

INSTALLATION INSTRUCTIONS

MODEL PA1235X 12 CHANNEL POWER AMPLIFIER



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SAFETY INSTRUCTIONS - READ BEFORE OPERATING EQUIPMENT



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

This product was designed and manufactured to meet strict quality and safety standards. There are, however, some installation and operation precautions, which you should be particularly aware of.

1. **Read Instructions** – All the safety and operating instructions should be read before the appliance is operated.
 2. **Retain Instructions** – The safety and operating instructions should be retained for future reference.
 3. **Heed Warnings** – All warnings on the appliance and in the operating instructions should be adhered to.
 4. **Follow Instructions** – All operating and use instructions should be followed.
 5. **Water and Moisture** – The appliance should not be used near water – for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
 6. **Carts and Stands** – The appliance should be used only with a cart or stand that is recommended by the manufacturer. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.
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7. **Wall or Ceiling Mounting** – The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
 8. **Ventilation** – The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
 9. **Heat** – The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
 10. **Power Sources** – The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
 11. **Grounding or Polarization** – Precautions should be taken so that the grounding or polarization means of an appliance is not defeated.
 12. **Power-Cord Protection** – Power- supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
 13. **Cleaning** – The appliance should be cleaned only as recommended by the manufacturer.
 14. **Power Lines** – An outdoor antenna should be located away from the power lines.
 15. **Nonuse Periods** – The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
 16. **Object and Liquid Entry** – Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
 17. **Damage Requiring Service** – The appliance should be serviced by qualified service personnel when:
 - A. The Power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure damaged.
 18. **Servicing** – The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

GENERAL INFORMATION

To enhance the ease of installation and obtain optimum performance from the PA1235X, we recommend that you first become familiar with all its features and special capabilities by studying the descriptions and instructions in this manual.

The PA1235X was designed to meet the audio power amplifier needs of custom installed multi-zoned systems with high sonic quality. It's 12-11-10-9-8-7-6 multi-channel capability permits a wide variety of other uses as well, such as surround sound home theater applications. Specific features and technology are as follows:

Cost/Size Efficiency. The PA1235X features twelve 35-watt power amplifiers. This permits each PA1235X to drive 6-zones in a multi-zone system -- each with a 35-watt stereo amplifier per zone. The rack-mount design, plus multiple amplifiers in a single package, delivers high quality at a reasonable price.

Input Level Flexibility. The input levels are individually adjustable (per stereo pair) from a low of 0.2 volts up to 3 volts. This gives the installer the ability to adjust the overall gain of the system or zone. For instance, there may be a need to adjust the amplifier to deliver a controlled, maximum sound level into a zone when the volume control on the preamp is set to maximum. This would act as a volume limiter for any particular zone (i.e. to prevent the kids from over-driving wall speakers, etc.).

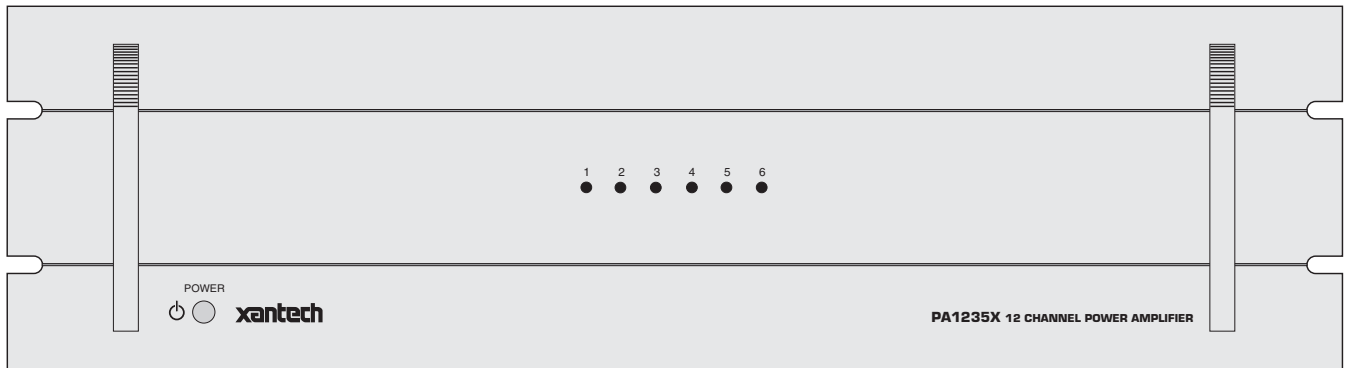


Figure 1 – The Model PA1235X

12-11-10-9-8-7-6 Output Flexibility. Each pair of amplifiers can be bridged to allow several channel and power output capabilities. It can be configured into four power packages as follows, which gives the PA1235X added use in many other applications, such as driving surround sound speaker systems in addition to multi-room:

- Twelve 35-watt amplifiers - 12 total.
- One 80 and ten 35-watt amplifiers - 11 total.
- Two 80 and eight 35-watt amplifiers - 10 total.
- Three 80 and six 35-watt amplifiers - 9 total.
- Four 80 and four 35-watt amplifiers - 8 total.
- Five 80 and two 35-watt amplifiers - 7 total.
- Six 80-Watt amplifiers - 6 total.

Low Impedance Capability. Each amplifier is 4-Ohm safe under music conditions in stereo mode and 8-Ohm safe when bridged. This means, for instance, that you can drive two pairs of 8-Ohm speakers in stereo mode in each zone with ease.

Auto Protection Circuit. Protects the PA1235X if a short circuit or very low impedance is detected at the speaker terminals. Each amplifier pair is protected separately, **with an LED indicator showing which pair is in protection. Normal operation is restored automatically within 3 to 4 seconds after the short is removed.**

Remote Master ON/OFF Jack. This jack allows the PA1235X to be powered on and off by a positive DC voltage ranging between 4 and 30 volts (11mA @ 12 V). Specifically, it permits the 12-volt common CO (Control Output) or zone STATUS outputs from the Xantech ZPR68 to power one or more PA1235X's ON and OFF automatically with zone ON/OFF commands.

PA1235X PANEL AND FEATURE DESCRIPTIONS

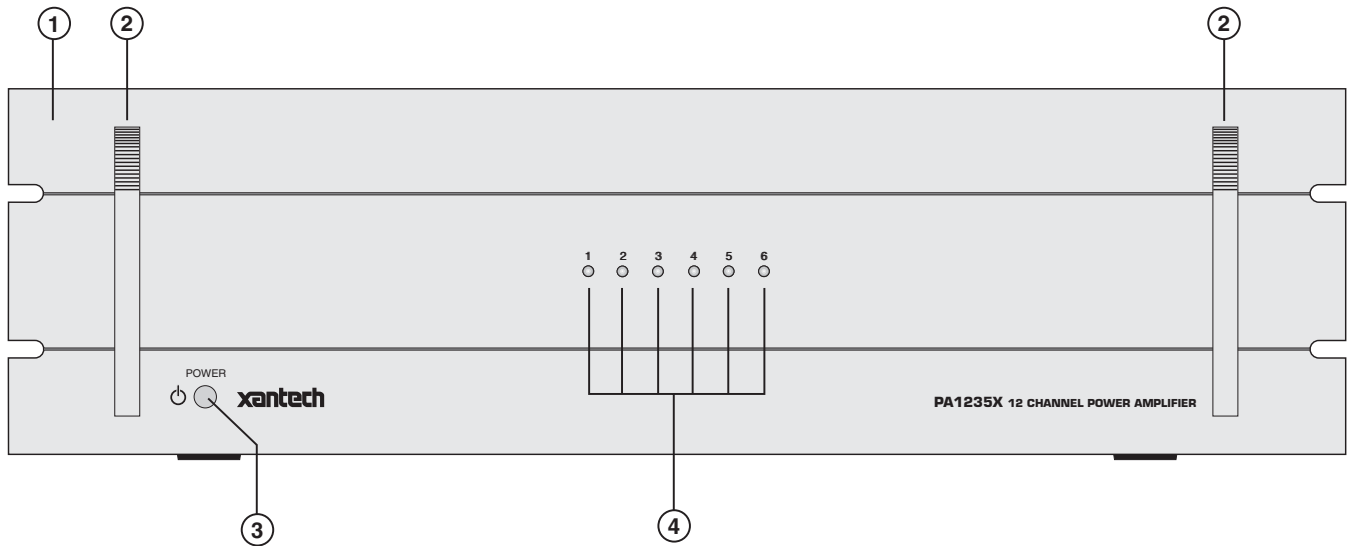


Figure 2 – The Model PA1235X Front Panel – Features and Functions

1. **Front Panel.** 19" X 5 1/4" panel designed for mounting into a standard 19" Rack Panel.
2. **Rack Panel Handles.**
3. **Power Switch.** When pressed to the IN position, power is applied to the PA1235X [provided the rear panel master AC LINE ON/OFF Switch, item #13, is placed in the ON (I) position]. This is the MANUAL ON position. When pressed again, it releases to the OUT position (MANUAL OFF), turning the unit OFF.

In addition, this switch must be left in the MANUAL OFF (OUT) position to permit an external DC Control Voltage to power the PA1235X ON and OFF. Refer to "**REMOTE MASTER ON/OFF CONTROL**" terminals, item #10.

NOTE: The PA1235X may also be powered ON/OFF with an external AC line switch into which the power cord of the PA1235X is plugged (such as the switched AC outlet of a preamp, timer, etc. with a 15 Amp rating). For this type of operation, leave the POWER switch depressed to the MANUAL ON position.

4. **Status LED Indicators.** These indicators, one for each channel pair, provide the following status information:

They are off during normal operation.

If the amplifier is driven into distortion or clipping, they will indicate with a red color.

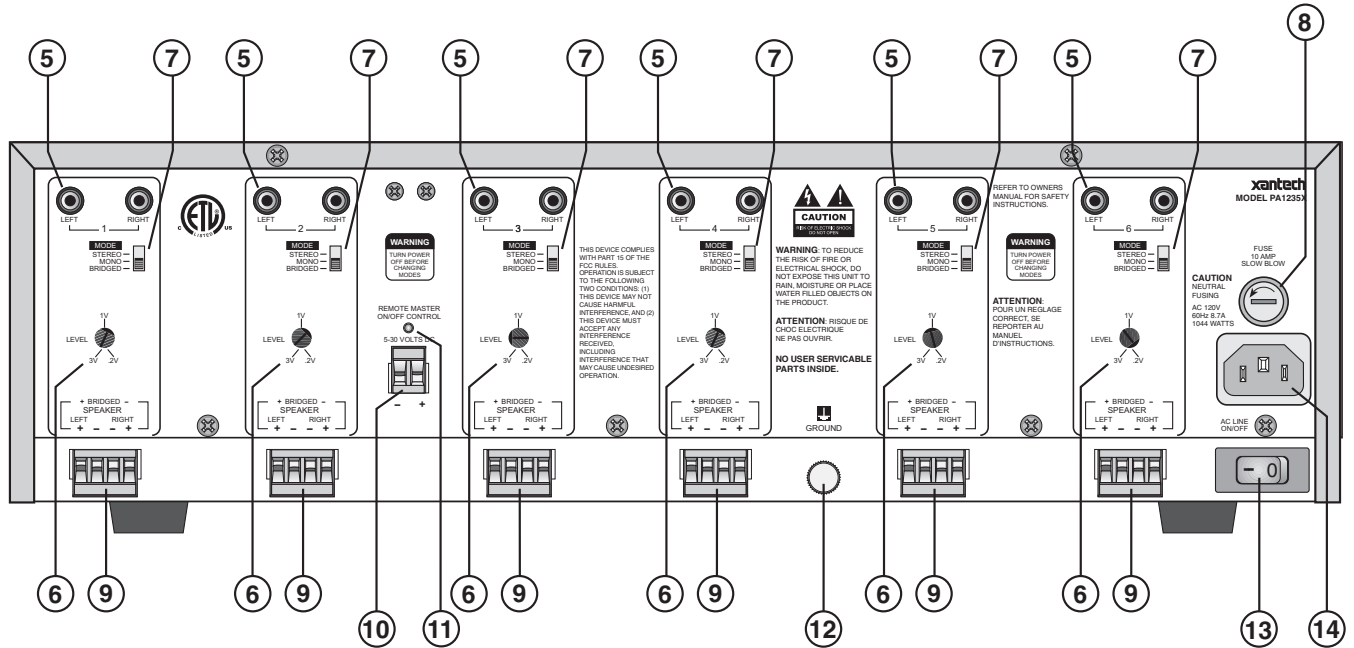


Figure 3 – PA1235X Rear Panel – Features and Functions

5. **Line Inputs.** These RCA-type jacks are the audio inputs for each of the amplifier pairs. Connect them to the OUTPUT jacks of the driving preamp with good quality RCA-type patch cables. Note that the inputs are marked LEFT-1-RIGHT, LEFT-2-RIGHT, etc., signifying the stereo channel pairs. Both the LEFT and RIGHT jacks are also active when the MODE switch (item #7) is set to the MONO or BRIDGED mode.
6. **Input Level Control.** This screwdriver adjustable control (for each stereo or bridged pair) allows the input level for full rated power output to be adjusted over a range of 0.2 volts to 3 volts. Normally you would adjust the driving preamp to maximum volume, then set this control to the maximum volume that the client desires for a given zone or room. This prevents the system from being driven to potentially destructive power levels.
7. **Mode Switch.** Switches the amplifier pair between **STEREO**, **MONO** and **BRIDGED** modes.
 - a) In **STEREO** mode, the two amplifiers operate independently of each other for 35 Watts of output each.
 - b) In **MONO** mode, left and right input signals are summed internally for Mono output from each of the two amplifiers. Also, either the Left or Right (item #5) input may be used if the source is already a Mono signal.
 - c) In **BRIDGED** mode, the two amplifiers are bridged for a single channel of high power output (80 Watts @ 8 Ohms). Either the Left or Right input (item #5) may be used to drive the resultant single channel amplifier.

CAUTION: Be sure to have the POWER turned OFF when changing the position of this switch and when making the corresponding speaker connection changes (see also item #9, following).
8. **Fuse.** When required, replace only with a fuse of the same type and rating:
 - 120 V Version: 10 A 250 VAC, SLOW BLOW.
 - 240 V Version: 5 A Time-Lag 250 VAC.
 - Replacement with a fuse of higher rating will not protect the amplifier and will void the warranty.
9. **Speaker Terminals.** These plug-in 4-terminal screw type connectors permit speaker wire sizes up to 12-gauge. When making connections for the STEREO mode, be sure to observe the "+" and "-" polarity markings, just under the LEFT & RIGHT markings, for each wire pair going to the speakers.

CAUTION: When making connections for the BRIDGED mode, remember, only one speaker is being attached per amplifier pair. Be sure to observe the outer "+" and "-" polarity markings on each side of the word "BRIDGED" on the panel above the 4-terminal connector when connecting the 2-conductor wire to the speaker.

- 10. Remote Master On/Off Control.** This 2-terminal connector allows the entire PA1235X to be powered ON and OFF by a control voltage ranging between 5 and 30 Volts DC (16mA @ 12 V). Be sure to observe the marked polarity. For instance, the 12 volt common CO (Control Output) of the Xantech ZPR68 preamp will power the PA1235X ON and OFF automatically with the first zone ON and last zone OFF commands. The DC Voltage must be applied continuously to retain the ON condition and drop to less than 0.5 Volt to switch to the OFF condition.

NOTE: *The front panel POWER switch (item #3) must be left in the Manual OFF (Out) position and the Master AC Line Switch (item #17) set to ON (I) to permit the REMOTE MASTER ON/OFF CONTROL to operate. See also CAUTION notes, Fig. 9.*

- 11. Rear Panel ON/OFF LED.** This LED indicates the power ON/OFF condition of the entire PA1235X, whether activated by a REMOTE MASTER ON/OFF CONTROL voltage (item #13) or from the front panel POWER switch (item # 3).
- 12. Grounding Screw.** Provides a means for chassis connection to earth ground or to other A/V products to aid in the reduction of system noise, etc., if needed.
- 13. Master AC LINE ON/OFF Switch.** Turns power OFF to the entire PA1235X, regardless of Remote Master or front panel POWER switch conditions. Must be placed in the ON (I) position for the other power switching functions to work.
- 14. 3-Conductor AC Line Cord Receptacle.** Standard IEC male receptacle for plug-in of a 3-conductor power line cord. Depending on the application, plug the line cord into a switched or un-switched 120V 60 Hz AC outlet (or 240 VAC 50 Hz on the 240 V version).

INSTALLATION - PHYSICAL LOCATION AND MOUNTING

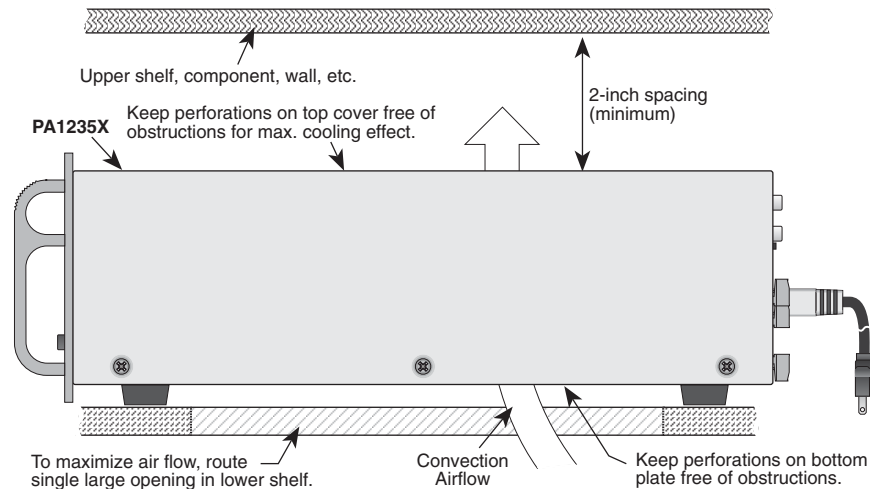


Figure 4 – PA1235X Horizontal Mounting

When you mount the PA1235X, you should plan its location carefully. Pay close attention to each of the following factors:

1. The amplifier is convection cooled. That is, it depends on the natural free flow of air up through the slot perforations in the bottom plate, over the internal heat dissipating fins, then out the top cover, for adequate cooling.
2. If mounted in an equipment cabinet or other confining location, allow at least 2 inches of space above the top cover (see Fig. 4). Be sure there are large openings in the shelf below the unit and in the cabinet to allow the entry of cool air and the escape of warm air.

Note: Do not remove feet in shelf-top installations.

3. If the cabinet contains other heat generating components or you are using several PA1235X's in a large multi-zone system, you will have to pay even closer attention to adequate ventilation.
4. Do not hesitate to use fans (quiet, boxer type), if necessary, to ensure a constant flow of air through the PA1235X's and the other heat generating components.
5. When mounting in a 19" (483mm) rack, adding a single RU (Rack Unit) above and below the PA1235X will improve convection in heavy use applications. [One Rack Unit size = 1-3/4" (44.5mm) in height].
6. In multi-zone installations, you will have large bundles of wire and cable to accommodate audio, video and speaker connections. Be sure to allow enough room for the leads and dress them in such a manner so as not to block airflow.
7. The PA1235X is designed for mounting into standard 19" Rack Panels or on flat horizontal surfaces. When mounting into a 19" rack, use the rack panel cup washers and screws supplied.

NOTE: You should consider some sort of rear support for rack mounted units when used in mobile applications or when located in seismically active areas.

CONNECTING THE PA1235X

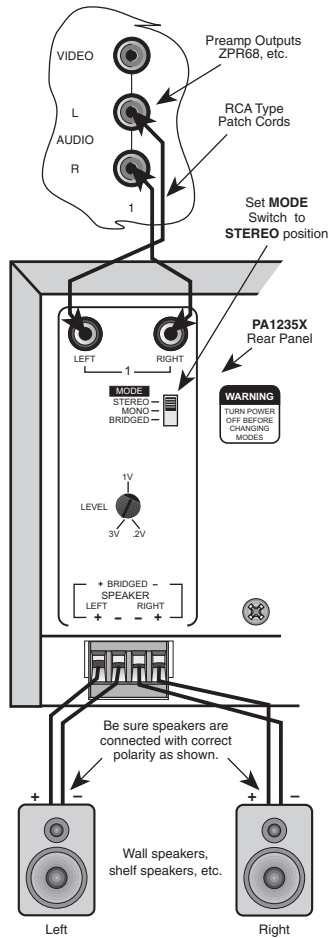


Figure 5 - PA1235X Stereo Mode Connections

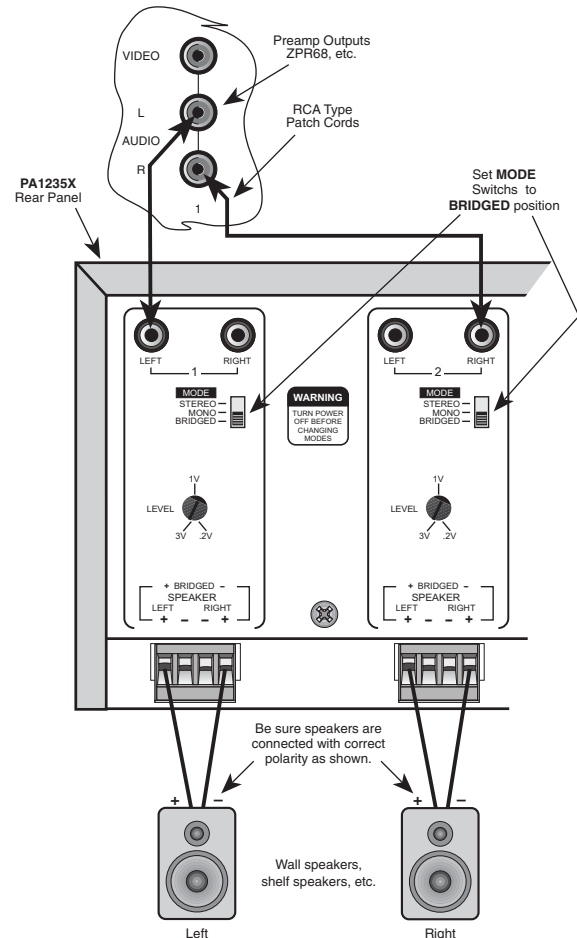


Figure 6 – Bridged Mode Connections

When making connections to the PA1235X be sure the power cord is unplugged. Proceed as follows:

Stereo Mode Connections

1. Using good quality RCA-type patch cables connect the L and R OUTPUT jacks of the driving preamp to the LEFT and RIGHT input jacks on the PA1235X. Do this for each amplifier pair. Refer to Fig. 5.
2. Slide the MODE switch to the **STEREO** position.
3. Using good quality speaker wire, connect the individual speaker leads to the 4-terminal "SPEAKER" connectors on the PA1235X as shown.
4. The PA1235X is 4-Ohm safe in Stereo Mode. Make sure the impedance presented to the speaker terminals by the speakers (or any combination of speakers) is 4-Ohms minimum.
5. Be sure to observe correct polarity by connecting the "+" and "-" terminal from each channel on the PA1235X to the corresponding "+" and "-" terminals on each speaker. This will ensure correct "phasing". See **Figure 5** and Speaker Phasing, following. Since the connectors are removable, you may unplug them for ease of lead assembly.

6. As a rule of thumb, use 18 gauge speaker wire for speaker runs up to 30' (9m), 16 gauge up to 70' (21m), and 14 gauge up to 150' (39m). The 4-terminal connectors accept wire sizes up to 12-gauge max.
7. Strip the insulation back about 1/4" (6mm) and twist the strands on each lead to prevent fraying.

CAUTION: After lead ends are inserted and the screws tightened down, be sure there are no free strands that could cause shorting!

Speaker Phasing

To obtain stable imaging and full bass response, it is imperative that stereo speakers be connected "in phase" with each other. You can verify this as follows:

- a) If the "+" (positive) and "-" (negative) terminals on your speakers are correctly marked, and visible, and you have wired the system as shown in **Figs. 5 and 7**, then the system will be "in phase". No further action is required. Most manufacturers identify the positive terminal with a red binding post, a "+" sign, or a red dot.
- b) If you are unsure of the markings, you can verify the phasing. Using a mono sound source, such as AM radio, alternately reverse the leads to one of the speakers. Pick the connection that delivers a solid center image between the speakers as well as best bass response.

Bridged Mode Connections

In general, **it is recommended that the BRIDGED mode not be used in multi-room applications where several speakers are driven through room volume controls and the like.** For such applications, use the STEREO mode. Use the BRIDGED mode for single speaker, higher power applications, such as in surround sound systems. Use speakers with an impedance rating of 8-Ohms minimum.

To make connections for the BRIDGED mode, follow the steps given before for stereo connections, but with the following differences:

1. You may connect the RCA-type patch cables from the OUTPUT jacks of the driving preamp or other source to either the LEFT or the RIGHT input jacks of the bridged pair, as shown in Fig. 6. Do this for just the amplifier pairs you wish to run in the bridged mode.

CAUTION: Be sure **Power is OFF** when connecting or switching the amp for BRIDGED operation.

2. Slide the MODE switch to the **BRIDGED** position.

NOTE: Do this only on the amplifier pairs you wish to run in the bridged mode!

3. Connect one speaker wire pair between the 4-terminal "SPEAKER" connectors on the PA1235X and the speakers as shown in **Fig. 6**. Be sure to use only the two outer terminals marked "+" and "-" on the 4-terminal connector as shown on the panel for BRIDGED connections.

NOTE: Only **one speaker** is connected per amplifier pair in the BRIDGED mode!

CAUTION: When operating in the BRIDGED mode (particularly when bench testing the amplifier) do not make a ground or any other kind of connection to the amplifier speaker terminals other than those to the individual speakers as shown. Failures caused by inappropriate connections are not covered under the warranty.

Connecting the REMOTE ON/OFF Jack

As mentioned under "PA1235X PANEL AND FEATURE DESCRIPTIONS", the REMOTE ON/OFF jack allows the power to the PA1235X to be turned ON and OFF by a remotely applied DC Voltage. **Fig. 7** illustrates how a

PA1235X can be switched ON and OFF via the switched AC outlet on the rear of a preamplifier. When the preamplifier Power Switch is switched ON, power is applied to the DC adapter, which in turn applies 5V to 30V DC to the PA1235X, switching it ON. Similarly, when the preamplifier is switched OFF, the DC voltage to the PA1235X is removed, turning it OFF.

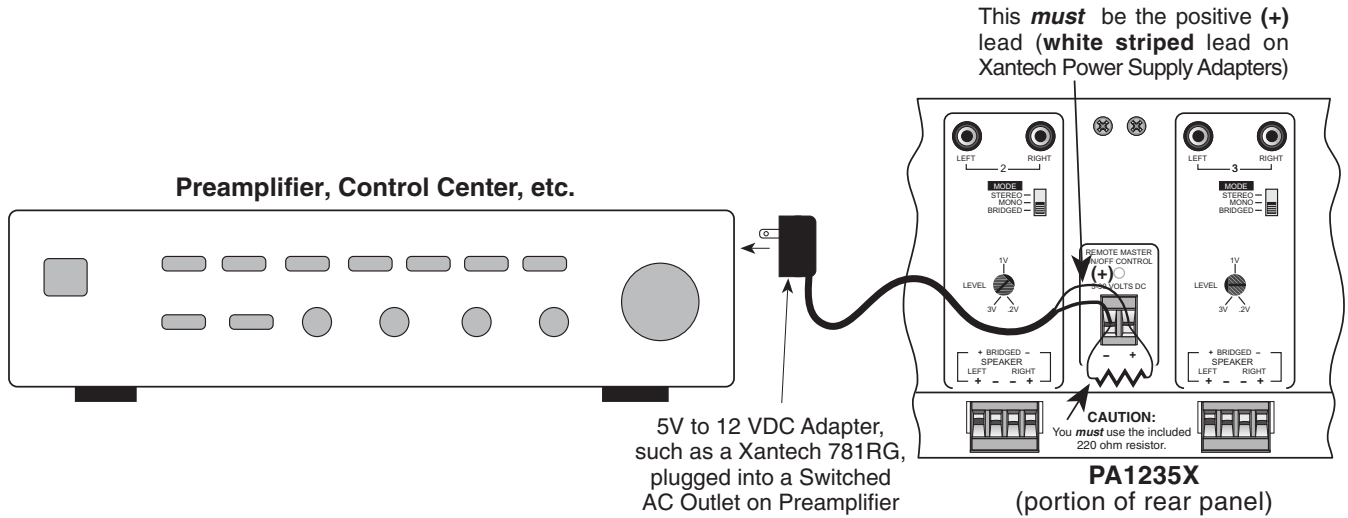


Figure 7 – Using the PA1235X Remote Master On/Off Control Terminals

A Multi-Zone System Diagram Using The PA1235X

Fig. 8, following, shows the PA1235X in a typical multi-room system with a Xantech ZPR68-10 Six-Zone Preamp.

In this case, the common +12V CO (control output) from the ZPR68-10 is used to remotely turn the PA1235X On and Off. When any one of the zones is turned on, the common +12V CO goes high, turning the PA1235X On. Similarly, when the last zone is turned OFF, the +12V CO drops to 0V and turns the PA1235X Off.

CAUTION: When powering up multiple PA1235X's, a delay of 2 or more seconds should be incorporated between "power on" using multiple Xantech AC2's.

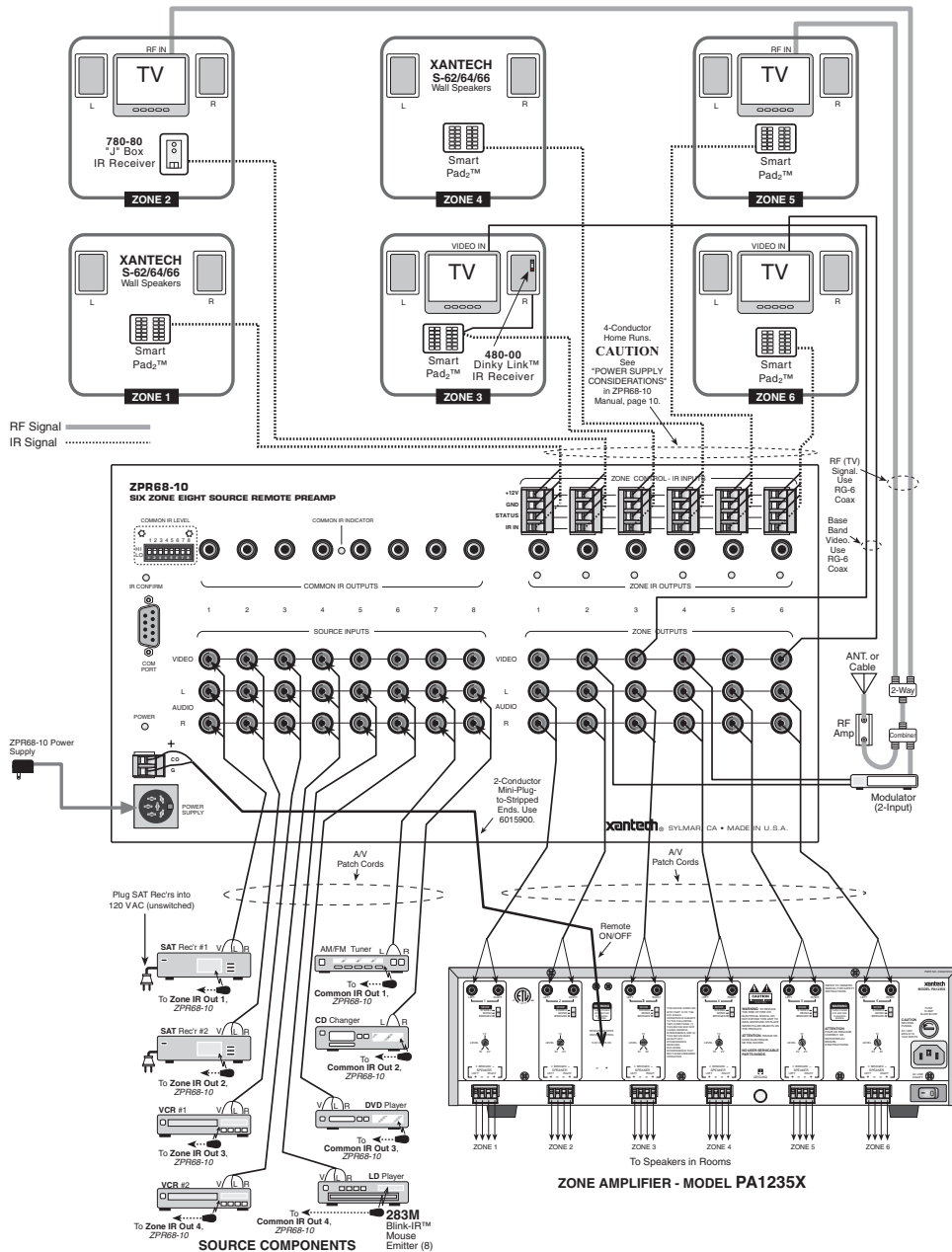


Figure 8 – Typical Multi-Room System with a PA1235X and a ZPR68-10

TROUBLE SHOOTING

If you encounter a problem, please review the items in the following list. Be sure, in addition, to check other system components, such as preamplifiers, CD players, speakers, speaker wiring, etc., that may be at fault.

PROBLEM	PROBABLE CAUSE AND SOLUTION
Rear panel Power Indicator does not light – no sound.	Check line cord for good contact in a live AC outlet. If REMOTE ON/OFF jack is used, be sure applied voltage is between +5V and +30V DC with proper polarity. See Fig. 7.
No sound from CH2, CH4 or CH6 when stereo operation is desired.	BRIDGED/STEREO switch is incorrectly set to BRIDGED position. Set to STEREO position. See Fig. 6.
Sound cuts in and out every 3 to 5 seconds.	Speaker load impedance is less than 4-Ohms for Stereo mode or less than 8-Ohms for Bridged mode. Make changes in speakers as necessary to obtain higher impedance.
PA1235X does not turn OFF when REMOTE input voltage goes to 0 Volts.	Be sure that the POWER switch (item 3, Fig. 2) is set to the MANUAL OFF (REMOTE ON/OFF) position.
PA1235X becomes very warm, shuts OFF, but does not come back ON automatically.	Set POWER switch (item 3, Fig. 2) to MANUAL OFF (OUT) position for 15 seconds, then back ON. If REMOTE ON/OFF jack is used, unplug for 15 seconds, then re-plug.
One or more front panel LED's glow red.	The amplifier has been driven into clipping and/or is overheating. Correct faulty condition.

SPECIFICATIONS

Number of channels	12
Power Output Rated continuous power, each channel, all 12 channels simultaneously driven, 20 Hz to 20kHz, at rated THD	35 Watts at 8 Ohms
Power Output Short term continuous, each channel, 2 channels driven, 1 kHz, at rated THD	55 Watts at 8 Ohms 80 Watts at 4 Ohms
Bridged Power Output Short term continuous, one pair driven at 1 kHz, at rated THD	150 Watts at 8 Ohms (80 Watts continuous)
Rated THD	< 0.08%
Damping Factor at 50 Hz, half rated power	> 100
S/N Ratio A-weighted, shorted inputs, ref to rated power	> 100 dB
Frequency Response at 1 Watt, \pm 3dB	12 Hz to 55 kHz
Input Sensitivity at rated power, stereo mode	Max: 0.5 V Default: 1.0 V Minimum: Off
Input Impedance	Local Inputs: 22 kOhms
Power Source	120 VAC, 60 Hz 240 VAC, 50 Hz (European version)
Power Consumption	No signal: 30 Watts (0.25/0.13 A) 12 Channels at 1/10 rated power: 360 Watts (3.0/1.5 A) 12 Channels at rated power: 1044 Watts (9.1/4.6 A) 6 Channels Bridged at 8.5 Watts/Chan: 720 Watts (6.0/3.0 A)
Remote On/Off and CI Voltage/Current	+5 V to +30 VDC (16 mA at +12 VDC)
Line Fuse Rating	120 V version: 10 A Slow Blow 220 VAC. TMRA 30° Celsius. If this temperature is exceeded, you will need to provide additional ventilation to insure proper operation. 240 V version: 5 A Time-Lag 250 VAC
Dimensions	19" W x 5.25" H x 15.5" D (483 mm W x 133 mm H x 394 mm D)
Weight	36.85 lbs (16.7 kg)

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