

Hafler®

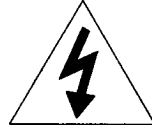
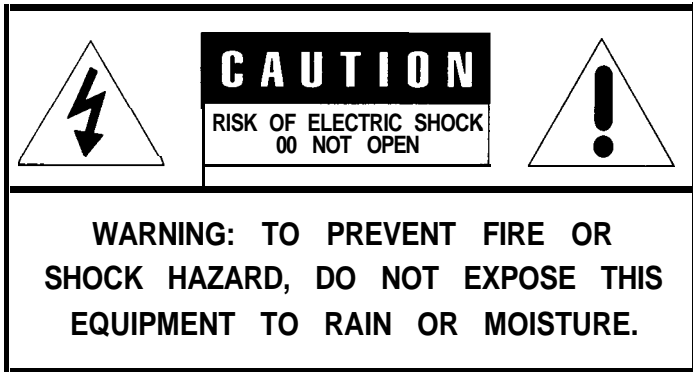
H O M E A U D I O C O M P O N E N T S

Series • 915

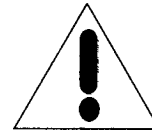
P R E A M P L I F I E R

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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

All specifications are for 20 Hz - 20 kHz unless specified otherwise.

PHONO SECTION (Measured At REC OUT)

FREQUENCY RESPONSE: +/-0.1 dB

MAXIMUM OUTPUT: 5 volts RMS

TOTAL HARMONIC DISTORTION AND NOISE:

Moving Magnet: .002%

Moving Coil: .009%

SENSITIVITY (For 0.5 volts RMS at REC OUT, @ 1 kHz):

Moving Magnet: 6.0 mV RMS

Moving Coil: 600 uV RMS

SIGNAL TO NOISE RATIO (A-weighted, relative to 0.5 V RMS at REC OUT):

Moving Magnet: -87 dB

Moving Coil: -80 dB

MAXIMUM INPUT SIGNAL (@ 1 kHz):

Moving Magnet: 65 mV RMS

Moving Coil: 6.5 mV RMS

INPUT IMPEDANCE:

Nominal: 47,000 ohms

Moving Magnet: 220 pF as supplied, user adjustable

Moving Coil: 100 ohms as supplied, user adjustable

GAIN (@ 1 kHz):

Moving Magnet: +38.5 dB

Moving Coil: +58.5 dB

LINE AMPLIFIER (Measured at OUT 1 or OUT 2)

FREQUENCY RESPONSE: +/- 0.1 dB (into 33,000 ohms)

BANDWIDTH: 8 Hz - 170 kHz, -3 dB, into 10k ohm load

MAXIMUM OUTPUT: 6 volts RMS

TOTAL HARMONIC DISTORTION AND NOISE: .008% @ 2 volts RMS

SENSITIVITY (For 0.5 volts RMS Output): 45 mV RMS

SIGNAL TO NOISE RATIO (A-Weighted, relative to 2 volts RMS output): -100 dB

INPUT IMPEDANCE: 20k ohms (including PHONO/AUX1 when phono option not installed)

OUTPUT IMPEDANCE: 316 ohms

TONE CONTROLS> Bass: +/- 16 dB @ 20 Hz, moving inflection, variable turnover

Treble: +/- 14 dB @ 20 kHz, shelving @ 5 kHz, fixed turnover

HEADPHONE AMPLIFIER

MAXIMUM OUTPUT: 4 volts RMS into 150 ohm load

OUTPUT IMPEDANCE: 150 ohms

GENERAL INFORMATION

INPUTS: Tuner, Video, CD, Phono/Aux 1, Aux 2, Tape Monitor

OUTPUTS: Out 1, Out 2, Record Out, Headphone

CONTROLS: input Selector, Volume, Tape Monitor, Tone Control In, Balance, Bass, Treble, Output Off, Power, Phono MM/MC

INDICATORS: Mute/Standby, Power

CONVENIENCE OUTLETS: 1 Unswitched, 4 Switched (Polarized)
(Convenience Outlets are not included on 200-240 VAC units)

PHYSICAL DIMENSIONS:

17" (W) x 7-5/8" (D) x 1-3/4" (H) (excluding feet); Faceplate 17" or 19" (W).
43.2cm (W) x 19.4cm (D) x 4.5cm (H) (excluding feet); Faceplate 43.2cm or 48.3cm (W).

POWER CONSUMPTION (Excluding Convenience Outlets): 9 watts Max.

AC LINE VOLTAGE OPERATING RANGE: (exceeding lower limit will activate muting circuit; exceeding upper limit will result in overheating and/or component damage)

100 - 120 Volt 50/80 Hz Models: 85 - 130 volts

200 - 240 Volt 50/80 Hz Models: 170 - 280 volts

INSTALLATION

RACKMOUNTING

The 915 Preamplifier 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.

VENTILATION/ PLACEMENT

The 915 produces very little heat during operation, and therefore requires no special considerations for ventilation. The preamplifier should be located at least several inches away from components that contain large power transformers (such as power amplifiers), due to the possibility of audible hum or buzz from magnetic radiation.

LINE VOLTAGE

The 915 Preamplifier is configurable for either 100 - 120 volt, or 200 - 240 volt operation. This is accomplished by changing internal jumpers on the printed circuit board. The procedure is detailed in the section "CHANGING LINE VOLTAGE RATING". 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.

OPERATION/CONNECTIONS

POWER CORD CONNECTION

Units wired for 200-240 VAC are supplied without power cords. Local agents will supply cords with male connectors appropriate to the local standard.

Units wired for 100-120 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 assembly. Should replacement ever be necessary, be sure to replace it with an identical cord.

Never remove the grounding pin from the male end of the cord. In applications where a grounded wall 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.

INITIAL POWER- UP/MUTING SYSTEM

For units wired for 200-240 VAC, the front panel Power Switch controls the power to the Preamplifier's circuitry. If desired, this switch may be left "on" at all times to allow circuits to be thermally stabilized for maximum fidelity as soon as the system is used.

For units wired for 100-120 VAC, the Power Switch controls the Switched Convenience Outlets only. As soon as the 915 is plugged into the AC line, power is applied to the circuitry (regardless of the position of the front panel Power Switch). Therefore, all connections should be performed with the unit unplugged.

For all units, when power is applied, the Ready Light will glow red for several seconds, indicating that the Audio and Headphone Outputs are muted. Once the delay period has passed and the power supply has stabilized, the light will turn green. The preamplifier is now ready to enjoy.

The muting will reactivate immediately (and the Ready Light turn red) upon loss of AC line voltage, (or operating the Power Switch on 200-240 VAC units), or if line voltage falls below a level which precludes proper operation of the preamplifier's circuitry.

CONVENIENCE OUTLETS

Units wired for 200-240 VAC are supplied without convenience outlets to conform to Regulatory Safety requirements.

Units wired for 700- 720 VAC have a total of five outlets for connection of associated components. The Unswitched Outlet is powered at all times, which should generally be used for a turntable or tape deck. The remaining four Switched Outlets are powered when the front panel Power Switch is engaged, as indicated by the switch's green pilot light.

The maximum power available from these outlets is 1200 watts total. This total power may be drawn from a single outlet, or a combination of outlets. Since some power amplifiers consume more than 1200 watts at maximum output, check the power amplifier's rating before connecting to these convenience outlets.

LINE LEVEL INPUTS

The inputs labelled CD, Tuner, Video, Aux 2, and Phono/Aux 1 (when the Phono Option is not installed), are identical line level inputs. The names chosen for these inputs are for convenience only, and may be used interchangeably, or for any other type of line level source. These inputs are selected via the rotary front panel Selector Switch.

The Phono/Aux 1 input is converted from a line level input to a high gain RIAA phono input when the Phono Option is installed. See Phono Section.

The 915 Preamplifier is available with an optional Phono Amplifier section. This option may be installed at time of purchase, or at a later date. Inclusion of this option is indicated by the presence of a switch button protruding from the rear panel opening marked MC/MM. Otherwise, this opening will be filled by a plastic cover.

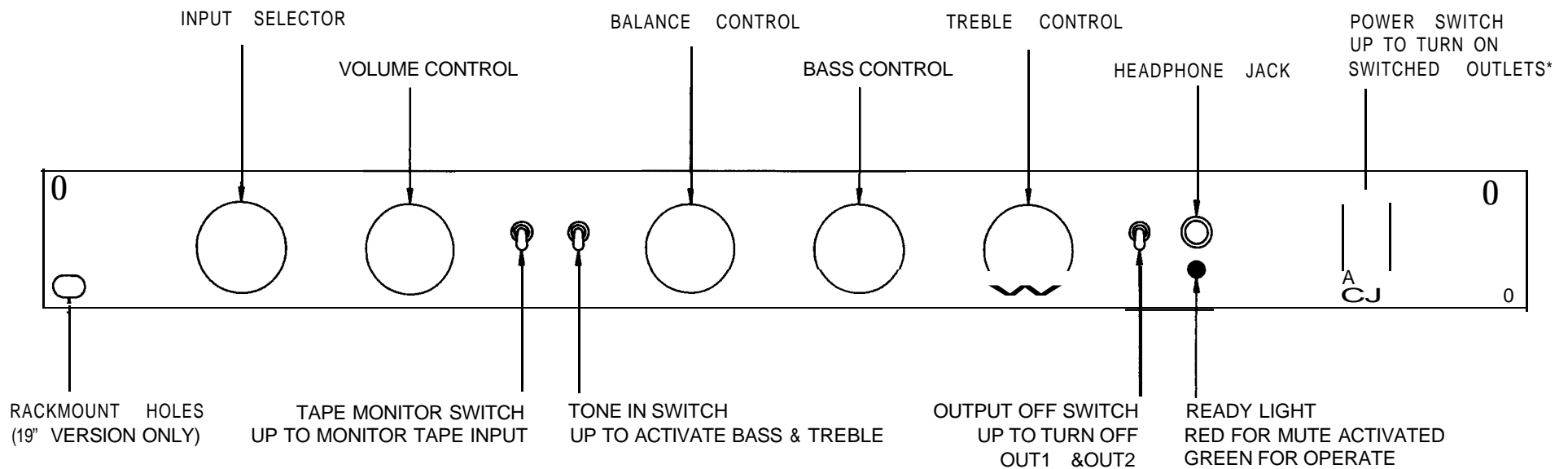
The MC/MM switch should be set to MC for low output (typically 0.2 - 0.5 mV) moving coil cartridges, and set to MM for high output (2 - 5 mV) moving coil cartridges or moving magnet cartridges.

NEVER OPERATE THE MC/MM SWITCH UNLESS THE VOLUME CONTROL IS TURNED FULLY DOWN. The very high gain present in the Phono Amplifier can result in switching transients capable of blowing amplifier or speaker fuses, and possibly damaging some loudspeakers.

PHONO SECTION (When Installed)

The ground terminal near the MC/MM switch is provided for turntable frame grounding via the extra ground wire provided on most turntables.

As supplied from the factory, the phono cartridge input termination is 47,000 ohms in parallel with 220 pF in the Moving Magnet mode, and 100 ohms in the Moving Coil mode. The value of capacitance and resistance is user selectable via plug-in components. See "Installing Cartridge Loads" for further information and instructions.



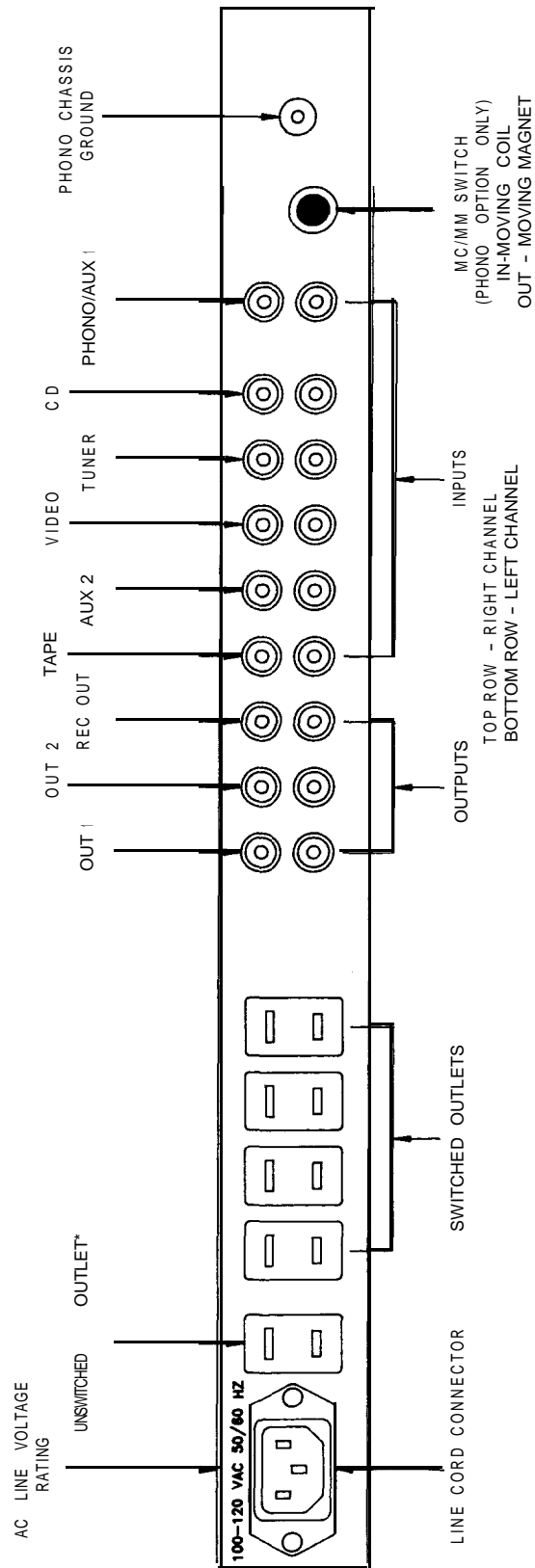
915 PREAMPLIFIER FRONT PANEL VIEW

*100-120 VAC UNITS ONLY.

200-240 VAC UNITS ARE WITHOUT CONVENIENCE OUTLETS:

POWER SWITCH CONTROLS PREAMPLIFIER POWER.

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915 PREAMPLIFIER REAR PANEL VIEW

*100-120 VAC UNITS ONLY.

200-240 VAC UNITS ARE WITHOUT CONVENIENCE OUTLETS.

TAPE INPUT/ RECORD OUTPUT

The 915 incorporates one monitoring loop for use with tape decks, or other input/output signal processors.

The Ret Out jack feeds a signal to a tape recorder's input. The signal present at this output is the same as indicated by the Selector Switch. This output may alternately be used to feed the input of a signal processing device, such as an equalizer.

Though rare, it is possible that some external devices connected to Rec Out may cause slight distortion to the main signal path when that device is turned off. This is due to possible semiconductor junction rectification in unpowered circuits. If this is suspected, leave power applied to any device connected to Rec Out during critical listening.

The Tape Input is electrically the same as the other line level inputs, but is selected via the Tape Monitor Switch. Activating this switch (UP position) breaks the main signal path after the Input Selector System and allows monitoring of the tape decks output, during recording or playback. Activating this switch does not affect the signal at the Rec Out jacks.

The Tape Input may alternately be used for the return signal from a signal processing device, such as an equalizer. The Tape Input may also be used for an additional line level input, although this signal cannot be made available to the Rec Out jacks.

A common system "malfunction" can often be traced to inadvertently leaving the Tape Monitor Switch engaged: in case of no sound from a selected line level input, check that the Tape Monitor Switch is de-activated (DOWN position).

See the Functional Block Diagram for a better understanding of the Tape Monitor Signal routing.

TONE CONTROLS/ TONE SWITCH

The Tone In Switch activates the Bass and Treble Controls when moved to the UP position. In the DOWN position, the Tone Controls are completely removed from the signal path, regardless of Bass and Treble knob position.

The Bass Control has a variable inflection, or "hinge" point so that only the very low frequencies are affected by small amounts of knob rotation on either side of center. This facilitates small amounts of low frequency corrections without noticeably altering the musical balance at upper bass frequencies. As the knob rotation is increased further from center, frequencies closer to 500 Hz are affected.

The Treble Control has a fixed "hinge" point at 1 kHz and has a "shelving" action above 5 kHz. This affords proper high frequency corrections without irritation from excessive boost at extreme high frequencies.

Activating the Tone Control Switch may cause a slight change in tonal balance even when both Bass and Treble controls are in their center detented position, and therefore the Tone System should be disabled via the switch when no tone control action is desired. The tone controls also limit the total bandpass of the line amplifier.

VOLUME CONTROL

This precision detented potentiometer increases output level in approximately 1 dB steps clockwise from the 12 o'clock position. Counterclockwise from the 12 o'clock position, each step is progressively greater until full attenuation is achieved at maximum counterclockwise position. This arrangement allows the most natural and useful volume control action for a wide variety of listening levels.

BALANCE CONTROL

This control alters the proportion between right and left output volumes. In the full counterclockwise position, only the left channel will be heard. In the full clockwise position, only the right channel will be heard. The Balance Control is useful for balancing the acoustic output of the system between left and right speakers, as well as being useful for system troubleshooting.

**OUT 1, OUT 2
AND OUTPUT OFF
SWITCH**

Activating this switch (UP position) turns off both Out 1 and Out 2. It does not affect the headphone output. This control is useful for turning off the signal to the power amplifier(s) during headphone listening, or for general system muting purposes.

When activated, the output switch disconnects the line amplifier from the output jacks, and grounds the jacks to prevent possible system noise due to open amplifier inputs.

Out 1 and Out 2 are connected in parallel, to provide two equal outputs to amplifiers. This feature is useful for bi-amplified speaker systems, or for running two amplifier/speaker systems.

A common system "malfunction" can often be traced to inadvertently leaving the Output Off Switch engaged. In case of no sound from the speakers, check that the Output Switch is de-activated (DOWN position).

**HEADPHONE
OUTPUT**

The headphone receptacle is a standard 1/4" stereo phone jack, with the tip of the plug as the left channel, the ring the right channel, and the barrel ground.

The headphone driver circuit is separate from the main line amplifier, and therefore, driving headphones will not cause distortion on the main outputs.

Unless simultaneously operating loudspeakers during headphone use, the Output Off Switch should be used to disable the outputs. Remember to reduce the Volume Control setting before turning on the outputs again, since a normal listening level for headphones may correspond to a surprisingly high volume for loudspeakers.

CIRCUIT DESCRIPTION

**PHONO SECTION
(When Installed)**

Each Phono channel consists of six low-noise JFET's connected in a complementary-symmetry, non-differential configuration. Shorted-input moving coil equivalent-input noise measures about -137 dB (140 nV) wide band.

Only two stages are used to yield an open-RIAA-loop gain of about 110 dB in moving coil mode and 90 dB in moving magnet mode. RIAA loop closure yields 58.5 dB and 38.5 dB respectively, at 1 kHz.

The first stage employs an active load technique in which the load JFET's are connected as gyrators, acting as if they were very large inductors. This arrangement allows very high gain at low frequencies and a natural roll-off of high frequencies in the amplifier loop, before the RIAA negative feedback loop is closed.

DC operating point stability is obtained by long time constant DC negative feedback applied from output to intermediate points in the gain structure.

AC gain is set by the RIAA network feeding back output signals to the sources of the input JFET pair. Switching to moving coil (MC) from moving magnet (MM) results in three operational changes: 1) open-loop gain is increased by 20 dB, 2) closed-loop gain is increased by 20 dB, and 3) user adjustable cartridge loading is changed from capacitive to resistive.

The phono outputs are capacitively connected to the high level Input Selector System.

**LINE LEVEL
INPUT SELECTOR
SYSTEM**

The front panel rotary input Selector Switch creates digital codes fed to a CMOS-FET electronic switch. This arrangement eliminates signal degradation due to mechanical switch contacts, and allows the electronic switches to be located close to the rear panel inputs for minimum signal path lengths and reduced interchannel crosstalk. The output of the Selector System is grounded between positions of the rotary knob to minimize switching noise.

JFET BUFFER AND RECORD OUTPUT DRIVER

The output of the Selector System is followed by a very high input-impedance JFET buffer pair to establish negligible CMOS switch loading (for low distortion) and to provide a low-impedance source for the Record Output and the Volume and Balance controls.

TAPE MONITOR SWITCHING

The Tape Monitor Switch drives a relay to break the line input path to insert tape input signals. The relay employs gold plated contacts, and allows optimum signal routing by placing the relay close to the Tape Input jacks and the Input Selector System.

VOLUME AND BALANCE CONTROLS

The Volume Control is a precision detented potentiometer employing laser-trimmed elements for precise channel-balance tracking and a multi-finger wiper for smooth action, prolonged life, and minimum contact noise. The center-detented Balance Control yields channel balance within 0.1 dB in its center position.

LINE AMPLIFIER

The 915 Line Amplifier is a Class-A JFET design employing a differential input stage, driving a complementary high gain output stage, symmetrically driven for balanced slew-rate and low harmonic distortion. This topology uses only four active devices per channel and extremely short loop feedback, yielding high bandwidth and excellent stability.

The feedback loop contains two user selectable paths: one conventional path for flat response, and another path allowing insertion of a tone control network. This arrangement allows maximally flat response and the shortest, cleanest signal path when tone control action is not required.

The output of the Line Amplifier is capacitor coupled to the outputs of the preamplifier.

tone CONTROL SYSTEM

The Tone In Switch allows complete removal of the tone controls from the signal path. This switching is accomplished with the same type of CMOS-FET electronic switch used for the Input Selector. This switching arrangement eliminates signal degradation due to mechanical switch contacts, and allows the electronic switch to be located very close to the Line Amplifier circuitry.

The Bass Control is of a moving inflection, variable turnover type, and the Treble Control is of a shelving, variable turnover type. These types of tone controls offer the best "tools" for modifying tonal balance without introducing unwanted side effects.

MUTING SYSTEM

The Muting System monitors the difference between the raw (unregulated) power supply voltage and the regulated power supply voltage. During the power-up cycle, the Audio and Headphone Outputs are muted until the difference between the unregulated and regulated voltages reaches a predetermined level, and then remain muted for several seconds to allow all circuitry to stabilize. During power-down, or in cases of excessively low AC line voltage, the Audio and Headphone Outputs are instantly muted to avoid extraneous noises.

The muting is accomplished by grounding the output of the Line Amplifier, using a relay with gold contacts.

POWER SUPPLY

The printed circuit board mounted power transformer utilizes dual primaries for worldwide operation. Internal jumpers configure the power supply for rated operation from 100 to 120 VAC, or 200 to 240 VAC, at 50 or 60 Hz. A generous amount of power supply headroom allows actual operation over much wider ranges of 85 to 130 VAC, or 170 to 260 VAC.

The power transformer feeds a conventional split full wave bridge rectifier system. Power supply capacitance is 4700 μF per rail. Stable and consistent ± 15 volt power for the amplifier circuits is provided by three-terminal heatsink-mounted regulators. Further local power supply filtering of 470 μF per rail is provided for each channel of the Line and Phono Amplifiers. All electrolytic filter capacitors are bypassed by high quality film capacitors.

Internal signal grounding has been carefully routed to follow the signal path from the input jacks, through the Selector System, through the Volume and Balance Controls, and finally to the line amplifier. All power supply ground paths are returned to a single "star" ground point at the power supply to minimize ground modulations. Extensive use of ground planes and interchannel shields maximize inter-channel separation.

For units wired for 100-120 VAC, the power supply is kept "on" at all times so that all circuitry is maintained at optimum operating temperature, for maximum fidelity as soon as the system is used. The front panel Power Switch operates the Switched Outlets only, to turn on associated system components.

For units wired for 200-240 VAC, the Power Switch controls the preamplifier's power supply. This switch may be left "on" at all times, if desired, to maintain optimum operating temperature.

HEADPHONE AMPLIFIER

The Headphone Amplifier utilizes a separate high-slew rate operational amplifier to drive the high current demands of headphone operation. This relieves the Line Amplifier from the additional burden of driving difficult headphone loads, and leaves the main signal path uncompromised for signals to power amplifiers.

The Output Off Switch turns off both line outputs, to be used when listening to headphones only, or as a system muting switch.

ADDITIONAL INFORMATION

INSTALLING PHONO OPTION

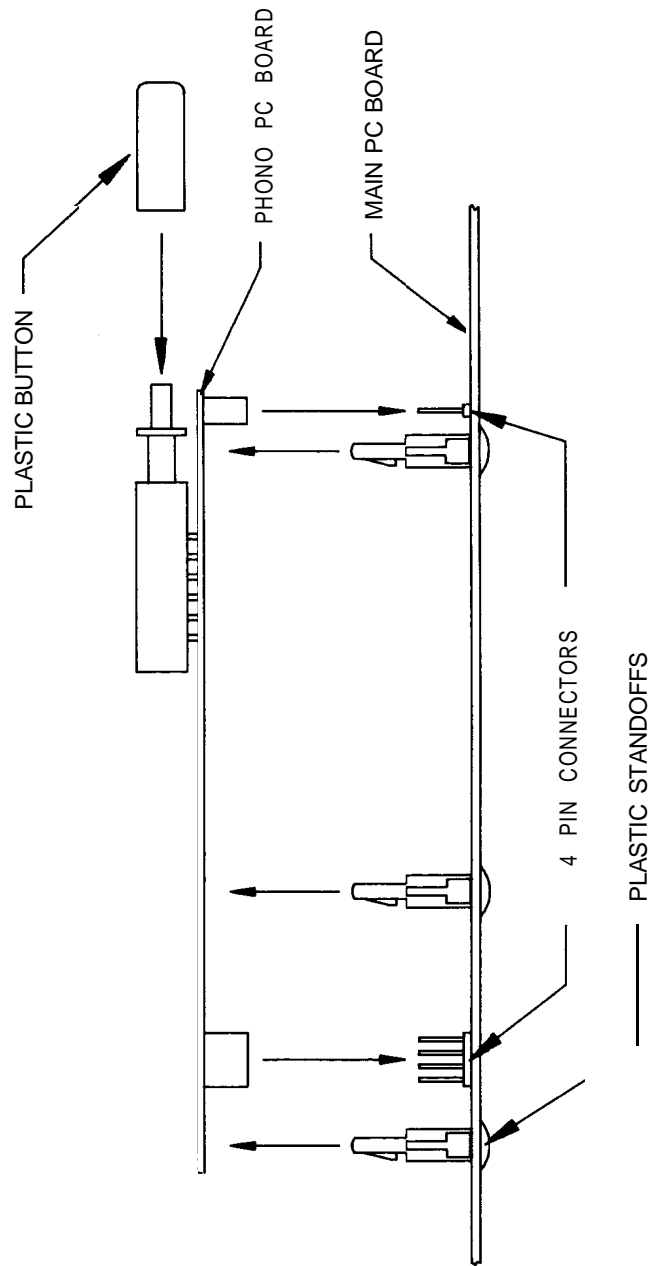
If the 915 Preamplifier was purchased without the Phono Option, the Phono/Aux 1 input is a line level input, and cannot be used with a turntable. To convert this input for use with a turntable, purchase the 915 Phono Option Accessory from your Hafler Dealer. Review the installation instructions before attempting this procedure. If any doubts exist about one's ability to install the Phono Option, 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 AS WELL AS DAMAGE TO THE PREAMPLIFIER AND/OR PHONO BOARD.

- 1) Place the preamplifier on a soft, protective surface. Remove the eight allen head screws (four on each side), and six phillips head screws (three each on top and bottom), securing the top and bottom covers. Remove covers. Carefully remove the plastic plug covering the MC/MM switch hole by squeezing the prongs inside the chassis and prying out the plug.
- 2) Find the three wire jumpers on the main printed circuit board, located near the Phono/Aux input jacks, labelled RJ5, RJ7, and RJ8. Remove the three jumper wires as shown. These jumpers may be de-soldered or clipped out.
- 3) Refer to the diagram "Installation Of Optional Phono Printed Circuit Board". Push the MC/MM switch to the "in" position to ease installation of the phono board. Carefully guide the phono board onto the main board, checking to make sure that all the electrical connector pins are aligned with their mating parts before completely seating the phono board onto the three plastic standoffs. It should snap into place with no free play. Double check that all four pins of each of three connectors have been inserted completely.

If some of the pins have not properly seated, squeeze the prongs of the three plastic stand-offs to release the phono board. Straighten any bent pins before re-attempting installation.

- 4) Add the button to the shaft of the MC/MM switch. Unless modifying the cartridge loads at this time, replace the covers. (See Installing Cartridge Loads).



INSTALLATION OF OPTIONAL PHONO PRINTED CIRCUIT BOARD

INSTALLING CARTRIDGE LOADS

Optional cartridge loading is a "fine tuning" matter. Many cartridges are not sensitive to loading and work well without it. Only a cartridge's manufacturer can provide recommended loading, as every cartridge is different. And only the user can say for sure whether or not it produces meaningful sonic improvement.

Components suitable for cartridge loads may be obtained from electronic parts or specialty audio component suppliers. should be 1% tolerance, metal-film, 1/4 watt types. should be axial lead, 10% (or better) tolerance, miniature polypropylene or polystyrene types.

As supplied from the factory, the 915 Preamplifier has been fitted with and pF capacitors installed in the appropriate sockets. While these values are suitable for most cartridges, the procedure described below may be used to alter these values. Review the installation instructions before attempting this procedure. If any doubts exist about one's ability to install the cartridge loads, 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 AS WELL AS DAMAGE TO THE PREAMPLIFIER AND/OR PHONO BOARD.

- 1) Place the preamplifier on a soft, protective surface. Remove the four allen head screws (two on each side), and three phillips head screws, securing the bottom cover. Remove cover.
- 2) Refer to the diagram "Installation Of Optional Cartridge Loads" for the location of the appropriate sockets, and how to form the component leads. Make sure that the component leads are only long enough to securely mate to the sockets. Be sure not to stress the component lead where it enters the body of the part. Observe carefully which sockets are for MM (capacitors) and for MC (resistors).
- 3) Replace cover.

NOTE: Even while experimenting with different optional loads, the cover must be replaced before re-applying AC power, not only for safety reasons, but to shield hum and interference which can totally invalidate any attempts at sonic evaluation.

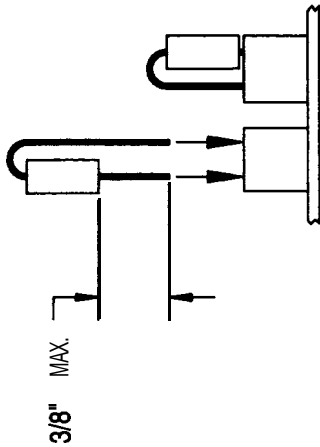
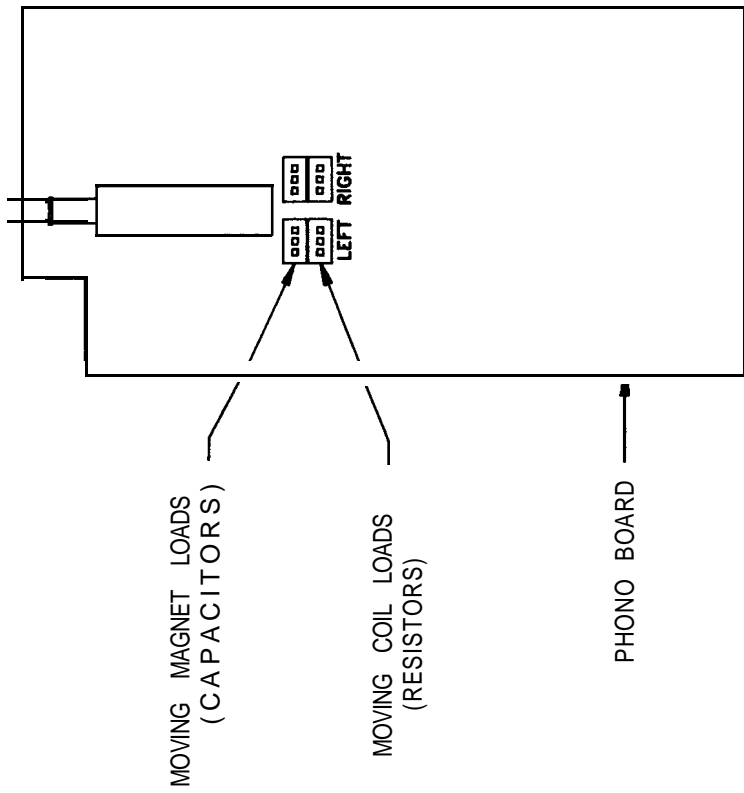
CAUTION: When low value resistors are installed and selected by the MC switch position, accidentally using this setup for a high output moving coil cartridge can result in deceptively normal output levels, but with improper cartridge frequency response.

CHANGING UNE VOLTAGE RATING

The 915 Preamplifier can be internally wired for two different AC line voltage ranges: 100 - 120 VAC, or 200 - 240 VAC, 50/60 Hz. The configuration is labelled above the power cord connector. If the preamplifier will be used in a location that requires a different line voltage, it is possible 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.

NOTE: As supplied from the factory, units wired for 100-120 VAC have five Convenience Outlets, and the Power Switch controls the Switched Convenience Outlets only. (Power is applied to the preamplifier's circuitry as soon as the unit is plugged in.) For units factory wired for 200-240 VAC, no Convenience Outlets are supplied, and the Power Switch controls application of power to the preamplifier's circuitry. Note that changing the Line Voltage affects only the operating line voltage: the above described switching arrangements will remain the same.

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



DETAIL OF COMPONENT INSERTION INTO
PHONO LOAD SOCKETS
(INSERT LEADS INTO OUTER TWO HOLES)

INSTALLATION OF OPTIONAL CARTRIDGE LOADS

- 1) Place the preamplifier on a soft, protective surface. Remove the eight allen head screws (four on each side), and six phillips head screws (three each on top and bottom), securing the top and bottom covers. Remove covers.
- 2) Referring to the diagram "Main Printed Circuit Board Component Layout", locate the three wire jumper locations labelled "A", "B", and "C", in front of the power transformer. These jumpers control the series/parallel connections of the power transformer's primary.
- 3) Remove the old jumper(s) by desoldering and replace with new jumper(s) as indicated:
 100 - 120 VAC: Jumpers A & B installed
 200 - 240 VAC: Jumper C installed

 Be sure to clip off excess wire length on the solder (non-component) side of the printed circuit board.
- 4) Referring again to the diagram, locate the clip-mounted fuse. Replace this fuse with a new slow-blow fuse as indicated:
 100 - 120 VAC: 1/10 AMP
 200 - 240 VAC: 1 /16 AMP
- 5) Referring again to the diagram, locate the wire jumper location labelled "Remove For 240 VAC", behind the transformer. This jumper controls the voltage supplied to the Power Switch indicator lamp. Remove or install this jumper as indicated:
 100 - 120 VAC: Jumper Installed
 200 - 240 VAC: Jumper Removed
- 6) Replace the covers.
- 7) Obtain a new voltage configuration label from the factory, and affix over the original markings. Alternately, prepare a small self adhesive label and indicate the new voltage range with permanent ink. Relabelling the unit is a vital safety requirement, particularly if the preamplifier is sold to a new owner.

GENERAL
TROUBLESHOOTING
HINTS

The 915 Preamplifier is configured for normal operation when all toggle switches are in the "down" position. That is, Tape Monitor is NOT selected, Tone Controls are OFF, and the outputs are ON. If no sound is heard from the system, first check the position of the Tape Monitor and Output switches. If altered tonal balance is detected (even with the Bass and Treble controls centered), check the position of the Tone switch.

If the Ready light is off or glowing red, the preamplifier's outputs are muted and no sound will be heard. If rated AC power is present and the light is glowing red, then the delay circuit will un-mute the outputs within several seconds. If the delay circuit does not un-mute within a few seconds and the light continues to glow red, check for low AC line voltage, and that the unit is configured for the local line voltage. If the Ready light is off, check the AC power connections.

If all controls are in the intended position and the Ready light is green, check all system power connections, interconnecting and speaker cables, and fuses. The 915 does contain one internal power fuse, but this fuse should not generally blow unless a malfunction has occurred. This fuse should be replaced only with the exact type and rating of fuse originally supplied. If this fuse is replaced and blows again within a short time, 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! 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.

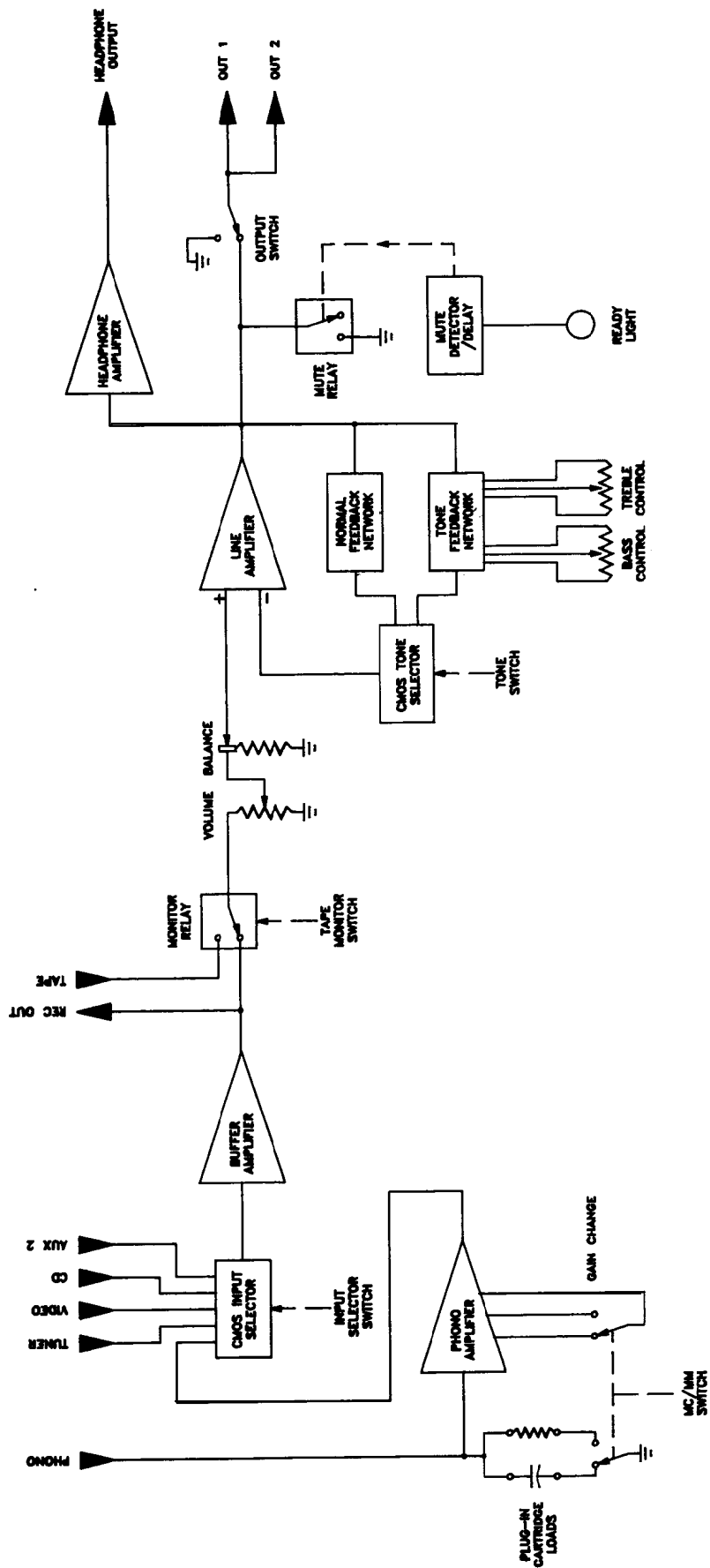
SPECIAL NOTE ON VIDEO CABLE "GROUNDS": As mentioned above, the ground conductor of cable service and antenna feeds should be connected to earth ground. Often, however, due to long feed lengths, especially in apartment distribution systems, this ground will be of poor quality and could be a source of 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.

CLEANING/ MAINTENANCE

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 915 Preamplifier, and all servicing should be referred to qualified, authorized personnel. The only user access to the inside of the chassis should be for changing the optional loading for the phono inputs (when installed). See "Phono Section".



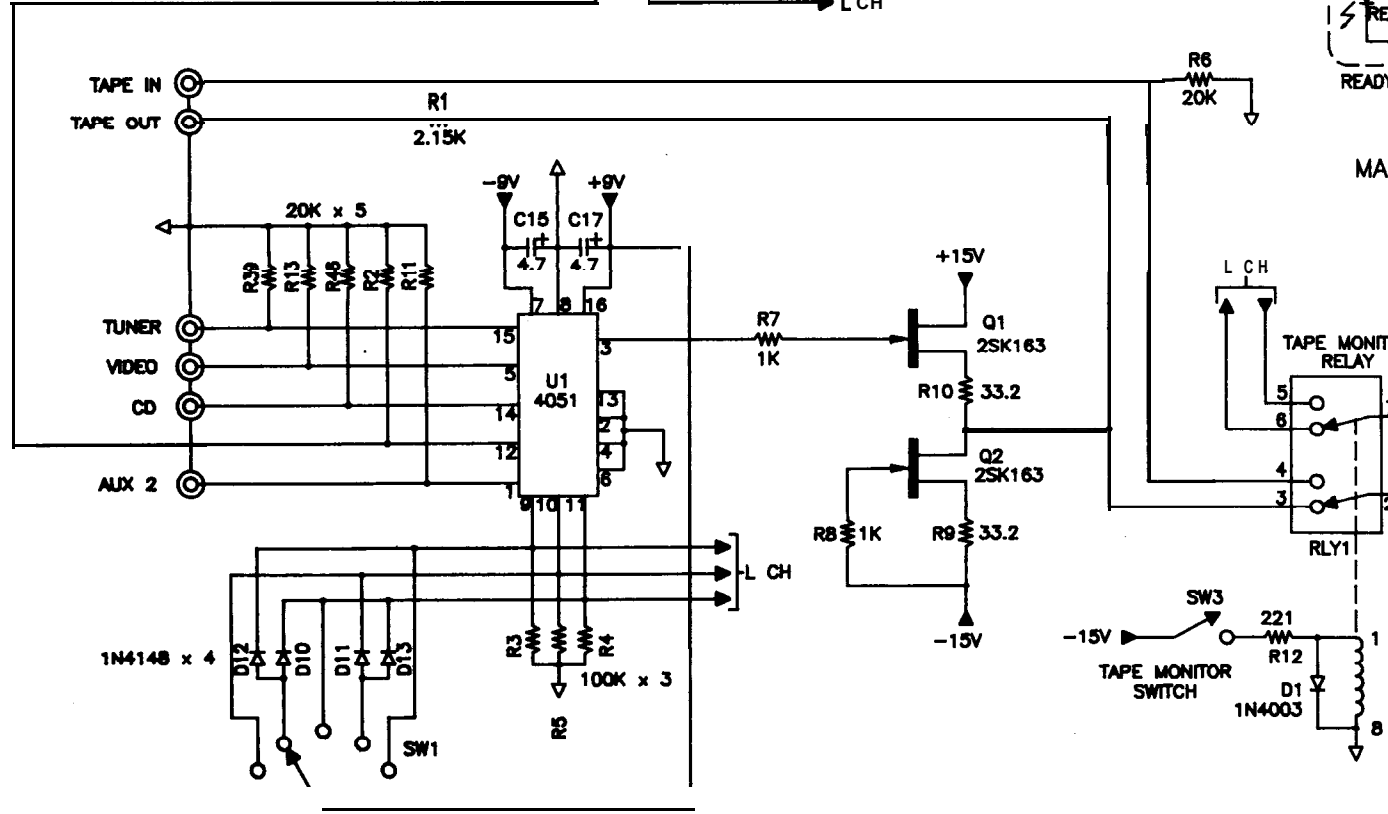
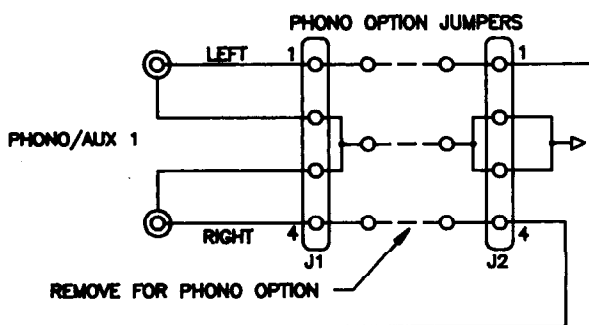
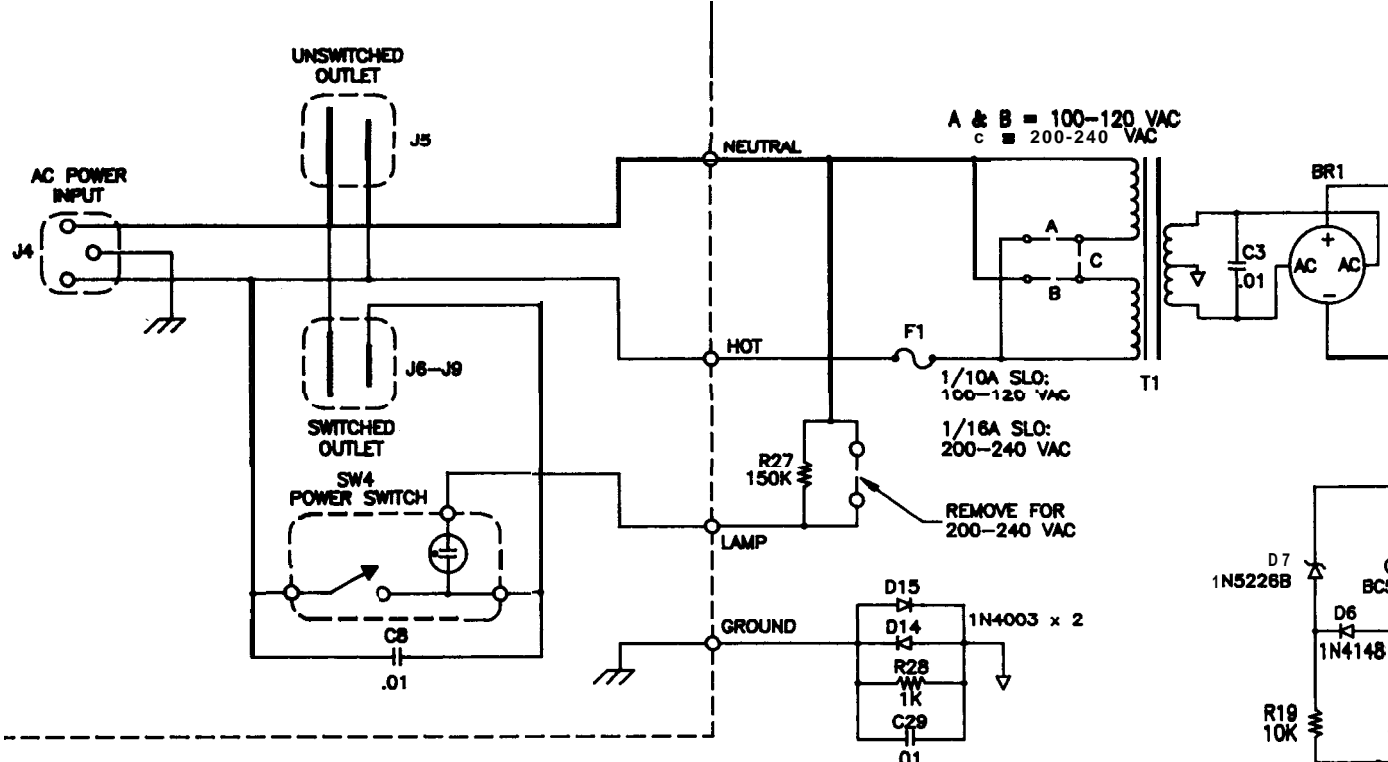
915 PREAMPLIFIER FUNCTIONAL BLOCK DIAGRAM

ONE CHANNEL SHOWN, PHONO OPTION INSTALLED

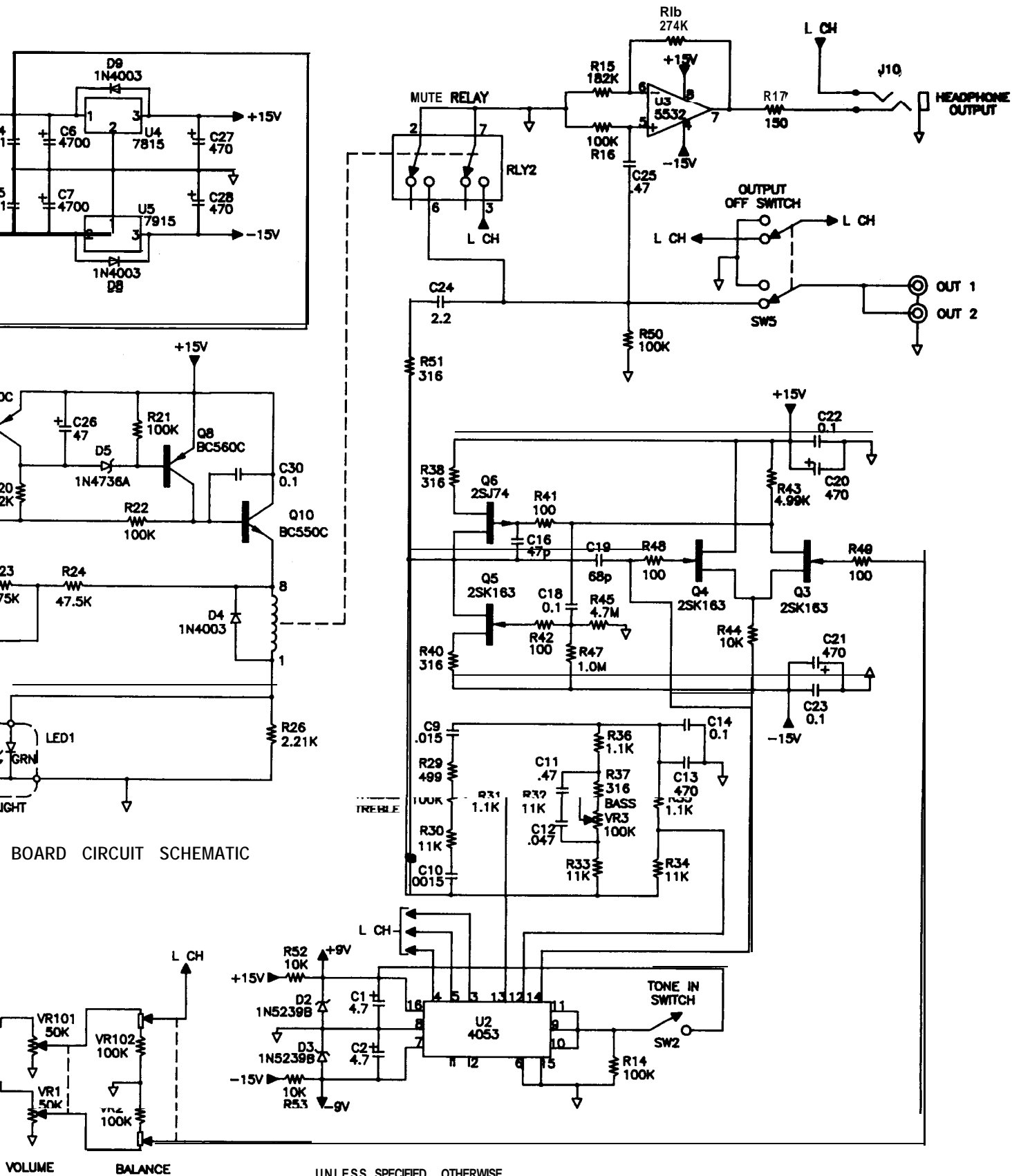
- MAIN CIRCUIT BOARD

DESIGNATORS I-99: FOR COMMON AND RIGHT CHANNEL PARTS 100-199: FOR LEFT CHANNEL

DESIGNATOR	VALUE	PART NUMBER	DESIGNATOR	VALUE	PART NUMBER
ALL RESISTORS 1/4 WATT, 1% METAL FILM			U1 U101	4051	SSH-656
R1, R101	2.15K	RMP/4-2151	U2	4053	SSH-657
R2, R102	20K	RMP/4-2002	U3	NE5532	SSH-667
R3	100K	RMP/4-1003	U4	7815	SSH-625
R4	100K	RMP/4-1003	U5	7915	SSH-628
R5	100K	RMP/4-1003	Q1,Q101	2SK163, Graded	SSH-614T
R6, R106	20K	RMP/4-2002	Q2,Q102	2SK163. Graded	SSH-614T
R7, R107	1K	RMP/4-1001	Q3,Q103	2SK163	SSH-614
R8, R106	1K	RMP/4-1001	Q4,Q104	2SK163	SSH-614
R9, R109	33.2	RMP/4-0332	Q5,Q105	2SK163	SSH-614
R10, R110	33.2	RMP/4-0332	Q6,Q106	2SJ74	SSH-617D
R11, R111	20K	RMP/4-2092	Q7	BC560C	SSH-651
R12	221	RMP/4-2210	Q8	BC560C	SSH-651
R13, R113	20K	RMP/4-2002	Q9	BC560C	SSH-651
R14	100K	RMP/4-1003	Q10	BC550C	SSH-650
R15, R115	182K	RMP/4-1623	SW1	Rotary Switch	SWH-153
R16, R116	100K	RMP/4-1003	SW2	Toggle Switch	SWH-151
R17, R117	150	RMP/4-1500	SW3	Toggle Switch	SWH-151
R16, R116	274K	RMP/4-2743	SW4	Power Switch	SWH-152G (Gray)
R19	10K	RMP/4-1002	SW5, SW1 05	Toggle Switch	SWH-152B (Black)
R20	162K	RMP/4-1623			SWH-151
R21	100K	RMP/4-1003	RLY1	Relay	SWH-146
R22	100K	RMP/4-1003	RLY2	Relay	SWH-146
R23	4.75K	RMP/4-4751	VR1, VR101	Volume Control	RVH-503C
R24	47.5K	RMP/4-4752	VR2, VR102	Balance Control	RVH-104A
R25	1.5K	RMP/4-1501	VR3, VR103	Bass Control	RVH-104B
R26	221K	RMP/4-2211	VR4, VR104	Treble Control	RVH-1048
R27	150K	RMP/4-1503	LED1	Tri-Color LED	SSH-739
R26	1K	RMP/4-1001	J1-J3	4-Pin Header	CCH-203
R29, R129	499	RMP/4-4990	J4	IEC Connector	CCH-233
R30, R130	11K	RMP/4-1102	J5-J9	Convenience Outlet	CCH-150
R31, R131	1.1K	RMP/4-1101	J10	Headphone Jack	CCH-208
R32, R132	11K	RMP/4-1102	F1	1110 Amp Slow Fuse	FS-111 OSB
R33, R133	11K	RMP/4-1102	F1 (EXPORT)	1 /1 6 Amp Slow Fuse	FS-1/16SB
R34, R134	11K	RMP/4-1102	T1	Transformer	I-r-915
R35, R135	1.1K	RMP/4-1101	BR1	Bridge Rectifier	ss-222
R36, R136	1.1K	RMP/4-1101	All Capacitors In Microfarads Unless Specified Otherwise		
R37, R137	316	RMP/4-3160	C1	4.7 25V Tant.	CTR-475A
R36, R136	316	RMP/4-3160	C2	4.7 25V Tant.	CTR-475A
R39, R139	20K	RMP/4-2002	C3	.01 1 KV Ceramic Disc	CD-103/20
R40, R140	316	RMP/4-3160	C4	0.11 OOV Polycarbonate	CPC-104
R41, R141	100	RMP/4-1000	C5	0.11 WV Polycarbonate	CPC-104
R42, R142	100	RMP/4-1000	C6	4700 35V Electrolytic	CER-478B
R43, R143	4.99K	RMP/4-4991	C7	4700 35V Electrolytic	CER-478B
R44, R144	10K	RMP/4-1002	C8	.01 Ceramic Disc, UL	CD-103A
R45, R145	4.7M	RMP/4-4754	C9,C109	.015 160V Polycarbonate	CPC-153
R46, R146	20K	RMP/4-2002	C10,C110	.0015 160V Polypropylene	CPP-152
R47, R147	1.0M	RMP/4-1004	C11,C111	.47 63V Polycarbonate	CPC-474
R46, R146	100	RMP/4-1000	C12,C112	.047 63V Polycarbonate	CPC-473
R49, R149	100	RMP/4-1000	C13,C113	470 Non Polar Electrolytic	CERNP-477
R50, R150	100K	RMP/4-1003	C14,C114	0.1 100V Polypropylene	CPP-104MC
R51, R151	316	RMP/4-3160	C15	4.7 25V Tant.	CTR-475A
R52	10K	RMP/4-1002	C16, C116	47p Polystyrene	CPS-470
R53	10K	RMP/4-1002	C17	4.7 25V Tant.	CTR-475A
DIODES			C18, C118	0.1 1 OOV Polypropylene	CPP-104MC
D1	1N4003	SS-161	C19,C119	68p Polystyrene	CPS-680
D2	1N5239B 9.1V	SSH-652	C20, C120	470 25V Electrolytic	CER-477A
D3	1N5239B 9.1V	SSH-652	C21, C121	470 25V Electrolytic	CER-477A
D4	1N4003	SS-161	C22, C122	0.1 1 WV Polypropylene	CPP-104MC
D5	1N4736A 6.8V	ss-171	C23, C123	0.1 1 OOV Polypropylene	CPP-104MC
D6	1N4148	SS-162	C24, C124	2.2 250V Polypropylene	CPP-225MC
D7	1N5226B 3.3V	SSH-653	C25, C125	.47 63V Polycarbonate	CPC-474
D6	1N4003	SS-161	C26	47 25V Electrolytic	CER-476A
D9	1N4003	SS-161	C27	470 25V Electrolytic	CER-477A
D10	1N4148	SS-162	C28	470 25V Electrolytic	CER-477A
D11	1N4148	SS-162	C29	.01 1KV Ceramic Disc	CD-13/20
D12	1N4148	SS-162	C30	0.1 1 OOV Polycarbonate	CPC-104
D13	1N4148	SS-162			
D14	1N4003	SS-161			
D15	1N4003	SS-161			



INPUT SELECTOR SWITCH



BOARD CIRCUIT SCHEMATIC

- UNLESS SPECIFIED OTHERWISE
1. RIGHT CHANNEL ONLY SHOWN
 2. COMPONENT DESIGNATORS 1-99 FOR COMMON AND RIGHT CHANNEL PARTS. 100-199 FOR LEFT CHANNEL
 5. ML RESISTORS IN OHMS, CAPACITORS IN MICROFARADS
 4. TONE SWITCH SHOWN IN BYPASS POSITION
 5. TAPE MONITOR SWITCH SHOWN IN WE POSITION
 6. MUTE RELAY SHOWN IN UNMUTED POSITION

- PHONO BOARD

DESIGNATORS 1- 99: FOR RIGHT CHANNEL PARTS
100-1 99: FOR LEFT CHANNEL

DESIGNATOR VALUE
PART NUMBER

All Resistors 1/4 Watt, 1% Metal Film

R1, R101	681	RMP/4-6810
R2, R102	33.2 Low Noise	RMP/8-0332LN
R3, R103	33.2 Low Noise	RMP/8-0332LN
R4, R104	681	RMP/4-6810
R5, R105	26.7K	RMP/4-2672
R6, R106	332K	RMP/4-3323
R7, R107	47.5K	RMP/4-4752
R8, R108	316	RMP/4-3160
R9, R109	100	RMP/4-1000
R10, R110	33.2 Low Noise	RMP/8-0332LN
R11, R111	3.32M	RMP/4-3324
R12, R112	1.0K	RMP/4-1001
R13, R113	22.1M	RMP/4-2215
R14, R114	10M	RMP/4-1005
R15, R115	316	RMP/4-3160
R16, R116	3.32M	RMP/4-3324
R17, R117	1.0K	RMP/4-1001
R18, R118	22.1M	RMP/4-2215
R19, R119	10M	RMP/4-1005
R20, R120	316	RMP/4-3160

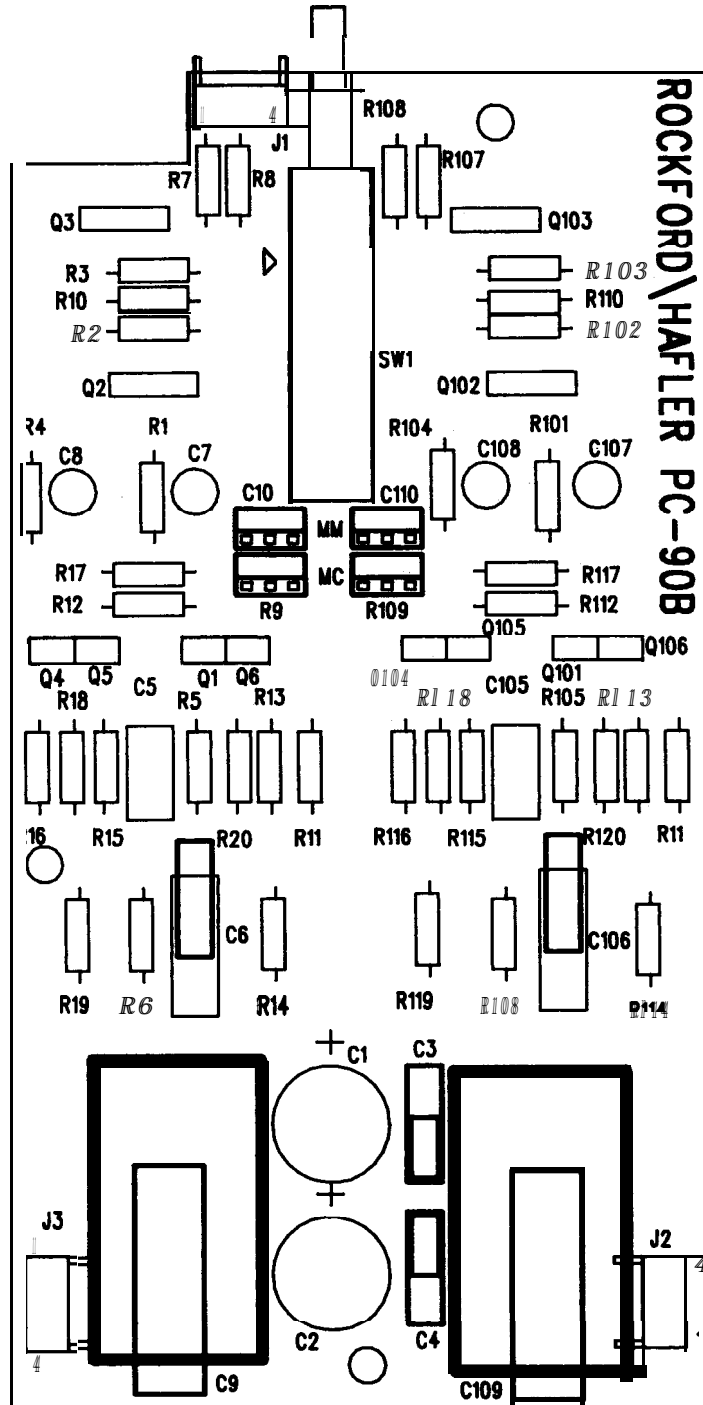
Q1, Q101	2SK147	SSH-674
Q2, Q102	2SK147	SSH-674
Q3, Q103	2SJ72	SSH-617C
Q4, Q104	2SJ72	SSH-617C
Q5, Q105	2SJ74	SSH-617D
Q6, Q106	2SK163	SSH-614

SW1, SW1 01	4PDT Switch	SWH-125
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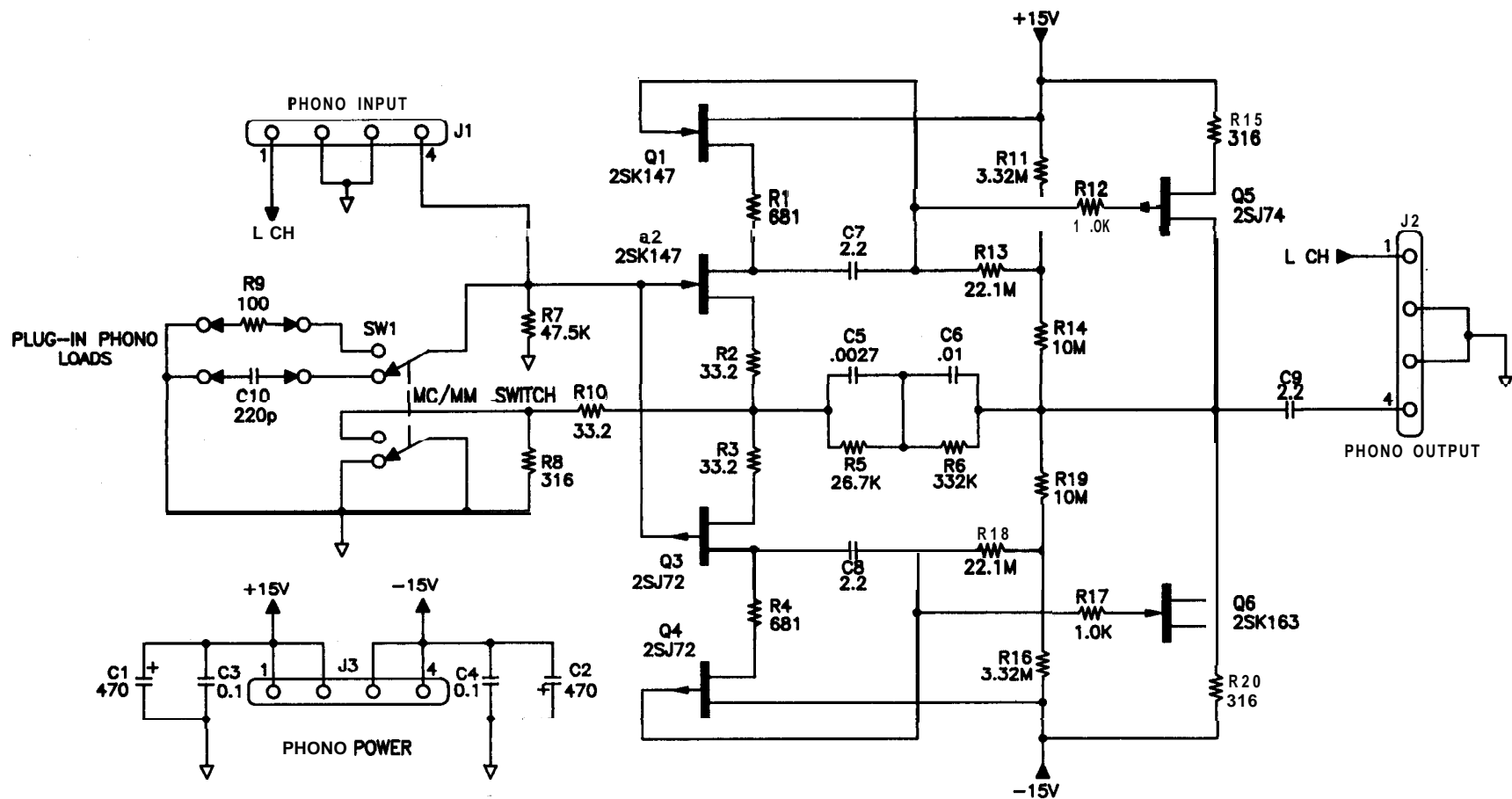
J1-J3	4-Pin Receptacle	CCH-240
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All Capacitors in Microfarads Unless Specified Otherwise.

C3	0.1 1 OOV Polypropylene	CPP-104MC
C4	0.1 1 OOV Polypropylene	CPP-104MC
C5, C105	.0027 1% Polystyrene	CPS-272
C6, C106	.01 1% Polystyrene	CPS-103
C7, C107	2.2 Polyester	CP-225
C8, C108	2.2 Polyester	CP-225
C9, C109	2.2 250V Polypropylene	CPP-225MC
C10, C110	220pf Polystyrene	CPS-221



PHONO BOARD COMPONENT LAYOUT DIAGRAM



1. RIGHT CHANNEL ONLY SHOWN.
2. COMPONENT DESIGNATORS 1-99 FOR RIGHT CHANNEL PARTS. 1 W-199 FOR LEFT CHANNEL.
3. ALL RESISTORS IN OHMS, CAPACITORS IN MICROFARADS.
4. MC/MM SWITCH SHOWN IN MOVING MAGNET POSITION.

PHONO BOARD CIRCUIT SCHEMATIC DIAGRAM

SERVICE POLICY AND LIMITED WARRANTY

If you encounter any difficulty or have any question concerning your 915 Preamplifier, please call our Customer Service Department weekdays, 8 am to 3:30 pm, Mountain Standard Time, at 602-967-3565.

Should you have any doubts as to whether the preamplifier 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 915 Preamplifier 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. This warranty applies only to products sold in the United States Of America. For warranties outside the USA, 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.

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