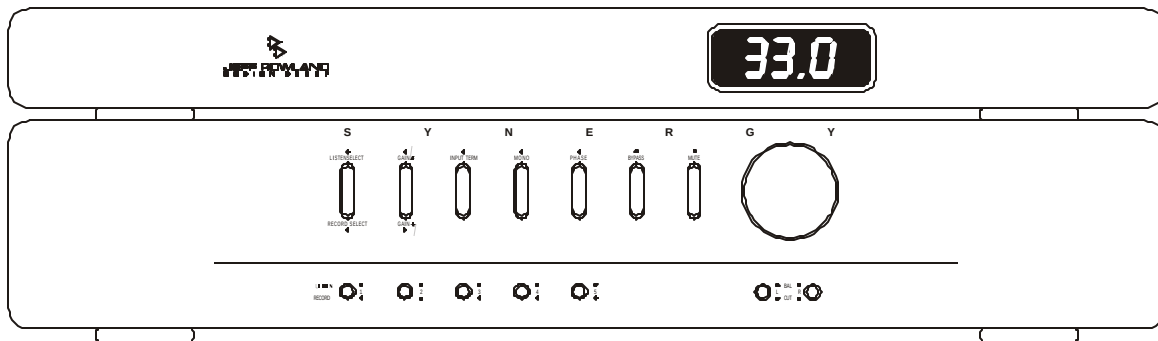


JEFF ROWLAND
DESIGN GROUP



Synergy III
Stereo Preamplifier Technology

The third generation of Synergy preamplifier from Jeff Rowland Design Group, the software-controlled Synergy *II*, features technology first conceptualized and created for the latest generation of amplifiers from JRDG. This circuit design incorporates changes to the basic implementation of the circuit itself and uses the latest in parts technology to improve upon the already capable Synergy II preamplifier.

The input section of the Synergy *II* remains unchanged from the previous generation preamplifier and utilizes a pair of audio input transformers custom designed with the assistance of Jeff Rowland Design Group using the latest in computer aided drafting techniques (CAD). These transformers enable the input section to accomplish a number of unique goals, including insensitivity to unbalanced source impedances, high common-mode rejection extending to well beyond the audio bandwidth, immunity from RF contamination and system ground loops, and the same input impedance and gain regardless of whether the input signal is truly balanced or unbalanced. *(For a more thorough description of transformer based inputs, please see the Jeff Rowland Design Group web site at: <http://www.jeffrowland.com/techtalk.htm>)*

Insensitive to unbalanced source impedances, the Synergy *II* has been designed to operate with the widest range of audio source components possible. Making the preamplifier immune to the effects of unbalanced source impedances means that in the real world where source components from different manufacturers will vary wildly in their design, a Jeff Rowland Design Group preamplifier will never be affected by these differences but will still provide the best possible sound quality from any CD player, surround processor, digital component, phono preamp, or analog source.

In the world of audio specifications, common mode rejection is the ability of a balanced audio component to reject noise, EMI, RF, and other artifacts. A high common mode rejection ratio improves dynamic range as the music is produced from a quiet, silent background free of hiss, background noise, artifacts, and ground loop hum. Because of the unique abilities of its transformer-based input section, the Synergy *II* realizes superior common-mode rejection, letting the subtlest details, fastest transients, and most powerful dynamics present themselves with ease and clarity.

With most amplifier designs, input impedance and gain will vary depending on whether the balanced or unbalanced inputs are used – generally, unbalanced inputs will have half of the output of balanced inputs. With the Synergy *II* preamplifier, because all inputs are balanced and unbalanced sources can be adapted, there is no difference between balanced and unbalanced inputs, meaning that there will be no differing characteristic in sound quality and output level depending on which inputs are used – both will provide the same seamless, neutral presentation.

From the input section, the delicate audio signal is then handed to a control circuit that is protected and allowed to function in the best possible environment. This portion of the preamplifier section is microprocessor controlled and fully shielded from the rest of the preamplifier while also preventing any interference from this board from affecting the audio portion of the preamp. Within the diamond-cut faceplate of the Synergy *II*, a form-fitting pocket is machined to house the user interface board. Once the board is

in place, the faceplate is bolted to the main chassis to seal off the board from any noise or interference from the rest of the preamplifier circuitry.

The volume control within the control circuit uses the most accurate and sonically neutral system available. A digitally controlled analog volume control is used to provide exact matching between both channels at every volume setting, as well as allowing the absolute simplest signal path possible. For each volume setting, the audio signal passes unscathed through only a single resistor. This unique system never suffers from the numerous problems found in conventional potentiometer controlled volume controls, including varying impedance and tracking accuracy, and avoids the issues associated with the use of DACs as volume controls, such as the distortions created by their internal polysilicon resistors. Inside the faceplate, the volume knob is attached to a laser-cut optical encoder wheel that is read by a light sensitive diode. This diode then sends the exact number of precise 0.5 dB steps to the volume control circuitry. The microprocessor within the unit then determines the knob rotation speed and raises or lowers the volume in either large or small increments for the most accurate and transparent volume control possible in the audio world today. The volume level is displayed by a green seven-segment LED display within the power supply that is easily read from the listening position. When not in use for more than 5 seconds, the volume control and display circuitry revert to a sleep mode to prevent any audible interference or distortion from corrupting the musical signal.

This unique volume control circuit is also the source of the gain circuit as well. To maintain equal output levels between sources, a ± 20 dB gain function has been added to the responsibilities of the volume control. This gain function will increase or decrease the level of each particular input so that the output level of each can be matched within 1 dB and prevent any differences in output level when switching from one input source to another. This gain circuit uses the exact same circuit as the volume control and is adjusted with a rocker switch on the front panel to prevent any change in the volume display. Because the gain circuit is the same circuit as the volume control, the audio signal is not affected by any adjustment in gain – since it is actually the volume control, any gain adjustment is absolutely transparent and does not affect the sonic characteristics of the audio signal.

The amplifier section of the Synergy II is contained on a small circuit board encased in the center of the main chassis of the preamplifier. This main chassis is machined from a solid block of aluminum and weighs approximately sixteen pounds. With the mass of the main chassis added to that of the faceplate, mechanical resonances outside the preamp have no chance to affect the audio signal sheltered within.

The primary difference between the Synergy II and the Synergy III is this new amplifier board. Now designed using the latest in Surface Mount Technology, this board is the epitome of compact and efficient audio circuit design. In nearly every other high-end audio component available, there are hundreds of small components or parts with little wire leads on the internal circuit boards. These leads are bent and protrude through holes in the board where they're soldered into place to comprise the complete circuit. In a few notably poor designs, these parts are arrayed in perfectly aligned little rows for visual appeal instead of sonic quality or care for signal path routing. This is to ease assembly without regard for the known negative consequences of this type of design.

By making use of surface mounted parts, JRDG has ensured that there are no leads that go through the board unless absolutely necessary, as every little component has a small metal tip or "leg" that lies flat on the board and is soldered directly to a small pad instead of through a hole. In essence, parts are soldered directly to the surface of the circuit trace itself, rather than through it. This presents a number of improvements over traditional printed circuit board construction:

- Lead inductance from each part's wire lead is eliminated or substantially reduced to lower distortion.
- Since they have no leads and no lead connections, parts are much smaller and take up less space or geometry on the circuit board.
- Overall circuit geometry is substantially reduced, meaning that the amount of space that the circuit actually occupies on the board is much smaller, leading to less generated or radiated noise and a much lower susceptibility to noise.
- Signal paths are considerably shorter because of reduced circuit geometry, meaning there is much less opportunity for any negative effects to harm the audio signal.
- Because the number of obstructions or holes in the board that have been placed for various layers of circuit or connections have been reduced, the circuit can be laid out optimally for the best possible audio reproduction.
- Better planing (the planes or layers of the board that are responsible for different portions of the circuit) can be laid out and organized to minimize their interaction with each other.
- Stored energy within the circuit and on the board as a whole is reduced to limit and eliminate the effect it has on the operations of parts of the circuit and on the audio signal itself.

This new amplifier board also utilizes the best possible tolerances for each part as well as new op-amps within the circuit itself. These new parts allow the Synergy IIi to lower distortion substantially below that of the previous generations of the preamp and increase detail retrieval, dynamic capabilities, and musical realism well beyond that of earlier designs. This board is then suspended from each corner and floated on soft vibration damping mounts to prevent any remaining vibrations from affecting the work of the board in the tiniest way.

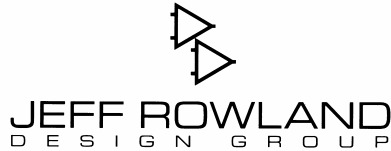
With any outside effects eliminated in the input and amplifier section of the preamp, the final aspect of proper preamplification that remains is the output section. The output section of the Synergy IIi uses the same optimized buffer system as the input section in order to isolate itself from any interference or impedance issues outside of the preamp: custom designed audio transformers. These transformers are housed in holes cut into the main portion of the preamp and held in place with a unique damping material to eliminate vibrational effects and preserve the subtlest details in the audio signal. The remainder of the output section is contained on a printed circuit board that is attached firmly to the rear panel of the preamplifier and again bolted to the chassis for yet another lowering of the mechanical resonant point of the entire preamplifier. The design of the rear panel allows the Synergy IIi to connect with any existing source or amplifier, including surround processors via the bypass function, to produce the most favorable interface possible through the balanced inputs. Balanced

to unbalanced adaptors are also provided to allow the use of unbalanced equipment with no ill effects. The rear panel utilizes surface mount technology as well, and allows the use of the preamp to listen to one source while recording another, provide the action to load an input for optimum impedance matching, reverse phase or absolute polarity, mute the outputs, or listen to any source monaurally. This is all accomplished via a system of microprocessor control that allows the control section, input section, output section, and power supply to “speak” to each other in order for each portion of the preamp to function as if it were a whole unit designed onto one large circuit board.

An external power supply completes the electronic design of the preamplifier; with the volume display housed in a slim, monolithic power supply chassis. The power supply features dual power out connectors to allow the use of the matching Cadence Phono Preamplifier in tandem with the Synergy Ili. This power supply uses a compact linear supply with power output capabilities more than adequate to supply both units at one time. This supply is encased in a housing that is again machined out of a solid block of aircraft grade aluminum to reduce any outside interference as well as shield the preamplifier section from any noise generated by the supply itself. The separate power supply is connected to the preamp by a flexible, custom manufactured umbilical cable that carries power as well as the microprocessor controlled volume display data.

The exterior shape of the preamplifier has been artistically designed with rounded corners and no sharp edges. The entire assembled chassis is finely constructed from pieces of solid aluminum, each cut to a specific depth and thickness determined by Golden Ratio mathematical proportions that, when bolted together, prevents any unwanted mechanical vibrations or resonances from reaching the audio signal within the unit. The exposed front surfaces of the preamplifier and power supply faceplates are each carefully machined in a unique process that uses a diamond tipped blade. This distinctive process was refined over many years to produce an artistic and attractive appearance which has been copied a number of times but never equaled. The raw faceplate metal is then finished with fine automobile polyurethane clear coat to preserve the clarity of the cut surface and allow the brilliant radiance of the diamond-cut process to shine. Every edge of the chassis is sealed with overlapping joints to prevent dust from entering the chassis; therefore the interior should never need cleaning over the lifetime of the product.

The Jeff Rowland Design Group Synergy Ili strives to attain the goal of completely removing any editorial comment on the audio signal that it passes from input to output. The final result is cleaner, clearer, faster, more musical and realistic sound reproduction from a smaller, more energy efficient preamplifier.



Synergy II/ Specifications

Overall Gain:	Adjustable for each input, ± 20 dB relative to unity gain (0 dB) in 0.5 dB increments.
Input impedance: Balanced Unbalanced	Adjustable for each input. 36k or 600 ohms 36k or 600 ohms
Output Impedance: Balanced Unbalanced	40 ohms 80 ohms
Maximum Input Level:	13 volts RMS at 0 dB gain.
Output Noise Level:	10 microvolts, 20-20 kHz bandwidth, 0 dB gain.
Signal to Noise Ratio:	Greater than 96 dB.
Channel Separation:	Greater than 100 dB, @ 20-20 kHz bandwidth.
Frequency Response:	5 Hz - 160 kHz, -3 dB.
THD + Noise:	0.0012%; 10 volt output, 600 ohm load.
Gain Range:	63.5 dB, 127 equal increments.
Gain Resolution:	0.5 dB ± 0.03 dB over entire range.
Channel Balance:	± 0.03 dB throughout entire range.
Power Consumption:	25 watts maximum.
Preamp Weight:	24 lbs./11 kg.
Power Supply Weight:	7 lbs./3 kg.
Preamp Dimensions:	17.5" (w) x 14.35" (d) x 5.75" (h)/ 44.5 cm (w) x 36.2 cm (d) x 14.6 cm (h).
Power Supply Dimensions:	17.5" (w) x 4.8" (d) x 1.5" (h)/ 44.5cm (w) x 12.2cm (d) x 3.8 cm (h).