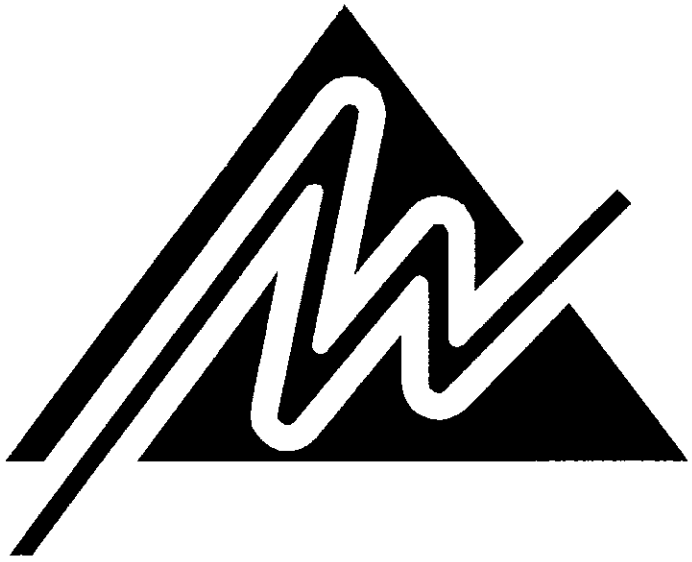

Australian Monitor

PROFESSIONAL AUDIO POWER AMPLIFIERS

CONTRACTOR
and
Opal

Audio Amplifiers

OPERATION MANUAL

IMPORTANT!

Please read carefully.

This Operation Manual contains important information regarding safety precautions, performance, maintenance and operation of your power amplifier. You should familiarize yourself with the contents of this manual **before** operating your amplifier.

Safety Precautions and Labelling

The rear panel of the unit has a number of markings and internationally recognized symbols related to the hazards and precautions that should be taken when operating MAINS connected equipment.

The presence of a LIGHTNING FLASH with an arrow-head contained within the boundaries of a equilateral triangle is intended to alert the user that dangerous uninsulated voltages may exist within the units enclosure. These voltages may be of a sufficient magnitude as to constitute the risk of an electrical shock.
This symbol is reinforced with the text:

!CAUTION!
RISK OF ELECTRICAL SHOCK
DO NOT OPEN

The presence of an EXCLAMATION MARK contained within the boundaries of a equilateral triangle is intended to alert the user that there is important operating and maintenance literature that accompanies the unit.

!WARNING!
DO NOT EXPOSE TO EITHER
RAIN OR MOISTURE

The unit should not be operated in a situation where it may encounter the entry of water, rain, or any fluids. To expose the unit to the above conditions may make the operation of the unit hazardous and increase the risk of electrical shock.

REFER SERVICING TO
QUALIFIED PERSONNEL ONLY

The user should not attempt to service the unit. Only qualified and knowledgeable personnel familiar with the internal workings of the unit should attempt any repair, servicing or authorized modification to the unit.

NO USER SERVICEABLE PARTS INSIDE

The unit does not contain any parts which the user can service or re-use in this or any other product.

If you are in need of special assistance and the information you require is outside the scope of this manual, please contact your nearest service agent or Australian Monitor direct:

THE TECHNICAL OFFICER
AUSTRALIAN MONITOR PTY LTD,
29 HOPE ST
ERMINGTON. SYDNEY. N.S.W.
AUSTRALIA. 2115

	Phone	Fax
Local	(02) 874 9355	(02) 874 9366
International	(612) 874 9355	(612) 874 9366

Contents

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Features:

- Custom designed, heavy duty alloy chassis.
- Open modular construction, for ease of servicing.
- Symmetrical weight distribution.
- Well-regulated, high current power supply.
- High VA-capable toroidal mains transformer.
- Binding post output connection
- Stereo or bridged / mono operation.
- Input signal XLR and tag strip connector
- 21 Position detented attenuators.
- 1 Watt output indication.
- Output clip indication at -1 dB
- Massive heat-sink and heat-exchangers.
- Efficient front to back cooling.
- Single speed automatic axial fans.
- Output fault indication.
- Plug in signal processors (optional).
- High-quality, close-tolerance components throughout.

Protection Features

- Suppression of inrush current at mains turn-on.
- Input muting at turn-on.
- Input overvoltage protection.
- Radio-frequency interference suppression.
- Short-circuit protection and indication.
- Independent DC supply rail fuses.
- Layout, grounding, decoupling and componentry have been optimized to provide the user with **stability**, **reliability** and **longevity**.

1. Introduction

Congratulations on choosing *Australian Monitor* for your professional amplification requirements.

The design of your audio power amplifier embraces all the aspects of a well designed unit. The visual design, mechanical, electrical and sonic parameters, along with our dedicated manufacturing processes, have all been optimized to provide a professional tool that exhibits quality, reliability and longevity.

Figure 1 shows a block diagram of the amplifier. Each channel of the amplifier comprises a balanced active input with a buffered attenuator driving a differential class A drive stage which in turn drives a fan-cooled, class AB, MOSFET output stage configured as a source follower. The unit operates from a high current-capable linear power supply.

The Contractor, Opal and PA Series are 2 units tall (3.5"), in 19" wide rack mountable cases.

These units have been specifically designed to deliver their high power output with minimal distortion, and provide the critical degree of control required by your speakers, at high duty cycles for extended periods.

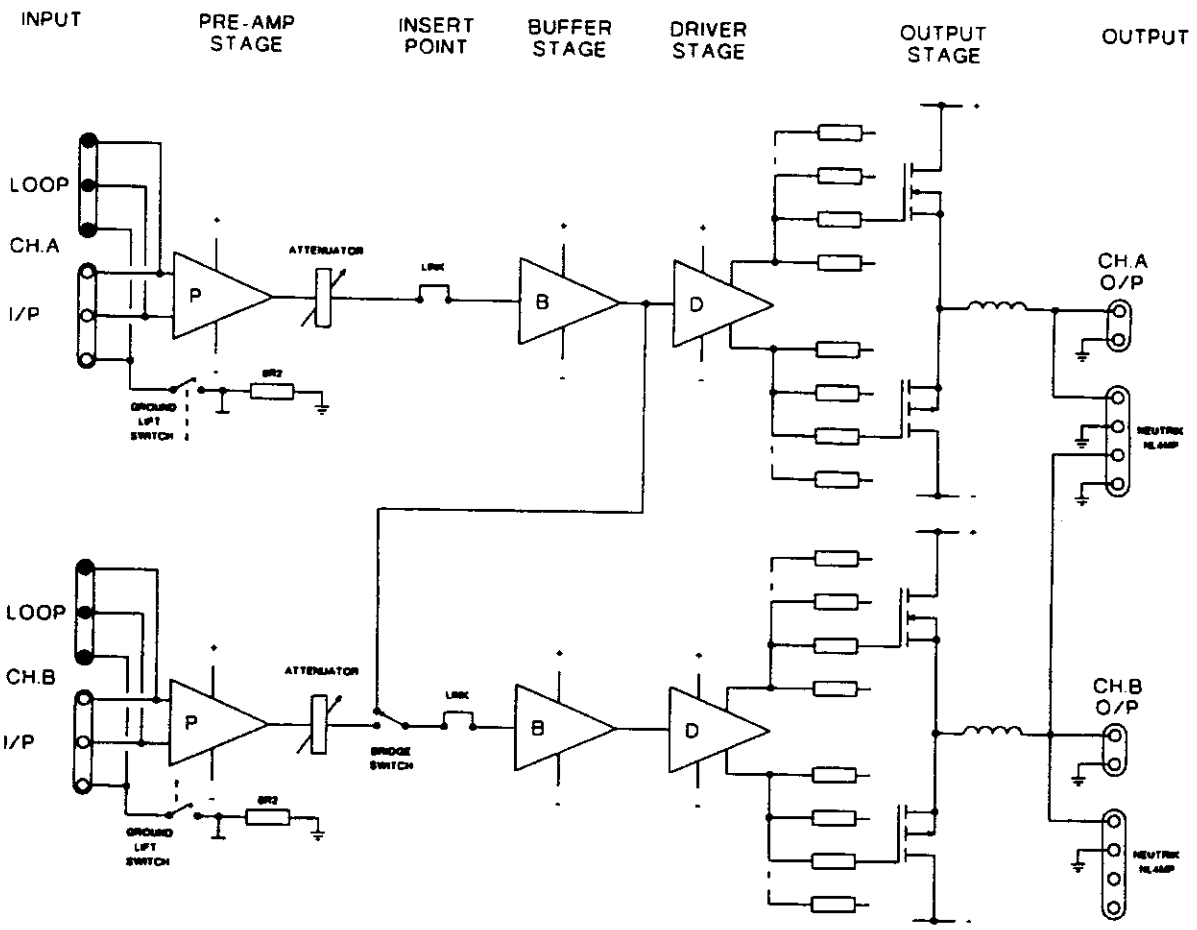


Figure 1 Amplifier Block Diagram

2. Controls, Connectors & Indicators

Models and Variants

While these amplifiers are designed to suit different applications, all variants use the same electronics. The output powers are:

Contractor Series :

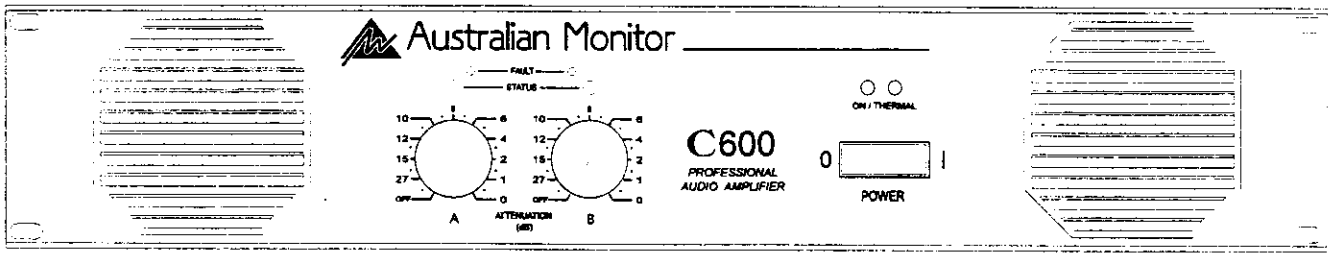
C300	=	2 x	175W	4 ohms
C600	=	2 x	300W	4 ohms
C800	=	2 x	400W	4 ohms
C1200	=	2 x	600W	4 ohms

Opal Series :

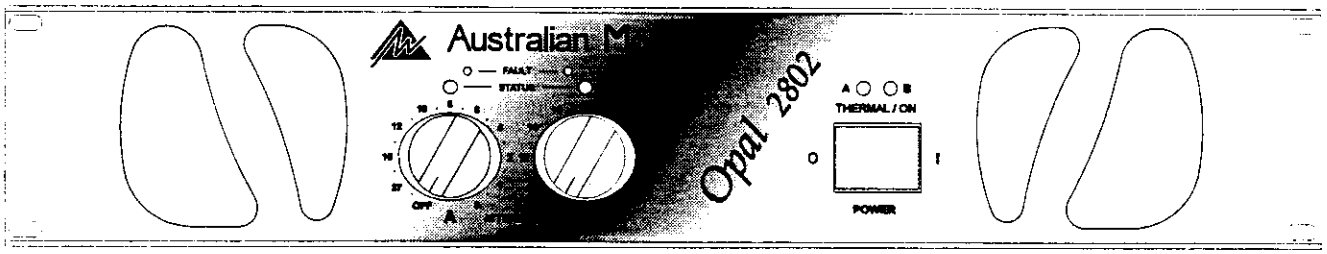
Opal 1202	=	2 x	175W	4 ohms
Opal 2802	=	2 x	300W	4 ohms

PA Series:

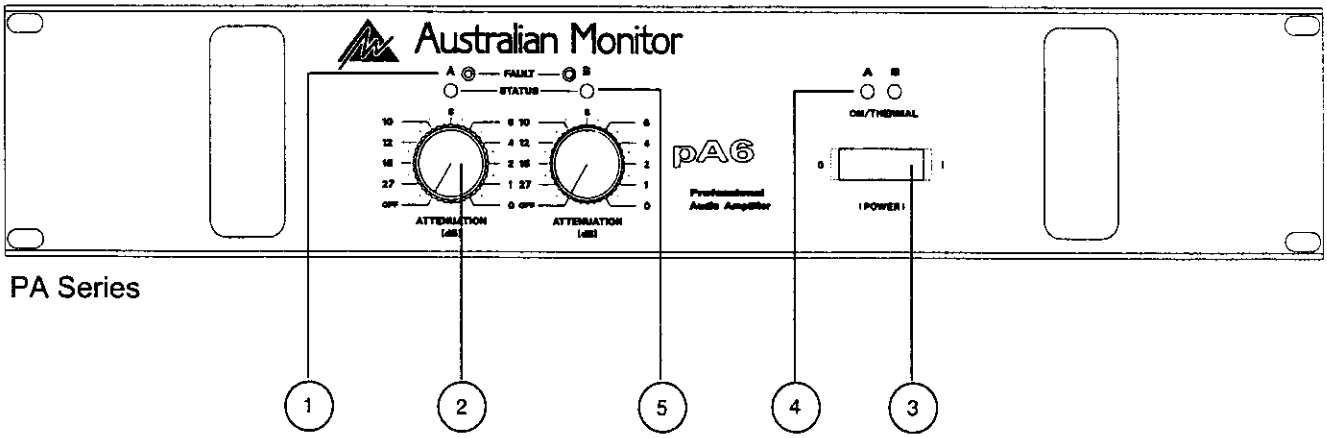
PA - 3	=	2 x	175W	4 ohms
PA - 6	=	2 x	300W	4 ohms
PA - 8	=	2 x	400W	4 ohms
PA - 12	=	2 x	600W	4 ohms



Contractor Series



Opal Series



PA Series

Figure 2 Front Panel Layouts

Front Panel

Figure 2 shows layouts of the front panels; the section numbers refer to areas on the drawing. The functions of the controls and indicators are as follows:

1. Fault Indicator

This amber LED will flash when a fault condition exists.

The fault detection circuit monitors the difference between drive and output of your amplifier.

A short on the speaker output or a blown negative rail fuse the LED will flash brightly in sync with the programme. This LED will also flash with programme peaks for gross overloads; or if the load is 2 ohms or less.

The circuit has two stages of operation:

1. It will provide indication (e.g gross overload) but does not affect the input signal.
2. It will indicate and mute the input signal (e.g shorted output).

2. Attenuator

Level control for your amplifier is provided by a 21 position detented potentiometer and indicates gain reduction in decibels from the '0 dB' position (maximum gain, no attenuation).

3. Power Switch

Press the switch **to the right** for power **ON.** Press the switch **to the left** for power **OFF**. At start-up (turn-on) the input to the amplifier is muted by 30dB for approximately two seconds.

4. On/Thermal Indicator

This is a dual colored LED which will normally be **green** and indicates that the amplifier is on and receiving mains power.

In the advent of a thermal overload this LED will turn **red** indicating that the internal operating temperature of the amplifier has exceeded a safe level of operation and that the amplifier has shut down. The fans will continue to run and once the amplifier has had a cool-down period the unit will restart, automatically providing inrush current suppression and input muting.

5. Status Indicator

This is a dual colour LED which displays the status of the output stage and displays three levels of operation. These levels are:

Below 1 watt	**(unlit)**
1 watt and above	**(green)**
1dB below actual clipping	**(red)**

The LED will turn **green** once the output voltage exceeds 2.828 volts (1 watt re 8 ohms, or 2 watts re 4 ohms).

The LED will change to **red** once the output exceeds the -1dB point before actual clipping of the amplifier's output stage. The threshold of the -1dB point is with reference to the amplifier supply rails and will alter with changes in the mains supply, changes in the load, and duty cycle fluctuations.

The attack and delay time (ballistics) of the status circuit are those of a Peak Programme Meter (P.P.M.)

If using this indicator to line up sensitivities, apply a steady tone (e.g slate on a mixing console). The 1 watt level is the point when indicator comes on, re 8 ohms, (or 2 watts for 4 ohm loads).

The amplifier is not damaged by running into clipping, but your speakers may be. To maximise the life of your speakers, try to keep clipping infrequent.

Rear Panel

Figure 3 shows layouts of the rear panels; the section numbers refer to areas on the drawing. The functions of the controls and indicators are as follows:

6. Balanced Input

A female 3 pin XLR connector is provided on each input:
Pin 1 = Signal Ground
Pin 2 = Cold (inverting or reverse phase)
Pin 3 = Hot (non-inverting or in phase)

6b Level Control

(Contractor version only)
A rear panel mounted 21 position detented potentiometer is provided on all Contractor models for input level control on each channel.

6c Barrier Strip Input

A three terminal barrier strip connector is provided for 'hard wiring' signal input in permanent situations. This input is parallel with the input XLR.

7. Signal Ground Lift Switch

(C800 & C1200 only)
When this switch is engaged it disconnects signal ground from the input connectors on both channels. It is intended to be used to isolate earth loops (due to different ground potentials between source equipment and the amplifier), or stray magnetic field pick up on the input ground/shield wiring. (It does not interrupt signal ground continuity on the strapping connector). **The amplifier should be turned off before engaging this switch!** Please read the *Hum Problems* information in the *Operation* section of this manual.

8. Binding Post Outputs

Binding posts (banana jacks) are provided for speaker output termination with banana plugs, spade type lugs or bare wire. The red post is used as **positive** and the black post is used as **negative**.

9. Mains Lead Connector I.E.C.

Your amplifier is supplied with a IEC mains lead (power cord) appropriately rated for the mains supply voltage marked on the rear panel of your amplifier. The wires in the mains lead are coloured in accordance with the following code:

BROWN = ACTIVE
BLUE = NEUTRAL
GREEN & YELLOW = EARTH

Your unit must always be earthed!

Note: 110V version are supplied with heavy duty mains lead.

10. Mains Fuses

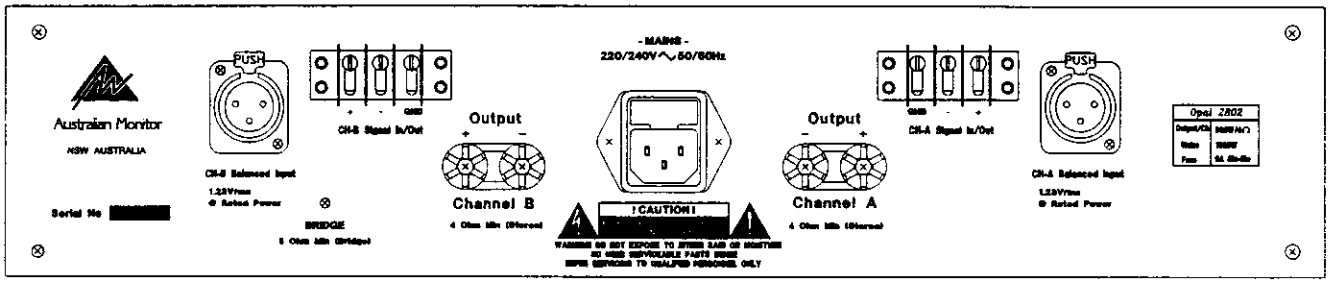
M 205 fast blow type fuses are used in these amplifiers. Fuses need to be replaced with the same type and the value must be as follows:

C300/Opal1202/PA3	3A
C600/Opal2802/PA6	6A
C800	7A
C1200/PA8/PA12	10A

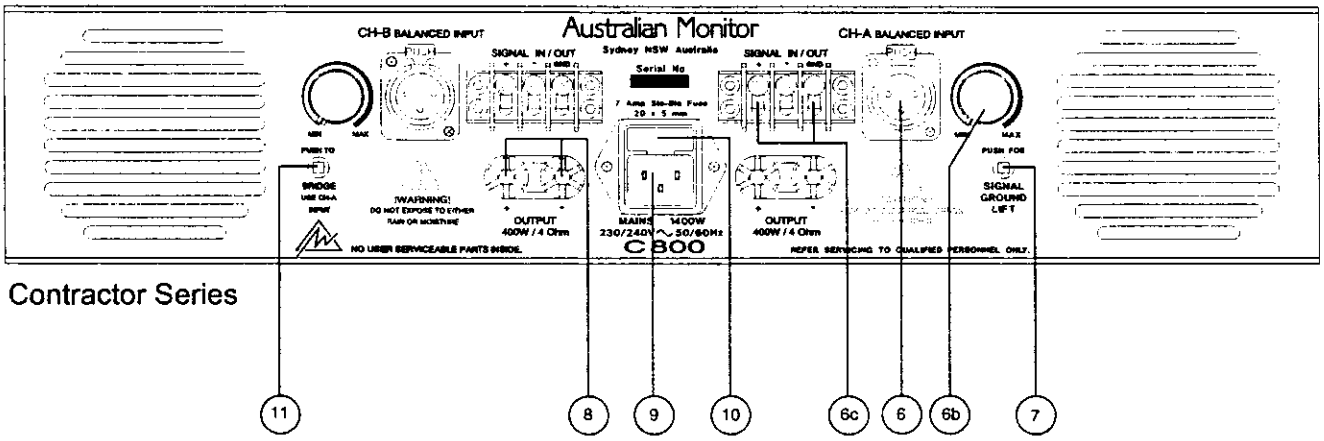
11. Bridge Switch

Pushing this switch **in** engages the BRIDGED/MONO mode of operation. In this mode your amplifier will only accept signal applied to channel A's input XLRs and the level of both channels will be controlled by channel A's attenuator. The output from channel B will automatically be of the opposite polarity (reversed phase) and speaker termination should be sourced from the red binding-post outputs. Please read the *Bridge Mode* section of this manual.

CHA +VE Phase
CHB - VE Phase



Opal & PA Series



Contractor Series

Figure 3 Rear Panel Layouts

3. Installation

Mains Lead Wiring

WARNING
Your amplifier must be earthed at all times!

When you first receive your amplifier it may not have a mains plug attached. You must ensure that an appropriate plug is used. It must correspond with the amplifier's current (ampere) requirements, and meet the approval of your local energy authority.

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

GREEN & YELLOW = EARTH
Connect to the terminal marked with the letter E, with the EARTH SYMBOL, or coloured GREEN.

BLUE = NEUTRAL
Connect to the terminal marked with the letter N, (or colored WHITE in USA and Canada, or coloured BLACK in the United Kingdom).

BROWN = ACTIVE (LIVE)
Connect to the terminal marked with the letter A or L, (or colored BLACK in USA and Canada, or coloured RED in the United Kingdom).

Power Requirements

Ensure that your mains supply voltage is the same as the rear panel mains voltage marker. Each model's power consumption is as follows:

110-120 Volt Models	Amps	Watts at idle	Watts at full power
C300/Opal1202/PA3	6	50	450
C600/Opal2802/PA6	15	100	1000
C800/PA8	15	120	1400
C1200/PA12	20	160	2200

220-240 Volt Models	Amps	Watts at idle	Watts at full power
C300/Opal1202/PA3	3	50	450
C600/Opal2802/PA6	6	100	1000
C800/PA8	7	120	1400
C1200/PA12	10	160	2200

Mounting

Your amplifier is designed for standard 19" rack mounting, and occupies 2 EIA rack units (3.5"). The mounting centers are:
Vertical: 3.0" (76.2mm)
Horizontal: 18.2" to 18.6" (461.2mm to 473.8mm).

The slots in the mounting flange will accept bolt diameters up to 1/4" (6.35mm).

We recommend that you provide additional support for the amplifier, especially if road use is planned, as the amplifier's weight can bend some racks. This support can be provided by secure shelving, support rails, or rear panel support brackets.

Cooling

All amplifiers are cooled by an axial fan which draws cool air from the front of the unit and expels the heated air from the side of the unit. The C800 & C1200 amplifiers expel the heated air from the rear of the unit. Standard units offer speed control fans which are turned on when the output level is above 2 watts into 4 ohms, and stay on while the heatsink is hot. The C800 & C1200 offer two speed fans which normally run at half speed, and switch to full speed when the internal heatsink temperature exceeds 60°C (128°F).

An unrestricted airflow into and out from the unit must be provided. Any restriction of the air flow will cause heat to build up within the unit and possibly force the unit into its thermal shutdown mode.

Input Wiring

NOTE. Input signal ground is not to be used as a safety ground (earth).

The input to your amplifier is a balanced 3-pin system and requires all three pins to be connected. Only high quality twin-core shielded cable should be used.

XLR Inputs

When wiring for a **balanced source** the connector going to the inputs of your amplifier should be wired as follows:

Pin 3 = HOT (non inverting)
Pin 2 = COLD (inverting)
Pin 1 = Ground / Shield

When wiring from an **unbalanced source** you must ensure that pin 2 is connected to pin 1 (input ground), either by linking the pins in the input connector or at the source equipment output wiring. Therefore when wiring for an unbalanced source:

Pin 3 = Hot (in phase with the amplifier's output)
Pin 2 = Connect to pin 1 (Ground/Shield)
Pin 1 = Ground/Shield

Barrier Strip Inputs

The barrier strip connector on the Contractor Series models is wired in parallel with the female XLR input connector as follows:

Pin 3 = +ve (non-inverting)
Pin 2 = -ve (inverting)
Pin 1 = GND (input signal ground)

NOTE. Some in-line XLR connectors have a termination lug that connects directly to the chassis of the connector. Do **not** link this lug to pin 1 at the amplifier's input as it will defeat the amplifier's input grounding scheme.
This lug is often referred to as a 'drain' and is used to provide a circuit to the chassis (not signal ground) for shielding purposes. This is useful when further isolation of signal grounds is required between source and destination, eg to help in reducing earth loop noise, or noise induced into signal grounds from stray magnetic fields.

Output Wiring

When wiring to your speakers always use the largest gauge wire your connector will accept. The longer the speaker lead the greater the losses will be, resulting in reduced power and less damping at the load. We recommend using a heavy duty two core flex (four core flex if bi-amping), 10 to 12 gauge (2mm² to 2.5mm² or 50/0.25 or equivalent) as a minimum.

Binding Post Outputs

When terminating to the 4 mm binding post (banana jack) output connectors, banana plugs or spade type lugs can be used. The red terminal is **positive** and the black terminal is **negative**.

If running in BRIDGE mode, only the **red** binding posts are used. Channel A provides the positive output to the load and channel B provides the negative output to the load.

'Speakon' Outputs

(C800 & C1200 only)

When using the NEUTRIK 'Speakon' (NL4MP) connector for speaker output, use only the mating NEUTRIK NL4FC in-line connector. This connector is designed so that both channels can be fed from a single connector.

Two 'Speakon' connectors are provided on the other amplifier. The channel A 'Speakon' actually carries both channel A & channel B outputs (see figure 4: Speaker Wiring Diagrams). The channel B 'Speakon' carries only the channel B output. This gives you options of connecting outputs separately or together through a single or two connectors.

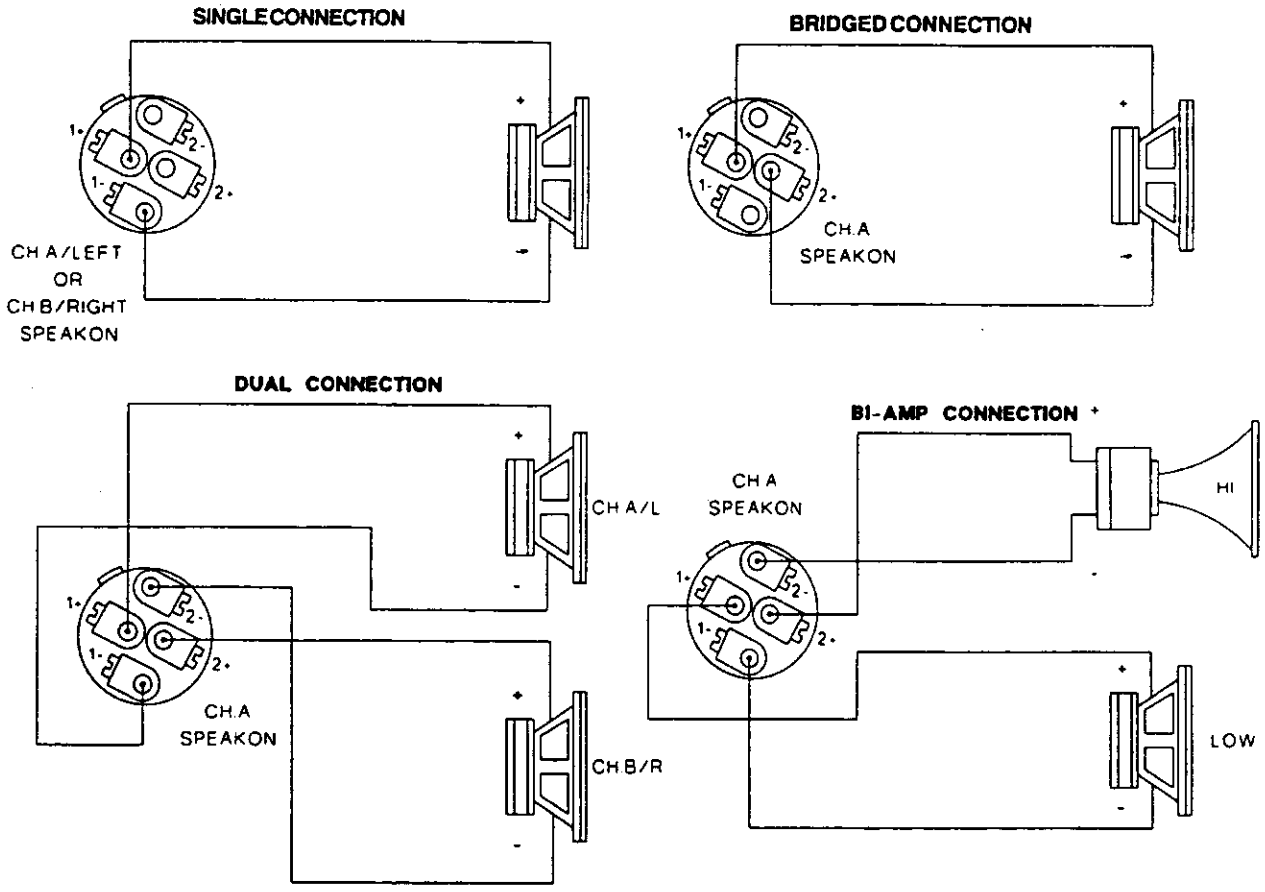


Figure 4 Neutrik 'Speakon' Connector wiring

4. Operation

IMPORTANT
All signal source equipment should be adequately earthed. This not only ensures **your** safety but everybody else's as well. Faults can and do occur in mains connected equipment where the chassis can become 'live' if it is not properly earthed. In these instances the fault in a 'floating' (ungrounded) piece of equipment will look for the shortest path to ground which could possibly be your amplifier's input. If the fault current is large enough it will destroy the input to your amplifier and look for the next available path, which **may be you!**

Before making any connections to your amplifier observe the following:

1. Ensure the mains voltage supply matches the label on the rear panel of your amplifier.
2. Ensure that all system grounds (earths) are connected to a common point. Avoid powering several pieces of equipment from multiple power sources that may be separated by large distances.
3. Check the continuity of all interconnecting leads to your amplifier; ensure that there are no open or short circuited conductors.
4. Ensure that the power handling of your load (speakers) can adequately cope with the power output of the amplifier.

Before operating your amplifier, ensure that:

- the attenuators are at the OFF position (fully anticlockwise).
- the power switch is OFF.
- the GROUND LIFT Switch is not engaged (should be in the 'out' position).
- the BRIDGE Switch is not engaged unless you are running the amplifier in bridged mode.

Powering Up

REMEMBER
The amplifier should be the **last** piece of equipment that you turn **ON,** and the **first** piece of equipment that you turn **OFF.**

We recommend turning the attenuators on your amplifier **down** when turning the unit on.

When you power up, your amplifier goes through an establishment period before it will accept signal. The Inrush Current Supression (ICS) circuit is in operation for the first 0.5 seconds. This limits the mains current to prevent 'nuisance-tripping' of circuit breakers caused by high start-up currents.

The ICS circuit also operates a 30dB input mute. After two seconds this mute will release, allowing any applied input signal to pass unattenuated.

When switching the amplifier **OFF wait** a couple of seconds before switching the unit on again. This allows the ICS circuit to reset.

Level Matching

The normal position for the attenuator is the '0 dB' position (fully clockwise, no attenuation). In this position the amplifier operates at full gain. Turning the attenuator back (anticlockwise) reduces the input sensitivity by the amount marked on the attenuator scale.

NOTE.
If full power output is required you should operate your amplifier with the front panel attenuator above the -15dB position, otherwise clipping of the input circuitry and some resultant distortion will occur before full output power is achieved.

Sensitivity

Your amplifier is a linear device operating with a fixed input-to-output voltage gain. The maximum output voltage swing is determined by: the applied mains voltage, the load, load type, and the duty cycle of the applied signal.

The voltage gain factor of your amplifier is:

C300 / PA3	19.9 x	(or 25dB)
C600 / PA6	29.0 x	(or 27dB)
C800 / PA8	37.0 x	(or 31.36dB)
C1200 / PA12	45.25 x	(or 33.11dB)
Opal 1202	19.9 x	(or 25dB)
Opal 2802	29.0 x	(or 27dB)

The **input sensitivity** for your amplifier when the attenuator is at the '0 dB' attenuation position (fully clockwise) is nominally:
+4.0dB (1.23 volts) for rated power into an 8 ohm load.
+2.6dB (1.04 volts) for rated power into a 4 ohm load.

Each channel of your amplifier has a balanced **input impedance** of 25k Ohms (25,000) and should not present a difficult load for any signal source.

The signal source (i.e. the equipment feeding the amplifier) should have an **output impedance** of 2k Ohms

(2,000) or lower to avoid unwanted high frequency loss in the cabling.

Input overload occurs at +20.5dBu (8.25 volts).

See the specification section for more detailed information.

Hum Problems

Most equipment is designed for minimum hum when used under ideal conditions. When connected to other equipment and to safety earth in an electrically noisy environment problems will often occur.

The three 'E's of hum and hum related noise which can plague your audio system are:

a) Electrostatic radiation,
b) Electromagnetic radiation, and
c) Earth loops

Electrostatic radiation capacitively couples to system elements causing an interference voltage that mainly affects higher impedance paths, such as amplifier inputs. The source is generally a nearby high voltage such as a mains lead or a speaker lead. The problem can usually be reduced by moving the offending lead away, or by providing additional electrostatic shielding (i.e. an earthed conductor which forms a barrier to the field).

Electromagnetic radiation induces interference currents into system elements that mainly effect low impedance paths. Radio transmitters or stray magnetic fields from mains transformers are often the cause of this problem. It is generally more difficult to eliminate this kind of interference, but again, moving the source away or providing a magnetic shield (i.e. a steel shield) should help.

Earth loops can arise from the interfacing of the various pieces of equipment and their connections to safety earth.
This is by far the most common cause of hum, and it occurs when source equipment and the amplifier are plugged into different points along the safety earth and where the safety earth wiring has a current in it. The current flowing through the wire produces a voltage drop due to the wire's resistance. This voltage difference between the amplfier earth and source equipment earth appears to the amplifier's input as an input signal and is amplified as hum.

There are three things you can do to avoid earth loop problems:

1. Ensure your mains power for the audio system is 'quiet' i.e. without equipment on it such as air-conditioning, refrigeration or lighting which will generate noise in the earth circuit.
2. Ensure all equipment within the system shares a common ground or safety earth point. This will reduce the possibility of circulating earth currents, by referencing equipment to the same ground potential.
3. Ensure that balanced signal leads going to the amplifier are connected to earth at one end only.

Signal Ground-Lift Switch

(C800 & C1200 Only)

When proper system hook-up has been carried out, you may still have some hum or hum related noise. This may be due to any of the previously mentioned gremlins.

The Contractor Series amplifiers have a 'Signal Ground Lift' switch which disconnects the input ground wiring from the amplifier. A substantial drop in hum and or hum related noise may result by use of this switch.

Always ensure that your amplifier is **off** and the attenuators are **down** when you engage this switch. This switch should only be used when the amplifier is operated from a **balanced** signal source. Be wary of **quasi-balanced** outputs, these are often no more than floating **unbalanced** outputs.

NOTE
If the input ground lift switch is used, you must ensure adequate shielding of the input wiring. If the signal source equipment does not provide adequate shielding you must disconnect your shield from input connector pin 1 and reconnect it to the 'drain' contact going to the amplifier's input. This will ensure the shield on your input wiring actually goes to the amplifier chassis and subsequently to earth.

5. Bridge Mode

The term BRIDGE is used when two independent amplifier channels are used to drive the same load. The load is in series (a bridge) between outputs of the two amplifier channels.

Channel A is used as the 'dominant' channel and its output is **in phase** with the input signal; channel B is phase reversed so its output is exactly 180° **out of phase** with the input signal.

Using two amplifiers this way with a phase difference of 180° provides a doubling of the voltage and four times the power into the load. The ouput is now an **active balanced output**.

A common use of an amplifier in bridge mode is for driving 70 and 100 volt distribution lines or the amplifier can be used in bridge mode to provide the correct voltage/power requirements for a specific load. Each amplifier can deliver the listed voltage into a load of 8 ohms.

C300 / PA3 / OPAL 1202	35V
C600 / PA6 / OPAL 2802	70V
C800 / PA8	80V
C1200 / PA12	100V

As shown in the diagram there are three steps in setting up your amplifier for running in BRIDGE mode.

Whilst the amplifier is OFF:

1. Connect the signal source to the channel A female input XLR. The channel A attenuator becomes the level control for both channels.
2. Engage the 'push to bridge' switch on the rear of the amplifier.
3. Connect your load between the **red** binding post output terminals, i.e. the **positive** side of the load is connected to the channel A output and the **negative** side of the load goes to the channel B output. There are no further connections required.

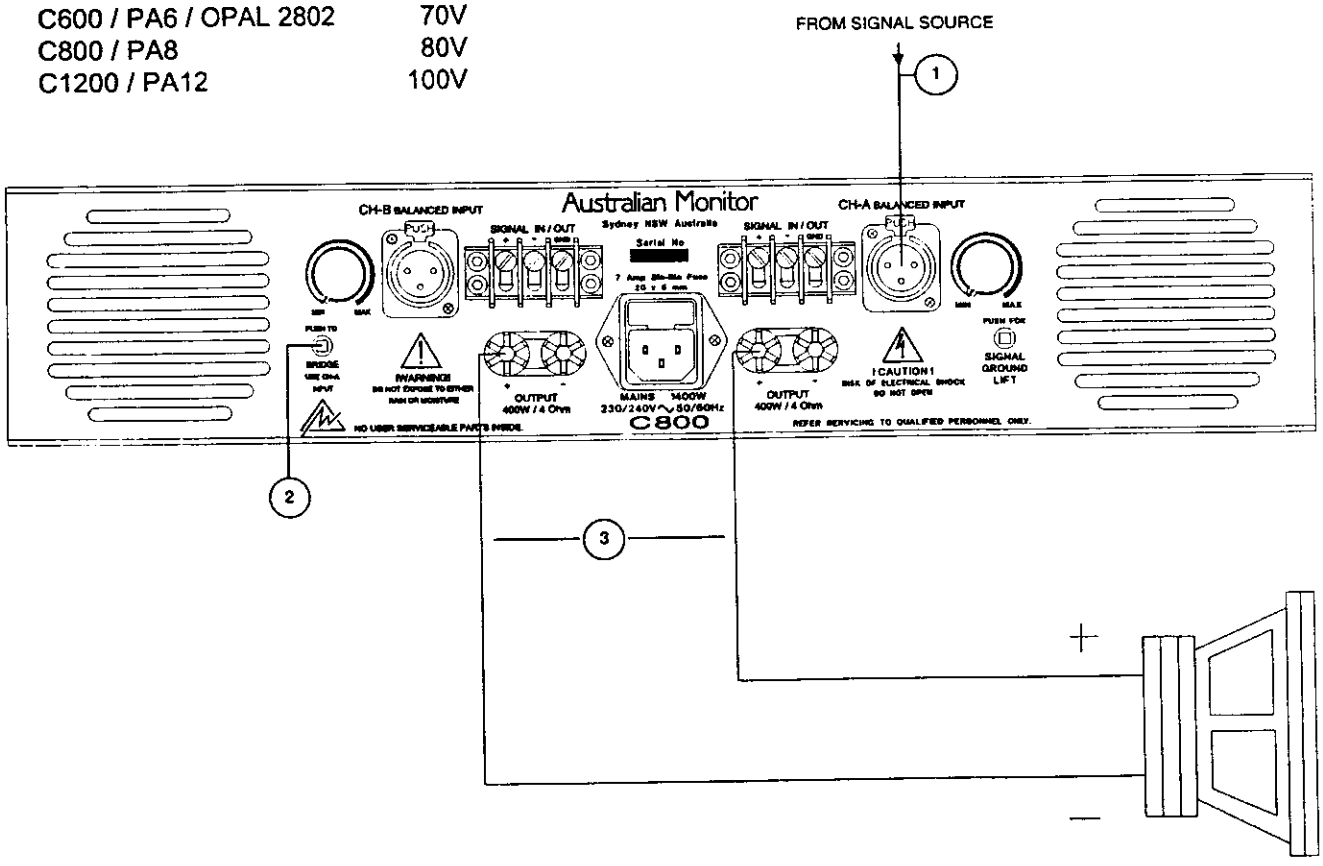


Figure 5 Bridge Mode Speaker Connection (All Models)

6. Load Impedance

NOTE
Ensure adequate ventilation and monitor the FAULT indicators to guard against thermal shutdown when driving two ohm loads.

The load that a loudspeaker presents to an amplifier is very complex and at different frequencies can be inductive, capacitive, resistive or a combination of these. With the complex interaction of these attributes, which alter from loudspeaker to loudspeaker, a definitive load for an amplifier does not really exist.

Loudspeakers operating within an enclosure carry a **nominal** impedance. This nominal impedance is a rough guide only to the actual characteristics of the speaker.

As an example, a loudspeaker with a nominal impedance of say 8 ohms, may have an impedance of over 50 ohms at resonance, drop to less than 6 ohms after the resonance peak and then increase to over 16 ohms for higher frequencies.

A 6 ohm load makes an amplifier work 'harder' than an 8 ohm load at the same voltage, as it requires more current.

Though various loudspeakers may have an equal nominal impedance, some loads are more 'equal' than others (with apologies to G.B. Shaw).

As well as this burden on the amplifier, the transient waveforms found in actual use can demand more current than the 'steady-state' sinewaves used in most amplifier bench tests.

The power output of your amplifier quoted on the specification sheet is derived from voltage excursion into a resistive load for a sine wave at a given frequency. Though this method is in line with the various standards that exist, it only gives an indication of maximum voltage swing (before clipping) for a given load. This method of rating power does not give an indication of the current (Ampere) capability of the amplifier, nor does it show the amplifier's ability to sustain high energy waveforms.

Your amplifier is designed to be able to deliver more than twice the current than that shown on the specification sheet to cope with difficult loads and/or high energy waveforms.

This extra current reserve is the result of over-engineering and is the headroom the amplifier utilizes to control the loudspeaker and deal with the 'reactive energy' from the loudspeaker load that is dissipated within the amplifier.

Your amplifier is able to drive 2 ohm loads or operate in BRIDGE mode into 4 ohms. The operator must be aware that when driving 2 ohm loads or bridged 4 ohm loads that the currents running in the output stage are very large and will cause greater heat build up within the amplifier than higher impedance loads will.

The **front panel fault indicators** can be used to provide an indication of the 'difficulty' of the load and will give the operator an indication of the heat build up in the output stage.

If the Fault LED indicators flash with the Status 'clip' LED, or do not illuminate until well into clipping then the load can be considered as normal or easy.

If the Fault LED indicator starts to flash before the Status 'clip' LED then the load should be considered complex and/or difficult.

For the more complex and/or difficult loads, the illumination of the Fault LED on programme peaks should be interpreted as the **output level limit**. Driving the output continuously past this point could result in muting of the output stage, fuse blowing or premature thermal shutdown.

7. Maintenance

Your amplifier will need minimal maintenance. No internal adjustments need to be made to the unit to maintain optimum performance.

To provide years of unhindered operation we suggest a maintenance inspection be carried out every 12 months or so.

Fuses

WARNING

Make sure the unit is OFF and give the main filter capacitors time to discharge before removing fuses.

The positive and negative rail fuse holders use spring loading to apply force to the contact faces of the 3AG fuse cartridge. The surface around the mechanical contact area of the fuse can be subject to oxidization in some environments. Removing and re-installing the fuse will help renew the contact surface.

You should replace the fuse if the element is **sagging or discoloured**.

When checking for a failed fuse, do not rely on visual inspection alone. You should use an ohmmeter to check continuity.

Fans

Due to the openness of the air path through your amplifier, very little dust should settle within the amplifier. The unit has been designed so that any dust and/or foreign particles that do settle within the amplifier will not unduly hinder the cooling of the unit.

Over time, dust may build up on the leading edge of the fan blades and reduce their cooling efficiency. The time taken for this to happen will depend on the environment and the amount of use.

8. Warranty

Australian Monitor Pty Ltd, of 29 Hope St, Ermington, Sydney, N.S.W. 2115 Australia, warrants the original purchaser of each amplifier (purchased from an authorised Australian Monitor dealer) that it will be free from defects in material and workmanship for the whole warranty period from the original date of purchase.

Australian Monitor will, at its option, repair or replace any unit or component covered by this warranty which becomes defective or malfunctions under normal use and service during the period of this warranty, at no charge for parts or labour to the original owner.

This warranty does not cover blown fuses, faulty fuse contacts, thermal problems due to obstructed airflow, or defects or malfunctions resulting from accidents, misuse, abuse, operation with the incorrect AC voltage, connection to faulty equipment, modification or alteration without prior factory approval or service by unauthorised personnel.

It is the owner's responsibility to ensure that normal maintenance inspections are carried out at regular intervals as recommended in the maintenance section of this manual. Australian Monitor reserves the right to refuse warranty service where the owner fails to take reasonable care in use and maintenance of the amplifier.

To validate this warranty, the original purchaser must complete and mail the warranty registration card to Australian Monitor at the above address within fourteen days of purchase.

To obtain warranty service, the equipment should be shipped to an authorised Australian Monitor dealer or to Australian Monitor at the above address, at the owner's expense.

Units with a defaced serial number will not be accepted for warranty service. Any evidence of alteration, erasure or forgery of purchase receipt will also void this warranty.

Australian Monitor accepts no liability for any consequential damages, whether direct or indirect, arising from the use or misuse of its products.

Australian Monitor reserves the right to alter its designs and specifications at any time without notice or obligation to previous purchasers.

Australian Monitor

WARRANTY REGISTRATION

IMPORTANT

Please complete this card and return it immediately after unpacking the product. This card is to be sent DIRECTLY to Australian Monitor. NOTE! Warranty is effective ONLY upon receipt of this card.

COMPANY _____

NAME _____ **MODEL** _____

ADDRESS _____ **SERIAL Nº** _____

CITY _____ **DATE PURCHASED** _____

STATE _____ **CODE** _____ **COUNTRY** _____

DEALER _____

Ensure that you fill out and send your warranty registration card. Use this copy to record a duplicate of the details.

9. Specifications

Model: C800

Output Power

	Power 8 ohm	Power 4 ohm
F.T.C. 20 Hz - 20 kHz @ 0.1% THD (pre-stress 4dB below rated power for 1 hr & rated power for 5 min) both channels driven	260W	400W
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min) single channel driven	300W	480W
both channels driven	280W	430W
Pulsed @ 1 kHz, at onset of clipping 10% duty cycle, single channel driven		630W
10% duty cycle, both channels driven		600W
Bridge mode	860W	1020W
2 Ohm Capability single channel driven	510W	
both channels driven	500W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.015%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15 dB:	20 Hz - 20 kHz
-3dB:	5 Hz - 95 kHz

Output Impedance

@ 1 kHz — 15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load — 500

Input Impedance

Line to Line, Balanced — 25 kohm

Input Sensitivity

At rated output into 8 ohms	1.2V (+3.8dBu)
At rated output into 4 ohms	1.0V (+2.3dBu)

Input CMRR

@ 1 kHz — >80 dB

Voltage Gain

@ 1 kHz — 31 dB (= 37 x)

Output Rise Time

20 kHz square wave 127Vpp (leading edge) — 2.4 µS

Slew Rate

20 kHz square wave 127Vpp (leading edge) — 42V/µS

Signal / Noise ratio

linear (30 kHz)	100 dB
A weighted	104 dB

Crosstalk

@ 1 kHz — < -90 dB

Weight

net	37.5lb / 17 kg
packed	42.16 lb /20 kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm
including handles	3.5 x 19 x 17.9 inch 88 x 482 x 455 mm

(19 inch EIA rack mounting, 2 units high)

Model: C1200

Output Power

	Power 8 ohm	Power 4 ohm
F.T.C. 20 Hz - 20 kHz @ 0.1% THD (pre-stress 4dB below rated power for 1 hr & rated power for 5 min) both channels driven	390W	560W
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min) single channel driven	430W	700W
both channels driven	400W	605W
Pulsed @ 1 kHz, at onset of clipping 10% duty cycle, single channel driven		930W
10% duty cycle, both channels driven		900W
Bridge mode	1200W	1400W
2 Ohm Capability single channel driven	800W	
both channels driven	700W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.015%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15 dB:	20 Hz - 20 kHz
-3dB:	5 Hz - 95 kHz

Output Impedance

@ 1 kHz — 15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load — 500 (typical)

Input Impedance

Line to Line, Balanced — 25 kohm

Input Sensitivity

At rated output into 8 ohms	1.23V (+4dBu)
At rated output into 4 ohms	1.1V (+3dBu)

Input CMRR

@ 1 kHz — >80 dB

Voltage Gain

@ 1 kHz — 33 dB (= 45 x)

Output Rise Time

20 kHz square wave 145Vpp (leading edge) — 2.4 µS

Slew Rate

20 kHz square wave 145Vpp (leading edge) — 50V/µS

Signal / Noise ratio

linear (30 kHz)	100 dB
A weighted	105 dB

Crosstalk

@ 1 kHz — < -90 dB

Weight

net	42 lb / 19 kg
packed	47.5 lb / 21 kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm
including handles	3.5 x 19 x 17.9 inch 88 x 482 x 455 mm

(19 inch EIA rack mounting, 2 units high)

Model: PA-8

Output Power

	Power 8 ohm	Power 4 ohm
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min)	300W	480W
Pulsed @ 1 kHz, at onset of clipping		
10% duty cycle, single channel driven		630W
10% duty cycle, both channels driven		600W
Bridge mode	860W	1020W
2 Ohm capability		
single channel driven	510W	
both channels driven	500W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.015%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15 dB:	20 Hz - 20 kHz
-3dB:	5 Hz - 95 kHz

Output Impedance

@ 1 kHz	15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load	500 (typical)

Input Impedance

Line to Line, balanced	25k ohm

Input Sensitivity

At rated output into 8 ohms	1.2V (+3.8dBu)
At rated output into 4 ohms	1.0V (+2.3dBu)

Input CMRR

@ 1 kHz	>80 dB

Voltage Gain

@ 1 kHz	31 dB (= 37x)

Output Rise Time

20 kHz square wave 127Vpp (leading edge)	2.4 µS

Slew Rate

20 kHz square wave 127Vpp (leading edge)	42V/µS

Signal / Noise ratio

linear (30 kHz)	100 dB
A weighted	104 dB

Crosstalk

@ 1 kHz	< -90 dB

Weight

net	37.5 lb / 17 kg
packed	42.6lb / 20kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm
including handles	3.5 x 19 x 17.9 inch 88 x 482 x 455 mm

(19 inch EIA rack mounting, 2 units high)

Model: PA - 12

Output Power

	Power 8 ohm	Power 4 ohm
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min)		
single channel driven	430W	700W
both channels driven	400W	605W
Pulsed @ 1 kHz, at onset of clipping		
10% duty cycle, single channel driven		930W
10% duty cycle, both channels driven		900W
Bridge mode	1200W	1400W
2 Ohm capability		
single channel driven	800W	
both channels driven	700W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.015%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15 dB:	20 Hz - 20 kHz
-3dB:	5 Hz - 95 kHz

Output Impedance

@ 1 kHz — 15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load — 500 (typical)

Input Impedance

Line to Line, balanced — 25k ohm

Input Sensitivity

At rated output into 8 ohms	1.23V (+4dBu)
At rated output into 4 ohms	1.1V (+3dBu)

Input CMRR

@ 1 kHz — >80 dB

Voltage Gain

@ 1 kHz — 33 dB (= 45 x)

Output Rise Time

20 kHz square wave 145Vpp (leading edge) — 2.4 µS

Slew Rate

20 kHz square wave 145Vpp (leading edge) — 50V/µS

Signal / Noise ratio

linear (30 kHz)	100 dB
A weighted	105 dB

Crosstalk

@ 1 kHz — < -90 dB

Weight

net	42 lb / 19 kg
packed	47.5lb / 21kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm
including handles	3.5 x 19 x 17.9 inch 88 x 482 x 455 mm

(19 inch EIA rack mounting, 2 units high)

Model: Opal 1202/C300/PA-3

Output Power

	Power 8 ohm	**Power** 4 ohm
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min)		
single channel driven	120W	175W
both channels driven	120W	160W
Bridge Mode	340W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.005%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15dB	20 Hz - 20 kHz
-3dB	5 Hz- 95kHz

Output Impedance

@ 1 kHz — 15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load — 250:1

Input Impedance

Line to Line, Balanced — 25 kohm

Input Sensitivity

At rated output into 8 ohms — 1.23V (+4dBu)

Input CMRR

@ 1 kHz — >81.5dB

Voltage Gain

@ 1 kHz — 28dB (= 19 x)

Output Rise Time

20 kHz square wave 113Vpp (leading edge) — 2.4 µS

Slew Rate

20 kHz square wave 145Vpp (leading edge) — 35V/µS

Signal / Noise ratio

linear (30 kHz)	102 dB
A weighted	104dB

Crosstalk

@ 1 kHz — <-90dB

Weight

net	33 lb / 15kg
packed	37 lb / 17 kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm

(19 inch EIA rack mounting, 2 units high)

Model: Opal 2802/C600/PA-6

Output Power

	Power 8 ohm	Power 4 ohm
E.I.A. 1 kHz, <0.05% THD (pre-stress at rated power for 5 min)		
single channel driven	215W	300W
both channels driven	200W	280W
Bridge Mode	560W	

Distortion

@ 0.5 dB below clipping re 4 ohms

THD @ 1 kHz	<0.005%
IMD SMPTE (60 Hz / 7 kHz 4:1)	<0.015%
IMD CCIF (14 kHz / 15 kHz 1:1)	<0.008%

Frequency Response

-0.5/ -0.15 dB	20 Hz - 20 kHz
-3dB	5 Hz - 95 kHz

Output Impedance

@ 1 kHz — 15 milliohm (typical)

Damping Factor

@ 1 kHz, 8 ohm load — 250:1

Input Impedance

Line to Line, Balanced — 25 kohm

Input Sensitivity

At rated output into 8 ohms — 1.23V (+4dBu)

Input CMRR

@ 1 kHz — >81.5dB

Voltage Gain

@ 1 kHz — 31dB (=37x)

Output Rise Time

20 kHz square wave 113Vpp (leading edge) — 2.4 µS

Slew Rate

20 kHz square wave 145Vpp (leading edge) — 35V/µS

Signal / Noise ratio

linear (30 kHz)	100 dB
A weighted	104dB

Crosstalk

@ 1 kHz — -90dB

Weight

net	33 lb / 15kg
packed	37 lb / 17 kg

Dimensions

	H x W x D
excluding handles	3.5 x 19 x 14.8 inch 88 x 482 x 375 mm

(19 inch EIA rack mounting, 2 units high)