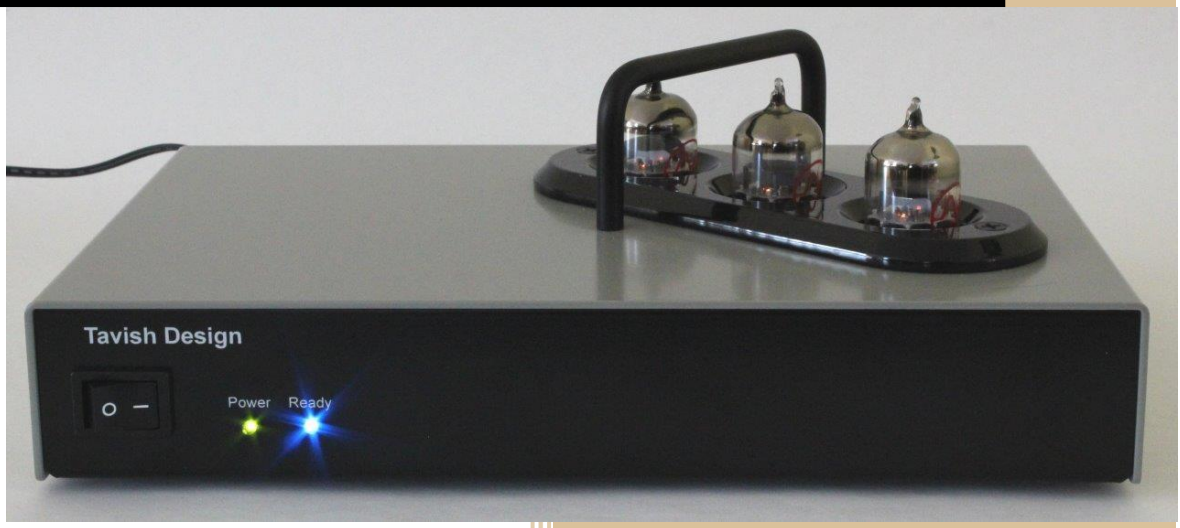
Classic Vacuum Tube Phono Stage (MM / MC)

Owner's Manual (Assembled)



TAVISH DESIGN, LLC

Made in U.S.A.

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1 INTRODUCTION AND QUICK START

Thanks for buying the Classic Phono Stage!

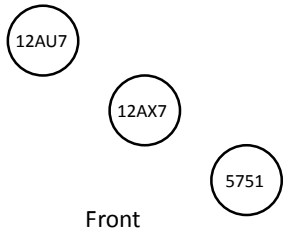
Tavish Design's Classic Vacuum-Tube Phono Stage is a passively-equalized, two-gain-stage design whose basic circuit topology has remained popular for more than 55 years. The reason for its endurance is simple: with appropriate updates, it is very difficult to beat without going to elaborate multi-tube circuits. In fact, this simple phono stage outperforms many (if not most) high-end products.

Vacuum tubes present some unique safety considerations, so please take time to look over the safety considerations in Section 2.

Feel free to contact Tavish Design if you have any questions (info@tavishdesign.com).

Quick Start

1. Install the tubes. See Section 3 if you haven't done this before.



2. Connect your turntable to either the Moving Magnet (MM) or Moving Coil (MC) input and set the rear panel toggle switch to the corresponding position. Default settings for the Classic Phono Stage should work well with most MM and low-output MC cartridges. You can customize cartridge loading, see Section 3.

   If you have a high-output MC cartridge, the MM input is probably the best one to use, but it depends on your cartridge output level, and you may want to adjust the internal cartridge loading and gain settings. See Section 3.

   Be sure to connect the ground post on the back of the phono stage to the ground post on your turntable.

3. The phono stage takes 30 – 40 seconds to warm up, as indicated by the blue "Ready" LED on the front panel. The phono stage will not pass signal until then.

   Turn down your volume control the first time you play an LP, until you are familiar with the appropriate volume setting.

2 SAFETY

1. **To avoid the risk of electric shock, do not operate the amplifier without the top cover in place. This amplifier uses high voltages internally which could cause an electrical shock, possibly resulting in injury or death. Lethal voltages can remain in the electronics after the unit is unplugged.** Refer servicing to Tavish Design, LLC. If the unit must be opened for servicing, unplug it and wait at least 10 minutes for internal capacitors to discharge.

2. **Do not operate the amplifier without the vacuum tubes in place.** Removal of the vacuum tubes exposes internal circuity to contact and presents a shock hazard. This hazard is similar to removing a light bulb from its socket.

3. **Do not allow liquids (such as from a spilled drink or flower vase) to run into the amplifier**, as this can damage the amplifier or create an electric shock hazard. Do not operate outdoors or in wet areas. Do not allow rain to enter the amplifier (by placing the unit next to an open window, for instance).

4. **A broken or improperly seated vacuum tube can cause electric shock.** Do not operate the amplifier if any vacuum tubes have broken glass shells. Align the tubes if any are leaning or not fully seated, prior to operating the amplifier. Vacuum tubes get hot, so allow them to cool before handling.

5. **To avoid electric shock, do not insert thin metal objects between the vacuum tubes and the cover, or allow children to do so.** A metal object inserted into the amplifier could possibly contact high voltages present internally. This hazard is similar to that of sticking a pin or thin screwdriver into an electrical outlet.

6. **Keep out of reach of children.** A high shelf or table is better than a low one, if children are present.

3 SETUP

3.1 INITIAL SETUP

Setup consists of installing the tubes (if needed), selecting the Moving Magnet (MM) or Moving Coil (MC) input, and setting the cartridge loading and MC gain (if needed). The factory settings for these should work well with most MM cartridges, and with low-output MC cartridges, so you might not need to adjust anything.

Installing the Tubes

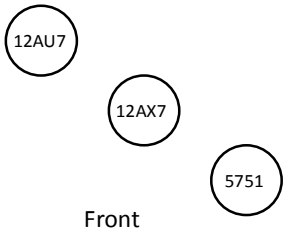


Fig. 3.1: Tube positions.

Note the tube positions above. To install the tubes, carefully align the tube pins with the socket and push down, gently rocking the tube slightly from side-to-side to ease the pins into the socket. Never twist or force the tube; the glass shell is easy to break if the pins are bent.

Moving Magnet or Moving Coil Input

MM cartridges connect to the MM input (obviously), and low-output MC cartridges connect to the MC input.

In general, we recommend that high-output MC cartridges with an output >2 mV be connected to the MM input. We recommend that high-output MC cartridges with outputs <2 mV be connected to the MC input, with low gain setting, as described below. However, almost all high-output MC cartridges can also connect to the MM input if you prefer (and if there is enough gain for your system).

The MM or MC input is selected with SW1 on the back. To avoid a loud transient, turn the volume control on your amplifier to minimum before adjusting the position of SW1 or connecting or disconnecting cables. Be sure to connect the ground post on the back of the phono stage to the ground post on your turntable.

Cartridge Loading and Moving Coil Gain

Cartridge loading and the MC gain setting are set with internal DIP switches. The factory settings for these should work well with most MM cartridges, and with low-output MC cartridges. To select other settings, unplug the unit and wait 10 minutes for the internal capacitors to discharge. Remove the cover by removing 4 screws. Note the positions of DIP switches S1 – S3 as shown in Fig. 3.2 below. The tables 3.1 to 3.3 below show the switch positions to select other MC gain and cartridge load settings. Table 3.4 gives suggested settings for some popular cartridges. These are only a starting point. Follow your cartridge manufacturer's recommendations, or select the loading to suit your preference. In selecting the capacitive load for a MM cartridge, note that the cables connecting your turntable to the phono stage have approximately 30 – 35 pF per foot, so a 3 foot cable contributes 100 pF of capacitance to cartridge loading.

Replace the cover after setting the cartridge loading and gain switches. To avoid a risk of electric shock, never operate the unit with the cover removed.

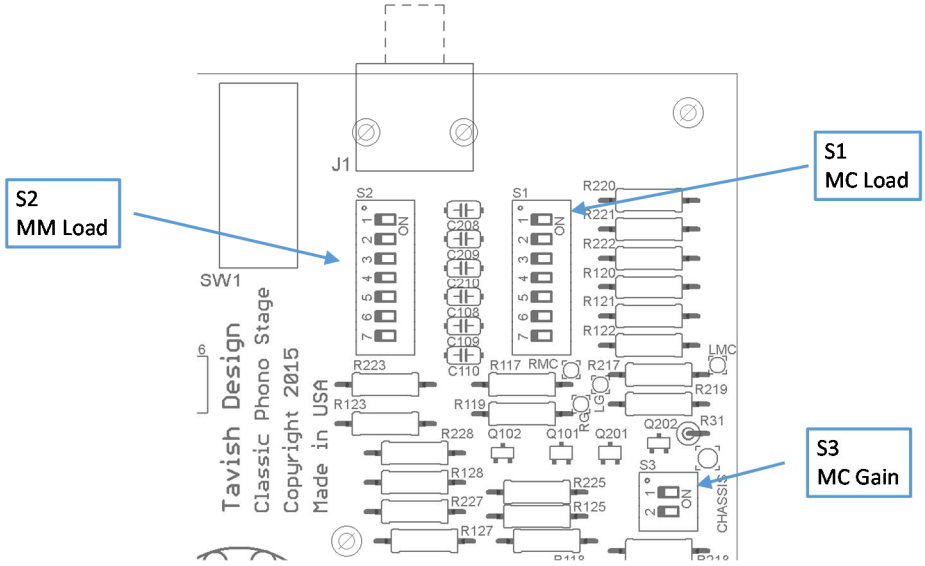


Fig. 3.2: Switch positions for setting MC Gain (S3), MM load (S2), and MC load (S1). For each switch, LEFT = OFF = 0, and RIGHT = ON = 1.

MC Gain Setting (S3)	**S3 Positions (1 – 2) OFF = 0, ON = 1**
High (61 dB)	00 Factory Default
Low (53 dB)	11

Table 3.1: MC Gain Settings.

MM Load Setting (S2)	S2 Positions (1 – 7) OFF = 0, ON = 1
No added capacitance	0001000
47 pF	1001100 Factory Default
100 pF	0101010
147 pF	1101110
180 pF	0011001
227 pF	1011101
280 pF	0111011
327 pF	1111111

Table 3.2: MM Load Settings.

MC Load Setting (S1)	S1 Positions (1 – 7) OFF = 0, ON = 1
47.5 kΩ	0001000
1 kΩ	0011001 Factory Setting
330 Ω	0101010
250 Ω	0111011
100 Ω	1001100
91 Ω	1011101
77 Ω	1101110
71 Ω	1111111

Table 3.3: MC Load Settings.

Cartridge Type	Example	Reference Output	Input	MC Gain Setting (S3: 1 – 2)	MM Load (S2: 1 – 7)	MC Load (S1: 1 – 7)
MM	AT95e	3.5 mV	MM	N/A	47 pF 1001100	N/A
MM	Ortofon 2M	5.5 mV	MM	N/A	47 pF 1001100	N/A
Low-Output MC	Denon DL103	0.35 mV	MC	High (00)	N/A	1 kΩ 0011001
Low-Output MC	Ortofon Quintet Red	0.5 mV	MC	High (00)	N/A	330 Ω 0101010
Hi-Output MC	Denon DL110	1.6 mV	MC	Low (11)	N/A	47.5 kΩ 0001000
Hi-Output MC	Sumiko Blue Point	2.5 mV	MM	N/A	No added C 0001000	N/A

Table 3.4: Suggested settings for popular cartridges. Note that the first three rows use the factory default settings.

3.2 Operation

If you removed the cover to adjust to set the cartridge loading and gain switches, you must replace it before operating the unit. To avoid a risk of electric shock, never operate the unit with the cover removed.

When the unit is switched on, it goes through a 40 second warmup sequence before the blue “ready” LED turns on. The phono stage will not pass signal until the blue “ready” LED is on. Before playing an LP, turn down the volume control on your amplifier until you are familiar with the required gain setting.

3.3 Tube Replacement and Substitution

Vacuum tubes last much longer than most people realize, and although the lifetime of any particular tube is impossible to predict, hopefully it should be many years before any tube replacement is necessary. Replace tubes with the same type. That is, replace the 12AU7A/ECC82 only with another 12AU7A/ECC82, not with another type. The only exception is the 5751, which can be replaced with a 12AX7A/ECC83 if you can’t find a 5751, or if you prefer the 12AX7.

The JJ 5751 tube usually supplied with the kit appears to have the same 300 mA heater current rating as a 12AX7 tube, but some 5751 tubes have a 350 mA heater. SW2 provides some adjustment range to accommodate this variability, as shown in Fig. 3.3 below.

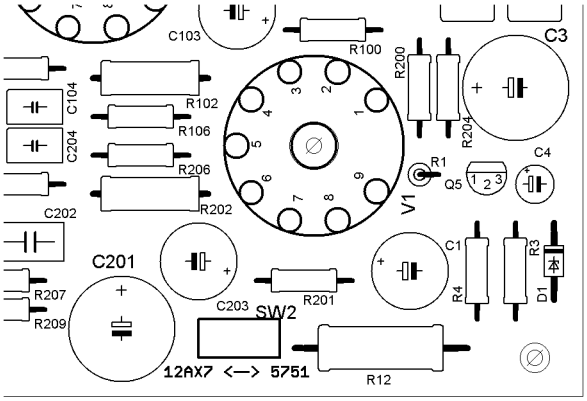


Fig. 3.3: Position of switch SW2. Left for 12AX7 (factory setting), right for some types of 5751.

The unit is supplied with JJ Electronics tubes, but tubes of other manufacturers are also OK. It is very unlikely that you will find a tube with lower noise than the JJ 5751 (if you do, please let us know). New, old-stock (NOS) tubes tend to be noisier. The noise levels in the electronics are well below the surface noise on vinyl LPs, so you may wish to choose the input tube by other criteria as well.

4 TECHNICAL INFORMATION

Parameter	Specification
Gain	41 dB Moving Magnet 53 dB High-Output Moving Coil 61 dB Low-Output Moving Coil
RIAA Equalization Accuracy	±0.5 dB, 30 Hz – 20 kHz
Signal-to-noise ratio (A-weighted)	>79 dBA ref. 5 mV @ 1kHz, Moving Magnet >79 dBA ref. 1.25 mV @ 1kHz, High-Output Moving Coil >76 dBA ref. 0.5 mV @ 1kHz, Low-Output Moving Coil
Reference Output Level	560 mV RMS (-2.8 dBu)
Total Harmonic Distortion	<0.02% at reference output level into 22 kΩ, 1 kHz
Output Overload (defined as 1% THD level)	>19 V RMS into 10 kΩ at 1 kHz (31dB overload margin)
Input Impedance, Moving Magnet	47.5 kΩ in parallel with fixed capacitance of approximately 35pF and adjustable capacitance of: 0pF, 47pF, 100pF, 147pF, 180pF, 227pF, 280pF, or 327pF
Input Impedance, Moving Coil	Adjustable: 47.5 kΩ, 1 kΩ, 330 Ω, 250 Ω, 100 Ω, 91 Ω, 77Ω, or 71 Ω
Output Impedance	<850 Ω at 1 kHz
Suggested Load Impedance	≥10 kΩ ≤1800 pF (up to 60 feet of coaxial cable)
Power	18 W, 120 VAC, 60 Hz
Size	9” wide x 6” deep x 1.5” high (3” high to top of tube guard)
Weight	3.5 pounds (6 pounds shipping weight)

Table 4.1: Phono stage performance. Measurements are taken with JJ 5751, JJ ECC83S, and JJ ECC82 tubes, as supplied.

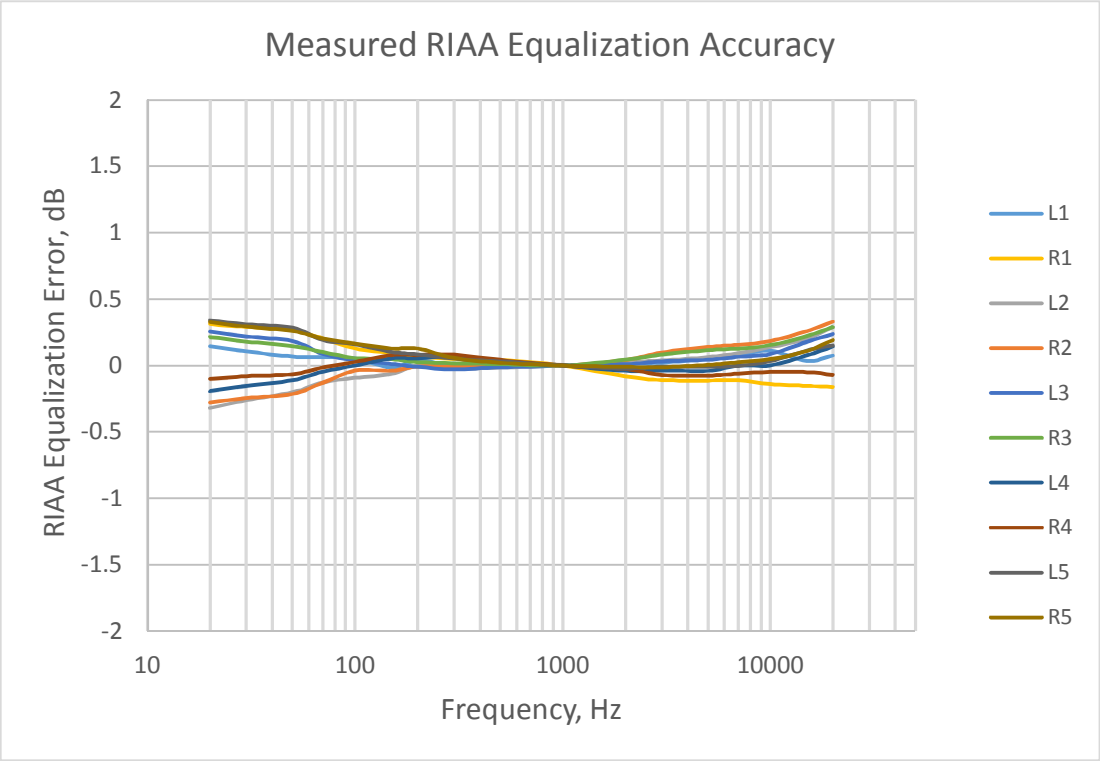


Fig. 4.1: Measured RIAA equalization error for 5 units with 5 sets of JJ tubes, left and right channels. Error is <0.5 dB from 30 Hz – 20 kHz for all curves.

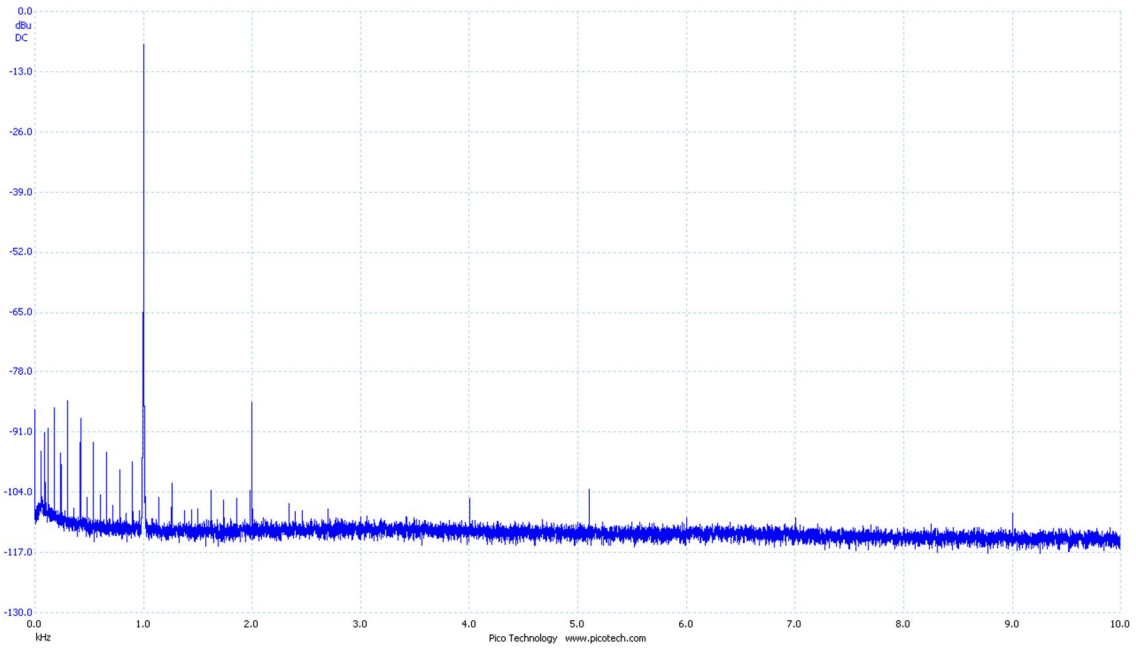


Fig. 4.2: Distortion spectrum, approximately 400 mV RMS output level at 1 kHz into 22 kΩ. This is 0.012% THD.

5 WARRANTY AND SERVICE

5.1 WARRANTY

With the exception of tubes, Tavish Design, LLC (hereinafter "Tavish Design") warrants to the consumer this product to be free of defects in materials or workmanship for a period of six (6) years from the date of purchase (6 months on tubes). If you discover a defect, Tavish Design will (at its option) repair or replace the product at no cost to you (excluding return shipping and handling outside the 48 continental United States) provided that you send it prepaid to Tavish Design (see Section 5.2).

Proof of purchase in the form of a dated bill of sale which indicates that the product is within the warranty period may be required to obtain warranty service, if the date of sale is not in our records.

In the case of units purchased as a kit, the warranty only covers the components supplied and does not cover incorrect assembly or components damaged during assembly. Tavish Design cannot warrant your assembly of the product.

This warranty does not cover cosmetic damage or any damage that results from product misuse, product abuse, installation error, connection to an incorrect voltage supply, accident, improper maintenance, alterations, modifications not authorized in writing by Tavish Design, lightening, power surges, or acts of God. Use of parts not obtained from Tavish Design may void this warranty.

This warranty is limited to the replacement or repair of this product and not to damage to equipment of other manufacturers. Any applicable implied warranties, including warranty of merchantability, are limited in duration to a period of the express warranty as provided herein beginning with the original date of purchase and no warranties, whether express or implied shall apply to the product thereafter. Under no circumstances shall Tavish Design be liable for any loss, direct, indirect, incidental, special, or consequential damage arising out of or in connection with the use of this product.

This warranty does not cover the cost of parts and labor which would be otherwise provided without charge under this warranty, obtained from any source other than Tavish Design.

This warranty applies only to the consumer use of this product. The product is not warranted for use in public address, sound reinforcement, in any trade or business, or in an industrial or commercial application.

The warranty applies only to the original owner and is not transferrable.

This warranty is only valid in the United States of America. Units shipped outside the United States must be returned to Tavish Design for warranty service.

5.2 SERVICE

Please contact Tavish Design for service (in or out of warranty) if you believe your amplifier needs repair. Most technical issues can be resolved by email or phone. If your unit does require repair, we'll issue a return merchandise authorization (RMA) number, along with packing and shipping instructions and a street address for delivery.

For kits, Tavish Design offers a repair service in the event you are unable to get your kit working. Please contact us for more details.

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