

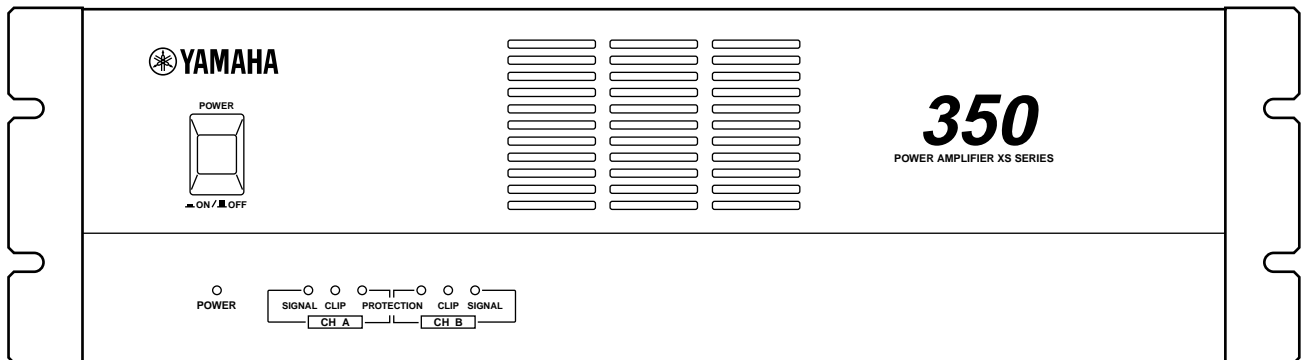


POWER AMPLIFIER

XS350

XS250

Owner's Manual



Introduction

Thank you for purchasing a Yamaha XS350, XS250 series power amplifier.

This series of audio amps was developed from Yamaha's wealth of experience in building PA equipment and its tradition of careful attention to every detail of circuit design. These amps feature high power and superb quality together with superior reliability and stability, guaranteeing the highest possible audio performance.

Main features of the XS350, XS250 series

- The unit is equipped with two types of inputs: balanced XLR and barrier strip, and two types of outputs: barrier strip and binding post. This combination of inputs and outputs affords flexible capabilities and accommodates a wide range of applications.
- Three operating modes are provided: STEREO mode in which CHANNEL A and B operate independently, PARALLEL mode in which a mono source is output by two amp systems, and BRIDGE mode in which the unit operates as a single high-power amplifier.
- A high pass/low pass switchable filter is provided for each channel. The high pass filter features a continuous controller that allows you to change cut-off frequencies between 25 Hz and 150 Hz.
- A SIGNAL indicator and CLIP indicator is provided for each channel.
- The PROTECTION indicator shows the status of protective circuitry such as power-on/off protection, output muting, and the DC detection circuit.
- Variable-speed low-noise fan(s) ensures high reliability even under demanding conditions.

This owner's manual covers the two models XS350, XS250. In order to take full advantage of your power amp and enjoy long and trouble-free operation, please read this owner's manual carefully before use.


WARNING: THIS APPARATUS MUST BE EARTHED

IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW :	EARTH
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 GREEN and YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol  or coloured GREEN and YELLOW.

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.

* This applies only to products distributed by YAMAHA KEMBLE MUSIC (U.K.) LTD.

Precautions

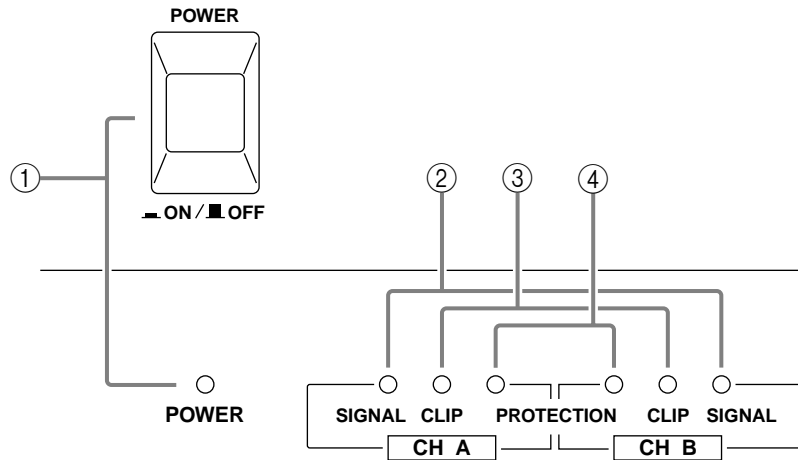
- Connect this unit's power cord only to an AC outlet of the type stated in this Owner's Manual or as marked on the unit. Failure to do so is a fire and electrical shock hazard.
- Do not allow water to enter this unit or allow the unit to become wet. Fire or electrical shock may result.
- Do not place heavy objects, including this unit, on top of the power cord. A damaged power cord is a fire and electrical shock hazard. In particular, be careful not to place heavy objects on a power cord covered by a carpet.
- Do not scratch, bend, twist, pull, or heat the power cord. A damaged power cord is a fire and electrical shock hazard.
- Do not remove the unit's cover. You could receive an electrical shock. If you think internal inspection, maintenance, or repair is necessary, contact your dealer.
- Do not modify the unit. Doing so is a fire and electrical shock hazard.
- If the power cord is damaged (i.e., cut or a bare wire is exposed), ask your dealer for a replacement. Using the unit with a damaged power cord is a fire and electrical shock hazard.
- If you notice any abnormality, such as smoke, odor, or noise, or if a foreign object or liquid gets inside the unit, turn it off immediately. Remove the power cord from the AC outlet. Consult your dealer for repair. Using the unit in this condition is a fire and electrical shock hazard.
- Should this unit be dropped or the cabinet be damaged, turn the power switch off, remove the power plug from the AC outlet, and contact your dealer. If you continue using the unit without heeding this instruction, fire or electrical shock may result.
- Hold the power cord plug when disconnecting it from an AC outlet. Never pull the cord. A damaged power cord is a potential fire and electrical shock hazard.
- Do not touch the power plug with wet hands. Doing so is a potential electrical shock hazard.
- This unit has ventilation holes at the front, rear and sides to prevent the internal temperature rising too high. Do not block them. Blocked ventilation holes are a fire hazard.
- Allow enough free space around the unit for normal ventilation. This should be: 10 cm at the sides, 30 cm behind, and 20 cm above. These distances should also be adopted when rack-mounting the unit. For normal ventilation during use, remove the rear of the rack or open a ventilation hole. If the airflow is not adequate, the unit will heat up inside and may cause a fire.
- To mount several of these units in an EIA-compliant rack, refer to the rack mounting instructions on page 11.
- Use only speaker cables when connecting speakers to amplifier outputs. Using other types of cables is a fire hazard.
- Do not use this amplifier for any purpose other than driving loudspeakers.
- XLR-type connectors are wired as follows: pin 1: ground, pin 2: hot (+), and pin 3: cold (-).
- Using a mobile telephone near this unit may induce noise. If noise occurs, use the telephone away from the unit.
- Clean the contacts of the phone plug before connecting it to the SPEAKERS jack of this unit. Dirty contacts may generate heat.

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Controls and Functions

■ Front Panel



① POWER switch and indicator

This is the main POWER switch. Press to power ON the amplifier. Press again to power OFF. The POWER indicator lights up when the amplifier is powered ON.

② SIGNAL indicators

These green LED indicators light up when the respective channel's output signal exceeds 2 Vrms. This is equivalent to 1/2 W into 8Ω, 1 W into 4Ω.

③ CLIP indicators

These red LED indicators light up when the respective channel's output signal distortion exceeds 1% (i.e. clipping). Output signal clipping is usually due to excessive input signal levels.

④ PROTECTION indicator

These LED indicators light up to indicate that the protection circuit is working. The speaker system is disconnected from the amplifier outputs and no sound is output from the speakers.

The protection circuit is activated in the following situations:

• When the amplifier is powered on:

The protection circuit is activated for approximately 3 seconds when the amplifier is powered on. After 3 seconds, the protection system is deactivated automatically, and the amplifier is ready to use.

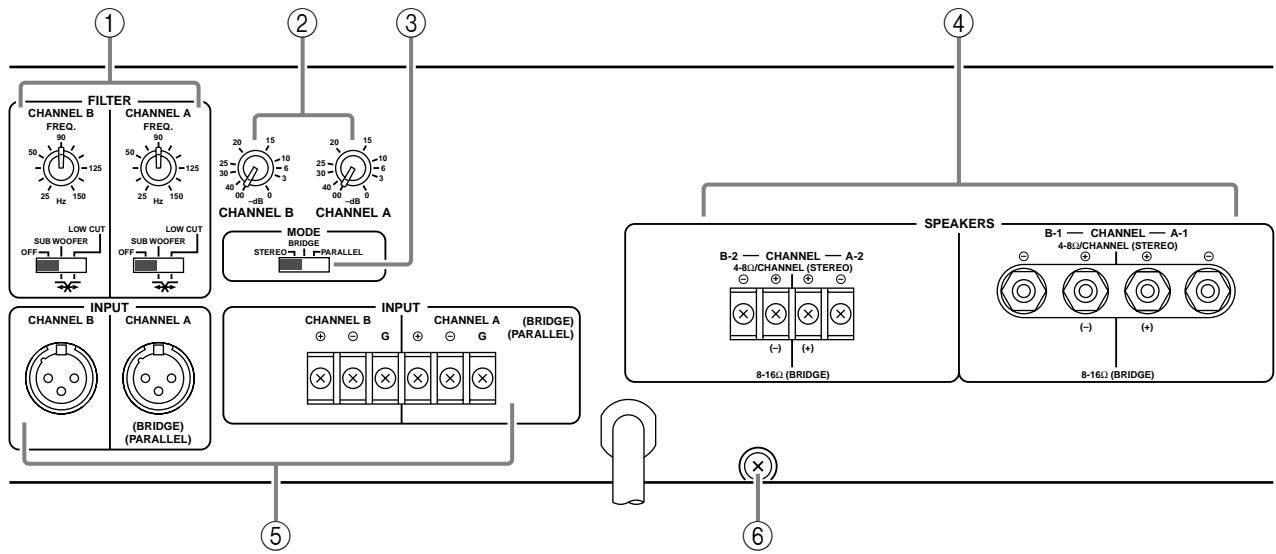
• If a DC voltage is present at the amplifier's outputs:

If the DC voltage problem is corrected, normal amplifier operation resumes.

• If overheating occurs:

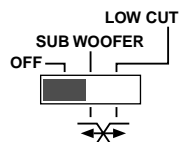
Turn off the power to the amplifier to cool down the unit and consult the Precautions section of this manual to improve the vent condition, if necessary. Turn the power on to the amplifier after it cools down.

■ Rear Panel



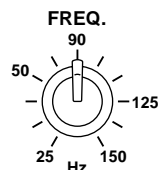
① Frequency controls/Filter select switches (CHANNEL A, B)

These knobs and sliding switches are used to select a filter type and control the cut-off frequencies respectively. You can select one of the following filter type:



- OFF Turns the filter off.
- SUB WOOFER Turns the low pass filter on. (The cut-off frequencies for the low pass filter are fixed.) This setting is suitable when using the unit as an amplifier for a subwoofer.
- LOW CUT Turns the high pass (low cut) filter on. (The cut-off frequencies are variable.)

If you select “LOW CUT,” you can use the frequency controls to adjust the cut-off frequencies in the range of 25 Hz to 150 Hz.



Note: In BRIDGE mode, only the frequency control and filter select switch for Channel A are available.

② Volume controls (CHANNEL A, B)

These knobs enable you to adjust the output level of Channels A and B in the range between $-\infty$ dB and 0 dB. In BRIDGE mode, only the volume control for Channel A is available.

③ STEREO/BRIDGE/PARALLEL switch

This slide switch is used to set the amplifier operating mode: STEREO, BRIDGE or PARALLEL.



• STEREO mode

In this mode, channels A and B operate independently (as a conventional stereo amp). The CHANNEL A input signal will be output from the CHANNEL A output jacks, and the CHANNEL B input signal will be output from the CHANNEL B output jacks.

• BRIDGE mode

In this mode, the CHANNEL A input signal will be output from the BRIDGE output jacks. In this case, use the rear panel CHANNEL A volume control to adjust the volume.

• PARALLEL mode

In this mode, the CHANNEL A input signal will be output from the output jacks of both channels A and B. The CHANNEL B input jack is not used. The CHANNEL A and B volumes can be adjusted independently.

④ SPEAKERS terminals

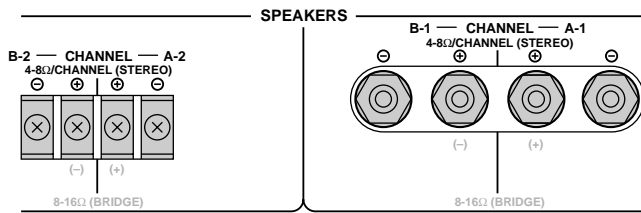
Two types of speaker output terminals:

Binding post (Channel A-1, B-1) and barrier strip (Channel A-2, B-2) are available.

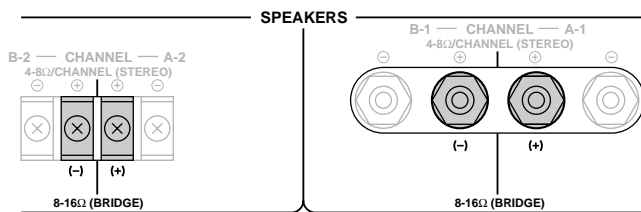
These parallel wirings are internally connected and output identical signals simultaneously. The output impedance varies depending on whether you use either or both types of SPEAKERS terminals. (Refer to “Speaker Impedance” on page 7 for more information.)

The following figures show terminal polarity in STEREO, PARALLEL, and BRIDGE modes.

• STEREO, PARALLEL mode



• BRIDGE mode



In BRIDGE mode, the (⊖) jacks of CHANNELS A-1, B-1 and A-2, B-2 are not used.

The minimum impedance for the connected speaker system is specified in “Speaker Impedance” on page 7.

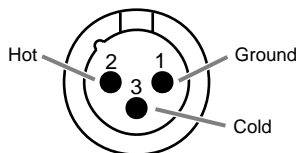
⑤ INPUT terminals (CHANNEL A, B)

Two types of balanced terminals for channels A and B are provided.

Channel A input terminal is used in BRIDGE and PARALLEL mode.

• XLR-3-31 type connector

They are wired pin 1–ground, pin 2–hot (⊕), and pin 3 cold (⊖).



• Barrier strip

Hot (⊕), Cold (⊖) and Ground (G).

⑥ GND terminals

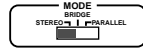
This is the grounding screw terminal. If hum or noise occurs, ground (earth) the unit via this jack, or try connecting it to the chassis of the mixer or preamp, etc.

■ Speaker Impedance

In STEREO and PARALLEL modes, the minimum load (i.e., speaker) impedance is 4Ω. In BRIDGE mode it is 8Ω. Make sure that the impedance does not fall below this specified impedance.

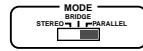
Using the barrier strip and binding posts simultaneously

STEREO mode connections:

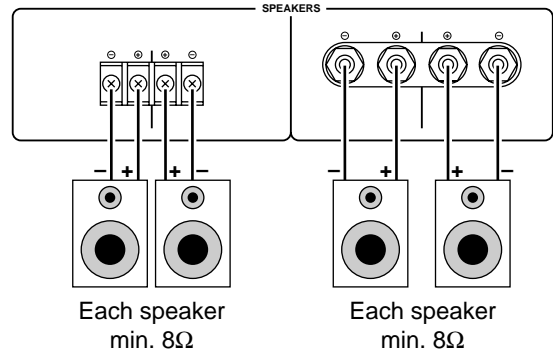


Set to STEREO

PARALLEL mode connections:



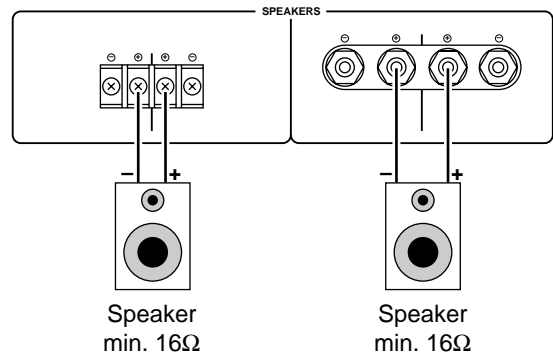
Set to PARALLEL



BRIDGE mode connections:

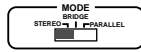


Set to BRIDGE



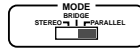
Using the barrier strip or terminal posts

STEREO mode connections:



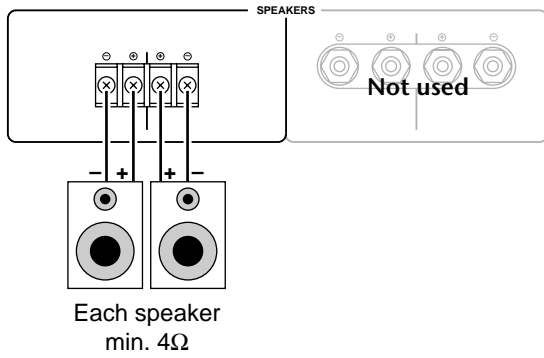
Set to STEREO

PARALLEL mode connections:

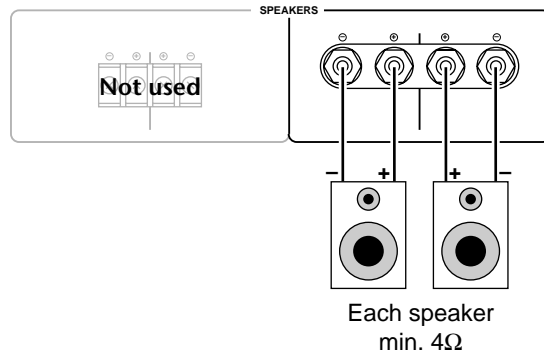


Set to PARALLEL

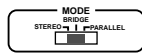
• Using the barrier strip



• Using the terminal posts

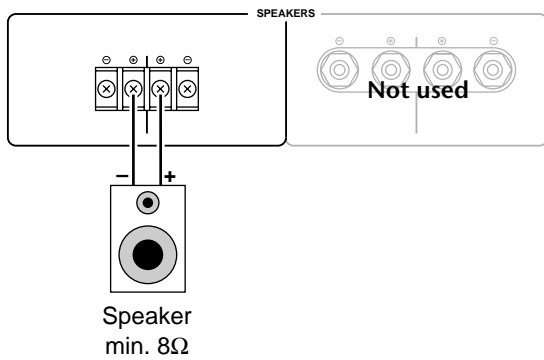


BRIDGE mode connections:

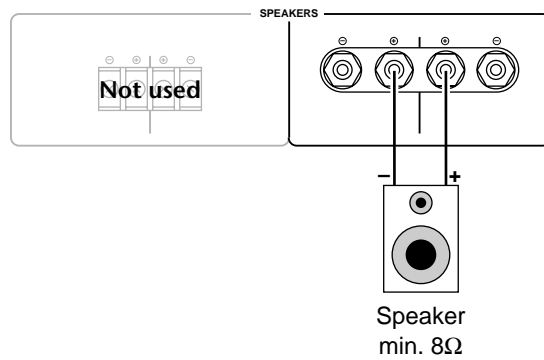


Set to BRIDGE

• Using the barrier strip

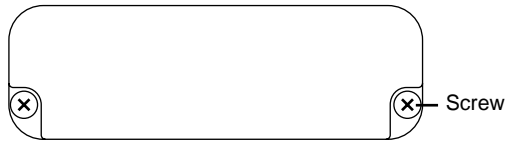


• Using the terminal posts

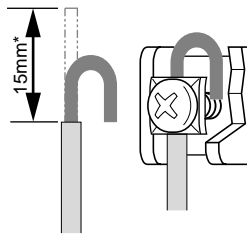


Caution for Speaker Connection

1. Turn off the POWER switch.
2. Remove the cover attachment screws and remove the protective cover from the speaker terminals.

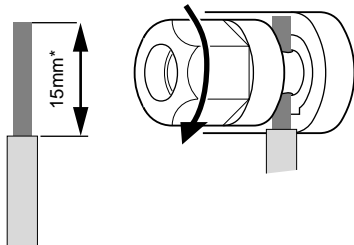


3. For Barrier strip:
After removing approx. 15 mm of insulation from the ends of the speaker cables, bind the bare ends of the speaker wires in the corresponding speaker terminals and tighten the terminals to securely clamp the wires. Refer to page 6 for speaker polarity.



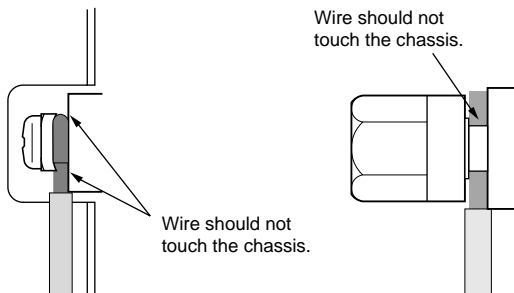
* Shown actual size.

For Five-way binding post:
After removing approx. 15 mm of insulation from the ends of the speaker cables, pass the bare ends of the speaker wires through the holes in the corresponding speaker terminals and tighten the terminals to securely clamp the wires. Refer to page 6 for speaker polarity.



* Shown actual size.

At this time make sure that the bare ends of the speaker cables do not extend from the terminals in such a way that they touch the chassis.

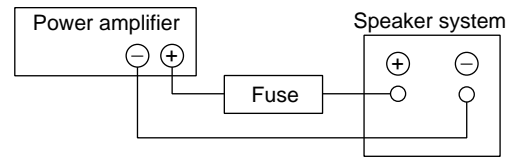


4. Reattach the protective cover over the speaker terminals.

• Speaker fuse

The output capacity of your amplifier is very high: 170 W+170 W (8Ω), 250 W+250 W (4Ω) in stereo and 500 W (8Ω) in monaural on the XS250; 230 W+230 W (8Ω), 350 W+350 W (4Ω) in stereo and 700 W (8Ω) in monaural on the XS350. Be sure to use a speaker system that has sufficient input capacity.

If the input capacity of your speaker system is lower than the rated output of the power amplifier, you can protect your speakers by connecting a fuse serially between the speaker and amplifier as shown below.



Use the following formula to determine the fuse capacity according to the speaker's input capacity.

$$P_o = I^2 R \rightarrow I = \sqrt{P_o/R}$$

P_0 [W] : Speaker's continuous input capacity (noise or RMS)

R [Ω] : Speaker's nominal impedance

I [A] : Required fuse capacity

ex.) Speaker's continuous input capacity : 100 W
Speaker's impedance : 8Ω

$$I = \sqrt{100/8}$$

In this example, the required fuse capacity is calculated as 3.5 [A].

• Speaker cable

If you use a long speaker cable, use as thick a cable as possible to prevent deterioration of the damping factor or power loss inside the cable.

Rack Mounting

■ Mounting in an EIA standard rack

If multiple high-power amp units are mounted in a rack with poor ventilation, the heat from the amps will cause the interior of the amp to become very hot, causing the performance of the amps to be impaired. In particular, when mounting in a rack whose back can not be left open, mount according to the following instructions.

Rack: Leave a gap of 10 cm or more between the rear panel of the rack and the rear panel of the amplifier.

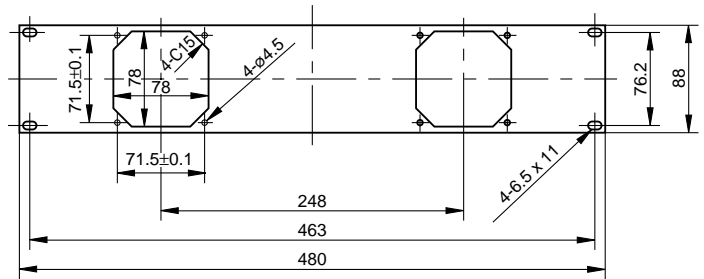
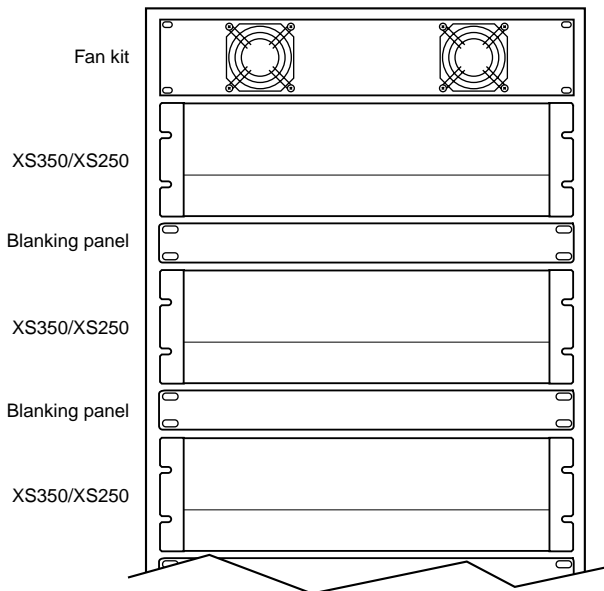
Fan: Use a fan with 1.5 m³/min or more maximum wind and 5 mmH₂O or more maximum static pressure.

Mounting: Install the fan kit on the top slot or the top panel of the rack and install a blanking panel between two amps.

Example of mounting

The figure on the left below shows an example of a fan kit (panels and two fans) on the top slot of the rack. The fans are Minebia 3115PS-12T-B30 (with 0.9 m³/min maximum wind and 5 mmH₂O maximum static pressure).

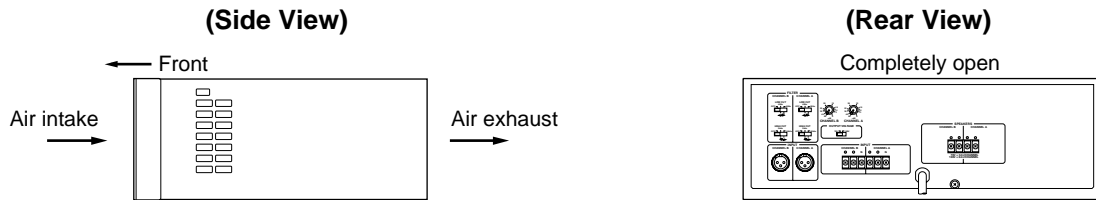
The figure on the right below is a dimensional diagram of a panel on which two 3115PS-12T-B30 are installed.



Unit: mm

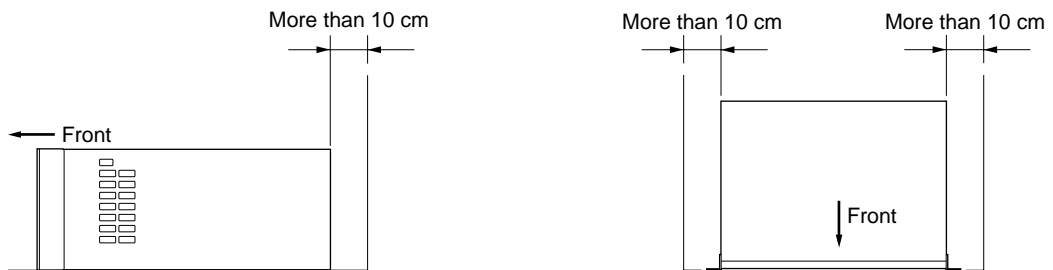
■ Portable Rack Mounting

This unit uses a forced cooling system in which air comes in through the front opening and goes out from the sides and rear. If you mount a single unit on a portable rack, be sure to maintain vent openings on the rear and sides.



■ Fixed Installation Mounting

Do not block the vent openings on the rear and sides when you use the power amplifier.



Specifications

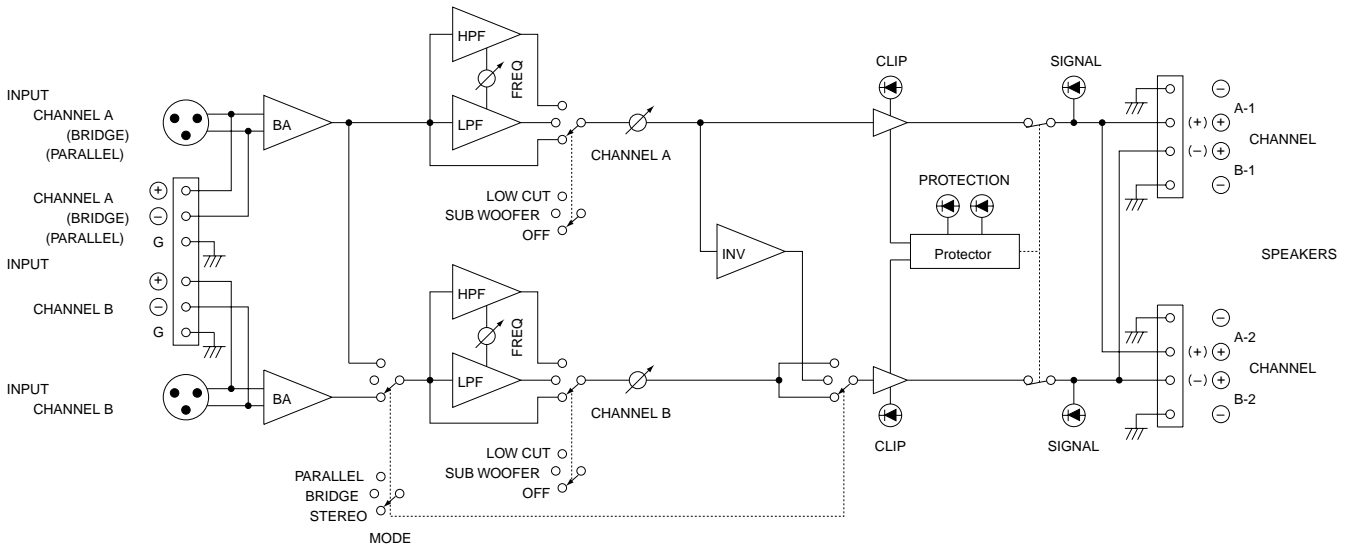
■ General Specifications

		XS250	XS350
Power Output Level (Rated Power) 20 Hz~20 kHz THD+N= 0.1%	8Ω/STEREO	170 W + 170 W	230 W + 230 W
	4Ω/STEREO	250 W + 250 W	350 W + 350 W
	8Ω/BRIDGE	500 W	700 W
1 kHz THD+N= 0.1%	8Ω/STEREO	185 W + 185 W	250 W + 250 W
	4Ω/STEREO	280 W + 280 W	400 W + 400 W
	8Ω/BRIDGE	560 W	800 W
1 kHz, 20 ms, no clip	2Ω/STEREO	400 W + 400 W	600 W + 600 W
Power Bandwidth	Half Power	10 Hz~40 kHz (THD+N= 0.1%)	
Total Harmonic Distortion (THD + N) 20 Hz~20 kHz, Half Power	4~8Ω/STEREO 8Ω/BRIDGE	0.05%	
Frequency Response	8Ω, Po= 1 W	+0.5, -1 dB 10 Hz~50 kHz	
Intermodulation distortion (IMD) 60 Hz:7 kHz, 4:1, Half Power	4~8Ω/STEREO 8Ω/BRIDGE	0.05%	
Channel Separation	Half Power, RL= 8Ω, Vol. max., input 600Ω shunt	≥65 dB, 20 Hz~20 kHz	
Residual Noise Vol. min.	12.7 kHz LPF IHF-A network	≤ -70 dB ≤ -75 dB	
SN Ratio		100 dB	
Damping Factor	8Ω, f= 1 kHz	≥100	
Slew Rate 8Ω full swing	STEREO BRIDGE	±30 V/μs ±40 V/μs	
Sensitivity (Vol. max.) Rated Power into 8Ω		+1.7 dB	+3.1 dB
Voltage Gain (Vol. max.)		32.1 dB	32.1 dB
Input Impedance		30 kΩ/Balanced, 15 kΩ/Unbalanced	
Controls	Front Panel Rear Panel	POWER switch (ON/OFF) Volume (31 position)x 2 Mode switch (STEREO/BRIDGE/PARALLEL) Filter switch (OFF/SUBWOOFER/LOW CUT)x 2 (-12 dB/oct.) Freq. control (25 Hz~125 Hz)x 2	
Connectors	Input Output	Barrier strip terminal XLR-3-31 type/ch Barrier strip terminal 5-way binding posts	
Indicators	POWER PROTECTION CLIP SIGNAL	Green x 2 (Red) x 2 (Red) x 2 (Green)	
Protection Circuits		POWER switch ON muting, DC detection, Temp. detection (heatsink temp ≥ 90°C)	
PC limiter		RL ≤ 1Ω	
Fan Speed		Low/~50°C, Variable/50~70°C, High/70°C~	
Power Requirements	US & Canada Europe Other	120 V, 60 Hz 230 V, 50 Hz 240 V, 50 Hz	
Power Consumption	Idling 1/8 output power, 4Ω Maximum output, 4Ω	450 W/600 VA 45 W 400 W 1000 W	600 W/800 VA 45 W 550 W 1400 W
Dimensions (W x H x D)		480 x 132 x 319 mm	
Weight		18 kg	20 kg

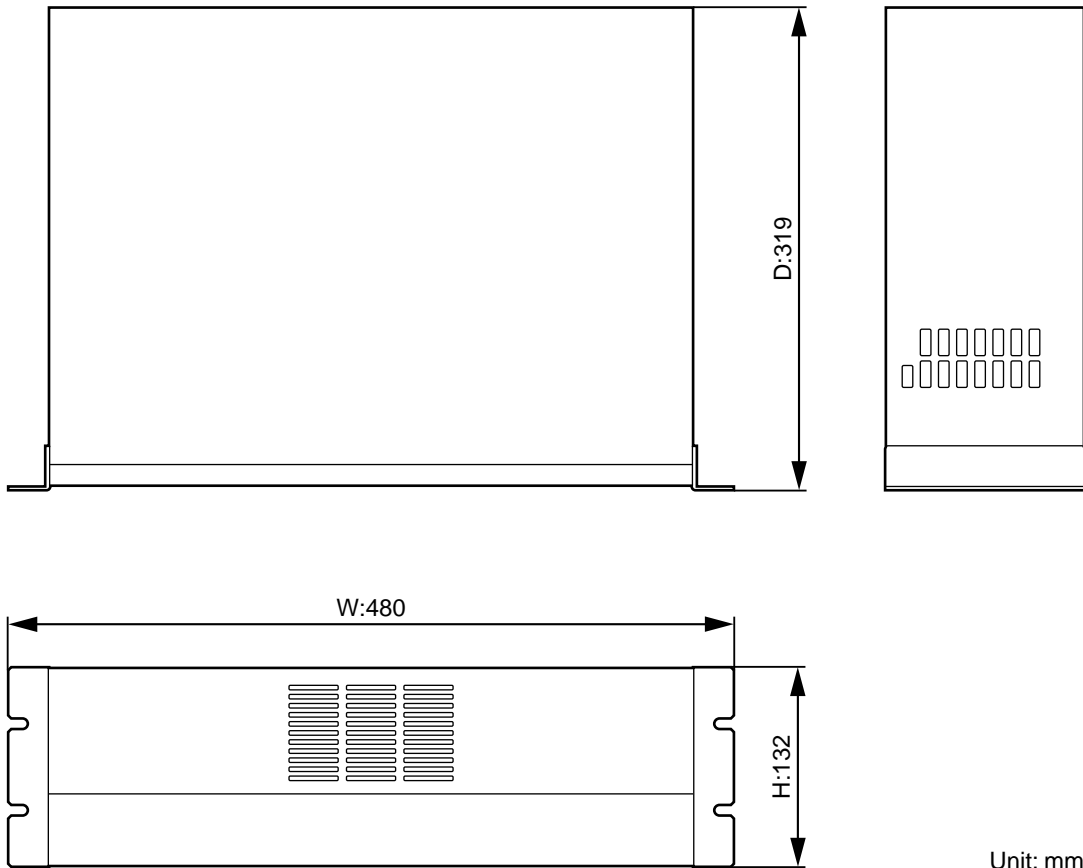
0 dB=0.775 Vrms, Half Power=1/2 Power Output Level (Rated Power)

Specifications subject to change without notice.

■ Block Diagram



■ Dimensions



Unit: mm

Troubleshooting

The following table lists the main causes of abnormal operation and the corrective measures required, as well as the protective circuit operation in each case.

Indicator	Probable Cause	Remedy	Protection Circuit
CLIP indicator lights.	There is a short at a speaker terminal, amplifier terminal, or wire.	Locate and correct the cause of the short.	The PC limiter circuit operates to protect the power transistors.
	The amplifier load is excessive.	Use a speaker system with an impedance of at least 4Ω (stereo) or 8Ω (bridge).	
PROTECTION indicator lights.	The heat sink temperature has exceeded 90°C.	Check the amplifier ventilation conditions and take appropriate measures to improve airflow around the amplifier.	The thermal protection circuit operates to protect the power transistors.
	A DC voltage of ±2 V or greater was generated in the power amplifier's output circuit.	Consult your dealer or nearest Yamaha service center.	The relay operates to protect the speaker system.

