PS Audio MK2 Perfect Wave DAC Direct Stream

PS Audio MK2 Perfect Wave DAC Direct Stream User Guide

Contents

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Product Information

- **Specifications**
  - **Brand:** PS Audio
  - **Model:** PerfectWave DirectStream DAC MK2

    - **Technology:** Handwritten, discrete, galvanically isolated conversion
    - **Upsampling Rate:** Twenty times the DSD rate
    - **Media Compatibility:** CDs, streaming audio, high-resolution PCM, DSD
    - The PS Audio PerfectWave DirectStream DAC MK2 is a state-of-the-art digital-to-analog converter that offers unparalleled sound quality.
    - It features handwritten, discrete, galvanically isolated conversion technology that enhances the audio experience by revealing hidden details in digital audio media.
- **Installation Considerations**
    - Before connecting the DirectStream DAC MK2, ensure that the unit is placed on a stable surface with proper ventilation. Avoid exposing the device to rain or moisture and keep flammable materials away from the component.
- **Unpacking and Connections**
    - When unpacking the DirectStream DAC MK2, carefully remove all packaging materials. Connect the DAC to a power source using the provided power cord and ensure all components are turned off before making any connections.
- **Connecting DirectStream**
    - Connect your audio sources to the appropriate inputs on the DAC. Use high-quality cables for optimal performance. Make sure to power on the DAC after all connections are secure.
- **Control and Operation**
    - The front panel of the DirectStream DAC MK2 features an Idle Button for standby mode. Navigate through the menu options using the Main Display and Menu controls. Adjust settings like Balance, Phase, and Pre-Emphasis to customize your audio output.

FAQs

- **Q: How do I clean the Piano Finish Top of the DAC?**
    - **A:** Clean the Piano Finish Top with a dry cloth following the instructions provided on page 8 of the Quick Start Guide.
- **Q: What should I do if I have questions not covered in the manual?**
    - **A:** Contact your authorized dealer, distributor, or PS Audio for assistance with any inquiries not addressed in the reference manual.

Introduction

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 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 the 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.
- 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.

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 a 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 groundbreaking 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 Arrays) 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 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 of 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 several 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, so all steps are at least positive for a positive change in the input, but making resistors that are accurate to one part in 216 is hard and to one part in 220 is very hard. DSD doesn't need anywhere near this level of component matching.
- DSD soft clips when overdriven, are more like magnetic tape: signals that 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 recovery to keep to a given signal-to-noise ratio (S/N) with a slightly corrupted digital signal.
- Ironically, most sanely priced PCM players 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, I2S 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 I2S 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. The 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 headroom 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 120dB S/N ratio from 10Hz to 220MHz and have several 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, and 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 at consistent times it will introduce jitter. The 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, that 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

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 were 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 I2S. 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. I2S 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 I2S 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 I2S format incorporated does not comply with the HDMI standards. PS Audio freely publishes its I2S 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 I2S. 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 I2S 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.

Unpacking and Connections

- Carefully unpack the unit and place it in the chosen location.
- The piano's 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 to the receptacle in the back and plug the unit into your Power Plant or 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** 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 I2S. S/PDIF is a serial digital interface available as an optical source (Optical), coaxial source (RCA) or balanced source (XLR/EBU XLR). Connect 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-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.

I2S Input

- I2S is available through several manufacturers as well as PS Audio equipment, such as the PerfectWave SACD Transport.
- I2S is a parallel data connection with separate clocks and data transferred via an HDMI cable. I2S 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 AutoSelect 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 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. 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.

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 centre, 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 centre 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 a Fixed Volume set, the unit will come up at that volume.

Inputs

- Inputs can be selected from either the DirectStream MK2 front panel display or the included remote control.
- 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 centre button returns you to the volume control menu.
- 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.
- 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.
- 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.
- For I2S, a green light means that there’s a PS Audio I2S source connected. It indicates a valid signal is present.

Operating

Main Menu

The main menu has the below features.

- Balance
- Phase
- Pre-emp
- Versions
- Audio Input
- Audio Output
- System
- Network
- Below are details on each feature.

Main Menu: Balance

- 

The Balance feature allows you to adjust the centre 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 centre 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-emp

- Some Compact Discs were recorded with pre-emphasis to improve the performance at high frequencies.
- If you are playing a track that was recorded with preemphasis, 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.

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 I2S 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 centre 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 centre control ring button. Now select whether that input should be Grounded or Lifted.

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, and 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 maximum 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 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 and 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) have an IR that sends code that causes the DirectStream MK2 to respond when that is not the intention.

FPGA Load

- This option allows you to copy FPGA loads to a USB thumb drive and select them 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 ensure 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 centre 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.

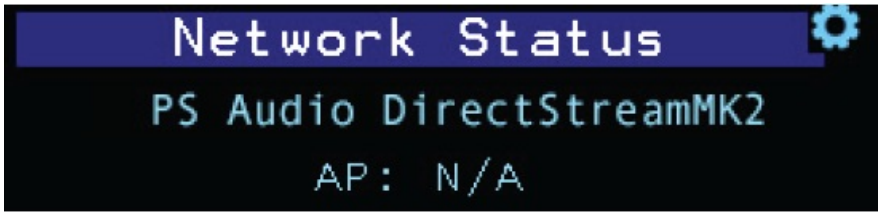
Sub-Menu: Network

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 firmware updates when available.

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

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

Network Select

- This menu is used to manually set up 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.

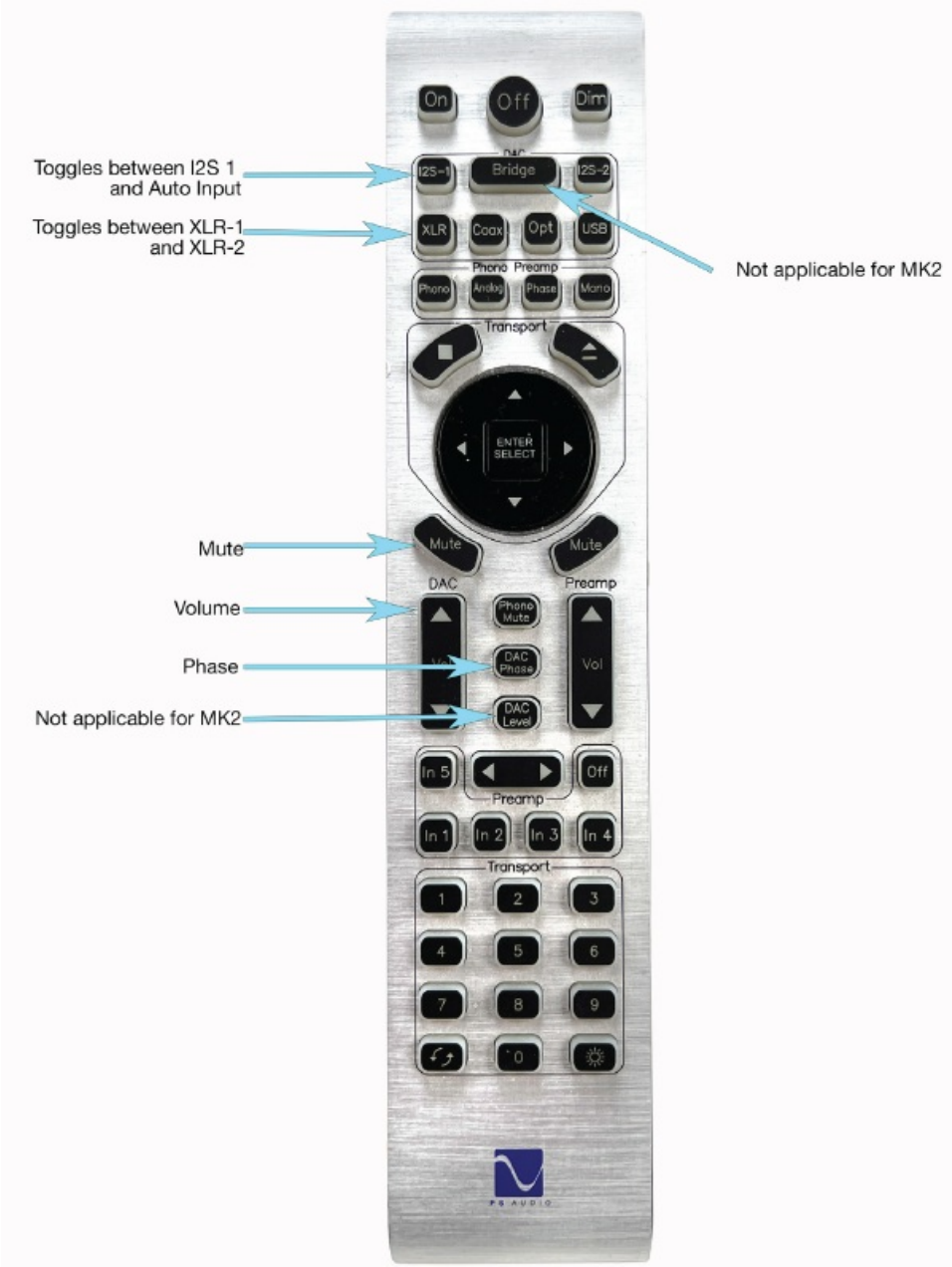
Password Screen

- 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 back up 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.

Remote Control

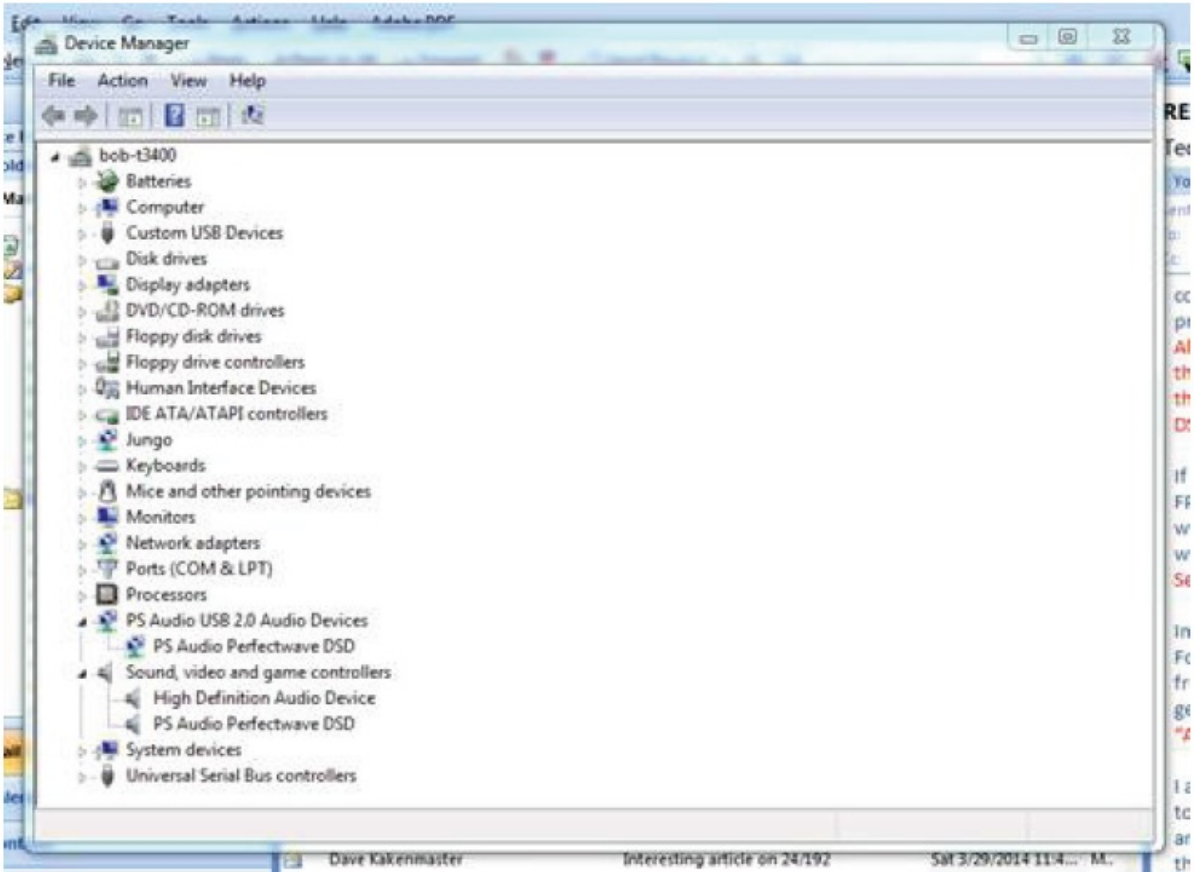


Troubleshooting

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 selecting 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 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 the device manager as “PSAudio High-Resolution DAC” The entry under “Sound video and game controllers” is the USB1.0 fallback driver.



Specifications

DirectStream DAC MK2 Specifications

Physical:	
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]
Power Requirements:	
Input Power	Model specific 100VAC, 120VAC, or 230VAC 50 or 60Hz
Power Consumption	25W
Digital Audio Inputs	I2S (2), Coax, XLR Balanced (2), Optical, USB
Sample Rates	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, 88.2 kHz, 96kHz, 176.4kHz and 192kHz; DoP64 Dual XLR: PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz and 352.8 kHz; DoP64 and DoP128 I2S: PCM 16 and 24 bits at 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kH z, 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, 176.4k Hz, 192kHz, 352.8kHz, and 705.6; DoP64, DoP128, DoP256, DSD64, DSD128, and DSD256.
Analog Audio Output:	
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 am ps producing double rate DSD.

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

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 centre.
  - At the option of PS Audio, the product will be repaired without charge for parts or labour, replaced, or the purchase price refunded through the original point of purchase.

Shipping

- **Shipping**
  - You are responsible for paying for the safe and proper shipment of the warrantied product to PS Audio or its authorized repair centre.
  - Under this limited warranty, PS Audio or its authorized repair centre 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**)
    - Use in any manner inconsistent with PS Audio's operating instructions (available for download at **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 centre.
    - 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**.
    - 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.
  - If your warrantied 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 centre, help with the operation of a product, or for more information.

Obtain an RMA number

- **Obtaining an RMA#**
  - To receive warranty service, you must first obtain a Return Merchandise Authorization Number (RMA#) before returning any item.
  - Please contact PS Audio or an authorized PS Audio repair centre to receive an RMA#.
  - The RMA# must be on all returned items. If it is not marked, PS Audio will return the package to you, and freight collected.

Use original packing

- **Packaging and Shipping**
  - Original packaging should be used for the safe transit of your PS Audio unit to the repair centre.
  - 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 centre. 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 the 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.

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.
- 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.

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

Documents / Resources

	**PS Audio MK2 Perfect Wave DAC Direct Stream** [pdf] User Guide MK2 Perfect Wave DAC Direct Stream, MK2, Perfect Wave DAC Direct Stream, DAC Direct Stream, Direct Stream

References

- **High-End Audio Products & Audio Equipment – PS Audio**
- **Downloads – PS Audio**
- **User Manual**