XA series professional power amplifiers

operator's manual

Biamp Systems Inc. 14270 N.W. Science Park Dr. Portland, Oregon 97229

XA Series Professional Power Amplifiers

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SECTION ONE: INTRODUCTION

1.1 Introduction

Thank you for selecting this Biamp XA Series amplifier for use in your audio system. The XA Series has been designed to give years of trouble-free service. With the introduction of the XA Series of power amplifiers, BIAMP has moved to the state of the art in high performance design. The XA Series features Power MOSFETs for unmatched sonic excellence plus the inherent ruggedness of these devices. All the amplifiers are mono-bridgeable via a rear panel switch. The XA Series carries on BIAMP's long tradition of high quality at a reasonable price. If you have any questions not answered in this manual, feel free to call your Biamp dealer or Biamp Systems.

1.2 Overview of the Amplifier

The XA300, XA600, and XA1000 are fan cooled stereo power amplifiers with a number of unique design features. First among these is the use of rugged power MOSFET technology in the output stage of the amplifier. Unlike bipolar transistors, MOSFETs actually tend to conduct less current as they heat up. This means that there is absolutely no possibility of thermal runaway. These amplifiers employ a fully complementary discrete design, with an actively balanced differential input stage. Each output is fused externally to protect both the amplifier and speakers. VI energy limiting also protects the amplifier from short circuits or mismatched loads. The fans are operated by a continuously variable proportional controller which senses the temperature of the heatsinks. At low heatsink temperature, the fan runs slowly and quietly. As power demand increases, the fan speed increases as well. Since both channel's heatsinks are monitored separately, the fan reacts to the hotter of the two heatsinks. The amplifier has a built in automatic soft-start that virtually eliminates both turn-on and turn-off transients. Biamp's AutoLimit circuitry eliminates any sign of hard clipping by instantly reducing amplifier gain only on the peaks that would cause clipping. There is absolutely no audible pumping or ducking of the signal when the AutoLimit is active. As impressive as these features might be, the sonic superiority of MOSFETs are these amplifier's most important specification.

Speaker fault, over-temperature shutdown, and signal present (-20dBv) conditions are indicated on the front panel. In addition, large high visibility level controls are on the front panel. The rear panel includes XLR and 1/4" phone jack inputs for each channel, as well a 5-way binding posts for output connections. Both line and speaker fuses are user accessible on the rear panel, as well as the mono bridge switch.

1.3 Specifications

	XA300	XA600	XA1000
Frequency Response (20-20KHz)	+0, -.5dB	+0, -.5dB	+0, -.5dB
Slew Rate (into 8 ohms)	30V/uS	30V/uS	30V/uS
Rise Time	< 7 uS	< 7 uS	< 7 uS

Damping Factor re 8 ohms (20-20KHz)	> 200	> 200	> 200
Sensitivity for Rated Output at 8 ohms	1.85 Vrms	2.65 Vrms	2.45 Vrms
Crosstalk (20-20KHz)	-60dB	-60dB	-60dB
Maximum Power at 1KHz (.1% THD)			
Both Channels Driven:			
8 ohms	100 W	200 W	300 W
4 ohms	150 W	300 W	500 W
Single Channel Driven:			
8 ohms	110 W	220 W	330 W
4 ohms	175 W	345 W	575 W
Mono Bridge:			
16 ohms	200 W	400 W	600 W
8 ohms	300 W	600 W	1000 W
S/N Ratio (re full output, 8 ohms, 0-30KHz)	100 dB	100 dB	100 dB
THD (20-20KHz) at Rated Power			
8 ohms	.07 %	.07 %	.1 %
4 ohms	.07 %	.07 %	.1 %
IMD (SMPTE) at Rated Power			
8 ohms	.1 %	.1 %	.1 %
4 ohms	.1 %	.1 %	.1 %
Input Impedance	20K Bal 10K Unbal	20K Bal 10K Unbal	20K Bal 10K Unbal
Dimensions			
Height	3.5"	3.5"	5.25"
Width	19.0"	19.0	19.0"
Depth	14.0"	14.0"	11.0"
Weight (amplifier alone)	21 lb.	24 lb.	35 lb.
Connectors			
Input	1/4", XLR	1/4", XLR	1/4", XLR
Output	5-Way Binding Posts	5-Way Binding Posts	5-Way Binding Posts
Indicators			
Power	Green LED		

Fault (speaker load)	Red LED, each channel
Over-temperature (shut-down)	Red LED, each channel
-20dBm (signal present)	Green LED, each channel

Power Requirements		120VAC, 60Hz 240VAC, 60Hz	
Power Consumption	5A, 600 W	10A, 1200 W	16.7A, 2000 W

SECTION TWO: UNPACKING AND PRECAUTIONS

2.1 Unpacking Instructions

All products leave Biamp Systems in good condition. Despite the protective carton and packing foam, it is possible for damage to occur during shipping. Be sure to check the carton for obvious damage when unpacking the unit.

Please save the original carton for return shipment, if this is ever necessary. Biamp Systems does not warrant against damage caused by shipment in any carton that is not the correct Biamp carton.

If shipping damage is evident, notify the shipping company immediately. Only the consignee can file a claim with the carrier for shipping damage. Biamp will co-operate fully in such an event. Be sure to save the carton for the shipper to inspect.

2.2 Precautions

2.21 Be sure the power is OFF while making all connections. Static pops or broken ground connections on cables may cause signals that can damage speakers.

2.22 When first powering up the amplifier, set the gain control fully counterclockwise. This will block unwanted signal or hum from damaged connecting cable. Slowly advance the level control. If no sound is heard, move the level control back to its original counterclockwise position and check to be sure there is an input signal. If signal is being supplied, but there is no sound with the level control advanced, check to see if the Fault LED is flashing. This would indicate a shorted speaker cable.

2.23 Check the AC voltage before connecting the AC plug. Amplifiers shipped in the USA are configured for 120 VAC operation. Operation from 240 VAC will destroy the amplifier, and is NOT covered by the warranty.

2.24 Never connect the red (plus) binding posts directly together. This may result in blown output fuses or internal damage to the amplifier.

2.25 Do not remove the top cover of the amplifier, as there are no user serviceable parts inside. All service work should be referred to a Biamp authorized repair center. The warranty may be voided if service is attempted on the amplifier by non-qualified personel. Please call the factory for Service Center locations and information.

2.26 High voltages can be present at the speaker terminals. Be sure to make all speaker connections with the power off.

2.27 The XA3ØØ, XA6ØØ, and XA1ØØØ take in cooling air from the front and exhaust out the rear. Because of this, it is important that the front side of the rack set-up have an unrestricted supply of cool air. These amplifiers should not be used in a closed rack.

SECTION THREE: OPERATION

3.1 Cooling

The XA3ØØ, XA6ØØ, and XA1ØØØ amplifiers may be used either in a rack mounted installation or on a flat surface. In a rack mounted situation, it is very important to insure an unrestricted supply of cool air to the front of the amplifiers, as well as good circulation in the rear to prevent heat buildup. Fan speed is continuously controlled based on heatsink temperature. The heatsinks of both channels are monitored, and fan speed is governed by the hotter of the two.

3.2 AC Requirements

The XA amps are designed for safe operation with AC voltages from 1Ø8VAC to 132 VAC. This represents a +/-1Ø% shift from the nominal line voltage of 12ØVAC. If the amps are used in areas that regularly experience prolonged periods of high line voltage, more heat will be generated by the amplifier than would be the case at 12ØVAC. Under these circumstances, it is particularly important to observe cooling precautions above. Operation at lower than normal line voltage will result in a slight loss of power, but is otherwise completely acceptable.

3.3 Stereo Input Connections

The input circuit of the XA amps employs a balanced, high-frequency compensated differential amplifier circuit using a high performance, low noise 5532 op-amp. XLR connectors have been included to accept balanced input signals, while 1/4" phone plugs accept unbalanced OR BALANCED inputs. Pin 2 on the XLR input is the "plus" conductor, while pin 3 is the "minus" conductor. Pin 1 is for connection to the cable shield. The 1/4" phone plugs will accept either balanced or unbalanced inputs. For unbalanced use, the tip of a standard 1/4" phone plug is the "plus" terminal. For balanced use, the tip of the plug is the "plus" input, the ring of the plug is the "minus" input, and the sleeve is the shield connection. In order to use the XLR connector in an unbalanced system, connections may be made as follows. Wire the "plus" side of the input signal to pin 2, and connect ground and the cable shield together at the end of the cable connected to the signal source. Wire the ground conductor (not shield) to pin 3, and the shield to pin 1. Do not connect pins 1 and 3 at the amplifier input.

Input connections on XLR and 1/4" phone are parallel, allowing either of these connectors to be used for a "STACKING" input signal to secondary amplifiers. However, "STACKING" connections must be similar to input connections in regards to BALANCED or UNBALANCED wiring.

3.4 Stereo Output Connections

The output connections for the XA amps are two pairs of 5-way binding posts on

the rear of the unit. The red posts are "plus" terminals, and the black posts are the "ground" terminals. Output connections can most conveniently be made using dual bananna type jacks. As an alternative, speaker wire can be stripped and tinned and fastened directly into the binding posts. It is most important to tin the ends of the speaker wire to prevent wire strands from accidentally shorting the outputs. Wire of sufficient guage should be used to prevent power loss and damping factor reduction. For lengths of wire up to 20 feet, 16 or 18 guage wire is acceptable. For runs between 20 and 80 feet, 14 guage should be used. For runs above 80 feet, 10 or 12 guage wire should be used. "Zip" cord type parallel construction for speaker wires is the best. Esoteric speaker cables, especially those of coaxial construction, may actually cause some amplifiers to oscillate (not the XA amps). This is because of the excess capacitance of the coaxial structure. Under no circumstances should the positive terminals of the outputs be directly connected together or parallelled, as this could cause the amplifier to destroy itself and is not covered by warranty.

3.5 Mono-Bridged Input Connections

In order to use the XA amps as a mono amplifier, all that is necessary is to engage the mono bridge switch on the rear of the unit. In this position, all channel 2 input connections are disconnected internally. Any input cabling on channel 2 should be removed. Channel 1 is the live input in this mode, and the channel 1 level control sets the output level.

3.6 Mono-Bridged Output Connections

In the mono-briged mode, the output is taken from the positive (red) terminals of both channels. The channel 1 red terminal is the "plus" terminal, while the channel 2 red terminal is the "ground" terminal. Under no circumstances should the positive terminals of the outputs be directly connected together or parallelled, as this could cause the amplifier to destroy itself and is not covered by warranty.

3.7 Output Protection

As with most high-powered amplifiers, the XA300, XA600, and XA1000 employ several output protection features. VI energy limiting protects the amplifiers from short circuits or mismatched loads. In addition, there is an external fuse in series with the output of each channel which will permit full rated power to be deleivered continuously for an indefinite time into loads of 4 ohms or greater in stereo, and loads of 8 ohms or greater in mono-bridged mode. Load impedances lower than those reccomended will blow the fuse with no harm to either the amplifier or the speakers. Output fuses, as with all fuses in the XA amplifiers, should be replaced ONLY WITH FUSES OF EQUAL VALUE for continued protection. Any damage to the amplifier caused by incorrect fusing is not covered by warranty. Thermal sensors on each heatsink of the XA amps will shut an overheated channel down until that channel cools to a safe temperature. Operation will then automatically resume. The other channel will not be affected. In the unlikely event of a DC fault, the amplifier has fast blow power supply fuses in addition to output fuses to protect the load. Internal turn-on and turn-off muting is provided to insure that no harmful transients reach the output.

3.8 AutoLimit

Biamp's unique AutoLimit circuit is designed to eliminate clipping without any

of the sonic side effects often associated with limiting or compressing circuits. AutoLimit works only on the signal peaks, and instantly reduces amplifier gain as the amplifier's output approaches either the positive or negative supply rail. The result is pure sound free from the harshness of hard clipping, with no pumping or ducking of the signal.

3.9 Indicators and Troubleshooting

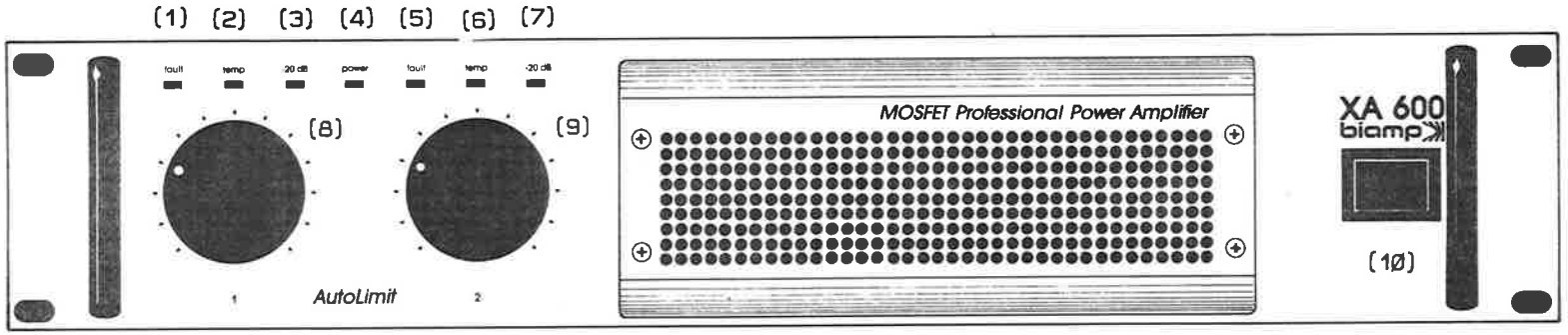
Several status indicators are provided on the front panel of the amplifier. The green LED in the center of the row of seven LEDs above level controls indicates the amplifier is on. If this light does not light when the power switch is engaged, turn the amp off and check to see that the plug is in and the outlet is live. If the power indicator does come on, but no sound is heard, see Section 2.22. The Fault indicators for each channel indicate amplifier loading below the recomended values of 4 ohms stereo or 8 ohms mono-bridge. Either VI limiting from speaker impedances that are too low or a short circuit on the output will cause the Fault light to come on. The Fault indicators will normally remain lit during the delayed turn-on period if input signal is present. The Temp indicators will light if the heatsink of either channel exceeds safe operating temperature. If this happens, the Fault indicator for that channel will come on until normal operation is automatically restored as the heatsink cools. If the Temp indicator comes on often, it probably indicates inadequate cooling in the particular installation. The -2ØdBm green LEDs indicate the presence of signals exceeding .Ø775 Vrms at the input of the amplifier.

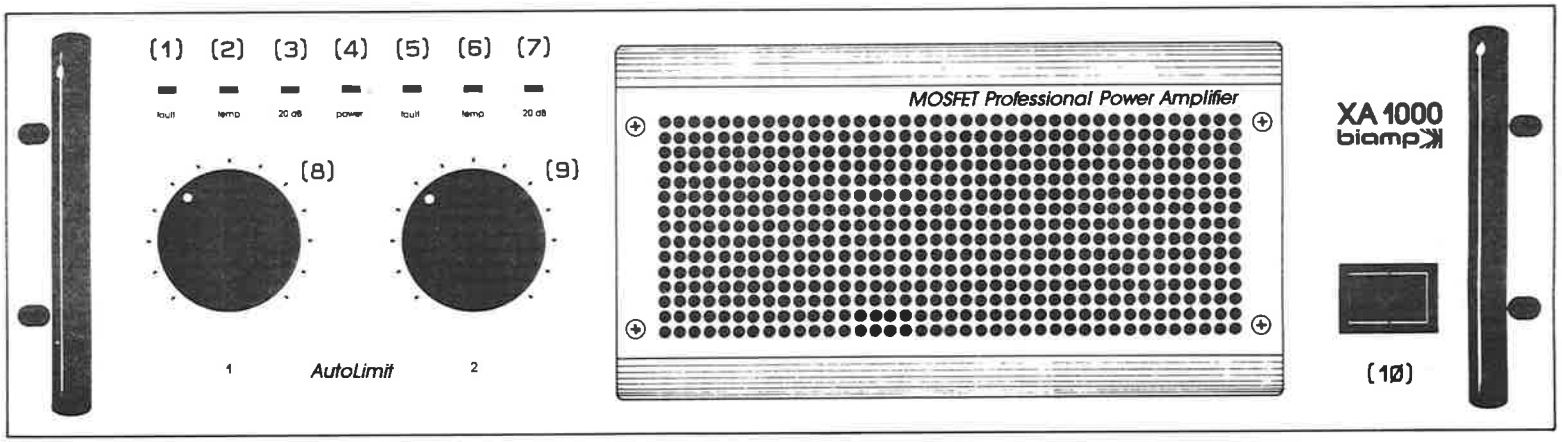
SECTION FOUR: OBTAINING SERVICE

4.1 Warranty Repair

If the amp is not working properly, even after going through the troubleshooting procedures above, the amplifier may require service. This must be performed by an authorized Biamp Service Center. Please note that the warranty does not cover repairs made by non-authorized sevice personnel, and that improper repairs may void future warranty coverage. If the amplifier is returned to a Service Center for service, it must be sent in the original type shipping carton. If you have not saved your carton, you must obtain an original shipping carton from your dealer or from Biamp Systems. The warranty does not cover shipping damage caused by returning an amplifier in the wrong carton.

SECTION FIVE: DIAGRAMS





(1)(5) Channel Fault Indicators
Indicate a fault with the speaker load on that channel. Indicator comes on when amplifier current limiting occurs, due to shorted output OR incorrect speaker load. These indicators will also light during periods of delayed turn-on or thermal shutdown if input signal is present.

(2)(6) Channel Temperature Indicators
Indicate thermal problem in that channel. Indicator comes on when over-temperature condition causes amplifier shut-down.

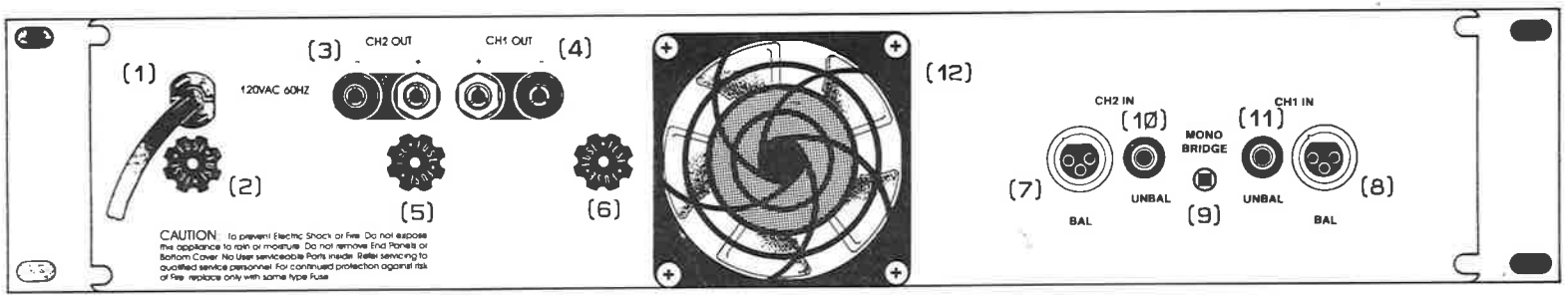
(3)(7) Channel -20dB Indicators
Indicate the presence of input signal in that channel. Indicator comes on when input signal level exceeds -20dBv (.0775Vrms).

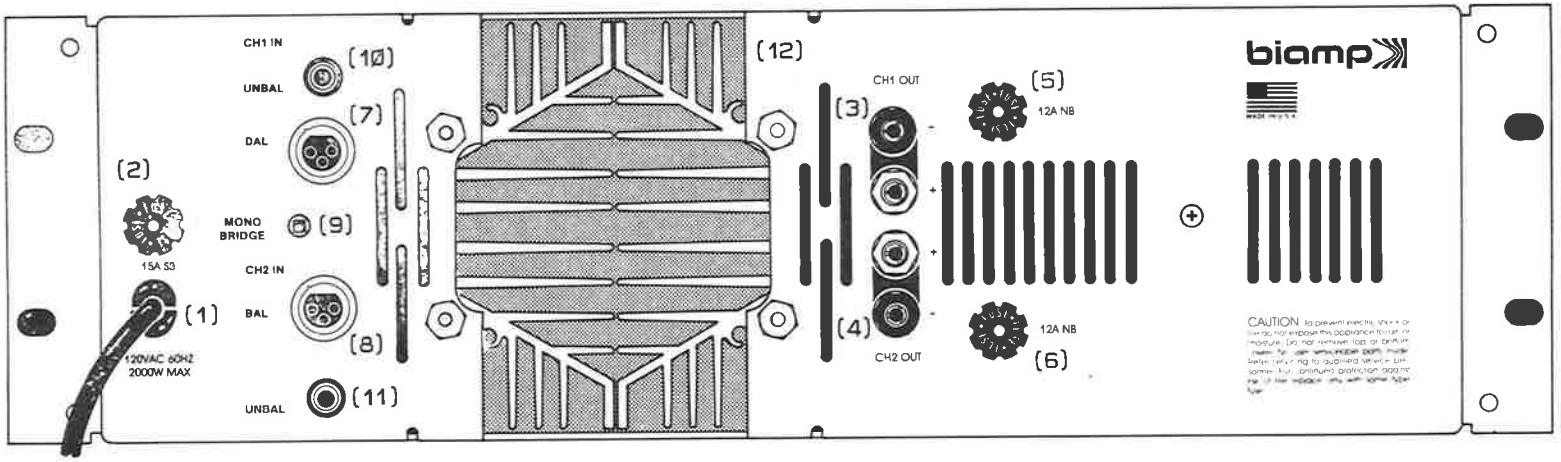
(4) Power Indicator
Indicates AC power is ON. When AC power is turned OFF, this indicator will dim gradually, as internal power supply voltages decrease.

(8)(9) Channel Level Controls
Control the output volume for that channel. During mono-bridge operation, channel 1 level control provides this function. Channel 2 level control is inactive.

(10) AC Power Switch

FRONT PANEL FEATURES





(1) AC Power Cord
Connect to 120VAC/60Hz outlets ONLY. Do not remove or defeat the AC ground prong on the plug, as this constitutes a shock hazard.

(2) AC Line Fuse
Replace fuse ONLY with exact type and current rating as original fuse.

(3)(4) 5-Way Binding Post Output Connectors
Red terminals are speaker (+) and Black terminals are speaker (-). For mono-bridge operation, channel 1 Red terminal becomes speaker (+) and channel 2 Red terminal becomes speaker (-).

(5)(6) Channel Output Fuses
Protect amplifier and speaker load against shorted output or DC voltage in that channel. The fuses are rated to allow full power operation into proper loads. Replace ONLY with exact type and current rating as original fuses.

(7)(8) XLR Balanced Input Jacks
Balanced XLR input for each channel. Pin 2 is positive (+), Pin 3 is minus (-), and Pin 1 is ground.

(9) Mono-bridge Switch
This switch should be OUT for STEREO operation, or IN for MONO operation. When in Mono-bridge mode, channel 1 becomes the active input. Channel 2 should have no input connection.

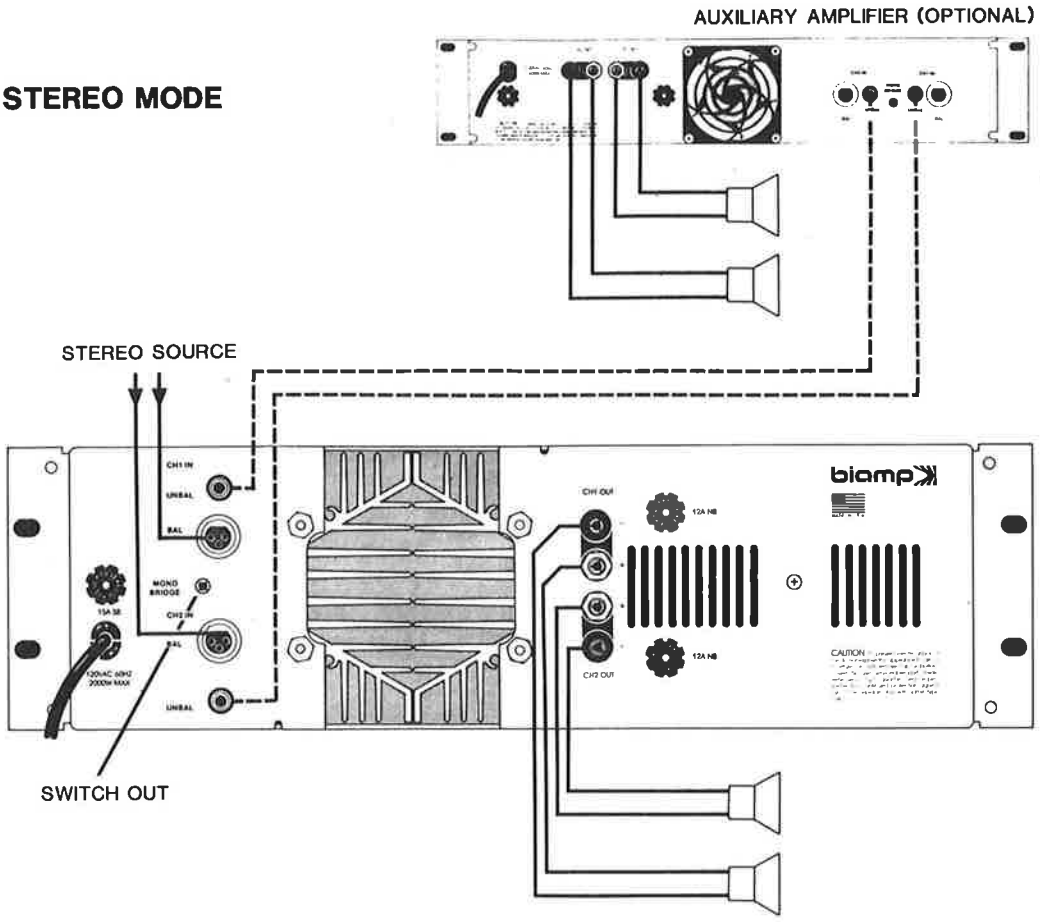
(10)(11) 1/4" Phone Unbalanced Input Jacks
1/4" phone input for each channel. These jacks will accept unbalanced OR balanced inputs. Tip is positive (+), Ring is negative (-), and Sleeve is ground.

(12) Fan
Rear mount on XA300 and XA600. Internally mounted on XA1000. Fan speed will vary depending on the amplifier's operating temperature.

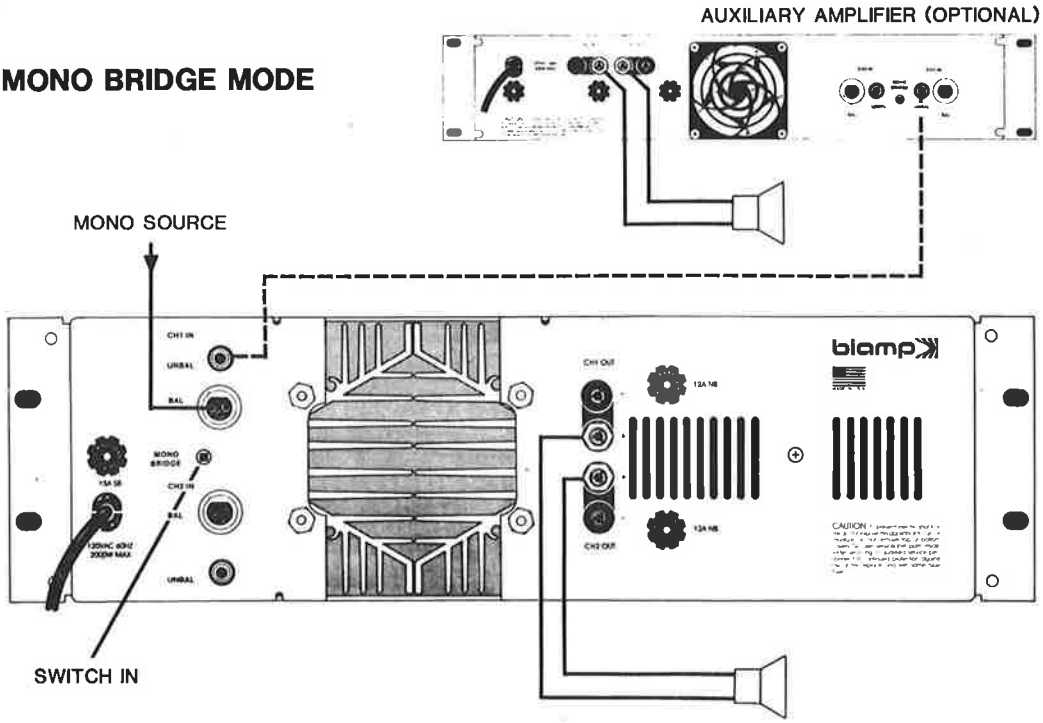
REAR PANEL FEATURES

HOOK-UP DIAGRAM

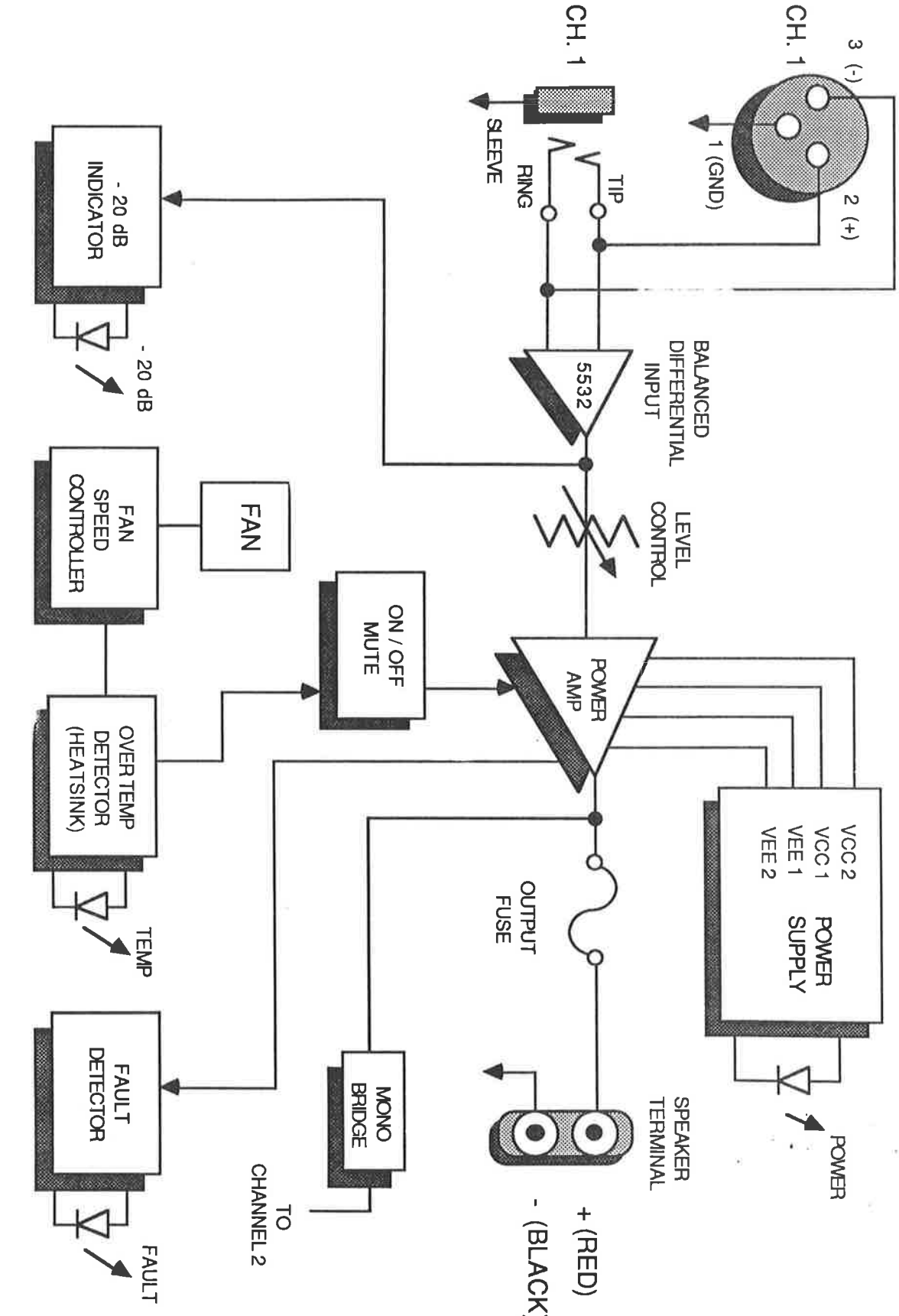
STEREO MODE



MONO BRIDGE MODE



BLOCK DIAGRAM



(channel 1 shown)

BIAMP Three Year Limited Warranty

BIAMP SYSTEMS IS PLEASED TO EXTEND THE FOLLOWING 3-YEAR LIMITED WARRANTY TO THE ORIGINAL PURCHASER OF THE PROFESSIONAL SOUND EQUIPMENT DESCRIBED IN THIS OPERATOR'S GUIDE.

BIAMP Systems expressly warrants this product to be free from defects in materials and workmanship for a period of 3 YEARS from the date of purchase from an authorized BIAMP dealer under the following conditions.

1. The Purchaser is responsible for completing and mailing to BIAMP, within 10 days of purchase, the attached warranty application.

2. In the event the warranted BIAMP product requires service during the warranty period, BIAMP will repair or replace, at its option, defective materials provided you have identified yourself as the original purchaser of the product to any authorized BIAMP Service Center. Transportation and insurance charges to and from an authorized Service Center or the BIAMP factory for warranted products or components thereof shall be the responsibility of the Purchaser.

3. This warranty shall be VOIDED if the serial number has been removed or defaced; or if the product has been subjected to accidental damage, abuse, rental usage, alterations, or attempted repair by any person not authorized by BIAMP to make repairs; or if the product has been installed contrary to BIAMP's instructions.

4. Electro-mechanical fans, electrolytic capacitors, and normal wear and tear of appearance items such as paint, knobs, handles and covers are not covered under this warranty.

5. BIAMP SHALL NOT IN ANY EVENT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, LOSS OF USE, PROPERTY DAMAGE, INJURY TO GOOD WILL, OR OTHER ECONOMIC LOSS OF ANY SORT, EXCEPT AS EXPRESSLY PROVIDED HEREIN. BIAMP DISCLAIMS ALL OTHER LIABILITY TO PURCHASER OR ANY OTHER PERSON ARISING OUT OF USE OR PERFORMANCE OF THE PRODUCT, INCLUDING LIABILITY FOR NEGLIGENCE OR STRICT LIABILITY IN TORT.

6. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. BIAMP EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES SET FORTH HEREIN SHALL BE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDIES WITH RESPECT TO ANY DEFECTIVE PRODUCT. THE AGENTS, EMPLOYEES, DISTRIBUTORS, AND DEALERS OF BIAMP ARE NOT AUTHORIZED TO MODIFY THIS WARRANTY OR TO MAKE ADDITIONAL WARRANTIES BINDING ON BIAMP. ACCORDINGLY, ADDITIONAL STATEMENTS SUCH AS DEALER ADVERTISEMENTS OR REPRESENTATIONS DO NOT CONSTITUTE WARRANTIES BY BIAMP.

7. No action for breach of this warranty may be commenced more than one year after the expiration of this warranty.

Thanks for purchasing BIAMP-AMERICAN SOUND CRAFTSMANSHIP.

BIAMP TEST REPORT

DATE 8/1/97 PRODUCT XA300 S/N 660150

Signal to Noise (20Hz-30KHz)
Channel 1 105dB
Channel 2 106dB

THD % at 100 Watts 8 ohms	Channel 1	Channel 2
20Hz	.009%	.012%
1KHz	.009%	.01%
10KHz	.032%	.017%
20KHz	.038%	.031%

IMD % at 100 Watts 8 ohms (60Hz/7KHz 4:1 ratio)
Channel 1: .031% Channel 2: .036%

Mono Bridge

Watts 316 at 8 ohms

Rise Time (10%-90%) Channel 1: 6μS Channel 2: 6μS