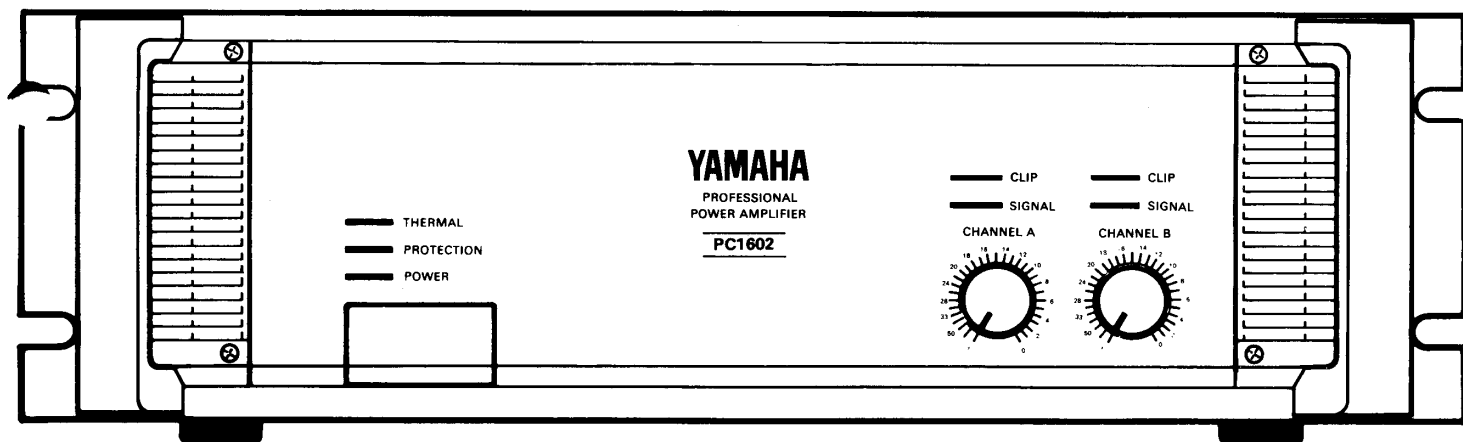


# PROFESSIONAL SERIES POWER AMPLIFIER

## PC1602

### OPERATING MANUAL



**YAMAHA**

*The PC1602 is a high-power sound amplifier, offering more boost, professional features, sophisticated design and uncompromising performance. It not only looks professional, but demonstrates a level of performance that the most discriminating listener will find faultless.*

*This is not an amplifier to be limited to home surroundings. A sustained output of 160 watts into 8 ohms (for each channel) produces powerful peaks that enable clean studio monitoring. Its high level of power handling makes the PC1602 especially suited for rock and disco sound systems, where longterm sustained power is essential. But this unit doesn't stop at power; its ultra-low distortion rate, less than 0.007% THD at 1/2 rated power, is guaranteed to satisfy the most critical listener.*

*Bass response is polished by a high damping factor of better than 200 at 1kHz. This lessens the tendency for speaker cone overshoot, greatly improving the overall response. In addition to top-notch bass response, the high frequency response extends well beyond 50kHz, so that extremely complex musical waveforms can be accurately reproduced. This is vital especially where modern synthesizers are concerned, because of their highly involved output.*

*Even with these extended frequency ranges, stability is maintained. The PC1602 offers stability matching or exceeding any other amplifier in its class. It handles highly reactive multi-speaker loads without shutting down or taking off into spurious oscillation.*

*The combination of all these features working in ensemble makes the PC1602 a highly satisfactory amplifier, assuring the listener of accurate and pleasing performance. No matter how difficult or complex your needs may be, the PC1602 is equipped to handle them with professional style and capability.*

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# SPECIFICATIONS

## POWER OUTPUT LEVEL

Continuous average sine wave power with less than 0.05% THD. 20 Hz to 20 kHz

Stereo, 8 ohms ..... 160 W + 160 W

Stereo, 4 ohms ..... 240 W + 240 W

Mono, 8 ohms ..... 480 W

## FREQUENCY RESPONSE

10 Hz to 50 kHz, 8 ohms, 1 W .....  $0 \pm 1$  dB

## TOTAL HARMONIC DISTORTION

Stereo 8 ohms, 80 W

20 Hz to 20 kHz ..... Less than 0.007%

Stereo 4 ohms 120 W

20 Hz to 20 kHz ..... Less than 0.015%

Mono 8 ohms 240 W

20 Hz to 20 kHz ..... Less than 0.015%

## INTER MODULATION DISTORTION

250 Hz 12.5 kHz mixed 4 : 1

Stereo 8 ohms, 80 W ..... Less than 0.005%

Mono 8 ohms, 240 W ..... Less than 0.01%

## INPUT SENSITIVITY

Input level which produces 160 W output into

8 ohms ..... +4 dB (1.23 V rms)

## INPUT IMPEDANCE

Balanced and unbalanced inputs maximum attenuator setting ..... 15 kohms

## DAMPING FACTOR

$f=1$  kHz.  $RL=8\Omega$  ..... Greater than 200

## S/N RATIO

Input shorted @ 12.7 kHz ..... 107 dB

Input shorted @ IHF-A ..... 110 dB

## SLEW RATE

Stereo 8 ohms .....  $\pm 40$  V/ $\mu$ sec Full Swing

Mono 8 ohms .....  $\pm 60$  V/ $\mu$ sec Full Swing

## CHANNEL SEPARATION

8 ohms 80 W

1 kHz ..... 90 dB

8 ohms 80 W

20 Hz to 20 kHz ..... 70 dB

## INDICATORS

Pilot ..... RED LED

Protection (Muting ON) ..... RED LED

Thermal ..... RED LED

Clipping (1% THD) ..... RED LED

Signal ..... GREEN LED

## FRONT PANEL CONTROLS

Power switch ..... Push-ON/Push-OFF

Input attenuators (one per channel) ..... 31 positions

## REAR PANEL CONTROLS

Mode switch ..... STEREO/MONO

Pin 1 GND switch (XLR connectors) ..... ON/OFF

Voltage selector switch (general model only)

## PROTECTION CIRCUITS

Muting .....  $6 \pm 2$  seconds after power turned ON

DC sense ..... DC  $\pm 2$  V output voltage

Thermal protection .....  $\geq 85^\circ\text{C}$  heat sink temperature

PC limiter .....  $RL \geq 2$  ohms when ON

## COOLING FAN CIRCUIT

Fan ON temp .....  $\geq 60^\circ\text{C}$  heat sink temp.

Fan OFF temp .....  $\leq 45^\circ\text{C}$  heat sink temperature

## POWER REQUIREMENTS

U.S. & CANADIAN models ..... AC 120 V, 60 Hz

GENERAL model ..... AC220/240 V, 50/60 Hz

## POWER CONSUMPTION

U.S. & CANADIAN models ..... 800 W, 1000 VA

GENERAL model ..... 800 W

## DIMENSIONS

(W x D x H) ..... 480 x 431.3 x 140 mm

(18-7/8" x 17" x 5-1/2")

WEIGHT ..... 21.7 kg (47.8 lbs)

**NOTE:**CANADIAN models must be operated into 8 ohms in stereo mode and 16 ohms in mono mode in accordance with safety regulations.

### IMPORTANT NOTICE FOR THE UNITED KINGDOM

#### Connecting the Plug and Cord

IMPORTANT: The wires in this mains lead are coloured in accordance with the following code:

BLUE : NEUTRAL

BROWN : LIVE

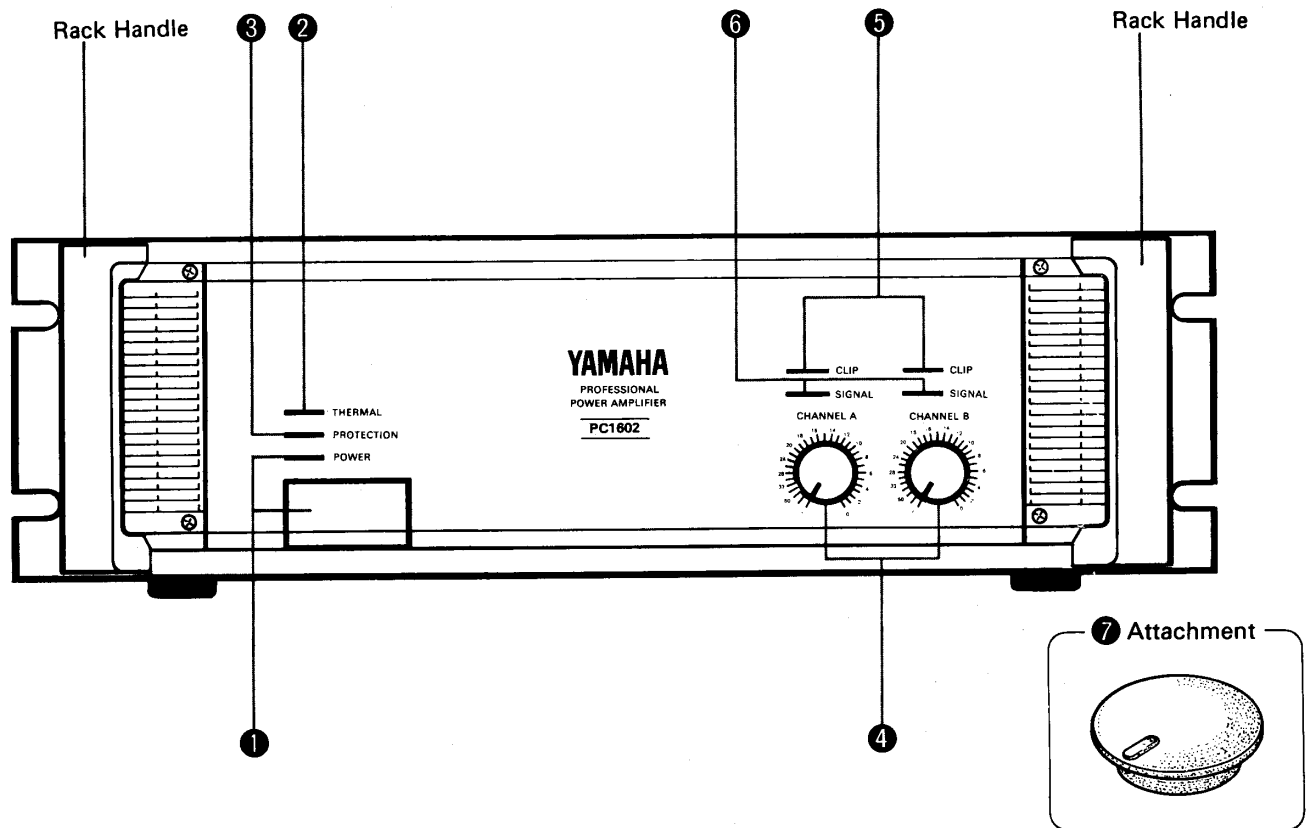
As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

All specifications subject to change without notice.

# FRONT PANEL



## 1 POWER Switch/POWER Indicator (Red)

Pressing this switch turns power to the amplifier ON and causes the power indicator to light. Pressing the POWER switch a second time turns the unit. OFF.

## 2 Thermal Indicator (Red)

This indicator lights when the force cooling fan is operating.

## 3 PROTECTION Indicator (Red)

Lights for approximately  $6 \pm 2$  seconds after power is switched on, indicating that the protection circuitry is active. The speaker outputs are shut off while this indicator is lit. If the protection circuitry is activated for any reason during amplifier operation, the indicator will light and the speaker outputs will be shut off. Once the cause of protection activation has been remedied, normal operation will resume automatically and the protection indicator will go out.

## 4 Input Attenuators

These attenuators adjust the sensitivity of the respective amplifier channel in 31 steps. Attenuation in the fully clockwise position is 0 dB, and  $\infty$  in the fully counter-clockwise position.

## 5 CLIP Indicators (Red)

The CLIP indicators light when output distortion of the respective channel exceeds approximately 1%. This indicates that the amplifier is clipping due to excessive input signal levels.

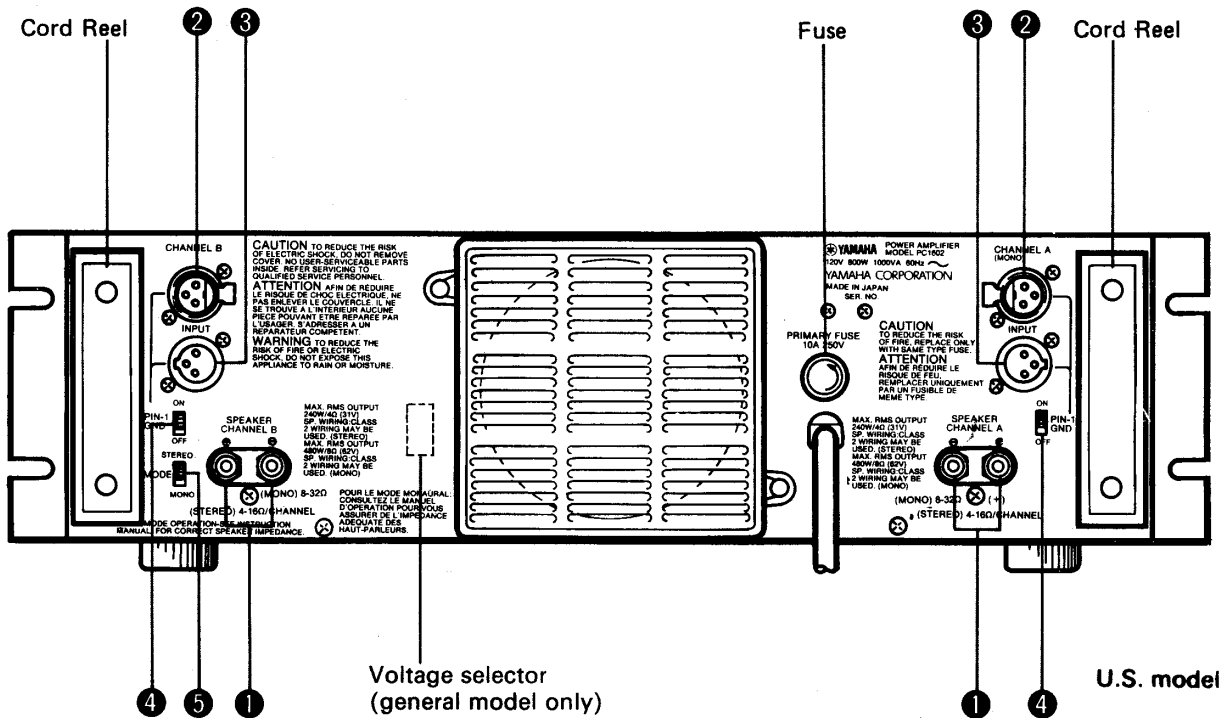
## 6 SIGNAL Indicators (Green)

The SIGNAL indicators light when output level of the signals is 2 V or more, in the range of 20 Hz to 20 kHz, for confirmation of input signal.

## 7 Knob Lock Adaptors (Supplied)

The Knob Lock Adaptors prevent accidental alteration of attenuator settings once the appropriate settings have initially been made. How to install Knob Lock Adaptors: pull out the Input Attenuator Knob to insert the Knob Lock Adaptors into exactly the same place.

# REAR PANEL



## 1 SPEAKER Output Terminals

The red SPEAKER terminal is connected to the "+" input terminal of the speaker system used and the black SPEAKER terminal is connected to the "-" speaker input terminal.

## 2 INPUT Connectors (XLR-3-31)

These connectors are generally used as inputs. Pin 1 is shield, pin 2 is hot and pin 3 cold. Compatible connectors include Canon XLR-3-12C and Switchcraft 5C-1055A.

## 3 INPUT Connectors (XLR-3-32)

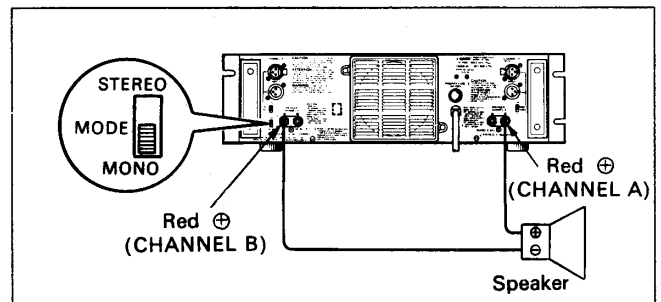
Compatible with Canon XLR-3-11C or switchcraft 5C-1056A connectors, these connectors are useful for sending the input signal to other power amplifiers.

## 4 PIN 1 GND SW

Couples or decouples the XLR connector earth line (pin 1, shield). Normally ON. In some cases where ground loops cause excessive hum, turning the ground switch OFF can interrupt the loop and reduce the hum.

## 5 MODE Selector Switch

Determines whether the amplifier is to operate in the stereo or mono (BTL) mode.



## MONAURAL OPERATION

The PC1602 can easily be adapted for monaural (BTL) operation by setting the rear-panel MODE switch to MONO. In the MONO mode use the channel A input connectors and channel A attenuator for level control. The "+" terminal of the speaker system is connected to the channel A "+" output terminal and the "-" terminal of the speaker system is connected to the channel B "+" output terminal. Leave the channel A and B "-" output (SPEAKER) terminals and channel B input terminals unconnected.

# PERFORMANCE GRAPHS

## FREQUENCY RESPONSE

LOAD : 8 ohms  
 Po = 1W at 1 kHz  
 MODE : STEREO  
 Input balanced

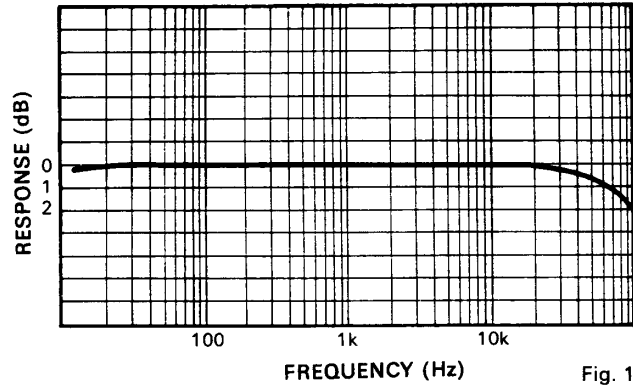


Fig. 1

## DAMPING FACTOR

LOAD : 8 ohms  
 MODE : STEREO

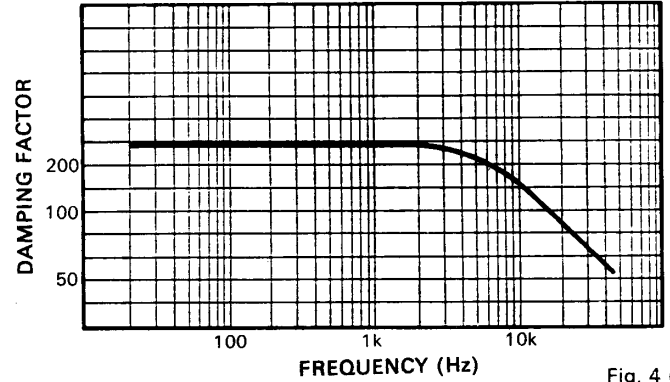


Fig. 4

## T.H. DISTORTION

LOAD : 16 ohms  
 MODE : MONO  
 Unbalanced input

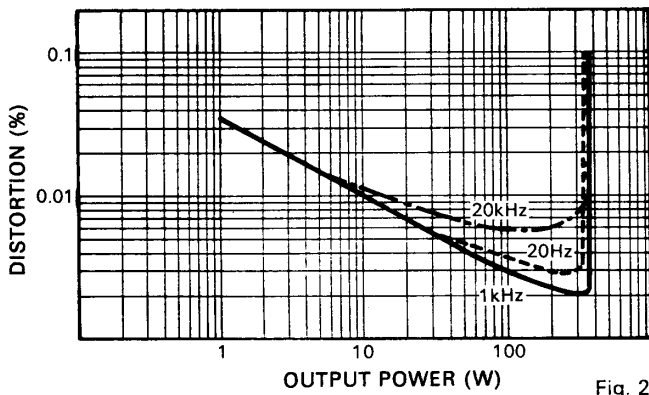


Fig. 2

## POWER BAND WIDTH

THD : 0.05%  
 LOAD : 8 ohms  
 MODE : STEREO  
 Both channels driven

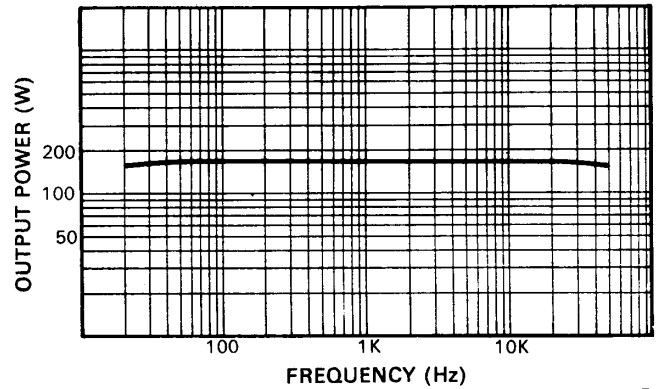


Fig. 5

## T.H. DISTORTION

LOAD : 8 ohms  
 MODE : STEREO  
 Both channels driven

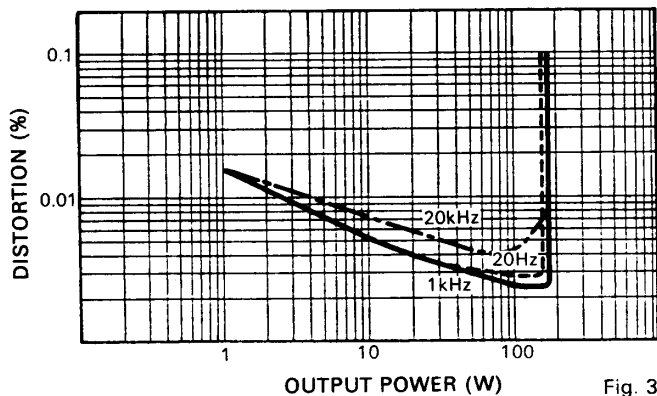


Fig. 3

**20 Hz SQUARE-WAVE RESPONSE**

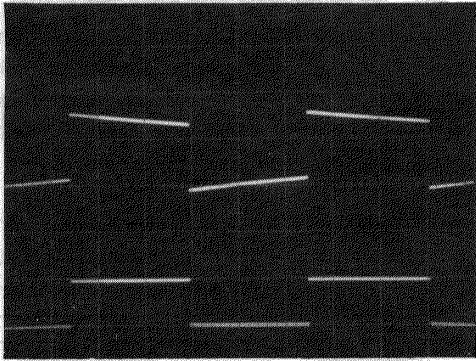
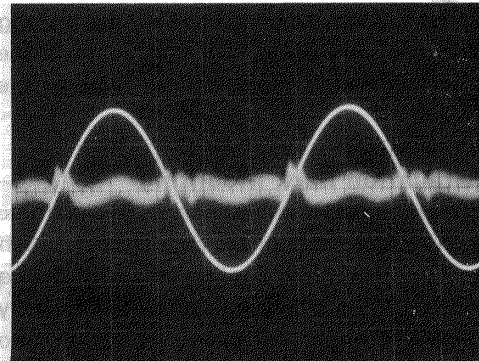


Fig. 6

**TOTAL HARMONIC DISTORTION 20 kHz SINE WAVE**



LOAD : 8Ω  
MODE : STEREO  
Po = 80W  
Fig. 10

**1 kHz SQUARE-WAVE RESPONSE**

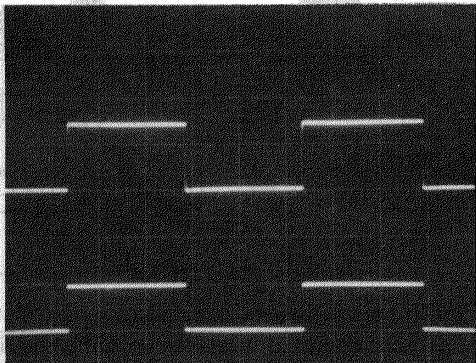


Fig. 7

**SLEW RATE**

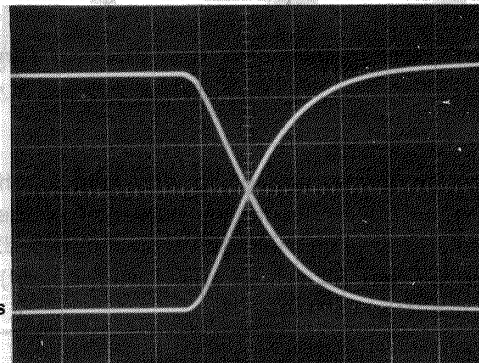


Fig. 11

**20 kHz SQUARE-WAVE RESPONSE**

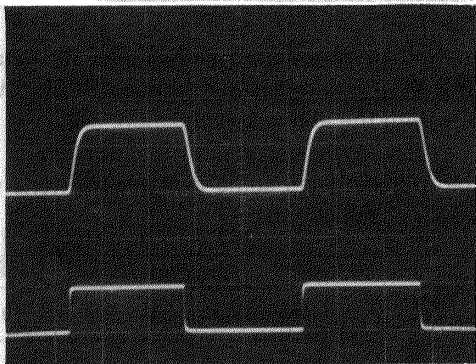


Fig. 8

**RISE TIME**

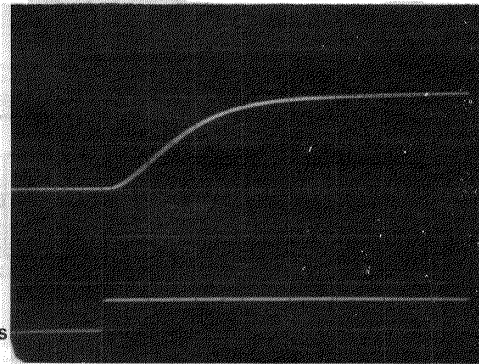
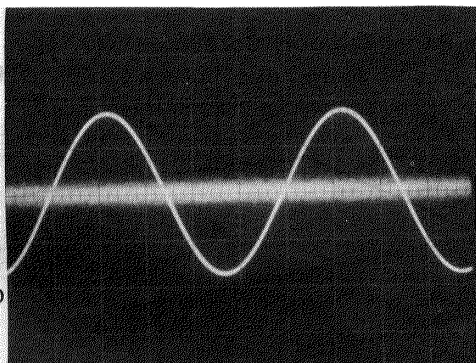


Fig. 12

**TOTAL HARMONIC DISTORTION 1 kHz SINE WAVE**



LOAD : 8Ω  
MODE : STEREO  
Po = 80W

Fig. 9

- In each photo, output waveform is upper and input waveform is lower.
- Horizontal and vertical scales in each photo are optional. But the scales in the photo of rise time are 0.5V/Div (vertical) and 1μsec/Div (horizontal).
- MODE STEREO LOAD 8 ohms.

# MOUNTING

## Shelf Mounting

The PC1602 can be used on any flat, level surface as long as there is adequate ventilation. Do not remove the amplifier's feet as this would block airflow through the bottom panel.

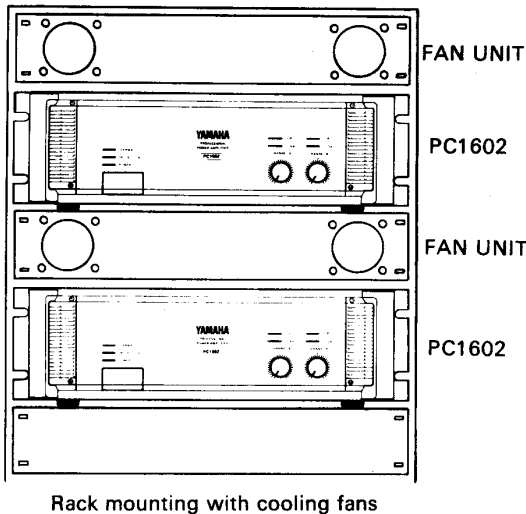
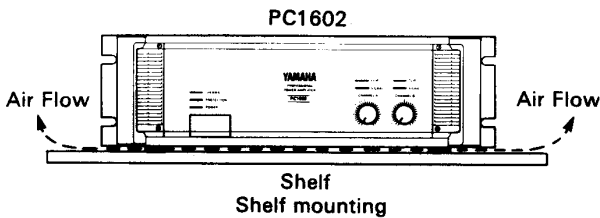
## Permanent-installation Rack Mounting

The PC1602 can be mounted in any standard 19" electronic equipment rack. The rear panel of the rack should be left open to promote smooth airflow. Cooling fans are required for rack-mounted PC1602's, if they must produce extremely high average power output (i.e. stereo operation into 4-ohm loads or mono operation into an 8-ohm load). Refer to the diagrams to the right for the ideal cooling fan configuration.

\* **One unit of PC1602 demands one cooling fan unit.**

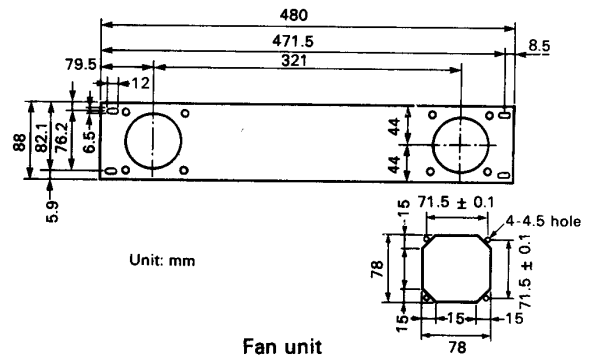
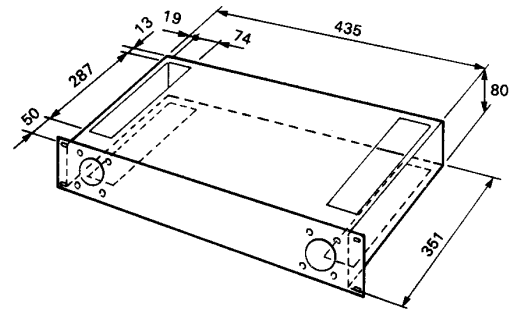
## Portable Rack Mounting

Road cases must be durable enough to withstand rough handling and airline travel. Secure the back end of the PC1602 side panels to the rack with the screws provided, and provide cooling fans (like those shown to the right) if ventilation is restricted.



## Fan Unit

- \* The fan unit shown uses two fans, each with a maximum volume of 19 CFM (cubic feet per minute) and a maximum pressure of 5 mm H<sub>2</sub>O.
- \* Slits should be provided on the top and bottom sides for air circulation.



## CAUTION!

If unit(s) are to be used in a rack mounted installation, it is recommended that fan cooling be installed. Without fan cooling, units could be damaged from excessive temperature conditions.

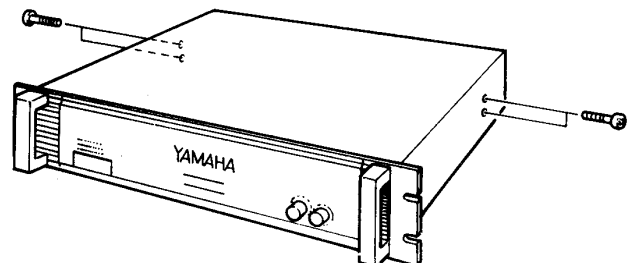
The minimum required airflow rate for fans should be 2 x 19 cubic feet per minute (CFM). Use only fans with the above specification.

The following are some examples of fans with the proper specifications:

Manufacturer	Type/Model	Airflow Rate
ORIENTAL MOTOR CO LTD	MU825S-23 or equivalent	19 CFM

## Side Panel Support Screws

Use the both screw holes on each side panel. Use only the supplied screws (millimeter thread).





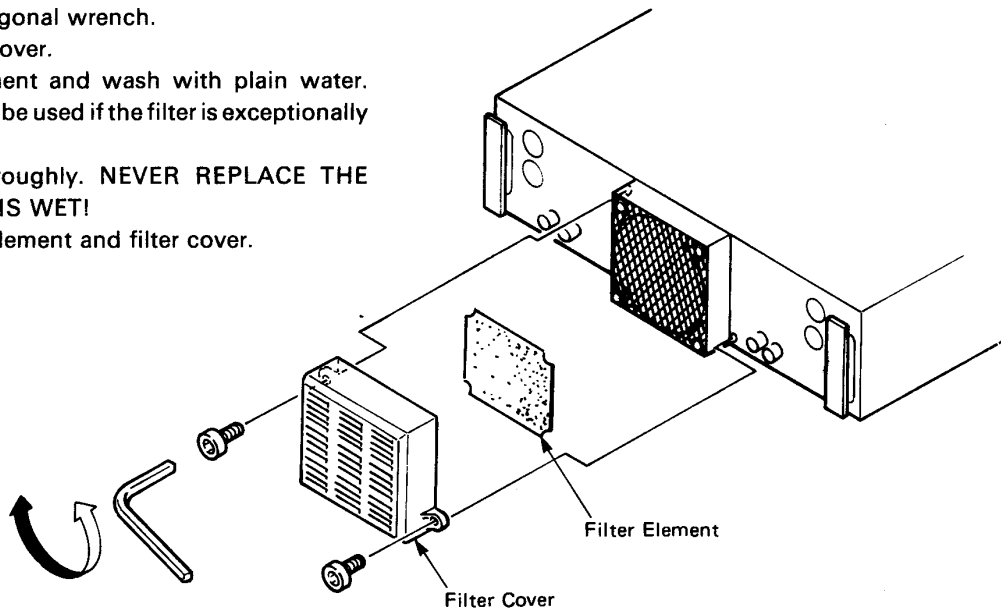
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## COOLING FAN FILTER MAINTENANCE

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The filter element is removed and cleaned as follows.

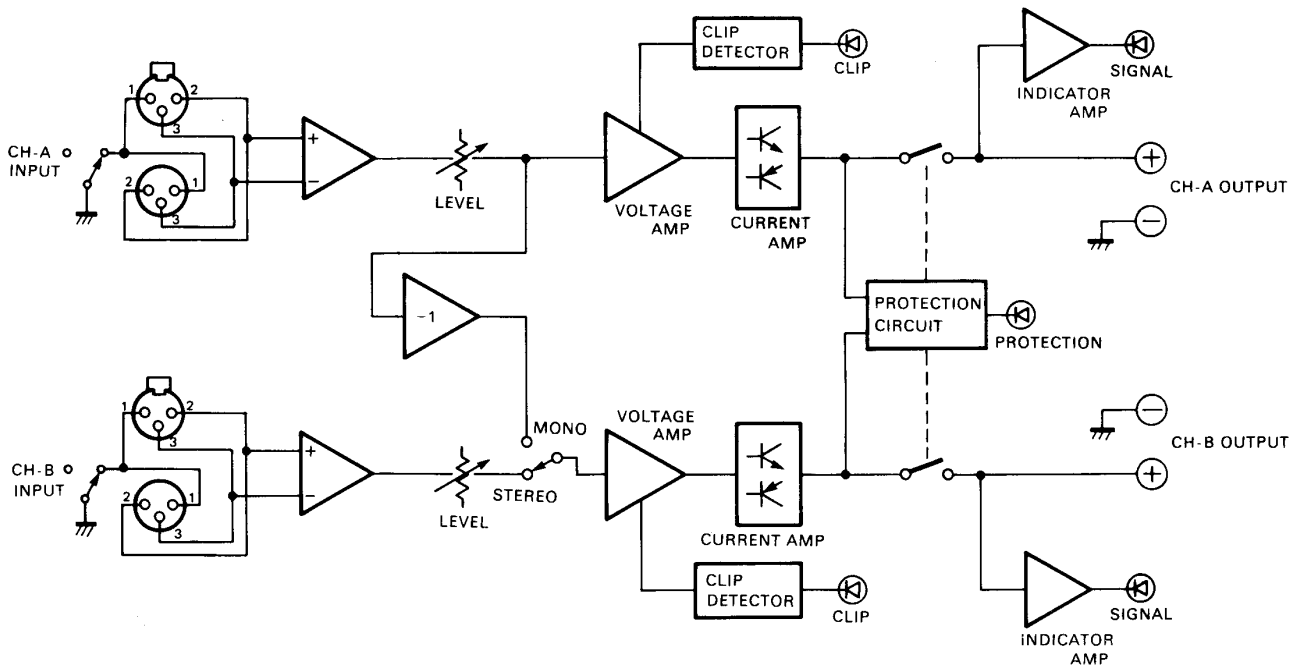
1. Remove the two upper screws on the rear panel with a 3 mm Allen hexagonal wrench. Remove the filter cover.
2. Remove filter element and wash with plain water. Detergent may also be used if the filter is exceptionally dirty.
3. Dry the filter thoroughly. **NEVER REPLACE THE FILTER WHILE IT IS WET!**
4. Replace the filter element and filter cover.



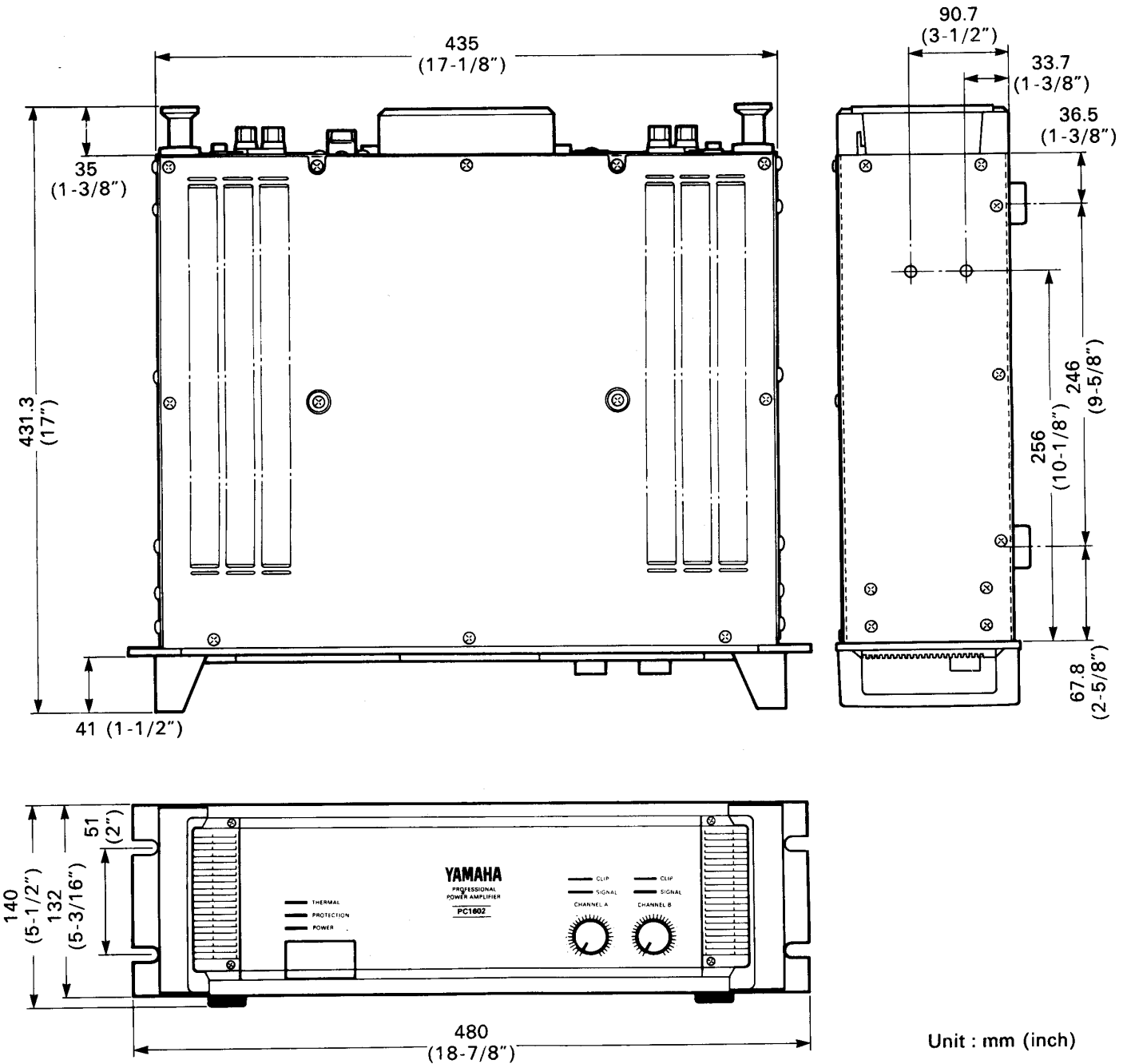
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## BLOCK DIAGRAM

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# DIMENSIONS



Unit : mm (inch)

## SERVICE

The PC1602 is supported by Yamaha's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest Yamaha dealer.



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