

# Accuphase

STEREO POWER AMPLIFIER

## P-5000

● Powerful 6-parallel push-pull output stage in each channel delivers linear power down to very low load impedances ● Input stage with MCS topology ● Current feedback circuit combines excellent sound quality with total operation stability ● Bridged connection mode allows upgrading to true monophonic amplifier ● Massive Super Ring toroidal transformer rated for 1 kVA ● 4-step gain control





**Stereo power amplifier is ideal match for C-2400 — MCS technology in input stage improves S/N ratio, distortion ratings and other characteristics. 6 pairs of wide-band high-power transistors in parallel push-pull configuration for each channel. Massive 1 kVA toroidal power transformer supports 650 watts of power into ultra-low 1-ohm impedance. 4-step gain control effectively reduces noise.**

The P-5000 continues the distinguished design policy of the M-8000 and P-7000. This stereo power amplifier uses carefully selected top quality parts throughout and is an ideal match for the C-2400 preamplifier. MCS topology in the input stage reduces noise even further. Refined technology and inspired design result in superb performance and flawless 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 these design goals, a power supply that fully meets the demands of the output stage is necessary. In the output stage of the P-5000, six pairs of high-power transistors with a rated collector dissipation of 150 watts are arranged in a parallel push-pull configuration for each channel. The devices are mounted to large heat sinks for efficient dissipation of thermal energy. Rated output power into 1 ohm is 650 watts per channel (music signals only). Power remains linear also when impedance changes, as exemplified by the rating of 400 watts into 2 ohms, 200 watts into 4 ohms and 100 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-5000 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.

The important input stage also has been given due attention. Another Accuphase innovation called MCS (Multiple Circuit Summing) helps to minimize noise. Current feedback topology assures totally stable operation up to very high frequencies. Balanced inputs shut out external noise. The copper foil side of the PCBs and all input and output terminals and major signal carrying points are gold plated, for enhanced signal purity.

#### 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 660 watts. At 2 ohms, the figure is 500 watts, at 4 ohms 310 watts, and at 8 ohms 171 watts. This demonstrates the impressive performance reserves of this amplifier.

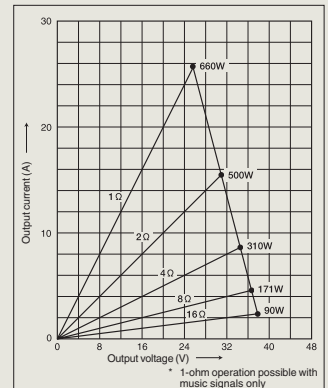
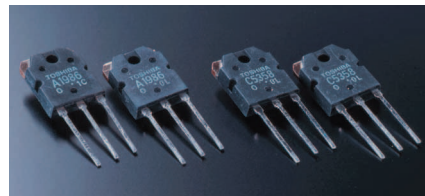


Fig. 2 Output power vs. load impedance (output voltage/output current: actual measurements)

#### 6-parallel push-pull power unit delivers guaranteed linear power output of 400 watts into 2 ohms, 200 watts into 4 ohms and 100 watts into 8 ohms

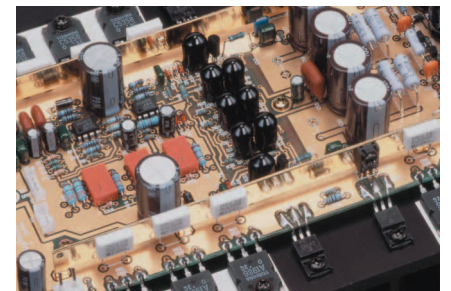
The output stage uses high-power transistors with a rated collector dissipation of 150 watts and collector current of 15 amperes. These devices boast excellent frequency response, current amplification linearity, and switching characteristics. The



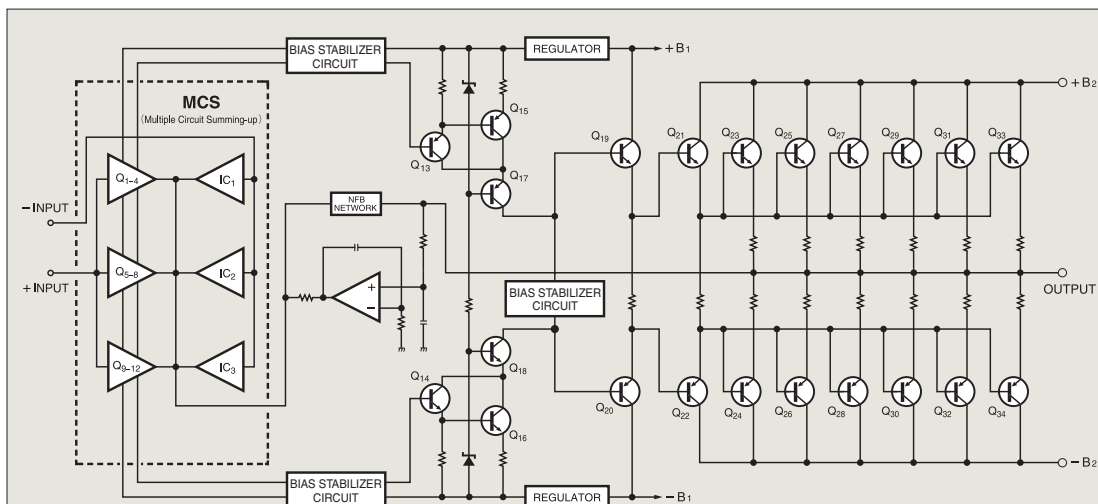
transistors are arranged in a 6-parallel push-pull configuration (Figure 1) for ultra-low impedance and mounted on a massive heat sink made from diecast aluminum. This assures effective heat dissipation and reduces the impedance of the output stage. Power linearity is maintained down to ultra-low loads, which demonstrates the impressive capabilities of this amplifier.

#### MCS topology in input stage reduces residual noise and drastically improves S/N ratio

The input stage features Accuphase's original MCS (Multiple Circuit Summing) design. Three separate



unit amplifiers for the input signal are connected in parallel, minimizing noise and distortion and greatly improving other performance parameters as well. This approach yields further improved sound quality.



#### NFB switching type gain control reduces residual noise

Because the current feedback type amplifier circuitry is very stable and introduces little phase shift, an NFB switching gain control has become possible (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.





### Current feedback circuit topology prevents phase shifts in high frequency range

The P-5000 employs the renowned current feedback principle developed by Accuphase. At the sensing point of the feedback loop, the impedance is

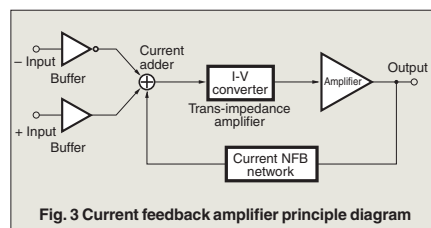


Fig. 3 Current feedback amplifier principle diagram

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.

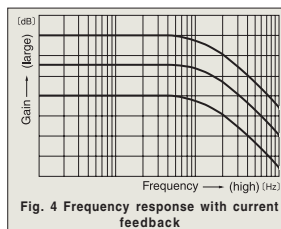


Fig. 4 Frequency response with current feedback

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

The P-5000 features a massive toroidal power transformer with a maximum rating of 1 kVA. The transformer is housed in a non-resonant aluminum 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. Two ultra-large aluminum electrolytic capacitors rated for 47,000  $\mu\text{F}$  each serve to smooth out the pulsating direct current from the rectifier, providing more than ample filtering capacity.



■ Power amplifier assembly with 6 parallel push-pull transistor pairs per channel mounted directly to large aluminum diecast heat sinks, MCS circuitry, and current feedback amplifier



**Bridged connection allows upgrading to a true monophonic amplifier with 1,300 watts into 2 ohms (music signals only), 800 watts into 4 ohms, and 400 watts into 8 ohms**

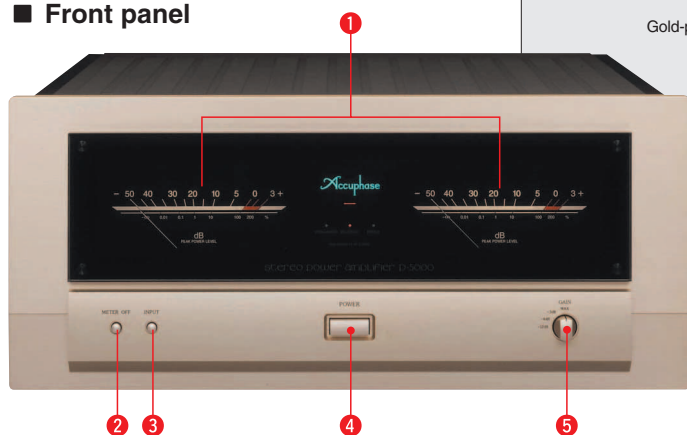
Bridged connection results in a monophonic amplifier with four times the power output than during stereo operation. Dynamic power with an almost unlimited feel is the result.

### Easy switching between dual mono/stereo/bridged

A mode selector on the rear panel makes it simple to switch between dual mono, stereo, or bridged operation. A mode selector on the rear panel makes it simple to switch between dual mono, stereo, or bridged operation. Dual mono can be used for example to drive subwoofers or to obtain the same single-channel signal at both speaker terminals, for bi-amping with dedicated low-range and high-range devices.



### Front panel



### Rear panel



- 1 Left/right-channel power meters (dB and % scale)
- 2 Meter operation/illumination switch ON OFF
- 3 Input selector  
BALANCE UNBALANCE
- 4 Power switch
- 5 Gain selector  
MAX -3 dB -6 dB -12 dB

- 6 Unbalanced inputs
- 7 Balanced inputs  
1 Ground 2 Inverted (-)  
3 Non-inverted (+)
- 8 Left/right-channel speaker output terminals
- 9 Mode selector  
DUAL MONO NORMAL BRIDGE
- 10 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

### ■ 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.

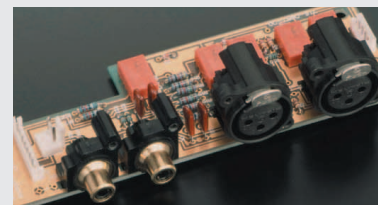


### ■ Balanced connection prevents induced noise

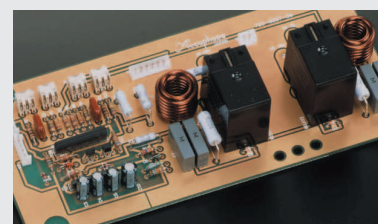
### ■ Input selector button (balanced/unbalanced) on front panel

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

### ■ PCB copper foil and all major signal path components are gold-plated



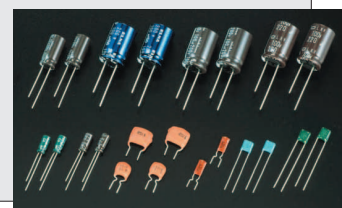
Unbalanced and balanced input connectors



Assembly with meter and protection circuitry



Gold-plated parts



High-quality, high-reliability parts

## 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)	650 watts per channel into	1 ohm(*)
	400 watts per channel into	2 ohms
	200 watts per channel into	4 ohms
	100 watts per channel into	8 ohms
Monophonic operation (bridged connection)	1,300 watts into	2 ohms(*)
	800 watts into	4 ohms
	400 watts into	8 ohms

Note: Values denoted by (\*) symbol are for music signals only.

### ● Total Harmonic Distortion

Stereo operation (both channels driven)	0.05%, with 2 ohm load
	0.03%, with 4 to 16 ohm load
Monophonic operation (bridged connection)	0.03%, with 4 to 16 ohm load

### ● Intermodulation Distortion

0.003%

### ● 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

28.0 dB (GAIN selector setting: MAX)

### ● Gain switching

MAX (28 dB), -3 dB (25 dB), -6 dB (22 dB), -12 dB (16 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

270 (also in stereo operation)

### ● Input Sensitivity (with 8 ohm load)

Stereo operation	1.12 V for rated output
	0.11 V for 1 watt output
Monophonic operation	2.25 V for rated output
	0.11 V for 1 watt output

### ● Input Impedance

Balanced: 40 kilohms, Unbalanced: 20 kilohms

### ● Signal-to-Noise Ratio

120 dB at rated output (A-weighted, input shorted)

### ● Output Level Meters

Logarithmic scale, dB/% indication

### ● Power Requirements

AC 120V / 230V, 50/60 Hz  
(Voltage as indicated on rear panel)

### ● Power Consumption

75 watts idle  
630 watts in accordance with IEC-65

### ● Maximum dimensions

Width 465 mm (18-5/16")  
Height 221 mm (8-11/16")  
Depth 461 mm (18-1/8")

### ● Weight

31.2 kg (68.8 lbs) net  
37.0 kg (81.6 lbs) in shipping carton

