SERVICE INFORMATION

AM1200
POWER AMPLIFIER

CONTENTS:

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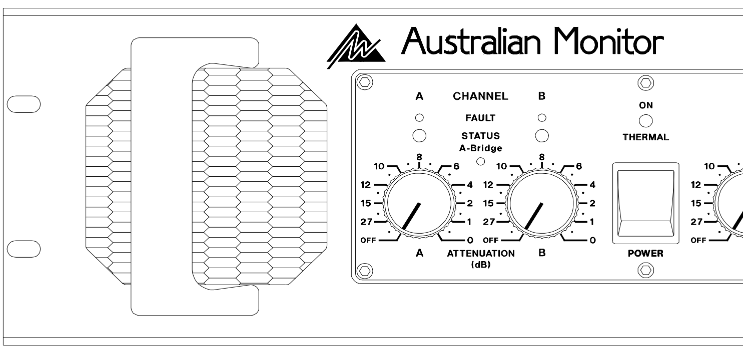
Australian Monit

AM1200



Operation Manual

IMPORTANT!
Please read carefully.

This operation manual contains important information regarding safety precautions, installation, performance, operation and maintenance of your AM1200 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 arrowhead contained within the boundaries of an equilateral triangle is intended to alert the user that dangerous uninsulated voltages may exist within the unit's 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 an 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.
NO USER SERVICEABLE
PARTS INSIDE.

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. 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:

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Features:

- 4, 3 or 2 channel operation.
- Custom designed, 3RU heavy duty alloy chassis.
- Modular construction.
- Symmetrical layout - even weight distribution.
- Linear, well-regulating, high current power supply.
- Dual isolated high current secondaries.
- High efficiency toroidal mains transformer.
- Continuous high power capability.
- Lateral Mosfet Class AB output stage.
- Binding post and Neutrik "Speakon" output connection.
- Input signal strapping (loop through) connectors.
- Active balanced inputs.
- 21 Position detented attenuators.
- Massive heat-sink / heat-exchangers.
- Efficient front to back cooling.
- Dual, twin speed axial fans.
- Front and rear carry handles.
- Front and rear mounting points.
- High-quality, close-tolerance components used throughout.

Protection Features

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

Contents

List of Illustrations

1. Introduction

Congratulations on choosing Australian Monitor for your professional amplification requirements.

The design of your AM1200 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 process, have all been optimized to provide a professional tool that exhibits quality, reliability and longevity.

The AM1200 amplifiers are 3 unit (5.25") tall, 19" wide rack mountable units.

Each channel of the amplifier comprises a balanced active input with an 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.

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.

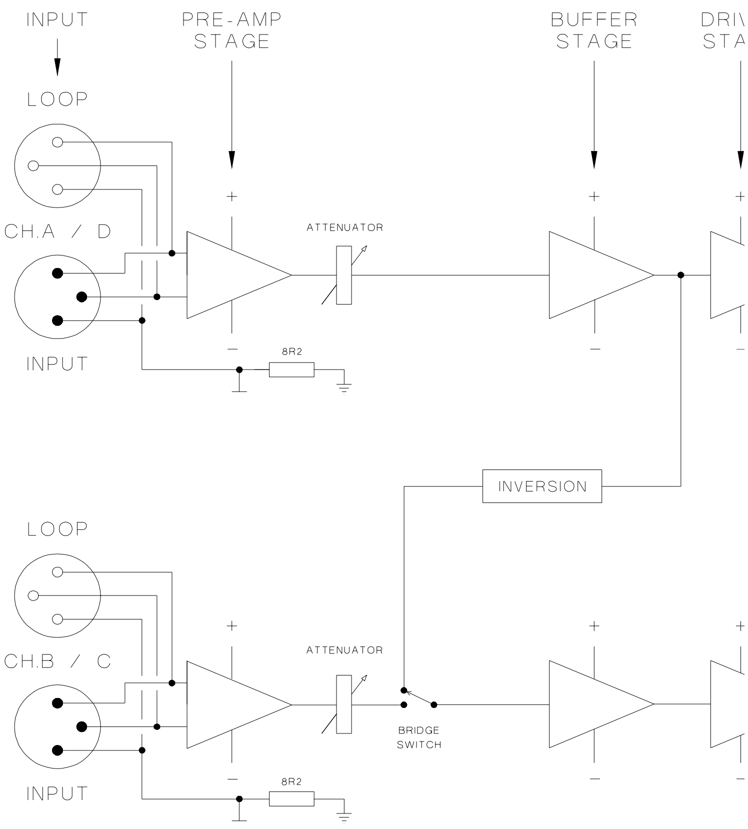

Figure 1 Amplifier Block Diagram

2. Controls, Connectors & Indicators

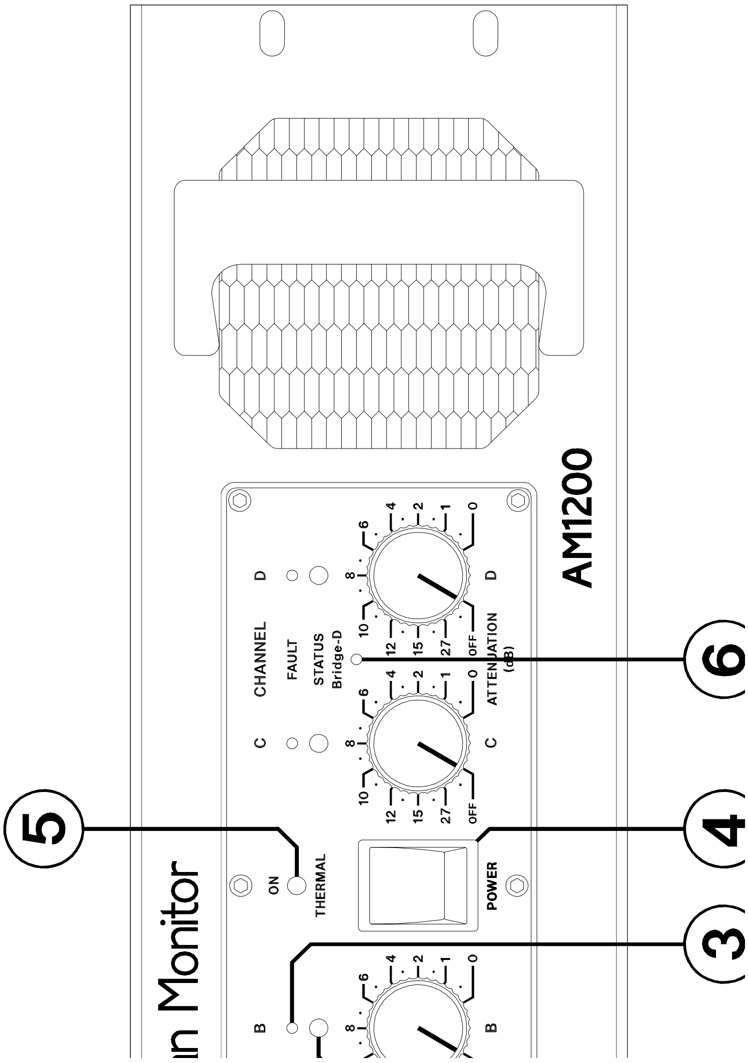

Figure 2 Front Panel Layout

Front Panel

Figure 1 shows the panel layout of the AM1200. The functions of the controls and indicators are as follows:

1. 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).

2. 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 -20dB	(unlit)
-20dB and above	(green)
1dB below actual clipping	(red)

The LED will turn green once the output voltage exceeds the -20dB point (3.5 volts).

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 referred to the amplifier supply rails and alters with changes in the mains supply, changes in the load and duty cycle fluctuations.

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

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

3. Fault Indicator

This amber LED will illuminate when a fault condition exists.

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

If you have 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 (a faint flash).
2. It will indicate and mute the input signal (e.g. shorted output) (brightly flashing or permanently on).

4. Power Switch

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

5. On / Thermal Indicator

When switching the amplifier on, this red LED will momentarily flash **Red**, indicating correct operation of the Mains In-Rush Current Suppression circuit. After establishment of the Inrush Current Suppression circuit the LED will change to **Green** indicating the unit is on and receiving mains power.

In the advent of a thermal overload this LED will illuminate **red** indicating that the internal operating temperature of one or all amplifier channels has exceeded a safe level of operation and the amplifier will be shut down. The fans will continue to run and once the amplifier has cooled down sufficiently, the amplifier will start up automatically providing Inrush Current Suppression and input signal muting until establishment of the amplifier after which it will return to normal operating mode.

NOTE: You should always ensure that the fan grille is kept clean and free from the build up of dust and lint. This will ensure longer operation of your amplifier and reduce the possibility of it prematurely going into thermal shutdown mode.

6. Bridge Mode Indicator

This LED will illuminate yellow when the relative pairs of channels of the amplifier have been selected to operate in a "BRIDGE" mode of operation.

Selection of the bridge mode is accomplished by engaging the rear panel "PUSH TO BRIDGE" Switch.

See section 5 (page 15) for more information on Bridge mode operation.

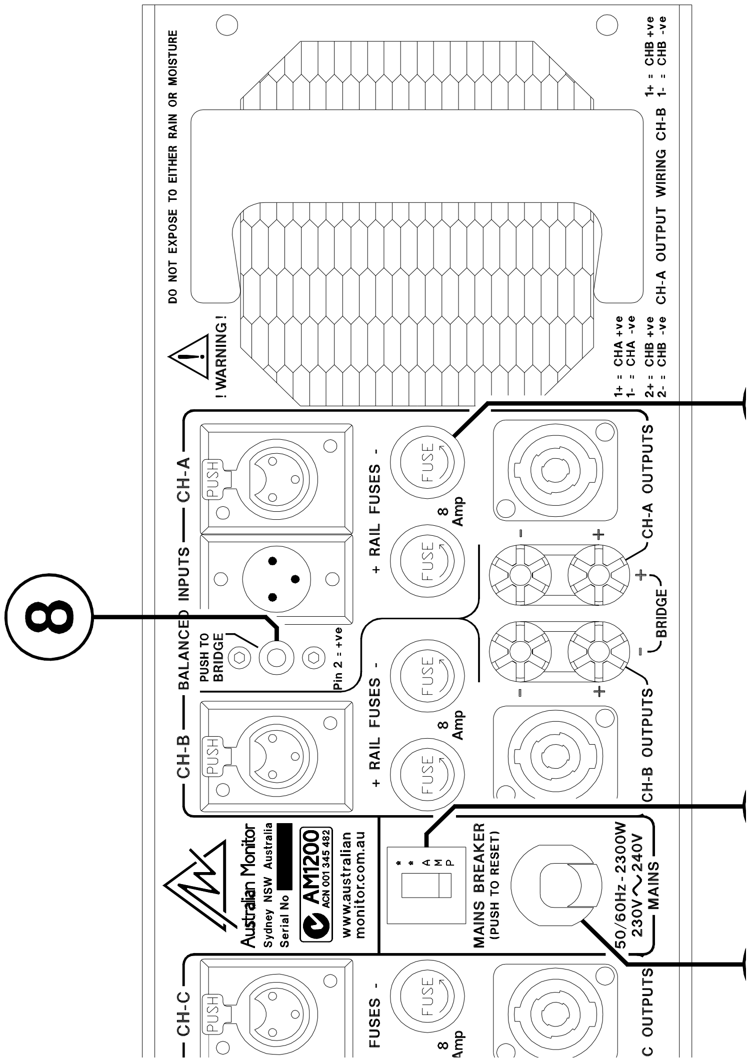

Figure 3   Rear Panel Layout

Rear Panel

7. Balanced Input

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

7a.Signal Strapping

A male 3-pin XL type connector is provided on channels A and D and is wired in parallel with the female input XLR for strapping / looping signal between amplifiers.

8. Bridge Switch

Pushing this switch **in** engages the BRIDGED/ MONO mode of operation for the relative pair of channels. In this mode, your amplifier will only accept signal applied to the Channel-A input XLR (for channels A and B) or signal applied to the Channel-D input XLR (for channels D and C).

Channel-A will now control the level of the A/B bridged pair and **Channel-D** will now control the level of the D/C bridged pair.

Speaker termination should be sourced from the red binding-post outputs.

9. SPEAKON Output Connector

The NEUTRIK (NL4MP) 4 way SPEAKON connector is provided as the main speaker output termination. This emerging standard of loudspeaker to amplifier connection allows access to both channels of the amplifier via the one connector for bi-amp applications. Channel-A (or D) is considered the dominant channel and has both channels wired to the Speakon connector. See the installation section of this manual for detailed information on Speakon wiring.

9a.Binding Post Outputs

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

10.Mains Lead

Your amplifier is supplied with a heavy duty 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 AND YELLOW = EARTH.

! CAUTION !

Your amplifier must always be earthed!

11.Mains Circuit Breaker

A “push to reset” thermal acting circuit breaker is supplied on your amplifier providing overall protection of your amplifier’s power supply and the interconnecting mains. The breaker will isolate the "active" mains conductor in the event of a high current internal fault or in continued overload conditions.

The breaker will not be able to be reset immediately after tripping. A cool down period of around 30 seconds is required before the breaker will reset back into circuit. If the breaker "trips" immediately after a reset, then a fault may have developed within the amplifier.

12.D.C. Rail Fuses

Your AM1200 amplifier is fitted with 8 Amp fuses per rail - per channel, as overload protection for the output stage of your amplifier.

These fuses are in series with the high current supply rails to the amplifier's output stage and will blow when:

1) An internal fault exists;
2) There is a sustained overload;
3) There is a sustained short circuit;
4) Sustained load fault.

Note: The front panel Fault Indicator will illuminate and pulse in sync. with the program source if the negative supply Rail fuse blows.
Distortion will result and the front panel Status LED will illuminate RED if the Positive Rail fuse blows.

Replace only with 8 Amp, 3AG fast acting type fuses.

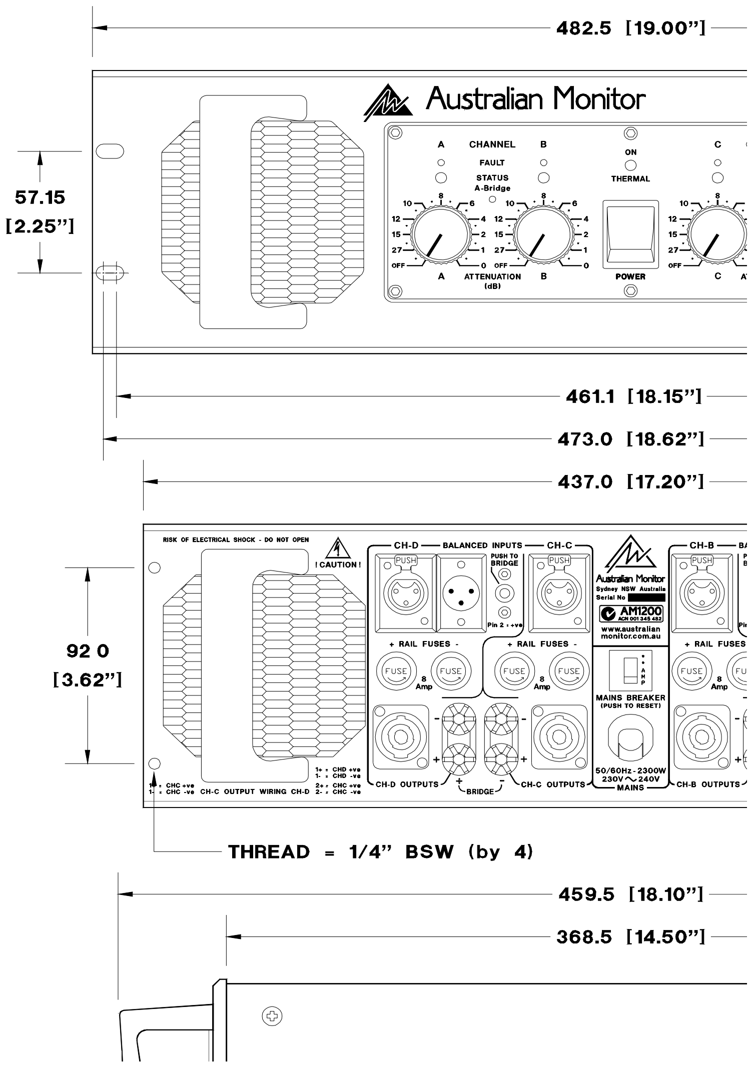

Figure 4 Dimensions

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 and corresponds with the amplifier's current (ampere) requirements and meets the approval of your local energy authority.

Please refer termination of this lead to qualified personnel. Australian Monitor takes no responsibility for any damage or harm resulting from improper termination of this lead!

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

GREEN AND 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 coloured 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 coloured BLACK in USA and Canada or coloured RED in the United Kingdom).

Power Requirements

Mains Voltage	Circuit Breaker Rating
100 to 120 volts	20 Amps
220 to 240 volts	10 Amps

Power Consumption at idle = 250 Watts
Consumption at rated 4 ohm power = 2300 Watts

Ensure that **your** mains voltage is the same as the rear panel mains voltage marker (+/- 10%).

Mounting

Your amplifier is designed for standard 19" rack mounting and occupies 3 EIA rack units (5.25"). The mounting centres are:

Vertical: 2.25" (57.15mm)

Horizontal: 18.15" (461.1mm) to 18.62" (473.0mm).

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 weight can bend some racks otherwise. This support can be provided by secure shelving, support rails or a rear rack mounting strip to match up with the rear rack mount points provided on your amplifier.

Cooling

Each pair of channels in your `AM1200` amplifier is cooled by an axial fan which draws cool air from the front of the unit and expels the heated air via the rear of the unit. These units offer two speed fans which run at half speed, switching to full speed when the internal heatsink temperature exceeds 60^0 C (128^0 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.

If the units are to be operated in an environment where the airflow is restricted such as sealed racks or even when running 2 ohm loads, the cooling should be supplemented by extra cooling fans to evacuate the heated air and aid the flow of cool air through the unit.

Input Wiring

IMPORTANT! Do not directly connect pin 1 on the amplifier's input or strapping XLR, to the amplifier's chassis, speaker ground or power ground!

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.

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

Pin 2 = HOT (In Phase - non inverting).
Pin 3 = COLD (Reverse Phase - inverting).
Pin 1 = GROUND / SHIELD.

When wiring from an unbalanced source you must ensure that pin 3 is connected to pin 1 (input ground), either by linking the pins in the input connector or by the source equipment's output wiring.

When wiring for an unbalanced source:

Pin 2 = HOT (in phase with the amplifier's output),
Pin 3 = GROUND/SHIELD (joins to pin 1).
Pin 1 = GROUND/SHIELD

NOTE: In-line XLR connectors often 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 termination to the chassis for shielding purposes when a floating signal ground is required between the source and destination, or when disconnecting the signal ground is required to reduce 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 ($2mm^2$ to $2.5mm^2$ 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 bare wires can be used. The red terminal is **positive** and the black terminal is **negative** (ground).

If running in BRIDGE mode, only the **red** binding posts are used. Channels A or D provide the positive output to the load and channel B or C provide the negative output to the load.

SPEAKON Outputs

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 sourced from a single connector.

Four SPEAKON connectors are provided on the amplifier. The Channel-A SPEAKON carries both speaker output signals for Channel-A & Channel-B outputs. The Channel-D SPEAKON carries both speaker output signals for Channel-D & Channel-C outputs.

(see *Figure 5*: Speakon Connector Wiring Diagrams).

The Channel-B and Channel-C SPEAKON carry only their own output.

This arrangement allows you the option of connecting to the outputs separately or together. Connecting through a single connector has the advantage of minimising connections, preserving phasing and simplified channel allocation, which is particularly important when **bi-amping** or in **bridge** mode.

IMPORTANT
Do not overload your amplifier by connecting the Channel-B or Channel-C output twice!

Channel-A or D is used as the "dominant" channel and when sourcing a dual output from Channel-A or D the following standard should be used:

Channel-A or D = Left or Low Frequencies.
Channel B or C = Right or High Frequencies.

When in **bridge** mode:
Pin 1+ = Bridge Output Positive
Pin 2+ = Bridge Output Negative.

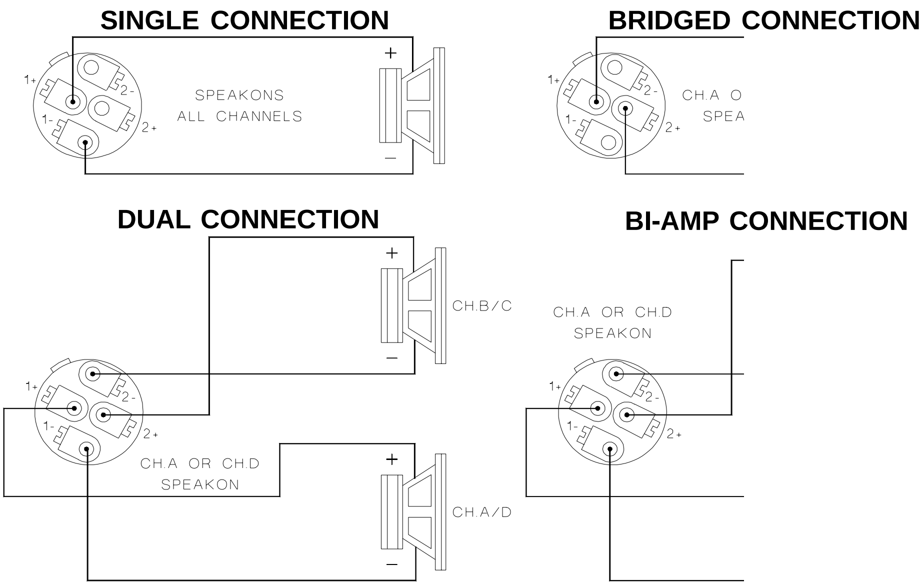

Figure 5. "Speakon" Connector Wiring Diagram

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" (un-grounded) 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 (+/- 10%).
2. Ensure that the power switch is OFF (**UP**)
3. Ensure that all system grounds (earths) are connected from a common point. Avoid powering equipment within a system from multiple power sources that may be separated by large distances.
4. Check the continuity of all interconnecting leads to your amplifier, ensure that there are no open or short circuited conductors.
5. Ensure that the power handling of your load (speakers) can adequately cope with the power output of the amplifier.

Very Important

Due to the high power ability of the AM1200 you need to be aware that certain precautions need to be followed to ensure longevity of your amplifier:

- Never turn your amplifier on unless all connections (inputs and speakers) have been made!

- Never plug in a signal lead after the amplifier has been turned on! Turn the unit off first.

- Never drive the output into clipping if the load is open circuit or there is no speaker load connected!

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, your amplifier goes through an establishment period before it will accept signal. The Inrush Current Suppression (ICS) circuit is in operation for the first 0.5 seconds. This limits the mains current to prevent "nuisance tripping" of circuit breakers.

During this period the THERMAL LED will flash **red** whilst the mains voltage gradually charges up the power supply. You will then hear a relay "click", indicating mains is now directly applied to the amplifier.

While the ICS circuit operates there is also a 30dB mute on the signal input. After two seconds this mute will release, allowing any applied 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 operating 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 (dial).

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 its 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 (less attenuation). The maximum output voltage swing is determined by the applied mains voltage, load, load type and the duty cycle of the applied signal.

The voltage gain factor of your amplifier is: **37 times or 31.4dB.**

The **input sensitivity** for your amplifier when the attenuator is at the "0" dB attenuation position (fully clockwise) is nominally:

+3.0dBu (1.10volts in) for rated power into a 8 ohm load.
+1.6dBu (0.93 volt in) for rated power into a 4 ohm load.

Each channel of your amplifier has a nominal balanced **input impedance** of **18k Ohms** (@1kHz) and should not present a difficult load for any signal source.

Your signal source (i.e. the equipment feeding the amplifier) should have an **output impedance** of 600 Ohms 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 however, 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 lower 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 where the safety earth wiring has a current flowing in it. The current flowing through the wire produces a voltage drop due to the wire’s resistance. This voltage difference between the amp earth and source equipment earth appears to the amplifier's input as a 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 may generate noise in the earth circuit.

2. Ensure all equipment within the system shares a common ground/ safety earth point. This will reduce the possibility of circulating earth currents as the equipment will be referenced 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 Lifting

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.

One of the most effective ways to reduce earth loop or electromagnetically induced hum is to disconnect input signal ground at the input connector of your amplifier. This effectively breaks the earth loop path or open circuits the input ground path so no electromagnetically induced currents can flow through the amplifier.

NOTE: If the input signal ground is lifted you must ensure adequate shielding of the input wiring. If the signal source equipment does not provide adequate shielding (i.e. a definitive connection to ground) you must disconnect the shield from the input connector's ground pin (Pin-1) and reconnect it to the "drain" contact on the input connector. This will ensure the shield on your input wiring actually goes to the amplifier chassis and subsequently to earth.

DO NOT CONNECT PIN-1 DIRECTLY TO THE DRAIN CONNECTION.

You will defeat the amplifiers internal grounding scheme and possibly cause instability to the amplifier.

This should only be done when the amplifier is operated from a **balanced** signal source.
NOTE: Be wary of **quasi-balanced** outputs, these are often no more than floating **unbalanced** outputs.

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 the two amplifier channels.

Channel A is used as the "dominant" channel and its output is **in phase** with the input signal, and channel B has its phase reversed so it is exactly 180^0 **out of phase** with the input signal.

As two amplifiers with a phase difference of 180^0 are now driving the load you will now have double the voltage into the load. This means you will now have four times the power into that load. The output can now be considered as an **active balanced output**.

A common use of an amplifier in BRIDGE mode is for driving 70 volt & 100 volt distribution lines. In BRIDGE mode, The AM1200 can produce over 70 volts with line impedances greater than 8 ohms and over 80 volts with line impedances greater than 16 ohms.

Equally the units can be used in bridge mode to provide the correct voltage/power requirements for an applicable load.

As shown in *Figure 6*, there are three steps in setting up your amplifier for running it in BRIDGE mode. Whilst the amplifier is **off**,

1. Connect the signal source to the Channel-A (or D) female input XLR. The Channel-A (or D) attenuator becomes the level control for both channels.

2. Engage the “push to bridge” switch.

3. Connect your load between the **red** binding post output terminals, where the **positive** side of the load is connected to the channel A (or D) output (marked BRIDGE**+**) and the **negative** side of the load goes to the channel B (or C) output (marked BRIDGE**-**). There are no further connections required.

You can also source the output from the Channel-A (or D) SPEAKON output connector where Channel-A (or D) will be on the pin marked **1+** and Channel-B (or C) will be on the pin marked **2+**.

NOTE: You should check after market manufactured Speakon interconnecting speaker leads before connecting them to your amplifier. Some leads are manufactured for specific purposes, or specific use, and may have pins shorted inside the connector. Any speakon lead with shorted pins will obviously short the output of your amplifier (either to ground, or output to output - be careful).

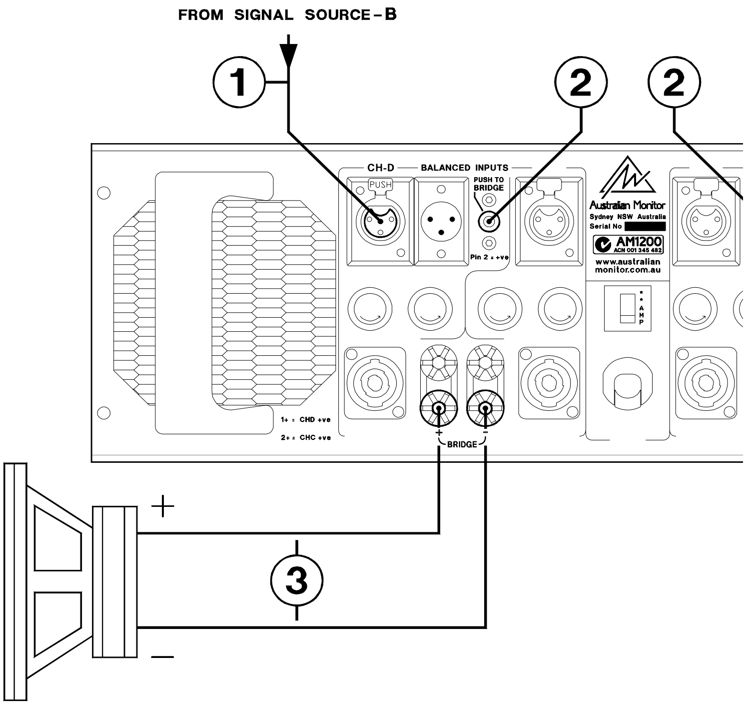

Figure 6   Bridge Mode Speaker Connection

6. Two Ohm or Not Two Ohm

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

A preamble.

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 (reactive). 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 are specified with a **nominal** impedance. This nominal impedance is only a rough guide to the load it presents to an amplifier.

As an example, a loudspeaker with a nominal impedance of say 8 ohms, may have an impedance of over 50 ohms at resonance (bass frequencies), drop to less than 6 ohms after the resonance peak (through its mid band area) and then increase to over 16 ohms for higher frequencies.
A 4 ohm load makes an amplifier work "harder" than an 8 ohm load at the same voltage, as double the current is required.
Though various loudspeakers may be marked with the same nominal impedance, some loads are more difficult than others.
Bass frequencies usually exhibit higher impedances and require higher voltages to achieve the desired result. They also reflect higher energy back to the amplifier simply due to the amount of cone excursion involved at lower frequencies.
The **Mid** frequency band usually offers the lowest impedances and the highest duty cycles requiring both high voltage and high current.
The **High** frequency region usually offers a moderate impedance and usually does not need much voltage but the instantaneous current demand can be much greater than you think.
As well as this burden on the amplifier, the transient waveforms found in actual use can demand a lot more current than the "steady-state" sinewaves used in most amplifier bench tests.

The power output of your AM1200 amplifier quoted on the specification sheet is derived from a 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 to the 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 AM1200 amplifier has been specifically 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 has to be dissipated within the amplifier.

Your AM1200 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.

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 indicators flash with the "clip" LEDs or do not illuminate until well into clipping then the load can be considered as normal or easy.

If the fault indicator starts to flash before the "clip" LEDs 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, breakers tripping or premature thermal shutdown.

The fault detection circuit is also thermally compensated, and fault indication will occur earlier when the unit is hot. If the "fault" LED continually lights earlier than normal, then the unit is heating up. If the signal level is not reduced to compensate for the heating of the unit then thermal shutdown may occur.

7. Maintenance

Your AM1200 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 on a regular basis, say every 12 months or so.

Fans

Due to the openness of the air path through your AM1200 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.

The mesh grille in front of the fans will act to limit the amount of dust and lint entering the unit. You will find in time that there will be a build up of dust and lint on the grille which may start to hinder the airflow through the unit. You should periodically remove the dust and keep the grille clean.

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.

The fan blades are accessible once the lids are removed and can be easily cleaned. You need only hold the fan rotor still and wipe the dust off the blades. Many users **stall** the fan and use compressed air to blow the dust off the fan blades. It is important to note that the fan blades must be held still whilst blowing air over the blades otherwise you may burn out the bearings in the fan.

NOTE:
Make sure the unit is **off** and is unplugged from the mains. Give the main filter capacitors time to discharge before removing lids and inspecting the fans.

Fuses

There are eight (8) rail fuses provided on the back panel of the unit. These rail fuses are in series with the positive and negative output supply to each amplifier channel and provide overall protection for the output stage. If the amplifier is subjected to heavy use such as short circuits, 2 ohm or bridged 4 ohm loads, these fuses will eventually fatigue and may require replacing to ensure they do not fail at an inconvenient time.

You should replace the fuse if the element is **sagging or discoloured.** Only ever replace with the same type fuse and current rating.

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

NOTE:
Make sure the unit is **off** and is unplugged from the mains and give the main filter capacitors time to discharge before replacing fuses.

Only **competent** or **qualified** persons should attempt any service or maintenance of your amplifier!

8. Warranty

Australian Monitor warrants the original purchaser of each AM1200 amplifier (purchased at an authorised Australian Monitor dealer) that it will be free from defects in materials and workmanship for a period of two (2) years 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 thermal problems due to obstructed airflow, or defects or malfunctions resulting from accidents, misuse, abuse, operation with the incorrect AC mains 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 directly to Australian Monitor within fourteen (14) days of purchase.

To obtain warranty service, the equipment should be shipped to an authorised Australian Monitor dealer or direct to Australian Monitor. Freight to Australian Monitor is 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 the 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 Mon

AM-SERIES 2 YEAR 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 ____________________

____________________ DATE PURCHASED ____________

CITY ____________________ DEALER ____________________

STATE ________ CODE ________ COUNTRY ____________________

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

AM1200 Specifications

General

The AM1200 will deliver or exceed - 200 watts RMS into an 8 ohm load - 300 watts RMS into a 4 ohm load - 600 watts RMS bridged into an 8 ohm load *for a single, pair, or all four channels being driven continuously (with less than 0.05% IMD and THD from 1 watt to rated power) from 20Hz to 20kHz.

Output Condition	Output Power		
E.I.A. Power @ 1 kHz, <0.05 % THD+N.	8 ohm	4 ohm	2 ohm
Single channel driven.	220W	370W	450W
All channels driven.	200W	320W	-
Bridge mode @ 1 kHz, <0.05 % THD+N.	16 ohm	8 ohm	4 ohm
Single pair (C & D only)	410W	670W	800W
Both pairs	400W	640W	-
Dynamic Power @ 1 kHz, at onset of clipping,			
20 cycles @ 0dB, 480 cycles @ -20 dB.			
Single channel driven re 4 ohm	410 Watts		
Bridged pair driven re 8 ohm	750 Watts		
Bridged pair driven re 4 ohm	1000 Watts		

Distortion (0.5 dB below clipping re 4 ohms)

THD+N	(@ 1 kHz)	<0.003%
IMD SMPTE	(60 Hz & 7 kHz 4:1)	<0.015%
IMD DIM 30	(3.15kHz square & 15 kHz)	<0.008%

Output Impedance @ 1 kHz

<0.011 ohms

Damping Factor @ 1 kHz re 8 ohms

>720:1

Output Rise Time

<2.2µS
(80%, leading edge of 20kHz square wave)

Slew Rate

>60V per µS
(leading edge, 20kHz square wave @ clipping)

Frequency Response

20 Hz - 20 kHz	< -0.3, -0.15 dB
-3dB points	5 Hz - 140 kHz

Input Impedance

Line to Line (Balanced) 18k ohms

Input Sensitivity (nominally)

For rated power re 8 ohm	1.10 Vrms (+3.0 dBu)
For rated power re 4 ohm	0.92 Vrms (+1.5 dBu)

Voltage Gain

37 times (31.4 dB)

Input CMRR

@ 1 kHz (re 8 ohm rating) >90 dB

Signal / Noise ratio

"A" weighted (re 8 ohm rating) >101 dB

Crosstalk

@ 1 kHz (re 8 ohm rating) >90 dB

Weight

Net 57.2 lb (26kg), Shipping 63.8lb (29kg)

Dimensions

	H		W		D	
excluding handles	133	x	483	x	375	(mm)
including handles	133	x	483	x	460	(mm)

(19 inch EIA rack mounting, 3 units high)

Test conditions

Input source = 600 ohm, Balanced and ground referenced (CMRR test had floating ground & 50 ohm source). Mains regulated to 240 volts / 50hz. All measurements taken at binding post output terminals. Standard production units measured. No compensation applied.

Australian Monitor

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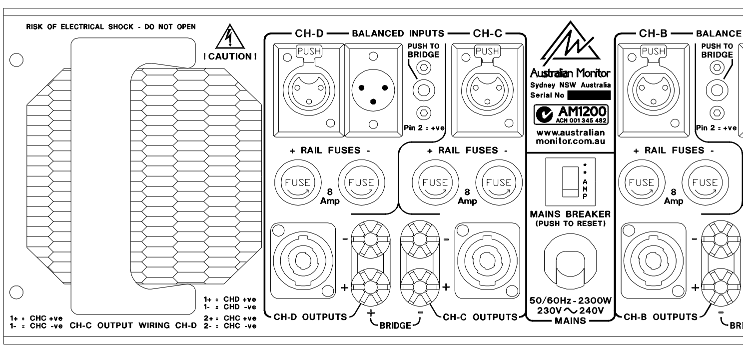

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SPECIFICATIONS	MODEL : AM1200
OUTPUT POWER Continuous @ 1 kHz. re 0.05% T.H.D. Single Ch. 8 Ohm Both Ch. 8 Ohm Single Ch. 4 Ohm Both Ch. 4 Ohm	220 W 200 W 370 W 320 W
2 OHM OUTPUT CAPABILITY @ 1 kHz./ 0.05% T.H.D. Single Ch. Both Ch.	450 W(D) 420 W(C+D)
BRIDGED OUTPUT POWER @ 1 kHz./ 0.05% T.H.D. 8 Ohm 4 Ohm	670 W 800 W(C+D)
DYNAMIC POWER @ 1 kHz. 4 Ohm 20 Cycles 0dB / 480 Cycles -20dB	410 W 750 8R Bridged 1000 4R Brdged
INPUT SENSITIVITY - for Rated Power @ 4 Ohm	0.92V/+1.5dBu
DAMPING FACTOR @ 1kHz. re 8 Ohm @ 20kHz. re 8 Ohm	>700:1 >200:1
SLEW RATE (Includes all Filters) @ 8 Ohm RISE TIME Both measured Leading Edge of 20 kHz. Square Wave just below Clipping.	60V/uS 2.2uS @ 120V pk-pk
INPUT IMPEDANCE balanced @ 1kHz.	18k Ohms
VOLTAGE GAIN @ 1kHz.	37X/31.4dB
SIGNAL TO NOISE re Rated Power @ 4 Ohm No Attenuation, A-Weighted.	100dB
T.H.D.+ N @ 1kHz. @ Rated Power	< 0.003%
INTERMODULATION DISTORTION S.M.P.T.E. 60Hz. & 7kHz./ 4:1 C.C.I.F. 14kHz. & 15kHz./ 1:1	< 0.015% < 0.01 %
INPUT C.M.R.R. @ 1kHz.	> 90dB
CHANNEL SEPARATION @ 1kHz.	**> 90dB**
FREQUENCY RESPONSE 20Hz.- 20kHz. re Rated Power 4 Ohm 1kHz. 0dB Ref. POWER BANDWIDTH -3dB Points	-0.3dB/0.15dB 5Hz.- 140kHz.
INPUT OVERLOAD	8.33V/+20.6dBu
DIMENSIONS Height Width Depth excl. Handles Depth incl. Handles	133mm 482mm 375mm 460mm
NET WEIGHT - Shipping weight add 3 kgs.	26 kgs

COMPONENT DESCRIPTIONS:

RESISTORS:

1/2 WATT
All half watt resistors used are 1% metal film, with temperature stability coefficient of 50 parts per million, per degrees celcuis. They are chosen from a E96 Series where -96 values per decade are available and thus some variations in circuit diagram to actual values may be encountered eg: 100R on Diagram, 102R on Board. 220K on Diagram, 221K on Board.
A 6 band colour code is used where the 4th band is the multiplier, the 5th band is the tolerance and the 6th band is the temperature coefficient. The easiest way to orientate the colour code is to have brown then red on your right (Tolerance 1% - then Temp 'Co' 50ppm).

1 WATT
All 1 watt resistors are metal oxide film type with a tolerance of 2%. They have a green lacquer body and the normally encountered colour coding.

2 WATT
As above but value and tolerance are printed on body eg: 4R7 2%.

5 WATT
The 5 watt power resistors are a fire-proof wire wound type of 10% tolerance - value is printed on body.

10 WATT
As above.

50 WATT
The resistance element is a copper-nickel alloy on an aluminia ceramic core and encapsulated within an aluminium body. Value and tolerance is printed on body.

CAPACITORS:

As capacitors have been chosen for various design requirements and to make use of their characteristics, it is important that they are replaced with the same type.
The Parts List contains the codes for the different types. These are as follows:

PINK - MKC = METALIZED FILM WITH A POLYCARBONATE DIELECTRIC
BLUE - MKP = METALIZED FILM WITH A POLYPROPYLENE DIELECTRIC
BLUE - KP = FILM/FOIL WITH A POLYPROPYLENE DIELECTRIC
GREEN - KT = FILM/FOIL WITH A POLYESTER DIELECTRIC
GREEN - MKT = METALIZED FILM WITH A POLYESTER DIELECTRIC
BROWN - POLYESTER FILM

(cont)

All ceramic capacitors are 100 volt rating or higher.
Electrolytic capacitors should be replaced with original types.
All other components if needing replacement should be replaced with same type and manufacturer.

MAINS INPUT:
MAINS LEAD: 15 Amp, heavy duty insulation for all 240v / 220v units.

BROWN = ACTIVE/switched (Quick connect to mains breaker)
BLUE = NEUTRAL/direct (Quick Connect to Slow Start board)
GREEN/YELLOW = EARTH/permanently connected to chassis.

MAINS BREAKER:
This is a thermal device which is fairly tolerant of short term peak currents exceeding nominal rating. It is tamper proof and may only be manually re-set.

MAINS SWITCH;
Switches the Active only.It is rated at 240V/15A resistive and 1/4 H.P.

90Deg.C/100Deg.C THERMAL SENSORS:
These are normally closed devices which interrupt the mains supply when the area of the Heatsinks on which they are mounted exceeds 100 Deg.C (Ch.C&D) and 90 Deg.C (Ch.A&B). They will automatically reset @ 70 Deg.C.

THERMAL SENSORS:
Normally opened devices are used to sense Heatsink temperature for Dual-Speed Fan operation. They are wired in parallel with two 3K3 10W resistors. Once heatsink temperature exceeds 60 Deg.C their contacts close, providing full mains potential to the fans for high speed operation. They will not open again until heatsink temperature falls below 40 Deg.C.

FANS:
Fans are 115v Rated and are series wired for 240/220v operation or parallel wired for 110v operation.

CURRENT INRUSH SUPPRESSION:
Current Inrush Suppression is referred to throughout this manual as "SLOW START". A power resistor shunted by a Triac and associated snubber network is in series with the mains input and the Toroidal Power Transformer Primary. This network limits the inrush current to a safe level, avoiding stress on power supply components. It also prevents excessive arcing and possible fusing of contacts, when actuated, due to a fault condition. Approximately 1 second after turn on, the Relay operates, enabling the gate of Triac. The slow start network is bypassed when the Triac conducts and mains is directly applied to the transformer. The relay coil supply is half wave rectified and the coil voltage is clamped via a 20 volt zener diode and filtered by a 220uF capacitor.
The front panel thermal led is also used to indicate proper functioning of the slow start circuit ie: it is illuminated RED momentarilly at turn on and then illuminates GREEN.

(cont.)

Fault condition or status of the slow start circuitry can be partially determined by the thermal led.
If there is no momentary illumination of the thermal led at turn on and the mains switch has had its contacts shorted together, it is possible the triac is defective (short), or the relay has remained latched.
If the thermal LED does not estinguish after turn on and flashes in time with the Programme Source - then failure of the Triac and associated components could have resulted. TURN OFF IMMEDIATELY as the slow start resistor is carrying the load and will eventually be destroyed. Turn Ch. A,B,C and D Bias Trim-Pots fully C.C.W. and follow the Test Procedures outlined in this manual.

NOTE: In the event of all amplifier service, one should remember that mains voltages below 60% nominal (eg: if using a Variac) will allow the slow start resistor to limit Transformer Primary current. Continuous rating of the Slo-Start Resistor may be exceeded if a fault exists. Short out RS1 if this occurs.

THERMAL FAULTS:
Thermal faults normally occur when airflow through the unit has been restricted. This is due to particle build up on the fan grills (front external - rear internal) or a failed fan. Oscillation (Full Power) or a solid short (internally or on the speaker lines) could also be responsible.

OVERCURRENT FAULTS:
The Mains Breaker will trip when internal faults occur such as a shorted turn on the mains transformer or a failed power electrolytic capacitor etc... Extreme levels of operation into "LOW" impedance loads, for extended periods and at elevated ambient temperatures, may also cause the breaker to trip.

POWER SUPPLY:
The heart of the power supply is a CUSTOM TOROIDAL TRANSFORMER. These transformers have low regulation and minimal temperature rise for their VA rating.
All transformers have 3 primaries of 110v + 110v + 20v for 110v, 220v and 240v operation. Units will tolerate a +10%/-15% mains variation and **thus final power output before clipping will vary accordingly.**
Each transformer has two high current secondary windings for the output supplies and two step- up windings which are wired in series with the high current secondary windings to create supplies for the DRIVE BOARD CIRCUITRY. Channel A&B and C&D are thus fed from independent windings. Separate windings are also provided for the PRE-AMP CIRCUITRY.
All centre taps are referenced to the circuit ground via busses between the power electrolytics. All speaker returns, driver and pre-amp supplies are also referenced to this point.

The bridge rectifiers for the output supplies are mounted on a heat sink which is located below the Slo-Start Board. Rectification and filtering for the drive supplies are located on the Slo-Start and Driver Boards respectively.

RAIL FUSES

Output supplies, both positive and negative and for each channel are conected via fuses before termination at each output stage. These are provided as protection for the output supply and output stage should a fault occur. They are also provided to isolate channels when undertaking repairs or to isolate a bad channel when continued use of the other channel is required.

Loss of a negative supply fuse is indicated by fault leds located on the front panel. (Note: This requires signal to be present).

GROUNDING

Single Point Ground and Ground Reference is used in all models.
MAINS EARTH is terminated at the chassis.
CIRCUIT GROUND is referenced to chassis/earth.
All other grounds return to the circuit ground at the buss bar between the main POWER ELECTROLYTIC CAPACITORS.

Note: INPUT SIGNAL GROUND does not return directly to circuit ground. Due to the nature of HIGH GROUND RETURN CURRENTS, the power amp input ground does not like to see the same ground impedance that the main amp does! Input signal ground is connected to the circuit ground via a 8R2 5W resistor. This resistor swamps any input potentials that are above signal ground and also prevents instability and possible oscillation if the output ground is inadvertantely linked to the signal ground.

The external signal source ground (though usually returning to mains earth) has enough resistance not to cause a problem. INPUT GROUNDS should not be connected directly to the chassis as is possible through the body (shell) of the input XLR Connectors.

The AM1200 may be used without the input ground connected if grounding problems occur. The shield of the input cable should then be grounded at the source.

The input grounding scheme has been adopted so that any circulating currents (due to multiple signal source grounds entering the unit) may be controlled. A bucking wire is also incorporated to neutralise induced hum currents due to the transformer field.

GROUNDING FAULTS:

Grounding faults are created when input source grounds are referenced back to an earth that is at a different potential to the power amp earth. This difference appears across the 8R2/5 watt resistor between input ground and circuit ground and consequently gets amplified as hum. If the potential difference is great enough this resistor can be destroyed along with associated circuitry. Signal source equipment must be earthed to the same earth as the power amplifier. Power amplifiers and signal source equipment should never have their power grounds lifted. If a fault occurs and the power ground is no longer connected, fault current will find a path to earth via a signal ground. Protection from electrocution requires a solid SAFETY EARTH so that sufficient fault current can trip Circuit Breakers. Fault leakage currents lower than 100mA can cause heart fibrilation but not be sufficient to trip protection devices.

PRE-AMP CIRCUITRY

INPUT CIRCUIT:

AM1200 amplifiers are provided with active balanced input circuits utilising differential op amps. D.C. blocking caps are provided at the input and over voltage and reverse biasing protection of the input stage is provided by shunting fault voltages to the pre-amp supply via diodes. High frequency compensation and roll off are also provided for stability and R.F. suppression.
A potentiometer is provided (+input to ground) for balancing gain for best C.M.R. results, typically better than; 100db/100hz, 90db/1khz, 60db/20khz, when driven from a low impedance source (less than 1kohm).
The output of each Differential Amplifier incorporates a 100ohm resistor for isolating wiring and P.C.B. capacitance and limiting currents in the case of a shorted load.

ATTENUATORS:

A 21 pos detented 50k linear potentiometer is used as a passive voltage divider between the buffer amplifier output and the main amplifier input. A 68k resistor is used to modify the law of the pot.
The attenuator is isolated from the main amp by a unity gain voltage follower to provide a constant source impedance for the power amplifier input stage thus maintaining constant rise time and frequency response characteristics, independant of attenuator position. Again series resistors are provided after the buffer for load protection and capacitance isolation.

BRIDGE CIRCUITRY:

The attenuator buffer amplifiers on Channels B & C also double as phase inverters for bridged operation. The op amps are switched from a voltage follower to a unity gain inverter by means of the associated wiring and rear panel Bridge Mode switches. A 3K4 resistor from the output of Channel A (D) is fed to the inverting input of the Channel B (C) buffer. The applied signal sees a virtual earth when the buffer is configured as a voltage follower and is effectively shorted out. Once the bridge switch is engaged, the output of the Channel B (C) input stage is grounded and the feed back path around the Channel B (C) buffer is enabled allowing the signal applied from the output of the Channel A (D) **buffer to be inverted and amplified. Channel A & D attenuators now control both bridged channels and any output from the Channel B & C input stages are grounded.**

Input muting is provided to reduce the Amplitude or Amplification of "Turn On" transients from the pre-amp section and any signal source equipment that is turned on at the same time as the power amps. A 2N4391 J-FET (referred to us as the "MUTE FET") is basically used as a voltage controlled resistor. With no voltage applied to its gate it will appear as a short. Once a potential difference between its gate and drain exceeds -4 to -5 volts it can be considered open circuit.
At turn on the FET shorts out signal to the base of the power amp's input transistor pair. It must be noted that the FET does not appear as a "dead" short and thus some signal is passed, attenuation is approximately 30db.

(cont)

A timing circuit is set up to "trickle" the voltage to the gate of the FET via a 1M resistsor and a 2.2uF tantalum capacitator, taking approximately 1.5 to 2 seconds before the required 4 to 5 volts is established for the FET to unmute the signal. (14 to 15 volts is the final applied voltage)
At "Turn Off" a diode acts as a one way shunt to short circuit/discharge the 2.2uF tantalum via a 3K4 resistor to ground.

MUTING FAULTS:
If the muting circuit fails - the input signal is normally attenuated, due to a failed FET or associated circuitry. This can be verified by checking the voltage at the gate of the FET (-15v). FETs normally fail gate to drain and or source.

FAULT DETECT/SHORT CIRCUIT PROTECTION
A Fault Detect Circuit is incorporated in each amplifier which senses a fault condition and provides fault indication and in conjunction with the input mute circuitry provides signal attenuation in the case of a short circuit.
A transistor is used to sense the gate source voltage difference of the P-channel mosfet output devices. Once this exceeds a safe level the circuit then discharges the voltage at the gate of the mute FET thus attenuating/muting the input signal. The circuit is compensated for frequency drive differences and inherently compensates for temperature changes ie: as the output stage heats up the SAFE OPERATING AREA lowers and the fault detect circuit becomes more sensetive. A PNP transistor sits between the fault detect circuit and the mute circuit. It is used to discharge the mute voltage and to forward bias the FAULT LED. The circuit is able to indicate "low load" and "gross overload" without affecting or muting the signal. This is done by making use of the "excess" voltage between the 4 to 5 volts required to unmute the FET and the -14 to -15 volts that is applied. Loss of a negative rail due to a blown fuse will also enable the fault led but will mute the signal.
In normal operation, the circuit swings with the drive and speaker voltage and is virtually invisible to the main signal path. It is also compensated to allow transients to pass which could be interpreted as required signal, or load demands. In the case of a short circuit the amplifier tries to drive the load, resulting currents cause a gate **drive/source speaker difference which is detected by the fault circuit and in turn mutes the input signal - signal is not applied to the amp for 1 to 2 seconds after which the process is repeated.** To verify correct operation of the circuit the negative rail fuse is removed whilst running amp at full output into a 4ohm load - the frequency applied should be switched from 20Hz to 200Hz to 2KHz to 20KHz and the FAULT LED should be brightly illuminated. Then switch to 200KHz and the LED should momentarily extinguish then re-illuminate.

STATUS INDICATION:
A dual bi-colour led is used to indicate 3 output levels. The led is extinguished for output levels below -20dB, turning green for levels above -20dB and finally turning red when the output is 1dB below cliping.
The -1dB indicator has a floating threshold which compensates for Mains Power fluctuations and Duty Cycle of the Output Stage.
The circuit utilises comparators which have uncomitted collectors at their outputs. The outputs are connected via 3K4 resistors to the status circuit supply as well as connecting to either side of the dual led. The green led comparator reference is +0.52 V and the comparator will switch (active low) when the halfwave rectified input signal voltage mathches the reference. The threshold for the red led comparator is factory set via a 2K trim pot. Signal is provided to both comparators via a divider, rectifier and filter whose response (ballistics) correspond to P.P.M. (Peak Program Meter) characteristics. Both comparators are provided with Hysterisis (positive feedback) to give control/stability during switching. When the input signal exceeds the green leds threshold the output of its comparator goes "low" causing current to flow forward through the green led. When the input rises and exceeds the threshold of the red leds comparator, it goes low, this also pulls down the base of P.N.P. transistor forcing it into conduction which in turn pulls up the green leds comparator threshold above signal and goes high allowing forward bias of the red led.
Note: Due to the red/-1db led comparator being referenced to the output supply rail - there is a transition period between red and green. This is due to the saw tooth (charge - discharge) ripple on the supply altering the threshold. The transition occurs between -1.5 to -1db. (ie: green + red together).

STATUS FAULTS:
If the red led fails to illuminaten or goess dull once into the clipping region then it is possible the "pull up" transistor for the green led comparator is not conducting.

POWER AMP
The amplifier has a single ended input which is converted to a complementary signal, via a current mirror driving a source follower **output stage, with overall negative feedback applied. The Main Amp has a gain of 39.3 (31.9dB) as established by the feedback divider resistors.** Due to the fact that the mosfet output stage operates at less that unity voltage gain and that more drive is required as frequency rises and the load lowers, elevated drive supply rails are provided to give ample head room. This ensures that saturation of the output stage occurs before the drive stage, for greater efficiency and the most effective use of correctional gain.

MAIN AMP FAULTS:
The diagrams showing relevant voltages and currents are a quick guide to localising any fault that may occur. Current values are provided so as the repairer can verify current drain of relevant sections.

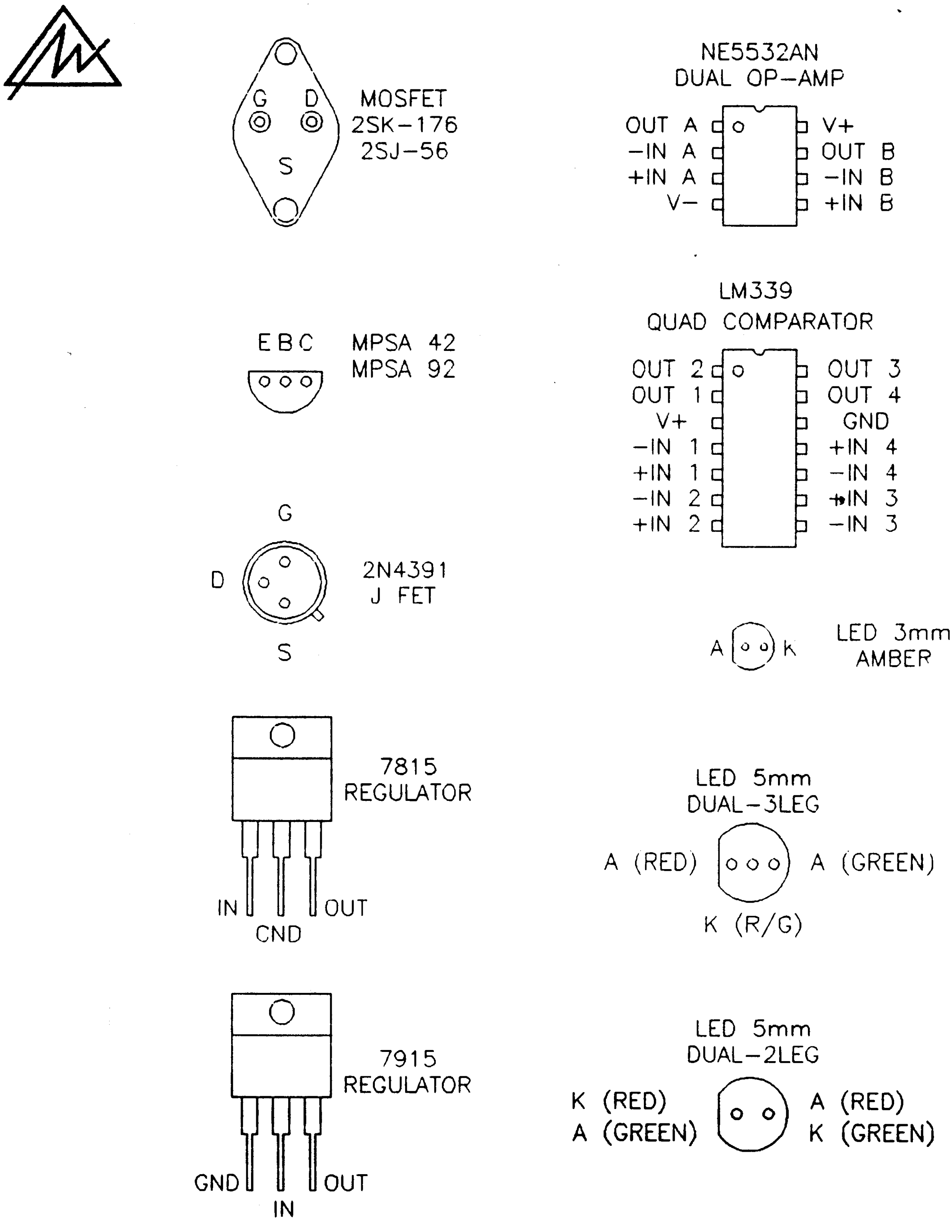
FAILED MOSFETS:
Symptoms of a failed mosfet are usually heard as distortion or D.C. on the output which may blow a fuse or be heard as a nasty high level hum. Waveforms on an oscilloscope could vary from pre-mature clipping of either positive or negative going halves of the waveform to steps or gaps in the trailing edge of each cycle. Distortion rise and an inability to achieve full power are also possible pointers to a degraded or failed fet.
Removal of a suspect mosfet output device is usually not required to verify a failed device. Though the drains and the source are in parallel the gates are resistively separated and 90% of the time are the fault.

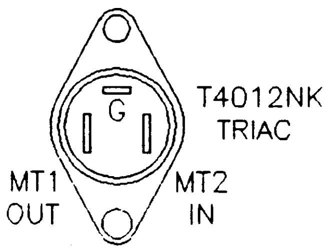
Normally, fault conditions that may destroy a fet are due to oscillations, and in most cases the gate fails. This is quite easy to find by using a multimeter. GATE TO DRAIN and GATE TO SOURCE should measure open circuit (at least 2 meg) if you read lower that 100k say 5k to 10k then the device has failed. One should verify the fault first before replacement of the device. This can be done by removing the gate resistor (220R) to the offending device and power up the unit. If you have correctly located the defective device the amp should now work.

DRAIN SOURCE FAULTS are rare and are ususlly caused by an inferior device due to a manufacturing defect. They are typified by D.C. on the output, and all the devices may need to be removed to find the offender if there is no indication through the gates. Mosfets are prone to damage caused by electroststic discharge. Ensure that a conductive plastic wrist strap is worn at all times when handling and installing replacement devices.

AM1200 TEST EQUIPMENT REQUIREMENTS :

1. A.C. VARIAC / 28A.
2. A.C. AMMETER / 30A.
3. A.C. VOLTMETER.
4. 20MHz.DUAL BEAM OSCILLOSCOPE.
5. D.M.M./20kHz BANDWIDTH.
6. LOW DISTORTION AUDIO SINE/SQUARE WAVE OSCILLATOR.
7. AUDIO DISTORTION & NOISE METER.
8. 4 OHM 1000W. DUMMY LOAD (X4) - NON INDUCTIVE.
9. MISCELLANEOUS CABLES & LEADS.
10. C.M.R.R. SWITCH ADAPTOR FOR AUDIO OSCILLATOR.
11. CH.A/CH.B SELECTOR SWITCH ADAPTOR FOR D&N METER.





Australian Monitor P/L			53 COLLEGE ST GLADESVILLE 2111	
REVISIONS			MODEL AM1200	DRAWN BY K.McP.
No	DATE	BY		
1			REFERENCE COMPONENTS	DATE 15.11.91
2				
3			DESCRIPTION CONNECTIONS	SCALE NIL
4				

POWER-UP VOLTAGE SEQUENCE TEST CHART.

AM1200						240 VOLT OPERATION	
VARIAC A.C.	OUTPUT RAILS	DRIVER RAILS	DIFF. REF.	MUTE FET.	PRE/ REG.	POST/ REG.	STATUS REG.
30V	+/-8V	+/-9.6V	+ 0.02V	-0.2V	+/-2.4V	0V	0V
75V	+/-20.4V	+/-25V	+ 0.08V	-5V	+/-6.2V	+/-5V	+5V
130V	+/-35.6V	+/-43.3V	+ 0.14V	-10V	+/-11.4V	+/-10V	+10V
240V	+/-68.5V	+/-84.5V	+ 0.18V	-13.5V	+/-22.5V	+/-15V	+15V

NOTE: VOLTAGES +/- 5% WITH NO BIAS APPLIED.

POWER-UP VOLTAGE SEQUENCE TEST CHART.

AM1200					220 VOLT OPERATION		
VARIAC A.C.	OUTPUT RAILS	DRIVER RAILS	DIFF. REF.	MUTE FET.	PRE/ REG.	POST/ REG.	STATUS REG.
30V	+/-8.7V	+/-10.6V	+ 0.02V	-0.5V	+/-2.6V	0V	0V
75V	+/-21.9V	+/-26.7V	+ 0.08V	-5.5V	+/-6.7V	+/-5.5V	+5.5V
130V	+/-38.6V	+/-47.2V	+ 0.15V	-10.5V	+/-12.5V	+/-11V	+11V
220V	+/-68.5V	+/-84.4V	+ 0.19V	-13.5V	+/-22.6V	+/-15V	+15V

NOTE: VOLTAGES +/- 5% WITH NO BIAS APPLIED.

POWER-UP VOLTAGE SEQUENCE TEST CHART.

AM1200						110 VOLT OPERATION	
VARIAC A.C.	OUTPUT RAILS	DRIVER RAILS	DIFF. REF.	MUTE FET.	PRE/ REG.	POST/ REG.	STATUS REG.
15V	+/-8.4V	+/-10.3V	+ 0.02V	-0.25V	+/-2.6V	0V	0V
37.5	+/-21V	+/-26V	+ 0.06V	-5V	+/-6.6V	+/-5V	+5V
65V	+/-37V	+/-45.4V	+ 0.12V	-10V	+/-12V	+/-11V	+11V
110V	+/-70.4V	+/-84.5V	+ 0.16V	-13.5V	+/-23.5V	+/-15V	+15V

NOTE: VOLTAGES +/- 5% WITH NO BIAS APPLIED.

AM1200 TEST REPORT		DATE
SERIAL No.	VOLTAGE	TECH

VISUAL INSPECTION : MECHANICAL [ ] ELECTRICAL [ ]
QUIESCENT D.C. CONDITIONS ( )
SLO-START TRIP IN ( )
HALF-SPEED FANS ( )

	CH.A	CH.B	CH.C	CH.D
STATUS DISPLAY				
BIAS (@ 120/220/240 V)				
D.C. OFFSET				
NOISE				
1kHz. T.H.D. @ RATED POWER				
SENSITIVITY				
1kHz. OUTPUT @ 0.05% T.H.D.				
1kHz. 10dB O/LOAD - SINE				
1kHz. 10dB O/LOAD - SQUARE				
20kHz. O/P T.H.D. @ -1dB				
20kHz. 10dB O/LOAD - SINE				
20kHz. 10dB O/LOAD - SQUARE				
20kHz. REACTIVE LOAD (SQ.)				
FAULT LED.				
MUTE RATE				

COMMON CHANNEL TESTS:
C.M.R.R. @ 1kHz. **@ 20kHz.** **@ 200Hz.**
TRIM POTS SET : ( )

BOTH CH. 1kHz. STATUS LEDS PHASE

BREAKER CHECK THERMAL CHECK

SLOW TURN-ON CHECK FULL SPEED FAN

COMMENTS :

TEST PROCEDURE:

1. Visual Inspection :
(a) External damage/wear & tear, power cord & plug.
(b) Internal connections/components for signs of damage.

2. Pre Power-up :
(a) Turn Ch.A,B,C &D Bias Trim Pots fully C.C.W.
(b) Turn Ch.A,B,C & D Attenuators fully C.C.W.
(c) Check that both Bridge-Mode switches are in the OUT position.
(d) Check Chassis Ground continuity to Power Plug Earth Pin.
(e) Check Ch.A,B,C & D +'VE and -'VE Fuses (8A).

3.Power-up :
(a) During the following tests, monitor Mains Current to check for major faults or to compensate for Full Load voltage drop. Adjust Variac if the Mains Voltage drops when doing Full Load tests.
(b) Turn Variac fully down, connect Amp power lead and switch Amp on.
(c) Increase Variac Output Voltage to 30 Volts A.C.(15 Volts for 110V A.C.supply.)
(d) Measure D.C. Voltages as per Table on all channels for apropriate mains supply voltage. Check for incorrect Voltages and monitor Status & Fault LEDS on Front Panel.
(e) Progressively increase Variac Output Voltage as per Table and repeat measurements.
(f) Note A.C. Voltage when Slo-Start Relay actuates, approximately 170V A.C. for 240V mains [80V A.C. for 110V mains] and when Pre-Amp Supplies reach regulation, 190V A.C. for 240V mains [90V A.C. for 110V mains].
(g) D.C. Voltages should now be stable. High Mains Current (>1A) indicates a fault. Should this occur, switch Amp off and return to Step 1 of the Table. Discharge Main Output and Driver Stage Supply filter capacitors. With the Variac adjusted to 30V A.C.(240V mains) or 15V A.C. (110V mains), apply power and check voltages to determine the nature of the fault. Do not proceed until all Voltages and Currents are correct.

4.Bias Adjust :
(a) Bias should be adjusted when the Amp is cold.
(b) Remove Ch.A +'VE Fuse and connect D.C. Ammeter across Fuse Holder Terminals.
(c) Adjust Bias Trim Pot C.W. for 450mA.
(d) Replace Ch.A +'VE Fuse and repeat for Ch.B,C & D.
(e) Note Ch.A,B,C & D Output Stage and Diver Stage Supply Voltages. These will be slightly lower than the previous test (3d) due to the conduction of the biased output mosfets.

(cont.)

5.Performance Test :

(a) Switch Amp off and connect signal to Ch.A & B Inputs and Dummy Loads (4 Ohms) to both Outputs. Mute Signal Source (Audio Oscillator) and turn both Attenuators fully C.W.

(b) Measure the D.C. Off-Set Voltage on each Output with the Input Signal Ground connected and with the Ground lifted. Note Off-Set Voltage for both positions for each Channel (<+/-20mV).

(c) Measure Noise (20kHz Bandwidth) on both Channel Outputs with Ground connected and with Ground lifted. Note results for both conditions.

(d) Un-mute Oscillator and apply 1kHz. Sine Wave @ 0.92V RMS to both Inputs. Turn Ch.A Attenuator fully C.W. and observe waveform for any irregularities. Turn Ch.A down and repeat for Ch.B. Observe waveform for any irregularities. Turn Ch.B Attenuator fully C.C.W. and Ch.A Attenuator fully C.W.

(e) Turn Oscillator Output fully down and increase level slowly until Ch.A Status LED illuminates green - Note Output Voltage. Decrease Oscillator level slowly until Status LED is extinguished - Again note Output Voltage and repeat for Ch.B. - Upper and Lower Thresholds for both Channels should match within 0.2dB.

(f) Measure Ch.A T.H.D. at Rated Output Power (34.7V/4R) and note reading. Increase Input level until T.H.D. rises to 0.05% and again note Output Voltage. Status LED should illuminate Red.

(g) Reduce Oscillator level slowly until Status LED changes to Green. Signal level reduction for Status change should be -1dB to -1.5 dB. Note level reduction on Test Report.

(h) Increase Input level by 10dB and observe Overload Waveform for irregularities. Check that Fault LED illuminates dimly.

(i) Repeat (h) with Square Wave input.

(j) Repeat (h) with a 100Hz. Sine Wave input. Measure T.H.D.

(k) Turn Ch.A Attenuator down and repeat Steps (f) to (j) for Ch.B.

(I) Return to Ch.A and apply 20kHz.@ 0.1dB below Rated Power. Measure T.H.D. and note on Test Report. Tap components and P.C.B. while observing Distortion Waveform for microphonics indicating possible dry joints or faulty components.

(m) Increase Oscillator level until Channel just starts to clip. Note Output Voltage.

(n) Raise Oscillator level by 10dB and observe waveform for any **irregularities. Tick compliance on Test Report.**

(o) **Apply Square Wave at the same level and observe waveform for any signs of severe ringing or distress. Tick compliance on Test Report.**

(p) Reduce Oscillator level by 10dB and momentarily connect a 2uF Polypropylene Capacitor across the Output. Observe ringing on waveform. It should be well damped with two well rounded overshoots and good recovery. There should be no excessive ringing on the waveform. Tick compliance on Test Report.

(cont.)

(q) Return to Sine Wave for Rated Output Power. Remove Ch.A -'VE Fuse. There will be no Output and the Fault LED should illuminate. Check that Fault LED flashes at low and high signal frequencies. The Status LED will extingish within one second. Tick compliance on Test Report.
(r) Replace -'VE Fuse and observe Signal recovery rate controlled by the Mute Fet. Tick compliance on Test Report. Turn Ch.A Attenuator fully C.C.W.
(s) Repeat steps 5(l) to 5(r) for Ch.B.
(t) Repeat steps 5(a) to 5(r) for Ch.C & D.

6.SUPPLEMENTARY CHECKS:
(a) Return to Ch.A and apply 1kHz. Sine Wave @ 0.92 Volt.
(b) Check Slow Turn-on by switching Amp off and on. Waveform amplitude should increase slowly with no erratic gain changes.
(c) Repeat steps (a) & (b) for Ch.B,C & D. Tick compliance of both Channels on Test Report.
(e) Apply Input Signal @ +4dB Overload to all Channels. Circuit Breaker should trip within 30 seconds. Tick compliance on Test Report.
(f) Reduce Input Signal Level by 4dB for rated output power. Rapidly switch Amp off and on to simulate a fast Mains fluctuation (Brown-Out). Output Waveform should restore slowly as per (c). Tick compliance on Test Report.
(g) Disconnect Ch.A,B,C & D Dummy Loads and monitor Ch.A Output with a D.M.M. set to D.C. Volts. Switch Amp off and check Max D.C. Reading.
(h) Repeat for Ch.B,C & D. Tick compliance of all Channels on Test Report.
(i) Reconnect Ch.A,B,C & D Inputs and Outputs.
(j) Set Attenuators at -4dB so that Heatsinks heat up faster to check for High Speed Fan operation. Amp may have previously gone to High Speed Fan operation depending on duration of tests.Thermal Cut-ins operate at 60 Deg.C and bypass the Low Speed Fan Resistors. Restoration to Low Speed should occur at around 55 Deg.C. Monitor the case of the Fan Thermal Sensor with a Temperature Probe to verify On/Off Temperature Thresholds.
(k) Switch Amp off and disconnect one side of the Ch.A/B Thermal Breaker. Switch Amp back on. The Front Panel On/Thermal LED should **be illuminated Red and both Fans should run at High Speed. Switch Amp off and restore the Q.C. Lug to the Thermal Breaker Terminal.**

7.COMMON CHANNEL TESTS :
(a) Restore Input Signal Level for Rated Output from Channels A & B. Press Bridge-Mode Switch in and check Ch.B Level Difference and phase polarity between Normal and Bridged operation. Level variation should not exceed 0.1dB. Note Difference on Test Report.
(b) Apply Signal to Ch.A Input and turn Ch.B Attenuator fully C.C.W. Measure T.H.D. with Bridge-Mode Switch in. T.H.D. should be less than 0.1% Note result on Test Report.
(c) Mute Oscillator Output and measure Noise (20kHz. Bandwidth). Noise should be >95dB below Rated Output (>100dB A weighted). Note result on Test Report.
(d) Repeat for Ch.C & D.

(cont.)

(e) Restore Amp to Four Channel operation (i.e. both bridge mode switches out)and apply 200Hz. Sine Wave to Ch.A and set Relative Level on D&N Set to 0dB. Select C.M.R.R. Switch on Output of Oscillator and reduce Range Switch until a reading is obtained. Adjust the C.M.R.R. Trim Pot to null out the residual 200Hz. Note reading and repeat for 1KHz. and 20 KHz. C.M.R.R. should be >80dB @ 1KHz. Note readings.

(e) Repeat for Ch.B,C & D and note readings on Test Report.

(f) With Output from all Channels, check that all Status LEDS change from Green to Red at the same time. Increase Oscillator Level by 10dB and check that all Red LEDS do not dim or extinguish and that all Fault LEDS are illuminated. Tick compliance on Test Report.

(g) Seal Ch.A,B,C& D Bias and C.M.R.R. Trim Pots and tick compliance on Test Report.

(h) Complete additional Test Report details and file for reference.

8.AUDITION :

(a) Turn Ch.A,B,C & D Attenuators fully C.C.W. and switch on. Check that Power On LED flashes Red momentarily then stays Green and that Slo-Start Relay operates - Listen for click. Check that no Fault LEDS are illuminated.

(b) Listen to Fans for possible defects e.g. tight Bearings or Bushes. If you have replaced a Fan check that it is blowing from Front to Rear by placing palm of hand over Rear Panel Grill to feel air flow.

(c) Turn Amp off and connect all Channels to Speakers. Switch on and check that all Speaker Cones move forward momentarily (if visible). Rotate Attenuators C.W. and C.C.W. to check for Wiper Contact Noise.

(d) Turn all Attenuators down and connect Programme Source (Preferably C.D.). Audition Ch.A (L) only then Ch.B (R) only to detect any possible Channel differences and similarly for Ch.C and Ch.D. Apply Mono Programme and check Status LED indication per Channel for Threshold match.

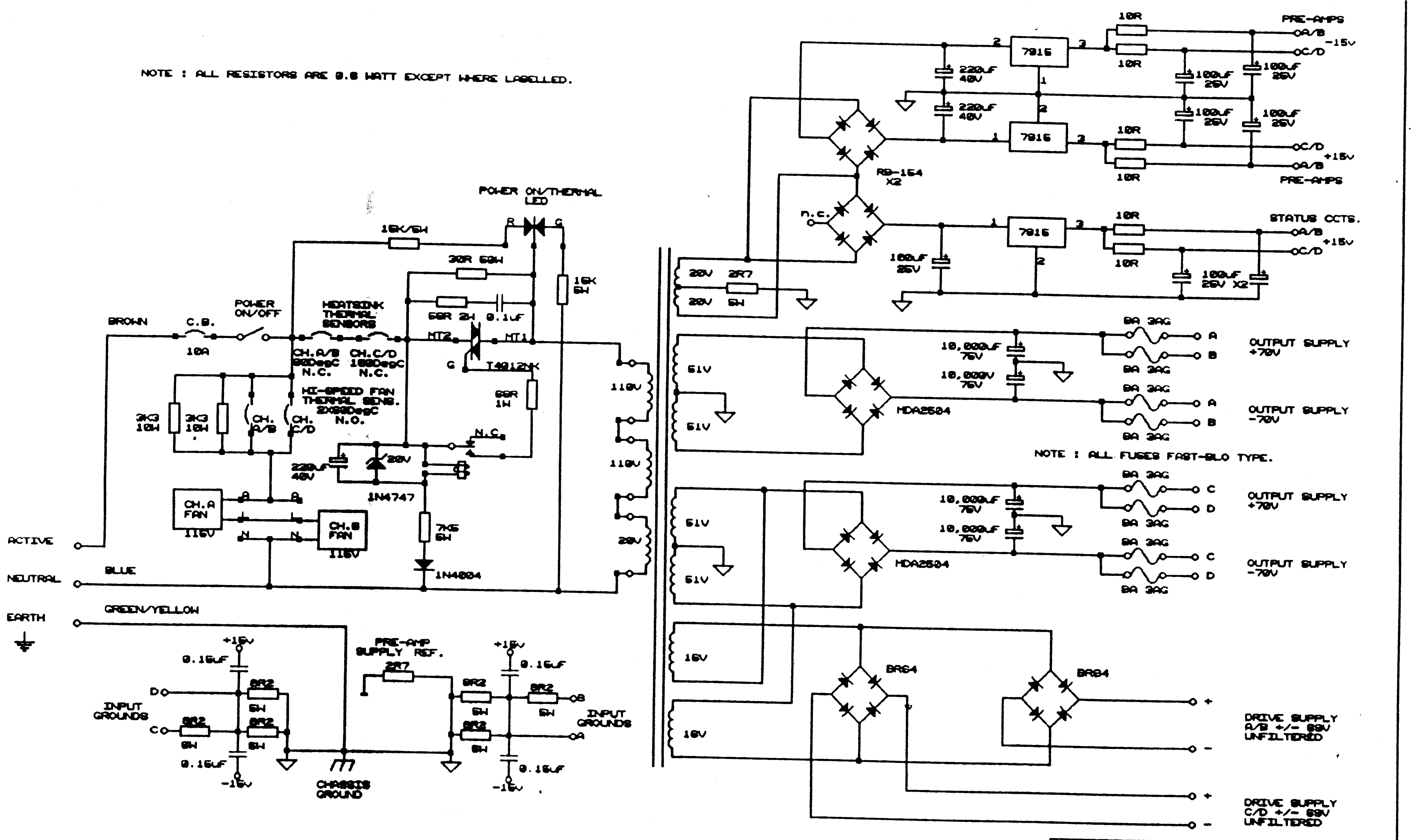
(e) Recheck for noisy Attenuators by rotating Knobs C.W. and C.C.W. several times. Listen for hum and if present turn Attenuators down and remove Input Connectors. Turn Attenuators back up to check if hum is still present. If hum still exists recheck the amplifier.

(f) With both Atttenuators fully C.W. switch Amp off then on to check **for thumps and discharge noise. If discharge noise is present, it should be inaudible at -15dB on the Attenuator scale. If not, then re-test.**

(g) Check for poor Connector Contacts by grasping Plugs and moving from side to side. Do not use worn Plugs for test leads as any clicks and plops may be due to the Plug and not the Sockets (Receptacle).

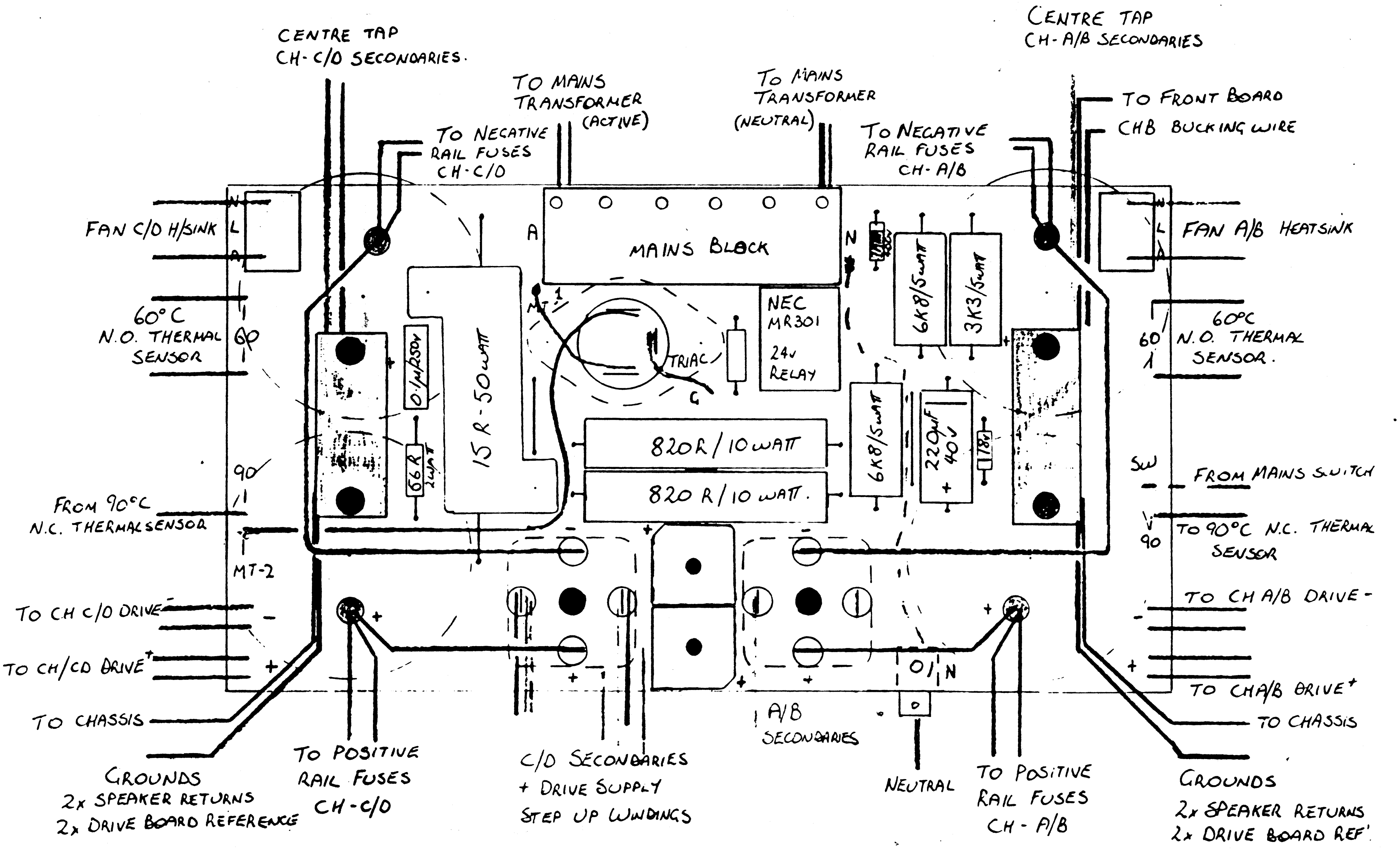
(h) Turn all Attenuators fully C.C.W., remove Ch.B and Ch.C Input Connectors and reconfigure the speaker connections for bridge mode operation of Ch.A/B and Ch.C/D. Press both Bridge-Mode Switches to the 'IN' position. Turn Ch.A and Ch.D Attenuators C.W. and audition.

(j) Turn both Attenuators fully C.C.W. and switch amplifier off. Restore Amp to Four-Channel Mode (Bridge-Mode Switches OUT). Disconnect Input, Output and Power Cables.



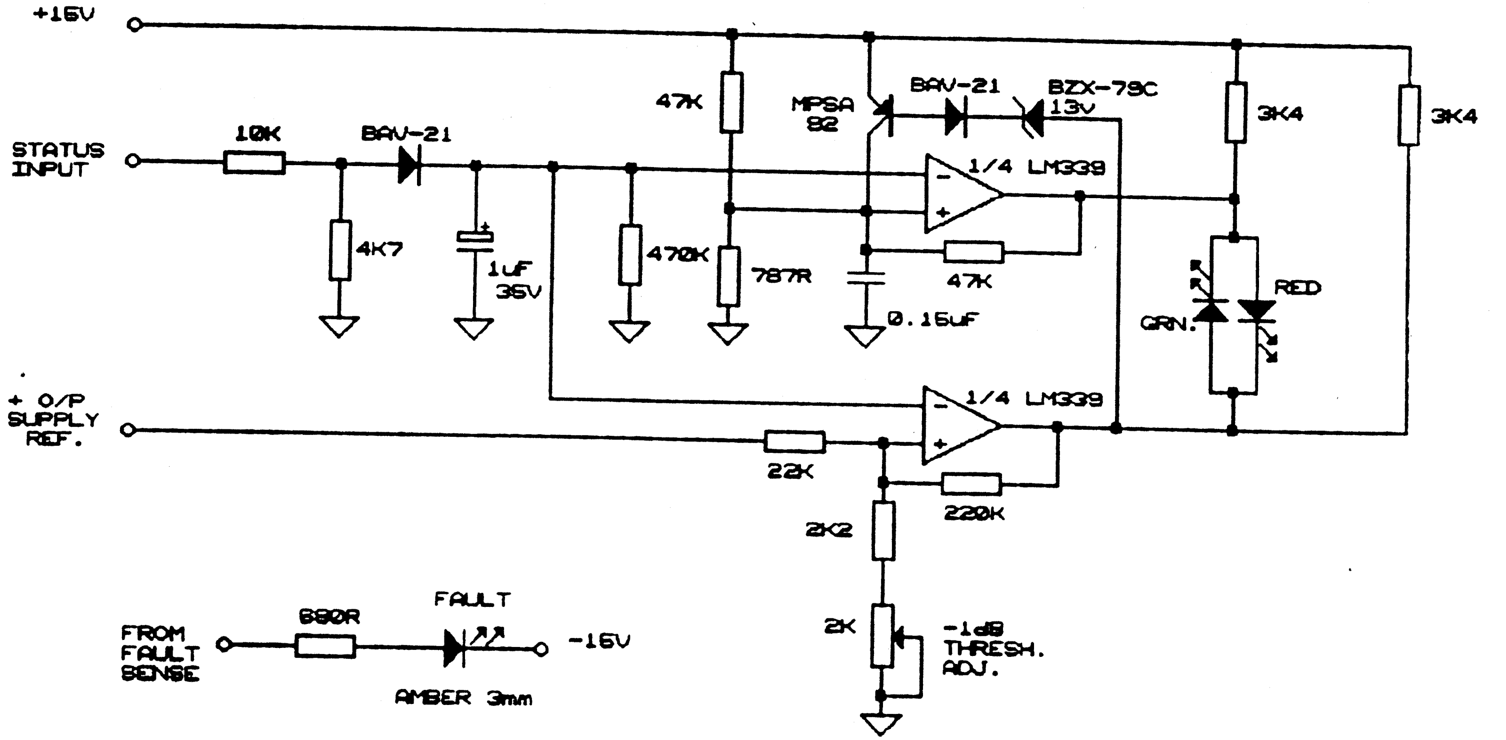
AUSTRALIAN MONITOR P/L 53 College St Gladesville NSW Australia			
Size	Document Number		REV
B	AM1200 POWER SUPPLY - 240 VOLT.		
Date:	December 11, 1991	Sheet	of

OVERLAY AND WIRING ASSIGNMENT.



QUAD-AM 1200
AUS'MON' SS-MD-DCD

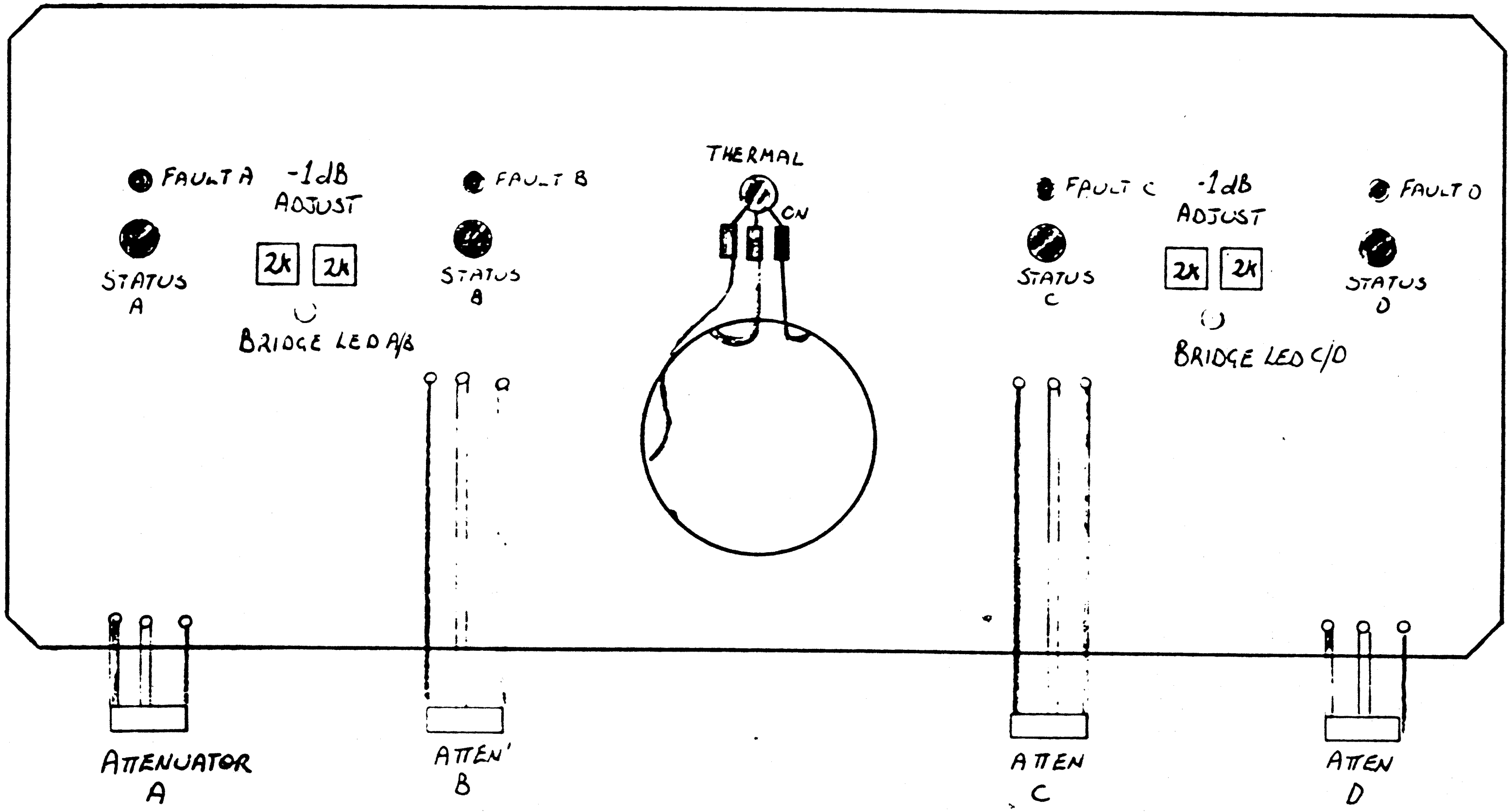
SLOW START - MAINS DISTRIBUTION AND D.C. DISTRIBUTION BOARD.



AUSTRALIAN MONITOR P/L
53 College St Gladesville NSW AUSTRALIA

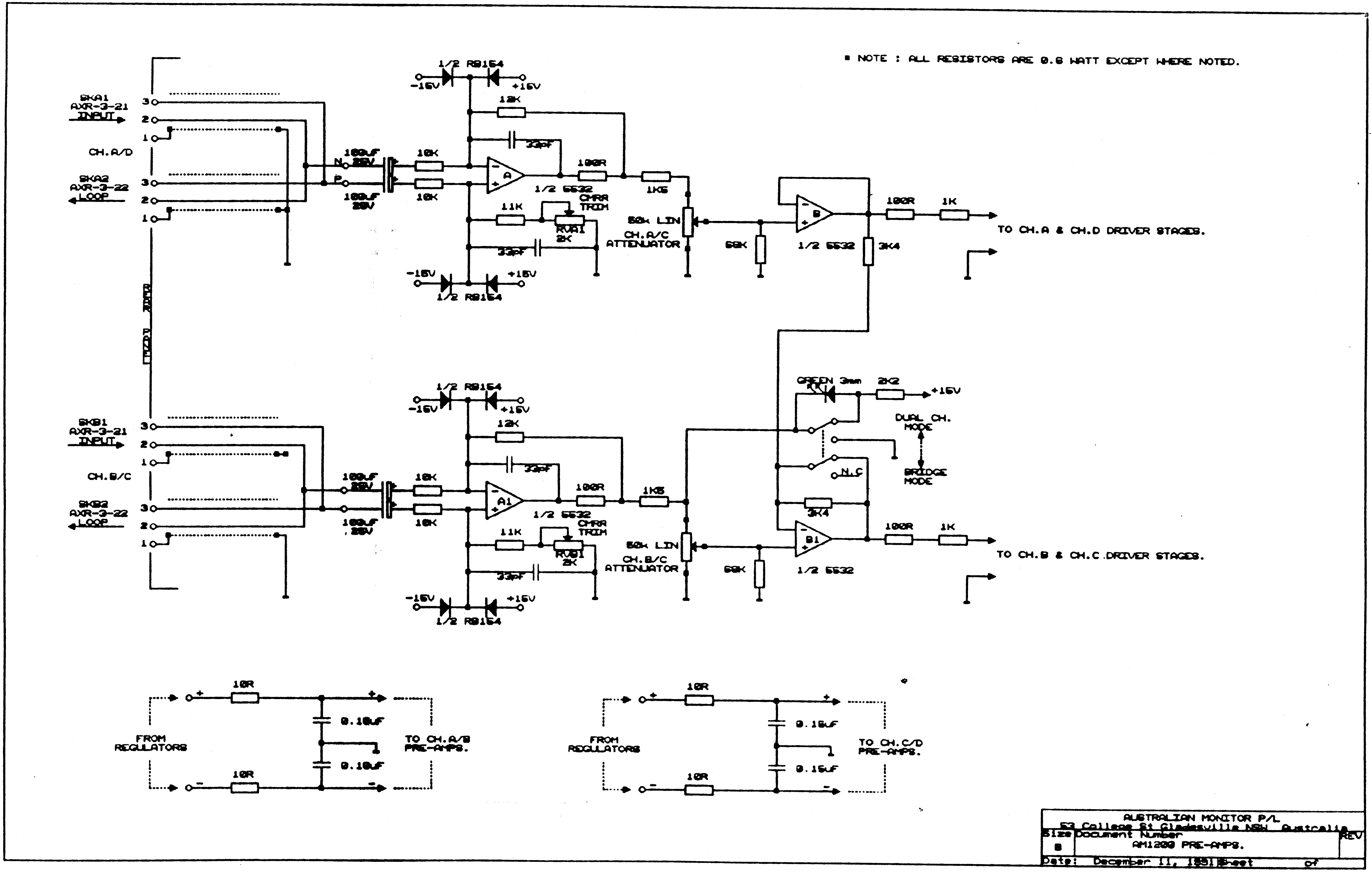
Size	Document Number	REV
A	AM1200 STATUS CIRCUIT (1 OF 4)	
Date:	December 12, 1991 Sheet of	

AM1200 FRONT BOARD OVERLAY (BAL-STAT-BR)



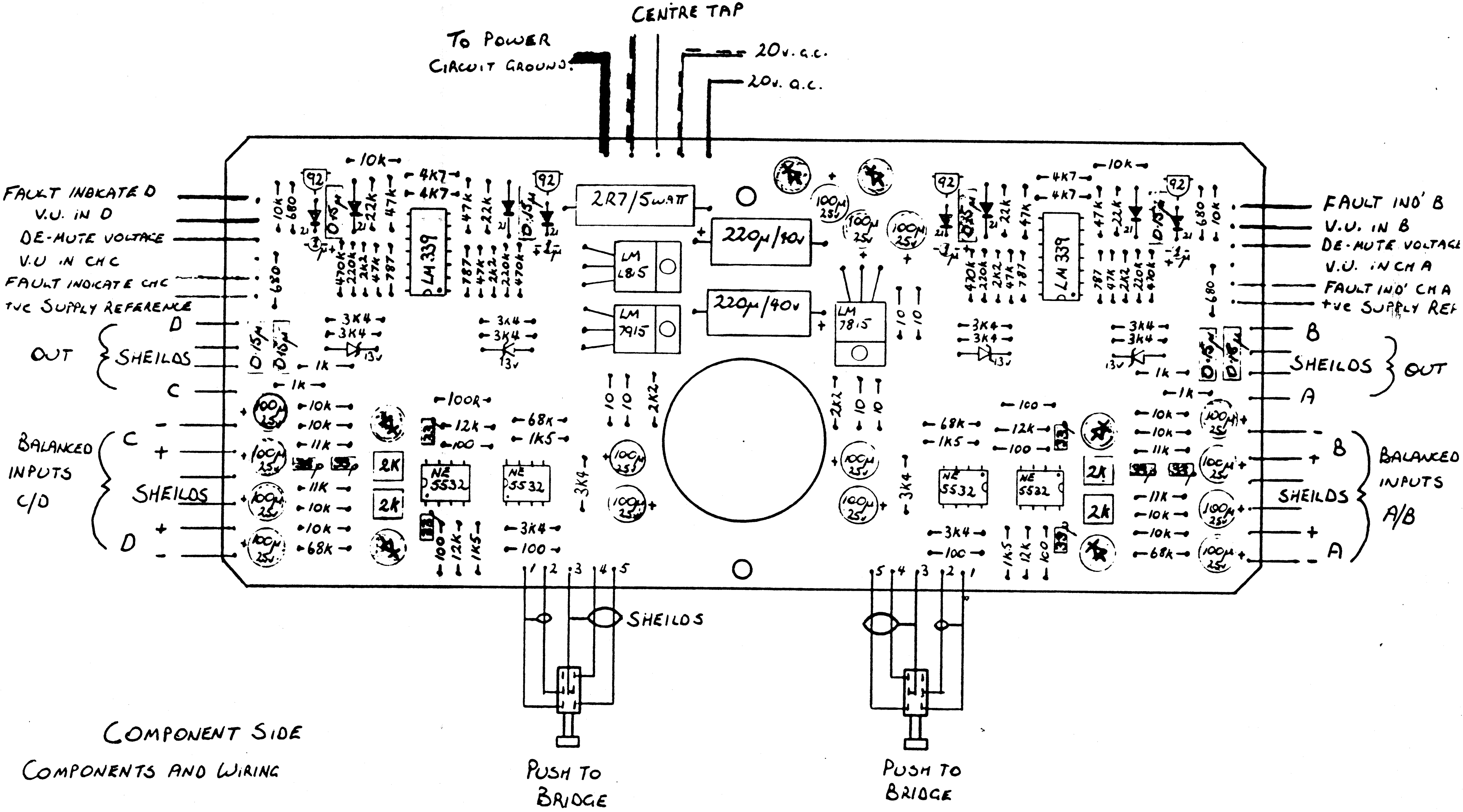
SOLDER SIDE

COMPONENTS - LEDS AND WIRING.


* NOTE : ALL RESISTORS ARE 0.6 WATT EXCEPT WHERE NOTED.
SKA1 AXR-3-21 INPUT
SKA2 AXR-3-22 LOOP
CH.A/D
SKB1 AXR-3-21 INPUT
SKB2 AXR-3-22 LOOP
CH.B/C
100uF 25V
10K
12K
33pF
100R
1K5
11K
CMRR TRIM
RVA1 2K
RVB1 2K
1/2 RB154
-15V
+15V
1/2 5532
50k LIN
CH.A/C ATTENUATOR
CH.B/C ATTENUATOR
68K
3K4
1K
TO CH.A & CH.D DRIVER STAGES.
TO CH.B & CH.C DRIVER STAGES.
GREEN 3mm
2K2
DUAL CH. MODE
BRIDGE MODE
N.C
10R
0.15uF
FROM REGULATORS
TO CH.A/B PRE-AMPS.
TO CH.C/D PRE-AMPS.
AUSTRALIAN MONITOR P/L
53 College St Gladesville NSW Australia
Size B
Document Number
AM1200 PRE-AMPS.
REV
Date: December 11, 1991 Sheet of

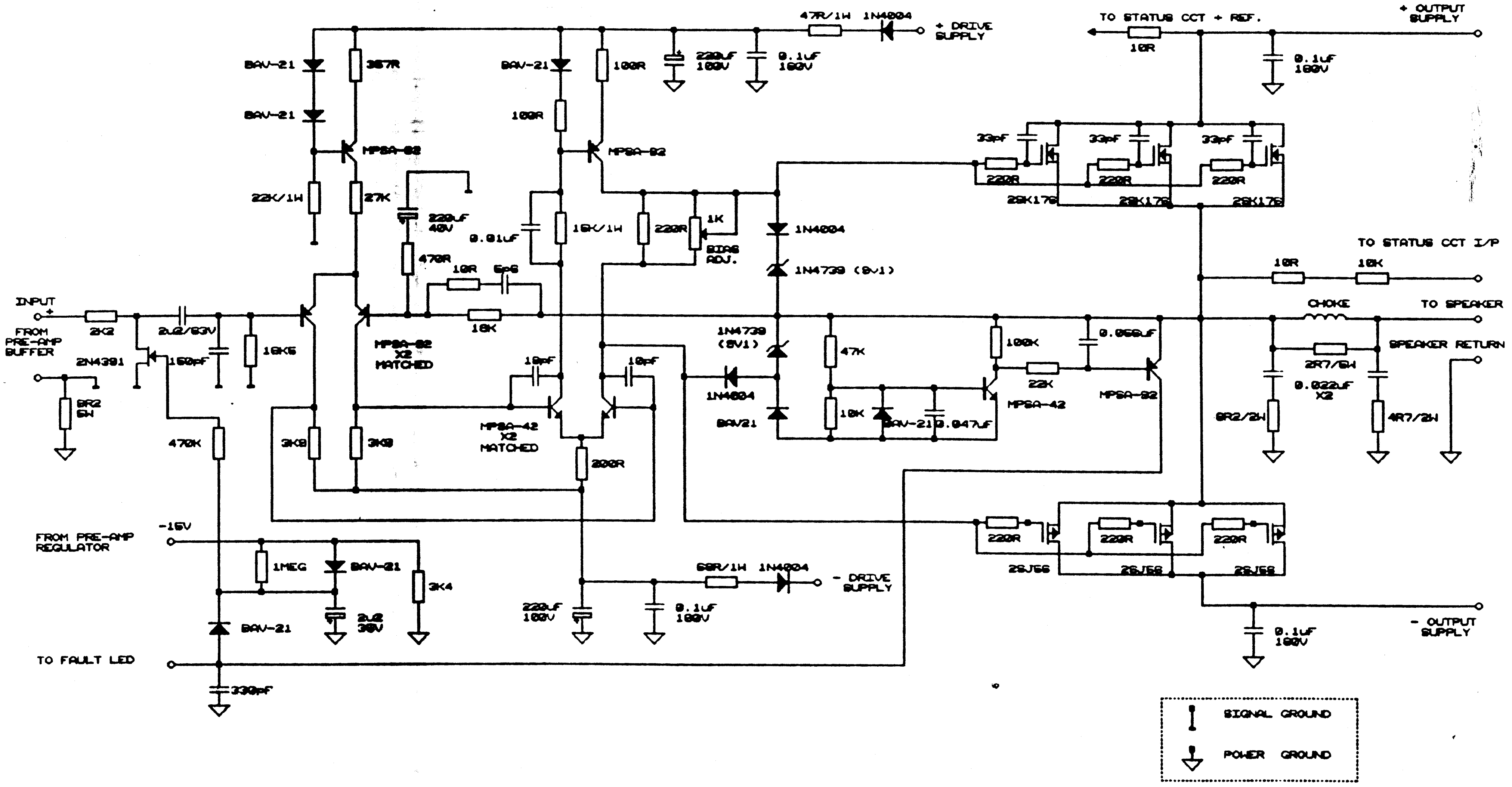
AM1200 FRONT BOARD OVERLAY (BAL' STAT - BR)

BALANCED, STATUS and BRIDGE



COMPONENT SIDE

COMPONENTS AND WIRING

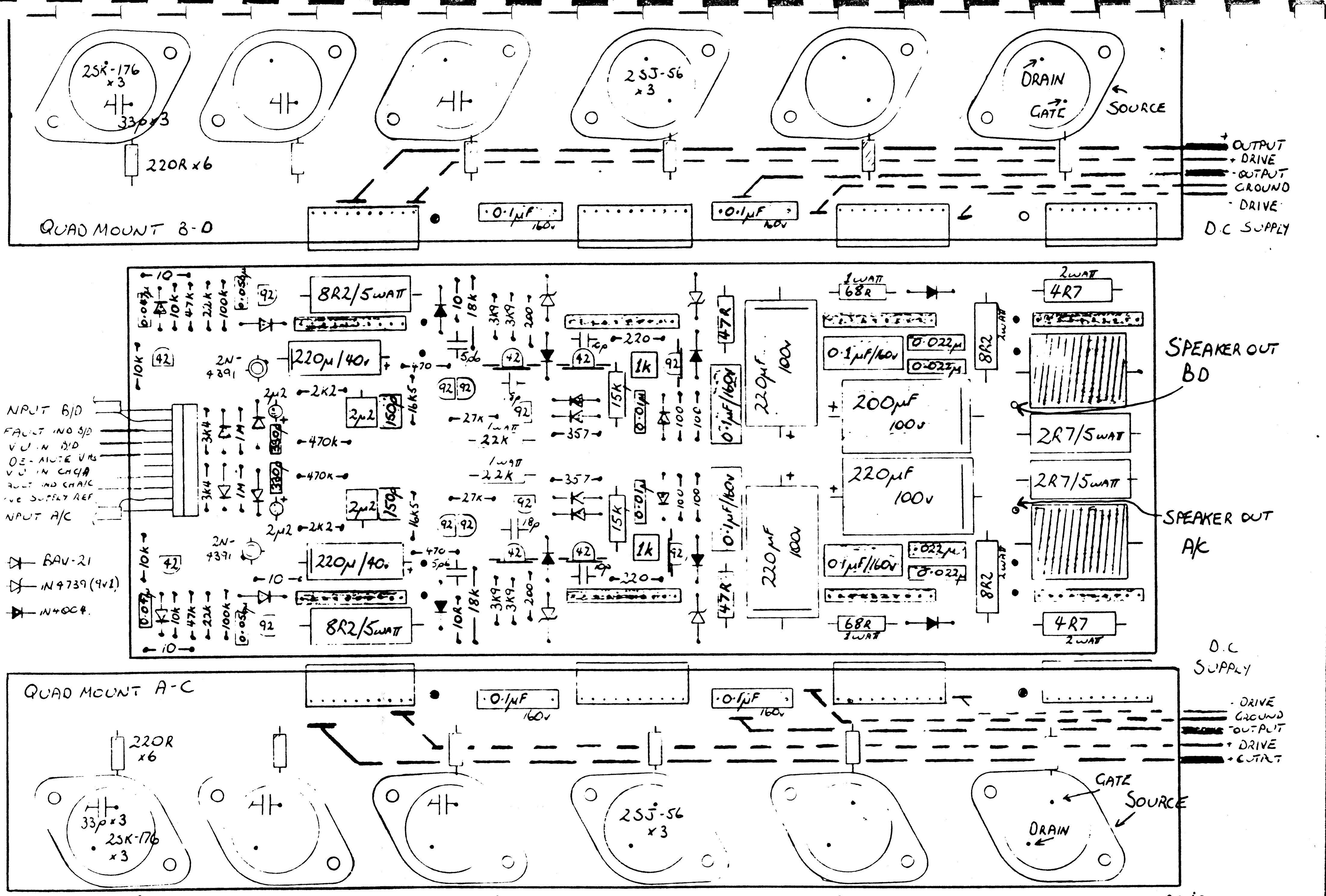


* Note : ALL RESISTORS ARE 0.6 WATT EXCEPT WHERE NOTED.

AUSTRALIAN MONITOR P/L
53 College St Gladesville NSW Australia

Size	Document Number	REV
B	AM1200 DRIVER & OUTPUT STAGE.	

Date: December 12, 1991 Sheet of



AM1200 COMPONENT OVERLAY + WIRE DESIGNATION AUST'MON QUAD DRIVE and QUAD MOUNTS BD/AC.

AM 1200	ASSY : POWER SUPPLY	MAINS : 240/220 V.

COMPONENT	DESCRIPTION	PART NO.	QTY.
TRANSFORMER	F931B	EMTXFF931B	1
CCT. BREAKER	W28 240V 10A	EMW28XQ1A10	1
THERMAL BKR	60 Deg.C/N.O.	EMT560CNO	2
THERMAL BKR	90 Deg.C/N.C.	EMT590CNC	1
THERMAL BKR	100 Deg.C/N.C.	EMT5100CNC	1
POWER SWITCH	82 SERIES DPST 240V 15A 1/4 H.P.	EM821605209U	1
FAN	TF80115AW 115V. A.C. 80mm	EMTF80115AW	2
FUSE HOLDER	F32 PANEL MOUNT 3AG	EHF32	8
FUSE	8A 3AG FAST-BLO	EM3AG8A	8
TRIAC	T4012NK	SET4012NK	1
RELAY	MR-301 24HS	EMMR301242HS	1
REGULATOR	LM7815	SELM7815	2
REGULATOR	LM7915	SELM7915	1
PWR/THERMAL LED	DUAL LED TRI-LEG 5mm RED/GREEN	SEHLMP4000	1
ZENER DIODE	1N4747 (20V)	SE1N4747	1
DIODE BRIDGE	MDA2504	SEMDA2504	2
DIODE BRIDGE	BR64	SEBR64	2
DIODE BRIDGE	RB154	SERB154	2
DIODE	**1N4004**	**SE1N4004**	**1**
CAPACITOR	10,000uF 75V ELECTRO. RADIAL	CA11100075ELR	4
CAPACITOR	220uF 40V ELECTRO. AXIAL	CA09220040ELA	3
CAPACITOR	100uF 40V ELECTRO. RADIAL	CA09100040ELR	7
CAPACITOR	0.1uF 250V MKP	CA06100250MKP	1
(cont.)			

AM 1200 ASSY : POWER SUPPLY MAINS : 220/240 V.

COMPONENT	DESCRIPTION	PART NO.	QTY.
RESISTOR	30R 50W W.W. 5%	RE05002300XWW	1
RESISTOR	3K3 10W W.W. 10%	RE01004330XWW	2
RESISTOR	15K 5W W.W. 10%	RE00505150XWW	2
RESISTOR	7K5 5W W.W. 10%	RE00504750XWW	1
RESISTOR	8R2 5W W.W. 10%	RE00501820XWW	6
RESISTOR	2R7 5W W.W. 10%	RE00501270XWW	1
RESISTOR	56R 2W M.O. 2%	RE00202560XMO	1
RESISTOR	68R 1W M.O. 2%	RE00102680XMO	1
RESISTOR	10R 0.6W M.F.1%	RE00062100XMF	6
TERM. BLOCK	6 WAY, SCREW TERMINAL	EHL1469NI	1
TERM. BLOCK	3 WAY, SCREW TERMINAL	EHDT1283P	2
CONNECTOR	6 WAY FEMALE, Q.C.	EH6F250PP	2

AM 1200	ASSY : POWER SUPPLY	MAINS : 110 V.

COMPONENT	DESCRIPTION	PART NO.	QTY.
TRANSFORMER	F931B	EMTXFF931B	1
CCT. BREAKER	W28 240V 20A	EMW28XQ1A20	1
THERMAL BKR	60 Deg.C/N.O.	EMT560CNO	2
THERMAL BKR	90 Deg.C/N.C.	EMT590CNC	1
THERMAL BKR	100 Deg.C/N.C.	EMT5100CNC	1
POWER SWITCH	82 SERIES DPST 240V 15A 1/4 H.P.	EM821605209U	1
FAN	TF80115AW 115V. A.C. 80mm	EMTF80115AW	2
FUSE HOLDER	F32 PANEL MOUNT 3AG	EHF32	8
FUSE	8A 3AG FAST-BLO	EM3AG8A	8
TRIAC	T4012NK	SET4012NK	1
RELAY	MR-301 24HS	EMMR301242HS	1
REGULATOR	LM7815	SELM7815	2
REGULATOR	LM7915	SELM7915	1
PWR/THERMAL LED	DUAL LED TRI-LEG 5mm RED/GREEN	SEHLMP4000	1
ZENER DIODE	1N4747 (20V)	SE1N4747	1
DIODE BRIDGE	MDA2504	SEMDA2504	2
DIODE BRIDGE	BR64	SEBR64	2
DIODE BRIDGE	RB154	SERB154	2
DIODE	1N4004	SE1N4004	1
CAPACITOR	10,000uF 75V ELECTRO. RADIAL	CA11100075ELR	4
CAPACITOR	220uF 40V ELECTRO. AXIAL	CA09220040ELA	3
CAPACITOR	100uF 40V ELECTRO. RADIAL	CA09100040ELR	7
CAPACITOR	0.1uF 250V MKP	CA06100250MKP	1
(cont.)			

AM 1200	ASSY : POWER SUPPLY	MAINS : 110 V.

COMPONENT	DESCRIPTION	PART NO.	QTY.
RESISTOR	15R 50W W.W. 5%	RE05002150XWW	1
RESISTOR	560R 10W W.W. 10%	RE01003560XWW	2
RESISTOR	6K8 5W W.W. 10%	RE00504680XWW	2
RESISTOR	3K 5W W.W. 10%	RE00504300XWW	1
RESISTOR	8R2 5W W.W. 10%	RE00501820XWW	6
RESISTOR	2R7 5W W.W. 10%	RE00501270XWW	1
RESISTOR	56R 2W M.O. 2%	RE00202560XMO	1
RESISTOR	68R 1W M.O. 2%	RE00102680XMO	1
RESISTOR	10R 0.6W M.F.1%	RE00062100XMF	6
TERM. BLOCK	6 WAY, SCREW TERMINAL	EHL1469NI	1
TERM. BLOCK	3 WAY, SCREW TERMINAL	EHDT1283P	2
CONNECTOR	6 WAY FEMALE, Q.C.	EH6F250PP	2

AM 1200 ASSY : PRE-AMP CH.A&B OR CH.C&D

COMPONENT	DESCRIPTION	PART NO.	QTY.
I.C.	NE5532AN	SENE5532AN	2
DIODE BRIDGE	RB154	SERB154	2
L.E.D.	LED 3mm GREEN	SEESPY3401	1
CAPACITOR	100uF 40V ELECTRO. RADIAL	CA09100040ELR	4
CAPACITOR	0.15uF 100V POLY.	CA06150100XGC	2
CAPACITOR	33pF NPO CER.	CA02330100CER	4
ATTENUATOR	50K LIN.- 21 POS.DETENT.	REAPOT5500XVR	2
TRIM POT	2K TRIM. (C.M.R.R. ADJ)	RECT6P4200XVR	2
RESISTOR	68K 0.6W M.F. 1%	RE00065680XMF	2
RESISTOR	12K 0.6W M.F. 1%	RE00065120XMF	2
RESISTOR	11K 0.6W M.F. 1%	RE00065110XMF	2
RESISTOR	10K 0.6W M.F. 1%	RE00065100XMF	4
RESISTOR	3K4 0.6W M.F. 1%	RE00064340XMF	2
RESISTOR	2K2 0.6W M.F. 1%	RE00064220XMF	1
RESISTOR	1K5 0.6W M.F. 1%	RE00064150XMF	2
RESISTOR	1K 0.6W M.F. 1%	RE00064100XMF	2
RESISTOR	100R 0.6W M.F. 1%	RE00063100XMF	4
RESISTOR	10R 0.6W M.F. 1%	RE00062100XMF	2
SWITCH	**DPST PUSH BUTTON SWITCH**	**EMSF2UEE**	1
CONNECTOR	AXR-3-21 (INPUT)	EHAXR321B	2
CONNECTOR	AXR-3-22 (LOOP)	EHAXR322B	1

AM 1200	ASSY : STATUS CCT.	(1 OF 4)

COMPONENT	DESCRIPTION	PART NO.	QTY.
I.C.	LM339 QUAD COMPARATOR	SELM339N	1
TRANSISTOR	MPSA92	SEMPSA92	1
ZENER DIODE	BZX-79C (13V)	SEBZX79C13	1
DIODE	BAV21 LOW LEAKAGE	SEBAV21	2
L.E.D.	LED 5mm DUAL COLOR - 2 LEG	SESPRG5111	1
L.E.D.	LED 3mm AMBER	SEESAA3401	1
CAPACITOR	1uF 35V. TANTALUM	CA07100035TAN	1
CAPACITOR	0.15uF 100V POLY.	CA06150100XGC	1
TRIM POT	2K TRIM POT.	RECT6P4200XVR	1
RESISTOR	470K 0.6W M.F. 1%	RE00066470XMF	1
RESISTOR	220K 0.6W M.F. 1%	RE00066220XMF	1
RESISTOR	47K 0.6W M.F. 1%	RE00065470XMF	2
RESISTOR	22K 0.6W M.F. 1%	RE00065220XMF	1
RESISTOR	10K 0.6W M.F. 1%	RE00065100XMF	1
RESISTOR	4K7 0.6W M.F. 1%	RE00064470XMF	1
RESISTOR	3K4 0.6W M.F. 1%	RE00064340XMF	2
RESISTOR	2K2 0.6W M.F. 1%	RE00064220XMF	1
RESISTOR	787R 0.6W M.F. 1%	RE00063787XMF	1
RESISTOR	680R 0.6W M.F. 1%	RE00063680XMF	1

AM 1200 ASSY : DRIVER & OUTPUT STAGES

COMPONENT	DESCRIPTION	PART NO.	QTY.
TRANSISTOR	2SK-176 MOSFET N.CH	SE2SK176	3
TRANSISTOR	2SJ-56 MOSFET P.CH	SE2SJ56	3
TRANSISTOR	MPSA-42 BJT NPN	SEMPSA42	3
TRANSISTOR	MPSA-92 BJT PNP	SEMPSA92	5
TRANSISTOR	2N4391 J FET	SE2N4391	1
ZENER DIODE	1N4739 (9V1)	SE1N4739	2
DIODE	BAV 21 LOW LEAKAGE	SEBAV21	7
DIODE	1N4004	SE1N4004	4
INDUCTOR	CHOKE/AIR CORE	EMCHOKE12T15	1
CAPACITOR	220uF 100V AXIAL	CA09220100ELA	2
CAPACITOR	220uF 40V AXIAL	CA09220040ELA	1
CAPACITOR	2.2uF 63v MKT	CA07220063MKT	1
CAPACITOR	2.2uF 35v TAG.	CA07220035TAN	1
CAPACITOR	0.1uF 160V MKP	CA06100160MKP	4
CAPACITOR	0.056uF 100V POLY.	CA05560100XGC	1
CAPACITOR	0.047uF 100V POLY.	CA05470100XGC	1
CAPACITOR	0.022uF 250V MKC	CA05220250MKC	2
CAPACITOR	0.01uF 250V MKT	CA05100250MKT	1
CAPACITOR	**330pF 160v KT**	**CA03330160XKT**	**1**
CAPACITOR	150pF 100V KP	CA03150100XKP	1
CAPACITOR	18pF 500V CER	CA02180500CER	2
CAPACITOR	10pF N750 CER	CA02100100CER	1
CAPACITOR	5.6pF 500V CER	CA01560500CER	1
TRIM POT	1K TRIM. (BIAS ADJ)	RECT6P4100XVR	1
(cont.)			

AM 1200 ASSY : DRIVER/OUTPUT STAGE (cont.)

COMPONENT	DESCRIPTION	PART NO.	QTY.
RESISTOR	1M 0.6W M.F. 1%	RE00067100XMF	1
RESISTOR	470K 0.6W M.F. 1%	RE00066470XMF	1
RESISTOR	100K 0.6W M.F. 1%	RE00066100XMF	1
RESISTOR	47K 0.6W M.F. 1%	RE00065470XMF	1
RESISTOR	27K 0.6W M.F. 1%	RE00065270XMF	1
RESISTOR	22K 1W M.O. 2%	RE00105220XMO	1
RESISTOR	22K 0.6W M.F. 1%	RE00065220XMF	1
RESISTOR	18K 0.6W M.F. 1%	RE00065180XMF	1
RESISTOR	16K5 0.6W M.F. 1%	RE00065165XMF	1
RESISTOR	15K 1W M.O. 2%	RE00105150XMO	1
RESISTOR	10K 0.6W M.F. 1%	RE00065100XMF	2
RESISTOR	3K9 0.6W M.F. 1%	RE00064274XMF	2
RESISTOR	3K4 0.6W M.F. 1%	RE00064340XMF	1
RESISTOR	2K2 0.6W M.F. 1%	RE00064220XMF	2
RESISTOR	470R 0.6W M.F. 1%	RE000634705MF	1
RESISTOR	402R 0.6W M.F. 1%	RE00063402XMF	1
RESISTOR	220R 0.6W M.F. 1%	RE00063220XMF	11
RESISTOR	200R 0.6W M.F. 1%	RE00063200XMF	1
RESISTOR	**100R 0.6W M.F. 1%**	**RE000631002MF**	**2**
RESISTOR	68R 1W M.O. 2%	RE00102680XMO	1
RESISTOR	47R 1W M.O. 2%	RE00102470XMO	1
RESISTOR	10R 0.6W M.F. 1%	RE00062100XMF	3
RESISTOR	8R2 2W M.O. 2%	RE00201820XMO	2
RESISTOR	8R2 5W W.W. 10%	RE00501820XWW	1
RESISTOR	2R7 5W W.W. 10%	RE00501270XWW	1

ROUTINE MAINTENANCE:

The AM1200 has been designed for heavy duty operation even in adverse environments. To achieve continuous operation the following maintenance procedures should be undertaken every 6 MONTHS.

1. Disconnect power to the unit and remove top and bottom lids.
2. Clean Ch.A/B and Ch.C/D Fans, Heatsinks and Fan Grils (Front & Rear) of accumulated dust and foreign particles. Block Fan blades if using compressed air to prevent Fan damage.
3. Replace D.C. fuses on the rear panel. Fuse element fatigue is caused by rapid thermal expansion and contraction relative to the load current. Routine replacement is therefore recommended.
4. Replace top and bottom lids.
5. Audition the Amplifier as outlined in the Service Procedures.