Resolution Series® 222 MK-III

Phono Linearizer / Preamplifier

UNIQUE PRECISION IN PHONO LINEARIZATION AND CARTRIDGE PREAMPLIFICATION

- Immense improvement of LP and Shellac reproduction.
  Record collections gain a new life.
- The absolute ultimate in phono linearization and preamplification.
- The world's only *true* balanced symmetrical phono pre-amplifier.
- Unique variable "non-RIAA" de-emphasis allows precise linearization of any recording ever made.
- Continuously variable controls allow precise restitution of any pre-emphasis curve.
  Astounding improvement in reproduction of vinyl treasures.
- Ultra-high accuracy RIAA record compensation circuitry.
- Zero overall feedback or feedforward.
- Variable cartridge loading allows optimization of any MC or MM cartridge.
- Tremendous headroom and reserves in signal handling capability.
- Outputs optimally interface to true balanced, pseudo-balanced or single-ended loads. Unit automatically adjusts for optimal performance with any type of line stage.
- Unique filter precisely removes hum frequencies on LP's and Shellacs
- Uncover rare vinyl treasures with the unique linearization controls.
- The only preamplifier providing truly accurate reproduction of vinyl LP's, EP's, 45rpm and Shellac records.
- Ultra linear balanced line drivers:
  No more matching problems of cables and electronics.
- Entire unit uses discrete circuitry.
- Special dynamic curve-tracer analysed semiconductors, which are additionally selected in an exclusive listening test.
- Proprietary enhanced Class A circuitry: no signal-degrading IC's, transformers, hybrid circuits, tubes or op-amps.
- Modular construction guarantees easy servicing.
- Hand-selected, high precision, matched components of DIN, IEC & MIL standard guarantee accuracy and long-term stability.
- Performance without equal as the technology, the circuitry and the manufacturing methods are proprietary to FM ACOUSTICS.
- The ultimate for restoration work, mastering studios, libraries, precise monitoring and for demanding record collectors.

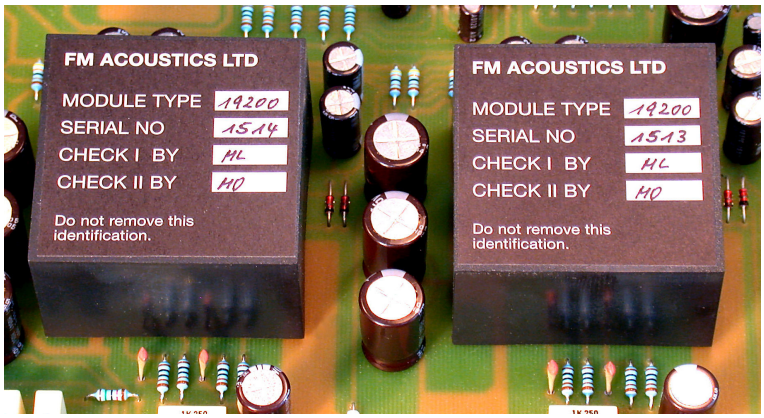
The introduction of the original FM 222 revolutionized the reproduction of vinyl records to a standard never imagined - and this in the days when a tremendous worldwide marketing campaign hailed CD as „perfect music forever“.... With the singular features and circuits of the FM 222 it was for the first time possible to realize what wealth of detail and information lie buried in record grooves. The FM 222 was THE revelation.

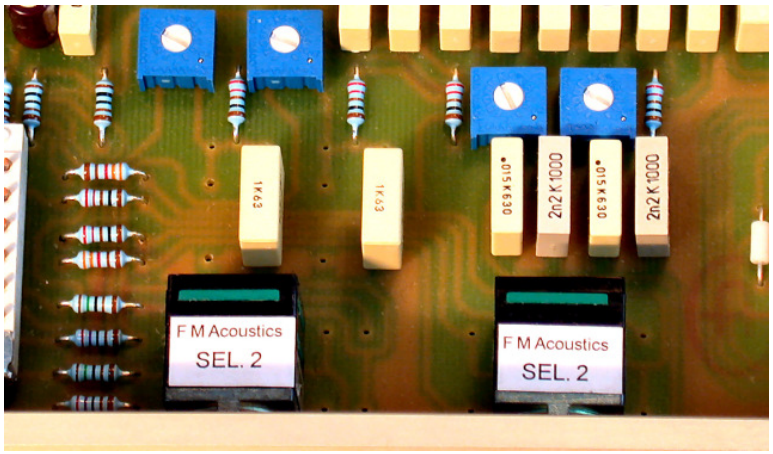
Quickly musicians, producers, engineers, libraries and collectors all over the world realized that with the FM 222 a new era had begun. Total revitalization of record reproduction was now possible. A short demonstration convinced even the most sceptical engineers and listeners.
The rest is history: the FM 222 - manufactured continuously since 1992 - has become a tremendous success with steady demand year after year.
More orders than ever were received when the "MKII" version was introduced 6 years ago. It provides a performance so far ahead that no one even challenged it. Never has there been anything comparable. It truly is phenomenal what realism and musicality the FM 222 can extract from vinyl.

Recently, new parts have become available that - together with advanced insights from continuous research - allow further ameliorations. The refinements manifest themselves in some smaller modifications but also some more substantial improvements - as described on the following pages.

It is a pleasure indeed to announce the **"MK-III"** version of the FM 222.

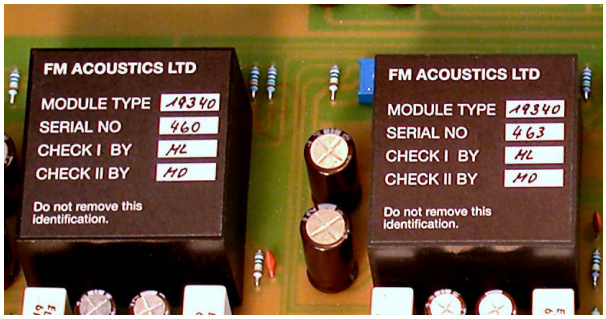
The new "HR" type 19200 modules are employed for the true balanced outputs. These new HR modules are the result of a research-intensive multi-year development. They provide a superb level of reproduction and reliability.
Never before has such a level of accuracy been achieved.





Advanced selection processes in combination with the most dedicated handcraftsmanship and very time-intensive comprehensive individual fine-tuning result in breathtaking vinyl reproduction.
Dynamic contrasts, transparency, detail, incredibly accurate imaging, perfect delineation of harmonic characteristics...
...the ingredients for a uniquely musical experience.

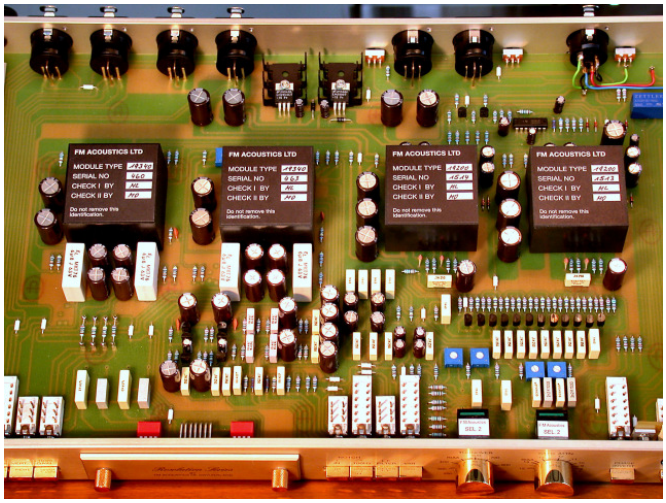
New HR modules are also used on the inputs. They reject Common Mode signals such as interference, hum, noise etc. by an astounding 100dB (!) making the FM 222-MKIII immune against noise, hum, RF and interference pick-up.
This phenomenal interference rejection ratio is NOT achieved with non-optimal sounding op-amps but with fine-tuned, discrete Class A circuits guaranteeing ultimate resolution in the unique FM ACOUSTICS way.



To avoid negative influence from spurious resonance and guarantee positive stability, the FM 222-MKIII employs FM ACOUSTICS new resonance-eliminator supports. These isolate the electronics from potential resonances and vibrations.

The new layout with complete remodelling and repositioning of critical parts achieves noticeable improvements.
Some ameliorations are not visible, but help performance; amongst them are:

- *an even lower interchannel crosstalk.*
- *a multitude of layout refinements that achieve some noticeable improvements.*
- *even better CMRR guarantees perfect signal symmetry.*
- *singular accuracy of de-emphasis curves.*



The following pages contain further descriptions on the unique features and characteristics of the FM 222-MKIII.

When a totally faithful phono reproduction of the original is required - the FM 222 MK-III Linearizer / Preamplifier is THE ultimate solution. The features:

TRUE BALANCED CARTRIDGE INTERFACE

By design all phono cartridges are **balanced** sources. The term "balanced" describes a system in which the audio signal is transferred via two shielded symmetrical conductors, neither of which is connected to ground (see Fig. 1).
(For general information on balancing consult Technical Bulletin No. 34).

To this day the interconnection of phono cartridges has been done "unbalanced". An unbalanced system is one in which one of the signal paths is carried by the shield or in some way is exposing the signal to the ground carrier. Because of this, interference signals such as hum, RF, noise etc. are picked up by the shield and can thereby enter the audio circuitry.
The lower the signal level and/or the more ambient interference present, the greater is the danger of degradation allowed by an unbalanced (single ended) interface.

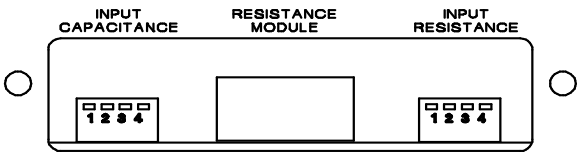
When one considers the extremely-low signal levels of cartridges, it becomes clear that a **true balanced** signal interface to the preamplifier is a huge improvement over presently available designs. Unfortunately, such an elegant system was always faced with a number of technical problems. In the FM 222 these limitations have been overcome entirely.

The FM 222 is the only unit which allows **true balanced** interconnection of cartridges. Fig. 1 shows a balanced interface. Such a balanced interconnection of the phono cartridge has major advantages:

- increased dynamics
- higher headroom
- elimination of non-musical signals (interferences)
- lower hum and noise

The signal lines from the cartridge are directly connected to the true balanced input stages and have no connection to the shield. Thus, the shield can function optimally, conducting all interference signals directly to ground. The ground, of course, must be separate from the electric ground of the circuits (in many other so-called "balanced" products this is not the case).

CARTRIDGE LOADING



In Phono preamplification **all** aspects require careful consideration. Cartridge loading is a touchy subject, as there are some preconceived ideas. However, this point needs addressing, as the variations in the loading have a considerable influence on reproduction.

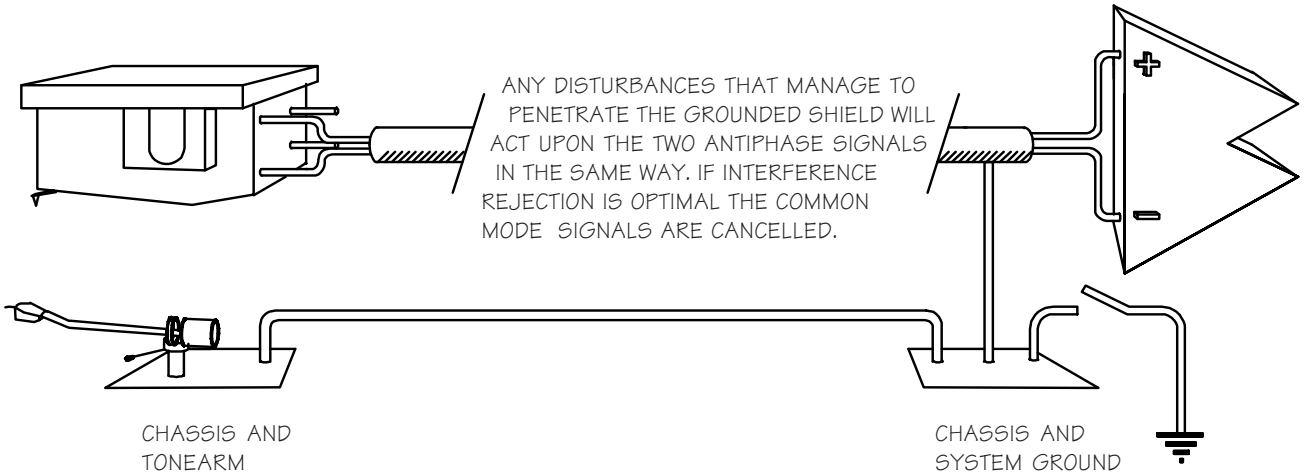


Fig. 1 THE INPUT STAGE OF THE FM 222 MK-III HAS AN EXTREMELY HIGH IMMUNITY (100dB) TO ANY NOISE AND INTERFERENCE THAT MAY BE PRESENT IN THE GROUNDING SYSTEM

The performance will be affected negatively if the impedance matching between the cartridge and the input stage of the preamplifier circuit is not optimal (the interconnect cable is a not to be neglected part of this interface!).

It would be handy if cartridge manufacturers would specify the detailed data required for calculation of the optimal cartridge loading (such as coil resistance, inductance and capacitance over the full frequency range, phase plots with tolerances, area and magnitude of resonances, etc.), as with this it would be possible to provide information on optimal loading for each cartridge model. But as this is not the case, it is necessary to obtain the correct values of cartridge loading by listening tests (note that by far not every impedance stated by cartridge manufacturers in their literature is actually correct. It is always best to verify recommendations with actual tests).
With the FM 222 MK-III's unique cartridge loading system, it is for the first time possible to optimally fine-tune the performance of **any** cartridge.

Resistive Loading

A load resistance is required because electro-acoustic transducers must be damped to avoid ringing, overshoot and other negative effects. The loading also influences the preamplifier's noise level and the performance of its input stage circuitry as well as the frequency response. Unfortunately, many pre-amplifier's noise performance suffers when the MC loading impedances are set to the relatively low values which are correct for MC cartridges, a design weakness of the respective preamplifier. Achieving low noise at low impedance is a real challenge and many manufacturers take the easy way out by fixing the MC input resistance to a higher value.
Some MC cartridge manufacturers even specify a loading resistance of 47 kOhm (the "standard" for Moving Magnet cartridges). While this may give a good theoretical noise specification for the preamp it does **not** provide the necessary damping for the MC cartridge. It is wrong.
One must realize where this fixed 47 kOhm input resistance comes from: it is a "compromise" setting that was accepted for loading of MM (moving magnet) cartridges. But this 47 kOhm input resistance is a theoretical figure and it is **not** the correct termination for all MM cartridges (whose inductance, capacitance and resonances vary from one type to another). It is *absolutely* incorrect for MC (Moving Coil) cartridges. The optimal loading resistance for most (but not all) MC cartridges is between approximately 20 and 500 Ohm. As a rule of thumb the loading impedance should be at least 10-30 times higher than the coil resistance of the cartridge.

Preamplifiers having just fixed input resistance that do not allow variable resistance**and** capacitance loading are unable to extract the full performance from a cartridge.
Most preamplifiers lack this important feature of adjustable cartridge loading which is one of the reasons why many preamplifiers work acceptably with one or two cartridges but do not provide satisfactory performance with other cartridges. The listener is at the mercy of the fixed input loading of the preamplifier. Performance cannot be optimized.

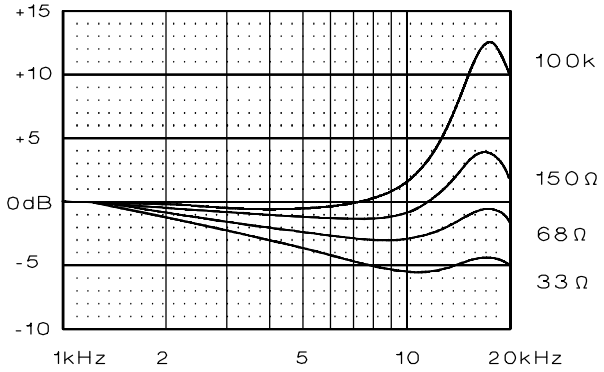


Fig.2 shows the effect of varying the resistive load on a MC cartridge.

The FM 222 MK-III provides the ultimate solution: it features switches for adjusting loading resistance as well as for fine tuning loading capacitance. Plug-in modules allow an infinite number of resistive loading combinations. Should the standard resistance module supplied (each module allows setting of four different input resistances) not provide the optimal loading for a certain cartridge type, the resistance module - located on the front panel behind a protective panel - can easily be exchanged.
Thanks to the plug-in module concept an **unlimited** number of resistance combinations in the range of 1 Ohm to 200 KOhm are possible; this for MC and as well as MM cartridges! One can optimize the loading for **any** cartridge ever made (or that will ever be made).

Capacitive Loading

The Capacitive Loading feature can be as important: multiple precision capacitors allow damping of cartridge resonances and help fine tuning the upper frequency response.
Because it has not been available so far and its use is not yet widely understood, this feature may not attract much attention initially. However, it is of great help in optimizing performance of MC and MM cartridges.

Figs. 2 - 4 show the effects of cartridge loading. The curves speak for themselves and show how important correct loading is.

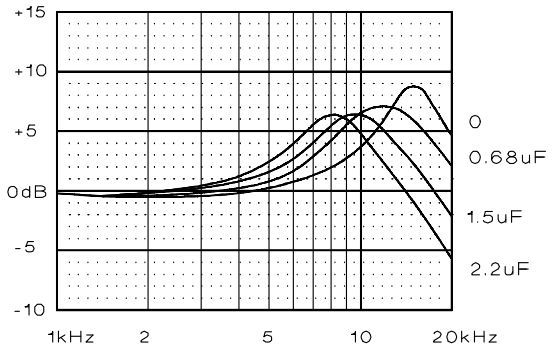


Fig 3. shows the effect of varying the loading capacitance on a MC cartridge.

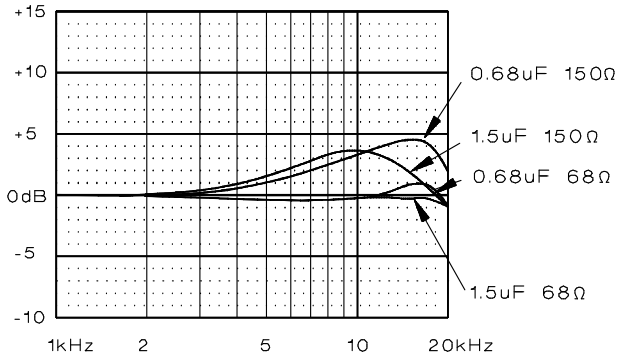


Fig 4. shows various combinations of resistance and capacitance loading.

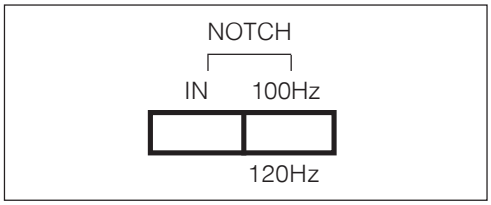
The effects of loading are quite pronounced as can be seen from the above figures.

There is no room here for getting into even further details of cartridge loading and its effect on overshoot and ringing, signal-to-noise ratios, etc.
Suffice to know that the FM 222 MK-III is the **only** preamplifier that addresses **all** of these problem areas and provides the optimum solution for **any** cartridge.

NOTCH FILTER ON FM 222 MK-III

Certain records contain disturbing hum frequencies. Apart from the fact that these quickly tire a listener, massive amounts of amplifier power is absorbed for reproducing this hum signal and the speakers will have to work correspondingly harder, thereby creating higher intermodulation distortion.
The FM 222 MK-III includes two additional switches: one that activates this hum filter and one that selects either the 100 Hz (e.g. European) or the 120 Hz (e.g. American) hum frequencies (hum manifests itself mostly at the 2nd harmonic of the mains frequency).

Whenever a record contains a hum or an ill-defined bass (which can be due to a hum frequency colouring the reproduction) a push of the "NOTCH" filter switch helps to solve the hum problem.



A NOTCH filter is a special filter that attenuates only one specific frequency while leaving other frequencies unaffected. However, it is difficult to achieve high attenuation at exactly one specific frequency and leave all other frequencies linear, especially so while remaining in the analogue domain.
This unique filter is only active at precisely the specific frequency while all other frequencies bypass this stage without being affected (see Fig. 5 on page 7).
By switching between the 100 Hz and 120 Hz frequencies one can determine which filter is correct for the respective record.

When using this filter, frequently low- and mid bass is reproduced with higher definition: a cleaning up of the entire signal (a psycho-acoustic effect) can be achieved this way.

These ultra-precise notch filters eliminate hum frequencies without creating excessive phase shift, without influencing any other frequencies or having any negative effect on the audio signal.

For collectors and the educated music lover this is a great feature as, in fact, it is now for the first time possible to enjoy some major recordings of important performances that so far were pretty much unlistenable due to disturbing hum frequencies.

NOTCH FILTER

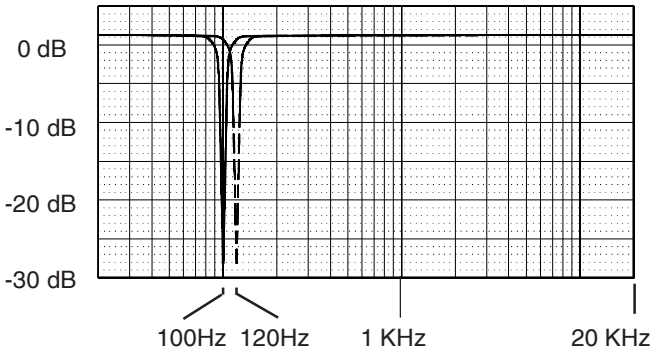
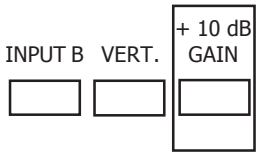


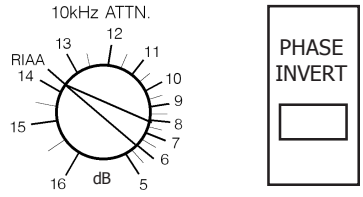
Fig. 5 Response with NOTCH filter activated at 100 Hz and at 120 Hz. Precise filtering of exactly the hum frequencies and no influence on any other part of the spectrum is apparent.

GAIN



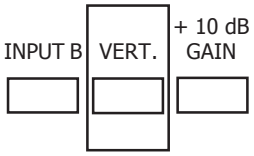
A +10dB gain switch located on the frontpanel allows an additional 10 dB gain for MC cartridges that have extremely low output voltage (< 0.2mV) or in systems with insufficient overall gain.

PHASE



A precision phase inversion switch on the frontpanel performs 180° phase inversion of the main outputs. Unlike other phase inversion switches this is done without any additional circuitry. Both “in-phase” and “out-of-phase" signals pass exactly the same electronics. Thanks to this switch, phase accuracy can be assured and this without any coloration or change in performance.

NORMAL / VERTICAL OPERATION

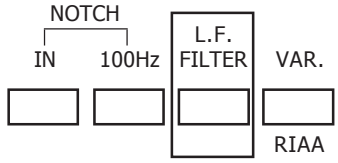


A special feature - the “Vertical” switch - guarantees utmost reproduction with monaural LP’s that were cut **vertically** (sometimes called "Hill and Dale Records") and cylinders.
Many 78 RPM discs and monaural LP’s are cut **laterally** rather than vertically. When in it’s "Norm" position this switch optimizes the **lateral information** content of the signal.

Some mono discs, however, were cut **vertically**. So far these records could never really be played back satisfactory. With a flick of the "Vertical" switch the FM 222 MK-III allows optimal reproduction of such **vertically** cut record.

Whatever the type of cutting, the FM 222 MK-III can extract every minute detail from the record grooves.

L.F. FILTER



In high quality sound reproduction elimination of sub-audio frequencies can be very important. These low frequency signals, usually from pressing faults or record warps, can have a deteriorating effect on the audio quality and can consume huge amounts of amplifier power.

The FM 222 MK-III employs a Linear-Phase filter which attenuates the sub-audio frequencies whilst having no effect on the audible signal.

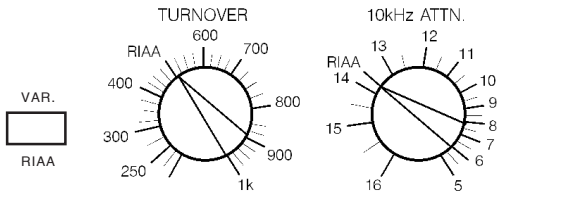
If required the L.F. filter can be factory adjusted to comply with the I.E.C. standard L.F. response (i.e. -3 dB at 20 Hz, 6 dB / octave). However, in practical use, the 12 dB / octave linear phase filter used as standard in the FM 222 MK-III is preferable.

UNIQUE VARIABLE RIAA DE-EMPHASIS

For music lovers the **performance** is every bit as important as the **sound** of a record. Many great performances are only available on LP's or on 78 RPM discs. On today's equipment these LP's or 78's are replayed wrongly and their reproduction leaves something to be desired. Even reissues can suffer from similar problems. One of the reasons is that practically all other preamplifiers are limited by the fact that they can only replay the RIAA de-emphasis curve.

In the 50'ies no "standardized" pre-emphasis/equalization curve existed. Different record companies used a wide variety of pre-emphasis "cutting" curves, until the RIAA curve was finally agreed to (it is interesting that in March 1964 the RIAA had to mail out a letter worldwide to remind record companies about the "new" (then 5-year old...) "standard" curve as quite a number of members had failed to convert to the RIAA standard...)

These non-RIAA conform LP's cannot be replayed correctly by today's audio electronics which are limited due to the fact that de-emphasis is fixed to the standard RIAA curve. Many different de-emphasis curves are required to inversely match the original recording curves, (which sometimes even changed within the same company!).



With the FM 222 MK-III's variable RIAA de-emphasis it is now possible to accurately play back important earlier LP's and 78's. With accurate equalization and true balanced Class A amplification stages an absolutely astounding amount of information can be extracted from these record grooves.

Fig. 6, on the top of the next page shows the pre-emphasis curves for several typical records, in the centre the error when replayed with the standard RIAA curve and on the bottom the result when the correct de-emphasis curve is set on the FM 222 MK-III. The corresponding correct knob setting of the "Turnover Frequency" and the "10 kHz Attenuation" on the FM 222 MK-III is also indicated.
The variable de-emphasis is not only useful for older records. Using this feature, records that lack in accuracy can be improved quite astoundingly.

It is not just a matter of correcting frequency response errors but as much the correction of *phase errors* that are created by the wrong de-emphasis circuits.
But even when the RIAA curve was adhered to there were other limitations had to be considered: the cutting lathes (where records are prepared for the vinyl press) used prior to 1968 were unable to perfectly cut the very high velocities present at frequencies above 12 kHz.
Mastering engineers had to balance trade offs: more noise (less headroom) achieving wider frequency response or reduced frequency response with lower noise (or higher headroom). Some mastering engineers somewhat attenuated the higher frequencies. This changed the phase and resulted in a slight lack of "airiness".*

It is amazing how much of the sound made it on record but discs of this area can lack a bit in transparency.

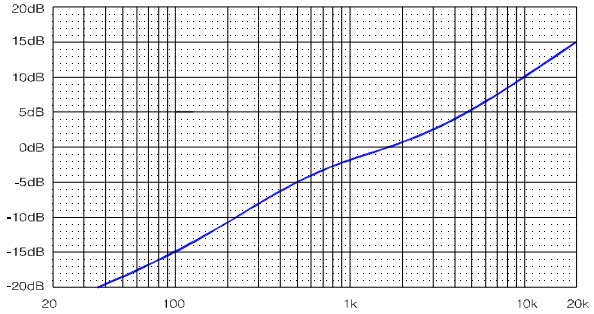
With the continuously variable de-emphasis of the FM 222 MK-III - no switches used! - it is now possible to compensate for such effects by fine tuning the de-emphasis/RIAA curve. By varying the "10 kHz ATTN." control on the front panel the attenuation can be reduced to less (or increased to more) than the standard 13.75 dB of the RIAA curve. This feature will revive some records that previously sounded dull and lifeless, providing a wonderful musical experience.

And the opposite also holds true: in the late 70's and 80's new cutting lathes finally allowed mastering records with high-level high frequencies. As soon as this was possible, it was promptly overused and some records were mastered with excessive high frequency levels. By *increasing* the 10 kHz attenuation these records sound more acceptable.

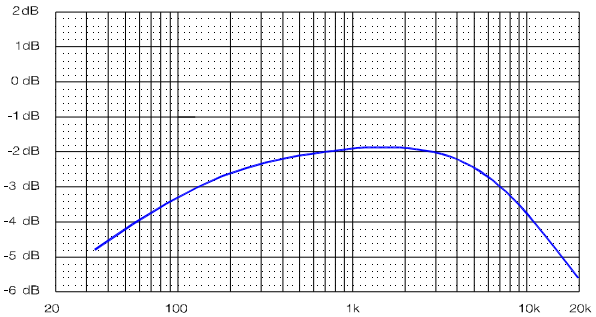
Even a recording that lacks in "warmth" (not just bass!) can be corrected by moving up the turnover frequency knob to a mildly higher setting. This way the entire frequency band above and below the turnover frequency is affected linearly. It is not just the harmonic content that is reproduced more realistically: the positive effect on depth and width information as well as the transparency can be most captivating.

On later versions of cutting lathes, Neumann incorporated an HF shelving filter. Some phono stage designers now just fix this into their RIAA de-emphasis circuits thinking that this is the way all LP's were mastered. Well, that is not correct: while by far not everyone used Neumann cutting lathes those that did often disliked this filter. Unbeknownst to todays designers, many experienced mastering engineers of the golden aera just disabled it.
Less experienced mastering engineers were told to use the non-modified Neumann machines (as there was the danger of burning a USD 12000 cutterhead with excessive HF signal).
No worries: the FM 122 and FM 222 provide the ultimate solution: Thanks to the "HF attenuation" control it is possible to fine tune the HF response and optimize the reproduction for each individual LP!

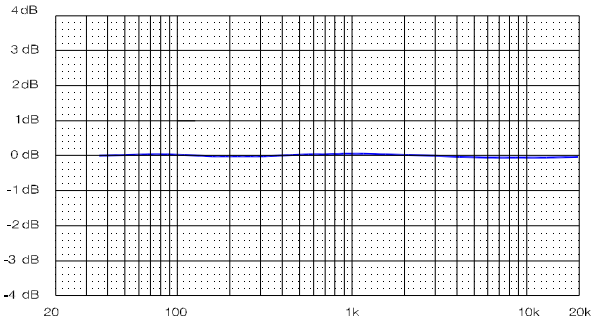
LONDON



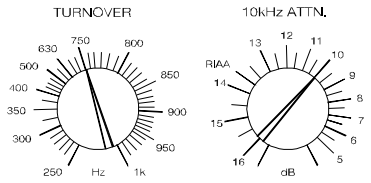
Recording Characteristic



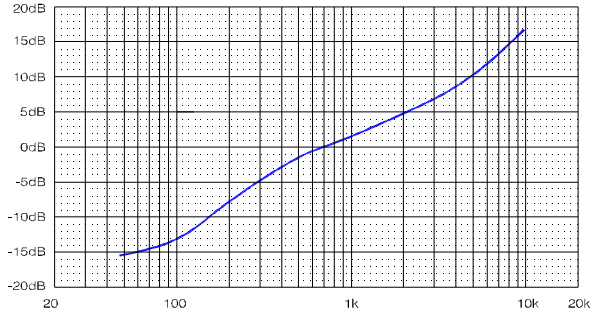
Frequency Response with RIAA Filter



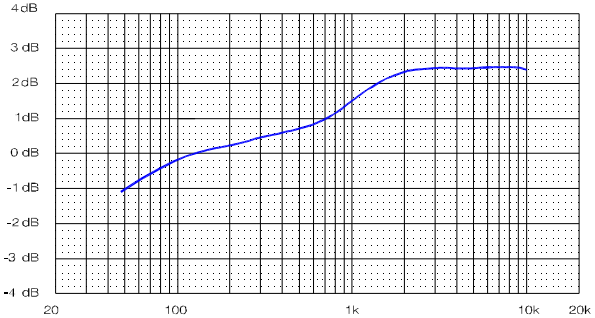
Frequency Response with FM 222 MK III Linearization



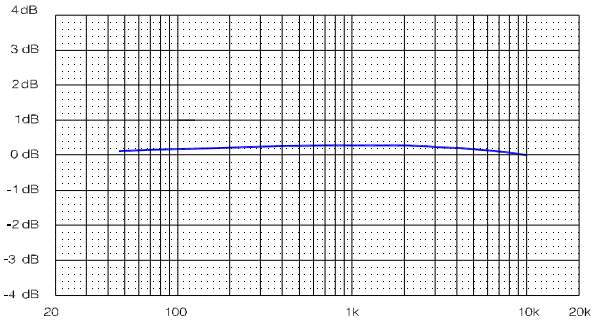
RCA ORTHOACOUSTIC



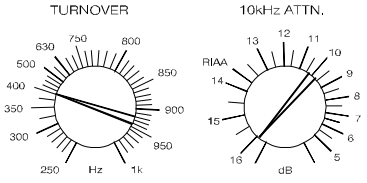
Recording Characteristic



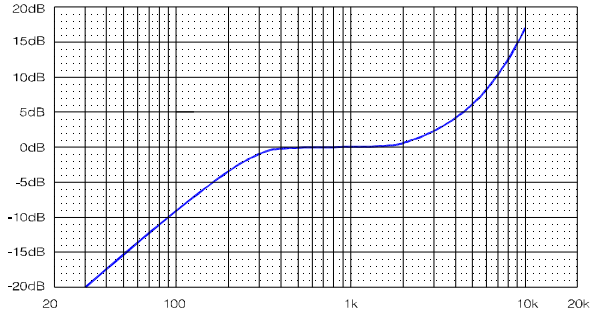
Frequency Response with RIAA Filter



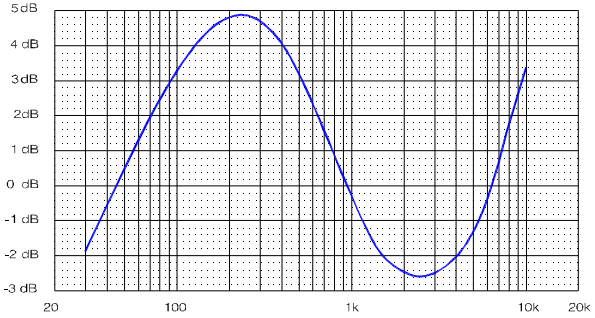
Frequency Response with FM 222 MK III Linearization



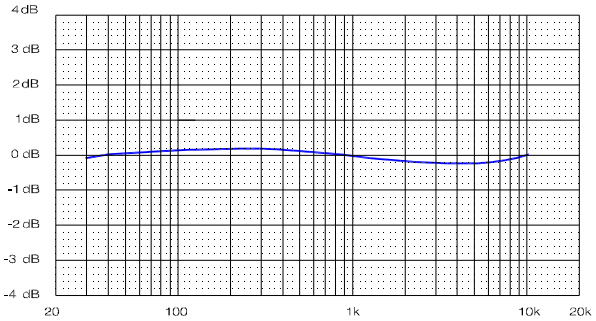
VERTICAL RECORDINGS 1953



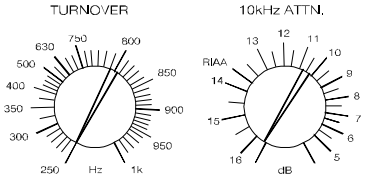
Recording Characteristic



Frequency Response with RIAA Filter



Frequency Response with FM 222 MK III Linearization



While some of the older LP's have high surface noise, by far not all of them do. Some of them are recorded superbly, some include stellar performances. There are many treasures to be uncovered.

A tremendous research effort has resulted in optimal performance of the enhanced Class A circuits in attaining the ultra-precise de-emphasis curves. The de-emphasis curves can now be calibrated perfectly for each brand and type of record. **Unlimited** variations in turnover frequencies and roll-off curves allow exact compensation for any curve used in the cutting of the records.
One has to realize, however, that sometimes engineers varied this pre-emphasis to their "gusto" and that the values do not always absolutely conform with the curves published by the recording companies. Therefore, experimenting with the two controls will lead to optimal results. The best judge is a good ear assisted by the extensive information contained in the Instruction Manual. The table below show a few examples of typical settings for certain records.
It is amazing how much the sound of older records is improved with the FM 222 MK-III. Once this has been experienced, one realizes that no other phono preamplifier is capable of retrieving the full information which is embedded in the record grooves.
Here are just a few examples of approximate Turnover Frequencies and Rolloff curves of earlier LP's:

Label	Turnover Frequency	Rolloff at 10kHz in dB	Speed
ANGEL	500	12.0	33
ATLANTIC	500	16.0	33
BLUE NOTE	400	12.0	33
COLUMBIA	750	16.0	33
HMV	300	5.0	78
LONDON	700	10.0	33
MERCURY	300-400	12.0	78
MERCURY	400	12.0	33
VICTOR	800	10.0	33
VOX	750	16.0	33

The FM 222 MK-III Linearizer/Preamplifier provides an entirely different dimension in the reproduction standard of vinyl records. Receiving accolades the world over, it is quite obviously the culmination of phono preamplifier design. A huge effort over more than a dozen years is paying off in that the entire field of record reproduction has entered a new era.

With its fine tuning possibilities, far more information from record grooves can be extracted than ever thought possible. In fact, with the FM 222 MK-III one can - for the first time - **truthfully** replay all vinyl treasures.
The proprietary true balanced enhanced Class A circuits allow a listening experience that cannot be described other than as breathtaking.

Practically every record (even acoustically recorded 78 RPM and shellac records) can be replayed with never-before-attained fidelity.
With the FM 222 MK-III record collections gain an entirely new life and value.

The FM 222 MK-III also offers other brilliant features based on advanced thinking and design criteria that never before have received serious consideration.

FURTHER FEATURES

- The FM 222 MK-III employs no overall feedback or feedforward. The entire unit is built with FM ACOUSTICS' proprietary true balanced enhanced Class A stages. Freedom from hum, noise and interference can be guaranteed. Stability and signal accuracy are unparalleled and far surpass anything that has ever been available.

- The FM 222 MK-III features two true balanced input stages. Both switchable inputs work optimally with any MC or MM cartridge.

- The CMRR - the specification that defines the accuracy of balancing - reaches a phenomenal 100 dB (!) (the higher the CMRR the more accurate is the balancing). Just to put this in relation: "balanced" circuits of other "high-end" products provide a CMRR of about 40-70 dB (which means that the FM 222-MKIII is 100 to over 1000 times better than other preamplifiers (a "dB" is a logarithmic measure).

  The FM 222 MK-III's phenomenal CMRR is achieved with totally discrete circuitry (no musically unsatisfactory op-amps, hybrid circuitry or IC's) providing a standard of balancing never achieved before.

- The input impedance of the two switchable inputs is absolutely linear over the full frequency range and they have precisely the same sensitivity and level.
  A feature unique to the FM 222 MK-III is that this is the case with both balanced as well as single-ended sources and any mixture of them!

- The FM 222 MK-III input circuit automatically recognizes if the source is balanced or single-ended. Signals from single-ended connections are balanced right at the input of the FM 222 MK-III.

- The FM 222 MK-III works optimally with all types of associated equipment. With the FM 222 MK-III, performance variations and matching problems are a thing of the past.

- Tremendous reserves of headroom and output drive capability are engineered into the FM 222.

- The back panel contains all inputs and outputs. Pretested XLR connectors are employed for balanced input and output connections.

- The unit can drive line inputs of any preamplifier/line stage (results of course depend on the performance of the respective line stage).

- The FM 222 MK-III allows connection to any balanced or single-ended equipment. Its circuitry analyses the type of preamplifier/line stage and automatically adjusts for optimum performance. Every interface will be 100% correct whether it is true balanced, pseudo balanced or unbalanced, whether it has high or low impedance.

- The combination of proprietary circuitry and stable outputs guarantees that the FM 222 MK-III can drive any cable type and any cable length, even hundreds of meters(!), with highest precision.

- Hermetically sealed, Swiss made high performance, relays are used. Four specially coated contacts guarantee perfect operation, even after millions of switching cycles. The hermetic seal guarantees that no environmental factors can have any negative effect on the contacts and therefore, on performance.

- The FM 222 MK-III's mechanically damped chassis design effectively isolates all sensitive electronic components from induced resonances. The chassis, cover, bottom, etc., are all effectively damped.

- To avoid negative influence from spurious resonances the new FM 222 MK-III employs FM ACOUSTICS' proprietary resonance eliminator feet that absorb any potential resonance and vibration.

- There is no signal carrying wire in the FM 222 MK-III. Unit to unit consistency is assured.

- The signal-to-noise ratio of the FM 222 MK-III is singular. It betters existing designs by a considerable margin.
  No wonder experts call it phenomenal.

- Power is supplied either from the FM 266 / FM 268 - or for those users who do not yet own an FM 266 / FM 268 - from the optional FM 203 power supply.

- Additional precision on-board stabilisation is used.

- Proprietary control circuitry perform various tasks:
  Delayed switch-on is incorporated. During switch-on outputs are disengaged and the FM 222 MK-III checks itself. If everything is found to be perfect, the control circuitry frees the outputs. Within ten seconds of switch-on the preamplifier is fully operational.

· Hum, noise, magnetic or electronic interference is non-existing (provided the proper interconnect cables are used).

- The FM 222 MK-III can handle overvoltage (up to 130% V^{nom}). In addition, a separate sensor also protects the unit (and the equipment connected to it) from extreme undervoltage that could result in non-optimal performance, transients and/or DC instability.
  This way neither extreme under- nor overvoltage can generate dangerous LF signals or DC instability which could harm the amplifier or the speakers.

- A special thermal control system assures that the *Resolution Series*® 222 MK-III does not have any form of distortion or changing tonal characteristics when warming up. It reaches its optimal temperature within minutes; there is no hour long warm-up time required as can be the case with other audio equipment.

- *Precision Interface Technology*® interconnect cables are used to optimally connect both sources and load. Cables for special types of connectors (such as Fischer/Camac, etc.), are available on special order.

- To assure no obsolescence, the *Resolution Series*® 222 MK-III Phono Linearizer/Preamplifier uses modular technology. Service or changes can be performed in a matter of minutes. This comes with the guarantee of 100% correct performance, as parameters are tuned inside the respective module. Every repair will be 100% accurate as the Class A modules have been precisely calibrated, burnt-in, and double-tested at the factory.

The FM 222 MK-III is transparent. It will leave the qualities and characteristics of the associated equipment unaltered. Tube aficionados will still have the "tube sound" of their equipment while at the same time benefiting from all the performance improvements of the FM 222 MK-III.

Words can by no means describe the experience of listening with an FM 222 MK-III. There is no other unit that can compare. It revives the entire field of record reproduction. New insights in performances can be gained thanks to the FM 222 MK-III's proprietary, ultra-transparent circuitry and it's unique features.

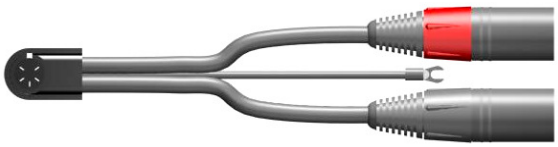
ACCESSORIES

Order Number	Description	
ACC 22018	Resistor Module 222:	Standard: 180 / 90 / 45 / 35 Ohm (Supplied as Standard)
ACC 22022	Resistor Module 222:	1800 / 900 / 450 / 350 Ohm (MC)
ACC 22023	Resistor Module 222:	18k / 9k / 4.5k / 3.5k Ohm (MC)
ACC 22024	Resistor Module 222:	100k / 50k / 33k / 24k Ohm (MM + MC)
ACC 22029	Resistor Module 222:	47k / 300 / 100 / 75 Ohm (MM + MC)
ACC 22111	Power supply cable for connection of FM 222 to FM 266 (length = 0.6 m)	
ACC 22112	Power supply cable for connection of FM 222 to FM 266 (length = 1.2 m)	
ACC 22113	Power supply cable for connection of FM 222 to FM 266 (length = 3.0 m)	
ACC 22114	Power supply cable for connection of FM 222 to FM 266 (length = 5.0 m)	
ACC 22026	Labels FM 222: for record coding; set of 240 pieces	

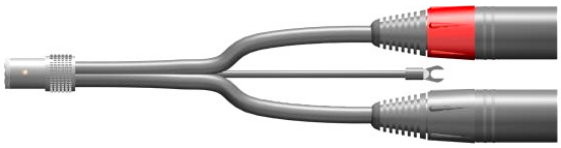
Precision Interface Technology® PHONO INTERCONNECT CABLES

It is mandatory to use *Precision Interface Technology*® interconnect cables from the tonearm/turntable to the FM 222 MK-III. The reason is that **no** other cable can guarantee the quality of true symmetrical balancing and - as important - extremely high rejection of interference signals (CMRR). All other cables lower the interference rejection (many of them drastically) and thereby forfeit the huge effort that goes into achieving the true balanced signal preamplification of the FM 222-MKIII. Only if the cables listed below are used can this interference rejection be achieved. This is why a P.I.T.phono cable must be ordered with every FM 222-MKIII.

CA-25141	RCA/Phono M - XLR M	0.6m	True balanced phono interconnect (Phono-XLR)
CA-25142	RCA/Phono M - XLR M	1.2m	True balanced phono interconnect (Phono-XLR)
CA-25143	RCA/Phono M - XLR M	3.0m	True balanced phono interconnect (Phono-XLR)



CA-25151	5-P DIN angled - XLR M	0.6m	True balanced phono interconnect (angled DIN-XLR)
CA-25152	5-P DIN angled - XLR M	1.2m	True balanced phono interconnect (angled DIN-XLR)
CA-25153	5-P DIN angled - XLR M	3.0m	True balanced phono interconnect (angled DIN-XLR)



CA-25161	5-P DIN straight - XLR M	0.6m	True balanced phono interconnect (straight DIN-XLR)
CA-25162	5-P DIN straight - XLR M	1.2m	True balanced phono interconnect (straight DIN-XLR)
CA-25163	5-P DIN straight - XLR M	3.0m	True balanced phono interconnect (straight DIN-XLR)

Note:
While P.I.T. line level cable and P.I.T. phono cables look similar it is actually easy to differentiate: the **phono** interconnect cables have a central earthing wire, the P.I.T. **line level** cables do not have this earth.
A phono cable has some different requirements than a line level cable and for optimal performance must NOT be used as such (and vice versa) despite that they look similar.

The choice of cable on the output of the FM 222 is important. While balanced cables all seem the same, they actually are not. Only one type is correct for each interface (because of the different types of balancing employed in electronic components). Only by understanding the circuit's requirements and choosing the correct cable can optimal system performance be guaranteed.
Different types of line level cables for connection of the output of the FM 222 MK-III to a line stage are available. Each one is optimized for connection to the corresponding balanced, pseudo-balanced or unbalanced input of the respective line stage. Make sure that you only use one of the three cable types below. Only in this way optimal interconnection is guaranteed.

CA-25041	XLR F - RCA/Phono M	0.6m	For connection to unbalanced equipment
CA-25042	XLR F - RCA/Phono M	1.2m	For connection to unbalanced equipment
CA-25043	XLR F - RCA/Phono M	3.0m	For connection to unbalanced equipment
CA-25044	XLR F - RCA/Phono M	5.0m	For connection to unbalanced equipment

CA-25091	XLR F - XLR M	0.6m	For connection to pseudo balanced equipment
CA-25092	XLR F - XLR M	1.2m	For connection to pseudo balanced equipment
CA-25093	XLR F - XLR M	3.0m	For connection to pseudo balanced equipment
CA-25094	XLR F - XLR M	5.0m	For connection to pseudo balanced equipment

CA-25101	XLR F - XLR M	0.6m	For connection to true balanced equipment
CA-25102	XLR F - XLR M	1.2m	For connection to true balanced equipment
CA-25103	XLR F - XLR M	3.0m	For connection to true balanced equipment
CA-25104	XLR F - XLR M	5.0m	For connection to true balanced equipment

Other lengths made to order.

Attention

In several countries fake copies of P.I.T. cables are offered. The copyists (and actually even some other cable makers...) fail to understand why different "balanced" cables are required (because of the type of balancing employed in the associated electronics - not all balancing is identical!). The copyists do - who would have thought... - not make this differentiation.
A fake copy may appear similar to the original because the cable exterior and connectors look similar (differences are not obvious visually). However, fake cables may lack the identification number (a printed white tag around the cable near one of the connectors). Since April 2007 the cables also have a Serial No. (printed on a white tag) and a non-visual coding. This coding system can be verified only by official FM ACOUSTICS distributors.
If the cable does not come in the blue velvet pouch printed "Precision Interface Technology" it is an alert.
While fake cables are somewhat cheaper it is not worth falling in this trap and ending up with non-optimal system interfacing, hum or interference just to save a a few Swiss Francs.

SPECIFICATIONS FM 222 MK-III

Circuitry

Proprietary, highest purity, discrete, enhanced Class A circuitry using hand-selected high-speed semiconductors. These are individually analysed, selected and are then subjected to FM ACOUSTICS' exclusive listening selection process. Built with FM ACOUSTICS' hand-calibrated precision Class A modules.

Inputs

Two true balanced, fully symmetrical inputs with precision cartridge loading.
Electronically balanced discrete Class A circuitry, floating ground, non-inverting or inverting connection; works perfect with any balanced as well as single-ended connection.
Single-ended sources are automatically converted to true balanced right at the input of the FM 222 MK-III as it automatically recognizes what connection standard is employed.

Input stage common mode rejection

110 dB typically; 95 dB 20 Hz to 20 kHz.

Input impedance / Cartridge loading

Variable. Unlimited combinations for both balanced as well as single-ended sources. Resistance and capacitance load is set by recessed front panel DIP switches. Replaceable resistance module allows infinite combinations.
Standard module:
MC cartridge: 180 / 90 / 45 / 35 Ohm
MM cartridge: 100 / 47 / 33 / 24 KOhm

Headroom

+24dB ref 0dBv (34VPP, 12VRMS)

Gain

MC input to output 1kHz: 52 dB / 62 dB (with +10dB switch). If required, internally adjustable to other values.

Gain switch

+10dB additional gain

Input Sensitivity

at 1 kHz: 250uV (79 uV with + 10dB switch)

Bandwidth

With internal RF filter: 1 Hz - 100 kHz
The frequency response of the FM 222 MK-III extends from less than 1 Hz to 400 kHz.
The actual frequency response of the preamplifier, however, is intentionally attenuated above 100 kHz with a linear-phase anti-RF circuit.

Hum and Noise

Equivalent input noise below full output
22Hz - 22kHz: -137 dBu

LF Filter

12 dB/octave Linear-Phase Filter.
No negative influence on audio signals.

RIAA accuracy

In RIAA setting better than
+/- 0.05 dB over full frequency range.

Outputs

Electronically symmetrical, balanced, discrete Class A outputs. Drives any balanced or unbalanced line stage. Automatically recognizes what connecting standard is used and adjusts itself for optimal performance.

Output drive capability

+ 24 dBu ($12V^{RMS}$) into 5 KOhm balanced load

Recommended load impedance

>600 Ohm

Stereo separation

70 dB

Distortion

At 1V (+1.2dBu) out: unmeasurable,
at +10dBu out : 0.005%
No higher order harmonics at all (up to clipping level)

Power

Supplied from FM 266 / FM 268 or from optional FM 203 power supply

Mains voltage

either 115V or 230V, 50-60 Hz

Mains overvoltage

Maximum short-term: 180% V nominal
Maximum long-term: 130% V nominal

Maximum undervoltage

80% V^{nom} before protection circuitry activates:
Stable operation within a mains voltage range of:
95 V to 140 V (115 V setting)
190 V to 280 V (230 V setting)

Power consumption

10 W continuous

Operating temperature

-20 to +40°C

Operating humidity

Long-term (non-condensing): 0 - 85%
Short-term: 0 - 95%
Continuous high humidity may shorten lifetime of certain components somewhat

Burn-in time at factory

500 thermal cycles, minimum 100 hours

Vibration test at factory

50'000 vibration cycles, minimum 60 minutes

Front panel

Laser milled, brushed and then hand-polished 9000 aluminium, letters anodized so they can never wear off. Precision, self-cleaning long-life switches, gold-plated resistance module receptables, hand-selected and sealed close tolerance RIAA controls, "Power on" switch and indicator.

Back panel

Laser milled, hand-brushed and polished 9000 aluminium; lettering anodized so it can never wear off. All inputs and outputs are professional XLR-connectors.
Chassis connected to mains earth wire.
Groundlift and additional channel-lift switches eliminate system groundloops.

Connectors

Balanced inputs: female XLR 3-pin

non-inverting:	Pin 1:	ground
	Pin 2:	return (cold)
	Pin 3:	signal (hot)
inverting:	Pin 1:	ground
	Pin 2:	signal (hot)
	Pin 3:	return (cold)

Balanced Outputs: male XLR 3-pin

Pin 1:	ground
Pin 2:	return (cold)
Pin 3:	signal (hot)

In the FM 222 MK-III output circuits automatically adjust according to the connection standard used.

Average Life expectancy

38 years (at 25°C ambient, 10 hours per day, 365 days per year)

Average Life expectancy

Minimum 10 years;
guaranteed availability of 99.8% of all parts ex stock.

Dimensions

446 mm wide / 58 mm high / 280 mm deep

Weight

FM 222 MK-III: 6.0 kg net / 8 kg packed
FM 203: 1.0 kg net / 1.5 kg packed
(power supply)

Applications

Reference phono linearizer/preamplifier control center for restoring work, libraries, mastering studios, true audiophile systems, record collectors, recording studios, laboratory, institutional and a variety of other professional applications.

IEC, DIN and MIL (military) standards of components used:

IEC 68 = 55/155/56
IEC 68 = 55/085/2
IEC 144/IP 65
IEC 40/100/56
IEC 115-1
IEC 384-9
IEC 384-8 IB
IEC 384-2
IEC 68: 55/085/56
IEC 68: 55/200/56
IEC 68: 2-6

DIN 384-4
DIN 40040
DIN 40046
DIN 40050 P 54
DIN 41332 TYPE IIA
DIN 44112
DIN 44356
DIN 45910 PART 1201
DIN 45921-107
DIN 44061

MIL-R-STD 202 method 101, 103, 106, 213, 301
MIL-R-11804/2B/G
MIL-R-22097
MIL-R-10509
MIL-R-55182
MIL-R-22684
MIL-R-45204 TYPE 2
MIL-R-23285
MIL-C-19978 B
MIL-VG-95-295
MIL-S-23190 R.I.N.A. Nr. 5/206/85

"You've never heard it so good"

Due to continuous research on existing products, FM ACOUSTICS LTD. reserves the right to change specifications without further notice.

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