

# Accuphase

## 1/3-OCTAVE STEREO GRAPHIC EQUALIZER

# G-18

- 1/3-octave, 33-band equalizer with constant Q factor
- Balanced input/output circuit provided
- All stages push-pull, DC servo controlled throughout, completely discrete circuit components



### GUARANTY SPECIFICATIONS

#### • PERFORMANCE GUARANTY:

All Accuphase product specifications are guaranteed as stated

#### • NUMBER AND WIDTH OF BANDS:

33-band 1/3-Octave

#### • CENTER FREQUENCIES:

Following 33 points

16 Hz, 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1k Hz, 1.25k Hz, 1.6k Hz, 2k Hz, 2.5k Hz, 3.15k Hz, 4k Hz, 5k Hz, 6.3k Hz, 8k Hz, 10k Hz, 12.5k Hz, 16k Hz, 20k Hz, 25k Hz

#### • Q FACTOR (Sharpness of frequency selectivity):

4.3 (constant)

#### • EQUALIZATION RANGE:

-12.0 dB to +12.0 dB

#### • FREQUENCY RESPONSE (with band level control set to 0 dB):

0.3 Hz to 160,000 Hz +0 -3.0 dB  
1.0 Hz to 40,000 Hz +0 -0.2 dB

#### • GAIN:

0 dB (with band level control set to 0 dB)

#### • TOTAL HARMONIC DISTORTION:

Will not exceed 0.002%  
(EIA from 16 Hz to 25,000 Hz)

#### • RATED INPUT VOLTAGE/RATED OUTPUT VOLTAGE:

2.0 V

#### • SIGNAL-TO-NOISE RATIO (EIA):

110 dB

#### • INPUT IMPEDANCE

Unbalanced: 20k ohms  
Balanced: 40k ohms/600 ohms (selectable)

#### • OUTPUT IMPEDANCE

Unbalanced: 10 ohms  
Balanced: 50 ohms

#### • LOAD IMPEDANCE

Unbalanced: 1k ohms min.  
Balanced: 600 ohms min.

#### • MAXIMUM INPUT/OUTPUT VOLTAGE:

(with band level control set to 0 dB)  
8 Vrms, +20 dBm/600 ohms (balanced output)

#### • SEMICONDUCTOR COMPLEMENT:

706 Tr's, 8 FET's, 10 IC's, 129 Di's

#### • POWER SUPPLY AND POWER CONSUMPTION:

Voltage selection by rewiring for 100V, 117V, 220V, 240V, 50/60 Hz, 55W

#### • DIMENSIONS:

445 mm (17-1/2 inches) width x 160 mm (6-5/16 inches) height (including rubber feet) x 373 mm (14-11/16 inches) depth

#### • WEIGHT:

12.0 kg (26.4 lb) net, 16 kg (35.2 lb) in shipping carton

# Accuphase G-18

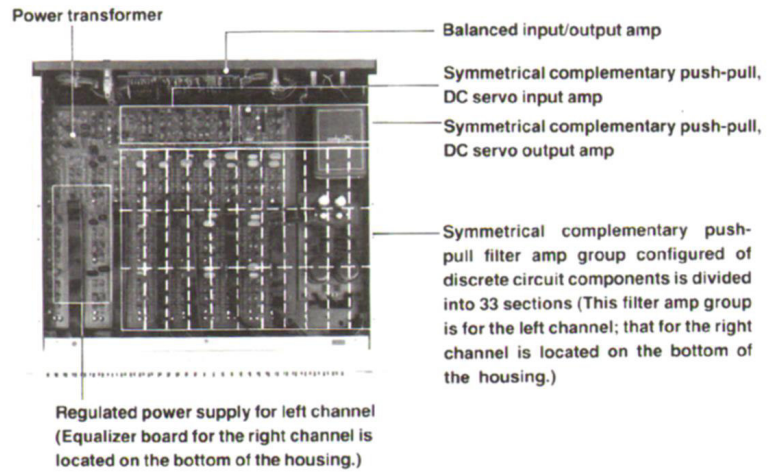
Stereo Graphic Equalizer

Recent years have seen the increasing popularity of digital audio sources such as compact discs, digital recorders, and so on. To reproduce from these sources, fine tuning of the sound distribution characteristics of the listening room as well as of the speakers is of vital importance. The sound distribution characteristic can be smoothed by compensating for (i.e., equalizing) the frequency characteristic of the speakers. Consistent sound quality can be thereby obtained over the entire frequency range, resulting in a superbly reproduced sound field with excellent presence and localization.

The G-18 is a 1/3-octave graphic equalizer designed to compensate the sound distribution characteristic without degrading the sound quality.

One unsolved problem for graphic equalizers had been degradation in the sound quality. In the development of the G-18, our special efforts tackled this problem. As their fruit, all the circuits constituting the bandpass filters are configured of discrete components such as transistors and FETs instead of ICs to improve the overall characteristic to its upper limit.

The circuit components, including the resistors and capacitors of the bandpass filters, are painstakingly selected with the criterion of "improved sound quality". In addition, the G-18 is so constructed that its left and right channels are independent of each other. Furthermore, balanced XLR-type connectors are provided as input/output connectors, in addition to conventionally employed unbalanced phono-jack connectors, to prevent degradation of sound quality that may be caused by use of an extension cable. Thus, the G-18 is ready for professional use also.



## 1 1/3-octave, 33-band equalizer for correct compensation of sound distribution characteristic

Generally, two types of equalizers are available: the 1-octave type and the 1/3-octave type. Fig. 1 shows the overall sound distribution characteristic, including that of the speakers, at the listening position of both types of equalizers. In this figure, the curves in thin line indicate the characteristic before equalization, whereas the curves in thick line indicate it after.

As can be seen, the sound distribution characteristic before equalization randomly fluctuates at 30 Hz, 45 Hz, 90 Hz, 130 Hz, 160 Hz, 250 Hz, 430 Hz, and so on, namely, at intervals of 1/2 to 1/3 octave. Therefore, with a 1-octave equalizer that equalizes the sound distribution characteristic on an octave basis, namely, equalization based on multiples of 2 by which the frequency is multiplied, the effect is inadequate though the heaviest fluctuations can be equalized as shown in Fig. 1 (a).

Fig. 1 (b) shows the sound distribution characteristic equalized by a 1/3-octave equalizer. As evident, the characteristic is equalized almost within a range of  $\pm 3$  dB, which is almost ideal for practical use. Because of this design advantage over its counterpart, the 1/3-octave equalizer G-18 equalizes the sound distribution characteristic in the sound field and produces as flat a characteristic curve as possible.

The center frequency of each band conforms to the preferred frequencies for acoustical measurements of ISO (International Standardization Organization) standard. The variable frequency range of the G-18 consists of 33 bands from 16 Hz to 25,000 Hz thereby completely encompassing the audio band ranging from 20 Hz to 20,000 Hz.

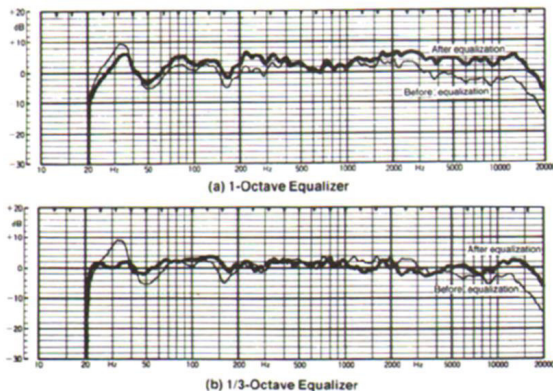


Fig. 1 Equalization Examples by 1- and 1/3-Octave Equalizers

## 2 Constant Q factor to minimize interference between adjacent bands

The Q factor which determines the sharpness of each band characteristic is set to 4.3, which is considered to be a perfect value for 1/3-octave equalizers, so that the crossing point of adjacent two bands becomes  $-3$  dB.

If Q changes with the position of the level control, the interference between adjacent bands increases in intensity as shown in Fig. 2. To prevent such increase in interference, the Q factor for the G-18 is held constant so that it will not change with the level control position. The result is the ideal band characteristic as shown in Fig. 3.

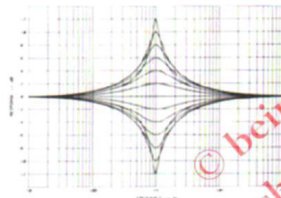


Fig. 2 Frequency Characteristic of Band Where Q Varies (Adjacent bands are significantly affected.)

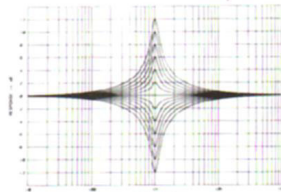


Fig. 3 Frequency Characteristic of G-18's Band Where Q is Constant (Q = 4.3) (Adjacent bands are hardly affected.)

## 3 Bandpass filters consisting of carefully selected discrete circuit components

The overall sound quality is determined by the quality of the unit amplifiers constituting the graphic equalizer such as buffer amplifiers and bandpass filter amplifiers.

In the case of the G-18, the construction becomes very complicated because the total number of BPF's is 66 (33 each for the left and the right channels). This complexity in construction normally leads to an increase in the number of circuit components and consequently, most graphic equalizers employ operational amplifiers formed by ICs.

Instead of following suit, however, the G-18 employs such discrete circuit components as transistors and FETs for substantial improvement of the sound quality. The buffer amplifiers are configured as differential complementary push-pull circuits with FET input. The bandpass filter amplifiers are also configured as differential complementary push-pull circuits.

Both the amplifiers realize the topmost performance and characteristics. The capacitors and resistors are responsible for the quality of the bandpass characteristics. The capacitors are especially important in that they have a significant influence on the sound quality. Of course, not only these capacitors, but all circuit components employed in the G-18 are chosen by the most stringent selection methods possible.

## 4 Balanced input/output circuit for excellent sound quality

The longer a cable, the more susceptible the signal is to external noise transmitted by the cable.

In a balanced cable network, both the positive and negative signals are generated and transmitted between plural pieces of equipment. If unwanted noise is induced during the transmission, it is suppressed at the input circuit. Therefore, the signal transmitted by this kind of network is difficult to be adversely affected by external noises which are likely to occur in the course of the signal transmission. For this reason, the balanced cable network is employed by many broadcasting stations as well as by professional audio equipment.

In addition to unbalanced input/output terminals (phono jacks) conventionally used, the G-18 is provided with balanced XLR-type connectors to prevent the sound quality from being degraded by external noise during transmission. The input impedance of the G-18 can be changed over between 600 ohms and 40K ohms. The output impedance is 50 ohms and thus, the G-18 can be connected to a balanced input/output signal with any impedance.

## 5 Two-power supply system and independent channels completely eliminating interference between channels

If a specific frequency band is to be boosted (lift up) or attenuated (lift down), interference between the left and the right channels becomes more severe than the interference that may occur with an ordinary flat amplifier.

The G-18 has an exclusive filter circuit with power transformer coils for left and right channels, each independent of the other as an adequate countermeasure against interference.

The picture shows the left channel of the equalizer board. The equalizer board for the right channel is mounted on the bottom of the housing, separated by a shielding plate from the left channel's board.

## 6 Simple signal route

The G-18 functions as a graphic equalizer only, which means that it does not have input/output terminals for a tape recorder. Instead, it has only one functional switch, namely, the EQUALIZER ON/OFF switch to activate or deactivate the bandpass filters. This simplicity establishes a signal route through which only a pure signal is allowed to pass.

It is recommended to insert the G-18 between the preamplifier and power amplifier.

## 7 Acryl protective panel attached as accessory

Exposed level controls may be accidentally moved from their set positions. Besides, level controls, some set upward and others downward, are an eyesore. For these reasons, a translucent acryl protective panel shields them from view.

This panel is attached by its pins into the mating holes on the front panel of the G-18 and therefore, attaching or detaching the panel is easy.

## 8 Front panel available in two colors: champagne gold and black

The color of the front panel is champagne gold, the traditional color of Accuphase products. As an alternative, a black front panel (Type G-18B) is also available.

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