

P4000

Installation & Operation



Hafler[®]

trans•nova

DESIGNED AND
ASSEMBLED IN THE
USA

PROFESSIONAL POWER AMPLIFIER

NOTICE - IMPORTANT SAFETY INFORMATION



WARNING: TO PREVENT FIRE OR SHOCK HAZARD DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. READ INSTRUCTIONS

All the safety and operating instructions of your Hafler equipment should be read before power is applied to the equipment.

2. RETAIN OWNER'S MANUAL

These safety and operating instructions should be retained for future reference.

3. HEED WARNINGS

All warnings on the equipment and in the operating instructions are important and should be followed.

4. FOLLOW INSTRUCTIONS

All operating and use instructions are important and should be followed.

5. HEAT

The equipment should be kept away from areas of high temperature, i.e., heater vents, radiators, stoves/ovens, fireplaces, etc.

6. VENTILATION

The equipment should be used in an area suitable for proper ventilation. Care should be taken not to impede airflow in and around the cabinet.

7. WATER AND MOISTURE

The equipment should not be used in or around water, such as a bathtub, sink, or swimming area. Also, the equipment should not be used in areas prone to flooding, such as a basement.

8. POWER SOURCES

The equipment should be connected only to a power source of the same voltage and frequency as that listed on the rear panel above the power cord entry point.

9. POWER CORD PROTECTION

Power cords should be arranged so they do not interfere with the movement of objects in the room: people, fan blades, utility carts, etc. Also, care should be taken that the cord is not pinched or cut, and placed so it is not in danger of being pinched or cut, as in under a rug, around a tight corner, etc.

10. POWER CORD GROUNDING

The power supply cord is of a three wire grounded type, designed to reduce the risk of electric shock sustained from a live cabinet. It is assumed to be of suitable length for most uses of the equipment. The use of extension cords and power strips is discouraged unless they are of suitable rating to deliver the required total current for safe operation of all connected equipment. Furthermore, extension cords or power strips must provide

the same three wire grounded connection. It is important that the blades of the equipment's plug be able to fully insert into the mating receptacle. **Never remove the round grounding pin on the plug in an attempt to mate to a two wire ungrounded receptacle:** use a grounding adaptor with the grounding tab or wire suitably connected to earth ground.

11. NON-USE PERIODS

During periods of extended non-use, the power cord should be unplugged from the power source.

12. CLEANING

The equipment should be cleaned only as detailed in the operating instructions.

13. OBJECT AND LIQUID ENTRY

Care should be taken so that objects and/or liquids, such as cleaning fluids or beverages, are not spilled into the enclosure of the equipment.

14. DAMAGE REQUIRING SERVICE

Hafler equipment should be serviced by qualified service personnel when:

- A. The power supply cord or plug has been damaged, or
- B. Objects have fallen onto, or liquid has been spilled into the equipment, or
- C. The equipment has been exposed to rain, or
- D. The equipment does not appear to operate normally or exhibits a marked change in performance, or
- E. The equipment has been dropped, or the enclosure has been damaged.

15. SERVICING

The user should not attempt to service the equipment beyond that which is described in the operating instructions. All other service should be referred to qualified service personnel.

16. CARTS AND STANDS

The equipment should be used with carts or stands only of sufficient strength and stability for the use intended.

An equipment and cart combination should be moved with care. Quick stops and starts, excessive force, and uneven surfaces may cause the equipment and cart combination to topple.

PERFORMANCE SPECIFICATIONS

P4000

Power Rating:	FTC (20Hz-20kHz, 0.2% THD) 200 wpc into 8Ω 275 wpc into 4Ω 550 wpc into 8Ω (bridged mono)
Signal-to-Noise Ratio:	100dB below rated output from 20Hz-20kHz "A" Weighted
Frequency Response:	20Hz-20kHz, ±0.1dB
Bandwidth:	0.2Hz-200kHz, +0/-3dB
Slew Rate:	100 V/μs
CMRR:	>75dB at 1kHz
Input Impedance:	47,000Ω per phase balanced
Input Sensitivity Range:	710mV to 4V (@ 8Ω) per phase balanced 592mV to 4V (@ 4Ω) per phase balanced
In/Out Gain:	+29dB maximum, -29dB minimum
Gain Control Range:	58dB
Damping Factor:	500 (to 1kHz); 150 (to 10kHz); 18 (to 100kHz)
Power Consumption:	120W / 1A @ 120VAC (Idle Power) (Both Channels Driven) 250W / 2.1A @ 120 VAC (1/8 Power – 8Ω) 720W / 6A @ 120 VAC (Max. Power – 8Ω)
Controls & Switches:	Front Panel Gain Control, Power Switch
Indicators:	Signal LED, Clip LED, Thermal LED, Short LED, Line Power LED
Connectors:	XLR & 1/4" combo input 5-way Binding Post output IEC Standard Line input
Dimensions:	19"W x 11"D x 5-1/4"H (3-rack spaces) (48.26cm x 27.94cm x 13.34cm)
Net Weight:	34 lbs. (15.42kg)

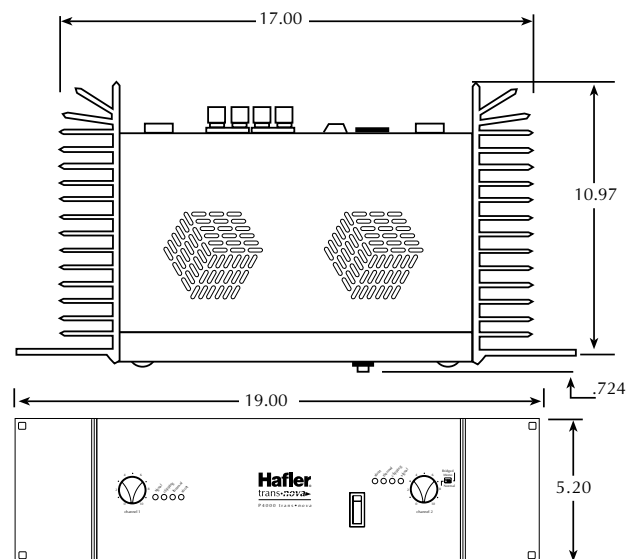
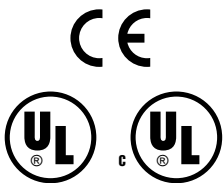


TABLE OF CONTENTS

SAFETY PRECAUTIONS	i
PERFORMANCE SPECIFICATIONS	ii
INTRODUCTION	1
FRONT & REAR PANEL VIEW	2
INSTALLATION	
Location	3
AC Line	3
Input	4
Output Connections	4
Monophonic Use	4
OPERATION	
Power Switch	6
Level Controls	6
Input Configuration Switch	6
Ground Switch	7
Short Circuit Protection	7
LED Indicators	7
Warm Up	7
Cleaning and Maintenance	7
TECHNICAL REFERENCE	
Field Service Considerations	8
Theory and Operation of trans•nova	8
P4000 Functional Block Diagram	9
Schematic Diagram	10
PC Board Layout.....	10
Parts List	13
Circuit Operation	15
Amplifier Module Replacement	18
WARRANTY	19

INTRODUCTION

The **Hafler P4000** is a three rack height, two channel professional power amplifier suitable for use in any situation where a moderately powered compact amplifier is required. The P4000 is particularly attractive for use in monitoring situations. Our *trans•nova* circuit topology and MOSFET output stage ensures trouble-free, long term operation and is backed by our five year warranty.

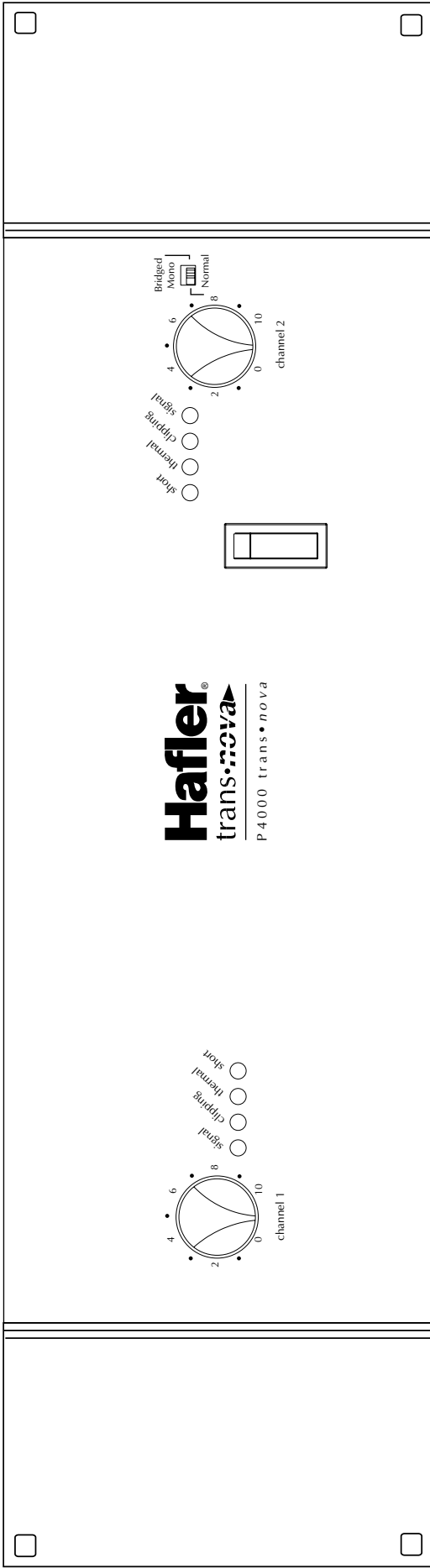
This manual contains information on using the P4000 amplifier. It is organized into three main sections. “**Installation**” covers the location and connection of the amplifier in the system. Like many precision components, careful attention to the initial setup can yield dividends in higher performance and trouble-free use. “**Operation**” covers the controls and features of the amplifiers and how to use them to get the best effect. The “**Technical Reference**” section contains field service information; in addition to the schematic and parts list there are block diagrams and circuit operation explanations useful for technicians. We strongly urge reading over the Installation and Operation portions of this manual before putting the amplifier into service.

The circuitry used in the Hafler Professional power amplifiers is our *trans•nova* (TRANSconductance Nodal Voltage Amplifier, U.S. Patent 4,467,288) circuit. The P4000 also utilizes our proprietary **DIAMOND** (Dynamically Invariant AMplification Optimized Nodal Drive, patent pending) transconductance driver stage which combines the linearity of Class A operation with the current headroom of a Class B system. When combined with the robust output stage used in the P4000, DIAMOND yields lower high frequency distortion without the sonic degradations associated with increasing the negative feedback. We have been using MOSFETs in our power amplifiers since the 1970's. During this time they have proven to be extremely fault tolerant, even in abusive situations. This ruggedness enables the amplifier to drive reactive speaker loads without the performance and sound degradations imposed by elaborate Safe Operating Area protection schemes.

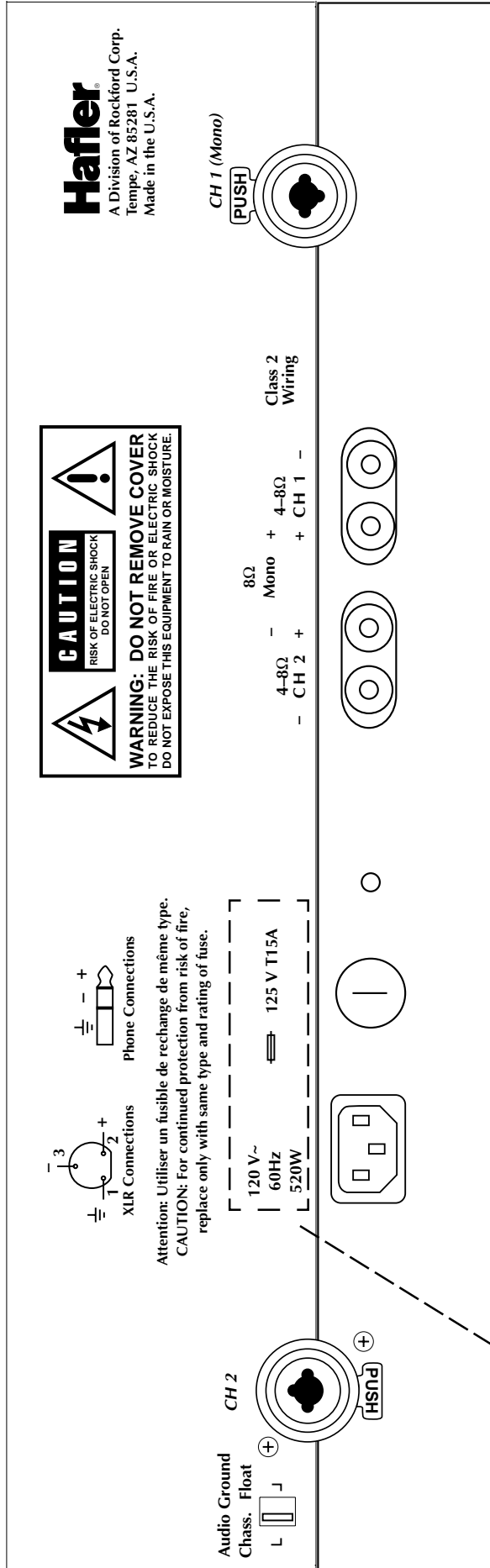
Other specialized circuits which prevent damage to the amplifier and speakers have been carefully implemented. A soft start circuit prevents sending potentially destructive turn-on and turn-off transients to the speakers. A thermal sensing network continuously monitors the heatsink temperature and shuts down the amplifier to protect it from excessive operating heat. The need for internal fuses has been eliminated; a sensing circuit monitors the output and shuts down operation when it detects a short at the output.

Each channel of the amplifier has been built as a self-contained module. This modular arrangement simplifies construction and improves service accessibility. The circuit board assembly makes extensive use of surface mount components in the low power portion of the audio circuitry. Automated equipment is used to place and solder the components which yields greater uniformity and reliability.

The front panel has controls for input level adjustment and the power switch. In addition, LED indicators give a visual representation of the operating status of each channel. The THERMAL and SHORT indicators light to show when these protection circuits have been activated. The CLIP indicator helps prevent damaging the speaker by showing when the amplifier is overdriven. The SIGNAL indicator lights to show the presence of an audio signal.



Front Panel View



Rear Panel View

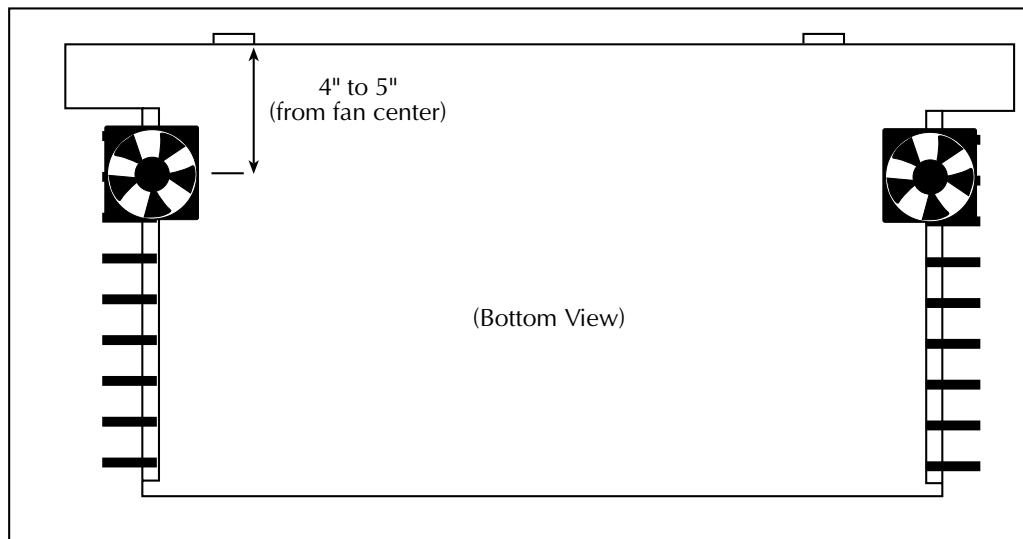
INSTALLATION

LOCATION

The P4000 power transformer can generate a substantial magnetic field, so caution should be exercised in the placement of low level components such as a tape deck, mixer or mic preamp to avoid inducing noise in the low level circuitry. The amplifiers can also produce considerable heat in normal operation so the primary consideration when determining a location for the amplifiers is to allow for adequate ventilation. The large heatsinks provide unrestricted airflow, but care must be taken to keep the slots in the bottom panel and top cover clear. If the amplifier is mounted in an equipment rack, make sure adjacent equipment does not impede cool air flow.

- ⚠ Rack systems should have two fans 4" to 5" in from the front of the amplifier blowing upward.
- ⚠ Los sistemas empotrados en gabinetes (rack), deben tener dos (2) ventiladores soplando hacia arriba, ubicados de 10 a 12.5 cms. detrás del frente del amplificador.
- ⚠ Les chaînes stéréo Rack devraient avoir deux ventilateurs placés à 4 ou 5 centimètres, en face de l'amplificateur.
- ⚠ Rack Systeme sollten zwei eingebaute Ventilatoren haben, die Luft von oben auf den Verstärker leiten. Die Ventilatoren sollten ca. 10-20cm hinter der Front des Verstärkers angebracht werden.
- ⚠ Per i sistemi ad armadio sono necessari due ventilatori direzionati in su collocati dai 10 ai 13 centimetri davanti all'amplificatore.

Inadequate ventilation can shorten component life, especially when other equipment raises the ambient air temperature, so circulating fans should be considered in tight quarters.



Fan center approximately in line with edge of unit and starting of heatsink fins

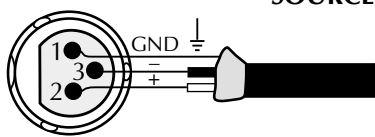
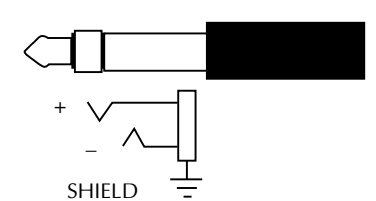
- Fans placed 4" to 5" from front of unit
- Fans placed under the unit pointing upwards
- Recommended P4000 fan is 50cfm x 2

AC LINE

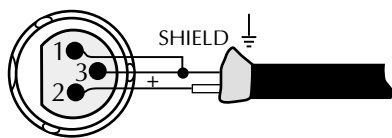
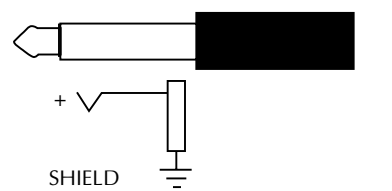
The P4000 amplifier operates from a 120 volt, 60Hz AC power line. Connection is made by a 16 gauge, IEC Type 320, grounded line cord. For safety considerations only a properly grounded (earthed) receptacle should be used. If a grounded circuit is not available, do not break off the ground pin; use the proper adapter plug for a two wire receptacle. Mounted on the rear panel is the line fuse which interrupts the power to the amplifier. If this fuse blows replace it only with the same type and rating fuse. The correct replacement fuse value is printed on the rear panel of the amplifier. If the new fuse blows, this is an indication of a fault with the amplifier. Servicing should be performed only by a qualified technician.

INPUT

The input jacks located on the back of the amplifier are dual function connectors which accept 1/4" Phone (Tip Ring Sleeve) or XLR plugs. The 1/4" Phone jack is connected according to conventional usage. The XLR jack is connected according to the IEC and AES standard.

XLR Balanced Input Check output of source unit for proper signal polarity	1/4" TRS Balanced Input Check output of source unit for proper signal polarity
<p style="text-align: center;">INPUT FROM SOURCE</p> <p>Pin 1 = GND Pin 2 = (+) Pin 3 = (-)</p> 	<p style="text-align: center;">INPUT FROM SOURCE</p> <p>Tip = (+) Ring = (-) Sleeve = GND</p> 

Many popular mixers use unbalanced outputs and can be used with the Hafler amplifier. To minimize residual ground noise, we recommend using twisted pair cable or short cable lengths in this type of configuration.

XLR Unbalanced Input Connect (-) and GND (shield) terminals at <i>both ends</i> of cable to prevent unstable amplifier operation	1/4" TRS Unbalanced Input
<p style="text-align: center;">INPUT FROM SOURCE</p> <p>Pin 1 = GND Pin 2 = (+) Pin 3 = GND</p> 	<p style="text-align: center;">INPUT FROM SOURCE</p> <p>Tip = (+) Sleeve = GND</p> 

OUTPUT CONNECTIONS

The speaker output connectors are dual binding posts. These binding posts will directly accept 12 AWG wire or banana plugs and are spaced on 3/4" centers to accept dual banana plugs.

MONOPHONIC USE

For systems with high power requirements, the amplifiers can be configured for single channel bridged mono operation. To bridge the amplifier, set the front panel Normal/Bridged Mono switch to the Bridged Mono position. Only the Channel 1 input and level control is used. The speaker is connected to the RED output binding posts.



When the amplifier is bridged the output is floating. Any speaker which requires a common ground from the amplifier output cannot be used in this application.



Cuando el amplificador esté en modo puente (bridge), la salida del mismo es flotante (sin neutro). Cualquier parlante que necesite una tierra común de la salida del amplificador, no puede ser usado cuando el modo puente esté activado.



Lorsque l'amplificateur est relié, la puissance de rendement est émise. Tout haut-parleur nécessitant l'utilisation d'une même fiche que celle de l'amplificateur, ne peut pas être utilisé dans cette application.



Wenn der Verstärker gebrückt wird, ist der Ausgang schwimmend geerdet. Alle Lautsprecher, die allgemeine Masse vom Verstärker nutzen, können in dieser Konfiguration nicht eingesetzt werden.



Nel caso di un'amplificatore ostruito, l'uscita é fluttuante non utilizzare in questa applicazione un altoparlante che richiede la messa a terra in comune con l'uscita dell'amplificatore.



Since a bridged amplifier shares the load between the two channels, each channel will effectively drive half of the load. Therefore, for bridged mono operation we recommend using an eight ohm load as the minimum impedance.



Ya que un amplificador en puente comparte la carga entre los dos canales, cada canal manejará efectivamente la mitad de la carga. Por lo que, para la operación en modo puente (mono) recomendamos el uso de una carga de ocho ohmios como la mínima impedancia.



Étant donné que l'amplificateur, une fois connecté, distribue la même charge entre les deux canaux, chaque canal conduira, de façon efficace, la moitié de la charge. C'est pourquoi, pour les opérations conduites en "mono", nous recommandons l'utilisation d'une charge de huit ohm comme impédance minimale.



Wird der Verstärker gebrückt, "sieht" dieser nur die halbe angelegte Last. Aus diesem Grund geben wir für die gebrückte mono Operation eine minimale Last von 8 Ohm vor.



Visto che un'amplificatore ostruito divide il carico tra i due canali, ogni singolo canale in effetti conduce meta del carico. Quindi, per il funzionamento monofonico ostruito dell'amplificatore si raccomanda l'utilizzo di un carico di 8 ohm impedenza minima.

OPERATION

POWER SWITCH

The POWER switch is located on the front panel of the amplifier. An internal lamp indicates when it is turned on.



Standard practice is to turn the amplifier on last and off first when switching components to prevent sending damaging transients to the speakers.



Es costumbre encender el amplificador de último y apagarlo de primero cuando se estan encendiendo/apagando otros equipos, para así evitar el envío de transientes dañinas a los parlantes.



Il est de pratique courante de commencer par tourner l'amplificateur sur "off" et de terminer par "on," lorsqu'il s'agit de prévenir l'envoi de passages nuisible aux haut-parleurs.



Der Verstärker sollte als letztes Gerät eingeschaltet und als erstes Gerät wieder ausgeschaltet werden, um eine Beschädigung der Lautsprecher durch Spannungsspitzen zu vermeiden.



L'uso comune consiglia l'accensione dell'amplificatore per ultimo e lo spegnimento per primo quando si accendono i vari componenti, per evitare l'invio di transitori danneggianti agli altoparlanti.

It is possible to leave the power switch in the on position and switch the amplifier remotely through a power distribution block or preamp switched outlet. When doing so make sure the switch is rated for the current required by the amplifier.

LEVEL CONTROLS

The input sensitivity for each channel can be adjusted individually using the level controls on the front panel. The level controls are configured to allow each channel to be attenuated by –60dB and are marked from 10 (full output) to 0 (full attenuation).

In public systems where it is necessary to match levels, the knobs can be removed and the controls adjusted with your fingers or a flathead screwdriver. Cover the holes with the enclosed plugs to restrict access.

INPUT CONFIGURATION SWITCH

Normal/Bridged Mono

The amplifier operates in two-channel mode when the front panel Normal/Bridged Mono switch is in the Normal position. To use the amplifier in single channel, bridged mono applications, the front panel switch must be in the Bridged mono position. When the switch is set in the Bridged Mono position, the Channel 1 (+) and (–) inputs are connected to Channel 2 in reversed polarity, which inverts the Channel 2 output. Only the Channel 1 input is used, and the speaker is connected to the two positive (+) output terminals. The amplifier gain is adjusted by the Channel 1 level control; the Channel 2 control is not active.



For thermal considerations we do not recommend using less than a nominal eight ohm load on the amplifier when running it in bridged mono.



Por consideraciones térmicas, no recomendamos el uso de una carga nominal menor de ocho ohmios cuando el amplificador esté trabajando en el modo puente.



Pour de raisons thermiques, nous ne recommandons pas d'envoyer à l'amplificateur, une charge de valeur nominale inférieure à huit ohm, au moment du fonctionnement en mode "mono."



Um thermische Störungen zu vermeiden, empfehlen wir in der mono Brückenschaltung die minimale Last von 8 Ohm nicht zu unterschreiten.



Per ragioni di natura termale non consigliamo l'uso di un carico nominale dell'amplificatore inferiore a 8 ohm nel caso di funzionamento monofonico ostruito.

GROUND SWITCH

Ground loops are characterized by a hum or buzz through the speakers and are caused by a voltage potential difference between two points in a ground circuit. Ground loops are aggravated when multiple paths exist for a given circuit. Mounting components in a rack with metal rails may introduce ground loops between associated equipment, because the rails can establish an additional ground path.

The CHASSIS/FLOAT switch allows you to select the amplifier grounding scheme for best system compatibility. With the switch in the CHASSIS position all signal grounds are referred to the chassis and power line ground.

In the FLOAT position the signal ground is decoupled from the chassis. The position of the switch is determined by the overall noise in the system; choose the position which gives the lowest hum.

SHORT CIRCUIT PROTECTION

Due to the self-protecting properties of the output power MOSFETs there is no need for sonically degrading voltage and current limiting circuits. To protect the amplifier from problems which may occur in the speaker line there is an overload detection circuit.



In the event of a short in the speaker load or cables, the speaker detection circuit will shut down that channel and light the front panel SHORT indicator. If this happens, correct the fault and turn the amplifier off, then back on to reset.



En el caso de un corto circuito en la carga de parlantes ó en los cables, el circuito de protección apagará el canal correspondiente e iluminará el indicador de corto (SHORT) en el panel frontal. Si esto sucede, corrija la falla y apague el amplificador, luego enciéndalo de nuevo para volver a la condición normal de operación.



En cas de court-circuit de la charge ou des câbles, le circuit de détection du haut-parleur éteindra le canal et allumera le bouton SHORT indiqué à l'avant. Si cela devait se produire: éteignez l'amplificateur puis réallumez.



Ist ein Kurzschluss in den Lautsprechern oder in den Lautsprecherkabeln, wird eine Schutzschaltung aktiv, die den entsprechenden Kanal abschaltet. Auf der Frontseite wird dies mit einer LED angezeigt. Sollte dies einmal passieren, beheben Sie den Fehler, schalten Sie den Verstärker aus und wieder ein. Dadurch wird in dem Verstärker ein Reset durchgeführt.



Nel caso di un cortocircuito nel carico dei cavi o degli altoparlanti, il circuito rivelatore di sovratensione dell'altoparlante provvederà allo spegnimento del relativo canale e all'accensione dell'indicatore SHORT sul pannello anteriore. In questo caso rimediare al guasto, spegnere l'amplificatore e poi ripristinare.

LED INDICATORS

Amplifier operation is monitored internally and each channel has four status LEDs. These indicators can be used for system troubleshooting in case of aberrant behavior.

Signal	Monitors the amplifier output and lights when a signal is present. The SIGNAL indicator is calibrated to activate an equivalent input voltage of 30mV, with the amplifier set for full gain.
Clipping	Monitors the DRIVE SIGNAL and lights when the drive signal voltage exceeds the maximum level for linear operation of the output MOSFETs.
Thermal	Indicates when the thermal protection has shut down the amplifier. This occurs when the heatsink temperature becomes excessive.
Short	Indicates when the output overload monitor detects a potentially damaging short and shuts down amplifier operation. After clearing the fault, restore normal function by turning the amplifier off, then on again.

WARM UP

In order to achieve the best sonic performance and image stability from the amplifier, we recommend letting it warm up for 1 hour before beginning any critical listening.

CLEANING AND MAINTENANCE

There is no requirement for regular maintenance on the electronic components of the amplifier. If the case becomes soiled it can be cleaned using a soft cloth and a mild detergent, such as spray window or glass cleaner. If the amplifier is located in a particularly dusty environment cleaning the inside with compressed air or vacuuming every 18 to 24 months is sufficient.

TECHNICAL REFERENCE

FIELD SERVICE CONSIDERATIONS

A primary focus during the design and development of the P4000 was to ensure the dependability of the amplifiers. The use of MOSFET output transistors and the low voltage *trans•nova* input stage combined with careful component selection for the circuit assembly made the reliability goals achievable. However, a parallel effort was also undertaken to make sure any down time caused by an amplifier fault was minimized by making the amplifier technician “friendly.” The modular construction allows exchanging the entire operational portion of either channel quickly and easily without the need for soldering or specialized equipment.

This section of the manual contains descriptions of circuit operation and block diagrams to assist technicians with component level repairs.

THEORY AND OPERATION OF *trans•nova*

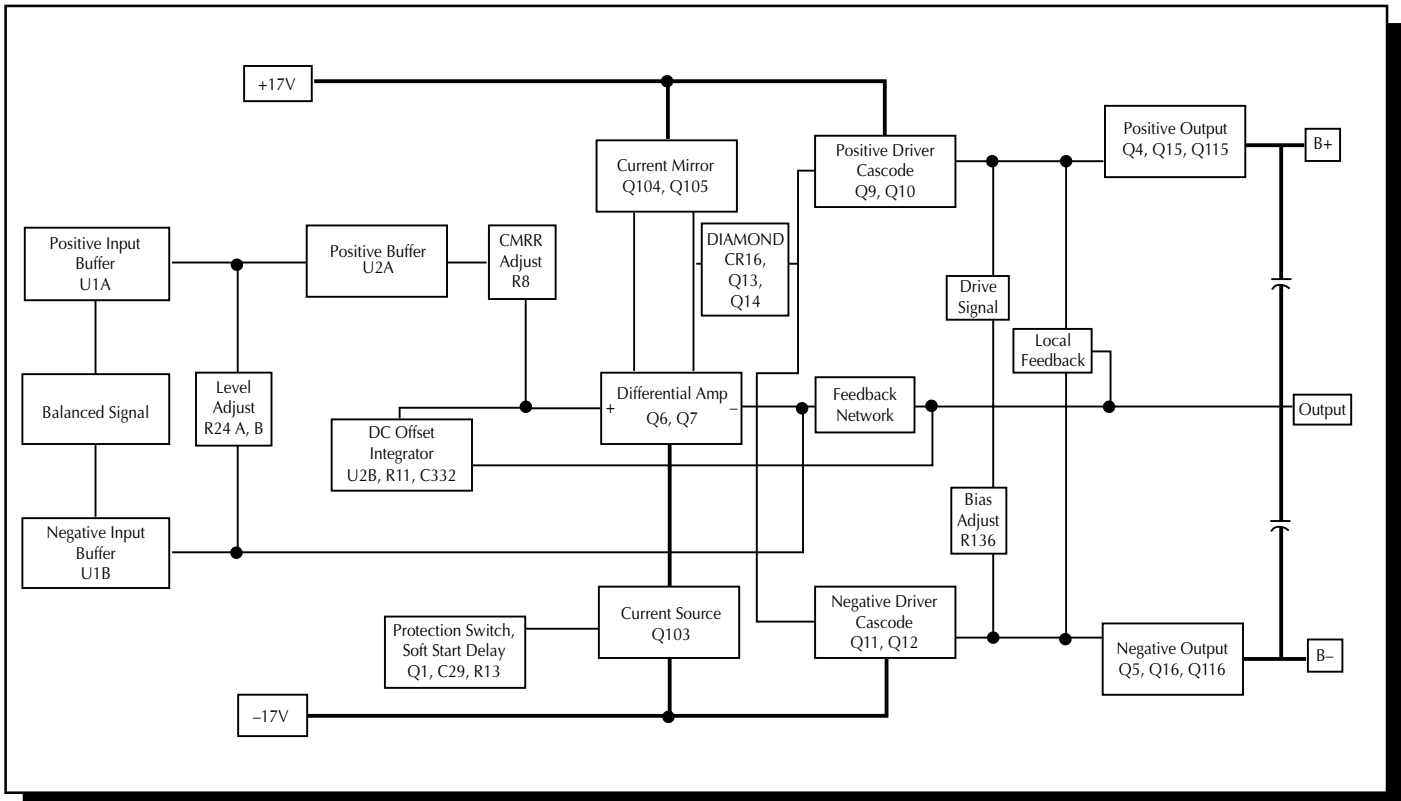
The *trans•nova* (TRANsconductance Nodal Voltage Amplifier) principle is based on our 1984 U.S. patent 4,467,288. This patent describes the advantages of audio power amplifiers in which a MOSFET output stage is connected in a grounded source configuration. In this connection, the output stage has its full voltage gain of typically 20dB (ten times), instead of the usual 1dB loss of voltage follower designs. The output stage is further refined into a transimpedance stage (current-to-voltage converter), to achieve extremely short loop (fast) negative feedback. The output stage is driven cooperatively by a transconductance stage (voltage-to-current converter).

Using the output stage to supply voltage gain inherently increases the power gain (for the same bandwidth) of the output stage by typically ten times over the conventional follower connection, using the same MOSFET devices. This increase in efficiency allows the use of a much simpler input section than in the more common high voltage designs. The number of serial stages, from input to output has been reduced from five or more to only four. This also allows the input section to be designed with the criteria of high quality Class A line amp with the characteristic high linearity and wide bandwidth.

The disadvantage of the Class A driver stage is the limited current headroom available. A conventional Class A transconductance stage has a 2:1 or 6dB limit on peak to quiescent current. The number of MOSFETs used in the P4000 imposes a significant capacitive load on the driver stage, enough of a load to strain the ability of the driver to deliver the required current at the higher audio frequencies.

Since the operation of the transconductance driver stage is a major factor in the reproduction quality of the amplifier, we developed our proprietary DIAMOND (Dynamically Invariant AMplification Optimized Nodal Drive, patent application in process) circuit to satisfy the current headroom requirements. DIAMOND does this by smoothly and continuously varying the current transfer ratios of the two transconductance paths, under the control of the signal current itself. This implementation allows the current transfer ration of one path to be smoothly and continuously reduced to zero while the other path is smoothly and continuously increased by a factor of two. This yields an additional 14dB of current headroom to drive the MOSFETs. The result is a dramatic reduction in high frequency distortion, combined with improved ultrasonic stability.

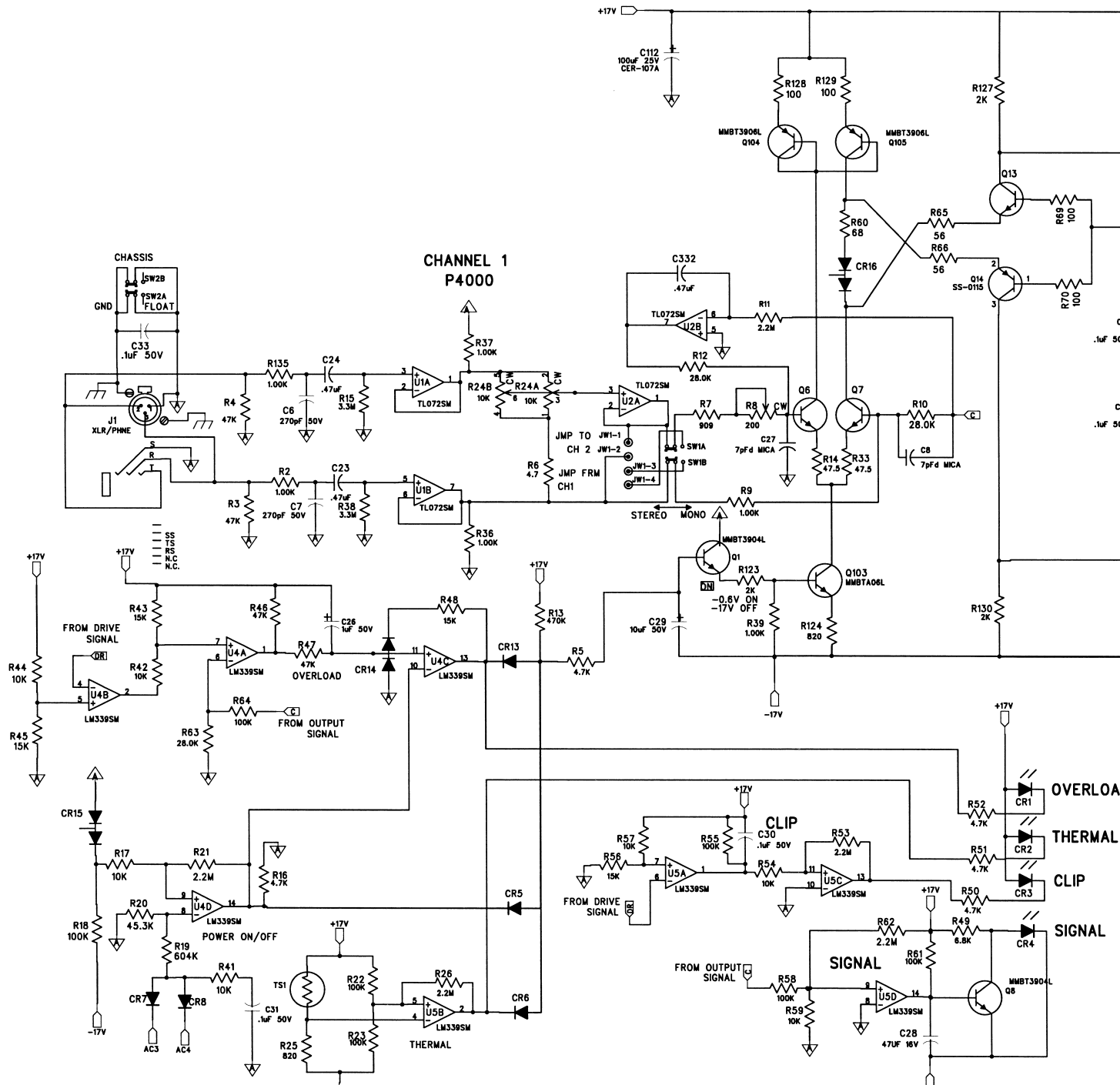
P4000 FUNCTIONAL BLOCK DIAGRAM

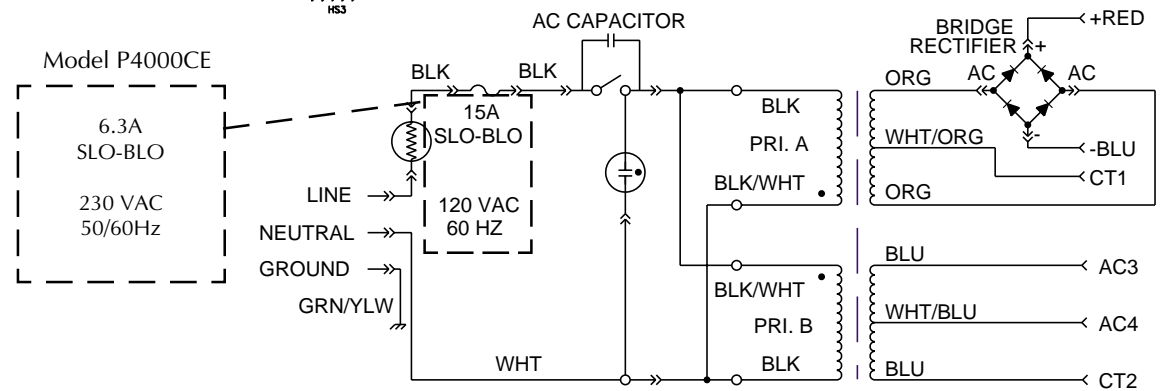
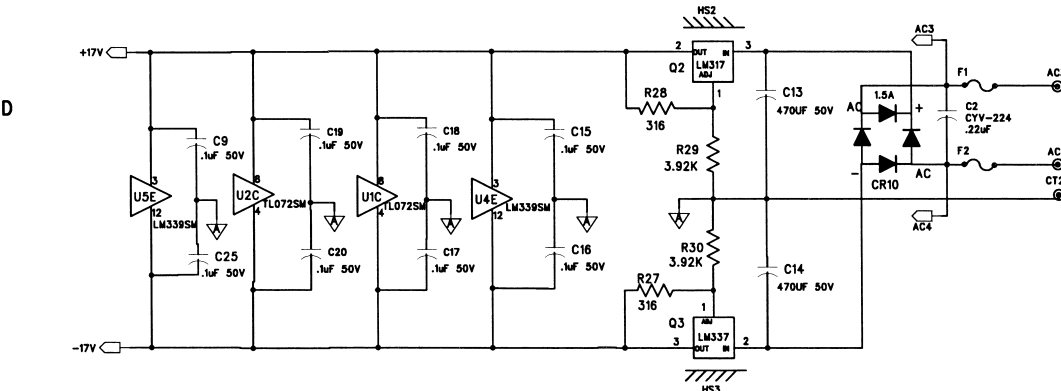
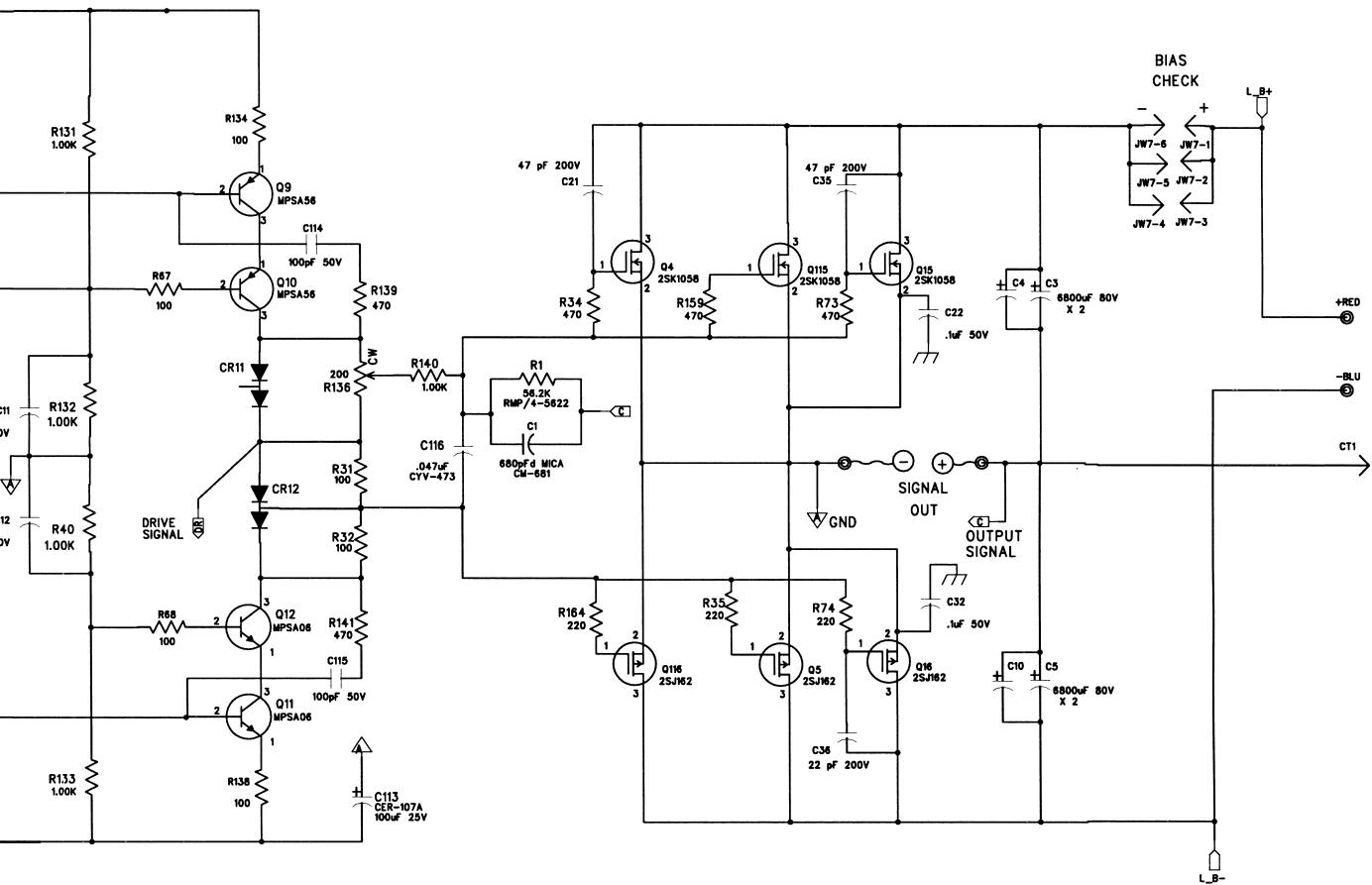


SCHEMATIC DIAGRAM

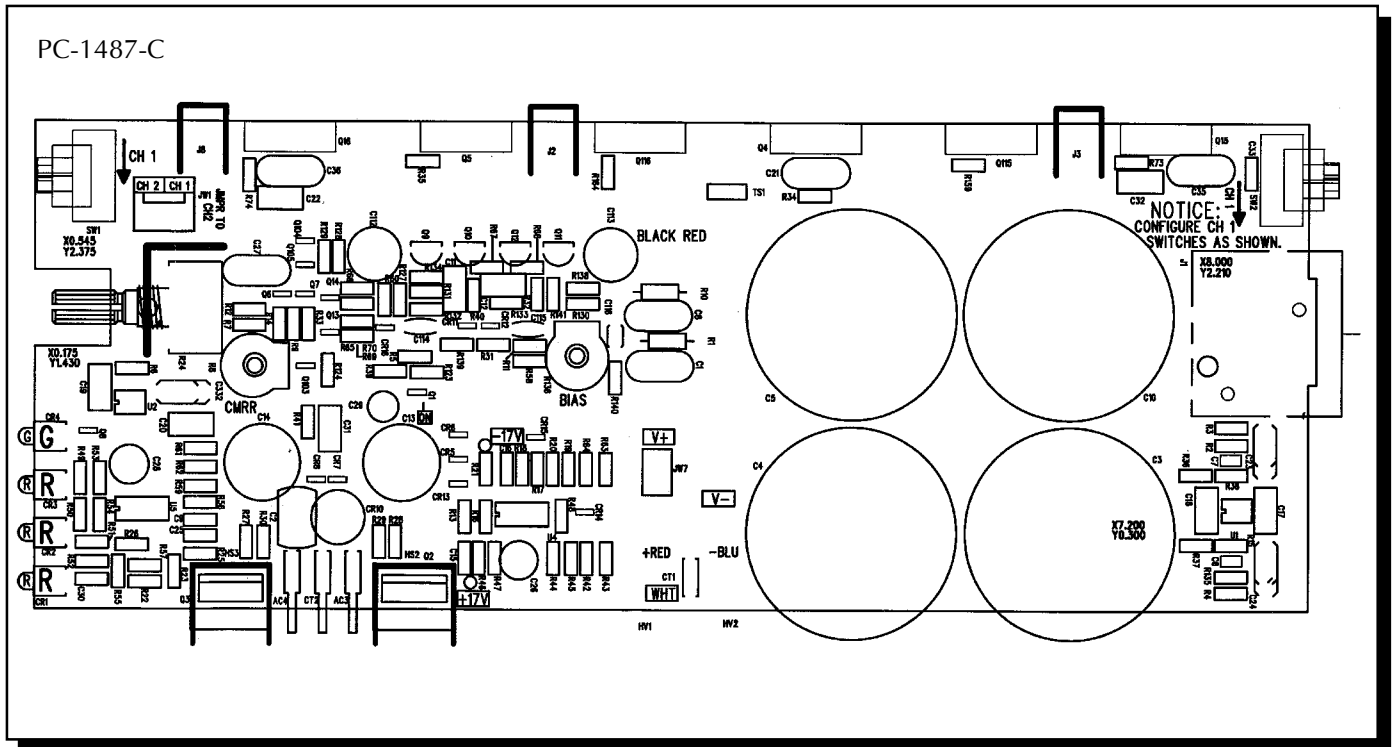
NOTES: Unless specified otherwise

1. All resistors in ohms.
2. All capacitors in microfarads.
3. Channel 1 only shown.





PC BOARD LAYOUT



PARTS LIST

DESIGNATOR VALUE ALL RESISTORS IN OHMS

R1	56.2k, 1/4W, 1%
R2	1k, 1/4W, 1%
R3	47k, 1/4W, 5%
R4	47k, 1/4W, 5%
R5	4.7k, 1/4W, 5%
R6	4.7, 1/4W, 5%
R7	909, 1/4W, 1%
R8	200, Trim Pot
R9	1k, 1/4W, 1%
R10	28k, 1/4W, 1%
R11	2.2M, 1/4W, 5%
R12	28k, 1/4W, 1%
R13	470k, 1/4W, 5%
R14	47.5, 1/4W, 1%
R15	3.3M, 1/4W, 5%
R16	4.7k, 1/4W, 5%
R17	10k, 1/4W, 5%
R18	100k, 1/4W
R19	604k, 1/4W, 1%
R20	45.3k, 1/4W, 1%
R21	2.2M, 1/4W, 5%
R22	100k, 1/4W
R23	100k, 1/4W, 5%
R24	10k Pot, Dual
R25	820, 1/4W, 5%
R26	2.2M, 1/4W, 5%
R27	316, 1/4W, 1%
R28	316, 1/4W, 1%
R29	3.92k, 1/4W, 1%
R30	3.92k, 1/4W, 1%
R31	100, 1/4W, 5%
R32	100, 1/4W, 5%
R33	47.5, 1/4W, 1%
R34	470, 1/4W, 5%
R35	220, 1/4W, 5%
R36	1k, 1/4W, 1%
R37	1k, 1/4W, 1%
R38	3.3M, 1/4W, 5%
R39	1k, 1/4W, 1%
R40	1k, 1/4W, 1%
R41	10k, 1/4W, 5%
R42	10k, 1/4W, 5%
R43	15k, 1/4W, 5%
R44	10k, 1/4W, 5%
R45	15k, 1/4W, 5%
R46	47k, 1/4W, 5%
R47	47k, 1/4W, 5%
R48	15k, 1/4W, 5%
R49	6.8k, 1/4W, 5%
R50	4.7k, 1/4W, 5%
R51	4.7k, 1/4W, 5%
R52	4.7k, 1/4W, 5%
R53	2.2M, 1/4W, 5%
R54	10k, 1/4W, 5%
R55	100k, 1/4W, 5%
R56	15k, 1/4W, 5%
R57	10k, 1/4W, 5%
R58	100k, 1/4W, 5%
R59	10k, 1/4W, 5%
R60	68, 1/4W, 5%
R61	100k, 1/4W, 5%
R62	2.2M, 1/4W, 5%
R63	28k, 1/4W, 1%
R64	100k, 1/4W, 5%
R65	56, 1/4W, 5%
R66	56, 1/4W, 5%
R67	100, 1/4W, 5%
R68	100, 1/4W, 5%
R69	100, 1/4W, 5%

PART

RMP/4-5622
RM/4-1001C
RM/4-473C
RM/4-473C
RM/4-472C
RM/4-047C
RM/4-9090C
RVH-201
RM/4-1001C
RMP/4-2802
RM/4-225C
RM/4-2802C
RM/4-474C
RM/4-0475C
RM/4-335C
RM/4-472C
RM/4-103C
RM/4-104C
RM/4-6043C
RM/4-4532C
RM/4-225C
RM/4-104C
RM/4-104C
RV-0818
RM/4-821C
RM/4-225C
RM/4-3160C
RM/4-3160C
RM/4-3921C
RM/4-3921C
RM/4/101C
RM/4/101C
RM/4-0475C
RM/4-471C
RMP/4-221C
RM/4-1001C
RM/4-1001C
RM/4-335C
RM/4-1001C
RM/4-1001C
RM/4-103C
RM/4-103C
RM/4-153C
RM/4-103C
RM/4-153C
RM/4-473C
RM/4-473C
RM/4-153C
RM/4-682C
RM/4-472C
RM/4-472C
RM/4-472C
RM/4-225C
RM/4-103C
RM/4-104C
RM/4-153C
RM/4-103C
RM/4-104C
RM/4-103C
RM/4-680B
RM/4-104C
RM/4-225C
RM/4-2802C
RM/4-104C
RM/4-560C
RM/4-560C
RM/4-101C
RM/4-101C
RM/4-101C

DESIGNATOR VALUE

R70	100, 1/4W, 5%
R73	470, 1/4W, 5%
R74	220, 1/4W, 5%
R123	2k, 1/4W, 5%
R124	820, 1/4W, 5%
R127	2k, 1/4W, 5%
R128	100, 1/4W, 5%
R129	100, 1/4W, 5%
R130	2k, 1/4W, 5%
R131	1k, 1/4W, 1%
R132	1k, 1/4W, 1%
R133	1k, 1/4W, 1%
R134	100, 1/4W, 5%
R135	1k, 1/4W, 1%
R136	200 Trim Pot
R138	100, 1/4W, 5%
R139	470, 1/4W, 5%
R140	1k, 1/4W, 1%
R141	470, 1/4W, 5%
R159	470, 1/4W, 5%
R164	220, 1/4W, 5%
C1	680pf, 500v Mica
C2	.22μF, 50V
C3	6800μF, 80V, Electrolytic
C4	6800μF, 80V, Electrolytic
C5	6800μF, 80V, Electrolytic
C6	270pF, 50V
C7	270pF, 50V
C8	7.0pF, 500V, Mica
C9	0.1μF, 50V
C10	6800μF, 80V, Electrolytic
C11	0.1μF, 50V
C12	0.1μF, 50V
C13	470μF, 50V, Electrolytic
C14	470μF, 50V, Electrolytic
C15	0.1μF, 50V
C16	0.1μF, 50V
C17	0.1μF, 50V
C18	0.1μF, 50V
C19	0.1μF, 50V
C20	0.1μF, 50V
C21	47pF, 500V, Mica
C22	0.1μF, 50V
C23	0.47μF, 50V
C24	0.47μF, 50V
C25	0.1μF, 50V
C26	1μF, 50V, Electrolytic
C27	7.0pF, 500V, Mica
C28	47μF, 16V, Electrolytic
C29	10μF, 50V, Electrolytic
C30	0.1μF, 50V
C31	0.1μF, 50V
C32	0.1μF, 50V
C33	0.1μF, 50V
C35	47pf, 500V, Mica
C36	22pf, 500V, Mica
C112	100μf, 50V, Electrolytic
C113	100μf, 50V, Electrolytic
C114	100pf, 100V, Disk
C115	100pf, 100V, Disk
C116	.047μF, 50V
C332	.47μF, 50V
Q1	MMBT3904L, NPN
Q2	LM-317 + Regulator
Q3	LM-337 – Regulator
Q4	N Channel MOSFET
Q5	P Channel MOSFET
Q6	MMBT5088L

PART

RM/4-101C
RM/4-471C
RM/4-221C
RM/4-202C
RM/4-821C
RM/4-202C
RM/4-101C
RM/4-101C
RM/4-202C
RM/4-1001C
RM/4-1001C
RM/4-1001C
RM/4-101C
RM/4-1001C
RVH-201
RM/4-101C
RM/4-471C
RM/4-1001C
RM/4-471C
RM/4-471C
RM/4-221C
CM-681
CYV-224
CERS-688D
CERS-688D
CERS-688D
CDS-271CAAA
CDS-271CAAA
CM-070
CDS-104CCDB
CERS-688D
CYV-104
CYV-104
CER-477C
CER-477C
CDS-104CCDB
CDS-104CCDB
CYV-104
CYV-104
CYV-104
CYV-104
CYV-104
CM-470
CYV-104
CYV-474
CYV-474
CDS-104CCDB
CER-105C
CM-070
CER-476
CER-106C-024
CDS-104CCDB
CYV-104
CYV-104
CDS-104CCDB
CM-470
CM-220
CER-107A
CER-107A
CD-101
CD-101
CYV-473
CYV-474
SS-0792
SS-1375
SS-1376
SS-741T Δ
SS-740T Δ
SS-0114

DESIGNATOR	VALUE	PART #
Q7	MMBT5088L	SS-0114
Q8	MMBT3904L	SS-0792
Q9	MPS-A56	SS-101A
Q10	MPS-A56	SS-101A
Q11	MPS-A06	SS-102A
Q12	MPS-A06	SS-102A
Q13	MMBT5088L	SS-0114
Q14	MMBT5087L	SS-0115
Q15	N Channel MOSFET	SSH-741T
Q16	P Channel MOSFET	SSH-740T
Q103	MMBTA06L	SS-102SM
Q104	MMBT3906L	SS-0791
Q105	MMBT3906L	SS-0791
Q115	N Channel MOSFET	SSH-741T
Q116	P Channel MOSFET	SSH-740T
CR1	LED Red	SS-741
CR2	LED Red	SS-741
CR3	LED Red	SS-741
CR4	LED Green	SS-740
CR5	MMBD914L Diode	SS-803SM
CR6	MMBD914L Diode	SS-803SM
CR7	MMBD914L Diode	SS-803SM
CR8	MMBD914L Diode	SS-803SM
CR10	Bridge Rectifier, 1.5 Amp	SS-0800
CR11	BAV99L Dual Diode	SS-260SM
CR12	BAV99L Dual Diode	SS-260SM
CR13	MMBD914L Diode	SS-803SM
CR14	BAV99L Dual Diode	SS-260SM
CR15	BAV99L Dual Diode	SS-260SM
CR16	BAV99L Dual Diode	SS-260SM
J1	Input Jack, Combo	CC-0588
JW1	4-Pin Header	CC-0970
JW7	6-Pin Dual Header	CC-673
SW1	DPDT Slide Switch	SW-0280
SW2	DPDT Slide Switch	SW-0280
U1	TL072CD Opamp	SS-143SM
U2	TL072CD Opamp	SS-143SM
U4	LM339 Quad Comparator	SS-730SM
U5	LM339 Quad Comparator	SS-730SM
	Power Switch	SWH-1009
	IEC Connector	CC-0852
	IEC Line Cord	FAH-146
	Transformer	TT-1501-B
	Bridge Rectifier, 25 Amp	SSH-609
	Thermistor, 10k	SS-1519-A
	Thermal Insulator	HW-1494-A
	Dual Binding Post	CC-0867
	2 by 3 Jumper	CC-648
	Gain Knob	KN-0838
F1	Fuse, 1A Fast	FS-1592
F2	Fuse, 1A Fast	FS-1592
Line Fuse	Fuse, 15A Slo Blo	FS-1773
	Surge Limiter	FA-1517-A
	AC Capacitor	FA-1502-A

Components marked with this symbol are safety critical and should only be replaced with identical components.

Los componentes marcados con el simbolo son imprescindibles para la protecci3n del equipo, por lo cual que solo sean reemplazados por los mismos componentes.

Les composants marqu3s du symbole sont indispensables 3 la s3curit3e et ne peuvent 4tre remplac3s qu'avec des composants identiques.

Bauteile, die mit einem gekennzeichnet sind, sind sehr wichtig und d3rfen nur mit den original Ersatzteilen ausgetauscht werden.

I componenti contrassegnati da sono critici per la sicurezza e devono essere rimpiazzati solo con ricambi di valore identico.

Model P4000CE	
IEC Line Cord	FA-1464-A
Transformer	TT-1617-A
Fuse, 6.3A Slo Blo (5 x 20mm)	FS-1835
Fuse Cap	FS-1125

CIRCUIT OPERATION

trans•nova Implementation

The transistor Q1 is configured to operate as a switch which controls the current source, Q103, of the input differential amp, Q6 and Q7. When Q1 is off the emitter voltage is low turning off Q103. Timing of the Soft Start function is controlled by the charging time of C29 through R13. The THERMAL and OVERLOAD Protection circuits use Q1 to shut down the channel when they activate.

U1A and U1B are buffer amps configured as unity gain, non-inverting voltage followers which feed the attenuator network comprised of the level control R24A, and R24B and the resistor R6 which establishes the 60dB adjustment range. The output of U2A and U1B is connected to the input of the differential amp. U2B is configured as a DC servo integrator to null the input offset currents.

The output of the differential amp is fed to the driver stage by Q13 and Q14 which perform the DIAMOND transconductance steering function. The cascode pairs Q9, Q10 and Q11, Q12 supply the signal voltage and current needed to drive the output stage Q4, Q115, Q15, and Q116, Q5, Q16.

Class AB bias current is controlled by R136.

Loop feedback is supplied by the network R1 and C1, and global feedback by R10 and C8.

CALIBRATION



WARNING: Only a competent technician should attempt the following procedure.



PRECAUCION: Sólo un técnico competente debe intentar efectuar el siguiente procedimiento.



MISE EN GARDE: Seul un technicien compétent devrait procéder à l'opération suivante.



WARNUNG: Nur ein speziell geschulter Techniker sollte die nachfolgende Prozedur durchführen.



AVVISO: La seguente procedura va eseguita soltanto da un tecnico di competenza.

Bias:

The bias control establishes the quiescent Class AB output current of the amplifier. The bias should not need readjustment from the factory setting; however, if the amplifier is repaired and output devices have been changed, or if the two channels of the amplifier do not run at the same temperature, calibrating the bias is necessary. **Disconnect the power to the amplifier before removing the cover.** To adjust the bias, disconnect the input and speakers and remove the jumper JW7. Connect an amp meter across the exposed pins. Adjust R136 to get a current reading of 300 mA.



WARNING: Only a competent technician should attempt the following procedure.



PRECAUCION: Sólo un técnico competente debe intentar efectuar el siguiente procedimiento.



MISE EN GARDE: Seul un technicien compétent devrait procéder à l'opération suivante.



WARNUNG: Nur ein speziell geschulter Techniker sollte die nachfolgende Prozedur durchführen.

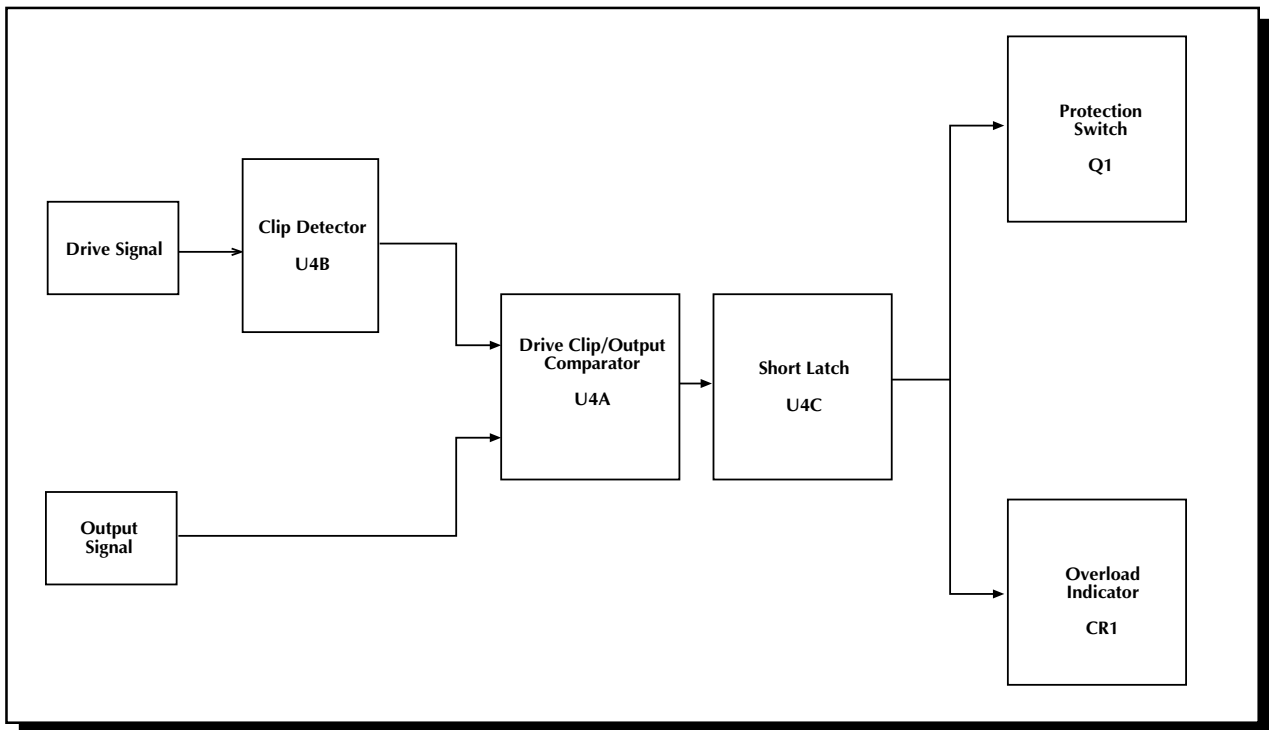


AVVISO: La seguente procedura va eseguita soltanto da un tecnico di competenza.

Calibrating Common Mode Rejection:

The input common mode null is adjusted by the trim pot R8. The CMRR should be greater than 75dB below rated output. If the CMRR requires adjustment, feed the amplifier input with a common mode signal and adjust R8. **Disconnect the power to the amplifier before removing the cover.** Use a sinewave generator set to 1 volt output at 1kHz. Connect the generator signal output to the tip and ring of a 1/4" plug and ground to the sleeve. Plug this into the amplifier input. Connect an AC voltmeter to the amplifier output binding posts. Adjust R8 to give the lowest voltage output from the amplifier. For a temporary adjustment when a signal generator and voltmeter are not available, use an FM tuner and tune it to an unused station as your signal source, and connect the signal to the amplifier as described above. Connect the amplifier output to a small full range speaker. Turn the amplifier level controls full down and turn the amplifier on. Turn up the level control until you hear a signal through the speaker. Alternate between adjusting R8 for the lowest output signal and increasing the input control until you have the level control full. There should be very low output from the amplifier if any is detected at all.

Output Short Protection

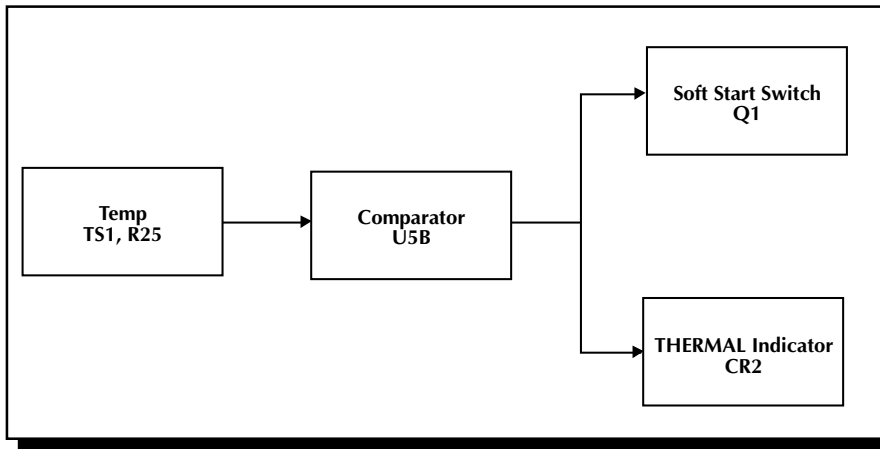


The Short detector monitors the Drive Signal and Output Signal levels and shuts down that channel when a shorted output condition is detected. Recovering for the Short protection requires turning the amplifier off to reset it.

The comparator U4B monitors the Drive Signal and goes low when the drive level is sufficient to clip the output stage. The drive signal clip status is connected to the input of U4A on pin 7, the Output Signal is connected to the input of U4A on pin 6. The output of U4A goes low when pin 7 is low and pin 6 is near zero.

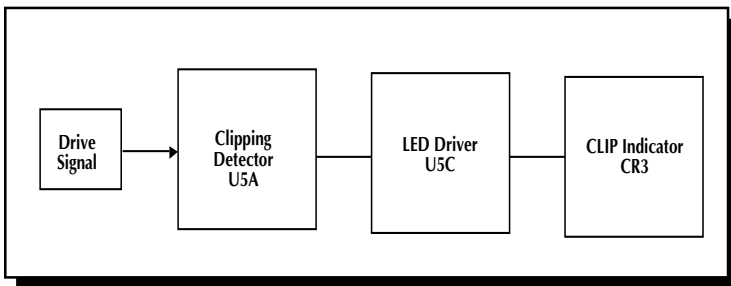
This condition, indicating high drive voltage and low output voltage, occurs only when the output is grounded. If the output of U4BA is low for the time sufficient for C26 to charge, then U4C latches low activating the protection switch Q1 and lighting the indicator CR1. The output of U4C is held low by CR14 and will reset only after the power is turned off.

Thermal Protection



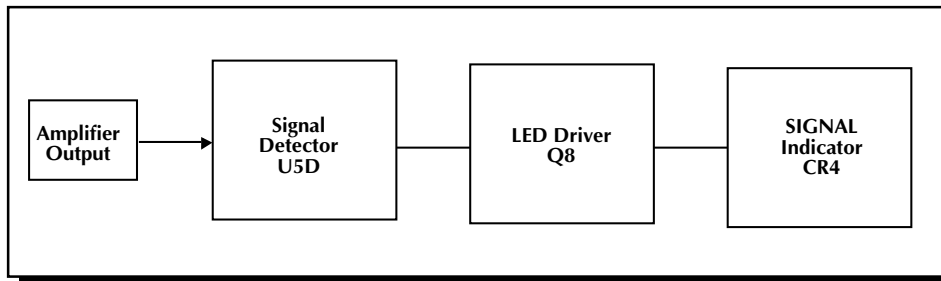
The thermal protection is activated, and shuts down audio operation, when the amplifier heatsink reaches an excessively high temperature. The voltage divider R22 and R23 establishes the reference voltage on pin 5 of U5B. The control voltage on pin 4 is established by the voltage divider TS1 and R25. TS1 is a NTC (Negative Temperature Coefficient) thermistor, mounted on the heatsink. As TS1 warms and the resistance falls, the voltage on pin 4 rises. When the voltage on pin 4 exceeds the voltage on pin 5, the output on pin 2 goes low, shutting down the Soft Start switch Q1 and lighting the THERMAL indicator.

Clipping Indicator



The CLIP indicator is driven by the comparator U5A. The voltage divider R56 and R57 established the reference voltage for the Clipping detector at pin 7 of U5A. The reference voltage scales the output of U5A to indicate when the Drive Signal, at pin 6, demands in excess of the available voltage or current of the output stage.

Signal Present Indicator



The SIGNAL indicator is controlled by the comparator U5D and the transistor Q8. The amplifier output is connected to the input pin 9. The voltage divider R58 and R59 scales the output voltage to change the comparator output stage at an equivalent input voltage of 30mV. The output at pin 14 controls the transistor Q8 to shunt across and turn off the LED CR4.

AMPLIFIER MODULE REPLACEMENT

The amplifier modules have been designed to eliminate the need for a special workplace if a field exchange becomes necessary. All wire connections are made with quick connect terminals so soldering is not necessary. The following tools are needed to disassemble the amplifier:

Allen wrench, 9/64
Allen wrench, 7/64
Phillips screwdriver, #1 tip
Thin nose pliers



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MISE EN GARDE: Seul un technicien compétent devrait procéder à l'opération suivante.



WARNUNG: Nur ein speziell geschulter Techniker sollte die nachfolgende Prozedur durchführen.



AVVISO: La seguente procedura va eseguita soltanto da un tecnico di competenza.

1. Locate the 9/64 Allen head screws on the top edge of the amplifier between the heatsink fins. Remove these and the Phillips head screws holding the input jacks on the rear panel. Lift the rear of the cover and remove it from the amplifier. Take the knobs off the level controls.
2. Remove the 9/64 Allen screw located behind the rack ears and the three 9/64 screws on the bottom edge of the heatsink. This frees the module from the chassis and it can be lifted clear.
3. Unplug the gray Mono cable connecting the two modules. Disconnect the red and black output wires and all transformer secondary wires from the PC board and bridge rectifier.
4. Prepare a new Channel 1 module for installation by setting the NORMAL/BRIDGED MONO switch to the default position according to the arrow marked on the PC board. Prepare a Channel 2 module by duplicating the switch setting of the module which was removed.
5. Install the new module and check the position and alignment of the LEDs. Replace the level control knob and check its alignment while securing the module.
6. After the module is secured, reconnect the wires according to the following chart:

Wire Color	Function	Terminal	Size
Red	Audio Output	RED	1/4"
Black	Output Ground	BLK	1/4"
Orange/White	Transformer Center Tap	CT1	1/4"
Blue (2)	Low Voltage Secondary	AC3, AC4	1/8"
Blue/White	Low Voltage Center Tap	CT2	1/8"
+ Red	High Voltage DC	Bridge Rect. +	1/4"
- Blue	High Voltage DC	Bridge Rect. -	1/4"

SERVICE POLICY AND LIMITED WARRANTY

Rockford Corporation (Hafler Division) offers a limited warranty on Hafler products on the following terms:

- **Length of Warranty**

- 5 years on P1000, P1500, P3000, P4000
- 7 years on P9505 and P7000
- 90 days on all B-Stock (receipts are required)

- **What is Covered**

This warranty applies only to products sold to the original owner (non-transferable). This only applies to units sold in the Continental United States. You are required to have a copy of the receipt stating the customer's name, dealer name, product purchased and date of purchase.

- **Products found to be defective during the warranty period** will be repaired or replaced (with product deemed to be equivalent) at Hafler's discretion.

- **What is NOT Covered**

1. Damage caused by accident, abuse, improper operations, water, theft
2. Service performed by anyone other than Hafler or an Authorized Hafler service center
3. Any product purchased outside the United States (please contact your local dealer)
4. Shipping charges to get the unit to Hafler
5. Any product which has had the serial number defaced, altered, or removed

- **Limit on Implied Warranties**

Any implied warranties including warranties of fitness for use and merchantability are limited in duration to the period of the express warranty set forth above. Some states do not allow limitations on the length of an implied warranty, so this limitation may not apply. No person is authorized to assume for Rockford Fosgate any other liability in connection with the sale of the product.

- **How to obtain service or technical support**

Please call 1-800-669-9899 for Rockford/Hafler support. You must obtain an RA # (return authorization number) to return any products to Hafler. You are responsible for shipment of product to Hafler.

Rockford Corporation
Hafler Division
2055 E. 5th Street
Tempe, Arizona 85281

ADVERTENCIA – INFORMACION DE SEGURIDAD IMPORTANTE



El símbolo de flecha relámpago dentro de un triángulo equilátero, es para alertar al usuario de la presencia de “voltajes peligrosos” no aislados en el interior del aparato, los cuales pueden ser de suficiente magnitud para constituir un riesgo de choque eléctrico a las personas.

El símbolo de exclamación dentro de un triángulo equilátero, es para alertar al usuario de la presencia de instrucciones importantes de operación y mantenimiento (servicio) en la documentación que acompaña al equipo.

1. LEA LAS INSTRUCCIONES

Todas las instrucciones de seguridad y operación de su equipo Hafler, deben ser leídas antes de que el equipo sea conectado eléctricamente.

2. CONSERVE EL MANUAL DEL PROPIETARIO

Estas instrucciones de seguridad y operación, deben ser conservadas para futuras referencias.

3. CUADROS DE ADVERTENCIAS

Todas las advertencias en el equipo y en las instrucciones de operación, son importantes y deben ser seguidas.

4. SIGA LAS INSTRUCCIONES

Todas las instrucciones de uso y operación son importantes y deben ser seguidas.

5. CALOR

El equipo debe ser mantenido lejos de áreas de alta temperatura, como por ejemplo: ventilaciones de calentadores, radiadores, estufas/hornos, hogueras, etc.

6. VENTILACION

El equip debe ser usado en áreas con ventilación adecuada. Deben er tomadas las precauciones necesarias para no impedir el flujo de aire dentro y alrededor del aparato.

7. AGUA Y HUMEDAD

El equipo no debe ser usado en el agua ó alrededor de ésta, tales como en una bañera, tanque o áreas de nado. También, el equipo no debe ser usado en áreas propensas a inundaciones, tales como en un sótano.

8. FUENTES DE PODER

El equipo debe ser conectado a una fuente de poder del mismo voltaje y frecuencia que el indicado en el panel trasero sobre el punto de entrada del cable de corriente.

9. PROTECCION DEL CABLE DE CORRIENTE

Los cables de corriente deben ser dispuestos de forma tal que no interfieran con el movimiento de objetos en la sala: personas, aspas de ventilación, carretillas, etc. También, es necesario tener cuidado de que el cable no esté punzado o cortado, y debe estar ubicado de forma tal que esto no ocurra, como podría suceder debajo de una alfombra o al pasar el cable por una esquina aguda, etc.

10. ATERRAMIENTO DEL CABLE DE CORRIENTE

El cable de corriente es del tipo aterrado de tres hilos, diseñado para reducir el riesgo de una descarga eléctrica procedent de un chasis energizado. Se asume que su longitud es suficiente para la mayoría de usos del equipo. El uso de extensiones y multienchufes

no es recomendado, a menos que tengan el amperaje adecuado para poder suministrar la corrioente requerida pra la operación segura de todo el equipo conectado. Aun más, las extensiones deben proveer de la misma conexión aterrada de tres hiles. Es importante que el enchufe se pueda introducir comjpletamente en el receptáculo. Nunca remeva el pin de aterramiento en un intento por conectar el cable en un receptáculo de dos hilos no aterrado: use un adaptador de aterramiento que esté adecuadamente conectado a un punto de tierra.

11. PERIODOS SIN USO

Durante períodos prolongados sin uso del equipo, el cable de corriente debe ser desconectado de la fuente de electricidad.

12. LIMPIEZA

El equip debe ser limpiado solo en la forma que se detalla en las instruxxiones de operación.

13. INTRODUCCIÓN DE OBJETOS Y LIQUIDO

Deben ser tomadas precauciones con el fin de que objetos y/ó líquidos, tales como fluidos de limpieza y gaseosas, no sean derramados dentro del chasis del aparato.

14. DAÑOS QUE REQUIEREN DE SERVICIO

Los equipos Hafler deben ser llevados a servicio por personal calificado cuando:

- A. El cable de corriente ó el enchufe haya sido dañado, ó
- B. Objetos ó líquido hayan sido introducidos ó derramado en el equipo, ó
- C. El equipo haya sido expuesto a lluvia, ó
- D. El equipo aparenta no operar normalmente ó exhibe un marcado cambio en su desempeño, ó
- E. El equipo se ha caído, o el chasis ha sido golpeado.

15. SERVICIO

El usuario no deberá intentar darle servicio al equipo más allá de lo que está descrito en el instructivo de operación. Todo lo demás, deberá ser referido a servicio por personal calificado.

16. CARRETILLAS Y SOPORTES

El equipo podrá ser usado con carretillas y soportes que tengan la fortaleza y estabilidad suficiente para el uso previsto.

La combinación equipo/carretilla deberá ser movida con cuidado. Rápidas paradas y arranques, excesiva fuerza y superficies imparejas, pueden causar el volcamiento del conjunto de carretilla/ equipo.

ATTENTION: INFORMATIONS IMPORTANTES DE SÉCURITÉ



La lumière clignotante du symbole de la flèche à l'intérieur d'un triangle équilatéral, à pour objet d'alerter l'utilisateur de la présence "d'un voltage dangereux" non-isolé à l'intérieur du produit, qui pourrait être de magnitude suffisante au risque d'électrocution.

Le point d'exclamation, à l'intérieur d'un triangle équilatéral, à pour objet de prévenir l'utilisateur de l'importance des instructions de fonctionnement et de maintenance, jointes à l'appareil.

1. LIRE LES INSTRUCTIONS

Le mode d'emploi et les mesures de sécurité de votre équipement Hafler devraient être consultés avant sa mise en marche.

2. CONSERVER LE GUIDE DE L'UTILISATEUR

Le mode d'emploi et les mesures de sécurité devraient être conservés pour des références futures.

3. CONSIDÉRATIONS DE MISE EN GARDE

Le mode d'emploi et les mises en garde concernant cet équipement sont de grande importance et devraient être suivis.

4. SUIVRE LE MODE D'EMPLOI

Le mode d'emploi et les conseils d'utilisation sont importants et devraient être suivis.

5. CHALEUR

Le matériel devrait être préservé loin de toute source de chaleur: radiateurs, cuisinière/fours, cheminées,...etc.

6. VENTILATION

Le matériel devrait être utilisé dans un endroit à bonne ventilation. Il reste nécessaire de respecter la circulation de flux d'air à l'intérieur et autour du meuble.

7. EAU ET HUMIDITÉ

Le matériel ne devrait pas être utilisé près d'une source d'eau, telle qu'une baignoire, un évier, ou une aire de baignade. De plus, le matériel ne devrait pas être utilisé dans des lieux sujets aux inondations, tels que les sous-sols.

8. SOURCES D'ÉNERGIE

Le matériel devrait seulement être relié à une source d'énergie de même voltage et fréquence que celle indiquée sur le tableau arrière, au dessus de la fiche d'entrée de la prise de courant.

9. PROTECTION DE LA PRISE DE COURANT

La prise de courant devrait être arrangée de façon à ne pas interférer avec le déplacement d'objets (chariots, pales de ventilateurs...etc.) ou de personnes à l'intérieur de la pièce. D'autre part, il faudrait faire très attention à ce que la prise ne soit pas percée ou coupée, ou disposée de façon à risquer de l'être, comme sous un tapis, autour d'un angle pointu...etc.

10. PRISE DE COURANT À TROIS FICHES

La prise de courant est composée de trois fiches, désignées à réduire le risque de décharge électrique de l'appareil.

Elle devrait être de longueur suffisante pour la plupart des utilisations de ce matériel. L'utilisation de rallonge et d'adaptateur est déconseillée à moins d'être en mesure de fournir la charge électrique requise à un fonctionnement sans risque, de tout matériel relié.

11. PÉRIODES DE NON-UTILISATION

Durant les périodes de non-utilisation, la prise de courant ne devrait pas être branchée à une source d'énergie.

12. NETTOYAGE

Le matériel devrait être nettoyé en respectant les instructions indiquées.

13. PÉNÉTRATION DES LIQUIDES

Une attention particulière est exigée quant à la dispersion de liquides tels que les produits de nettoyage et boissons, de façon à éviter toute pénétration dans l'enceinte du matériel.

14. DÉGÂT NÉCESSITANT UNE RÉVISION

Le matériel Hafler devrait être révisé par des personnes qualifiées de service après-vente, lorsque:

- A. Les fiches ou la prise de courant ont été endommagés, ou:
- B. Des objets sont tombés sur le matériel, ou des liquides s'y sont dispersés, ou:
- C. Le matériel a été exposé à la pluie, ou:
- D. Le matériel ne semble pas fonctionner correctement, ou affiche un changement de performance, ou:
- E. Le matériel a été renversé à terre, ou l'enceinte a été endommagée.

15. RÉVISION

L'utilisateur ne devrait pas essayer de réviser le matériel en allant plus loin que ce qui a été décrit dans le mode d'emploi. Toute autre révision devrait être confiée à un personnel qualifié.

16. CHARRIOTS ET MEUBLES

Le matériel devrait être utilisé avec des chariots et meubles de qualité et stabilité suffisante à son utilisation préconçue.

L'ensemble du matériel et du charriot devrait être déplacé avec précaution. Des mises en marche et arrêts brusques, des collisions excessives ainsi que des surfaces inégales peuvent renverser l'ensemble du matériel et du charriot.

ACHTUNG – WICHTIGE SICHERHEITS – INFORMATIONEN



Der Blitz mit dem Pfeil, in einem gleichschenkligen Dreieck, soll den Benutzer vor unisolierter "gefährlicher Spannung" innerhalb des Gerätes warnen.

Das Ausrufezeichen, in einem gleichschenkligen Dreieck, soll den Benutzer darauf aufmerksam machen, daß dem Gerät wichtige Operations- und Service-Informationen beigelegt sind.

1. INSTRUKTIONEN LESEN

Alle Sicherheits- und Operationshinweise Ihres Hafler Equipments sollten vor der Inbetriebnahme gelesen werden.

2. BETRIEBSANLEITUNG AUFBEWAHREN

Bewahren Sie die Bedienungsanleitung sorgfältig auf, damit Sie in dieser auch in Zukunft nachschlagen können.

3. WARNUNGEN BEACHTEN

Alle Warnungen des Gerätes und der Bedienungsanleitung sind extrem wichtig und müssen befolgt werden.

4. INSTRUKTIONEN BEACHTEN

Alle Operations- und Gebrauchshinweise sind extrem wichtig and müssen beachtet werden.

5. HITZE

Das Equipment sollte fern von Hitze ausstrahlenden Geräten aufgestellt werden, wie z.B. Heizungen, Öfen etc.

6. VENTILATION

Das Equipment sollte so aufgestellt werden, daß eine ausreichende Ventilation gewährt wird.

7. WASSER UND FEUCHTIGKEIT

Das Equipment sollte nicht im oder in der Nähe von Wasser benutzt werden, wie z.B. in Schwimmbädern, Saunen etc. Es sollte ebenfalls nicht in Überschwemmungsgefährdeten Gebieten aufgestellt werden, wie z.B. Kellerräumen.

8. STROMANSCHLUß

Das Equipment darf nur an eine Stromversorgung angeschlossen werden, die die gleichen Parameter aufweist, welche auf der Rückseite, über em Anschlußterminal des Gerätes, aufgelistet sind.

9. SCHUTZ DER ZULEITUNG

Die Zuleitungen sollten so verlegt werden, daß diese nicht in den Bewegungsbereich anderer Möbelstücke oder Personen hereinragen. Achten Sie darauf, das das Kabel nicht gequetscht oder durchschnitten wird, wie z.B. unter Schränken oder an scharfen Kanten etc.

10. MASSEANSCHLUß

Das dreidrige Anschlußkabel ist mit einem Erdungsleiter ausgestattet, welcher die Risiken eines Elektroschocks verringert. Das Kabel hat eine Länge, welche für die meisten Anwendungen völlig ausreicht. Wenn Sie Verlängerungskabel benutzen, achten Sie darauf, das dies die erforderlichen Ströme übertragen können. Benutzen Sie immer dreidrige Verlängerungskable.

11. ZEITRÄUME IN DENE DAS GERÄT NICHT GENUTZT WIRD

Wird das Gerät über einen längeren Zeitraum nicht genutzt (z.B. Urlaub), ziehen Sie bitten den Netzstecker aus der Steckdose.

12. REINIGEN

Reinigen Sie das Gerät nur, wie in der Bedienungsanleitung detailliert beschrieben.

13. EINDRINGEN VON FREMDKÖRPERN

Achten Sie darauf, daß weder Fremdkörper, noch Flüssigkeiten in das Gerät eindringen.

14. ERFORDERLICHER REPARATURSERVICE

Hafler Equipment sollte nur von qualifizierten Service-Technikern instand gesetzt werden, wenn:

- A. Das Stromversorgungskabel beschädigt wurde
- B. Eine Flüssigkeit in das Gerät eingedrungen ist
- C. Das Gerät Regen ausgesetzt wurde
- D. Das Gerät nicht mehr ordnungsgemäß funktioniert, ggf. nicht mehr die volle Leistung abgibt
- E. Das Gerät runtergefallen ist oder das Gehäuse beschädigt wurde

15. SERVICE

Der Benutzer sollte nur den Service ausführen, der in der Bedienungsanleitung für den Benutzer freigegeben wird. Den weiterführenden Service sollte nur von qualifizierten Tevnikern durchgeführt werden.

16. AUFSTELLUNG

Das Equipment sollte so aufgestellt werden, daß der gewählte Untergrund die erforderliche Stabilität aufweist, so daß eine gefahrlose Bnutzung gewährleistet wird.

Das Equipment und der Untergrund sollte mit äußerster Vorsicht bewegt werden. Bei schnellen Bewegungen oder starkem Abbremsen, kann es zum Umkippen des Equipments kommen.

NOTARE – IMPORTANTI INFORMAZIONI SULLA SICUREZZA



Il simbolo del fulmine in un triangolo equilatero vuole avvertire della presenza di tensioni elevate non isolate e di valore sufficiente per costituire rischio di shock elettrico alle persone.

Il punto esclamativo contenuto in un triangolo equilatero vuole avvertire l'utente della presenza di parti di servizio e di manutenzione che sono dettagliate nel manuale di istruzioni.

1. LEGGETE LE ISTRUZIONI

Tutte le istruzioni riguardanti la sicurezza ed il funzionamento devono essere lette prima di applicare tensione all'apparato.

2. CONSERVATE IL MANUALE

Queste istruzioni riguardanti la sicurezza ed il funzionamento devono essere conservate come riferimento futuro.

3. AVVERTENZE

Tutte le avvertenze poste sull'apparato e sul libretto di istruzioni sono importanti e devono essere seguite.

4. SEGUIRE LE ISTRUZIONI

Tutte le istruzioni operative e di funzionamento devono essere seguite.

5. TEMPERATURA

L'apparato deve essere mantenuto lontano da tutte le zone ad alta temperatura, termosifoni, termoconvettori, stufe e forni, caminetti ed altro.

6. VENTILAZIONE

L'apparato deve essere posizionato in aree convenienti per una corretta ventilazione. Prestare attenzione che sia consentita circolazione d'aria attorno e dentro il cabinet.

7. ACQUA E POLVERE

L'apparato deve essere posizionato lontano da zone contenenti acqua, come vasche a bagno, acquari e piscine. Inoltre non deve essere impiegato in aree soggette ad allagamento, come le cantine.

8. REQUISITI DI ALIMENTAZIONE

L'apparato deve essere connesso solo ad un'alimentazione della stessa tensione e frequenza di quanto scritto sulla parte posteriore del telaio.

9. PROTEZIONE DEL CAVO DI ALIMENTAZIONE

Il cavo di alimentazione deve essere posizionato in modo di non interferire con il movimento di oggetti nella stanza: persone, ventilatori, carrelli, ecc...prestate attenzione anche che il cavo non sia tagliato o spellato e che non possa tagliarsi e spellarsi.

10. MESSA A TERRA

Il cavo di alimentazione è del tipo a tre fili con terra ed è progettato per ridurre il rischio di shock elettrici. Si presume che sia della lunghezza sufficiente per la maggior parte degli impieghi. L'impiego di prolunghie e adattatori è sconsigliato se questi non garantiscono la potenza sufficiente per il corretto funzionamento degli apparati connessi. È altresì importante che vengano sempre impiegate prolunghie con la configurazione a tre fili con terra.

11. PERIODI DI NON UTILIZZO

Durante lunghi periodi di non utilizzo, staccare il cavo di alimentazione.

12. PULIZIA

L'apparato deve essere pulito solo come indicato dalle istruzioni.

13. INGRESSO DI OGGETTI E LIQUIDI

Si deve prestar attenzione che oggetti e liquidi, come fluidi detergenti e bibite, non vengano versati all'interno dell'apparato.

14. RIPARAZIONI

Gli apparati Hafler devono essere riparati da personale qualificato quando:

A. Il cavo di alimentazione o la spina sono danneggiati

B. Oggetti sono caduti all'interno del telaio o quando del liquido è entrato

C. Quando l'apparato è stato esposto a pioggia

D. Quando l'apparato non sembra funzionare normalmente o quando esibisce un cambiamento di prestazioni o

E. Quando è caduto o il telaio è stato danneggiato

15. ASSISTENZA

L'utente non deve tentare di prestare assistenza all'apparato, se non per quanto esposto nelle istruzioni. tutti gli altri interventi devono essere effettuati da un tecnico specializzato.

16. CARRELLI E STAND

L'apparato deve essere impiegato su carrelli o stand solo se questi sono sufficientemente solidi e stabili per la funzione a cui si vuole dedicarli.

La combinazione di carrello ed apparato deve essere mossa con cautela. Fermate e partenze improvvise, forze eccessive e superfici irregolari, possono ribaltare la combinazione carrello e apparato.



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