

CPU Utilization:
This shows the loading of the adapter's CPU load in percent.

Temperature:
The internal temperature in degrees C is shown here.

Power Source:
PoE indicates the unit is running off Power-over-Ethernet. External indicates it is using the external +5V adapter.

14.1.5 Level

The levels in dBu for the adapter's line_outs and line_ins can be adjusted here.
In the example below, the Line_Out 1 node in the topology view of ASIControl has been selected. Its Level will show up on the right side of ASIControl. The same is done for a Line_In to see its Level.

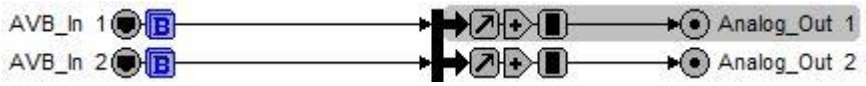


Figure 4. Using ASIControl to select Analog_Out 1

14.1.5.1 Interface

Figure 5. Level displayed by ASIControl for Line_Out 1

Level:

The line out level can be adjusted by clicking the  arrows or by typing values in to set the appropriate level. Consult the specification section of this datasheet for the range of supported levels.

14.1.5.2 Developer

14.1.5.2.1 Windows APIs

Wave/Mixer – Analog levels are controlled using mixerSetControlDetails() on a control of type signed and with the name Level/Trim.
HPI – Analog levels are controlled using the HPI_LevelSet() API.
ASX – Analog level are controlled using the ASX_Level_Set() API.
DirectSound – TBD.

14.1.5.2.2 Linux APIs

HPI – Analog levels are controlled using the HPI_LevelSet() API.
ASX – Analog level are controlled using the ASX_Level_Set() API.
ALSA – TBD.

14.1.6 Meter

Meters in ASIControl are located on audio nodes and display the audio level as the audio signal passes through the node. Most AudioScience devices return both RMS and peak level readings and ASIControl displays both simultaneously.

14.1.6.1 Interface

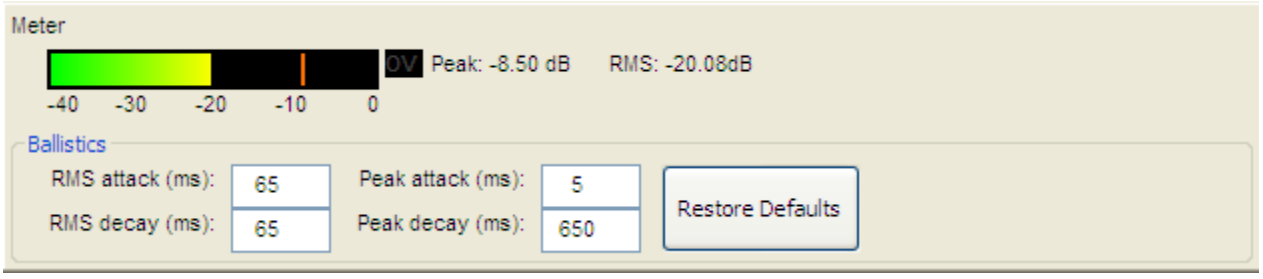


Figure 6. A stereo peak meter display; RMS is green and peak is yellow

To the right of the peak meter is the absolute readings in dBFS. These can be useful when testing input tones of a specific known level.

14.1.6.2 Developer

14.1.6.2.1 Windows APIs

Wave/Mixer – Meters are read using mixerGetControlDetails() on a control of type signed and with type “Peak” the name “Peak Meter”. A minimum value is 0 and maximum is 32767. The interface returns the peak readings only, not the RSM level. It confirms to expected Windows functionality.
HPI – Meters are read using the HPI_Meterxxx() API.
ASX – Meters are read using the ASX_Meter_xxx() API.
DirectSound – TBD.

14.1.6.2.2 Linux APIs

HPI – Meters are read using the HPI_Meterxxx() API.
ASX – Meters are read using the ASX_Meter_xxx() API.
ALSA – TBD.

14.1.7 AES/EBU I/O

The Hono AVB 2.2D and 4.4D have AES/EBU I/O.

- Hono AVB 2.2D – 1 AES/EBU output and 1 AES/EBU input (2 channel I/O)
- Hono AVB 4.4D – 2 AES/EBU outputs and 2 AES/EBU inputs (4 channel I/O)

14.1.7.1 AES/EBU Inputs

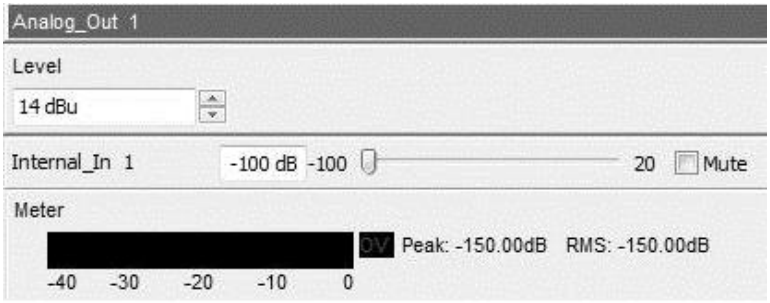
Each AES/EBU input has a sample rate converter (SRC) on it and so may have a sample rate that is asynchronous to the rest of the system. Valid sample rates are 32, 44.1, 48, 64, 88.2 and 96kHz.

14.1.7.2 AES/EBU Outputs

The AES/EBU outputs are clocked at 48kHz, the same rate as the AVB interface and cannot be changed.

14.1.8 Input and Output Volume Adjustment

All outputs from the Hono Mini AVB interface have volume adjustments in their path that support a range of –100 to + 20 dB. The nodes that support this are Analog_Out 1-4, Internal_out 1-4 and AES/EBU_Out 1-2.



Clicking on Analog_Out 1 in the topology pane of ASIControl will show a list of volumes in the node view pane. At left is an image of the Level section, the first volume control and the Meter control shown in the node pane. The meter is found after the full list of volumes (the Hono Mini AVB interface incorporates AudioScience’s anything to anywhere’ mixing).

Figure 7. ASIControl node displays with volumes

The volumes are self-explanatory. Just drag the sliders. All lineouts also have an audio path (with volume) from the corresponding line in. This can be use useful in verifying the correct operation of the audio modules without having to send the audio across an AVB network.

14.1.9 Audio Delay – Future feature

The audio delay block supports user programmable delay per audio output. By default, each output has a maximum of approximately 80 milliseconds of delay assigned to it. If a larger delay is required, more delay storage can be assigned from the global unallocated pool of storage. The maximum delay is 10 seconds.

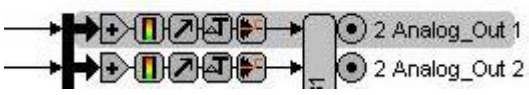


Figure 8 Using ASIControl to select Analog_Out 1

14.1.9.1 Interface

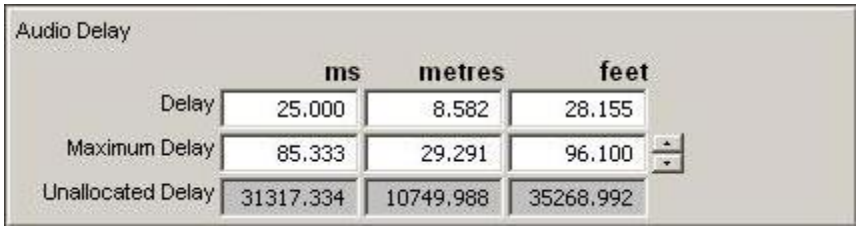


Figure 9 Audio Delay displayed in right pane of ASIControl for Line_Out 1

Delay:
The audio delay is specified in MS (milliseconds), metres, and feet in the user interface. It can be adjusted by typing in new values.

14.1.9.2 Developer

14.1.9.2.1 Windows APIs

HPI – The Audio Delay is a block control. See functions then Mixer, Blocks, Audio Delay.
ASX –TBD.

14.1.9.2.2 Linux APIs

HPI – The Audio Delay is a block control. See functions then Mixer, Blocks, Audio Delay.
ASX – TDB
ALSA – TBD.

14.1.10 Signal Generator

In the topology pane of ASIControl, click on Internal_In 5

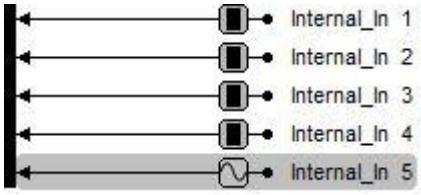


Figure 10. Internal nodes as seen in ASIControl

to see the Signal Generator information in the node pane.

14.1.10.1 Interface

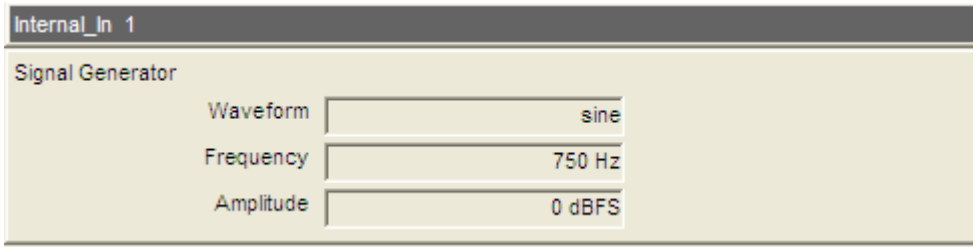


Figure 11. Signal Generator User Interface as seen in ASIControl

Waveform:
The signal generator waveform type is fixed as a Sinewave.

Frequency:
The frequency is fixed at 750Hz.

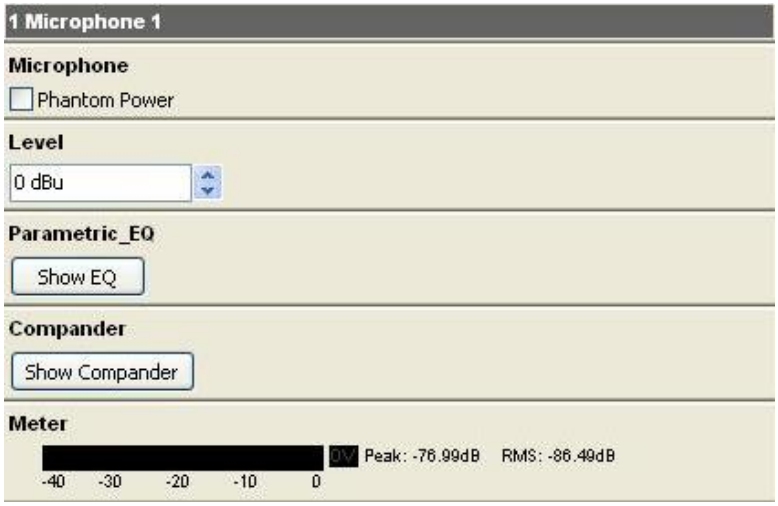
Amplitude:
The amplitude is fixed at 0dBFS.

14.2 Mic/Line input configuration

For each mic/line input, the following can be configured

- Phantom power
- Input Level (Sensitivity)
- Parametric Equalizer (future)
- Compressor/Limiter (future)

Here are the controls as viewed in ASIControl's node pane (its right pane):



Further information on each control follows.

14.2.1 Phantom Power

Phantom power (48v) can be set on/ off independently for each channel by checking/unchecking the checkbox.

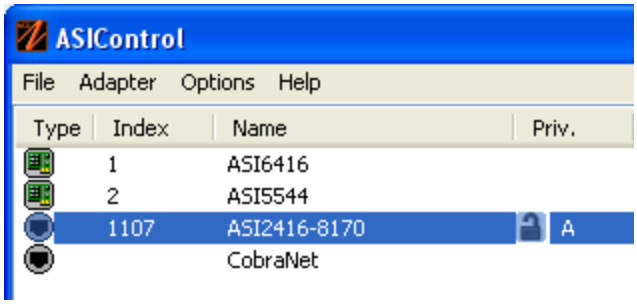
Note: Phantom power cannot be turned on and will be disabled if the Level is higher than -9dBu.

14.2.2 Input Level

The input level can be set between –60 and +26dBu in 1dB increments by either using the up/down arrows to the right of the Level textbox or by clicking in the Level textbox, typing in a particular number, and then hitting the <Tab> key on the keyboard.

14.3 Access control using passwords – Future feature

Beginning with driver 4.10.00, some AudioScience adapters support password protected access to adapter controls. In ASIControl, an adapter that supports passwords shows a padlock in its adapter information line of the adapter list window. For example see



By default, if a password has not been set, the adapter operates as if there is no active password. Any user has complete access to all the device functionality.

The access control system supports 3 different “user” login levels. They levels their associated privileges are outlined in the following table.

Username	Controls	Scripting	Configuration Save/restore	Passwords
Admin	Read/write	Read/write	Read/write	Write
User	Read	No access	No access	No access
Guest	Read	No access	No access	No access

Password information is stored on the adapter itself, not the host computer, so if a different computer is used to control the adapter, the same passwords should be used.

14.3.1.1 Login in states

14.3.1.1.1 Admin

This is the default state if no passwords have been set on the device. Or, the user has logged in using the Administrator password. This is indicated in the ASIControl as: A

14.3.1.1.2 User

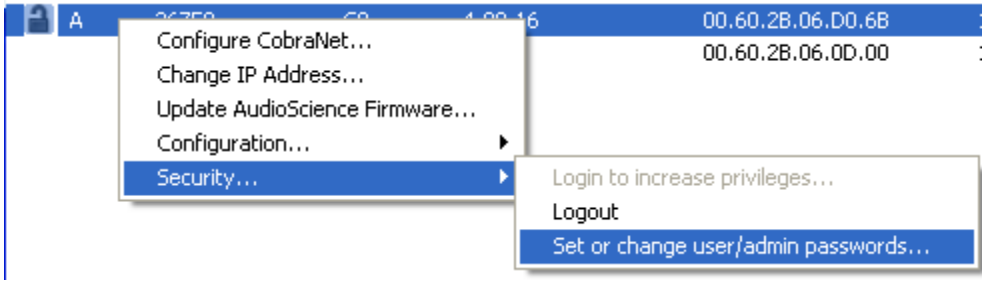
The user successfully has logged in using the User password. This is indicated in the ASIControl as: U

14.3.1.1.3 Guest

If passwords have been set, but the user has not logged on, the Guest privilege level in invoked. This is indicated in the ASIControl as: G

14.3.1.2 Setting passwords

Right click on the highlighted adapter and follow the menu tree to



the “Set…” option. The following dialog will show.

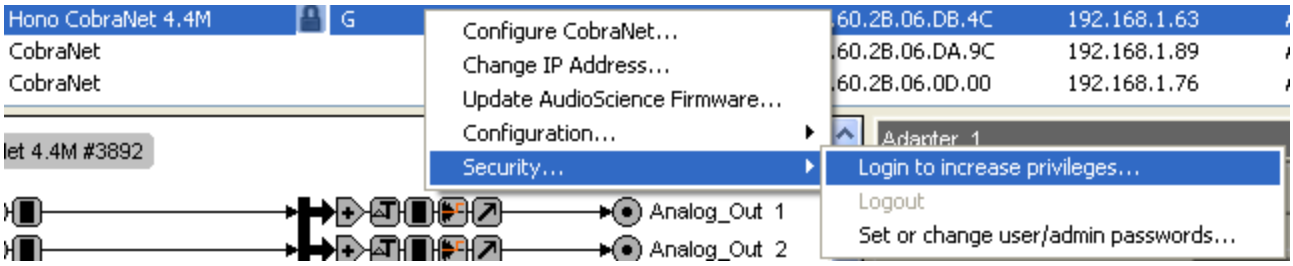
Select User or Admin from the first combo box and enter the new password in the two password fields.

Upon setting a password for the first time on a device that has never had a password before, Adim rights are assumed to be in place for the current user, so after setting the password the user should logout if they wish the adapter to be secured.

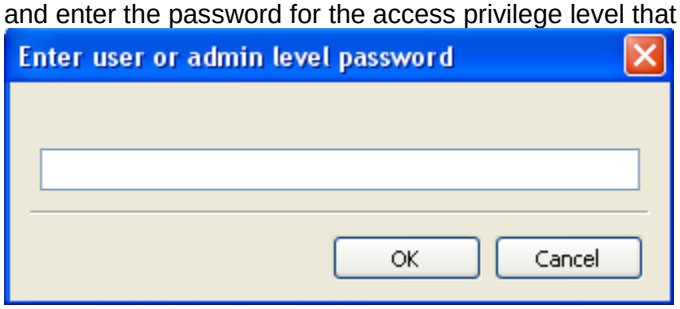
Note that on an PCI or PCIe adapter that has password support, the user should not power down or restart the PC within 30 seconds of changing the passwords. In other words, permanent storage of the updated passwords settings can take up to 30 seconds.

14.3.1.3 Logging in

Right click on the adapter in the list to login and increase user rights.

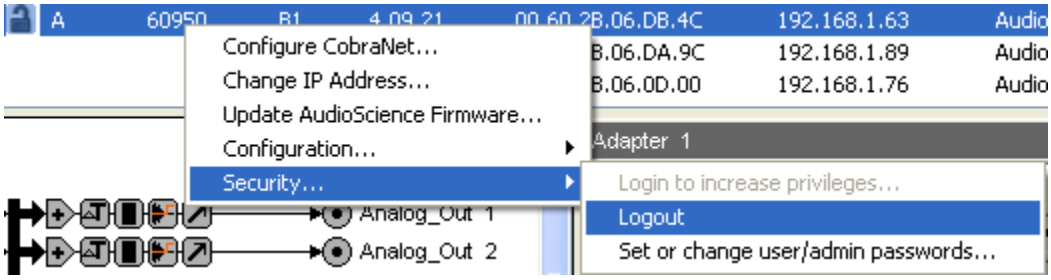


and enter the password for the access privilege level that you wish to use.



14.3.1.4 Logging out

After completing privileged operations, logout is performed by right clicking on the adapter and selecting the logout option.

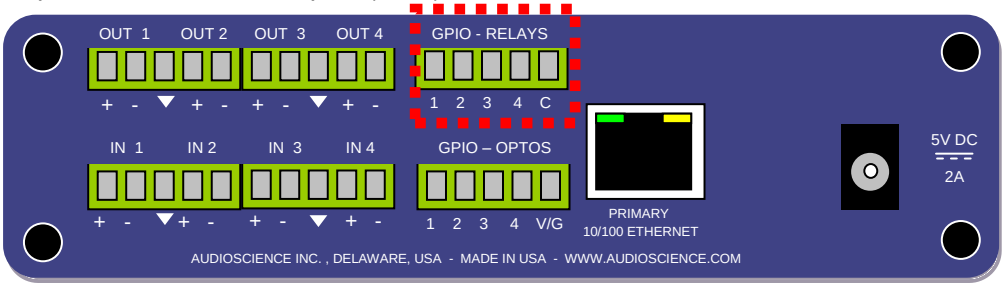


14.4 GPIO

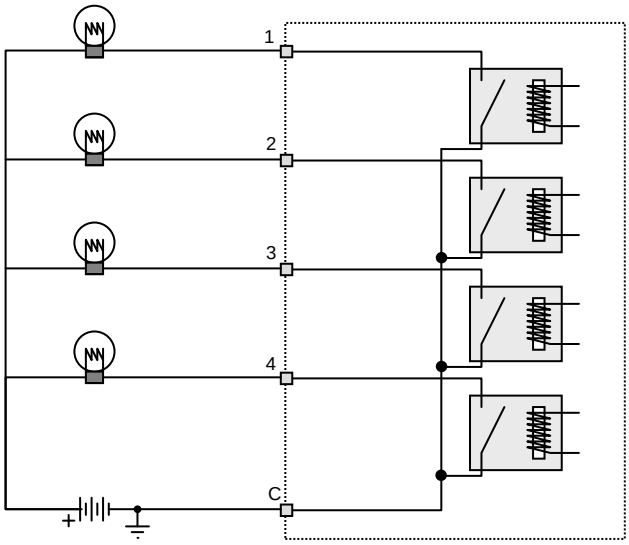
General Purpose Input/Output (GPIO)

14.4.1 Outputs

The Hono Mini provides four GPIO outputs (1…4).

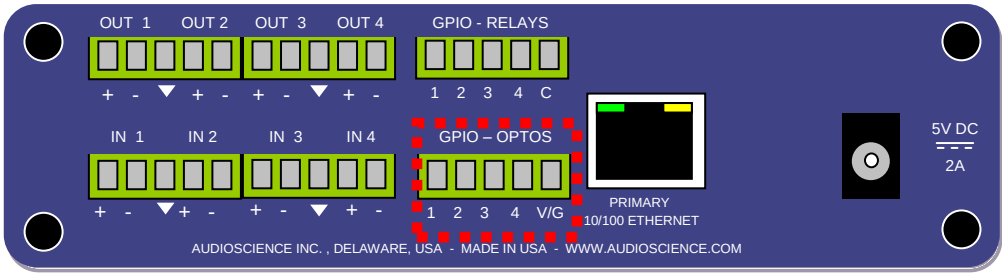


Each outputs consists of a normally open relay with one side connected to a common pin (C). The current through each relay should be limited to 500mA.

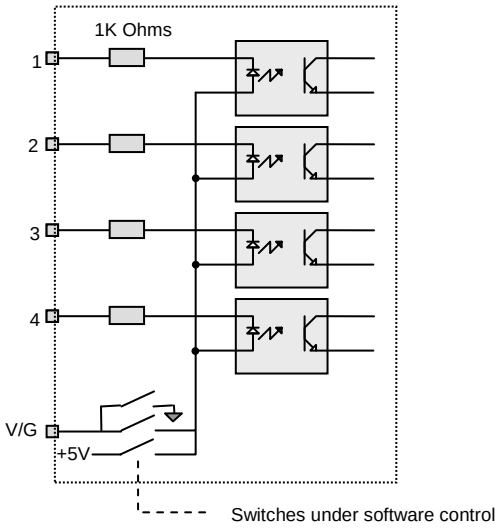


14.4.2 Inputs

The Hono Mini GPIO provides four opto-isolated inputs (1...4).



The voltage powering the LED in the opto-isolator may either be supplied from an external source through the V/G pin or may be powered from the Hono Mini's internal +5V supply. The opto-isolator voltage is software selectable using ASIControl and the setting is stored in the units non-volatile memory,

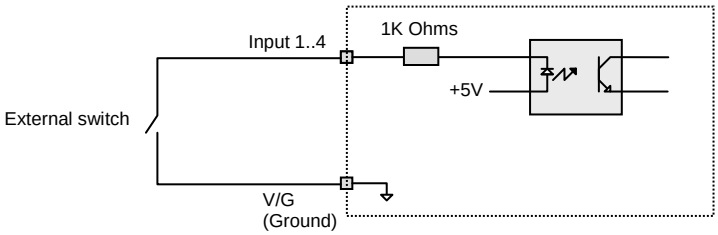


14.4.2.1 V/G Pin Function - Ground

When using the internal voltage source, the V/G pin becomes ground. Connecting an opto-isolator input to V/G will turn it on. Approximately 5mA is needed to fully turn on each opto-isolator. When using the internal +5V power source then the internal 1K ohm current limiting resistors are all that is needed.

NOTE: In this mode the opto-isolators are not being used as isolators.

The following diagram shows the connections needed if using this mode.



14.4.2.2 V/G Pin Function – Power Input

When using an external power source for the opto-isolators, the V/G pin becomes an input for the external voltage. In this mode, a maximum external voltage of +14V can be used, so as not to damage the opto-isolators.

Use the following diagram as a guide to connections: