

JC I+

Mono Power Amplifier

OWNER'S GUIDE

Important Safety Instructions

The lightning flash with the arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of “dangerous voltage” inside the product that may constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the product.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

1. **Read Instructions** — Read all the safety and operating instructions before operating this product.
2. **Retain Instructions** — Retain safety and operating instructions for future reference.
3. **Heed Warnings** — Adhere to all warnings on the product and in the operating instructions.
4. **Follow Instructions** — Follow all operating and use instructions.
5. **Cleaning** — Unplug this product from the wall outlet before cleaning. Use a damp cloth for cleaning. Clean the outside of the product only.
6. **Attachments** — Do not use attachments that are not recommended by the product manufacturer; they may be hazardous.
7. **Water and Moisture** — Do not use this product near water.
8. **Accessories** — Do not place this product on an unstable cart or stand. The product may fall, causing bodily injury and damage to the product. A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart to overturn.
9. **Ventilation** — Slots and openings in the cabinet are provided for ventilation to ensure reliable operation of the product and to protect it from overheating. These openings must not be blocked or covered. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided.
10. **Power Sources** — Operate this product only from the type of power source indicated on the label. If you are not sure of the type of power supply to your home, consult your dealer or local power company. This product is equipped with a three-prong grounding plug. This plug will only fit into a grounding power outlet. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding plug.
11. **Power Cord Protection** — Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them.
12. **Lightning** — Unplug the unit from the wall outlet for added protection during a lightning storm and when it is left unattended and unused for long periods of time. This will prevent damage to the product due to lightning and power line surges.
13. **Overloading** — Do not overload wall outlets or extension cords. This can result in a fire or electric shock.
14. **Inserting Objects into Unit** — Never push objects of any kind into this product through any openings; they may touch dangerous voltage points or short out parts that could result in fire or electric shock.
15. **Servicing** — Do not attempt to repair or service this product yourself. Opening or removing covers may expose you to dangerous voltage and other hazards. Refer all servicing to qualified service personnel.
16. **Damage Requiring Service** — Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions: **a)** If the power-supply cord or plug is damaged. **b)** If liquid has been spilled into the product. **c)** If the product has been exposed to rain or water. **d)** If the product does not operate normally by following the operating instructions. **e)** If the product has been dropped or damaged in any way. **f)** If the product exhibits a distinct change in performance.
17. **Replacement Parts** — When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer. Unauthorized substitutions may result in fire, electric shock, and other hazards.
18. **Safety Check** — Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
19. **Wall or Ceiling Mounting** — Mount the product to a wall or ceiling only as recommended.
20. **Heat** — The product should be situated away from heat sources such as radiators, heat registers, stoves, and other products (including amplifiers) that produce heat.

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INTRODUCTION

Thank You for Choosing Parasound

Your new Parasound Halo JC 1+ power amplifier has been designed with the most advanced, proven class A/AB amplifier technology. The JC 1+ is built to extremely strict quality and performance standards for which Parasound is renowned. We're proud to offer you this exceptional audio component that will bring you many years of enjoyment and dependability. We designed your new Halo JC 1+ Amplifier to perform at a higher level of sonic performance than you might have expected and we encourage you to read this entire manual to maximize your enjoyment. We wish you many years of listening enjoyment.

-The Parasound Staff

Keeping Records for Future Reference

Record the serial number located on the back panel or bottom of your JC 1+ in the space below. Also note your Parasound dealer's name and telephone number. Your purchase receipt/bill of sale is required to determine if your JC 1+ is eligible for Parasound warranty service. We recommend that you make an extra copy of your original purchase receipt/bill of sale and store it inside the JC 1+'s carton.

Parasound JC 1+ Amplifier Serial #: _____ (5 digit number below the bar code)

Parasound Dealer: _____

Parasound Dealer Phone Number: _____

Date of Purchase: _____

Important Warranty information

There is no Parasound warranty for this unit if it was not purchased from an Authorized Parasound Dealer. A list of Authorized Parasound Dealers and detailed warranty information is available at www.parasound.com or you can call **415-397-7100** between 8:30 am and 4 pm Pacific time. A missing or altered serial number could indicate that this unit was re-sold by an unauthorized dealer or is stolen merchandise. If this unit is missing its serial number or the serial number has been altered, you should return it to your dealer immediately for a full refund.

Investigate any claims made by a dealer who is not listed on our web site very carefully. Statements an unauthorized dealer makes regarding their own coverage or third party warranty coverage are undependable and misleading because unauthorized dealers and warranty companies lack the capability to make repairs or arrange for repairs of Parasound equipment.

Unauthorized dealers lack the capability to make repairs or arrange for repairs of Parasound equipment.

Unpacking Your JC 1+ & Placement Guidelines

Unpacking Your JC 1+

Carefully remove your JC 1+ from its shipping carton and locate the enclosed accessories:

- AC power cord
- A 12V trigger wire for auto turn on (It has a mono 3.5 mm plug at each end)
- Rack mount ears

While you are unpacking your JC 1+, inspect it thoroughly for possible shipping damage and tell your Parasound dealer immediately if you find any evidence of shipping damage. This would be a good time to make a copy of your sales receipt to store with the JC 1+'s original packing.

Note: Please save and store both the inner and outer cartons and, most especially, the foam packing inserts to protect the JC 1+ if you have to move it or ship it. You may wish to flatten the cardboard cartons to save room in storage after cutting the taped seams on the bottom flaps.

Placement Guidelines

The JC 1+ will be easier to use and will last longer if you follow these simple guidelines:

- The JC 1+ should never be placed in a completely enclosed cabinet.
- Place the JC 1+ on a surface that will adequately support its substantial weight.
- Use input and output cables that are long enough to leave some slack; that will enable you to pull the JC 1+ out of a cabinet to check or to change connections without inadvertently disconnecting cables.
- Place your JC 1+ where you can route input and output signal cables as far as possible from any AC cords.
- Where input interconnects must cross AC cords they should do so only at a 90° right angle.

Ventilation Requirements

- Always position the JC 1+ horizontally.
- The JC 1+ should never be stacked directly above another power amplifier or directly below another component.
- Do not install the JC 1+ in an unventilated equipment cabinet or compartment. Pockets of stagnant hot air can build up even in a cabinet with an open front and back.

AC Mains Voltage

NOTE: Before you plug this amplifier into an AC mains outlet:

The correct voltage for JC 1+ is printed on the rear panel, between the AC power switch and the power cord connector. This must match the AC mains voltage where you live.

AC 115V ~60Hz

or

AC 230V ~50Hz

If you live in a region where the AC mains is 230V (220V-240V range):

Plugging this amplifier into a 220V-240V AC mains outlet when the unit is internally configured for 115V (110V-120V range) and its main fuse value is for 115V operation will severely damage it and could put you at risk of personal injury. If you are unsure of the internal voltage configuration for this amplifier you should have a qualified electronics technician inspect it and reconfigure it as required. Amplifiers configured for 115V which are damaged by 220V-240V are not covered under the Parasound Warranty.

AC Voltage Reconfiguring Technical Information

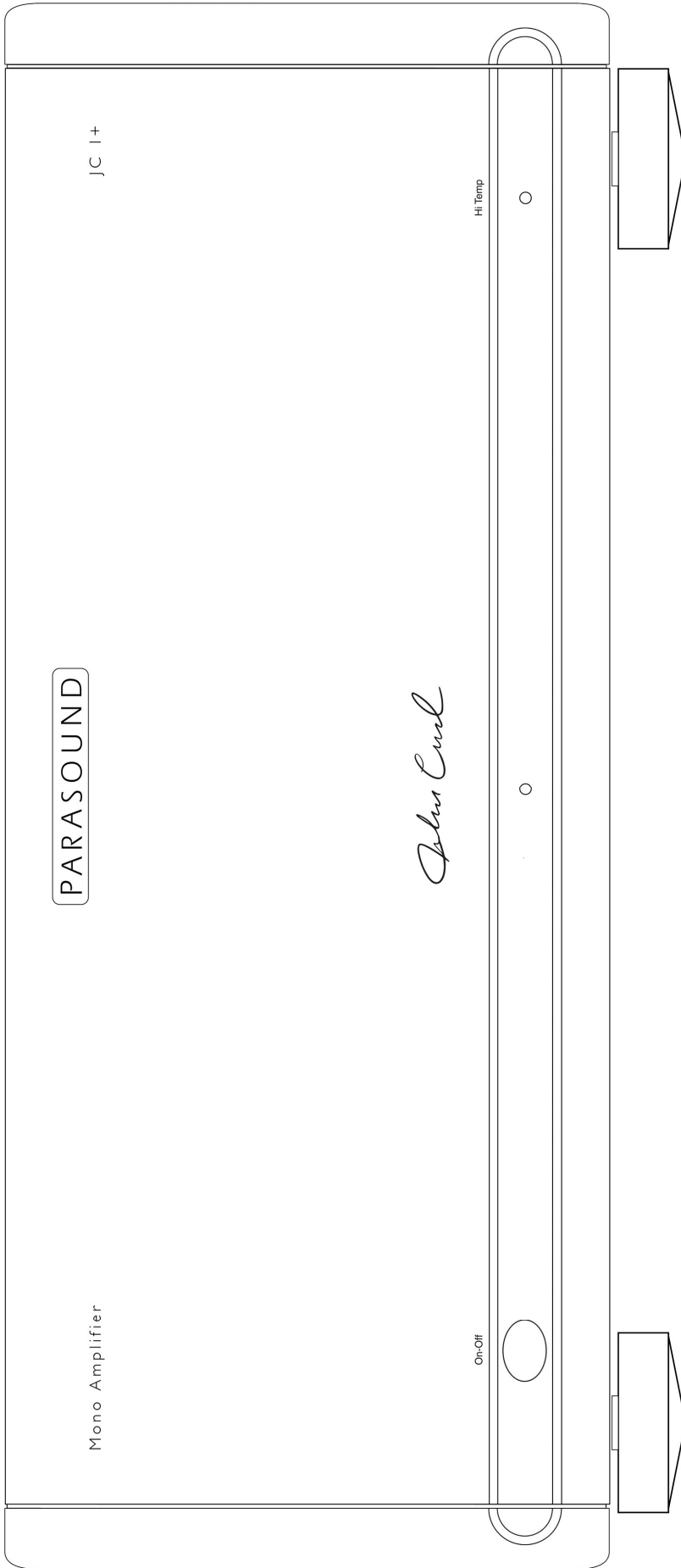
Parasound will provide technical information which pertains to the interior of this amplifier only to a qualified audio electronics technician. This restriction is for your safety as well as the correct functioning of your amplifier.

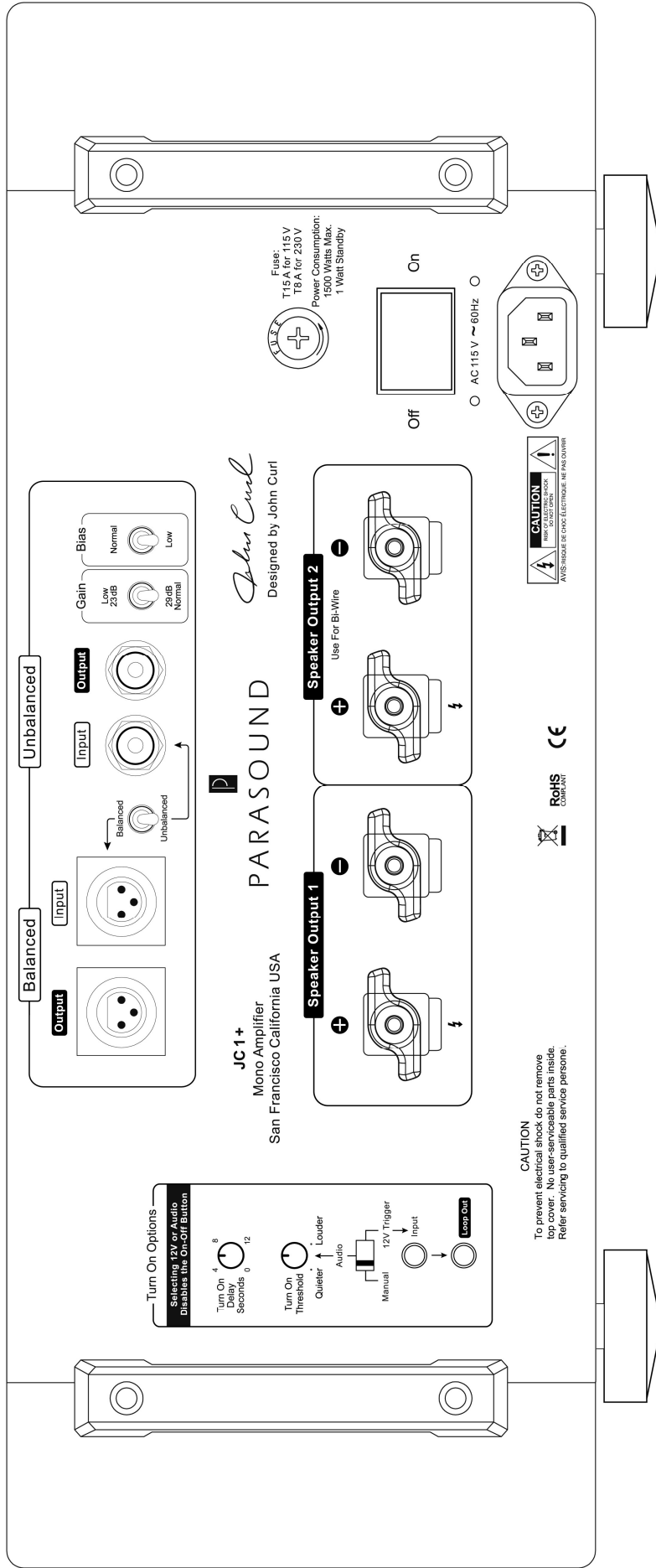
Before Making Any Audio Connections

Always turn off your JC 1+ and disconnect the AC cord before making or changing any input, output or trigger wire connections. Inserting or removing an input or output cable while the JC 1+ and your preamp are turned on can result in a blast of sound that can damage your loudspeakers.

AC Power Cord

The AC cord supplied with your JC 1+ is a high quality IEC type cord. Please connect it directly to an AC wall outlet or power conditioner that is always "live." If possible, plug your JC 1+ into the same AC outlet that your preamplifier is plugged into. If different AC outlets are used for the JC 1+ and other components, (including a TV or video projector) the ground potential may be higher or lower between the outlets, resulting in audible hum.





John Curl
Designed by John Curl

PARASOUND

JC1+
Mono Amplifier
San Francisco California USA

Fuse
T1.5 A, 250V, 115V
TBA for 230 V
Power Consumption:
1500 Watts Max.
1 Watt Standby

CAUTION
To prevent electrical shock do not remove top cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

CAUTION
RISK OF ELECTRIC SHOCK
AVIS: RISQUE DE CHOC ELECTRIQUE. NE PAS OUVRIER

RoHS COMPLIANT

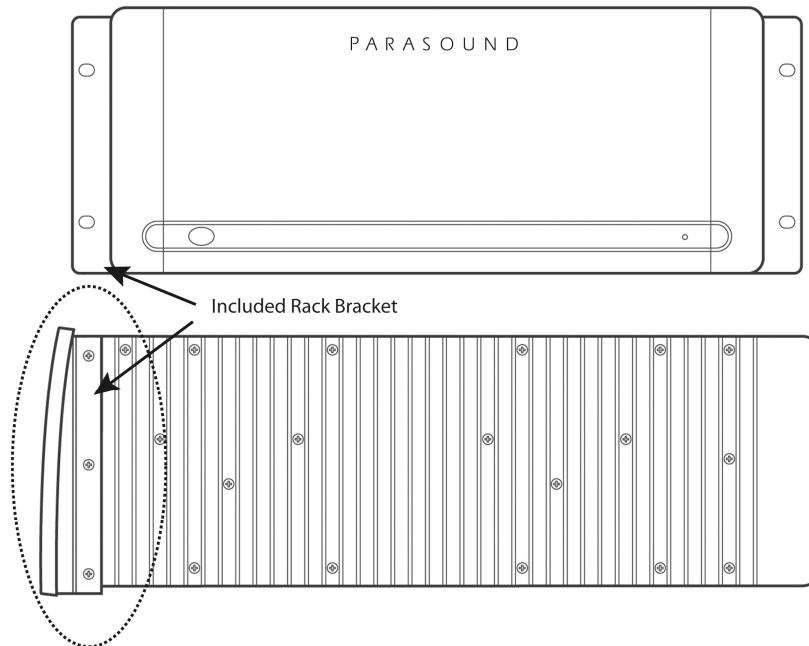
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Rack Mounting Your Parasound JC 1+

To mount the JC 1+ into a 19" wide equipment rack, you must first attach its two "L" shaped rack mount brackets (included). With its four feet removed, the JC 1+ chassis and front panel height occupies four rack spaces (7" or 178 mm). You will also need to allow an additional 1/8" (3.2mm) or more below the JC 1+ to allow for its bottom chassis screws when mounting other components below the JC 1+. Since the JC 1+ operates very warm, when rack mounting you must provide forced air cooling or set the Bias switch to low.

To attach the rack mount brackets:

- Remove the three bolts from each side of the JC 1+. These bolts are arranged vertically, behind its front panel and in front of its first heatsink fin.
- Line up the three holes on each bracket with the three holes on the JC 1+ and reinsert the bolts.
- Make sure the bolts are tight because they will support the entire weight of the JC 1+ in the equipment rack.



To secure the brackets to the rails of your equipment rack:

- Tighten each bolt just enough to keep the amplifier secure in the rack. This will avoid deforming the insulating shoulder washers. Eliminating metal-to-metal contact reduces the likelihood of creating a ground loop that might introduce hum into your system. Please call your Parasound dealer or Parasound Technical Service if you need additional advice about rack mounting the JC 1+.

Rear Panel Controls & Audio Connections

Always disconnect the AC cord to your JC 1+ before making or changing any input, output or trigger wire connections. Inserting or removing an input or output cable while the JC 1+ is turned on can result in a blast of sound that can damage your loudspeakers. Make sure there is no strain or tension on any cables that could cause them to pull loose.

Bias Level Switch

The Bias Level switch offers two bias settings for the output transistors. In its Normal (up) switch position, bias idle current is higher to perfectly match the characteristics of the JC 1+'s output devices. In its Low (down) position, bias idle current and class A operation are lowered to reduce heat output and power consumption.

With its Bias Level switch set to Normal, the JC 1+ will run very warm and consume more AC power even when it is idling or playing music at low listening levels. If your JC 1+ is well ventilated, you may find the Normal bias setting offers a sonic improvement. **If your JC 1+ is mounted in a cabinet, or ventilation is restricted in any way, we recommend you leave the Bias Level switch in the Low position.**

Examples of when to use the Low Bias setting:

- The JC 1+ is getting too hot (if you can't keep your hand on the heatsink for at least 5 seconds it is too hot)
- The JC 1+ is installed in a cabinet
- The JC 1+ is installed in a rack without forced air ventilation
- Anything is placed on top of the JC 1+
- You wish to reduce the energy consumption
- Your room temperature is above 82°F (28°C)

Gain Switch

The Gain switch has two positions Low (23dB) and Normal (29dB). This switch would typically be left in the Normal position. If you have very high sensitivity speakers or your preamp already has very high gain then you should use the Low setting.

Examples of when to use the Low (23dB) Gain setting:

- You have very high sensitivity speakers (typically above 96dB sensitivity)
- The volume control on your preamp ramps up too fast
- You can hear some background hiss in your speakers

Audio Input & Output Connections

Balanced XLR Input Jacks

In most systems balanced XLR connections will give you the best quality sound because of their ability to reject noise. Refer to the Balanced and Unbalanced Lines in the Technically Speaking section for additional information and why we recommend using balanced lines.

Note: Using balanced XLR input connectors results in a 6 dB higher volume level compared with using the RCA input jacks. This is a noticeable level increase.

Unbalanced RCA Input Jacks

Use these inputs if your preamplifier doesn't have balanced XLR output connectors or if you simply prefer to use unbalanced connections.

Balanced/Unbalanced Selector Switch

Place the switch in the position for the input type you will be using.

Note: The Balanced/Unbalanced switch is not an input selector. Its function is purely to optimize the signal to noise ratio for each type of input. You should not connect both the Balanced and Unbalanced jacks at the same time with the expectation of switching between two different devices such as a preamp and a surround processor.

Balanced XLR Pin Configuration

The JC 1+ XLR jacks conform to the industry standard of:

Pin 1: Ground Pin 2: Positive (+) Pin 3: Negative (-).

XLR and RCA Output Jacks

These Output jacks enable the incoming audio signal to pass along or "daisy chain" the incoming audio signal to an additional amplifier for bi-amping or for connecting a powered subwoofer. The XLR input signal is available at both the XLR and RCA Output jack. The XLR and RCA Output jacks are not affected by the Gain switch setting.

Speaker Connections

Speaker Terminals

The JC1 + has two speaker outputs labeled Speaker Output 1 and Speaker Output 2. The second speaker output is used for a bi-wiring setup (see page 12). The speaker terminals accept wires terminated with banana plugs, spade connectors up to 16mm wide or bare wire up to 8 AWG.

Bare Speaker Wire Ends

If you plan to connect your speaker cables with bare wire ends, use a wire stripper to remove just enough insulation to expose about a 1/2" (13 mm) length of bare wire. You can insert the stripped bare wire into the hole that goes vertically through each terminal's metal post. Before inserting the wire, twist its bare strands tightly so they are all contained within the speaker terminal, with no stray strands. If you have a soldering iron, you can "tin" (apply a small amount of molten solder) to each stripped bare wire to prevent it from unraveling, fraying and oxidizing.

Correct Speaker Polarity is Important

Polarity refers to + and – speaker wire connections. Speaker wires are coded with color, printing or a ridge on the insulation of one lead so you know which lead was connected to the + and – terminals at the other end. This coding will help you keep the + and - polarity consistent for all channels. If one speaker is wired with incorrect polarity it will significantly impair the sound quality.

Speaker Wire Length and Gauge (thickness)

When selecting speaker wire, follow these guidelines:

- Keep the length of your speaker wire as short as possible.
- Use the thickest wire practical. For lengths greater than 25 feet, use speaker wire with an AWG (gauge) of 14 or lower. The smaller the AWG number, the thicker the wire.

Bi-Wiring and Bi-Amping

Bi-wiring and Bi-amping can only be used with speakers that have separate input terminals for HF (high frequency) and LF (low frequency). The straps that connect the speaker's LF and HF inputs will need to be removed. Some KEF speakers use a rotary switch instead of metal straps to disconnect the HF and LF sections internally. Bi-wiring requires one JC 1+ for each speaker. Bi-amping requires two JC 1+ for each speaker.

Bi-Wiring

The JC 1+ is equipped with two pairs of speaker terminals marked Speaker Output 1 and Speaker Output 2. This simplifies attaching two pairs of speaker wires. When bi-wiring, connect one JC1+ Speaker Output terminals to the speaker's LF terminals and the other Speaker Output terminals to the same speaker's HF terminals.

Bi-Amping

Bi-Amping in this context is technically "passive bi-amping" so an external electronic crossover is not required. The speaker LF and HF terminals still connect to the speaker's internal passive crossover circuits. With bi-amping the LF and HF speaker terminals connect to two separate amplifiers.

Connecting speaker wires for bi-amping

Bi-Amping requires two JC 1+ per speaker (*four total for a stereo setup*). Each speaker must be equipped with separate LF (Low Frequency) and HF (High Frequency) input terminals. The first JC 1+ will power the LF section of one speaker. A second JC 1+ will power the HF of the same speaker. A third JC 1+ will power the LF of the other speaker and a fourth JC 1+ will drive the HF of that speaker.

Setting up the input wires for bi-amping

Your stereo preamp has Left and Right output jacks. With Bi-Amping each of the preamp's output channels has to drive two JC 1+s. This can be accomplished with a "Y" adapter cable. Rather than using a "Y" adapter you can also use the XLR and RCA "Looping" Output Jacks of the JC1+. The Loop Output jacks enables the input signal for each channel to be daisy-chained to the other JC 1+ Input jack. Connect the first JC 1+ Loop Output jack to the Input jack of the second JC 2+. Repeat for the preamplifier's other channel and for the third and fourth JC 1+.

Turn On Options Switch

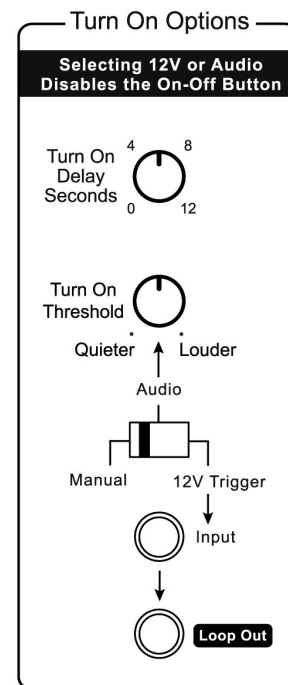
The setting of the rear panel three position Turn On Options switch determines how the JC 1+ turns on and off. Setting this switch to Audio or 12V disables the JC 1+'s front panel On-Off button. There are three turn on options:

Manual: When the Turn On Options switch is set to **Manual** the JC 1+ is turned on and off manually only by pressing the On-Off button on its front panel every time you want to listen to music.

Audio: When the Turn On Options switch is set to **Audio** the JC 1+ will be turned on automatically when an audio signal is present at either of its Input jacks. After the audio signal ceases the amplifier will remain on for approximately 8-10 minutes before shutting itself off. This prevents unintended turn-off during pauses in your music.

Note: The actual turn off delay can vary from unit to unit. This is normal.

12V Trigger: When the Turn On Options switch is set to **12V**, the JC 1+ is turned on and off only with an external +9 V to +12 V DC voltage. When the external 12 volt signal ceases the amp will turn off within a few seconds. The 12V turn on trigger circuit is opto-coupled and draws a mere 5mA.



Turn On Delay Adjustment (all turn on modes)

You can delay the JC 1+ turn on time so it doesn't turn on at the same instant as your other components (or other JC 1+s). This avoids AC power turn-on surges and brownouts that might trip power strips or house wiring circuit breakers. If you're fortunate enough to own more than two JC 1+s, select a different delay time for each unit. Turn the delay knob to the desired delay time from 0 seconds (fully counterclockwise) to 12 Seconds (fully clockwise).

Turn On Threshold Adjustment (audio turn on mode only)

This knob sets the audio signal level required for the JC 1+ to automatically turn on when the Turn On Options switch is set to the Audio position. Fully counter-clockwise is the most sensitive setting and requires the least audio signal voltage. It is therefore labeled "Quieter." Fully clockwise requires a higher audio signal voltage and is therefore labeled "Louder." In most systems the best results will be with the Turn On Threshold knob set at or close to the Quieter position. In some situations the JC 1+ might turn itself on if there is transient noise in your system, even when an audio signal is not present. Similarly, the JC 1+ might never shut off after the music stops, even after waiting more than 10 minutes. In this case, try rotating the knob towards the Louder position.

12V Input Jack

The JC 1+ 12V input is a 3.5 mm jack (mono). To use the 12V trigger, insert the trigger wire plug into this jack and plug the wire's other end into your preamplifier's 12V output jack. For your convenience we have included a 12V trigger wire with mono 3.5 mm plugs at both ends. The JC 1+ 12V trigger circuit draws a negligible 5 mA.

Note: If your preamplifier's 12V trigger output is bare terminals with + and - screws terminal instead of a jack, you can cut the 3.5 mm plug off one end of the included trigger wire and attach the bare wires to these terminals. The lead with the white stripe on it corresponds to the plug's tip and the unmarked lead corresponds to the sleeve of the plug. The trigger plug tip is + (positive) and its sleeve - (negative).

12V Loop Out Jack

The Trigger Out jack lets you loop or “daisy-chain” the incoming trigger voltage to an additional JC 1+ or other component(s). The total load on your triggering device’s 12 V output is the sum of the trigger current drawn by each of the components you plan to loop together. Check the maximum capacity of your preamplifier’s trigger output so you do not overload it by connecting too many power amplifiers. Typical preamp trigger outputs are rated to handle 50 mA to 100 mA.

3.5 mm and 2.5 mm jacks

Some other Parasound power amplifiers and preamplifiers might use a 2.5 mm “sub-mini” (mono) trigger jack. To use the JC 1+ trigger with products that use a 2.5mm jack you will need a 3.5 mm to 2.5mm mono adapter for one of the plugs on the included trigger wire.

Front Panel Operation

On-Off Button

Push once to turn the JC 1+ on. Push the On-Off button again to turn the JC 1+ off. The On-Off button will be disabled when the Turn On Options switch is set to Audio or 12V. Whenever the JC 1+ is turned on, the soft blue glow behind its On-Off button changes to red for a few seconds while its internal circuits stabilize. Then the red glow is replaced by a brighter blue glow to indicate normal operation. If the glow remains red after turn-on or while the amp is playing, it indicates activation of the JC 1+’s protection circuits and no sound will be heard from the speakers.

The JC 1+ protects itself from external conditions such as excessive heat, load impedance that is too low, or a short-circuited speaker connection or wire. After you correct the fault, the JC 1+ will resume operation. If the JC 1+ remains in “protection mode” (with a red glow around the On-Off button) after it has cooled down and you’ve confirmed there are no external faults, it could indicate an internal problem. Please contact your Parasound dealer or Parasound’s Technical Service Department.

Channel Indicator

When the blue channel indicator is lit, the JC 1+ is operating normally. If the indicator does not light, even though the amp is turned on, there is a fault in your system. In the case of a fault first check that there is no short circuit with your speaker wire or speakers.

Hi Temp Indicator

This indicator is near the right side of the front panel recess. It will glow red if the JC 1+ overheats. The On-Off button will also glow red if the JC 1+ overheats. If such a condition occurs you must provide for better ventilation around the amplifier or check the speakers for faulty operation that is causing the JC 1+ to overheat. You might find you need to set the Bias switch to the Low setting to reduce heat output.

Technically Speaking

Balanced and Unbalanced Interconnects

Recording and broadcast studios use balanced connections exclusively because of their inherent ability to reject noise and hum, thus assuring the best sound. Certain high-quality preamplifiers and surround controllers built for residential use utilize balanced connections with XLR jacks for the same reasons. As with other Parasound Halo series power amplifiers the JC 1+ is equipped with an XLR balanced input connector so you can take full advantage of its inherent noise reduction capability and superior sound quality.

Unbalanced connections with RCA jacks are found on all home audio equipment. RCA jacks use two-conductor wires are less costly than the additional circuitry, higher priced XLR connectors and three-conductor differential balanced circuitry required for balanced connections.

In an unbalanced line, the positive audio signal is conducted through the center pin of an RCA plug and RCA jack while the negative signal is on the outer shield wire, which also functions as the ground connection. Unbalanced interconnect cables are vulnerable to hum from an AC line or other electrical noise, such as broadcast RF (Radio Frequency), which can be reproduced through your loudspeakers. Since the unbalanced line's ground also carries the audio signal, there is no way for the amplifier or preamplifier to distinguish between the audio signals you want and noise emanating from external sources.

Balanced lines are superior at rejecting noise because they utilize separate conductors for the audio and the ground: two inner conductors carry the positive and negative audio signal, and a third outer wire connects the grounds and also shields the two signal conductors from interference. When the positive and negative signals appear at the component receiving the signal they are equal, but 180 degrees out of phase with each other relative to ground. Balanced signals require special differential circuitry to conduct separate plus and minus audio signals.

A differential input circuit amplifies only the difference between the positive and negative signals. For example, when a 1 Volt audio signal arrives at a balanced input stage, the differential input "sees" a positive +1 Volt minus a negative -1 Volt, or 2 Volts total. External hum and noise that somehow gets into a balanced line is common to both its positive and negative conductors with respect to ground. Therefore, it is canceled or rejected in a differential input circuit.

This phenomenon of rejecting noise signals common to both positive and negative conductors is called common mode rejection. Differential inputs are specified according to how well they reject signals common to both conductors. This is measured in dB and is called the common mode rejection ratio or CMRR.

Eliminating Hum and Buzz – Ground and Ground Loops

Audible hum and buzzing noises in a system are usually related to issues with the component grounds. Ground (sometimes called "common") is a point of reference for voltages in virtually all audio and video components. Ground is supposed to remain at zero volts while the audio signal voltage swings positive (voltage above ground) and negative (voltage below ground). If ground isn't at zero, there can be an audible 60 Hz hum (or 50 Hz hum in regions with 50 Hz AC). The harmonics of these frequencies (120 Hz, 240 Hz, 480 Hz or 100 Hz, 200 Hz, 400 Hz) may add a raspy "buzzing" noise to the hum. The most common cause of a ground loop in an audio system is from cable TV. If disconnecting the cable line stops the hum then you might need a cable TV ground loop isolator.

The ideal of zero voltage ground in and between every component in an audio system is practically impossible, because some resistance exists between the ground points of different components is inevitable. By keeping components close together with short interconnects and their power cords plugged into a common AC outlet or power strip, you'll avoid noise problems created by resistance in the house electrical wiring.

Hum and buzz is also caused when unwanted voltage flows through multiple component ground points called ground loops. Here are three tips to avoid ground loops:

1. Your Cable TV or Satellite receiver box might require a Cable TV Ground Isolator.
2. Use balanced input cables with your Parasound JC 1+. (See Balanced & Unbalanced Lines in this section).
3. When rack mounting, always use the insulated "shoulder" washers on both the front and rear sides of the metal rack mount before bolting it to the equipment rack rails. These insulating washers interrupt the ground loops caused by metal-to-metal contact between the rack, the components, and their rack-mount bolts. Extra insulating washers are available from any manufacturer of audio racks.

Parasound JC 1+ Design Overview

Circuits Designed by John Curl

Parasound design consultant John Curl has been a legend among audiophiles and electronic engineers for decades. He pioneered measurements to correlate musical accuracy with the materials used in parts, worked with world-class touring companies, has designed highly coveted audio classics, including the original Mark Levinson JC-2, Denneson JC-80, Vendetta Phono Preamplifier, and CTC Blowtorch preamplifiers; master recorders for Wilson Audio and Mobile Fidelity; and the mixing consoles used in live concerts by The Grateful Dead and the Montreux Jazz Festival in Switzerland.

As our featured amplifier designer since 1990, he has also created many products that have earned Parasound worldwide acclaim and favor, including the Parasound Halo JC 1, JC 2/JC 2 BP, JC 3, JC 3+, JC 3 Jr and JC 5. John is particularly proud of what he and Parasound have accomplished together: “The circuits I design for Parasound are extremely sophisticated and are typical of products that are far more expensive. I can’t think of any other audio products that offer nearly as much bang for the buck.”

Parts Selection

Every part in the JC 1+ is carefully chosen for its accuracy and reliability. Metal film resistors with 1% tolerance are selected for their precision and because their values don’t drift as they heat up during operation. Polypropylene and mica capacitors are used extensively for their superior linearity and low dielectric absorption. Semiconductors are selected for superior performance in their specific roles in the circuit. Gold has the best conductivity of any metal, so we use high quality gold-plated input connectors and speaker terminals. The main circuit boards are double-sided FR4 glass epoxy for long-term durability. The material of the input-driver stage circuit board is FR408 which was developed for super-computers and is superior to other circuit board materials especially for high frequencies. The chassis is made of heavy gauge aluminum and steel to safely house the internal circuitry. This attention to detail when selecting parts makes the difference between a very good amplifier and an outstanding amplifier.

The Output Stage Power Supply

The heart of the power supply is a 2.1 kVA toroid power transformer with a special premium grade steel core chosen for its efficiency, low hum field, and high continuous power rating. Encapsulating this massive power transformer in a steel canister filled with epoxy prevents mechanical vibrations, assuring ultra-quiet performance.

The JC 1+ Input Stage Power Supply

It all starts here because the input stage determines the “sonic signature” of an amplifier. Most amplifier designers don’t realize that even the most minute distortions created within the input stage are the most insidious because they are amplified by the output stage. A major cause of this distortion is whenever the input stage voltage sags whenever the output stage is working hard and pulling down the voltage of the input stage. To prevent any distortion originating in the input stage, the JC 1+ has an independent input stage power supply with its own R-core power transformer. The 110V B+ and B- voltage rails cannot sag under any condition, virtually eliminating distortion, regardless of how hard the output stage is working. The independent driver power supply for the input stage employs premium Nichicon Gold capacitors totaling 4,440uF per channel.

Extra Filtering

The JC 1+ input stage power supply also employs two Bybee Music Rails™. These are sophisticated active filters that “scrub” the last vestige of high frequency noise from the input stage B+ and B- rails. We do not know of any other commercially available amplifier that uses them and many probably don’t know they exist. Music Rails™ were invented by a Silicon Valley microwave genius, in collaboration with John Curl and Carl Thompson, Curl’s circuit board designer.

The JC 1+ Output Stage

The JC 1+ output stage includes six ultra-premium quality 33,000uF Nichicon “Gold Tune” electrolytic filter capacitors. These rare parts are chosen for their low Equivalent Series Resistance (ESR), dielectric absorption and resistance to high temperature. In addition, these filter capacitors are bypassed with smaller polypropylene capacitors to reduce AC ripple in the DC supply and to further eliminate noise and interference that is generated in AC power lines, from computers and other appliances in the home.

Relay-Bypassed Soft Start Circuit

When the JC 1+ is turned on, a significant amount of current is required to charge the enormous power supply capacitors. A sudden in-rush of current stresses capacitors and shortens the product's life. To prevent this the JC 1+ employs an NTC (negative temperature coefficient) thermistor to slow down and suppress the in-rush current. A secondary benefit is that it also prevents tripping of a household circuit breaker or power strip. In a few seconds, as it heats up to its operating temperature the thermistor drops to near zero ohms of resistance. However, the JC 1+ goes one step further with this circuit. After the thermistor has done its job of suppressing the in-rush current a heavy-duty relay with gold contacts activates to jump across the thermistor to bypass it completely. This extra measure ensures that the thermistor will not restrict any current whatsoever when the JC 1+ is in full operation.

Complementary Differential Configuration

Each stage (there are three) of amplification employs transistors that require positive DC power and complementary transistors that require negative DC power that is a mirror image of the positive DC power. Thus, half of the transistors amplify the positive half of the musical waveform while the other half of the transistors amplify the negative half. This complementary topology is inherently linear, which minimizes distortion and improves sonic accuracy.

The Input Stage

The function of the JC 1+'s input stage is voltage gain. It uses matched pairs of N and P channel discrete JFETs (Junction Field Effect Transistors) arranged in a differential configuration. JFETs are ideal for the input stage because their inherently high impedance makes them less affected by the impedance of the connected source components. Ordinary bi-polar transistors are low impedance devices and more susceptible to the higher impedance of source components. The Differential configuration also provides superior noise reduction. These precision matched input JFETs are cascaded to produce the current necessary to drive the MOSFET drivers in the following stage.

The Driver Stage

The driver stage provides further voltage gain for which we employ a complementary matched pair of MOSFETs (Metallic Oxide Field Effect Transistors) selected for their vacuum tube-like sonic qualities. MOSFETs tend to generate less odd-order higher harmonic distortion than bipolar transistors. This is important because odd-order distortion sounds unnatural and fatiguing to the human ear because the harmonics are dissonant. Even-order distortion is less offensive because it is primarily consonant. The JC 1+ employs a driver stage in a new cascode configuration which improves linearity and reduces distortion. This sophisticated MOSFET driver stage prevents the harshness and brittle sound so often found in other solid state amplifiers.

The Output Stage

An amplifier's sonic characteristics are established by its input and driver voltage gain stages. The sole job of its output stage is to deliver current from its power supply to the speakers. In the output stage bipolar output transistors are superior to MOSFETs because of their higher safe operating area (SOA) and inherent ruggedness. The JC 1+ employs 24 high current (15-amp) high voltage bipolar transistors to insure long-term reliability, even with continuous high-power operation and challenging speaker loads. The lightning-fast (60 MHz) transistors respond instantly to complex demands in the musical signal, virtually eliminating distortions that occur with “slower” transistors. Slew rate limiting and Transient Intermodulation Distortion (TIM) are simply not an issue in the JC 1+.

Class A-A/B Operation

Pure class A operation provides the purest sound. However, an amplifier with the output power of the JC 1+ and operating entirely in class A would be enormous, highly inefficient, and generate far too much heat. Class A/B combines the primary advantage of Class A with the higher efficiency of Class B. This reduces the heat generated in pure class A operation as well as the higher-order odd harmonic distortions created in class B. In class AB, the driver and output stages are always partially turned on, which provides a nominal amount of pure class A operation. At higher power levels, when the musical waveform swings from positive to negative and vice versa, each bank of transistors is allowed to rest momentarily. This resting, or quiescent time, makes it possible to deliver high amounts of power without overheating. It also makes possible the use of passive cooling and avoids fans, whose noise can be heard over the music. The JC 1+ input and driver stages operate in pure Class A while its output stage operates with greater Class A power than most amplifiers selling for twice or three times its price. The result is less fatiguing, more natural sound.

Total Protection - DC Servos

Even a miniscule amount of Direct Current (DC) will burn out speakers without any warning. Every power amplifier must have some way to ensure that DC from its power supply never reaches its + or - speaker terminals. Most amplifiers simply use adjustable trim controls to reduce their DC offset or capacitors to block DC. Unfortunately, trim controls can allow DC offset to increase over time, and even the most expensive capacitors in the audio signal path "veil" sonic clarity and attenuate bass response.

The JC 1+ incorporates fast-acting DC servo circuits which completely eliminates the need for coupling and blocking capacitors. Thus, the JC 1+ is fully direct (DC) coupled from its input jacks to its speaker terminals. This advanced protection circuitry never needs adjustment or maintenance. It operates outside the audio signal path to keep the DC offset at a negligible level. The results are startling clarity, freedom from listening fatigue, and superior bass response.

Total Protection - Relay

The JC 1+ has a high-current protection relay with gold-plated contacts for long-term reliability. This relay's function is to protect the amplifier, the speakers, or both when there is a fault. When the JC 1+ is first powered on, this relay remains open for approximately three seconds as the positive and negative power supplies stabilize and reach equilibrium so that no DC offset reaches the speaker terminals. This prevents annoying popping or other transient noises. Relay protection also prevents damage to your speakers in case of a catastrophic amplifier failure. Any amplifier that doesn't use relay protection for its speaker outputs compromises the safety of the amplifier and your speakers.

Total Protection - Current Overload

Specialized current-sensing transistors are connected to the output stage of the JC 1+ to constantly monitor the current flow through the output transistors. If the current drawn by this stage exceeds a predetermined safe level due to a load impedance below 1 ohm or a short circuit at the speaker terminals, the output relay will open immediately to prevent the output transistors or other parts from failing.

Total Protection - Fuses

In addition to the main fuse on the rear panel the amplifier has two internal fuses for the positive and negative DC voltage rails of the input stage and four for the output stage. These fuses provide backup protection in case the over-current protection does not work in time, or if an internal part fails. In the event of a part failure, these fuses halt operation to minimize damage to additional parts.

Problems and Remedies

Unit will not turn on

- Check the setting of the Turn On Options switch. (The front panel On-Off button will be disabled if this switch is set to Audio or 12V)
- If using the Audio Turn On mode, try increasing the sensitivity of the audio trigger by turning the audio threshold knob to the “Quieter” position.
- Check that the rear panel power switch is on and that the AC power is live.

No sound from speaker

- Check that input interconnect cables and speaker wires are secure at both ends.
- Make sure the preamplifier is switched to the correct input.
- Is the Hi-Temp light illuminated? The blue indicator in the middle of the panel recess should be illuminated. Check for excessive temperature, short-circuited speaker wires, a very low impedance speaker load and inadequate ventilation.

Overheating

- If you can't keep your hand on the heatsinks for at least 5 seconds it is too hot.
- The JC 1+ should never be placed inside a fully enclosed cabinet.
- If the amplifier is rack mounted then forced air cooling should be used.
- Use the Low Bias setting.
- Increase the free space and ventilation above the JC 1+.
- Remove any nearby external sources of heat such as other audio equipment or heaters.

Background hum or hiss

- If you have cable or satellite TV, try disconnecting the incoming TV or satellite cable; if the hum is eliminated you will need a Cable TV Ground Isolator which can be purchased online.
- Light dimmers can cause noise in your audio system. Try turning lights that are controlled by dimmers all the way off. If the hum goes away the problem is electrical noise the dimmers introduce into your home's AC power.
- Ground loops are also a common cause of hum and buzzing noise. Finding a ground loop requires a patient process of elimination. Unplug your source components one at a time. When the hum goes away you've identified the source of the ground loop. You might be able to stop the hum by attaching a wire from the chassis of the offending component to the chassis or ground screw of your preamplifier.
- Move audio cables and AC cords apart from each other.
- Try different routes for the audio cables and AC cords.
- Make sure plastic insulating shoulder washers are used if the unit is rack mounted.

Are You Having Difficulty?

Repair or Service

Call your Parasound dealer first. If the dealer can't help you with your problem we encourage you to call Parasound's Technical Service Department at **415-397-7100**, Monday - Friday, 8am - 4pm Pacific Time. We can suggest other diagnostic tests you can easily perform.

If we determine that your JC 1+ should be returned to Parasound or an Authorized Parasound Warranty Center for inspection and possible servicing, we will provide the location of a warranty center near you or shipping instructions for the unit's return to Parasound.

Before You Return Any Unit to Parasound for Service

Before you send your unit to Parasound, you will need to obtain a specific Return Authorization (RA) number and shipping instructions from Parasound's Technical Department. The RA number must be clearly marked on the outer carton. Use the original factory packing materials and arrange adequate insurance to cover its value. You must include a copy of your purchase receipt, since this document establishes the validity of this unit's warranty. Warranty repairs are only performed by Parasound or Parasound Authorized warranty centers when your purchase receipt is from a Parasound Authorized Dealer or Parasound Authorized Reseller.

Shipments Will Be Refused by Parasound Under the Following Conditions:

1. Unit was sent without the Parasound-assigned RA number marked on the carton.
2. Unit was sent in an unsuitable shipping carton and packing inserts and was likely to have been damaged in transit.
3. Unit has inadequate packing materials and is likely to have been damaged in transit. Wrapping the JC 1+ with bubble wrap will not protect it during shipment.
4. Unit was shipped collect for shipping charges. We do not accept collect shipments.
5. Unit was shipped via USPS, the US Postal Service. We do not accept USPS shipments.
6. Unit was sent to an address other than the address instructed by our Technical Department.

Warranty Repair-USA

Please read the Parasound Limited Warranty carefully to understand the applicable rights and limitations. This section provides instructions for obtaining repairs, both for units covered under the Parasound Limited Warranty and for units or situations which are outside the Warranty. The complete warranty can be found at www.parasound.com.

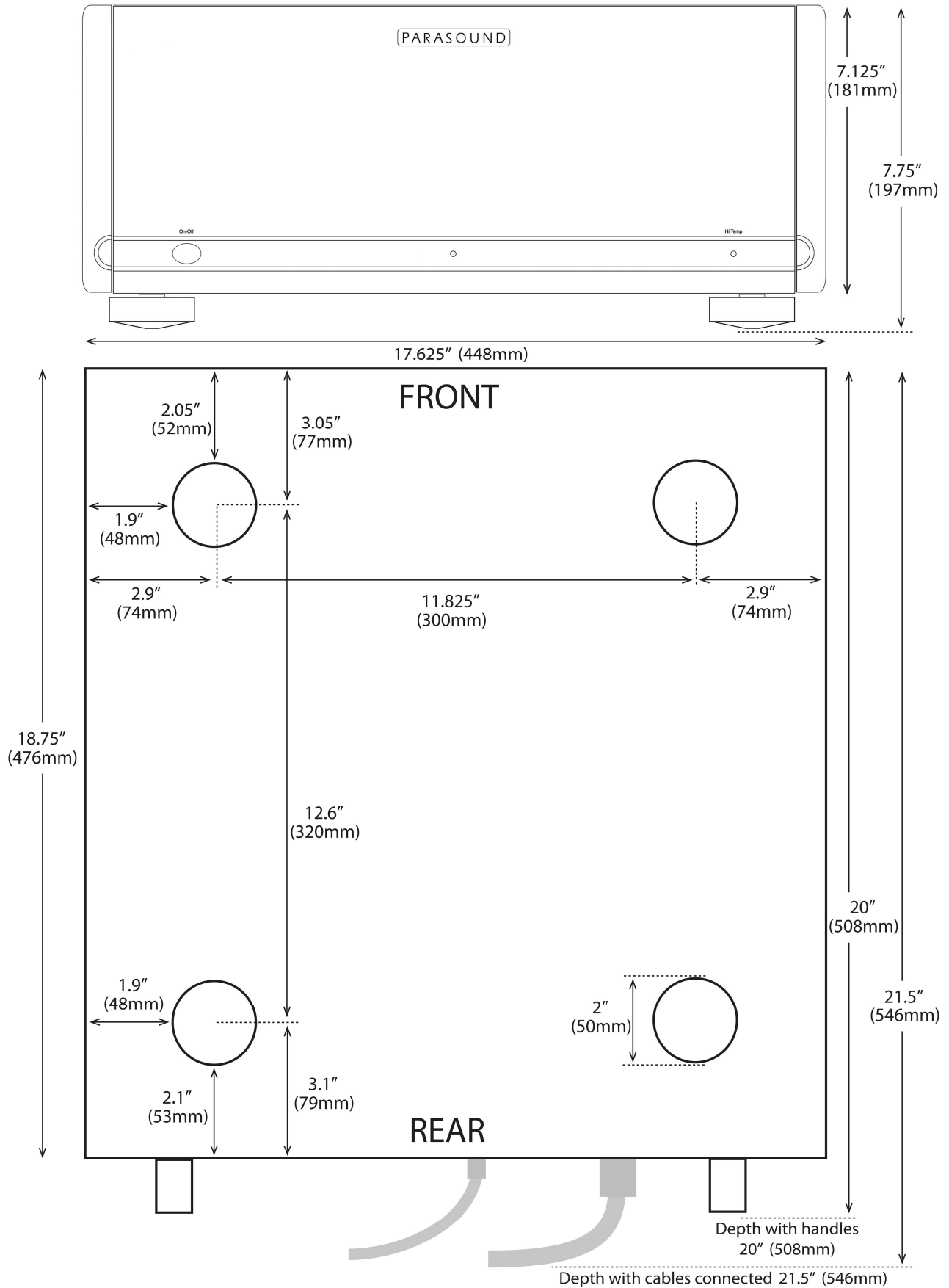
Unit is not eligible for repair under the terms of the Parasound warranty if:

1. Unit was not purchased from a Parasound Authorized Dealer.
2. You do not have the original bill of sale receipt from the Parasound Authorized Dealer.
3. You are not the original owner. The Parasound warranty is not transferable.
4. Unit's original serial number was removed, modified, or defaced.
5. Unit shows evidence of abuse and/or misuse.
6. Unit was altered in any way.
7. A prior repair was attempted by an unauthorized repair station.

Warranty for products purchased outside the USA

Please refer to www.parasound.com

Chassis Illustration and Dimensions



Specifications

Power Output

450 watts @ 8Ω
850 watts @ 4Ω
1300 watts @ 2Ω

Power measurements are with 120 VAC:
0.15% THD, RMS continuous power,
full audio band (20Hz - 20kHz)

Class A Power Output

25 Watts, bias set to high
10 Watts, bias set to low

Current Capacity

180 amps, peak

Slew Rate

> 130 volts per microsecond

Frequency Response

2 Hz - 120 kHz, +0/-2 dB
20 Hz - 20 kHz, +0/-0.25 dB

Total Harmonic Distortion (THD)

< 0.15% at full power
< 0.02% at typical listening levels

IM Distortion

< 0.03%

TIM

Unmeasurable

Damping Factor

> 1200 at 20Hz

Input Impedance

Unbalanced: 50kΩ
Balanced: 100kΩ, (50kΩ per leg)

S/N Ratio, inputs shorted

>122 dB, IHF A-weighted, bias set to Low
>120 dB, IHF A-weighted, bias set to High
>113 dB, Unweighted, bias set to Low
>111 dB, Unweighted, bias set to High

Total Gain

29dB (Gain switch set to normal)
23dB (Gain switch set to low)

Input Sensitivity for 28.28 V Output into 8 Ω

Unbalanced: 1 V
Balanced: 1 V per leg
(Gain switch set to normal)

DC Trigger Requirements

+9 Vdc to +12 Vdc, 5 mA

Audio Trigger Requirement

2.5 mV - 10 mV

XLR Pin Identification

1 = Ground (Shield)
2 = Positive
3 = Negative (Return)

Dimensions

Width: 17-5/8" (448 mm)
Height without feet: 7-1/8" (181 mm)
Height with feet: 7-3/4" (197 mm)
Depth: 20" (508 mm)
Depth with cables: 21-1/2" (546 mm)

Net Weight

83lb. (37.6 kg)

Shipping Weight

100lb. (45.4 kg)

Power Requirement

Standby: <1 Watt
Idle (bias set to low): 145 Watts
Idle (bias set to high): 275 Watts
Typical Listening levels: 400 Watts
Maximum: 1500 Watts

PARASOUND

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415-397-7100 www.parasound.com**