

Hafler®

- C W E A U D I O C C M P O N E N T S

Series 9180/9270 Power Amplifier

Series • 9180/9270

P O W E R A M P L I F I E R

NOTICE - IMPORTANT SAFETY INFORMATION



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 OWNERS 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, such as 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. Do not mount on a carpeted shelf or in a sealed enclosure. Allow for proper clearance above the equipment.

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 that 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 that 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, 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.

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PERFORMANCE SPECIFICATIONS

GENERAL INFORMATION

All specifications are for 20 Hz - 20 kHz, at full power into 8 ohms, unless specified otherwise.

Power Rating: 9180: 105 watts per channel (8 ohms)
150 watts per channel (4 ohms)
300 watts mono (8 ohms)

9270: 135 watts per channel (8 ohms)
200 watts per channel (4 ohms)
400 watts mono (8 ohms)

Rated THD: less than 0.025%, typically 0.005% at 1 kHz

Full Power Bandwidth: 0.3 Hz to 116 kHz

Signal to Noise Ratio: greater than 100 dB, unweighted

Input Impedance: 47,000 ohms

Input Sensitivity: 9180: 1.4 volts RMS
9270: 1.6 volts RMS

Damping Factor: 300 to 1 kHz, 200 to 10 kHz

Slew Rate: 50 V/μs

Controls: Power Switch, Left/Right Gain Controls, Mono/Stereo Switch

Inputs: Right and Left/Mono RCA jacks

outputs: Right, Left, and Mono 5-Way Binding Posts

Power Consumption: 100 watts quiescent, 1200 watts maximum

Size: 17"(W) x 12.5"(D) x 3.5"(H) excluding feet, faceplate 17" or 19"(W)
43.2cm(W) x 31.7cm(D) x 8.9cm(H) excluding feet,
faceplate 43.2cm or 48.3cm(W)

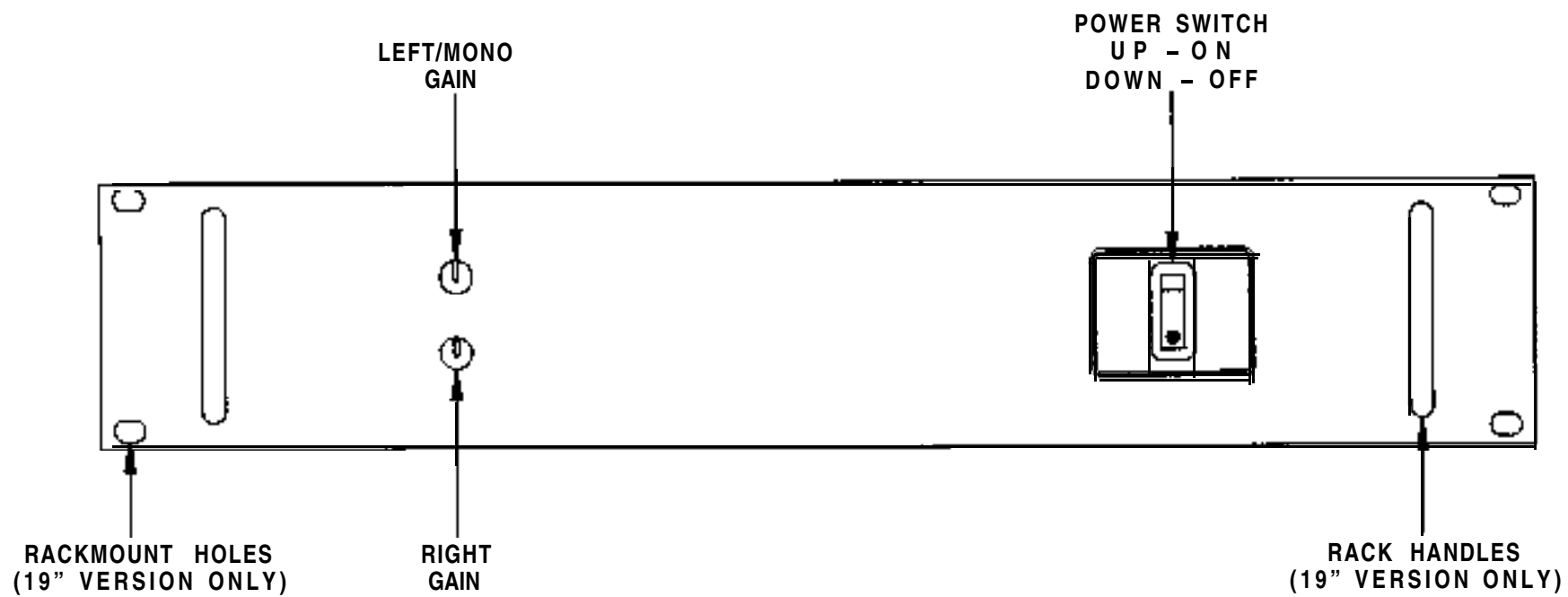
Weight: 9180: 33 lbs., 15 kg, net.
9270: 35 lbs., 15.9 kg, net.

INSTALLATION

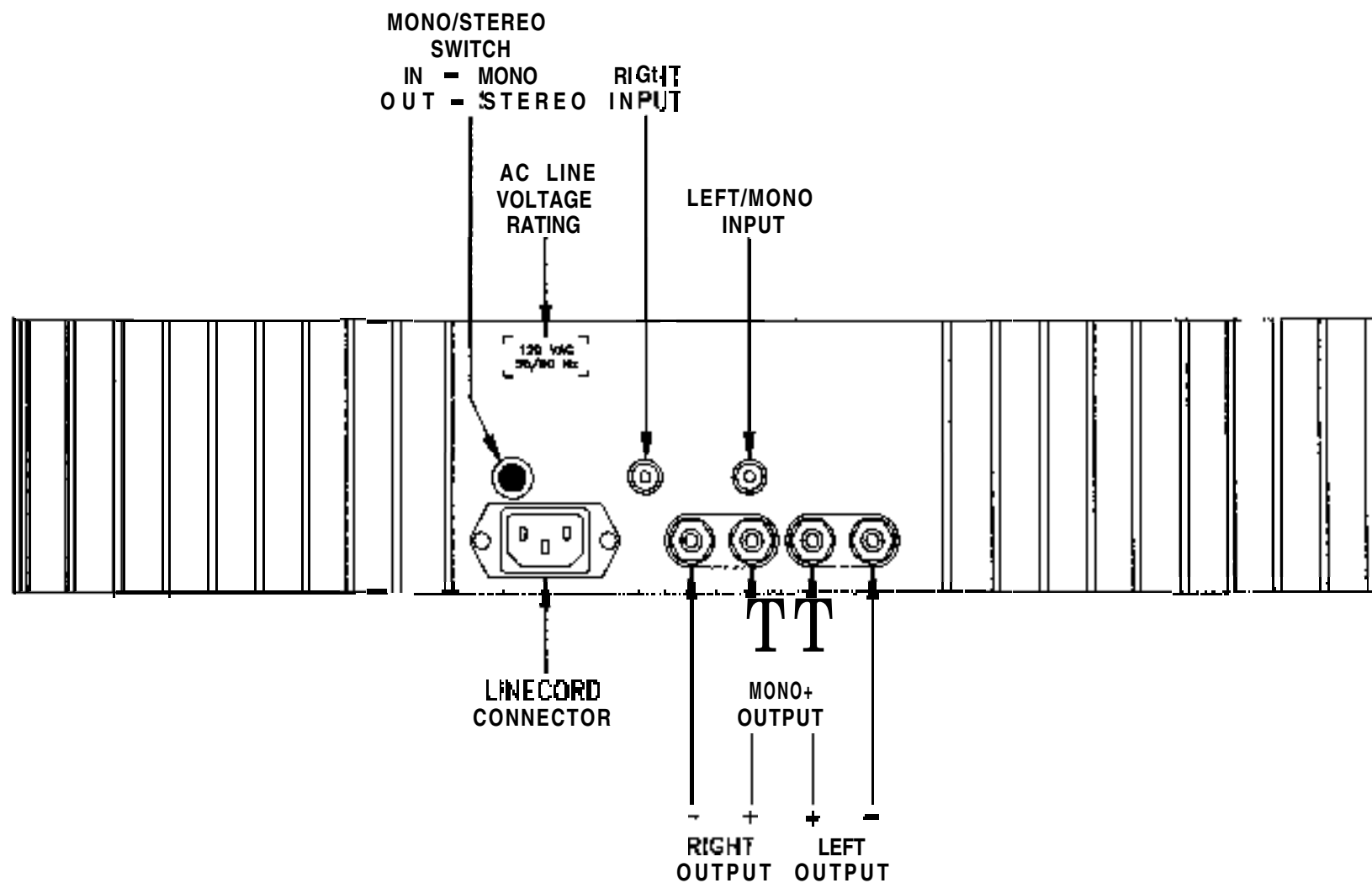
RACK MOUNTING	<p>The 9180/9270 Amplifier is supplied in either a 17" Black Version, or a 19" Silver Version. The 19" model has rackmounting holes provided for installation in equipment racks. The holes are on standard EIA spacings. Due to conflict with adjacent equipment, it may be advisable to remove the four rubber feet from the bottom of the unit. The feet may be removed from the outside, with no dis-assembly of the chassis necessary.</p>
VENTILATION/ PLACEMENT	<p>The 9180/9270 Amplifier can produce considerable heat during normal operation. The amplifier should be placed on a hard, smooth surface to allow air to circulate beneath the unit. Additionally, allow at least one inch of free space on either side, and several inches above and behind the amplifier to allow air circulation around the heatsinks. This is particularly important when the unit is installed in a closed cabinet.</p> <p>In applications where the amplifier is driving low impedance and/or low efficiency loudspeakers at high levels, thermal shutdown may occur if inadequate ventilation is provided. If this occurs, it may be necessary to move the amplifier to a location with better free air circulation.</p> <p>The amplifier should be located at least several inches away from sensitive components, (such as preamplifiers, tuners, CD players, turntables, etc.) due to the possibility of audible hum or buzz from magnetic radiation.</p>
LINE VOLTAGE	<p>The 9180/9270 Amplifier is configurable for either 100, 120, 220 or 240 volt operation. This is accomplished by moving the Voltage Selector on the printed circuit board. The procedure is detailed in the section "CHANGING LINE VOLTAGE RATING".</p> <p>Make sure that the unit is configured for your local AC line voltage before attempted use. The configuration is labelled directly above the power cord connector.</p>

OPERATION/CONNECTIONS

POWER CORD CONNECTION/ POWER SWITCH	<p>Units wired for 100, 220 and 240 VAC are supplied without power cords. Local agents will supply cords with male connectors appropriate to the local standard.</p> <p>Units wired for 120 VAC are supplied with a detachable AC power cord. The female connector plugs into the receptacle provided on the rear panel. This power cord is a standard IEC Type 320, 3-wire, 16 gauge assembly. Should replacement ever be necessary, be sure to replace it with an identical cord.</p> <p>Never remove the grounding pin from the male end of the cord. In applications where a grounded outlet is not available, a ground adaptor should be employed, with the ground tab or wire of the adaptor connected to a suitable earth ground.</p> <p>The AC power cord of the amplifier must be connected to a receptacle capable of delivering a minimum of 1200 watts. The convenience outlets of some preamplifiers are not rated for this power level. Before connecting the amplifier, be sure to check the rating of such outlets, and take into account the power consumption of any other connected components to determine the total maximum power consumption.</p> <p>If the amplifier is connected to a component with a switched convenience outlet, then the amplifier's Power Switch may be left ON at all times, and the power controlled by the switched outlet. If the amplifier is connected to an unswitched outlet, then the amplifier's power should be controlled by the front panel Power Switch.</p>
INPUTS	<p>All input connections to the amplifier must be performed with the amplifier off!</p> <p>The left and right audio inputs to the amplifier are via standard RCA jacks. In addition to the printed labelling above the jacks, the channels are identified by RED for right channel, and WHITE for left channel. Connect these jacks to the output of the preamplifier or other signal source.</p> <p>When operating the amplifier in the Mono Mode, only the left channel input should be used.</p>



9180 / 9270 AMPLIFIER FRONT PANEL VIEW



9180 / 9270 AMPLIFIER REAR PANEL VIEW

OUTPUTS	<p>All output connections to the amplifier must be performed with the amplifier off!</p> <p>The left and right audio outputs from the amplifier are via standard 5-way type, 3/4" spacing, binding posts. Connect these binding posts to the loudspeakers. The amplifier's binding posts will accept single or dual banana plugs, spade lugs, pin plugs, or bare wires. If using bare wires, it is recommended that the ends of the wire be tinned with solder so that no stray strands can cause a short circuit to the chassis or adjacent terminals.</p> <p>To ensure proper speaker phasing and frequency response, be sure to connect each respective amplifier RED (+) terminal to the speaker RED (+) terminal, and the amplifier BLACK (-) terminal to the speaker BLACK (-) terminal. The polarity symbols (+/-) for Stereo Mode are labelled below the amplifier's binding posts.</p> <p>For operation in the Mono Mode, a single loudspeaker should be connected to the two RED binding posts only. No connection is made to the amplifier's BLACK binding posts. Connect the speaker's RED (+) terminal to the amplifier's RED terminal labelled (+), and the speaker's BLACK (-) terminal to the amplifier's RED terminal labelled (-). The polarity symbols (+/-) for the Mono Mode are labelled above the amplifier's binding posts.</p>
GAIN CONTROLS	<p>The 9180/9270 Amplifier is equipped with front panel mounted Gain Controls. These controls may be used to attenuate the input signal to the amplifier. The maximum clockwise position of these controls applies the full input signal to the amplifier. Intermediate positions of these controls will partially attenuate the signal, and the full counter-clockwise position attenuates the input signal completely.</p> <p>Most applications will dictate that these controls be set to their maximum clockwise position. In situations of unusually high level signal sources, or for matching levels in multiple amplifier installations, it may be desirable to use an intermediate position of the Gain Controls. Unless intentionally introducing different gain levels in the two channels of the amplifier, these controls should normally be set at the same rotational position.</p> <p>In the Mono Mode, the Left Gain Control effects the overall gain of the amplifier. The Right Gain Control has no effect.</p>
MONO/ STEREO SWITCHING	<p>The 9180/9270 Amplifier may be operated in the normal two channel Stereo Mode, or may be converted (bridged) to a higher power, single channel amplifier in the Mono Mode.</p> <p>Operation of the Stereo/Mono switch must be performed with the amplifier off! Set the Stereo/ Mono Switch in the OUT position for Stereo Mode, or in the IN position for Mono Mode. Mono Mode operation requires different input and output connections: consult the sections of the manual titled "Inputs" and "Outputs".</p>
SOFT TURN-ON/OFF SYSTEM	<p>The 9180/9270 Amplifier is equipped with a Soft Turn-On/Off System that gradually activates the amplifier's circuitry to avoid spurious noises as the power supply stabilizes.</p> <p>At turn-off, this same system rapidly deactivates the amplifier's circuitry before the power supply begins to collapse, again eliminating any spurious noises.</p>
THERMAL PROTECTION SYSTEM	<p>The 9180/9270 Amplifier is equipped with a Thermal Protection System that constantly monitors the temperature of the heatsinks. When the heatsink temperature reaches a pre-determined level, the amplifier's circuitry is electronically shut down through the same system that provides the Soft Turn-On function. When the heatsinks cool to a safe operating temperature, normal operation of the amplifier resumes.</p>

CIRCUIT HIGHLIGHTS

The input stage of the 9180/9270 Amplifier utilizes four low-noise, High-g, JFET's (high transconductance junction field-effect transistors), in a fully complimentary, symmetric configuration. This circuit configuration results in excellent front-end headroom and a simple, straightforward connection to the remainder of the circuitry. The ultra low noise characteristics of the JFET's virtually eliminates noise "mixing" (intermodulation) with the music signal, reducing discordant product frequencies known as "noise grain", or "noise fuzz".

The input stage is cascode connected to convert the low voltage input system to the high voltage output system, and "speeds up" the front end for superior bandwidth. The cascode stage is connected to an emitter-follower and current mirror configuration that amplifies the current level about ten times, necessary to drive the biasing string and final output stage driver emitter followers.

The final output stage uses multiple lateral MOSFET's (Metal Oxide Semiconductor Field Effect Transistors): four devices per channel in the 9180, and six per channel in the 9270. These devices, unlike conventional bipolar transistors, have a negative temperature coefficient, which means that they do not exhibit "thermal runaway". Thermal runaway is a phenomenon whereby a transistor heats up as it conducts more current, which causes it to get hotter, and conduct more current, and so on, until the device self destructs. Since MOSFET's are inherently self-protecting, no sonically degrading, complex circuitry is required to monitor and protect the output devices.

Furthermore, these lateral MOSFET's exhibit a very linear input to output transfer function. Their connection in circuits and operating characteristics are very similar to vacuum tubes, which is perhaps responsible for their widely recognized sonic trait of being very "musical" and non-fatiguing.

Conversion to Mono Mode is accomplished by driving the negative input (feedback point) of the right channel with the output of the left channel. This causes the right channel to mirror exactly the output of the left channel, but 180 degrees out of phase. This creates twice the voltage swing to be available across the two red output binding posts. This simple method of bridging the amplifier (involving only one resistor) eliminates the costly and sonically degrading inverter circuitry used in other amplifiers.

The Thermal Protection System consists of thermistors (temperature sensitive resistors) mounted to the heatsinks, connected to a comparator system that activates when the heatsinks reach an unsafe operating temperature. The output of the comparator system is connected to a small MOSFET switch that turns off the input stage of the amplifier, which effectively shuts down the entire amplifier. When the heatsinks cool to a safe temperature, the amplifier is turned on again.

The Soft Turn On/Off System cooperates with the Thermal Protection System by sensing the high voltage power supply. At power up, when both the comparator and power supply have stabilized to normal operating levels, the Soft Turn On System activates the amplifier circuitry through the same MOSFET switch in the input stage. At power down, the system deactivates the amplifier rapidly before the power supply begins to collapse. This system eliminates spurious noises during the turn on/off cycle.

The power supply utilizes a very large UI type transformer with dual multi-tapped primaries to allow alternate connections for world-wide voltage operation. Selection of the various voltage options is made via a simple multi-position plug inside the unit. The UI type of transformer construction results in very low stray magnetic leakage.

The transformer feeds a conventional split full-wave bridge rectifier system. Power supply capacitance is 15,000 uF per rail. Further power supply de-coupling is provided for the input stage of each channel.

ADDITIONAL INFORMATION

LOUDSPEAKER LOAD IMPEDANCE CONSIDERATIONS

The 9180/9270 Amplifier is suitable for use with a wide variety of loudspeaker types and load impedances. Though not rated for impedances below 4 ohms, the amplifier is capable of driving lower impedances. Operation at low impedances is limited by the thermal dissipation capacity of the heatsinks and the airflow around the unit. Operation at very high power levels into low impedances for extended periods may overheat the amplifier, but no damage will occur due to the Thermal Protection System.

In the Mono Mode, some additional consideration is required when driving low impedances. When a stereo amplifier is converted (bridged) into a single channel mono amplifier, each half of the bridged amplifier “sees” only half of the loudspeaker’s load impedance. For example, when driving an 8 ohm load in the Mono Mode, each channel is actually loaded to 4 ohms. Therefore, little advantage is gained when attempting to drive 4 ohm loads (2 ohms per channel) in the Mono Mode, because of the reduced power available at extremely low impedances. It is usually better to use a stereo amplifier of higher power rating (rather than two bridged amplifiers of lower power) when driving low impedances.

CHANGING LINE VOLTAGE RATING

The 9180/9270 Amplifier is equipped with a simple means to adjust the AC line voltage rating for 100, 120, 220, or 240 volts AC, 50/60 Hz. The configuration is labelled above the power cord connector. If the amplifier will be used in a location that requires a different line voltage, use the following procedure to change the configuration. Review the modification instructions before attempting this procedure. If any doubts exist about one’s ability to change the line voltage, it is advisable that the procedure be conducted by a qualified technician.

WARNING! UNPLUG THE UNIT FROM AC POWER BEFORE ATTEMPTING THIS PROCEDURE. FAILURE TO DO SO CAN RESULT IN SEVERE ELECTRICAL SHOCK.

- 1) Remove the top cover by removing the seven allen head screws (three on each side, one at rear center).
- 2) Using the diagram “Component Layout” as a guide, find the white Voltage Selector plug on the printed circuit board located behind the front panel Power Switch. Note that this plug has several alternate positions. Each position is labelled for where the end of the plug is to be aligned for each appropriate voltage. Move this plug to the new desired position, making sure that the plug is fully seated on the mating pins.
- 3) Depending upon which new voltage is chosen, it may be necessary to change the AC line fuse. Locate the clip-mounted Line Fuse adjacent to the Voltage Selector plug. Replace the fuse with a new slow-blow fuse as follows:

9180:	100 and 120 VAC: 7 amp
	220 and 240 VAC: 4 amp

9270:	100 and 120 VAC: 10 amp
	220 and 240 VAC: 5 amp

- 4) Replace the cover.
- 5) Obtain a new voltage configuration label from the factory, and affix over the original markings on the rear panel. Alternately, prepare a small self-adhesive label and indicate the new voltage with permanent ink. Relabelling the unit is a vital safety requirement, particularly if the amplifier is sold to a new owner.

ADJUSTING BIAS

The 9180/9270 Amplifier employs a single control per channel to set the bias operating point of the output stage. This bias point is factory set, and normally should not require adjustment for the life of the product. However, should improper bias be suspected, or if repairs have been made that would require a readjustment of bias, the following procedure should be used. Review the instructions before attempting this procedure. If any doubts exist about one’s ability to set the bias, it is advisable that the procedure be conducted by a qualified technician.

WARNING! UNPLUG THE UNIT FROM AC POWER BEFORE ATTEMPTING THIS PROCEDURE. FAILURE TO DO SO CAN RESULT IN SEVERE ELECTRICAL SHOCK.

REQUIRED TEST EQUIPMENT: Milliammeter capable of measuring at least 300 mA.

- 1) Remove the top cover by removing the seven allen head screws (three on each side, one at rear center).
- 2) Using the diagram "Component Layout" as a guide, find the fuses labelled F1 and F2 for the left channel, or F1 01 and F102 for the right channel.
- 3) Working on one channel at a time, remove either one (and only one) of the fuses. Connect the milliammeter to the two fuse clips, and set the meter to a scale capable of measuring at least 300 mA.

WARNING! THE NEXT STEP OF THIS PROCEDURE CAN EXPOSE THE OPERATOR TO UNINSULATED HIGH VOLTAGES. KEEP ALL BODY PARTS CLEAR OF THE INTERNAL CIRCUITRY OF THE AMPLIFIER.

- 4) Apply power to the amplifier, and allow the unit to thermally stabilize for about three minutes. (If using an analog meter, and the meter reads backwards, temporarily remove power and reverse the meter leads.)
- 5) Again referring to the diagram, locate the trimmer potentiometer labelled PI for the left channel, or P101 for the right channel. Using a small screwdriver, adjust the trimmer for a measured current according to the following:

9180: 200 mA

9270: 300 mA

- 6) Remove power from the amplifier. Wait about one minute for the power supply to discharge, and remove the meter connections. Replace the fuse.
- 7) Repeat steps #2,3, 4, 5 and 6 for the other channel.
- 8) Replace the covers.

GENERAL TROUBLESHOOTING HINTS

The 9180/9270 Amplifier contains five internal fuses: one for AC line power, and four for DC power supplies. These fuses should not generally blow unless a malfunction has occurred. These fuses should be replaced only by a qualified technician, and only with the exact type(s) and rating of fuse(s) originally supplied. If a fuse is replaced and blows again within a short time, check all output connections for short circuits, or abnormally low speaker load impedances. If all connections and load conditions appear to be correct, disconnect all power immediately and return for service.

If all controls, fuses, cables, etc. seem to be functioning properly, a process of one-at-a-time component substitution should be employed until the defective unit is identified. If only one channel is not functioning properly, a one-at-a-time reversal of interconnect and speaker cables from left to right should reveal the malfunctioning component.

GROUND LOOPS

Ground loops are characterized by a low level hum or buzz in the system. Loops are caused by a voltage potential difference between two points in a ground circuit, and aggravated when multiple paths for a given circuit exist. Noise-free audio performance is dependent upon all grounds being at the same potential, with a single path for each ground connection. Ground loops can exist in two forms: 1) loops created in audio interconnects, and 2) loops created between earth grounded chassis.

Mounting components to a rack with metallic rails may introduce ground loops between associated equipment, because the rails can introduce a second ground path. The extent of this problem will depend on the grounding arrangements of associated equipment. Ground loops can occur in non-rackmounted equipment, though it is less common.

If ground loops occur, and any other component in the system has a three wire grounded power cord, the first step should be to use a ground adaptor (with the ground tab or wire of the adaptor not connected) on the power cord plug of the preamplifier. DO NOT cut off the grounding pin on the plug!

CLEANING/ MAINTENANCE

It may be necessary to use additional adaptors on other grounded components if more than two components are earth grounded. (In other words, only one earth ground per system should exist.) Another potential source of multiple earth grounds is from coaxial antenna or cable service feeds for FM or video sources, which usually are (and should be) earth grounded. The ground adaptor(s) should cure this grounding problem as well.

WARNING: The use of ground adaptors (with the ground tab or wire of the adaptor disconnected) will eliminate the safety feature of the grounded power cord. This safety feature is intended to reduce the risk of electric shock should an internal fault in the equipment result in an electrically “live” chassis. Therefore, this method of ground isolation should be employed only when absolutely necessary, rather than as a general practice. When using a ground adaptor for isolation, make sure that the power cord plug is inserted into the receptacle in the same orientation as if no adaptor were present, to maintain the same hot/neutral polarity.

SPECIAL NOTE ON VIDEO CABLE “GROUNDS”: As mentioned above, the ground conductor of cable service and antenna feeds should be connected to earth ground. Often, however, due to long feed lengths, especially in apartment distribution systems, this ground will be of poor quality and could be a source of noise. This interference is usually characterized by a high frequency noise, rather than a hum or a buzz. If such interference is experienced, a separate earth ground connection should be made from the cable outlet nearest the audio/video equipment to a known good earth ground.

If ground loops exist due to potential differences in the interconnects in rack mounted systems, then it is advisable to isolate the preamplifier chassis from the rack rails. This may be accomplished by sandwiching a thin sheet of insulating material (i.e., plastic washers or several layers of electrical tape, etc.) between the rack and the preamplifier, and securing the unit with non-metallic (i.e., nylon, etc.) hardware. It may be necessary to insulate other components so that only one component is directly connected to the rack rails.

If the faceplate should become soiled, it may be cleaned with a slightly damp, soft cloth and, if necessary, a mild detergent. Do not use any abrasive cleaners or solvents. Unplug the power cord before attempting any cleaning operations.

Except as specifically detailed in the owners manual, there are no user serviceable parts or adjustments inside the 9180/9270 Amplifier, and all servicing should be referred to qualified, authorized personnel.

Parts List

DESIGNATORS	1- 99:	LEFT CHANNEL
	101-1 99:	RIGHT CHANNEL
	201-299:	COMMON PARTS
	301-399:	CHASSIS/POWER SUPPLY

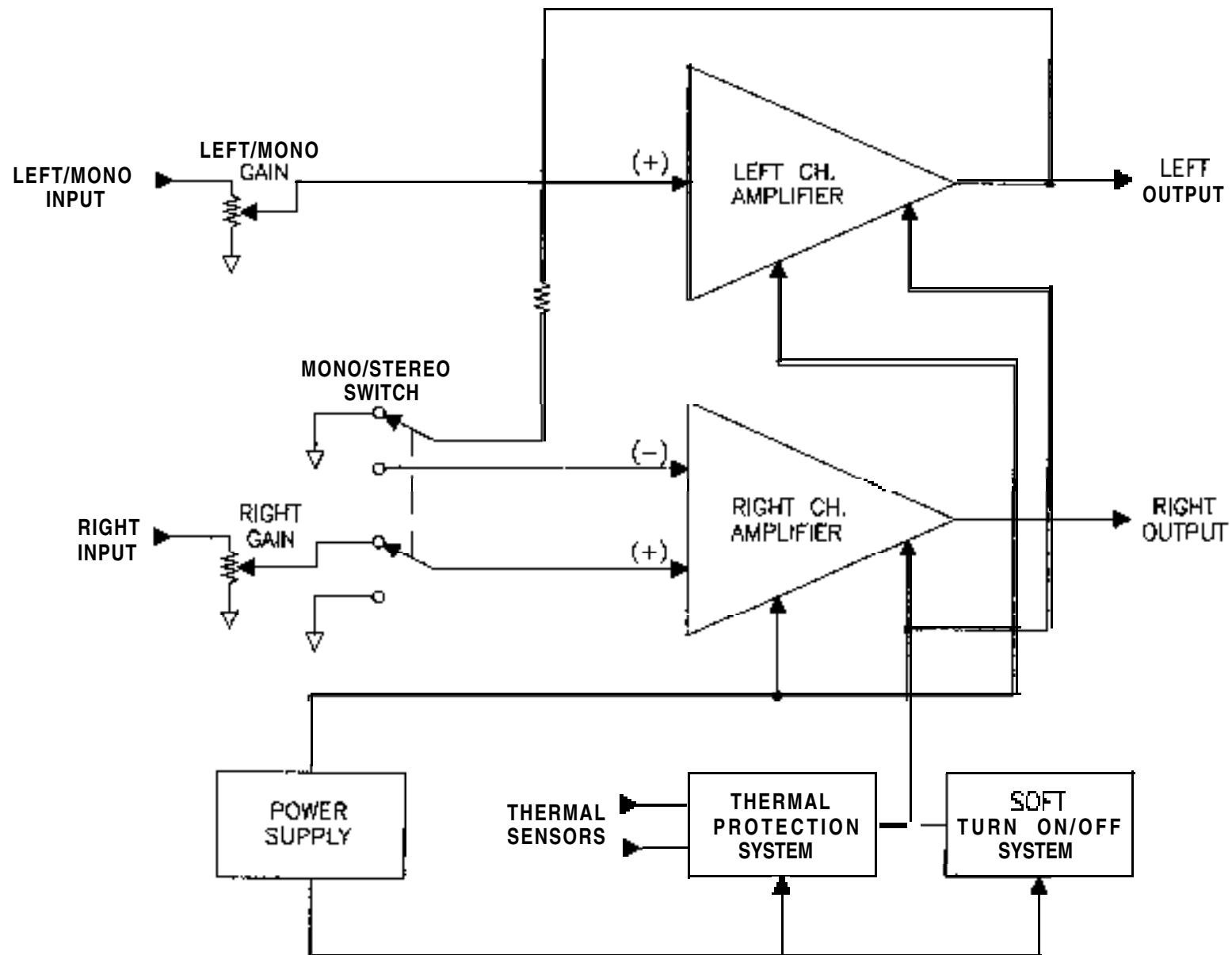
DESIGNATOR	VALUE	PART NUMBER
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ALL RESISTORS 114 WATT, 1% METAL FILM
(unless specified otherwise))

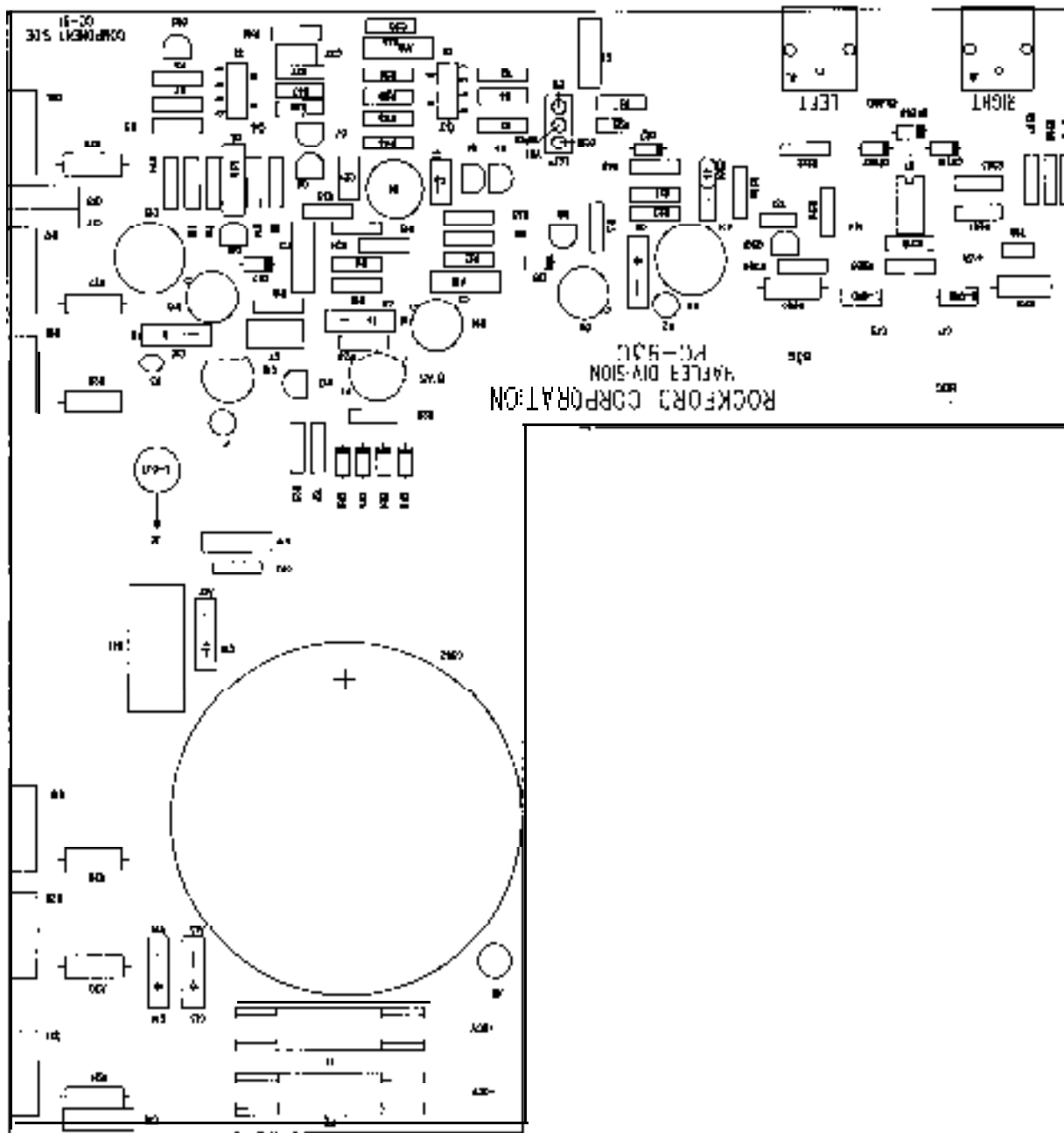
R1,R101	2.43K	RMP/4-2431
R2,R102	2.43K	RMP/4-2431
R3,R103	47.5	RMP/4-0475
R4,R104	47.5	RMP/4-0475
R5,R105	66.1	RMP/4-0681
R6,R106	47.5	RMP/4-0475
R7,R107	47.5	RMP/4-0475
R8,R108	1K	RMP/4-1001
R9,R109	1K	RMPN-1001
R10,R110	6.61K	RMP/4-6811
R11,R111	47.5K	RMP/4-4752
R12,R112	2.43K	RMP/4-2431

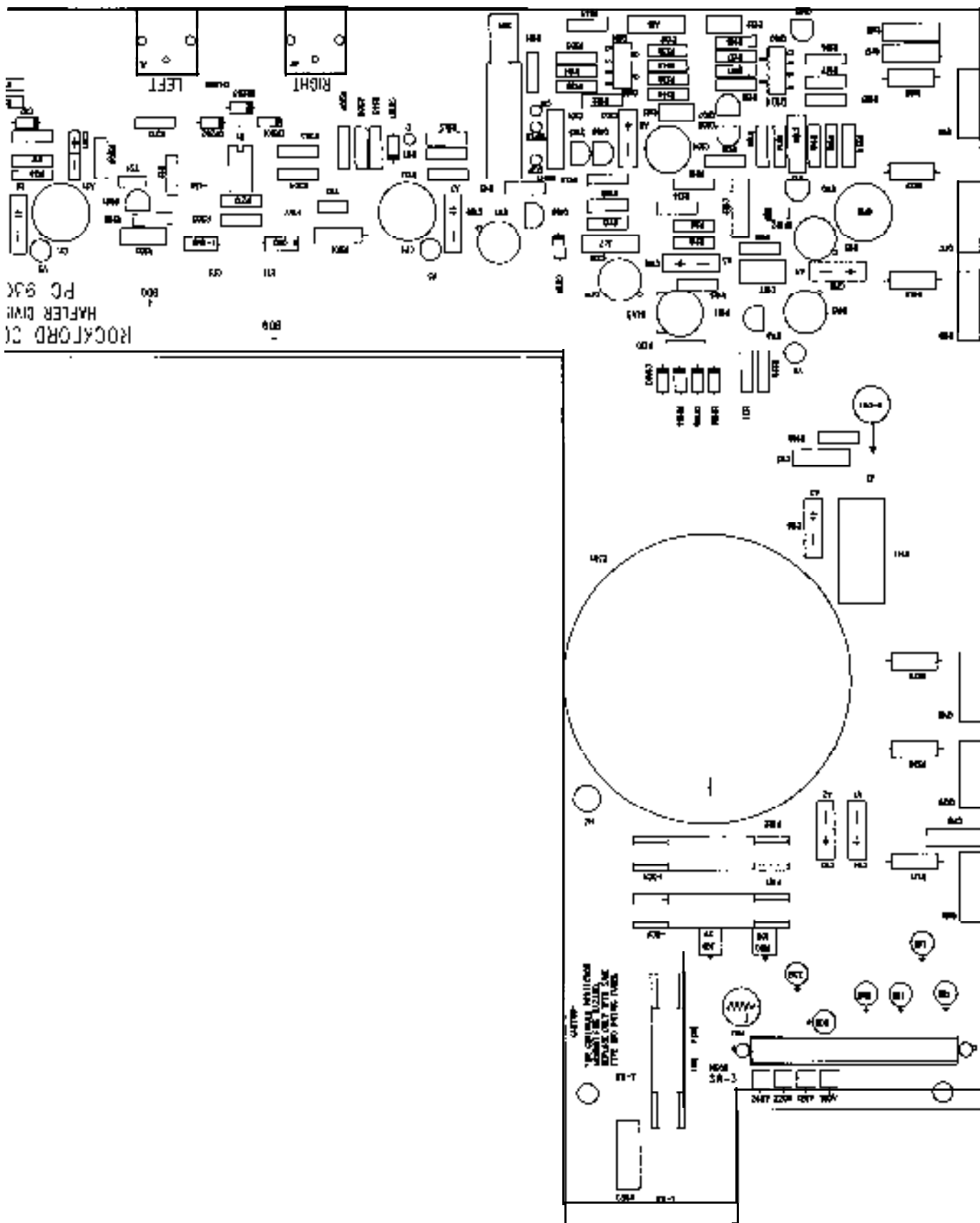
DESIGNATOR	VALUE	PART NUMBER
R13,R113	267	RMP/4-2670
R14,R114	267	RMP/4-2670
R15,R115	1K	RMP/4-1001
R16,R116	1K	RMP/4-1001
R17,R117	100	RMP/4-1000
R18,R118	100	RMP/4-1000
R19,R119	47.5K	RMP/4-4752
R20,R120	562	RMP/4-5620
R21 ,R121	475	RMP/4-4750
R22,R122	10	RMP/4-0100
R23,R123	47.5	RMP/4-0475
R24,R124	47.5	RMP/4-0475
R25,R125	221	RMP/4-2210
R26,R126	475	RMP/4-4750
R27,R127	475	RMP/4-4750
R28,R128	475	RMP/4-4750
R29,R129	221	RMP/4-2210
R30,R130	221	RMP/4-2210
R31 ,R131	221	RMP/4-2210
R32,R132	475K	RMP/4-4753

DESIGNATOR	VALUE	PART NUMBER	DESIGNATOR	VALUE	PART NUMBER
R33,R133	47.5K	RMP/4-4752	C21,C121	0.01, Polypropylene	CPP-103A
R34,R134	33.2K	RMP/4-3322	C22,C122	0.01, Polypropylene	CPP-103A
R35,R135	47.5K	RMP/4-4752	C201	0.01, Polycarbonate	CYV-103
R36,R136	1 0 0	RMP/4-1000	C301	15000, Electrolytic	CER-159ES
R37,R137	1 0 0	RMP/4-1000	C302	15000, Electrolytic	CER-159ES
R38,R138	1 0 0	RMP/4-1000	C303	0.01, Ceramic	CD-I 03/20
R39,R139	1 0 0	RMP/4-1001	C304	0.01, UL Approved	CD-103A
R40,R140	1 5 K	RMP/4-1502			
R41,R141	10,5W, Wirewound	RW5-100	Q1 ,Q101	2SK163, Graded	SSH614T
R42,R142	1K	RMP/4-1001	Q2,Q102	2SK163, Graded	SSH-614T
R43,R143	4.75M	RMP/4-4754	Q3,Q103	2SJ74, Graded	SSH-617DT
R44,R144	1M	RMP/4-1004	Q4,Q104	2SJ74, Graded	SSH-617DT
R45,R145	1M	RMP/4-1004	Q5,Q105	2N5550	SSH613
R46,R146	1M	RMP/4-1004	Q6,Q106	2N5550	SSH-613
R47,R147	1M	RMP/4-1004	Q7,Q107	2N5401	SSH-708
R201	7.5K, .5 W, Carbon	RC/2-752	Q8,Q108	2N5401	SSH-708
R202	7.5K, .5 W, Carbon	RC/2-752	Q9,Q109	2N5401	SSH-708
R203	100K	RMP/4-1003	Q10,Q110	2N5550	SSH-613
R204	10K	RMP/4-1002	Q11,Q111	2N5415	SSH-616
R205	18.2K	RMP/4-1822	Q12,Q112	2N3440	SSH-612
R206	332K	RMP/4-3323	Q13,Q113	2N2222A	SSH-611
R207	18.2K	RMP/4-1822	Q14,Q114	2N3440	SSH612
R208	332K	RMP/4-3323	Q15,Q115	2N5415	SSH-616
R209	1K	RMP/4-1001	Q16,Q116	2SK1057, Graded	SSH-717T
R210	68.1K	RMP/4-6811	Q17,Q117	2SK1057, Graded	SSH-717T (9270 Only)
R211	33.2K	RMP/4-3322	Q18,Q118	2SK1057, Graded	SSH-717T
R212	33.2K	RMP/4-3322	Q19,Q119	2SJ161, Graded	SSH-719T
R213	47.5K	RMP/4-4752	Q20,Q120	2SJ161, Graded	SSH-719T (9270 Only)
			Q21,Q121	2SJ161, Graded	SSH-719T
VR1 ,VR101	50K Volume	RVH-503G	Q22,Q122	2N7000	SSH-724
			Q201	MPSA56	SS-101A
P1,P101	1 K Trim	RV-102	U1	LM393	SS-207
ALL CAPACITORS IN MICROFARADS (unless specified otherwise)			TS1	Thermal Sensor	SS-215
			TS2	Thermal Sensor	SS-215
			T R M	Inrush Limitor	SSH-618
DESIGNATOR	VALUE	PART NUMBER	CR1 ,CR101	FDH400	SS-163
C1,C101	330p, Polypropylene	CPP-331 (9180)	CR2,CR102	FDH400	SS-163
	330p, Polystyrene	CPS-331 (9270)	CR3,CR103	1N4148	SS-162
C2,C102	10p, Mica	CM-100 (9180)	CR4,CR104	1N5245B,15V	SS-212
	8p, Polystyrene	CPS-080 (9270)	CR5,CR105	1N5245B,15V	SS-212
C3,C103	0.1, Polycarbonate	CPC-104 (9180)	CR6,CR106	1N4148	SS-162
	0.1, Polypropylene	CPP-104MC (9270)	CR7,CR107	1N4148	SS-162
C4,C104	220, NP Electrolytic	CERNP-227	CR201	1N52458,15V	SS-212
C5,C105	0.001, Polypropylene	CPP-102 (9180)	CR202	1N52458,15V	SS-212
	0.001, Polystyrene	CPS-102 (9270)	CR203	1N4148	SS-162
C6,C106	0.001, Polypropylene	CPP-102 (9180)	BR301	Diode Bridge	SSH-609
	0.001, Polystyrene	CPS-102 (9270)	J1	RCA Jack, White	CCH-232
C7,C107	220p, Polypropylene	CPP-221 (9180)	J101	RCA Jack, Red	CCH-231
	220p, Polystyrene	CPS-221 (9270)	J2,J102	5-Way Binding Post	CC-568
C8,C108	0.1, Polycarbonate	CPC-104 (9180)	J201	AC Voltage Selector	
	0.1, Polypropylene	CPP-104MC (9270)		Header:	CCH-245
C9,C109	0.1, Polycarbonate	CPC-104 (9180)		Housing:	CCH-246
	0.1, Polypropylene	CPP-104MC (9270)		Pins:	CCH-247
C10,C110	0.1, Polycarbonate	CPC-104 (9180)	J301	IEC Connector	CCH-233
	0.1, Polypropylene	CPP-104MC (9270)	SW1	Stereo/Mono Switch	SWH-510
C11,C111	100, Electrolytic	CER-107D	S301	Power Switch	SWH-152G (Gray)
C12,C112	100, Electrolytic	CER-107D			SWH-152B (Black)
C13,C113	0.1, Polycarbonate	CPC-104 (9180)			
	0.1, Polypropylene	CPP-104MC (9270)	T301	Power Xformer	TT-9180 (9180)
C14,C114	0.1, Polycarbonate	CPC-104 (9180)			TT-9270 (9270)
	0.1, Polypropylene	CPP-104MC (9270)	F1 ,F101	5 Amp	FS-005 (9180)
C15,C115	330p, Polypropylene	CPP-331 (9180)		7 Amp	FS-007 (9270)
	330p, Polystyrene	CPS-331 (9270)	F2,F102	5 Amp	FS-005 (9180)
C16,C116	0.1, Polycarbonate	CPC-104 (9180)		7 Amp	FS-007 (9270)
	0.1, Polypropylene	CPP-104MC (9270)	LINE FUSE	7 Amp Slo-Blo	FS-007SB (9180 100-120V)
C17,C117	Not Used			4 Amp Slo-Blo	FS-004SB (9180 220-240V)
C18,C118	Not Used			10 Amp Slo-Blo	FS-010SB (9270 100-120V)
C19,C119	Not Used			5 Amp Slo-Blo	FS-005SB (9270 220-240V)
C20,C120	0.47, Polycarbonate	C W - 4 7 4			



9180 / 9270 FUNCTIONAL BLOCK DIAGRAM





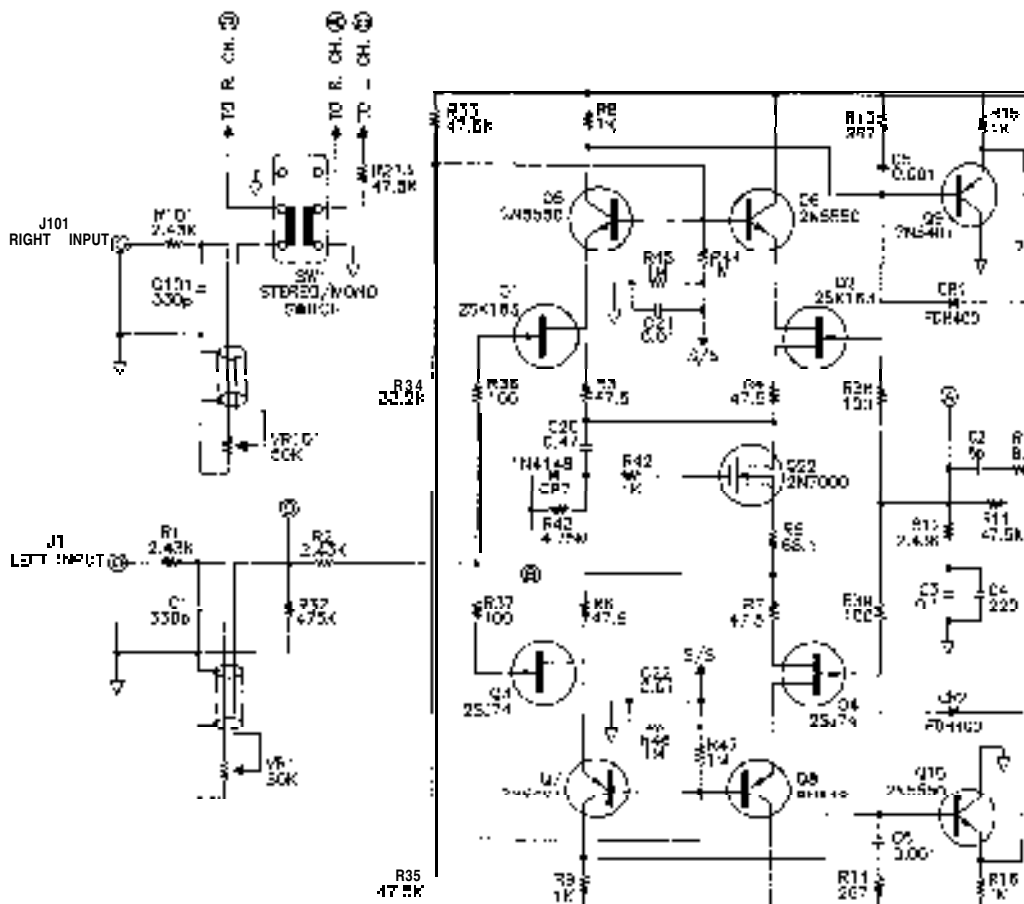
ROCKFORD 21
HAFER DIVE
PC 93X

NOTE:3 UNLESS SPECIFIED OTHERWISE

1. ALL RESISTORS IN OHMS
2. ALL CAPACITORS IN MICROFARADS
3. COUPONENT DESIGNATORS:
1-99: LEFT CHANNEL
101-199: RIGHT CHANNEL
201-299: COMMON PARTS
301-399: CHASSIS/POWER SUPPLY
4. Q17/Q117 & Q20/Q120 NOT PRESENT ON SERIES 9180
5. LEFT CHANNEL ONLY SHOWN
6. STEREO/MONO SWITCH SHOWN IN STEREO
7. VOLTAGE SELECTOR SHOWN IN 100V POSITION
6. Q1/Q101 & Q2/Q102 USE TWO 2SK163 SINGLE JFETS OR ONE 2SK389 DUAL JFET
9. Q3/Q103 & Q4/Q104 USE TWO 2SJ74 SINGLE JFETS OR ONE 251109 DUAL JFET
10. R44/R144, R45/R145, R46/R146, R47/R147, C21/C121, C22/C122 ARE PRESENT ONLY WHEN USING DUAL JFETS 2SK389 & 2SJ109 (FOR SUBSTRATE BIASING)
11. C17/C117, C18/C118 C19/C119 NOT USED

FUSE CHART

MODEL	LINE (ELO-BLO)	F1/F2/F101/F102
9180 100/120V	7A	3A
9180 220/240V	6A	
9270 100/120V	10A	7A
9270 220/240V	5A	



SERVICE POLICY AND LIMITED WARRANTY

If you encounter any difficulty or have any question concerning your 9180/9270 Amplifier, please call our Customer Service Department weekdays, 8 a.m. to 3:30 p.m., Mountain Standard Time, at 602-967-3565.

Should you have any doubts as to whether the amplifier is malfunctioning and requires service, please call us before sending in for repair. All units being returned (regardless of warranty status) must receive a Return Authorization (RA) number. In addition, we can offer troubleshooting assistance that may simplify or even eliminate the need for factory service.

The Hafler 9180/9270 Amplifier is warranted to the original owner (non-transferrable) for seven years from the date of purchase, including parts, labor, and return shipping costs within the Continental United States, Alaska, and Hawaii. This warranty applies only to products sold in the United States Of America.

For warranties outside the U.S.A., please contact your local agent.

It is the owner's responsibility to pay shipping (preferably United Parcel Service, UPS) to the factory: collect shipments will not be accepted. Units under warranty should be accompanied by a copy of the dated Bill Of Sale. Use the original carton and all packing material, with the RA number clearly marked on the outside of the package. Be sure to include a return address, the RA number, a daytime telephone number, and a brief description of the difficulty, including whether it occurs continuously or intermittently.

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.