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Sansui Full Auto Direct-Drive Turntable with Exclusive Silent Synchrotor System

What causes wavering pitch and the unstable sonic image of direct-drive turntables?

Many people know that direct-drive turntables are technically very dependable, and offer superior wow and flutter, signal-to-noise and other "steady-state" performance characteristics.

But there are also a few very stringent listeners who point a finger at direct-drive turntables, criticizing them for unsatisfactory sound quality such as dull high-frequency sound, unstable musical pitch and a blurred stereo image.

Sansui engineers closely scrutinized the problem and came up with a solution that greatly improves the sound quality of the direct-drive format. First let's closely examine the problem.

In a direct-drive turntable, the motor itself is subject to irregularities in driving torque due to factors such as groove irregularities and warps that can dynamically

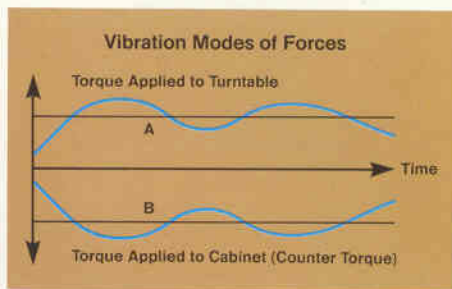
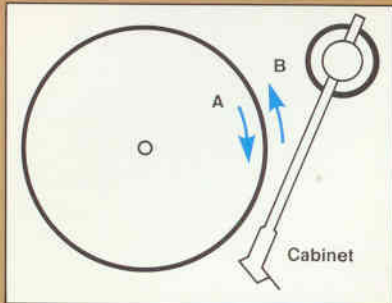
slow down and speed up the platter, requiring the servo speed control system to compensate by increasing or decreasing the torque of the motor. And it's these torque variations that cause cabinet vibration. Every high school student learns the principle involved — "for every action, there's an equal and opposite reaction." Torque variations (A in the diagram) represent the action, and counter torque (B in the diagram), working in a direction opposite to the direction of motor torque, represents the reaction. It's this counter torque, or force, that is passed on to the cabinet in the form of vibration. These vibrations are picked up by the tonearm and can prevent faithful tracking of the stylus in the grooves, creating what we know as intermodulation distortion and the peculiar sound quality — dull high frequencies and unstable stereo imaging, among others — some find objectionable.



Theory behind the Silent Synchrotor System

The prototype turntable developed by our engineers was unique. It incorporated a system consisting of a second motor and platter underneath the turntable's regular drive motor and platter, both sharing a common axis but revolving in opposing

Diagram Showing Generation of Torque and Counter Torque



directions. The second motor was servo-controlled through a torque synchronizing circuit to generate exactly the same amount of torque as the drive motor—but rotated in the direction opposite to that of the drive motor, which effectively cancelled all torque fluctuations. Our engineers had ascertained from experiments that the irregular torque fluctuations of the drive motor that were previously passed on to the turntable cabinet in the form of vibration were now effectively cancelled by the second motor. These early experiments represent the basis on which our engineers designed the Silent Synchrotor System.

This method of eliminating cabinet vibration was modified and perfected until, finally, it was made available to consumers under the name Silent Synchrotor System. The Silent Synchrotor System utilizes a second rotor, essentially the same design as the drive motor, located directly under-

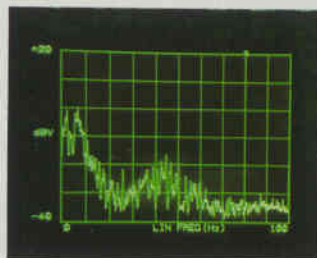
neath the drive motor. This second rotor is synchronized with the main drive motor, but rotates back and forth in either direction in response to speed change commands sent by the servo to the drive motor, thereby cancelling any vibration that the torque variations may cause before they can affect the cabinet.

Silent Synchrotor System (pat. pend.) dramatically improves the sound of direct-drive turntables

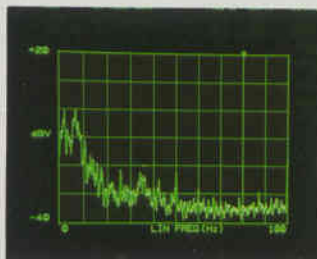
The newly developed Silent Synchrotor System, featured in the XR-Q7 turntable, has been proven to prevent the reactionary force generated by the direct-drive motor from vibrating the turntable cabinet. It does so by rotating the Silent Synchrotor in a direction opposite to that of the direct-drive motor at any given moment, thereby cancelling any torque fluctuations as they occur.



Silent Synchrotor System reduces modulation components in output signal



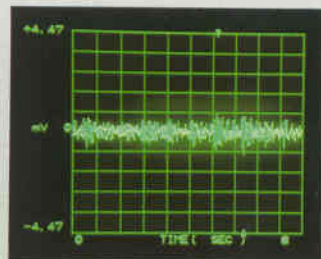
Silent Synchrotor System OFF



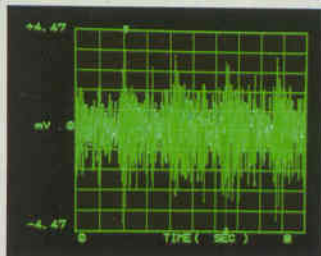
Silent Synchrotor System ON

The Silent Synchrotor System reduces intermodulation in the audio output.

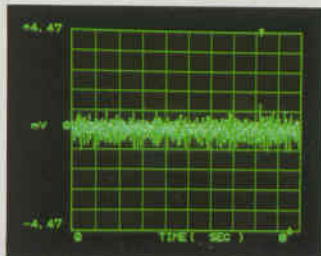
XR-Q7: Cabinet Vibration due to Motor Torque



Motor: Stop/Power Switch: On

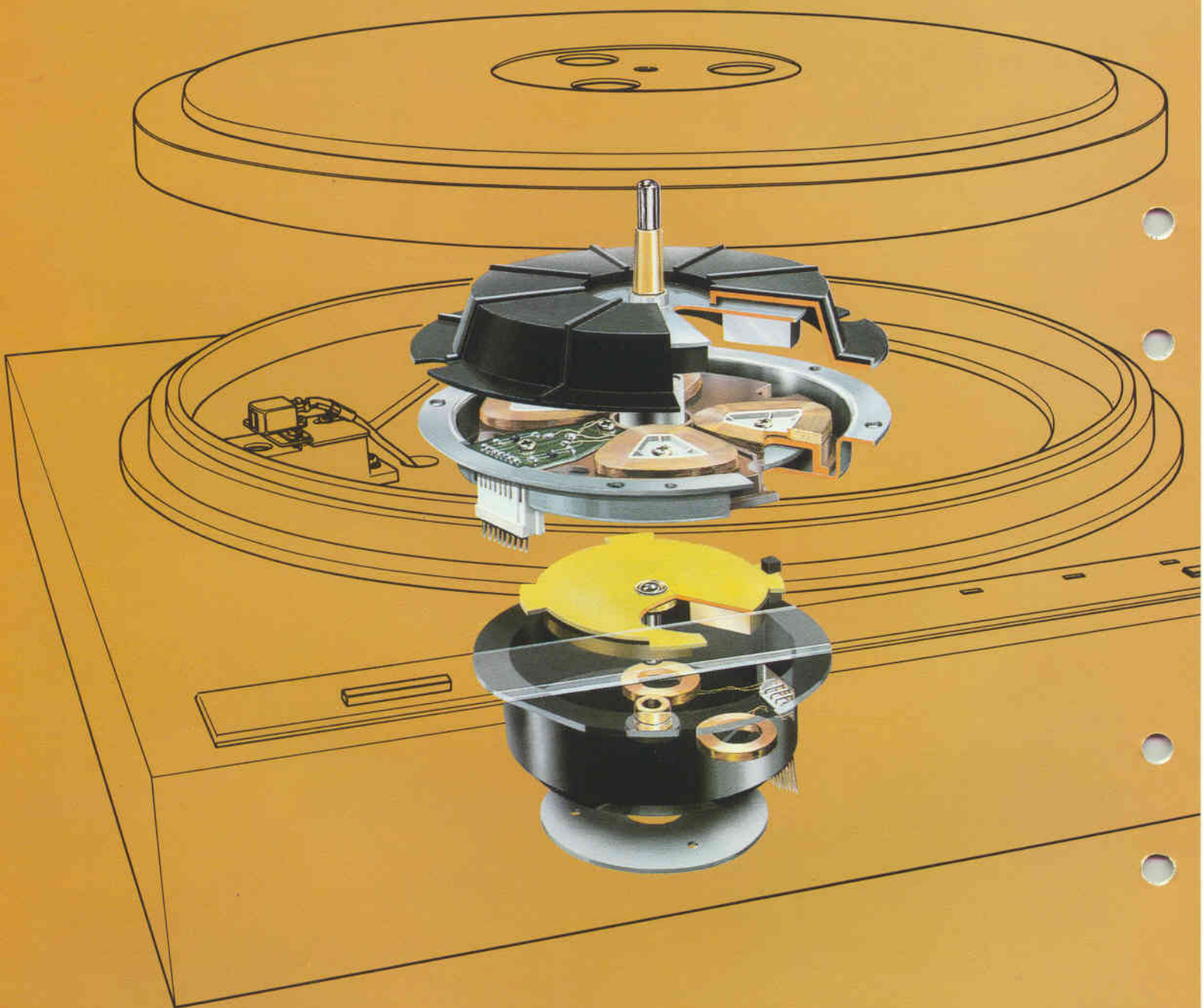


Silent Synchrotor System: Off
Motor: On



Silent Synchrotor System: On
Motor: On

Experiments were conducted in a special vibration-free room at our Sansui facilities.



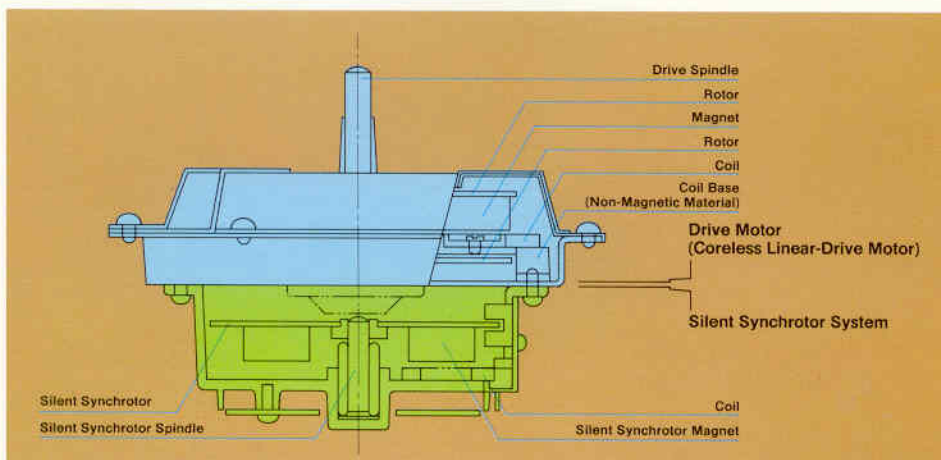
Sansui's Silent Synchrotor System: The Superior Sound Solution.

Direct-drive turntables dominate the marketplace today for several reasons. One, by utilizing a motor that turns at exactly the same speed as the platter, less vibration is generated which leads to a higher signal-to-noise ratio. Two, speed control systems, and, in particular, the quartz-servo control system, have dramatically improved speed accuracy.

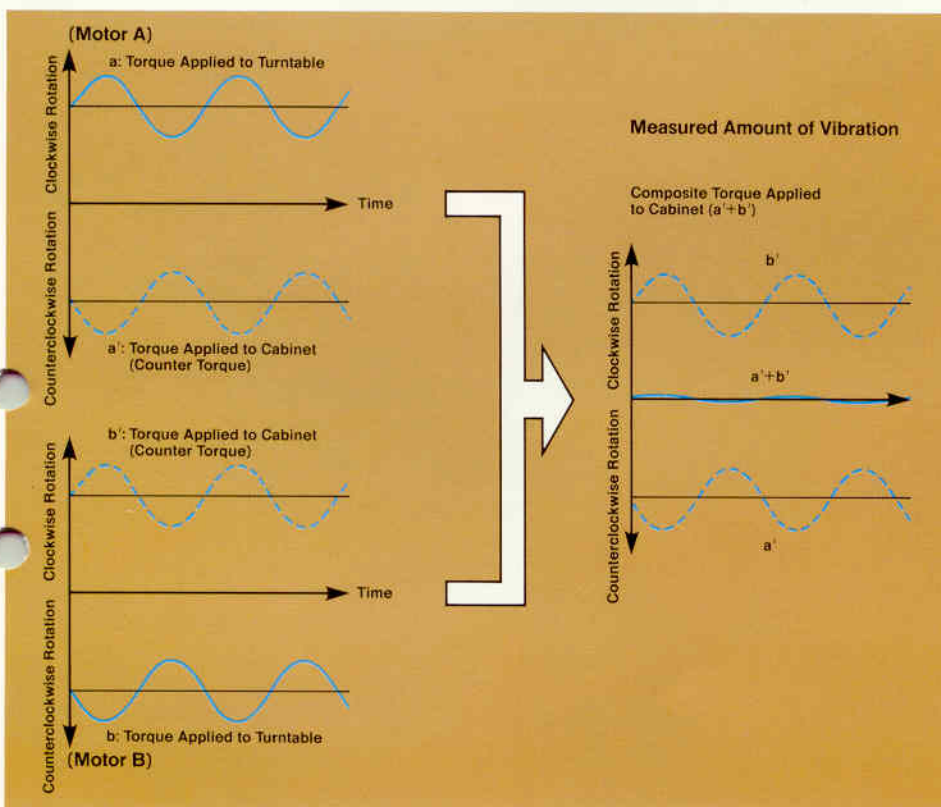
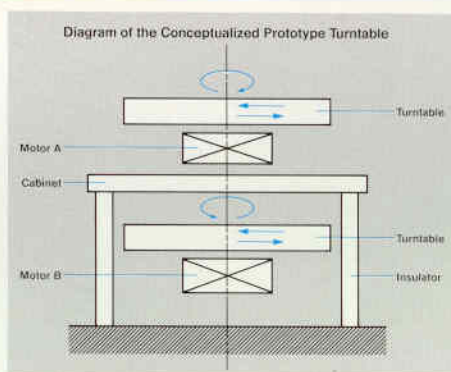
But direct-drive turntables are not without their shortcomings. Some music and audio critics have often criticized the wavering pitch and unstable sonic image of records played back on direct-drive turntables.

True, these problems are relatively minor in comparison to the significant advantages enjoyed by direct-drive turntables, but still, Sansui engineers decided to tackle them. Their answer is the Silent Synchrotor System (pat. pend.).

The Silent Synchrotor System cancels essentially all cabinet vibration generated by the direct-drive motor before it has a chance to adversely affect the quality of the music. For the first time, truly clear musical reproduction quality—a clearness you can actually hear—is available from a direct-drive turntable. And it took Sansui to do it.

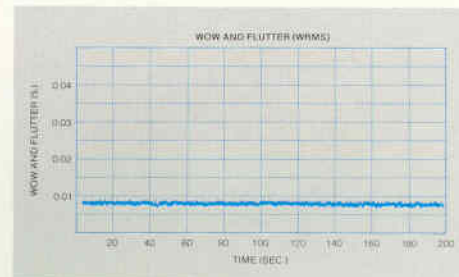


The speed and direction of the Silent Synchrotor are synchronized with fluctuations in torque of the drive motor. In this way, all forces that attempt to cause the turntable cabinet to vibrate are effectively cancelled. For the first time, the one major weakness of direct-drive turntables has been eliminated. Clearer sound reproduction with definite stereo imaging is now possible, along with rock-steady pitch constancy. With the introduction of the Silent Synchrotor System, direct-drive turntables have truly come of age.



Sansui's newly developed Coreless Linear-Drive Motor (pat. pend.) helps achieve amazing wow/flutter of 0.009%, surprising signal-to-noise ratio of 80dB (DIN B)

The single greatest cause of rotational vibration in a direct-drive motor is torque irregularities. So Sansui developed a coreless linear-drive motor that minimizes these irregularities. The coreless design of this motor and its linear-drive circuit permit the turntable to achieve astonishingly low wow and flutter of 0.009% or less.



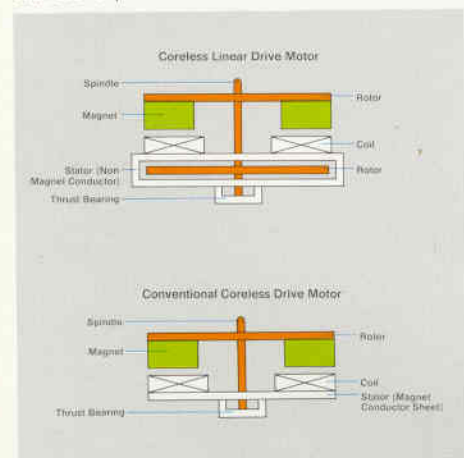
as well as a signal-to-noise ratio of 80dB or better (DIN B).

In a conventional direct-drive motor, the powerful attraction of the magnets, attached to the rotor, to the conductive magnetic material of the stator, causes mechanical friction at the thrust bearing and thus causes rotation speed to be less than ideally smooth. Also, in a conventional motor, magnetic poles form over the stator since it is made of magnetic material. This creates a hysteresis effect between the rotor and stator or generates an eddy current that brakes the rotor.

But, now, Sansui's Coreless Linear-Drive Motor is completely free of these aberrations. The part that corresponds to the stator of a conventional motor is now fastened to the spindle, and thus revolves exactly the same way as the rotor magnets. This means that any pulling force working

between the rotor magnets and the "stator" would not apply any pressure on the thrust bearing. Also, since the "stator" now revolves with the rotor magnets, no magnetic hysteresis is generated nor is there any eddy current loss.

Add to this advanced design the linear-drive circuit—which employs sine waves to excite the motor coils—and you have a direct-drive motor that drives the platter far more powerfully and smoothly than standard pulse-driven motors.



Quartz-Servo System for perfect speed control

The Quartz-Servo System maintains perfect speeds by controlling the direct drive motor. In order to control motor speed with greater accuracy, Sansui has increased the number of coated magnetic pits to 960. Pulses are detected by the special speed-detecting magnetic head. If any advance or delay is detected, the servo control system works instantly to bring the motor back to the proper speed.

Then, in order to assure a smoother platter rotation, we have equipped the turntable with a positive/negative servo system, which also minimizes both overshoot and undershoot of the motor.

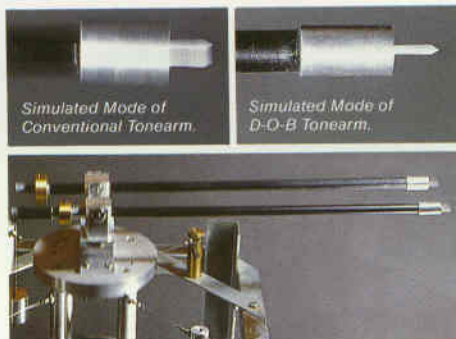
Amazing vibration-free D-O-B Tonearm, plus vibration-free tonearm base

The XR-Q7 is equipped with the Dyna-optimum Balanced Tonearm (pat. pend.), which has already won wide acclaim in previous Sansui turntables.

The D-O-B Tonearm is designed so that its fulcrum is at the exact point of dynamic balance, so that any vibration picked up by the stylus never vibrates the tonearm's fulcrum, or, in the other direction, any external vibration never travels to the stylus tip.

The tonearm is of a straight design, with an integral headshell fixed to the tonearm tube to minimize mass and improve trackability. If desired, the entire tonearm/headshell unit may be replaced by detaching it at the tonearm base. A replacement tonearm is also provided, so you can mount the cartridge of your own choice and switch back and forth whenever desired. Tonearm height can be adjusted 3mm up or down relative to a reference to compensate for varying cartridge dimensions.

The base of the tonearm is firmly attached to the vibration-free cabinet by a solid die-cast zinc block to prevent tonearm resonance. Other measures for preventing tonearm resonance include a sound-absorbing filler inside the brass arm tubing and a headshell of die-cast aluminum, another material of very high rigidity.



Apply vibrations to the base of a conventional-design tonearm; the arm will vibrate together with the base. But the D-O-B tonearm, subjected to the same test, does not vibrate at all.

Precise, computer-controlled fully automatic operation

Fully automatic operation of the XR-Q7 is controlled by what is considered synonymous with absolute precision—a microcomputer. It's a control system for which Sansui already has an established reputation.

Simply give a light touch to the feather-touch buttons along the front edge of the turntable to effect such convenient operations as auto start, auto return, auto repeat or auto cut. Or if you prefer, you can cue the tonearm to any desired place on a record by hand, then press the DOWN button to gently lower the tonearm, just as you do with any quality manual turntable.

All automatic operations of the tonearm are controlled by a completely separate motor from the turntable's main drive motor, and the built-in microcomputer supervises all motor functions. Also, Sansui has included a number of safety protection features. Whenever the tonearm is stopped by hand in the middle of automatic operation or in the unlikely event of a mechanical failure, the microcomputer halts all further motion after just 20 seconds. Another protection feature returns the tonearm to rest whenever the power is suddenly shut off during record play—for instance, if there is a power failure.

Solid platter mat helps assure optimum reproduction quality

It is a known fact that the platter mat can alter the overall sound of a turntable, and this is why there are many different views as to what is the best material for this seemingly non-essential part of a turntable.

For the platter mat of the XR-Q7, Sansui has chosen a basically plastic compound which is a combination of inorganic materials mixed with polyester. This mat is mechanically affixed to the aluminum die-cast platter, and prevents any deterioration of reproduced sound quality by undesirable resonance between the platter and the mat.



XR-Q7's Four Automatic Functions



Auto Start: If the tonearm is on the tonearm rest, a simple push on the START/STOP button automatically moves the tonearm to the edge of the record, the size of which you have selected beforehand, thus assuring quick and smooth lead-in.



Auto Return: A photosensor system on the tonearm drive mechanism provides contactless detection of the end of a record. When the tonearm reaches the end of a record, it returns automatically to its rest.



Auto Repeat: The REPEAT button, when pressed, automatically tells the tonearm to replay the same record over again.



Auto Cut: A light push on the START/STOP button during record play tells the tonearm to automatically return to rest, and also defeats the REPEAT mode if it has been selected.

Specifications

TYPE	2-speed Fully Automatic Turntable with Silent Synchrotron & Quartz Servo System
MOTOR	Coreless and brushless Hall DC Motor
DRIVE SYSTEM	Direct spindle drive with Silent Synchrotron System
PLATTER	330mm (13") die-cast aluminum alloy
PERFORMANCE	
WOW & FLUTTER	less than 0.009%
SIGNAL TO NOISE RATIO	better than 80dB (DIN-B)
BUILD-UP TIME AND ARC ANGLE	within 1 sec. (120°)
PLATTER SPEED DEVIATION	±0.002% (QUARTZ-SERVO)
TEMPERATURE COEFFICIENT	less than 0.00003%/°C (QUARTZ-SERVO)
LOAD CHARACTERISTICS	0% (QUARTZ-SERVO)
PLATTER SPEEDS	33 $\frac{1}{3}$, 45 rpm
TONEARM	Statically-balanced straight D-O-B tonearm with two-point pivot support
LENGTH	245mm (9 $\frac{7}{16}$ ") pivot to stylus
OVERHANG	16mm (5/8")
OFFSET ANGLE	22°
MINIMUM TRACKING FORCE SETTING	0.5g (when using cartridge guaranteed to operate at 0.5g stylus pressure)

ACCEPTABLE CARTRIDGE WEIGHT	4 to 9.5g
CABINETRY	Chip board base with anti-howling insulators and hinged dust cover
CARTRIDGE	SV-101
TYPE	Dual Magnet Type
FREQUENCY RESPONSE	10 to 20,000Hz
OUTPUT VOLTAGE	2.5mV per channel (1,000Hz, 35.4mm/sec.)
OPTIMUM LOAD	47k ohms
TRACKING FORCE	2±0.5g
STYLUS	0.6 mil diamond spherical (SN-101)
POWER REQUIREMENTS	100, 120, 220, 240V 50/60Hz
POWER CONSUMPTION	European and UK models: 220, 240V 50Hz less than 15W
DIMENSIONS	490mm (19 $\frac{1}{16}$ ")W
	180mm (7 $\frac{1}{8}$ ")H
	430mm (16 $\frac{1}{16}$ ")D
WEIGHT	11kg (24.26 lbs.) Net
	12.9kg (28.44 lbs.) Packed
ACCESSORY	Spare straight tonearm pipe with headshell

No Sansui cartridge is provided some area in the U.S.A.
Design and specifications subject to change without notice for improvements.



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