

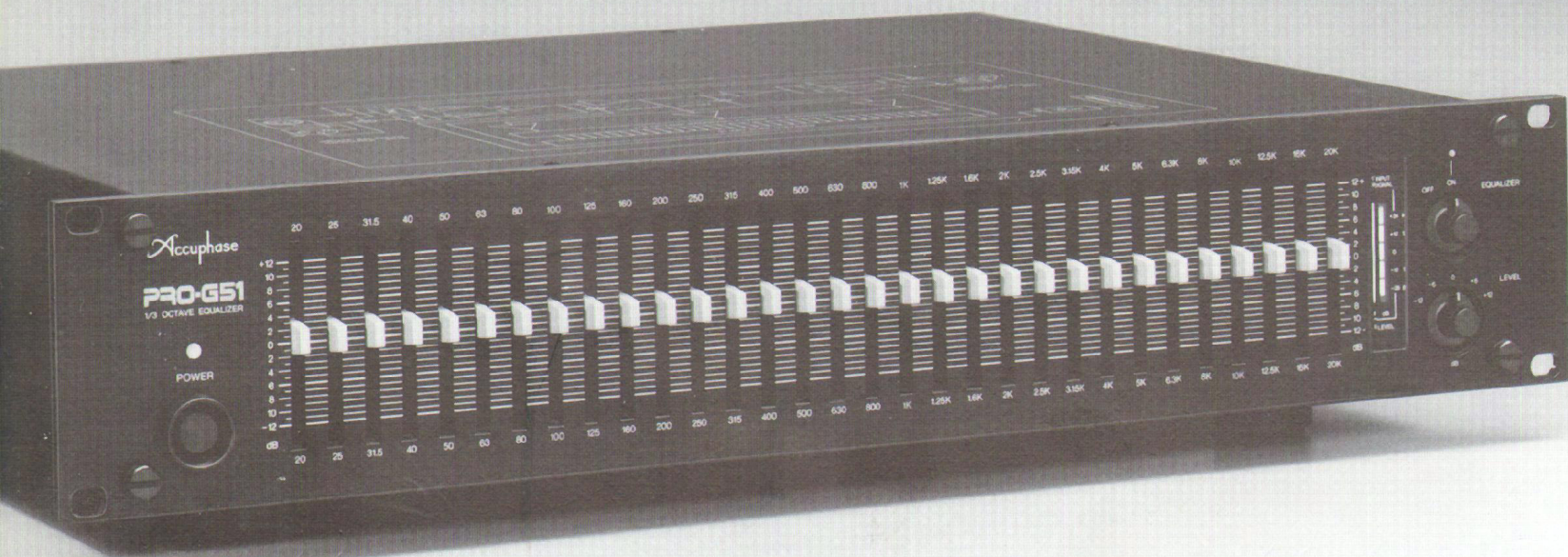
Accuphase

1/3 OCTAVE GRAPHIC EQUALIZER

PRO-G51

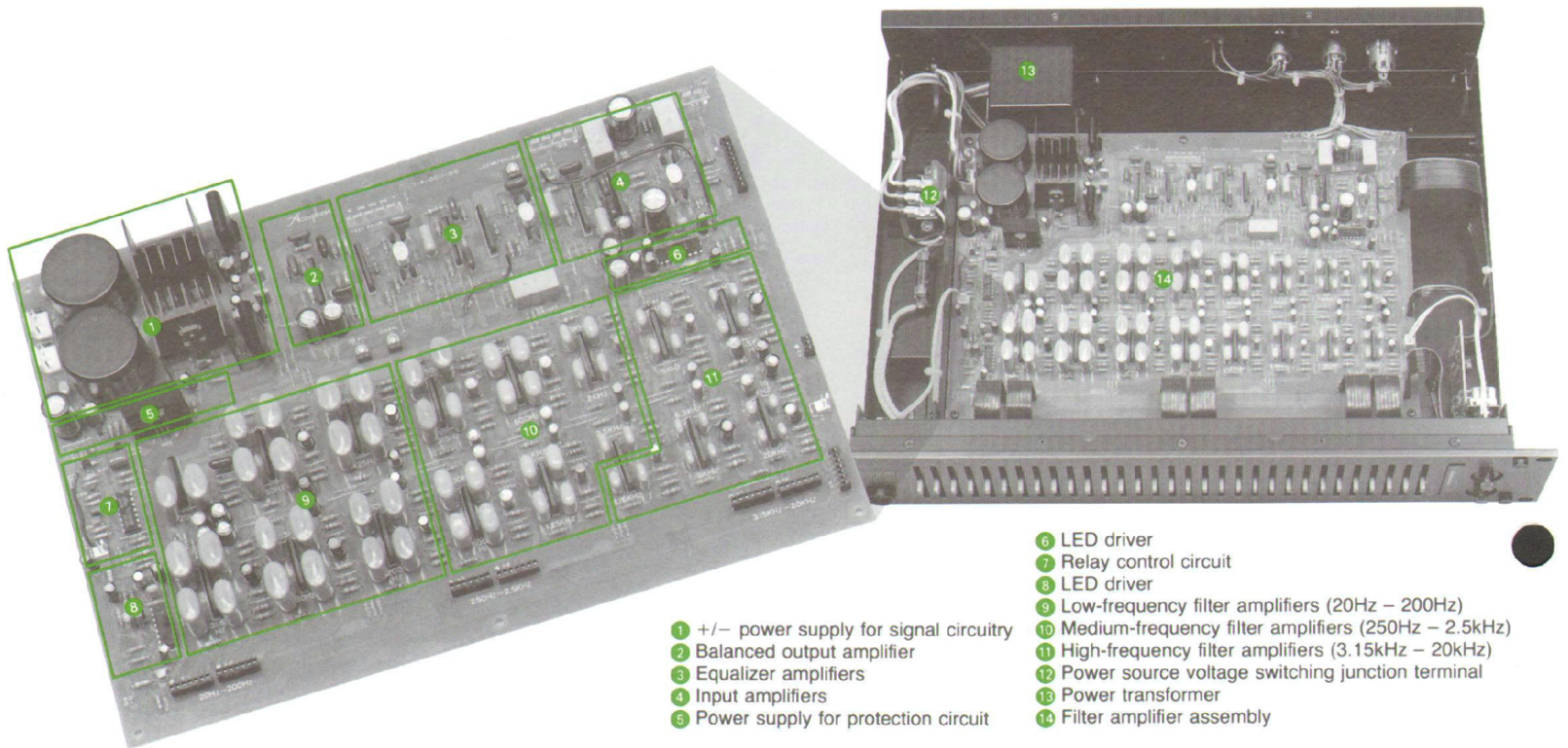
- 1/3-octave 31-band constant Q factor graphic equalizer
- 5-position input level control

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Archiv Michael Otto
HiFi-Classic.de



Professional Series

1/3-octave 31-band graphic equalizer with a constant Q factor for minimal interference between adjacent bands and transmission characteristics with truly high sound quality. 5-position level control for ha



- 1 +/- power supply for signal circuitry
- 2 Balanced output amplifier
- 3 Equalizer amplifiers
- 4 Input amplifiers
- 5 Power supply for protection circuit

- 6 LED driver
- 7 Relay control circuit
- 8 LED driver
- 9 Low-frequency filter amplifiers (20Hz – 200Hz)
- 10 Medium-frequency filter amplifiers (250Hz – 2.5kHz)
- 11 High-frequency filter amplifiers (3.15kHz – 20kHz)
- 12 Power source voltage switching junction terminal
- 13 Power transformer
- 14 Filter amplifier assembly

The graphic equalizer is an indispensable component for balancing the energy within the audible frequency range and providing a large howling margin. However, as graphic equalizers often increase noise and distortion, there is a strong demand for high-quality equalizers with top-class sound for use in studio systems.

The Accuphase PRO-G51 is a graphic equalizer designed both for durability and sound with absolute quality, based on years of technological experience in the development of top quality audio amplifiers. It has a monophonic configuration and 31 bands distributed at intervals of 1/3 octave over the entire audible frequency range of 20 through 20,000 Hz, with all center frequencies conforming to ISO standards. Each band can be adjusted by ± 12 dB. One of the great features of the PRO-G51 is that the Q factor, which determines the sharpness of the peak, remains constant regardless of the position of the level control. If the Q factor varies according to the position of the level control, and especially in the 6dB range where the level change is small, it becomes broad and the response changes over a wide range. For this reason, the interference with adjacent bands is great, and the original purpose of the graphic equalizer – to allow precise level adjustment for narrow bands – is defeated. With the PRO-G51, the Q factor is fixed at 4.3 so the influence on adjacent bands is minimal.

Furthermore, the PRO-G51 is equipped with an input level control so that signals with optimum levels can always be sent to the power amplifier, and the level can be selected in five steps: -12 , -6.0 , 0 , $+6$, and $+12$ dB.

We are confident of the true value of the PRO-G51, a graphic equalizer of the new age designed for true quality sound.



1/3-octave 31-band graphic equalizer with center frequency accuracy of $\pm 3\%$

With the PRO-G51, each band covers 1/3 octave, the most suitable interval for the compensation of the sound distribution. The center frequency of each band conforms to the frequencies determined by the ISO (International Standardization Organization) standards. (Refer to the diagram for the maximum and minimum response values for each band.) The output level for each band can be adjusted by ± 12 dB, making the PRO-G51 suitable for various applications. Furthermore, the level control stroke is a long 45mm, so accurate adjustment is possible. The accuracy of the center frequency of each band is important for the sound quality. Particularly when using a measuring instrument for compensating the sound distribution, adequate compensation cannot be obtained if the center frequency of the measuring instrument and that of the graphic equalizer do not coincide correctly.

For the PRO-G51, a center frequency accuracy of $\pm 3\%$ max. ($\pm 2\%$ typ.) is achieved through the use of highly precise components.



Constant Q factor to minimize interference between adjacent bands

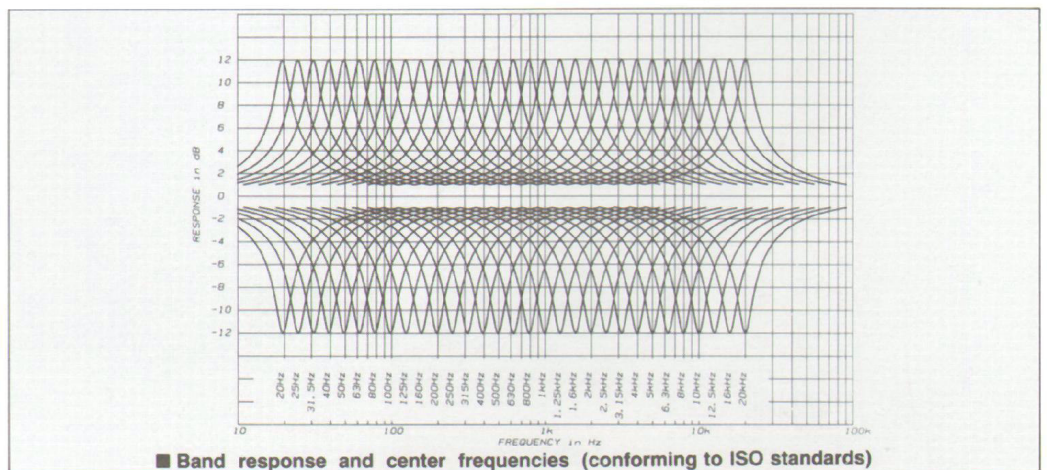
The Q factor which determines the sharpness of the response for each band is set to 4.3, considered the ideal value for obtaining a crossing point of -3 dB with adjacent bands for 1/3-octave equalizers. If the Q factor changes with the position of the level control, the interference between adjacent bands increases in intensity, as shown on Figure 1. With the PRO-G51, the Q factor is held constant to prevent this, thereby achieving the ideal band response as shown in Figure 2.



Bandpass filter with carefully selected circuit components

Figure 3 shows the basic circuitry of a bandpass filter for controlling the frequencies in a range of 1/3 octave.

AMP₁ and AMP₂ are buffer amplifiers, and the BPFs (bandpass filter) are amplifiers which have filtering properties. The PRO-G51 contains a



■ Band response and center frequencies (conforming to ISO standards)

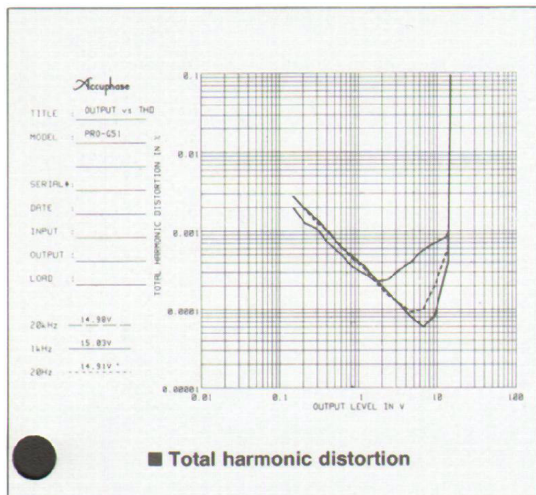
between adjacent bands, designed for correction of handling a wide range of signal levels.

Accuphase PRO-G51

PRO-G51 Guaranty Specifications

- **Type**
Monophonic 1/3-octave 31-band, conforming to ISO standards
- **Center frequencies**
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, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz, 12.5kHz, 16kHz, 20kHz
- **Center frequency accuracy**
±3%
- **Q Factor (Sharpness of frequency selectivity)**
4.3 (constant)
- **Equalization range**
-12.0 dB to +12.0 dB
- **Gain**
-12.0, -6.0, 0, +6.0, +12.0 dB (selectable)
- **Input impedance**
40k-ohms balanced XLR type connector
- **Output impedance**
100-ohms balanced XLR type connector
- **Maximum output level (with band level control set to 0 dB)**
+24 dBm (20 to 20,000 Hz, total distortion factor: 0.002%)
- **Load impedance**
600 ohms min.

- **Frequency response (with band level control set to 0 dB)**
20 to 20,000 Hz +0 -0.2 dB
2.0 to 150,000 Hz +0 -3.0 dB
- **Total harmonic distortion (20 to 20,000 Hz at maximum output level)**
0.002% (with band level control set to 0 dB)
0.01% (with band level control set to +12 dB)
- **Signal-to-noise ratio (EIA) (with input grounded)**
100 dB (with input level control set to +4 dBm, and band level control set to 0 dB)
- **Input level indicators**
-28, -12, 0, +12, +24 dBm
- **Semiconductors**
12 Tr's, 16 FET's, 25 IC's, 21 Di's
- **Power requirements and consumption**
Voltage selection by rewiring for 100/120 V and 220/240 V, 50/60 Hz operation
Power consumption: 20 Watts
- **Dimensions and weight**
Width 482.5mm (19inches), height 107mm (4-1/4inches), depth 345mm (13-9/16inches)
Panel height: 2U
Panel size: width 482.5mm (19inches), height 88mm (3-1/2inches)
(Can be mounted on 19-inch standard rack)
Weight: 7.4 kg (16.3 lb)



total of 31 of these filters. When the level controls for each band are set to the central position (0dB), the gain for both AMP₁ and AMP₂ is 1, so they function as flat amplifiers and the frequency response is flat.

When the level control is moved to point "a", the response curve rises on the + side as shown in Figure 3. Inversely, when moved to point "b", the curve forms a trough. This is the principle of operation of the summing type filters used for operational amplifiers.

Because the overall sound quality is determined by the quality of the buffer amplifiers and band-pass filter amplifiers, components with superior quality have been used in the PRO-G51, and the input and output impedance were taken into full consideration for the design of circuitry. Advanced dual-IC operational amplifiers with high output-current capacities and capable of handling low impedance loads are used for the filter amplifiers to assure a low distortion rate and wide dynamic range for low frequencies, in which the impedance of the filter elements decreases. For the buffer amplifiers which require high-input impedance, input amplifiers using an FET are also used, providing performance to rival discrete systems. As can be seen on the diagram, the

result is a typical distortion rate of 0.001% or less and a maximum output of +24 dBm.



5-position level control

The reference input level for professional equalizers varies greatly depending on usage conditions. The PRO-G51 is equipped with an input level control which makes it possible to attenuate by -6 dB or -12 dB, or for low inputs, amplify by +6 dB or +12dB. This is one of the main features of the PRO-G51.



Level meter for monitoring the input level

An LED level meter is provided to monitor the input level. This level meter is located after the input level control circuitry, so the level indicated is the same as the level output when the level controls are set at the 0 dB position. In other

words, this level is that of the signals input to the graphic equalizer unit. The LEDs light in five steps, +24, +12, 0, -12, and -28 dB. The lowest position (-28 dB) can also be used effectively for checking whether or not signals are being input.



Acrylic panel for protecting key positions

The PRO-G51 comes with a thick acrylic panel for preventing keys from being accidentally moved from position. This panel can easily be attached with square screws.



PRO-G51 shown with included acrylic panel attached

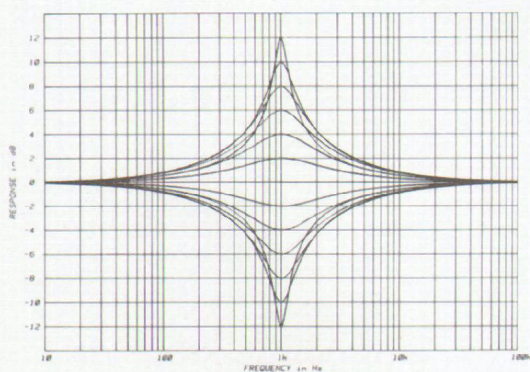


Figure 1. When Q factor changes, influence on adjacent bands is great

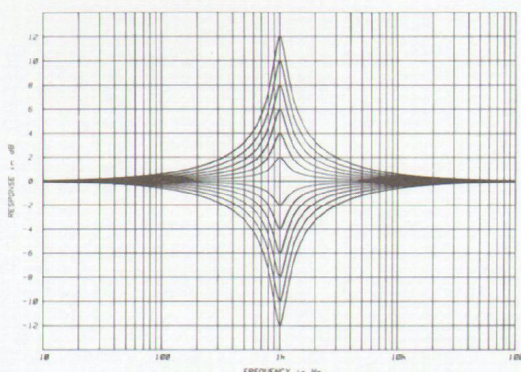


Figure 2. When Q factor is constant, influence on adjacent bands is small

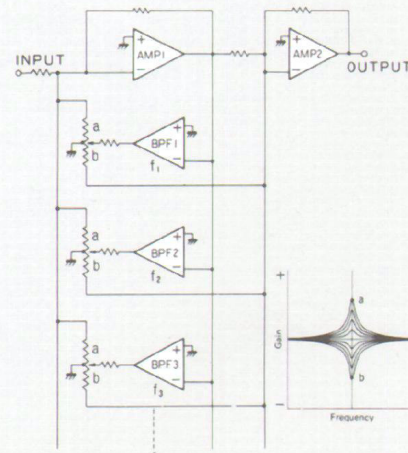
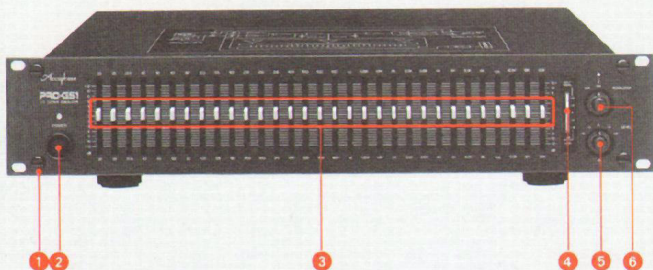
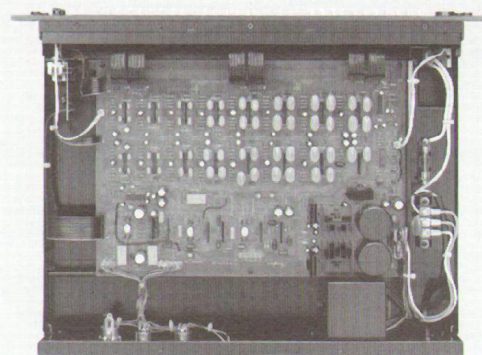
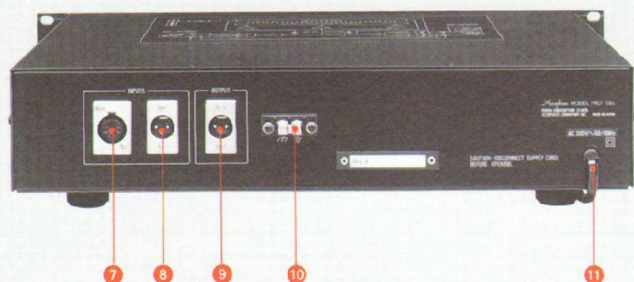


Figure 3. Principles of the graphic equalizer

Accuphase PRO-G51

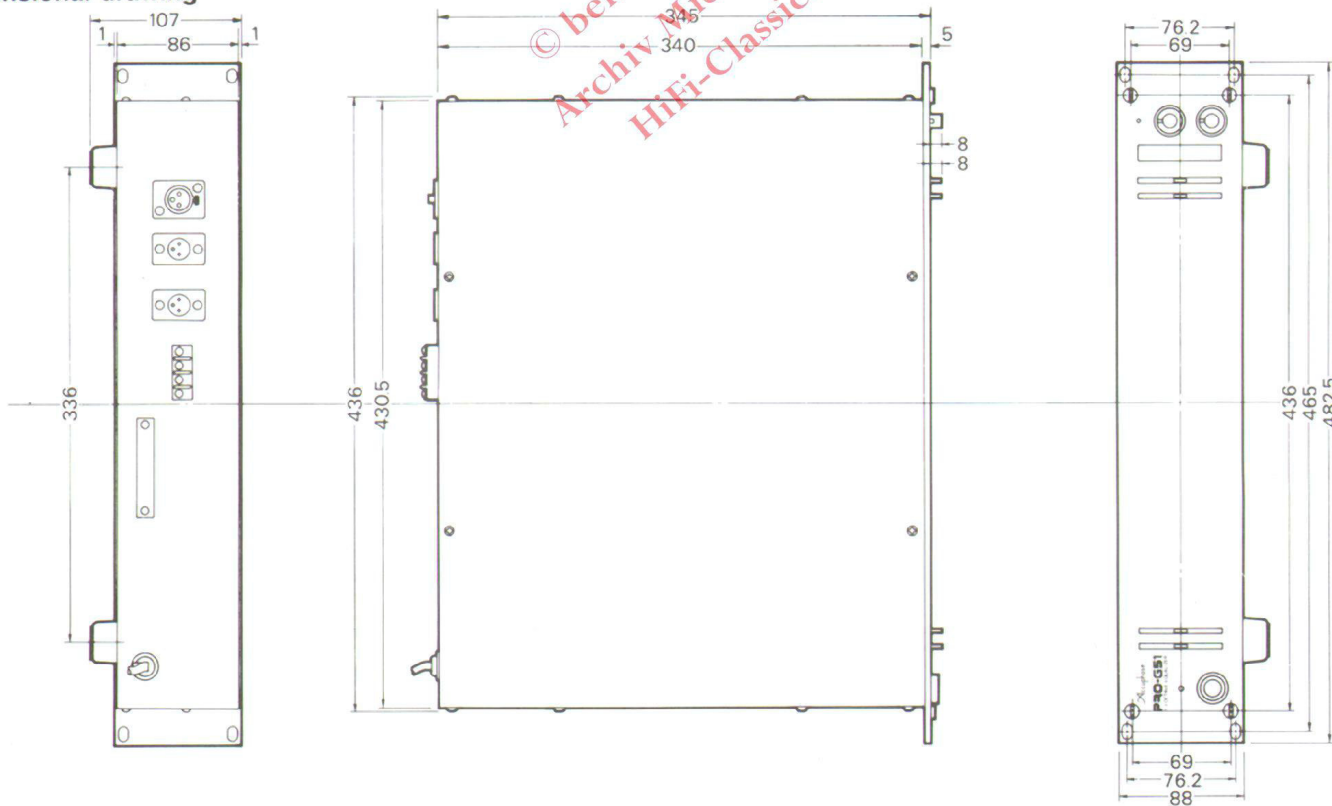


- 1 Remove these four screws when attaching the included acrylic panel
- 2 POWER switch
- 3 Band level control levers
- 4 LEVEL meter
- 5 Input LEVEL control
- 6 EQUALIZER ON/OFF switch
- 7 INPUT connector – equivalent to XLR-3-31 (compatible with XLR-3-12C equivalent connectors)
- 8 INPUT connector – equivalent to XLR-3-32 (compatible with XLR-3-11C equivalent connectors)
- 9 OUTPUT connector – equivalent to XLR-3-32 (compatible with XLR-3-11C equivalent connectors)
- 10 Ground terminal board (ground line switchable)
- 11 AC power cord



■ Neat internal layout

■ Dimensional drawing



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ACCUPHASE LABORATORY INC.