Accuphase

MC CARTRIDGE HEAD AMPLIFIER

C-17

- Cascode push-pull amplification for all stages
- Input impedance and gain selectors provided

GUARANTY SPECIFICATIONS

- **PERFORMANCE GUARANTY:** All Accuphase product specifications are guaranteed as stated.
- **GAIN:** 0dB (MM) +26dB +32dB
- **FREQUENCY RESPONSE:** 20Hz to 20,000Hz; +0, −0.2dB 2Hz to 100,000Hz; +0, −3.0dB
- **MAXIMUM INPUT LEVEL (at 0.005% distortion, 1kHz):** +26dB position: 150mV +32dB position: 75mV
- **RATED INPUT LEVEL:** +26dB position: 0.1mV +32dB position: 0.05mV
- **RATED OUTPUT LEVEL:** 2.0mV
- **TOTAL HARMONIC DISTORTION:** Will not exceed 0.005% at maximum input level, 20Hz to 20,000Hz.
- **A-WEIGHTED SIGNAL-TO-NOISE RATIO**

Gain	Rated Input	EIA
+26dB position	72dB	76dB
+32dB position	66dB	76dB

- **INPUT IMPEDANCE:** 10 ohms, 30 ohms, 100 ohms (selectable)
- **OUTPUT IMPEDANCE:** 50 ohms
- **MINIMUM LOAD IMPEDANCE:** 10k ohms
- **SEMICONDUCTOR COMPLEMENT:** 71 Tr's, 4 FETs, 8 ICs, 64 Di's
- **POWER REQUIREMENT:** Voltage selection by rewiring for 100, 117, 220, 240V, 50/60Hz operation
- **POWER CONSUMPTION:** 30W
- **DIMENSIONS:** 194mm (7-5/8 in.) width, 142mm (5-5/8 in.) max. height, 371mm (14-5/8 in.) depth
- **WEIGHT:** 8.1 kg (17.8 lb) net, 11.0 kg (24.2 lb) in shipping carton

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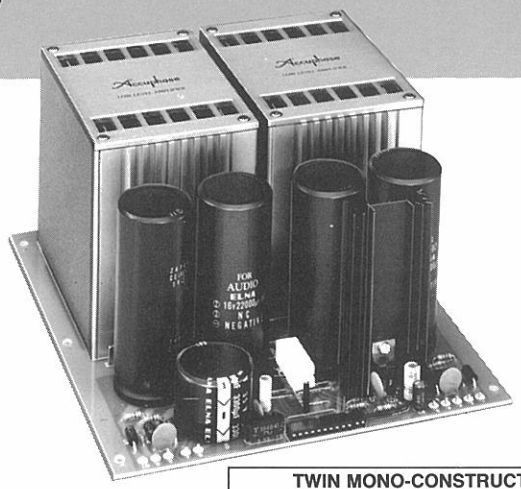


Although the superiority of MC (Moving-coil) cartridges in their sound quality is indisputable, their outputs must be amplified 20 to 30dB more than MM (Moving-magnet) cartridges because the output level of an MC cartridge is low.

To provide this extra amplification, step-up transformers have been traditionally used. However, recent years have found the advent of head amplifiers that realize electronically direct amplification of the input signal thanks to the improvement of semiconductor and circuit technologies. Although step-up transformers are still preferred by some audio enthusiasts, the reason for this is that the combination of the characteristics of the transformer and cartridge allows reproduction of unique musical nuances. Nevertheless, the characteristics of the cartridge are sometimes not faithfully transmitted and mismatching of impedances may cause degradation in the tonal balance.

Accuphase Head Amplifier C-17 is constructed with an eye to the faithful transmission of the unique characteristics of the cartridge. In other words, our goal was a head amplifier that does not announce the presence of amplification system.

All amplification stages of the C-17 employ a cascode push-pull configuration that provides the upper limits of the frequency characteristics, linearity, and signal-to-noise ratio. The overall performance of a head amplifier is likely to be affected by the power supply because the level of the signal processed by the head amplifier is extremely low. Consequently, the impedance of the power supply and noise have a significant influence on the sound quality.

The C-17 eliminates almost all the problems attributable to the power supply by using mono-construction of power transformers in which the left and right power transformers are completely independent of each other.

To accommodate the wide range of the output voltages and input impedances of MC cartridges, gain can be set to 26dB or 32dB by selector switches. Additionally, the input impedance can also be varied to 10, 30 or 100 ohms by selector switches.

We are confident that the C-17, which is designed to be the ultimate head amplifier, is fully capable of accurately and faithfully reproducing the unique sound quality of every type of MC cartridge.

1 CASCODE PUSH-PULL AMPLIFICATION REALIZING IDEAL AMPLIFIER PERFORMANCE

The circuit diagram of the C-17 is shown in Fig. 1. As shown, each amplifier circuit stage has two vertically connected elements that operate just as if they were a single element. The connection of elements is called "cascode connection", which features low feedback at each element constituting the connection, extremely small noise, and superb linearity at both low and high frequencies. The C-17 employs push-pull circuits formed in the cascode connection and thereby suppresses the distortion and noise. The ideal performance of the C-17 and an amplifier has thus been realized. These cascode amplifier circuits are accommodated into both the right and left aluminum housings that are independent of each other, thereby preventing resonances caused by induction noise and vibration.

2 COMPLETE LOW-NOISE DESIGN

Noise, that is, signal-to-noise ratio, provides the most significant clue to determine the performance of a head amplifier. Especially, when using the signal from an MC cartridge whose output is 0.1mV or less, how to suppress the residual noise of the head amplifier is the most important theme.

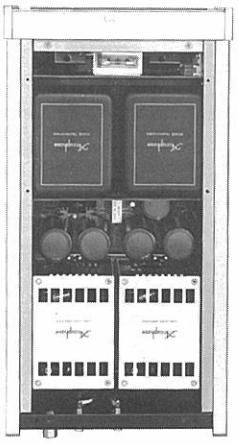
Of course, the C-17 employs carefully selected low-noise circuit elements. What is more, resistance noise is substantially reduced by decreasing the impedance of the NFB loop so that the noise generated in the differential input circuit is suppressed.

Moreover, to prevent the noise generated in the DC servo circuit from affecting the performance of the head amplifier, the signal is fed back to the bases of the constant-current transistors Q5 and Q6 instead of being directly fed back to the negative side of the differential amplifier circuit. This feedback method has realized a signal-to-noise ratio that is virtually the theoretical upper limit.

3 TWIN MONO-CONSTRUCTED INDEPENDENT POWER TRANSFORMERS; EACH UNIT AMPLIFIER HAS ITS EXCLUSIVE REGULATED POWER SUPPLY

The power supply circuit can be considered a part of the amplifier circuit since signals also pass through it. Therefore, unless its quality matches that of the amplifier circuit, no improvement in overall sound characteristics can be realized.

The C-17 employs twin power transformers which are both completely independent, electrically and structurally, of each other. One energizes the left channel and the other the right channel, thereby constituting the ideal mono-construction. Furthermore, to achieve low impedance over a wide bandwidth, the C-17 employs an exclusive constant-voltage power supply for each of the left and right channels. To minimize the wiring route, these constant-voltage power supplies are accommodated in the same aluminum housing where the amplifier circuits are incorporated.



4 IMPEDANCE AND GAIN SELECTORS ENSURE BEST INPUT MATCHING

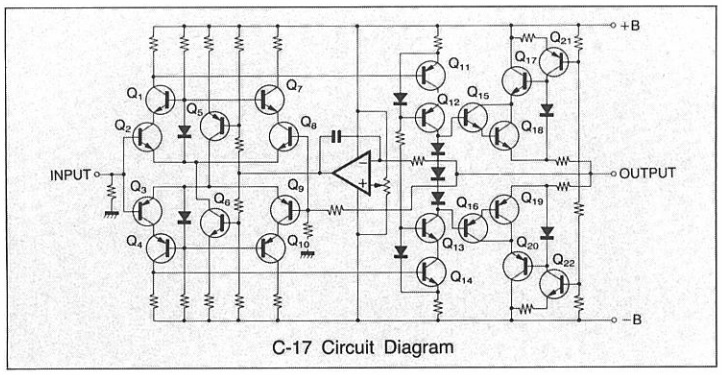
The C-17 is provided with excellent input matching to various MC cartridges which come in such wide variations of impedances and output levels. For example, the internal (output) impedances of MC cartridges vary all the way from 2 ohms to about 50 ohms, a difference of 20 or 30 times. Likewise, their output voltage levels vary from 0.01 mV to 0.5 mV, a difference of 50 times (34dB).

To accommodate this wide variety of MC cartridges and preserve fine control of sound quality, the C-17 provides three choices of input impedances and two choices of gains for closer matching.

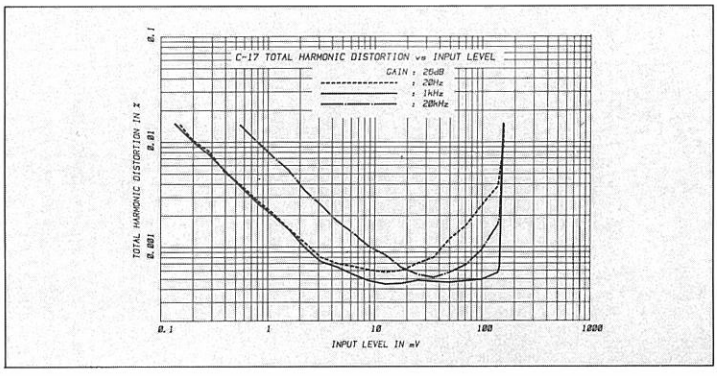
The output impedance of the cartridge need not be matched as strictly to the input impedance of the head amplifier as when a step-up transformer is used.

However, on many occasions, a good [illegible] will be obtained if the low output impedance cartridge is matched accordingly to the low input impedance of the head amplifier.

To adapt the input impedance to all kinds of MC cartridges so that the sound quality may be minutely controlled, the C-17 is provided with three MC input impedances: 10, 30 and 100 ohms. These impedances are selectable with selector switches. The 10-ohm input impedance is suitable when using cartridges having a load impedance of about 3 ohms. Similarly, the 30 and 100 ohm impedance are for the cartridge with a load impedances of 10 ohms or more. Furthermore, two GAIN selector switches (26dB and 3?dB) are also provided to allow use of low-output MC cartridges and to obtain a gain of 32dB in addition to the normally used 26-dB gain. Moreover, the signal received by the head amplifier is of RIAA recording characteristics. This means that the amplitude decreases at low frequencies and increases at high frequencies. Therefore, a signal of about 20dB (ten times) is input to the head amplifier when the frequency is increased from 1,000Hz to 20,000Hz. For this reason, the maximum input level of the head amplifier must be at least 50mV. To provide a wide margin of the input level, the maximum value of the input voltage of the C-17 is 150mV (at a gain of 26dB), thereby realizing a very wide dynamic range.



C-17 Circuit Diagram



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