apollo | solo

Thunderbolt 3-Powered Audio Interface
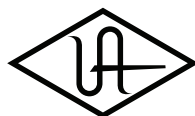

Apollo SOLO Manual

UAD Software v11

Manual Version 240715

UNIVERSAL AUDIO

www.uaudio.com

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A Letter from Bill Putnam Jr.

Thank you for choosing the Apollo Solo Thunderbolt 3 Audio Interface as part of your music making experience. We know that any new piece of gear requires an investment of time and money — and our goal is to make your investment pay off.

Universal Audio's family of audio interfaces represent the best examples of what UA has stood for over its long history; from its original founding in the 1950s by my father, to our current vision of delivering the best of both analog and digital audio technologies.

Starting with its high-quality analog I/O, Apollo Solo's superior sonic performance serves as its foundation. This is just the beginning however, as Apollo Solo is the only bus-powered Thunderbolt 3 audio interface that allows you to run UAD plug-ins in real time. Want to monitor yourself through a Neve® channel strip while tracking bass through a classic Fairchild or LA-2A compressor? Or track vocals through a Studer® tape machine with some Lexicon® reverb?* With our growing library of more than 100 UAD plug-ins, the choices are limitless.

At UA, we are dedicated to the idea that technology should serve the creative process — not be a barrier. These are the very ideals my father embodied as he invented audio equipment. We believe Apollo Solo will earn its way into your creative workflow by providing stunning fidelity and rock-solid reliability for years to come.

Please feel free to reach out to us via our website www.uaudio.com, and via our social media channels. We look forward to hearing from you, and thank you once again for choosing Universal Audio.

Sincerely,

Bill Putnam Jr.

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Introducing Apollo Solo

Shape your Recordings Into *Records* with Genuine UA Conversion and Classic Studio Sounds.

Apollo Solo is the world's finest Thunderbolt 3-powered desktop recording audio interface for Mac and Windows — delivering class-leading audio conversion, two Unison™ mic preamps, and a suite of onboard UAD plug-ins for recording album-quality results, in real time.

This compact 2x4 interface starts with esteemed Apollo A/D and D/A conversion to sonically outperform anything in its class. And with its Unison technology and built-in UAD-2 processing, you can record through classic studio tools including the UA 610-B Tube Preamp & EQ, LA-2A and 1176 compressors, and more — with near-zero latency.

Now You Can:

- Record with class-leading A/D and D/A conversion — as heard on hundreds of hit records
- Track with near-zero latency through mic preamp and guitar amp emulations from Neve,® API,® Fender,® and more using Unison™ technology*
- Mix with included UAD plug-ins like the Teletronix® LA-2A and 1176 compressors, Pultec® EQs, and more
- Includes LUNA Recording System — a fully-integrated and inspiring music production application (Mac only)
- Create on-the-go with a sonically superior, bus-powered interface with rugged all-metal construction
- Enjoy clear, detailed monitoring with the best-sounding headphone amplifier in its class

Unison™ Technology for Stunning Mic and Guitar Preamp Emulations

Apollo Solo's Unison technology gives you the tone, touch, and "feel" of the world's most sought-after preamps. These include the bundled UA 610-B Tube Preamp, plus authentic mic preamp emulations from Neve® and API,® plus guitar amp emulations from Fender® and Marshall® — complete with their signature impedance, gain stage "sweet spots," and component-level circuit behaviors.*

The secret to Unison is its hardware-software integration between Apollo Solo's mic preamps and its onboard UAD-2 processing. Simply place a Unison preamp plug-in on your mic input in Apollo Solo's Console software, and it physically reconfigures Apollo Solo's impedance and gain staging — giving you the classic tube and transformer sounds of the world's most recorded mic preamps and guitar amps.

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A Full Suite of Classic Studio Processing Onboard

Right out of the box, Apollo Solo provides a suite of incredible analog emulation plug-ins including the world's only authentic Teletronix LA-2A and 1176LN compressors, Pultec EQs, and much more. From the tube warmth of the Pultec EQ on guitars, to the gentle limiting of the LA-2A on vocals, your recordings will take a giant leap forward in rich, sonically complex analog sound.

Access the World of UAD Powered Plug-Ins

Beyond the included Realtime Analog Classics plug-ins, Apollo Solo lets you tap into the full library of award-winning UAD Powered Plug-Ins — including vintage EQs, Compressors, Reverbs, Tape Machines, Auto-Tune and more — in real time. With exclusive emulations from Neve, Ampex, Lexicon, Fender, Antares, Moog, and more,* the creative possibilities are nearly endless.

Vintage Guitar and Bass Amps

For guitarists and bassists, Apollo Solo includes Unison technology on its front panel instrument input — giving you access to dead-on emulations of amps like the Fender® '55 Tweed Deluxe, Ampeg® B-15N Bass Amplifier, and the included Marshall® Plexi Classic — all available at near-zero latency for songwriting and recording.

Create with a Fast, Natural Workflow in LUNA

Apollo Solo is the ideal entry point to LUNA, UA's groundbreaking music production application. Whether you're exploring the analog sounds and workflow of Neve summing and Studer tape Extensions or creating with inspiring LUNA Instruments like Moog Minimoog and Ravel grand piano, LUNA transforms Apollo Solo into a fully-integrated recording system.

Best-in-Class Headphone Amplifier

Apollo Solo's onboard headphone output is louder and punchier, with lower noise and flatter frequency response versus any interface in its class. This means you can confidently track and mix using headphones, knowing you're hearing every sonic detail.

Ready to Go

With its robust all-metal construction and bus-powered Thunderbolt 3 operation, Apollo Solo is the only "clutter-free" portable audio interface that truly delivers album-quality results. It's like having a virtual analog studio that fits onto any desktop, and easily travels in your laptop bag.

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Apollo Solo Hardware Features

Key Features

- Best in class audio quality with 24-bit/192 kHz conversion
- Realtime UAD Processing — track through vintage compressors, EQs, tape machines, and guitar amp/pedal plug-ins with near-zero latency
- 2 premium mic/line preamps, 2 monitor outputs, front-panel Hi-Z instrument input and stereo headphone output
- Unison™ technology for stunning models of classic mic preamps and guitar amps
- UAD-2 DSP accelerator processing onboard
- Thunderbolt 3 connection for blazing-fast PCIe speed on modern computers
- Bus-powered design provides portability and less cable clutter
- Uncompromising analog design, superior components, and premium build quality throughout

Audio Interface

- Sample rates up to 192 kHz at 24-bit word length
- 2 x 4 simultaneous input/output channels
    - Two channels of analog-to-digital conversion via:
        - Two balanced mic/line inputs
        - One Hi-Z instrument input
    - Four channels of digital-to-analog conversion via:
        - Stereo monitor outputs
        - Stereo headphone output

Microphone Preamplifiers

- Two high-resolution, ultra-transparent, digitally-controlled analog mic preamps
- Unison technology for stunning models of classic mic preamps and guitar amps
- Front panel and software control of all preamp parameters
- Low cut filter, 48V phantom power, 20 dB pad, polarity inversion, and stereo linking

Monitoring

- Stereo monitor outputs
- ¼" stereo headphone output
- All outputs are independently addressable

UAD-2 Inside

- Onboard UAD-2 DSP Accelerator with SHARC® SOLO core processing
- Realtime UAD Processing on all inputs
- Same features and functionality as other UAD-2 devices and plug-ins when used with a DAW
- Complete UAD Powered Plug-Ins library is available online

Other

- Attractive and durable desktop form factor
- Easy firmware updates
- One year limited warranty

Package Contents

- Apollo Solo Thunderbolt 3 Audio Interface
- Getting Started URL card

Apollo Solo Software Features

Console Application

General:

- Enables tracking and/or monitoring with Realtime UAD Processing and Unison technology
- Analog-style mixer for low-latency monitoring and tracking with UAD plug-ins
- Remote control of Apollo Solo hardware features and functionality
- Console sessions can be saved/loaded for instant recall of any configuration
- Virtual I/O for routing DAW channels into Console and Console channels into DAW
- Multiple Undo/Redo for edit operations
- Plug-In Scenes for recalling settings over MIDI, even in the middle of a performance

Realtime UAD Processing:

- UAD plug-in processing on Apollo Solo inputs with indiscernible latency
- Up to five UAD plug-ins can be serially chained on each input and aux return
- UAD insert processing can be monitored while recording wet or dry
- Sub-2ms round-trip latency with five serial UAD plug-ins at 96 kHz sample rate
- Unison technology on mic/line preamps for fully authentic preamp emulations from Neve, API, Manley, Avalon, and more*

Channel Inputs:

- Input channels for hardware and virtual inputs
- Level, pan, solo, and mute controls on all inputs
- Two stereo auxiliary sends with level and pan controls on all inputs

- Virtual inputs accept any outputs from DAW
- Stereo headphone cue sends with level and pan controls on all inputs and auxes
- Adjacent input pairs can be linked for convenient stereo control

Monitoring:

- Stereo monitor mix bus with level, mute, solo, dim, and source select controls
- Separate stereo headphone cue mix bus
- Independent monophonic sum controls for both mix buses

Auxiliary Buses:

- Two stereo auxiliary send/return buses with independent level, mute, and mono sum controls
- Four plug-in inserts per auxiliary return for Realtime UAD Processing on auxes
- Auxiliary buses can be routed to main monitor mix and/or headphone outputs
- Independent pre/post switching on each auxiliary bus

Metering:

- Signal level meters with peak hold and clip indicators on all inputs
- Dual peak hold meters with signal peak LEDs display monitor bus levels
- Input meters are globally switchable to display pre or post fader signal levels
- Independently selectable peak/clip hold times and global clear clips button

Console Recall plug-in

- Convenient access to Console's monitor controls via DAW plug-in
- Saves Apollo Solo configurations inside DAW sessions for easy recall of settings
- VST3, AAX 64, and Audio Units plug-in formats

UAD Powered Plug-Ins

- Award-winning audio plug-ins for monitoring, tracking, mixing, and mastering
- UAD plug-ins can be used simultaneously within Console and/or DAW
- All UAD plug-ins include fully-functional 14-day demo period
- Complete UAD plug-ins library is available online at www.uaudio.com

UAD Meter & Control Panel application

- Configures global UAD settings
- UAD-2 resource gauges for DSP and Memory usage
- Facilitates automatic authorization of UAD plug-in licenses

Device Drivers

- All hardware inputs and outputs can be individually addressed by DAW
- All of Console's mix buses can be routed to DAW inputs for recording
- I/O Matrix feature for customizing Core Audio & ASIO I/O routes and names

UAD Powered Plug-In Features

- Run UAD plug-ins with Apollo Solo's integrated UAD-2 DSP Accelerator
- Apollo Solo includes the Realtime Analog Classics UAD plug-ins bundle
- Over 100 UAD plug-ins available at the UA online store
- Fully functional 14 day demo available for all UAD plug-ins
- Realtime UAD Processing via Console allows monitoring and tracking through UAD plug-ins with near-zero latency, regardless of DAW's I/O buffer setting
- Includes VST3, AAX 64, and Audio Units plug-in formats for compatibility with all major DAWs including Cubase, Pro Tools, Logic Pro, and more

Some of the UAD plug-ins included with Apollo Solo

About Apollo Solo Documentation

Documentation for Apollo Solo is extensive, so instructions are separated by areas of functionality. Each functional area has a separate manual. An overview of each manual, and how they are accessed, is provided in this section.

Some manual files are in PDF format. PDF files require a free PDF reader application such as Preview (Mac) or Edge (Windows).

Apollo Solo Manual

The Apollo Solo user manual includes everything about Apollo Solo except the descriptions of, and operating instructions for, individual UAD plug-in titles.

Hardware – Complete details about the Apollo Solo hardware, including detailed descriptions of all hardware features, controls, connectors, and specifications.

Software – Detailed information about how to integrate Apollo Solo's functionality into the DAW environment and configure and operate all Apollo Solo software features.

System – Detailed information about the overall Apollo Solo/UAD-2 system, the UAD Meter & Control Panel application, buying optional plug-ins at the UA online store, and more.

UAD Console Manual

UAD Console is Apollo's companion software application, for controlling up to four Apollo units and their digital mixing and low-latency monitoring capabilities. UAD Console is where you configure and operate Realtime UAD Processing with UAD-2 plug-ins and Unison technology.

UAD Plug-Ins Manual

The features and functionality of all individual UAD Powered Plug-Ins developed by Universal Audio are detailed in the UAD Plug-Ins Manual. Refer to this document to learn about the operation, controls, and user interface of each UAD plug-in title developed by UA.

Direct Developer Plug-In Manuals

UAD plug-ins include titles created by our Direct Developer partners. Documentation for these 3rd-party plug-ins are separate files written and provided by the plug-in developers. The file names for these plug-in manuals are the same as the plug-in titles.

Accessing Documentation

Any of these methods can be used to access documentation:

- Choose Documentation from the Help menu within the UAD Console application
- Click the Product Manuals button in the Help panel within the UAD Meter & Control Panel application
- All manuals are available online at help.uaudio.com

Installed File locations

The UAD Plug-Ins Manual and Direct Developer manual files are placed on the system drive during installation so they can be accessed from VST2-format UAD plug-in toolbars.

Windows

- Start Menu>All Programs>UAD Powered Plug-Ins>Documentation

Mac

- /Applications/Universal Audio/Documentation

Host DAW Documentation

Each host DAW software application has its own particular methods for configuring and using audio interfaces and plug-ins. Refer to the host DAW documentation for specific instructions about using audio interface and plug-in features within the DAW.

Glossary

This manual uses technical terms and acronyms that may be unfamiliar. Refer to the Glossary for the definitions of many of these terms.

Hyperlinks

Links to other manual sections and web pages are highlighted in blue text. Click a hyperlink to jump directly to the linked item.

> *Tip: Use the back button in the PDF reader application to return to the original page after clicking a hyperlink.*

Technical Support

For additional resources, or if you need to contact Universal Audio for assistance, see the Technical Support page.

Getting Started

Overview

Before you can use Apollo Solo, you need to complete these steps:

1. Connect Apollo Solo to your computer with a Thunderbolt™ 3 cable (not included)
2. Download and install the latest UAD software and UAD Console via UA Connect
3. Register your Apollo Solo hardware
4. Authorize your UAD plug-ins

Additionally, you'll want to learn these essential Apollo Solo operations:

- Connect to Input Sources and Monitor System – How to connect your audio gear.

- Setting Hardware Input/Output Levels – Learn how to adjust Mic/Line/Instrument input gain levels and monitor/headphone output volume levels.

This chapter will guide you through these procedures. For assistance, see the Technical Support page.

Apollo Solo System Requirements

Note: For operating system and storage requirements, and complete compatibility information, please visit help.uaudio.com.

- Mac or Windows computer with available Thunderbolt 3 port
- Thunderbolt 3 cable (not included)
- Internet connection to download software and authorize UAD plug-ins
- Quad Core i7 or better processor recommended

Hardware Setup

Choose a Suitable Location

- Locate Apollo Solo on a flat surface.
- The location should be sturdy enough to securely hold its weight and withstand the pressure of operating the top panel controls.
- Leave enough room at the front and rear of the unit for connecting cables.

Connect Apollo Solo to the Computer

Caution: Before connecting Apollo Solo to the computer, lower the volume of the monitor speakers (if connected) and remove headphones from your ears.

1. Connect a Thunderbolt 3 cable (not included) to the Thunderbolt 3 port on Apollo Solo's rear panel.
2. Connect the other end of the Thunderbolt 3 cable to a Thunderbolt 3 port on the computer.

About Thunderbolt 3 Power

- Apollo Solo is bus powered by its Thunderbolt 3 connection to the computer. A power cable, external power supply, or Thunderbolt 2 cable cannot be used to power Apollo Solo.
- When using Apollo Solo with notebook computers, connecting the computer to AC power is suggested to conserve the computer's battery resources.
- When notebook computers are sleeping, power events such as connecting/disconnecting Thunderbolt devices, USB-C devices, and/or power adapters may cause peripheral devices (including Apollo Solo) to briefly power on.

About Thunderbolt 3 Ports and Cables

Important: Although Thunderbolt 3 always uses USB-C connectors, not all USB-C ports are Thunderbolt 3 ports. Similarly, not all USB-C cables are Thunderbolt 3 cables. Always connect Apollo Solo to a Thunderbolt 3 port with a Thunderbolt 3 cable.

USB-C is not Thunderbolt 3

Thunderbolt 3 uses USB-C connections to transfer data and power. However, USB-C is simply a connector type; it doesn't determine the type of data used by the connector. For example, USB-C connections can be used for Thunderbolt 3, USB 3.1, and other data protocols, so USB-C connections are not always interchangeable.

Does your USB-C connector support Thunderbolt 3?

To determine if a USB-C port or cable connector supports Thunderbolt 3, look for the Thunderbolt icon. The Thunderbolt icon on a USB-C port or cable means the connector supports Thunderbolt 3. Alternately, confirm Thunderbolt 3 compatibility with the device and/or cable manufacturer.

Thunderbolt icon on USB-C cable (left) and USB-C port (right)

Software Setup

The UAD Software must be installed to use Apollo and UAD-2 plug-ins. You'll use UA Connect, our software management program, to obtain and install the UAD software and the UAD Console application.

Our Web Pages Guide You

The Universal Audio website guides you through the process of software installation and hardware registration. The procedure you'll follow to complete this process is detailed below, but the web pages can guide you.

To get UA Connect and begin the process, visit:

uaudio.com/downloads/uad

If you've already registered your Apollo and simply want to update to a newer version of UAD software, use UA Connect.

Installation, Registration, and Authorization Procedure

Note: For optimum results, connect Apollo Solo to the computer with a Thunderbolt 3 cable (not included) before installing the UAD software.

1. Download UA Connect from uaudio.com/downloads/uad and open the app.
2. In UA Connect, click "Apollo & UAD-2" then download/install the UAD Software and UAD Console. Follow the on-screen instructions and be sure to restart the computer when prompted.

Note: If prompted to update the Apollo Solo firmware, see the procedure below.

3. After restarting, your web browser launches and connects to the Universal Audio website. Follow the instructions on our web pages to complete registration of your Apollo Solo hardware and claim your bundled UAD plug-ins.
4. After registration is complete, authorize your UAD system by following the guidance on the registration web pages (or see the UAD Authorization Procedure).

Note: On Windows computers, see Windows Setup for additional steps. On Mac computers, Apollo Solo is ready for use.

Firmware Update Procedure

If the "Apollo Solo Firmware Update" dialog window appears:

1. Click "Load" to begin the process. The "firmware is updating" window appears.
2. Wait for the "Power Off Apollo Solo" window, which appears after the firmware is updated.
3. Disconnect Apollo Solo from the computer for several seconds to power off Apollo Solo. After reconnecting to the computer, the firmware update is complete.

Windows Setup

Disable Windows Notification Sounds

Windows notification sounds (such as a "ding" when an alert window appears) can interfere with DAW audio. Follow the procedure below to disable all notification sounds.

1. Open the Sound control panel. Sound can be accessed by right-clicking the Windows Start Menu and selecting Control Panel from the contextual menu, clicking Hardware and Sound, then clicking Sound within the Hardware and Sound window.

2. Click the Sounds tab within the Sound control panel window. The Windows notification sounds options are displayed.

3. Click the "Sound Scheme" drop menu to display the menu items.

4. Select "No Sounds" from the Sound Scheme drop menu.

5. Click the Apply button to activate the new setting.

Important: Ensure the "Play Windows Startup sound" box is unchecked.
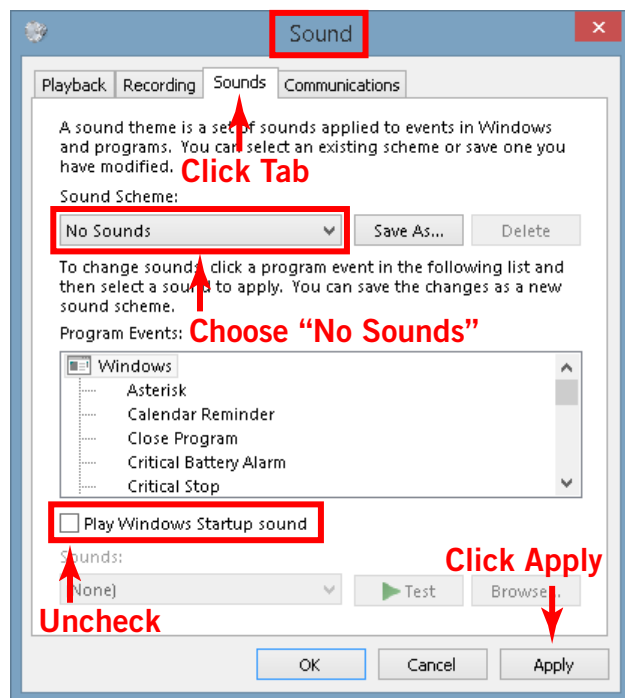
Correct setting shown — "No Sounds" scheme is selected in Sound control panel

Important: See Windows WDM System Sound Notes for important related information when using Apollo Solo for system sound I/O.

Additional Windows Optimizations

- Visit the Apollo Solo Knowledge Base at help.uaudio.com for updated technical news and system optimization information.

Audio Setup

Connect to Input Sources and Monitor System

One typical Apollo Solo audio setup is illustrated below. For complete details about all of Apollo Solo's connectors and controls, see the Hardware Controls & Connectors chapter in this manual.
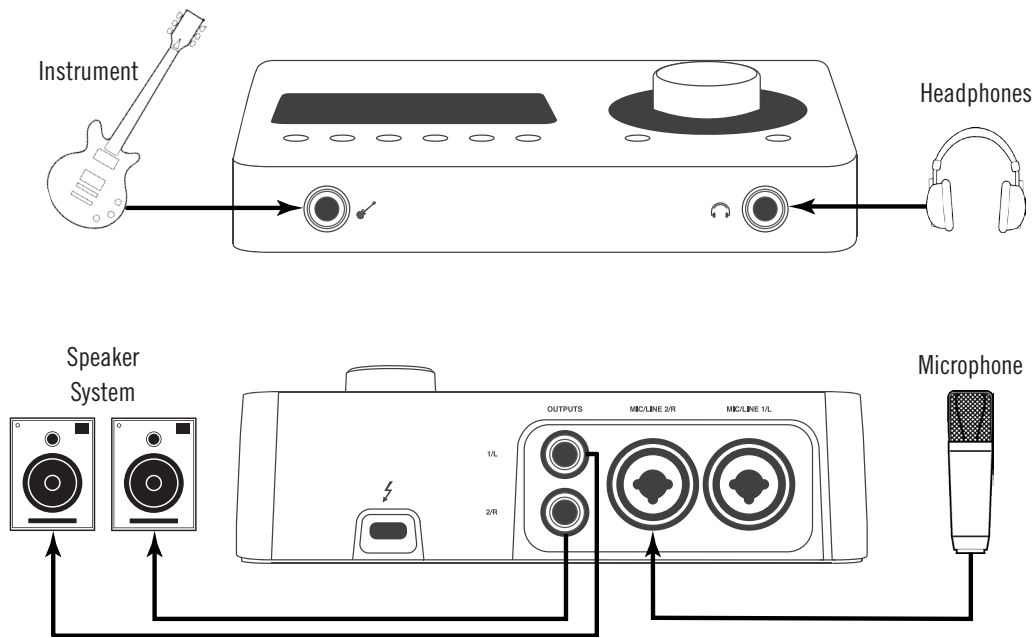
Typical Apollo Solo audio connections

Audio Connection Notes

- **Important:** When plugging into a rear panel combo jack input, the input source jack (either XLR or ¼'' phone) must be manually selected with the top panel INPUT button while in PREAMP Mode. Select MIC when connecting XLR plugs, and LINE when connecting ¼" phone plugs. See Controls Overview for details.

- When an instrument is plugged into the front panel Hi-Z jack, channel 1 automatically switches to the Hi-Z input. To use a MIC or LINE input with channel 1, the Hi-Z instrument jack must be disconnected.

- The main outputs are line level. Connect the main outputs to the line level inputs of powered monitors or an amplifier+speaker system. Balanced TRS or unbalanced TS cables with ¼" plugs may be used.

- In the illustration above, the microphone is plugged into input 2 so the mic (channel 2) can be used at the same time as the Hi-Z instrument (channel 1).

- For optimum sonic performance, always use high-quality shielded audio cables.

Setting Hardware Input/Output Levels

This section explains how to set input gain levels for the hardware inputs (mic, line, and Hi-Z instrument) and adjust volume levels for the stereo hardware outputs (monitor speakers and headphones). Refer to the Top Panel and Display Panel illustrations for the control names and numbers mentioned below.

> *Important: Before proceeding, lower the volume of the monitor speakers and remove headphones from your ears.*

Set Input Gains

1. Select the input channel to be adjusted by pressing the PREAMP button (4) until the Channel Selection Indicator (7) displays the channel (CH1 or CH2).

2. Select the input jack (MIC or LINE) by pressing the Input Select button (5-a) until the Input Selection indicator (9) displays the desired input jack* (see note below).

3. Adjust the channel's gain by increasing the LEVEL knob (1) until the input meter for the channel (8) approaches maximum, but does not reach the red clip LED when the loudest input signal is present. If the level is too high to avoid clipping (if the red "C" LED illuminates) when the LEVEL knob is all the way down, enable the attenuation PAD (5-d).

4. To set the input gain for the other input channel, repeat steps 1 – 3.

Adjust Output Volumes

1. Select the output volume to be adjusted (monitor or headphone) by pressing the MONITOR button (3) until the Monitor Selected (10) or Headphone Selected (12) indicator is lit.

2. Set the volume level by carefully increasing the LEVEL knob (1) until the desired volume is reached (you might need to adjust the volume of the speaker system).

3. To set the volume for the other output (monitor or headphone), repeat steps 1 – 2.

Mute (and Unmute) Monitor Outputs

1. Select the Monitor outputs by pressing the MONITOR button (3) until the Monitor Selected (10) indicator is lit.

2. Press the LEVEL knob (1) to mute the monitor outputs. The Volume Level Indicator LEDs (2) are red when the monitors are muted and MONITOR is selected (10).

3. To toggle the monitor mute state, press the LEVEL knob (1) whenever MONITOR (10) is selected.

Notes:

- *The Hi-Z input is automatically selected and overrides the channel 1 MIC and LINE inputs when a ¼" mono TS (tip-sleeve) plug is connected to the Hi-Z Instrument jack (14) on the front panel.

- To control both channels simultaneously when a stereo source is connected, press the LINK button (5-f) when an input is selected (9).

What Next?

After the initial setups in this chapter are complete, Apollo Solo is ready to be used with the included Console application, your DAW (digital audio workstation) software, and UAD Powered Plug-Ins. To learn how to operate Apollo Solo, refer to the areas of functionality below.

Hardware Controls & Connectors

To learn how to use the controls on Apollo Solo's top panel and how the front and rear connections can be used, see Hardware Controls & Connectors.

Apollo Solo System Overview

Reviewing the Apollo Solo System Overview is especially recommended for those that are unfamiliar with digital audio workstation environments.

Using Apollo Solo's Unique Features

Apollo Solo has unique features in addition to those of a typical audio interface. To take advantage of Apollo Solo's low-latency input monitoring, Realtime UAD Processing, and UAD-2 DSP accelerator features, there are some core differences in how to operate the DAW with Apollo Solo versus most audio interfaces.

To learn how to integrate Apollo Solo and Console within a DAW environment and related information, see the Working With Apollo Solo chapter.

UAD Console Application

UAD Console is the software interface for the Apollo Solo hardware. UAD Console controls Apollo Solo's mixing, low-latency input monitoring, and Realtime UAD Processing features. UAD Console is also used to configure various Apollo Solo settings.

Operating UAD Plug-Ins

To learn how to load, edit, and remove UAD plug-ins within Console, see the UAD Console Manual. To learn how to use UAD plug-ins within the DAW, see your DAW documentation.

The features and functions of individual UAD plug-in titles are detailed in the UAD Plug-Ins Manual. Refer to these manuals to learn about the operation, controls, and user interface of each individual UAD plug-in.

Technical Support

For additional resources such as setup and operation videos, the UA Knowledge Base, user community forums, or if you need to contact Universal Audio for assistance, see the Technical Support page.

Hardware Controls & Connectors

Complete details about all Apollo Solo hardware controls and connector jacks are provided in this chapter.

> **Tip:** *To learn how to set input gain levels (Mic, Line, and Hi-Z instrument) and output volumes (monitors and headphones), see Setting Hardware Input/Output Levels in the Getting Started chapter.*

Controls Overview

Some Apollo Solo controls have multiple functions. The function of each control depends on the current operating mode and the current settings within that mode. To control a particular function, the control must be activated.

Operating Modes

Apollo Solo's top panel has two operating modes: *PREAMP* and *MONITOR*. The function and availability of the top panel controls vary depending on the active operating mode. The active mode is selected with the PREAMP and MONITOR buttons. Press the button to activate the mode. Each mode is explained in greater detail below.

> **Tip:** *All top panel functions can be operated at the same time (without switching modes) from within the companion Console software application.*

PREAMP Mode

When Apollo Solo is in preamp mode, the top panel controls adjust the input functions only. To adjust any input function, press the PREAMP button to enter preamp mode and activate the input channel controls.

> **Important:** *Apollo Solo must be in PREAMP mode to adjust input channel settings with the hardware controls. Input settings can be adjusted with the Console software application when Apollo Solo is not in preamp mode.*

Preamp Channels

Apollo Solo has two independent analog input channels. Each input channel has a preamplifier. Both input channels can be independently controlled and used at the same time for A/D conversion.

Preamp Controls

Apollo Solo has one set of input channel preamp controls. The input channel controls adjust all preamp functions for the currently selected input channel. The other input channel preamp can be adjusted by changing the selected channel.

Selected Channel

The currently selected input channel is shown by the CH1 and CH2 indicators at the upper left of the main display panel, above the input meters, as shown at right. The top panel controls adjust the functions of the currently selected channel only.

Selected channel indicators

> **Important:** *To adjust an input channel's settings, that input channel must be selected. The currently selected channel may need to be changed to the other channel.*

Changing Channels

When in preamp mode, press the PREAMP button to change the selected input channel so its controls can be adjusted. Press PREAMP again to switch the selected channel back to the other channel.

> **Tip:** *When in PREAMP mode, pressing the main LEVEL knob also changes the selected channel.*

Input Source

The Mic, Line, or Hi-Z inputs are routed into the input channel's preamplifier. The active input source is shown by the indicators below the input meters, as shown at right.

Input source indicators

The Mic or Line input source is selected by the pressing the INPUT button when the channel is selected. The Hi-Z input (available on channel 1 only) is automatically selected when an instrument cable is plugged into the Hi-Z input on the front panel.

> **Note:** *Only one input source at a time (Mic, Line, or Hi-Z) can be used as the channel's input source.*

Preamp Gain

When an input channel is selected, its input gain is adjusted with the main LEVEL knob. Preamp gain is applied to the Mic, Line, or Hi-Z input of the selected channel.

Preamp Options

Each input channel has six preamp options. The preamp options for the currently selected input channel are enabled using the row of six buttons at the bottom of the top panel when in PREAMP mode.

Preamp options display

The current state of the preamp options is displayed by the six options indicators (shown above) at the bottom of main display. Available options are dim when inactive, bright when enabled, and unlit when unavailable.

> **Note:** *Not all preamp options are available with all input types. For specific details, see the Top Panel section later in this chapter.*

MONITOR Mode

When Apollo Solo is in monitor mode, all top panel controls are related to output functions only. To adjust any output function, press the MONITOR button to enter monitor mode and activate the monitor controls.

> *Important: Apollo Solo must be in MONITOR mode to adjust the volume of the monitor and headphone outputs with the hardware controls. Monitor volume can be adjusted with the Console software application when Apollo Solo is not in monitor mode.*

Stereo Outputs

Apollo Solo has two stereo outputs that can be controlled with the top panel hardware: MONITOR and HEADPHONE. These two stereo outputs are independently controlled.

Output Volume

The LEVEL knob is used to set the volume level for each stereo output independently. The LEVEL knob adjusts the volume of the currently selected output only.

Output Selection

The currently selected output is shown by the MONITOR and HEADPHONE indicators at the right of the main display, above and below the output meters.

When in monitor mode, press the MONITOR button to change the selected output. Press MONITOR again to switch back to the other output.
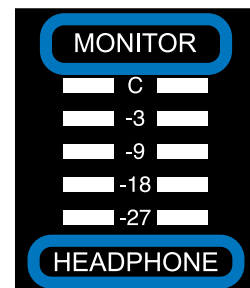
Output selection indicators

Monitor Mute

When MONITOR is selected, press the LEVEL knob to mute (silence) the stereo monitor outputs. Press the LEVEL knob again to unmute the monitor outputs. The green level indicators (the ring of LEDs around the LEVEL knob) and the monitor output selection indicator are RED when the monitor outputs are muted.
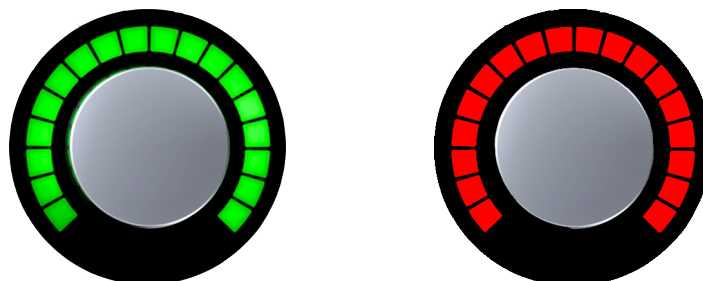
LED ring showing monitor outputs unmuted (left) and muted (right)

Top Panel

Refer to the illustration below for descriptions in this section.

Top panel elements

(1) LEVEL Knob & Switch

The LEVEL knob & switch controls multiple functions. The knob's current function is selected with the MONITOR (3) and PREAMP (4) buttons.

Monitor Mode

When in MONITOR Mode (3), rotate clockwise to increase the monitor output level or headphone output level, depending on which output (10 or 12) is selected with the MONITOR (3) button.

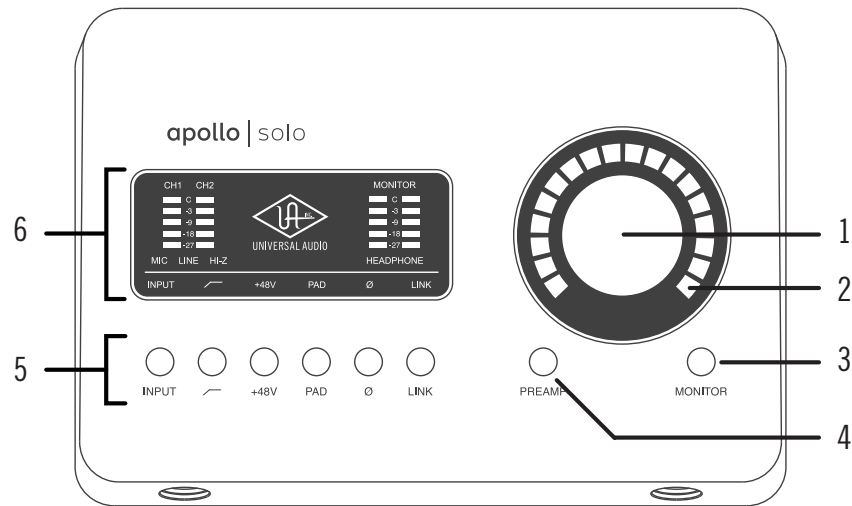When MONITOR (10) is selected in monitor mode, press to mute/unmute the monitor outputs.

> **Note:** *MUTE does not apply to the headphone output.*

Preamp Mode

When in PREAMP Mode (4), rotate the knob clockwise to increase the amount of preamp gain for the currently selected input channel.

> **Tip:** *When in preamp mode, press to toggle between selection of channels 1 & 2.*

Unison Integration

The LEVEL knob can be used to control Unison-enabled UAD preamp plug-ins.

(2) PREAMP Gain & Volume Level Indicator LEDs

The LEDs around the LEVEL knob indicate the relative level of the selected function (input preamp gain or monitor/headphone volume).

Note: The indicator LEDs are RED when MONITOR (3) is selected and MUTE is active.

(3) MONITOR Button

Press this button to enter MONITOR mode for controlling the monitor and headphone functions. Press again to alternate between control of MONITOR and HEADPHONE volumes with the LEVEL knob (1).

Tip: Indicators (10) and (12) determine which volume (monitor or headphone) is being controlled with the LEVEL knob (1).

(4) PREAMP Button

Press this button to enter PREAMP mode and activate the input channel controls. Press again to alternate between channels 1 & 2.

Tip: When in preamp mode, press the LEVEL knob (1) to toggle between selection of channels 1 & 2.

(5) Preamp Option Buttons

These six buttons control the Preamp Options (a through f on following page) when the input channel is selected (7). The preamp option is active when its indicator is lit. When MONITOR (10) or HEADPHONE (12) is selected, the preamp options cannot be modified and the options display (13) is unlit. See the next page for preamp option descriptions.

INPUT   +48V   PAD   Ø   LINK
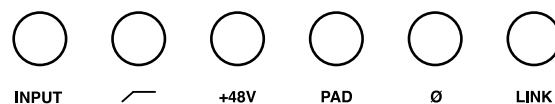
Preamp option buttons

Unison Integration

In PREAMP mode, the option buttons can be used to control Unison-enabled UAD plug-ins.

(6) Display Panel

This panel displays the status of various Apollo Solo functions. See Display Panel for detailed descriptions of all panel elements.

Preamp Options

The option buttons control the PREAMP options (labeled a through f below) for an input channel when that channel is selected (7) with the PREAMP button (4). A preamp option is active when its indicator (13) in the display is lit, and inactive when the indicator is dim. If the indicator is unlit, the option is unavailable.
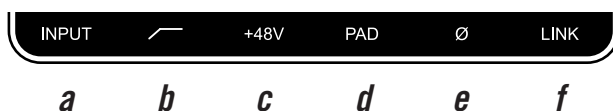
> **Note:** In MONITOR Mode, the preamp options cannot be modified and all preamp options in the display are unlit.

| INPUT | ⌐ | +48V | PAD | Ø | LINK |

a   *b*   *c*   *d*   *e*   *f*

Preamp options

(a) INPUT Select

Selects the active input source jack for the channel. Press to alternate between the mic and line inputs. The current selection is displayed by the input source indicators (7).

The Hi-Z input is selected automatically whenever a ¼" mono (tip-sleeve) plug is connected to the front panel's Hi-Z Instrument jack (14).

> **Note:** Hi-Z instrument input is available for channel 1 only.

(b) FILTER

Enables a low cut (high pass) rumble filter with a cutoff frequency of 75 Hz.

(c) +48V

Enables +48 Volt phantom power for the mic input. Phantom power is typically needed for condenser microphones. +48V is available for the microphone inputs only.

> **Caution:** To avoid potential equipment damage, disable +48V phantom power on the channel before connecting or disconnecting its XLR input.

(d) PAD

Attenuates (lowers) the mic input signal level by 20 dB. Pad is unavailable for the line inputs and the Hi-Z instrument input.

(e) POLARITY Ø

Inverts the polarity (aka phase) of the input signal. Polarity inversion can help reduce phase cancellations when more than one microphone is used to record a single source.

(f) LINK

Links input channels 1 and 2 as a stereo pair. When the inputs are stereo linked, all input control adjustments are applied to both input channels equally.

> **Note:** The Hi-Z instrument input cannot be linked to a mic or line input. Therefore, LINK cannot be activated when a plug is inserted in the Hi-Z jack (14).

Display Panel

Refer to the illustration below for descriptions in this section.
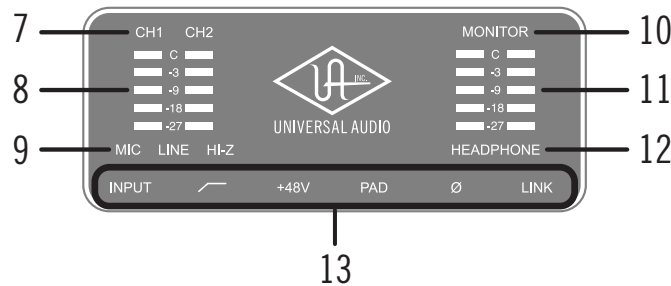
Display panel elements

(7) Channel Selection Indicators

The currently selected input channel is indicated by the lit channel name above its input meter (CH1 or CH2). Press the PREAMP button (4) to switch between channels 1 & 2.

(8) Input Meters

These meters display the incoming signal level for input channels 1 & 2. Reduce the channel's preamp gain (see Setting Hardware Input/Output Levels) if its red clip LED illuminates.

(9) Input Source Indicators

These indicators show which input source (MIC, LINE, or HI-Z) is active for the selected channel. Use the Input Select button (5-a) to change the input source.

> *Note: Hi-Z instrument input is available for channel 1 only.*

(10) Monitor Selected Indicator

When lit, the LEVEL knob (1) controls volume the monitor outputs (17). Press the MONITOR button (3) to activate the monitor controls if this indicator is not already lit.

> *Note: The MONITOR indicator (10) is RED when the monitor outputs are muted.*

(11) Stereo Output Meters

These meters display the main stereo signal output levels.* Output meter levels are independent of monitor and headphone volume levels. If a red "C" (clip) LED at the top of the Output Meters illuminates, reduce levels feeding the output(s).

> ***Exception:** If HEADPHONE is currently selected (12) and the Headphone Source within the CUE OUTPUTS window in the Console software application is set to HP, these output meters indicate the level being sent to the headphone bus via Console's headphone sends and/or the DAW.*

(12) Headphone Selected Indicator

When lit, the LEVEL knob (1) controls the volume of the headphone output (15). Press the MONITOR button (3) to light this indicator and activate headphone volume control (you may need to push it twice).

(13) Preamp Options Display

This area displays the status of the six preamp options, which are controlled by the six preamp option buttons (5). Three status indications are possible:

Bright – The preamp option is active.

Dim – The preamp option is inactive.

Off – The preamp option is not available.

Front Panel

Refer to the illustration below for descriptions in this section.
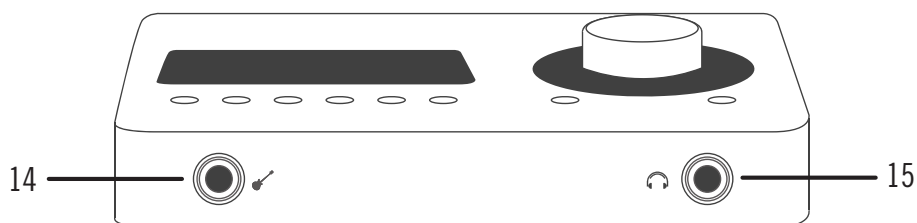
Front panel connectors

(14) Hi-Z Instrument Input

Connect any guitar, bass, or other high impedance instrument here. This jack automatically overrides the channel 1 mic and line inputs on the rear panel.

Levels for the Hi-Z instrument input are set using the same method as the mic and line inputs.

> **Note:** *This jack accepts a ¼" mono (tip-sleeve) plug only.*

(15) Headphone Output

Connect ¼" stereo headphones here. Volume is set with the LEVEL knob (1) when HEADPHONE (12) is selected with the MONITOR button (3).

Rear Panel

Refer to the illustration below for control descriptions in this section.

Note: All rear panel ¼" jacks can accept unbalanced TS (tip-sleeve) or balanced TRS (tip-ring-sleeve) connections.

Rear panel connectors

(16) Thunderbolt 3 Port

Connect the Thunderbolt 3 cable (not included) here. A Thunderbolt 3 connection to the host computer is required to use Apollo Solo.

Thunderbolt 3 Port Notes:

- Apollo Solo requires a built-in Thunderbolt 3 via USB-C port for the computer connection.
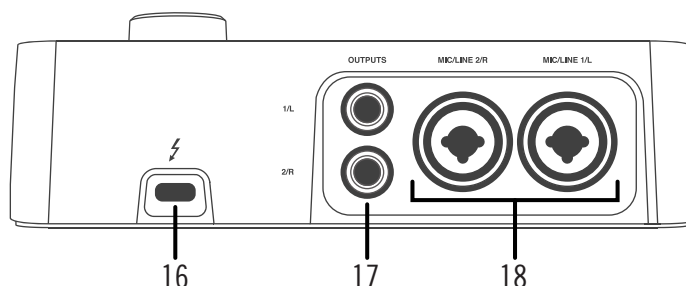- Although Thunderbolt 3 always uses USB-C connectors, not all USB-C computer ports are Thunderbolt 3 ports.
- Apollo Solo is incompatible with Thunderbolt 1 and Thunderbolt 2 computer ports, even if an adapter is used.
- See About Thunderbolt 3 Power and About Thunderbolt 3 Ports and Cables for related information.

(17) Monitor Outputs

Connect powered monitor speakers (or an amplifier+speaker system) here. Volume is set with the LEVEL knob (1) when MONITOR is selected (10) with the MONITOR button (3).

Caution: Before powering Apollo Solo, lower the volume of the monitor speakers and remove headphones from your ears.

(18) Mic/Line Inputs 1 & 2

The female combo jacks for channels 1 & 2 accept either a male XLR plug for connecting to the mic input, or a ¼" phone plug for connecting to the line input.

The input jack that is used for the channel (MIC or LINE) is specified with the Input Select button (5-a).

Caution: To avoid potential equipment damage, disable +48V phantom power on the channel before connecting or disconnecting its XLR input.

Apollo Solo System Overview

To get the most from your Apollo Solo and UAD plug-ins, it helps to have an understanding of the overall Apollo Solo system. This chapter provides an overview of the Apollo Solo hardware and software components.

Apollo Solo Hardware

Thunderbolt 3 Bus Powered Audio Interface for Mac & Windows

First and foremost, Apollo Solo is a premium 2 x 4 bus-powered Thunderbolt 3 desktop audio interface with best-in-class 24-bit/192 kHz conversion. Apollo Solo connects to the inputs and outputs of other audio gear to perform analog-to-digital (A/D) and digital-to-analog (D/A) audio conversion of the gear's signals. The converted digital audio signals are routed into and out of a Thunderbolt 3 host computer via the high-speed PCIe protocol, which is carried over a single Thunderbolt 3 cable along with power for the unit.

Apollo Solo leverages Universal Audio's expertise in DSP acceleration, UAD plug-ins, and analog hardware design by integrating the latest cutting edge technologies in high-performance A/D–D/A conversion, DSP signal reconstruction, and connectivity.

Integrated UAD-2 DSP Accelerator

Apollo Solo includes a built-in SOLO core UAD-2 DSP accelerator that performs digital signal processing using Universal Audio's acclaimed UAD Powered Plug-Ins. UAD plug-ins provide the world's best emulations of vintage and modern analog and digital hardware.

UAD plug-ins can run in Apollo Solo's Console software for realtime signal processing with indiscernible latency, delivering the ultimate sonic experience to artists while monitoring and/or tracking. UAD plug-ins can also be used within a DAW during mixdown and mastering.

> *Note: As with other UAD-2 and Apollo devices, Apollo Solo can only load UAD plug-ins, which are specifically designed to run on UAD-2 DSP accelerators. Native (host CPU-based) plug-ins cannot run on Apollo Solo's UAD-2 DSP.*

System Expansion

Apollo Solo is compatible with Universal Audio's family of UAD-2 DSP Accelerator and Apollo audio interface products, allowing you add UAD DSP and I/O as your needs grow.

Various Universal Audio products are available to accommodate your particular computer system, processing needs, and budget. For the complete product lineup, visit the UA website at www.uaudio.com.

Apollo Solo Software

Apollo Solo has several software components that are part the complete Apollo Solo system. A brief description of each component is provided below, along with a link to complete details about the component.

UAD Console Application

UAD Console is Apollo Solo's software interface. Console controls Apollo Solo's input monitoring, Realtime UAD Processing, Unison technology, audio interface hardware settings, and more. Console's analog-style workflow is designed to provide quick access to the most commonly needed features in a familiar, easy-to-use mixer interface.

Important Fundamental Concept: The primary function of UAD Console is to control Apollo's low-latency hardware input monitoring, Unison plug-ins, and Realtime UAD Processing when using third-party DAWs such as Logic Pro, Live, and Pro Tools. UAD Console replaces the software input monitoring feature of the DAW's mixer. UAD Console or LUNA Recording System must be used to take advantage of these Apollo features.

UAD Console application

Realtime UAD Processing

Apollo Solo can process UAD Powered Plug-Ins with sub-2ms latency, delivering the ultimate sonic experience while monitoring and/or tracking your performance. This feature is named Realtime UAD Processing.

Realtime UAD Processing is a special function that is only available within Console. This function is completely independent of the DAW's I/O hardware buffer size setting, so even when the I/O buffer setting is high — where any plug-ins in a DAW have noticeable latency — UAD plug-in latency is still indiscernible.

With Realtime UAD Processing, up to five UAD plug-ins can be stacked in series without any increase in latency, for flexible and complex signal processing chains. Realtime UAD Processing is automatically active with every UAD plug-in that's inserted in Console.

Unison Technology

Unison™ is an exclusive analog/digital integration system built into Apollo Solo's microphone preamplifiers. Unison is an audio processing breakthrough that starts right at the source, the input stage, allowing Apollo Solo's mic preamps to sound and behave like the world's most sought-after tube and solid state preamps, guitar amps, and pedals — including their all-important impedance, gain stage "sweet spots," and component-level circuit behaviors.

Unison is activated when a UAD Unison plug-in is loaded in Console's dedicated Unison insert slot.

Console Recall Plug-In

Console Recall is a special DAW plug-in supplied in VST, Audio Units, and AAX 64 formats. Console Recall offers additional convenience when using Apollo Solo and/or the Console application in conjunction with a DAW.

The Console Recall plug-in does not process audio. Instead, the primary function of Console Recall is to store complete Console configurations within the DAW project file. It also provides access to key Console functions (monitor volume, mono, and mute) without leaving the DAW.

Console Recall plug-in

UAD Meter & Control Panel Application

The UAD Meter & Control Panel application is used to configure global UAD-2 system functions and monitor UAD-2 DSP resources (including multiple devices, if connected). The application also facilitates authorization of UAD plug-ins and UAD-2 devices.

The application consists of two components: The UAD Meter, and the UAD Control Panels. To learn more, see UAD Meter & Control Panel.

UAD Meter

The UAD Meter displays the current UAD plug-in DSP and memory loads of all active UAD-2 hardware. These meters are also present at the bottom of the Console application window.

> *Note: Apollo Solo uses DSP and memory for its internal DSP mixer. Therefore, the UAD meter displays DSP and memory usage even when UAD plug-ins are not in use.*
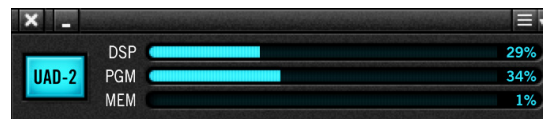
UAD Meter

UAD Control Panels

The UAD Control Panel window has multiple panels that display, and enable control of, the various UAD-2 system, plug-in, and global configuration parameters.

The screenshot below shows the System Info panel, one of four control panel windows in the UAD Meter & Control Panel application.

UAD Control Panel with System Info panel selected

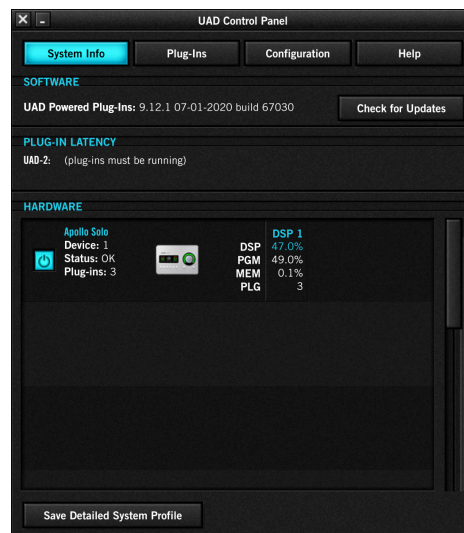# UAD Powered Plug-Ins

UAD plug-ins are the software titles containing audio signal processing algorithms such as compressors, equalizers, mic preamps, guitar amps, and special effects. Each UAD plug-in contains various control parameters that can be adjusted to achieve the desired sonic results.

The Authentic Sound of Analog

From project studios to multi-platinum mix engineers, UAD Powered Plug-Ins have been winning over audio professionals for more than 15 years with their stunning analog sound. The UAD library now features more than 90 plug-ins, co-created with the biggest brands in audio. Developed by UA's world-renowned team of DSP engineers, UAD plug-ins set the standard by which all other audio plug-ins are judged.

Typical UAD plug-in interface

Plug-In Host Applications

UAD plug-ins are loaded within a host application (such as Apollo Solo's Console or a DAW) for signal processing of the host's audio signals on Apollo Solo's integrated UAD-2 DSP accelerator. UAD plug-ins are typically used in Console for Realtime UAD Processing when monitoring and tracking, and in a DAW when mixing and mastering. UAD plug-ins are provided in VST, AAX-64, and Audio Units formats for compatibility with all major DAWs.

> **Tip:** *When loaded in Apollo Solo's Console application, UAD plug-ins run in real time, with indiscernible latency, completely independent of the DAW's I/O buffer size setting.*

Bundled & Optional Plug-Ins

Apollo Solo includes a variety of UAD plug-ins bundled with the device, and optional UAD plug-in licenses can be purchased at the UA online store.

Try Before You Buy

All optional UAD plug-ins UAD plug-ins can be evaluated without functional limitations for 14 days in trial demo mode.

Apollo Audio Interfaces

Apollo is Universal Audio's line of high-resolution audio interfaces with class-leading sound quality, Realtime UAD Processing, and elegant hardware design and workflow. Apollo Thunderbolt models include the Apollo Solo, Apollo Twin X, and Apollo x4 desktop interfaces, and the Apollo X Series rackmount interfaces.

Apollo Solo can be combined with Apollo Thunderbolt interfaces to increase I/O channel counts and UAD DSP processing power as your system needs grow. Up to six UAD devices can connected in one system. See the UA Knowledge Base for specific details about multi-device compatibility for each model.

UAD Software Installer

The UAD Powered Plug-Ins software installer contains all UA audio interface and UAD-2 software components and places them on the system drive during installation. These components include the Console and UAD Meter & Control Panel applications, all UAD plug-ins (including unlicensed plug-ins, UAD drivers, and documentation.

The UAD software installer supports all variations of UA audio interface and UAD-2 products. The most recent UAD software is always recommended so you'll have access to the latest UAD plug-ins and platform updates. The latest software is available at www.uaudio.com.

LUNA Recording System

Get your songs sounding like the records you love with LUNA – a next-generation DAW that makes it easy to record, edit, and mix your music. LUNA is the only recording software with the sound of classic studio equipment like analog console summing and tape machine emulations, built right in.

LUNA gives Apollo owners the fastest recording environment for music production, editing, and mixing. In addition to its seamless hardware-software integration with Thunderbolt-equipped Apollo interfaces, LUNA Recording System allows capturing audio through DSP-powered UAD plug-ins with no discernible latency, as well as offering new Accelerated Realtime Monitoring™ — which provides analog-style tracking and overdubbing workflows using Apollo's onboard DSP acceleration.

LUNA is included FREE with your Apollo purchase. Visit the LUNA product page for more information:

www.uaudio.com/luna

UA Account & Store

UA Account

Your Universal Audio account is where all your UAD devices, and their associated UAD plug-ins, are registered and managed.

An account is required to download UAD software, register and authorize your Apollo Solo hardware, claim bundled UAD plug-ins, and receive customer support.

UA Store

The Universal Audio online store is where optional UAD plug-in licenses are purchased and UA coupons are redeemed. For related information, see UA Account & Store.

UAD Authorization

UAD plug-ins must be authorized before they will process audio. UAD plug-ins in your UA account are authorized automatically (internet connection required).

Note that UAD plug-in authorizations are stored on the UAD device, not the computer. If the device is moved to a different computer, it's not necessary to reauthorize the device.

When an optional UAD plug-in license is purchased at the UA store, it needs to be manually authorized. The store shows you how, or see UAD Authorization Procedure for instructions.

> **Note:** *When an optional UAD plug-in license is purchased, you don't download that individual plug-in. Instead, you reauthorize the system, which activates the UAD plug-in that is already installed.*

UA Website

UA Blog

The blogs at www.uaudio.com contain a wealth of information about UA products and how to use them. In-depth artist interviews and how-to videos are routinely published.

UA Knowledge Base

UA's Knowledge Base is your complete technical resource for the latest compatibility information, setup videos, customer support, and more. See the Technical Support page for details.

Technical Support

For additional resources such as setup/operation videos, the UA Knowledge Base, user community forums, or if you need to contact Universal Audio for assistance, see the Technical Support page.

Working With Apollo Solo

Apollo Solo is a flexible audio interface and DSP accelerator that can be used in many ways. This chapter explains how to setup and use Apollo Solo and Console in digital audio environments.

Each chapter section covers the area of functionality listed below. Click a blue page number to jump directly to the section for details.

> *Tip: The Apollo Solo System Overview provides an introduction to the UAD environment.*

In This Chapter:

Essential Apollo Solo Concepts

Apollo Solo's basic audio interface functionality with a DAW operates the same as other typical (non-DSP) interfaces. However, Apollo Solo has unique features in addition to those of a typical audio interface.

To take advantage of Apollo Solo's unique low-latency input monitoring, Realtime UAD Processing, and UAD-2 DSP accelerator features, there are some core differences in how to operate the DAW with Apollo Solo versus most audio interfaces.

The companion Console application is used to control Apollo Solo's unique features. Understanding the interactions between Apollo Solo, Console, and the DAW will help you optimize workflows.

> *Note:* To learn how to operate the DAW with basic audio interface functionality, consult the DAW documentation.

The DAW Environment

To get the most from your Apollo Solo system and LUNA Recording System, it will help to understand the core concepts and terms below, which are integral to digital audio workstation workflows. These terms are used when describing how to operate Apollo Solo and Console.

Input Monitoring

Input Monitoring is the process of listening to live inputs, such as when an artist is performing with a musical instrument and/or vocals. When the artist has great input monitoring, they may deliver a more inspired performance.

Generally speaking, you'll want to use Console or LUNA for input monitoring when working with a DAW so you can take advantage of Apollo Solo's Realtime UAD Processing for great input sounds.

Input Latency

Various sources of audio latency (time delay) are inherent in all digital audio systems. However, latency is normally only an issue when an artist is input monitoring their performance through headphones or speakers.

If what is heard in headphones arrives later than when the sound is produced, the performance may be compromised. Using Console or LUNA eliminates input latency when monitoring, tracking, and/or overdubbing with a DAW.

I/O Buffering

I/O buffering is the shuttling of audio data back and forth between the DAW and the audio interface. The DAW's I/O buffer size setting determines the amount of input latency when *software monitoring* via the DAW. Smaller buffer sizes reduce latency, but increases CPU loading of the host computer. Lower buffer sizes do *not* increase UAD DSP loads.

Using Console or LUNA to control Apollo Solo's input *hardware monitoring* completely bypasses DAW I/O buffering, so there is no input latency, regardless of DAW's I/O buffer size setting.

> ***Note:*** *LUNA Recording System manages I/O buffer settings automatically.*

Software Input Monitoring

Software input monitoring refers to using the DAW's software mixer for monitoring live inputs instead of hardware input monitoring via the audio interface. Software input monitoring allows plug-ins (UAD or otherwise) loaded in a DAW to process live inputs, but the monitored signals are subject to the input latency caused by DAW I/O buffering.

> ***Note:*** *The DAW's software input monitoring feature is enabled by default. To prevent doubled signals at Apollo Solo's outputs when software monitoring via the DAW, Apollo Solo's hardware monitoring must be disabled by muting Console's inputs.*

Hardware Input Monitoring

Hardware input monitoring means an audio interface's inputs are routed directly to its outputs, which avoids discernible audio latency by eliminating DAW I/O buffering. Apollo Solo features low-latency hardware input monitoring via its internal digital mixer, which is controlled by Apollo Solo's companion Console or LUNA applications.

> ***Note:*** *Apollo Solo's hardware input monitoring is active by default. To prevent signal doubling at Apollo Solo's outputs when hardware input monitoring via Apollo Solo's Console, the DAW's software input monitoring feature must be disabled.*

Delay Compensation

Various sources of input and output latency are inherent in complex digital audio environments. However, when the DAW and Console are properly configured and operated, all time and phase alignment of all audio within a session is managed automatically by the DAW's delay compensation feature. See Delay Compensation with Apollo Solo and Latency Basics for more information.

Setting the DAW to use Apollo Solo I/O

Apollo Solo's Core Audio and ASIO device drivers enable the device to be used as the audio interface hardware for any compatible Core Audio or ASIO DAW. After the DAW is set to use Apollo Solo as the audio interface hardware device, the DAW can directly access and route the audio signals at Apollo Solo's inputs and outputs.

Specifying the Audio Interface Device

To set Apollo Solo as the DAW's audio interface, select Apollo Solo's device driver name as the audio device in the DAW's hardware setup preferences. The name of Apollo Solo's device driver is **Universal Audio Thunderbolt**.

The methods for specifying the audio interface hardware device, and the name of the setting, are different for each DAW. Examples of how to specify the audio interface within major DAWs are provided below. For more specific details, refer to the DAW documentation.

> **Tip:** For helpful videos that show how to setup popular DAWs with Apollo Solo, visit the UA Knowledge Base at help.uaudio.com.

Steinberg Cubase

1. Open the Device Setup window.
2. Select VST Audio System in the Devices column (left side of window).
3. Locate the ASIO Driver menu under VST Audio System (right side of window).
4. Select **Universal Audio Thunderbolt** from the ASIO Driver drop menu.
5. Click Apply. Cubase is now set to use Apollo Solo I/O.
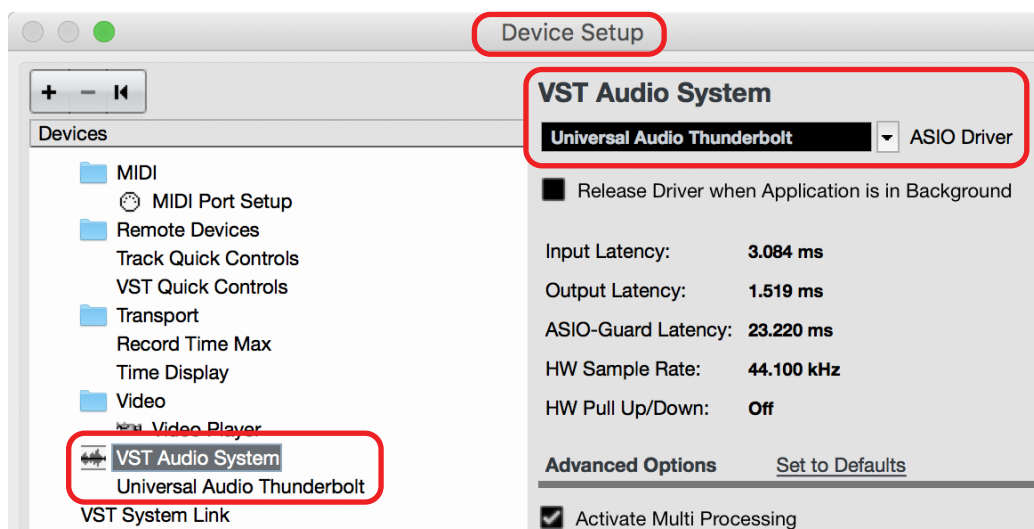
Apollo Solo selected as the VST Audio System device in Cubase Device Setup

Apple Logic Pro X

1. Open the Preferences > Audio > Devices window.

2. Select **Universal Audio Thunderbolt** from the Output Device and Input Device drop menus.

3. Click Apply Changes. Logic Pro is now set to use Apollo Solo I/O.
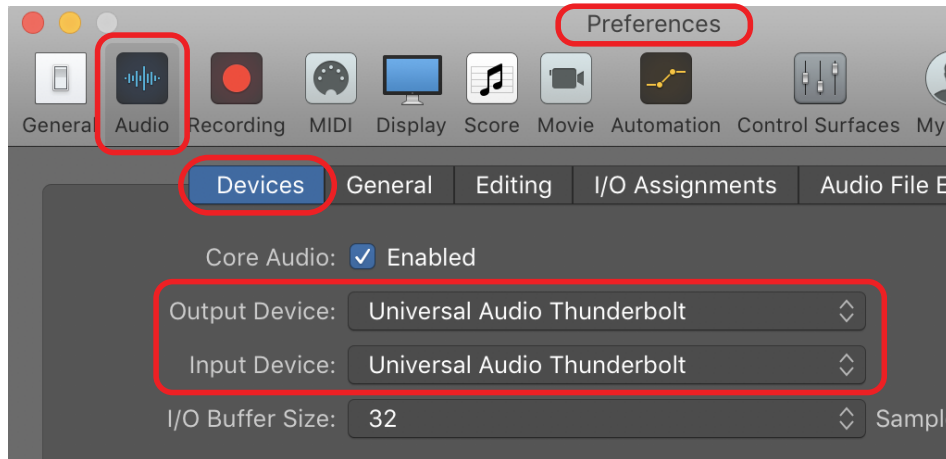
Apollo Solo selected as the output and input device in Logic Pro preferences

Ableton Live

1. Open the Preferences window.

2. Select the Audio tab at left side of the Preferences window.

3. Select **Universal Audio Thunderbolt** from the Audio Input Device and Audio Output Device drop menus. Live is now set to use Apollo Solo I/O.
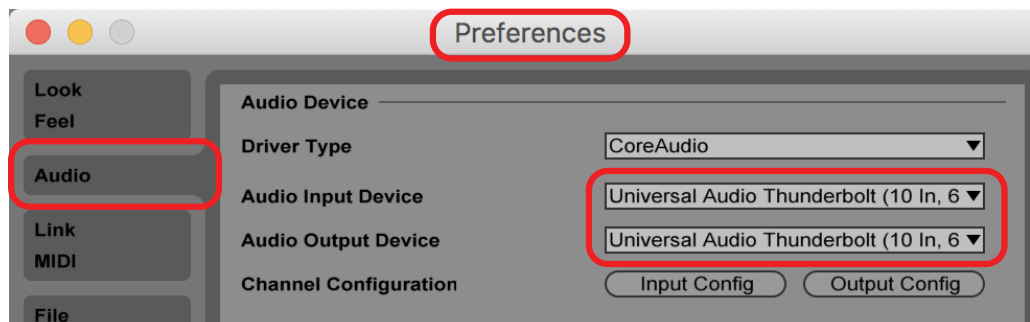
Apollo Solo selected as the audio input and output device in Ableton Live preferences

Avid Pro Tools

1. Open the Setup > Playback Engine window.

2. Select **Universal Audio Thunderbolt** from the Playback Engine drop menu.

3. Click OK. Pro Tools is now set to use Apollo Solo I/O.
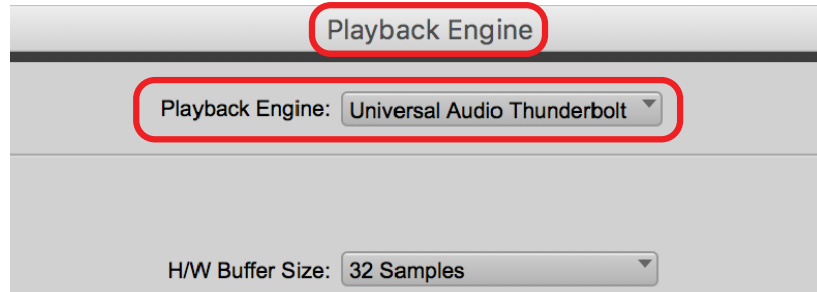
Apollo Solo selected as the Playback Engine in Pro Tools

Universal Audio LUNA Recording System

When LUNA is launched, Apollo is detected and configured automatically.

Accessing Apollo Solo's I/O in the DAW

After Setting the DAW to use Apollo Solo I/O/O, the DAW can access and route all of Apollo Solo's inputs and outputs directly.

Selecting Apollo Solo's Inputs and Outputs

The methods for selecting channel inputs and outputs are different for each DAW. One example of how to choose I/O is shown below. For instructions, refer to the DAW documentation.
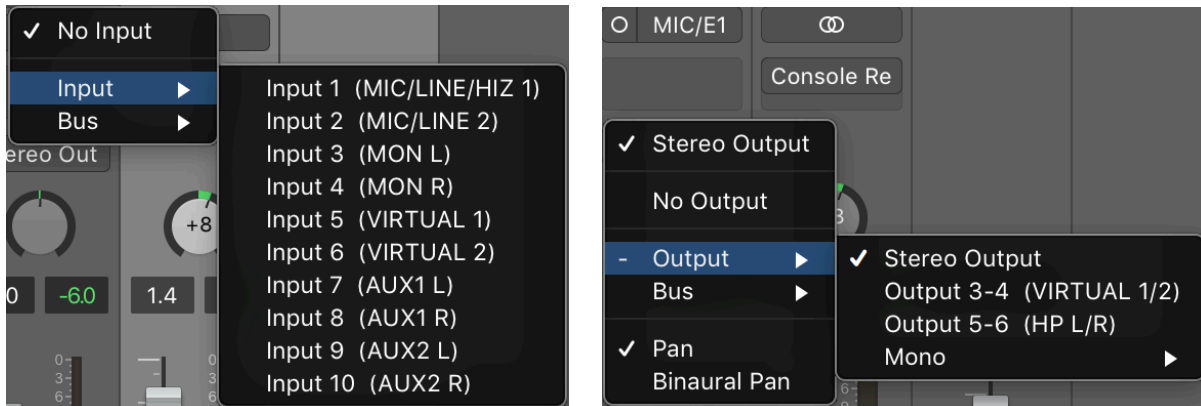
Apollo Solo's inputs (left) and outputs (right) as they appear when selecting I/O in Logic Pro X

Available I/O

Apollo Solo's available inputs and outputs, along with their default channel names are numbers, are listed in the Driver I/O Table.

Available I/O includes Apollo Solo's physical inputs and outputs, as well as its virtual inputs and outputs. Virtual I/O are software-only channels for digitally routing DAW audio into and out of Console. See Virtual I/O for more information.

Tip: *Apollo Solo's I/O routes and I/O channel names can be customized in the I/O Matrix panel within the Console Settings window.*

Default Outputs

The main stereo outputs of a DAW usually output to channels 1 and 2 by default. Because channels 1 and 2 correspond to Apollo Solo's main outputs, the DAW's main outputs are sent to Apollo Solo's main outputs by default. The channels used for DAW output can usually be changed within the DAW settings.

Apollo Solo I/O Driver Names

Each Apollo Solo input and output has a channel number and name provided by the Apollo Solo drivers to Core Audio and ASIO. Depending on the DAW (see Numbers versus Names below), these channel numbers and/or names are used when selecting and displaying Apollo Solo I/O.

I/O Numbers versus Names

Apollo Solo's drivers describe all I/O channels by name and number, but what is actually displayed depends on each particular DAW. Names are not displayed by all DAWs (e.g., Ableton Live), or the driver name display mode can be changed within the DAW (e.g., Apple Logic Pro X).

All Apollo Solo driver default I/O numbers and names are listed in the Driver I/O Table. These values can be used to reference specific Apollo Solo inputs or outputs by name when selecting I/O in an application that does not display the driver names.

> *Tip: Apollo Solo's I/O routes and I/O names can be customized in the I/O Matrix Panel within the Console Settings window.*

Input Monitoring with the DAW

Input monitoring is the process of listening to live inputs, such as when an artist is performing with a musical instrument and/or vocals. When using Apollo Solo with a DAW, there are two ways to monitor inputs:

Software Input Monitoring via DAW– The DAW's software mixer is used to control input monitoring and plug-in processing. Inputs are subject to DAW I/O buffering latency.

Hardware Input Monitoring via Console or LUNA – Console or LUNA is used to control Apollo Solo's low-latency hardware input monitoring and Realtime UAD Processing. Inputs are routed directly to outputs, bypassing DAW I/O buffering latency.

Use Software OR Hardware Input Monitoring

When monitoring live inputs, it's important that only one input monitoring system is active. If software and hardware input monitoring are both active, the input signal(s) will be heard twice at Apollo Solo's outputs — first from Console's low-latency mix, and shortly thereafter from the DAW's I/O buffered (higher latency) software mix. Doubled signals can cause undesirable "thin" sounds or other anomalies due to phase cancellations.

> *Tip: Use Console for hardware input monitoring to take advantage of Apollo Solo's low-latency monitoring and Realtime UAD Processing features.*

Disable Unused Input Monitoring System

By default, the DAW's software input monitoring and Console's hardware monitoring are both enabled. Therefore, one of the input monitoring systems must be manually disabled to prevent doubled signals at Apollo Solo's outputs. Instructions are provided in following sections.

> *Important: To prevent doubled signals at Apollo Solo's outputs when input monitoring via Apollo Solo's Console, DAW software input monitoring must be disabled. Conversely, if DAW software input monitoring is enabled, Apollo Solo's hardware input monitoring must be disabled by muting Console's inputs.*

How To Disable Software Input Monitoring

To prevent doubled signals at Apollo Solo's outputs when hardware monitoring live inputs via Console, the DAW's software input monitoring feature must be disabled. Note that DAW software input monitoring is usually enabled by default in the DAW's settings.

The methods for disabling DAW software input monitoring, and the name of the setting, are different for each DAW. Examples of how to disable software input monitoring within major DAWs are provided below. For more specific details, refer to the DAW's documentation.

> *Note: Some DAWs have multiple ways to disable software input monitoring.*

Steinberg Cubase Auto Monitoring

1. Open the Preferences window.

2. Click VST in the left column of the Preferences window.

3. Select Manual from the Auto Monitoring drop menu.
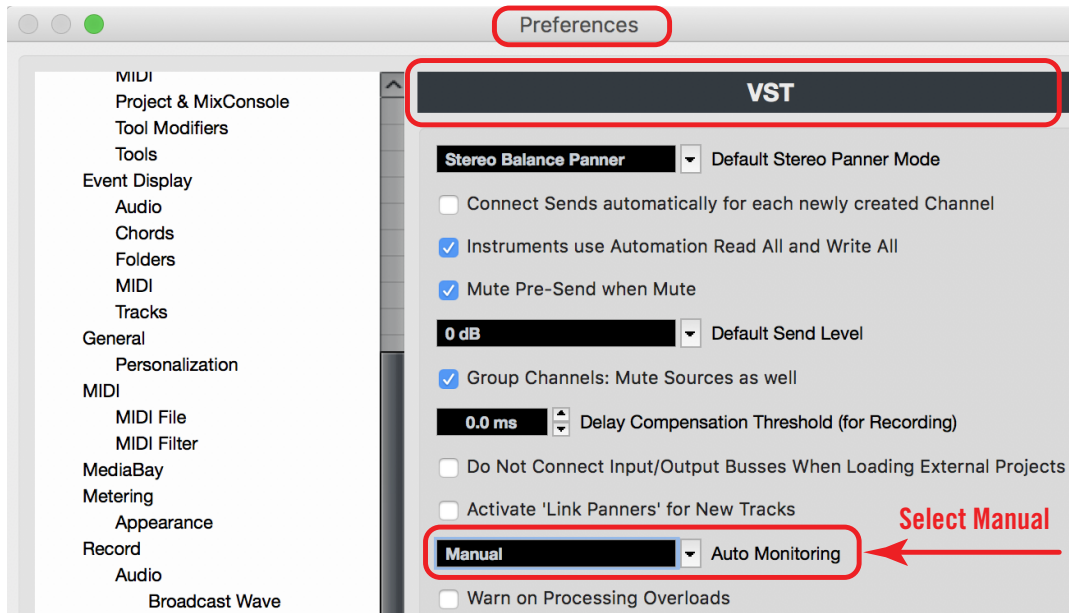
Cubase: Set Auto Monitoring to Manual in VST preferences

Apple Logic Pro X Software Monitoring

1. Open Preferences > Audio > General.

2. Deselect (uncheck) the Software Monitoring option.
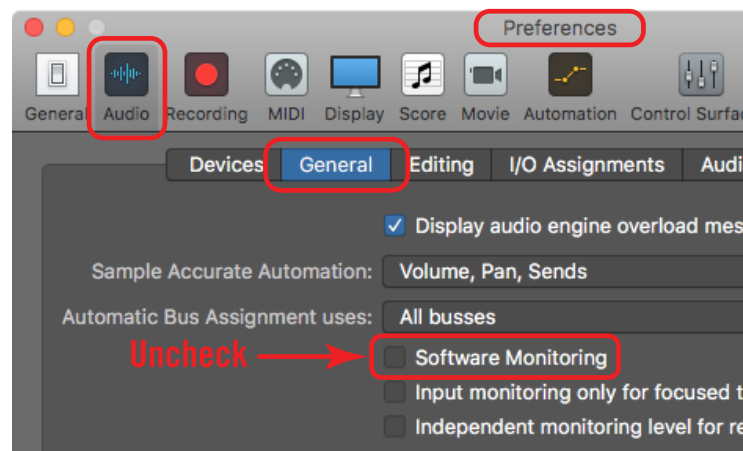
Logic Pro X: Uncheck Software Monitoring in audio preferences

Ableton Live Monitor Mode

1. In the View menu, ensure the Mixer and In/Out options are checked so you can see the monitoring buttons. If in Arrangement View, unfold and resize the track to see the In/Out section.

2. Click the Off button in the Monitor section within the In/Out options. The button is orange when software monitoring is disabled.

Tip: *If multiple tracks are selected, pressing an Off button applies the selection to all selected tracks.*
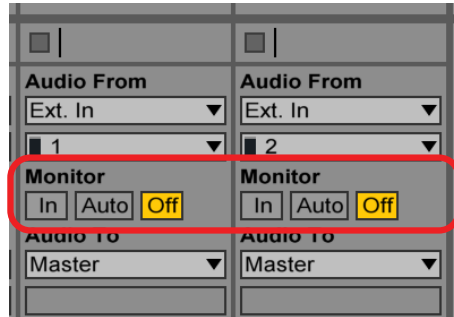
Ableton Live: Set Monitor to Off in mixer In/Out section

Avid Pro Tools Low Latency Monitoring

1. Assign each track output to either Output 1 or Output 2 (mono), or both (stereo). Only tracks assigned to these outputs use Low Latency Monitoring.

2. Record enable audio track(s) by clicking their Record Enable buttons.

3. Select Options > Low Latency Monitoring. Software monitoring is disabled when Low Latency Monitoring is checked in the Options menu.
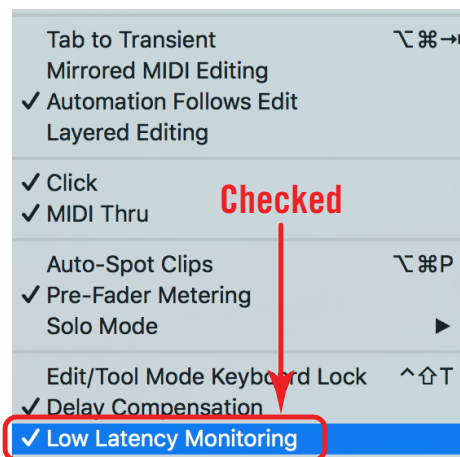
Pro Tools: Low Latency Monitoring checked under Options menu

How To Disable Hardware Input Monitoring

To prevent doubled signals at Apollo Solo's outputs when software input monitoring via the DAW, Apollo Solo's hardware input monitoring feature via Console must be disabled. Note that Console input monitoring is enabled by default.

1. Open Console.

2. Mute input channels within Console by clicking the MUTE buttons so they are red.

Tip: In Console, option-click any input MUTE switch to quickly toggle the mute state of all input channels.
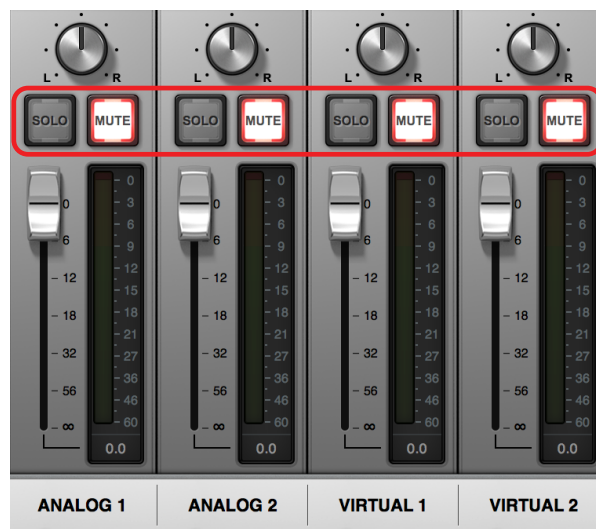
Console: Mute inputs when software monitoring via DAW

Input Monitoring Tips

- Use Console for front-end hardware input monitoring to eliminate I/O buffering latency caused by DAW software monitoring — regardless of the DAW's buffer size setting.

- Prevent signal doubling at Apollo Solo's outputs by allowing only Console's hardware input monitoring **or** the DAW's software input monitoring feature — not both at the same time. Signal doubling can make input signals sound "thin" due to phase cancellations and/or comb filtering that occurs when two identical signals are mixed together and they are not phase-aligned.

- Route the DAW's main outputs into Console's virtual inputs via Virtual I/O when overdubbing so you can balance the levels of the DAW's pre-recorded tracks with Apollo Solo's live inputs — all within the Console mixer.

- If monitoring/recording a virtual software instrument in the DAW and you want to process the instrument with UAD plug-ins, route the output of the software instrument channel into Console's virtual input(s) and apply the UAD plug-ins in Console instead of the DAW. This technique reduces latencies caused by I/O buffering.

Using Console with the DAW

The primary function of Console is the low-latency monitoring of Apollo Solo's inputs during live performance, either with or without Realtime UAD Processing. When used with a DAW, Console controls front-end monitor mixing and signal processing, replacing the DAW's software monitoring functions.

> *Important Fundamental Concept: The primary function of Console is to control Apollo's low-latency hardware input monitoring, Unison plug-ins, and Realtime UAD Processing with third-party DAWs (such as Pro Tools or Cubase). Console or LUNA Recording System **must** be used to take advantage of these features.*

Disable DAW Input Monitoring when Input Monitoring via Console

When using Console for low-latency input monitoring and recording with a DAW, the DAW's software input monitoring feature must be disabled to prevent doubled signals at Apollo Solo's outputs. See How To Disable Software Input Monitoring for details and methods.

Disable Console Input Monitoring when Input Monitoring via DAW

When monitoring live inputs via the DAW's software monitoring feature, Console's inputs must be muted to prevent doubled signals at Apollo Solo's outputs. See How To Disable Hardware Input Monitoring for details and method.

Controlling Apollo Solo's Unique Functions

Apollo Solo's unique Unison and Realtime UAD Processing features are controlled by the Console application. These are special functions that are available only when UAD plug-ins are inserted within Console. To activate these features, simply insert UAD plug-ins within Console.

Sharing UAD Resources

The UAD DSP resources that are available for UAD plug-in processing are shared between UAD plug-ins loaded within Console and UAD plug-ins loaded within the DAW.

To maximize UAD resources when monitoring and tracking live inputs, disable unused UAD plug-ins within the DAW. Conversely, when mixing, disable unused UAD plug-ins within Console.

> *Note: For important related information, see UAD Plug-Ins: Console versus DAW.*

Saving Console Setups Within DAW

The Console Recall plug-in offers additional convenience when using Apollo Solo with a DAW. Console Recall is a utility plug-in that doesn't process audio. Instead, it stores Console's current configuration within the DAW project file. When the saved DAW project is subsequently opened, the complete Console configuration is restored.

The Console Recall plug-in also features Console monitor controls, enabling adjustments of level, mono, and mute without leaving the DAW.

Routing and Recording Console I/O

Recording Console Inputs

To record any Console input (physical or virtual), select the Console channel as the source for the DAW's audio channel(s). See Accessing Apollo Solo's I/O in the DAW for an example.

Recording Console Outputs

Console's four stereo mix bus outputs (MON, HP, AUX 1, AUX 2) can be digitally routed into the DAW. This feature can be used, for example, to send Console's stereo monitor mix, stereo headphone cue mix, and/or stereo AUX processing into the DAW for recording.

To record Console outputs, select the outputs as the source for the DAW's audio channel(s). See Accessing Apollo Solo's I/O in the DAW for details.

Route DAW Outputs Into Console

DAW output channel(s) can be digitally routed via software into Console's virtual input channel(s). With this feature, DAW outputs can be used for routing and processing within Console, just as if they were physical inputs.

The Virtual I/O feature can be used for the DAW's main stereo mix outputs, virtual instrument plug-in channels, or any other DAW output that can be assigned to hardware outputs.

To route DAW outputs into Console's virtual inputs, select the virtual *input* as the output route for the DAW's output channel(s). See Virtual I/O for details.

Recording Realtime UAD Processing

When monitoring Apollo Solo's inputs with Realtime UAD Processing, those inputs can be recorded with processing (wet) or without processing (dry). This function is accomplished with the Insert Effects switch. See the Insert Effects Overview for details.

DAW Mixdown and Console

Console has less utility when mixing prerecorded tracks in the DAW. Because the DAW tracks are already recorded, input latency and I/O buffering are never an issue during mixdown, so Console's input functions aren't needed.

Note that Console's configuration does not need to be changed when moving between tracking and mixdown. Console simply remains idle, ready to monitor and process those last-minute takes when inspiration strikes.

> *Tip:* The Console application can remain open or closed at any time. Console plug-ins and routings remain active even when the application is closed.

UAD Plug-Ins: Console versus DAW

There are important fundamental differences between using UAD plug-ins within Console versus within a DAW. Apollo Solo features two distinct methods for using UAD plug-ins:

Console processing (Realtime) – Low-latency hardware input monitoring and recording with Realtime UAD Processing via UAD plug-ins that are loaded within Console.

DAW processing (Buffered) – DSP-accelerated processing via UAD plug-ins in VST, AAX 64, or Audio Units formats that are loaded within a DAW.

These two methods are not a switched mode, but instead simply depend on which host application, either Console or a DAW, contains the UAD plug-in(s). Note that both methods can be used at the same time for maximum flexibility. Each method is explained in greater detail below.

UAD Processing in Console (Realtime)

UAD plug-ins run in realtime, without discernible latency, only when used within Console. Hardware input monitoring with Realtime UAD Processing via Console is optimum for artists and engineers that need to monitor and capture performances without DAW I/O buffering latency and its associated hindrances.

> **Important:** *UAD plug-ins used within Console only run on the DSP within Apollo Solo. If UAD-2 DSP accelerators are active in the same system, the DSP on those devices cannot be used to process UAD plug-ins in Console.*

The special Realtime UAD Processing functionality is achieved via Apollo Solo's unique ultra-low latency DSP+FPGA+Console design. Although *every* audio interface has undetectable latency that is inherent to the A/D–D/A process, routing Apollo Solo's input signals through UAD plug-ins within Console *does not add to this inherent latency*.

Up to five UAD plug-in instances can be inserted serially (aka, stacked or chained) on each of Console's inputs and/or auxiliary buses at the same time, without adding to the inherent A/D–D/A latency.

Console inputs and stereo mix buses (monitor, headphone, auxiliary), with or without Realtime UAD Processing, are routed into the DAW via Apollo Solo's device drivers. These channels can be optionally recorded as either processed (wet) or unprocessed (dry) audio using the Insert Effects feature in Console.

Console Processing Notes

- Console controls Apollo Solo's Unison and Realtime UAD Processing features. These are special functions that are available only when UAD plug-ins are inserted within Console. To activate these features, simply insert UAD plug-ins within Console.

- As with all UAD devices, Apollo Solo can only load UAD plug-ins, which are specifically designed to run on UAD DSP. Host CPU-based (native) plug-ins cannot run on UAD DSP or be inserted in Console.

- Upsampled UAD plug-ins add negligible latency (usually indiscernible) when used within Console or a DAW. See Latency Basics for more information.

UAD Processing in DAW (Buffered)

When UAD plug-ins are used within compatible VST, AAX 64, or Audio Units host DAW applications (i.e., outside of Console), monitored input signals are subject to I/O buffering latency because the data must be shuttled back and forth between the DAW and the audio interface.

The amount of input latency depends on the I/O buffer size setting (including when plug-ins are *not* used, UAD or otherwise). As the buffer size is increased, more input latency is induced. At lower buffer sizes, input latency is reduced but the host computer's CPU loads increase. With larger buffer sizes, input buffering latency makes software monitoring via the DAW mixer while recording live inputs less practical — if the sound is heard noticeably later than it is produced, it can compromise the performance.

Note that latency is not an issue during mixdown in a DAW because the performances are already captured. The benefits of using Apollo Solo's integrated DSP acceleration when mixing with UAD plug-ins in the DAW include the off-loading of plug-in processing from the host computer's CPU, and the sonic rewards of UAD plug-ins.

DAW Processing Notes

- UAD plug-ins within a DAW are heard only when Apollo Solo and/or UAD-2 DSP accelerators are active in the system. UAD plug-ins can be loaded in a DAW when UAD DSP is unavailable, but they will not process audio.
- When monitoring or recording Apollo Solo's inputs in a DAW, eliminate I/O buffering latency by using Console for hardware input monitoring and Realtime UAD Processing.

UAD Processing in both Console and DAW

UAD plug-ins can be used within Console and a DAW at the same time. In this scenario, Apollo Solo's UAD DSP resources are shared between the two host applications. Realtime UAD Processing is available via Console, and I/O buffered (non-realtime) UAD processing is available via VST, AAX 64, or Audio Units plug-ins in the DAW.

> **Note:** *UAD plug-ins within a DAW can also run at the same time as native (host CPU based) plug-ins, in any combination.*

Bypass UAD plug-ins within DAW when monitoring with Console

To maximize available DSP resources for UAD plug-in processing within Console when monitoring, power off or unload UAD plug-ins in the DAW.

Bypass Console plug-ins when mixing in DAW

To maximize available DSP resources for UAD plug-in processing within the DAW when mixing, power off or unload the UAD plug-ins in Console.

> **Tip:** *Use the "Disable All" feature within Console (see Channel Options) to quickly disable/enable all UAD plug-ins within Console.*

Virtual I/O

Apollo Solo's device drivers carry various *virtual* (software only) input and output channels in addition to its physical hardware inputs and outputs. Virtual I/O enables digital routing of DAW signals back and forth between Console. The virtual channels consist of Console's virtual inputs, Console's virtual outputs, and all of Console's MON, HP, and AUX mix bus outputs.

Flexible, Pristine Signal Routing

Virtual I/O facilitates highly flexible signal routing via the DAW, without needing to reach behind gear for manual cable patching. Additionally, because the virtual I/O channel audio streams are in the digital domain, a pristine audio signal path is maintained by not requiring additional A/D–D/A conversions.

Virtual Inputs into Console

The virtual input channels enable any DAW output to be routed directly into Console's virtual inputs so Realtime UAD Processing can be applied to the DAW signal(s).

> *Tip: This feature is particularly useful when performing live with virtual software instruments inserted in the DAW, because the throughput latency associated with I/O buffering is reduced in this configuration.*

Virtual Outputs into DAW

Virtual outputs enable any (or all) of Console's virtual input channels, and the stereo MON, HP, and AUX mix bus outputs, to be directly routed to any DAW input so they can be recorded. With virtual outputs, it's easy to capture Console signals, with or without Realtime UAD Processing.

*Pro Tools screen shots showing signals being digitally routed from the
DAW into Console for monitoring and/or Realtime UAD Processing (left)
and from Console into the DAW for recording and/or further processing (right)*

Routing DAW Outputs to Console Inputs

To route a DAW output signal into Console for monitoring and/ Realtime UAD Processing, assign any Console virtual channel (or channel pair, when the DAW source is stereo) as the output device for any DAW track, bus, or output.

That DAW output signal then appears in the associated virtual input channel(s) in Console, and it can be processed or routed the same as Apollo Solo's hardware inputs.

At Right: A stereo DAW channel's outputs assigned to Console's virtual inputs
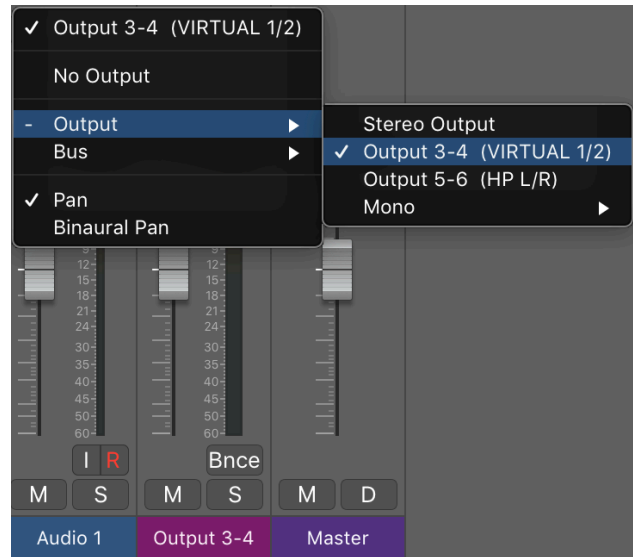
Routing Console Outputs to DAW Inputs

To route a Console output signal into the DAW so it can be recorded, assign any Console virtual channel (or channel pair, when the Console source is stereo) as the input source for any DAW input.

That Console signal can then be recorded or routed by the DAW as if it were a hardware input.

Tip: This technique can be used to re-capture and record (bounce) a software instrument performance that was virtually routed from the DAW into Console for Realtime UAD Processing.

At right: Console's virtual outputs assigned to a DAW channel's input. Note that any output listed here (including Console's stereo MON, HP, and AUX mix buses) can be used for DAW input.

Virtual I/O Examples

Adjust DAW Levels Within Console

By default, the DAW's main stereo outputs (the playback mix) is routed to Apollo Solo's main outputs and blended with Console's inputs, and the DAW playback level is adjusted with the DAW's outputs controls.

By digitally routing the DAW playback mix into Console's virtual input(s) with Virtual I/O, the DAW playback level can be adjusted with Console's virtual input faders. This is particularly useful when overdubbing — you can balance the DAW playback level along with the live input levels without leaving Console.

Reduce UAD Processing Latency on Virtual Instruments

When playing a virtual software instrument plug-in via the DAW, the monitored performance is subject to I/O buffering latency. If the live instrument is processed by a UAD plug-in in the DAW, latency is further increased due to additional buffering to and from Apollo Solo's DSP.

By digitally routing the live software instrument channel into Console's virtual input(s) with Virtual I/O, the UAD plug-in(s) can be used inside Console for Realtime UAD Processing instead of the DAW's buffered UAD plug-in processing. This setup reduces monitored input latency by more than half.

Using Apollo Solo for System Sound I/O

Apollo Solo's I/O can be used for the computer's system sound audio. System sound audio I/O is used by music players, web browsers, system software alert sounds, and similar applications — essentially, any audio application that doesn't access Apollo Solo's Core Audio or ASIO drivers directly.

If an audio application doesn't have its own setting for accessing an I/O device directly, it uses the device specified within the Sound control panel in the operating system. When Apollo Solo is set as the audio I/O device in the OS, any audio software that uses system sound will use Apollo Solo for I/O.

Important: To prevent system sounds from being inadvertently routed into Apollo Solo's outputs and/or DAW recordings, setting Apollo Solo as the output device for system sounds is generally not recommended when using a DAW.

System Sound Routing

When the OS is set to use Apollo Solo for system sound I/O, audio levels are controlled by the audio application, Apollo Solo, or both, as described below.

System Sound Output

Audio from the application is routed to Apollo Solo's main outputs and mixed with Apollo Solo's input signals. The application's audio level is controlled from within the audio application, while Apollo Solo's input levels are controlled within Console.

Note: To adjust the level of system audio at Apollo Solo's outputs, use the output level control within the audio application.

System Sound Input

The level of Apollo Solo's input signals being routed into the audio application are adjusted with the preamp controls — and UAD plug-ins, if any — in Console. In this scenario, Console's input faders don't control levels routed to the audio application. Signals routed to audio applications are always pre-fader (Console's input faders control monitoring levels only, not recording levels).

Tip: It's usually best to keep Console metering set to pre-fader (in Console Settings>Display Panel) so the input meters accurately represent the signal level at the audio application's inputs.

Setting System Sound I/O (Mac)

To use Apollo Solo I/O for system sound:

1. Open macOS System Preferences > Sounds.

2. In the Output panel, select **Universal Audio Thunderbolt**.

3. In the Input panel, select **Universal Audio Thunderbolt**.
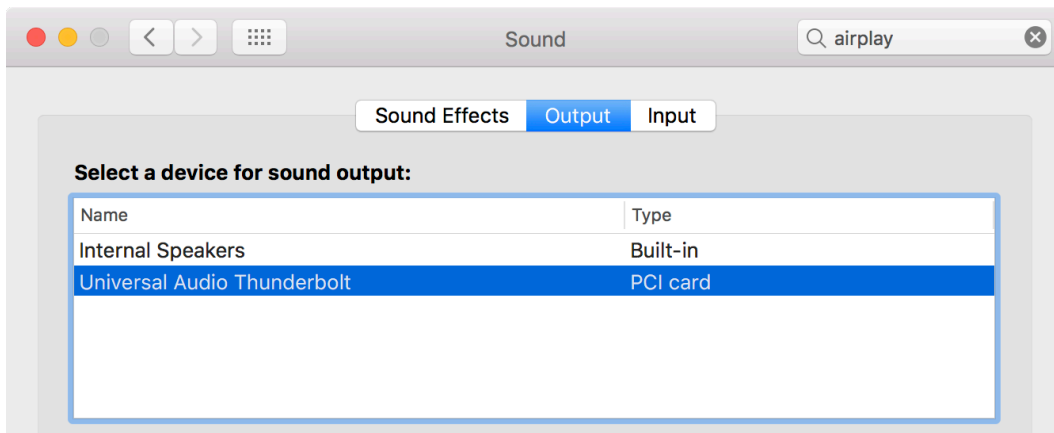
Apollo Solo selected for system sound output in macOS System Preferences
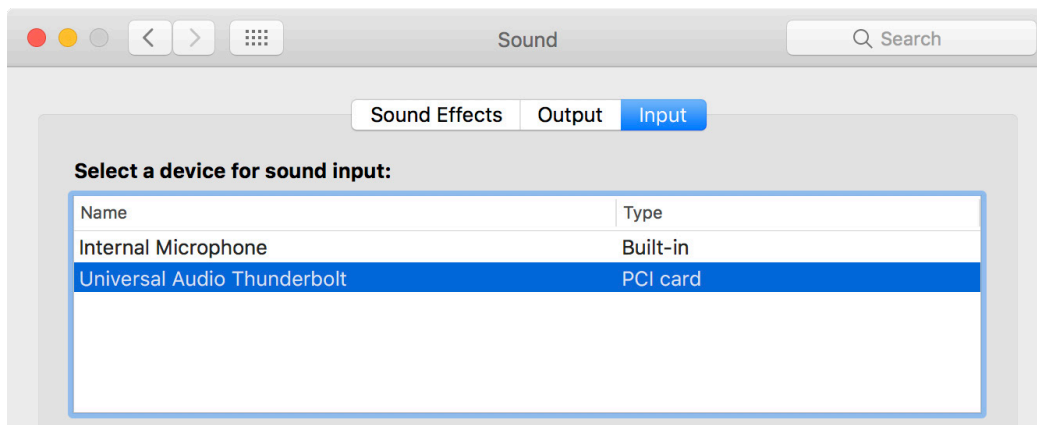
Apollo Solo selected for system sound input in macOS System Preferences

Setting System Sound I/O (Windows)

To use Apollo Solo I/O for system sound:

1. Open Windows Control Panel > Sounds.

2. In the Playback tab, select **Universal Audio Thunderbolt WDM**. Click Apply, then click Set Default.

3. In the Recording tab, select **Universal Audio Thunderbolt WDM**. Click Apply, then click Set Default.

   Important: *See* Windows WDM System Sound Notes *for important information when using Apollo Solo for system sound I/O.*
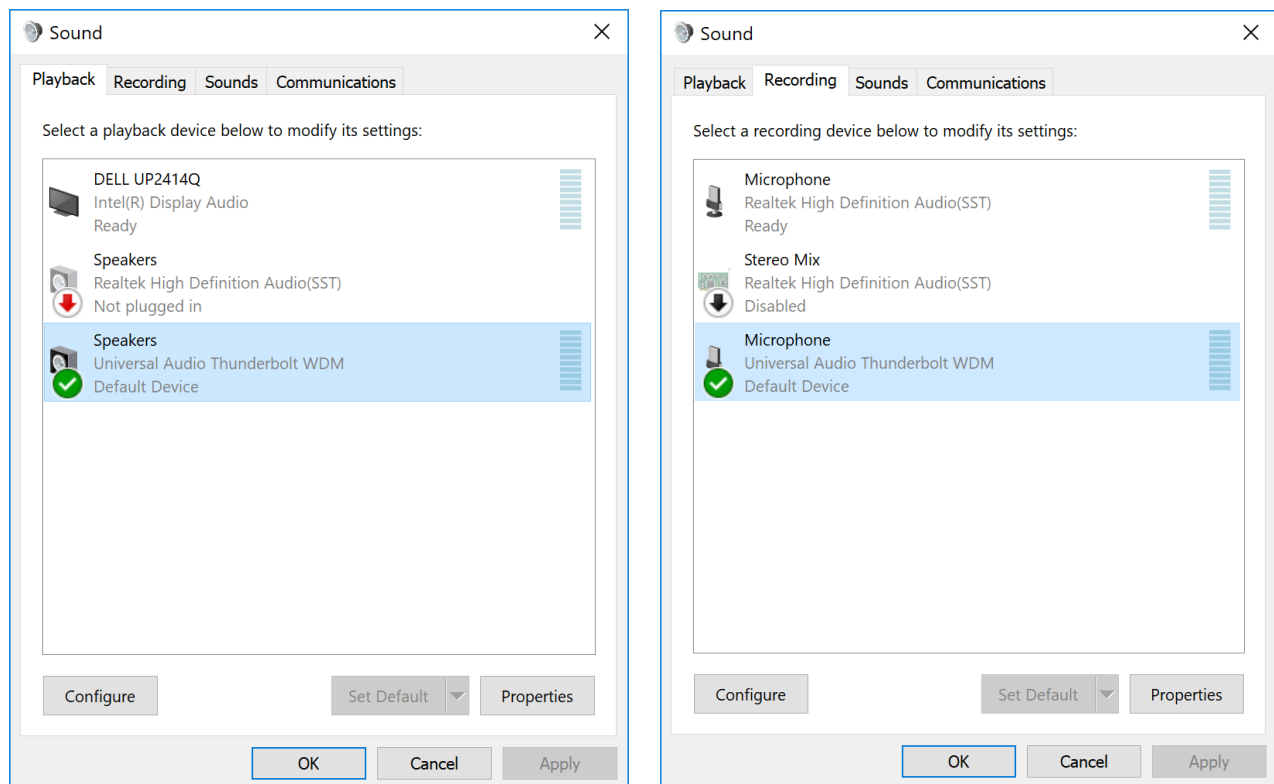
Apollo Solo selected for WDM system audio output (left) and input (right) in the Sound control panel

Windows ASIO versus WDM

On Windows systems, ASIO and WDM are different subsystems that are configured and operated separately. ASIO is typically used for DAW setups, while WDM is typically used for system sound I/O.

ASIO system settings are configured in the Apollo Solo Console Settings>Hardware panel and within the DAW preferences. WDM system settings are configured in the Sound control panel within the Windows OS.

Important: *When using Apollo Solo for WDM system sound I/O, the sample rate of both subsystems must be set the same rate to be heard in both subsystems. See* Windows WDM System Sound Notes *for related information.*

Windows WDM System Sound Notes

Windows WDM system audio is used for audio input and playback in media players, web browsers, audio conference, and similar programs.

To ensure proper audio system functionality, follow these guidelines when using Apollo Solo as the input and/or output device for Windows WDM system audio.

- **Disable system notification sounds.** Turn off all Windows system alert sounds using the procedure detailed on the previous page.

- **ASIO and WDM sample rates must match.** All sample rate values in ASIO DAW programs and WDM audio programs must be set to the same sample rate. If the ASIO and WDM sample rates are not the same, audio from one or more programs will not be heard correctly.

- **WDM sample rate changes.** Set the sample rate in Apollo Solo's Console **before** changing sample rates in the Sound>Playback or Sound>Recording control panels within Windows. Note that WDM programs may need to be closed then reopened to be heard correctly if the sample rate is changed in the Sound control panel within Windows.

- **DAW sample rate changes.** If the DAW sample rate is changed, WDM audio will no longer be heard correctly because the sample rates no longer match. In this case, the WDM sample rate must be changed in the Windows Sound>Playback panel to match the DAW sample rate.

Additional Windows Optimizations

- Visit the Apollo Solo Knowledge Base at help.uaudio.com for updated technical news and system optimization information.

Using Apollo Solo Without Audio Software

Apollo Solo and Console can be used without a DAW or any other audio software. For example, Apollo Solo can be used as a signal processor for live performance when a DAW's recording and playback features are not needed. In this scenario, Console controls Apollo Solo's digital mixing, monitoring, and Realtime UAD Processing features.

To use Console by itself for input monitoring and Realtime UAD Processing, there aren't any special considerations — simply launch Console and start using it.

Note: Because Apollo Solo is powered by the computer's Thunderbolt 3 bus, standalone use without a computer is not possible. Apollo Solo can only be used when connected to a Thunderbolt 3 computer.

UAD Console Software

UAD Console is the companion software application for Apollo audio interface hardware. UAD Console's analog-style workflow is designed to provide quick access to the most commonly needed features in a familiar, easy-to-use application.

UAD Console's function is to control up to four Apollo hardware units and their digital mixing and low-latency monitoring capabilities. UAD Console is where you configure and operate Unison and Realtime UAD Processing with UAD-2 plug-ins.

UAD Console remotely controls the digital mixing and signal processing functions that are performed within the Apollo hardware. Although UAD Console runs on the host computer, the computer's CPU is not performing these audio functions. All audio mixing and signal processing occurs on the DSP inside Apollo.

> **Important Fundamental Concept:** *The primary function of UAD Console is to control Apollo's low-latency hardware input monitoring, Unison plug-ins, and Realtime UAD Processing when using third-party DAWs such as Logic Pro, Live, and Pro Tools. UAD Console replaces the software input monitoring feature of the DAW's mixer. UAD Console or LUNA Recording System must be used to take advantage of these Apollo features.*

Complete documentation for UAD Console is available online in the Universal Audio Knowledge Base:

UAD Console Manual

https://help.uaudio.com/hc/sections/25052396869908

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62   UAD Console Software

UAD Meter & Control Panel

The UAD Meter & Control Panel application is used to monitor and configure UAD device resources. It is also used to manually authorize UAD plug-ins after a purchase as the UA store. The application has two main windows: the UAD Meter, and the UAD Control Panel.

The UAD Meter displays the current DSP, program, and memory status of UAD devices in realtime. The UAD Control Panel has multiple panels that display and modify various system, plug-in, and global configuration parameters.

> *Note: This application is for all UAD device models (Arrow/Apollo audio interfaces and UAD-2 DSP Accelerators).*
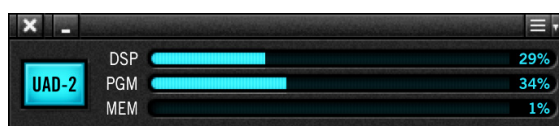
UAD Meter Window

The UAD Meter & Control Panel application can be launched or quit at any time. It does not need to be open or active to use Apollo Solo or UAD plug-ins. It is completely independent and does not require Console or a DAW. You can move the UAD Meter to a convenient location on your screen by dragging its window title bar.

> *Note: If "No Devices Found" appears in the UAD Meter window instead of the expected buttons and gauges, the UAD software is not communicating with the UAD hardware. If this occurs, double-check hardware and software installations and/or contact Technical Support.*

Launching the Application

The UAD Meter & Control Panel application can be opened using the techniques listed for each operating system below.

UAD Meter & Control Panel application icon

Windows

- Access the application from:
  Start Menu>All Programs>UAD Powered Plug-Ins

Mac

- Single-click the UAD Meter & Control Panel icon that was placed in the macOS Dock during installation

- Double-click the UAD Meter & Control Panel application that was installed at:
  /Applications/Universal Audio/

UAD Meter Window

Refer to the illustration below for descriptions in this section
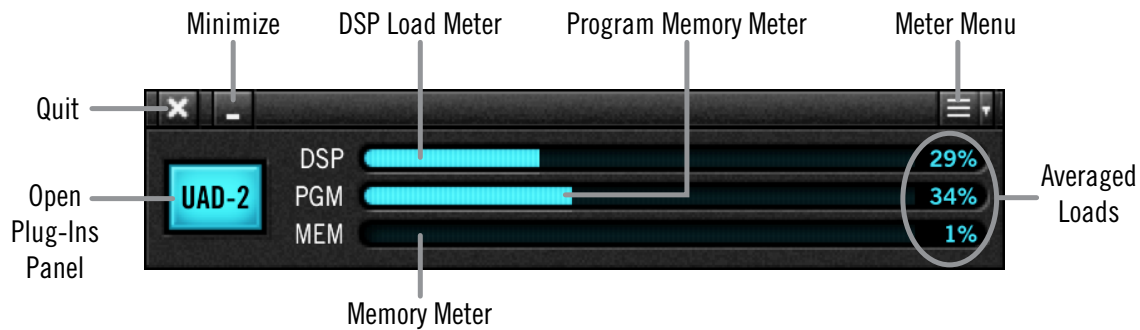
UAD Meter window elements

Title Bar

The Title Bar (the strip across the top of the UAD Meter window) contains buttons to quit the UAD Meter & Control panel application, minimize the UAD Meter window, and access the Meter Menu.

> **Note:** *The Quit, Minimize, and Menu button positions shown above are as they appear on Mac systems. These button positions are reversed on Windows systems, reflecting the OS conventions.*

Plug-Ins Panel Button

Clicking this blue button opens the Plug-Ins panel. It has the same function as selecting "Plug-Ins…" from the Meter Menu.

UAD Resource Display

UAD plug-in loads are shown in the UAD Meter window. These three gauges (DSP, PGM, and MEM) provide visual feedback, helping to determine which UAD plug-ins to use if available UAD resources are limited.

The UAD resources are displayed as blue bar graphs and as percentages. These gauges have no controls; they are visual indicators only.

> **Tip:** *The UAD Resource Gauges are also displayed in the Info Bar within Console.*

Averaged Loads

The load for each gauge represents the average for all UAD devices in use. For example, if a UAD-2 Satellite Thunderbolt OCTO is connected, the UAD DSP load is an average of the eight DSP processors in the unit plus the single DSP within Apollo Solo. If additional UAD-2 accelerators are added, the average load is automatically adjusted.

Individual Loads

When additional UAD devices are added to the system, individual DSP loads within the individual units can be viewed in the System Information panel.

UAD Plug-In Loads

The amount of UAD resources used by UAD plug-ins vary with each individual plug-in; more complex algorithms require more resources.

UAD Instance Chart

The amount of DSP used by each individual UAD plug-in is available in the UAD instance count chart. The chart can help determine which to plug-ins to use with available resources. The chart is published online at help.uaudio.com.

Static Loads

Apollo Solo uses UAD DSP and memory for its internal digital mixer and Input Delay Compensation engine. Therefore, the meters will indicate loads when Apollo Solo is connected, even if UAD plug-ins are not inserted in Console or the DAW.

> *Note: Console's Input Delay Compensation can be disabled in Console Settings to slightly reduce UAD loads when IDC is not needed.*

DSP

The DSP gauge indicates the amount of digital signal processing resources that are being used by all UAD devices in the system.

DSP is the primary hardware resource that powers the UAD plug-In algorithms. When UAD plug-ins are disabled, DSP requirements are decreased.

> *Note: When UAD plug-ins are disabled, DSP requirements are decreased EXCEPT when the plug-in is disabled using the soft bypass control within the plug-in interface. This control may be named bypass or power, depending on the plug-in.*

Program

The Program (PGM) gauge indicates how much UAD program memory is in use. Program memory is an on-chip memory that is specific to the UAD-2 DSP processor and is used for certain UAD plug-in resources.

Each unique UAD plug-in uses a bit of program memory. If many different UAD plug-ins are loaded simultaneously, it is possible for this resource to run out before a DSP overload occurs. This threshold is considered and factored in by the automatic UAD load balancing routines.

Memory

The Memory (MEM) gauge indicates the percentage of UAD RAM that is currently in use. It indicates the total available UAD memory available, regardless of the number of DSP processors that are installed.

Memory is used for echo, delay lines, reverb, and other spatial processing. When UAD plug-ins are disabled but not unloaded, memory requirements are not decreased. In this case, the memory remains loaded so that reverb tails and delay lines are not cut off when the plug-in is disabled.

Meter Menu

The Meter Menu can be used to access the UAD Control Panels and Always On Top mode. To view the Meter Menu, click the menu button in the UAD Meter window title bar as shown below. After clicking the menu button, select an available function from the drop menu.

Tip: The Meter Menu functions can also be accessed by using the keyboard shortcuts listed in the menu.

Accessing the Meter Menu

Control Panels

The UAD Control Panels (System Info, Plug-Ins, Configuration, Help) can be accessed by selecting them from the Meter Menu.

Always On Top

The UAD Meter & Control Panel application windows can be set to either normal or Always on top view modes.

In normal mode, the UAD Meter and UAD Control Panel windows are covered by the windows of the foreground application. Normal mode is active when the Always On Top menu item is unchecked

In Always On Top mode, the UAD Meter and UAD Control Panel windows always float on top of other windows, even when other applications are in the foreground. Always On Top is active when a check mark appears next to the item in the Meter Menu.

UAD Control Panels

The UAD Control Panels are where detailed system information is displayed and global UAD plug-in settings are modified. The main UAD Control panel window has four panels, organized by related functions: System Information, Plug-Ins, Configuration, and Help.

Accessing the Control Panels

The UAD Control Panel window is accessed from the UAD Meter window. To open the Control Panel, click the menu button in the UAD Meter window title bar as shown below. After clicking the menu button, the available functions are listed in the drop menu.

> **Tip:** The UAD Control Panels can also be accessed by using the keyboard shortcuts listed in the Meter Menu.
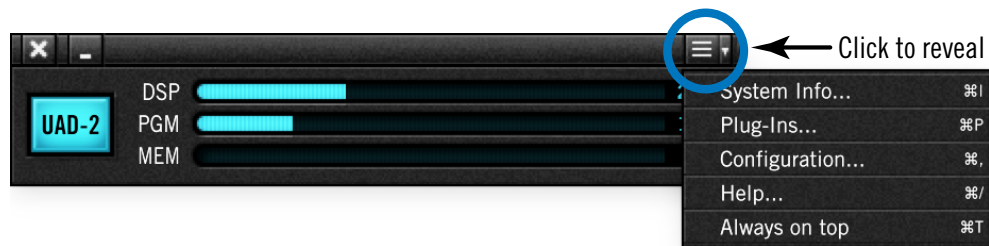
Control Panels drop menu

When the main UAD Control Panel window is open, the individual window panels are accessed by clicking the panel name buttons at the top of the Control Panels window or typing the keyboard shortcuts shown in the Control Panel drop menu.

Control Panel buttons with System Info panel selected

System Information Panel

The System Information panel displays detailed UAD software and hardware information and contains several useful buttons. Refer to the screenshot below for descriptions in this section.
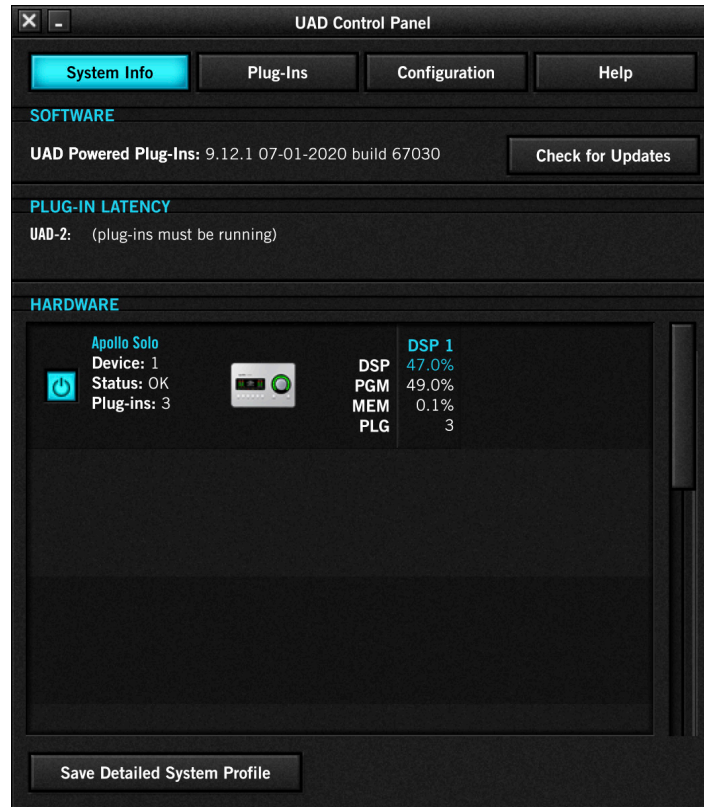
Software Section

Version String

The currently installed version of UAD software is displayed here.

Check for Updates

This button checks the Universal Audio web servers for a newer version of the UAD software. Running the latest version of UAD Powered Plug-Ins is recommended for maximum stability and new platform features, such as the latest UAD plug-ins.

Plug-In Latency

UAD plug-in latency in the DAW, in samples and milliseconds, is displayed here when the DAW is running.
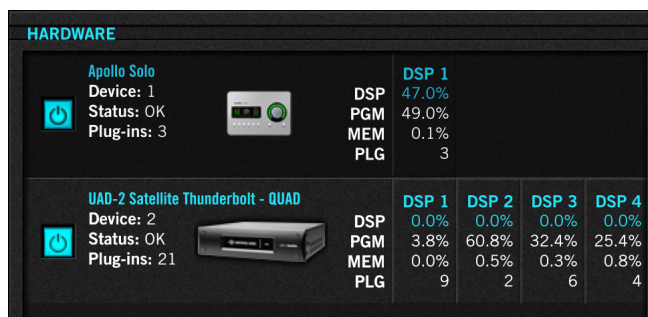
> *Note: These plug-in latency values are unrelated to UAD plug-ins used within Console.*

The displayed values are calculated from the current audio I/O buffer size and the session sample rate when Extra Buffering is off. When Extra Buffering is on, the displayed latency is the I/O buffer size plus 64 samples.

> *Note: The displayed sample latency number does not include the extra samples produced by UAD plug-ins with additional latency. For more detailed information about the extra samples and latency, see Latency & Apollo Solo.*

Hardware Section

Detailed information about each active UAD device and its DSP is displayed in the Hardware area. If several devices are installed, use the scroll bar to see the other devices if they are out of view.

Hardware section as it appears with multiple UAD devices

Device Status

For each installed device, its status and a small hardware icon are displayed. When the device displays "Status: OK" the hardware is operating properly. The total number of UAD plug-ins loaded on each device is also displayed here.

Device Enabled

Individual UAD devices can be disabled using the Device Enabled button. This can be useful, for example, if creating a session on a system with multiple devices that will be transferred to a system with fewer devices, or to streamline performance of the host system when multiple devices are not needed.

Click the button to disable an individual device. The device is enabled when the button is blue. For additional information regarding multi-device use, see Expanded UAD Systems.

Devices remain disabled only while the UAD Meter & Control Panel application is open. When the UAD Meter & Control Panel is quit, disabled devices are re-enabled.

> *Note: Disabling devices does not disable plug-ins already running on the device; it only prevents additional plug-ins from being loaded onto the device.*

> *Important: For optimum results, quit any host applications using UAD plug-ins before disabling/enabling devices.*

DSP Load

If more than one UAD DSP is installed, information for each DSP is displayed. DSP, Program (PGM), and Memory (MEM) loads are displayed as a percentage of total available load for that processor. The number of UAD plug-ins (PLG) running on each individual processor is also displayed.

Save Detailed System Profile

Clicking this button will generate a detailed UAD system profile and prompt you for a location to save the text file to disk. This file contains an even greater level of detail than the System Information panel, which can be useful for troubleshooting or if UA Customer Support requests this document when providing assistance.

The profile lists the version strings of the individual UAD software components, installed device type(s) with serial and hardware ID numbers, host computer information, and detailed authorization status for all UAD plug-ins.

Plug-Ins Panel

The Plug-Ins panel displays the current authorization and demo status of all installed UAD plug-ins. Use the scroll bar to view plug-ins that are not visible in the list. Refer to the screenshot below for descriptions in this section.

Tip: The Plug-Ins panel can be accessed by clicking the blue Plug-Ins Panel Button labeled "UAD-2" in the UAD Meter window.
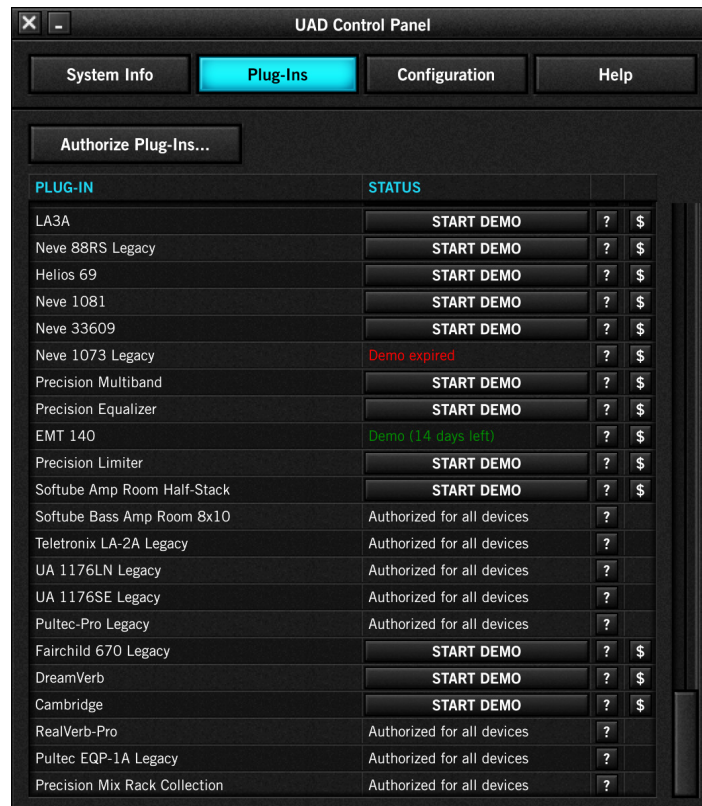
Authorize Plug-ins button

UAD plug-ins are automatically authorized each time the computer is started (internet connection required). This button links to your account at the UA online store to manually authorize licensed UAD plug-ins.

Note: Click this button whenever you buy a plug-in at the UA store to manually authorize your new plug-in purchase.

The complete procedure for manual UAD device authorization is detailed in the UAD Authorization Procedure. If the UAD computer is not connected to the internet, see Offline UAD Authorization.

Important: UAD plug-ins require authorization before they can be used.

Plug-In Column

All currently installed UAD plug-ins are displayed in the Plug-In column. Plug-Ins are listed by release order, with newest plug-ins at the top of the column.

Status Column

The Status column reflects the current authorization state of each UAD plug-in. After authorization, the status will show one of the following:

Authorized for all devices – When the plug-in is licensed and authorized to run on all devices in the system, "Authorized for all devices" is displayed in white text.

When a plug-in is licensed but not all devices in a multi-device system are authorized with the license (when the devices are not in the same UA account system), the Status column indicates which of the devices is authorized (for example, "Authorized for device 1 only").

Start Demo – When this button is visible, the demo period has not been started for the plug-in. Click the START DEMO button to begin the 14-day trial period.

UAD plug-in demos can also be initiated by the START DEMO button in the UAD Toolbar at the bottom of the plug-in window. See Demo Mode for detailed information.

> ***Important:*** *The 14-day demo period can only be activated once, and cannot be stopped or restarted during this period. Don't activate demo mode unless you have adequate time to thoroughly evaluate its sound and functionality.*

Demo Active (days remaining) – If the 14-day demo has been activated but is not yet expired, the number of days remaining in the trial period is displayed here in green text.

Demo Expired – If the 14-day trial period has ended, DEMO EXPIRED is displayed here in red text.

Help Column

Clicking the Help button (?) opens a link to the plug-in product page at the UA online store.

Buy Column

Clicking the Buy button ($) adds the plug-in to your shopping cart at the UA online store. See Buying UAD Plug-Ins for details. This button does not appear if the plug-in is already licensed.

> ***Tip:*** *The BUY button provides a quick visual reference to determine which UAD plug-ins are unlicensed.*

Configuration Panel

The UAD Configuration Panel is where most of the global UAD settings and preferences are specified for UAD devices. Refer to the screenshot below for descriptions in this section.

> **Note:** *Settings related specifically to Apollo Solo's audio interface functionality and Console are set in Console Settings.*
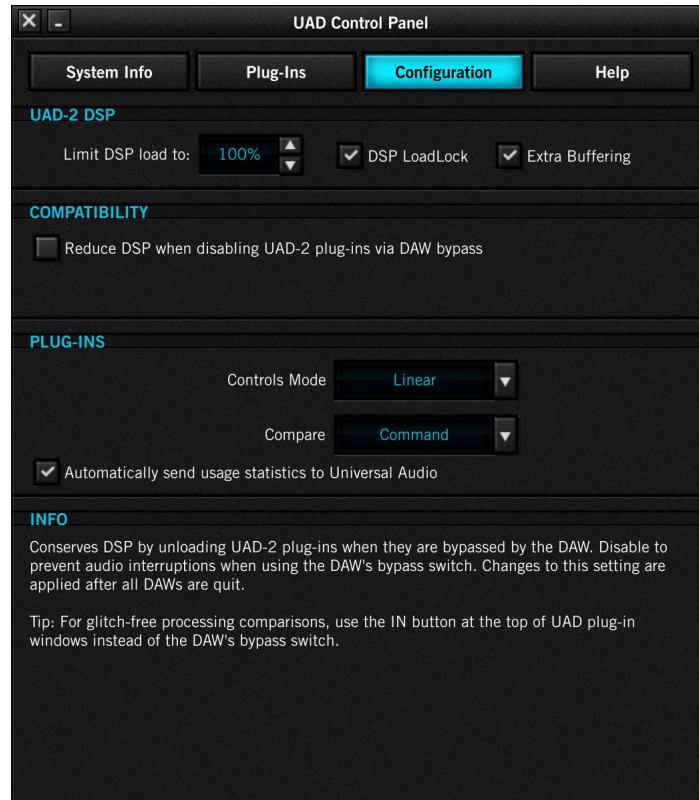
The settings displayed in the Configuration Panel depend on the UAD hardware that is currently installed and the OS platform (Windows or Mac). For example, if Apollo Solo is installed in a Windows system, you will not see Mac-specific settings.

> **Note:** *UAD settings apply to all UAD-2 DSP Accelerators and UA audio interfaces unless specifically noted otherwise.*

UAD-2 DSP Settings

Overview

Without UAD plug-ins, overloading the host computer system with native (host CPU based) plug-ins can cause audio dropouts and other system issues. Some DAWs, for example, provide a switch that allows you to trade latency for stability when the system is overloaded. Similarly, the UAD DSP load cannot exceed 100% without unpredictable behavior.

With the Limit DSP Load feature, the UAD DSP can also be limited so the load cannot exceed 100%, thereby increasing overall system stability in high load situations. With very heavy UAD loads, DSP load limiting may also improve host CPU performance.

There are many variables that affect DSP load (sample rate, I/O buffer size, parameter values, mono/stereo, automation, host system performance, etc). Although these variables are taken into account, the resulting measurement cannot be absolutely accurate due to variations in system configurations, including computer bus loading, which is impossible to measure.

Systems that are heavily loaded due to the presence of other devices or suboptimal configurations may cause additional DSP loading that cannot be measured by the UAD plug-in load calculator. The DSP load limit should be reduced in this case.

It is possible for certain (atypical) conditions to be met where another UAD plug-in can't be added, even when the UAD Meter says you should have DSP available when compared to the DSP Load Limit value.

> **Note:** When Limit DSP Load is enabled and the DSP load limit is exceeded when instantiating a new UAD plug-in, an overload message will appear and DISABLED will be displayed in the plug-in's UAD Toolbar. In this case, even though the UAD plug-in loads, it will not process audio.

Limit DSP Load

This setting determines the maximum UAD DSP load. If performance issues such as overloads, dropouts, stuttering, and/or other artifacts persist, change the UAD DSP load value by clicking the triangles to the right of the percentage display or entering a value directly with text entry.

> **Note:** UAD-2 DSP load limiting is always on. 100% (the default value) is the maximum available setting.

DSP LoadLock

DSP LoadLock reserves the maximum UAD-2 DSP load required by each plug-in, even if certain plug-in features are disabled. This ensures there will always be enough DSP if those features are later enabled, or when automating parameters that affect the DSP load.

Disabling LoadLock increases available UAD-2 DSP by disabling unused features in certain plug-ins, but may cause problems with previously saved sessions that had all plug-in features enabled, or when automating parameters that affect the DSP load.

The specific UAD plug-ins that have the ability to reduce DSP use when certain features are disabled are listed in the UAD Instance Chart at help.uaudio.com. These plug-ins are marked with an asterisk (*) in the chart.

Enabling DSP LoadLock is recommended for optimum performance. Disable LoadLock only when you need to squeeze in that extra bit of DSP resources.

> *Note: Changes to this setting do not take effect until all open sessions containing UAD plug-ins are reloaded.*

Extra Buffering

Extra Buffering adds an additional 64 samples of buffering for increased DAW compatibility.

> *Note: This setting is unrelated to UAD plug-ins used within Console.*

If your DAW is incompatible with reduced latency when Extra Buffering is off, a dialog will be displayed indicating that Extra Buffering must be enabled. If this dialog does not appear, disable Extra Buffering to reduce latency in the DAW.

> *Note: Changes to this setting do not take effect until all open sessions containing UAD plug-ins are closed.*

Host Compatibility Settings

Reduce DSP when disabling UAD-2 plug-ins via DAW bypass

This option conserves DSP by unloading UAD-2 plug-ins when they are bypassed by the DAW. Disable the setting to prevent audio interruptions such as glitching when using the DAW's bypass switch. Changes to this setting are applied after all DAWs are quit.

> *Tip: For glitch-free processing comparisons, use the IN button at the top of UAD plug-in windows instead of the DAW's bypass switch.*

User Interface Settings

Controls Mode

This setting determines how UAD plug-in parameter knobs respond to adjustment. Three control modes are offered: Circular, Relative Circular, and Linear. Select the desired mode from the Controls Mode menu.

> *Tip: To increase control adjustment resolution when in adjusting rotary controls in circular and relative circular modes, increase the radius of the mouse relative to the knob while dragging (move the mouse farther away from the knob while dragging in a circular motion).*

Linear (slider)

In Linear mode, the knob is adjusted by dragging horizontally or vertically instead of by rotating. This behavior is similar to moving a fader or other slider control.

Circular (jump)

In Circular mode, the software knobs behave like physical rotary knobs. Values are changed by clicking on the knob then rotating in a circular direction. When the edge of the knob is clicked, the parameter value instantly jumps to the mouse position.

Relative Circular (grab)

Relative Circular mode operates similar to Circular mode, but the knob value does not jump to the mouse position when clicked. Instead, the knob value is modified relative to its original value.

In this mode you can click anywhere on the knob to make an adjustment originating at the original value (it's not necessary to click on the current knob position).

Automatically send usage statistics to Universal Audio

Enabling this option helps make UAD software better. If checked, statistics will be periodically sent to Universal Audio in the interest of product improvement. These statistics are minimal, and do not impact your system performance. If this box is unchecked, statistics are not sent.

Info Display

This area displays helpful text about parameters in the Configuration panel. Hover the mouse over a Configuration setting to view the informational text.

Help Panel

The Help & Support Resources panel (shown below) contains helpful buttons to help you get the most out your Apollo Solo and UAD plug-ins experience.

The button names are self-explanatory. Click a button to open its page on the internet. If the UAD computer isn't online, much of the information is in the manual you're reading now; find the topic in the Table of Contents or the PDF reader's search feature.

> **Note:** See *About Apollo Solo Documentation* for related information.
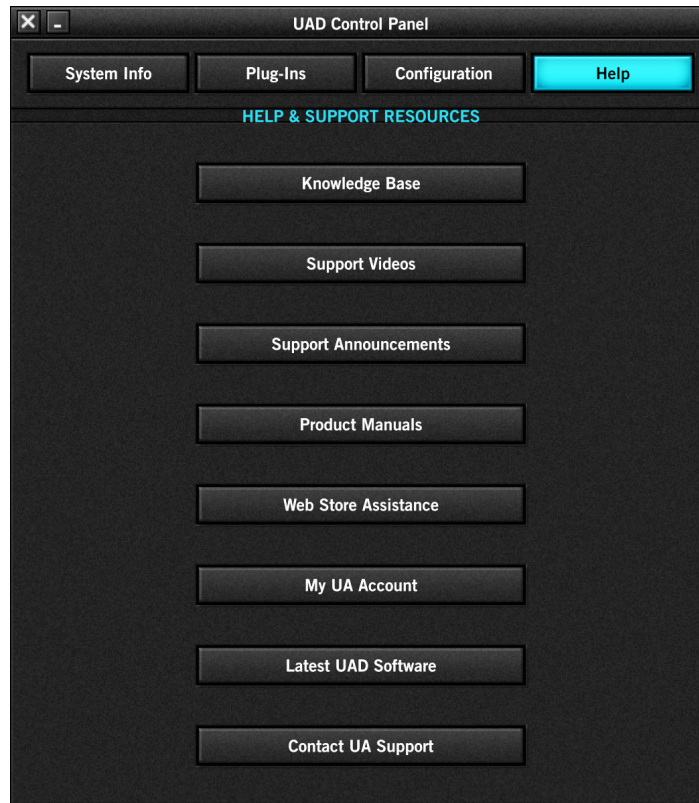
Using UAD Plug-Ins

After the UAD hardware and software have been properly installed and configured, UAD plug-ins are accessed and used just like any native (host-based) plug-in. All UAD plug-ins can run concurrently with each other and with native plug-ins simultaneously, in any combination. Note that UAD plug-ins running at 96 kHz use twice as much UAD DSP resources than those used at 48 kHz, and so forth.

> **Note:** *To learn how insert UAD plug-ins, consult your DAW documentation.*

The UAD Plug-In Interface

One typical UAD plug-in interface is shown below. Each plug-in contains various control parameters for modifying the sound of the plug-in, display-only elements (such as meters) for visual feedback, and the UAD Toolbar. The UAD Toolbar is common to all UAD plug-ins, and is displayed at the bottom of the interface.
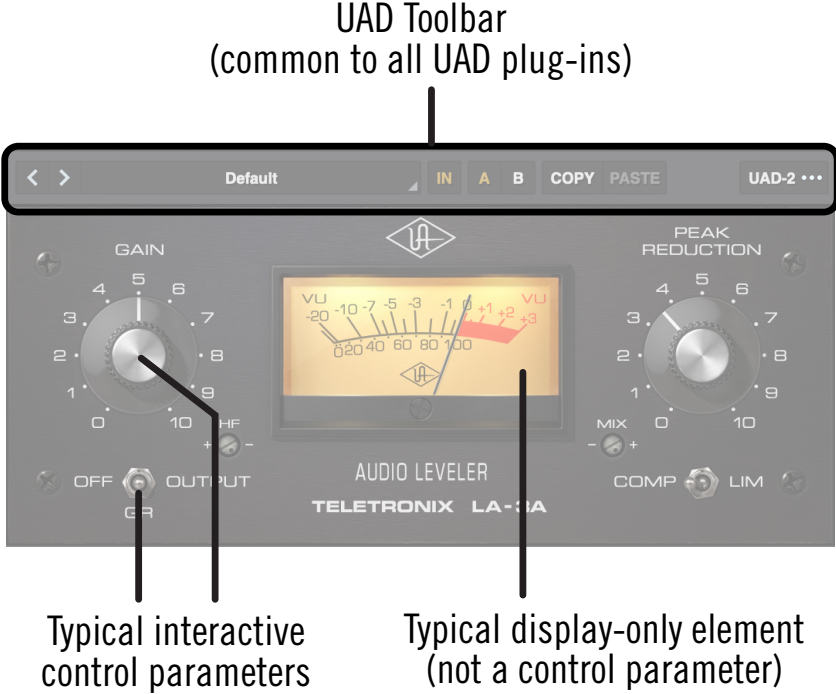
Typical UAD plug-in interface

Controls View

Some DAW applications have an alternate plug-in display mode feature called Controls View, Parameter Mode, or similar terminology. This mode displays the control parameters as a list with simple sliders, switches, and menus (the appearance is controlled by the DAW), which some users may prefer. Consult the DAW documentation for how to display this view. Controls view is not available within Console.
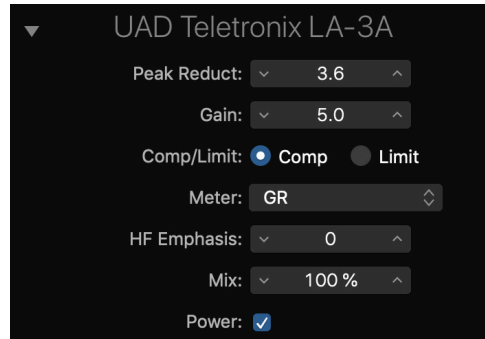
Typical UAD plug-in as displayed in controls view

UAD Toolbar

The UAD Toolbar is located at the top of every UAD plug-in (when the plug-in is not in Controls View). Refer to the illustration below for control descriptions in this section.
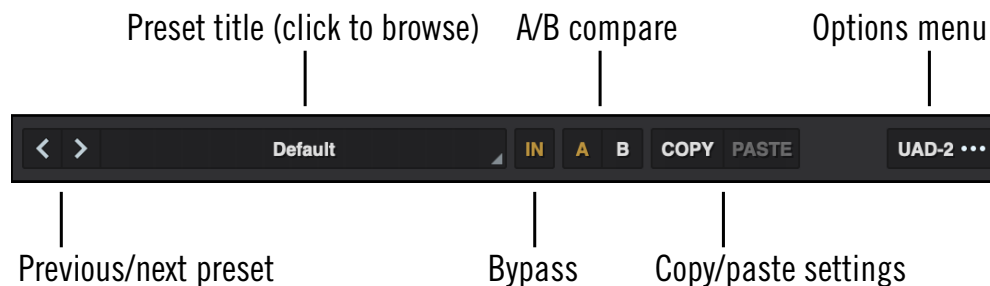
UAD Toolbar elements

Previous/Next Preset

Use the < > buttons to quickly select the previous or next preset in the Preset Browser without opening the browser window.

Preset Title

The active preset title is displayed here. If the preset settings have been modified, the title is displayed in *italics*.

> **Tip:** *Click the preset title to open the Preset Browser.*

IN/Bypass

Use the IN button to compare plug-in processing with the original sound. To enable or disable audio processing, click IN above the plug-in's controls. When IN is highlighted, the plug-in is enabled and processing audio. When IN is not highlighted, the plug-in is bypassed.

IN is a soft bypass, equivalent to toggling the power button in the plug-in. This method keeps the plug-in loaded on DSP to prevent audio interruptions when toggling. When the plug-in is bypassed with the DAW's bypass control, the plug-in is unloaded from DSP which can cause playback glitches.

A/B Compare

Use the A and B buttons to compare two sounds. For example, you can compare two different presets, or an edited version of a sound with its original.

To copy sounds from one slot to the other, click the ••• options menu and choose Copy A To B (when A is active) or Copy B To A (when B is active). The A and B settings are stored in the plug-in instance, not in preset files.

Copy/Paste Settings

Use Copy and Paste to copy settings from the plug-in and paste them to a different instance of the same plug-in. You can use this to copy and paste settings between instances of the same plug-in within a session, or to copy and paste settings between the UAD-2 and native (UADx) versions of a plug-in.

> *Note: For UAD plug-ins with narrow header bars (for example, Lexicon 224), the Copy and Paste functions are located in the ••• options menu.*

Settings Compatibility

You can load/save and copy/paste settings between the same UAD plug-in title, as well as load/save/copy/paste between SE and standard plug-ins of the same title (for example, between Neve 33609 and Neve 33609SE).

> *Note: Presets and settings between Legacy titles and their newer equivalents with the same title are not compatible (e.g., Fairchild 670 Legacy and Fairchild 670).*

Options Menu

The ••• options menu contains several helpful functions.
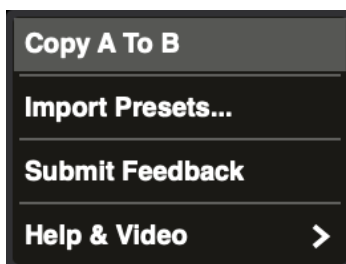
Copy A To B

Use this function to copy the A/B compare sounds from one slot to the other. You can choose Copy A To B or Copy B To A.

Import Presets...

Use this feature to share presets with another user or between computers. You can locate a user preset on the file system, and easily import a preset from another system or another user into your plug-in presets. See Sharing user presets between systems below for details.

To locate a user preset:

- Right-click on the user preset and choose "Show in Finder" (macOS) or "Show in Explorer" (Windows). A window opens with the preset selected. UAD plug-in presets can be freely shared between macOS and Windows systems.

To import (load) a preset:

1. Select Load a Preset...

2. Select the preset on your file system, and click Open.

The preset is imported and opened in the plug-in, and automatically stored in the user presets location on your system.

Submit Feedback

You can submit UAD plug-in feature requests, bugs, or general feedback. There are options to include any relevant details in the feedback submission form, and automatically include your current log files and system information files. You can also attach files (for example, a screenshot).

Help & Video

You can access the online documentation page or a short video from this menu. The video gives quick tips on the operation of the plug-in, and the documentation page details the operation and controls of the plug-in.
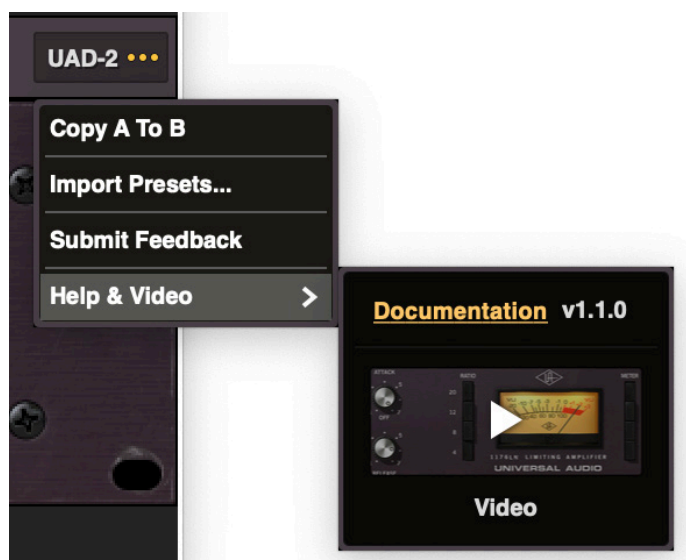
Using UAD Presets

UAD plug-ins include a preset browser that provides deep and comprehensive ways to work with presets.

Click the preset name (for example, Default) in the UAD Toolbar to open the preset browser. When the preset browser is open, the search bar takes keyboard focus so you can find presets and tags.

Tip: *To close the preset browser, press the Esc key.*

Type to filter the list of presets •———

Click to choose tags •———

———• View favorites only

Delete/Rename/Save a preset •———

Select a preset •———

PRESETS	✕
I	
› TAGS	FAVORITES ☆
Default	
DELETE	RENAME	SAVE
› User Presets	
80s Fine Grained Gate	
80s Snare	
90s Big Kick	
A Little Bit Of Hall	
Acoustic Solo Chamber	
Atmosphere	
Ballad Vocals	
Ballad Vox Plate	
Big 80s Snare	
Brooklyn BVs	
Chamber Made	
DI's Drum Room	
DI's Room	
Dark Room	
Default	
Density Plate	
Drum Ballad Plate	
Drum Crunch Room	

Using a preset

Click a preset to load it.

Navigating presets

Press the up and down arrow keys to navigate through, and load, presets.

Searching for a preset

To search for a preset by name or tag, type in the search bar. The list of presets is filtered as you type. Press Enter to use the first preset in the list, or navigate up/down with the arrow keys, then press Enter.
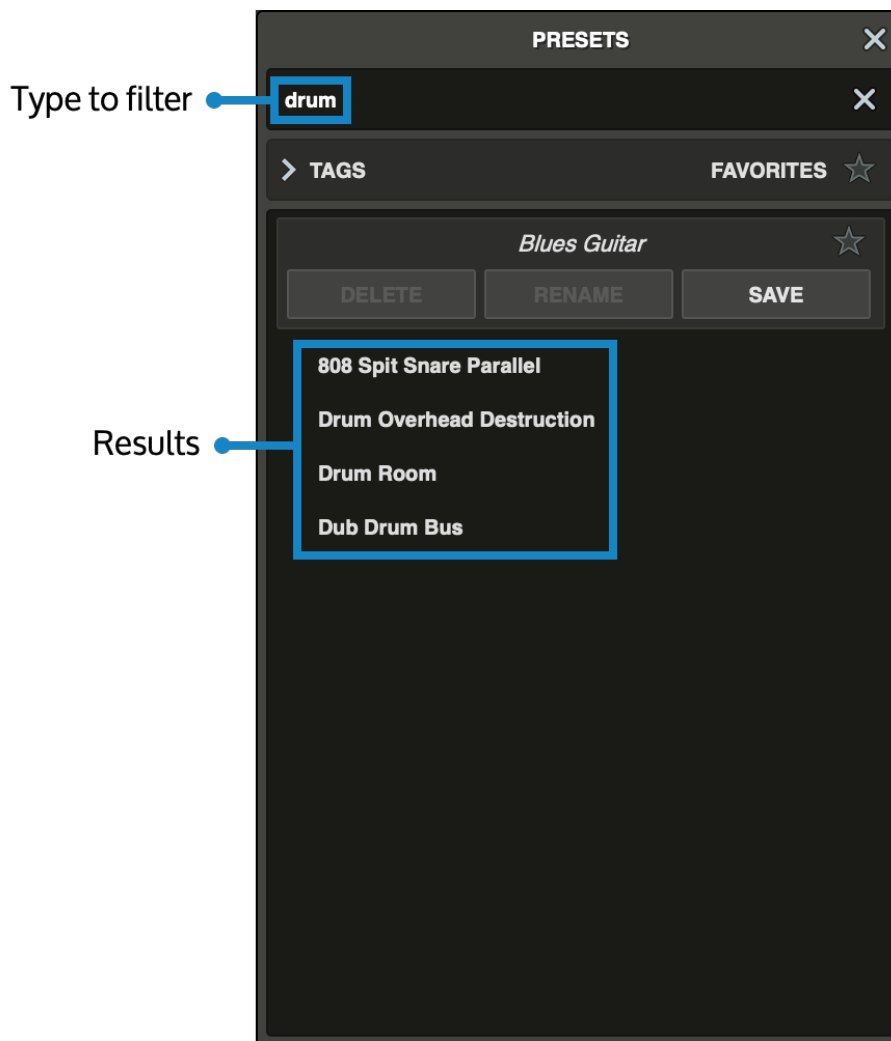
Using Tags to find a preset by characteristics

The Tags feature allows you to find presets based on descriptive terms, genres, and other categories.

- To show the list of tags, click TAGS.

- To close the list of tags, click TAGS again.

- To filter the list of presets by a tag, click the tag. Click one or more tags to narrow the list of plug-in presets. Each tag you add narrows the list of results further, and also reduces the list of tags.

- To remove a tag, click one of the selected tags.

- To stop filtering by tags, click the X next to TAGS.

Note: You cannot add new tags, or add existing tags to plug-in presets.
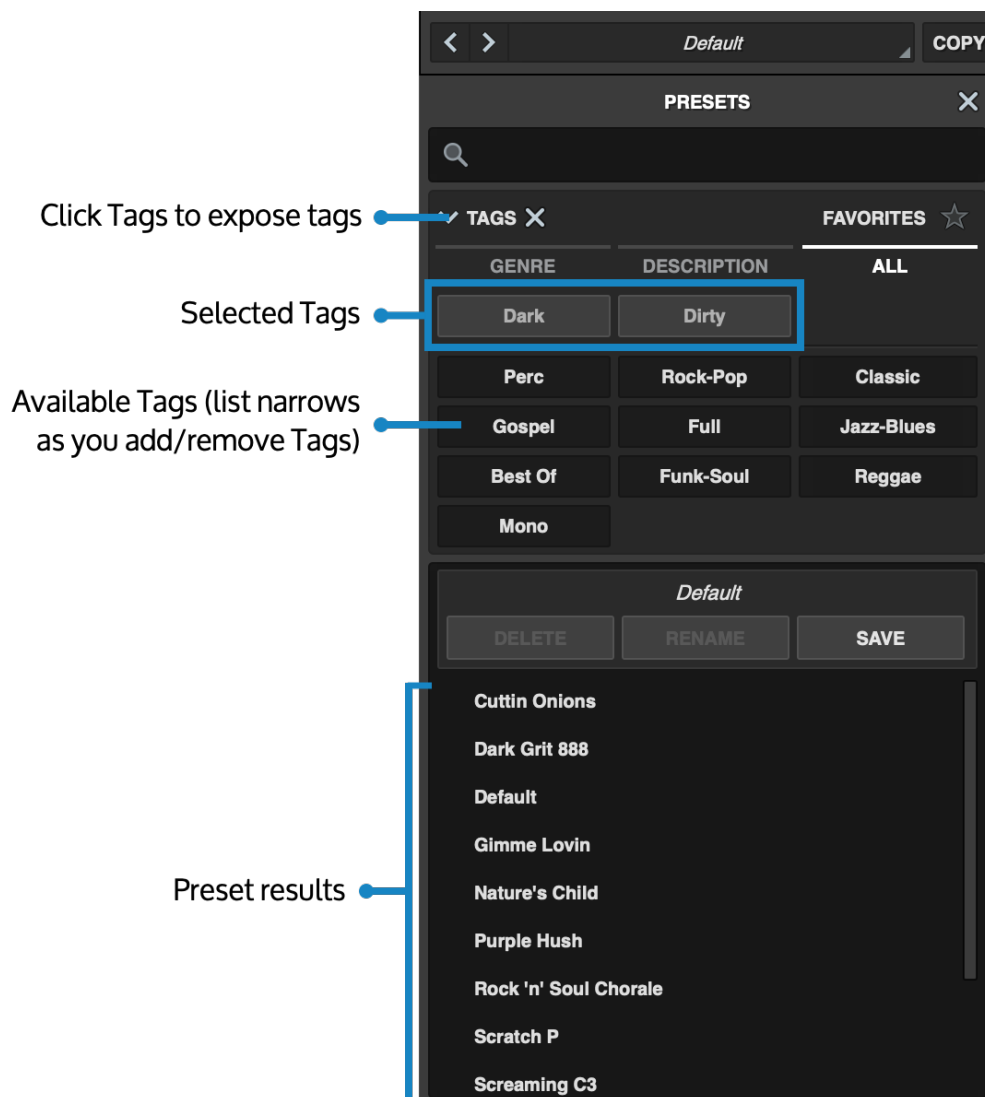
Tag categories

UAD plug-ins include preset tag categories. Categories run across the top of the tags list, and allow you to view a subset of tags.
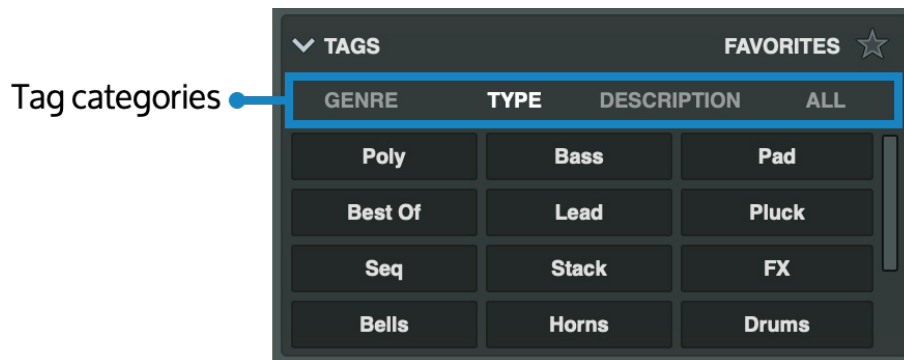
Tag categories

Click a category to see tags for that category. Click All to see all tags.

You can sort tag categories by category name, or by the number of presets in the category, from most to least, and you can show the number of presets in each tag category.

To sort tag categories:

1. Right-click or control-click on TAGS.

2. Under Sort Tags By, choose Name or Number of Presets.

3. To show the number of presets in each tag category, under Show, select Number of Presets. Deselect Number of presets to stop showing the number of presets in each category.

Sort tag categories by name or number of presets

Show/hide number of presets in each tag category
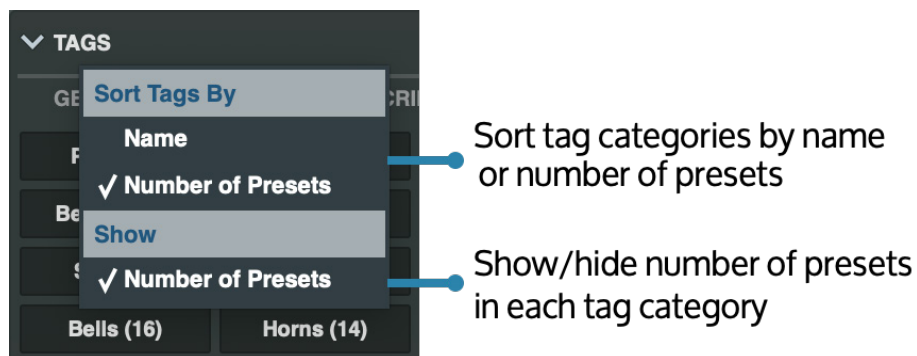
Setting a default preset

You can set a default preset that will load automatically when you instantiate a native UAD plug-in.
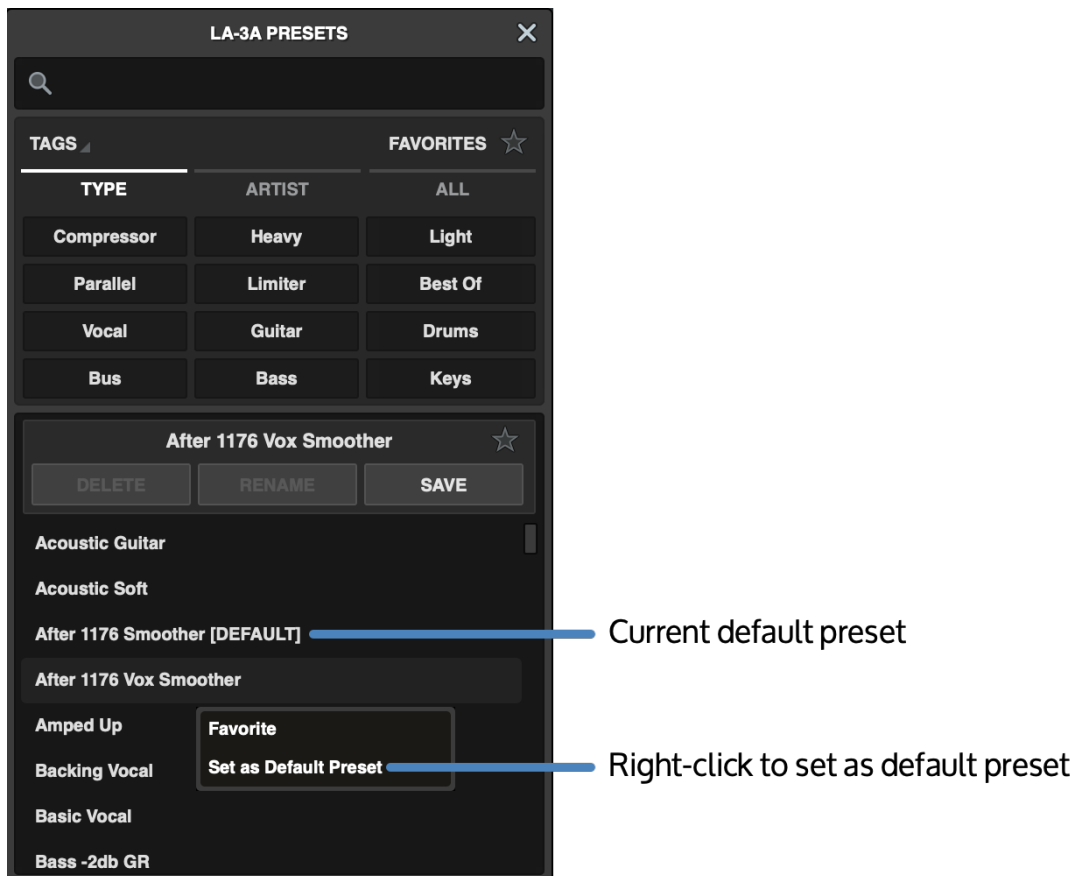
- To set a default preset, right-click the preset name and choose Set as Default Preset. The current default preset includes [DEFAULT] after the preset name.

- To clear the default preset, right-click the preset name and choose Clear Default Preset.

Favoriting presets

You can favorite presets, and filter the list of presets by your favorites.
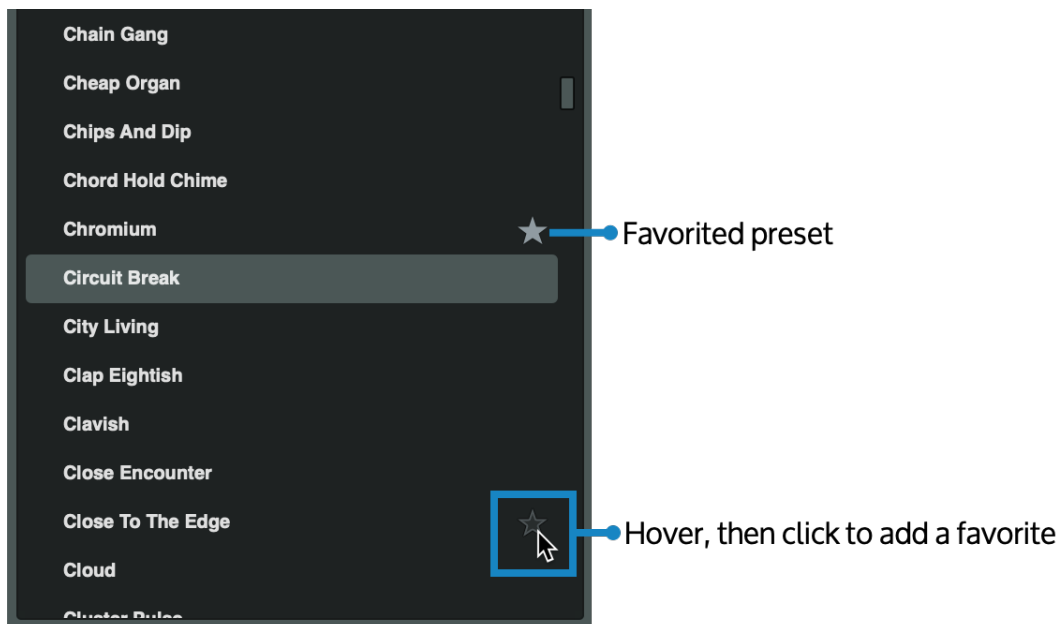
- To favorite a preset, hover over the preset name, and click the star to the right of the preset name, or right-click the preset name and choose Favorite.

- To unfavorite a preset, hover over the preset name, and click the favorite star again, or right-click the preset name and choose Unfavorite.

- To show only favorites in your preset list, click Favorites in the Tags bar.
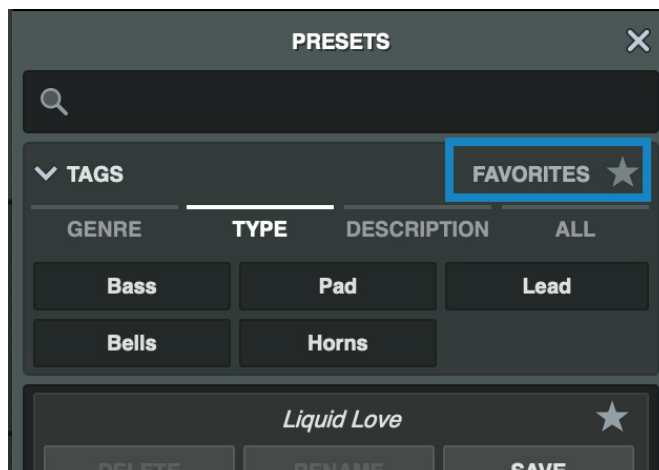
Working with User Presets

You cannot edit, delete, or move factory presets. However, you can edit a factory preset and save it as a user preset. You can organize user presets into folders, import user presets, and locate and share user presets from your system. Preset files can be shared between macOS and Windows operating systems. When you load a preset into the system, it is automatically added to the user preset list in the plug-in preset manager.

Editing presets

You can edit a preset you have loaded in a UAD plug-in, and save that preset with the Preset browser.

You can also delete and rename presets that you have created. If you save changes to a factory preset, the preset is saved as a user preset with the same name. Factory presets cannot be edited.

To save a UAD plug-in preset:

1. Select a preset.

2. Make changes to the plug-in as required. The preset name changes to italic text to indicate that it has been edited.

Note: *Reopen the preset browser if it closes after adjusting settings in the plug-in window.*

3. Click Save. The Save dialog opens.
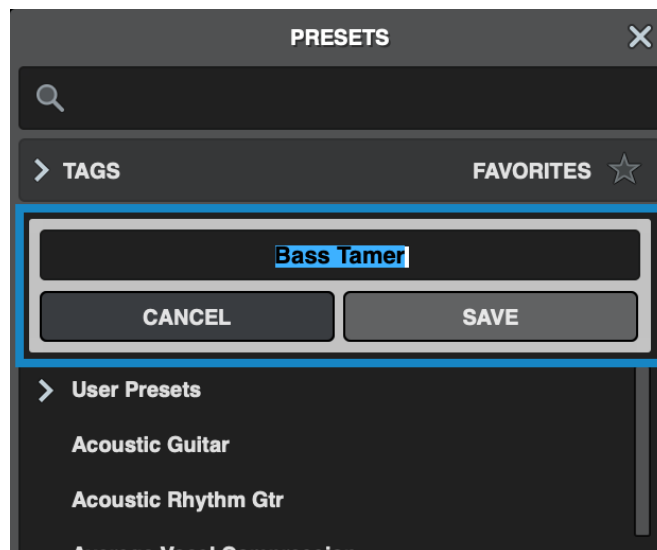
4. Click Save to save the changes to the existing preset, or type a name for the preset to save with a new name, then click Save.

If you save a preset that is based on a factory preset, the preset is saved in the User Presets list. You cannot overwrite factory presets.

To rename a preset:

1. Select a preset from the User Presets list, and click Rename, or right-click on the user preset and choose Rename. The rename dialog opens.
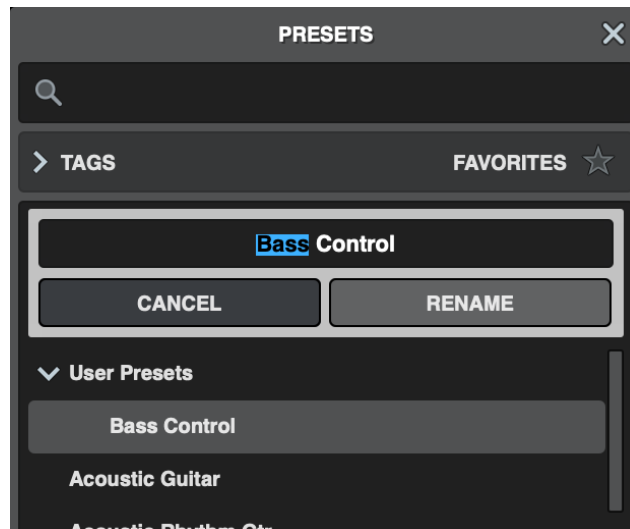
2. Type a new name for the preset and click Rename.

The preset is renamed. Factory presets cannot be renamed.

To delete a preset:

1. Select a preset from the User Presets list, and click Delete, or right-click on the user preset and choose Delete.

2. The Delete dialog appears. Click Delete again.
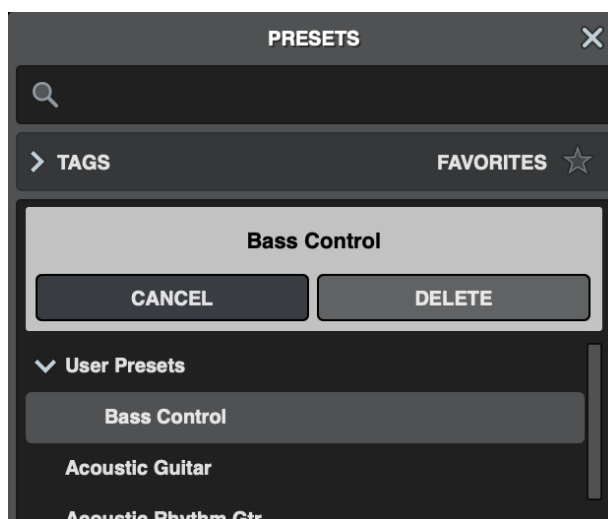
The preset is deleted from the User Presets list. Factory presets cannot be deleted.

Sharing user presets between systems

UAD plug-ins make it easy to find and share user presets. You can locate a user preset on the file system, and easily import a preset from another system or another user into your plug-in presets. You can use this feature to share presets with another user or between machines.

To locate a user preset:

- Right-click on the user preset and choose "Show in Finder" (Mac) or "Show in Explorer" (Windows). A window opens with the preset selected. UAD plug-in presets can be freely shared between macOS and Windows systems.

To import (load) a preset:

1. Click the ••• in the UAD Toolbar above the plug-in's controls, then select Load a Preset...

2. Select the preset on your file system, and click Open.

The preset is imported and opened in the plug-in, and automatically stored in the user presets location on your system.

Organizing user presets

You can organize user presets into folders.

> ***Note:*** *You must have created one or more user presets to create a preset folder.*
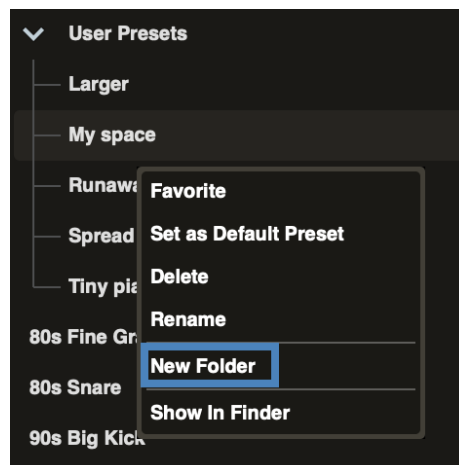
To create a user preset folder:

1. Right-click on a user preset or on the user presets folder, and choose New Folder.

2. Type a name for the folder, and click New Folder.

You can save presets from within folders, or organize the presets into the folders on your computer operating system's file system, and they will appear with the folder organization within the plug-in.

Preset/Settings Compatibility

Load/save and copy/paste of parameter values between the same UAD plug-in title is allowed, as well as load/save/copy/paste between SE and standard plug-ins of the same title (for example, between Neve 33609 and Neve 33609SE).

> **Note:** *Presets and settings between Legacy titles and their newer equivalents with the same title are not compatible (e.g., Fairchild 670 Legacy and Fairchild 670).*

Presets Location

The Presets folder path below is the parent folder for all UAD plug-in presets. Within the parent folder is a subfolder for each individual UAD plug-in title, and the subfolder contains all the presets for that UAD plug-in.

Windows:

• C:\Documents\Universal Audio\Presets\Plug-Ins\

Mac:

• ~/Documents/Universal Audio/Presets/Plug-Ins/

Status Bar

The area below the main plug-in window displays information about the current state of the plug-in. Each state is described below.
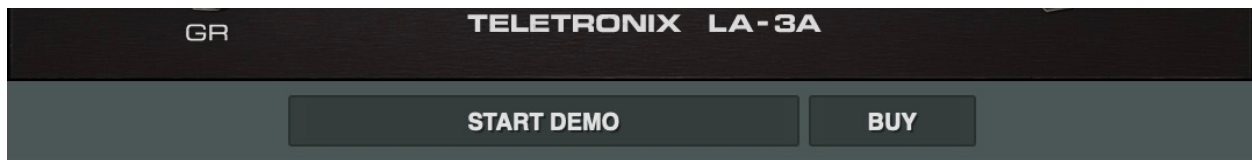
Start Demo

When START DEMO is displayed, the 14-day trial period for the particular plug-in has not been activated. Clicking this button will start the demonstration period (you can also start the demo in the UAD Control Panel's Status Column.

> *Important: The 14-day demo period can only be activated once, and cannot be stopped or restarted during this period. Don't activate demo mode unless you have adequate time to thoroughly evaluate its sound and functionality.*

Demo Active

After starting the demo, and when the plug-in is still within the active 14-day trial period, the number of days remaining in demo mode is displayed here.

Disabled

When DISABLED is displayed in red, the plug-in will not process audio. This can occur in two situations: Either the demo period has expired (click the cart button!), or there are not enough UAD resources to run the plug-in.

Buy

When the plug-in is not licensed, the BUY button is displayed. If the computer is connected to the internet, clicking Buy links to the UA online store so you can purchase the plug-in.

Blank

When no text is displayed in the Status area, the plug-in is licensed and operating normally. In this state, the cart button is not displayed.

Adjusting Parameters

The parameter settings within each UAD plug-in can be adjusted to achieve a desired sonic effect. Parameter values are easily modified by dragging sliders, rotating knobs, clicking switches and buttons, or by selecting values from a drop menu. The functions of all individual UAD plug-in parameters are detailed in the UAD plug-in manuals.

The parameter adjustment style can be Circular, Relative Circular, or Linear. For descriptions of these options, see User Interface Settings.

> *Tip:* To increase adjustment resolution when adjusting rotary controls in circular and relative circular modes, increase the radius of the mouse relative to the knob while dragging (i.e., move the mouse farther away from the knob while dragging).

Text Entry

Parameters that have a value display field can be modified directly with text entry. To enter a parameter value using text entry, single-click the parameter value text field. The text value will highlight, indicating it is ready to receive a new value. Type in a new value, then press Return, Enter, or Tab, or click outside of the text box. Press Esc if you want to revert to the prior setting without entering the new value.

Values entered via text entry are rounded to the closest significant digit. If an entered value is out of range, it will be ignored.

Time Values

To enter time values, the units must be specified; m = milliseconds, and s = seconds. For example: To enter 400 milliseconds, type 0.400s or 400m. To enter 1.5 seconds, type 1.5s or 1500m.

Mouse/Wheel Scroll

If your input device has a scroll function, it can be used to adjust knob and slider controls. Place the mouse cursor over any knob or slider control, then use the scroll function to change the parameter value.

> *Note:* Some DAWs do not support parameter scrolling.

Keyboard Control (Mac)

If you control+click a parameter, that control is selected for keyboard control. This feature is particularly useful when control adjustment is set to circular mode, and you want to finely adjust a value.

Normally, clicking on a control in circular mode makes the value jump to the location clicked. Control+clicking selects the control so the keyboard can be used to adjust the value without causing its value to jump to the cursor location first.

Shortcuts

The table below lists the keyboard shortcuts that are available for modifying UAD plug-in parameter values. When using keyboard shortcuts, the last edited control will be modified.

On Mac systems, you can use control-click to select a different control as the target for keyboard shortcuts without changing the control's value.

> **Note:** *Not all DAW applications support sending keystrokes to plug-ins.*

UAD Plug-In Keyboard shortcuts

Keyboard Action	Result
Control + Click Parameter (Mac only)	Select parameter for keyboard control (without changing its value)
Shift + Drag	Fine Control
UpArrow RightArrow Shift + PageUp	Increment Fine
DownArrow LeftArrow Shift + PageDown	Decrement Fine
Shift + UpArrow Shift + RightArrow PageUp	Increment Coarse
Shift + DownArrow Shift + LeftArrow PageDown	Decrement Coarse
Control + Click parameter (Windows) Modifier* + Click parameter (Mac)	Toggle initial editor setting (the value when the editor window was last opened)
Control + Shift + Click parameter (Windows) Modifier* + Shift + Click parameter (Mac)	Revert to initial editor setting (the value when the editor window was last opened)
*Modifier key set in UAD Meter & Control Panel application's Configuration panel	

DSP Loading Notes

- UAD devices feature either one, two, four, or eight (SOLO, DUO, QUAD, or OCTO) on-board DSP cores for UAD plug-in processing. Apollo Solo features UAD-2 SOLO core processing.

- UAD DSP use is proportional to the sample rate. Twice as many UAD plug-ins can be used at a 48 kHz sample rate versus a 96 kHz sample rate, and so forth.

- UAD plug-ins within Console can only run on Apollo Solo's built-in DSP. If a UAD-2 DSP accelerator is added to the system (such as UAD-2 Satellite), the additional DSP can be used for UAD plug-ins within a DAW, but not for Realtime UAD Processing within Console.

- Bypassing individual components within some UAD plug-ins can conserve UAD resources. For example, bypassing the compressor in the Precision Channel Strip when only the EQ is in use, and/or bypassing any of the unused bands of the Precision Channel Strip EQ will use less UAD DSP (unless DSP LoadLock is enabled).

- The UAD Instance Chart at help.uaudio.com lists the amount of DSP used by each UAD plug-in. The chart can help determine which UAD plug-ins to use within available UAD resources.

- Specific UAD plug-ins have the ability to conserve UAD resources when individual features within the plug-in are inactive. These plug-ins are marked with an asterisk (*) in the UAD Instance Chart at help.uaudio.com. Note that DSP LoadLock must disabled to take advantage of this feature.

- Apollo Solo uses UAD DSP and memory for its internal digital mixer and Input Delay Compensation engine. Therefore, the UAD Meter gauges will indicate loads (when UAD hardware is connected) even if UAD plug-ins are not inserted in Console or the DAW.

- The host computer system memory and CPU are never used for UAD plug-in processing within a DAW. However, there will be a small additional load on the host CPU induced by data transfers and user interface operations. This is unavoidable when using any DSP device.

- Within a DAW, UAD plug-ins can run at the same time as native (host CPU based) plug-ins, and in any combination. However, native plug-ins cannot be loaded within Console.

Mono (m) UAD plug-ins

UAD VST2 plug-ins with "(m)" in the name are monophonic versions of the plug-in for use within VST2-based DAWs.

> **Note:** *UAD mono (m) plug-ins are available in VST2 format only.*

Standard UAD VST2 plug-ins (which support both stereo and mono configurations) do not consume additional UAD DSP on mono sources when loaded in DAWs that use true-mono processing (for example, Apple Logic Pro, Avid Pro Tools, and Steinberg Cubase).

Some DAWs (for example, Ableton Live and Cakewalk Sonar) do not use true-mono processing on mono signals. In these DAWs, using the mono (m) versions may conserve UAD DSP when used on mono sources.

Apollo Solo's Console always uses true-mono processing, therefore Mono (m) UAD plug-ins are not available within Console.

> **Note:** *Some UAD plug-ins do not consume less DSP even when used in a true-mono configuration. For details about mono vs. stereo DSP use, see the UAD-2 DSP Chart.*

Tempo Sync

The time-based parameters of some UAD plug-ins can be synchronized to the tempo of the host application using the Tempo Sync feature.

> **Note:** *Not all DAW applications support Tempo Sync. In these hosts, the tempo sync features will not function.*

When Tempo Sync is activated, the time-based parameters that are available for synchronization are changed to note duration values, and will sync to the tempo of the host application using the displayed note value.

Tempo Sync switch within Precision Delay Mod

Tempo Sync Plug-Ins

The Tempo Sync feature is available with the UAD plug-ins listed below.

Cooper Time Cube	Moog Multimode Filter XL
Galaxy Tape Echo	MXR Flanger/Doubler
EP-34 Classic Tape Echo	Precision Delay Mod
Korg SDD-3000 Digital Delay	Precision Delay Mod L
Moog Multimode Filter	Precision Reflection Engine
Moog Filter Multimode SE	Roland RE-201 Space Echo

> **Note:** *This table does not include UAD Direct Developer (3rd-party) plug-ins.*

Sync Activation

To activate Tempo Sync, click the "Sync" button within the plug-in interface. The Sync button LED will illuminate and the time parameters will change from a time-based display to a note value display.

> **Note:** *When Tempo Sync is activated, the plug-in will automatically switch the time or rate parameter(s) to the nearest available note value(s) given the range of the parameter in question and the current tempo.*

Available Note Values

The note values that are available for selection are listed below. The values are listed in musical notation as a division of measures. For example, 1/4 = one quarter note, 1/1 = one whole note, 4/1 = four whole notes, and so forth.

The available note values were chosen to allow syncing to tempo in odd time signatures as well the common 4/4 time signature.

LFO rate parameters have their note values listed from longest to shortest, since long note values correspond to slow LFO rates.

Available Tempo Sync Note Values

1/64D*	1/8	5/8	4/1
1/64	5/32*	1/1T	5/1
1/32T	1/4T	1/2D	6/1
1/32	1/8D	1/1	8/1
1/16T	1/4	5/4	9/1
1/32D	5/16	1/1D	12/1
1/16	1/2T	7/4	16/1
1/8T	1/4D	2/1	
1/16D	1/2	3/1	
D = Dotted T = Triplet * = Galaxy Tape Echo & RE-201 only			

A quarter note is always a quarter note, independent of the time signature. In different time signatures a quarter note can represent different numbers of musical beats (e.g. 6/8) or different fractions of a bar (e.g. 5/4).

Example: The time signature is 6/8 and the delay time tempo sync note value is 1/4. If a sound occurs on beat one of the measure then its delay will occur on beat 3, which is 1/4 note (i.e., two 8th notes) later.

> **Note:** *The "beat" value in a sequencer's BPM tempo setting always refers to a quarter note, independent of time signature.*

Range Limits

Some Tempo Sync parameters cannot access the entire note range in Available Tempo Sync Note Values. Because the original (non-tempo sync) range of the time-based parameters within each plug-in is limited, if the host tempo is too fast or too slow, the tempo sync note value may not be able to be achieved within the constraints of the original parameter.

Out of range

When a parameter note value is out of range of the current tempo note value, the note value is displayed in parentheses. In this case, the parameter's minimum (slow tempo) or maximum (fast tempo) value is used instead of the displayed value.

Tempo Sync value out of range (parentheses)

Entering Values

In addition to adjusting the parameter control, the following methods can be used for entering Tempo Sync values.

Arrow Keys

After clicking the parameter to select it, the computer's arrow keys can be used to increment/decrement through available note values.

Text Entry

Any notation values can be entered (fraction or decimal), and the values are automatically converted to the nearest appropriate setting.

Example: If 3/4 or 6/8 is entered using text entry, 1/2D is displayed because a dotted half note equals three quarter notes, which is the duration of one measure in a time signature of 3/4 or 6/8. If 12/8 is entered with text entry, 1/1D is displayed because a dotted whole note equals six quarter notes, which is the duration of one measure in a time signature of 12/8 (or two measures in a time signature of 3/4 or 6/8).

This means you can create a tempo sync duration of one measure for any time signature by simply typing in the time signature (assuming there is a match in the beat table).

Similarly, if 1/12 is entered with text entry, 1/8T is displayed because an eighth note triplet is equivalent to one-twelfth of a measure (if in 4/4 time).

Precision Delay Modes with Tempo Sync

The UAD Precision Delay Mod and UAD Precision Delay Mod L plug-ins have a Mode menu that switches the plug-in operation between delay, chorus, and flanger mode. In these plug-ins, when the Mode is set to DUAL DELAY and PING PONG, the delay Time and modulation Rate parameters are simultaneously available for Tempo Sync.

However, when the plug-in is set to a CHORUS or FLANGER mode, only the Rate is available for Tempo Sync. This enables the more typical and musical chorus/flange effect by only syncing the modulation Rate to the tevmpo while the delay time remains constant.

Galaxy Tape Echo & Roland RE-201 Sync

When the Galaxy Tape Echo and Roland RE-201 plug-ins are in Tempo Sync mode, note values can be imprecise due to the fixed tape head relationships.

Values that are imprecise approximations (but are within the available delay time range) are displayed with a "+" or "-" symbol. The leading head in the current mode is accurately synced; the other values are based on the fixed tape head relationship.

> *Note: When a parameter note value is out of range of the current tempo note value in these plug-ins, the note value flashes instead of in being parentheses.*

UA Account & Store

Account Overview

Your Universal Audio account is where all your UAD devices, and their associated UAD plug-ins, are registered and managed. A UA account is required to register and authorize your Apollo Solo hardware, download UAD software, and receive customer support.

Device Registration

The account creation and device registration process is triggered automatically whenever a new UAD device is recognized by the UAD software. Our web pages guide you through the process.

Accessing Your Account

To view your account pages, click the MY ACCOUNT link at the top of web of pages at www.uaudio.com.
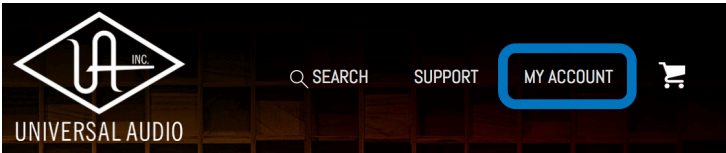
When you're not already logged in, the LOG IN link appears instead of the MY ACCOUNT link. In this case, click LOG IN to enter your email and password and access your account.

You have the option to stay logged in so you don't have to enter credentials with each visit. If you forgot your password, the store can email a password reset link to you.

Account Details

The My Account pages are available when logged in. These pages contain all details about the account such as registered UAD devices, licensed UAD plug-ins, and account preferences.

The account menu, shown at right, is used to navigate the account pages. Click an item in the menu to view that account page.

ACCOUNT DASHBOARD

MY OFFERS

ACCOUNT INFORMATION

MY UA HARDWARE

MY PLUG-IN LIBRARY

ORDER HISTORY

ADDRESS BOOK

PRODUCT REVIEWS

WISHLIST

NEWSLETTER SUBSCRIPTIONS
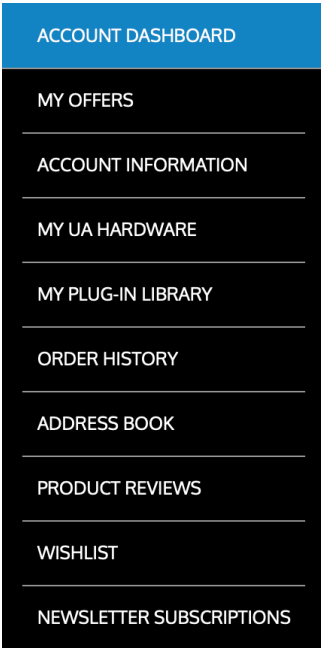
Store Overview

The Universal Audio online store is where optional UAD plug-in licenses are purchased and UA coupons are redeemed.

Bundled Plug-Ins

UAD plug-ins that are bundled (included) with Apollo Solo are automatically issued to your UA account when the device is registered. After registration is complete, authorize the UAD system to run the bundled plug-ins.

Note: UAD devices must be registered and authorized to use bundled plug-ins.

Optional Plug-Ins

UAD plug-ins that are not bundled with the UAD device require an optional license to run without restrictions. After purchasing a UAD plug-in, the UAD device(s) in the system need to be manually authorized to run the additional plug-in.

Our web pages guide you through the purchase and authorization process.

UAD Plug-Ins Are Already Installed

The UAD software installer always installs the complete suite of available UAD plug-ins during installation. When you purchase an optional license, you don't download that individual plug-in. Instead, you simply re-authorize your system, which activates the plug-in file that is already installed.

Important: Older versions of UAD software may not include all the latest UAD plug-ins. To ensure all UAD plug-ins are installed, and for optimum performance, update to the latest UAD version (see Check for Updates).

Coupons

Promotional coupons have dollar values that are as "good as cash" for buying UAD plug-ins. Coupons are applied to your UA account automatically. The coupon dollar amount is displayed in your account as a credit, ready to be applied to your store purchase.

Coupons expire after a limited time period, and they can be used only once.

Tip: Coupons are a great reason to sign up for UA's promotional email. These options are set in the Newsletter Subscriptions page in My Account.

UAD Authorization Overview

Note: This section is an overview of the UAD authorization system. For step-by-step authorization instructions, see UAD Authorization Procedure.

My Hardware

The UAD devices (Apollo Solo is a UAD device) and UAD plug-ins that you own are found on your MY HARDWARE page at www.uaudio.com/my/account/hardware. The My Hardware page keeps track of your registered UAD devices and UAD plug-in licenses and is managed automatically by the UA store and UAD software.

Tip: The current UAD plug-in license state is also shown in the Plug-Ins Panel within the UAD Meter & Control Panel application.

UAD System

All UAD devices registered to the UA account, and all UAD plug-in licenses for those devices, are grouped as a system on the My Hardware page. Licensed UAD plug-ins are only authorized to run on the UAD devices associated with the same account and system.

Account Creation and Device Registration

Creating a UA account and registering the UAD hardware is only needed once during initial device installation. After registration, authorization is performed automatically in the background by the UAD Meter & Control Panel application each time the computer is started.

Adding Additional UAD Devices

If a second (or more) UAD device is added to the computer that already has the UAD software installed, the new device(s) is automatically detected by the UAD software. Upon detection, the web browser opens, you are guided to register the new device, and the new device is added to your account.

Authorizing Newly-Purchased UAD Plug-Ins

When a UAD plug-in is purchased at the UA store, it needs to be manually authorized. The store guides you through the process, or see the UAD Authorization Procedure for instructions.

Authorizations Are Stored On UAD Device

During authorization, the UAD plug-in license state is stored on the UAD device. If the device is moved to another computer, it's not necessary to reauthorize the device.

Demo Mode

All unlicensed UAD plug-ins include a free 14-day trial evaluation period. When the demonstration mode is activated, the plug-in runs without functional limitations for 14 days. Demo mode can be activated once only. After the demo trial period has expired, demo mode cannot be activated again on the same UAD device.

If an unlicensed plug-in is loaded and its demo has never been started, a dialog appears with instructions to start the demo and the option to visit the UA store to purchase the license. If you don't start the demo or purchase a license, the plug-in interface appears and its controls can be manipulated, but audio is not processed by the plug-in.

Important: The 14 day demo period can only be activated once, and cannot be stopped or restarted during this period. Activate demo mode only when you have adequate time to thoroughly evaluate its sound and functionality.

Demo Reset

As a courtesy, each time a new UAD plug-in is purchased, all expired demo periods are automatically reset so all UAD plug-ins with expired demos can be evaluated again.

Demo Activation

To activate demo mode:

1. Ensure the UAD hardware and software is already installed and properly configured.

2. Open the Plug-Ins Panel within the UAD Meter & Control Panel application.

3. Locate the row for the UAD plug-in you want to evaluate (scroll if necessary).

4. In the Status Column, click the START DEMO button for the UAD plug-in. A confirmation window appears and the timed demo can be activated or demo activation can be cancelled.

Note: Manipulating the computer's system date and time may result in a decreased demo period.

Buying UAD Plug-Ins

To obtain optional UAD plug-in licenses, simply visit www.uaudio.com, browse the available plug-ins at the secure UA store, complete your purchase with several payment options, and authorize the new plug-in(s). You can also apply any coupon credit that is available from promotional offers.

Lots of product information such as features, specifications, audio/video examples, and reviews are available on the plug-in product pages to help you make informed buying decisions.

Purchase Procedure

To purchase optional UAD plug-in licenses:

1. Visit the UA store at www.uaudio.com.

2. Add the items you want to purchase to your shopping cart. You'll need to login to your UA account if not already logged in.

3. When ready to complete your purchase, click the Shopping Cart icon at the top of the page, then click the CHECKOUT button. The payment page appears.

4. Select payment method and provide payment details. If applicable, apply any discount coupon codes.

5. Click the PLACE YOUR ORDER button **once only**. The transaction is processed, the order confirmation page appears, a confirmation email is sent, and the UAD plug-in license(s) is issued to your UA account.

6. Authorize the UAD device(s) by following the instructions on the next page.

UAD Authorization Procedure

UAD plug-ins are automatically authorized each time the computer is started. However, the UAD system must be manually authorized whenever a plug-in is purchased from the UA store.

Note: Follow this procedure to manually authorize a new UAD plug-in purchase whenever you buy a plug-in at the UA store.

To manually authorize UAD plug-ins to run on the UAD device:

1. Open the UAD Meter & Control Panel application (see Launching the Application for methods).

2. Access the Plug-Ins Panel within the application by clicking the blue "UAD-2" button in the UAD Meter window.
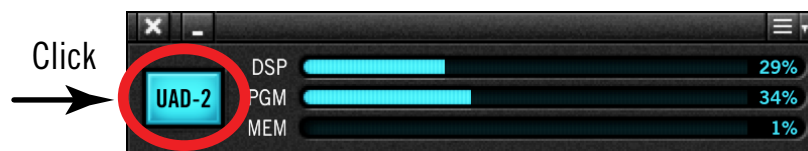
3. Click the "Authorize Plug-Ins" button in the Plug-Ins panel.

4. After a few moments the Authorization Status window appears. Click OK to close the window.
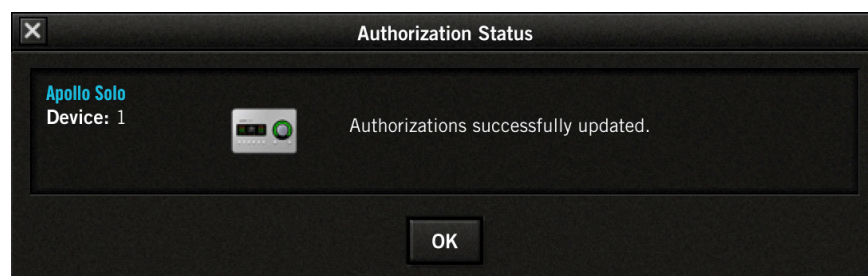
UAD plug-ins are now authorized and ready for use.

Offline UAD Authorization

Important: *UAD devices must be registered and UAD plug-ins must be authorized before they can be used.*

UAD plug-ins are automatically authorized each time the computer is started if the system is connected to the Internet. If the UAD computer is not connected to the Internet, you will need:

- Manually transfer a URL into the browser of a web-enabled computer
- Download an authorization file onto the web computer
- Transfer the authorization file back to the UAD computer

These steps are detailed below.

To obtain and apply the UAD authorization file if not connected to the internet:

1. Install the UAD software and the UAD hardware before proceeding. The system must be operating properly. See Getting Started for details.

2. Launch the UAD Meter & Control Panel application and open the Plug-Ins Panel.

3. Click the Authorize Plug-ins button. The default web browser opens with the registration URL in the address bar (and you may get an error that the computer is not connected to the Internet).

4. You must enter this URL into a web-connected computer, so either:

   a. Drag the URL icon in the browser's address bar to the Desktop to create a weblink shortcut (preferred, to prevent transcription errors) then transfer the weblink shortcut to the internet computer via a storage device or network, OR

   b. Copy/paste the URL into a file that can be transferred (or carefully write down the URL, EXACTLY as it appears in the address field).

1. Click+Hold URL icon in browser address bar

Failed to open page

http://my.uaudio.com/systems/authorize.php?sw=

Failed to open page

http://my.uaudio.com/systems/authorize.php?sw=

2. Drag URL icon to Desktop or flash drive to create a link shortcut

http://my.uaudio.com/systems/authorize.php?sw
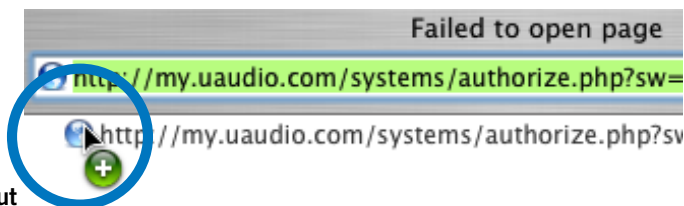
Creating a web location shortcut on the offline UAD system
for easier transfer of the URL file to an online system

5. Go to the URL using a web browser on an Internet-connected computer. Double-click the transferred weblink shortcut, or enter the URL as previously noted.

   • If you don't already have a UA account, you are directed to create one. Follow the online instructions.

   • If you already have a UA account, login with your email address and password. If your password is lost, the store can email password reset link to you.

6. Your device will be automatically registered and added to your My Hardware page, and your authorization file is generated.

7. The authorization file named "auth.uad2" should begin downloading automatically (if not, click the download authorization link).

8. Transfer the authorization file to the UAD computer via a storage device or network.

9. For optimum results, quit all open audio host applications (DAWs).

10. Double-click the authorization file. The authorization is loaded onto the UAD device(s) and after a few seconds the "Authorizations Status" window appears.

Offline UAD authorization is complete and UAD plug-ins are ready for use.

Latency & Apollo Solo

Delay Compensation with Apollo Solo

System latency encapsulates all latencies induced within the typical digital audio workstation environment. See Latency Basics for a detailed overview of where, when, and how latency (delay) is induced in the DAW environment.

> *Note: Upsampling latency, input latency, and all other system latencies are automatically compensated by Console and modern DAWs when delay compensation is enabled in the host application.*

Driver Reporting

Any system latency that is induced by Apollo Solo's I/O, Console, and/or UAD plug-ins is reported by Apollo Solo's device drivers to the host audio software that is using the device.

The host software (e.g., Console and the DAW) uses this reported device latency for its automatic delay compensation (ADC) engine. When ADC is enabled in Console and the DAW, phase coherency (time alignment) is maintained throughout the recording, overdubbing, and mixing process.

Upsampled UAD Plug-Ins

Some UAD plug-ins are *upsampled,* meaning their internal sample rate is increased to achieve sonic design goals. Depending on the session sample rate, upsampled UAD plug-ins can add additional latency when used in the Console Mixer and/or a DAW.

Although the latency added by upsampled UAD plug-ins is negligible (typically between 0-300 samples, depending on the plug-in and sample rate), this extra latency can affect phase coherency in a session. However, phase alignment is managed automatically by Input Delay Compensation in Console and Automatic Delay Compensation in the DAW when these features are enabled.

> *Note: For specific additional latency values for UAD plug-ins, visit this article at help.uaudio.com.*

Automatic Delay Compensation in the DAW

Generally speaking, ADC should always remain enabled in the DAW when using Apollo Solo (and any other audio interface), regardless of whether or not Console is used at the same time. The DAW's ADC engine performs all necessary housekeeping to keep tracks phase-aligned, regardless of the latency source (if any).

Input Delay Compensation in Console

Console has automatic Input Delay Compensation (IDC), which is controlled by the *Input Delay Compensation* menu in Console Settings. Console IDC maintains phase alignment across all Console inputs when upsampled UAD plug-ins are used in Console.

Console's IDC is useful when multiple Console inputs are used on a single source. For example: If two microphones are used on an acoustic source (such as a acoustic guitar) and an upsampled plug-in is used on one of the mic channels but not the other, without input delay compensation, the phase of the two mic channels would no longer be aligned (mics must be exactly equidistant from the sound source to remain phase aligned).

How Console IDC works

To maintain phase alignment, Console IDC automatically adds small amounts of delay to each Console input that is *not* delayed by Upsampled UAD Plug-Ins. In other words, all compensated inputs are automatically delayed by the same amount.

When To Use Console Input Delay Compensation

Console IDC is required to maintain phase alignment only when **BOTH** of the following conditions are active:

1. Multiple Console inputs are used for a single source (such as a drum kit using multiple microphones), AND

2. Any of those input channels contain upsampled UAD plug-ins.

Tip: When IDC is not needed, disable Console IDC for the lowest possible input latency.

Effect of Console's IDC setting

Note: Console's IDC value is set with the Input Delay Compensation menu in Console Settings. By default, Console IDC is enabled with the Short value of 100 samples.

In Console

In Console, the amount of delay added by the IDC engine is automatic. Only the minimum amount of delay actually required to compensate the input(s) is applied (up to the maximum value of the setting), maintaining the lowest possible latency for phase alignment at all times.

For example: When Console's IDC value is set to Short (100 samples – the default value) and only 31 samples is actually required to compensate, then only 31 samples of delay will be applied to the other Console inputs.

In the DAW

In the DAW, the amount of delay added by Console's IDC engine is static. The extra samples are always added to all inputs in the DAW, even if no upsampled plug-ins are active. However, this overall additional input latency is reported by Apollo Solo's drivers, so it is automatically compensated by the DAW's ADC.

For example: When Console's IDC value is set to Short (100 samples – the default value) and only 31 samples is actually required to compensate, 100 samples is still added to all inputs in the DAW. If using software monitoring via the DAW, the extra (unnecessary) delay could be detected.

Software monitoring with Console IDC

When software monitoring via the DAW and Console IDC is enabled, the lowest effective Console IDC setting is recommended to minimize monitoring latency. If using Console for monitoring and software monitoring via the DAW is disabled, the IDC value isn't as critical because Console will dynamically deliver the lowest possible monitoring latency.

UAD-2 DSP Resources

Console IDC uses a small percentage of Apollo Solo's DSP. To maximize UAD resources available for UAD plug-ins, disable Console IDC if it is not needed.

Special Cases: Precision Multiband, Ampex ATR-102, and AKG BX 20

These three UAD plug-ins have extra latency values that exceed the capacity of Console's IDC engine even at the maximum setting (Long). These plug-ins are designed to be used on the outputs of a DAW during mixdown, where latency is not a consideration. If using these plug-ins in Console, the Input Delay Compensation feature may need to be disabled or ignored.

Minimizing UAD Input Latency When Software Monitoring

If the DAW's I/O buffered software monitoring is used when performing and UAD plug-ins are used within the DAW, input latency can be *much* higher versus using Console for hardware input monitoring. However, there are ways to mitigate the additional input latency if software monitoring is preferred.

When software monitoring, input latency is determined by the session sample rate, the DAW's buffer size setting, and the number of serial (i.e., stacked or chained) UAD plug-ins. To minimize input latency, try any or all of these mitigations:

- Use a higher session sample rate
- Use a lower I/O buffer size
- Use fewer serially inserted (stacked/chained) UAD plug-ins

Latency Basics

Latency (delay) is an inherent factor in digital audio systems because of A/D-D/A conversion, I/O buffering in the DAW, plug-in signal processing, and other aspects.

Although there are ways to mitigate latency (such as delay compensation and/or low-latency monitoring), it always exists to some degree when working with systems that combine analog and digital audio. These concepts are explained in greater detail below.

Audio Interface Latency

Every audio interface that performs A/D and/or D/A conversion induces latency as a result of the conversion process. This inherent A/D–D/A latency is essentially undetectable. A/D–D/A latency usually depends on the sample rate, with higher sample rates inducing less latency (higher rates = less time required for conversion).

An audio interface's "analog I/O round-trip latency" specification refers to how long it takes for an analog signal at an interface input to reappear at the same interface's analog output after both A/D and D/A conversion. Apollo Solo's audio interface analog I/O round-trip latency is 1.1 milliseconds at a sample rate of 96 kHz.

DAW Latency

Most DAWs use hardware I/O buffering to shuttle audio data back and forth between the audio interface and the DAW. This I/O buffering induces additional latency with any audio interface (not just Apollo Solo).

I/O Buffer Size

The amount of DAW latency is usually determined by the DAW's I/O interface *buffer size* setting. Low buffer sizes reduce latency, but increase the host computer's CPU loading. If the buffer size is set too low, host CPU overloads and/or audio artifacts such as clicks, distortion, or dropouts can occur.

Monitoring Live Performance During Recording

DAW latency can be a problem during recording when software monitoring via the DAW's mixer, because the buffering delay is a distraction; an artist cannot hear their performance in realtime. DAW latency when recording with Apollo Solo is mitigated by using Console for live performance input monitoring, where I/O buffering latency does not apply.

Time-Alignment Of Newly-Recorded Tracks With Previously-Recorded Tracks

Dealing with latency is also important with DAWs for time-alignment of newly-recorded tracks and previously-recorded tracks which are inevitably shifted from the I/O buffering process.

The solution is to use the automatic delay compensation (ADC) feature of the DAW. Modern DAWs, and Console, have automatic delay compensation. For more information about system latency and its compensation, see Delay Compensation with Apollo Soloo Solo.

Console Latency

Apollo Solo's Console mixer is used for low-latency input monitoring (cue mixing) of Apollo Solo's analog inputs. Using Console to monitor Apollo Solo's inputs may or may not add to the inherent analog I/O round-trip latency, depending on how it is configured, as described below:

Console without UAD plug-ins – When Console is used without UAD plug-ins, monitoring Apollo Solo's inputs via Console does not add any latency. In this configuration, Apollo Solo's analog I/O round-trip latency is still 1.1 milliseconds at 96 kHz.

Console with Realtime UAD Processing – When Console is used for Realtime UAD Processing with UAD plug-ins that are not upsampled, monitoring Apollo Solo's inputs via Console *does not add any latency*.

In this configuration, Apollo Solo's analog I/O round-trip latency is still 1.1 milliseconds at 96 kHz, even if up to five UAD (non-upsampled) plug-ins are serially inserted (chained) on a single Apollo Solo input.

Multiple Apollo Solo inputs can have up to five UAD (non-upsampled) plug-ins each (up to the limit of available DSP resources), and this configuration also *does not add any latency*.

> **Note:** *Upsampled UAD plug-ins add latency when used in Console or a DAW. See* Upsampled UAD Plug-Ins *for details.*

Console Auxiliary Buses – The outputs of the auxiliary buses in Console have 72 samples of additional latency. This is necessary to maintain the lowest possible input latency.

DAW UAD-2 DSP Latency

When UAD plug-ins are used within a DAW (not Console), I/O buffering is used to shuttle audio data back and forth between the UAD-2 inside Apollo Solo and the DAW, which induces additional latency.

UAD-2 DSP latency from UAD plug-ins within the DAW is determined by the DAW's I/O Buffer Size setting. This latency is unrelated to the (indiscernible) audio interface I/O latency — they are separate processes.

DAW UAD-2 DSP latency makes tracking through UAD plug-ins in the DAW via software monitoring problematic for the performer because an artist cannot hear their performance in realtime.

The issue of UAD-2 DSP latency when recording with Apollo Solo is eliminated by using Console for live performance input monitoring with optional Realtime UAD Processing, where buffering latency does not apply.

Does all this latency stuff matter?

With Apollo Solo, not really. Performance input latency is not a factor because of Console's low latency hardware input monitoring, and recording (track alignment) latency during recording, overdubbing, and mixing is automatically compensated by Apollo Solo's device drivers and the DAW's automatic delay compensation engine.

Device Drivers

The Apollo Solo device drivers are low-level system software files that instruct the computer's operating system about how to communicate with the Apollo Solo hardware. Apollo Solo's drivers control Apollo Solo's audio interface, Console, and UAD-2 functionality.

The drivers are loaded during computer system startup so that whenever Apollo Solo is connected, the device is ready to accept instructions from the OS and audio applications.

Core Audio & ASIO

Apollo Solo's audio drivers use the Core Audio (Mac) and ASIO (Windows) APIs. Apollo Solo's normal (non-DSP) audio interface features are simply seen as a Core Audio / ASIO device; therefore any Core Audio / ASIO compliant software can use Apollo Solo for audio I/O.

UAD Mixer Engine

The Console application and Console Recall plug-in don't actually communicate directly with Apollo Solo. Instead, they communicate with the *UAD Mixer Engine*, which is the central software hub for all Console and Console Recall functionality. The UAD Mixer Engine behaves as a server for Apollo Solo's internal DSP mixer that runs in the background, so Console does not have to be open for Apollo Solo to function.

The UAD Mixer Engine is a system-level application that is automatically launched during system startup and is always running during normal operation. The UAD System Menu is it's only interface, which can be accessed from the Menu Bar (Mac), or the Windows System Tray (Windows).

Driver I/O Complement

The specific inputs and outputs that are available to the DAW depends on the active configuration. The I/O complement changes at high sample rates and when multi-unit cascading. The specific I/O complements can be customized in the I/O Matrix Panel. Default I/O values are listed in the Driver I/O Table in this chapter.

Driver Names and Numbers

Apollo Solo's drivers describe all I/O channels by name and number, but what is actually displayed in the DAW's I/O assignment lists depends on each particular DAW. Names are not displayed by all DAWs (e.g., Ableton Live), or the driver name display mode may need to be changed in the DAW (e.g., Apple Logic Pro).

Virtual I/O

Apollo Solo's device drivers carry various *virtual* (software only) input and output channels in addition to those directly associated with the hardware inputs and outputs. The virtual channels consist of all of Console's mix bus outputs (the main monitor mix, HP mix, and AUX mixes) and Console's virtual inputs. Virtual I/O facilitates highly flexible signal routing via the DAW. See Virtual I/O for details about this feature.

Driver I/O Table

The table below lists the I/O channel numbers and names for all Core Audio / ASIO streams available at default I/O Matrix Panel settings.

Tip: For convenient reference with DAWs that don't display driver I/O channels by name, print this page.

Custom I/O Routes

The default I/O routes can be easily changed in the I/O Matrix Panel within the Console Settings window.

Driver I/O Table Notes

- The number at the left of both columns is the channel number used by the DAW if the channel names are not displayed by the DAW.
- At sample rates of 176.4 kHz and 192 kHz, AUX 2 and VIRTUAL channels are unavailable.

Apollo Solo Default I/O Table			
INPUTS		**OUTPUTS**	
1	MIC/LINE/Hi-Z 1	1	MON L
2	MIC/LINE 2	2	MON R
3	MON L*	3	VIRTUAL 1†
4	MON R*	4	VIRTUAL 2†
5	VIRTUAL 1*	5	HP L
6	VIRTUAL 2*	6	HP R
7	AUX1 L*		
8	AUX1 R*		
9	AUX2 L*		
10	AUX2 R*		
Software Outputs (for DAW inputs)		*†Software Outputs (for Console inputs)*	

Troubleshooting

If Apollo Solo isn't behaving as expected, some common troubleshooting items to confirm are below. If you are still experiencing issues after performing these checks, contact Technical Support.

SYMPTOM	ITEMS TO CHECK
Unit won't power on	• Confirm Thunderbolt 3 cable is connected to Apollo Solo • Confirm Apollo Solo is connected to built-in Thunderbolt 3 port on computer • Confirm computer is started • Try a different Thunderbolt 3 cable • Note that not all USB-C cables are Thunderbolt 3 cables
Unit is not recognized by computer	• Confirm Thunderbolt 3 cable is fully inserted at both ends • Confirm latest Apollo Solo software is installed (reinstall if necessary) • Confirm computer port is Thunderbolt 3 port (not a USB 3.1 via USB-C port) • Note that not all USB-C cables are Thunderbolt 3 cables
No monitor output	• Confirm connections, power, and volume of monitoring system • Confirm Apollo Solo monitor level is turned up • Confirm monitor outputs are not muted (push MUTE button when in monitor mode) • Confirm monitor LEDs are displaying signal activity (check signal flows)
Can't hear mic or line input(s)	• Confirm mic/line switch setting is correct for the channel • Confirm preamp gain is turned up for the channel(s) • On channel 1, confirm nothing is plugged into the Hi-Z input
Can't hear mic input(s)	• Confirm +48V phantom power is enabled if required by microphone
Can't hear Hi-Z input	• Confirm volume on connected device is turned up • Confirm Hi-Z input cable is 1/4" TS (TRS cables cannot be used with Hi-Z input)
Preamp controls have no effect on channel	• Confirm desired channel is selected for control (push PREAMP button to select channel when in PREAMP mode)
Audio glitches and/or dropouts during DAW playback	• Increase hardware I/O buffer size value in DAW (Mac) or Console (Windows)
Undesirable echo/phasing	• Confirm input monitoring is not enabled in both Console and DAW
Static and/or white noise is heard when nothing is plugged in	• Mute or lower preamp gain to minimum on unused preamp channels (mic preamps can emit noise even when nothing is plugged in) • Some UAD plug-ins model the noise characteristics of the original equipment (defeat the noise model in the UAD plug-in interface, or mute the channel containing the plug-in to temporarily mute the noise)
Various LEDs inside the unit are blinking	• This is normal operational behavior and can be safely ignored
Acoustic clicking heard within hardware unit when powering on and/or changing settings	• This is normal operational behavior and can be safely ignored; mechanical relays are temporarily muting the outputs
Apollo Solo is behaving unexpectedly	• As a last resort, perform a hardware reset on the unit by following these steps: 1. Disconnect the Thunderbolt 3 cable from Apollo Solo 2. Press and hold the main LEVEL knob, FILTER button, and POLARITY button 3. Connect the Thunderbolt 3 cable while continuing to press these controls 4. After all front panel LEDs ash rapidly for several seconds, release the controls Note: The computer must be on while performing this procedure. Alternately, when computer is shut down (powered off), hold the switches while starting the computer.

Glossary

A/D An acronym for "Analog to Digital," which refers to the conversion of analog signals to digital data.

Acronym A word formed from the first letters of other words (e.g., GUI, ADAT, TRS, etc.).

ADAT An acronym for "Alesis Digital Audio Tape." ADAT was the name given to the Alesis-branded products of the 1990s which recorded eight tracks of digital audio on a standard S-VHS video cassette. The term now generally refers to the 8-channel optical "Lightpipe" connection that is used in a wide range of digital products from many manufacturers.

AES (sometimes written as "AES/EBU") The name of a digital audio transfer standard jointly developed by the American-based Audio Engineering Society and the European Broadcast Union. Designed to carry two channels of 16-, 20- or, 24-bit digital audio at sampling rates of up to 192kHz, the most common AES physical interconnect utilizes a 3-conductor 110 ohm twisted pair cable, terminating at standard XLR connectors. (See "Dual Wire" and "Single Wire")

Analog Literally, an analog is a replica or representation of something. In audio signals, changes in voltage are used to represent changes in acoustic sound pressure. Note that analog audio is a continuous representation, as opposed to the quantized, or discrete "stepped" representation created by digital devices. (See "Digital")

API Acronym for Application Programming Interface. A software layer between an operating system and third-party hardware (such as an audio interface) and/or software (such as a DAW). For example, a computer OS's audio API enables audio hardware and audio software from different vendors to communicate with the OS and each other.

Apollo Universal Audio's line of high-resolution audio interface products featuring low-latency monitoring of hardware inputs with Realtime UAD Processing.

Apollo Expanded Universal Audio's name for connecting more than one Apollo device together via Thunderbolt in a multi-unit cascading setup for increased I/O.

Arrow Universal Audio's entry-level audio interface featuring Realtime UAD Processing.

ASIO Acronym for Audio Stream Input/Output. ASIO is an audio interface driver protocol for Windows operating systems developed by Steinberg GmbH.

Balanced Audio cabling that uses two twisted conductors enclosed in a single shield, thus allowing relatively long cable runs with minimal signal loss and reduced induced noise such as hum.

Bit A contraction of the words "binary" and "digit," a bit is a number used in a digital system, and it can have only one of two values: 0 or 1. The number of bits in each sample determines the theoretical maximum dynamic range of the audio data, regardless of sample rate being used. Each additional bit adds approximately 6 dB to the dynamic range of the audio. In addition, the use of more bits helps capture quieter signal more accurately. (See "Sample" and "Dynamic range")

Bit Depth (See "Bit Resolution")

Bit Resolution Often used interchangeably with "bit depth," this is a term used to describe the number of bits used in a digital recording. Apollo converts analog audio and transmits digital audio with a resolution of 24 bits (thus yielding a theoretical dynamic range of approximately 145 dB), the highest audio interface resolution in common use today. (See "Dynamic Range")

BNC A bayonet-type coaxial connector often found on video and digital audio equipment, as well as on test devices like oscilloscopes. In digital audio equipment, BNC connectors are normally used to carry word clock signals between devices. BNC connectors are named for their type (Bayonet), and their inventors, Paul Neil and Carl Concelman. (See "Word Clock")

Buffer, buffers, buffering The transference of data in small batches instead of continuously. Buffering induces latency (delay) and is inherent in most digital audio systems.

Bus A signal path that carries more than one signal, e.g., a mix bus, auxiliary bus, headphone cue bus, etc.

Channel Input Strip A group of controls that pertain only to the functions contained within a particular mixer input channel. In most mixing consoles, the "strips" are duplicated for each input.

Class A One design technique used in electronic devices such that their active components are drawing current and working throughout the full signal cycle, thus yielding a more linear response. This increased linearity results in fewer harmonics generated, hence lower distortion in the output signal.

Condenser Microphone A microphone design that utilizes an electrically charged thin conductive diaphragm stretched close to a metal disk called a backplate. Incoming sound pressure causes the diaphragm to vibrate, in turn causing the capacitance to vary in a like manner, which causes a variance in its output voltage. Condenser microphones tend to have excellent transient response but require an external voltage source, most often in the form of 48 volts of "phantom power."

Clock In digital audio or video, a clock serves as a timing reference for a system. Every digital device must carry out specified numbers of operations per period of time and at a consistent speed in order for the device to work properly. Digital audio devices such as Apollo normally have an internal clock, and are also capable of locking to external clock routed from other digital devices. In order to avoid signal degradation or undesirable audible artifacts, it is absolutely critical that all digital devices that are interconnected in a system be locked to the same clock.

Clock Distribution Refers to the process of routing a master clock signal (either from an internal clock or an external source) to multiple devices by means of multiple outputs, thus removing the need to cascade the clock through external devices, which can degrade the signal.

Core Audio The audio API for macOS.

D/A Acronym for "Digital to Analog," which refers to the conversion of a digital data to an analog signal.

DAW Acronym for "Digital Audio Workstation" – that is, any device or software that can record, play back, edit, and process digital audio.

dB Abbreviation for "decibel," a logarithmic unit of measure used to determine, among other things, power ratios, voltage gain, and sound pressure levels.

dBm Abbreviation for "decibels as referenced to milliwatt," dissipated in a standard load of 600 ohms. 1 dBm into 600 ohms results in 0.775 volts RMS.

dBV Abbreviation for "decibels as referenced to voltage," without regard for impedance; thus, one volt equals one dBV.

DI Acronym for "Direct Inject" or "Direct Input," a recording technique whereby the signal from a high-impedance instrument such as electric guitar or bass is routed to an input. DI into mixer or tape recorder inputs often employ use of a "DI box," which raises the signal to the correct voltage level at the right impedance.

Digital Information or data that is stored or communicated as a series of bits (binary digits, with values of 0 or 1). Digital audio refers to the representation of varying sound pressure levels by means of a series of numbers. (See "Analog" and "Bit")

Dither Minute amounts of shaped noise added intentionally to a digital recording in order to reduce a form of distortion known as "quantization noise" and aid in low level sound resolution.

Dry Refers to a signal that is unprocessed, e.g., recording a dry signal. The antonym of a "wet" signal.

DSP Acronym for "Digital Signal Processing" (or "Digital Signal Processor.")

DSP Accelerator A device dedicated to digital signal processing. UAD-2 devices are DSP accelerators.

Dynamic Microphone A type of microphone that generates signal with the use of a very thin, light diaphragm which moves in response to sound pressure. That motion in turn causes a voice coil which is suspended in a magnetic field to move, generating a small electric current. Dynamic mics are generally less expensive than condenser or ribbon mics and do not require external power to operate.

Dynamic Range The difference between the loudest sections of a piece of music and the softest ones. The dynamic range of human hearing (that is, the difference between the very softest passages we can discern and the very loudest ones we can tolerate) is considered to be approximately 120 dB. (See "Bit resolution")

EQ Abbreviation for "Equalization," a circuit that allows selected frequency areas in an audio signal to be attenuated or boosted.

External Clock A clock signal derived from an external source. (See "Clock")

FET Acronym for "Field Effect Transistor." A type of transistor that relies on an electric field to control the shape, and hence the conductivity, of a "channel" in a semiconductor material.

Firmware Software that is embedded in hardware.

Flex Routing Apollo technology that enables its physical inputs to be routed to various physical outputs. Compare to Virtual I/O.

FPGA Acronym for "Field Programmable Gate Array." A type of integrated circuit that can be programmed after manufacturing ("in the field") to perform specialized functions.

Front End Refers to a device that provides analog and digital input/output (I/O) to a digital audio workstation (DAW). Apollo is a front end.

Graphical User Interface A software window, panel, or screen containing controls where parameters are adjusted by the user. (See "GUI")

GUI Acronym for Graphical User Interface.

Hi-Z Abbreviation for "High Impedance." Apollo's Hi-Z input allows direct connection of an instrument such as electric guitar or bass via a standard unbalanced ¼" jack.

High Resolution In digital audio, refers to 24-bit signals at sampling rates of 88.2 kHz or higher.

Hz Abbreviation for "Hertz," a unit of measurement describing a single analog audio cycle (or digital sample) per second.

Impedance A description of a circuit's resistance to a signal, as measured in ohms, thousands of ohms (Kilohms), or millions of ohms (megohms).

Internal Clock A clock signal derived from onboard circuitry. (See "Clock")

I/O Acronym for "input/output."

I/O Matrix Apollo technology that enables customized I/O mapping at the Core Audio / ASIO driver level.

kHz Abbreviation for "kiloHertz" (a thousand Hertz), a unit of measurement describing a thousand analog audio cycles (or digital samples) per second. (See "Hz")

JFET Acronym for Junction Field Effect Transistor, a specific type of FET which has some similarities to traditional bipolar transistor designs that can make it more appropriate for use in some audio circuit designs. (See "FET")

Jitter Refers to short-term variations in the edges of a clock signal, caused by a bad source clock, inferior cabling or improper cable termination, and/or signal-induced noise. A jittery signal will contain spurious tones at random, inharmonic frequencies. Usually, the jitter will be worse with higher signal frequencies. The internal digital clock of Apollo was designed for extreme stability and jitter-free operation, and its onboard phase aligned clock conditioner circuitry removes jitter from external sources, so conversion quality is uneffected by clock source.

Lightpipe A digital connection made with optical cable. This was a phrase coined by Alesis to make a distinction between the proprietary 8-channel optical network used in their ADAT products and standard stereo optical connectors used on CD players and other consumer products.

Line Level Refers to the voltages used by audio devices such as mixers, signal processors, tape recorders, and DAWs. Professional audio systems typically utilize line level signals of +4 dBm (which translates to 1.23 volts), while consumer and semiprofessional audio equipment typically utilize line level signals of -10 dBV (which translates to 0.316 volts).

Low Cut Filter An equalizer circuit that cuts signal below a particular frequency. Same as "high pass filter."

Mic Level Refers to the very low level signal output from microphones, typically around 2 millivolts   (2 thousandths of a volt).

Mic Preamp The output level of microphones is very low and therefore requires specially designed mic preamplifiers to raise (amplify) their level to that needed by a mixing console, tape recorder, or digital audio workstation (DAW).

Mute "Turn off the signal." Mute stops the signal from being routed.

Native Refers to computer-based digital audio recording software controlled by the computer's onboard processor, as opposed to software that requires external hardware to run.

OS Acronym for Operating System. The OS is the software used to control the computer hardware, such as OS X (Mac) and Windows 10 (PC).

Pan Abbreviation for "Panorama" or "Panoramic." A pan control determines a monophonic signal's positioning in the stereo field.

Patch Bay A passive, central routing station for audio signals. In most recording studios, the line-level inputs and outputs of all devices are connected to a patch bay, making it an easy matter to re-route signal with the use of patch cords.

Patch Cord A short audio cable with connectors on each end, typically used to interconnect components wired to a patch bay.

PDF Acronym for "Portable Document Format." PDF is the standardized file format used for distribution of documentation in electronic form. Various applications can open PDF files; one such "reader" application is available for free at www.adobe.com.

Plug-In Software components that are added to host software applications to enhance their functionality and/or performance.

Powered Plug-Ins High-quality audio processing plug-ins, developed and sold by Universal Audio, that run exclusively on UAD DSP accelerator products.

Quantization Noise A form of digital distortion caused by mathematical rounding-off errors in the analog to digital conversion process. Quantization noise can be reduced dramatically by dithering the digital signal. (See "Dither")

Realtime UAD Processing Universal Audio's DSP + FPGA technology that enables UAD Powered Plug-Ins to run with latencies in the sub-2ms range on input with UA's Arrow and Apollo line of audio interface models. Realtime UAD processing provides the ultimate sonic experience while monitoring and/or tracking. Realtime UAD processing is a special function that is available only within the Apollo/Arrow Console application.

Ribbon Microphone A type of microphone that works by loosely suspending a small element (usually a corrugated strip of metal) in a strong magnetic field. This "ribbon" is moved by the motion of air molecules and in doing so it cuts across the magnetic lines of flux, causing an electrical signal to be generated. Ribbon microphones tend to be delicate and somewhat expensive, but often have very flat frequency response.

Sample A digital "snapshot" of the amplitude of a sound at a single instant in time. The number of samples taken per second is determined by the device's sample rate. (See "Sample rate")

Sample Rate The number of samples per second. In digital audio, there are six commonly used sample rates: 44.1 kHz (used by audio CDs), 48 kHz, 88.2 kHz (2 x 44.1 kHz), 96 kHz (2 x 48 kHz, used by DVDs), 176.4 kHz (4 x 44.1 kHz), and 192 kHz (4 x 48 kHz). The higher the sample rate, the greater the frequency response of the resulting signal; however, higher sample rates require more storage space. (See "kHz")

Sample Rate Conversion The process of altering a digital signal's sample rate to a different sample rate.

S/MUX (sometimes written as "S-MUX") Abbreviation for Sample Multiplexing. S/MUX is a method for transmitting two channels of high sample rate (88.2, 96, 176.4, or 192 kHz) 24-bit digital audio over a legacy optical "lightpipe" ADAT connection, which was originally designed to carry eight channels of 16-, 20- or 24-bit audio at 44.1 kHz or 48 kHz sampling rate. (See "ADAT" and "Lightpipe")

SPDIF (sometimes written as "S/PDIF") An acronym for "Sony/Philips Digital Interface Format," a digital audio transfer standard largely based on the AES/EBU standard. Designed to carry two channels of 16-, 20- or, 24-bit digital audio at sampling rates of up to 192 kHz, the most common SPDIF physical interconnect utilizes unbalanced, 75 ohm video-type coaxial cables terminating at phono (RCA-type) connectors. (See "AES")

Superclock A proprietary format used by some early Pro Tools systems to distribute clock signal running at 256x the system's sample rate, thus matching the internal timing resolution of the software. (See "Clock" and "Pro Tools")

Transcoding Converting one type of digital signal to another (i.e, from AES to SPDIF, or from ADAT to AES).

Transformer An electronic component consisting of two or more coils of wire wound on a common core of magnetically permeable material. Audio transformers operate on audible signal and are designed to step voltages up and down and to send signal between microphones and line-level devices such as mixing consoles, recorders, and DAWs.

Transient A relatively high volume pitchless sound impulse of extremely brief duration, such as a pop. Consonants in singing and speech, and the attacks of musical instruments (particularly percussive instruments), are examples of transients.

Transimpedance Preamplifier A transformerless solid-state preamplifier utilizing a transistor configuration that employs current feedback for ultra-low distortion and the highest possible quality of signal from input to output. The transimpedance design allows audio from 4 Hz to 150 kHz to pass through without altering the phase relationships between fundamental frequencies and overtones. Noise and distortion are kept to near-theoretical minimums so critical signals may be generously amplified without degrading the quality or character of the sound source.

TRS Acronym for Tip-Ring-Sleeve. A ¼" phone connector with three conductors, typically used for balanced signal connections (e.g., I/O) or carrying two unbalanced signals (e.g., headphones).

TS Acronym for Tip-Sleeve. A ¼" phone connector with two conductors, typically used for unbalanced signal connections. Note that TS, like TRS and XLR, denotes the connector only and does not necessarily indicate the signal level of the connection. TS/TRS/XLR cables are used for both low-level (e.g., microphones and instruments) and line-level connections.

UAD Acronym for "Universal Audio Digital." Used in reference to digital products created by Universal Audio.

UAD-2 A line of DSP accelerator products developed and manufactured by Universal Audio.

Unison Universal Audio's exclusive preamp hardware/software integration technology that enables UAD preamp plug-ins reconfigure the physical input impedance, gain staging response, and other parameters of Apollo's mic preamp hardware to match the emulated preamp's hardware design characteristics with bi-directional hardware and software control.

Virtual I/O Apollo audio inputs and outputs that exist in software but not in hardware. Virtual I/O is used to route digital audio channels between Console and other audio applications.

Wet Refers to a signal that is processed, e.g., recording a wet signal. The antonym of a "dry" signal.

Word Clock A dedicated clock signal based on the transmitting device's sample rate or the speed with which sample words are sent over a digital connection. (See "Clock")

XLR A standard three-pin connector used by many audio devices, with pin 1 typically connected to the shield of the cabling, thus providing ground. Pins 2 and 3 are used to carry audio signal, normally in a balanced (out of phase) configuration.

Specifications

All specifications are typical performance unless otherwise noted, tested under the following conditions: 48 kHz internal sample rate, 24-bit sample depth, 20 kHz measurement bandwidth, with balanced inputs and outputs.

Specifications are subject to change without notice.

SYSTEM	
I/O Complement	
Microphone Inputs	Two
Analog Line Inputs	Two
Hi-Z Instrument Inputs	One
Analog Monitor Outputs	Two (one stereo pair)
Headphone Outputs	One stereo
Thunderbolt 3 Port	One
A/D – D/A Conversion	
Supported Sample Rates (kHz)	44.1, 48, 88.2, 96, 176.4, 192
Bit Depth Per Sample	24
Simultaneous A/D conversion	Two channels
Simultaneous D/A conversion	Four channels
Analog Round-Trip Latency	1.1 milliseconds @ 96 kHz sample rate
Analog Round-Trip Latency with up to five serial UAD Powered Plug-Ins via Console application	1.1 milliseconds @ 96 kHz sample rate

(continued)

ANALOG I/O	
Frequency Response	20 Hz – 20 kHz, ±0.1 dB
Line Inputs 1 & 2	
Connector Type	¼" Female TRS Balanced (Combo XLR/TRS)
Dynamic Range	118 dB (A–weighting)
Total Harmonic Distortion + Noise	−107 dBFS
Input Impedance	10K Ohms (differential)
Gain Range	+10 dB to +65 dB
Maximum Input Level (600 Ohm source)	+20.7 dBu
Microphone Inputs 1 & 2	
Connector Type	XLR Female, pin 2 positive (Combo XLR/TRS)
Phantom Power	+48V (switchable per mic input)
Dynamic Range	118 dB (A–weighting)
Total Harmonic Distortion + Noise	−108 dBFS
Default Input Impedance	5.4K Ohms (variable via Unison plug-ins)
Gain Range	+10 dB to +65 dB
Pad Attenuation (switchable per input)	20 dB (variable via Unison plug-ins)
Maximum Input Level	+25.2 dBu (minimum gain, pad engaged)
Hi-Z Instrument Input	
Connector Type	Female ¼" TS Unbalanced
Dynamic Range	118 dB (A–weighting)
Total Harmonic Distortion + Noise	−105 dBFS
Input Impedance (variable via Unison plug-ins)	1M Ohms
Gain Range	+10 dB to +65 dB
Maximum Input Level (@ minimum gain)	+12.5 dBu
Outputs 1 & 2	
Connector Type	¼" Female TRS Balanced
Output Impedance	100 Ohms (differential)
Dynamic Range	115 dB (A–weighting)
Total Harmonic Distortion + Noise	−106 dBFS
Maximum Output Level	+20.7 dBu
Operating Reference Level	+14 dBu, +20 dBu (selectable)

(continued)

| ANALOG I/O	
Stereo Headphones Output	
Connector Type	¼" Female TRS Stereo
Dynamic Range (A–weighting)	115 dB (600 Ohm load) 114 dB (32 Ohm load)
Total Harmonic Distortion + Noise (A–weighting)	–97 dB (600 Ohm load) –88 dB (32 Ohm load)
Maximum Output Power	62 mW (300 Ohm load) 240 mW (32 Ohm load)
ELECTRICAL	
Power Supply	None (Bus powered via Thunderbolt 3)
Maximum Power Consumption	10 Watts
ENVIRONMENTAL	
Operating Temperature Range	32º to 95º Fahrenheit (0º to 35º Celsius)
Storage Temperature Range	–40º to 176º Fahrenheit (–40° to 80° Celsius)
Operating Humidity Range	20% to 80%
MECHANICAL	
Dimensions	
Width	7.1" (179.9 mm)
Height (front)	1.0" (25.2 mm)
Height (rear)	1.8" (46.7 mm)
Depth	4.8" (121.1 mm)
Shipping Box (Length x Width x Height)	8.5 x 6.4 x 2.63 (inches), 216 x 162 x 68 (mm)
Weight	
Weight (bare unit)	1.38 lbs (0.63 Kg)
Shipping Weight (with box)	4 lbs (1.8 Kg)
Package Contents	
Apollo Solo Thunderbolt 3 Bus Powered Audio Interface	
Getting Started URL Card	

Hardware Block Diagram
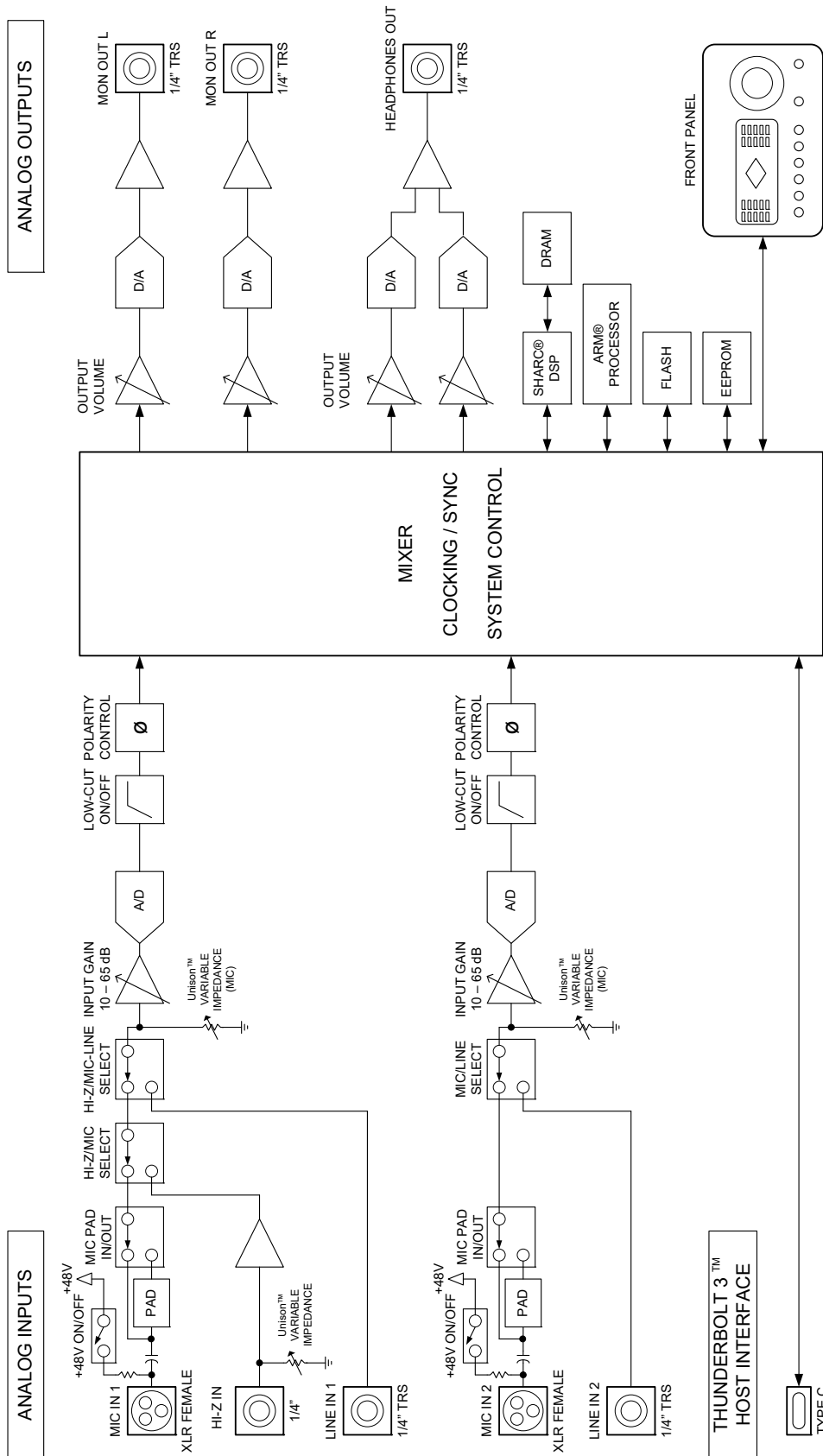
Apollo Solo Hardware Block Diagram

Universal Audio History

Pioneering audio recording for more than 50 years.

Founded in 1958 by Bill Putnam Sr., Universal Audio has been synonymous with innovative recording products since its inception. A favorite engineer of Frank Sinatra, Nat King Cole, Ray Charles and more, the late Bill Putnam Sr. was a passionate innovator who is widely regarded as the father of modern recording — with many of his legendary studio and equipment designs still in use today.

Specifically, Putnam was the inventor of the modern recording console, the multi-band audio equalizer, and the vocal booth, and he was the first engineer to use artificial reverberation in commercial recording. Alongside his friend Les Paul, Putnam was also involved in the early development of stereophonic recording.

Putnam, a natural entrepreneur, started three audio product companies during his long career: Universal Audio, Studio Electronics, and UREI. All three companies built equipment that remains widely used decades after their introduction, including the ubiquitous LA-2A and 1176 compressors, and the 610 tube recording console. The 610 console in particular stands as one of the most beloved designs in audio history, used to record everyone from Sinatra to the Beach Boys to Van Halen's eponymous debut.

Re-founded in 1999

Universal Audio was re-founded in 1999 by Bill's sons, James Putnam and Bill Putnam Jr., with two main goals: to faithfully reproduce classic analog recording equipment in the tradition of their father; and to design new digital recording tools in with the sound and spirit of vintage analog technology. To that end, Universal Audio employs the world's brightest DSP engineers and digital modeling authorities to develop our award-winning UAD Powered Plug-Ins platform. Featuring the most authentic analog emulation plug-ins in the industry, our DSP gurus work with the original hardware manufacturers — using their exact schematics, golden units, and experienced ears — to give UAD plug-ins warmth and harmonics in all the right places, just like analog.

Nothing better represents the merging of our analog heritage and groundbreaking digital designs than the award-winning Apollo audio interface. Introduced in 2012, Apollo has become the new worldwide standard for professional music production, and has been used to record breakthrough albums by artists such as Kendrick Lamar, Coldplay, Dr. Dre, Brad Paisley, and many more.

With 165 employees and offices in Los Angeles, Colorado, and Amsterdam, Universal Audio is headquartered near Silicon Valley in Scotts Valley, California — where our classic analog gear is still hand-built, one unit at a time.

Software or hardware, every Universal Audio product is backed by a decades long legacy of innovation, superlative quality, and technical passion.

Bill Putnam Sr.

The name M.T. "Bill" Putnam retains a unique status in the audio industry hall of fame- it's legendary even among those who are considered to be legends themselves. Called the "father of modern recording" by no less a luminary than Bruce Swedien, and a "visionary, responsible for motivating new thinking," by respected studio engineer Tom Hidley, Putnam was a true renaissance man in the world of sound and music.

As a record producer, engineer, inventor, writer, singer, technician, studio owner and businessman, he excelled at combining his talents in a creative way. A pioneer in recording studio acoustics, Putnam is acknowledged to be the first person to use artificial reverberation for commercial recordings. He also developed the first multi-band equalizers, and with his company Universal Audio, was responsible for the development of classic equipment like the 1176LN and UREI® Time Align monitors. He was involved in the early development of stereophonic recording, and founded studios in Chicago, Hollywood and San Francisco whose legacy still lives on today.

Early Interests Born in 1920 in Danville, Illinois, he was influenced by his father, a businessman who also put on radio programs, including a number one country music show. Young Putnam's interests surfaced early; in Boy Scouts he earned a merit badge in wireless, building a crystal set and a one-tube radio. By 15 he was taking the ham radio operator's exam and constructing his own equipment. In high school both his artistic and technical sides emerged full on. He worked repairing radios and renting out P.A. systems, while also singing on weekends with dance bands (for five dollars a night, which included the P.A. rental!), developing his interest in the music business, and realizing, as he has said, that "musicians were my favorite people."

Universal Recording Corp. Opens in Chicago Technical college followed, then work at radio stations, and radio engineering work for the Army during World War II. In 1946 Putnam started his own recording studio, Universal Recording Corp., in Evanston Illinois. His goals at the time, besides having a successful business, were the development of new recording techniques and specialized equipment for recording studios.

To that end the manufacturing company Universal Audio, which later became UREI®, was formed. Most of the equipment, including the console, for Universal Recording was built by Universal Audio. It wasn't long before the company relocated to Chicago, and it was there, in 1947, that Putnam recorded what is generally accepted to be the first "pop" record to use artificial reverberation. The founder of the group The Harmonicats, Jerry Murad, wanted to record using an echo chamber like he'd heard on effects in spooky radio mysteries. Putnam not only financed the record for a piece of the profits, he came up with the idea of using the tiled men's room at Universal Recording to create that echo. The Harmonicats song "Peg-O-My-Heart," became the first million seller smash with more than 1,400,000 copies sold, and the rest was, well, history.

Landmark Recordings Bruce Swedien, a teenager at the time, recalls that the sound on "Peg-O-My-Heart" was a seminal influence on him. "It was the first pop music recording where artificially controlled reverb was used for artistic effect," he explains. "Many of the recordings that were done prior to that had reverb, but it was part of the acoustics of the recording environment. Bill's contribution to the art was that he literally came up with the design of the way the echo or reverb sound is sent from the recording desk and the way it's returned to the mix so that it can be used in a variable amount.

"I was a youngster in Minneapolis in the early 50s when I first heard "Peg-O-My-Heart," Swedien continues, "And I can remember it like it was yesterday. It had an extraordinary effect on me. I didn't understand how the techniques were done, but I knew it had tremendous artistic impact."

Putnam's engineering credits grew quickly; at that time he worked with artists such as Patti Page, Vic Damone and Dinah Washington, and had a million selling record on his own Universal Records label with "Jealous Heart" by Al Morgan. A number of firsts occurred at Universal: the first use of tape repeat, the first vocal booth, the first multiple voice recording, the first 8-track recording trials and experiments with half speed disc mastering.

Universal was becoming famous, doing recordings for the Chicago based labels VeeJay, Mercury and Chess. It was a hub for rhythm and blues recordings including cuts for Muddy Waters, Willie Dixon, Bo Diddley, Little Walter, and Chuck Berry. Jazz artists recorded by Putnam included Stan Kenton, Tommy Dorsey, Count Basie, Dizzy Gillespie, Ella Fitzgerald, Sarah Vaughn, Nat King Cole, and the master, Duke Ellington. Putnam was also producing records for Decca, as well as writing songs and lyrics.

With all this success, Universal Recording went through several incarnations, with the dream version completed in 1955. At that time it was the most advanced and largest independent recording facility in the country attracting top producers like Nelson Riddle, Mitch Miller and Quincy Jones. It was also at that time that Bruce Swedien went to work for the studio.

"It's absolutely true," he states. "Bill Putnam was the father of recording as we know it today. The processes and designs which we take for granted -- the design of modern recording desks, the way components are laid out and the way they function, console design, cue sends, echo returns, multitrack switching -- they all originated in Bill's imagination."

Murray Allen, who purchased Chicago's Universal Recording from Putnam in 1972 elaborates. "Bill was a brilliant person, highly talented, with a great set of ears," he says. "He was Duke Ellington's favorite engineer, among many, and at one time he had more singles in the top 40 than anybody else. At the time, if you needed something in sound, he was the guy. He designed systems for the Sands and other big showrooms in Las Vegas; John Kennedy flew him out to arrange the sound for the broadcast of his inauguration. He did it all."

Moving West- United Recording Corp. With his Chicago studio so successful, Putnam's clients began urging him to open a facility on the West Coast, and finally he was convinced. In 1957 he sold his interest in Universal Recording, started a new company called United Recording Corp. and moved to Hollywood, taking over a building at 6050 Sunset and starting construction on new studios. Stereo was taking off, and Putnam was determined to incorporate as many technological innovations into the complex as possible.

In 1958, Studio B was completed along with two reverb chambers. The facility soon grew to three studios, a mixdown room, three mastering rooms including one with stereo, and a small manufacturing plant, all in 15,000 square feet. The studios were busy around the clock, with projects from Ricky Nelson to voice-overs for Hanna Barbera cartoons like the Flintstones.

In the early 60s Western Recorders, one block away at 6000 Sunset, was acquired and remodeled. The studio was renamed United Western, and business continued to grow. The talent behind and in front of the glass in those days reads like a who's who of classic recording: Bones Howe, Wally Heider and Lee Hirschberg were on staff.

During the 60s and 70s the studios were jumping 24 hours a day, seven days a week with artists like Frank Sinatra, Bing Crosby, Dean Martin, Sammy Davis, Nat King Cole, Johnny Mercer and Ray Charles. Charles classic "I Can't Stop Loving You" was recorded there, as well as Sinatra's "It Was A Very Good Year," and The Mamas and The Papas' "California Dreamin.'" The United Western studios, still in existence today as both Cello Studios and Allen Sides' Ocean Way Recording, are still considered to be some of the best sounding rooms ever built.

Universal Audio and UREI Meanwhile, upstairs in the 6050 Sunset building Universal Audio was thriving, and changing names. Now called UREI®, the company had acquired the patent rights to the LA-2A leveling amplifier, and also to National Intertel, which became the Teletronix division of UREI®. It was a unique situation; Putnam was always searching for better ways to do things and the combination of studios and manufacturing led readily to new product ideas. Out of this synergy came the 1176LN leveling amplifier, the 1108 FET preamp and, in conjunction with Ed Long, the 813 family of speakers.

Mentor and Innovator Allen Sides, currently owner of Ocean Way Recording, whose studios today encompass almost unchanged what was part of United Western, calls Putnam "my best friend." "When Bill started designing control rooms they were about eight feet by six feet and they were calling them booths," he says. "He built the first of what we now call conventional control rooms, with speakers above the windows. The whole control room concept we think of today was Bill's. The first console that had equalizers in every channel was Bill's, the feedback equalizer was Bill's creation, he built all his own limiters, his own consoles, he could tune his own pianos; he basically did the whole deal.

"Around 1962 he was doing half speed cutting, to get the high frequencies on the discs," recalls Sides. "He'd designed his own mastering systems, because you couldn't do it any other way. He was recording on custom made 30 IPS machines and he was doing all the super hi fi stuff, like the Mercury Living Presence series."

Sides, who is renowned for both his golden ears and his abilities in the 'art of the deal,' appreciated Putnam on many levels. "He was an exceptional businessman, with a tremendous understanding of things," he says. "If I had a complex deal and I couldn't quite figure out how to approach it, I'd sit down with Bill and he'd reason it out in the most amazing way.

"There's a great story about when stereo was coming on. The record companies really weren't that interested -- everyone was cost conscious. They didn't want to spend any more money and they were saying that stereo was a waste of time. But Bill could see the potential, and around 1959 he started recording everything with feeds to two control rooms, one for a stereo mix, one for a mono mix. In late '58, '59 and '60 everything Bill did was recorded in both stereo and mono.

"When stereo hit big around '61, none of the record companies had any catalog. But Bill did -- he had two and one half years worth. It was a lot of material -- understand at that period of time he was doing about $200,000 a month in the United Western Complex -- which is like a million dollars a month now.

"So the record companies came to Bill and said, 'We'll pay you for the tape.' And he said, 'No, you can't pay for the tape, but if you repay me all the studio time that was used in the last two and a half years you have a deal.' And they did. They wrote him a check for the whole thing."

It's recollections like these that bring home Putnam's visionary and entrepreneurial style. An undisputed leader in music recording and in recording technology, with innumerable accolades to his credit, it's his son, Bill Putnam, who perhaps sums it up best, in a way Bill Sr. himself might like. Bill Jr. says, simply, "He was a guy who built equipment to solve problems in the studio."

"There's a whole school of what I'd call Bill Putnam engineers out there," concludes Murray Allen. "People like Allen Sides and Bruce Swedien who worked with him and who really understood what recording sound should be about. They've carried on his tradition, and I think we all agree that it's very important for people to know what he contributed."
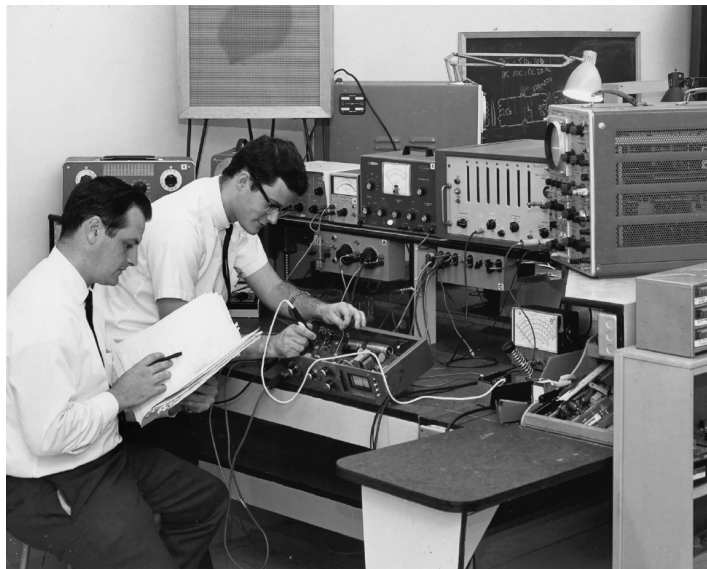
Classic Compressors

The LA-2A and 1176 compressor/limiters long ago achieved classic status. They're a given in almost any studio in the world -- relied upon daily by engineers whose styles range from rock to rap, classical to country and everything in between. With so many newer products on the market to choose from, it's worth looking at the reasons why these classics remain a necessary part of any professional studio's outboard equipment collection.

The basic concept of a compressor/limiter, is of course, relatively simple. It's a device in which the gain of a circuit is automatically adjusted using a predetermined ratio that acts in response to the input signal level. A compressor/limiter "rides gain" like a recording engineer does by hand with the fader of a console: it keeps the volume up during softer sections and brings it down when the signal gets louder. The dynamic processing that occurs at ratios below 10 or 12 to one is generally referred to as compression; above that it's known as limiting.

Modern day compressors offer a great degree of programmability and flexibility - older devices such as the 1176 and the LA-2A are more straightforward in their design. Perhaps it is this fact that has contributed to their appealing sound and the longevity of their popularity.

LA-2A

The LA-2A leveling amplifier, a tube unit with hand wired components and three simple controls, was introduced in the mid-1960s. It utilized a system of electro-luminescent optical gain control that was quite revolutionary. Gain reduction was controlled by applying the audio voltage to a luminescent driver amplifier, with a second matched photoconductive cell used to control the metering section.

With its 0 to 40 dB of gain limiting, a balanced stereo interconnection, flat frequency response of 0.1 dB from 30-15,000 Hz and a low noise level (better than 70 dB below plus 10 dBm output), the LA-2A quickly became a studio standard. Originally patented by Jim Lawrence, it was produced by Teletronix in Pasadena, California, which became a division of Babcock Electronics Corporation in 1965. In 1967 Babcock's broadcast division was acquired by the legendary Bill Putnam's company, Studio Electronics Corporation shortly before he changed the company's name to UREI®. Three different versions of the LA-2A were produced under the auspices of these different companies before production was discontinued around 1969.

1176LN

It was Bill Putnam himself who, in 1966, was responsible for the initial design of the 1176. Its circuit was rooted in the 1108 preamplifier which was also designed by Putnam. As is evident from entries and schematics in his design notebook, he experimented with the recently developed Field Effect Transistor (F.E.T.) in various configurations to control the gain reduction in the circuit. He began using F.E.T.s as voltage variable resistors, in which the resistance between the drain and the source terminals is controlled by a voltage applied to the gate. His greatest challenge was to ensure that distortion was minimized by operating the F.E.T.s within a linear region of operation.

After several unsuccessful attempts at using F.E.T.s in gain reduction circuits, Putnam settled upon the straightforward approach of using the F.E.T. as the bottom leg in a voltage divider circuit, which is placed ahead of a preamp stage.

The output stage of the 1176 is a carefully crafted class A line level amplifier, designed to work with the (then) standard load of 600 ohms. The heart of this stage is the output transformer, whose design and performance is critical. Its primary function is to convert the unbalanced nature of the 1176 circuit to a balanced line output, and to provide the proper impedance matching to drive the line impedance of 600 ohms. These two jobs are accomplished by the primary and secondary windings whose turns' ratio defines the impedance ratio.

This transformer is critical due to the fact that it uses several additional sets of windings to provide feedback, which makes it an integral component in the operation of the output amplifier. Putnam spent a great deal of time perfecting the design of this tricky transformer and carefully qualified the few vendors capable of producing it.

The first major modification to the 1176 circuit was designed by Brad Plunkett in an effort to reduce noise--hence the birth of the 1176LN, whose LN stands for low noise. Numerous design improvements followed, resulting in at least 13 revisions of the 1176. Legend has it that the D and E blackface revisions sound the most "authentic".

The original Universal Audio 1176LN designed by Bill Putnam was a major breakthrough in limiter technology - the first true peak limiter with all transistor circuitry offering superior performance and a signature sound. Evolved from the popular Universal Audio 175 and 176 vacuum tube limiters, the 1176LN retained the proven qualities of these industry leaders, and set the standard for all limiters to follow.

Pros Talk UA

Both the 1176 and the LA-2A remain in daily use. Busy engineers and producers' comments about both the 1176 and the LA-2A demonstrate their impact on the industry:

Mike Shipley

Mike Shipley (Def Leppard, Shania Twain, Blondie): "I grew up using 1176s - in England they were the compressor of choice. They're especially good for vocals, which is also what I primarily use the LA-2 for. Most anything else I can do without, but I can't be without at least a pair of 1176s and an LA-2A. For example, on the Enrique Iglesias project I'm currently mixing, I'm using both an 1176 and an LA2 on his voice, which is not unusual for me.

"The 1176 absolutely adds a bright character to a sound, and you can set the attack so it's got a nice bite to it. I usually use them on four to one, with quite a lot of gain reduction. I like how variable the attack and release is; there's a sound on the attack and release which I don't think you can get with any other compressor. I listen for how it affects the vocal, and depending on the song I set the attack or release - faster attack if I want a bit more bite. My preference is for the black face model, the 4000 series - I think the top end is especially clean.

"The LA-2A is not as versatile, but it also has a sound that I really like. On certain voices you can crank it heavily, to where you almost want to put a piece of tape over the meter because there's so much gain reduction that you don't want anyone else to see it! I'm not particularly into overcompression, but when you use it that way there's something about it that just sounds really great. It does depend how it's set on the back, where there's a flat control that can be set to roll off certain frequencies when you reduce more gain. If you have a singer with an intensely piercing voice I find that compressor a good one, incredibly useful. It makes things warmer, especially when you crank it, and for thinner voices that can be just the ticket."

Allen Sides

Allen Sides has always been known for having golden ears when it comes to the sound of equipment. The owner of Ocean Way Studios in Los Angeles and Nashville, he's also a speaker designer and engineer who is especially respected for his work with live musicians, including orchestra and string dates. Among his recent credits are work with the Goo Goo Dolls, Alanis Morissette and Green Day. Sides brings his different perspectives into play when he talks about using the 1176.

"The 1176 is standard equipment for my sessions. I just used them last night, as a matter of fact, on a project for singer Lisa Bonet that Rob Cavallo was producing at Ocean Way. We were recording drums and I used them on the left/right overheads as effects limiters. It's something I learned from (engineer) Don Landy, who worked with Randy Newman a lot. I mult the left and right overheads and bring them back on the console, then insert a pair of 1176s into a pair of the mults. Push in 20 to one and four to one simultaneously and it puts the unit into overdrive creating a very impressive sound."

Murray Allen

Murray Allen is a veteran engineer and Director of Post Production for the San Francisco Bay Area company Electronic Arts. He has a fascination for gear both old and new and he explains why he thinks the 1176 has been so popular for so long. "It has a unique sound to it that people like, it's very easy to operate, and it does a great job. You have just two controls relative to the ratio of compression. You have input and output and you have attack and release. That's all there is. It's still my favorite limiter for Fender basses and string basses, because you don't know it's working. It doesn't change the way the bass sounds, it just keeps the level at a more controllable place.

Ken Kessie

Mixer Ken Kessie (En Vogue, Tony! Toni! Tone!, Celine Dion) is known for being experimental. "Seems like everybody knows the basic tricks for the 1176," he says, "But here are two that might be lesser known. If you turn the attack knob fully counterclockwise until it clicks, the 1176 ceases to be a compressor and acts only as an amplifier. Sometimes this is the perfect sound for a vocal. And of course the unit can be overdriven, adding another flavor of distortion in case your plug-ins are maxed out!

"Then, for that hard-to-tame lead vocalist (the one that backs up from the mic to whisper and leans in for the big ending chorus), try an 1176 followed by a DBX 165. Use the 1176 as a compressor, and the DBX as a peak limiter...it's guaranteed to be smooth as silk."

Jim Scott

Jim Scott shared a Grammy for Best Engineered Album for Tom Petty's Wildflowers. He's also known for his work with Red Hot Chili Peppers, Natalie Merchant and Wilco. "I use 1176s real conservatively and they still do amazing things," he comments. "I'm always on the four to one button, and the Dr. Pepper - you know, 10 o'clock, 2 o'clock, and it does everything I need.

"I always use them on vocals. I use them on room mics, on acoustic guitars- - sometimes in mixing I'll sneak a little on a snare drum or a separated channel of a snare drum. I'm not one of those guys who leaves it on everything, but I'd have to say I've used an1176 on everything at one time or another.

"They have an equalizer kind of effect, adding a coloration that's bright and clear. Not only do they give you a little more impact from the compression, they also sort of clear things up; maybe a little bottom end gets squeezed out or maybe they are just sort of excitingly solid state or whatever they are. The big thing for me is the clarity, and the improvement in the top end.

"The 1176 has that same kind of phenomenon, where, when you patch something through a Neve equalizer and you don't even engage the EQ, it sounds better. It's just a combination of the amps.

"I also use LA-2As all the time. I use them on bass, and it's one of the compressors I use for reverb. Often I'll send a bunch of things to one LA2A and bring it back into the console like a return - it's great for drums, great for kick drum especially.

"LA-2As warm things up. They're the opposite of the 1176--they EQ all the warmth and low mids and bass. When you put bass and drums in them they get fatter and bigger. And unless you hit them way hard and make the tubes sizzle they don't really distort. Of course, you can get them to sound like an AC30 if you want to, just turn them all the way up. They are very loud, powerful amplifiers.

"I've also used both the 1176 and the LA-2A for stereo buss compressors - you just have to be a little bit careful that your mixes don't go one sided. Tom's [Petty's] records have often been mixed through 1176s. I've also done that with LA-2As - they are of course, more inconsistent piece to piece than the 1176s, because of the tubes and the difference in fatigue of the tubes.

"My big mentors were Andy Johns and Lee DeCarlo and Ron Nevision because they were all Record Plant guys. I learned how to make a rock and roll record from them. Although over the years it's become my own thing, my style still tends to be that Record Plant style, U87s, 1176s, LA-2As, 47 F.E.T.s…it's what I like."

Mike Clink

Producer/Engineer Mike Clink (Guns N' Roses, Sammy Hagar, Pushmonkey) also comes from the Record Plant school of recording. "I find that I actually use 1176s more now than I ever did," he comments. "I like them because they bring out the brightness and presence of a sound - they give it an energy. It seems like when I'm mixing I end up using an 1176 on the vocals every time. And if I want to compress a room sound I'll take a mono room mic, put an 1176 across it and push in all the buttons."

Bruce Swedien

Bruce Swedien is a master engineer who needs no introduction. He also is a die-hard 1176 fan. "I have two silverface 1176LNs in my rack that Bill Putnam personally picked out for me," he says. "I remember sitting at Bill's place in the Channel Islands, and talking about the 1176 and how I wanted a pair. The next time we went over he'd picked this pair out and they were sitting in his garage waiting for me. I love them on vocals. All of the Michael Jackson and James Ingram vocals that everyone has heard so much were done with at least one of those 1176s. I couldn't part with them for anything. They sound fabulous."

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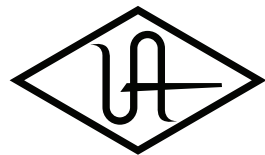### UA YouTube Channel

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