

Accuphase

INTEGRATED STEREO AMPLIFIER

E-450

- Revolutionary AAVA-II volume control
- Parallel push-pull output stage with high-power transistors delivers plenty of quality power
- Instrumentation amplifier principle enhances current feedback and MCS+ topology in power amplifier section
- Logic-control relays for straight and short signal paths
- Robust power supply with large toroidal transformer and high filtering capacity





High-class integrated amplifier with 180 watts per channel (8 ohms) – Innovative AAVA-II volume control opens up new musical frontiers. High-power transistors operate in a parallel push-pull arrangement. Power supply with large, highly efficient toroidal transformer and oversized filtering capacitors sustains ample power. Instrumentation amplifier configuration in power amplifier makes optimum use of current feedback design combined with further improved MCS+ topology, resulting in excellent high-range phase characteristics.

The E-450 succeeds the highly popular and successful Accuphase model E-408. It reflects latest research breakthroughs and features the innovative AAVA-II volume control principle. Only top-quality parts are used throughout its sophisticated circuitry. The overall result is an integrated amplifier that brings out even the most delicate nuances in the music with breathtaking immediacy.

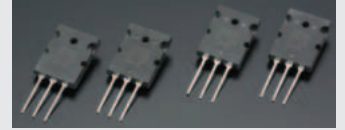
The AAVA volume control principle developed by Accuphase totally revolutionizes the way that the listening volume is adjusted. However, in its initial form, AAVA required a considerable amount of physical space. With AAVA-II, Accuphase has now taken this principle to the next level, delivering the same peerless performance in a more compact form factor. This was made possible by implementing highly sophisticated surface mount technology while increasing component density and integration and optimizing the layout. With AAVA-II, amplification and volume control are fully integrated. The use of highly reliable electronic components eliminates mechanical wear and associated problems, allowing the control to function perfectly for many years.

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-450 is built with totally separate preamplifier and power amplifier sections. Both electrically and structurally, these two parts operate completely autonomously. A set of EXT PRE inputs and outputs allows using the preamplifier and power amplifier separately. In terms of performance quality, the E-450 can hold its own even when compared with stand-alone components.

The power amplifier section is built as an advanced instrumentation amplifier, which enables fully balanced signal transmission throughout. Together with further improved MCS+ circuit topology and the highly acclaimed current feedback principle, this makes for even better electrical characteristics. In the output stage, high-power transistors designed for audio applications are arranged in a parallel push-pull configuration, greatly improving the capability of the amplifier to drive low impedance loads.

■ **Parallel push-pull power amplifier unit achieves 180 watts per channel into 8 ohms or 260 watts into 4 ohms.**

The output stage devices feature excellent frequency response, current amplification linearity, and switching characteristics. These high-power transistors have a rated collector dissipation of 220 watts.



High-power transistors

■ **Instrumentation amplifier principle in power amplifier section allows fully balanced signal paths. Current feedback design ensures outstanding high-range phase characteristics together with further improved MCS+ topology.**

■ **Massive high-efficiency toroidal transformer and large filtering capacitor selected for sound quality provide ample reserves.**



Toroidal power transformer

■ **Logic-controlled relays assure high sound quality and long-term reliability.**

■ **Tone controls using active filters for optimum sound quality.**

■ **Loudness compensator for enhanced bass at low listening levels.**



"MC/MM" Selector "EXT PRE" button



Filtering capacitors

■ **E-450 front panel switching enables MC/MM selection for optional Analog Disc Input Board AD-20.**

■ **"EXT PRE" button and preamplifier output/power amplifier input connectors allow independent use of preamplifier and power amplifier sections.**

■ **Dedicated headphone amplifier delivers audiophile quality sound.**

■ **Analog peak power meters for monitoring output levels.**

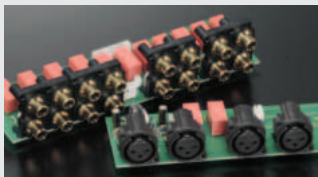
■ **Two sets of large-size speaker terminals.**

■ **"High Carbon" cast iron insulator feet further enhance sonic purity.**

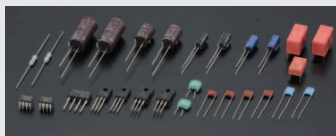


Large speaker terminals

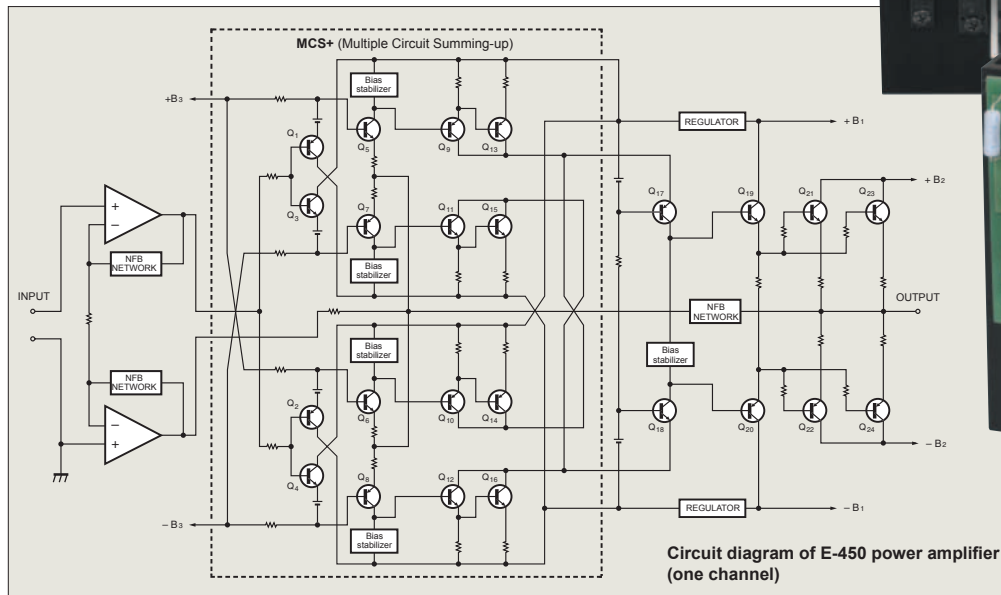
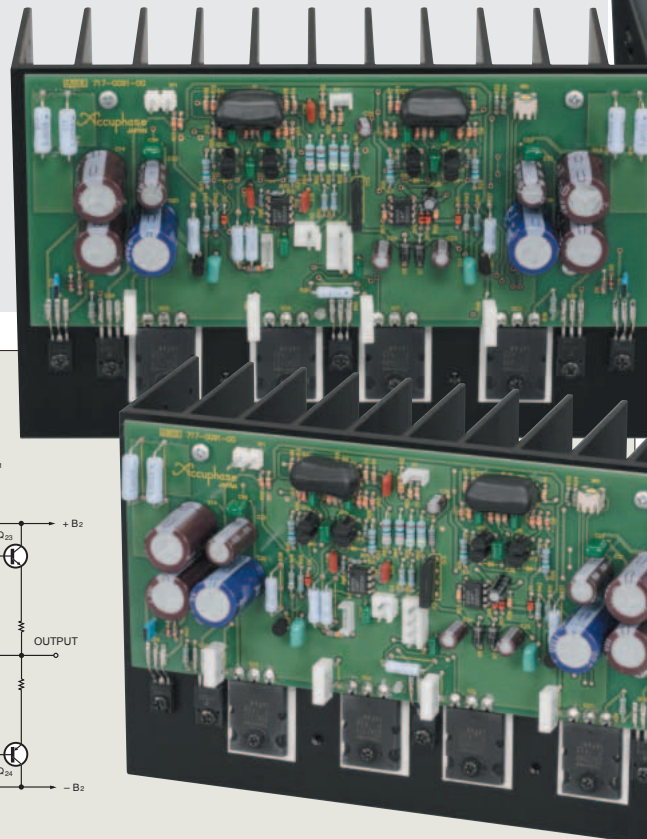
■ **Versatile array of inputs with balanced connectors to shut out external noise interference.**



Unbalanced input/output jacks and balanced input connectors



High-reliability parts selected for sound quality



Circuit diagram of E-450 power amplifier (one channel)

■ **Output stage and power amplifier assembly with parallel push-pull devices, MCS+ circuit and current feedback circuitry mounted to large heat sink**

AAVA-II (Accuphase Analog Vari-gain Amplifier) type volume control

AAVA-II (Accuphase Analog Vari-gain Amplifier) is a totally new volume control concept that completely does away with variable resistors in the signal path. Because the music signal does not have to pass through such devices, there is no adverse influence from changes in impedance. This means that the outstanding S/N ratio and low distortion of the amplifier are not compromised in any way, and the same superb sound quality will be obtained at any volume setting.

■ **AAVA-II input stage employs current feedback principle that ensures high-speed, low-noise operation and assures excellent characteristics at high output voltages.**

■ **Volume control resolution.**
The listening volume is adjusted by a combination of 16 V-I converters. The number of possible volume steps is 2 to the power of 16 = 65,536, as determined by current switches.

■ **AAVA-II circuitry is deceptively simple.**
Because AAVA-II employs circuitry that is electrically very simple, long-term reliability is excellent, with performance and

sound quality that will remain unchanged also after prolonged use.

■ **AAVA-II means analog processing.**
The AAVA-II circuit converts the music signal from a voltage into a current, to allow control by current switches, and then back into a voltage. The entire process is carried out in the analog domain.

■ **No more left/right tracking differences or crosstalk.**

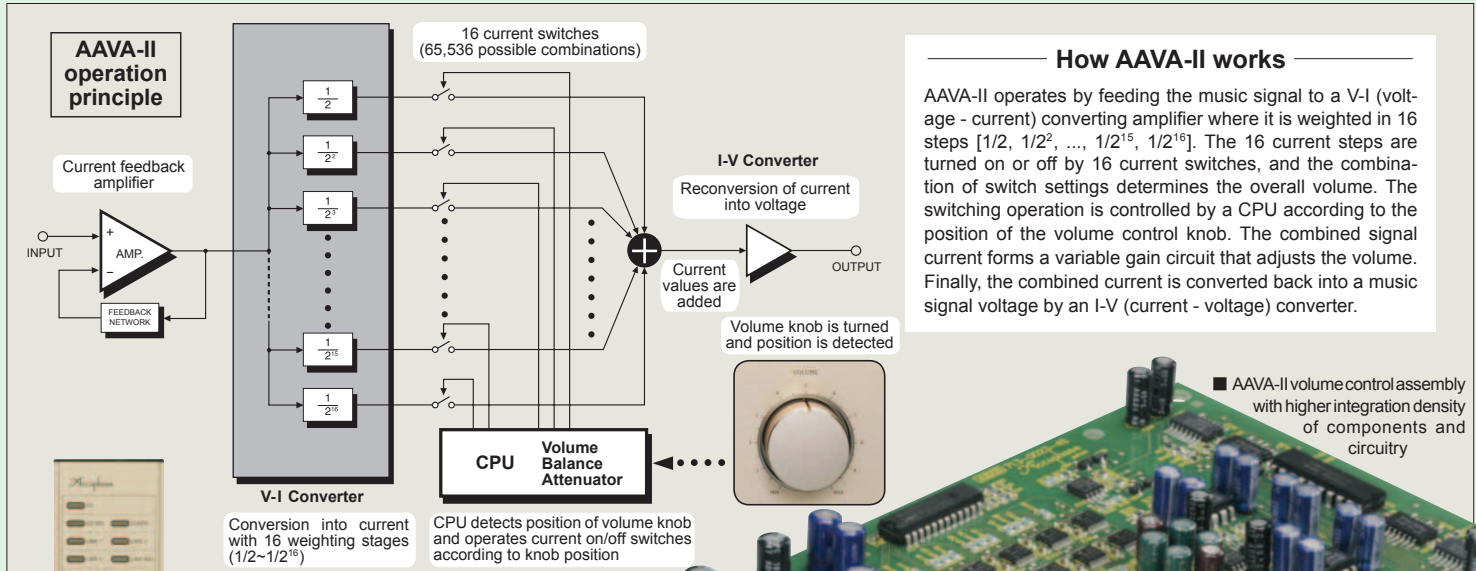
Because AAVA-II is an electronic circuit employing only fixed-value resistors, there is virtually no left/right tracking error also at low volume levels, and crosstalk also does not present a problem.

■ **AAVA-II maintains high S/N ratio and uniform frequency response.**

Because AAVA-II does not introduce any change in impedance, there is no deterioration of S/N ratio or alteration of frequency response. Changing the volume with AAVA does not mean introducing noise or otherwise degrading the sound quality of the amplifier.

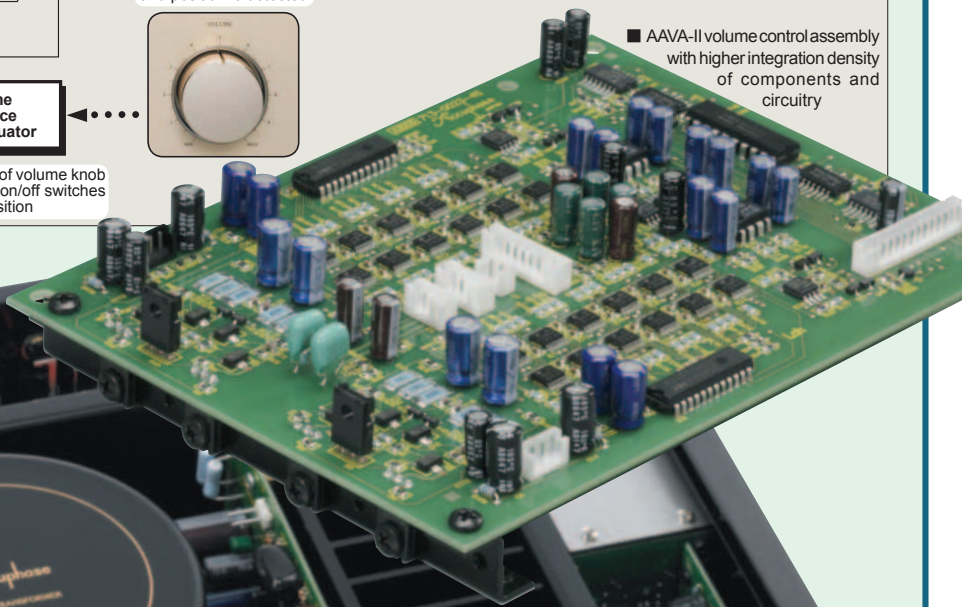
■ **Control knob gives same operation feel as with a conventional high-quality volume control.**

■ **Attenuator and balance control also implemented by AAVA-II.**



How AAVA-II works

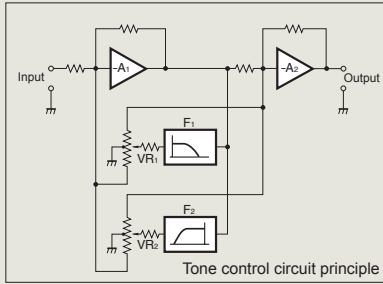
AAVA-II operates by feeding the music signal to a V-I (voltage - current) converting amplifier where it is weighted in 16 steps [$1/2, 1/2^2, \dots, 1/2^{15}, 1/2^{16}$]. The 16 current steps are turned on or off by 16 current switches, and the combination of switch settings determines the overall volume. The switching operation is controlled by a CPU according to the position of the volume control knob. The combined signal current forms a variable gain circuit that adjusts the volume. Finally, the combined current is converted back into a music signal voltage by an I-V (current - voltage) converter.



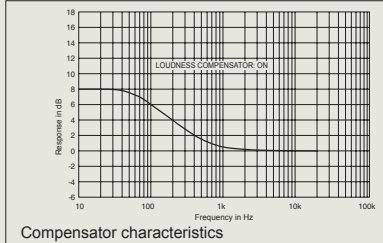
■ **Supplied remote commander RC-200**
Allows volume adjustment and input source switching



■ Tone controls using summing active filters for optimum sound quality



■ Loudness compensator for enhanced bass at low listening levels



Option Boards

Three types of option boards can be used in the E-450: the Digital Input Board DAC-20, Analog Disc Input Board AD-20, and Line Input Board LINE-10. These boards can be installed in the rear-panel slots as required.

- It is possible to install two identical boards.
- The Analog Disc Input Board AD-9/AD-10 and the Line Input Board LINE-9 can also be used.
- When using the AD-9/AD-10, the MC/MM button of the E-450 has no effect. MC/MM switching must be performed on the board.



Digital Input Board DAC-20

The board features an MDS (Multiple Delta Sigma) ++ type D/A converter and allows direct digital connection of a CD player, MD or DAT recorder or other component with digital output (sampling frequency up to 96 kHz, 24 bits), for high-quality music reproduction.

- Inputs for coaxial and optical fiber connections are provided.

Analog Disc Input Board AD-20

This board serves for playback of analog records. It contains a high-performance, high-gain phono equalizer.

- MC/MM switching is possible on the front panel of the E-450.
- Internal DIP switches control MC input impedance and subsonic filter on/off.

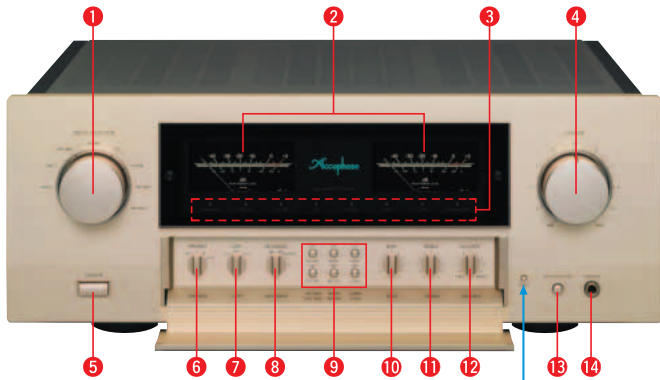
MC Gain : 62 dB
Input impedance: 10/30/100 ohms (selectable)

MM Gain : 36 dB
Input impedance: 47 kilohms

Line Input Board LINE-10

This option board provides an additional set of unbalanced line inputs.

■ Front Panel



■ Rear Panel



- | | |
|--|--|
| 1 Input selector
LINE 2 LINE 1 LINE-BAL CD-BAL CD
TUNER OPTION 1 OPTION 2 | 10 Bass control |
| 2 Left/right channel output meters | 11 Treble control |
| 3 Function indicator LEDs | 12 Balance control |
| 4 Volume control | 13 Attenuator button |
| 5 Power switch | 14 Headphone jack |
| 6 Speaker selector OFF A B A+B | 15 Line inputs (unbalanced) |
| 7 Copy selector 1→2 OFF 2→1 | 16 Recorder inputs and outputs |
| 8 Recording output selector REC OFF, SOURCE 1, 2 | 17 Left/right speaker output terminals A/B |
| 9 Function buttons
MC/MM, EXT PRE, MONO/STEREO, Meter ON/OFF
Compensator ON/OFF, Tone Control ON/OFF | 18 CD/LINE inputs (balanced) |
| | 19 Preamplifier outputs |
| | 20 Power amplifier inputs |
| | 21 Switched AC outlet* |

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.

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)
0.05% with 4 to 16-ohm load
- **Intermodulation Distortion** 0.01%
- **Frequency Response** HIGH LEVEL INPUT/POWER IN
20 – 20,000 Hz +0, –0.2 dB (for rated continuous average output)
3 – 150,000 Hz +0, –3.0 dB (for 1 watt output)
- **Damping Factor** 120 (with 8-ohm load, 50 Hz)
- **Input Sensitivity, Input Impedance**

Input	Sensitivity		Input impedance
	For rated output	For 1 W output (EIA)	
HIGH LEVEL INPUT	190 mV	14.2 mV	20 kΩ
BALANCED INPUT	190 mV	14.2 mV	40 kΩ
POWER IN	1.51 V	113 mV	20 kΩ

- **Output Voltage, Output Impedance**
PRE OUTPUT: 1.51 V, 50 ohms (at rated continuous average output)
- **Gain**
HIGH LEVEL INPUT → PRE OUTPUT: 18 dB
POWER IN → OUTPUT: 28 dB
- **Tone Controls**
Turnover frequency and adjustment range
BASS: 300 Hz ±10 dB (50 Hz)
TREBLE: 3 kHz ±10 dB (20 kHz)
- **Loudness Compensation** +6 dB (100 Hz)
- **Attenuator** –20 dB
- **Signal-to-Noise Ratio (input-converted noise)**

Input	Input shorted (A weighting)	EIA S/N
	S/N ratio at rated output	
HIGH LEVEL INPUT	110 dB	92 dB
BALANCED INPUT	93 dB	92 dB
POWER IN	123 dB	100 dB

- **Power Level Meters** Logarithmic compression, peak reading meters
Output dB/% scale
- **Load Impedance** 4–16 ohms
- **Stereo Headphones** Suitable impedance: 8–100 ohms
- **Power Requirements** AC 120 V/230 V 50/60 Hz (Voltage as indicated on rear panel)
- **Power Consumption** 60 watts idle
450 watts in accordance with IEC 60065
- **Maximum Dimensions**
Width 465 mm (18-5/16")
Height 181 mm (7-1/8")
Depth 427 mm (16-13/16")
- **Mass** 24.4 kg (53.8 lbs) net
30.0 kg (66.1 lbs) in shipping carton
- **Supplied Remote Commander RC-200**
Remote control principle: Infrared pulse
Power supply: 3 V DC (IEC R03 batteries × 2)
Maximum dimensions: 56 mm × 175 mm × 26 mm
Mass: 153 g (including batteries)

- Supplied accessories:**
- AC power cord
 - Remote Commander RC-200



ACCUPHASE LABORATORY, INC.