



# Owner's Reference

Owner's Reference DirectStream DAC MK2

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## Instructions for Use



## PerfectWave DirectStream DAC MK2

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PS Audio® Inc. 800-PSAUDIO 4865 Sterling Drive Boulder, Colorado 80301



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# Introduction

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## Important Safety Instructions



Read these instructions  
Heed all warnings  
Follow all instructions



**WARNING. TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.**

Clean only with a dry cloth. For the Piano Finish Top refer to the instructions on page 8 of the Quick Start Guide.

Do not place flammable material on top of or beneath the component.

All PS Audio components require adequate ventilation at all times during operation. Rack mounting is acceptable where appropriate.

Do not remove or bypass the ground pin on the end of the AC cord unless absolutely necessary to reduce hum from ground loops of connected equipment. This may cause RFI (radio frequency interference) to be induced into your playback setup. Removing or bypassing the ground pin on any electrical component is potentially dangerous and should be avoided for safety reasons. A polarized plug has two blades, one wider than the other. A grounding type plug has two blades and a third grounding prong. All PS products ship with a grounding type plug. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus. Unplug this apparatus during lightning storms or when unused for long periods of time.

When making connections to this or any other component, make sure all components are off. Turn off all systems' power before connecting the PS Audio component to any other component. Make sure all cable terminations are of the highest quality.

**THERE ARE NO USER-SERVICEABLE PARTS INSIDE ANY PS AUDIO PRODUCT. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL**

This device contains FCC ID: 2AC7Z-ESP32WROVER(B/E).

Please contact your authorized dealer, distributor, or PS Audio if you have any questions not addressed in this reference manual.

This product is manufactured in the United States of America. PS Audio® is a registered trademark of PS Audio International Inc., and is restricted for use by PS Audio International, Inc., its subsidiaries, and authorized agents.

Rev. C-1



The exclamation point within a triangle is intended to tell the user that important operating and servicing instructions are in the papers with the appliance.



The lightning flash with arrow-head within a triangle is intended to tell the user that parts inside the product are a risk of electric shock to persons.





# Introduction

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## Welcome

The PS Audio PerfectWave™ DirectStream Digital to Analog Converter (DAC) MK2 is a state-of-the-art DAC that replaces its predecessor, the PerfectWave DirectStream DAC.

Since its groundbreaking introduction 8 years ago, the PerfectWave DirectStream DAC has stood alone as one of the most remarkable DACs ever built. We are excited to share with the world the next generation of this technological wonder, the PerfectWave DirectStream DAC MK2.

Unlike the vast majority of high-end DACs based on off-the-shelf IC technology, DirectStream MK2 is handwritten, discrete, galvanically isolated, perfection-based conversion that uncovers all the missing information hiding in your digital audio media.

CDs, streaming audio, high-resolution PCM or DSD based media are all expertly upsampled in the DirectStream MK2 to twenty times DSD rate and output as pure analog directly into your amplifier or preamplifier.

## DirectStream MK2 Overview

There has never been a better sounding DAC anywhere close to the price of DirectStream MK2. The ground breaking DirectStream DAC was the first choice of thousands of critical listeners worldwide, and now, with the introduction of the MK2, that legacy will continue.

DirectStream MK2 features a unique architecture inside. From its galvanically isolated digital inputs to its galvanically isolated output stage, DirectStream MK2 has been hand written and hand designed by Ted Smith.

DirectStream MK2 has two FPGAs (Field Programmable Gate Array) as the core processors and no off-the-shelf DAC chips are used in the design.

Each input on the DirectStream MK2 is galvanically isolated, which means there are no



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physical connections between the noisy digital source and the sensitive DAC. Power supplies that power noisy inputs are galvanically isolated from the rest of the system. Galvanic isolation aids in the reduction jitter and unwanted audio artifacts.

DirectStream MK2 is less sensitive to the vagaries of input source types and their level of jitter than most DACs made. Remarkably low jitter sensitivity is one of the hallmarks of this design and is accomplished by not using classic edge transition detection techniques used on the digital input data. Instead, a proprietary method of extremely fast sample-and-recognize technology is employed that reduces dependency on cables, jitter and the quality of the incoming data source.

Once the data from the selected digital audio source has been inputted, it is upsampled to twenty times the standard DSD rate of 2.8MHz before any processing takes place. After processing, all input data is converted to quad rate DSD (11.2896MHz) and outputted through a passively filtered analog section consisting primarily of a high-quality audio output transformer. Elimination of the classic active analog output stage, with all its difficulties running at these high frequencies, has been implemented with a high quality passive audio transformer.

## Why DSD?

DirectStream MK2 is entirely DSD based, even for PCM inputs. DSD was chosen as the core engine for this instrument for a number of compelling reasons:

- DSD is simple to convert to analog: just low pass filter it.
- DSD is inherently linear: it's hard to build a PCM DAC that always takes the same sized step in the output for any possible unit increment of the representative PCM voltage value. The best PCM technology for linearity is arguably a resistor ladder, then all steps are at least positive for a positive change in the input, but making resistors that are accurate to one part in  $2^{16}$  is hard and to one part in  $2^{20}$  is very hard. DSD doesn't need anywhere near this level of component matching.
- DSD soft clips when overdriven, more like magnetic tape: signals which exceed the nominal full scale value only get slightly compressed if at all. With PCM you either have flat tops which induce extra energy at the squared off edges or, worse, you can have wrap around, which is very audible.
- All bits in a DSD stream have the same weight: a single bit error anywhere is barely measurable let alone audible. Some bits in PCM carry a lot of weight and would make a very loud pop if changed. PCM needs more error



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recovery to keep to a given signal to noise ratio (S/N) with a slightly corrupted digital signal.

- Ironically, most sanely priced PCM players actually use DAC chips that utilize a sigma-delta modulator (DSD) to get a DSD-like signal anyway. Similarly, many (most) A/Ds are sigma-delta based. The typical PCM path is analog -> DSD -> PCM -> disc -> PCM -> DSD -> analog. The DSD path can skip the conversions to PCM. Those conversions can't be perfect and artifacts of the steep anti-aliasing filter or the reconstruction filter aren't considered benign by many.
- DirectStream MK2 handles the PCM conversion from XLR/EBU, S/PDIF, Optical, I<sup>2</sup>S and USB without recovering a clock, by simply watching for the edges and making decisions about what they mean in context. The result is that any jitter present on the input is lost entirely in the FPGA. There is no difference in Optical or I<sup>2</sup>S because the output clock's rate only depends on the long term average rate of the inputs not on any edge or other local feature.

The DSD engine is its heart

The heart of DirectStream MK2 is the DSD engine itself. Regardless of input format, whether PCM or DSD, all data are upsampled to 30 bits running at 20 times the standard DSD rate and then back down again to double rate DSD for noise shaping.

The internal volume control keeps complete precision: every bit in the input affects the output of the DAC for any volume level. Except for the sigma-delta modulation process itself there is no rounding, dither or other trimming, not to 24 bits, not to 32 bits, not to 48 bits, but rather a full 50. The incoming PCM signal is 30 bits from the upsampling filter and the volume control is 20 bits wide so all 50 bits of the output are used throughout the sigma-delta conversion, requiring more than 50 bits of precision.

DSD only requires a nominal 20 bit signal to noise ratio, this design utilizes a minimum width of 24 bits with wide filter coefficients and 144dB S/N. Use of full precision everywhere and many guard bits in the IIR filters and the sigma-delta modulator help maintain our goal of perfecting the audio output.

Full headroom with room to spare

While some designs may run out of headroom or approach saturation levels, depending on the source material, the new design opts for an extra top bit everywhere in the digital path coupled with an extra 6 dB of head room in the analog path beyond the 6 dB of headroom that SACD uses. The top bit keeps PCM from saturating, even if that PCM was not properly bandwidth limited in the initial recording process.

The output of the DSD engine is fed directly into the output stage, based on high speed video amplifiers and a passive output transformer.

Most output schemes for DSD modulators are active low pass filters, covering the required



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120dB S/N ratio from 10Hz to 220MHz and have a number of design challenges and problems associated with even the best designs.

If the analog processing isn't linear and doesn't have a very wide bandwidth, it will modulate the high frequency noise that's inherent in DSD back into the audio band. That modulation will not result in just low level noise. In practice it will be aliased back into the audible band with serious sonic consequences. To maintain low noise and linearity, the design incorporates both high speed symmetrical video amps and a passive output filter. The first challenge in such a design is the output switch that generates the final 1's and 0's of the modulator.

A very clean switch that hooks up the positive rail with a 1 and the negative rail with a 0 is essential. If it has too much resistance, if the resistance is different at the positive end than the negative end, if the resistance changes from time to time, ... the result will not be as clean as it needs to be. For 120dB S/N the switch resistance has to be quite consistent. Another design requirement is consistent and fast switching time.

If the switch is too slow it won't keep up with the 5.6MHz signal used in this instrument. If the switch doesn't react in consistent times it will introduce jitter. Use of traditional CMOS gates adds a lot of jitter as do cross-coupled totem-poled bipolar transistors. Instead, DirectStream MK2 relies on high speed differential video amps, which are essentially class A switches, have their outputs either near the top rail or near the bottom power supply rail (without ever saturating) and provide a very clean DSD switch.

For the all important low pass filtering requirements an active filter adds self noise even if it is effectively lowering incoming noise. A unique and effective solution to this problem is a passive filter. The design uses a carefully crafted high bandwidth audio transformer at the output of the instrument for both galvanic isolation from the outside world as well as low pass filtering.

The PerfectWave DirectStream MK2 DAC represents a significant departure in the design and execution of PS Audio's products. We believe this new instrument will help further our industry, music and the faithful reproduction of music around the world.





# Getting Started

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## Installation Considerations

A good location for DirectStream MK2 is in a cabinet or on a shelf at an easily accessible height. Care should be taken to keep it away from power amplifiers or large, potentially hum-inducing products. The IR (infrared) receiver for the remote is located to the left of the Touch Screen. A direct line of sight will help with DirectStream MK2's IR sensor, which has been greatly improved from its predecessor, the DirectStream.

DirectStream MK2 and the PerfectWave SACD Transport were designed to stack on top of each other if they are not placed on separate shelves. To do this, remove the feet from the unit you wish to place on top of the stack. Carefully place the top unit so it rests on the bottom unit. You will note that the bottom of the corners of each PerfectWave piece is specially designed to mate with the top corners of another PerfectWave.

## Digital Inputs Available

DirectStream MK2 offers multiple digital input choices including: two XLR (XLR/EBU), RCA and Optical (S/PDIF), USB as well as two I<sup>2</sup>S. All inputs, including USB, are capable of accepting high-definition digital audio signals. The Optical input is capable of 96kHz, 24 bit audio. XLR/EBU up to 352.8kHz PCM and up to DoP128. I<sup>2</sup>S handles up to 705.6 kHz PCM and up to DSD256. USB is capable of handling up to 705.6 kHz PCM and up to DSD256.

DirectStream MK2 uses an HDMI cable to transfer I<sup>2</sup>S data. This data can only be used with another compatible component, such as the PerfectWave SACD transport, and will not work in other HDMI equipment as the I<sup>2</sup>S format incorporated does not comply with the HDMI standards. PS Audio freely publishes its I<sup>2</sup>S standard and it has been adopted by multiple other manufacturers as well.

## DoP

DoP (DSD over PCM) is a standard allowing single rate DSD to travel over S/PDIF (the RCA, and XLR digital inputs are S/PDIF compatible) as well as over USB and I<sup>2</sup>S. It is not currently possible to send DSD directly over S/PDIF and the DSD files must first be converted to DoP standards to travel this route.

It is possible to send DSD files (without conversion to DoP) over DirectStream MK2's I<sup>2</sup>S inputs as well as USB. Most programs, such as Roon, Audirvana, JRiver Media Center and Foobar 2000, will automatically convert DSD files to the DoP standards on the fly if the appropriate checkbox has been enabled. There are no sonic penalties for conversion to DoP as the raw DSD data is unaffected by the process.

## Power Cables

Your new PS Audio DAC is supplied with a removable AC Power cord. While the supplied cord is of good quality, it is recommended that you replace it with one of PS Audio's matching PerfectWave AC power cords for optimum performance. It is also recommended that you connect your new DirectStream MK2 to one of PS Audio's award-winning AC power products such as the P12, P15 or P20 Power Plants.

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## Unpacking and Connections

- Carefully unpack the unit and place in the chosen location.
- The piano black top cover has a protective plastic film. Remove this film.
- Connect DirectStream MK2 to your digital sources using the appropriate connections.
- Connect the AC cable into the receptacle in back and plug the unit into your Power Plant or into the wall.

## Register the Unit

PS Audio products come from the factory with a 3-year warranty. Please register your new DirectStream MK2. Registration takes just a few minutes, helps us inform you about future upgrades, keeps track of your serial number and allows us to maintain the highest standards of product quality of any company.

To register your new unit, look on the back panel of DirectStream MK2 and note the serial number. Using any web browser, go to [www.psaudio.com](http://www.psaudio.com) and click on Register Products. Once you have completed the registration process, you can go to the PS website and look at the My Registered Products page. The link to this page is located at the top right hand corner of the website once you are logged in. If you do not have web access, you may register the unit via mail or phone. Notification of software upgrades to this product will be available only to registered owners via the web and email.

## Connecting DirectStream

There are multiple methods of connecting the digital inputs of DirectStream MK2: Through the S/PDIF based Optical, Coax, and XLR inputs, USB, and I<sup>2</sup>S. S/PDIF is a serial digital interface available as an optical source (Optical), coaxial source (RCA) or balanced source (XLR/EBU XLR). Connect to your digital sources with any of these cable types.

USB is the preferred method of connection for a direct-to-computer connection and DirectStream MK2 is capable of processing up to 705.6kHz 24 bit PCM data as well as DSD 64 through DSD256. Connect DirectStream MK2 to your computer using a well



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regarded USB cable and make sure to set the output of your computer to the highest 24 bit standard. Once connected, your computer should automatically install DirectStream MK2 as a new device if you have a Mac. If you have a Windows operating system, you will need to download the DirectStream Extended Resolution driver from our website and install it on your Windows computer.

## I<sup>2</sup>S Input

I<sup>2</sup>S is available through several manufacturers as well PS Audio equipment, such as the PerfectWave SACD Transport. I<sup>2</sup>S is a parallel data connection with separate clocks and data and transferred via an HDMI cable. I<sup>2</sup>S will typically provide a better performance standard than USB or any serial data stream such as S/PDIF or XLR/EBU.

## USB

You can connect one or all seven inputs at the same time. For instance, you can connect the USB input to your computer and the coax input to your CD player. Then you can simply choose which one to listen to from the front panel (or the remote) that selects the input. If you are using USB, make sure both the computer and DirectStream MK2 are connected and powered up. USB also requires a driver to operate properly. Mac computers running OSX have the driver built in. Windows based computers require the PS Audio Extended Resolution USB driver to be installed. Download the driver from our website <https://www.psaudio.com/downloads/>; DirectStream MK2 will show up under Device Manager as PS Audio Extended Resolution USB.

## Auto Select

DirectStream MK2 features an auto select input. Using the front panel menu system (or the remote), choose either the specific input you wish or the Auto Select feature. When in the Auto Select mode, DirectStream MK2 will automatically select the active input.

## Connecting the Output

DirectStream MK2 is designed to drive a power amplifier directly or as another input on a preamplifier. The outputs of DirectStream MK2 are high-performance, high current outputs that can drive long lengths of interconnect cable without degradation.

DirectStream MK2 has two types of analog outputs, balanced XLR or single ended RCA. **We do not recommend using both outputs at the same time.** Be aware that most amplifiers and preamplifiers will produce 6dB higher level with the balanced outputs relative to the single ended outputs. If you are using both outputs be advised they will be at different levels. Our preference for connection to a power amplifier or preamplifier is through the balanced XLR outputs of DirectStream MK2.

RCA or single ended outputs will be the typical outputs as many preamplifiers, surround processors receivers, integrated amplifiers and power amplifiers have only this standard type of input.

Plug either the RCA or the XLR outputs of DirectStream MK2 into a line level input on the preamp, integrated, amplifier or subwoofer. Do NOT plug the output of DirectStream MK2

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into a phono or equalized input of any type.

## Control and Operation

Turn the AC power switch in the rear of DirectStream MK2 to the ON position. The power switch is located just above the AC inlet.

As soon as the switch is activated the front panel screen will display the initializing screen. This screen shows when DirectStream's internal "engine" is being loaded with the firmware that runs DirectStream MK2.

After the initializing screen, you will see the main screen of DirectStream MK2.

## Front Panel Idle Button



The front panel PS logo button, located on the upper left hand corner of the unit, is the Ready/Operation Mode control for DirectStream MK2. This control has two modes: Ready Mode and Operational Mode. Ready Mode (Idle) is designed to keep power on to critical internal circuitry, including power supply capacitors, thermally sensitive semiconductors and integrated circuits.

Press this front panel button to activate the Ready Mode or to place DirectStream MK2 in Operational Mode. When pressed to activate the Ready Mode, the display as well as the outputs are turned off, but all the unit's critical internal circuitry remains active.

If you wish to conserve energy consumed by DirectStream MK2 it will be necessary to use the rear panel power switch. Using this rear panel switch will remove power from critical components. In order to gain maximum performance levels, you will need to turn DirectStream's power on at least 1 hour before use.

## To reboot use the rear switch

Should DirectStream MK2 need to be rebooted, use the rear panel power switch to power cycle the instrument. It's best to wait 30 seconds before powering back on.

## Front panel display

The DirectStream MK2 features a menu display system that is accessible using the control ring. It's a good idea to familiarize yourself with the different functions in the DirectStream MK2 menu. To access the menu, simply press and hold the menu button to the left of the display for two seconds. A gear icon will appear in the upper right corner showing that you are in the Settings menu.



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Menus	Executing a long press of the menu button (holding for more than two seconds) will exit the menus and return the unit to the Home screen. The menus will also time out after fifteen seconds. Note that settings are typically saved in real time as the changes are made.
Main display	The main display shows the volume by default. Pressing the center, right, or left buttons on the control ring will bring up the current input. Additional presses right or left will change the input. The changes take effect immediately. Pressing the center of the control ring toggles between the Volume and Input displays.
Volume	The up and down buttons on the control ring change the volume.
Mute	The Menu button toggles mute on or off. This button works when either the Volume or Input display is up. "MUTE" will only appear if the user is on the volume screen. It will not be visible when the Input display is up.
Access menus	A long press of the Menu button (more than 2 seconds) enters the menus.
Volume choices	By default, the unit comes up at volume 25. However, if the user has Fixed Volume set, the unit will come up at that volume.
Inputs	<p>Inputs can be selected from either the DirectStream MK2 front panel display or the included remote control.</p> <p>From the front panel display controller, press either the right arrow to scroll forward through the inputs or the left arrow to scroll in the opposite direction. Pressing the control's center button returns you to the volume control menu.</p> <p>The round red or green light on the right corner of the display indicates whether the current input is connected or not. A green light means the connection is good.</p> <ul style="list-style-type: none"><li>• For USB, a green light indicates that a USB cable is connected to a USB host. A red light indicates that there's no connection to a USB host.</li><li>• For S/PDIF, XLR3 and Optical, the green light means that there's an active signal on that input with a valid sampling rate and no bad flags from the XLR receiver.</li><li>• For I<sup>2</sup>S, a green light means that there's a PS Audio I<sup>2</sup>S source connected. It indicates a valid signal is present.</li></ul>

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## Main Menu

The main menu has the below features.

- Balance
- Phase
- Pre-emph
- Versions
- Audio Input
- Audio Output
- System
- Network

Below are details on each feature.

## Main Menu: Balance



The Balance feature allows you to adjust the center location of the stereo image. Press down on the control ring to reduce the gain of the right channel, thus making the image come more from the left channel, and vice-versa. The balance steps are each 1/4dB and the range is 48 steps each way for a maximum shift of 12dB.

When the balance is set to anything other than the center position, there will be an icon on the Home screen to indicate this state.

## Main Menu: Phase



The phase feature allows you to invert the signal from the digital inputs. Use up or down buttons on the control ring to change the absolute polarity of the signal from “Norm” (Normal) to “Inv” (Inverted). This can be useful when listening to certain source material that may have inverted absolute polarity. NOTE: Some listeners are more sensitive to absolute polarity than others.

## Main Menu: Pre-emph

Some Compact Discs were recorded with pre-emphasis in order to improve the performance at high frequencies. If you are playing a track that was recorded with pre-emphasis, you can manually engage the de-emphasis filter using this option. Set to On to engage the de-emphasis filter. Set Off to disable it. The default is Off.

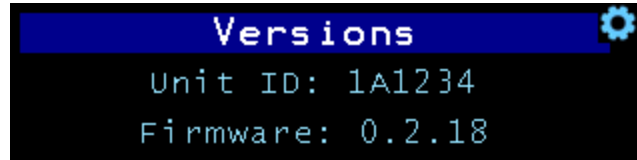
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Main Menu:  
Version



This menu display shows the versions of the DirectStream MK2's operating firmware. If you need to contact our customer service team for help with your unit, please have this information ready.

Main Menu:  
Access  
Sub-Menus

There are 4 sub-menus that can be accessed from the main menu. They are:

- Audio Input
- Audio Output
- System
- Network

Sub-Menu:  
Audio Input

This sub-menu allows you to change the below:

- Input Name
- Ground Lift

## Input Names



This feature allows you to customize the name shown for each input. For example, Input 1 is I<sup>2</sup>S 1. If you are using the PS Audio AirLens or SACD Transport on this input, you can select that name. You can enter the Input Names sub-menu the same way as other sub-menus, by double pressing the menu button or by pressing the center button on the control ring.

## Ground Lift

Allows the user to select Input Ground Lifts for each input (excluding the Optical). Ground lifts reduce or eliminate ground-related noise arising from ground loops in audio cables. This opens the connection between the DSD MK 2 ground and the shielding conductor of the audio cables, leaving those cables grounded only at their opposite end.

Select the input you want to modify and press the center control ring button. Now select whether that input should be Grounded or Lifted.





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Sub-Menu:  
Audio Output

This sub-menu allows you to adjust the below:

- Fixed Volume
- Max Volume
- Ground Lift
- Shell Lift
- RCA Balance

## Fixed Volume

The Fixed Input feature allows you to set the volume at a fixed value, such that it cannot be changed. This is useful when feeding the DSD MK2 into a pre-amplifier. When Fixed Volume is enabled, a Lock icon appears on the icon bar at the top of the screen. The volume up/ down keys will no longer function. All inputs are affected by the Fixed Volume setting. The Fixed Volume setting is saved and restored on power downs.

Use the up/ down arrow keys to set the fixed volume you desire. Hold the up/ down arrow keys to scroll through the volume settings quickly. To disable Fixed Volume, set it to 0 or OFF.

## Max Volume

Setting this value limits the maximum volume when using the up volume control. This value is ignored by the Fixed Volume setting.

Use the up/ down arrow keys to set the max volume you desire. Set to 100 to disable this feature.

## Ground Lift

Ground lifts reduce or eliminate ground-related noise arising from ground loops in audio cables. This opens the connection between the DSD MK 2 ground and the shielding conductor of the audio cables, leaving those cables grounded only at their opposite end.

Set to Lifted to enable the output Ground Lift. Set to Grounded to disable the output Ground Lift. The default is Grounded.

## Shell Lift

Select to lift the XLR balanced outputs shield or shell.

This typically will sound a little better lifted in most systems. But some interconnects have

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a shield that's only connected on the source end. Systems with these interconnects may need to tie the shield or XLR ground to the system ground to drain off any RFI that the cable's shield picks up.

Set to Lifted to enable the XLR Shell Lift. Set to Grounded to disable the XLR Shell Lift. The default is Grounded.

## RCA Balanced

This option connects the shield/ground reference of the RCA connection to either the ground as expected or to the other side of the output transformer making a balanced connection. The DS Mk II will make sure that the grounds of the output are lifted when the RCA is balanced to not interfere with the balanced signal. Not every unbalanced input on a preamp or an amp can accept a 4VRMS input, but for those that do this could be useful for systems that don't have enough gain.

Set to On to select RCA Balanced. Set to Off to select RCA Unbalanced. The default is Off.

Sub-Menu:  
System

This sub-menu allows you to adjust the below:

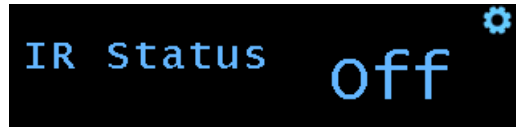
- Backlight
- IR Toggle
- FPGA Load
- Factory Reset

## Backlight



The brightness of the display can be adjusted to suit your room lighting any your tastes. The range is from 1 to 10.

## IR Status



IR Status allows you to enable or disable the IR remote. This can be useful in situations where different pieces of equipment that are IR enabled (such as a TV or other audio equipment) has an IR that sends code that causes the DirectStream MK2 to respond when that is not the intention.



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## FPGA Load

This option allows you to copy FPGA loads to a USB thumb drive and select them to into the DSD MK2. Using this allows you to easily toggle between new FPGA loads when they are released.

Follow the instructions that come with the FPGA load when it is released to place the file on the USB thumb drive and insure it is named correctly. Up to ten files will be read and displayed on the screen. Use the up/ down arrow keys to scroll through the list and select the load you want. Press the center control ring button or the menu button to select the load. Prompts will appear to guide you through the process and display status updates.

Once the FPGA load is complete, you will be asked to reboot the unit. You must reboot for the new FPGA load to take effect.

## Factory Reset



This feature allows you to reset all of the configuration settings back to what they were when the DirectStream MK2 was shipped from the factory. Any custom input names, trim levels, Wi-Fi networks, or any other settings you have made will be erased.

Sub-Menu:  
Network

This sub-menu allows you to adjust the below:

- Network Status
- Wi-Fi Enable
- WPS
- Wi-Fi Setup
- Forget Wi-Fi

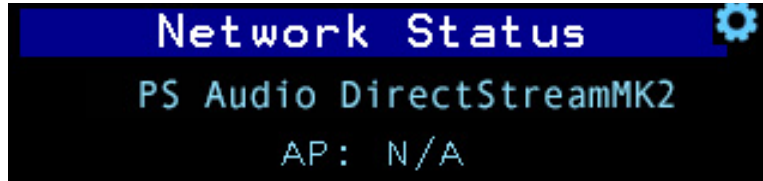
DirectStream MK2 connects to your local network using either Ethernet or Wi-Fi for the purpose of firmware updates when available.



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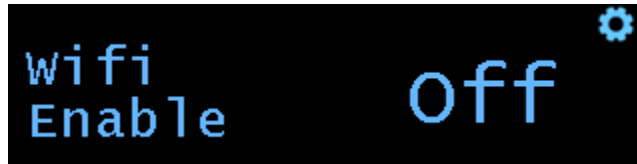
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## Network Status



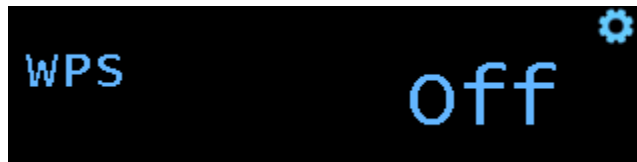
This menu item will show you information about your network connection, including Wired/Wi-Fi, IP address, and connection status. This menu is informational only; there are no settings.

## Wi-Fi Enable



This feature allows you to enable/ disable the wireless (Wi-Fi) functionality. Press up or down on the control ring to turn the Wi-Fi on or off.

## WPS



This feature is for using WPS, or Wi-Fi Protected Setup, to configure your DirectStream MK2 with your network without the need to enter passwords. Use this menu to activate the WPS feature, then press the corresponding WPS button on your router. Your DirectStream MK2 will then be connected to your Wi-Fi network automatically.

## Wi-Fi Setup Sequences





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Selecting the Wi-Fi Set Up will take you through the below features:

- **Network Select**

This menu is used to manually setup a Wi-Fi network connection. Select your router from the drop down menu by pressing up or down on the control ring to select the correct AP (access point). Press the menu select button to choose the AP.

- **SSID Accept Screen**

Available network resources are identified by their SSID. Press up or down on the control ring to Accept or Cancel the AP SSID selection.

- **Password Screen**

Press up or down on the control ring to find each character. Press the menu select button to select the character. Double press the menu select button to backup one character. Once the last character is entered, long press the menu select button to save the password. The DirectStream MK2 will connect to your AP.



**Forget Wi-Fi**

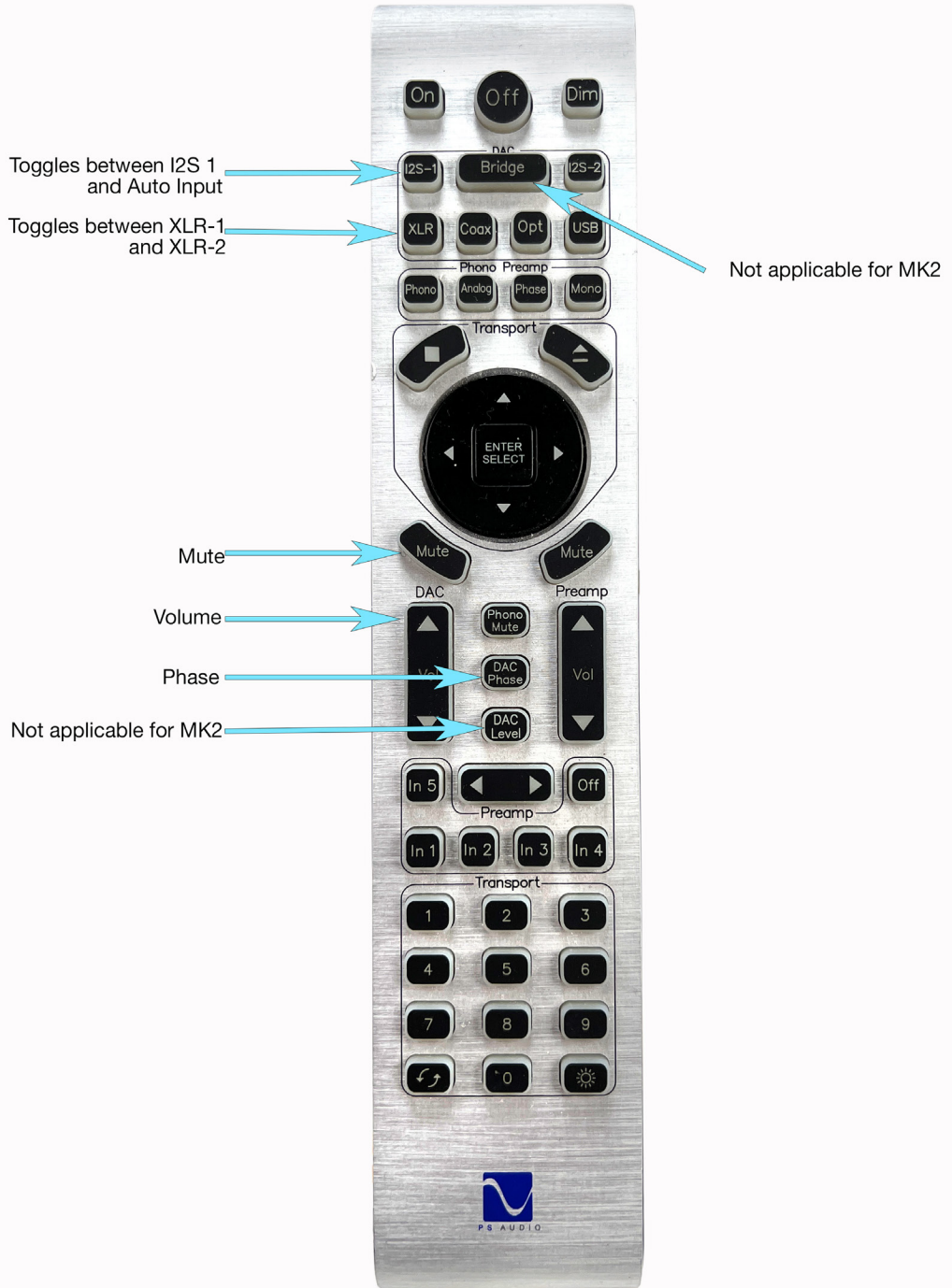
Deletes current Wi-Fi information, including preferred SSID, user name and password.



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## Remote Control





# Troubleshooting

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## USB not connecting

### USB – DirectStream MK2 not recognized, or no sound via USB

To play music from your computer into the DirectStream MK2 via USB you must have a driver installed that communicates with the DirectStream. On a Mac computer with OSX or Monterey the drivers are already available and the unit should be automatically recognized. You can then go and choose the PS Audio USB driver to play to by going to System Preferences->Sound and select the PS Audio PerfectWave. You can also go to Applications->Utilities->Audio Midi and select the driver as well as set the same rate.

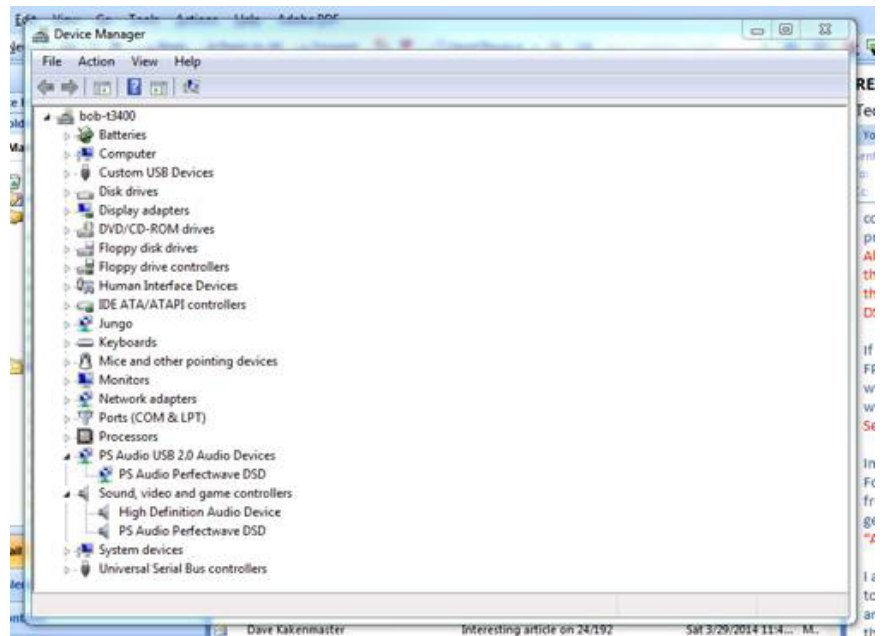
On Windows the drivers are not yet available for automatic recognition. You will need to download the PS Audio High Resolution USB driver which can be downloaded from our website.

You can also contact our support staff via email or phone or simply go to [www.psaudio.com](http://www.psaudio.com) and click on the Downloads page for the download. You must then unzip the driver and install it on your Windows machine. Once installed, Windows will recognize the DirectStream MK2 and allow you to select it for playback from any program on your computer.

If you are unable to obtain sound via USB on a Windows based device it is most likely the result of a partial or incorrect driver installation.

You may have also experienced a pop-up window asking you to provide the correct driver. In any of these cases the remedy is quite simple. Remove the device and force Windows to reinstall the driver and the device.

DirectStream MK2 will show up under device manager as “PS Audio High Resolution DAC” The entry under “Sound video and game controllers” is the USB1.0 fallback driver.





# Reference

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## DirectStream DAC MK2 Specifications

<b>Physical:</b>	
Unit Weight	21 lbs [9.53 kg]
Unit Dimensions	14" x 17" x 4" [ 36cm x 43cm x 10cm]
Shipping Weight	30 lbs [13.6 kg]
Shipping Dimensions	20.5"x 24" x 10" [52cm x 61cm x 25cm]
<b>Power Requirements:</b>	
Input Power	Model specific 100VAC, 120VAC, or 230VAC 50 or 60Hz
Power Consumption	25W
<b>Digital Audio Inputs</b>	I2S (2), Coax, XLR Balanced (2), Optical, USB
<b>Sample Rates</b>	Optical (TOSLink): PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz and 96kHz S/PDIF (Coax and XLR): PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz and 192kHz; DoP64 Dual XLR: PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz and 352.8kHz; DoP64 and DoP128 I2S: PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz, 352.8kHz, and 705.6; DoP64, DoP128, DoP256, DSD64, DSD128, and DSD256 USB: PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz, 352.8kHz, and 705.6; DoP64, DoP128, DoP256, DSD64, DSD128, and DSD256.
<b>Analog Audio Output:</b>	
Connector	RCA single ended or balanced, XLR balanced
Output level high, maximum	4 VRMS Balanced 2 VRMS Single Ended
Output Impedance	<100Ω/<200Ω
Frequency Response	20-20KHz +/- 0.25dB
THD+N @ 1KHz (full scale)	<0.1%
Output Stage	Passive audio transformer, fed by high current, high speed analog amps producing double rate DSD.





# Reference

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Data Handling:	
Format	PCM or DSD
Sample Rate (PCM)	44.1kHz, 48.0kHz, 88.2kHz, 96.0kHz, 176.4kHz, 192kHz, 352.8kHz; 705.6kHz
Word Length (PCM)	16b, 18b, 20b, 24b
Data Rate (DSD)	Standard (2.8MHz) or Double (5.6MHz) DoP as well as raw DSD on I2S and USB inputs
Input Jitter Reduction	effectively 100%, residual immeasurable. No input PLLs, FLLs.
Input Processing	225.792MHz
Signal Processing	56.448MHz
Synchronous Upsampling, All Inputs	56.448MHz for 48k, 96k or 192k; 11.2896MHz for all others
Digital Processing S/N ratio	Upsampling > 210dB, volume control and Sigma Delta Modulator: > 330dB
Digital Volume Control	Zero loss of precision
Analog Conversion method	low pass filter DSD256 (quad rate DSD: single bit DSD at 11.2896MHz)
I2S Digital Input:	
Connector	HDMI
Format	PCM or DSD. DoP on all inputs as well as raw DSD on I2S inputs
USB Digital Input:	
Connector	USB "B" Type
Format	PCM, DoP v1.1 (DSD over PCM), or Native DSD
Transfer mode	Asynchronous



# Warranty

Owner's Reference DirectStream DAC MK2

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## Registering

### Product registration

By registering your product, you are validating the start date of your limited warranty. This limited warranty is in effect for 3 years from the date the unit was first purchased from PS Audio or its dealers and agents. If you do not register your product within 30 days of service, a copy of your purchase receipt from an authorized PS Audio dealer may be used as proof of purchase to establish the warranty start date. If no proof of purchase from an authorized PS audio dealer or registration is provided, the production date of the product will be used to determine the warranty start date. You can register your product online, by phone, by mail, or by email.

## Coverage

### What this warranty covers

This warranty covers defects in material and workmanship for products purchased from PS Audio or its authorized dealers and agents. In the event your product fails, your sole remedy under this limited warranty shall be to return the product to PS Audio or an authorized PS Audio repair center. At the option of PS Audio, the product will be repaired without charge for parts or labor, replaced, or the purchase price refunded through the original point of purchase.

## Shipping

### Shipping

You are responsible to pay for the safe and proper shipment of the warranted product to PS Audio or its authorized repair center. Under this limited warranty, PS Audio or its authorized repair center will pay the cost of returning the repaired or replacement product to you.

## Not Covered

### What this warranty does not cover

This warranty does not cover damage due to:

- Accidents, carelessness, improper transportation, misuse, neglect, or abuse
- Failure to follow the operating instructions that are provided by PS Audio in the Owner's Reference Manual (available for download at [www.psaudio.com](http://www.psaudio.com))
- Use in any manner inconsistent with PS Audio's operating instructions (available for download at [www.psaudio.com](http://www.psaudio.com))
- Lack of routine maintenance
- Connection to an improper voltage supply
- Alterations or modifications to the unit
- Improper or unauthorized repair, including repairs not authorized by PS Audio or a PS Audio authorized repair center



# Warranty

Owner's Reference DirectStream DAC MK2

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- Fire, lightning, flood, “Acts of God,” or other contingencies beyond the control of PS Audio
- Products purchased through an unauthorized source (if you have questions as to whether or not a dealer is authorized, please contact customer support at [www.psaudio.com](http://www.psaudio.com))
- Products with a factory-applied serial number that has in any way been altered, defaced, or removed

## Limitations

### **Limitations under this warranty**

In no event will PS Audio’s liability to you exceed the original purchase price of your unit. This warranty does not cover the cost of custom installation, customer instruction, setup adjustments, or signal reception problems. Consequential and incidental damages are not covered under this warranty. However, some states do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. In the event that your warranted product cannot be repaired, PS Audio will either replace or refund the cost of the unit. We reserve the right to replace any out-of-stock, discontinued, or limited edition products with a comparable product. Discontinued products may not be available for warranty.

## Warranty Transfer

### **Warranty transfer**

This warranty is for the benefit of the original purchaser of the product. The warranty may be transferred to a subsequent purchaser during the 3 year warranty period. To do this, you must contact PS Audio directly to set up a transfer of warranty registration.



If you require service in North America

### **Warranty Service within North America**

Please contact PS Audio customer support for service assistance, help with locating an authorized PS Audio repair center, help with the operation of a product, or for more information.

Obtain an RMA number

### **Obtaining an RMA#**

In order to receive warranty service, you must first obtain a Return Merchandise Authorization Number (RMA#) prior to returning any item. Please contact PS Audio or an authorized PS Audio repair center to receive an RMA#. The RMA# must be on all returned items. If it is not clearly marked, PS Audio will return the package back to you, freight collect.

Use original packing

### **Packaging and Shipping**

Original packaging should be used for the safe transit of your PS Audio unit to the repair center. If you do not have the original packaging, PS Audio can sell and ship replacement packaging to you. You are responsible for the cost of shipping the product to a PS Audio authorized repair center. You should insure the product for its full retail cost, in the event it gets lost or damaged in transit. PS Audio is not responsible for damage incurred during the transit of products sent to us. Shipping your product in non-PS Audio packaging may void this warranty. PS Audio reserves the right to charge you for new factory packaging to return your product after a repair.

State law

### **State Law**

This warranty gives you specific legal rights. You may also have other rights, which vary from state to state.

If you are outside the US

### **International Warranty Service**

PS Audio has authorized distribution in many countries of the world. In each country, the authorized importing distributor has accepted the responsibility for warranty of the products sold by that distributor. Warranty service should be obtained where the product was purchased.

### **Changes to Our Products**

PS Audio reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products, and to change the prices or specifications of any products without notice or obligation to any person.



# Notes

Owner's Reference DirectStream DAC MK2

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# Thanks for being a part of the PS Audio Family

At PS Audio, we're family.

Not just a family that runs in bloodlines, but in frequencies.

Because while we may not all share the same genes here, we are all related by a passion, nay, obsession with listening to the music we love at the highest, most breathtaking quality possible.

And in our minds, that makes us kin.

In fact, we believe that every nutty, hertz counting audiophile out there is part of our tribe.

That's how we've built our company over the last 50 years - with the kind of care and respect that you give to your family.