Music Reference RM-200 MK-I and MK-II

100-Watts Per Channel Stereo Power Amplifier

Owner's manual

2010

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LINEAGE

The RM200MkI/MkII evolved from Music Reference's classic RM9, the RM10, and the state-of-the-art Music Reference RM9 Special Edition. The RM200MkI/MkII achieves a news standard for musicality in stereo amplification. Using only a single matched pair of KT88 of 6550 output tubes per channel, the RM200MkI/MkII easily achieves 100 watts per channel.

Let's take a few moments to learn what the RM200MkI/MkII achieves relative to a typical 100 watts per channel stereo tube amplifier in terms of *True Music Power™:*

Amplifier	***8-Ohm Load***	***4-Ohm Load***	***2-Ohm Load***
RM200MkI/MkII	**112 Watts**	**145 Watts**	**125 Watts**
Typical Tube Amplifier	**100 Watts**	**65 Watts**	**40 Watts**

These specifications are all gained with the speakers connected to the 8-Ohm tap, and represent the amplifier's True Music Power™, not simply the typical RMS rating…

INSTALLING THE TUBES AND SETTING-UP YOUR RM200MkI/MkII

Please remove the tube set from the accessory box found with your RM200MkI/MkII. Note the "'V' Number" marked on each tube. With your RM200MkI/MkII **turned-off** and **unplugged**, please insert each tube into its corresponding position/socket as marked on your RM200MkI/MkII's top plate.

Please note your RM200MkII has two 70-Amp rated "high in-rush" power switches for long switch life. One power switch is marked "Master/Forming," and the other is marked "Play." Please make sure both power switches are in the "off" position.

Select a location for your RM200MkI/MkII that provides at least 2-feet of free air space above your RM200MkI/MkII to allow for adequate ventilation of your RM200MkI/MkII. DO NOT place your RM200MkI/MkII directly on a carpeted surface.

CONNECTIONS

Plug your RM200MkI/MkII into a 3-prong wall socket. If any other units in your system have ground pins, we recommend you "float" the grounds of all your other units with an adapter or "cheater-plug." However, we recommend that you always ground your RM200MkI/MkII.

We find that the lowest hum is achieved in most systems when *only* the power amplifier is grounded, as your power amplifier is the least sensitive component, and has the largest ground current. You may also wish to defeat polarized 2-prong plugs in your other components t allow you to reverse the plugs for the lowest noise and best sound. You should do this systematically with your power amplifier first, followed by your preamplifier,

and each of your sources to determine the configuration for each component is your system. Do not expect large differences in the change of hum…

Connect the **INPUT** to the LEFT and RIGHT XLR connectors located behind your RM200MkI/MkII's transformer cover. Should you be using your RM200MkI/MkII with a preamplifier or other source that lacks balanced (XLR) inputs, then please use an RCA-to-XLR adaptor or re-terminate your interconnects with XLR plugs. In accordance with industry standard, Music Reference defines **XLR Pin No. 2 as HOT**.

Connect your speaker cables to the brass binding posts located behind your RM200MkI/MkII's transformer cover. Note the "Impedance" markings adjacent to each speaker binding post. Since your RM200MkI/MkII is a fully balanced amplifier from input to output, you will notice the 4-Ohm and 8-Ohm speaker outputs/binding posts are not ground referenced. For these two impedances, the speakers are connected to the "+" and the "-" terminals of the appropriate impedance.

Additionally, 2-Ohm and 1-Ohm speaker taps are provided. These quite low speaker impedance taps can be very useful for loudspeakers that exhibit very low or unruly impedances. Feel free to experiment with different impedance connections.

"LIGHT LOADING" YOUR RM200MkI/MkII

You may always connect an 8-Ohm speaker on your RM200MkI/MkII's 4-Ohm speaker tap, however, not the other way around. Your RM200MkI/MkII amplifier actually appreciates the "lighter load," and the tubes will last longer. As long as your system will play loud enough without clipping, then "light loading" your RM200MkI/MkII is preferable. Your RM200mkI/MkII amplifier will also have higher damping (woofer control) and lower distortion.

Always use the same impedance value for your right and left channel.

TUBES

Your RM200MkI/MkII is factory-equipped with 2-each 6BQ7 driver tubes, and 2-each matched pairs of KT88 or 6550 output tubes. Each of these tubes has been specially tested and selected for your RM200MkI/MkII by RAM Labs (www.tubeaudiostore.com) using specially developed testing and matching procedures that allow you to operate your output tubes at a higher bias resulting in lower distortion!

Please record the serial number, **Bias**, and Transconductance (**Gm**) of each tube (marked on the label of each tube box) on in the corresponding position on the Tube Seating Chart located at the end of this owner's manual. Please refer to these Bias and Transconductance (Gm) values when ordering replacement tubes from your dealer or RAM Labs (www.tubeaudiostore.com). **Please keep this manual with your most valued documents**. It will be very important should you ever need replacement tubes.

OUPUT TUBES

The output tubes of your RM200MkI/MkII are set up as matched pairs by RAM Labs (www.tubeaudiostore.com) for optimum performance when working in push-pull. The two pairs are matched by RAM Labs (www.tubeaudiostore.com) to **less than 10%** variation in bias and transconductance (Gm). Both output tubes in each pair will then share the workload equally. They will also track evenly as they age and dissipate. For optimum performance, always use RAM Labs matched output tubes as other vendors only match for either bias or transconductance, but not both. They also may not test their tubes at the correct operating values for your RM200MkI/MkII.

BIASING THE OUTPUT TUBES

Your RM200MkI/MkII was fully adjusted and calibrated at our factory. No further adjustments are necessary.

However, we **highly recommend** checking the bias of your RM200MkI/MkII's output tubes every few months (**check tube bias at least twice-a-year**).

This is a simple procedure that requires the use of a voltmeter.

Output Tube Bias Values for your RM200MkI/MkII		
Tube Types tested and matched by **RAM Labs**	mV (**Recommended**)	mV (**Maximum**)
Genalex KT88 Gold Lions	40	44
RAM KT88	38	42
Shuguang (Chinese) KT88	35	38
6550 WE	38	42
6550 =C=	38	42
Tube Types tested by Others	mV (**Recommended**)	mV (**Maximum**)
Genalex KT88 Gold Lions	35	38
Sovtek KT88	31	35
Electro Harmonix (EH) KT88	31	35
Shuguang (Chinese) KT88	21	27
6550 WE	31	35
6550 =C=	31	35

STEP-BY-STEP OUTPUT TUBE BIASING PROCEDURE

RM200MkI/MkII Tube Biasing instructions (written for 4-Ohm speaker tap use):

1. Adjust your voltmeter to read DC volts, 200 milli-Volt range.

2. Turn on your RM200MkI/MkII amplifier and allow your RM200MkI/MkII to fully warm-up (approximately 15-minutes).

Please note your RM200MkII has two 70-Amp rated “high in-rush” power switches for long switch life. One power switch is marked “Master/Forming,” and the other is marked “Play.” Please press the “Master/Forming” power switch to the “on” position first. Then, press the “Play” power switch to the “on” position, and allow your RM200MkII to fully warm-up (approximately 15-minutes).

3. To test one channel, please insert the "red"/"positive" (+) probe into the test point (marked "TP+") closest to the tube to be tested (say "V6"), and place the "black"/"negative" (-) probe on the (-) 4-Ohm binding post that is connected to your speaker cable and is closest to the test point ("TP+")/tube you are testing (say "V6"). Please make sure your probes are making firm contact...

4. Note the Bias Reading of the tube you are testing (say "V6"). (Bias reading should be between the “**Recommended**” mV and “**Maximum**” mV Bias Values listed in the table above for your RM200MkI/MkII).

5. Then, test the other tube in that same channel (say "V4"), by inserting the "red"/"positive" (+) probe into the test point (marked "TP+") closest to the tube to be tested (say "V4"), and place the "black"/"negative" (-) probe on the (+) 4-Ohm binding post that is connected to your speaker cable and is closest to the test point/tube you are testing (say "V4)."

6. Note the Bias Reading of the tube you are testing (say "V4"). (Bias reading should be between “**Recommended**” mV and “**Maximum**” mV Bias Values listed in the table above for your RM200MkI/MkII).

7. Please average the two Bias Readings for one channel, and note the "Averaged Bias Reading" for that channel.

For example, let's assume the Bias Reading for "V6" reads "38mV," and the Bias Reading for tube "V4" reads "36mV." Then, the "Averaged Bias Reading" would be "37mV."

8. Use a fine flat-head adjustment screwdriver (we recommend a 2.5mm by 55mm screwdriver) to adjust the Bias of your RM200MkI/MkII so each tube is set to your desired Bias setting/reading.

For example, let's assume you wish to set the "Average Bias" of your RM200MkI/MkII at "35mV." And, let's assume the Bias Reading for "V6" reads "38mV," the Bias Reading for "V4" reads "36mV," and therefore, the "Average Bias Reading" for the right channel is "37mV."

To reduce the "Average Bias Reading" from "37mV" to "35mV," please adjust the right channel Bias pot (ie. "V4," and "V6" output tubes) so that together, both tubes average "35mV" (ie. set "V6" to read "36mV" and set "V4" to read "34mV").

9. Repeat thee procedures for your left channel (ie. "V5" and "V3" tubes).

10. Roger A. Modjeski recommends setting the Bias of your RM200MkI/MkII amplifier closer to "**Recommended**" mV values shown in the table above as this will result in a slower tube dissipation rate (ie. your output tubes will have longer life)...Our experience shows that the tube life is 5000-10,000 hours at this bias setting…However, your RM200MkI/MkII amplifier will produce lower distortion with a Bias setting closer to "**Maximum**" mV values shown in the table above.

"CAPACITOR FORMING CIRCUIT" FOR RM200MKII

Your RM200MkII includes the industry's first "capacitor forming circuit" for a tube amplifier. This unique circuit allows charging the capacitors in your RM200MkII without energizing your Rm200MkII's tubes to maximize the musical performance of your RM200MkII without prematurely dissipating your tubes to extend their tube life.

EMPLOYING RM200MkII's "CAPACITOR FORMING CIRCUIT"

Your RM200MkII employs two 70-Amp rated "high in-rush" power switches for long switch life. One power switch is marked "Master/Forming," and the other is marked "Play."

Please press the "Master/Forming" power switch to the "on" position first. The "Master/Forming" switch in the "on" position charges the capacitors in your RM200MkII at a higher than normal operating voltage to assure your RM200MkII is always "ready-to-play" at maximum musical performance.

When you are ready to play your RM200MkII, then please press the "Play" power switch to the "on" position. The "Play" switch in the "on" position reduces the voltage in your RM200MkII to the normal operating voltage, and energizes the tubes in your RM200MkII. Your RM200MkII is ready for "active listening" after a brief tube warm–up period (approximately 15-minutes).

ADJUSTMENTS, FUSES, TUBE CONSIDERATIONS AND LIFE

CHECKING BIAS

We have designed your RM200MkI/MkII to make tube biasing simple using a voltmeter. The test points are accessible from the top of your RM200MkI/MkII so you don't have to remove anything. You may check the bias as often as you like, and we recommend you **check your RM200MkI/MkII's tube bias at least twice-a-year**. We do not recommend leaving the meter connected permanently as there is a small risk of damaging

an analog meter if a tube shorts or flashes. We suggest a using a digital voltmeter as most digital voltmeters have excellent protection.

FUSES

The fuses for your RM200MkI/MkII have been carefully specified.

The output tube fuses are ceramic, 5 X 20 mm, 250 mA, *slow blow,* ***high-interrupting*** (interrupt rating: 1500A@250VAC). Please note that typical fuses have a much lower interrupt rating of 35A@250VAC, and are not suitable for your RM200MkII.

The mains fuse is 5 x 20 mm standard slow blow, 5.0 Amp (for 120 volt) or 2.5 Amp (for 240 Volt).

For your protection and safety, always replace with identical or comparable fuses. **DO NOT SUBSTITUTE!** Using a different fuse will void your warranty. You may order additional fuses from RAM Labs/Music Reference (www.tubeaudiostore.com) or your dealer.

WARNING: Do not use “Tuning Fuses”, “IsoClean”, “Furutech” or any of the high-end fuses as they have already shown that they are unable to protect the tubes and output transformers. The people making them know nothing about **high-interrupting** fuses (interrupt rating: 1500A@250VAC). Roger A. Modjeski was told by one distributor that their *ceramic* fuse was equivalent to our high-interrupting *ceramic* fuse because they were both *ceramic*. This is clearly not factual.

TUBES

The six tubes in your RM-200MkI/MkII have been carefully selected by RAM Labs for best performance. The operating parameters have also been selected to achieve long life and reliable operation. We suggest replacing with RAM Labs tubes when that time comes.

You may notice a bright flash from the bases of V1 and V2 on turn-on. This is perfectly normal and does not shorten the life of the tube in any way. The flash is due to the fact that the filaments are coated to insulate them from the cathode sleeve. In the process of connecting the tungsten wires to their pins, the coating has been removed. This uncoated portion has less thermal mass and thus heats quickly, causing the flash. The input tubes are rated for 10,000 hours and 10,000 turn-on cycles. Therefore, it is perfectly OK to turn the amplifier off and on again if you are not listening for an hour or more. Although there is a common myth that tubes do not like to be cycled, I have found it to be without foundation. Filament failures in well-made tubes are so rare, I can't remember when I last saw one.

You may notice some hum from your speakers if your hand or an AC cord is placed near V1 or V2. This is normal as the tube is unshielded. If you notice crackling noises, try cleaning the pins of V1 and V2 with a small brass wire brush and *lightly* coat the pins with DeoxIT, use sparingly.

SYSTEM NOISE

If you have hum, leave the RM200MkI/MkII grounded and float all the other ground pins on your other power cords. Those units will now be grounded to the wall through their interconnects and the hum will be far lower.

To ensure quietest performance, we suggest that your RM200MkI/MkII be properly grounded, and that your RM200MkI/MkII have a distance of at least one-foot between any electrical appliance (ie. Preamplifier, TV monitor, power filter, another amplifier). Start with only having your RM200MkI/MkII grounded in your system. If you are using two amplifiers in your system (mono-blocking or bi-amping), then float the ground on one of the amplifiers using a non-polarized 3-prong to 2-prong adapter ("cheater" plug). Sometimes reversing a 2-prong plug will lower hum or improve sound. Experiment with each component in your system to find which combination works best for you. The differences may be subtle or not appear at all…

Remember to dress the cables away from your RM200MkI/MkII's transformers, and any other source of magnetic fields. If you are still getting hum, check the placement of each of your components. Are they stacked on top of each other so that the input section of your preamplifier is directly beneath the power supply of your Digital-Audio-Converter (DAC) or other source? You want to isolate each component as much as conveniently possible.

Often, an FM tuner connected to the Cable TV system or outside antenna will cause hum in the entire system due to AC pickup in the coaxial cable coming in. Always disconnect the tuner audio cables or antenna cable to test for this hum, as it will affect other sources. This insidious problem can be corrected by installing a "75Ω to 75Ω" isolation transformer that breaks the ground.

At Music Reference, we recommend keeping interconnects short in length, and having longer runs of speaker cable. Interconnect impedance should be no more than 20ρF per running foot, or 200ρF total. You may use any type of interconnect you desire. However, we do recommend using shielded interconnects especially if the run between your preamplifier and your amplifier is a long one…

TUBE NOISE

Your RM200MkI/MkII uses specially selected input tubes that are quiet and stable. Tube noise would be evidenced when sputtering, hissing, spitting, or high frequency ringing sounds are audible in one channel. To determine the faulty driver tube, listen to your amplifier to assess what channel emits the tube noise. Then, turn off your amplifier and exchange the driver tubes left-to-right. Turn your amplifier back on, allow the tubes to warm up, and check the bias on both channels. If the offending sound has moved to the other channel, then you know it is time to replace that faulty driver tube. If the sound did not change channels, then turn your amplifier off, allow the tubes to cool, put the tubes back in their original positions, and contact your dealer or Music Reference for further assistance.

TROUBLE SHOOTING

While it is highly unlikely that you run into all, if any, of these situations, the following are some test procedures that you should run in the event that your RM200MkI/MkII appears to misbehave (the vast majority of problems encountered are attributed to noisy tubes and improper component placement or grounding):

DISTORTION

Output tube distortion usually results from one or more of the output tubes becoming gassy (having grid leakage). A gassy tube will cause the **BIAS** to change from the time you turn-on your RM200MkI/MkII through the first hours or so of operation. A gassy tube draws extra current when it gets hot and will run even hotter as a consequence. You may feel the extra thermal heat from the output tube by holding your hand beside the bad (gassy) tube. **NEVER TOUCH A TUBE'S GLASS ENEVLOPE WHILE THE AMPLIFIER IS OPERATING OR IMMEDIATELY UPON TURN-OFF! SEVERE BURNS WILL RESULT!** Darken the room and look for a part of the gray PLATE area of the tube GLOWING RED. A gassy tube will also blow fuses when the amplifier is driven hard for long periods. It is necessary to replace the bad (gassy) tube out of your amplifier, or you will cause slow damage to the other tube in that pair.

Through our research and published speaker test date, we have found speakers whose impedance drops markedly below the values stated by the manufacturer. When played hard for long periods of time, this drop in impedance below the stated value causes overheating of output tubes and premature gassiness.

We highly recommend using the lowest impedance speaker tap that you can without experiencing clipping at your listening level. Quite often, a speaker will play louder and cleaner on the lower impedance speaker tap.

BLOWN FUSES

There are two different types of fuses used in your RM200MkI/MkII: 250mA Slow Blow, High Interrupting (interrupt rating: 1500A@250VAC) ceramic output tube fuses; and a 5Amp Slow Blow power supply fuse (2.5Amp Slow Blow for 240V mains).

The 250mA Slow Blow, High Interrupting (interrupt rating: 1500A@250VAC) output tube fuse is in series with that cathode of each output tube. One tube fuse will blow if you have a lint short, a gassy tube, or a power surge. You may or may not see a flash in the tube at fault when this occurs…If the fuse blows, then there will be a drop in power on that side, but sound will still be present. We suggest replacing the 250mA Slow Blow, High Interrupting tube fuse at least two times before giving up on that tube.

The easiest way to find out if the 250 mA tube fuse is blown is to check the bias. If the tube fuse is blown, then there will be zero-mV or just a few mV reading. The tubes will still light because the tube fuse is only for the high voltage and not the heaters.

To replace the blown tube fuse, turn your amplifier off, replace the 250mA Slow Blow, High Interrupting tube fuse, rap the output tube with a pencil, and turn your amplifier back on, again. If the tube fuse blows immediately, then the tube has a short and needs to be replaced.

As your amplifier plays for the first couple of hours, check the amount of heat coming off of the faulty tube by holding your hand approximately 1" away from the tube, and comparing the heat generated from that tube and the others. Also, watch the plate structure of the tube to see if there is any change in color from gray to red. Signs of excessive heat, or a glowing plate structure means that the faulty tube is gassy and should be replaced. Since the output tubes are in parallel, one gassy tube will cause its partner to get hot also. If after two hours there are no other instances of blown tube fuses, then sit back, relax, and enjoy your RM200MkI/MkII.

If the main fuse blows the tubes will not light and the amp will act like it is off or unplugged. If one pair or two pairs of output tubes do not light but the drivers do the problem is an open filament, bad tube socket or broken wire beneath the socket. The filaments of the output tubes are series connected so both must be good to light. The drivers are parallel connected and light independently.

Visit our home page to learn about the design philosophy of the RM-200MkI/MkII:

http://www.ramlabs-musicreference.com/rm200.html

A brief autobiography of the designer is located at:

http://www.ramlabs-musicreference.com/bio.html

or simply go to our website www.ramlabs-musicreference.com and look under "Articles by Roger A. Modjeski" in the center of the bottom of our home page.

If you need assistance, then please send an email message to us at roger@ramlabs-musicreference.com or call us at 805 687-2236.

We have replacement output tubes at $100-$150 per pair and driver tubes at $75 per pair. Fuses are $3 each or 10 for $20. These are current prices that may change without notice.

These items may be purchased directly from us at our www.tubeaudiostore.com site.

SPECIFICATIONS

	RM200MkI	RM200MkII	RM200MkII-T
INPUT IMPEDANCE:	15kΩ One Leg Driven (Un-Balanced)/ 30kΩ Balanced	30kΩ One Leg Driven (Un-Balanced)/ 60kΩ Balanced	30kΩ One Leg Driven (Un-Balanced)/ 60kΩ Balanced
INPUT SENSITIVITY:	1.1 volts for full output	1.1 volts for full output	1.1 volts for full output
POWER OUTPUT:	100-Watts per Channel	100-Watts per Channel	100-Watts per Channel
POWER REQUIREMENTS:	220-Watts at idle; 600-Watts at full power	185-Watts at idle; 600-Watts at full power	185-Watts at idle; 600-Watts at full power
FREQUENCY RESPONSE:	+0.5 dB @ 6Hz - 20kHz; -3.0 dB @ 2Hz – 60kHz	+0.5 dB @ 6Hz - 20kHz; -3.0 dB @ 2Hz – 60kHz	+0.5 dB @ 6Hz - 20kHz; -3.0 dB @ 2Hz – 60kHz
HALF POWER BANDWIDTH:	13 Hz – 65 kHz	13 Hz – 60 kHz	13 Hz – 80 kHz
FULL POWER BANDWIDTH:	20 Hz – 35 kHz	20 Hz – 35 kHz	20 Hz – 65 kHz
DISTORTION:	Less than 0.5% @ 1kHz/100-Watts	Less than 0.5% @ 1kHz/100-Watts	Less than 0.5% @ 1kHz/100-Watts
SHIPPING WEIGHT:	52-lbs	52-lbs	52-lbs
SIZE:	17-1/4”L X 14-1/2”D X 7”H	17-1/4”L X 14-1/2”D X 7”H	17-1/4”L X 14-1/2”D X 7”H
DESIGNER:	Roger A. Modjeski	Roger A. Modjeski	Roger A. Modjeski

WARRANTY

Your RM200MkI/MkII and its tubes are warranted fro 1-year from the date of sale, to the original owner only. During this period, RAM Labs will repair any RM200MkI/MkII that is proven to be defective. This warranty does not cover user abuse of any sort. If your believe your RM200MkI/MkII is in need of repair, then please contact RAM Labs via email at roger@ramlabs-musicreference.com or by phone at 805.687-2236. If in our judgment a problem exists, then we will issue a Return Authorization (RA) Number. The user is responsible for the cost of safe shipment to our repair facility. Once your RM200MkI/MkII arrives at RAM Labs, our technicians will Bench Test your amplifier and repair any defects. RAM Labs will pay the return shipping cost for all amplifiers repaired under warranty and sold in the Unites States of America. RAM Labs alone will judge whether a fault exists, and whether it was the result of abuse. Research at RAM Labs is ongoing…Therefore, we reserve the right to make changes in the design and construction of our products without notice.

KEEP ALL PACKING/SHIPPING MATERIALS

Please keep all packing and shipping materials in case you move or need to ship your RM200MkI/MkII. Replacement Packing Sets are available for purchase directly from RAM Labs.

TUBE SEATING CHART

TUBE POSITION	SERIAL NUMBER	BIAS	TRANSCONDUCTANCE (Gm)
V5			
V3			
V4			
V6			
V1		N/A	N/A
V2		N/A	N/A