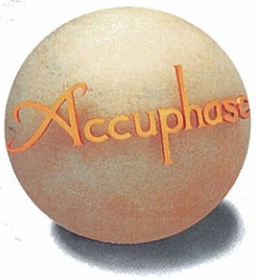
Accuphase

STEREO POWER AMPLIFIER

P-450

● 4-parallel push-pull output stage delivers quality power:200 watts per channel into 8 ohms ● Current feedback topology assures stable operation and superb sound quality ● Bridge mode creates a true monophonic amplifier ● Large power supply with"Super Ring"toroidal transformer Balanced inputs ● Large speaker connectors



This new power amplifier makes musical dynamics truly come alive in your listening room. It combines impressive vigor with high detail resolution. High acclaimed Accuphase current feedback topology guarantees stable operation and great sound even under difficult conditions. A generously dimensioned power supply and wide-band, high-performance power transistors connected in a 4-parallel push-pull arrangement deliver ample 200 watts into 8 ohms in stereo operation or 600 watts into 8 ohms when used as a mono amplifier.

The stereo power amplifier P-450 reflects the extensive know-how that Accuphase has gained in building a succession of world-class amplifiers. For the P-450, all circuit parts and components were carefully selected for their electrical and sonic performance. This meticulous attention to detail, in conjunction with features such as the current feedback topology developed by Accuphase, ensures transparent and utterly natural sound that is bound to captivate the heart of every audiophile and music lover.

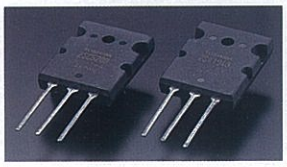
For faithful music reproduction, a power amplifier must be able to supply ample energy regardless of load conditions. This requires a low-impedance power supply section designed with ample performance margin. The P-450 excels in this regard, thanks to a highly efficient "Super Ring" toroidal transformer in combination with large filtering capacitors. In the output stage, newly developed high-power transistors are used in a 4-parallel push-pull arrangement. This enables the P-450 to drive even difficult reactive loads with ease and authority. A front-panel switch for bridged mode operation is also provided, which turns the P-450 into a monaural amplifier delivering even higher output.

The amplifying circuitry of the P-450 features the Accuphase current feedback principle that has gained high acclaim the world over. This circuit combines superb sonic qualities with extraordinary stability of operation and excellent frequency response characteristics. It requires only minimal phase compensation in the high frequency range, and response is not affected by gain. NFB can be kept desirably low, which results in drastically improved transient response.

The massive diecast aluminum heat sinks on both sides of the amplifier not only look impressive but are essential to assure stable performance. The sound of the P-450 is powerful and dynamic, yet subtle and absolutely true to the musical source.

Modular Power Units Using 4-Parallel Push-Pull Configuration Deliver 400 Watts Per Channel Into 2 Ohms, 400 Watts Into 4 Ohms and 200 Watts Into 8 Ohms

The output stage uses newly developed quality devices with high collector dissipation, excellent frequency characteristics and outstanding reliability. The transistors are rated for a collector dissipation of 150 watts and collector current of 15 amperes. They also have excellent linearity of forward-current transfer ratio and outstanding switching characteristics. The devices are arranged in a 4-parallel push-pull configuration (see Fig. 1) and directly mounted on the massive heat sink made from diecast aluminum. This assures effective heat dissipation and yields impressive output capability on the order of 400 watts per channel into two ohms, 300 watts per channel into four ohms and 200 watts into eight ohms. The amplifier can drive even difficult reactive low-impedance speaker loads with ease.



Current Feedback Circuit Topology Prevents Phase Shifts

In order to improve the characteristics of an amplifier, a commonly employed technique called negative feedback (NFB) routes part of the output signal back to the input. Conventional amplifiers employ voltage NFB, but the P-450 uses the signal current rather than the voltage for feedback. Figure 2 shows the operating principle of this circuit. At the sensing point of the feedback loop, current detection with low impedance is performed. A trans-impedance amplifier then converts the current into a voltage to be used as the feedback signal. Since the impedance at the current

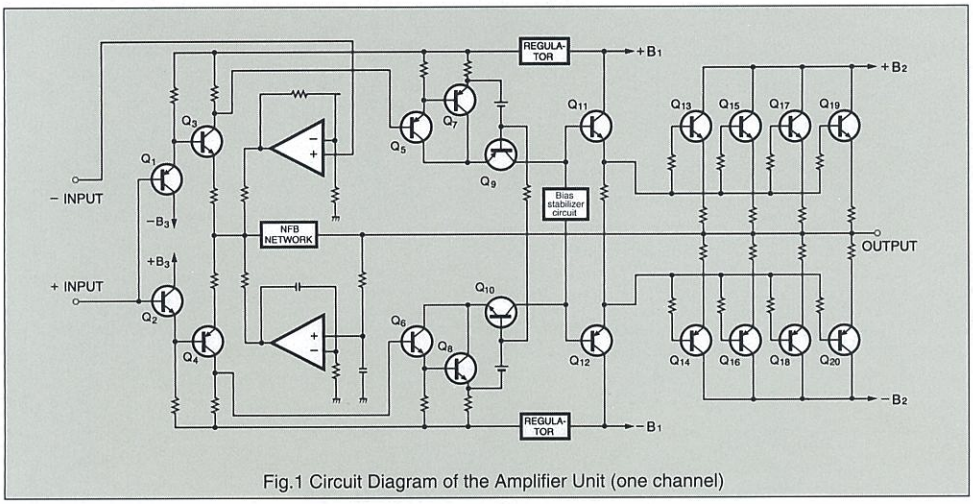


Fig.1 Circuit Diagram of the Amplifier Unit (one channel)

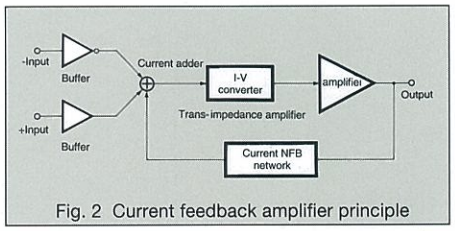


Fig. 2 Current feedback amplifier principle

feedback point (current adder in Fig. 2) is very low, there is almost no phase shift. Phase compensation can be kept at a minimum, resulting in excellent transient response and natural energy balance. Figure 3 shows frequency response for different gain settings of the current feedback amplifier. With this circuit, there is virtually no change in frequency response when gain is altered, and response remains uniform over a wide range.

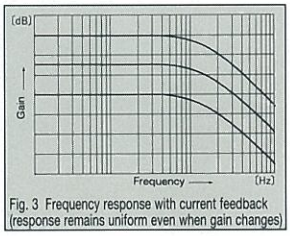


Fig. 3 Frequency response with current feedback (response remains uniform even when gain changes)

Bridged Mode Creates True Monophonic Amplifier With 800 Watts Into 4 Ohms and 600 Watts Into 8 Ohms

Bridged mode means that the two channels of an amplifier are driven with the same signal voltage but with opposite phase, and their output is combined. The P-450 provides a switch arrangement for bridged operation, which turns the unit into a high-grade monaural amplifier capable of delivering an awesome 800 watts into 4 ohms and 600 watts into 8 ohms.

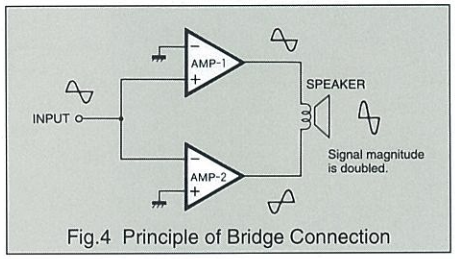


Fig.4 Principle of Bridge Connection

Switchable bridged operation mode

Balanced Connection Reliably Blocks Induced Noise

The P-450 has facilities for true balanced connection, to shut out any induced noise that could enter the signal path. As shown in Figure 5, balanced signal transmission means that the output stage of a component supplies a non-inverted (+) and

inverted (-) signal. On the input side, these signals are mixed. Since any noise interference that has arisen during transmission will be present in both lines with identical phase, such noise is canceled out. The longer the cable connections between audio components, the higher the danger

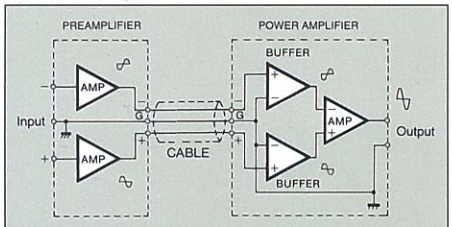


Fig.5 Principle of the Balanced Outputs to inputs

of external noise being introduced into the signal path, which invariably leads to sound quality degradation. The balanced connection principle reliably prevents this danger, by keeping the signal transfer completely free from any kind of interference.

Unbalanced and balanced input connectors

Robust Power Supply With "Super Ring" Toroidal Transformer and High Filtering Capacity

In any amplifier, the power supply plays a vital role as the source of energy for the entire unit. The P-450 features a large toroidal power transformer with a rating of 660 VA. Toroidal transformers have extremely low impedance, are compact and highly efficient. In addition, the "Super Ring" transformer used by Accuphase has the following advantages:

① Smaller ferrite core diameter and copper windings with high specific gravity mean low ferrite losses and low inrush current.

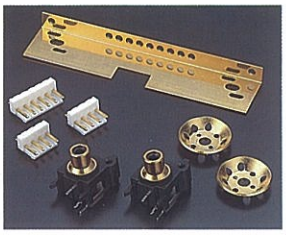
② Near-circular core caliber allows near-circular coil windings with high packing density, resulting in low leakage flux and minimum vibrations. These and other characteristics make this transformer type ideally suited for audio applications.

In addition, two enormous aluminum electrolytic capacitors, each rated for 47,000 uF/80 WV provide more than ample filtering capacity for the rectified current.

■ Power amplifier assembly with 4-parallel push-pull output stage mounted to lerge aluminum diecast heat sink and current feedback circuitry

Gold-Plated Signal Paths

High-purity copper is commonly used in audio components for signal path lines. The P-450 goes one step further by providing gold-plating, not only for the copper traces on printed circuit boards but also ground bars carrying large ripple currents, capacitor terminals, input jacks, and speaker terminals. Frequently used parts such as the input jacks have a professional-quality coating that is 10 times thicker than normal, to assure utmost reliability.

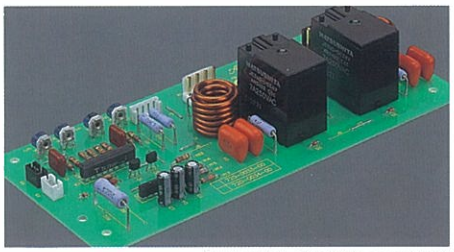


Large Direct-Reading Analog Power Meters

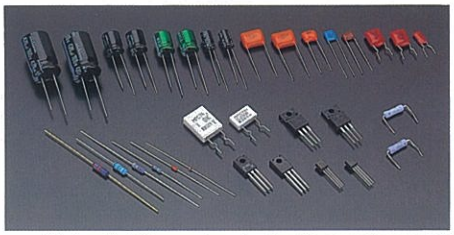
The large analog power meters have a peak hold function which lets the user easily monitor the output level of the rapidly fluctuating music signal. Thanks to logarithmic compression, the meters cover a wide dynamic range. Switches for meter on/off and illumination control are also provided.

Extra Large Speaker Terminals

The oversize speaker terminals accept even very heavy-gauge speaker cable. The terminals are made of extruded high-purity brass material and are gold-plated for utmost reliability and minimum contact resistance. Molded caps provide proper insulation.

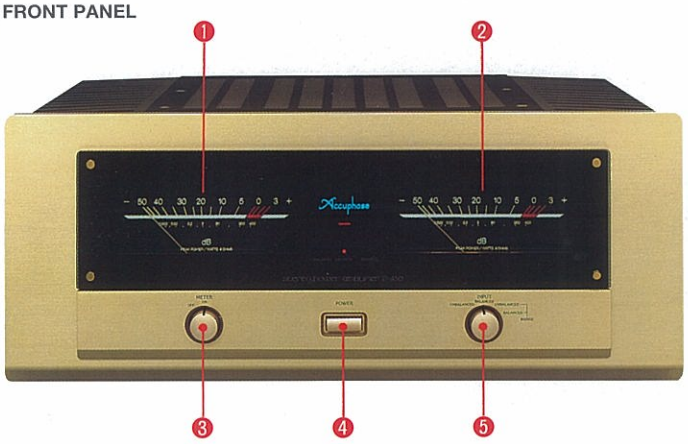


Protection circuitry assembly

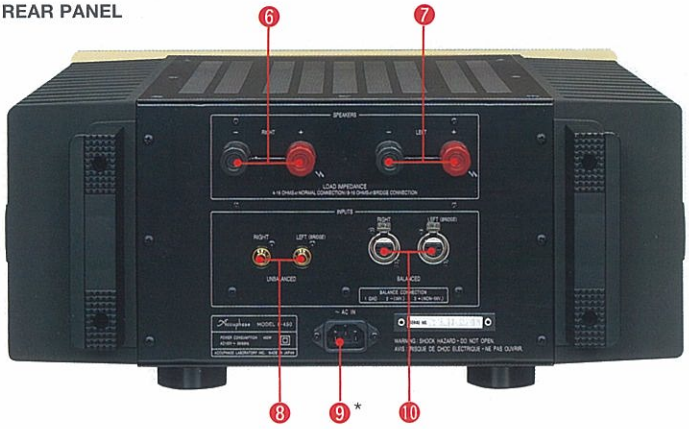


High-reliability parts selected for quality sound

■ FRONT PANEL



■ REAR PANEL



❶ Left-channel output meter
(dB and direct-reading watt scale)
❷ Right-channel output meter
❸ Meter operation/illumination switch
ON OFF
❹ Power Switch
❺ Input/bridge mode selector
UNBALANCED BALANCED
BRIDGE UNBLANCED BRIDGE BALANCE
❻ Right-channel speaker connector
❼ Left-channel speaker connector
❽ Unbalanced input connectors
❾ AC input connector
(for supplied power cord)★
❿ Balanced input connectors
① Ground
② Inverted (-)
③ Non-inverted (+)

Remarks

★ *The shape of the supplied power cord depends on the voltage rating and destination country.*

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 2 ohms ※
  300 watts per channel into 4 ohms
  200 watts per channel into 8 ohms
  Monophonic operation (bridge connecion)
  800 watts into 4 ohms ※
  600 watts into 8 ohms
  Note: Load values marked with a ※ kpply only to music signals.
- **Total Harmonic Distortion :**
  Stereo operation (both channels driven)
  0.05%, with 2 ohms load
  0.02%, with 4 to 16 ohms load
  Monophonic operation (bridge connecion)
  0.02%, with 4 to 16 ohms 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
- **Damping Factor :**
  Stereo operation : 400
  Monophonic operation : 200
- **Input Sensitivity : (with 8 ohm load)**
  Stereo operation : 1.59 V for rated output
  : 0.11 V for watt output
  Monophonic operation : 2.76 V for rated output
  : 0.11 V for watt output
- **Input Impedance :**
  Balanced : 40 kilohms
  Unbalanced : 20 kilohms
- **Signal-to-Noise Ratio : (A-weighted)** 120 dB with input shorted, at rated output
- **Output Level Meters :** Logarithmic scale, -50 dB to +3 dB range
- **Power Requirements :** 100 V, 120 V, 220 V, 230 V, 240 V (Voltage as indicated on rear panel) AC, 50/60 Hz
- **Power Consumption :**
  125 watts idle
  450 watts in accordance with IEC-65
- **Maximum Dimensions :**
  Width 475 mm (18-11/16")
  Height 211 mm (8-5/16")
  Depth 465 mm (18-5/16")
- **Weight :**
  30.6 kg (67.5 lbs) net
  37.0 kg (78.5 lbs) in shipping carton

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

Accuphase

ACCUPHASE LABORATORY INC.

PRINTED IN JAPAN D9710Y 851-0147-00(AD1)