INTEGRATED STEREO AMPLIFIER

E-408

- Triple parallel push-pull output stage delivers high power: 180 watts per channel into 8 ohms
- Preamplifier and power amplifier with MCS topology and current feedback
- Logic-control relays permit straight and short signal paths
- Tone control circuits
- Ample power supply with high-capacity R-toroidal transformer
- Option board slots provide capability for digital signal input or analog record playback
High-output, high-performance integrated amplifier – with MCS topology in preamplifier and power amplifier stages. Current feedback ensures optimum phase characteristics in high frequency range. Wide-band power transistors in triple push-pull configuration and high-efficiency R-toroidal power transformer deliver plenty of quality power: 260 watts per channel into 4 ohms or 180 watts into 8 ohms. Option boards can be used to implement digital input or analog record playback with impeccable quality.

The E-408 is a further refined and enhanced version of the highly popular and successful E-407. Incorporating latest technology and using only top quality parts, the E-408 is an integrated amplifier that stands out through sheer excellence. S/N ratio in the preamplifier and power amplifier sections has been further improved by the adoption of MCS (Multiple Circuit Summing). Musical dynamics never sounded so impressive, with every nuance clearly outlined. The E-408 is the yardstick by which integrated amplifiers will be measured from now on.

Because an integrated amplifier has very high overall gain, even the slightest interference or crosstalk at the input can have a considerable effect on the signal provided at the output. To preclude this possibility, the E-408 is built with totally separate preamplifier and power amplifier sections. Both electrically and structurally, these two parts operate completely autonomously. Each has its own power supply and dedicated regulator circuitry. A separate set of inputs and outputs even allows using the preamplifier and power amplifier as if they were stand-alone components.

The circuits in the preamplifier and power amplifier stages both use the MCS principle as well as current feedback. MCS is a sophisticated technique developed by Accuphase for connecting multiple circuits in parallel. The overall result of combining these circuit topologies is improved performance specs as well as superior sound quality. The output stage of the power amplifier is constructed as a triple parallel push-pull configuration of multi-emitter type power transistors designed for high-current audio applications. The efficient R-toroidal power transformer in the power supply and plenty of filtering capacity support 260 watts per channel (4 ohms) or 180 watts (8 ohms). The preamplifier section features tone controls and a loudness compensator designed to retain the purity of the music signal. Functions such as recorder monitoring and copying provide welcome flexibility. All major parts were selected by strict listening evaluation to assure a high all-round standard of quality.

A Digital Input Board using a high-precision MDS (Multiple Delta Sigma) D/A converter is available as an option, allowing the digital signal of a CD player or similar to be directly supplied to the E-408. Another option is an Analog Disc Input Board for high-grade reproduction of analog records.

**Triple parallel push-pull power unit delivers 260 watts/ch into 4 ohms, 220 watts/ch into 6 ohms, and 180 watts/ch into 8 ohms**

The power transistors used in the output stage are multi-emitter devices designed for audio applications, with optimum frequency response, forward-current transfer ratio linearly, and switching performance characteristics. By arranging these devices in a triple parallel configuration (Figure 1), low impedance is achieved. The transistors are mounted to a large heat sink for efficient dissipation of thermal energy. As a result, the E-408 provides plenty of high-quality output power.

**Parallel connection MCS topology in preamplifier and power amplifier stages**

Both the power amplifier (Figure 1) and preamplifier (Figure 2) employ the MCS (Multiple Circuit Summing) topology developed by Accuphase. This design results in significantly improved performance characteristics such as higher S/N ratio and lower distortion. In the E-408, two separate amplification circuits are fed the same signal, as well as the feedback signal, and the output of the circuits is combined, which is equivalent to parallel operation of the overall circuit. Mathematically, when two parallel circuits are employed, the improvement in S/N ratio is 3 dB.

**Current feedback circuit topology in power amplifier and preamplifier sections prevents phase shifts**

In the E-408, the signal current rather than the more conventionally used voltage is used for feedback.

Because 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 **c u r r e n t feedback amplifier.** The graphs demonstrate that response remains uniform over a wide range.
High-efficiency toroidal power transformer and high filtering capacity

The power supply section is a critical aspect of any power amplifier. The E-408 features a large toroidal power transformer with a rating of 600 VA. The transformer is housed in a non-resonant aluminum enclosure filled with damping material that has excellent heat transfer characteristics. Two large 33,000 µF capacitors smooth out any current irregularities. This no-holds-barred approach manifests itself in rock-solid, powerful sound even at ultra-deep frequencies.

Tone controls with summing active filters for best sound

The tone control circuitry in the E-408 was specially designed with summing active filters such as found in high-quality graphic equalizers. Figure 5 illustrates the operation principle of this circuit. The flat signal is passed straight through, and only when an adjustment is required, the characteristics are created at F1 and F2 and added to the signal, thereby producing the desired change. This design provides efficient control without diluting signal purity.

Logic-controlled relays for signal switching assure high sound quality and long-term reliability

All signal switching is performed by logic-controlled relays which are arranged so as to permit the shortest possible signal paths. The hermetically sealed relays are high-quality types developed specifically for demanding communication applications. The contacts are twin crossbar types plated with gold for minimum contact resistance and outstanding long-term reliability.

Two sets of large size speaker terminals

The speaker terminals are made of extruded high-purity brass material which accept also heavy-gauge speaker cable. Two sets of outputs with a speaker selector are provided, and bi-wiring (supplying the same signal via dual leads to speakers with separate high-frequency and low-frequency inputs) is also possible.
Front panel

Rear panel

Option Board Slots

Push to open sub panel

Other Functions and Features
- Digital input can be implemented via option board.
- Analog power meters
- High-quality volume control that can also be operated via supplied remote commander
- “High Carbon” cast iron insulator feet with superior damping characteristics further enhance sound quality
- Dedicated headphone amplifier for optimum sound quality and damping characteristics further enhance sound quality
- Loudness compensator restores natural balance at low listening levels

OPTION BOARDS

Three types of option boards are available for the E-408:
- Digital Input Board DAC-10
- Analog Disc Input Board AD-10
- Line Input Board LINE-10

DAC-10
- This board features an MDS (Multiple Delta Sigma) D/A converter and has inputs for coaxial and optical fiber connections
- It can accept the digital output signal from components such as a CD player, MD recorder, DAT recorder, etc. (sampling range 32 - 96 kHz, 24 bits)

AD-10
- This board contains a high-performance, high-gain phono equalizer
- Internal DIP switches control MM/MC operation, MC input impedance, and subsonic filter on/off

LINE-10
- This option board provides an additional set of conventional line inputs which can be used to connect a CD player, tuner, or other component with analog output

GUARANTEED SPECIFICATIONS

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

- Continuous Average Output Power (both channels driven, 20 - 20,000 Hz)
  - 260 watts per channel into 4 ohms
  - 220 watts per channel into 6 ohms
  - 180 watts per channel into 8 ohms

- Total Harmonic Distortion (both channels driven, 20 - 20,000 Hz)
  - 0.02%, with 4 to 16 ohms load

- Intermodulation Distortion
  - 0.01%

- Frequency Response
  - HIGH LEVEL INPUT/MAIN INPUT
  - 20 - 20,000 Hz
  - 0.02%, with 4 to 16 ohms load

- Damping Factor
  - 120 (with 8-ohm load, 50 Hz)

- Input Sensitivity, Input Impedance
  - MAIN INPUT
  - 1.58 V
  - 112 mV
  - 20 kΩ
  - 40 kΩ

- Line Input Board LINE-10

- Digital Input Board DAC-10

- Analog Disc Input Board AD-10

- Main Input
  - 158 mV
  - 11.2 mV
  - 20 kΩ

- Input impedance
  - 10 kΩ
  - 30 kΩ
  - 100 kΩ

- Frequency Response
  - MAIN INPUT
  - 20-120,000 Hz
  - 0.02%, with 4 to 16 ohms load
  - 0.02%, with 20-150,000 Hz

- Intermodulation Distortion
  - 0.01%

- Total Harmonic Distortion
  - 0.02%, with 4 to 16 ohms load

- Power Level Meters
  - Logarithmic compression, peak reading meters

- Load Impedance
  - 4 - 16 ohms

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

- Power Requirements
  - 55 watts idle
  - 220 watts per channel into 6 ohms
  - 260 watts per channel into 4 ohms
  - 470 watts total (both channels driven, 20 - 20,000 Hz)

- Power Consumption
  - 55 watts idle
  - 470 watts total (both channels driven, 20 - 20,000 Hz)

- Maximum Dimensions
  - Width: 475 mm (18-1/16")
  - Height: 180 mm (7-1/16")
  - Depth: 422.7 mm (16-5/8")

- Weight
  - 28.0 kg (61.7 lbs) net
  - 30.9 kg (68.4 lbs) in shipping carton

- Supplied Remote Commander RC-20
  - Remote control principle: infrared pulse

- Power supply: 3 V DC (IEC R6 batteries x 2)

- Maximum dimensions: 55 mm x 194 mm x 18 mm

- Weight: 100 g (including batteries)

Specifications and design subject to change without notice for improvements.

http://www.accuphase.com/