

LUXMAN

Pure Musical Sensation, Pure Audio by Lux

C-05/M-05

Ultimate Series DUO β -CIRCUIT/S Separates



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Archiv Michael-Otto*

LUX CORPORATION

Audio Quality that fulfills the Dream.

We know the true measurements of the minimum performance standards of quality amplifiers must be of a very high level. However, these figures are not the only requirements. Despite every effort to make amp design a pure science, one amp among many with similar absolute specifications can have, relatively, far better sound quality.

The reason: there are more comprehensive theories of amp design which account for such problems as harmonic, intermodulation, cross-over and notch distortions; frequency response; stability; filters; and equilization, as all of them relate to statements of power.

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Whatever the scientific theory, Lux conducts the most scrupulous listening test with engineers and musicians in different fields to ensure that Luxman amps sound best apart from what is considered good in brochures.

To Lux, sound is not only a science but an art. Listen to the ultimate difference at your nearest audio shop.

LUX does not talk much about specifications, but speaks only what a certain product can offer you, and that is all we can explain about the product. It may not be of much help to those who select the product depending on distortion, frequency response, etc. For LUX specifications are not all. At the same time, extended treble or voluminous bass is just a part of expression. Life is given to a music only when all factors are organically combined for reproduction of sound. The value of a product depends on how much its quality can be enhanced. With the C-05 and M-05, totally uncoloured music reproduction is realized with unprecedented tranquility in sonic background. We ourselves are confident that reproduction full of musicality is now realized beyond the kind of music whether from digital or from analog sources. Needless to say, its superb performance owes much to LUX's refined technology represented by "Duo- β " circuitry.

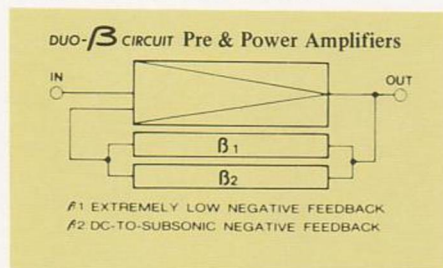
Ultimate Simplicity — "Single-Stage" — Amp Configuration

It begins with the "Duo- β " technology:

How to give a life to music? That might be, first of all, to reproduce music comfortably with ample composure. And this is the beginning of "Duo- β " technology.

Negative Feedback (NFB) is a circuit device to extend bandwidth and to reduce distortion. Once this principle of NFB was discovered, it has been often used as a corrective device rather than as a basic element of circuitry. It can, however, cause as many problems as it can solve. NFB can reduce total harmonic distortion (THD), but at the same time increase transient intermodulation distortion (TIM). TIM is more disturbing to the listener and more conducive to listener's fatigue. A smaller amount of TIM is worse than the same or even more THD.

To make the most of this device, LUX invented our exclusive "Duo- β " circuitry. That is — first to design an amp having inherently good open-loop characteristics and then to apply an optimum amount of NFB (β -1) and our original DC servo circuit (β -2) in the most skillful manner. Beta 1 is a low negative feedback circuit which increases the frequency response, beautifully enhances middle and high frequencies and eliminates audible TIM. Beta 2 uses higher feedback, but operates only at DC-to-subsonic frequencies. The amplifier's damping factor is dramatically improved while low frequency noise is filtered out without losing gain. DC drift is minimized for a tight bass and full tonal balance.



With the C-05 and M-05, such circuit design has been further advanced and reinforced in the form of "Duo- β Circuit/S" by means of "Plus X" power supply and "Single-Stage"

Amp format. All the circuitry is designed without compromise under the firm concept to remove "distortion - modulation of music signal".

Birth of "Single-Stage" Amp

As amps get closer to perfection, such problems are brought to light as how many of various distortions of extremely low level can be removed in the course of amplification. For this purpose, conventionally such methods have been employed as simplification of wiring and elimination of capacitors etc. Now the final solution is given to this problem of simplification of amp in the most laconic form of "Single-Stage" Amplification by removal of one whole stage, not simply by reduced number of components.

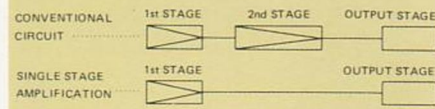
So far the basic amp circuitry has been standardized in such configuration as 1st stage — 2nd stage — output stage. For instance, in the case of equalizer, such high gain as much as 110dB is obtained at the 1st and 2nd stages, and only the impedance is converted without gain at the output. For a huge amount of NFB was needed to improve such static characteristics as distortion, which requires high open-loop gain unobtainable by single-stage amplification.

In the LUX's basic Duo- β concept to apply an optimum NFB to the amp having good original characteristics, neither excessive NFB nor high open-loop gain is required. In fact, we ventured to use at the 1st stage high-gain discrete circuit composed by low-noise transistors, enabling to take out the necessary gain without difficulty. While the output stage is made totally independent to prevent adverse effect on the 1st stage. In this way, we succeeded in removal of the 2nd stage to form an ideal amp having only one stage for voltage amplification.

Roughly speaking, the "Single-Stage" Amp brought about an epoch-making improvement in the following 2 points. The first is a sole earth-referenced amplification circuitry. So far the 2nd stage has been designed as an amp circuit referencing the power supply, and the power supply fluctuates under the influence of variations of input signals, thus causing modulations of music signals. And also the

noises induced from power supply were amplified and reproduced by loudspeakers. Secondly comes elimination of multiple staggers. In the amp circuit each stage employs a stagger to compensate for the treble response. In the case of a 2-stage amp, these 2 staggers interfere with each other, which sharply deteriorates freshness and brilliance of music. Thanks to perfect removal of these 2 problems, an uncountable number of merits were brought about by the "Single-Stage" Amp — dramatic improvement in presentation of musicality, unconditional stability, removal of modulation factor, to name a few.

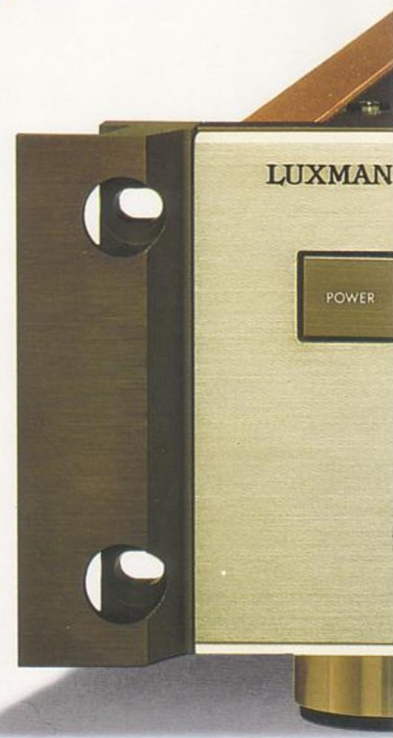
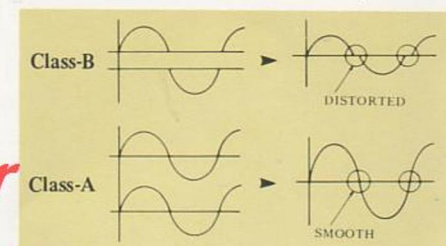
Single-Stage Amp



Pure Class "A"

It is a well-known fact that the Class "A" format is the best among various methods of amplification. Though several merits can be mentioned such as high quality sound, superb treble response, etc., the biggest advantage is in the outstanding characteristics such as low distortion and large damping factor in open-loop circuit.

Recently many manufacturers have been putting on the marketplace various new models under the name of Class "A", but



"Pure Audio" Concept a

most of them are designed under quasi-Class "A" that is virtually Class "AB" totally different from our genuine Class "A". Here depicted are 2 kinds of waveforms. With the pure Class "A" we employ, the signal is

amplified as it is without switching, thus perfectly banishing the switching or crossover distortions associated with quasi Class "A" or Class "AB". The result: No distortion and no colouration at the cost of lavish structure.

Summit of Elaboration—Absolutization of Zero (0) Reference Potential

The earth circuit is the reference point of all operations of amp. All the amplifications are performed on the basis of "earth=0 potential". Immobile earth point is the major premise for such sonic image with steadfast core and clear contour. While the earth potential is not always 0 (zero). In case the theoretical "0" potential in the circuit is taken as the earth point, the amp operates even without grounding, but its minute variations due to constant fluctuations of signal current trigger interference among music signals, thus causing many evils such as blurred sonic image, colouration, degraded auditory S/N, etc. The mutual interference among music signals takes place most conspicuously between the right and left channels. For example, with the common power supply when a large input is fed at the right channel with a small one at the left, both channels interfere with each other following the fluctuations of input level at the right channel. This is caused by a "tottering" at the reference point of operation. Similar interferences take place everywhere inside the amps—among frequencies, amp-stages, positive/negative sides of power supply, etc. With the C-05 and M-05, the common power supply and theoretical middle earth point are totally banished, realizing absolutization of "Reference potential=0" by means of thorough grounding.

Employment of Twin-Monaural Configuration

Both of the C-05 and M-05 feature perfect twin-monaural configuration from the power transformer to the output stage. Two mono amps are independently placed in the right and left channels, enabling to keep all the signal amplification circuits entirely free from interferences across the channels.

Elimination of Theoretical Middle Earth Point

The theoretical middle point, i.e., "0" potential exists in between the $\oplus$ and $\ominus$ potentials of the circuitry. The theoretical middle earth point means to use this point as the immobile "0" potential. To evade sway of this point caused by signal variations, all earth points are individually grounded, and moreover these groundings are made direct to the chassis as grounding to wiring PCB yields high impedance.

Employment of Concentration Earth System

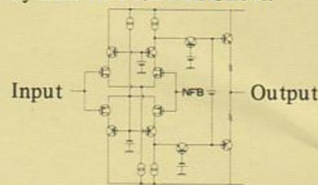
The one-point concentration earth system provides the ideal "0" potential. The earth lines at each stage are concentrated on one point at the centre of the right and left channels. In this way we succeeded in establishment of the fixed, immovable "0" potential at each stage earth point. In addition, non-oxygen copper wires are effectively arranged at all important portions.

Prestige Pre-Amplifier

C-05

All stages—head amp, equalizer and flat amp feature symmetric push-pull class "A" operation, providing extremely stable amplification superb in open-loop characteristics.

C-05 Symmetric Push-Pull Circuit



Flat Amp

As digital audio evolves, many of the good CD's (compact discs) are made available. It is the flat amp section in pre-amp that receives and amplifies the output of this DAD, and also all the other input signals go through this amp stage. In this sense, the flat amp may be called the heart of the pre-amp. In designing the C-05, prime importance was attached to this amp section; "flatness", as the name stands for, to create no variation in sound and musicality, was the fundamental conception. On top of that, literally wide dynamic range is procured to cope with CD's, etc. The difference of dynamic range can be procured only with high S/N ratio not only in specifications but in auditory sensation.

The advantage of wide dynamic range lies in vivid reproduction of 3-dimensional feelings even at the low listening level not to speak of prevention of tonal breakage at the high volume level.

The circuit composition is same as that of the

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nd "Duo- β " Technology Cre

Symmetric Differential, Cascode Push-Pull Operation with S.E.P.P. Output at All Stages

equalizer amp with symmetric differential, double cascode push-pull, 1-stage amp by means of low-noise dual FET, offering the highest Gm, which provides outstanding S/N and unparalleled stability in combination with high-performance operational amp by FET input at the DC servo circuit.

Head Amp

Head amp has the role to amplify low-impedance signals from MC cartridge, and it is not wise to employ FET whose S/N is inferior to that of transistor. Here, specially selected low-noise transistors compose 1-stage amp of differential cascode configuration. The output section features class "A" S.E.P.P. operation by means of a small power transistor with heat-sink, which realizes high S/N and powerful driving capability against load. Despite almost 20-time voltage amplification, total flatness is thus delivered.

Equalizer Amp

The symmetric differential, double-cascode push-pull circuit featuring the low-noise dual FET of the highest Gm exerts 1-stage amplification with the best load resistance, ensuring compatibility of high S/N ratio and low distortion. The equalizer amp reproduces analog discs, and therefore utter importance should be ascribed not only to flatness in amplification but to linearity in RIAA equalization.

Circuitwise, the equalizer amp has the same configuration as the flat-amp based on the idea to combine an ultimate fidelity amp with NFB circuit for RIAA equalization, which makes it possible not simply to realize the flatness in frequency response, but to provide ample allowance to NFB load and low impedance at the output. In this way, even the nuance or atmosphere of music given by

recordists can be reproduced without difficulty. In addition, removal of output capacitor totally banishes harmful inter-stage sonic colouration. Also the linearity in treble range is ameliorated to make the most of the superb recording characteristic one of the salient features of analog disc.

Power Supply Section

The power supply section is so designed as to provide compatibility between high-speed response and massive stabilization capability. First a large, circular power transformer offering good regulation is arranged independently for the right and left channels, and the chemical capacitors lowest in leakage and distortion are severely selected for the signal treatment.

The polarity is strictly controlled at the primary as well as secondary sides of the transformer. Exclusive power supply is individually employed at the head-amp and servo circuit.

Aluminium Chassis & Select Componentry

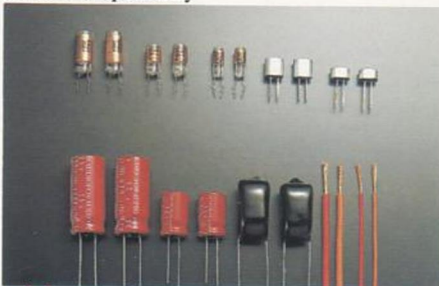
In the case of the C-05, not merely the interference distortion but magnetic distortion are entirely eliminated thanks to thorough aluminium chassis employing double-layer construction with copper plate at important sections. Needless to say, the copper plate is firmly fixed to the chassis preventing subtle vibrations. Extension shafts are generously used for the selector switches to minimize noxious wirings. As to the componentry,

polarity is controlled even for the film capacitor that is understood to have no polarity, and non-oxygen copper wires are effectively adopted. All input and output terminals are gold-plated to reduce contact resistance. The input attenuator features precision detent-volume excellent in linearity and sound quality.

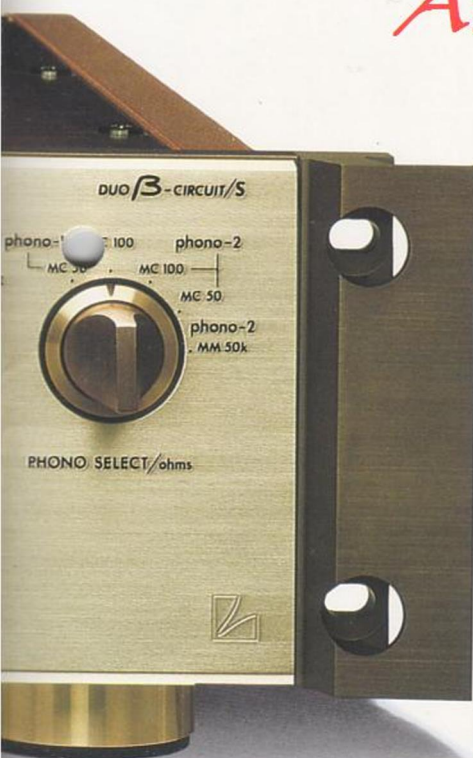
Aluminium Chassis



Select Componentry



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reated Such Musicality!!

Prestige Power Amplifier

M-05

The most conspicuous feature of the M-05 consists in the gigantic output power 105W + 105W under pure Class "A" configuration by means of fixed bias current.

Of late many manufacturers have been introducing so-called class "A" amps, but most of them are virtually of class "AB" operation just to show ostensible high power quite different from our genuine class "A". With the M-05, pure class "A" circuit is operated with abundant application of fixed bias current, and music signals are amplified as they are.

Exclusive designed, huge heat-sink block and large noiseless cooling-fan for medical use make it possible to take out with ease such

Huge Output under Genuine Class "A" Operation with Perfect Twin-Monaural Configuration

high power as 105W per channel. In fact, the entire capability exceeds 400W + 400W in terms of class AB operation.

In case of the BTL (Duo-Alpha) connection, you can take out 400W in the monaural mode. Even in this case, sonic quality remains unchanged thanks to high-quality BTL inverter amp. Such sumptuous system is now made possible as if 2 separate amps were used for one channel.

Amplification Stages

The pre-driver stage is composed by cascode boot-strap differential 1-stage amp by dual FET, while the driver and output stages feature S.E.P.P. system by means of 3-stage

Darlington connection.

For the output stage, high-speed power transistors excellent in linearity are arranged in triple push-pull configuration.

Power Supply Section

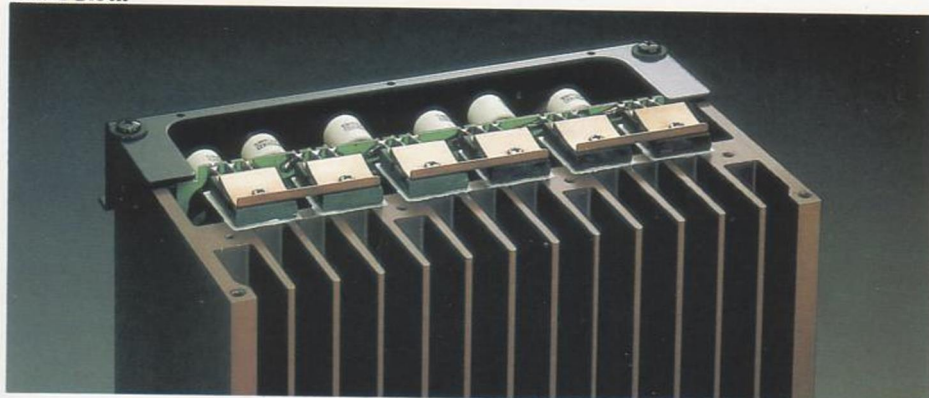
To support high quality class "A" power, the power supply is placed independently for the right and left channels. The power transformer of large capacity is specially designed, whose inside is solidified by silicon sand to suppress temperature rise. Needless to say, perfect control is rendered on wirings for both of the primary and secondary sides. 2 large chemical capacitors for audio use are employed in each channel. The constant voltage circuit for the pre-driver stage and servo circuit is composed by 1-stage amp regulator, ensuring steadfast power potential and real-time instantaneous response to an abrupt large input signal. Mutual interference is thoroughly eliminated, e.g., employment of separate windings on the right and left channels in the transformer, etc.

Generous Construction

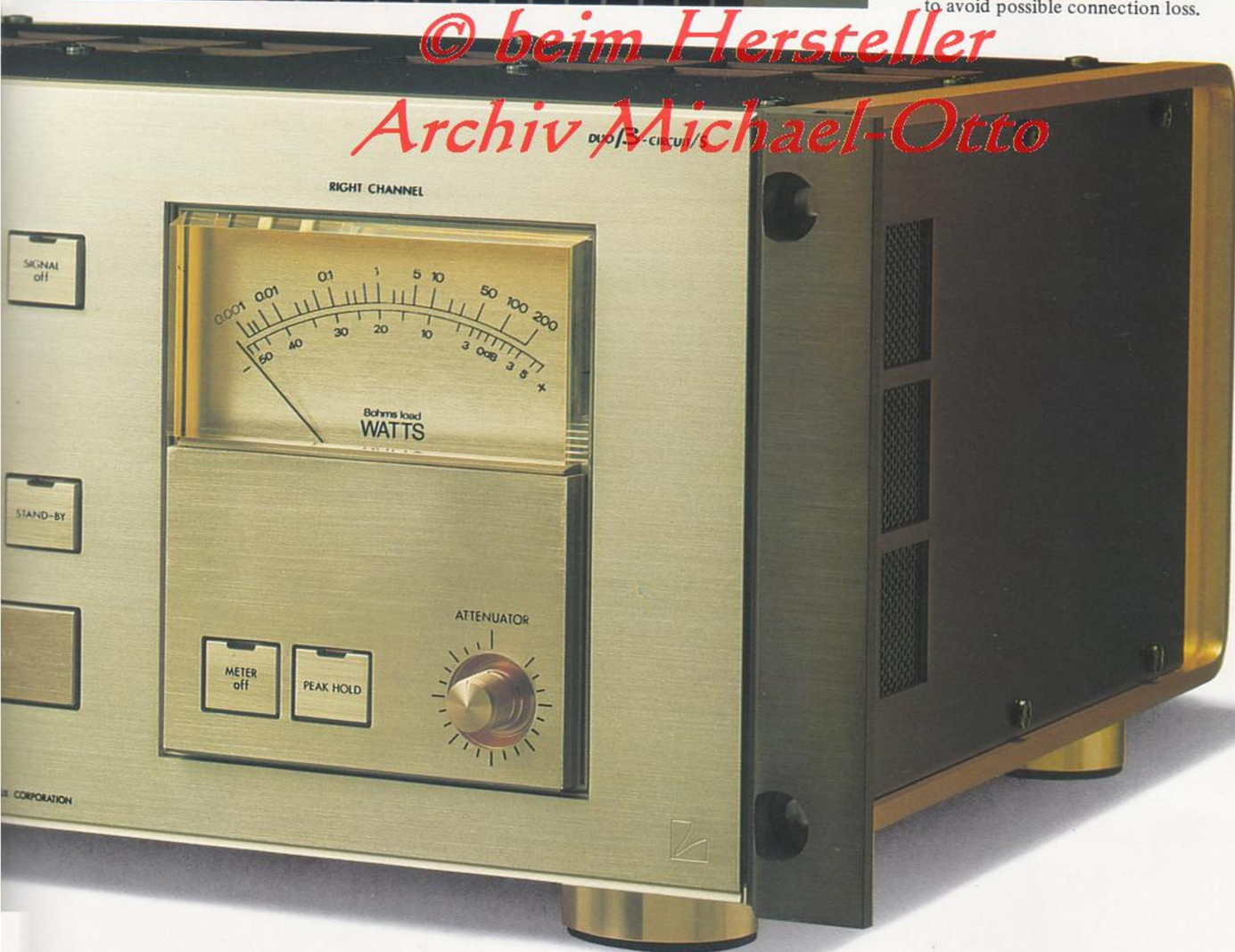
Like the case of the C-05, select componentry is ungrudgingly applied to remove magnetic distortion.

At all vital points, copper plates are firmly fixed to the chassis, and all capacitors, resistors and even wiring material are carefully selected with strict control on sonic quality. Newly designed big speaker terminals ensure easy hook-up with stout speaker cord allowing to avoid possible connection loss.

Power Block



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*Rack-Mount Attachments LM-05C/M - Optional Accessories

SPECIFICATIONS C-05



Input Sensitivity & Impedance	PHONO-MC	100 μ V	500 Ω /100 Ω
	PHONO-MM	2mV	50k Ω
Rated Output Voltage & Output Impedance	DAD/LINE/TUNER/MONITOR	150mV	47k Ω
	REC OUT	150mV	100 Ω
PHONO Overload (1kHz, RMS)	PRE OUT	1.5V (nominal)/18V (max.)	39 Ω
	PHONO-MC	12.5mV	
Frequency Response	PHONO-MM	250mV	
	PHONO-MC	20Hz-20kHz ($\pm$ 0.2dB)	
Total Harmonic Distortion (20Hz-20kHz, VOL. -30dB, Output 2V)	PHONO-MM	20Hz-20kHz ($\pm$ 0.2dB)	
	DAD/LINE/TUNER/MONITOR	2Hz-100kHz ($\pm$ 0.5dB)	
PHONO Overload (1kHz, RMS)	PHONO-MC	no more than 0.01%	
	PHONO-MM	no more than 0.005%	
Frequency Response	DAD/LINE/TUNER/MONITOR	no more than 0.002%	

Rated I.M. (2V Output, SMPTE 60Hz:7kHz=4:1)	no more than 0.005%
Signal-to-Noise Ratio (IHF, A-weighted)	PHONO-MC better than 80dB (250 μ V)
	PHONO-MM better than 90dB (5mV)
Additional Features	DAD/LINE/TUNER/MONITOR better than 110dB (1V)
	Signal-Off Switch
Dimensions	Warm-Up Indicator
	460mm(W) x 442mm(D) x 135mm(H)
Weight	Net 11.0kgs
	Gross 13.0kgs
Optional Accessories	Rack-Mount Attachments Kit
	LM-05C, Wooden Cabinet W-05C

SPECIFICATIONS M-05



Power Output	105 watts in genuine class-A mode minimum continuous per channel, both channels driven into 8 Ω loads, 20Hz - 20kHz, with no more than 0.008% total harmonic distortion
	400 watts in class-AB mode minimum continuous, reserving genuine class-A operation up to 105 watts, driven into 8 Ω loads, 20Hz - 20kHz, with no more than 0.008% total harmonic distortion
Power Output at BTL (Duo-Alpha) Monaural Connection	
Rated I.M. (8 Ω , 105W/ch, SMPTE 60Hz:7kHz=4:1)	no more than 0.008%
Power Bandwidth (IHF, -3dB, THD 0.2%)	5Hz - 60kHz
Gain	32dB
Frequency Response	10Hz - 100kHz (+0, -1.5dB)
Signal-to-Noise Ratio (IHF, A-weighted, input short-circuited)	better than 120dB
Input Sensitivity	750mV
Input Impedance	DIRECT-IN/300k Ω
Damping Factor (8 Ω , 1kHz)	ATT-IN/45k Ω
	180

Slew Rate	20V/ μ sec
Additional Features	Power Peak Meter with Peak-Hold Facility (Meter-Off Switch provided)
	Exclusive Output Terminals for Electrostatic Speaker System
Protection Circuitry	Signal-Off Switch
	BTL (Duo-Alpha) Monaural Connection
Dimensions	Selector Switch
	Subsonic Filter (15Hz, -6dB/oct.)
Weight	Direct-In/Att-In Selector Switch
	Warm-Up Indicator
Optional Accessories	STAND-BY Pre-Heating Facility
	DC-Drift Detecting Speaker System Protection Circuit
Current Detecting Amplifier Protection Circuit	Heat Sensing Amplifier Protection Circuit
	460mm(W) x 437mm(D) x 210mm(H)
Net 40.0kgs	Gross 44.5kgs
	Rack-Mount Attachments Kit
LM-05M, Wooden Cabinet W-05M	

*Specifications and appearance design subject to change without notice.

AUTHORIZED DEALER



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