



Equalization -

MAG PHONO
 TAPE HEAD

RIAA.
 NAB.

NOTE: Proper equalization will be obtained from crystal and ceramic phono cartridges when recommended loading network is used at MAG PHONO input.

Tube Complement

2 - 12AT7 tubes.
 8 - 12AX7 tubes.

Power Supply

Four silicon rectifiers and a specially designed power transformer supply B+ requirements and DC voltage to the filaments of all tubes.

Power Requirements

105-125 volts, 50/60 cps AC 45 watts.

AC Receptacles

Two receptacles, one SWITCHED (375 watts maximum) and one NORMAL (375 watts maximum), provide 105-125 volts AC for powering other equipment.

Dimensions

Overall: 15-5/8" wide x 5-5/16" high x 11-7/8" deep. Depth dimension allows for external connection plugs in rear chassis apron.

Net Weight

17 lbs.

Shipping Weight

19 lbs.

INTRODUCTION

Your Heathkit Model AA-11 Stereo Preamplifier is a complete audio control center, with thirteen inputs for monophonic operation and five pairs of inputs for stereophonic operation.

Among the many features of the Preamplifier, is a nine-position pushbutton switch which provides instant selection of the desired STEREO or MONO input. Also located on the front panel are individual BASS, TREBLE, and VOLUME controls. For greater flexibility, the following controls are located under the front control panel; BLEND, VOLUME-LOUDNESS, SCRATCH FILTER, RUMBLE FILTER, MODE, PHASE, and CHANNEL REVERSE. All inputs

except TAPE HEAD have individual level controls to permit adjusting input sensitivity for uniform volume.

The Preamplifier circuitry includes feedback equalization, plus a matrixing network which provides a DERIVED CENTER CHANNEL OUTPUT for three-channel stereo. Ten dual-purpose tubes and four silicon diode rectifiers are used in the Preamplifier. DC filament voltages are used for all tubes for minimum hum.

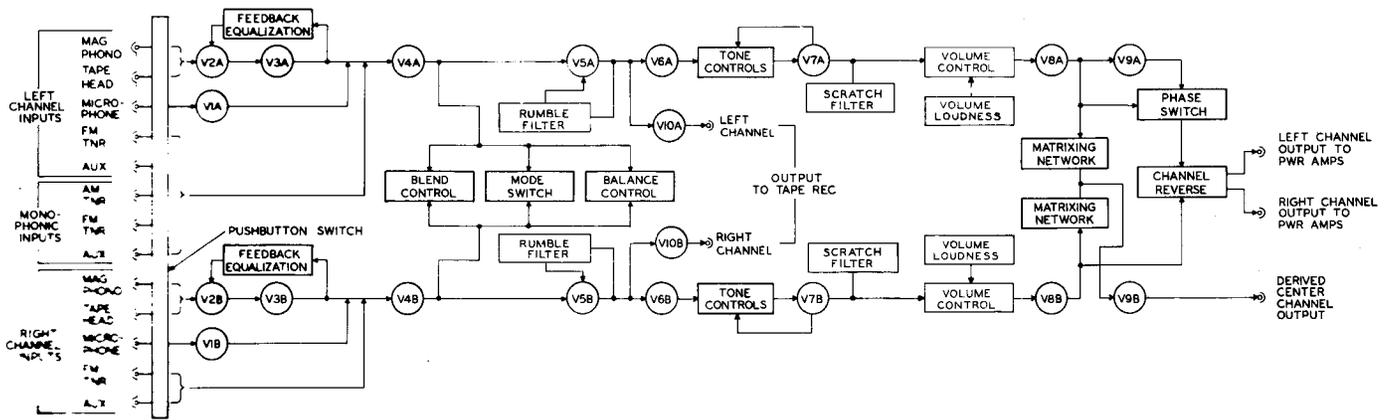
This decorator-designed Preamplifier incorporates all the virtues of front panel simplicity, combined with high performance standards.

CIRCUIT DESCRIPTION

The AA-11 Stereo Preamplifier consists of two identical but separate preamplifier channels, using one power supply. Since both channels are the same, only the left channel will be discussed. Refer to the Schematic and Block Dia-

grams to follow the circuit and identify circuit components while reading this description.

Assume that the pushbutton switch is in the MAG PHONO position and the MODE switch is



BLOCK DIAGRAM

in the STEREO position. The signal from the PHONO input is first amplified by tubes V2A and V3A. Following these two stages of amplification, RIAA equalization is provided by a feedback network consisting of resistor R45, and capacitors C5 and C7. The signal from the TAPE HEAD, with NAB equalization provided by capacitor C9 and resistor R47 is applied to tube V2A when the TAPE HEAD button is pressed. When the MIC button is pressed, the signal from the MIC input is first amplified by tube V1A and then is applied to tube V4A. Each of the other inputs, when selected with the pushbutton switch, is applied directly to tube V4A.

After equalization the signal is amplified by tube V4A and applied to tube V5A for further amplification. The signal from V4A also goes through BLEND control R59 and the MODE switch. From tube V5A the signal goes through BALANCE control R118 and the RUMBLE FILTER switch. This filter is made up of resistor R73 and capacitors C25 and C27. The signal from V5A is also applied to tube V10A, a cathode follower stage. This tube, V10A, provides a low impedance output to feed a tape recorder. The BLEND control, the MODE switch, and the BALANCE control are in parallel with both channels to permit a varied amount of mixing and balancing of the channels. From the RUMBLE FILTER switch, the signal continues to tube V6A for further amplification.

From tube V6A the signal is applied to the left channel Baxandall type feedback tone control circuitry, consisting of: BASS control R85, TREBLE control R87, and the left channel P.E.C. tone control network. The tone control net-

work constitutes a complex feedback loop, including tube V7A.

The amplified signal from the plate of tube V7A is applied to the SCRATCH FILTER made up of resistors R105 and R107, capacitors C33 and C35, and coil L3. Resistor R103 is switched into the circuit when the switch is in the OUT position.

From stage V7A the signal goes through the VOLUME-LOUDNESS switch to VOLUME control R61. The VOLUME-LOUDNESS switch, with resistors R66 and R67, and capacitors C21 and C22, provides the compensation necessary for the VOLUME control to operate as a LOUDNESS control with the switch in the LOUDNESS position. The desired amount of signal chosen with the VOLUME control is applied to tube V8A.

Tube V8A amplifies this signal and applies it to tube V9A as well as the PHASE switch. Tube V9A does not amplify but reverses the phase of the signal. This signal from tube V9A is also applied to the PHASE switch. From the PHASE switch, the signal goes to the CHANNEL REVERSE switch and then to the LEFT CHANNEL OUTPUT.

The transformer-operated power supply uses two silicon diodes, D1 and D2, in a full-wave voltage-doubler arrangement to supply B+ voltages. Filtering is accomplished by filter choke L1, electrolytic capacitors C48A, C48B, C48C, C48D, and C49, and resistors R128, R130, R131, and R132. Diodes D3 and D4 are used as full-wave rectifiers to supply DC voltage for the tube filaments. Filtering for this voltage is provided by resistor R129 and electrolytic capacitors C45A, C45B, and C50.



DERIVED CENTER CHANNEL OUTPUT - For feeding an output composed of mixture of the left and right channel signals to a third power amplifier, driving either a remote speaker (or speakers), or a speaker for stereo "center-fill".

SWITCHED AC OUTLET - For supplying power to devices such as power amplifiers and tuners,

which may then be controlled by the power switch on the Preamplifier.

NORMAL AC OUTLET - For supplying power to devices such as record changers or tape decks, which may be subjected to damage if power is removed without shutting off the mechanism.

OPERATION

INPUT LEVEL CONTROLS

After making all input connections, the INPUT LEVEL controls should be adjusted for approximately equal volume levels as the push-buttons are depressed, switching from one input to another.

- () Set the VOLUME control at midpoint; and the OFF-ON pushbutton ON (depressed).
- () Adjust all the INPUT LEVEL CONTROLS to their maximum clockwise position, viewed from the bottom of the chassis through the holes in the bottom plate.

NOTE: If your system includes a TAPE HEAD input, follow the procedure given in A. If your system does not include a TAPE HEAD input, follow the procedure given in B.

- A. No level controls are provided for the TAPE HEAD inputs. This is because, generally, the signal from the tape head will be lower in level than that from the magnetic phono pickup. Therefore, the PHONO LEVEL CONTROLS and all the other level controls should be adjusted to match that of the tape head level.
- B. With the VOLUME control at midpoint, depress the PHONO button. Adjust the PHONO level control to a desirable listening level. Adjust all the other level controls to match that of the PHONO. Each level control, previously adjusted to its minimum value, should be turned until the same comparative level as the PHONO is reached.

FRONT PANEL CONTROLS

The Preamplifier controls may be thought of as being in two groups; a primary group and a

secondary group. The primary group is composed of the VOLUME, BASS and TREBLE controls and the 9-pushbutton switch. The secondary group, under the control panel cover, is composed of the BLEND, and BALANCE controls and the VOLUME-LOUDNESS, SCRATCH FILTER, RUMBLE FILTER, MODE, PHASE and CHANNEL REVERSE switches. The primary controls offer maximum flexibility of operation with a minimum of control complexity. The secondary controls offer the means for correcting any deficiencies existent in program material. The function of each control is explained in the following sections.

PRIMARY GROUP:

VOLUME -

It is of dual-tandem construction, allowing the listening levels of both channels to be adjusted simultaneously. Maximum volume is obtained when the knob is rotated clockwise.

BASS AND TREBLE -

Each of these controls has two knobs that are concentrically clutched. Rotating the larger inner knob (clear plastic) of either control also rotates the smaller outer knob (black) of that control; therefore, the tonal response is simultaneously varied by the same amount in both channels.

If it is desired to introduce different tonal response (either in bass response or in treble response) in the left and right channels, the two concentric knobs of either control may be individually adjusted by holding one knob stationary while turning the other to any desired position of boost or cut.



Flat response is obtained when the knobs are in the 12 o'clock position. Clockwise rotation produces boost, and counterclockwise rotation produces cut.

9-PUSHBUTTON SWITCH -

This switch serves both as an input selector and Preamplifier OFF-ON switch. Depressing the OFF-ON button turns the Preamplifier ON and also turns ON any accessory equipment plugged into the SWITCHED AC outlet to the rear. Once depressed, the OFF-ON button will remain in an inward position. To turn the Preamplifier OFF, the OFF-ON button must be depressed a second time, which returns it to the original outward position.

The remaining eight pushbuttons select any one of the Preamplifier inputs. To select input, simply depress the desired button. Depressing any one of the eight pushbuttons automatically disengages those previously depressed except the OFF-ON button. Operating the Preamplifier with more than one input button depressed is not recommended due to the loading effect and the improper equalization that would result.

SECONDARY GROUP:

All of the controls in the secondary group are located behind the control panel cover. The control panel cover is hinged so that it opens downward, exposing the controls.

BLEND -

The normal position of the BLEND control (full counterclockwise) is designated as "OFF" on the front panel. This is the position of normally high channel separation and maximum stereo effectiveness. Turning the control clockwise gradually mixes both channels together until, in the full clockwise position, both speakers are carrying both channels, completely mixed, and the stereo source has been made completely monophonic.

The principal purpose of the BLEND control is to permit whatever degree of mixing is necessary to eliminate the "hole-in-the-middle effect" which is present in some stereo material. This control will be found extremely effective in such cases. As an alternate to the use of

the BLEND control, the output of the DERIVED CENTER CHANNEL may be used.

BALANCE -

Turning the BALANCE control either way from the 12 o'clock position increases the level of one channel and simultaneously decreases the level of the other channel. Turning the control clockwise shifts the sound toward the left; turning it counterclockwise shifts the sound to the right. This control should be used to keep the two channels balanced, despite any unbalance in the program material.

VOLUME-LOUDNESS -

This is a two-position switch that allows the VOLUME control to function either as a conventional volume control, or as a loudness contour control. When in the VOLUME position, the VOLUME control functions conventionally. When in the LOUDNESS position, loudness compensation is added at lower level settings of the volume control. See Graph 2 on page 3. This compensation closely follows the Fletcher-Munsen "equal loudness contours", representing the reduced sensitivity of the human ear to low and high frequencies at low volume levels. Thus, loudness compensation of this type maintains flat response to the ear at low listening levels.

SCRATCH-FILTER -

This is a two-position switch, providing for a low-pass filter to be inserted IN or OUT of the circuit. When the filter is inserted, a sharp cutoff of frequencies above 6000 cps is produced.

RUMBLE-FILTER -

This is a two-position switch, providing for a high-pass filter to be inserted IN or OUT of the circuit. When the filter is inserted, a sharp cutoff of frequencies below 50 cps is produced.

MODE -

This is a two-position slide switch, providing for either a STEREO or a MONO mode of operation. When in the MONO position, the left and right channels are connected together.

Monophonic sources, when reproduced in this way over both speakers, may be given a "pseudo-stereo" effect by adjusting the tone controls so that one channel contains mostly high frequencies and the other channel contains mostly low frequencies. This will give an added dimension to orchestral music, since some instruments will seem to be located on one side, and others on the other. The overall effect bears some resemblance to true stereophonic sound, hence the term "pseudo-stereo".

The following additional use of the MODE switch should be noted: Any normally-phased stereo phono cartridge will play monophonic records successfully if its two "hot" terminals are tied together. Since both channels are tied together when the MODE switch is in the MONO position, monophonic records may be played in this way with a stereo pickup.

PHASE -

This is a two-position slide switch, providing for phase reversal of the left channel output.

SPEAKER PHASING: The two speakers should be connected to the amplifier so that they are "in phase" when the PHASE switch is in the NORM position. "In phase" means that both speaker cones move in the same direction at the same time. (If multi-speaker systems are used, phasing refers to the low-frequency woofers).

Speaker phasing can be easily determined in the following manner: Disconnect the tape head, if used, from the TAPE HEAD input jacks and depress the TAPE HEAD pushbutton. Advance the VOLUME control until a hum is heard in the speakers. If necessary, introduce

a hum in both channels by inserting and holding a screwdriver or piece of wire in one of the MONOPHONIC INPUT sockets, and depressing the corresponding pushbutton. Place the speakers side by side or, better, face to face. Find the position of the PHASE switch which gives the loudest hum. If this is the NORM position, the speakers are in phase when the switch is in the NORM position. If it is the REV position, reverse the wires to one of the speakers; then they will be in phase when the switch is in NORM position. The switch should normally be left in the NORM position. If you encounter stereo program material which seems to be out-of-phase, you can correct it by throwing the switch to REV. Correct phasing is definitely important for proper stereo reproduction.

CHANNEL REVERSE -

This is a two-position slide switch, permitting instant CHANNEL REVERSE. When the CHANNEL REVERSE switch is in the NORM position, the external stereo connections should be such that the left channel feeds the LEFT speaker (defined as the listener's left when facing the speakers) and the right channel the RIGHT speaker. Turning the CHANNEL REVERSE switch to the REV position reverses the two channels, with respect to the speakers. This switch position serves as a convenient corrective for stereo material which might be reversed. For example, many radio stations today broadcast stereo by means of FM transmission, but there is no set standard as to which is left and which is right. By means of the NORM and REV positions of the CHANNEL REVERSE switch, the channels may be instantly reversed, if the situation demands.

IN CASE OF DIFFICULTY

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorials as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice some-

thing consistently overlooked by the constructor.

2. It is interesting to note that about 90% of the kits that are returned for repair, do

**SCHEMATIC OF THE
HEATHKIT®
STEREO PREAMPLIFIER
MODEL AA-11**

NOTES:
ALL RESISTORS ARE 1/2 WATT UNLESS SPECIFIED OTHERWISE.
ALL CAPACITORS ARE IN µD UNLESS SPECIFIED OTHERWISE.
RETRY SWITCHES WIRED FROM THE REAR PANEL. VOL. LINE COM.
RESISTOR VALUES IN OHMS. R = 1000 Ω, MEG. = 100,000 Ω.
VOLTAGES MAY VARY 30% DUE TO TOLERANCE OF COMPONENTS.
VOLUME-LOADNESS SWITCH IN VOLUME POSITION.
ALL PUSHBUTTONS SHOWN IN UNDEPRESSED POSITION.

