



Owner's Reference

Owner's Reference DirectStream Junior

Instructions for Use



DirectStream Junior™

4826 Sterling Drive, Boulder, CO 80301

PH: 720.406.8946 service@psaudio.com www.psaudio.com

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Rev A

Important Safety Instructions



Read these instructions
Heed all warnings
Follow all instructions



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

Clean only with a dry cloth.

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. 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 fuses inside this product.

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

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

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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 arrowhead within a triangle is intended to tell the user that parts inside the product are a risk of electric shock to persons.





Introduction

Owner's Reference DirectStream Junior

Thank You

Thank you for your purchase of the PS Audio® DirectStream Junior Digital to Analog Converter.

Designed by Ted Smith

The PS Audio PerfectWave™ DirectStream Junior Digital to Analog Converter (DAC) is a state-of-the-art DAC, preamplifier and media center. DirectStream accepts PCM as well as DSD Digital Audio data and converts it to high-performance analog audio that can be fed directly to a power amplifier or preamplifier.

DirectStream Junior, based on its larger sibling, the DirectStream DAC, represents a major advancement in the art of recreating the musical event.

Uncover What You've Been Missing

Musical information that may have previously been hidden (or covered up by other DACs) in digital audio media ranging from CDs to high resolution downloads will be uncovered by DirectStream Junior.

Subtle musical details and cues such as upper harmonics, decay, reverb and room reflections will no longer be masked by the conversion process from digital to analog. Your music will sound natural, and you will be able to rediscover much of what you may have been missing in your digital audio library with the introduction of DirectStream Junior into your system.

Unique Architecture

DirectStream Junior features a unique architecture inside. From its digital inputs to its simple output stage, DirectStream Junior has been hand written, hand designed and personally voiced by its designer, Ted Smith, along with PS Audio CEO, Paul McGowan and legendary loudspeaker designer and founder of Infinity Loudspeaker Systems, Arnie Nudell.

DirectStream Junior is based on a FPGA (Field Programmable Gate Array) as its core processor and no off-the-shelf DAC chips are used in its design.

Less Sensitive to Jitter

DirectStream Junior 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 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 input to DirectStream Junior, it is upsampled to ten times the standard DSD rate of 2.8MHz before any processing takes place. After processing by DirectStream Junior, all input data is converted to double rate DSD (5.6MHz) and output through a passively filtered solid state analog section.

DSD Based

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

- DSD is simple to convert to analog: just low pass filter it.
- DSD is inherently linear: it's hard to build a PCM DAC that always takes the same sized step in the output for any possible unit increment of the representative PCM voltage value. The best PCM technology for linearity is arguably a resistor ladder, then all steps are at least positive for a positive change in the input, but making resistors that are accurate to one part in 2^{16} is hard and to one part in 2^{20} , very hard. DSD doesn't need anywhere near this level of component matching to achieve its

excellent results.

- 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 steep anti-aliasing filter or the reconstruction filter aren't considered benign by many.
- DirectStream Junior handles the PCM conversion from AES/EBU, S/PDIF, TOSLINK, 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 little difference between TOSLINK 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 Heart of Junior

The heart of DirectStream Junior is the DSD engine itself. Regardless of input format, whether PCM or DSD, all data are upsampled to 30 bits running at 10 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.

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 6dB of head room in the analog path beyond the 6dB 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 passively filtered solid state output stage.

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.

-
- No Active Filtering** 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.
- Design Challenges** 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 Junior 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 theory of operation, the firmware and the complex algorithms needed to execute a design of this magnitude are daunting in their scale and scope. The actual hardware to run the instrument is, perhaps, easier to grasp, although no less critical to the perfected performance.
- Hardware Highlights** Listed in this section are the highlights of the hardware, system's overview and design choices made to create an instrument of this caliber.
1. DirectStream Junior runs from one master clock designed to subtend all possible combinations of sub-clocks, from 44.1, 88.2, 48, 96, etc in order to eliminate the need for multiple clocks that cause errors and problems associated when noise from the unused clock propagates to the desired clock.
 2. All sample rates supported are synchronously upsampled to 10x the standard DSD sample rate and then back down to double rate DSD ($2 * 64 * 44.1\text{kHz}$). There's no need for other clocks to interpret the inputs, no matter what their sample rate, because of the instrument's single clock architecture.
 3. The path from the single master clock to its retiming flip-flop path is designed as short as possible and isolated from all other clocking.
 4. Connections between sections of the design have large impedances, not only lots of power supply isolation, but also, for example, 2k resistors in series with digital signals to slow down the edges and lessen any noise transfer.
 5. Similarly, we run I2C, SPI and other control signals as slowly as they can possibly go without
- Connection Impedances**



Introduction

Owner's Reference DirectStream Junior

causing problems; we also control their transition times, thus limiting the amount of induced noise and jitter into the main digital processing area.

6. Outputs of the FPGA use the slowest, lowest drive compatible with their function, keeping noise as low as possible.

7. We use slower, older technology CMOS when we need CMOS. This choice lowers both noise and jitter potential.

Balanced Architecture

8. We use balanced signals when practical; they not only lessen radiation and are less sensitive to radiation, but they lessen noise in the ground and power rails.

9. We use non-saturation logic so the exact transitions are more predictable. Coming out of saturation is a statistical process.

Signal Isolation

10. High rate signals (or signals with fast edges) are isolated from control signals and especially each other. If they have to be fast they are terminated appropriately to help address jitter.

Hand Selected Parts

11. Jitter is addressed everywhere in the design. Every component choice, every signal connection, every wire routed on the boards are all hand done to lower noise and pay attention to jitter.

12. 0.1% precision thin film low temperature coefficient resistors are incorporated everywhere in the audio path; 2% film caps in critical places and 5% film caps elsewhere in the audio path. By using 1/8W resistors or 1/4W resistors where others might use a 1/10W resistor, the temperature coefficient of the resistors is lowered. For digital bypassing, NP0/COG, or at worst, X7R MLCCs are used.

13. Low noise techniques are employed such as liberal use of low inductance capacitor bypassing with a self resonance frequency at the main clock rate to keep noise from ever getting into the voltage rails in the first place.

14. Digital filtering in general, and the upsampling and noise shaping filters in the sigma-delta modulators in particular, offer many degrees of freedom for a filter designer. There isn't a mathematically perfect filter to use (they all have tradeoffs), so we've chosen the filters that sound best in our experience, and in addition to that, we run everything with as wide of an audio bandwidth as possible.

Double DSD

15. Although design choices might have been made to run everything at single rate DSD (64 * 44100Hz), it was decided instead to run at double rate DSD to have a wider audio band below the upsampling and noise shaping filters. Noise shaping is how a high rate sampled signal can have more accuracy in part of the spectrum than the 6dB / bit rule and it is understood that the quantizer in a sigma-delta modulator can hide a multitude of sins in the noise shaping filter. Our instrument still runs the noise shaping filter at full precision to get the cleanest DSD signal possible.

16. No shortcuts are ever taken in the Digital Signal Processing (DSP) section of the FPGA. Despite the fact that DSD is only nominally 20bit S/N, the design uses a minimum width of 24 bits throughout the device. Where needed, very expensive (in terms of math operations) filters with wide coefficients and 144dB S/N are employed along with many guard bits in the IIR filters and the sigma-delta modulator.

17. Every trace on the PC board is hand routed: even for the digital sections. No autorouting is



Introduction

Owner's Reference DirectStream Junior

employed so that each trace, each critical path is calculated and designed for lowest noise, jitter and isolation.

The PerfectWave DirectStream Junior 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, at an affordable price.



Getting Started

Owner's Reference DirectStream Junior

Location

LOCATION

A good location for DirectStream Junior 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 volume control knob. A direct line of sight will help with DirectStream Junior's IR sensor.

DirectStream Junior and the PerfectWave Transport (PWT) or the upcoming DirectStream Transport (DST) 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

DIGITAL INPUTS

DirectStream Junior offers multiple digital input choices including: The Network Bridge II, XLR (AES/EBU), RCA and Toslink (S/PDIF), USB as well as I²S. All inputs, including USB, are capable of accepting high-definition digital audio signals. The Toslink input is capable of 96kHz, 24 bit audio and all other inputs, including the USB, are capable of handling up to 192kHz 24 bit of PCM or DoP data. The I²S inputs can handle single and double rate DSD directly or DoP. The PS Audio NuWave Phono A/D Converter is capable of sending pure DSD over I²S, as well the upcoming DirectStream Transport, which will play pure DSD from SACD sources.

HDMI for I²S

DirectStream Junior uses an HDMI cable to transfer I²S data. This data can only be used with another compatible component, such as the PerfectWave Memory Player, DirectStream Transport, and NuWave Phono Converter and will not work in other HDMI equipment, as the I²S format incorporated does not comply with the HDMI standards. The HDMI connector and cable were chosen to carry the I²S signal because of their superior high-speed data transmission capabilities for multiple clocks and data lines. PS Audio 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, XLR and Network Bridge 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.



Getting Started

Owner's Reference DirectStream Junior

DSD File Types

It is possible to send DSD files (without conversion to DoP) over DirectStream Junior's I²S inputs. Most programs, such as 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.

- Carefully unpack the unit. Use the included cotton gloves to remove the unit and place in the chosen location.
- The piano black top cover has a protective plastic film. Remove this film.
- Connect DirectStream Junior 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.

Warranty Registration

PS Audio products come from the factory with a 3-year warranty. Please register your new DirectStream Junior. 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 Junior and note the serial number. Using any web browser, go to www.psaudio.com and click on My PS. From there you can click on Register Products.

Once you have completed the registration process you can then 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 Digital Sources

CONNECTING TO A DIGITAL SOURCE

There are four methods of connecting the digital inputs of DirectStream Junior: Through the home network, S/PDIF, USB and I²S. The home network option requires the use of a router, CAT5 Ethernet cable, NAS or computer with the appropriate program installed (like JRiver), and a controller. S/PDIF is a serial digital interface available as an optical source (TOSlink), coaxial source (RCA) or balanced source (AES/EBU XLR). Connect to your digital sources with any of these three cable types.

Connecting Through Ethernet

Direct to Computer

USB is the preferred method of connection for a direct-to-computer connection and DirectStream Junior is capable of processing up to 352kHz 24 bit PCM data as well as both single and double rate DSD converted to DoP. Connect DirectStream Junior to your computer using a well regarded USB cable and make sure to set the output of your computer to the higher 192kHz 24 bit standard. Once connected, your computer should automatically install DirectStream Junior as a new device if you have a Mac. If you have a Windows operating system, you may need to download the appropriate driver from our website and install it on your computer. The driver for DirectStream Junior is the same as that used with DirectStream, the PWD and NuWave DSD.

Driver Conflicts

If the device is not recognized or you are unable to obtain output through DirectStream Junior, it is possible there is a driver conflict on your computer. Please see the Troubleshooting section for further assistance on playback issues via USB.





Getting Started

Owner's Reference DirectStream Junior

I²S Sources

I²S is available through several manufacturers as well PS Audio equipment such as the PerfectWave Transport, NuWave Phono A/D Converter, and DirectStream Transport. I²S is a parallel data connection with separate clocks and data and transferred via an HDMI cable. I²S will typically provide a slightly better performance standard than any serial data stream such as S/PDIF or AES/EBU.

You can connect one or all six 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 selector button, the remote, or set inputs to AUTO.

If you are using USB, make sure both the computer and DirectStream Junior 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 driver to be installed. Download the driver from our website; it is the same driver used in the PWD, DirectStream, and NuWave Phono Converter.

DirectStream Junior will show up under Device Manager as PS Audio PerfectWave DSD, under a heading PS Audio USB 2.0 Audio Devices.

Connecting the Output

CONNECTING DIRECTSTREAM JUNIOR'S OUTPUT

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

RCA and XLR

DirectStream Junior has two types of analog outputs: balanced XLR or single ended RCA. It is fine to use 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 Junior.

Output Level Setting

If DirectStream Junior has a gain mismatch with your power amplifier, you can use the balanced outputs and achieve 6dB more gain or choose the single ended RCA outputs for lower gain. DirectStream Junior also has two output levels available to users.

Use the Gain button on the remote or go to the setup menu on the front panel display to select the best output level. To access the setup menu, press the front panel selector button to the left of the display for 3 seconds. Step through the menu options by pressing the button once for each menu. Attenuator IN is the lowest volume setting, Attenuator OUT is the highest level setting.

RCA or single ended inputs will be the typical inputs, 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 Junior into a line level input on the preamp, integrated, amplifier or subwoofer. Do NOT plug the output of DirectStream Junior into a phono or equalized input of any type.



Getting Started

Owner's Reference DirectStream Junior

Use Only High Quality Power Cables

Once everything has been connected, use a high quality AC cable to power DirectStream Junior. DACs in particular are quite sensitive to AC power and produce a bit of line noise themselves. Make sure you have a high quality shielded power cable to power DirectStream Junior, and a Power Plant AC Regenerator if possible.

PS Audio produces an entire line of high quality quiet power cables that are generally accepted as being some of the best in the industry. Whatever you choose, make sure it honors the music.

Rear Panel Power Switch

Turn the AC power switch in the rear of DirectStream Junior to the ON position. The power switch is located to the left of the AC inlet as you face the rear panel.

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

After the initializing screen, you will see the volume control setting.

Front Panel Standby 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 Junior. This control has two modes: Ready Mode and Operational Mode. Ready Mode (Standby) is designed to keep power on to critical internal circuitry, including power supply capacitors, thermally sensitive semiconductors and integrated circuits.

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

Keep Power On

If you wish to conserve energy consumed by DirectStream Junior, it will be necessary to use the rear panel power switch. Using this rear panel switch will remove power from critical components and in order to gain maximum performance levels you will need to turn DirectStream Junior's power on at least 3 hours before use. DirectStream Junior is designed to be left powered on at all times.

Should DirectStream Junior 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.

Select the Input

SELECT THE INPUT

The first step is to select the input you wish to play. This can be accomplished with the remote control



or through the front panel selector and display.

Touch the selector button on the left side of the screen. The first press will show the active display. Touch again and you toggle to the next input.

Lock Light

Each input has a lock light associated with it. The lock light has two states: connected (displays an asterisk in the upper right corner of the display) and not connected (nothing displayed). It is also possible to select AUTO. AUTO input senses when a digital input is actively playing music and switches to the live input. This is the recommended input setting.

Name the Input

INPUT NAMING

For greater convenience, it is possible to assign a custom name to each input, such as PWT, XLR, etc. To name each input, you must first enter the setup display. Select the input you wish to change. Once selected, hold the selector button down for 3 seconds to enter the display mode. The first screen is balance. Press the selector button once again, while in the setup mode, to toggle to the input naming screen. The input already selected will appear, along with data and bit rate information. Depress and



hold the selector button until the Name Edit Screen is displayed.

The cursor sits under the letter you can select. Rotate the volume knob to choose which letter you desire. Press the selector button and that letter will appear as part of the name. Repeat the process until you spell the input name. Press and hold the selector button to leave the naming edit screen.

Set the Output Level

DirectStream Junior has two output levels: High and Low. In the standard output mode, DirectStream Junior will provide adequate output level to directly feed a power amplifier without use of a preamplifier. If the power amplifier or preamplifier is overly sensitive, or you need to reduce the output level of DirectStream Junior for any reason, you can activate the output attenuator to reach a lower level.



There should be no sonic penalty for doing so.

To turn on/off the output attenuator, press the DAC Level button on the remote. Or, go to the setup screen which is accessed by depressing the selector button, located to the left side of the display, for 3 seconds to enter the setup mode. Toggle through the setup screens with a button push. Once you get to the Attenuator screen, use the volume control knob to select In (lowest gain) or Out (normal gain).

Screen Brightness

The unit's screen brightness can be adjusted in the setup menu as well. The display can be turned



Screen On-Time

off by pressing the button labeled "DIM" located on the remote. When you are in the DIM mode, the screen will come back on when you turn the volume control knob or press a remote key. To turn the DIM feature off, press "ON." You can also adjust brightness in the setup menu.

You can also adjust the length of time the display remains visible, from 10 seconds to 1 hour, or select AUTO. AUTO will activate the display when any changes occur, like a new volume setting or input change. It will go dark when no music is playing. When music begins, the display will automatically



Network Bridge

display the volume setting.

DirectStream Junior can become far more than a high-performance stereo DAC with its built-in Network Bridge II that connects to any home network. The Bridge II allows playback from a source not directly connected to DirectStream Junior using a UPnP protocol and separately available controller and server, such as a NAS.

The Network Bridge II incorporates the exact same Digital Lens™ technology found in the PWT – without the input to the Lens being from a nearby source. Instead, the input to the internal Lens of the Bridge II is over a network: addressable through an Ethernet connection. Music stored on a hard drive or even an internet radio service are all accessible via the Network Bridge II.

Bridge Operation

BRIDGE II OPERATION

The PS Audio Network Bridge II is built into DirectStream Junior. The Bridge provides network connectivity to a media server or NAS. The Network Bridge is a UPnP compatible device, requiring a UPnP server and controller to stream to the Bridge. A program like JRiver Media Center, available on both Mac and Windows platforms, can be configured to act as both a UPnP server and Controller. Many NAS come with UPnP servers built into their operating systems. If you use a NAS, you will control the NAS and Bridge through the use of a UPnP controller, typically via a mobile device, such as a tablet or phone, that have a UPnP compatible controller app, such as PlugPlayer, or MConnect.

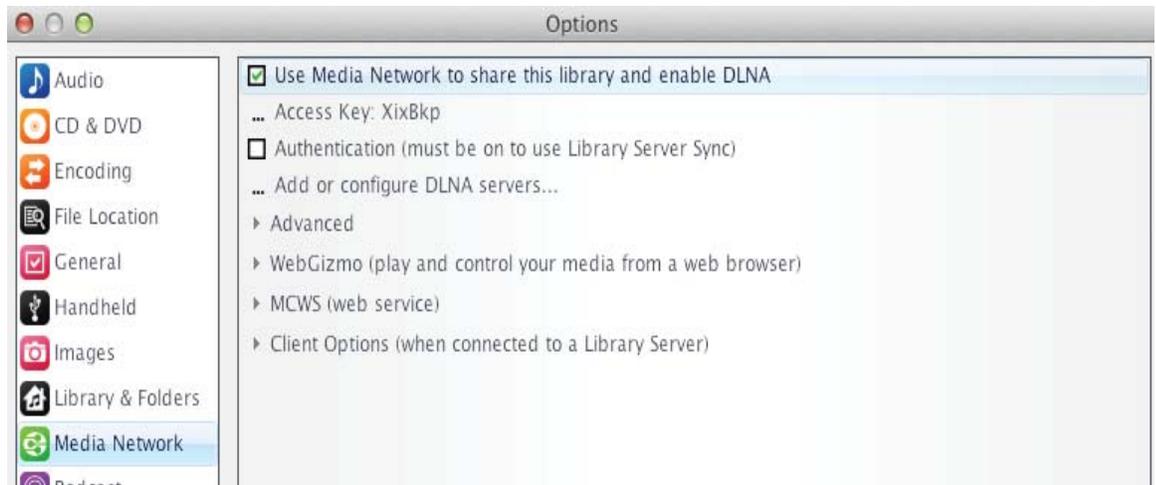
To use the Bridge, the rear panel Ethernet connector must be plugged into your home router through a CAT5 Ethernet cable. A WIFI Ethernet Bridge can be used, but is not recommended. Once connected, the Bridge should be visible on the network to a controller that is also on the home network via WIFI or

Using JRiver

hard wired through CAT 5. Select the PS Audio Bridge, or whatever friendly name you have set for the Bridge, to connect the UPnP server. Once connected, change DirectStream Junior's input to Input 7, labeled the same as the Bridge friendly name. You should now be able to stream music to the Bridge.

If you are using JRiver Media Center, it will be necessary to turn JRiver's DLNA/UPnP server on to recognize the Bridge. Make sure the computer running JRiver Media Center is connected to the same router/home network as the PS Audio Network Bridge. In JRiver, go to Tools->Options->Media Network and check mark the box that reads: Use media network to share this library and enable DLNA.

Follow instructions and once setup, the Bridge should appear in the JRiver Media Center far left window under Playing Now. Select the Bridge and you should be connected.

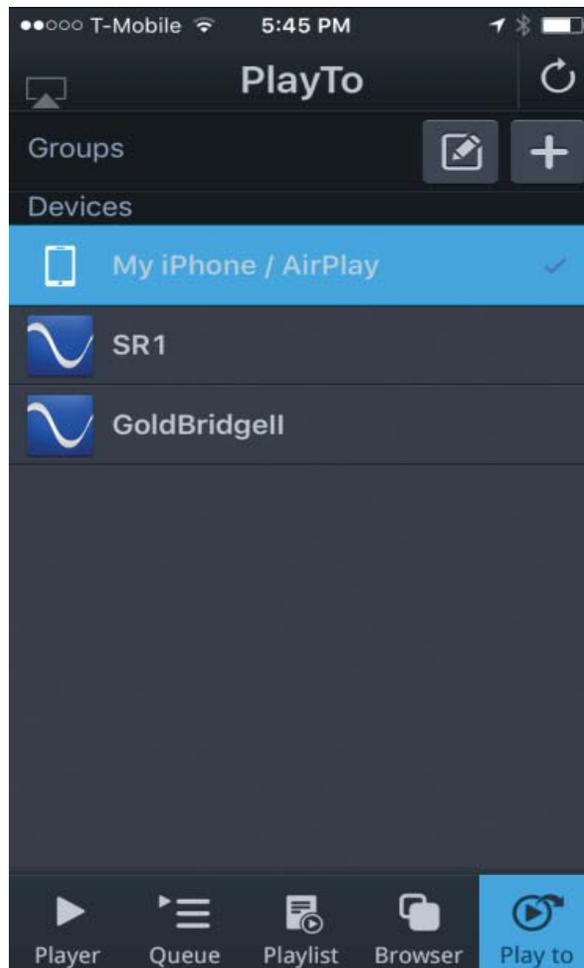


Using a NAS

If you are using a NAS and mobile controller, the Bridge should be visible on the controller app's connect screen. The image shows MController (from MConnect) and the screen you go to for connection to the Bridge. In this case, the Bridge friendly name has been set, as GoldBridgell. There is another, second Bridge in this image, labeled SR1.

To select the NAS or UPnP server of any type, in MController, touch the lower icon that says Browser. Choose the server you wish to connect to, or VTuner, for internet radio access.

MConnect's MController app is our recommended mobile platform UPnP controller and is available for both Android and Apple tablets and phones.



Changing Bridge Friendly Name

CHANGING THE FRIENDLY NAME

Many times it is less confusing to change the standard Bridge name from its default of Bridge II to another, more familiar name, like John's DAC. This friendly name is what will appear in the JRiver or MController Play-To windows as described above. To change the friendly name, you must access DirectStream Junior's setup window. Press and hold the front panel selector button (next to the display on the lefthand side) for 3 seconds to access the setup menu. Press the selector button to toggle to the next setup screen. Press the button 6 times to access the friendly name screen. To change the name, press and hold the selector button for 3 seconds while in the friendly name screen. The edit menu appears. Follow the same instructions found in the Input Naming section of this manual for further instructions.



Network Settings

NETWORK SETTINGS

It is sometimes useful to find out the network setting when you have the Network Bridge connected to your home network through the router. To discover the network setting, go to the setup menu by pressing and holding the front panel selector button for 3 seconds. Toggle through the screens by multiple button presses until you arrive at the Network Setting screen.



Bridge Updates

BRIDGE UPDATES

From time to time, the Network Bridge will receive firmware updates when available. The update notifications can be accessed over the internet if the Network Bridge is properly connected to the home network router, which must itself be connected to the internet.

To find out if there is an update available, go to the setup menu. Press and hold the selector button for 3 seconds, then toggle to the Bridge Update screen with multiple selector button pushes.



Junior's OS Updates

UPDATE DIRECTSTREAM JUNIOR'S OPERATING SYSTEM

DirectStream Junior operates from sophisticated software that is built in to the device, but upgradable by the user through the rear panel mounted USB connector. To check for the current firmware version, simply hold the selector button next to the display for 3 seconds to enter the setup scroll to the Version screen.





Getting Started

Owner's Reference DirectStream Junior

When New Firmware is Available

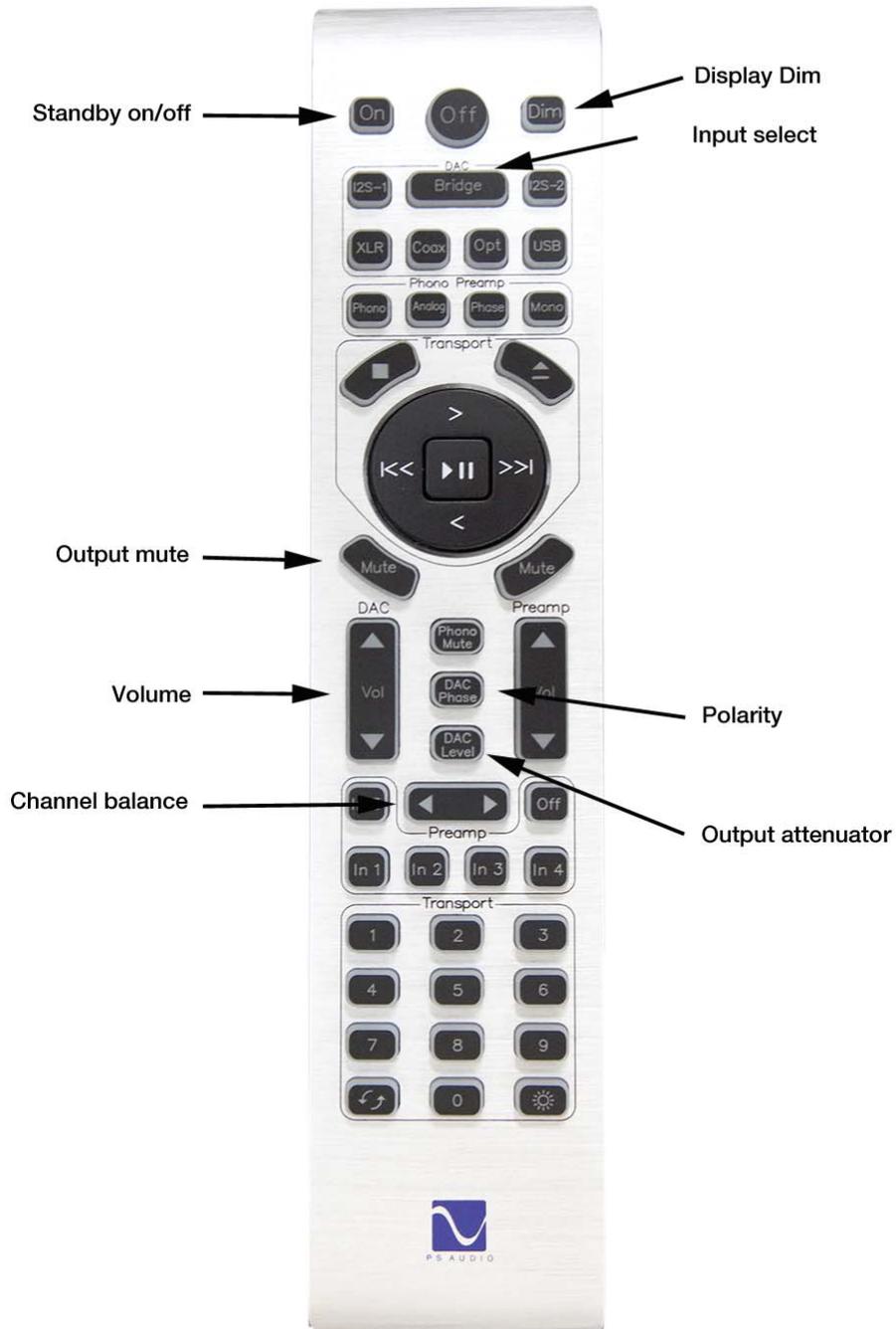
When a new operating system become available, it may be obtained by ordering a pre-programmed USB memory stick directly from PS Audio, or downloaded to your own USB memory stick for free from the PS Audio website. To install, place the USB stick in the rear of DirectStream Junior. Then, turn off the rear panel power switch. Wait for 10 seconds, then turn the rear panel main power switch to the on position, rebooting the instrument. The front panel Ready Light will begin blinking, signifying the new firmware is being installed.

DO NOT REMOVE THE POWER OR DO ANYTHING WHILE THE UPDATE PROCESS IS TAKING PLACE. BE PATIENT AND WAIT UNTIL THE LOGO LIGHT BLINKING IS DONE.

Once the blinking has finished, keep the power to the unit on until it has fully initialized and is ready for operation again. Remove the USB memory stick.

DirectStream Junior does need some care and is appreciative of being fed proper AC power. A Power Plant AC regenerator is recommended for this task.

Should minor scratches occur in your top cover, simply purchase any type of high quality automotive scratch removal polish such as Kit's Scratch Out or McGuire's products. Car finish polish and wax can both be used on this surface for a beautiful luster.





Troubleshooting

Owner's Reference DirectStream Junior

No Sound

If no sound comes out of the system with DirectStream Junior connected, there are several areas to check. Either you are not getting an audio signal into the preamplifier, or you don't have a good digital source feeding DirectStream Junior.

First, check to make sure your preamp, integrated, receiver or amplifier is switched to the same input DirectStream Junior is connected to. Test the connection and the cables to make sure. Keeping the input selected and using the same cable, connect this input to a known good source like a tuner or the direct analog output of a CD player. If that works, then it is most likely not a connection problem between DirectStream Junior and the preamp, integrated or amplifier.

The next step is to check and see if the digital input is properly connected. Look on the front panel of DirectStream Junior to see if the locked light is illuminated. If it is not, this is most likely the problem. You can troubleshoot this by making sure DirectStream Junior is on the proper input and that you have connected the input correctly. If this fails, try replacing the digital interconnect or try using another type. For instance, if you are using a coax connection, try using the CD player's optical output instead or try replacing the cable.

USB Problems

USB – DirectStream Junior not recognized, or no sound via USB

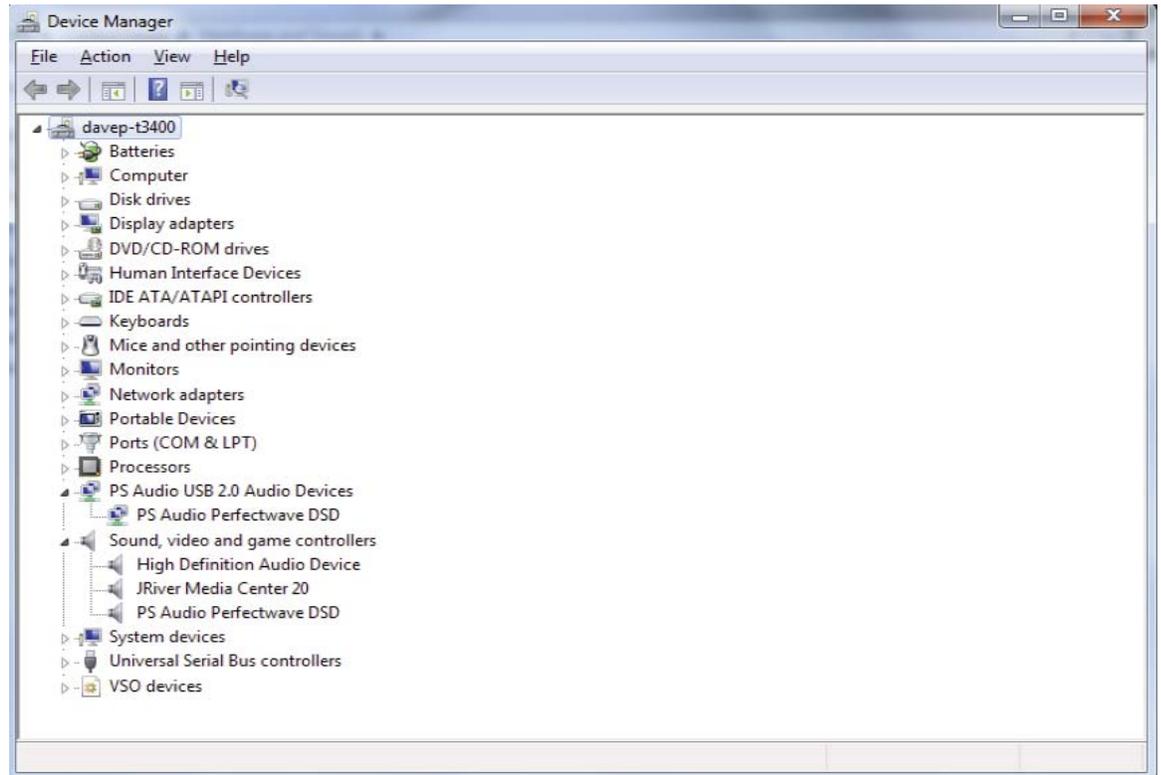
To play music from your computer into the DirectStream Junior via USB, you must have a driver installed that communicates with DirectStream Junior. On a Mac computer with OS X Yosemite, the drivers are already available and the unit should be automatically recognized. You can then go and choose the PS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

Currently, Windows operating systems do not come with the appropriate USB audio driver software installed. You will need to download the PS Audio USB driver from the PS Audio website. You can also contact our support staff via email (support@psaudio.com) or phone (+17204068946), or simply go to www.psaudio.com and click on Resources, then click on the Downloads page. You must then unzip the driver and install it on your Windows machine. Once installed, Windows will recognize DirectStream Junior and allow you to select it for playback from any program on your computer.

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

It May Be a Driver Conflict

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 Junior will show up under device manager as “PS Audio PerfectWave DSD” It should show up under a heading “PS Audio USB 2.0 Audio Devices”, this is the USB2.0 driver.

The entry under “Sound video and game controllers” is the USB1.0 fallback driver.

Bridge Connection Issues

CAN'T CONNECT TO THE BRIDGE

Most problems with the Network Bridge trace back to home networks and their routers. Make sure you have a modern, high speed router and connection to the Bridge is through CAT5 network cable, not WIFI.

Make certain the server, computer, and mobile device are on the same network as the Bridge. We often see this problem arise, especially with WIFI connected mobile devices. The mobile device may not be sharing the same network, through WIFI, as the home router. If you are using a mobile device, such as a phone or tablet to control the server, make sure the mobile device has WIFI enabled and is on the same network as the Bridge.

The server must be UPnP compatible. Programs like iTunes are not UPnP compatible and cannot stream over a home network. iTunes and non-UPnP compatible servers must be connected to DirectStream Junior through USB to work.

JRiver Problems JRiver problems are common. If the Bridge is not displayed as an option to select, look under Tools->Options->Media Network and check mark the box that reads: Use media network to share this library and enable DLNA.

Follow instructions and once setup, the Bridge should appear in the JRiver Media Center far left window under Playing Now. Select the Bridge, and you should be connected.

Check the Logo THE UNIT DOES NOT APPEAR TO POWER ON
It may be in Standby mode. Verify that the rear panel master power switch is in the UP/ON position. Press the front panel PS logo button on the upper left side of the front panel to take the unit out of standby.

If You Have Hum If you experience a hum through the speakers, this can be caused by several things. The first is the source. If there is an excessive amount of buzz or noise from the loudspeaker, it may be caused by a ground loop, a light dimmer in the home, poor AC power, or any number of causes. The quickest way to determine where to start your search is to simply turn the preamplifier, integrated, receiver or amplifier off, disconnect the audio cables between it and DirectStream Junior, and see if the hum goes away when you turn the preamplifier, integrated, receiver or amplifier back on. If it does, it's most likely a ground loop or buzz from a dimmer.

If this doesn't solve the problem, reconnect DirectStream Junior and follow these easy humbusting tips.

Ground Loops The easiest way to figure out where ground loop problems lie is by the process of elimination. You need to determine where the hum or buzz is coming from within your system.

If the hum/buzz goes away when you remove the inputs to the power amp, your next step will be to reconnect the amp and move further down the chain. If you have a preamp, or processor that is feeding the power amp, your next step would be to disconnect all inputs to the preamplifier or processor. Once these are disconnected, and the preamp or processor is connected only to the power amplifier, turn the system on and again, listen for hum. Should the hum now appear, it is a problem with your preamp, processor, DAC or their interaction with the power amp. Before returning the preamp, processor or DAC to the manufacturer, try a cheater plug to break a ground loop. Cheater plugs are simple devices that convert a three prong AC plug into a two prong AC plug and in the act of converting three prongs to two prongs, they disconnect the ground from the wall socket. Try one of these on the preamp, or the power amp, or both.

If you determine that there is still no hum present when the preamp, processor, or DAC is connected with no inputs, then selectively begin plugging in your various inputs one at a time. After each connection, check for hum until you discover the humming culprit.



Troubleshooting

Owner's Reference DirectStream Junior

VCRs, surround processors, and any device that is connected to a television cable or satellite dish can cause a loud buzz and should always be suspect. If, by the process of elimination described above, you determine it is a component like a VCR that is causing the hum/buzz to occur, and using a cheater plug doesn't help matters, it may be necessary to isolate the cable connection (CATV) with an isolation transformer. This inexpensive device is available at most Walmart, Radio Shack or department store type outlets and is sometimes called a 'matching transformer'. If you have problems finding one, call your local cable TV company for advice. The matching transformer will be placed between the cable TV cord and the VCR, TV or processor.

Just remember, take the system down to its simplest level of connection. Find a way to hook the system up with as many pieces of the system missing or not connected. Keep it simple and get it to the point where the hum's gone. Then start adding back components one at a time until the hum returns.

Finding the problem is 9/10ths of the work in finding a solution.



Warranty

Owner's Reference DirectStream Junior

Limited Three Year Warranty

Should I Register My Product?

- Registering your product validates the warranty start date.
- 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 a 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.
- Registration can be completed online, by phone, by mail, or by email.
- You may wish to sign up for PS Audio's monthly newsletters, specials, product updates, and/or Paul's Daily Posts.

What Does this Warranty Cover?

This warranty covers defects in material and workmanship for products purchased from PS Audio or its authorized dealers and agents.

What Will PS Audio Do to Correct the Problem?

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. The product will be repaired without charge for parts or labor, replaced, or the purchase price refunded through the original point of purchase, at the option of PS Audio.

What is the Period of Coverage?

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.

Who Pays for Shipping?

You are responsible to pay for the safe and proper shipment of the warranted product to PS Audio or its authorized repair center.

PS Audio or it's authorized repair center will pay the cost of returning the repaired or replacement product to you under this warranty.

What Does this Warranty 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 manuals (available for download at psaudio.com)
- Use in any manner inconsistent with PS Audio's operating instructions (available for download at psaudio.com)
- Lack of routine maintenance
- Connection to an improper voltage supply
- Alterations or modifications to the unit



Warranty

Owner's Reference DirectStream Junior

- 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 psaudio.com)
- Products with a factory-applied serial number that has in any way been altered, defaced, or removed

Limitations on PS Audio's Obligations Under this Warranty

- In no event will PS Audio's liability to you exceed the original purchase price of the unit.
- This warranty does not cover the cost of custom installation, customer instruction, setup adjustments, or signal reception problems.
- This warranty does not cover consequential and incidental damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
- In the event your warranted product cannot be repaired, PS Audio will replace or refund 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 replacement.

How Can the Warranty be Transferred?

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 transfer of registration.

How Do I Get Warranty Service?

To locate an authorized PS Audio repair center, for service assistance, or for help with the operation of a product or just for information, please contact PS Audio customer support.

Warranty Service Within the US

- You must first obtain a Return Merchandise Authorization Number (RMA#) to receive warranty service and prior to returning any item. Contact PS Audio or an authorized PS Audio repair center to receive an RMA#.
- You must put the RMA# on all returns. If it is not clearly marked, PS Audio will return the package back to you, freight collect.
- You should include a description of the problem, along with the RMA# inside the packaging.
- 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 packing, PS Audio can sell and ship to you replacement packaging.
- 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 in 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.



Warranty

Owner's Reference DirectStream Junior

How State Law Applies

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

Warranty Service Outside of the US

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 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.

PS Audio Inc.
4826 Sterling Dr.
Boulder, CO 80301
Phone - 720.406.8946
Fax - 720.406.8967
Email - service@psaudio.com
Web - psaudio.com