Echo Test + Measurement

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Who is Echo T+M?

- Formerly Echo Digital Audio – we made pro audio soundcards!
- Established in 1978 as Street Electronics
- Echo II interface for Apple II
- Layla, Gina and AudioFire pro audio soundcards
- 2014 launched the AIO Test System
- Over 25,000 units shipped since 2014!

Milo Street – CEO
Matt Gonzalez – CTO
Kris Jackson – VP Sales, Marketing, Prod. Dev.
Leah Meyer – Controller, Finance & Accounting
Mike Libby – Technician, Quality Assurance, & Support

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Echo AIO Test System Overview

Audio Test Interface - *Soundcard Alternative!*

- The Echo AIO™ is a dedicated modular audio test ***hardware*** platform ideally suited for high-volume continuous mass production and quality control verification applications.
- The AIO combines the functionality of multiple standalone devices into a single, integrated unit, making test stations both ***more reliable*** and ***less expensive***.
- AIO provides ***industry standard test connections*** and signal conditioning to simplify test setups and minimize test configuration time.
- ***Appears as a standard soundcard*** – ASIO, WASAPI (Windows), CoreAudio (Mac)

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Echo AIO Key Features

Factory Tough – Lab Quality!

Test Industry Standard Connections	BNC inputs with CCP and TEDS, EuroBlock outputs
Reliability	All locking connectors, no front panel controls
Choice of inputs and outputs	Mic/Line inputs, Line/Headphone/Amplifier outputs
Impedance measurements	Integrated sense resistors on Headphone and Amp outputs
High Channel Count	8 inputs X 4 outputs analog, 14 X 12 mixed digital + analog
Multiple control methods	Control Panel App, Command Line Interface, Shared Library Interface
TDM I/O	10 X 10 TDM bus, up to 32 bits per sample, internal and external sync

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Echo AIO Key Features

Auxiliary GPIO Control	Optional 8 GPIO inputs and 8 GPIO outputs are available for control signals
Battery Simulation	Variable 5V DC power supply with current monitor simulates battery under-voltage and over-voltage conditions and monitors current for wearable products.
5V DC Power Supply	Optional fixed 5V DC supply for powering test fixtures
Pressure, Temperature, Humidity Sensor	For establishing environmental baselines
Test + Measurement Technical Support	Technical support geared to test and measurement issues
USB 2 Interface	Echo AIO™ is a standard USB 2.0 audio class device
Audio APIs	Echo AIO™ supports ASIO, WASAPI and macOS CoreAudio

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AIO versus Soundcards

Manufacturer	ECHO	RME	RME	RME	Lynx	Lynx
Product	**ECHO AIO**	**Fireface UC**	**Fireface UCX**	**Fireface 802**	**Aurora**	**E22**
Locking AC Cord	Yes	No	No	No	No	No
Locking USB Connector	Yes	No	No	No	No	No
IEPE Inputs with CCP/TEDS	Yes	No	No	No	No	No
Fixed 5V 1A DC Power Supply	Yes	No	No	No	No	No
Variable 2V 10mA DC Power Supply	Yes	No	No	No	No	No
Amplifier Outputs	Yes	No	No	No	No	No
Impedance Mesurements	Yes	No	No	No	No	No
GPIO	Yes	No	No	No	No	No

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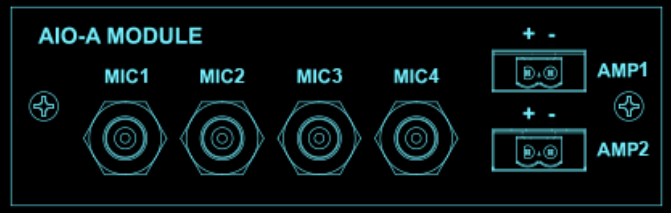
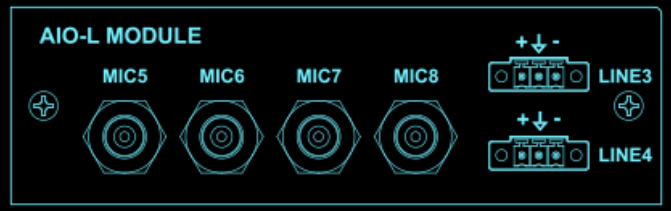
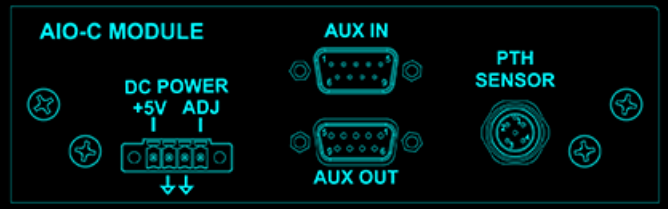
AIO Interface Module

- Required for each AIO chassis
- IEC Power – Locking
- USB 2 – Locking
- Left slot (viewed from the back)

AIO Test Modules







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AIO A-Module

- ❖4 X Mic/Line Inputs (BNC Connectors) w/CCP and TEDS
- ❖2 X 10W Class-D Amplifier Outputs (EuroBlock Connectors)
- ❖Maps to audio driver as a 4 input channels and 2 output channels
- ❖All inputs and outputs can be used simultaneously

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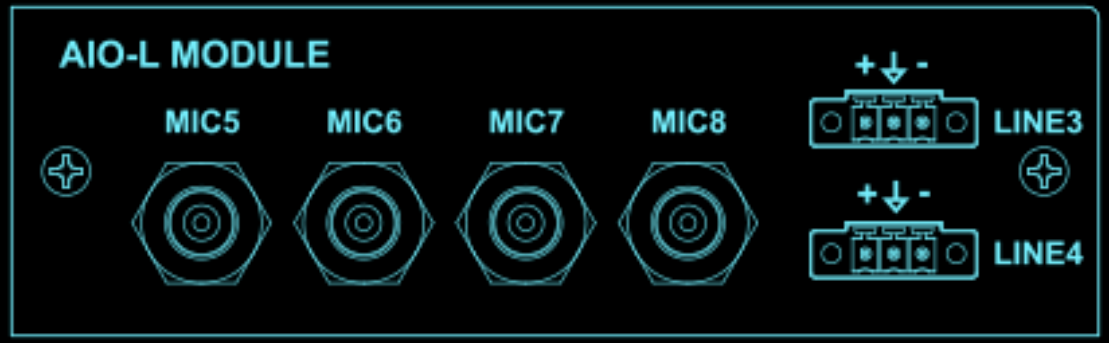
AIO L-Module



- ❖4 X Mic/Line Inputs (BNC Connectors) w/CCP and TEDS
- ❖2 X differential Line Outputs (EuroBlock Connectors)
- ❖Maps to audio driver as a 4 input channels and 2 output channels
- ❖All inputs and outputs can be used simultaneously

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AIO S-Module

- ❖2 X Mic/Line Inputs (BNC Connectors) w/CCP and TEDS
- ❖2 X 10W Class-D Amplifier Outputs (EuroBlock Connectors).
- ❖SPKR Out has .1 Ohm integrated sense resistor
- ❖Voltage Monitor (VMON) and Current Monitor (IMON) inputs
- ❖Maps to audio driver as a 4 input channels and 2 output channels
- ❖All inputs and outputs can be used simultaneously

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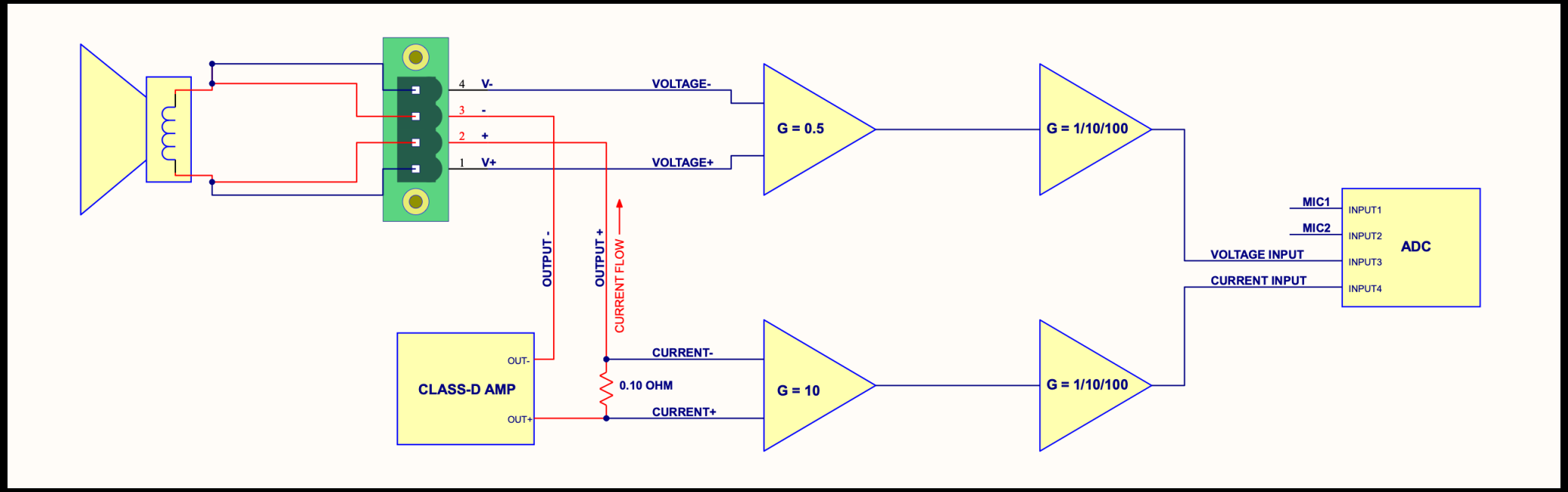
AIO S-Module

Block Diagram



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Coming Q4!

AIO H-Module

- 2 X Mic/Line Inputs (BNC Connectors) w/CCP and TEDS
- 2 X Headphone Outputs (EuroBlock Connectors)
- 0.1 Ohm integrated sense resistor switchable to either side
- Voltage Monitor (VMON) and Current Monitor (IMON) inputs
- Maps to audio driver as a 4 input channels and 2 output channels

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AIO T-Module

- 10 Inputs X 10 Outputs TDM bus (BNC connectors)
- 1.8V or 3.3V logic levels
- 24.576 MHz master clock
- Supports up to 32 bits per sample, 192 kHz sample rate
- Maps to audio driver as a 10 input, 10 output device
- All inputs and outputs can be used simultaneously

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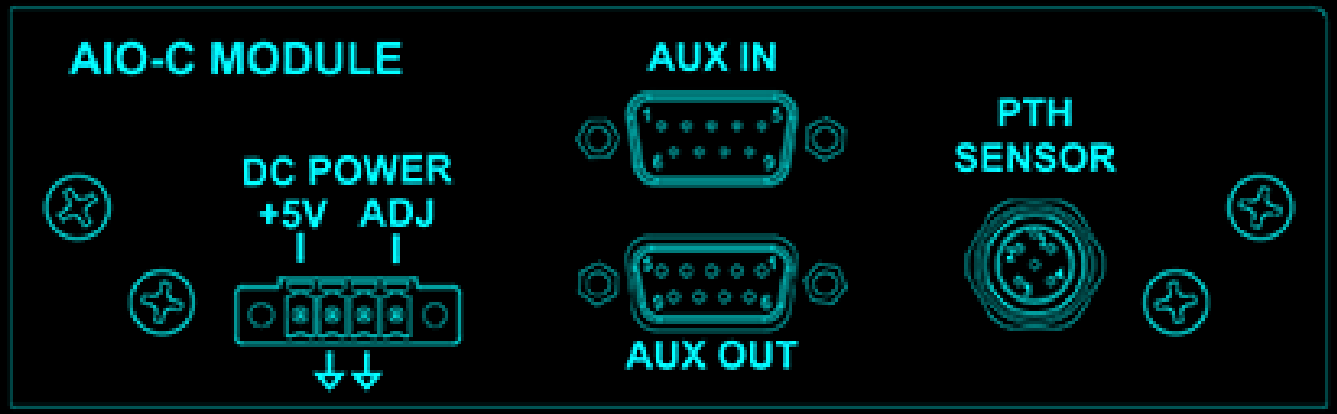
Coming Q4!

AIO C-Module



- 8 X GPIO inputs, 8 X GPIO outputs
- 5V @ 1A fixed DC Power Supply for driving fixtures
- 5V @ 1A variable DC Power Supply w/current monitor for battery simulation
- Pressure, Temperature, Humidity sensor input for environmental baselines
- External PTH sensor included on 2m cable
- No audio on this module

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Coming Q2!

AIO C-Module

PTH Sensor

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AIO Hardware Configurations

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AIO Hardware Configurations

- The AIO Chassis has 3 module slots
- The 1st module slot on the left (viewed from the rear) is always the Interface Module
- The AIO Model name tells you the type of module and the position of the modules in the two remaining slots

  Example 1: AIO-SA – has an AIO S-Module in the middle slot and AIO A-Module in the right-hand slot

  Example 2: AIO-A1 has an AIO A-Module in the middle slot and a blank panel in the right-hand slot

  Example 3: AIO-A2 has an AIO A-Module in each slot

AIO Common Configurations

Model	Inner Module	Outer Module	Mic/Line Inputs	Line Outputs	Headphone Outputs	Amp Outputs	Impedance	Digital	5VDC & Battery Simulator	GPIO	PTH
AIO-A1	AIO-A		4			2					
AIO-A2	AIO-A	AIO-A	8			4					
AIO-AC	AIO-A	AIO-C	4			2			Yes	8-Aug	Yes
AIO-AH	AIO-A	AIO-H	6		2		1				
AIO-AT	AIO-A	AIO-T	4			2		TDM 10/10			
AIO-C1		AIO-C							Yes	8-Aug	Yes
AIO-H1	AIO-H		2		2		1				
AIO-H2	AIO-H	AIO-H	4		4		2				
AIO-L1	AIO-L		4	2							
AIO-L2	AIO-L	AIO-L	8	4							
AIO-LT	AIO-L	AIO-T	4	2				TDM 10/10			
AIO-S1	AIO-S		2			2	1				
AIO-S2	AIO-S	AIO-S	4			4	2				
AIO-SA	AIO-S	AIO-A	6			3	1				
AIO-SL	AIO-S	AIO-L	6	2		2	1				
AIO-T1		AIO-T						TDM 10/10			

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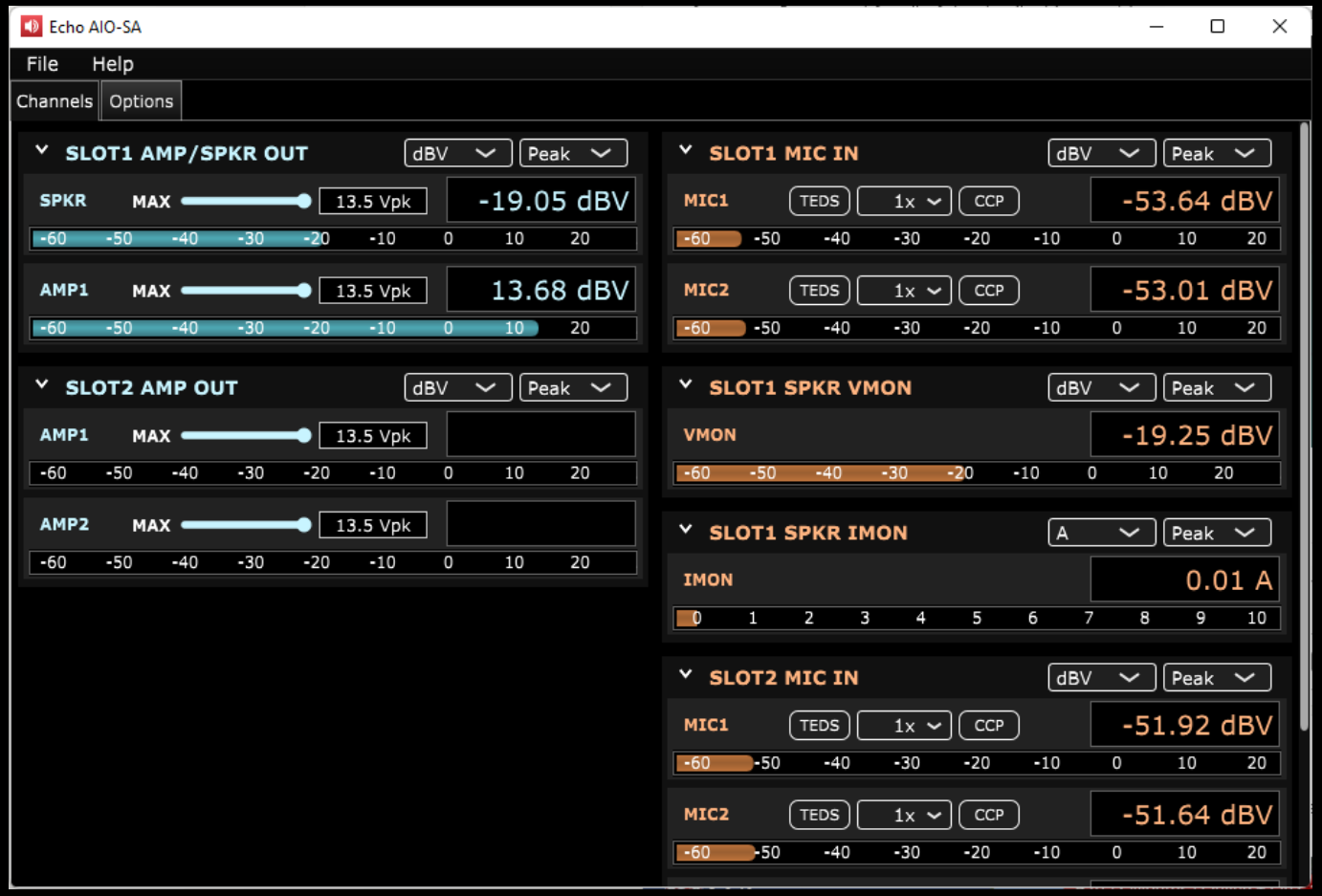
AIO Control Panel



- Basic input and output gain settings
- CCP on/off for mics
- ASIO driver settings
- Diagnostics log
- Firmware updates
- Calibration settings
- PTH sensor data
- TEDS data

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AIO Command Line Interface

- Allows control of the AIO hardware from third-party software.

Example - to set 10x gain and enable the constant current for MIC3:

```
echoaio.exe input=3 gain=10 ccp=on
```

- The command-line application can also configure the entire unit from a text file.

AIO Dynamic Library (API)

- The dynamic library offers a standard C-language interface for users who want to write their own software
- Supports macOS and Windows

AIO Audio Drivers

- Windows Audio (WASAPI)
  - Default is disabled
    - Don’t want system sounds to play through the AIO
  - Required for some 3rd party software
    - Can be enabled in the Control Panel app

- ASIO (recommended)
  - Select “ASIO Echo AIO” in your test software

- macOS (CoreAudio)

- Drivers install along with AIO Control Panel app

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3rd Party Software

- Any software that supports ASIO, WASAPI or CoreAudio will work
- Ideal for Audio Precision APx500 Flex
  - AIO-SA and AIO-A2 have been certified by AP. Project files and setup files available.
- Virtins Multi-instrument
- Loudsoft
- ARTA
- LabView
- SoundCheck
- Homegrown

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Some AIO Use Cases

	AIO-A1 AIO-A2	AIO-L1 AIO-L2	AIO-S1 AIO-S2 AIO-SA	AIO-H1	AIO-AC
Basic speaker (no impedance) – requires amp output	✓		✓		
Speaker with impedance – requires sense resistor, amp			✓		
Basic headphones/earbuds	✓	✓	✓	✓	
Headphones/earbuds with impedance – requires sense resistor			✓	✓	
ANC headphones/earbuds	✓	✓	✓	✓	
ANC headphones/earbuds with impedance			✓	✓	
Analog microphone	✓	✓	✓		
Hearing aids – battery simulation, GPIO			✓		✓
Linear actuator	✓	✓	✓		
Wearable audio device – battery simulation					✓

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Thank You!