National Technics

SL-1000MKII

Quartz Phase-Locked Control Direct Drive Turntable with Variable Dynamic Damping Tonearm and Obsidian Base

Built For Perfectionists

Even the Best Conventional Tu
the Performance or Reliability

Technics, the manufacturer that developed the world's very first direct drive turntable as long ago as 1970, now proudly presents a turntable system that is bound to become the standard of excellence in professional installations. Quartz-controlled electronics, extremely high torque direct drive motor, dynamic damping, ruby bearing tonearm, and obsidian base are utilized as the latest

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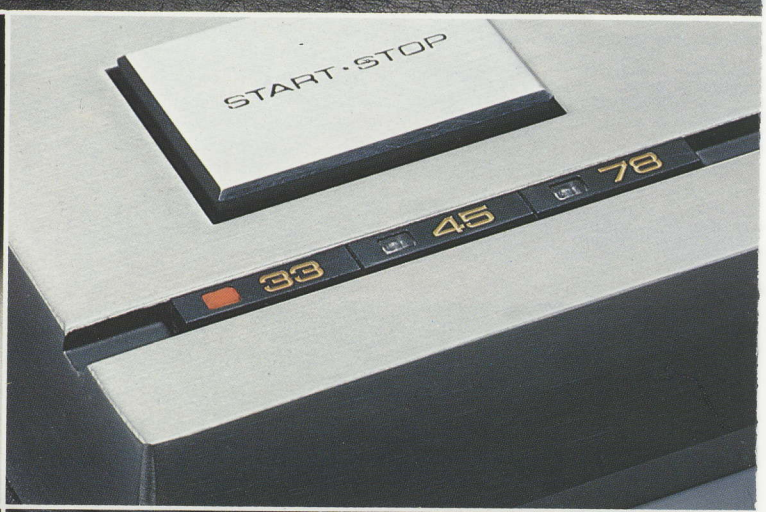
advances in their respective fields of technology to achieve a level of total performance that until quite recently would have been deemed unobtainable. Hard on the borderlines of physical possibility, the SL-1000MKII removes all limitations in the accuracy of record reproduction other than those inherent in the records themselves. The SL-1000 MKII is as reliable as it is precise.


START·STOP
Technics


START·STOP
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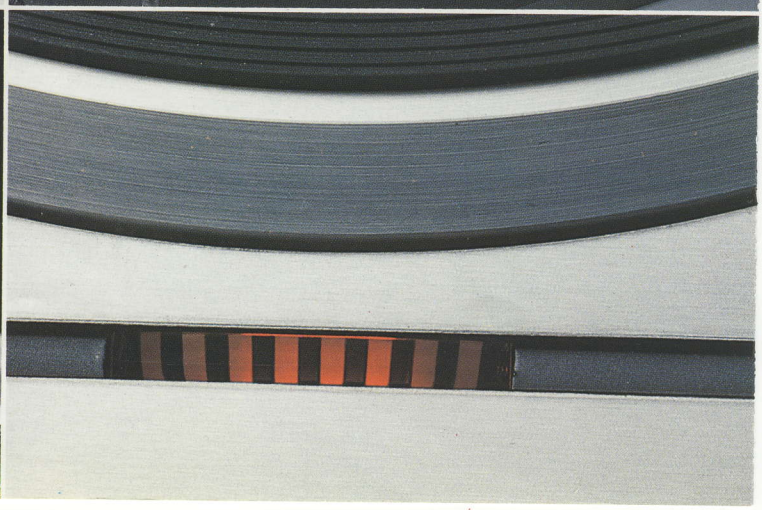
78


616-1K
KSS

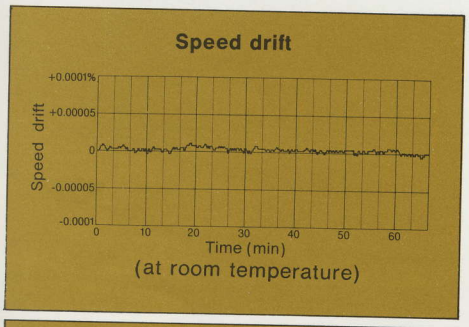


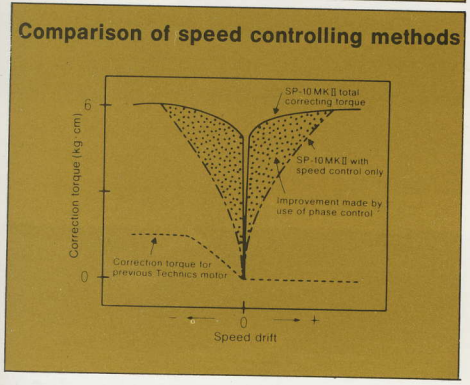
The Turntable: The Famous SP-10MKII

Quartz Phase-Locked Control of Extremely High Torque

Quartz Reference Maintains 99.998% Speed Accuracy.

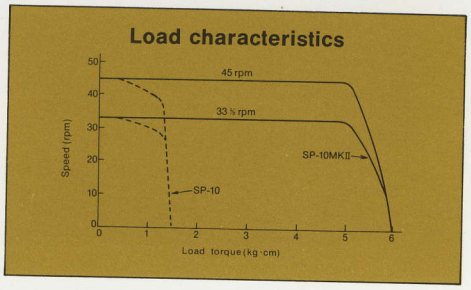
Over the 30 minute program time of a generous LP side, the SL-1000MKII errs by as little as thirty-six one-thousandths of a second, meaning that its speed drift remains within ±0.002 percent, much too small to be detected by a stopwatch and certainly not by ear. This extreme speed accuracy is achieved by using the most advanced time-keeping method known: reference to an oscillating quartz crystal. Elaborate servo electronics, employing the phase locked loop and circumference integral type push-pull FG for delay-free servo action, keep the turntable speed independent from fluctuations in AC line frequency, drag load, temperature, humidity or any other external factor.





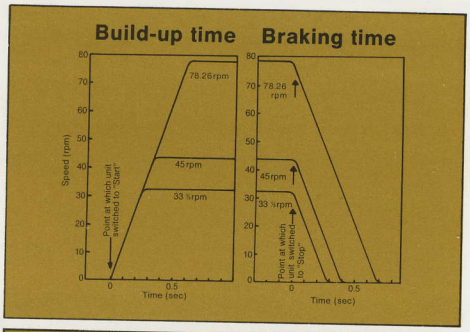
Extremely High Torque Overcomes Changes in Drag Load.

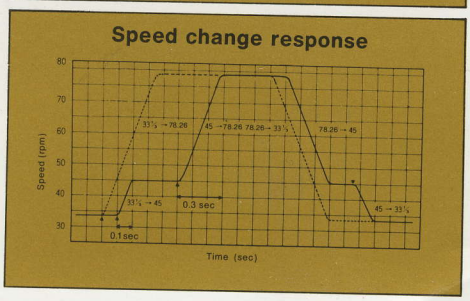
The drag load on a turntable is by no means constant, it varies substantially as arm-type cleaning devices or hand held brushes are applied. Changes in load can cause momentary speed changes which make themselves heard in an unsteady, vacillating, "muddied" sound quality. The SL-1000MKII motor delivers an enormous amount of corrective torque (6 kg·cm) and no speed fluctuation will be found up until 5 kg·cm drag load. Even 500 arms tracking at 2 grams each, for a total of 1 kg of tracking force, could not slow it down appreciably.



Instantaneous Start in 0.25 sec and Stop in 0.3 sec

Within 0.25 of a second, the platter reaches the rated 33-1/3 rpm speed from standstill thanks to the tremendous starting torque of 6 kg·cm. Expressed differently, the platter reaches rated 33-1/3 rpm speed after only 25 degrees or less than 1/14 of a turn. This is important in professional applications where split-second cueing is required. The graph below indicates how rapidly the SL-1000MKII reaches any of its three rated speeds from standstill, but also how quickly it brakes to a stop. For this, it is equipped with a electromechanical dual braking system. It comes to a dead stop in only 0.3 of a second.





Single-Row, Quarts Controlled Stroboscope

Not controlled by the unstable AC line frequency that often causes misreadings, but rather governed by the extremely stable quartz oscillator, the stroboscope gives a true indication that the platter is rotating at exactly rated speed. Only a single row of strobe markings is needed.

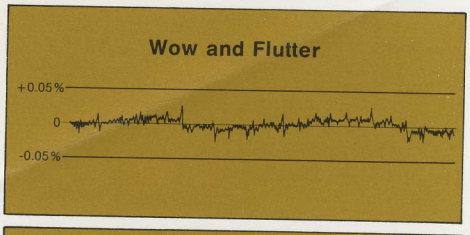
Remote Control for Instantaneous Start and Stop

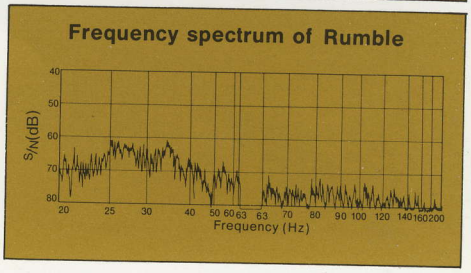
The turntable can be started and stopped via a cable-connected remote control unit.

What Performance Data Can You Expect?

Wow and Flutter:
0.025% (JIS C5521) WRMS
±0.035% (DIN 45507) weighted, zero to peak
Rumble:
−50 dB (DIN 45539A)
−73 dB (DIN 45539B)

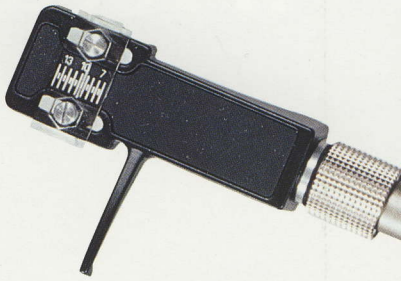
These figures speak for themselves.
Further details on the drive system and its quartz phase locked servo loop can be found in the SP-10MKII product information sheet.





The Tonearm: EPA-100

Variable Dynamic Damping Universal Tonearm with Ruby Ball Bearings



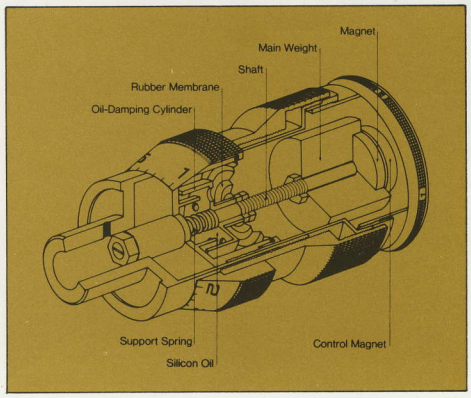
Tonearm Principles Re-Thought: Technics Introduces the World's First Variable Dynamic Damping.

The EPA-100 Tonearm (which is the model designation of the tonearm installed in the SL-1000MKII) is a unique universal tonearm developed for both hi-fi enthusiasts dissatisfied with the best conventional tonearms and for music lovers with ears sensitive to the faintest tonal difference.
1) To minimize trouble caused by tonearm partial vibrations and low-frequency resonance incidental to any arm/cartridge assembly, and to obtain optimum damping in accordance with the compliance of the cartridge used, the main weight is supported via a spring on one side and floated by magnets on the other, thereby reducing the resonance steepness (Q) to a minimum. In addition, the spring is damped by viscous silicon oil whose visco-elasticity is, in turn, increased by an oil damping cylinder and rubber membrane. With this variable dynamic damping device, low-frequency intermodulation distortion and subsonic noise are effectively suppressed.
2) To achieve minimum friction and maximum accuracy, an extremely sensitive gimbal suspension is employed. It is provided with four bearings, each of which has five accurately-finished "Ruby" balls. The pivots also incorporate shock-resisting springs to protect the twenty precious ruby balls.
3) The tubular arm is made of nitrogen-hardened titanium (titanium-nitride), combining a high degree of mechanical rigidity with extreme lightness. The nitrogen-hardened titanium tubular arm has outstanding attenuation characteristics against vibrations without a high-frequency resonance peak. The EPA-100, developed from intensive research into tonearm/cartridge vibration characteristics, is the world's first truly "universal" tonearm.

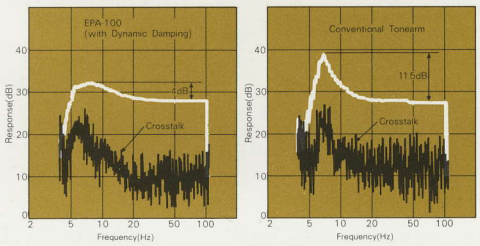
World's First Variable Dynamic Damping System

The counterweight at the rear of the tonearm is equipped with a built-in dynamic damping device. This device is a variable dynamic damping system designed to adjust damping to an optimum level in accordance with the resonance frequency of the arm/cartridge assembly.

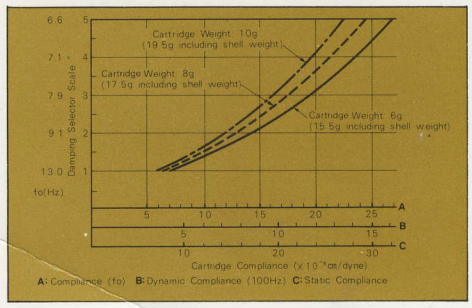
The main weight is supported via a spring on one side and floated with magnets on the other. In addition, the spring is damped by viscous silicon oil. An oil damping cylinder enhances the visco-elasticity of the oil. This elaborate design keeps the resonance steepness (Q) to a minimum. As the resonance frequency of the arm/cartridge assembly, however, is affected by the weight and compliance of the cartridge used, the counter-weight is provided with our unique variable magnetic damping selector. The distance between two magnets, one attached to the main weight itself and the other mounted to a helicoid selector knob, can be varied, thereby adjusting the resonance frequency of the main weight to that of the entire arm/cartridge assembly. The result is reduced subsonic noise and intermodulation distortion often caused by warped records etc.



Comparison of frequency response at low frequency range



Adjustable range of damping selector in accordance with cartridge compliance



Damping Selector Scale	Cartridge Compliance (100Hz Dynamic)
4～5	more than 15 x 10^{-6} cm/dyne
2～4	10～15 x 10^{-6} cm/dyne
1～2	5～10 x 10^{-6} cm/dyne

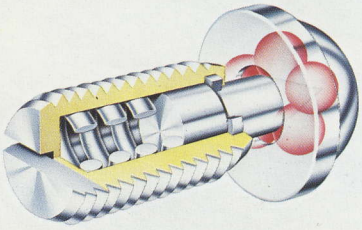
Ultra-Low Friction with Ruby Ball Bearing Suspension

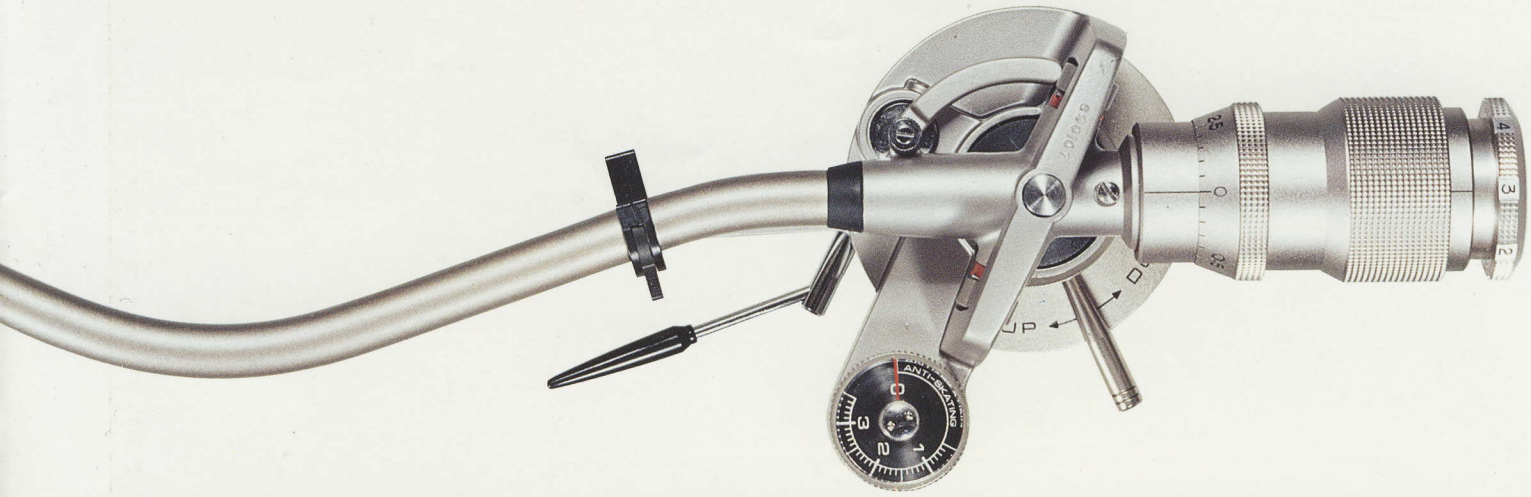
The high-precision sensitive gimbal suspension employs ruby ball bearings at each of four horizontal and vertical pivots. These ruby balls, five in each bearing, have been finished to a roundness tolerance of ±0.5μ and their friction coefficient is only one fifth that of conventional steel balls, reducing the static friction of the suspension to a negligible minimum.

As a result, this gimbal suspension construction eliminates such defects as sensitivity deterioration and cartridge dislocation, often found with one-point suspension oil damping construction, and achieves outstanding tracking ability. The pivots are of the anti-shock-structured type with coil spring to absorb shock both to pivot themselves and to the ruby ball bearings. The combination of these pivots with ruby ball bearings is another world's first.

Comparison of physical properties

	Ruby	Diamond	Steel	Quartz	Glass
Coefficient of Friction (Value against High-Carbon Steel)	0.14	—	0.35 | 0.4	0.8	0.5—0.7
Hardness Mohs'	9	10	—	7	5.5—6.5
Elastic Modulus (10^{-4}kg/cm²)	5	9	—	0.76	0.5—0.8





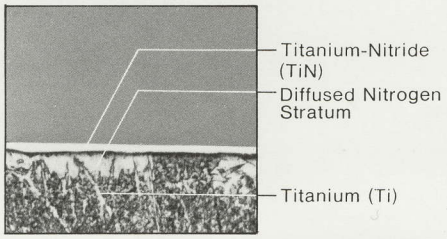
World's First Nitrogen-Hardened Titanium Tublar Arm

Light, rigid titanium, originally developed for aerospace applications, is here employed as tubular arm material for the first time in the world. The titanium tube, 9.5 mm in outer diameter and 0.5 mm thick, is light in weight—only 85% of conventional aluminum tubes. Furthermore, it has great internal loss. Finally, this titanium tube is specially nitrogen-hardened to increase its rigidity. The mechanical strength and low effective mass of the arm virtually eliminate partial vibrations arising from bending or twisting. Really an ideal tubular arm design.

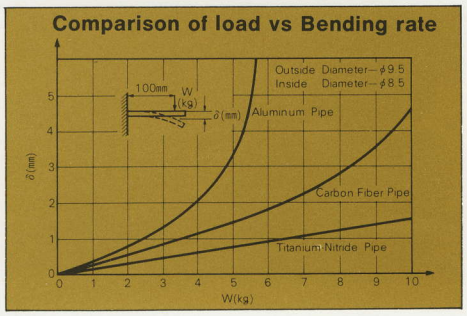
Comparison of Vickers' hardness

Material	Vickers' Hardness (kg/mm²)
Titanium-Nitride	more than 1500
Titanium	200
Aluminum	50
Carbon Fiber	30

Sectional view of titanium-nitride tubular arm



Photographed at 200X magnification



Other Features of the Tonearm

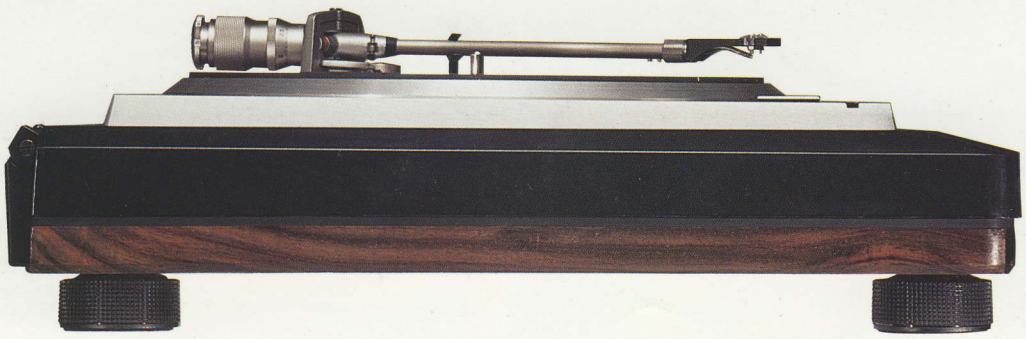
1) Precision Processing and Finish Worthy of a High-Quality Tonearm
2) Helicoid Tracking Force Adjustment and Helicoid Arm Height Adjustment
3) Heavy Zinc Diecast Arm Base
4) Light, Vibration-Proof Aluminum Diecast Headshell
5) Easy-to-Adjust Anti-Skating Control
6) Arm Rest with Spring-Loaded Steel Ball Clamp
7) Low-Capacitance Phono Cables with Gold-Plated Connectors

The Base: SH-10B3

Obsidian Turntable Base with 3-layered Construction

Combating Acoustic Feedback with a New Level of Efficiency: the Obsidian Base and Its Three-Layer Construction

Designated model SH-10B3, the base of the SL-1000MKII turntable system is a vital part contributing to the overall performance. Its surprisingly great weight of 12 kg already indicates its chief design objective: to prevent acoustic feedback—vibrations originating at the loudspeakers and returned to the pickup cartridge via the air or floor and through the turntable base. But weight is not the primary consideration; the base consists of three layers of material, i.e. obsidian stone, rubber, and wood, each absorbing vibrations at a different area of the frequency spectrum, and together making the SL-1000MKII virtually feedback proof. Even at very high volume levels, there should never be an acoustic feedback or "howling" problem. Towards this end, specially designed, vibration absorbent legs are also provided. Also note the heavy one-piece acrylic dust cover which effectively shields the pickup system from feedback transmitted through the air.



Technical Specifications

TURNTABLE SECTION (SP-10MKII)

Type	Direct drive turntable
Motor	Quartz phase-locked control brushless DC motor
Turntable platter	Aluminum diecast, diameter 32 cm (12-19/32''), weight 2.9 kg (6.4 lbs), moment of inertia 380 kg·cm^2 (130 lbs·in^2)
Turntable speeds	33-1/3'', 45, and 78.26 rpm
Starting torque	6 kg·cm (5.2 lbs·in)
Starting time	0.25 sec (=25° rotation) to 33-1/3 rpm
Braking time	0.3 sec (=30° rotation) from 33-1/3 rpm to standstill
Speed fluctuation due to load torque	0% within 5 kg·cm (4.3 lbs·in)
Speed drift	Within ±0.002%
Wow and flutter	0.025% (JIS C5521) WRMS ±0.035% (DIN 45507), weighted zero to peak
Rumble	−50 dB (DIN 45539A) −73 dB (DIN 45539B)

TONEARM SECTION (EPA-100)

Type	Variable dynamic damping universal tonearm
Suspension	Gimbal suspension with 20 precision ruby ball bearings
Arm pipe	Nitrogen-hardened titanium (TiN) tubular arm
Effective length	250 mm
Total length	322–350 mm
Height adjustment range	42–90 mm (Range of helicoid mount is 6 mm.)
Overhang	15 mm
Lateral tracking error angle	+1.1° at the inner groove of record +2.1° at the outer groove of record
Friction	5 mg (lateral, vertical)
Effective mass	22g with a cartridge weighing 6.5 g at 1.25 g tracking force
Resonance frequency	9.8 Hz with a cartridge compliance of 12×10^{-6}cm/dyne (cartridge weight: 6.5 g, tracking force: 1.25 g)
Resonance (Q)	Below 6 dB (optimum adjustment)
Damping adjustment	5 selectable positions for cartridge compliance (dynamic compliance, at 100 Hz) 4–5: more than 15×10^{-6}cm/dyne 2–4: $10 - 15 \times 10^{-6}$cm/dyne 1–2: $5 - 10 \times 10^{-6}$cm/dyne Usable as conventional high sensitivity tonearm by means of locking inner weight
Adjustable tracking force	0–3 g
Headshell weight	9.5 g
Pitch of mounting screws	Standard, 12.7 mm (1/2'')
Output terminal	ϕ1.2 mm, 4-pin terminal
Cartridge weight range	5–10 g (with supplied headshell)
Diameter of arm mount	ϕ38 mm

GENERAL

Power consumption	26 VA
Dimensions* (W × H × D)	56 cm × 17 cm × 46.5 cm (22-1/16'' × 6-11/16'' × 18-5/16'')
Weight	26.2 kg (57.8 lbs)

*excluding power unit and remote control unit.

National **Technics**
Matsushita Electric

Specifications are subject to change without notice.

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