

Technics

by Panasonic

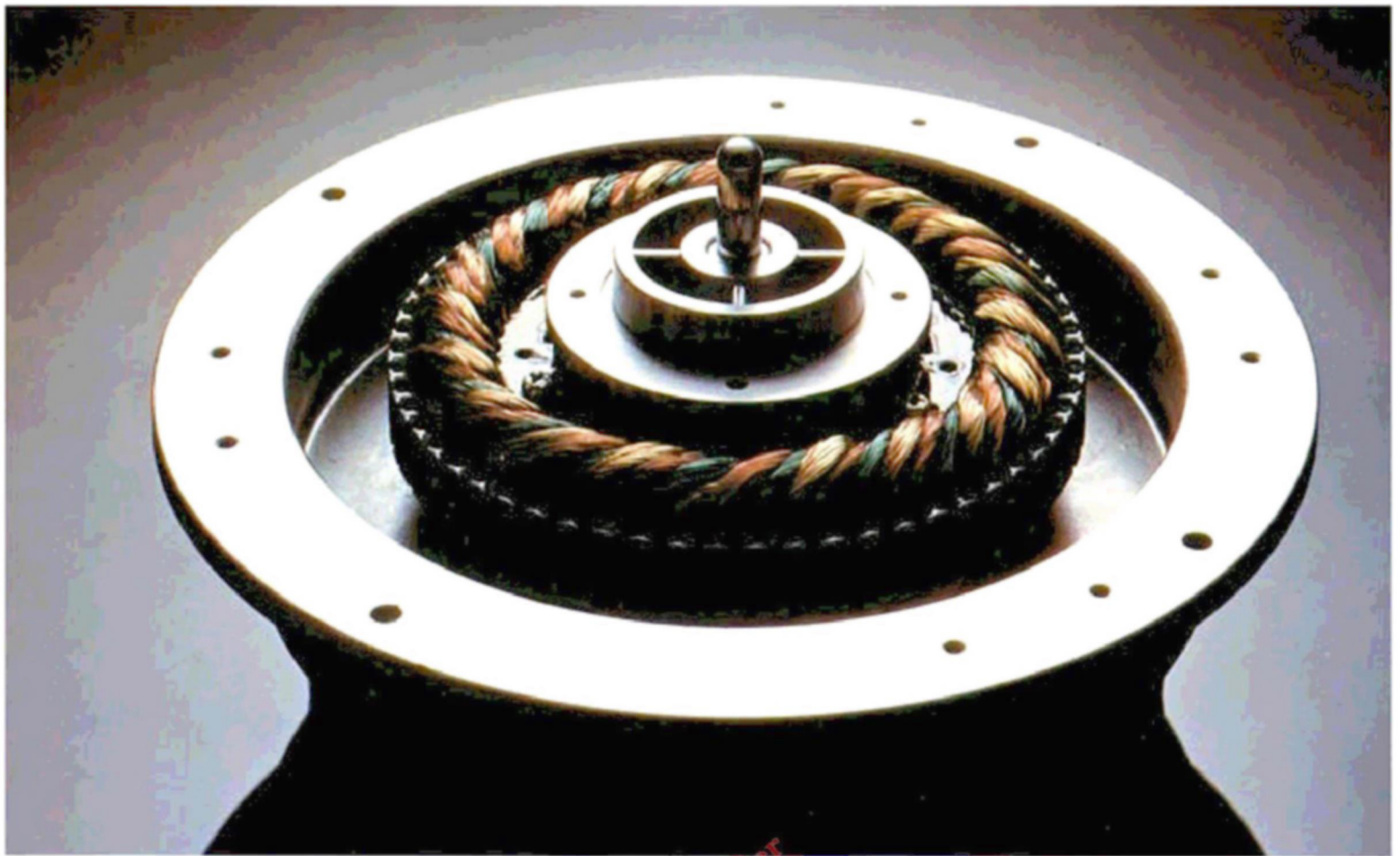
Direct Drive Turntables

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Archiv Michael Otto



Technics
by Panasonic

Direct Drive Automatic Turntable System
SL-1600



Direct Drive: The Idea That Revolutionized the Turntable

When Technics first introduced the direct drive turntable back in 1969, we were sure that our new drive design would revolutionize turntable manufacture. Subsequent history has shown that we were correct. The direct drive system was so much of an improvement over the old way that it just couldn't be ignored, and the rest of the audio world was quick to imitate us. Today the direct drive turntable has become the industry standard, and it's no wonder. Just take a look at the direct drive advantages.

Greater Simplicity

In the Technics integral rotor-platter structure direct drive system, the platter serves as the rotor and the motor housing serves as the stator. Thus, the platter is the only moving part. No pulleys, no belts, and no idlers are needed to drive the platter. Construction is greatly simplified and overall precision is much greater. And with fewer parts to wear out, reliability and service life is vastly improved.

Greater Efficiency

The direct drive motor runs at an ultra-slow speed since it need rotate no faster than the platter. This reduces mechanical wear and stress, causes less evaporation of lubricants, and creates much less vibration. The brushless DC motor has a power consumption 90% lower than conventional motors. This means much less trouble causing heat and lengthened service life of all parts. And the elimination of the AC motor means the elimination of hum and power line frequency variations as a source of speed inaccuracy.

Higher Performance

The real payoff is in performance. The simple construction of the direct drive system enables much more precise construction and easier quality control. This has permitted the reduction of wow and flutter to spectacularly low levels and the total elimination of rumble as a source of interference. As you can see, it is no exaggeration to say that the Technics direct drive turntable has revolutionized the world of turntables.

GENERAL

Power supply:	AC 120 V, 50/60 Hz
Power consumption:	6 W
Dimensions: (H × W × D)	12.5 × 45.3 × 36.9 cm (4-15/16" × 17-12/16" × 14-9/16")
Weight:	8.8 kg (19.4 lb.)

SL-1600

TURNTABLE SECTION

Type:	Direct drive fully-automatic turntable
Motor:	Electronically controlled brushless DC motor
Turntable platter:	Aluminum diecast; 33 cm (13") diameter
Turntable speeds:	33 $\frac{1}{3}$ and 45 rpm
Speed change method:	Electronic change
Variable pitch controls:	Individual adjustment controls, 10% adjustment range
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)

ONEARM SECTION

Type:	Universal S-shaped tubular arm, static-balanced type, direct-reading tracking force adjustment, with anti-skating force control device, oil-damped cueing device
Effective length:	23 cm (9-1/16")
Overhang:	1.5 cm (19/32")
Friction:	7 mg (horizontally and vertically)
Effective mass:	22 g (6.0 g cartridge weight, 1.75 g stylus pressure)
Tracking error angle:	Within +3° (at the point of 14.5 cm or 5-45/64" from the centre), +1° (at the point of 5.5 cm or 2-3/16" from the centre).
Offset angle:	21.5°
Adjustable tracking force:	0-3g
Cartridge range:	5-11 g
Headshell weight:	9.5 g

GENERAL

Power supply:	AC 120 V, 50/60 Hz
Power consumption:	6 W
Dimensions: (H × W × D)	12.5 × 45.3 × 36.9 cm (4-15/16" × 17-12/16" × 14-9/16")
Weight:	9.0 kg (19.8 lb.)

SL-1100AC

TURNTABLE SECTION

Type:	Direct drive turntable
Turntable material:	Dynamically-balanced aluminum diecast
Diameter:	35 cm (13-25/32")
Inertial moment:	7.7 kg/cm ² (109.5 lb-in ²)
Weight:	2 kg (4.4 lb.)
Turntable speed:	33 $\frac{1}{3}$ and 45 rpm

Motor:	20 poles (rotor), 15 poles (stator), ultra-low-speed DC brushless motor
Speed change method:	Electronic change
Variable pitch control:	±5% adjustment range, individual adjustment by variable resistor
Wow and flutter:	Less than 0.03% WRMS
Rumble:	Better than -50 dB (DIN A) -70 dB (DIN B)
Build-up time:	Within $\frac{1}{2}$ rotation at 33-1/3 rpm

ONEARM SECTION

Type:	Static-balanced tubular
Tracking force control:	0-5 g, direct reading type
Anti-skating device:	Yes
Cueing control:	Viscous-damped
Cartridge headshell:	Universal type
Effective length:	23 cm (9-1/4")
Overhang:	1.4 cm (35/64")
Tracking error angle:	Within ±1.75°

GENERAL

Power supply:	AC 120 V, 60 Hz
Power consumption:	4 W
Player base:	Aluminum diecast with audio insulated legs
Dimensions: (H × W × D)	19.5 cm × 51 cm × 39 cm (7-11/16" × 10-3/32" × 15-3/8")
Weight:	13 kg (28.7 lb.) (including dust cover)

SP-10MKII

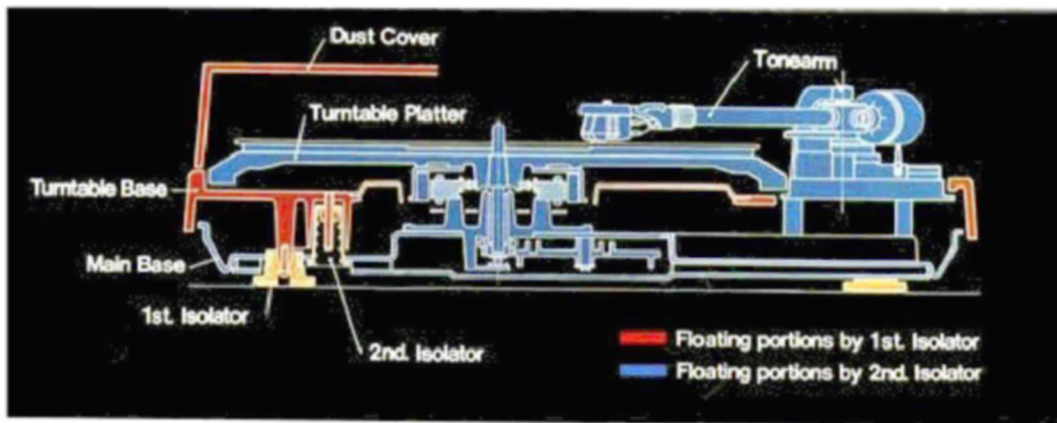
TURNTABLE

Type:	Direct drive turntable
Motor:	Brushless DC motor, electronic rectification, quartz-controlled phase-locked servo circuit
Turntable platter:	Aluminum diecast, diameter 32 cm (12-19/32"), weight 2.9 kg, (6.4 lb.) moment of inertia 380 kg·cm ² (130 lb-in ²)
Turntable speeds:	33 $\frac{1}{3}$, 45 and 78.26 rpm
Starting torque:	6 kg·cm (5.2 lb-in)
Build-up time:	0.25 sec (=25° rotation) to 33 $\frac{1}{3}$ rpm
Braking time:	0.3 sec (=30° rotation) from 33 $\frac{1}{3}$ rpm to standstill
Speed fluctuation by load changes:	0% within 5 kg·cm (4.3 lb-in)
Speed drift:	Within ±0.002%
Wow and flutter:	0.025% WRMS (JIS C5521) ±0.035% weighted, zero-to-peak (DIN 45507)
Rumble:	-50 dB (DIN 45539A) -73 dB (DIN 45539B)

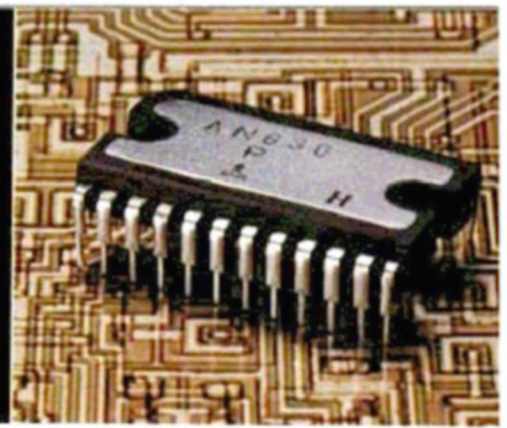
GENERAL

Power supply:	AC 120 V, 60 Hz
Power consumption:	20 W
Dimensions (turntable only): (H × W × D)	10.25 × 36.85 × 36.85 cm (4-1/64" × 14-31/64" × 14-31/64")
Weight (turntable only):	9.5 kg (20.9 lb.)

Weights and dimensions shown are approximate. Specifications subject to change without notice.



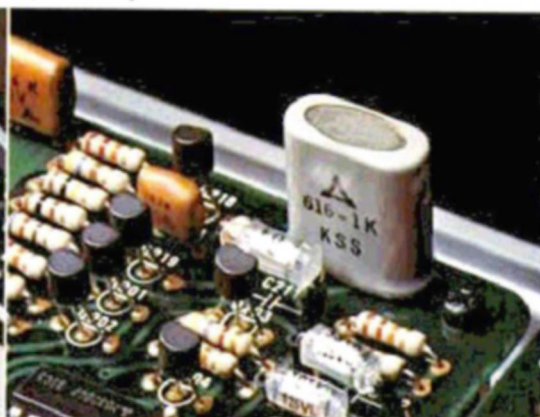
Double Isolated Suspension System



One Chip IC



Independent Variable Pitch Controls



Quartz Oscillator



Gimbal Suspension Tonearm

One Chip IC Control

Most Technics direct drive turntables incorporate sophisticated one chip integrated circuits to govern all motor control functions. This One Chip IC is one of the secrets behind the spectacular performance achieved by Technics DD units. The B.F.G principle (Back-Electromotive-Force Frequency Generator) causes a near instantaneous current change to correct for even the slightest speed deviation, assuring highly stable rotation.

Double Isolated Suspension System

As they have done in so many other areas of turntable design, Technics engineers have come up with an ingenious and unique method of coping with the acoustic feedback problem: the floating double isolator. External sounds and vibrations that reach the turntable either through the air or through the unit's resting position—are met by two separate isolation systems.

The first isolators effectively dampen harmful external vibrations which may reach the unit through the surface that it rests on. The all important turntable, motor and tonearm assembly are then supported on a main base which floats on the secondary isolation system. These isolators are specially designed with material and springs of calculated and finely tuned elasticity to absorb external vibrations. The result is an audible clarity and transparency in sound.

Quartz Phase-Locked Servo Control

The quartz oscillator, the most accurate method known for electronic frequency control, is used in Technics professional grade turntables to provide the basic reference frequency for all motor movements and for the stroboscope. This allows the

achievement of the fantastically low speed drift figure of $\pm 0.002\%$, or a maximum of ± 0.036 second error over the 30 minute playing time of a typical LP side.

Gimbal Suspension Tonearm

For the finest tracking sensitivity, Technics tonearms rest in a gimbal suspension equipped with two pairs of low friction pivot bearings. With this enhanced rotational sensitivity, the tonearm is allowed free, gyroscopic movement to ensure flawless tracking.

High Starting and Running Torque

Due to exceptionally high motor torque (6 kg-cm), speed build-up is an amazing 0.25 second. Normal operating speed (33-1/3 rpm) is reached after only a 25 degree turn of the platter.

Anti-Skating Device

For perfect tracking, a fine-scale anti-skating device permits adjustment to fit all stylus pressures.

Independent Variable Pitch Controls

To allow adjustment of the rotational speed, independent pitch controls are built-in.

Illuminated Stroboscope

Permits monitoring of exact platter speed.

Universal Headshell

For convenient replacement of cartridge, a removable universal headshell fits easily on the end of the tonearm.

Viscous-Damped Cueing

This feature is provided even on automatic units to allow safe manual lowering of the tonearm onto the record.

Detachable Dust Cover Sleek, Elegant Design

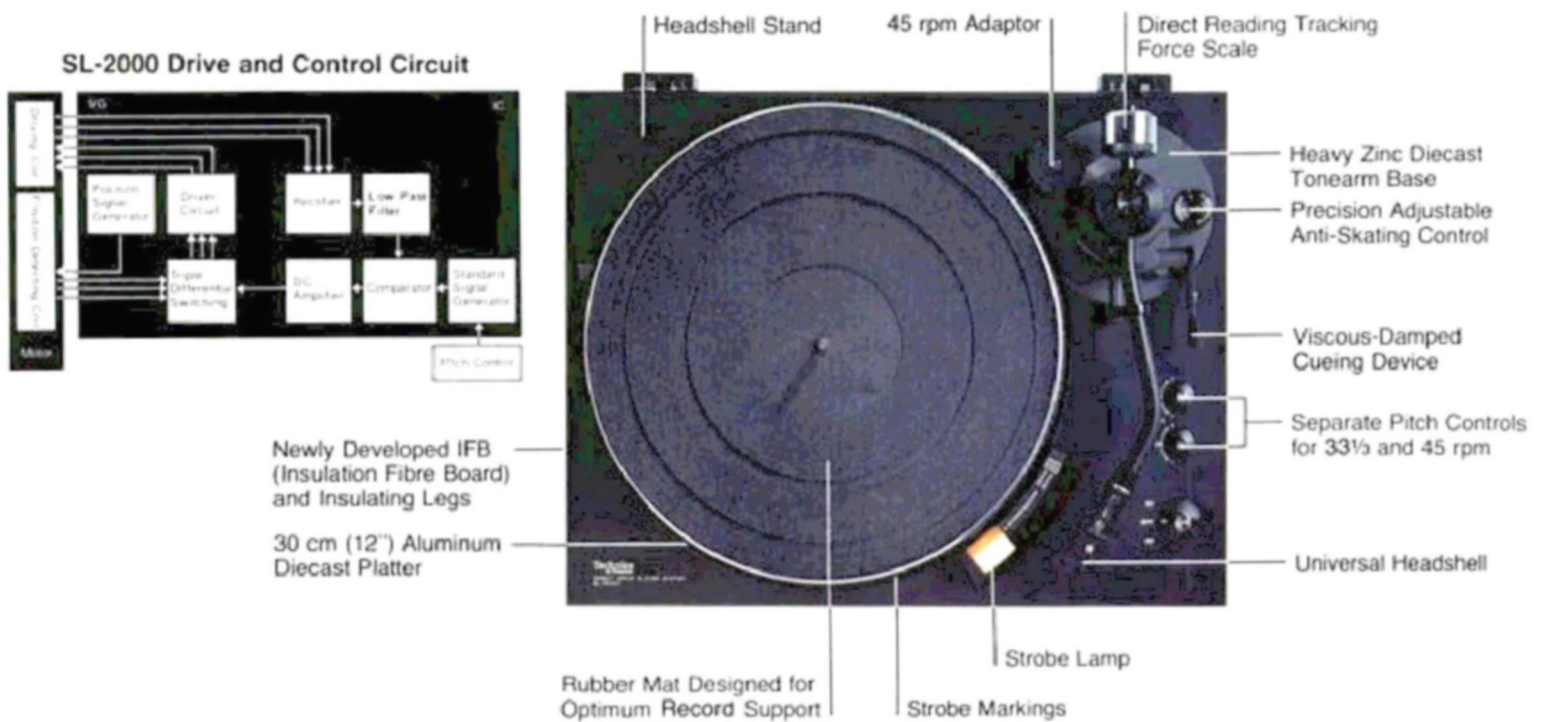
Features available as specified on individual models.



SL-2000 "Black Beauty" Direct Drive Turntable

The SL-2000 is designed for those who want direct drive performance at a moderate cost. This beauty is equipped with Technics' famous brushless DC motor, which operates free from power line fluctuations and trouble causing heat and hum. The absence of moving parts in the motor means better reliability and longer service life. Completely accurate platter speed is guaranteed by a One Chip IC servo control, a simple and compact unit equivalent to 78 electronic components. The result of all this precision is wow & flutter of only 0.045% (WRMS) and rumble of -70 dB (DIN B). A precisely manufactured tonearm ensures minimum tracking

error and optimum mass distribution for high compliance cartridges. Clear and clean sound reproduction is assisted by the Insulation Fibre Board (IFB) and a newly developed insulator which effectively shields the motor and tonearm assembly from outside vibrations. The heavy zinc diecast tonearm base also works to prevent vibration and subsonic resonances. Other features include a fine-scale (increments of 0.25g) direct reading anti-skating device, an illuminated stroboscope, independent pitch controls variable by up to 10%, viscous-damped cueing, aluminum diecast universal headshell, and detachable dust cover.

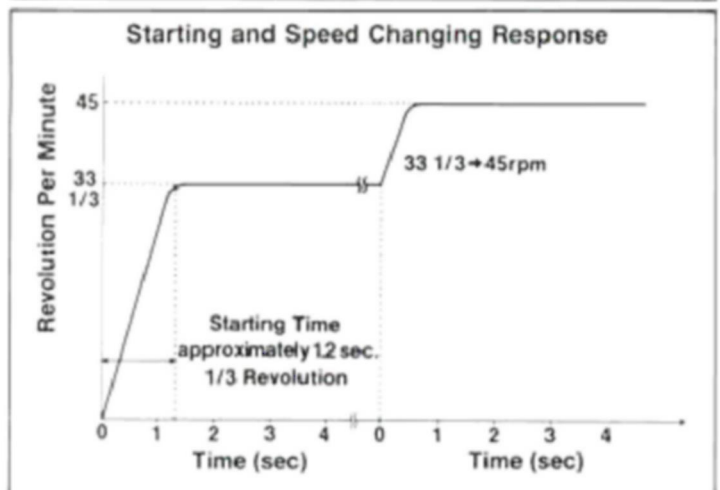
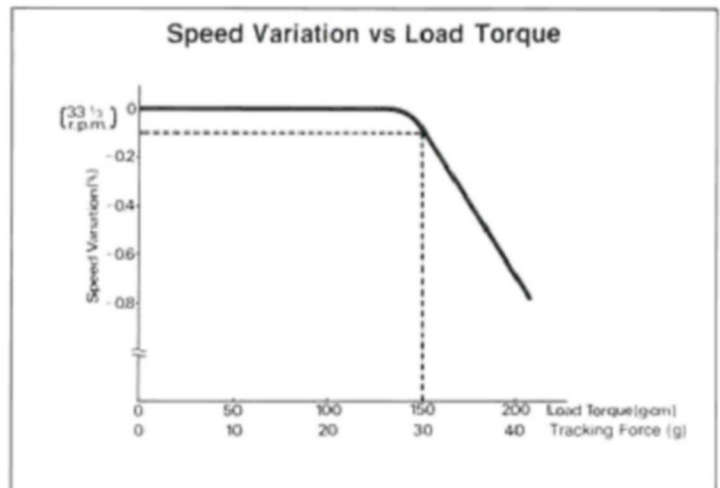




SL-1800 Direct Drive Turntable

The SL-1800 features full Technics uncompromised direct drive performance in a simple, straightforward package. The centre of this sleek, attractive unit is its highly accurate One Chip IC controlled B.FG servo DC motor. This direct drive motor, which incorporates all of the design features of all Technics fine DD motors, is controlled by the unique B.FG (Back-Electromotive-Force Frequency Generator) system which utilizes the back electromotive force induced by the rotor in the stator field coils to monitor the platter speed. The frequency generator uses the waveform obtained as its reference and it is compared with the standard calibration frequency from the reference oscillator. In this way, a signal to correct the speed can be sent instantly whenever needed to change the motor drive current in order to maintain precise platter speed. This B.FG principle greatly improves speed stability and gives a shorter build-up time. It also maintains the platter speed under varying load conditions. The above mentioned control circuitry is all contained in a fantastic One Chip IC which can perform the functions of up to 321 separate elements such as transistors, diodes and resistors. The sum of all this electronic and mechanical advancement is performance, the kind of super performance that produces the low wow & flutter figure for the SL-1800 of only 0.025% (WRMS), a figure almost unsurpassed by any other turntable anywhere. Rumble is -73 dB (DIN B). Another outstanding feature of the SL-1800 is the Floating Double Isolator. This new advance fights against acoustic feedback by shielding the turntable and tonearm assembly from all outside vibrations with two separate isolators constructed of metal springs and special vibration absorbing material. Additional

features of the SL-1800 are a fine-scale direct reading anti-skating device, an illuminated stroboscope, independent pitch controls variable by up to 10%, sensitive gimbal suspension tonearm, viscous-damping cue arm, and detachable dust cover.





SL-1700 Direct Drive Semi-Automatic Turntable

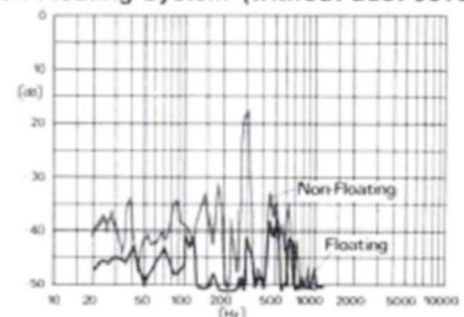
The SL-1700 offers the famous Technics direct drive system with the added convenience of semi-automatic operation. Once the tonearm is manually positioned over the lead-in grooves, the automatic mechanism will lower the tonearm onto the record when the lever is flicked, and automatically return it to the arm rest at the completion of play. The unit is then automatically shut off. This handy feature frees the user from rushing to the turntable at the end of record play and also saves wear on your stylus. At any time during play, flicking the stop lever will cause the tonearm to automatically lift up and return to the arm rest. To control the DC direct drive motor, the SL-1700 incorporates a B.FG servo with One Chip IC which can perform the functions of up to 321 transistors, diodes and resistors. B.FG stands for Back-Electromotive-Force Frequency Generator and it describes the method whereby the back electromotive force induced by the rotor in the stator coils is used to monitor the speed of the platter. The waveform obtained from this becomes the reference for the frequency generator. Its output is compared with the standard calibration frequency obtained from the reference oscillator and then, when needed, a correction signal instantly changes the motor drive current to the proper value to turn the platter at precisely the right speed. Wow & flutter for the SL-1700 is an insignificant 0.025% (WRMS), while rumble is -73 dB (DIN B).

The SL-1700 also is equipped with Technics newly designed Floating Double Isolator, which prevents acoustic feedback by shielding the turntable and tonearm assembly from external vibrations. This isolator actually insulates the turntable from the outside with two layers of specially designed iso-

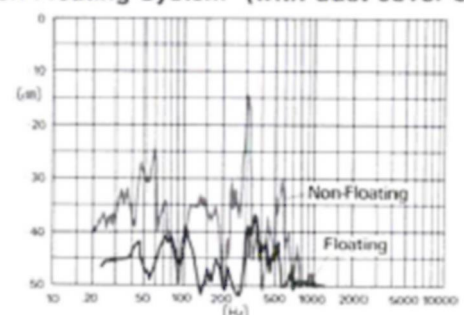
lators constructed of metal springs and special vibration absorbing material.

The SL-1700 is equipped with several other defences against acoustic feedback: a heavy zinc alloy tonearm base, a newly designed turntable mat, and a precision made diecast aluminum cabinet. The tonearm is gimbal suspended to achieve 7 mg friction. Effective arm mass has been kept very low (22 g) to accommodate premium high compliance cartridges. Other features of the SL-1700 include a fine-scale direct reading anti-skating control, illuminated stroboscope, independent pitch controls variable by up to 10%, viscous-damped cueing device, and detachable dust cover.

Vibration Analysis of Floating System vs Non-Floating System (without dust cover)



Vibration Analysis of Floating System vs Non-Floating System (with dust cover on)





SL-1600 Direct Drive Fully Automatic Turntable

The SL-1600 features fully automatic play while incorporating the famous Technics direct drive motor and B.F.G Servo One Chip IC control system. The auto-mechanism permits auto start, auto return, and auto stop, and will automatically repeat a record up to six times or indefinitely when the Memo-Repeat dial is set. A simple flick of the auto start lever automatically lifts the arm from the rest, places it on the record, returns it to the arm rest at the end of play, and shuts off the turntable. Should you wish to stop play in the middle of a record, simply slide the lever to the stop position and the arm will automatically lift and return to the arm rest and the power will shut off. With this handy automatic feature, the SL-1600 brings you the maximum in operating convenience with no compromise in turntable performance. The motor of the SL-1600 is the incomparable Technics direct drive brushless DC motor which contains only one moving part, the rotor, which is also the platter. For motor drive and control this turntable employs our famous One Chip IC which is equivalent to 321 separate electronic components. A B.F.G (Back-Electromotive-Force Frequency Generator) servo control regulates the speed and issues instant correction commands whenever necessary. The result: a spectacular wow & flutter of 0.025% (WRMS), an inaudibly low rumble of -73 dB (DIN B). Rapid starting time, full speed within 1/3 rotation of a turn and 0% speed variation up to 30 g tracking force. A number of measures are taken in the SL-1600 to isolate the motor, platter and tonearm from outside vibrations. The Floating Double Isolator insulates these important parts from most vibrations transmitted through the floor or the air. A heavy, aluminum diecast base, a heavy zinc tonearm base, a newly

designed turntable mat, and a precision made diecast aluminum cabinet also act to absorb vibrations and keep them away from the record platter and the tonearm. And speaking of the tonearm, it is gimbal suspended to ensure 7 mg friction. Effective arm mass has been kept very low (22 g) to accommodate premium high compliance cartridges. Other features include illuminated stroboscope, fine-scaled anti-skating device, independent pitch controls variable by up to 10%, viscous-damp cueing device and detachable dust cover.





SL-1100AC Direct Drive Turntable

The SL-1100AC provides that incomparable professional Technics quality in a reasonably priced package. The heart of this outstanding direct drive turntable is its DC brushless motor which drives the platter directly to eliminate belts, pulleys, and idlers. This simple design means fewer moving parts to wear out and greater long term reliability. The motor is controlled electronically by a DC servo which provides highly accurate rotation completely unaffected by power line frequency and voltage variations. And due to its high torque, speed remains the same even during changes of external drag. This combination produces wow & flutter of 0.03% (WRMS) and rumble of better than -70 dB (DIN B).

The turntable is dynamically balanced and of extra large size (35 cm/13-25/32") and weight (2 kg/4.4 lb.) to contribute to overall high performance.

The tonearm is static balanced low mass tubular with a length (pivot to stylus) of 23.5 cm (9-1/4") for low tracking error. Effective arm mass has been kept very low to accommodate high compliance cartridges. The headshell is made of precision diecast aluminum with the universal type connector.

Other features include independent pitch controls variable $\pm 5\%$, illuminated stroboscope, feather-touch start/stop buttons, viscous-damped cueing, anti-skating device, feedback insulated legs, diecast aluminum base, detachable dust cover, and two AC outlets (one for stroboscope).



SL-110A

Identical in every respect with model SL-1100AC, but without tonearm. Metal tonearm panel permits installation of any tonearm. Transparent dust cover supplied.

SH-11P3



Arm panel for SME arm



SP-10 MK II Quartz-Controlled Direct Drive Turntable

Technics all new SP-10 MK II represents a standard of accuracy and quality in disc reproduction that has never been attained before. This truly outstanding three speed package unquestionably constitutes a new reference against which professional systems will have to be measured for years to come. Just glance at some of these amazing features: almost total absence of speed drift; immeasurably small wow & flutter; extreme quietness; enormously high torque; and practically instantaneous starting and stopping.

The SP-10 MK II employs a sophisticated electronic servo control circuit to deliver expressed mathematically, rotational speed accuracy. Speed drift remains within $\pm 0.002\%$. During the 30 minute playing time of the average LP side, this amounts to a maximum of ± 0.036 seconds error! This makes the rotational speed independent of AC power line fluctuation and the passage of time.

The secret behind this amazing speed control is the ingenious quartz oscillator which produces an unvarying reference frequency to which the motor and the strobe light are locked. The quartz reference frequency is split by a frequency divider into appropriate control frequencies for each of the 3 speeds. Then the frequency generator translates platter RPM into a signal which is fed into the phase control and speed control circuits which then alter the motor voltage by just the right amount to maintain the correct speed in response to changing load conditions.

This corrective current, by being phase locked to the reference frequency, permits instant corrective torque response when needed. The overall result of this circuitry shows up very impressively in two of the most revealing measurements of turntable

quality. Wow & flutter are a low, low 0.025% (WRMS) while rumble is -73 dB (DIN B).

Another exclusive feature of this state-of-the-art instrument is its extremely high torque of 6 kg-cm (5.2 lb-in) higher than that found in any other turntable. This means that rated speed will be maintained even under the most severe conditions of external drag. No longer will you hear a speed change when placing a disc preener on the record or even when accidentally brushing against the rotating platter.

At 33-1/3 rpm, the rated speed of the SP-10 MK II is reached within 0.25 seconds. This compares with the one second build-up time considered satisfactory in professional broadcast equipment.

Looked at another way, standard speed is reached after only a 25 degree turn of the platter. This short build-up time is achieved without sacrifice to the platter weight, which is a heavy 2.9 kg (6.4 lb.). Not only does the SP-10 MK II have a short build-up time, but it also is able to stop almost instantly. From the moment the stop button is pushed until the turntable stops requires only 0.3 seconds, which facilitates rapid speed changes. And whenever the platter is not running, the mechanical braking system holds the platter still.

For extra operating convenience, stop and start functions may be controlled from a remote control unit which comes with the SP-10 MK II.

The power supply, housed in a separate cabinet, isolates the transformer from the electronics of the turntable and also permits a slim, elegant appearance for the SP-10 MK II. Other features include modular circuit construction for ease of servicing and a specially designed rubber mat on the underside of the platter for vibration damping.

Technical Specifications

SL-2000

TURNTABLE SECTION

Type:	Direct drive turntable
Motor:	Low-speed electronically controlled brushless DC motor
Turntable platter:	Aluminum diecast, 30 cm (12") diameter with strobe
Turntable speeds:	33 $\frac{1}{3}$ and 45 rpm
Speed Change method:	Electronic change
Variable pitch controls:	Individual adjustment controls, 10% adjustment range
Wow and flutter:	0.045% WRMS (JIS C5521) $\pm 0.065\%$ weighted, zero to peak (DIN 45507)
Rumble:	-47 dB (DIN 45539A) -70 dB (DIN 45539B)

ONEARM SECTION

Type:	Universal S-shaped tubular arm, static-balanced type, direct-reading tracking force adjustment, with anti-skating force control device, oil-damped cueing device
Effective arm length	22 cm (8-21/32")
Overhang:	1.4 cm (35/64")
Tracking error angle:	Within +3° (at edge of 30 cm or 12" record), -0.2° (at centre of 30 cm or 12" record)
Offset angle:	22°
Adjustable tracking force:	0-3 g (direct-reading)
Cartridge range:	3.5-9 g
Headshell weight:	9.5 g

GENERAL

Power supply:	AC 120 V, 50/60 Hz
Power consumption:	3.5 W
Dimensions: (H x W x D)	12.5 x 43.0 x 34.6 cm (4-15/16" x 16-15/16" x 13-5/8")
Weight:	6.1 kg (13.4 lb.)

SL-1800

TURNTABLE SECTION

Type:	Direct drive turntable, manual
Motor:	Electronically controlled brushless DC motor
Turntable platter:	Aluminum diecast; 33 cm (13") diameter
Turntable speeds:	33 $\frac{1}{3}$ and 45 rpm
Speed change method:	Electronic change
Variable pitch controls:	Individual adjustment controls, 10% adjustment range
Wow and flutter:	0.025% (JIS C5521) WRMS $\pm 0.035\%$ (DIN 45507) weighted, zero to peak
Rumble:	-50 dB (DIN 45539A) -73 dB (DIN 45539B)

ONEARM SECTION

Type:	Universal S-shaped tubular arm, static-balanced type, direct-reading tracking force adjustment, with anti-skating force control device, oil-damped cueing device
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Effective length:	23 cm (9-1/16")
Overhang:	1.5 cm (19/32")
Friction:	7 mg (horizontally and vertically)
Effective mass:	22 g (6.0 g cartridge weight, 1.75 g stylus pressure)
Tracking error angle:	Within +3° (at the point of 14.5 cm or 5-45/64" from the centre), +1° (at the point of 5.5 cm or 2-3/16" from the centre).
Offset angle:	21.5°
Adjustable tracking force:	0-3 g
Cartridge range:	5-11 g
Headshell weight:	9.5 g

GENERAL

Power supply:	AC 120 V, 50/60 Hz
Power consumption:	5 W
Dimensions: (H x W x D)	12.5 x 45.3 x 36.9 cm (4-15/16" x 17-12/16" x 14-9/16")
Weight:	8.5 kg (18.7 lb.)

SL-1700

TURNTABLE SECTION

Type:	Direct drive semi-automatic turntable
Motor:	Electronically controlled brushless DC motor
Turntable platter:	Aluminum diecast; 33 cm (13") diameter
Turntable speeds:	33 $\frac{1}{3}$ and 45 rpm
Speed change method:	Electronic change
Variable pitch controls:	Individual adjustment controls, 10% adjustment range
Wow and flutter:	0.025% (JIS C5521) WRMS $\pm 0.035\%$ (DIN 45507) weighted, zero to peak
Rumble:	-50 dB (DIN 45539A) -73 dB (DIN 45539B)

ONEARM SECTION

Type:	Universal S-shaped tubular arm, static-balanced type, direct-reading tracking force adjustment, with anti-skating force control device, oil-damped cueing device
Effective length:	23 cm (9-1/16")
Overhang:	1.5 cm (19/32")
Friction:	7 mg (horizontally and vertically)
Effective mass:	22 g (6.0 g cartridge weight, 1.75 g stylus pressure)
Tracking error angle:	Within +3° (at the point of 14.5 cm or 5-45/64" from the centre), +1° (at the point of 5.5 cm or 2-3/16" from the centre)
Offset angle:	21.5°
Adjustable tracking force:	0-3 g
Cartridge range:	5-11 g
Headshell weight:	9.5 g

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