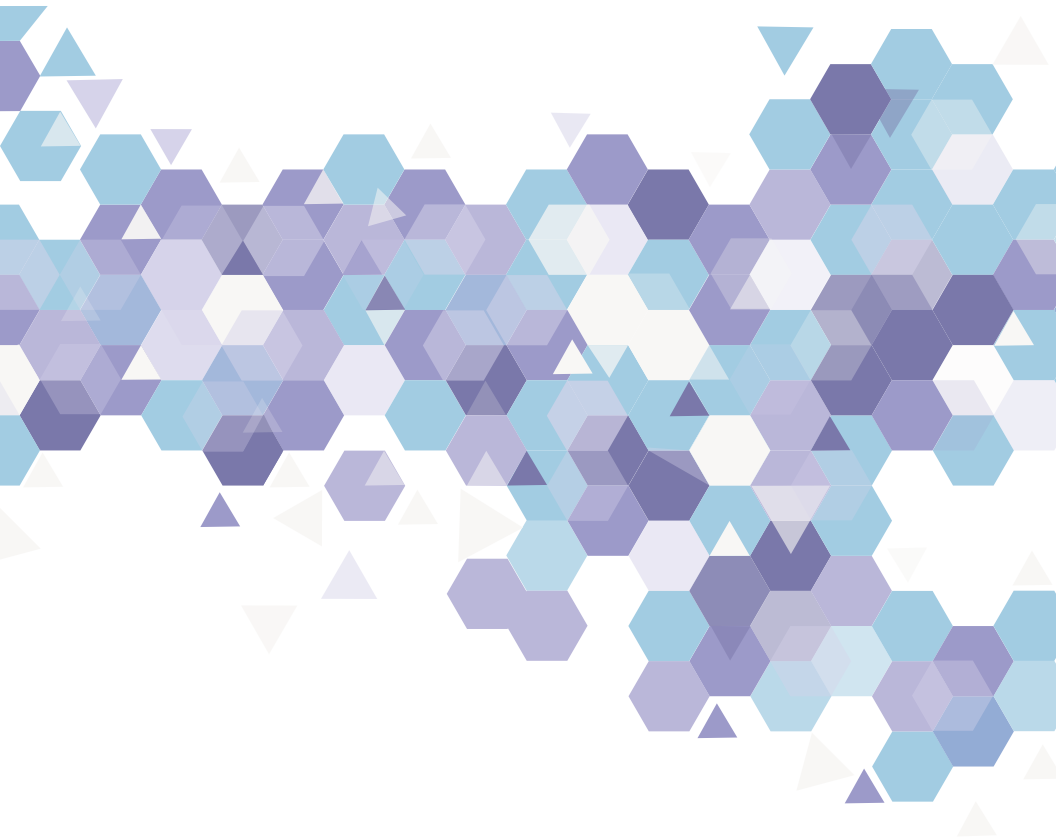




QUADRATIC

Moving Coil Transformer
MC-1



Quadratic Audio MC-1

The Quadratic Audio MC-1 is the product of the evolution of transformer based "Head-Units" for phono stages. It takes the low level signal from Moving Coil cartridges and passively increases the level to be compatible with standard phonograph pre-amplifiers.

Cartridges

The main two phonograph cartridge technologies that have withstood the test of time are Moving Magnet (MM) and Moving Coil (MC). MM cartridges are less expensive to manufacture than MC. The moving components have more mass than MC cartridges which limits their ability to accurately reproduce the sound imprinted in the groove which comprises the photograph recording. MM cartridges have high impedance and inductance. Cable length becomes a significant problem because of cable capacitance increases linearly with length. This capacitance causes high frequency response problems, both with amplitude and phase shift. Amplitude loss at high frequency is readily heard. Phase shift is very important for sound image "smear" which determines how well defined spatially the reproduced sound is reproduced.

Both cartridges put out a similar amount of electrical energy. Electrical energy is the product of voltage times current. Phonograph pre-amplifiers only amplify voltage making it feasible to directly connect a MM cartridge to their input. The voltage level of a MC cartridge is too low to go directly into a pre-amplifier. Attempts have been made to give them a higher voltage output, but those designs were few and have been abandoned because they could not deliver the performance demanded for critical listening.

MC Transformers

The engineering problem is: How can the very low voltage at a very low impedance MC cartridge be made compatible with a pre-amplifier?

The solution is the transformer. This is an electrical device that "transforms" one voltage to another in proportion to the turns ratio of the "primary" input side to the "secondary" output side. Not having active electronics to introduce electrical noise, it brings the signal amplitude up to a useful level without introducing objectionable noise.

The combination of a high quality audio transformer matched to the cartridge - when done properly - makes cable length on the primary side less critical, frequency response can be optimized, and the signal level delivered to the input of the pre-amplifier is optimal for best signal-to-noise ratio.

Just like the MC cartridge, the transformer must be carefully designed and manufactured. If the two do not mate well, the results will be inadequate.

MC-1 Initial Setup

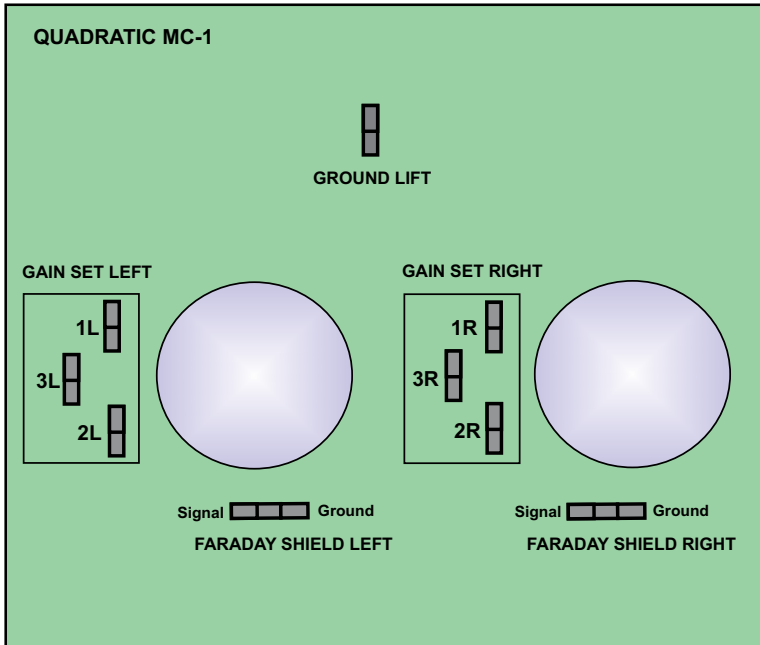
Transformers “transform” the impedance presented on one side to the other as the square of the turns ratio. This works in both directions. The load impedance on the secondary is transformed and reflected back to the primary, just as the primary impedance is increased by the square of the turns ratio and presented to what it feeds. Each MC cartridge works best in its own limited range of loading impedances. The input impedance of a RIAA pre-amplifier has been standardized at 47,000 Ohms (47K). If the turns ratio of the transformer is 1:10 and it is an ideal transformer, the impedance that the cartridge will see is $47,000/100=470$ Ohms. (This ratio was used for this example for the ease of mental calculation only. Most MC transformers make available a higher turns ratio.)

Your MC-1 is a fully passive transformer matching system. It comes pre-set for high impedance ratio which works well for most modern MC cartridges. That said, there are internal jumpers that can be re-positioned to change the impedance ratio and grounding.

The MC-1 does not require external power to operate. It is safe to open if desired.

To change gain settings remove cover (4 screws) and set gain with jumpers according to diagram. It is important to disconnect power to associated components while this is being done to avoid damage to your equipment.

The low turns setting impedance ratio, when feeding a 47K RIAA phono preamp, is 326:47,000. For this setting, jumpers 1L and 2L / 1R and 2R are engaged and jumper 3L / 3R are removed. (Do not put the jumpers in a drawer where they can get lost. Just lift them and rotate 90 degrees, re-setting them on one of the terminals where they cannot get lost.)



Jumper Locations

High gain is established by engaging jumpers 3L / 3R and removing jumpers 1L and 2L / 1R and 2R. Instructions are also printed on the circuit board.

The MC-1 is designed to attain maximum separation between channels and the lowest noise pickup possible.

Note: The MC-1 leaves the factory at the high gain setting (28dB)

Your turntable phono cables should be connected to the inputs Left and Right and the turntable ground wire is attached to the Ground Post. It is important that the cables attached to the output (to your phono amplifier or integrated amplifier with a phono stage) are well shielded.

MC-1 Gain Evaluation

We suggest that you pick a variety of recordings that you know well to audition your MC-1 and the turns ratio setting you select. It also is useful to listen to recordings that have passages that are difficult to reproduce well. Select the gain setting that gives you the best results.

If you have any questions about which setting works best with your cartridge, please consult with your dealer. He/she will be able to guide you or to ask us at Quadratic Audio and pass that information along to you.

Hum and Noise Rejection

MC cartridges put out very low voltages. The MC-1 step-up transformers are specifically designed to operate optimally in that environment. Stray magnetic fields can cause problems, as most experienced audiophiles working with phono cartridges know. The MC-1 transformers are encased in mu-metal cans which block out a lot of stray magnetic interference (greater than -30dB isolation). Additionally, they are manufactured using a hum-bucking technique which greatly increases the ability of the transformers to reject induced magnetic field pickup typically coming from nearby power transformers and motors.

The ability of the transformer to reject hum induced into the transformer itself is only part of the hum rejection equation because hum can be induced in the cables and wiring of the overall system leading up to the transformer primary. Hum bucking transformers inherently have superior common mode rejection ratios (CMRR) which helps mitigate this problem.

The MC-1 transformers include internal "floating" (not internally connected to either the primary or secondary) Faraday shielding which ultra-isolates the primary side of the transformer from the secondary. Jumpers are available on the circuit board that allow you to bond the Faraday shields to the system or even float them completely. Detailed instructions are printed on the circuit board. The MC-1 is delivered in the configuration that typically gives best results.

Finally, there is a Ground Lift option. Engage or disengage if needed for best hum rejection.

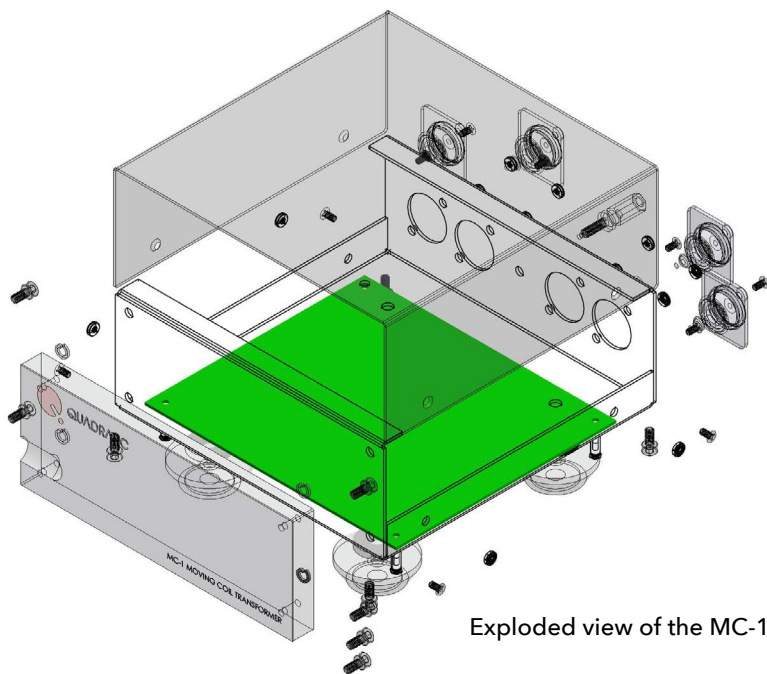
External Adjustments

Some systems have the ability to add capacitance across the input jack of the pre-amplifier. If you feel that your cartridge is too bright, you may want to experiment with this. However, keep in mind that the MC-1 has extended bandwidth and you may not be used to hearing this. Remember comparable live performances of similar music that you heard in the past. The objective is to give you the best and most real listening experience.

Final Thoughts

The MC-1 comes factory set for best overall performance for most modern cartridges. We encourage you to modify internal settings only if needed, doing it simultaneously on both the right and left channels. Remember: Your dealer is there to help you when needed.

Two generations of experience in designing and manufacturing professional and audiophile grade transformers have gone into the production of the MC-1 transformers. Decades of experience engineering audiophile equipment have been applied marrying these disciplines into the MC-1.



Exploded view of the MC-1

Warranty

The unit is covered by a limited warranty for a period of three years if purchased from an authorized dealer in the United States. Subjecting this product to voltages above that which can be generated by a phonograph cartridge or a properly working RIAA phonograph pre-amplifier input shall void this warranty

Non-United States warranties will be provided by the distributor in the country of sale and may vary as the distributor determines in accordance with local applicable laws.

Units that have been modified or altered in any way will not be covered by this warranty. Removal or defacing the serial number voids all warranties.

Specifications

Gain Setting High: +28 dB

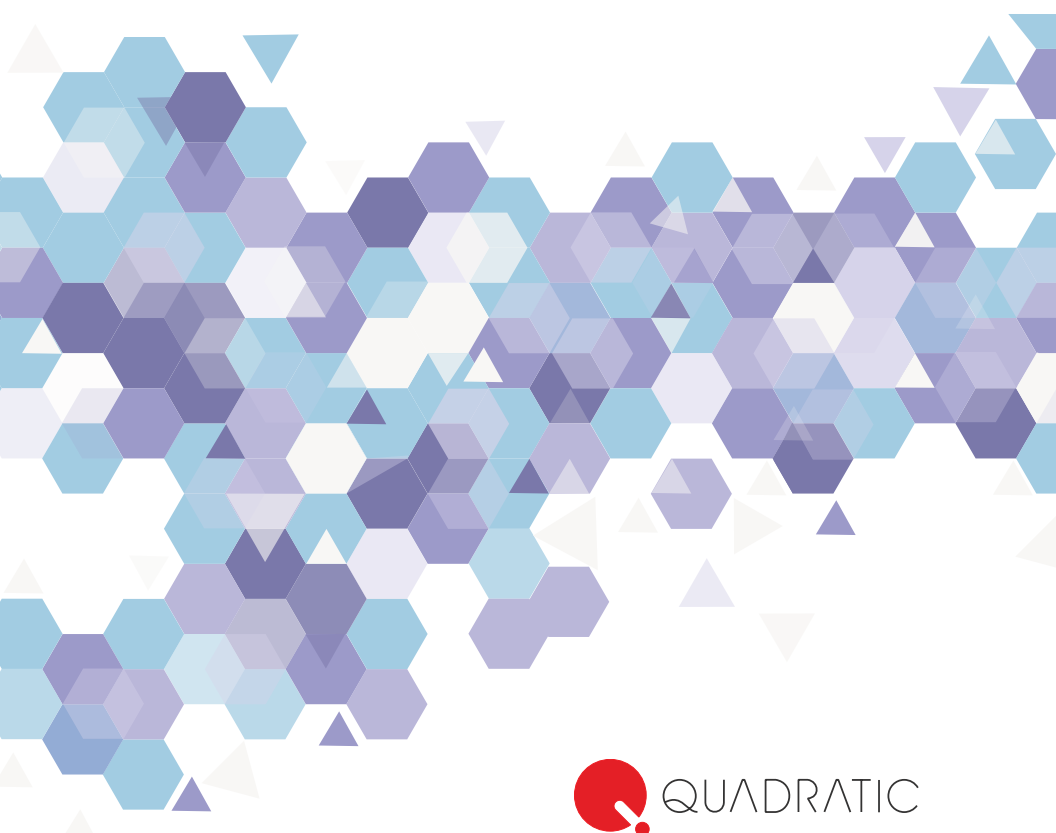
Gain Setting Low: +22 dB

Frequency Response: 10Hz - 100Khz

Recommended Load: 47k

Dimensions: W 6.5" (165mm) D 8.0"(203mm) H3.0"(76mm)

Weight: 4.2 lbs. (1.9 kg.)



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