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PS Audio MK2 DAC Perfect Wave Direct Stream Owner's Manual

Owner's Reference
DirectStream DAC MK2
Instructions for Use

PerfectWave DirectStream DAC MK2
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Contents

Introduction

Important Safety Instructions

⚠ Read these instructions
Heed all warnings
Follow all instructions

FC CE ⚠

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.

⚠ 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.

⚡ **WARNING** **RISK OF ELECTRIC SHOCK DO NOT OPEN** ⚠

WARNING: To reduce the risk of electric shock do not remove cover or back.

No user-serviceable parts inside. Refer servicing to qualified service personnel.

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 Perfect Wave 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 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-andrecognize 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 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 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 16 steep anti-aliasing filter or the reconstruction filter aren't considered benigmany.
- 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. 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 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

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 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 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** 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 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 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 PS Audio equipment, such as the PerfectWave SACD Transport. I²S is a parallel data connection with separate clocks and data and 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 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 into a phono or equalized input of any type.

Power On

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. PS Audio will flash across the display.

Setup Guide

The setup guide will then ask you questions to help you configure the unit. Use the left and right arrow on the control ring to highlight your answer and the center button on the control ring to select it. Please note the below:

- If you select No to the question "Do you have a preamp?", fixed volume is disabled and the default volume will be set to 35. The main display will show the volume.

- If you select Yes to the question "Do you have a preamp?", fixed volume will be set to 100 and the main display will show the sample rate.

  – If this was not your intention, you can cancel it on the second screen. The second screen informs you that the fixed volume will be set to 100. You can choose OK or Cancel. Simply highlight and select Cancel if you don't want to set a fixed volume.
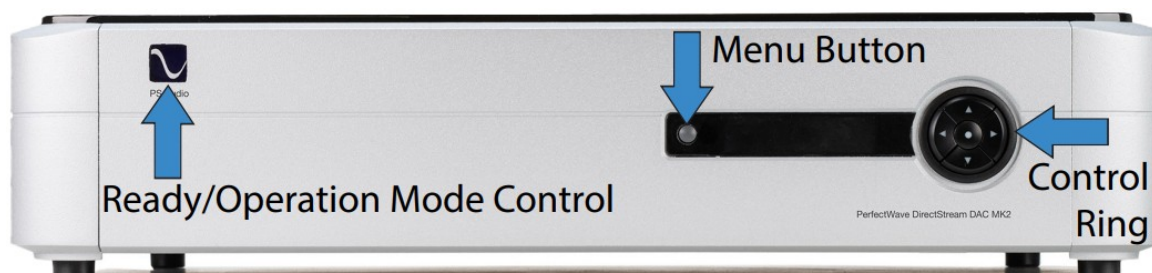
Front Panel Idle Button

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.

Main display

Information on Main Display:

- Depending on how your DAC was configured during the setup guide, the main display will either show the volume (if you said no to using a preamp) or the sample rate (if you said yes to using a preamp).

Note: In addition to volume and sample rate, input can also be the main display. Please see the section on Display Mode in the System Sub-Menu for more on this and other display options.

- The red or green dot in the corner indicates whether the current input is connected. A green dot indicates the connection is good.

– For USB, a green dot 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 and Optical, a green dot means there's an active signal on that input with a valid sampling rate.
– For I2S, a green dot means there's a PS Audio I2S source connected with a valid signal.
- When certain menu options are selected, small icons will appear on the main display. Please note that the example above has volume as the main display.

Inputs
To change the input, press the right or left arrow keys on the control ring. Once you reach the desired input, stop scrolling to select it. You can also use the remote to select the desired input. The changes take effect immediately.
Note: If input is not the main display, the initial press will display the current input for 5 seconds. Subsequent presses (before 5 seconds elapse) change the input. Pressing the control ring's center button returns you to the volume control menu.

Volume
By default, the unit comes up at volume 35. To change the volume, press the up and down arrow keys. Once you reach the desired volume, stop scrolling to select it. If fixed volume has been selected, you will not be able to change the volume.
Note: If volume is not the main display, the initial press will display the current volume for 5 seconds. Subsequent presses (before 5 seconds elapse) change the volume.

Mute

A quick press of the Menu button toggles mute on or off. (You will hear a soft click.) If the main display is set to volume or sample rate, "MUTE" will appear in big letters. If you are on input, a smaller "MUTE" will appear in red on the top right corner of the screen.

Menu System

To enter and exit the menu system, 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.
Note: The menus will also time out after fifteen seconds.

Navigating the Menu System

To navigate the menu system:

- Use the left and right arrow keys to scroll through menu items.
- Use the up and down arrows to change an item's values. Note that changes to settings are typically saved in real time as the changes are made.
- To enter sub-menus, press the center button on the control ring.
- When in a sub-menu, press the center button twice to go back one menu level. When in the main menu, this action will return you to the main display.
- A long press of the menu button from anywhere in the menus will return you to the main display.

Main Menu Features

The main menu has the below features.

- Balance
- Phase
- Pre-emphasis
- Versions (informational only)
- Audio Input (sub-menu)
- Audio Output (sub-menu)
- System (sub-menu)
- Network (sub-menu)

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. This can be useful when listening to certain source material that may have inverted absolute polarity. Use up or down buttons on the control ring to change the absolute polarity of the signal from "Norm"
(Normal) to "Inv" (Inverted).
Note: Some listeners are more sensitive to absolute polarity than others.

Main Menu: Pre-emphasis

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 preemphasis, you can engage the de-emphasis filter using the pre-emphasis option.
Use up and down arrows to set to On, Off or Auto. On engages the de-emphasis filter and Off disables it. Auto automatically detects tracks with pre-emphasis and then engages deemphasis (this only works on Coax and Optical inputs). The default is Auto.

The icon for pre-emphasis (see above arrow) means de-emphasis is active. When on auto, this allows you to see if pre-emphasis has been detected and de-emphasis is active.

Main Menu: Versions
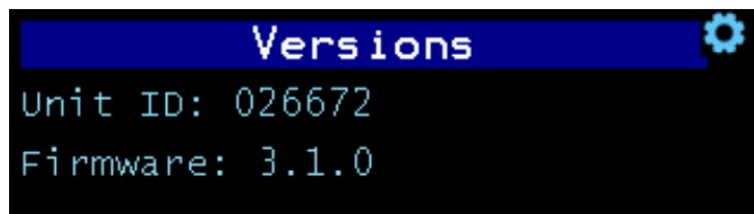
The Versions menu display is informational only and shows the firmware version of the unit. Use the up and down arrow to scroll through all the items. If you need to contact our customer service team for help with your unit, please have this information ready.

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 (for PS Audio use only)

Menu items with sub-menus are indicated by a right arrow. Press the center button on the control ring to enter them. To go back one menu level, press the center button twice. For example, from the audio input sub-menu press the center button twice to go back to the main menu.

Sub-Menu: Audio Input

The Audio Input sub-menu allows you to change the below:

- Auto Power (sub-menu)
- Input Names (sub-menu)
- Transport Input
- Ground Lift (sub-menu)
- I²S Polarity (sub-menu)

Auto Power (sub-menu)
The auto power feature allows you to select whether the inputs on your DirectStream DAC always have power on or if the inputs power off when not in use.
Press the center button to enter this sub-menu. Use the down and up arrows to highlight the input. Use the center button on the control ring to change from "on" (input always powered on) to "auto" (input powered off when not in use).
Note: If you select Auto mode from the Input menu, the DAC will not detect any input that has Auto Power set to Auto because that input will be powered down. Instead, you will need to manually select the input.

Input Names (sub-menu)
This feature allows you to rename the inputs (I2S 1, I2S 2, USB, Optical, Coax, XLR1, XLR 2) using a preset list with items like Bridge, CD, DVD, PC, Phono, etc. This is a sub-menu, so click on the center button to enter it. To use this feature:

- Use the up and down arrows until you land on the input you want to rename. Press the center button to select it.
- Use the up and down arrows until you land on the name you want. Press the center button to select it.
- A pop up will appear to ask if you want to rename it. Click the center button to choose okay or use the right arrow to navigate to cancel first if you change your mind.
- The input has now been renamed.

Transport Input
Use the Up and Down arrows to select the input you are using for the PS Audio Transport.
Once selected whenever you press Play, Pause, Open or Close on the remote, the DAC will automatically switch to the input you specified. If you don't have a Transport or don't want to use this feature, select Off.

Ground Lift (sub-menu)

This 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.

Click on the center button to enter this sub-menu. Highlight the input you want to modify using the up and down arrows. Then press the center control ring button to change selection to grounded or lifted.

I²S Polarity (sub-menu)
This feature allows you to invert the pins on the I²S cable. This is valuable if you need to switch the pins so that the DAC works with a 3rd party source that does not adhere to PS Audio's HDMI/I²S standard.

Use the center button on the control ring to change from Normal to Inverted on the below:

- I2S1 Data & L/R
- I2S1 DSD Channel
- I2S2 Data & L/R
- I2S2 DSD Channel

Sub-Menu: Audio Output

The Audio Output sub-menu allows you to adjust the below:

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

Fixed Volume
The Fixed Volume feature allows you to set the volume at a fixed value so 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 of the main display. 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. However, 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.

Operating Manual

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 DSD 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
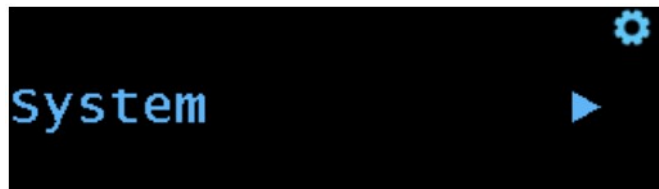
The system sub-menu allows you to adjust the below:

- Backlight
- Display Mode
- Trigger Timeout
- IR Enable
- FW Update (sub-menu)
- Factory Reset (sub-menu)

Backlight
The brightness of the display and logo button can be adjusted to suit your room lighting any your tastes. Use the up and down arrow to select a brightness from 1 (dimmest) to 10 (brightest).

Display Mode
This menu provides three options for the main display: auto, sample rate and minimal. The auto function varies depending on whether or not fixed volume is on. (As a reminder, if you indicated you were using a preamp during set up, fixed volume is automatically turned on.)

- Auto: When fixed volume is on, this shows the input on the main display. If fixed volume is off, this shows the
  volume on the main display. Both will display small icons when certain menu options are selected.

Auto: Displays input when fixed volume is on.
Auto: Displays volume when fixed volume is off.

- Sample Rate: This option shows the current sample rate on the main display. Small icons will be displayed when certain menu options are selected. If the input selected is not connected – indicated by the red dot in the corner of the screen – the screen will show the current input instead.

Sample Rate: Displays sample rate if input's good. Sample Rate: Displays input if connection's bad.

Note: It's common for the FPGA to take a second or two to detect the sample rate when it changes. What may look like delayed reporting is normal. It is a result of detecting and reporting the correct sample rate.

- Minimal: Provided the connection is good, this option shows the sample rate without any icons. If the connection is not good, it will show the input with icons.

Min: Shows sample rate (no icons) when input's good. Min: Shows input and icons if connection's bad.
Trigger Timeout
This feature allows the trigger output to be delayed a period of time after the DirectStream DAC Mk2 is activated. You can adjust the time it takes for any other units plugged into the trigger output of the DAC to turn on once the DAC is powered up. The time delay can be adjusted in increments from 0 to 60 seconds using the up and down arrows on the control ring.
IR Enable
There are 3 options – Off, IR1, and IR2. If you are using a Stellar remote with this product and experience interference with your other devices when using the remote, you can change this setting. Both the unit and the remote will need to be updated when you make changes.

- Off: This makes it so that no remote works with the DAC.
- IR1: This is the default setting. If you are not experiencing interference with your other devices, leave this setting.
- IR2: This changes the remote to a different code set. If your Stellar remote is interfering with other devices, for example, turning off your television, change to this setting.

When changing this option, the Stellar remote will also need to be updated. To do so, press the Light Bulb button (bottom of the remote) and the circular Off button (top center of the remote) at the same time. If the remote

backlight flashes white once, you are on IR1. If it flashes white twice, you are on IR2.

Note: If using the PerfectWave remote, leave this on IR1.

FW Update (sub-menu)

This feature allows you to select from multiple firmware loads on a USB thumb drive. It provides a faster and easier method of upgrading and downgrading new firmware for A/B style testing.

Preparing the USB thumb drive

- You can have as many files on the USB thumb drive as you want, but only the first five valid files for the device are displayed.
- The files must be named dsdmk2_v#.#.#.bin. For example, dsdmk2_v2.4.1.bin.
- You can have other bin files for other products on this thumb drive (for example, stellar_ pre_v2.1.2.bin). Only files that start with "dsdmk2_" will be loaded by the DirectStream DAC Mk2.

WARNING: In the past, you would update a unit by copying an "image.bin" file to the thumb drive. This method still works to automatically update a unit after a reboot (you do not need to go through the menus to use the image.bin file). The image.bin file takes precedence over the dsdmk2_bin_xxx.bin files. It is recommended to NOT have an image. bin file on the thumb drive if you are using the dsdmk2_xxx.bin files and the System | FW Update method to update files.

Upgrading/ Downgrading

- Plug the USB thumb drive into the unit in USB-A slot on the back panel marked FW.
- Enter the menus and go to System | FW Update. Press the center button to enter the sub-menu.
- The files will display on the screen in alphabetical order.
- Scroll up or down to highlight the file you want to load.
- Press the center button to select the file.
- A progress screen will display. The update process will initialize and then a progress indicator in percentage complete will display.
- Once complete, the progress screen will indicate the unit is resetting.
- The unit will reset. The Logo LED will blink rapidly as the unit is being programmed.
- Note that if you select the same version that is already loaded, the upgrade will be skipped and the Logo LED will not blink. The unit will still reset.
- If there is an error, the error will be displayed.

    – If you have problems with loading firmware, you can contact PS Audio customer support with the error you see.

    – Press the center button to exit from the error screen
- You can exit the FW Update screen using the right/ left arrows or long pressing the menu button.

Factory Reset (sub-menu)

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. Press the center button on the control ring to enter this sub-menu and follow the prompts.

Sub-Menu: Network

The Network sub-menu is for PS Audio internal use.

Remote Control

On   Off   Dim

Toggles between I2S 1 and Auto Input

Toggles between XLR-1 and XLR-2

DAC
I2S-1   Bridge   I2S-2
XLR   Coax   Opt   USB

If an input has been renamed to AirLens, Bridge, or Streamer, use this button to switch to that input.

Phono Preamp
Phono   Analog   Phase   Mono

Transport

ENTER SELECT

Mute   Mute

DAC   Preamp

Volume

Phase

Not applicable for MK2

Phono Mute

DAC Phase

DAC Level

Vol

In 5   ◄ ►   Off

Preamp
In 1   In 2   In 3   In 4

Transport
1   2   3
4   5   6
7   8   9
↺   0   ☼

PS AUDIO

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** 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.
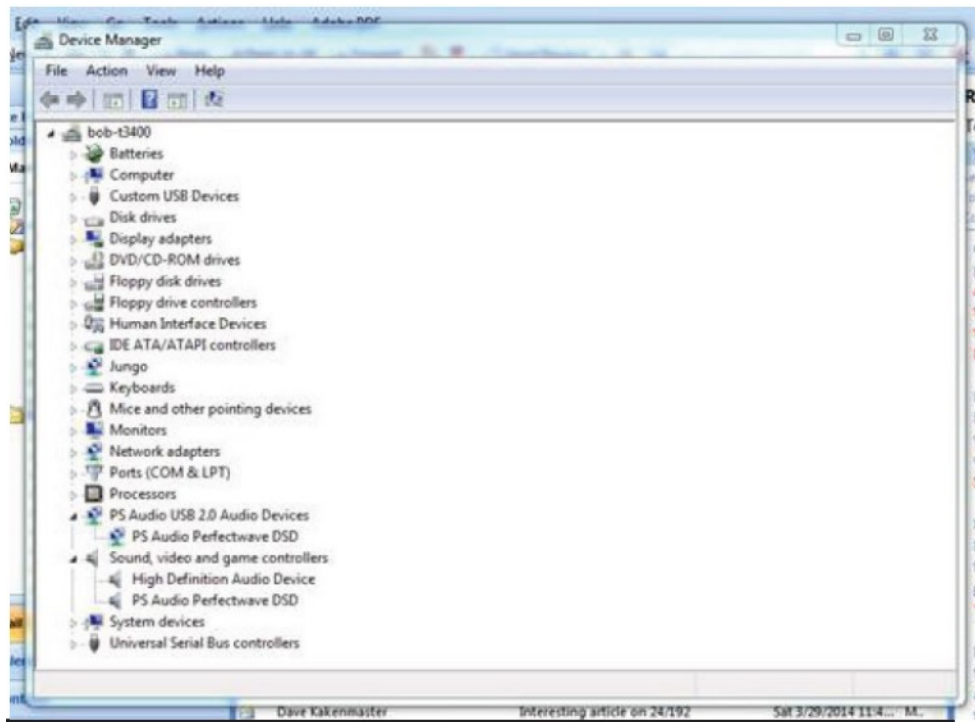
DirectStream DAC MK2 Specifications

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, 88.2kHz, 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.
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 amps 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

Navigating Menus

Navigating Menu System:
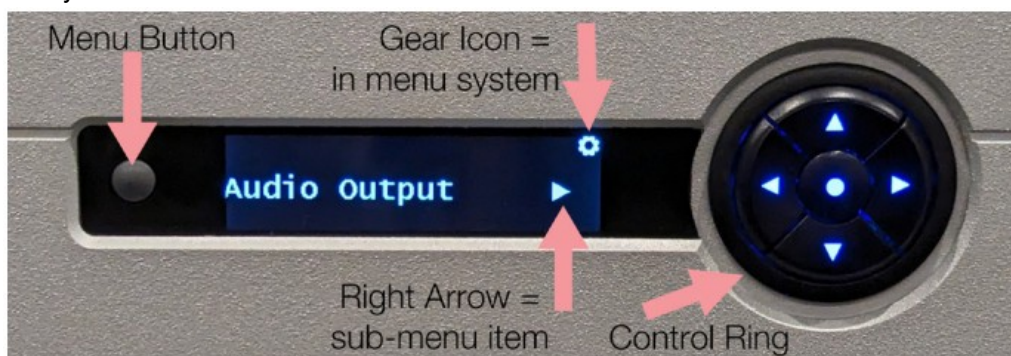
- To enter the menus, do a long press of the menu button. A gear icon will appear in the right corner of the screen to show you are in the menus. Do another long press to leave the menus.
  Note: Menus time out after 15 seconds of inactivity.
- Scroll through menu and submenu items using the right and left arrows. Use the up and down arrows to change

values for specific items.

- Unless otherwise specified, scrolling to your choice and leaving it on the screen updates your settings.
- Menu items with sub-menus are indicated by a right arrow. Press the center button on the control ring to enter them.
- Two quick presses of the center button take you back one menu level. For example, if you are in the Audio sub-menu and press the center button twice, you will return to the main menu.

Main Menu

Main Menu	
Balance	Reduce the gain of the left channel. Reduce the gain of the right channel.
Phase	 Scroll to change absolute polarity from "Norm" (Normal) to "Inv" (Inverted).
Pre-Emphasis	 Scroll between auto, on, and off.
Versions (informational only)	 Scroll to see unit id, firmware, and FPGA versions.
Audio Input (sub-menu)	Enter menu (see more in Audio Input Sub-Menu).
Audio Output (sub-menu)	Enter menu (see more in Audio Output Sub-Menu).
System (sub-menu)	Enter menu (see more in System Sub-Menu).
Network (for PS Audio use only)	This sub-menu is for internal PS Audio use.

Audio Input Sub-Menu

Audio Input Sub-Menu Press to enter the Audio Input Sub-Menu from the main menu.	
Auto Power (sub-m enu)	Enter Auto Power sub-menu. Highlight the input you want to change. Toggle between "On" for always on and "Auto" for powered off when not in use.
Input Names (sub- menu)	Enter Input Name sub-menu. Highlight the input you want to rename. Press to select it. Highlight the name you want. Press to select it. A pop up will appear to ask if you want to rename it. Press to select okay.
Transport Input	 Select the input you are using for the PS Audio Transport. Select Off if you don't have a transport or don't want to use this feature.
Ground Lift (sub-me nu)	Enter Ground Lift sub-menu. Highlight the input you want to modify. Change between grounded and lifted.
I2S Polarity (sub- m enu)	Enter I2S Polarity sub-menu. Highlight the I2S signal you want to change. Change between Normal and Inverted.

Reference

Audio Output Sub-Menu

Audio Output Sub-Menu

Press to enter the Audio Output sub-menu from the main menu.

Fixed Volume	If desired, select the fixed volume for the unit. Hold the up or down arrow to quickly move through the volume settings. To disable this feature, set to 0 or OFF.
Max Volume	Select the fixed volume for the unit. Set to 100 to disable this feature.
Ground Lift	Select Lifted to enable the output Ground Lift. Set to Grounded to disable the output Ground Lift.
Shell Lift	Select Lifted to enable the XLR shell lift. Set to grounded to disable the XLR shell lift.
RCA Balance	Select on to set RCA Balanced. Select Off to select RCA unbalanced.

System Sub-Menu

System Sub-Menu Press to enter the System Sub-Menu from the main menu.	
Backlight	 Scroll to select 1-10. 10 is brightest.
Display Mode	 Select Auto, Sample Rate, or Minimal (Sample Rate, no icons) for the Main Display.
Trigger Timeout	 Delay trigger output for 0s, 5s, 10s, 20s, 30s, 45s, or 1 minute after the DAC is powered up.
IR Enable	 Select Off (no remote will work), IR1, or IR2. Leave on IR1 if using the PerfectWave remote. Change to IR2 if you are experiencing interference with other equipement when using the Stellar remote. (See IR enable section for remote instructions.)
FW Update (sub- menu)	This is a multi-step process. See section on System/Firmware Update for instructions.
Factory Reset (sub-menu)	Enter factory reset. Use right arrow to select reset and press it again.

Warranty

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 warrantied 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)
- 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 center
- 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. In the event that 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 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.

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.

Documents / Resources

PS Audio MK2 DAC Perfect Wave Direct Stream [pdf] Owner's Manual
MK2 DAC Perfect Wave Direct Stream, MK2, DAC Perfect Wave Direct Stream, Perfect Wave Direct Stream, Wave Direct Stream, Direct Stream, Stream

References

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