

Accuphase

P-260

- STEREO POWER AMPLIFIER
- 130W/30W/ch. (PURE CLASS-A)
- MOS FET OUTPUT STAGE
- OPERATION CONTROL SWITCH



The Accuphase P-260 is a highly perfected stereo power amplifier, which is the result of Accuphase's mind dedicated to eager pursuit of sound quality and of the combined aggregation of Accuphase audio technology.

MOS FETs, which are recognized as the most promising power amplifier device, are employed in the output stage. In addition to superior inherent characteristic of MOS FETs that there is no trace whatsoever of notching distortion, it is capable of switching over operating mode to pure Class-A operation in which crossover distortion is completely eliminated.

It has a power output of 130 Watts per channel (8-ohm load, 20-20,000Hz, 0.005% distortion) at Normal Operation, which provides ample sound pressure even for lowest efficiency speakers. Despite the output power of 30 Watts per channel at Class-A operation, it will still supply sufficient sound pressure for ordinary, medium efficiency speakers rating of more than 90dB/W/m.

Pure Class-A operation of the P-260 most strikingly exhibits its effectiveness in high grade multi-amplification systems. For example, superior quality reproduction will immediately become apparent when it is utilized together with high efficiency horn speakers to handle amplification of the mid and high frequency range channels of such a system.

Two pairs of MOS FETs are used in the parallel push-pull output stage and the P-260 employs the extravagant "Accuphase Original" complementary-symmetry, push-pull driven DC amplifiers in every stage so that they may possess further superior open-loop characteristics, inherent characteristics before NFB application. The P-260 promises highest quality reproduction with minimum sound coloration, and especially transitional distortion is effectively prevented because of these careful circuit design approach.

1 CLASS-A OPERATION

The P-260 offers a choice between Normal and Class-A operation with front panel switching. Pure Class-A operation was provided in response to the endless search of dedicated audiophiles for further sound perfection, and in view of the fact that the electrical characteristics of recent power amplifiers have approached the theoretical performance limitations for normal Class-B or Class-AB operation. (which is the commonly accepted practice for practically all audio equipment on the market today).



The P-260's Class-A operation is achieved in the orthodox manner which calls for the operation slopes of push-pull amplification devices to overlap each other in perfect alignment. Current flow from the power supply to the amplification devices is constant, and stability, both operational and thermal, is maintained at all times.

Switching of the operational control system is achieved electronically as opposed to mechanical switching of bias resistors. The system is built around Q_{10} and Q_{11} , as shown in the amplifier block diagram of Figure 1. Q_{11} is an Opto-Coupler that controls transistor Q_{10} which controls the bias resistor R.

Q_{11} , which contains a photo transistor and a Light Emitting Diode (LED) does not operate and remains OPEN during normal operation. Under this condition the Q_{10} is ON and shorts the bias resistor R that determines the normal operation of FETs.

When the Operation selector is switched to Class-A, current flows through the Light Emitting Diode and activates the photo transistor which turns Q_{10} OFF, and releases the short of the bias resistor R. This causes Class-A operational current flow through all the transistors and FETs that follow Q_{12} , and, also at the same time, reduces the voltage supplied to the power output MOS FET devices by cutting the B voltage of the power transformer. As for Q_1 to Q_9 , Class-A operation is used for them at all times.

High stability is achieved since the signal path line is not wired over long distance for switching two operational modes, because of this remote switching way. The OPERATION switch on the front panel controls the selection of Normal or Class-A operation, and the LED lamps will be coincidentally switched over to indicate operation mode.

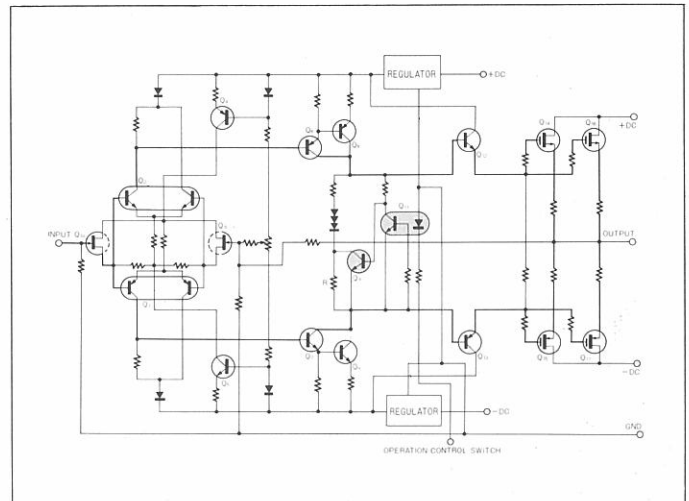


Fig.1 MOS FETs' SYMMETRICAL PUSH-PULL DC POWER AMPLIFIER

2 MOS FETs USED IN POWER OUTPUT STAGE

MOS FETs, which are considered the most promising devices for power output applications, are used in a parallel push-pull circuitry in the final output stage. MOS FETs have many advantages over bipolar and/or SIT (V-FET) devices, and greatly improve the high frequency range characteristics by eliminating notching distortion. Also they have a wide frequency range and are very effective in minimizing harmful transient intermodulation (TIM) distortion. Moreover, higher reproduction quality is possible when MOS FETs, which have high gain and are voltage controlled devices, are used in the final stage because Class-A operation for the driver stage, as well as all preceding stages, can be adopted more readily.

3 COMPLEMENTARY-SYMMETRY PUSH-PULL DC AMPLIFIER CIRCUIT IN EVERY STAGE

Figure 1 shows the block diagram of the P-260 which is built around complementary-symmetry push-pull DC amplifiers in every stage. This circuitry assures high stability amplification because of its superior inherent characteristics before Negative Feedback (NFB). As a result, very little NFB is required, which accounts for its very low distortion ratio. The high stability of the complementary-symmetry push-pull circuit also effectively helps to reduce TIM distortion, and contributes greatly to improved sound quality.

Distortion data are shown in the last page, and Fig. 2 shows the IM Distortion data under new IHF Standard Methods of Measurement defined in 1978.

When plural signals closed each other in frequency cause non-linear distortion, as well as harmonic distortion of each original signals, a third signal of difference in frequency between each signals appears and deteriorates the reproduction sound. This is the process of the IM Distortion stated in the new IHF. This distortion is occasionally called as BEAT DISTORTION. Even if original signals are out of the audible range, such a distorted third signal comes to appear in the audible range and it results in a deterioration of sound quality. This became a great issue recently. This kind of IM Distortion is apart from the former Intermodulation Distortion which is measured with the frequencies of 50Hz or 60Hz vs 7,000Hz and is called as "SMPTE-IM".

Refer to Fig. 2. It shows the distortion spectrum of the P-260 which was measured under the condition at rated output, with input signals in frequencies of 19kHz and 20kHz at the rate of 50 to 50. If the IHF-IM Distortion has been caused in the P-260, a spectrum appears at the frequencies of 1kHz, 2kHz, 3kHz and so on. The Fig. 2 attests the truth that none of IM Distortion have been detected and any distortion are out of measuring limit of 0.0027%.

In addition, virtual elimination of DC drift at the output by the utilization of dual transistors in an input differential circuit and rational layout of components according to thermal considerations has resulted with very stable, and pure DC amplifier characteristics of the P-260.

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STEREO POWER AMPLIFIER

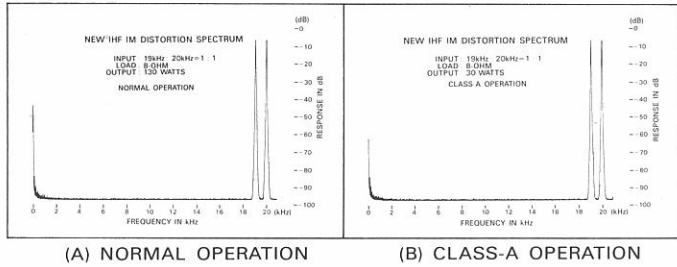
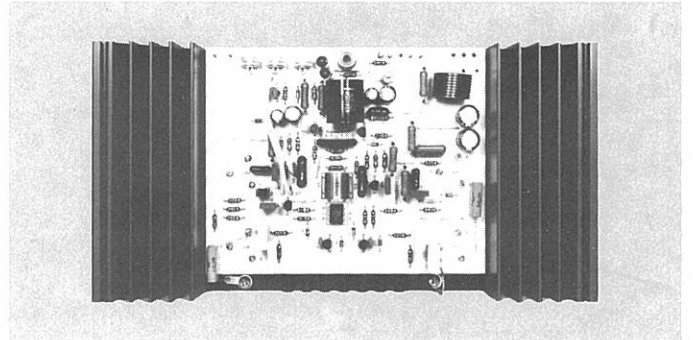


Fig.2 NEW IHF-IM DISTORTION SPECTRUM

7 PROTECTION CIRCUIT AGAINST OVERHEATING

Maximum heat is generated at zero signal during Class-A operation and continuous operation may cause overheating of the cabinet interior if air circulation at the point of installation happens to be poor. Because of such a possibility, a built-in heat sensor is provided as an extra safety measure, despite the fact that the P-260 has been designed for long life, trouble free service that is well-supported by sufficient thermal considerations.

If the interior temperature happens to rise to 70 degrees centigrade, the heat sensor automatically alters the bias for Class-A operation, and will reduce the B voltage to the power output FETs in case of NORMAL operation.



Showing that Power Drive Circuit Board is closely installed in Heat-sinker for MOS FETs in order to diminish wiring distance.

4 IDEAL POWER SUPPLY WITH NEW C-I CORE POWER TRANSFORMER AND GIANT FILTER CAPACITORS

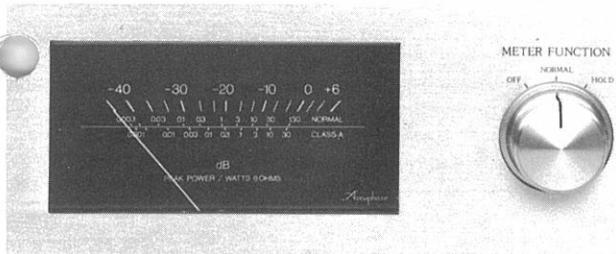
A new C-I shaped power transformer which is gaining increasing recognition for high efficiency and low flux leakage is used in the power supply. It is the same type transformer as those AC power line transformers on electric posts which have dual balanced type windings that ensure high efficiency and superior characteristics against line voltage fluctuations.

The power supply also has two low impedance, 40,000 μ F filter capacitors which were specially designed for audio use. The C-I core power transformer and the extra large filter capacitors form the heart of an ideal power supply.

5 PEAK LEVEL METER WITH "PEAK HOLD" FEATURE

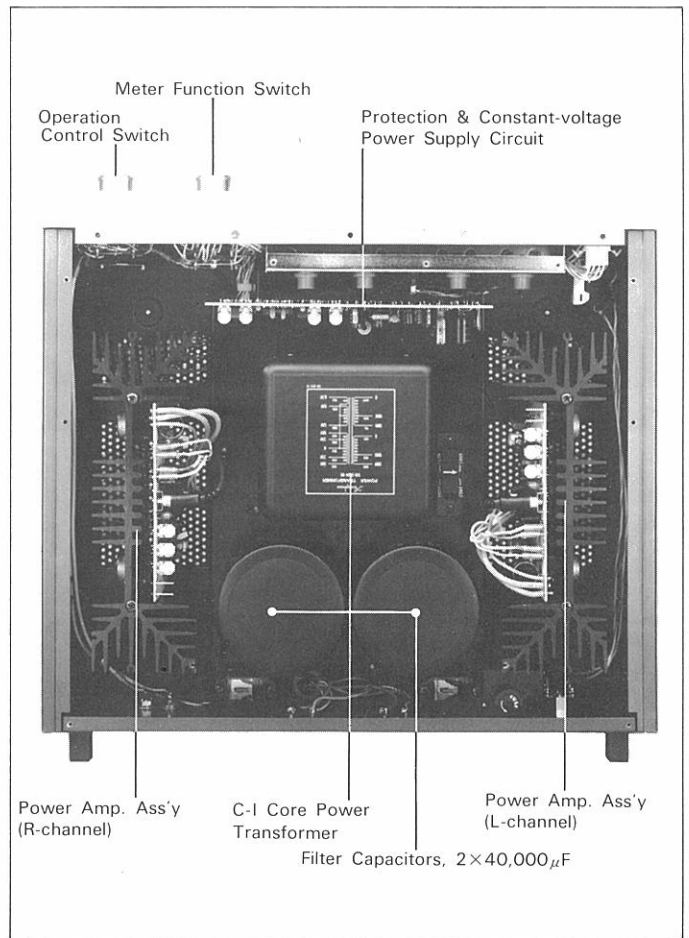
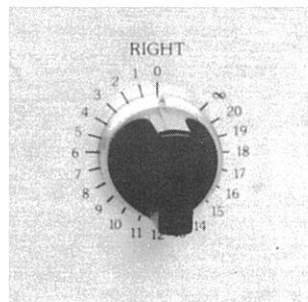
A very convenient power meter is provided on the front panel. It is a logarithmic type peak level meter which has scales for direct reading of output level in decibels (dB) and power output in watts at 8-ohm load.

The meter also offers a PEAK HOLD feature that holds the pointer at peak level for a sampling period of three seconds. It is very convenient for observing program source peaks. Whenever the OPERATION switch is used for Class-A operation, the meter pointer will thereafter automatically register 0dB for the rated output of 30 watts.



6 1 dB STEP ATTENUATOR

This power amplifier provides input level step attenuation so that the overall amplifier gain can be controlled in accordance with total efficiency, including that of the speaker. Independent, variable control of left and right channels is possible down to -20dB in one dB steps. This feature is most convenient for multi-amplification systems.



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STEREO POWER AMPLIFIER

GUARANTY SPECIFICATIONS

PERFORMANCE GUARANTY:

All Accuphase product specifications are guaranteed as stated.

CONTINUOUS AVERAGE POWER OUTPUT: (New IHF Standard)
both channels driven, from 20Hz to 20,000Hz with no more than 0.01% total harmonic distortion:

NORMAL OPERATION: 180 watts per channel, min. RMS, at 4 ohms
130 watts per channel, min. RMS, at 8 ohms
65 watts per channel, min. RMS, at 16 ohms

CLASS-A OPERATION: 45 watts per channel, min. RMS, at 4 ohms
30 watts per channel, min. RMS, at 8 ohms
15 watts per channel, min. RMS, at 16 ohms

TOTAL HARMONIC DISTORTION: both channels driven, from 20Hz to 20,000Hz at any power output from 1/4 watt to rated power:
0.01% max., at 4 ohms
0.005% max., at 8 ohms
0.005% max., at 16 ohms

INTERMODULATION DISTORTION: (New IHF Standard)
will not exceed 0.003% at rated power output

FREQUENCY RESPONSE : (New IHF Standard)
20 Hz to 20,000 Hz; +0, -0.2 dB for rated output at the maximum level control
0.4 Hz to 250,000 Hz; +0, -3.0 dB for 1 watt output at the maximum level control
0.4 Hz to 120,000 Hz; +0, -3.0 dB for 1 watt output at -6 dB attenuation

DAMPING FACTOR: (New IHF Standard)
120, at 50Hz

INPUT SENSITIVITY AND IMPEDANCE: 1.3V, 50k ohms, for rated output at the maximum level control
0.12V, 50k ohms, for 1 watt output (New IHF Standard)

A-WEIGHTED SIGNAL-TO-NOISE RATIO: (Normal Operation)
120dB below rated output, inputs shorted
100dB at 1 watt output (New IHF Standard)

POWER LEVEL METER: logarithmic scale Peak Level indication of the dynamic range from -40dB to +6dB with Peak-Hold circuit, calibrated to read 0dB at 130 watts into 8 ohms load

SEMICONDUCTOR COMPLEMENT: 33Tr's, 16FET's, 4IC's, 40Di's, 2 Opto-couplers

POWER REQUIREMENT: Voltage selector for 100, 117, 220, 240V
50/60Hz operation
NORMAL OPERATION

Consumption:

63 watts at zero signal output
490 watts at rated power output into 8 ohms load

CLASS-A OPERATION
195 watts at zero signal output
210 watts at rated power output into 8 ohms load

DIMENSIONS: 445mm (17-1/2 inches) width, 160mm (6-5/16 inches) max. height
390mm (15-3/8 inches) depth

WEIGHT: 19.7kg (43.3 lbs.) net, 23.7kg (52.2 lbs.) in shipping carton

