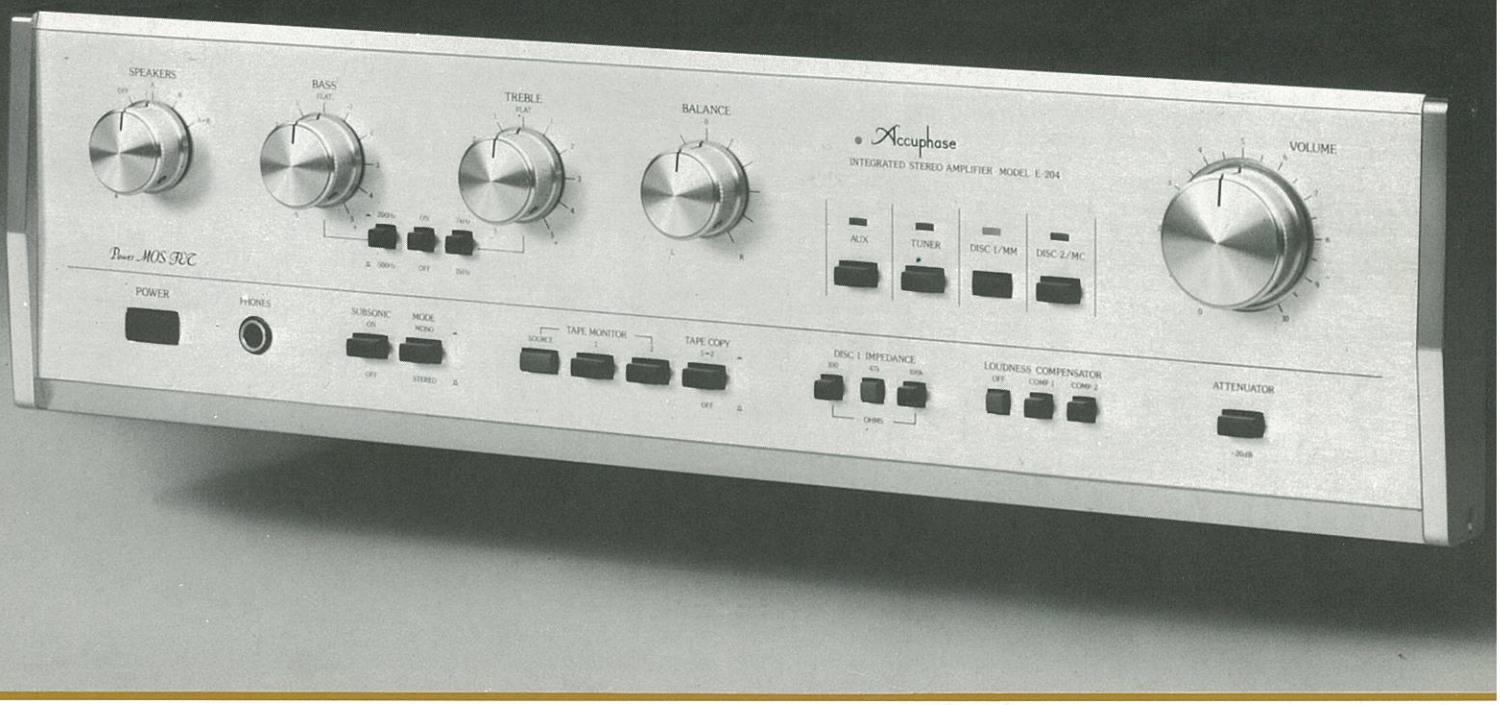
Accuphase

Integrated Stereo Amplifier E-204

- 75W/CH REALIZED WITH MOS FETs
- PURE DC AMPs REALIZED WITH DC SERVO CONTROL SCHEME
- BUILT-IN, SYMMETRICAL, PUSH-PULL HEAD AMPLIFIER
- TWO-STEP LOUDNESS COMPENSATOR

Power MOS FET 75W/ch



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The E-204 is a new 75W/ch high quality Integrated Stereo Amplifier which received the full benefit of Accuphase's outstanding separate amplifier design technology in its development. Its powerful output stage is built around MOS FETs, which are regarded as the best power amplification devices available. MOS FETs ensure a big improvement in the brilliance of treble reproduction by eliminating notching distortion, making its low distortion measurements comparable to Class-A operation characteristics. Another big advantage of MOS FETs is their high durability and heat resistant properties, both important requisites for devices used in power amplifier applications.

The E-204 employs these superior MOS FETs, about which more details are given in another section, in a complementary-symmetry push-pull power output stage that delivers a high quality 75 watts of power into both channels simultaneously at 8 ohms over a frequency range of 20 to 20,000 Hz., with less than 0.0l% distortion.

Pure DC amplifiers are used in both the voltage amplifier and power amplifier sections which permit direct coupling between them to contribute to improved sound. Employment of DC Servo Control in both sections further guarantees stable DC operation.

A built-in, 26 dB Head Amplifier in the Preamplifier section makes possible direct connections of high quality MC (Moving-coil) cartridges that require the extra amplification boost to bring their levels up to that of MM (Moving-magnet) cartridges.

In creating the E-204, a most rigid program of parts selection was followed to ensure that this amplifier would give forth outstanding expressive power of music. Rigid parts selection is a basic policy of Accuphase whose engineers are well aware of the fact that two amplifiers with identical electrical specifications do not necessarily produce the same sound. Long experience in the pursuit of perfection has taught them that high quality parts make the difference in amplifiers which have that special power to express music more brilliantly, clearly and impressively.

1 75W/ch POWER AMP EMPLOYS MOS FETs AND DC SERVO CONTROL

The power amplifier section employs MOS FETs, the most ideal device for the power output stage. They deliver a powerful 75 watts (8-ohm load, both channels simultaneously driven, 20–20,000 Hz., distortion within 0.0l%).

MOS FETs assure a very high quality output signal that is free of notching and crossover distortions. MOS FETs also have very wide-band characteristics, which, when fully utilized, prevents harmful TIM (Transient Intermodulation Distortion) that occurs when strong dynamic signals are handled. This is achieved in the E-204 by providing a wide frequency response within the NF (Negative Feedback) loop circuit to obtain the high speed amplification characteristics necessary to prevent TIM.

A DC Servo Control system is also employed to stabilize DC amp operation in the output stage. It effectively prevents DC drift that might otherwise occur from temperature and/or power supply voltage fluctuations, and also prevents the flow of DC current and spurious ultra-low frequency noise into the speakers.

2 DC SERVO CONTROLLED HIGH-LEVEL AMPLIFIER SECTION

The lineup of the high-level amplifier section includes the use of dual FETs in the input buffer stage, followed by a high performance operational, differential amplifier that feeds a wideband complementary-symmetry final stage. This preamplifier section supplies amplified, undistorted signal voltages of the highest order to the following circuits.

Here again, as in the power amplifier section, DC Servo Control is utilized to prevent DC drift and ensure pure DC operation. This, together with the use of FETs at the input, has made possible perfect direct coupling of all sections, all the way from the input to the output without using coupling capacitors. Sound coloration has thus been eliminated, giving the E-204 the capability to deliver a more faithful signal reproduction with improved sound transparency.

3 LOW NOISE, WIDE DYNAMIC RANGE HEAD AMPLIFIER

The Head Amplifier features push-pull circuitry throughout that includes a differential push-pull input and a complementary-symmetry push-pull output.

The input circuit of the Head Amplifier employs ultra-low-noise transistors in a differential amp circuit, which together with the low impedance of the NF loop are the reasons for the high S/N ratio of 70 dB (at rated input). Any type Moving-coil cartridge can be connected directly without fear of clipping distortion because of the wide dynamic range of the Head Amplifier (maximum input voltage l0 mV rms).

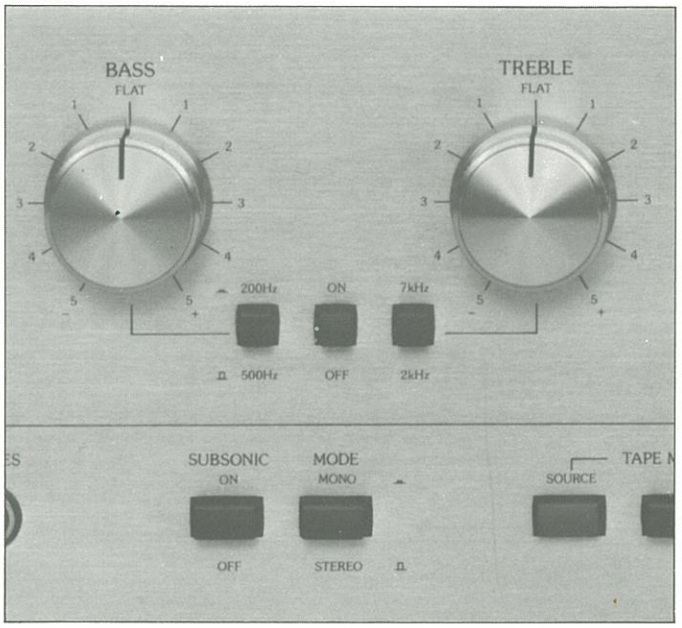
4 HIGH S/N EQUALIZER AMP

Low noise active devices must be used in the equalizer input circuit to achieve high S/N ratio, but this alone is insufficient. Low noise parts and elements must be used as well. Low impedance of the feedback loop is also most important to obtain low current-noise and thermal-noise.

Class-A operation with large current flow in the final equalizer transistors has lowered the impedance of the NF loop, and greatly reduced the noise generated at the differential input circuit. The S/N ratio is 77 dB (at rated input) which is close to the theoretical limit.

5 TURNOVER SELECTOR SWITCH

A turnover selector switch is provided to expand the tone control function. This provides selection of 200 Hz and 500 Hz turnover frequencies for BASS, and 2 kHz and 7 kHz for TREBLE. The turnover selections of 200 Hz and 7 kHz are especially effective for smooth control over the widest range from the deepest bass to the highest treble tones. Furthermore, a 10-step detent type control permits accurate 10-step tonal variations as well as on/off switching of the tone control circuit.



6 TWO-STEP LOUDNESS COMPENSATION

Two-step Loudness Compensator switch provides a choice of two sound energy balancing curves to make up for the deficiency of the human ear to detect certain audio frequencies during low-level reproduction. This switch also helps to balance out listening room characteristics. COMP 1: +6 dB at 50 Hz, and COMP 2: +10 dB at 50 Hz and also +6 dB at 20 kHz (above values with volume control at −30 dB)

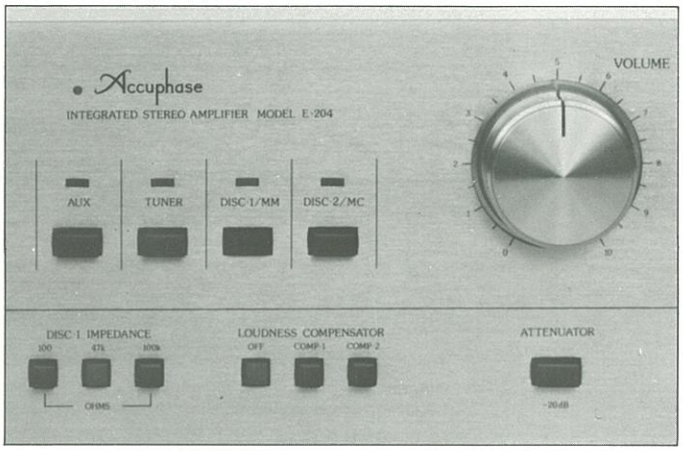
7 SUBSONIC FILTER

The provision of filters was based on practicality, and only a 17 Hz 12 dB/oct subsonic filter is provided. It is an active filter that was designed to cut off frequencies below 17 Hz that sometimes might cause intermodulation distortion in the audible frequency range.

8 OTHER FUNCTIONS

This amplifier is equipped with many other useful functions such as a −20 dB Attenuator switch which is convenient to start off records, a Disc Input Impedance Selector switch, and a switch that permits separation of the preamp and the power amplifier.

An LED (Light Emitting Diode) is located above each of the four Input Selector switches on the front panel. One of them will illuminate to indicate the input source that is selected.



"POWER MOS FETs"

The special characteristics of MOS FETs (Metal-Oxide Semiconductor Field Effect Transistors) that make them the most ideal power amplification device had been known for a number of years by those concerned in the audio world. However, their availability did not take place for a long time because of technical production difficulties that delayed their commercial feasibility. A breakthrough was finally made here in Japan ahead of the world in developing a practical means of producing high power MOS FETs, and these remarkable devices have now become available, and are opening the way for further progress in audio amplification.

The following is a brief summary of some of the advantages of MOS FETs in power amplifier applications.

SUPERIOR HIGH SPEED CHARACTERISTICS ENSURE LOW DISTORTION

A harmful notching distortion caused by a phenomenon known as carrier storage effect occurs at the P-channel and N-channel circuit junction of bipolar transistors when they are used in normal push-pull formation. This distortion occurs especially in the high frequency range, and bipolar transistors must be worked in Class-A operation to eliminate it completely.

This carrier storage effect and notching distortion are not encountered with MOS FETs because of their superior high-speed switching characteristics, so the use of MOS FETs ensures very excellent, low distortion characteristics.

VOLTAGE CONTROLLED MOS FETs PERMIT SUPERIOR DRIVER STAGE DESIGN

MOS FET power transistors have a high input-impedance characteristic and are voltage controlled devices which require only low current, signal voltages fed to their input to deliver a high power output, unlike bipolar transistors that must be driven by high current, more powerful signals. This means that more ideal operating conditions can be designed for the preceding driver stage when MOS FETs are used in the final stage. Because of the low current requirements, superior low power devices can be utilized. Class-A operation can also be utilized for driver stage amplifiers more easily and improve the overall performance of the amplifier.

MOS FETs PRODUCE HIGH GAIN

The high gain attainable from only one stage of complementary push-pull Power MOS FETs is equivalent to the gain obtained with two or three bipolar transistor amplifier stages. The reduced number of stages for MOS FET amplifiers simplifies signal path circuitry and helps to create a superior power amplifier with higher stability and improved characteristics.

SUPERIOR HIGH FREQUENCY PERFORMANCE

It is advantageous to provide adequate wideband, high frequency characteristics within the NF (Negative Feedback) loop in audio amplification circuits where large amounts of negative feedback are required. This helps to prevent TIM (Transient Intermodulation Distortion) and obtain a more accurate, faithful reproduction of music. The wideband characteristics of MOS FETs make this possible, and helps to prevent TIM more effectively.

LINEARITY

Compared with Junction-type FETs, MOS FETs have a wider linear range which means that superior performance can be obtained with smaller bias currents and less heat generation, a desirable characteristic for power amplifier devices. In this respect, bipolar transistors are very excellent devices also.

BUILT-IN PROTECTION AGAINST OVERHEATING

MOS FETs have a Negative Temperature Coefficient in the high current area, a characteristic which basically differs from bipolar transistors. This helps to protect itself from damage in case of trouble. For example, if an abnormal current flow occurs resulting from some circuit breakdown, a sudden rise in pellet temperature will cause this negative temperature coefficient of the MOS FET to decrease current flow, reduce heat and protect itself from damage. A similar breakdown may cause thermal runaway with bipolar transistors which would require protective countermeasures and special operational care.

As explained above, MOS FETs have many advantages. However, if we are to mention a weak point, it is that they are costly.

Nevertheless, Accuphase has adopted MOS FETs because of their excellent performance characteristics which, we firmly believe, is well worth the extra cost.

Although certain weak points of bipolar transistors were described in the above comparison with MOS FET devices, we must add that due to constant progress in circuit design technology, there are certain well-designed bipolar amplifiers that are equal in performance, if not superior, to some MOS FET Amplifiers.

Accuphase E-204

INTEGRATED | STEREO AMPLIFIER

GUARANTY SPECIFICATIONS

PERFORMANCE GUARANTY: All Accuphase product specifications are guaranteed as stated.

CONTINUOUS AVERAGE POWER OUTPUT: (New IHF Standard)
both channels driven, from 20 Hz to 20,000 Hz with no more than 0.02% total harmonic distortion plus N
90 watts per channel, min. RMS, at 4 ohms
75 watts per channel, min. RMS, at 8 ohms
38 watts per channel, min. RMS, at 16 ohms

TOTAL HARMONIC DISTORTION + N: (New IHF Standard)
both channels driven, from 20 Hz to 20,000 Hz at any power output from 1/4 watt to rated power
0.02% max., at 4 ohms
0.01% max., at 8 ohms
0.01% max., at 16 ohms

INTERMODULATION DISTORTION: (New IHF Standard) will not exceed 0.005% at rated power output

FREQUENCY RESPONSE: (New IHF Standard)
Main Amp Input: 20 Hz to 20,000 Hz; +0, −0.2 dB at rated power output
1 Hz to 300,000 Hz; +0, −3.0 dB at 1 watt power output
High Level Input: 20 Hz to 20,000 Hz; +0, −0.2 dB at rated power output
Low level Input: 20 Hz to 20,000 Hz; +0.2, −0.5 dB at rated power output

DAMPING FACTOR: (New IHF Standard)
80, 8-ohm load at 50 Hz

INPUT SENSITIVITY AND IMPEDANCE:

Input Terminal	Sensitivity Rated Output	Sensitivity New IHF Std. (1 watt output)	Impedance Ohms
Disc 1/MM	1.9 mV	0.22 mV	100, 47k, 100k
Disc 2/MC	0.09 mV	0.011 mV	100
Tuner Aux, Tape Play	120 mV	13.9 mV	47k
Main Amp Input	1V	0.12V	47k

MAXIMUM INPUT FOR DISC INPUT: (0.01% THD)
Disc 1/MM: 200 mV RMS at 1,000 Hz
Disc 2/MC 10 mV RMS at 1,000 Hz

OUTPUT LEVEL AND IMPEDANCE: Preamp, Output; 1V at rated input level, 200 ohms
Tape Rec. 1, 2; 120 mV at rated input level, 200 ohms

HEADPHONE JACK: For listening with low impedance (4 to 32 ohms) dynamic stereo headphones

VOLTAGE AMPLIFICATION IN DECIBELS:
Main Amp Input to Output; 27.8 dB
High-Level Input to Preamp Output; 18.4 dB
Disc 1 Input to Tape Rec.; 36 dB
Disc 2 Input to Tape Rec.; 62 dB

A-WEIGHTED SIGNAL-TO-NOISE RATIO:

Input	Rated Output	New IHF Standard
Main Amp Input	115 dB	95 dB
High-Level Input	100 dB	82 dB
Disc 1/MM	77 dB	80 dB
Disc 2/MC	70 dB	77 dB

TONE CONTROLS: 11-position click-stop, Bass and Treble controls, turnover frequency switches and tone ON/OFF switch.
Bass; Turnover frequency 200 Hz; ±10 dB at 50 Hz
Turnover frequency 500 Hz; ±10 dB at 100 Hz
Treble; Turnover frequency 2,000 Hz; ±10 dB at 10 kHz
Turnover frequency 7,000 Hz; ±10 dB at 50 kHz

LOUDNESS COMPENSATOR: (Volume attenuation at −30 dB)
COMP 1; +6 dB at 50 Hz
COMP 2; +10 dB at 50 Hz, +6 dB at 20 kHz

SUBSONIC FILTER: 17 Hz, cutoff 12 dB/oct

ATTENUATOR: −20 dB

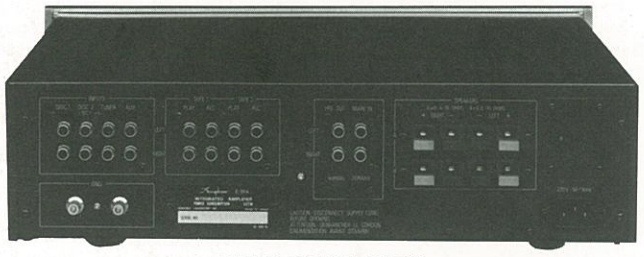
OUTPUT LOAD IMPEDANCE: 4 to 16 ohms

SEMICONDUCTOR COMPLEMENT: 55 Tr's, 11 IC's, 8 FET's, 42 Diodes

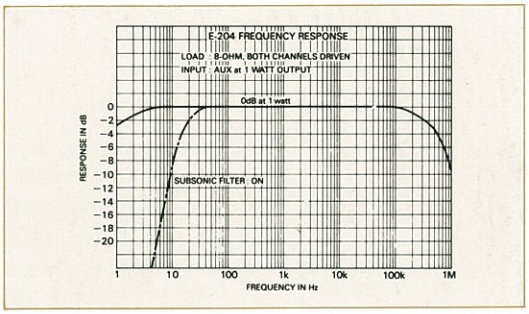
POWER REQUIREMENT: 100, 117, 220 and 240V (Voltage selector provided) 50/60 Hz
Consumption; 45 watts at zero signal output
285 watts at rated power output into 8-ohm load

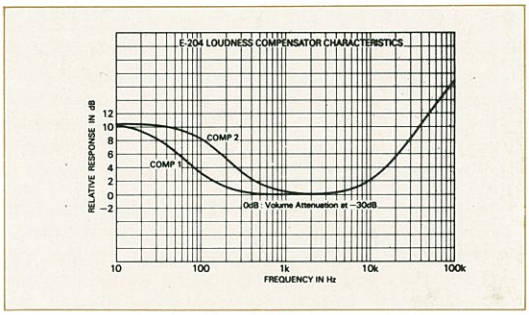
DIMENSIONS: 445 mm (17-1/2 inches) width, 128 mm (5-1/16 inches) max. height, 370 mm (14-9/16 inches) depth

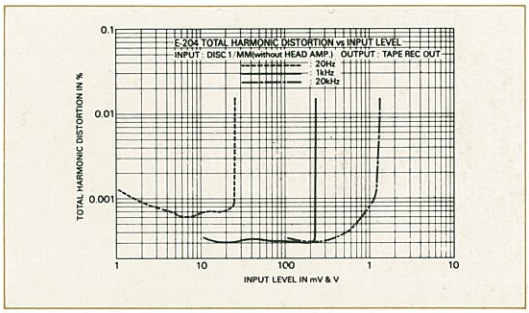
WEIGHT: 13.6 kg (30.0 lb) net, 18.0 kg (39.6 lb) in shipping carton

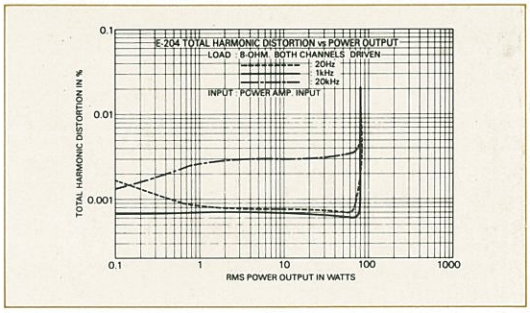


REAR PANEL VIEW









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