

Pass Laboratories

Aleph Ono Owner's Manual

Introduction

The Aleph Ono is a high performance phono preamplifier for use with moving magnet and moving coil cartridges. It features extremely low noise and distortion, very high gain and output swing, variable cartridge loading, variable gain, and balanced output.

The Aleph Ono uses three stages of circuitry. An ultra-low noise non-inverting pre-preamplifier circuit is used to boost the low output of moving coil (MC) cartridges by a selectable 25 or 30 dB without equalization. This drives the primary non-inverting gain stage which also amplifies the high output of moving magnet (MM) cartridges, and provides RIAA equalization. Output of the primary gain stage is also applied to an inverting unity gain stage to provide the negative polarity for the balanced output.

The main gain stage uses low noise matched JFETs for the input circuit and power MOSFETs elsewhere in the gain path. Voltage gain devices are operated cascode mode, and the single-ended circuitry is biased by constant current sources.

The main gain stage uses a combination of active and passive equalization to achieve the RIAA characteristic. The active equalization works in the mid-band of the audio range and the passive equalization determines the characteristic and the highest and lowest frequencies. The stage has a fixed gain value of 40 dB at 1 KHz.

The pre-preamplifier circuit uses four matched ultra-low noise JFETs operated in parallel to provide an input random noise floor less than 500 picovolts (-186 dBV). The cascaded output of these JFETs drives another JFET to deliver a selectable 25 or 30 dB of un-equalized non-inverting gain. There is no feedback employed.

Cartridge loading of the Aleph Ono is very flexible. Moving Magnet cartridges can be loaded with capacitance from 0 to 650 pF in increments of about 100 pF. There is provision for two load positions for any additional value the user may choose to insert. Moving Coil cartridge loading ranges from 5 to 1000 ohms to 47 Kohms using eight switches with binary weighting and providing 256 different values.

The balanced and unbalanced output connections of the preamplifier have an output impedance of 150 ohms, which will drive a 1000 pF cable load flat to about 1 megahertz.

The Aleph Ono has a very accurate RIAA equalization characteristic, varying plus or minus 1/10 of a decibel from 20 to 20 KHz. This accuracy does not vary with gain or loading.

The preamplifier has extremely low noise. The curves accompanying show a Moving Magnet noise floor at more than -100 dB below a 10 millivolt input, which gives it an unweighted total noise of -90 dB. The Moving Coil noise floor is better than -90 dB referenced to 1 millivolt input, giving a -81 dB unweighted audio band noise figure.

The Aleph Ono is adjustable to very high gain, 76 dB @ 1 KHz, which makes it capable of delivering .5 V line level output with cartridges 80 microvolts output. This appears to be the best figure in the audio industry.

The preamplifier has very low distortion and very high output. Maximum harmonic distortion is less than .05% (1 KHz) at outputs of 20 volts RMS. or less. This figure holds for MM operation and highest gain MC.

The power supply of the Aleph Ono uses a shielded oversize toroidal transformer providing an unregulated 80 volts DC which is then passively RC filtered, then actively regulated without feedback to 60 volts, and then passively filtered again for each channel. The pre-preamplifier circuitry is additionally regulated.

The Aleph Ono was engineered through listening tests over a period of two years in competition with the most highly regarded phono stages on the market. Changes in the design were based solely on listening experience, and not on measurements.

Considering this, it is perhaps remarkable that the final product displays such spectacular objective qualities. However, we view the specifications as a secondary source of pride in this product.

The measurements only hint at the listening experience with the Aleph Ono. The sound is lush and smooth, with a wide sound stage, fine detail and layering, and a nice firm bottom. The preamplifier will allow you to renew your acquaintance with your vinyl collection and appreciate the essential character of the finest analog recordings.

The Aleph Ono is the work of Wayne Colburn. He supervises its construction, and personally tests and listens to each preamplifier. If you have questions, comments, or problems, please feel free to contact him or me directly.

Thank you for purchasing this preamplifier. It is my sincere hope that you will enjoy its sound as much as I do.

Nelson Pass

Serial # _____

Date: _____

Next page: Distortion curve of your particular preamplifier at 1 kHz from 1 to 30 volts output

Setup

The preamplifier has two sets of input connections, and two sets of output connections.

It also has an AC line power connection. The amplifier's voltage and current rating are indicated on the rear. It will be either 240 volts, 120 volts, or 100 volts. A .5 amp 3AG slow blow fuse is provided with 100-120 volt units, and a .25 amp slow blow fuse is provided with 220-240 volt units. The frequency rating of the power supply is 50 to 60 Hz. The preamplifier typically draws 20 watts during operation.

We have provided a standard AC power cord which fits into the line receptacle at the rear. The preamplifier is equipped for operation with an earth ground provided by the AC outlet. Do not defeat this ground. The chassis and circuit ground of the preamplifier is connected to earth through a power thermistor, which gives a ground connection but helps avoid ground loops.

The two sets of input connections on the rear are pairs of RCA connectors with right and left channels indicated. If your signal source is a low output moving coil cartridge, you will use the moving coil input. If your signal source is a high output moving magnet cartridge, you will use the moving magnet input. A ground post is provided for grounding the turntable.

The two sets of output connections on the rear are a pair of RCA connectors with right and left channels indicated. These connections provide a single ended output of the preamplifier. A pair of XLR connectors provides a balanced output connection. On these connectors, pin 1 is grounded, pin 2 is the positive signal output, and pin 3 is the negative signal output.

The output signal of the balanced connector is twice the level of the unbalanced circuitry, by the virtue of having the same amplitude signal plus its inverse.

The output impedance of the single ended output connection is 150 ohms. The output impedance of the balanced output connection is 150/150 ohms. This value is low enough to drive ten thousand picoFarads (10000 pF) of cable capacitance flat to 100 KHz.

Selection of input, adjustments for gain and cartridge loading are accomplished via switches on the interior of the Aleph Ono.

To change these settings, it is necessary to take the top off the preamp using a hex wrench.

It is very important to disconnect the AC line power before opening the preamp.

If you do not feel capable of safely adjusting the settings internally, please contact your dealer or the factory.

On the main board you will see a set of DIP switches which are used to alter the input connections.

Two switches, S1 and S1A, are used to select moving coil and moving magnet inputs. Positions 7 and 8 are labeled MC and MM. Select one only by depressing the switch toward the silk screened label, which is the ON position of the switch.

On these same switches, positions 1 through 3 are used to select the capacitive loading of the moving magnet cartridge input. You may select 100 pF, 200 pF, and 330 pF, or any combination of these values, which are additive, for a maximum of 630 pF, or no capacitance by simply leaving the switches in the off position. Two additional blank positions 4/CX and 5/RX are available for you to solder your own loading values onto the main board. Position 6 allows 1000 ohm loading of the moving magnet stage for use with some cartridges.

Switches S2 and S2A are used to adjust the resistive loading of the inputs for low output moving coil cartridges. Switch positions 1 through 8 will load the input from 10 ohms up to 1000 ohms in roughly binary steps. The switches and resistors are in parallel, so placing more than one switch in the "on" position loads the cartridge with the two resistor values in parallel. Placing all resistors "on" will give approximately 5 ohms loading.

The preamplifier is shipped with the moving coil stage enabled, with the higher gain setting (69 dB single ended, 75 dB balanced) and a 100 ohm input load. To obtain 4 dB lower gain, locate the jumper connectors for each channel next to the two large capacitors near the switches. With the jumpers in place, the moving coil gain is the lower value. There is a second set of jumpers on the board for additional gain adjustment of the MC stage. These are to the right of the first set of jumpers. Installing these decreases the gain 10dB. Either or both sets can be used together for -4, -10, or -14dB from max. The board is marked on the silk screen.

When you are done adjusting the input gain and loading, replace and tighten the cover before reconnecting the AC line power.

Product Philosophy and Design

For a long time there has been faith in the technical community that eventually some objective analysis would reconcile critical listener's subjective experience with laboratory measurement. Perhaps this will occur, but in the meantime, audiophiles largely reject bench specifications as an indicator of audio quality. This is appropriate. Appreciation of audio is a completely subjective human experience. We should no more let numbers define audio quality than we would let chemical analysis be the arbiter of fine wines. Measurements can provide a measure of insight, but are no substitute for human judgment.

As in art, classic audio components are the results of individual efforts and reflect a coherent underlying philosophy. They make a subjective and an objective statement of quality which is meant to be appreciated. It is essential that the circuitry of an audio component reflects a philosophy which addresses the subjective nature of its performance first and foremost.

Lacking an ability to completely characterize performance in an objective manner, we should take a step back from the resulting waveform and take into account the process by which it has been achieved. The history of what has been done to the music is important and must be considered a part of the result. Everything that has been done to the signal is embedded in it, however subtly.

Experience correlating what sounds good to knowledge of component design yields some general guidelines as to what will sound good and what will not:

- 1) Simplicity and a minimum number of components is a key element, and is well reflected in the quality of tube designs. The fewer pieces in series with the signal path, the better. This is often true even if adding just one more gain stage will improve the measured specs.
- 2) The characteristic of gain devices and their specific use is important. Individual variations in performance between like devices is important, as are differences in topological usage. All signal bearing devices contribute to the degradation, but there are some different characteristics that are worth attention. Low order nonlinearities are largely additive in quality, bringing false warmth and coloration, while abrupt high order nonlinearities are additive and subtractive, adding harshness while losing information.
- 3) Maximum intrinsic linearity is desired. This is the performance of the gain stages before feedback is applied. Experience suggests that feedback is a subtractive process; it removes information from the signal. In many older designs, poor intrinsic linearity has been corrected out by large application of feedback, resulting in loss of warmth, space, and detail.

A very important consideration in attempting to create an amplifier with a natural characteristic is the selection of the gain devices. A single ended Class A topology is appropriate, and we want a characteristic where the positive amplitude is very, very slightly greater than the negative. For a current gain device, that would mean gain that smoothly increases with current, and for a tube or field effect device a transconductance that smoothly increases with current.

Triodes, JFETs, and Mosfets share a useful characteristic: their transconductance tends to increase with current. Bipolar power devices have a slight gain increase until they hit about an amp or so, and then they decline at higher currents. In general the use of bipolar in a single ended Class A circuit is a poor fit.

Another performance advantage shared by Tubes and Fets is the high performance they deliver in simple Class A circuits. Bipolar designs on the market have between four and seven gain stages associated with the signal path, but with tubes and Mosfets good objective specifications are achievable with as few as one gain device in the signal path.

Regardless of the type of gain device, in systems where the utmost in natural reproduction is the goal, simple single ended Class A circuits are the topologies of choice.

The gain devices in the Aleph Ono were all selected for top performance in each part of the circuits. A quad of ultra low noise matched JFETS form the input stage, followed by power Mosfets for output devices.

Resistors are all precision RN55D or better. Film capacitors are used for all values below 10 uF, and bypassed low impedance/high bandwidth electrolytics are used for greater values.

The internal power supply for the Aleph Ono consists of a toroidal power transformer delivering an unregulated 85 volts which is actively regulated before feeding passive filtering powering the constant current sources which bias the gain stages. The power supply noise reaching the circuit is on the order of a microvolt, and is differentially rejected at the output in a balanced system. A total of 16 high performance power electrolytics are used to accomplish energy storage and passive filtering in the power supply.

The chassis of the Aleph Ono is made entirely of machined aluminum. We mill and engrave the chassis components from solid aluminum material on computer controlled vertical milling machines. No sheet metal is employed.

The Aleph Ono was designed by Wayne Colburn.

The Aleph Ono is warranted by Pass Laboratories to meet performance specifications for 3 years from date of manufacture. During that time, Pass Laboratories will provide free labor and parts at the manufacturing site. The warranty does not include damage due to misuse or abuse or modified products and also does not include consequential damage.

ALEPH ONO SPECIFICATIONS

Gain	40 dB @ 1 KHz (MM) 71 dB @ 1 KHz (MC) 76 dB @ 1 KHz (MC)
RIAA response	plus/minus .1 dB 20-20 KHz
Distortion	< .05 % THD @ 20 volts balanced @ 1 KHz
Maximum Output	20 volts rms.
Output Impedance	150/150 ohms
Input Impedance	47 Kohm 0-650 pF (MM) 5 ohm - 47 Kohm (MC)
Unweighted Noise	-90 dB ref. 10 mV input (MM) -81 dB ref. 1 mV input (MC)
Power consumption	20 watts
Dimensions	19 " W x 11.5 " D x 4 " H
Weight	35 lbs.

The logo for Pass Laboratories, featuring the word "PASS" in a bold, stylized, black font. The letters are thick and blocky, with a slight shadow effect.

Pass Laboratories
PO Box 219
24449 Foresthill Rd.
Foresthill CA 95631

tel (916) 367 3690
fax (916) 367 2193

web site: www.passlabs.com