Accuphase

STEREO POWER AMPLIFIER

P-3000

● Triple parallel push-pull output stage in each channel delivers plenty of linear power even into very low load impedances ● Instrumentation amplifier derived signal path design ● Advanced MCS+ circuit topology ● Bridged connection mode allows upgrading to true monophonic amplifier ● Massive Super Ring toroidal transformer rated for 700 VA ● 4-step gain control

A stereo power amplifier capable of delivering 400 watts into 1 ohm (with music signals) – Fully balanced signal paths as found in high-quality instrumentation amplifiers. Further refined MCS+ topology and current feedback design. Improved S/N ratio, minimal distortion, and great performance in all other areas. Power supply with massive 700 VA toroidal transformer and triple parallel push-pull arrangement of high-power transistors in each channel.

The P-3000 is based on the same design technology as the renowned P-7000 and P-5000 models. Using only carefully selected top quality parts throughout, the P-3000 is an ideal match for the C-2000 preamplifier.

A new feature in the P-3000 is the fact that all signal paths from the input terminals onwards are fully balanced, an approach otherwise found only in instrumentation amplifiers of the highest quality. In addition, the power amplifier section employs an improved version of MCS called MCS+ (Multiple Circuit Summing plus), as well as the famous Accuphase current feedback topology. S/N ratio, distortion, and other electrical characteristics are further improved. And of course, these refinements manifest themselves in even better sound quality.

In order to drive any kind of speaker with precision and authority, a power amplifier must provide extremely low output impedance (Note 1) and be capable of supplying a constant drive voltage at all times (Note 2). To realize constant-voltage capability over the entire frequency range, a powerful output stage supported by a capable power supply are necessary.

In the output stage of the P-3000, three pairs of high-power transistors are arranged in a parallel push-pull configuration for each channel. The devices are mounted to large heat sinks on both sides for efficient dissipation of thermal energy. Rated output power into an ultra-low impedance of 1 ohm is 400 watts per channel (music signals only). Power remains linear also when impedance changes, as exemplified by the rating of 300 watts into 2 ohms, 150 watts into 4 ohms and 75 watts into 8 ohms. Even speakers with very low impedance or with drastic impedance fluctuations can be driven effortlessly and accurately.

By using the P-3000 in bridged mode, it is possible to create a monophonic amplifier with even higher power reserves. This performance is sustained by a massive high-efficiency Super Ring toroidal transformer and large filtering capacitors.

Note 1 Low amplifier output impedance

When forming the load of a power amplifier, a loudspeaker generates a counterelectromotive force that can flow back into the amplifier via the NF loop. This phenomenon is influenced by fluctuations in speaker impedance and interferes with the drive performance of the amplifier. The output impedance of a power amplifier should therefore be made as low as possible by using output devices with high current capability. This absorbs the counterelectromotive force generated by the voice coil and prevents the occurrence of intermodulation distortion.

Note 2 Constant drive voltage principle

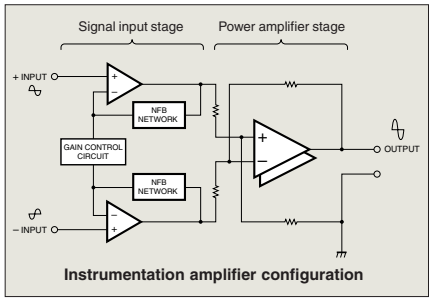
Even when the impedance of a load fluctuates drastically, the ideal power amplifier should deliver a constant voltage signal to the load. Figure 2 is a graph plotting the output voltage versus current characteristics. Even when the load changes, the output voltage remains almost constant, showing linear current progression. Actual measurement of clipping power at the extremely low load impedance of 1 ohm yields 400 watts. At 2 ohms, the figure is 330 watts, at 4 ohms 220 watts, and at 8 ohms 133 watts. This demonstrates the impressive performance reserves of this amplifier.

★1 ohm rating is for music signals only.

Fig. 2 Load impedance vs. output power
(Output voltage/output current)

Power amplifier with instrumentation amp configuration

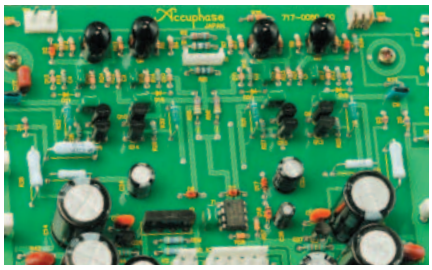
The P-3000 features a new "instrumentation amplifier" principle whereby all signal paths from the inputs to the power amp stage are fully balanced. This results in excellent CMRR (common mode rejection ratio) and minimal distortion. Another significant advantage is that external noise and other external influences are virtually shut out. The result is a drastic improvement in operation stability and reliability.



Instrumentation amplifier configuration

Further refined MCS+ topology

Accuphase's original MCS (Multiple Circuit Summing) principle uses a number of identical circuits



connected in parallel to achieve superior performance characteristics. The MCS+ is a further refined version of this approach. Improvements in the bias circuitry of the input-stage buffer amplifier result in greater stability. This in turn makes it possible to extend the parallel operation approach to the class-A drive stage of the current/voltage converter, thereby further lowering the noise floor.

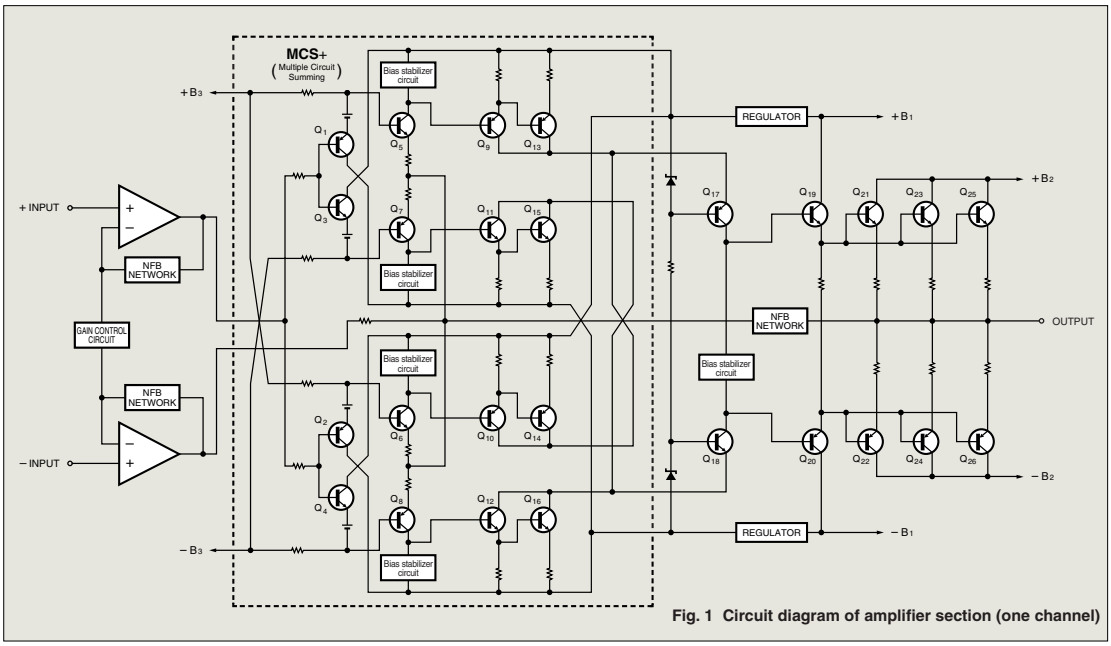
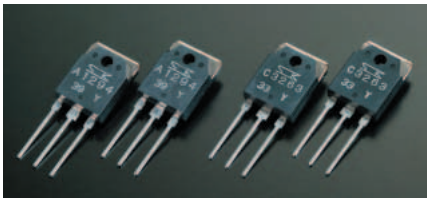


Fig. 1 Circuit diagram of amplifier section (one channel)

Triple parallel push-pull power unit delivers guaranteed linear power output of 300 watts into 2 ohms, 150 watts into 4 ohms, and 75 watts into 8 ohms

The output stage uses high-power transistors with a rated collector dissipation of 130 watts. These devices feature excellent frequency response, current amplification linearity, and switching characteristics. The transistors are arranged in a triple parallel push-pull configuration and mounted on a massive heat sink. This assures

■ Power amplifier assembly with 3 parallel push-pull transistor pairs per channel mounted directly to large heat sink, MCS+ circuitry, and current feedback amplifier



effective heat dissipation and reduces the impedance of the output stage.

Current feedback circuit topology prevents phase shifts in high frequency range

The P-3000 employs the renowned current feedback principle developed by Accuphase. At the sensing point of the feedback loop, the impedance is kept low and current detection is performed. An impedance-converting amplifier then turns the current into a voltage to be used as the feedback signal. Since the impedance at the current feedback point (current adder in Figure 3) is very low, there is almost no phase shift. Phase compensation can be kept to a minimum, resulting in excellent transient response and superb sonic transparency. Minimal amounts of NFB are used to maximum effect, providing natural energy response. Figure 4 shows frequency response for different gain settings of the current feedback amplifier. The graphs demonstrate that response remains uniform over a wide range.

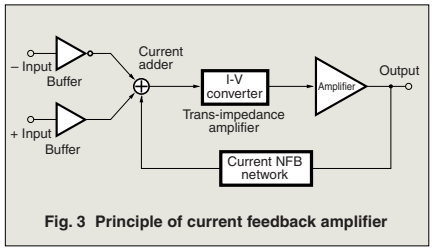


Fig. 3 Principle of current feedback amplifier

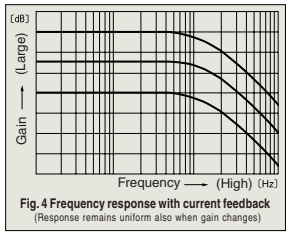


Fig. 4 Frequency response with current feedback
(Response remains uniform also when gain changes)

Robust power supply with "Super Ring" toroidal transformer and high filtering capacity

The P-3000 features a massive toroidal power transformer with a maximum rating of 700 VA. The transformer is housed in a case filled with a material that transmits heat and absorbs vibrations. This completely prevents any adverse influences on other circuit parts. A toroidal transformer uses heavy-gauge copper wiring on a doughnut-shaped core, resulting in low impedance and high efficiency while allowing compact dimensions, which is especially useful for audio applications.

Two ultra-large aluminum electrolytic capacitors rated for 47,000 µF each serve to smooth out the pulsating direct current from the rectifier, providing more than ample filtering capacity.

Instrumentation amp type gain control minimizes residual noise

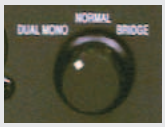
The gain control switches gain in the first amplification stage after signal input. Four settings are available (MAX, –3 dB, –6 dB, –12 dB). With this approach, reducing gain also results in reduced noise. This is especially beneficial when using highly efficient speaker systems where the noise floor could be a problem.

Bridged connection allows upgrading to a true monophonic amplifier with 800 watts into 2 ohms (music signals only), 600 watts into 4 ohms, and 300 watts into 8 ohms

Bridged connection results in a monophonic amplifier with four times the power output than during stereo operation. This gives effortless dynamic power.

■ **Easy switching to dual mono mode**

In the dual mono position of the mode selector, the left-channel signal is supplied to both speaker terminals, which can be used for bi-amping with dedicated low-range and high-range drivers.



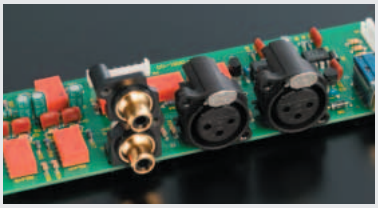
■ **Oversize speaker terminals accept also Y lugs or banana plugs**

The sturdy terminals can handle even very large gauge speaker cable. The connectors are made of extruded high-purity brass material and are gold-plated for utmost reliability and minimum contact resistance. Y lugs or banana plugs can also be used.

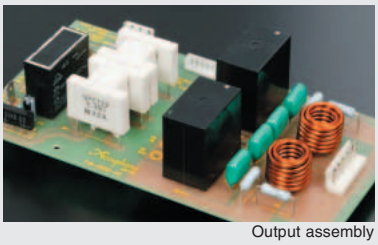
■ **Balanced connection prevents induced noise**

■ **Input selector button (balanced/unbalanced) on front panel**

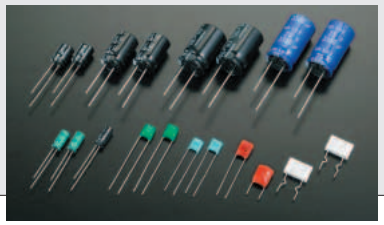
■ **Large analog power meters with on/off switch**



Unbalanced and balanced input connectors

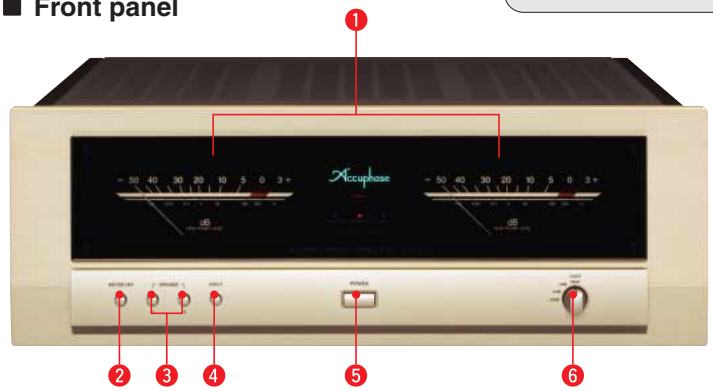


Output assembly



High-quality, high-reliability parts

■ Front panel



■ Rear panel

❶ Right/left-channel power meters (dB and % scale)
❷ Meter operation/illumination switch
ON OFF
❸ Speaker A/B selector buttons
❹ Input selector button
BALANCE UNBALANCE
❺ Power switch
❻ Gain selector
MAX –3 dB –6 dB –12 dB
❼ Unbalanced inputs
❽ Balanced inputs
①: Ground
②: Inverted (–)
③: Non-inverted (+)
❾ Mode selector
DUAL MONO NORMAL BRIDGE
❿ Right/left-channel speaker output terminals for A and B
⓫ AC power supply connector*

Remarks
★ *This product is available in versions for 120/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.*
★ *The shape of the AC inlet and plug of the supplied power cord depends on the voltage rating and destination country.*

■ Supplied accessories: • AC power cord

GUARANTEED SPECIFICATIONS

[Guaranteed specifications are measured according to EIA standard RS-490.]

● **Continuous Average Output Power (20 - 20,000 Hz)**

Stereo operation (both channels driven)	400 watts per channel into 1 ohm (✻) 300 watts per channel into 2 ohms 150 watts per channel into 4 ohms 75 watts per channel into 8 ohms
Monophonic operation (bridged connection)	800 watts into 2 ohms (✻) 600 watts into 4 ohms 300 watts into 8 ohms

Note: Load ratings marked ✻ apply only to operation with music signals.

● **Total Harmonic Distortion** Stereo operation (both channels driven)
0.05%, with 2-ohm load
0.02%, with 4 to 16-ohm load
Monophonic operation (bridged connection)
0.02%, with 4 to 16-ohm load

● **Intermodulation Distortion** 0.005%

● **Frequency Response** At rated output: 20 ~ 20,000 Hz +0, –0.2 dB
At 1 watt output: 0.5 ~ 160,000 Hz +0, –3.0 dB

● **Gain (GAIN selector in MAX position)**
28.0 dB (stereo and monophonic operation)

● **Gain settings** MAX, –3 dB, –6 dB, –12 dB

● **Output Load Impedance** Stereo operation: 2 to 16 ohms
Monophonic operation: 4 to 16 ohms
[★ With music signals, load impedances of 1 Ω (stereo) or 2 Ω (mono) can be driven.]

● **Damping Factor** 150

● **Input Sensitivity (with 8-ohm load)**
Stereo operation: 0.98 V for rated output, 0.11 V for 1 watt output
Monophonic operation: 1.95 V for rated output, 0.11 V for 1 watt output

● **Input Impedance** Balanced: 40 kilohms
Unbalanced: 20 kilohms

● **Signal-to-Noise Ratio (A-weighted, input shorted)**
120 dB (GAIN selector in MAX position)
125 dB (GAIN selector in –12 dB position) At rated output

● **Output Level Meters** Logarithmic scale, with off switch
–50 dB to +3 dB (dB/% Scale)

● **Power Requirements** AC 120 V/230 V (Voltage as indicated on rear panel) 50/60 Hz

● **Power Consumption** 55 watts idle
480 watts accordance with IEC 60065

● **Maximum Dimensions** Width 465 mm (18-5/16")
Height 180 mm (7-1/16")
Depth 425 mm (16-3/4")

● **Mass** 24.0 kg (52.9 lbs) net
28.0 kg (61.7 lbs) in shipping carton

• Specifications and design subject to change without notice for improvements.

Accuphase
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