USER GUIDE FOR

MARTIN AUDIO

M SERIES AMPLIFIERS

WARNING

Martin Audio M Series amplifiers have the added advantage that plug-in programmable cards can be installed internally to achieve optimum performance from certain loudspeakers in the Martin Audio range, without the need for separate system controllers.

If the M Series amp is to be used with plug-in cards then the separate instruction leaflet referring to this use must be read in conjunction with this general user guide.

Always disconnect the amplifier from the mains before attempting to fit plug-in cards or adjusting various user configurable jumpers on the plug-in cards.

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1 INTRODUCTION

1.1 Introduction

The M Series of amplifiers from Martin Audio consists of two models, M800 and M1200, in a uniform low-profile package, incorporating considerable knowledge and expertise accumulated over many years involvement in the art of Amplifier design and manufacture.

Modern power amplifiers are sophisticated pieces of electronic engineering capable of producing extremely high power levels. They must be handled with respect and correctly installed if they are to provide you with many years of reliable service. They are potentially extremely dangerous if abused, misused or incorrectly installed.

Please take a little time to study this M Series manual, in order that you can get the best service from the amplifier.

1.2 Serial Number

Every M Series amplifier has an individual serial number which is marked on the rear of the unit. Make a separate note of this number somewhere safe where you can refer to it. You may need to know this number on an occasion when the amplifier is not to hand, e.g. if it is stolen or has been sent away for repair or the rear is not easily accessible.

1.3 Warning

The M amplifier must be earthed via the three core mains cable (see 4.7).

To prevent the danger of electric shock or fire hazard do not expose the unit to rain or moisture. If the unit should come into contact with moisture for any reason, disconnect it from the mains supply and leave it in a suitable place to dry out.

1.4 Caution

Never remove the service covers with the unit connected to the mains supply. In the event of a failure refer to your Dealer. Unauthorised servicing or tampering with the circuitry may be dangerous and invalidates your warranty.

1.5 Attention

The M Series has been designed to be rack-mounted in any standard 19" equipment rack or (in fixed installations) 'stack' mounted on its base. If this amplifier is to be used in a mobile application it must be properly mounted in a suitable equipment rack with front and rear support. Martin Audio will not be responsible for any damage, electronic or mechanical, sustained due to a

failure to rack mount in a mobile application, or insufficient support in the rack housing. Failure to comply with this will invalidate the warranty. Please read section four concerning installation which details the correct procedures for mounting the M Series.

1.6 Loudspeaker Warning

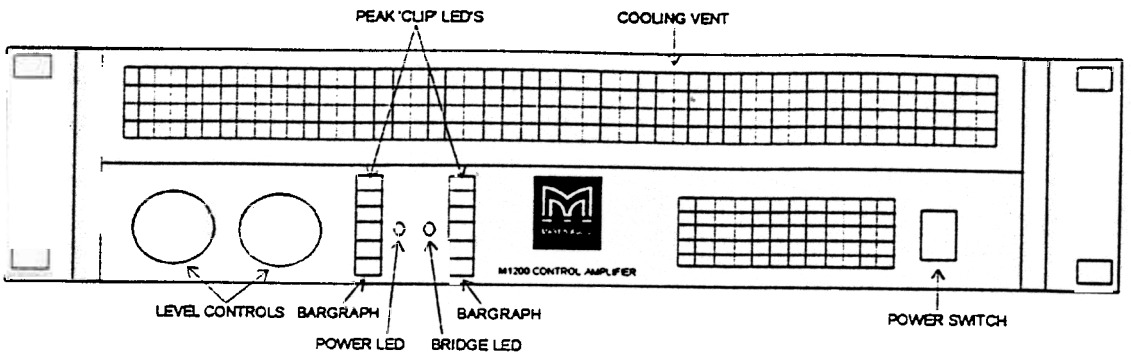
The single most common cause of loudspeaker damage is due to amplifier clipping. This may be due to driving the power amplifier itself into clip, or by sending a clipped signal to the amplifier.

Never operate the amplifier with the red 'peak' LED's (on the bar graphs) flashing more than occasionally.

Also, beware of sending a clipped signal to the amplifier. Owing to the amplifiers wide bandwidth and high slew rate, such signals will be reproduced with extreme accuracy and loudspeaker damage will almost certainly result. If you are operating your system with the mixer faders near maximum and the amplifier level controls below half way you are in danger of clipping the mixer. Wherever possible the amplifier level controls should be near maximum and the level controlled by the mixer master faders. Always keep an eye on the mixer meters to ensure you are not overdriving the mixer.

Never operate the amplifier with less than the rated load impedance. This will not result in increased power, but due to the amplifiers output protection is likely to result in premature clipping and damage to the loudspeakers.

2 FRONT PANEL CONTROLS



2.1 On/Off

This switch powers up the amplifier. The amplifier is ON when the switch is depressed DOWN (see 5.1).

2.2 Power Indication

The green power LED is a visual indicator that will light up when the unit is connected to the mains and switched on.

2.3 Bridge

The yellow bridge LED is a visual indicator that will light up when the amplifier is being used in bridge mono model (see section 5.5)

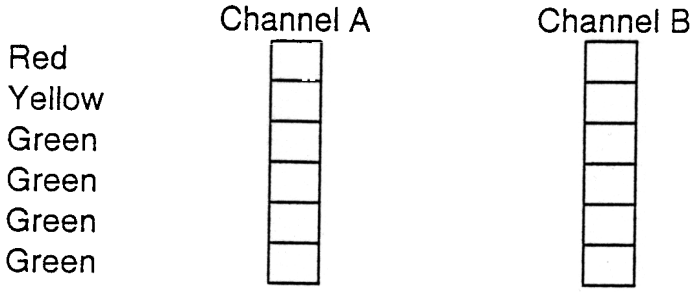
2.4 Input Level Control

The two black rotary level potentiometers individually control the input signal to each of the amplifier's channels. When turned fully clockwise they allow the amplifiers maximum gain to be utilised.

2.5 Bargraph Output Indicators and Peak LED Indicators.

Front panel mounted dual channel bargraphs indicate output levels and 'clipping' of the output stages.

Each bargraph has four green LED's, a yellow LED and a red LED.



The signal levels indicated by each segment illuminated are as follows:

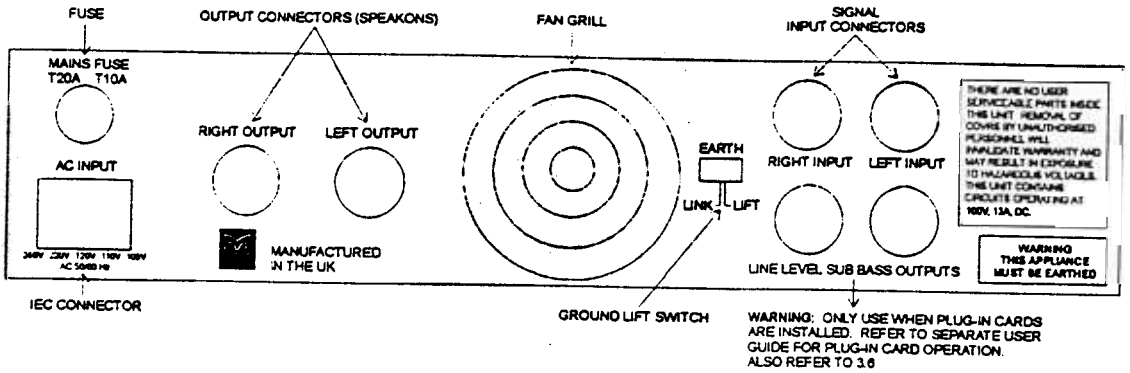
Red	= amplifier at full power and also clipping which will result in damage to loudspeaker due to 'squared' output signal.
Yellow	= -2dB from full output
Top Green	= -4dB from full output
2nd Top Green	= -10dB
2nd Bottom Green	= -16dB
Bottom Green	= Signal present

WARNING: Never allow the amplifier to operate heavily in the red 'clip' section, although very occasionally is acceptable (see 1.6).

2.6 Cooling Vent

All high power amplifiers produce considerable heat as a by product of power output. Keeping an amplifier cool is essential to its performance and long life. The cooling system of the M Series employs a fan mounted on the rear of the amplifier chassis which draws air through the amplifier and exhausts through the vent in the front panel. It is important to ensure that this vent is never blocked (see 3.5 and 4.3).

3 REAR PANEL



3.1 AC Input

On amplifiers set to 220/240V mains is connected to the amplifier via the IEC 10 amp 'Euro' connector. A mating mains connector also rated at 10 amps is supplied with the amplifier.

On amplifiers set to operate at 100/110/120V mains is connected to the amplifier via a fixed mains cable. This cable is rated at 20 amps.

3.2 Fuse

A mains fuse is fitted to protect the amplifier. The fuse is of the anti-surge type. The rating of this fuse varies depending on the amplifier model and what voltage the amplifier has been set to operate on:

	220/240V	100/110/120V
M800	T10 amp-20mm	T10 amp-32mm
M1200	T10 amp-20mm	T20 amp-32mm

It is essential that if the fuse should need to be replaced for any reason only one of the correct type and rating are used.

The correct fuse allows the M Amplifier to deliver its full power without danger. A fuse of a lower value than specified will be likely to blow again when the amplifier is required to deliver its full rated output, whilst a fuse of a higher value will not protect the unit. Never attempt to bypass the fuse as this can result in serious damage and will invalidate your warranty.

3.3 Signal Output

There are two Neutrik Speakon sockets. Connection to the speakon sockets can only be made with a speakon plug. It is most important that correct phase polarity is observed (4.13) otherwise your speaker system performance will be reduced. The positive (phase) output must be connected to Pin 1+ of

the speakon plug. The negative (non-phase) output should be connected to Pin 1- of the speakon plug. It is essential that the connections are firmly made and that the cables are properly prepared so as to avoid any possibility of a short circuit.

3.4 Ground Switch

This switch is used to lift the audio ground from the AC ground. For its use see section 4.16.

3.5 Cooling Fan

A cooling fan is mounted inside the chassis behind the perforated mesh to ensure the cool running of the amplifier (2.6 and 4.3). It is important that nothing obstructs the airflow to the fan at any time.

3.6 Signal Input

Input to the amplifier is via two female XLR connectors. Although the inputs are balanced, provision has been made for them to be used unbalanced if required without the need for adapters (see 4.8, 4.9, 4.10, 4.11).

WARNING

Signal input is via the two uppermost XLR on the rear panel labelled Input A and Input B.

The bottom pair of XLR are used only when plug-in cards are installed and are used for sub bass line level outputs for active use in bi-amped systems.

Never connect an input signal to these bottom XLR's - refer to separate instruction sheet covering the installation and use of plug-in cards for full operational usage.

3.7 Bridge Switch

The M Series may be configured in bridge mode, enabling the total power of both channels to be summed into a single load of 8 ohms (e.g. 1200 watts for the M1200 and 800 watts for the M800 into 8 ohms).

The bridge switch is found mounted on the circuit board just behind the left hand side of the front panel inside the amp.

WARNING: Disconnect mains power from the amplifier before removing the lid.

The bridge switch is clearly marked and for normal stereo operation the switch remains in the forward position labelled stereo. Moving the switch to the rear (marked bridge) selects bridge mono operation. Never operate this switch when the amp is switched on. Never power up the amplifier after moving this switch without resetting the speaker connections (see 5.6). **Never use in bridge mode with a load of less than 8 ohm nominal. Failure to observe these requirements may result in permanent damage to the amplifier or speakers connected to it, and will invalidate the warranty.**

WARNING

The circuit board that holds the bridge switch is also used for plug-in card operations. Bridge mono operation cannot be used if a plug-in card is in use. If plug-in cards are not being used bridge mono operation can safely be selected although care must be taken to ensure that no other switch or jumper plugs are inadvertently altered.

Always replace the lid securely before reconnecting the amplifier to the mains.

For further information on plug-in cards (if used) please refer to separate instruction sheet covering the installation and use of plug-in cards.

4 INSTALLATION

4.1 Unpacking

Before this unit left the factory it went through an exhaustive test procedure and was carefully inspected before packing to ensure flawless appearance. Before powering the unit up, carefully inspect the outer carton for any signs of rough handling or physical damage. When you unpack the carton do not damage it, as it should be stored safely with all the internal packing materials in care the amplifier needs to be returned to a dealer for service. After unpacking the unit, carefully inspect it for any signs of physical damage. In the event that any damage is discovered do not power the unit up but immediately contact your Dealer who will advise you on an appropriate course of action and submit a written claim to cover the damages.

4.2 Mounting

If the amplifier is to be permanently installed it may be stacked on its base, and multiple units may be piled up one above the other. However it is always advisable to mount the amplifier in a suitable 19" rack, and if the amplifier is to be used in any mobile application then it must be properly installed in a rack. The variation and range of different racks and flightcases is enormous. Although they are all designed to accomplish the same basic objective some are much stronger quality than others. It is important to ensure that the rack you use is suitable for its application. Most of the world's large touring sound companies mount their amplifiers into housing racks (of wood or metal) which are then mounted in foam lined flightcases or wooden cases, to provide maximum protection. The housing rack must have racking rails at the front and rear for bolting the unit to, so that it can be evenly supported all round. Racks for multiple units are normally designed with wheels, to facilitate easier moving around. Generally speaking the rack should be designed such that when it is in use and in transit, the rack is off its wheels, so that it cannot move. This generally also means that when the amp is static the amplifiers are resting on the floor of the rack, or on the amplifier below them, thus reducing the stress on the racking strip and bolts. This is especially important when a rack is in a truck and may be liable to be bounced around in transit. It is also imperative to ensure that the rack rails are securely fastened to the rack itself to prevent them tearing loose in the event of any accident.

When mounting multiple units into a rack it is good practice to mount the heaviest items at the bottom and the lightest at the top. In this way the rack is more stable, with a lower centre of gravity, for easier handling.

The rack should have rear access, even if all connections to the amplifiers are via the front of the unit, as it may be necessary to gain access from time to time, e.g. to lift a ground switch or check a connection.

4.3 Cooling requirements

It is essential that air can circulate freely around the amplifier to keep it cool. The rear fan will draw air into the amplifier case, forcing it over the large transverse heatsink in order to keep the power devices cool, and exhaust through the front vent. The front and rear of the unit must not be obstructed in any way to prevent this. If the unit is mounted in a rack, care must be taken that the rack is sufficiently open at the front and back to allow a sufficient flow of air through the rack. If the air flow is restricted in any way a separate fan should be mounted on the back to draw air inside the rack.

Similarly the front of the rack must not be obstructed, for example, some racks in fixed installations utilise perspex front doors to prevent tampering. These must not be used as they would restrict the exhaust of the air, trapping it inside the rack, and increasing the risk of thermal overload.

In addition to keeping the amplifier cool the fans will also draw dust and dirt into the amplifier casing, which may remain there. If this dust is allowed to build up inside the amplifier it will reduce the effectiveness of the heatsinks and the amplifier may produce lower than normal output levels (see 5.7). To reduce dust intake into the rack, air vents in the rear of the rack should have dust filters which are periodically cleaned. In certain environments the dust level will be much higher than is normal, e.g. in discotheques which have smoke machines located near the amplifiers. Some smoke oils deposit a corrosive residue which over time attacks the component leads and Printed Circuit traces. Care should be taken not to use such smoke oils in the presence of these amplifiers (damage caused in this way will not be covered by the warranty). In such circumstances steps should be taken to locate the amplifiers as far away from a potential dust source as is practical, and this must be borne in mind when considering service intervals.

4.4 Cable Looms

When the amplifiers are housed in a rack the input and output connections are usually terminated on a connecting panel. Typically when multiples of amplifiers are housed in a rack the panel may be configured with multipin input connectors, which will have a variety of signal sources (usually being outputs from a crossover frequency dividing network) in a PA system, or various monitor outputs from the mixing console in a studio application. The connection panel will thus normally have a number of input and output connectors, together with an AC input, and cables from these connectors will connect with each amplifier.

It is important that the appropriate type of cable is used and that care is taken with the way in which the cables are routed round the rack and tied together. Poor cabling may result in reduced performance, amplifier failure, unreliability, and increased hum. To reduce these possibilities all cables should be loomed together with cables performing similar functions, but not with other

cables. For example if a rack is housing six M Series amplifiers, there will be 12 signal cables connecting the amplifiers to the connector panel. These 12 cables should utilise screened pair cable and they should be tied together in a bundle using plastic cable ties or lacing cord, and also tied to the rear rack rails, so they cannot move around inside the rack. If signal cables are left free and not tied a magnetic hum field may be created and the possibility of them causing hum through ground loops is increased.

The back panel of the M Series has been laid out such that all signal input and signal output cables can be loomed together up one side of the rack, and all speaker outputs can be loomed up the other side. Similarly all AC cables should be carefully loomed and positioned, as these too may also cause ground loops which produce hum. The use of the ground lift switch (3.4, 4.16) may be of assistance, but care should be taken to ensure that the AC cables are in an optimum position before this is tried.

4.5 Power Requirements

The currently requirements of the M Series are as follows:

	220/240 Volt	110/120 Volt
M800	10 amp	20 amp
M1200	10 amp	20 amp

Accordingly when multiple units are mounted in a rack, and share a common AC feed, care must be taken to ensure that the AC connector is of sufficiently high current capacity, otherwise the connector may overheat, with the risk of fire and/or breakdown.

4.6 Voltage Selection

Before use, the amplifier must be set to the local operating voltage. This is normally set at the factory for the country the unit is to be used in (i.e. 100, 110, 120, 220 or 240V). Check that the amplifier is set to the right voltage by checking the markings on the rear panel and the markings on the carton. The amplifier should only be used when set to the appropriate local voltage and operated from an AC mains of ± 10% of the selected line voltage. Failure to comply with these regulations may lower the performance of the amplifier and could lead to damage not covered under warranty.

4.7 AC Wiring

This unit must be connected to a three wire grounded outlet at the appropriate voltage (see 4.6).

Where required a mating AC cable (plug type CEE22-V) is supplied with each M Series amplifier. Should you need to wire your own mating connector it is essential to note that the earth pin is the central one in the connector.

The AC cable supplied is colour coded according to the European standard, which

Brown	=	+ Live
Blue	=	- Neutral
Green/Yellow	=	Earth/Ground

Where a fixed mains lead is fitted, the colour coding is to the American standard, which is:

Black	=	+ Live
White	=	- Neutral
Green	=	Earth/Ground

The cable supplied has bare wires at the other end for terminating in an appropriate plug. When wiring up the terminating plug it is essential that the earth wire is connected and that the supply feeder has a good earth connection. A poor earth connection may result in the amplifier chassis not being grounded, thus increasing the risk of electric shock.

If a number of amplifiers are connected via an AC distribution board and extension cable, care must be taken to ensure that the cable is of a heavy enough current capacity. The longer the cable the heavier the gauge required for safety and to prevent loss in the cable. It will also be necessary to ensure that the mains outlet is of sufficient amperage for the load (see also 4.4).

4.8 Balancing Option

The M Series will accept both balanced and unbalanced inputs. It is important to determine which signal type you will be using. This is governed by the signal output from the devices preceding the amplifier in the signal chain.

4.9 Balanced Signal - A Description

A low impedance signal can be balanced or unbalanced. A balanced signal is a three wire system, whilst unbalanced uses only two wires.

Until comparatively recently, signals could only be balanced using large low impedance matching transformers. However, these have a number of inherent limitations: sometimes introducing colouration into the sound, limiting the frequency bandwidth, adding weight, and are expensive. Modern technology has now produced a more reliable., cost-effective and technically

superior system; electronic balancing, where the signal is balanced by a small electronic circuit.

The advantage of a balanced signal is that it can reduce noise and reject interference, particularly where long cable runs are used, such as might be the case in a PA system where mixing console is in the auditorium, and its outputs are fed through equalisers and crossovers to the amplifiers at the stage. For a balanced system to be fully effective it is essential that the complete signal chain from source to amplifier is balanced. Thus it is imperative to ascertain whether the equipment in the signal chain has the option to be wired balanced, and how it has been previously wired.

A balanced signal uses three wires, one for ground, one for signal phase (+) and one for signal anti phase (-). When cabling a system it is important that phase polarity is carefully observed throughout the signal chain. This is harder than it sounds however, because although the XLR and 1/4" stereo TRS (Tip-ring-sleeve) are almost universally used as the signal connector for inputs and outputs to electronic signal processing equipment, there is no standard pin wiring. On XLR's Pin 1 is usually ground, but Pin 2 can be phase (+) or anti phase (-).

Accordingly when setting about wiring a balanced system, care must be taken with each piece of equipment connected in the signal chain.

4.10 Input Connections - Balanced

Signal input to the M Series is via female XLR connectors. The signal cable should be of good quality with an overall shield, to reduce hum and noise. For balanced operation the pin wiring is:

Pin 1	Ground (connects to the cable shield)
Pin 2	Signal Phase (+)
Pin 3	Signal Anti Phase (-)

4.11 Input Connections - Unbalanced

If using the input unbalanced the pin wiring is:

Pin 1	Not Connected (see note)
Pin 2	Signal Phase (+)
Pin 3	Ground (cable shield)

NOTE:

When using an unbalanced input, Pin 1 is usually left unconnected. This removes the possibility of ground loops and often offers some of the noise cancelling advantage of a truly balanced input. However, in some circumstances (when, for example the source equipment is not earthed)

leaving Pin 1 unconnected may cause hum at the amplifier output. In this case, connecting Pin 1 to Pin 3 (and the cable shield) is likely to eliminate the hum.

4.12 Speaker Wire

Any signal chain is only as strong as its weakest link. The importance of the speaker cable quality and diameter is frequently overlooked. There are several factors which dictate the type of cable you should use, e.g. the length of the cable run, the signal type going down the cable, the output power of the amplifier. Generally speaking, the lower the frequency, the longer the distance and the higher the output, the thicker the speaker cable must be. If the cable is too thin, signal output will be lost (most noticeably with bass frequencies) and the system damping factor will be reduced. If you are unsure about the type of cable you should use consult your local dealer for advice. Many loudspeaker enclosure manufacturers stipulate the appropriate cable for their speakers in their literature.

Cable Lengths

When connecting any loudspeaker system to an amplifier, it is recommended that the return resistance of the cable used is less than one tenth of the nominal impedance of the system or systems in parallel. Table 1 gives an indication of the maximum permissible cable runs for various conductor cross-sectional areas driving 4, 8 and 16 ohm loads.

Conductor CSA	Maximum Cable Run		
	4 ohms	8 ohms	16 ohms
$1.5mm^2$	17m	34m	68m
$2.0mm^2$	22m	44m	88m
$2.5mm^2$	29m	58m	116m
$4.0mm^2$	44m	88m	176m
$6.0mm^2$	66m	132m	264m

To work out the actual return resistance (R) for cable run of length (L), with each conductor having cross-sectional area (A), use the formula:

$$R = \frac{2 \times 0.017 \times L}{A}$$

4.13 Output Connections (also see 3.3)

Speaker outputs are via 2 x speakon connectors mounted on the rear panel and all connections must be made as in 3.3.

When you have wired up the whole system it is worthwhile checking the polarity of the system to confirm the system is 'in phase'. This is easily achieve with a proprietary phase checker.

For normal (two channel) operation one pair of wires will be connected to each speakon. Do not allow the wires to become crossed as this will short out the amplifier and may cause damage which will not be covered by the warranty.

For bridged mono operation, the wiring configuration is difference. The output should be taken between Channel A Pin 1+ (positive) and this wiring can only be used when the amplifier is switched to bridge mode (2.3, 5.4, 5.6) Channel B Pin 1+ (positive). This needs two speakon plugs with one wire taken from each.

If the amplifier is connected to speakers wired in the bridge mode without the internal bridging switch (see 3.7) being in the correct position serious damage to the amplifier and speakers will occur. The manufacturers warranty will not cover damage caused in this manner.

To activate the output, push the speakon plug into place and turn it clockwise until it clicks into place. To lock the plug, turn the locking ring on the speakon plug clockwise until it clicks.

SPEAKON

Connection to the speakon sockets can only be made with a speakon plug. The positive (phase) output should be connected to Pin 1+ of the speakon plug. The negative (non-phase) output should be connected to Pin 1- of the speakon plug.

For bridged mono operation, the output should be taken between channel A Pin 1+ (positive) and channel B Pin 1+ (positive). This needs two speakon plugs with one wire taken from each.

To activate the output, push the speakon plug into place and turn it clockwise until it clicks into place. To lock the plug in place, turn the locking ring on the speakon plug clockwise until it clicks. The speakon plug will no be safely secured.

4.14 Signal matching

The M Series input sensitivity is + 4dBu (= OVU or 1.2v RMS)

The input impedance is 20k ohms for all models. For the amplifier to achieve its full rated output gain it is important that the input signal is matched. Different types of pre-amplifier (e.g. mixing console, disco mixer etc) have different output levels. If the signal is too low the amplifier will not meet its

rated output, and if the signal is too high the signal will be 'clipped' (distorted) at maximum gain (see 1.6). If you are unsure consult your dealer.

4.15 Cable Routing

The majority of hum and noise problems are caused by poor cabling. This may take the form of badly made XLR connections (most often a missing screen termination), inadequately screened cable, or poor cable routing. In the event that hum at the output of the amplifier is experienced, first check that the input connectors and cable are correctly wired. Check that the cable used is of good quality, with an effective screen and preferably twisted inner cores. If all is well check the routing of the input cables. The input cables to the two channels should run together to the source equipment. The cables should be tied together with lacing cord or plastic cable ties, or better still be twisted together, which will tend to cancel any hum induced into the cable screen. Ensure that input cables are not in close proximity to any mains or output wiring. When there are multiple units in a rack it is preferable to tie all input cables to the amplifiers together, and to tie all mains leads to the amplifiers together (maintaining, of course, maximum separation between mains and input cables).

4.16 Grounding

Normally the ground switch should remain in the normal (left) position. In this position the audio ground (of the signal) is tied to the chassis of the amplifier which is tied to the AC ground. When you are installing your amplifier(s), however, it is possible that the interconnection of the various units, e.g. mixing console, equalisers, crossovers, amplifier(s), may result in a ground loop. A ground loop as such is not necessarily undesirable, but it often results in a hum on the output of the amplifier which is unwanted. Such hum is often caused by poor cabling (see 4.15). When testing the amplifier in the system at the end of installation, if excessive hum is present and the cabling has been checked as per 4.15, move the ground switch to the right position, which isolates the AC ground from the audio ground. This may be done with the amplifier switched on and the speakers connected without any adverse effects. If the hum reduces, the switch may be left in the ground lift mode. If it does not, move the switch back to its normal position and examine other pieces of equipment in the signal chain. Most of them should also be fitted with ground lift switches and by a process of trial and error it is usually possible to achieve the required result.

Another possible source of hum is poor cabling inside the rack (see 4.4).

5 OPERATION

5.1 Power Up

Plug in all signal input and output cables to and from the amplifier. If the amplifier is being used in a PA system then all the cables in the system should be connected including all the signals from the mixing console (i.e. the outputs via a multicore).

Ensure that the amplifier power switch is in the OFF position (up).

Ensure that both amplifier level controls are turned fully anti-clockwise to the OFF (nil gain) position.

Connect the AC cable from the amplifier or rack to the mains feed.

If the amplifier is being used in a PA system it is normal to switch on the mixing console and the crossover before the amplifiers.

Ensure that the console master gain controls are fully down or muted.

Ensure that the crossover gain controls are fully down or muted.

Switch the amplifier on by moving the switch to the DOWN position.

Observe that the green power LED comes on.

The M Series features a relay on each speaker output. This disconnects the load (i.e. speakers) automatically from the output of the amplifier when the amplifier is switched off. When the amplifier is next powered up the load remains disconnected for approximately two seconds, and is then automatically reconnected. This is because high power amplifiers are subject to high current 'transients' when switched on, which may potentially damage a speaker.

After waiting for a couple of seconds turn the level controls clockwise. Normally these controls will be in the full on position, i.e. all the way to the right. However it may be that to balance your speaker components you require less level to one unit than another. The level controls may be safely used for this purpose.

When switching on a whole rack of amplifiers they should be individually switched on one at a time. The practice of leaving all amplifiers in a rack switched on and powering up the whole rack by connecting it to the A/C is dangerous and likely to blow the mains fuse of the supply to the rack. As aforementioned power amplifiers are subject to high current transients when switched on, switching on a number of amplifiers simultaneously (i.e. as

described above) will possibly cause a current surge greater than the mains supply is capable of delivering, resulting in a mains fuse blowing.

5.2 Power Down

When you have finished using the amplifier, first turn the level controls anti-clockwise all the way off, then move the power on switch to the UP (off) position. The green LED should fade out. For safety it is advisable to disconnect the AC power feed before going any further. If you always follow this strict procedure the amplifier will be ready for you next time you need it.

Technical Note

The M Series amplifiers incorporate a thermistor controlled soft start circuit to reduce the in-rush current. At switch on, the resistance of the thermistor is high but rapidly drops to a very low valve thus giving control over the in-rush current.

If, however, the amplifier is turned off and back on rapidly, the thermistor may not have had time to return to its high resistance state resulting in possible failure of the chassis fuse or even the 13 amp mains plug fuse.

It is therefore recommended that after switching off the unit it not be turned on for at least 30 seconds.

5.3 Power Loss

If power to the amplifiers (or the whole system) is lost for any reason whilst in use the following precautions should be observed.

Mute the signal source outputs (e.g. mixing console) and pull the master level faders all the way down. When power is lost there is a natural tendency to push the faders up further to try and see if this will bring the sound back. Should this happen unexpectedly and the amplifiers regain power they will suddenly go to full power after the relays release the outputs, and this is likely to blow your speakers.

Turn the amplifier level controls down and switch the amplifiers off. If multiple amplifiers are being used and the power should come back on unexpectedly without the amplifiers being turned off, the AC surge may add to your problems by blowing a mains fuse generally in the most inaccessible place.

When the power has been restored follow the normal power up procedure, ensuring the console is powered (and muted) before switching on the amplifiers. Loss of power at a concert is never welcome, but lack of thought can turn a power loss into an abandoned performance. It is good practice to familiarise yourself with the location of the hall fuse box and to ensure that the

local hall manager has instructions that in the event of a loss of power it should not be reset without an 'all clear' from the sound crew.

5.4 Stereo Mode

In stereo mode, M Series amplifiers work as two separate mono amplifiers, housed in a single chassis, with separate inputs, outputs and controls. To operate as a stereo (two channel mono) amplifier the internal mode switch must be in the forward position (3.7) and the speakers wired appropriately (4.13).

WARNING

Disconnect amplifier from the mains before removing the cover to alter the mode switch for stereo or bridged mono operation.

5.5 Mono Parallel Mode

In mono parallel model M Series amplifiers work as two separate mono amplifiers fed with the same signal, but with separate level control of each output. For the amplifier to work in parallel mono mode a signal cable must be connected between the two channel signal inputs (4.10, 4.11). The speaker connections remain the same as in stereo mode (4.13, 5.4).

5.6 Mono Bridged Mode

In bridged mode the M Series amplifier utilises both channels as a single mono block. This is achieved by inverting the phase of channel B to produce output voltages twice as high as those available from a single channel. This higher output voltage is delivered into a single load. It must be remembered that in bridged mode the minimum load impedance has to be doubled, e.g.

Mathematically

$$\text{Power} = \frac{\text{Voltage}^2}{\text{Impedance}}$$

	Stereo Mode	Bridge Mode
Output voltage	50V	100V
Load	4 ohms	8 ohms
Power	625 watts	1250 watts

Bridge mode is usually employed when very high output levels are required to drive a specialist speaker enclosure which has a very high power handling. Operating amplifiers and systems in bridged mode requires extra care because of the higher voltage levels on the speaker lines. It is also worth

remembering that in the event of a failure more of the system may be lost than when it is being used in the conventional stereo manner.

To operate the amplifier in bridged mode the following procedure should be followed.

WARNING: Disconnect the amplifier from the AC.

Remove speaker wires if already fitted.

Remove the amplifier cover.

Switch the internal mode switch to the rear (2.3, 3.7).

Replace the cover.

Re-connect the speaker cables as described (4.13) after checking that the total speaker load is not less than 8 ohms.

Connect a signal input cable to channel A only. If there is a parallel signal link cable between channels A and B this must be removed.

Check that the power switch is in the off position.

Check that both level controls are at minimum fully anti-clockwise.

Re-connect the AC.

Switch the power switch to on. Check the power LED comes on.

Check that the yellow bridge LED is on.

Turn the channel A (left control pot) level control clockwise (when trying this application out for the first time it is advisable to turn the level to half power only and then feed audio into the amplifier to ensure everything is working). When you are satisfied that it is, turn the audio source down in level and turn the amplifier level up, then proceed in the usual way. In bridge mode the channel B level control has no function. Powering down should follow the normal procedure but should be set fully anti-clockwise.

5.7 Protection

The M Series has a number of internal electronic protection circuits to prevent damage occurring to the amplifier or the speakers.

If the working temperature of the amplifier rises above 90°C the amplifier will automatically shut down. The principle causes of over temperature can be:

a. the air vents are blocked
b. poor air circulation in the rack or housing
c. the fan has failed
d. incorrect load impedance
e. output cable short

To remedy the above see (2.6, 3.5, 4.3). When the temperature inside the amplifier drops below the safety threshold it will come on again automatically. Since this could result in speaker damage it is advisable to reduce the level controls by 50% until the amplifier has started working again. Beware: if an amplifier has shut down once through overheating it is likely to do it again, thus a thorough checking of the air cooling system and the output cables should be made at the first opportunity.

5.8 Cleaning

Dirt will accumulate inside the amplifier rack as well as inside the amplifier casing (4.3). To ensure continued reliability regularly clean the rack interior with a brush or vacuum cleaner. Vacuuming through the amplifiers vent and fan grill will also keep the fan clean and remove loose dust from inside the casing. Over a period of time however dust will accumulate on the internal heatsink which needs to be cleaned by a qualified technician. Consult your local dealer for further advice.

6 SPECIFICATIONS AND PERFORMANCE

6.1 General Specifications

Total Harmonic Distortion: Less than 0.1% from 5Hz-50KHz
Typically less than 0.03%

Input Impedance: 20kohms, balanced

Voltage Gain: M1200 - 32dB
M800 - 30dB

Hum and Noise: Better than -100dB referred to maximum output

Output DC Offset: +/- 50mV maximum

Output Rise Time: Less than 3 microseconds

Protection: Overtemperature: if the unit shall exceed its rated temperature, thermal sensors shut down the amplifier until a safe working temperature is reached.
Inputs: have radio frequency filters
V x 1 limiting circuits keep output devices within safe operating limits.

Current Requirements (240v):
M1200 - 10 Amps
M800 - 10 Amps

Minimum Load Impedance:
Stereo mode; 4 ohms per channel nominal
Bridge mode; 8 ohms nominal

Dimensions: Front panel: 482mm x 88mm - 19" x 3.5" (2U)
Front to Back: 427mm (16.5") (including rear mounting support) x 83mm (3.25") high

Weight	Boxed	Unboxed
M1200	20kg	18kg
M800	20kg	18kg

6.2 Stereo Specifications

Both channels driven, continuous average power at 1kHz 0.1% distortion:

M800	4 ohms - 400 watts	8 ohms - 260 watts
M1200	4 ohms - 600 watts	8 ohms - 400 watts

6.3 Mono Specifications

Continuous average power at 1kHz 0.1% distortion:

M800	8 ohms - 800 watts
M1200	8 ohms - 1200 watts