Professional Power Amplifier
Owner's Manual

DH series
Professional Power Amplifier

Before attempting to connect, operate or adjust this product, please read these instructions completely

Rev: 1.0-Clavia-DH 10/2009

Thank you for selecting our products.
Please read this manual carefully to get the most out of your new unit.

Caution: Do not let this unit touch the rain or get wet, to avoid the fire or electric shock.

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. Clean only with dry cloth.

7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

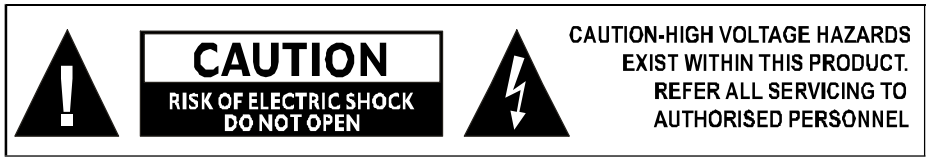
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

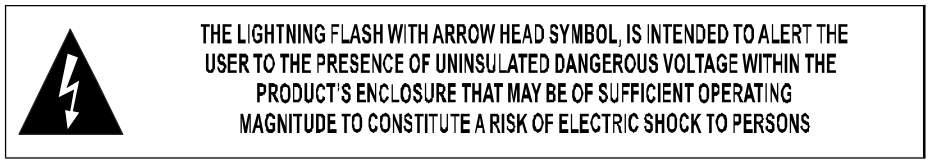
11. Only use attachments/accessories specified by the manufacturer.

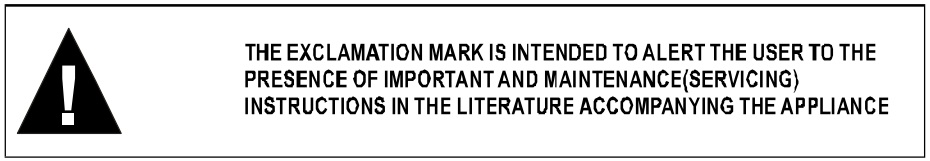
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart / apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.







CAUTION-RISK OF ELECTRIC SHOCK-DO NOT OPEN

WARNING-TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE

1.Read Owner 's Manual

When shipping the **DH series** amplifier, always use the original shipping carton and packing materials. For maximum protection, repack the unit as it was originally packed at the factory.

2.Environments

Use this amplifier only in E1,E2,E3orE4 environments according EN55103-2.

3.Ventilation

Slots and openings in the cabinet are provided for ventilation, to ensure reliable operation of the product and to protect it from overheating. These openings must not be blocked or covered. This product should not be installed unless proper ventilation is provided or manufacturer 's instructions have been adhered to.

4.Water And Moisture

Do not use this product near water (for example, in a wet basement or near a swimming pool).

5.Cleaning

Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners.

6.Power-cord Protection

Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon them or against them, paying particular attention to cords and plugs, and the point where they exit from the product.

SAFETY

7. Lightning

For added protection of this product during lightning storms, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the product due to lightning and power-line surges.

8. Object And Liquid Entry

Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

9. Accessories

Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury, and serious damage to the product. Any mounting of the product should follow the manufacturers instructions, and should use a mounting accessory recommended by the manufacturer.

10. Connecting

When you connect the amplifier to other equipment, turn off the power and unplug all of the equipment from the supply source. Failure to do so may cause an electric shock and serious personal injury. Read the owner's manual of the other equipment carefully and follow the instructions when making the connections.

11. Sound Volume

Reduce the volume to minimum before you turn on the amplifier to prevent sudden high levels which may cause hearing or speaker damage.

12. Servicing

Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Please refer to your dealer/distributor.

13.Damage Requiring Service

Unplug this product from the mains supply and refer to your dealer/distributor under the following conditions;

- When the power-supply cord is damaged
- If liquid has been spilled, or objects have fallen into the product
- If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- If the product has been dropped or damaged in any way.
- When the product exhibits a distinct change in performance this indicates a need for a service.

14.Replacement Parts

When replacement parts are required, be sure the dealer/distributor uses replacement parts specified by the manufacturer. Unauthorized substitutions may result in fire, electric shock or hazards.

15.Safety Check

Upon completion of any service or repairs to this product, ask the dealer/distributor to perform safety checks to determine that the product is in proper operating condition.

EC DECLARATION OF CONFORMITY

EC Declaration Conformity in accordance to EC Directives;
electro-magnetic compatibility (Council Directive89/336/EEC,
as amended by Directives 92 /31 /EEC and 93/68/EEC)
low-voltage electrical equipment (Council Directive 73/23/EEC)

Clavia DH series Power amplifier **1800 VI,1600VI,3600VI**

Conforms to the following standards:

- EN60065 Security
- EN55103-1 Emission
- EN55103-2 Immunity

The operating conditions and application environments presupposed in the operating instruction are to be kept accordingly.

DH series

CONTENTS

1.1 Welcome to Clavia

Since factory establishment, **Clavia** has gained worldwide experience with professional sound reinforcement technology. With in the audio market, **Clavia** specialises in the production and marketing of high quality power amplifiers and sound systems for use both on tour and in static installations.

The success of the **V** and **P SX DH series** power amps has made the **Clavia** name synonymous with professional quality, high performance and utterly reliable power amps.

Clavia 's commitment to research and development, seen not just in the are a of materials and technology but also most importantly in its highly skilled and motivated workforce, is one of the keys to its ongoing success.

Welcome to the new world of professional power amplifiers ---

Welcome To Clavia !

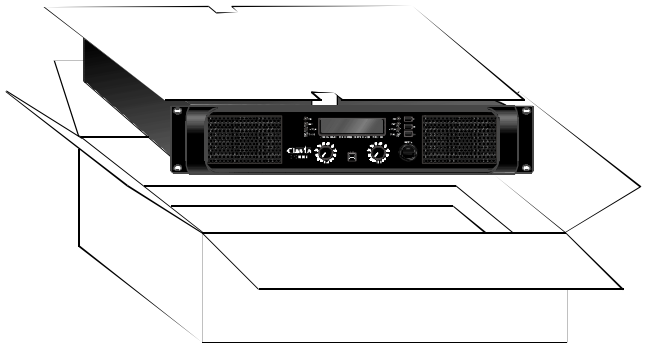
1.2 Unpacking

Please unpack and inspect your new amplifier for any damage that may have occurred during transit. If damage is found, notify the transportation company immediately. Only you the consignee may initiate a claim for shipping damage. **Clavia** will be happy to cooperate fully as needed. Please save the shipping carton as evidence of damage for the shipper's inspection.

Even if the amplifier has arrived in perfect condition, save all packing materials so you will have them if you ever need to transport the unit.

NEVER SHIP THE AMPLIFIER WITHOUT THE ORIGINAL PACKING MATERIALS.

When shipping the **DH series** amplifier, always use the original shipping carton and packing materials. For maximum protection, repack the unit as it was originally packed at the factory.



1.3 The amplifier

The **DH series** is a Class-H power amplifier with a power output of:

DH-1800V 1900 W per channel /4 Ω
3800 W in Mono-Bridge /8 Ω
3800 W in Parallel-Mono / 2 Ω

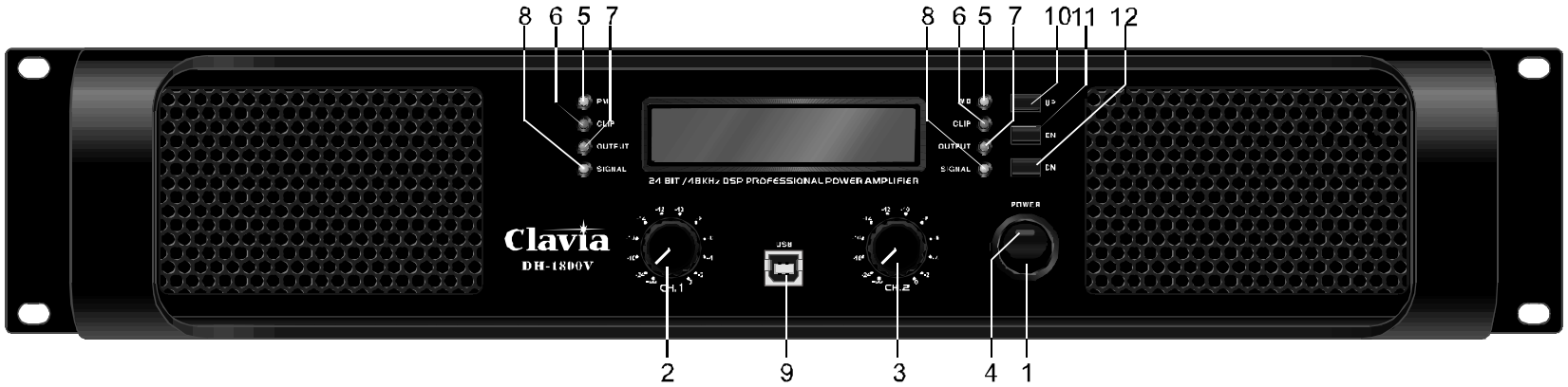
DH-1600V 1200 W per channel/4 Ω
2400 W in Mono-Bridge/8 Ω
2400 W in Parallel-Mono / 2 Ω

DH-3600V 1420 W per channel/2 Ω
2840 W in Mono-Bridge/4 Ω
2840 W in Parallel-Mono / 1 Ω

It is supplied by Switched Mode Power Supplies (SMPS). These SMPSs radically reduce the weight and size (only 2U) of the amplifier. Using SMPS, the 2 symmetrical supply voltages of the power amplifier are more stable than the power supplies used in conventional amplifiers.

The **DH series** has been designed as intelligent and powerful product for performing specialised tasks within a complex audio system. Users can adapt the power amp to meet their specific audio requirements before use Controls mounted on the front and the rear of the **DH series** allow access to the functionality.

If you have questions about **DH series** power amps **Clavia** would be pleased to offer you further information. Alternatively, contact your dealer/distributor.

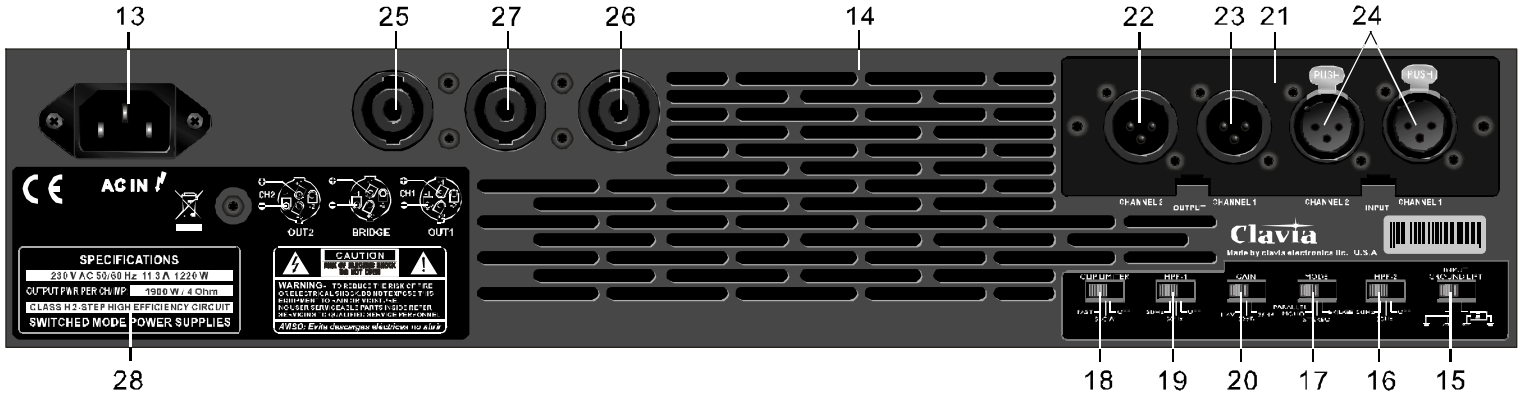


2.1 DH series-The Front

1. On/Off Switch
2. Volume Control - Channel 1
3. Volume Control - Channel 2
4. Power LED Indicators
5. Operating Mode LEDs
6. CLIP-LEDs
7. Output Current
8. Signal/Protect LEDs multifunctional
9. USB connectors
10.
11.
12.

2.2 DH series-The Rear

13. AC Power Cable
14. Cooling Air Outlet Vents
15. Input Ground Lift Switch
16. High Pass Filter 2
17. Mode Selector
18. Limiter Switch
19. High Pass Filter 1
20. Gain Selector
21. Extended User Inter face(E.U.1.2)
22. XLR-Line Input 2
23. XLR-Line Link 1
24. XLR-Line Link 1/XLR-Line Input 2
25. Speaker Output 2
26. Speaker Output 1
27. Bridge Speaker Output
28. Rating Plate



2.3 Factory Settings

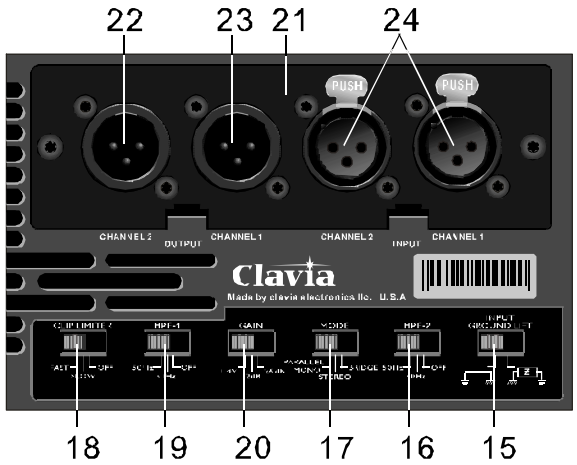


Figure 6

The switches at the back are set in the following positions after testing

15 Ground Lift Switch - **Grounded**
16 High Pass Filter 2 - **OFF**
17 Mode Selector - **STEREO**
18 Limiter Switch - **OFF**
19 High Pass Filter 1 - **OFF**
20 Gain Selector - **26dB**

Make sure that the switches will be set in the configuration needed for the application. More detailed informations in section 3.3,3.5 and4.2.

3.1 Mounting

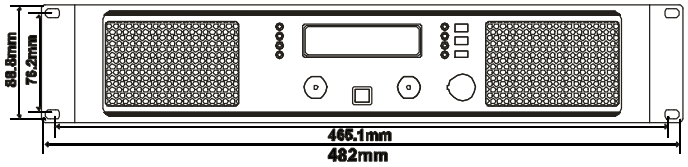
3.1.1 Precautions

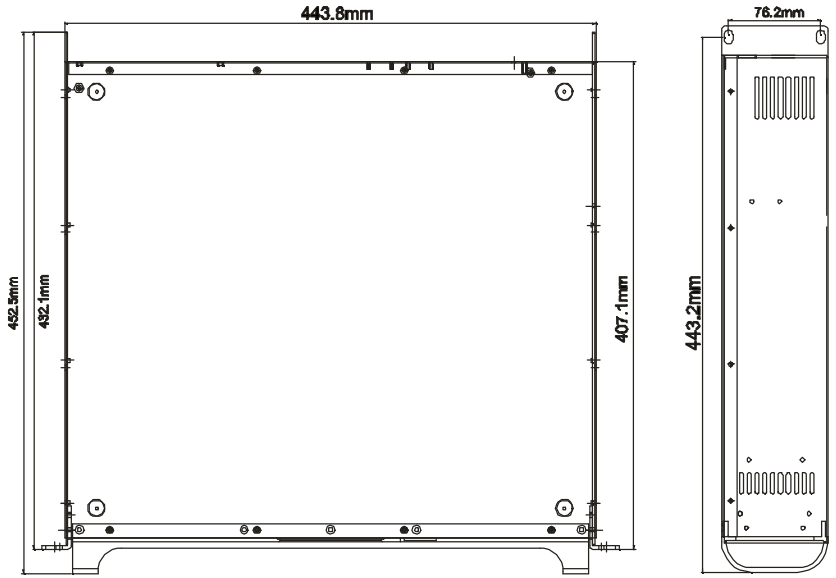
When mounting or connecting the amp always disconnect it from mains.

3.1.2 Mounting

Use four screws and washers when mounting the amplifier to the front rack rails.

Rear support is also recommended, especially in mobile and touring use.





3.1.3 Cooling

Under normal operation of the power amp, overheating should never be a Problem. The air is taken in from the front and out through the back, it is of course essential that while the power amp is running air is able to circulate around it freely.

The efficiency of the cooling will depend on the immediate environment (e.g. an enclosed rack, direct sunlight).If the amp is installed in a case, the open area at the back of the case must be at least140cm^2. This area should be in line with the amp.

If this can not be achived a forced ventilation system has to be used.

3.2 Power

3.2.1 AC Mains Connection

The correct AC line voltage is shown on the serial number label (see 4.1 Precautions). Make sure the AC mains is the correct voltage. Connecting to the wrong line voltage is dangerous and may damage the amplifier.

Connect the mains plug to an appropriate mains socket. Ensure that all grounding connections are maintained.

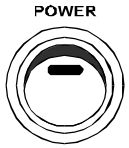
3.2.2 On/Off Switch

The power switch is a rocker-type switch. It is located on the right side of the front panel.

To turn the amplifier on, push in on the top of the switch. This initiates start-up by activating the inrush current limiter.

During power up the Clip and Signal LED's from both channels will light up in red for a few seconds.

To turn amplifier off, push in on the bottom of the switch.

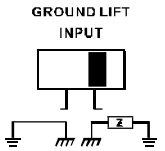


NOTE: This switch does NOT isolate the appliance from mains.
Make sure the mains power socket or an alternative disconnect device is near by and easily accessible.

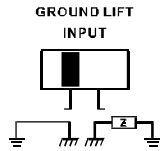
When the amp is connected to mains, the line-filter and the input of the silicon controlled rectifier(fused) are energised.

3.3 Ground Lift

The Input signal ground (pIn 1for all 4 XLRs) is tied to the ground potential. Opening the ground lift switch causes this connection to be disconnencted. This allows ground loops that sometimes occur in practice to be eliminated. The ground potential of the power amp and therefore of the loudspeaker outputs is independent of the power amp and therefore of the loudspeaker outputs is independent of the switch setting and remains at the ground potential of the mains.



Lift Position



Ground Position

Removing the mains connector ground-as often practiced-is not only illegal but pointless too, since in practice it never produces any improvement!

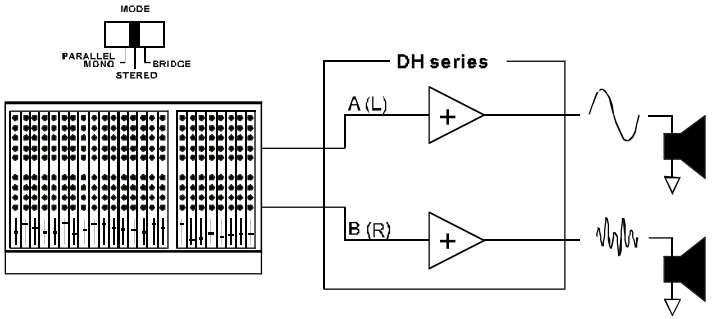
DO NOT REMOVE MAINS CONNECTOR GROUND
IT IS ILLEGAL AND DANGEROUS

3.4 Mode Selector

The switch on the rear panel changes the operating mode. Switch the power switch to off position to make changes at the mode Selector.

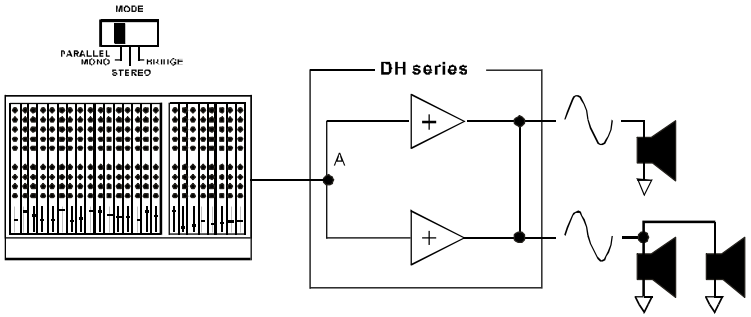
3.4.1 Stereo Operation,2Channel Operation

Two fully independent amplifier channels(normal operating mode)



3.4.2 Parallel-Mono Operation

Parallel operation of the two channels together.



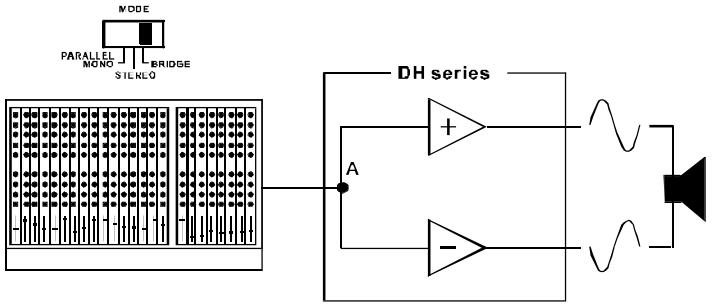
The output terminals of the two channels are configured in parallel using an internal relay. The (single) load is connected either to the output of channel 1 or to that of channel 2 (as if in stereo).While the total output of the amplifier remains the same and the output voltage level is also the same as in stereo operation, the minimum impedance that can be connected is reduced by half due to the fact that current capability is doubled. This mode is useful when powering 3 speaker cabinets in parallel. Only Channel 1-Input is active. A signal feeding Channel 2 will have no effect on the output. Turn down volume control of channel 2. A load balancing is achieved in this case.

WARNING!

In STEREO and PARALLEL-MONO mode RMS output voltages as high as 120 V are available at the output. Wiring to the sepeaker loads must conform to Class 2 (NEC) safety standard or its aquivalent that meets all national and local electric codes.

3.4.3 Mono-Bridge Operation

One-channel mono bridged operation.



The second channel processes the same input signal, but with reversed phase. The (single) load is connected between the two positive channel outputs using a suitable connected SPEAKON connector .While the total output of the amplifier remains the same, both the available output voltage and the minimum impedance that can be connected are doubled, as compared with stereo operation. Only Channel 1-Input is active. A signal feeding Channel 2 will have no effect on the output. Turn down volume control of channel.

WARNING!

In MONO-BRIDGE mode RMS output voltages as high as 230V are available at the output. Wiring to the speaker loads must conform to NEC Class 3 safety standards or its aquivalent that meets all national and local electric codes.

3.5 Wiring

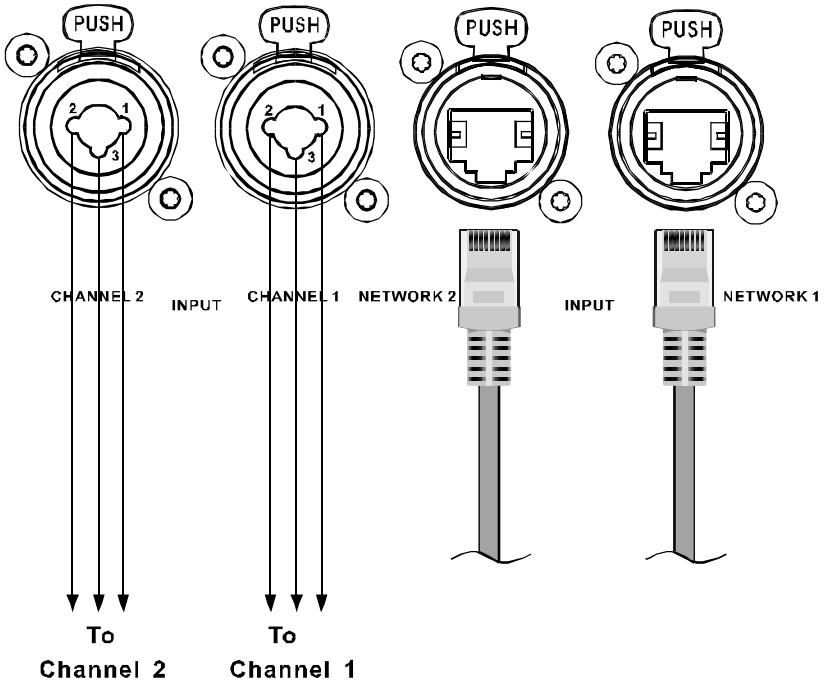
3.5.1 E.U.I.and XLR Connection

XLR: Pin 1 =Ground(or lifted via 15Ω resistor)

Pin 2=Hot (inphase)

Pin 3=Cold(out of phase)

Always use symmetrical (balanced) shielded cable to connect the amplifier wherever possible



3.5.2 Standard input modules and Bose EQ cards

Through the use of Clavia input module (the standard module provided with the amplifier) and equalization cards, Clavia Model 1800-VI 1600-VIor 600-VI amplifiers can provide active equalization for BOSE 402,502,MB4,MA12,360P,502B,and802 professional loudspeakers. Each channel of the input module has its own equalizer card input connector, which allows different equalization for each channel (provided the correct EQ card is installed). For a view of the input module, refer to Figure 10 on page 16. A sample set up might involve one Model 1800-VI amplifier driving two channels of 502Aloudspeakers in stereo mode. A second Model 1800-VI amplifier could be added to drive a 502B module. Alternatively, just one amplifier could be used to drive the 502A loudspeaker son one channel and the 502B module on the other channel. Many configurations are possible using the four loudspeakers above. This flexibility can be achieved by installing the EQ cards for the desired setup.

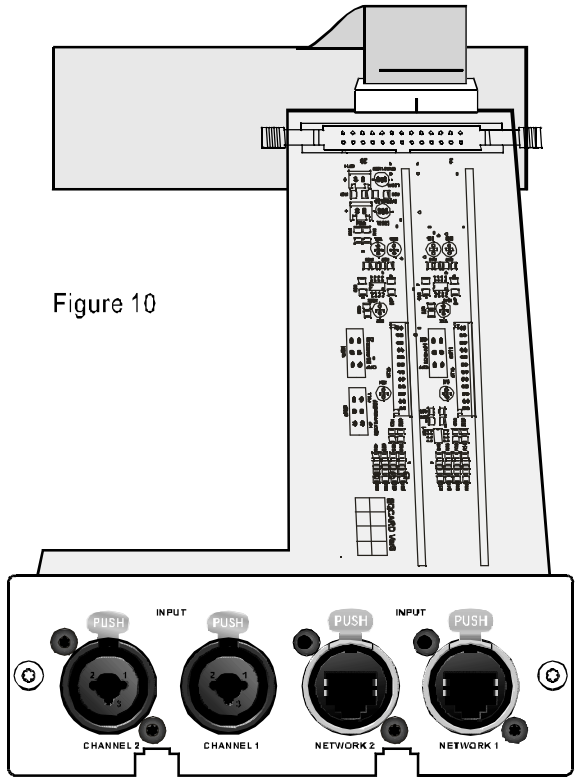
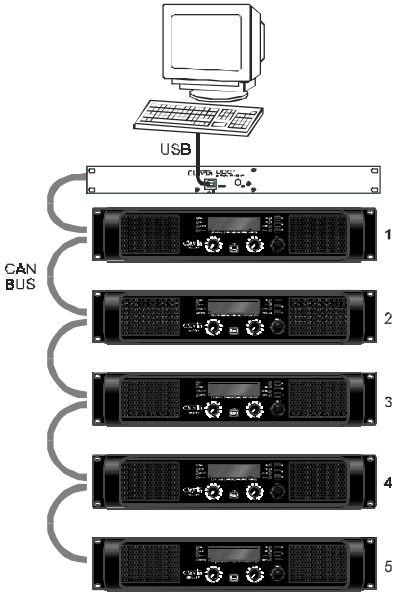


Figure 10



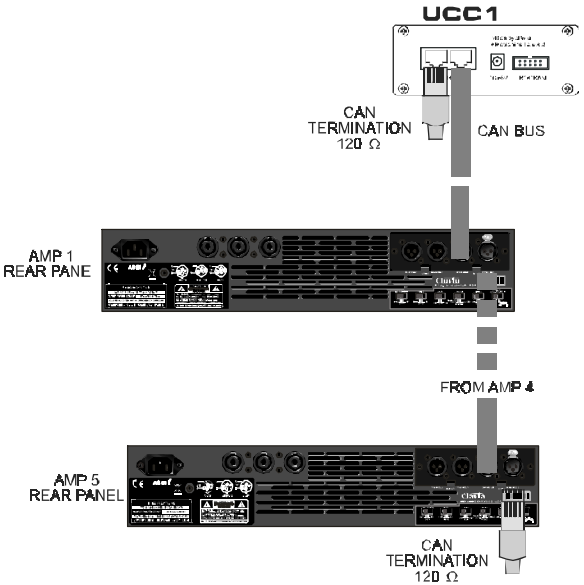
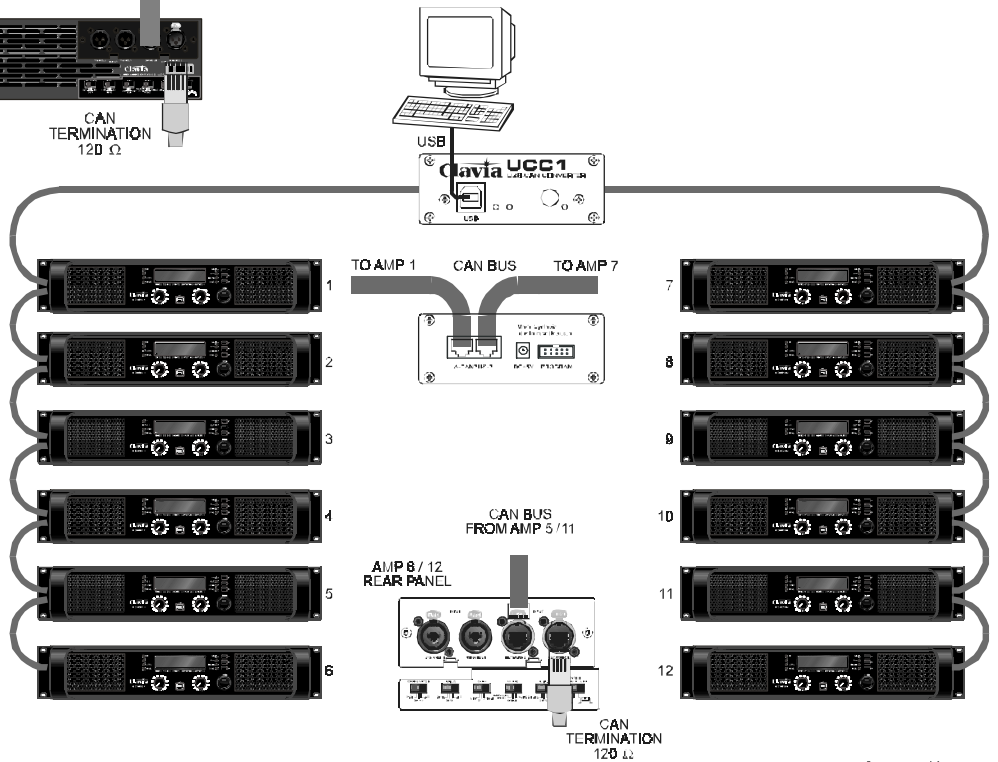


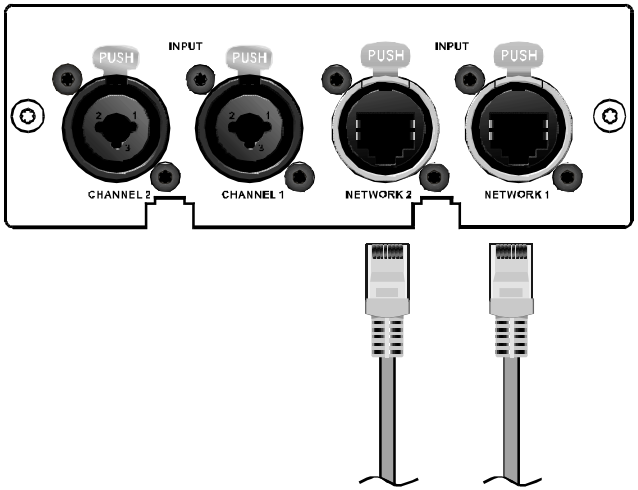
Fig 4: System set-up with 5 amps and a single UCC1/PC being the first unit on the bus Terminator at the UCC1 (first unit) and at the amp No. 5 (last unit on the bus)

Fig 5: System set-up with 2 racks and a single UCC1/PC in the middle Terminators at amp No. 6 (first unit) and amp No. 12 (last unit on the bus)



3.5.3 ACM-1 amplifier control module

The Clavia ACM-1 amplifier control module is designed to establish network control of the Clavia 1800-VI 1600-VI or 1600-VI amplifier. This network link makes remote operation of signal level functions possible. The module also provides amplifier monitoring capability. Using the graphical user interface of the ACM-1 module software, settings like amplifier output, amplifier load, temperature, and clip levels can be checked routinely. Refer to the ACM-1 installers guide for complete installation instructions.



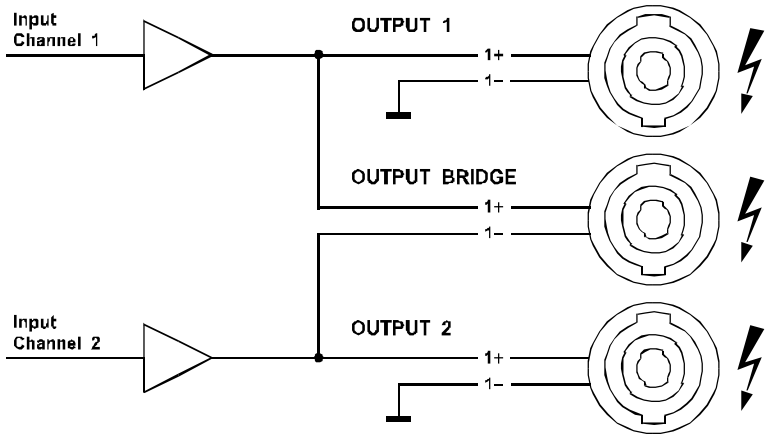
3.5.4 SPEAKON Connection

Both SPEAKON connectors are connected to Channel 1,Channel 2 and BRIDGE outputs.

OUTPUT Ch.1: Pin 1+ Channel 1 speaker signal
Pin 1 - Channel 1 speaker ground

OUTPUT Bridge: Pin 1+ Channel 1 speaker signal
Pin 1 - Channel 2 speaker signal

OUTPUT Ch.2: Pin 1+ Channel 2 speaker signal
Pin 1 - Channel 2 speaker ground



WARNING!

SPEAKON terminals marked with the lightning flash carry hazardous voltage.

Wiring to these terminals requires installation by an instructed person or the use of ready-made leads or cords.

Custom wiring should only be made by qualified personnal.

To prevent electric shock, do not operate the amplifier with any of the conductor portion of the speaker wire exposed.

NOTE:

For safety and performance, use only high-quality fully insulated speaker cables of stranded copper wire. Use the largest wire size that is economically and physically practical, and make sure the cables are no longer than necessary. As a guideline, use wire sizes from>2.5mm^2(AWG 14).

IMPORTANT:

Parallel Mono Mode: When connecting speaker cabinets in parallel, use the contacts in both SPEAKON connectors. If not, this may cause permanent damage of the connectors, depending on the music material.

4.1 Precautions

Only connect the DH series amplifier to a appropriate AC circuit and outlet, according to the requirements indicated in the second row on the rating plate.

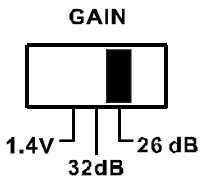
Exemplary a rating plate of DH series

NOTE: Even under normal conditions the mains current can reach levels up to 60A (230V) and 120 A (120V), respectively; this could cause lamps to flicker if connected to the same mains as the amp .The impedance of the AC circuit should be less then 0,157 Ohms to avoid flicker according to EN61000-3-11. Ask/inform your local power provider. Don't even think about measuring this with your ohmmeter. This may damage your meter, caution-high voltage hazards!

4.2 Controls

4.2.1Gain Selector

A switch on the rear of the **DH series** allows the maximum amplification attainable to be set directly in the input stage



The **DH series** amplifier has a 26 dB and 32 dB voltage gain setting along with a 1,4V sensitivity setting.

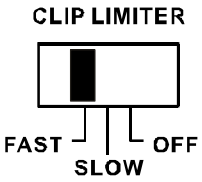
4.2.2 Gain and Input Sensitivity

The table shows input sensitivity per channel for a given gain and load.It also shows the gain for the 1,4V input sensitivty.

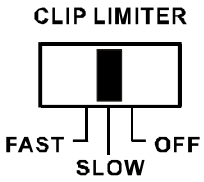
Model		26dB	32dB	1,4V
DH-1800V	4Ω/1900W 8Ω/1100W	4,37V 4,70V	2,19V 2,36V	36,52dB
DH-1600V	4Ω/1200W 8Ω/700W	3,47V 3,75V	1,74V 1,88V	34,56dB
DH-3600V	2Ω/1420W 4Ω/920W	2,67V 3,04V	1,34V 1,52V	32,74dB

4.2.3 Limiter Switch

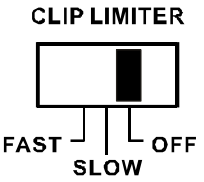
This switch is located at the rear of **DH series**. It allows you to set the mode of the limiter. There are three modes.



Right position:
Clip Limiter: **FAST**
Attack fast



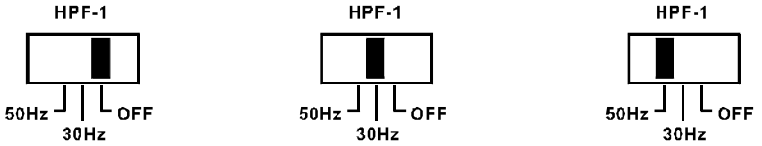
Middle position:
Clip Limiter: **SLOW**
Attack slow



Left position:
Clip Limiter: **OFF**

4.2.4 HPF Filter

(Channel 1 as example)



Left position:

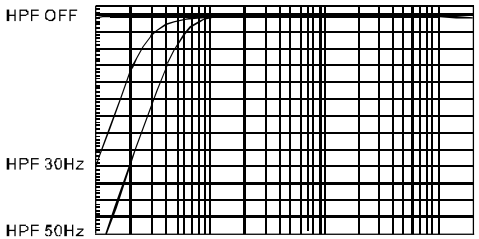
HPF: **OFF**

Middle position:

HPF: **30Hz**

Right position:

HPF: **50Hz**

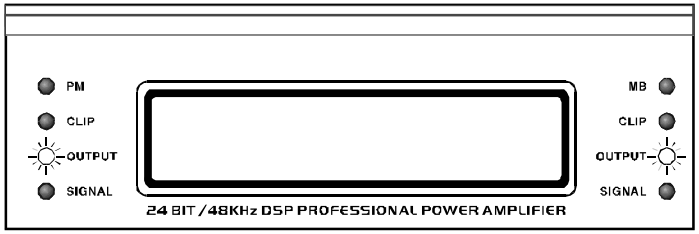


Low frequency response curves

4.3 Indicators

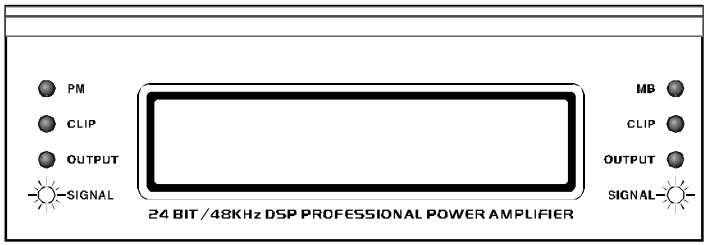
4.3.1 Output Current LEDs

The brightness is proportional to the output current in the channel. The LED is visibly lit above around 1 Amp, while full brightness corresponds to the maximum rated current.

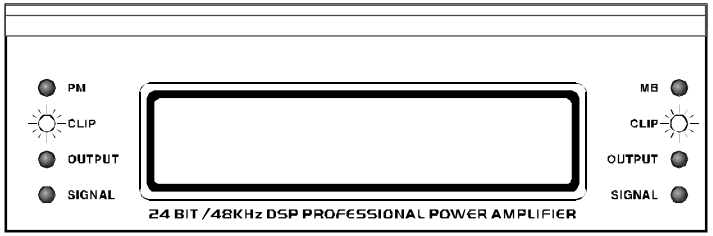


4.3.2 Signal LEDs (multifunctional)

The green section is illuminated when the voltage level at the output reaches approx.4 V; this corresponds to a power of approx. 4 W at an impedance of 4 Ohms. The red section is illuminated while the Amp is in Protect Mode (Mute).



4.3.3Clip LEDs



If the power level is overloaded, the LED will light up.

4.4 Power Amp Protection Systems

4.4.1 Clip Limiter

4.4.2 SOA Protection

Whenever the power transistors leave their Safe Operation Area (SOA), the SOA-protection in stereo mode switches back the current rail of the respective power stage. In mono modes the rails of both channels are switched back. At heavy SOA violations the channel (amplifier) will be muted

4.4.3 DC Protection

Each output of the power amp is constantly monitored for persistent DC voltage levels. If the 3 V thresholds are exceeded at any of the outputs, the corresponding channel will be muted. If DC was only applied for a short while the amplifier will relase mute and work as normal. If DC is applied for longer periodes or several short times the amplifier will switch to stand by mode.
Switch of the amplifier, wait until the power LED stops flashing and switch the amplifier on again.

4.4.4 DC Servo

To prevent DC Offset at the speaker output the **DH series** is fitted with a DC servo.

4.4.5 Over Current Protection

Over current is permanently controlled in the output stage. There are two limiting levels of over current depending on output voltage. These limits will be set automatically. This improves reliability without degrading sound quality when driving complex loads.

4.4.6 Thermal Protection

If the temperature exceeds 96℃,the amplifier will be muted. The Clip and Signal LED of both channels will light up in red.

As soon as the temperature is in the working range the amplifier will release mute and operate as normal.

4.5 Mains Protections

4.5.1 Inrush Current Limitation

Within 2 seconds of the amplifier being switched on, the inrush current limiter will increase mains current from nearly zero to nominal value. This value depends on program material, output level and speaker loads.

4.5.2 Mains Over Voltage Detection

Mains over voltage detection is always operative. When the mains voltage exceeds approx.267V(230V operation) or 134V(120V operation). the amplifier will be switched off. When the mains voltage returns to nominal value, a soft start occurs.

4.5.3 Mains Failure Detection

Mains failure detection is always operative. When the mains supply is interrupted for about 2 mains cycles, the amplifier will be switched off. When the mains voltage returns to a normal value, a soft start occurs.

4.5.4 Fuse Protection

Depending on the load impedance and type of signal levels, the effective mains current can ,even during normal operation, reach a level several times higher than its nominal value for short periods, Repeated peaks of this nature will also cause the average value to increase. In such cases,the internal mains fuse could blow, if the average current remained too high for an extended period. In order to avoid this unsatisfactory operation, the mains fuse is protected by a prevention circuit inside the amplifier. Prior to the point when the fuse would blow the clip level will be reduced. After the recovery time for the fuse has elapsed, the clip level is again adjusted to its normal level. This offers reliable operation of **DH series** Amps on 16 A mains at 230V and 30A at 120V.

4.6 Main SMPS Protections

4.6.1 Over Current Protection

Main SMPS (Switched Mode Power Supply) transformer current is continuously monitored. If over current occurs, the main SMPS immediately stops working. Should there be an internal failure, this feature prevents other parts being damaged.

4.7 Fans

The fan mounted in the **DH series** operate permanently, but as long as the temperature remains below 40℃ they run at their slowest speed and can hardly be heard. The highest detected temperature from either channel controls the speed of the fan: above 40℃ the speed is increased until it reaches its maximum value:

5.1 Problem:No Sound

Indication: Power LED not lit

- Check AC plug.
- Confirm that AC outlet works by plugging in another device.
- Make sure the amplifier is switched on

Indication: Power LED lit
Signal LED not lit

- Make sure the signal source is operating and try another cable.
- Check position of Volume Pots.

Indication: Power LED lit
Signal LEDs responding to signal level

- Check the speaker wiring for breaks.
- Try another speaker and cable.

5.2 Problem: No Channel Separation

- Check the mode indicators on the front panel and make sure the mode selector on the rear panel is in the stereo-position.
- Make sure other equipment in the signal path such as mixers and preamps are set for stereo, not mono.

5.3 Problem:Distorted Sound

Indication: Power LED lit
Signal LED responding to signal level
Clip LED not lit

- A faulty speaker or loose connection could cause this .Try another speaker and check the wiring.
- The signal source might be clipping. Keep the **DH series** volume pots at least halfway up so that the source does not have to be over driven.
- Keep the **DH series** volume pots at least halfway up and try changing input sensitivity from 1,4V to 32 dB or 26 dB with the gain selector on the rear.

5.4 Problem: Hiss

- Unplug the amplifier input to confirm that the hiss is coming from the source or from a device upstream. Erratic or popping noises indicate an electronic fault in the offending unit.
- To keep the noise floor low, operate the primary signal source at full level, Without clipping.
- Avoid boosting the signal further between the source and the amplifier.

5.5 Problem: Squeals and Feedback

- Microphone feedback should be controlled with mixer controls. If noise continues to build up with no microphone gain, there is a serious fault in the signal processors or cables. Working in succession from the signal source towards the amplifier and check each device in the signal path by reducing its gain or by unplugging it .

Clavia

2006 Clavia Electronics LLC,113
Bardsdale Professional Center,
Newark City, New Castle County
Delaware State, USA
Zip Code 197711
Http://www.claviaaudio.com