

# Accuphase

STEREO POWER AMPLIFIER

## P-370

- 3-parallel push-pull output stage delivers linear power into ultra-low impedance loads
- Current feedback circuit topology combines excellent sound quality with total operation stability
- Bridged connection mode allows upgrading to true monophonic amplifier
- Massive Super Ring toroidal transformer
- Balanced inputs
- Two sets of large speaker connectors





**The embodiment of musical power. Witness a stereo power amplifier capable of delivering 400 watts of linear power into 1-ohm loads. Current feedback topology guarantees stable operation up to ultra high frequencies. Massive power supply with 700 VA toroidal transformer, and wide-band high-power transistors in 3-parallel push-pull configuration ensure constant-voltage drive.**

In order for an amplifier to drive loudspeakers to optimum performance, two major goals must be realized: very low output impedance (Note 1), and constant drive voltage (Note 2). Low impedance not only ensures accurate speaker drive but also absorbs the counterelectromotive force generated by the voice coil, thereby eliminating a major source of intermodulation distortion. Accuphase amplifiers are capable of driving any kind of speaker load with optimum results, which is one of the reasons behind the high praise that these products invariably receive.

The P-370 is a stereo power amplifier which fully implements these advanced circuit design principles. The output stage uses three pairs of high-power transistors in each channel, arranged in a parallel push-pull configuration. These devices are mounted to massive heat sinks, for efficient dissipation of thermal energy. Power linearity is maintained down to extremely low load impedances. This allows the amplifier to easily drive even speakers with very low impedance or uneven impedance curves. Using the P-370 in bridged mode creates a mono amplifier with even more impressive power reserves.

The power supply section which acts as the energy source for the amplifier employs a high-efficiency "Super Ring" toroidal transformer in combination with large filtering capacitors. Current feedback topology combines total operation stability with excellent frequency response, while requiring only minimal amounts of negative feedback. Balanced inputs make the amplifier impervious to externally induced noise during signal transmission. The front panel features two large analog power meters which give the amplifier an elegant look. For use in an audiovisual system, the meter lights can be switched off so as not to interfere with the monitor image.

**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 output circuitry. The internal impedance of a power amplifier should therefore be made as low as possible by using output devices with high current capability.

**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. When the supplied voltage remains constant for any impedance, output power will be inversely proportional to the impedance of the load. A conventional amplifier can be easily made to operate in this way down to a load impedance of about 4 ohms. However, at 2 ohms and below, much more substantial output reserves are needed. This can only be achieved by a thorough redesign of all basic amplifier aspects.

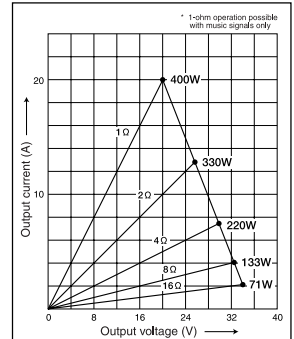
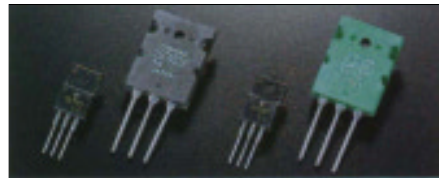


Figure 2 Load impedance vs. output power (output voltage/output current) of P-370

**Triple-parallel power units with push-pull configuration deliver ample linear power: 300 watts per channel into 2 ohms, 150 watts into 4 ohms, or 75 watts into 8 ohms**

The output stage uses high power transistors with excellent linearity and switching characteristics, rated for a collector dissipation of 150 watts and collector current of 15 amperes.



These transistors are arranged in a 3-parallel push-pull configuration (Figure 1) and mounted on massive heat sinks, for efficient heat dissipation. This enables the P-370 to effortlessly drive even speakers with extremely low impedance or with reactive loads. Figure 2 shows the output/voltage characteristics at various load impedances. It can be seen that output voltage remains nearly

constant regardless of load, which means that output current increases linearly. The actually measured clipping power is an impressive 400 watts into 1 ohm, 330 watts into 2 ohms, 220 watts into 4 ohms, or 133 watts into 8 ohms.

**Current feedback circuit topology prevents phase shifts**

The P-370 employs the so-called current feedback principle. Figure 3 shows the operating principle of this circuit. At the sensing point of

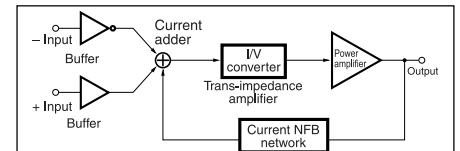


Figure 3 Principle of current feedback amplifier

the feedback loop, the impedance is kept low and current detection is performed. An impedance-converting amplifier then converts 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.

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.

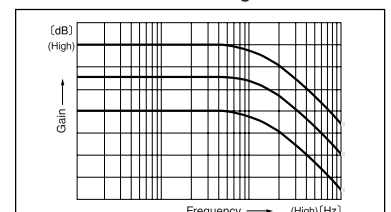


Figure 4 Frequency response with current feedback (response remains uniform also when gain changes)

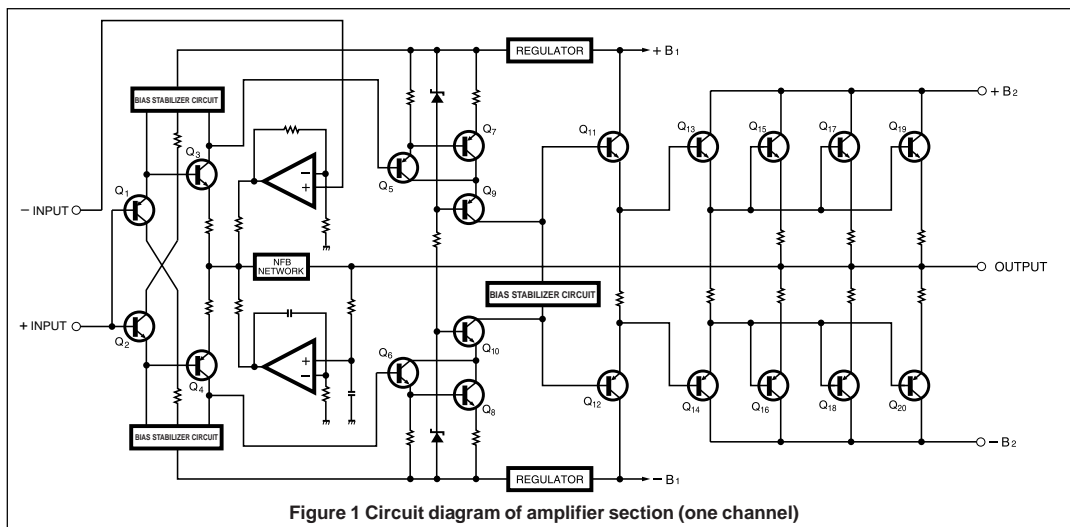


Figure 1 Circuit diagram of amplifier section (one channel)

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

The P-370 features a large toroidal power transformer with a rating of about 700 VA. The transformer is housed in an enclosure filled with a material that transmits heat and absorbs vibrations. A toroidal transformer uses



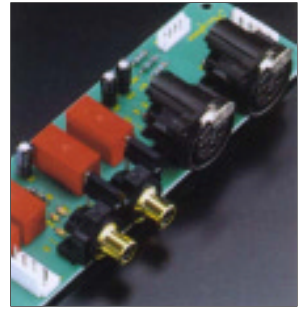
heavy-gauge copper wiring on a doughnut-shaped core. This results in low impedance and high efficiency, while allowing compact dimensions. In particular, the "Super Ring" transformer used in the P-370 has various advantages, such as the near-circular core caliber, allowing near-circular coil windings with high packing density. Two ultra-large aluminum electrolytic capacitors



rated for 47,000 uF each serve to smooth out the pulsating direct current from the rectifier, providing more than ample filtering capacity.

**Balanced connection reliably blocks induced noise**

Balanced signal transmission means that two signal lines are used which carry the same signal with opposite phase. On the receiving side, the signals are mixed, which cancels out any noise, leaving only the pure original signal.



Unbalanced and balanced input connectors

**Bridged mode creates a true monophonic amplifier with 600 watts into 4 ohms or 300 watts into 8 ohms**

Bridged operation means that two amplifiers are driven by the same signal voltage but with opposite phase. This turns the unit into a high-grade monaural amplifier with even higher output capability.



■ Output stage of one channel with 3-parallel push-pull transistors mounted directly to large heat sinks. Power amplifier assembly with current feedback amplifier circuitry.

## Large direct-reading analog power meters

Power levels can be easily monitored thanks to the large analog power meters which cover a wide dynamic range and provide direct readings. Switches for meter on/off and illumination control are also provided.

## Easy switching between dual mono operation and bridged connection

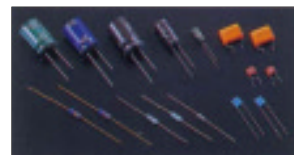
A mode selector on the rear panel makes it simple to switch between dual mono, stereo, or bridged operation. The dual mono position is useful for example to drive a center woofer in mono,



or to obtain the same signal from both speaker outputs for driving a bi-amped speaker setup.

## Two sets of speaker outputs

The large speaker terminals accept heavy-gauge speaker cable. Two sets of outputs with an A/B speaker selector are provided. Both outputs can also be used at the same time, which allows bi-wiring (supplying the same signal via dual leads to speakers with separate high-frequency and low-frequency inputs).

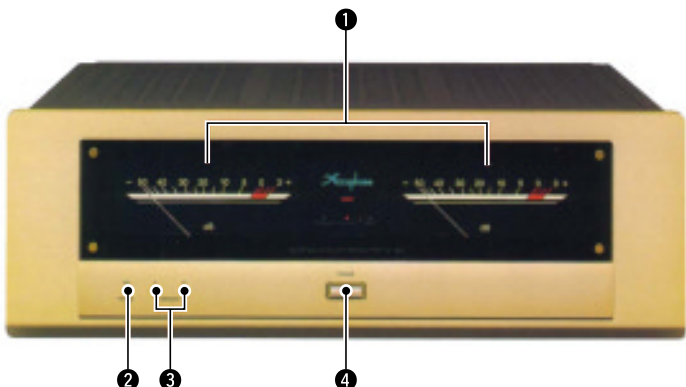


High-quality, high-reliability parts used in P-370

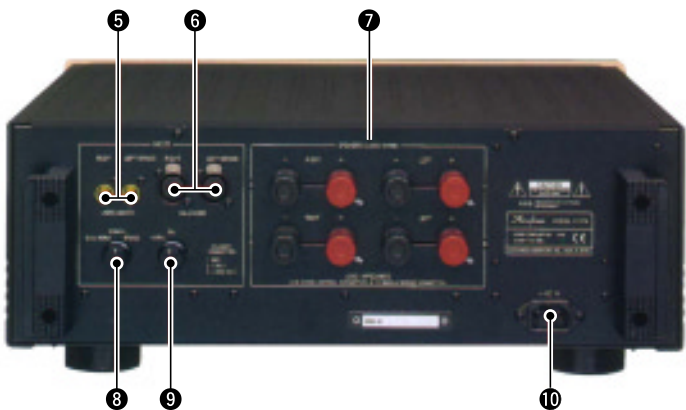


Assembly with protection circuitry, etc.

### FRONT PANEL



### REAR PANEL



- |  |   |
|--|---|
| 1 Power meters for left and right channel (dB scale) | 7 Speaker output terminals for left and right channel |
| 2 Meter operation/illumination switch ON OFF         | 8 Mode selector DUAL MONO NORMAL BRIDGE               |
| 3 SPEAKER A/B switches                               | 9 Input selector UNBAL BAL                            |
| 4 Power switch                                       | 10 AC input connector (for supplied power cord)*      |
| 5 Unbalanced inputs                                  |   |
| 6 Balanced input connectors                          |   |
| 1 Ground 2 Inverted (-)                              |   |
| 3 Non-inverted (+)                                   |   |

#### 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 accessory: • AC power cord

## P-370 Guaranteed Specifications

(Guaranteed specifications are measured according to EIA standard RS-490.)

### Continuous Average Output (20 to 20,000 Hz)

Stereo mode (both channels driven)	400	watts per channel into 1 ohms*
	300	watts per channel into 2 ohms
	150	watts per channel into 4 ohms
	75	watts per channel into 8 ohms

Note: Ratings marked ★ are for music signals only.

Monophonic mode (bridge connection)	800	watts into 2 ohms*
	600	watts into 4 ohms
	300	watts into 8 ohms

Note: Ratings marked ★ are for music signals only.

### Total Harmonic Distortion

Stereo mode (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

0.003%

### 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 (in stereo and monophonic operation)

### Output Load Impedance

Stereo operation: 2 to 16 ohms  
Monophonic operation: 4 to 16 ohms

★ With music signals, load impedance of 1 ohm (stereo) or 2 ohms (mono) can be driven.

### Damping Factor

200 (stereo/monophonic operation)

### Input Sensitivity

Stereo mode (with an 8-ohm load)	0.98 V	for rated output
	0.11 V	for 1 watt output
Monophonic mode	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 (rated continuous average output)

### Output Level Meters

-50 dB to +3 dB, logarithmic scale, OFF switch provided

### Power Requirements

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

### Power Consumption

44 watts idle  
475 watts in accordance with IEC-65  
335 watts at rated power output into 8 ohms

### Maximum Dimensions

Width: 475 mm (18-11/16")  
Height: 180 mm (7-1/16")  
Depth: 417 mm (16-7/16")

### Weight

24.4 kg (53.8 lbs) net  
29.0 kg (63.9 lbs) in shipping carton