

Accuphase

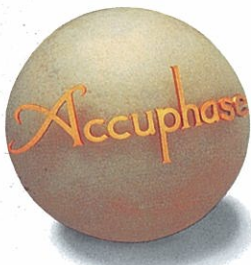
INTEGRATED STEREO AMPLIFIER

E-210

E-210A

- Parallel push-pull output stage delivers quality power: 80 watts per channel into 8 ohms
- Current feedback circuit topology prevents phase shifts
- High-gain power amplifier
- E-210A incorporates high-performance phono stage
- Logic-controlled relays for optimum signal routing





Current feedback topology assures supreme sonic realism and extraordinary detail resolution. High-gain power stage acts as a "straight wire with gain". Parallel push-pull output stage with multi-emitter power transistors delivers 80 watts/channel of quality power into 8 ohms. E-210A incorporates dedicated MM/MC phono equalizer stage.

The E-210/E-210A is an integrated amplifier based on superior Accuphase technology developed for our celebrated separate components. While surprisingly affordable, the E-210/E-210A delivers performance that far surpasses the realm of conventional integrated amplifiers. The E-210 is configured as a line-level amplifier, whereas the E-210A integrates a phono amplifier stage which will be welcomed by audiophiles with a treasured collection of analog records.

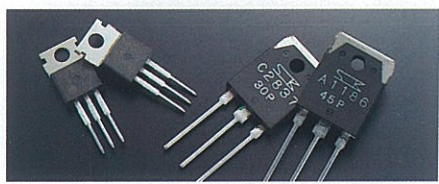
The most important circuit feature of the E-210/E-210A is the high-gain power amplifier principle (Figure 1) which feeds the line-level signal directly to the power stage. This keeps the signal path desirably simple, while totally eliminating the possibility of mutual interference between the low-level signal switching sections and the power amplification circuitry. The audible benefit is a clear improvement in sonic purity. Another significant advantage is the current feedback topology developed by Accuphase. It virtually eliminates phase shifts in the upper frequency range and assures uniform frequency response which does not change with gain. In other words, it combines total operation stability with excellent frequency response. Thanks to this principle, phase compensation can be kept at a minimum, and high amounts of negative feedback with their associated disadvantages are no longer required. This assures excellent transient response, with superb sonic transparency and detail. Music reproduced with the E-210/E-210A sounds almost uncannily life-like.

The output stage employs a parallel push-pull configuration of multi-emitter type power transistors designed for high-current audio applications. The drive stage uses MOS-FET devices which have negative temperature characteristics. This means that there is no danger of thermal "runaway" as exists with bipolar transistors, assuring stable operation under all circumstances.

Six inputs including a balanced input provide ample flexibility, and hermetically sealed relays with gold contacts ensure that source switching is performed without any signal degradation. A supplied remote commander lets you adjust the volume level and select the input source from anywhere in the listening room.

Parallel push-pull power unit delivers 110 watts/ch into 4 ohms, 100 watts/ch into 6 ohms, and 80 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 linearity, and switching performance characteristics. By mounting these transistors to a large heat sink and connecting



Multi-emitter type power transistors and power MOS-FETs

them in parallel, the E-210/E-210A achieves ample power output capabilities, providing 110 watts into 4 ohms, 100 watts into 6 ohms, or 80 watts into 8 ohms per channel. The driver stage uses MOS-FET devices with negative temperature characteristics, which assures perfectly stable operation.

Current feedback circuit topology prevents phase shifts

When the gain of an amplifying circuit increases, frequency response, i.e. the bandwidth that can be handled by the amplifier, becomes more narrow. To counter this effect, a commonly employed technique called negative feedback (NFB) routes part of the output signal back to the input. If phase shift is disregarded, a circuit designed to have high open-loop-gain can apply a high amount of NFB, resulting in the wide frequency response of a closed-loop circuit, as shown in Figure 2.

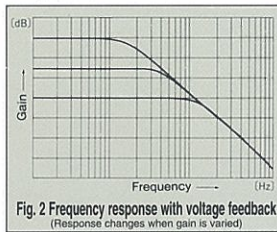


Fig. 2 Frequency response with voltage feedback (Response changes when gain is varied)

Conventional amplifiers employ voltage NFB, whereby the output voltage is used for the feedback loop. In the E-210/E-210A however, the signal current rather than the voltage is used for

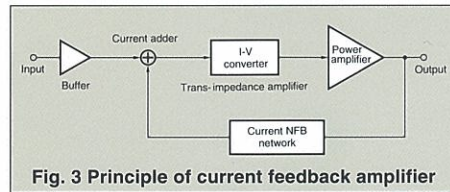


Fig. 3 Principle of current feedback amplifier

feedback. Figure 3 shows the operating principle of this circuit. At the sensing point of 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.

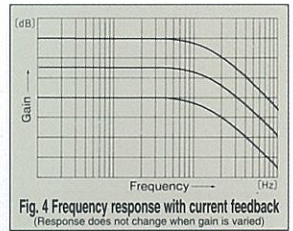


Fig. 4 Frequency response with current feedback (Response does not change when gain is varied)

High-gain power amplifier

The line input signal from source components such as a CD player or tuner is fed directly to the high-gain power amplifier. This fully brings out the advantages of the current feedback principle which provides total stability even with high gain. The noise floor is exceptionally low, and performance of the amplifier approaches the ideal of a 'straight wire with gain'. The signal passes along a very simple path from the inputs to the speaker. This dramatically enhances sonic clarity by eliminating all unwanted influences.

Strong power supply with large power transformer and high filtering capacity

The power supply is the source of energy for an amplifier. The E-210/E-210A features a large 400 VA power transformer and two large electrolytic capacitors rated for 22,000 µF each. This assures ample reserves also for reproduction of demanding bass passages.

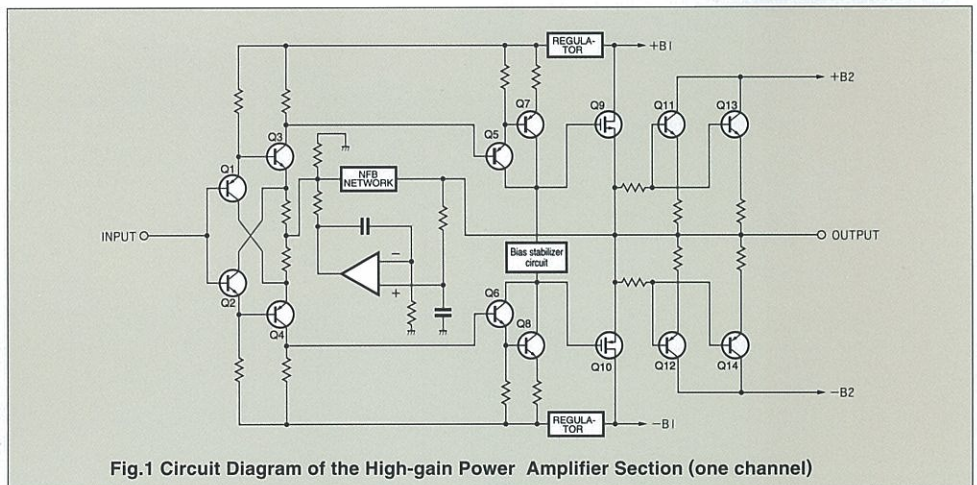


Fig.1 Circuit Diagram of the High-gain Power Amplifier Section (one channel)

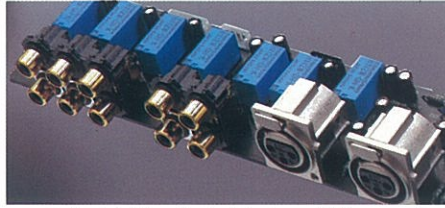
Highly reliable logic-controlled relays

Long signal paths for functions such as input switching and tape monitoring tend to degrade high-frequency response and impair imaging. In the E-210/E-210A, all 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 cross-bar types plated with gold for minimum contact resistance and outstanding long-term reliability.

Versatile input configuration including balanced connectors

The E-210/E-210A offers five inputs controlled by the input selector plus another input for a tape recorder. One input is designed for balanced connections. The principle of balanced signal transmission is shown in Figure 5. At the source component, the signal is converted into a positive

and negative signal with identical voltage potential but phase-inverted by 180 degrees. On the receiving side the two signals are fed into a positive and negative amplifier input and combined precisely. Since any noise which was picked up by the connecting cable etc. has the same phase in

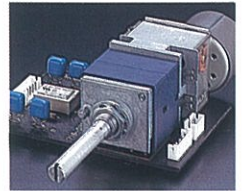


Gold-plated input/output jacks and XLR connectors with directly connected relays

Remote commander allows source switching and volume adjustment

Listening level adjustment is performed by a small motor which drives the high-quality volume con-

trol via a clutch, for smooth, reliable action. The input selector controls the relays in the amplifier, offering remote control convenience without any sacrifices in sound quality.



Heavy-duty speaker terminals accommodate also banana plugs

The oversize speaker terminals accept even very heavy-gauge speaker cable, and it is also possible to insert banana plugs.



Remote commander RC-15 Allows volume adjustment and input source switching.



High-gain power amplifier assembly (one channel) Output stage with parallel push-pull arrangement of multi-emitter power transistors, power MOS-FETs, and current feedback circuitry mounted to large heat sink

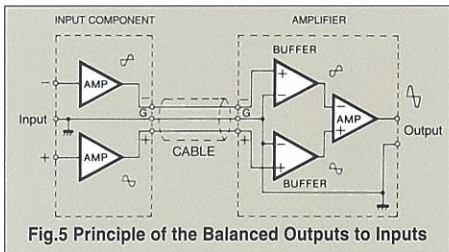
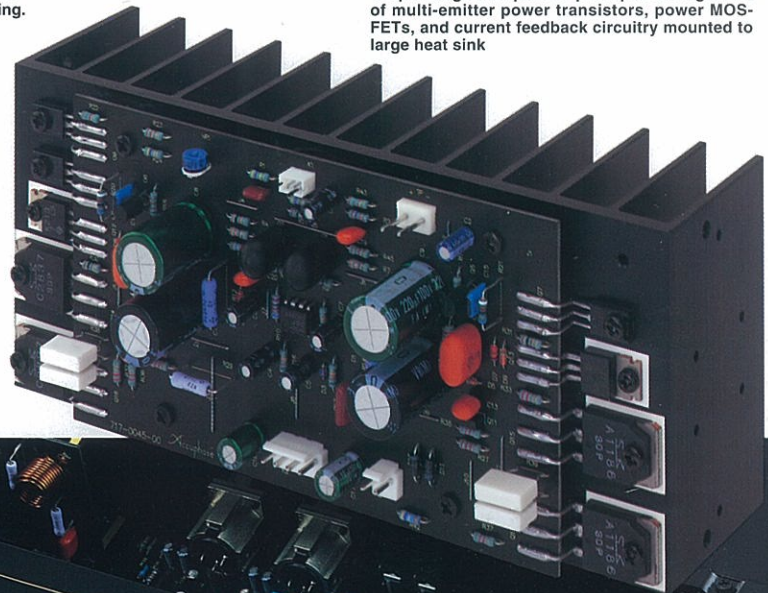


Fig.5 Principle of the Balanced Outputs to Inputs

and negative signal with identical voltage potential but phase-inverted by 180 degrees. On the receiving side the two signals are fed into a positive and negative amplifier input and combined precisely. Since any noise which was picked up by the connecting cable etc. has the same phase in

*Photograph shows E-210A with integrated phono stage



E-210A With Integrated Phono Stage

Whereas the E-210 is designed for line-level inputs only, the E-210A adds a top-quality phono equalizer stage. The outstanding sound and flawless performance of the phono stage will be welcomed by any audiophile who owns a collection of valuable analog records.

Figure 6 shows the circuit diagram of the phono stage. Dedicated inputs are provided for MM and MC cartridges, which allows optimization for their respective requirements. Since MM cartridges have high output voltage as well as high output impedance, two FETs (Q_1 , Q_2) which maintain high input impedance over the entire frequency range are used in the MM section. On the other hand, the MC section has to deal with very low-level sig-

nals at low impedances. Therefore, four low-noise devices ($Q_3 - Q_6$) are arranged in a differential configuration with a low-impedance NFB loop, to as-

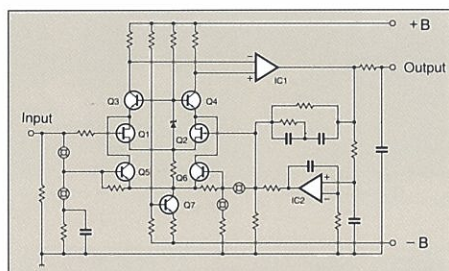
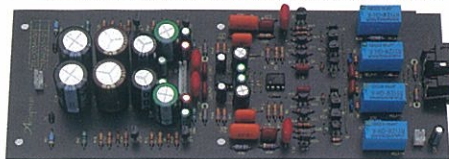


Fig.6 Circuit Diagram of the Equalizer Amplifier (one channel)

sure optimum signal-to-noise ratio and keep residual noise at a minimum.

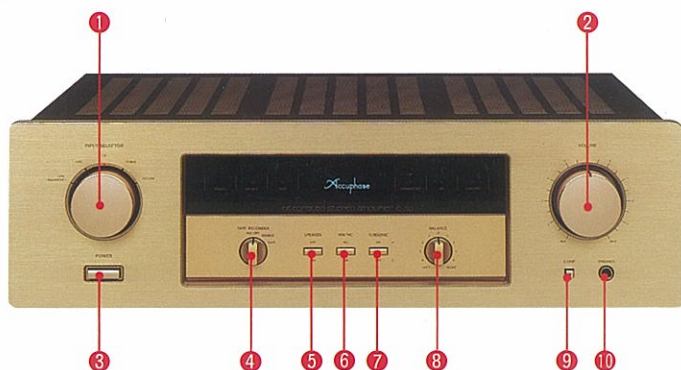
Phono equalizer assembly (AD-210)

PCB with input jacks, dedicated power supply, separate MM and MC input stages and other circuitry

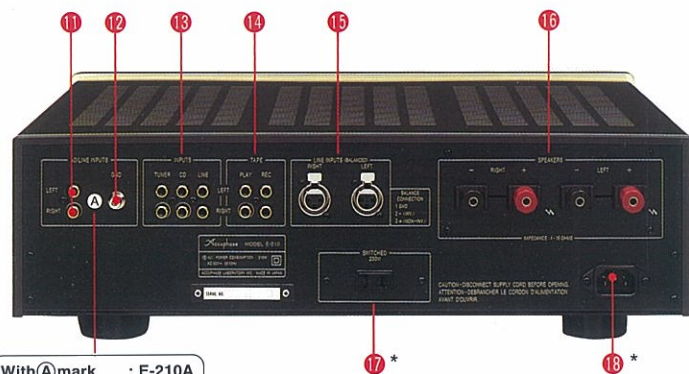


※ The E-210 can be converted into an E-210A after purchase. Please consult your Accuphase dealer or an authorized service station.

FRONT PANEL



REAR PANEL



With : E-210A
Without : E-210

- | | |
|---|---|
| <p>1 Input selector:
LINE(BALANCED), LINE
CD, TUNER, AD/LINE</p> <p>2 Volume control</p> <p>3 Power switch</p> <p>4 Record output/tape monitor switch:
REC OFF, SOURCE, TAPE</p> <p>5 Speaker ON/OFF switch</p> <p>6 MC/MM selector</p> <p>7 Subsonic filter</p> <p>8 Volume balance control</p> <p>9 Compensator switch</p> <p>10 Headphone jack</p> | <p>11 E-210A :AD (analog disc) input jack
E-210 :LINE input jack</p> <p>12 Ground terminal</p> <p>13 LINE Input jacks:
TUNER, CD, LINE</p> <p>14 Tape input / recording output jacks</p> <p>15 LINE balanced input connectors:
① Ground, ② inverted (-)
③ Non-inverted (+)</p> <p>16 Left and right channel output terminals</p> <p>17 Switched AC outlets*</p> <p>18 AC power connector*
(for supplied power cord)</p> |
|---|---|

Remarks

* The shape of the AC inlet, plug of the supplied power cord, and AC outlet depend on the voltage rating and destination country.
* The switched AC outlet may not be supplied depending on the safety standards or regulations applicable in the particular country or where the unit is desired.

※ Specifications and design subject to change without notice for improvements.
※ The AD-210 (phono equalizer assembly) cannot be installed by the user.

GUARANTEED SPECIFICATIONS (E-210/E-210A)

Guaranteed specifications are measured according to EIA standard RS-490. Analog disc specs are for E-210A.

Performance Guaranty

All Accuphase product specifications are guaranteed as stated.

- **Continuous Average Output Power** 110 watts per channel into 4 ohms
(Both channels driven, 20 - 20,000 Hz)
100 watts per channel into 6 ohms
80 watts per channel into 8 ohms
- **Total Harmonic Distortion** 0.04%, with 4 to 16 ohms load (both channels driven)
- **Intermodulation Distortion** 0.01%
- **Frequency Response** HIGH LEVEL INPUT : 20 - 20,000 Hz +0, -0.2 dB
(for rated output) LOW LEVEL INPUT : 20 - 20,000 Hz +0.2, -0.5 dB
- **Damping Factor** 110 (with 8-ohm load, 50 Hz)
- **Maximum AD Input Level** MM : 250 mV rms, 1 kHz, THD 0.005% (REC OUT)
MC : 7.0 mV rms, 1 kHz, THD 0.005% (REC OUT)

Input Sensitivity, Input Impedance

Input	Sensitivity		Input impedance
	For rated output	For 1 W output (EIA)	
AD INPUT(MC)	0.201mV	22.5µV	100
AD INPUT(MM)	7.0mV	780µV	47k
HIGH LEVEL INPUT	201mV	22.5mV	20k
BALANCED INPUT	201mV	22.5mV	40k

- **Rated Output Level and Impedance** TAPE REC OUTPUT : 200mV, 200 ohms (from AD input)
- **Gain** HIGH LEVEL INPUT → OUTPUT : 42 dB
AD INPUT (MM) → TAPE REC OUTPUT : 29 dB
AD INPUT (MC) → TAPE REC OUTPUT : 60 dB
+6 dB (200 Hz) (Volume control setting -30 dB)
- **Loudness Compensation**
- **Signal-to-Noise Ratio**

Input	Input shorted, IHF-A weighting S/N ratio at rated output	EIA S/N
HIGH LEVEL INPUT	113dB	- 83dB
BALANCED INPUT	94dB	83dB
AD INPUT(MM)	92dB	82dB
AD INPUT(MC)	78dB	81dB

- **Subsonic Filter** Cutoff frequency 25 Hz, -12 dB/octave
- **Load Impedance** 4 - 16 ohms
- **Stereo Headphones** Suitable impedance: 4 - 100 ohms
- **Power Requirements** 100 V, 120 V, 220 V, 230 V, 240 V
(Voltage as indicated on rear panel) AC, 50/60 Hz
- **Power Consumption** 35 watts idle (E-210)
37 watts idle (E-210A)
190 watts in accordance with IEC-65
- **Maximum Dimensions** Width 475 mm (18-11/16")
Height 150 mm (5-7/8")
Depth 417 mm (16-7/16")
- **Weight** 18.0 kg (39.8lbs) net
22.5 kg (49.5lbs) in shipping carton
- **Supplied Remote Commander RC-15** Remote control principle: infrared pulse
Power supply: 3 V DC (IEC R6 batteries x 2)
Dimensions: 45 mm width (1-3/4")
136 mm height (5-3/8")
18 mm depth (11/16")
Weight: 85 g (including batteries)

ACCUPHASE LABORATORY INC.