

OCTAVE

MRE 220

INTRODUCTION

Congratulations and thank you for choosing OCTAVE!

MRE 220

You are now the owner of one of the world's most innovative and reliable amplifiers. Look after it, and it will provide you many years of listening pleasure.

You often hear people claim that tube amplifier design has not progressed for years. The operating principles of tubes have indeed been documented extensively and are well known to amplifier designers. Of course, the same can be said for transistor amplifiers.

However, advances in both technologies are still possible thanks to the development of innovative and improved components, our greater appreciation of the fundamental principles and, of course, deeper and more advanced insights into the interaction of amplifier and loudspeaker. With tube amplifiers in particular, a general reluctance to depart from the classic circuit designs has not done the technology any favors. Although today's loudspeakers and source equipment provide better performance than ever before, they also present greater demands on amplifiers. Modern sound reproduction equipment delivers a level of performance at a price that simply would not have been possible 20 or even 10 years ago.

These advances have been achieved through the application of the latest technological developments as they become available and affordable. OCTAVE has specialized in tube amplification for the past 25 years, during which time we have developed a number of innovative technologies that have earned us a reputation as one of the leaders in the field.

Here's wishing you many happy hours of musical pleasure!



Andreas Hofmann

CONTENTS

	Page
Introduction	3
1. Description of the MRE 220	7
2. Safety instructions	8
2.1 Before you begin	8
2.2 Placement	9
2.3 Warranty.....	9
3. Getting started.....	10
3.1 Unpacking, package contents	10
3.2 Removing the grille	10
3.3 Installing the power tubes	11
3.4 Switching on for the first time: the soft-start feature	11
3.5 Checking the tubes (BIAS).....	12
3.6 Connecting the unit	12
4. Front panel controls	13
5. Rear panel connections	14
6. Advanced functions	16
6.1 Power selector, alternative power tubes	16
6.2 Soft-Start, Inrush current limitation	16
6.3 Electronic Protection System	17
6.4 Muting.....	17
6.5 Ecomode (power saving mode)	18
6.6 Electronic XLR-Input	19
6.7 Option: Transformer coupled Input	19
6.8 Ground Lift	19
7. Tubes	20
7.1 Removing the grille	20
7.2 Tube layout	20
7.3 BIAS measurement facility	21
7.4 Replacing the tubes	24
7.5 Running in the tubes	24
7.6 Tube service life	24
8. Using Black Box or Super Black Box	25
8.1 The Black Box option	25
8.2 The Super Black Box option	26
9. Troubleshooting	27
10. Specifications and dimensions.....	28
11. Frequently Asked Questions (FAQ)	30

1. DESCRIPTION OF THE MRE 220

The newly designed MRE 220 mono power amplifier is based on the ultra-reliable MRE 130 and the award winning RE 290 models. The RE 290 was designed for the newly developed KT 120 power tube. This model won the prestigious Golden Sound Award from Hifi Magazine Stereo Sound in Japan and is used as a reference amplifier by many editors. The MRE 220, Octave's second amplifier designed for the KT 120, achieves a performance that was previously deemed impossible with tube amplifiers. The output power climbs up to 220 W RMS into 4 Ohms with 300 W Impulse Power. Just to mention a few key specs: The Power Bandwidth at full power ranges from 20 Hz up to 70 kHz. The amplifier is stable down to 2.5 Ohm speaker impedance and the S/N ratio is higher than -116dB. The input section can be optionally equipped with a Balanced Input Transformer. Such an Input Transformer eliminates effective ground loops and high frequency noise on the ground Line which can affect the sound.

BIAS Measurement

The MRE 220 is fixed **BIAS**, and utilizes external precision BIAS trim pots and LED confirmation which allows the user to readily monitor the output tubes and simply correct their BIAS individually at the front panel of the unit without the need of a micrometer let alone any special knowledge or tools – just the supplied 3 mm flat-head screwdriver.

Black Box Option

The MRE 220 is fitted with a connector for the optional Octave “**Black Box**” capacitance modules – available in normal and “Super” versions. The use of the Black Box or Super Black Box significantly increases power supply capacitance to stabilize current delivery and reduce impedance interaction of the load, thus improving dynamic range, separation, depth, soundstage size and articulation. This enables optimizing the MRE 220 in respect to the speaker, which is a tremendous benefit if the speaker is difficult to drive.

Input Section

Unlike other designs, the MRE 220 offers single ended RCA and true balanced XLR inputs with a very high common mode rejection ratio that eliminates unwanted hum and high frequency distortion induced in the small signal connection to the preamp.

Power Management

The MRE 220 input and output tube heaters as well as its high-voltage rails are logic-controlled to ensure that the conduction of the output tubes as well as the input stage voltages are constantly monitored and controlled by the **Power Management System**, which serves to protect the vital internal parts (tubes, rectifier, electrolytic caps, switches, etc.) against excessive turn-on current. This increases the lifetime of not only the tubes, but all power related components as each derives benefit through this system.

Ecomode

The **Ecomode** serves to reduce heat and unnecessary power consumption when the unit is switched on but not in use. After 10 minutes without receiving signal, the MRE 220 Ecomode is activated, turning down the power. In this “sleep” mode, the MRE 220 draws only 20 W Idle current. Therefore, the unit produces no heat while it remains switched on. When a music signal is once again detected by the MRE 220, the Ecomode circuit will power the unit back on, with a short warm-up/start-up delay (approximately 35 seconds) before the unit will operate.

The Ecomode also serves to increase the lifetime of the tubes, while providing an added benefit of **increased safety** allowing the MRE 220 owner a level of security against any problems when leaving the unit switched on.

2. SAFETY INSTRUCTIONS

2.1. Before you begin

Before using the MRE 220 for the first time, remove the grille and install the power tubes! (See Section 3.2 "Removing the grille"). Replace the grille before switching the MRE 220 on. Operating the amplifier without its protective grille is dangerous and not recommended.

In case of emergency: unplug the unit from the wall outlet

Never use an amplifier that is damaged or faulty. Make sure that no one can use it until it has been repaired by a qualified service technician. Ensure that there is easy access to the IEC socket and power cord.

Do not open the case

There are dangerously high voltages and hot tubes inside this equipment. To avoid a burn or the risk of electric shock, never allow anyone except qualified personnel to open the case.

Servicing and maintenance

For reasons of safety, please ensure that any servicing, repairs or other modifications to OCTAVE equipment are carried out only by a qualified technician. Always get an engineer to replace blown fuses with ones of the same type and rating. If your amplifier requires servicing, please ship or take your equipment directly to OCTAVE or to one of our authorized service centers.

Modifications to OCTAVE equipment

Use "audio grade" fuses and other power cables at your own risk. The use of such devices will void the warranty. This also applies to the use contact fluids on the tube sockets.

Explanation of the warning symbols:



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



The exclamation point within an equilateral triangle is intended to alert the user to important operating and maintenance instructions

Before connecting up

Make sure that the voltage of your amplifier matches your electricity supply voltage.

Grounding

This amplifier is a protection class I device (with an earth conductor). To avoid the risk of electric shock in the event of a fault, the unit must be grounded. To do this, use the power cable supplied with the amplifier.

2. SAFETY INSTRUCTIONS

2.2. Placement

1. Location

OCTAVE equipment is designed strictly for use in a dry domestic environment. Do not use it in the open air or in damp environments!

Never place plants or liquid-filled containers on your OCTAVE equipment. Take care to avoid dropping objects or spilling liquids into the case. Should this happen, remove the mains plug immediately and have your amplifier checked by a qualified service technician.

Condensation may form if the amplifier is taken from a cold environment into a warm one. If you do this, wait until the amplifier has reached room temperature and is dry before switching it on.

Avoid installing the unit close to sources of heat such as radiators or anywhere that may be in direct sunlight.

Do not operate the unit near flammable materials, gases or vapors. Avoid areas where there may be heavy accumulations of dust or where the unit may be subject to mechanical vibration.

Place your OCTAVE amplifier on a stable, level surface.

2. Grille

Never operate the amplifier without the protective grille in place.

3. Ventilation

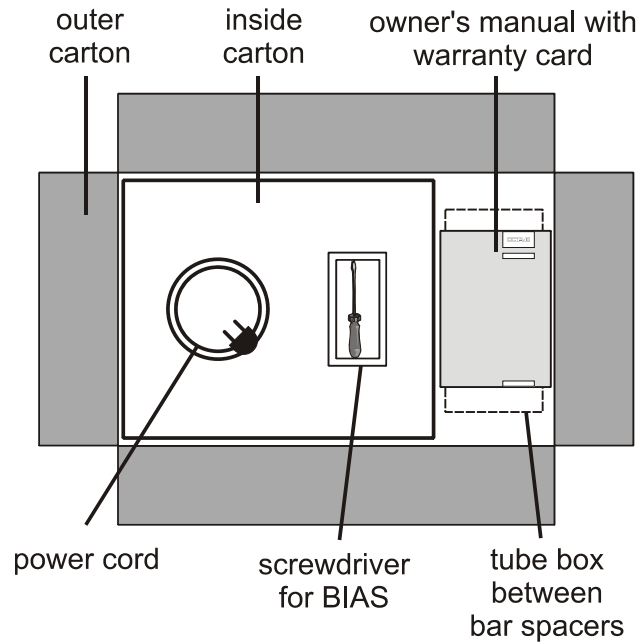
Make sure that your amplifier has an adequate flow of air around it. If you intend to install your equipment into a cupboard or on a wall shelf unit, ensure that there is at least a ten centimeter (4 inch) gap between the ventilation slots and the walls all around the amplifier. The rear panel of cupboards should have ventilation holes to prevent heat build up. Do not rest the equipment on a soft surface such as carpet or foam sheeting.

2.3. Warranty

OCTAVE can only guarantee the safety, reliability and performance of this unit if modifications and repairs are carried out by specialized personnel and when the amplifier is operated in accordance with the instructions contained in this manual.

3. GETTING STARTED

3.1. Unpack and check the contents of the box.



Package contents standard

- MRE 220 serial equipped with 5 x KT120 power tubes
- 5 power tubes packed separately with tube layout diagram
- Power cord
- 4.0 x 100 flat-bladed screwdriver for adjusting the bias
- Owner's manual with warranty card

3.2. Removing the grille

Operating the amplifier without its protective grille is dangerous and not recommended.

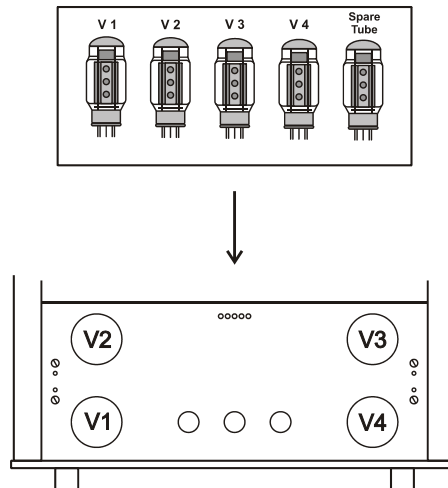
To remove the grille:

1. For your own safety, switch the amplifier off using the on/off switch or disconnect the power cord.
2. Pull the grille upward to remove.

3. GETTING STARTED

3.3. Installing the power tubes

The power tubes are packed in a separate box in the tube compartment



Insert the power tubes into their sockets as shown on the tube layout. Ensure that you correctly locate the anti-rotation lug on each of the tubes.



Anti-rotation recess on the tube socket

3.4. Switching on for the first time – the Soft-Start feature

The MRE 220 is equipped with a multi-stage Soft-Start-Turn-On protection circuit which extends component as well as tube life considerably by protecting against stress caused by typical high inrush currents during switch on.

- 1) Connect the MRE 220 to the mains.
- 2) Switch on the MRE 220 using the amplifier's mains power on/off switch (see chap. 4 front panel ①). The Power-LED ③ will illuminate.
Turn the Input Rotary Selector ② to Muting – the Muting LED ④ goes out
Turn the Function Rotary Selector ⑤ to Eco off – the Ecomode LED on the top side goes out. (see chap. 6.4 Ecomode)
- 3) After approx 30 seconds you hear a relay click noise. The soft start phase is finished and the power tubes start to work.

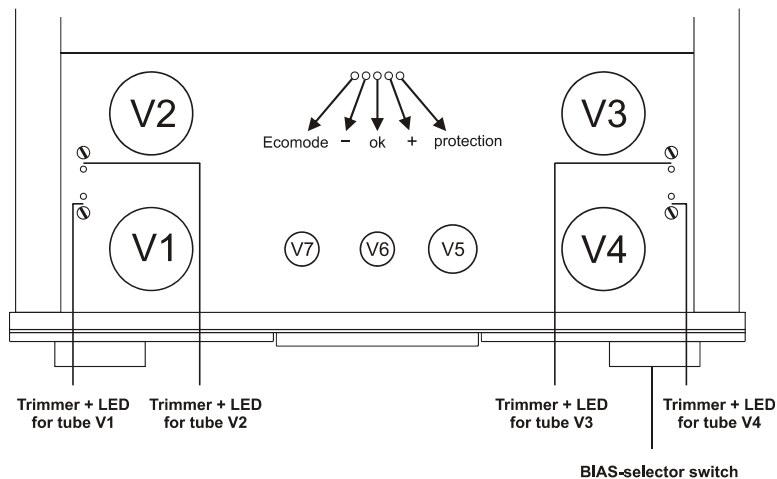
3. GETTING STARTED

3.5. Checking the power tubes – setting the BIAS

For the first function check you don't have to connect the loudspeakers or the preamp. The trim pots are located next to their respective tubes. Next to each trim pot you will see a pilot lamp, which shows which tubes have been selected with the bias selector switch. A row of LEDs in front of the transformer cover assists you in setting the bias correctly. It shows three conditions: bias too low, correct, and too high.

Before checking the BIAS please wait five to ten minutes. Because the tubes are still cold you would adjust the wrong BIAS

Turn the BIAS-selector switch clockwise to position V1 = BIAS setting for the tube V1. The LED next to the tube will illuminate, and one of the three BIAS LEDs will illuminate, normally first the Minus LED, than the OK-LED.



The LED display:

Ecomode LED	Indicating the status of the Ecomode (see chapter 6.4)
Yellow "-" LED	BIAS setting of the selected output tube is too low
Green "OK" LED	BIAS setting of the selected output tube is correct
Yellow "+" LED	BIAS setting of the selected output tube is too high
Red "off" LED	Indicates that the electronic protection has switched off the amplifier (see chapter 6.2)

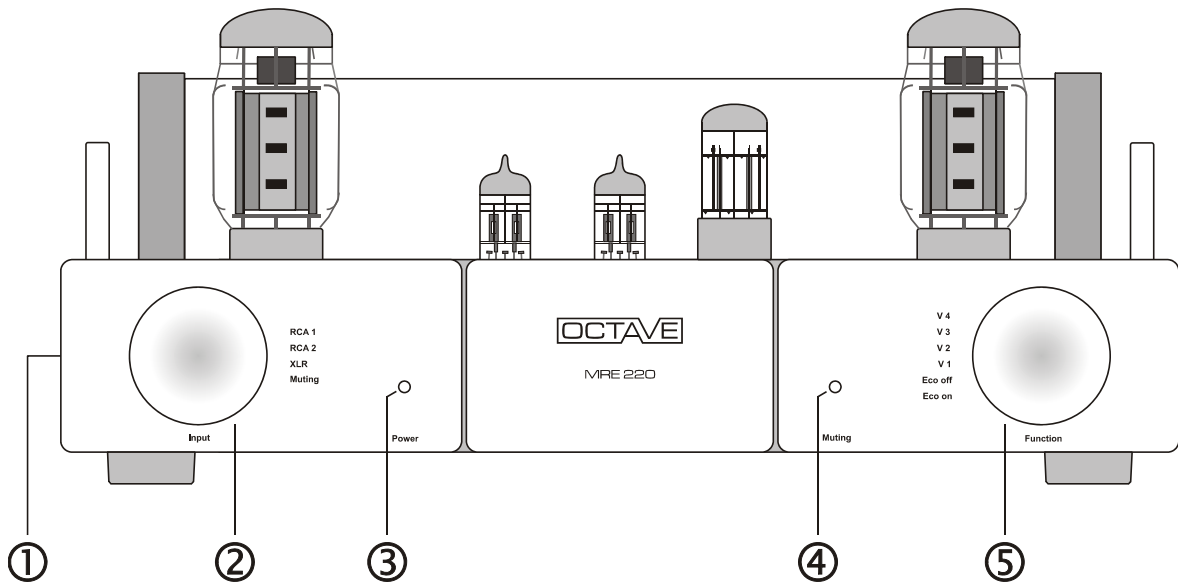
After an additional 5 to 10 minutes, the BIAS control LEDs will change from yellow to green in case the BIAS Measurement Electronic is switched to tube 1 for example. This indicates the correct BIAS. Check all four tubes and switch OFF the BIAS electronic during listening. This is the ECO Off position.

If you notice any irregularity ("+" = High BIAS) in the display please refer to chapter 7.3.

3.6. Connecting other components to the MRE 220

- 1) Make sure that the MRE 220 is switched off !
- 2) Connect the other components in your system to the appropriate sockets on the rear of the MRE 220. (See chapter 5 "Rear panel connections").
- 3) Check that the switch positions on the front and rear of the amplifier are in their recommended settings.
- 4) Switch on the MRE 220 using the on/off switch ① and wait a few minutes until the unit is powered. Now you can listen to music.

4. FRONT PANEL CONTROLS



① **Mains Power Switch**

0 = off; 1 = on. The Power LED ③ illuminates that the unit is ON

② **Input Selector**

This is used to select the desired input signal.

RCA 1: RCA Input, direct coupled

RCA 2: The same RCA Input, but with different internal connection, see Chapt. 6.6, 6.7

XLR: Balanced XLR Input, see Chapt. 6.6, 6.7

Muting: Muting Function of the Input's, see Chapt. 6.5

③ **Power LED**

lights up when the Power Switch ① is on 1

④ **Muting LED**

goes out when the Input Selector Switch ② is in position "Muting"

⑤ **Bias Measurement and Ecomode Selector**

Eco On: The Ecomode facility is activated, the Ecomode LED lights up in green

Eco Off: The Ecomode facility is disabled, and simultaneously the BIAS measurement facility is Off.

Position V1 - V4: The BIAS measurement facility is connected to the relevant tubes.

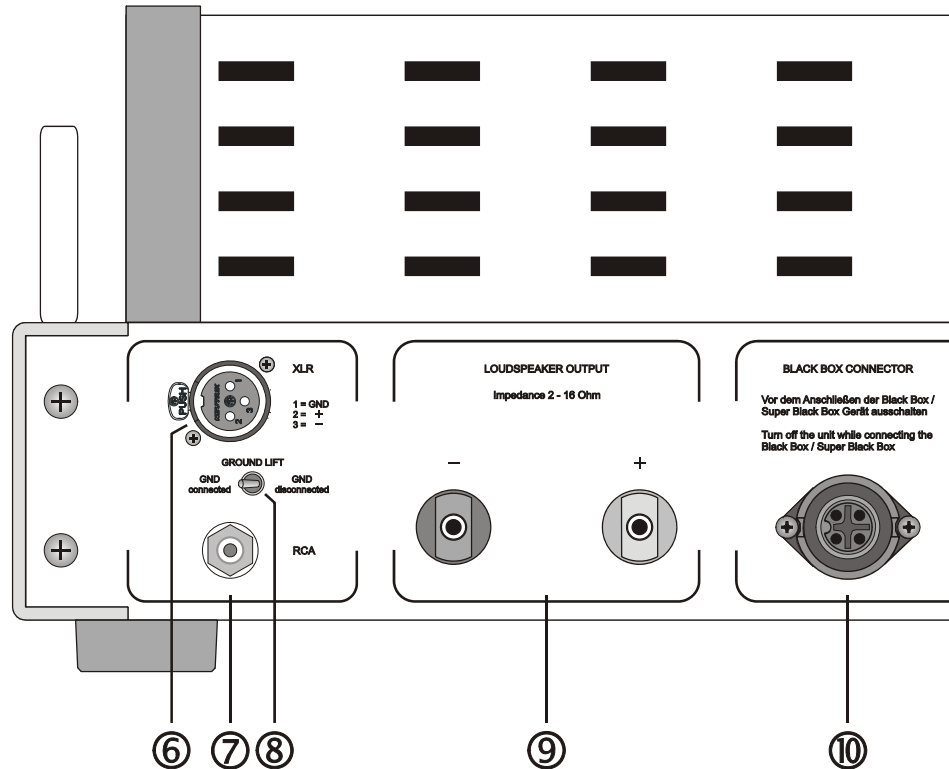
To ensure the accuracy of any adjustment, switch On the Muting function

NOTE:

The MRE 220 is equipped with a Soft-Start circuit and a Power-Up delay timer.

The amplifier is ready for use after a delay of approximately 2 minutes. Because there are no relays in the signal path, a low-level, slightly distorted signal from your source equipment may be heard through your loudspeakers during warm-up. This circuitry extends tube service life and also protects the power section from voltage spikes and excessive inrush currents.

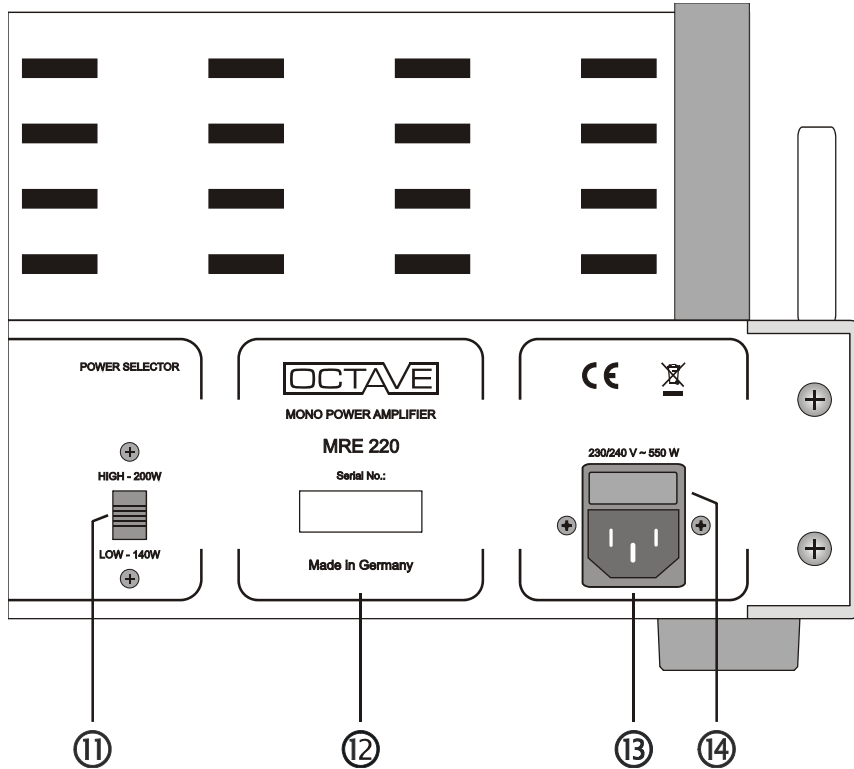
5. REAR PANEL CONNECTIONS



- ⑥ **XLR Input** Pin 1: Ground, Pin 2: +, Pin 3 –
- ⑦ **RCA Input** RCA Cinch Input:
Input for preamplifier (using RCA Cinch interconnect)
- ⑧ **Ground Lift** Allows connecting or disconnecting the ground connection of the XLR and RCA Input, if the option “Input Transformer” is installed.
In the standard configuration (electronic Input) the value for the position “Disconnect” is 18 Ohm
- ⑨ **Loudspeaker Terminal** Binding posts to connect the speaker cable.
Red = positive terminal, Black = negative terminal.
You can connect either 4 mm Banana connectors or spades.
The negative speaker terminal is connected to ground.
- ⑩ **Black-Box-Connector** The (Super) Black Box is an outboard power supply capacitance upgrade for the power amplifier section (see chapter 8).
You should switch off the MRE 220 using the power switch before connecting and disconnecting the Black Box!



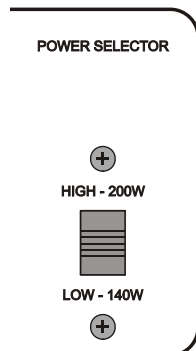
5. REAR PANEL CONNECTIONS



- | | | |
|---|-----------------------------------|---|
| ⑪ | Power Selector | Sliding switch to adjust the output power of the MRE 220 depending on the Output Tubes.
(see Chapter 6.1) |
| ⑫ | Model identification plate | Model and Serial Number |
| ⑬ | Mains supply receptacle | IEC socket with integrated fuse holder.
The fuse is located in a pullout compartment above the socket. You can open the fuse compartment after removing the mains plug |
| ⑭ | Fuse holder | Fuse for 230/240V: 4 H slow-blow IEC Type (5 x 20 mm).
Fuse for 115/120V: 6.3 H slow-blow IEC Type (5 x 20 mm)
Fuse for 100V: 8 H slow-blow IEC Type (5 x 20 mm). |

6. ADVANCED FUNCTIONS

6.1. Power Selector, alternative output tubes



Position „HIGH“:
KT120

Position „LOW“:
KT88, 6550, KT90, KT100
(EL34 with Restrictions)

The Power Selector allows adjusting the MRE 220 in accordance to the output tubes. Position HIGH is reserved for the standard KT 120 tubes. In the HIGH Position the MRE 220 is able to deliver up to 220 W RMS Output Power. The slightly weaker tubes type KT 88 or 6550 can be used in the position LOW. In this position the maximum output power is limited to 140 W to avoid overloading these tubes. The rather rare tubes of type KT 90 and KT 100 can be used also in the LOW position.

The EL 34 can be used in the LOW Position in cases of speakers with an impedance higher than 4 ohms.



Tubes of Type 6L6, KT 66, 5881 are not recommended for the MRE 220
EL 519 and EL 156 are not suitable for the MRE220.
Before switching the Power Selector turn OFF the mains rocker switch

After switching from power LOW to HIGH and vice versa the BIAS should be corrected in case of using the same output tubes. Normally there is only a slight correction necessary.
When using different tubes the BIAS has to adjust according to chapter 7.3

6.2. Soft-Start, Inrush current limitation

The MRE 220 input and output tube heaters as well as its high-voltage rails are logic controlled to ensure that the conduction of the output tubes as well as input stage voltages are constantly monitored and controlled by the **Power Management system** to protect the vital internal parts (tubes, rectifier, electrolytic caps, switches, etc.) against excessive turn-on current. This increases the lifetime not only of the tubes, but also the caps, while all power related components derive benefit through this system.

The Soft-Start is always activated within the first 60 seconds after the unit is switched on. During this time you cannot listen.



During the Soft-Start-phase, adjusting the BIAS is not possible.

6. ADVANCED FUNCTIONS

6.3. Electronic Protection System

The MRE 220 features a comprehensive electronic monitoring and protection system. This system will automatically switch off the MRE 220 in case of a fault occurring in the power section. The protection system has been designed to keep the unit safe from the consequences of overloads of any kind and to protect the output tubes from current surges.

The RED "Protection" LED lights up to indicate that the protection system has tripped.



The amplifier will not play music once the protection system has tripped and you will not be able to check or adjust the BIAS setting.

The BIAS LEDs will show "yellow" for each of the four output tubes.

If a Black Box or a Super Black Box is connected to the MRE 220, the front panel (operate) LED of the Black Box / Super Black Box will go out. If the Super Black Box is connected, tripping the protection system will automatically activate the discharge circuit of the Super Black Box (see chapter 8.2).

The following conditions can cause the protection system to trip:

- Overdriving the MRE 220 to excessive levels or with excessive levels of low frequency.
- A speaker cable short circuit while the speakers are being driven at high listening levels.
- A fault in one or more of the output tubes.
- A fault in one of the preamp tubes which overloads the output stage.

Once the protection system has cut in, the only way you can turn the MRE 220 back on, - is to turn the on/off switch off and then on again. Allow the unit two minutes to cool down before switching it back on. If possible, identify and eliminate the cause of the problem (see chapter 9 "Troubleshooting").

If it is not clear what has caused the protection system to trip, we recommend that you check the BIAS before attempting to use the amplifier again. Tube faults can often result in widely varying BIAS settings. When these settings exceed a particular value they can cause the protection system to trip.

6.4 Muting Function

The Muting Function is switching Off the RCA and the XLR Inputs of the unit. In this way you can connect or change the cables without the need of switching Off the unit. You can connect or disconnect the signal or speaker cables in this mode.

6. ADVANCED FUNCTIONS

6.5. Ecomode (power saving mode)

The **Ecomode** serves to reduce heat and unnecessary power consumption when the unit is switched on but not in use. After 10 minutes without receiving signal, the MRE 220 Ecomode is activated, turning down the power. In this “sleep” mode, the MRE 220 draws less than 20 W Idle current. Therefore the running unit produces no heat, because the heater voltage and the high voltage for the power amplifier section are switched off. When the music signal is once again sensed by the MRE 220, the Ecomode circuit will turn the unit back on, with a warm-up/start-up delay of approximately 30 seconds before the unit will operate.

The Ecomode also serves to increase the lifetime of the tubes, while having an added benefit of **improved safety** allowing the MRE 220 owner a level of security against any problems when leaving the unit powered on. The Ecomode is a safety and energy-saving feature that automatically switches off the amplifier's tube circuitry during breaks of more than 10 minutes.

Ecomode reduces the overall power consumption of the amplifier to under 20W, compared with 180W in normal operation. When detecting a signal, the MRE 220 reactivates automatically and is ready for use again within 30 seconds.

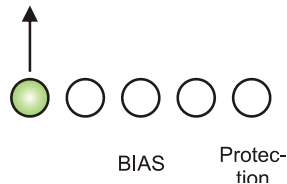
Eco off:

The Ecomode function is off, the Ecomode LED on the top doesn't burn

Eco on:

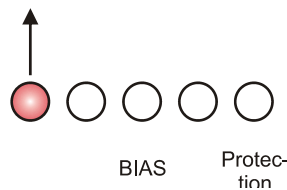
LED display on the top side:

Ecomode on: LED lights **GREEN**



The Ecomode function is activated. The Ecomode LED lights up in GREEN.

Ecomode on: LED lights **RED**



After a 10-minute silence, Ecomode turn the Unit down. The Ecomode LED changes to RED indicating that the Ecomode circuit is powering down the unit.

Note:

If you switch the MRE 220 on with Ecomode active, it will go through the start procedure. If it fails to detect a music signal, it will shut down after 10 minutes. Ecomode is not the same as standby, however, because certain sections of the amplifier remain on.

Important!

You cannot adjust the BIAS in Ecomode once the amplifier has powered down!
The signal switching level of 0.6mV results in approx. 40µW output power of the MRE 220.
In case of a speaker with a high efficiency an adjusted listening level can be lower than this value. The Ecomode would drive the unit down. In such cases the Ecomode should be switched off

6. ADVANCED FUNCTIONS

6.6 Electronic Balanced Input Circuit

As standard the Balanced Input is equipped with a precision low noise electronic balanced input receiver. The Gain of this converter is 0dB, which means that in case of the usual +6dB of the balanced signal of an electronic balanced preamplifier you will have a slightly higher Output level in respect to the RCA connection.

In Position RCA 2 the Balanced Input Converter is switched into the single ended Mode and is connected to the RCA Input. This is helpful in cases the preamplifier has a high Output resistance. Driving the MRE 220 via RCA with a preamplifier's Output Impedance of more than 500 Ohm the sound of the MRE 220 can degrade.

6.7 Option: Transformer Coupled Input, XLR and RCA

If the Transformer Coupled Input is installed, the electronic Balanced Input is replaced by an Low Distortion Wideband Transformer.

In respect to the sound the transformer solution offers unaffected sonic characteristics. A great benefit is the possibility to disconnect the ground connection of the preamplifier to the power amplifier (see Chap 6.8)

With the transformer option the XLR Input is connected to the transformer only with its Plus and Minus connections. This is a true balanced connection that requires a true balanced output of the preamplifier.

In the position RCA 2 the transformer is switched to the Single Ended Mode, similar to the way we have in the standard version. Driving a transformer via a Single Ended Signal (RCA) is a very practical way to isolate the preamplifier and the power amplifier from the mains distortions. With this unique feature we have the benefit of the transformer not only with the balanced connection.

The output resistance of the preamplifier should be less than 500 Ohm. If the Output of the preamplifier is capacitor coupled (this is normally the case in all tube preamp designs), the output Cap should be higher than 4.7 μ F. If the Cap is smaller you will have a peak in the low frequency range depending on the output resistance of the preamplifier. If the bass is overlaying the midrange you should choose the RCA 1 position.

If you notice a loud pop when switching the input from any input to another input there must be a DC Offset of the preamplifier. DC Offset voltages can be seen in DC coupled preamplifier designs. If the Offset voltage is too high please ask your local dealer if there is the possibility to adjust the Offset of the preamplifier's Output Stage. The DC Offset can vary during the lifetime or temperature of a unit.

6.8 Ground Lift

The ground lift allows switching the ground connection of the MRE 220 to the preamplifier between zero and a high impedance.

If the standard input is equipped the ground resistance in the position "connected" is 0 Ohm and in the position "disconnected" it is 18 Ohm.

In most cases you should choose the position "connected", independent from using XLR or RCA. Only in cases of problematic Ground-Earth situations with a noticeable hum you can use the position "disconnect".

In the case the transformer option is installed the same conditions are valid. But due to the transformer the resistance in the position "disconnect" is much higher. This helps to reduce effectively the Hum of Ground Loops and to reduce the noise of the ground - earth line. In today's AC Power Supply Lines there are high levels of high frequency signals caused by the switched power supplies of computers and other digital equipment. This wideband noise is affecting the sound not only of a power amplifier, also the preamplifier and other components of the combination are benefiting from the reduction of the total mains noise.

7. TUBES

7.1. Removing the grille

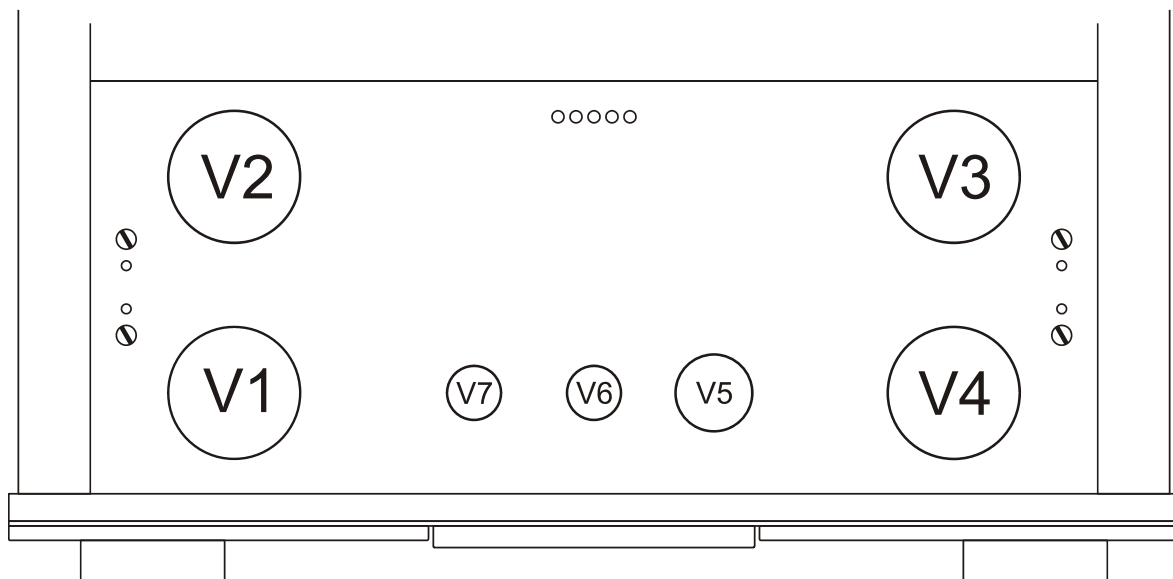
Operating the amplifier without its protective grille is dangerous and not recommended.

To remove the grille:

1. For your own safety, switch the amplifier off using the on/off switch or disconnect the power cord.
2. Pull the grille upward to remove.

See chapter 3.2.

7.2. Tube layout



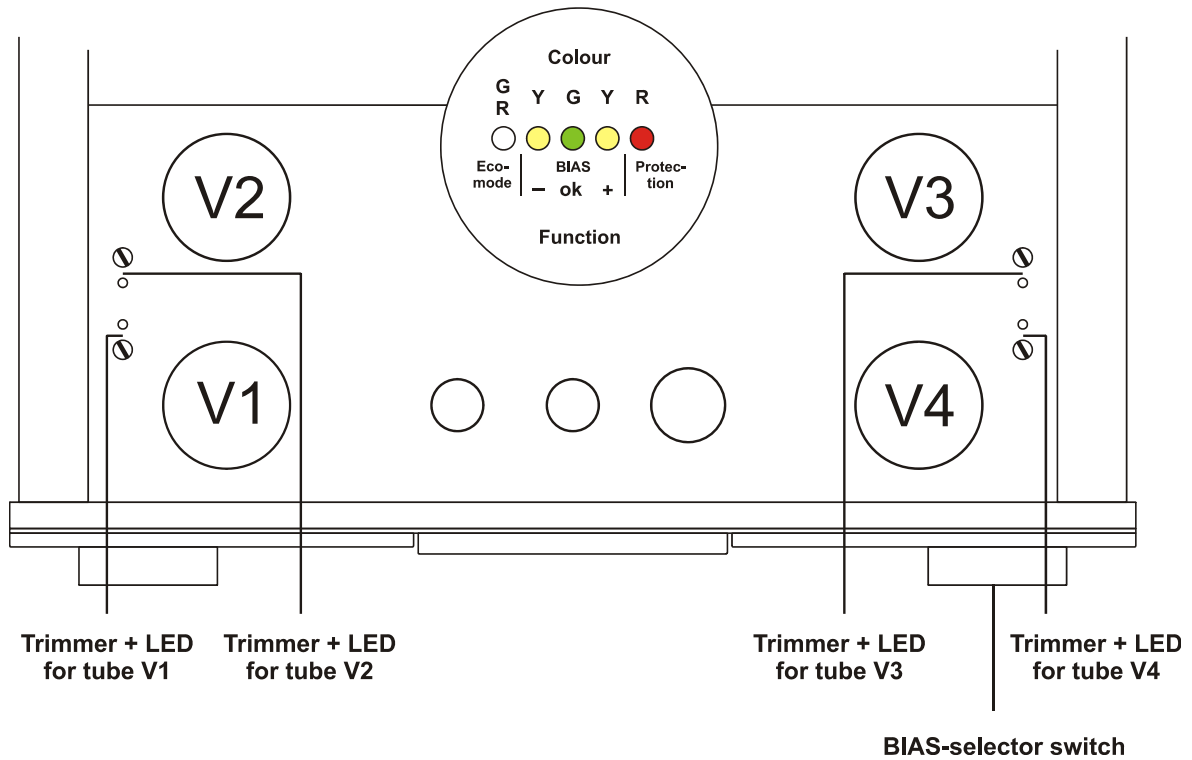
Output tubes: V1 - V4: KT 120 TS standard

Driver tubes: V5, 6SN7 (GTB)

V6, V7 ECC802 (= ECC 82,12 AU 7, 5814, 6189)
V 6 should have a system Gain match close to 0.2dB

7. TUBES

7.3. BIAS measurement facility



The BIAS measurement facility makes it easy for you to check and adjust the idle current of the output tubes. Getting the BIAS setting right for all four tubes is critical for both the sound of the power amplifier section and for the service life of the tubes. This feature guarantees consistent sound quality over the entire lifetime of the output tubes.

That is why we have built this BIAS measurement facility into the MRE 220 – to allow you, the user, to carry out the adjustment yourself without the need for test equipment. The use of precision op amps makes it possible for you to set the BIAS to accuracy within 0.2%, making it superior to any other method.

Using selected output tubes only makes sense if the idle current is adjusted accurately, as is clearly shown in Fig. 1 Technical Data.

The LED display:

Ecomode LED	indicates the status of the Ecomode Electronic
Yellow - LED	indicates that the BIAS is Low
Green OK LED	indicates that the BIAS has the correct value
Yellow + LED	indicates that the BIAS is too high
Red OFF LED	indicates that the Protection Electronic has turned off the Power supply of the Tube section

7. TUBES

How to set the BIAS

Make sure that no signal is playing through the amplifier when you are adjusting the BIAS. It is sufficient to turn your preamp volume control to 0, or you switch on the Muting; there is no need to disconnect the speakers.

The tubes should have reached operating temperature. The unit should run at least 15 minutes before you adjust the BIAS. If you notice high BIAS at one or more of the output tubes in cold state you should reduce the BIAS in any case.

Procedure:

- 1) Turn the volume control on your preamp to 0.
- 2) Set the bias selector switch to V1. The green LED next to the trim pot for tube V1 will light up to show that you have chosen to adjust the bias for tube V1.
- 3) The bias setting for this tube is correct when the green OK LED on the display illuminates.
 - If the yellow + LED illuminates, the bias is set too high.
 - Turn the trim pot counter-clockwise until the OK LED illuminates.
 - If the yellow - LED illuminates, the bias is set too low.
 - Turn the trimmer clockwise until the OK LED illuminates.Repeat this procedure with the other three tubes
- 4) Switch the bias selector back to its "off" position.

If there is no change in the BIAS of a tube while turning the BIAS regulator, the corresponding output tube is faulty.

Note:



It is not possible to adjust the bias if the amplifier's electronic protection has cut in (as indicated by the red "off" LED in the display), or if the Ecomode has powered down the unit. When you activate the measuring facility under these circumstances, the- LEDs will illuminate for all tubes. You must fix the fault or switch off the Ecomode before using the measuring facility. If a defective tube is causing the problem, you should locate and replace it. (See Troubleshooting Chapter 9)

7. TUBES

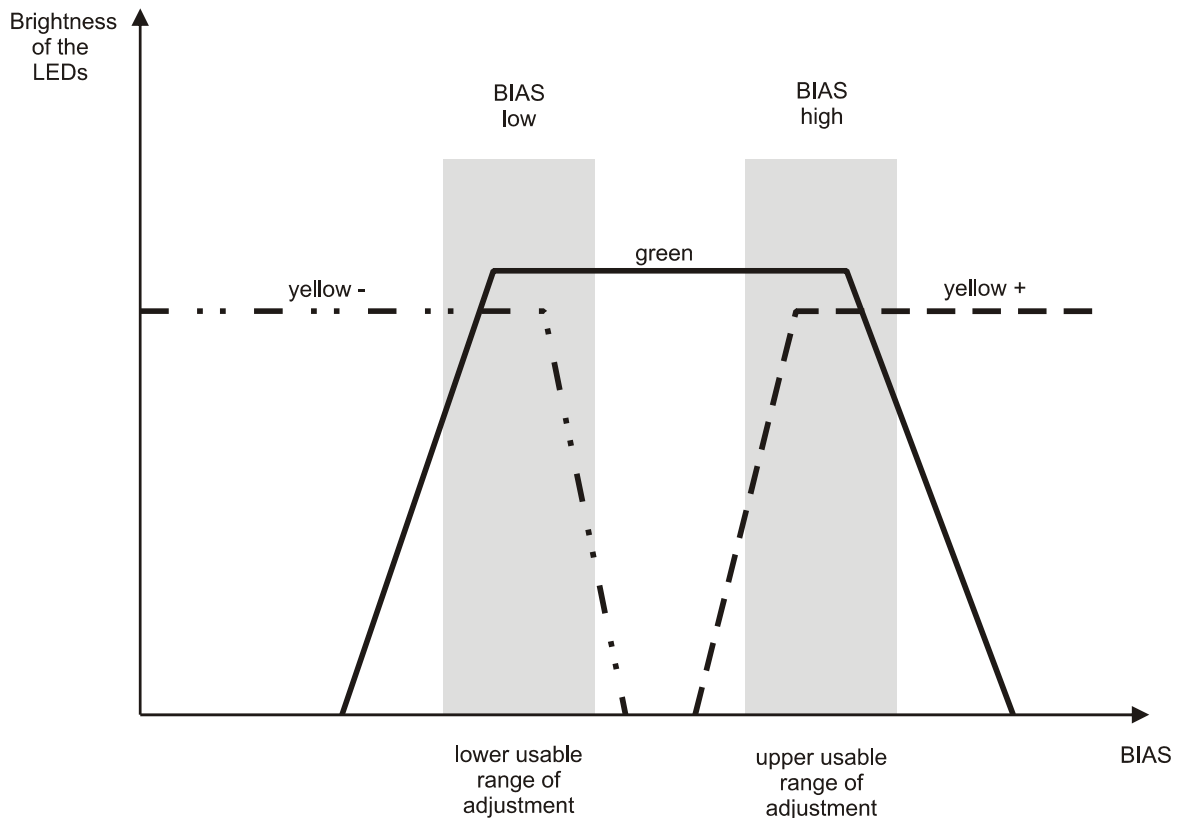
LED graphs, advanced adjustments of the BIAS setting

There is an upper adjustment limit to the "high" BIAS setting, which is indicated by the green and red LEDs lighting up at the same time, and a lower limit to the "low setting, where the yellow and green LEDs light up. The lower limit should be used with "smaller" output tubes such as the KT 88, KT100, 6550, KT 90, EL 34 and similar. The upper value, which provides a higher BIAS current for the output tubes, can be used with the KT 120 in both positions of the power selector.

Exception: The BIAS high setting can also be used with the KT 88 in the power LOW position.

Certain loudspeakers may benefit from the higher BIAS current, as it will increase the damping factor and provide slightly better control of the speakers.

LED graphs



The BIAS LOW setting corresponds to the plate current of 33mA
 The BIAS HIGH setting corresponds to the plate current of 40mA

The crossover setting yellow / green or green / red is an adjustment with a very high precision. Small changes in the brightness of the LEDs are normal due to the long time drift of the tubes or the mains voltage.

7. TUBES




7.4. Replacing the tubes

- **Driver tubes**

Replacement driver tubes require no adjustment.

- **Output tubes**

General procedure:

1. Switch off the amplifier and allow it to cool down for 10 minutes. Remove the old tubes and fit the new ones.
2.  Before you switch the amplifier back on, turn all BIAS adjustment screws (see chapter 7) counter clockwise (this greatly reduces the anode current). These screws are ten-turn potentiometers, i.e. it takes ten revolutions to go from the maximum to the minimum setting.
3.  Switch on the amplifier and turn the BIAS selector switch to the BIAS position. Following the Soft-Start phase, the "minus" LED (yellow) will illuminate at every of the four Output tubes. If from this point of time any of the LEDs are green or red, this indicates a faulty tube that must be replaced. After a 10-minute warm-up period, set the BIAS as explained in chapter 7.
- 3.1.  Original Octave tubes.
There is no need to break in original Octave replacement tubes, as they are factory tested and passed a 24-hour endurance test. Allow the tubes 10 minutes to warm up and adjust them to the appropriate setting for the tube type.
- 3.2. New, untested output tubes should be allowed a longer warm up period. You should adjust these tubes after about 20 minutes and control the setting in the first days of operation.

7.5. Running in

All OCTAVE equipment is subject to a 48-hour performance test at the factory to break in the tubes. The tubes are preselected for use in each particular model.

New tubes can take up to three months to run in and start sounding their best.

Daily use is beneficial in speeding up this process but is not mandatory. Continuous operation does very little to help reduce the running-in time and is therefore ***not*** recommended.

7.6. Tube service life

- Thanks to the protection circuits and soft-start electronics, the output tubes in your amplifier should achieve a service life of up to 3 - 5 years.
- Driver tubes can be used for 10 years or even longer.
- Because tubes have different service lives, you will never have to renew the entire tube complement at the same time. The facility for setting the BIAS for each output tube individually makes it unnecessary to use matched sets of output tubes. You can replace output tubes individually if you wish.
- Some tubes require a long time (up to 300 hours) to achieve their optimum sound quality. Depending on how long the tubes have been stored, it may be necessary to adjust the BIAS several times in the first two to three weeks after installing them.

8. USING THE (SUPER) BLACK BOX

Description

OCTAVE, with the Black Box technology, offers an instrument for optimizing the OCTAVE amplifier in respect to the speaker. This flexibility is a unique feature of the OCTAVE brand.

The dynamic and tonal stability of an amplifier is strongly dependent upon the stability and capacity of the power supply, therefore the Black Box and Super Black Box were developed as external upgrades to the OCTAVE amplifiers' power supply storage capacitors by increasing their capacitance by a factor of 4 (Black Box) or 10 (Super Black Box), respectively. This is a tremendous benefit if the speaker is difficult to drive. Loudspeaker efficiency is made less critical, while the amplifier is enabled to handle speakers with minimum impedances as low as 2 ohms (except for EL34 with 4 ohms). The power supply capacitance increase realized via use of the Black Box or Super Black Box stabilizes current delivery and reduces the impedance interaction of the load. This improves dynamic range, separation, depth, soundstage size and articulation, rendering the musical reproduction clearer throughout the entire frequency range. The amplifier remains unaffected by mains variations and interferences due to the noise filtering characteristics of the capacitors

8.1. The Black Box option

The LED illuminates continuously when the power amplifier is on.

The LED goes out when the protection circuitry trips. This is normal, as the protection circuitry cuts the power to the amplifier.

Specification

Dimensions	170 X 97 X 257 mm (W x H x D)
Weight	2.5 kg
Connection cable	Length: 70 cm. Longer lengths are available upon request.

Connecting to the amplifier



- Important! Before connecting the Black Box, switch **off** the unit using **the power switch and wait for 1 minute**.

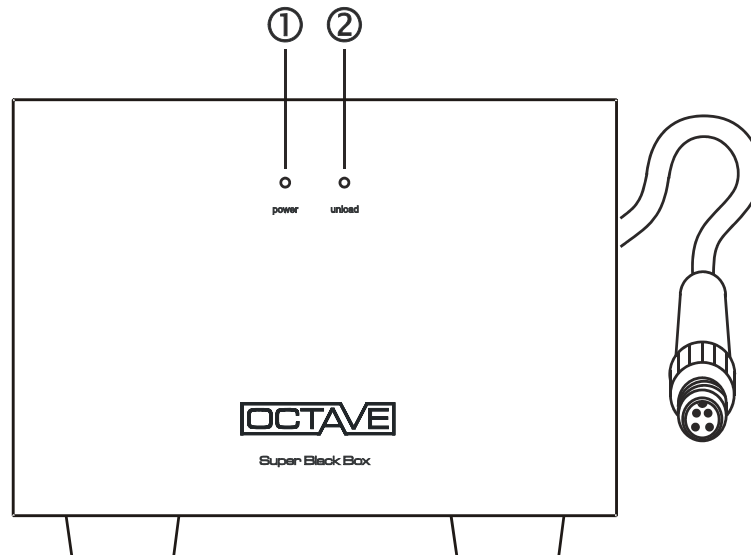


- When inserting the connector, guide the anti-rotation lug carefully into the mating recess in the socket.
- When you switch on the amplifier, the LED on the front panel of the Black Box will illuminate.
Note: The LED on the Black Box goes off when the amplifier's electronic protection circuitry is activated or the Ecomode has turned the unit down.
- Should you wish to disconnect the Black Box, switch off the amplifier first and **wait until the LED on the Black Box has gone out**.

8. USING THE (SUPER) BLACK BOX

8.2. Super Black Box option

Operation



- ① **Blue power LED**
The blue "power" LED illuminates when the power amplifier is switched on via the amplifier's power on/off switch.
- ② **Yellow unload LED**
The yellow "unload" LED (discharge control circuit) lights up for approximately two seconds after switch-off, in case the electronic protection is activated and if the MRE 220 is powered down through the Ecomode. The Super Black Box is equipped with a rapid discharge circuit, which discharges the unit's electrolytics. The yellow LED indicates that that this procedure is taking place. The discharge circuit also activates if the SBB connecting cable is accidentally removed. This is to prevent the SBB maintaining its charge when it has not been properly disconnected.

Specifications

Dimensions	203 X 159 X 320 mm (W x H x D)
Weight	7.5 kg
Connection cable	Length: 80 cm. Longer lengths are available upon request.

Connecting to the amplifier (Please see Black Box option).

9. TROUBLESHOOTING

■ Hum in the speakers

Possible cause: multiple grounds

Hum in an audio system is often caused by several system components having their own separate grounds. It is particularly common in systems containing tuners, VCRs or satellite receivers, as these components are connected to an aerial. Because aerials and cables are always grounded, ground loops can form between the aerial connection and other grounded equipment. Other equipment that is normally grounded may include PCs with sound cards, and some CD/DVD players and DACs.

Although the MRE 220 is grounded, its signal ground is a "floating" ground, which means that the MRE 220 cannot itself create ground loops. Hum can only be caused when it is connected to other items of equipment.

To fix the problem

Before trying to fix the problem, find out which of your system components is responsible for generating the hum.

Procedure:

- Switch the Ground Lift to "disconnect"
- check the signal connectors if the ground is properly connected
- Unplug all source equipment, including any equalizer if used, from the MRE 220, leaving only the loudspeakers connected.
- Reconnect the components back to the MRE 220 one at a time. As soon as the hum reappears, you have two grounded components connected to the MRE 220 via the preamp. Consult a technician if there is a possibility to eliminate this grounding problem.

■ Tube faults caused by output tubes

There are 3 different symptoms indicating a faulty output tube:

1. Broken heater filament: the tube stops glowing.
2. Defective cathode layer: the tube glows, but no current can flow. You can confirm this fault using the bias display LEDs - no amount of adjustment will be able to extinguish the minus LED.
3. Internal short circuit: Normally, the electronic protection cuts in and the red "off" LED illuminates, or the tube will not respond to BIAS adjustment (the display keeps jumping from plus to minus or vice versa).

With faults 1 and 2, the amplifier will still operate, although the channel containing the faulty tube will be quieter than normal. At low listening levels, the fault may not be obvious, but distortion will become evident at higher listening levels.

If fault 3 occurs, the protection circuits will normally switch off the amplifier. You may also hear loud background noises just before it switches off, although these will not harm the amplifier.

You can find the faulty tube by removing one tube at a time. Operating the power amplifier with just a single output tube is allowed for test purposes and will not damage the power amplifier.

Only a qualified technician must carry out this test.

■ Tube faults caused by driver tubes

Increased noise in one channel.

Normally the noise level of a driver tube is stable during its lifetime. Depending on the production and type of tube, the noise can noticeably increase over time. The most sensitive tube in the MRE 220 in this regard is the input tube V5 and in rare cases V6.

10. SPECIFICATIONS AND DIMENSIONS

Power Amplifier.

Configuration: push pull pentode circuit, class A/B; negative grid voltage adjustable separate for each power tube through ten turn precision regulators. Special wideband output transformer using high efficient PMZ core.

Output Power into 4 ohms:	Power Selector High:	200 W RMS
	Power Selector Low:	140 W RMS
Peak Power into 4 ohms:	Power Selector High:	220 W Peak
	Power Selector Low:	150 W Peak
The Output Power specs are measured with the Super Black Box Into 8-Ohms Load the Output Power is reduced by 20 %		
Power Bandwidth:	20 Hz – 70 KHz / - 3dB at Full Power 5 Hz – 80 KHz / -3dB at 5 W	
Noise:	< 100 μ V 150 Hz – 15KHz, > -116dB	
Input Sensitivity:	1V RCA; 2 x 0.5V	
Input Resistance:	50 k Ω RCA 1; 25 k Ω , Electronic XLR 7 k Ω Transformer Input	
CMRR of the XLR-Input:	> 85dB / 1 kHz	
Minimal Load Impedance:	2 Ω	
Gain:	+29.5dB - RCA	
Eco Mode Trigger Level:	0.6mV	

In- and Outputs:

Inputs:	1 x RCA, 1 x XLR
Outputs:	1 x speaker terminal suitable for 4 mm Banana connectors and spades

Construction

- double sided PCBs with plated-through holes using 70 μ m copper
- ceramic tube bases with silver contacts
- specially selected and burned-in long-life tubes
- professional, low inductance storage electrolytics, LH grade 105° C
- available in black or silver design

General

Power consumption:	< 20 W in Ecomode, 180 W idle, 500 W at full power
Weight:	29 kg
Mains:	100 V / 120 / 240 VAC available
Dimensions:	488 x 186 x 410 mm (W x H x D)

Optional Black Box:

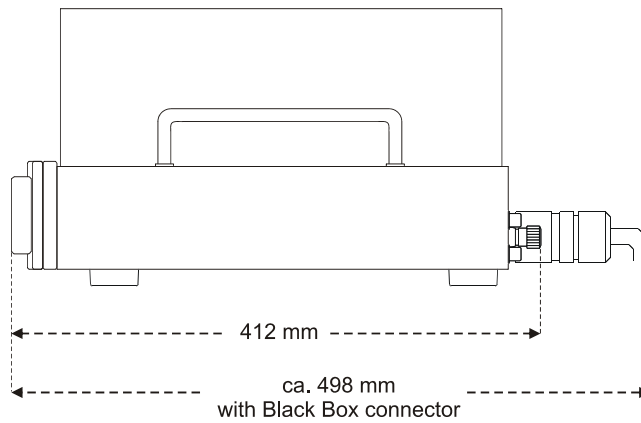
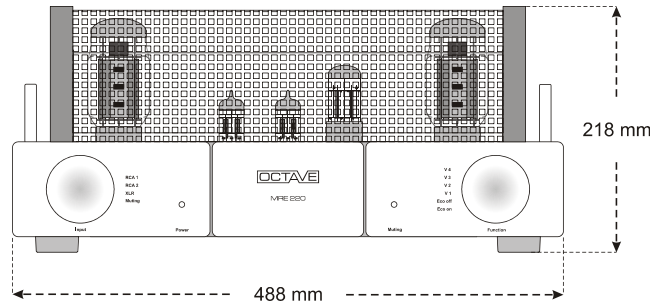
Dimensions:	170 x 97 x 257mm (W x H x D)
Weight:	3.1 kg
Connecting Cable:	70 cm (other lengths on request)

Optional Super Black Box:

Dimensions:	203 x 159 x 320mm (W x H x D)
Weight:	7.5 kg
Connecting Cable:	80 cm (other lengths on request)

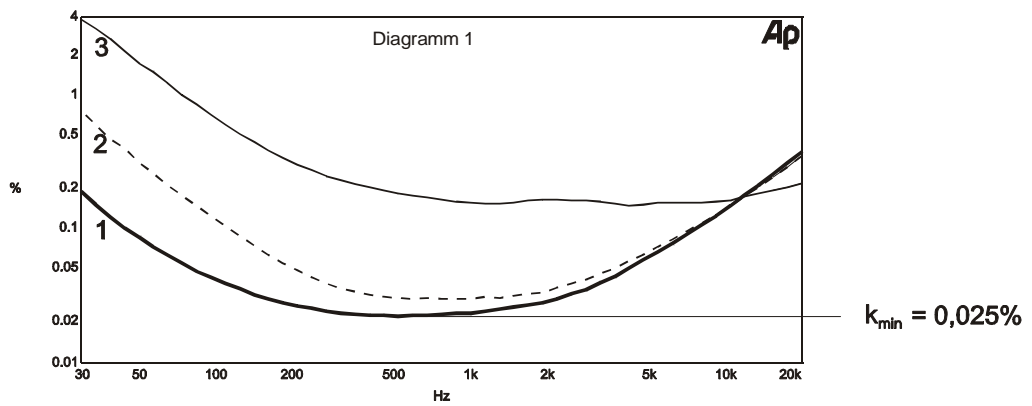
12. SPECIFICATIONS AND DIMENSIONS

Dimensions:



Diagram

THD at 4V into 4 ohms from 30 Hz to 20 kHz at a variety of BIAS settings



- Curve 1: BIAS adjusted correctly
- Curve 2: BIAS 10% out
- Curve 3: BIAS 30% out

11. FAQ

1. Can you operate the MRE 220 when no loudspeakers are connected?

Yes. The MRE 220, like all OCTAVE amplifiers, is fully protected against open circuit operation, i.e. the amplifier will come to no harm if it is operated without loudspeakers connected and the input level is in the magnitude of normal listening levels.

2. How do you recognize a faulty tube?

See troubleshooting

3. Is there a loss of sound quality as tubes age?

No. Tubes normally sound the same throughout their service life. Our soft-start technology contributes greatly to extending the service life of tubes. You can tell when an output tube has reached the end of its useful life: it becomes impossible to adjust it correctly. Driver tubes cannot be checked, but these will generally last for well over 10 years.

4. Does the MRE 220 have to have all of its tubes fitted?

In principle, the MRE 220 will also operate without output tubes. Of course, it is not possible to play music under these circumstances.

For test purposes, or as a temporary measure, one channel may be fitted with just a single power tube, although its power output will - of course - be reduced. The amplifier will come to no harm if it is operated continuously like this.

Operation without driver tubes is also possible for test purposes, although, for obvious reasons, music playback is not possible.

5. What is the significance of loudspeaker impedance and efficiency?

The impedance and efficiency of modern loudspeakers is not an issue for OCTAVE amplifiers. The often-quoted damping factor is not normally a guarantee that an amplifier will exert tight control over the loudspeakers. In practice, speakers of 85 dB efficiency and above are suitable for use with tube amplifiers. The high stability of the OCTAVE power amplifier technology even allows the use of speakers whose impedance dips as low as 2 ohms (except for EL34 with 4 ohms)

6. What cables are suitable for tube power amplifiers?

The cable manufacturers are now offering cables that have supposedly been designed specifically for tube amplifiers. Although such cables may be of good quality, there is no need to use special cables with tube amplifiers. Speaker cable can exhibit high values of capacitance and inductance, and tube power amplifiers deal with such loads better than transistor power amplifiers. The only exception would be if you needed to use a tube pre-to-power amp interconnect cable longer than 5 meters. In that case, a low capacitance cable would be advisable.



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