

# FR-Q5

Sansui Computerized Full-Automatic Direct-Drive Quartz-Servo Turntable with D-O-B Tonearm



Only hi-fi, everything hi-fi.

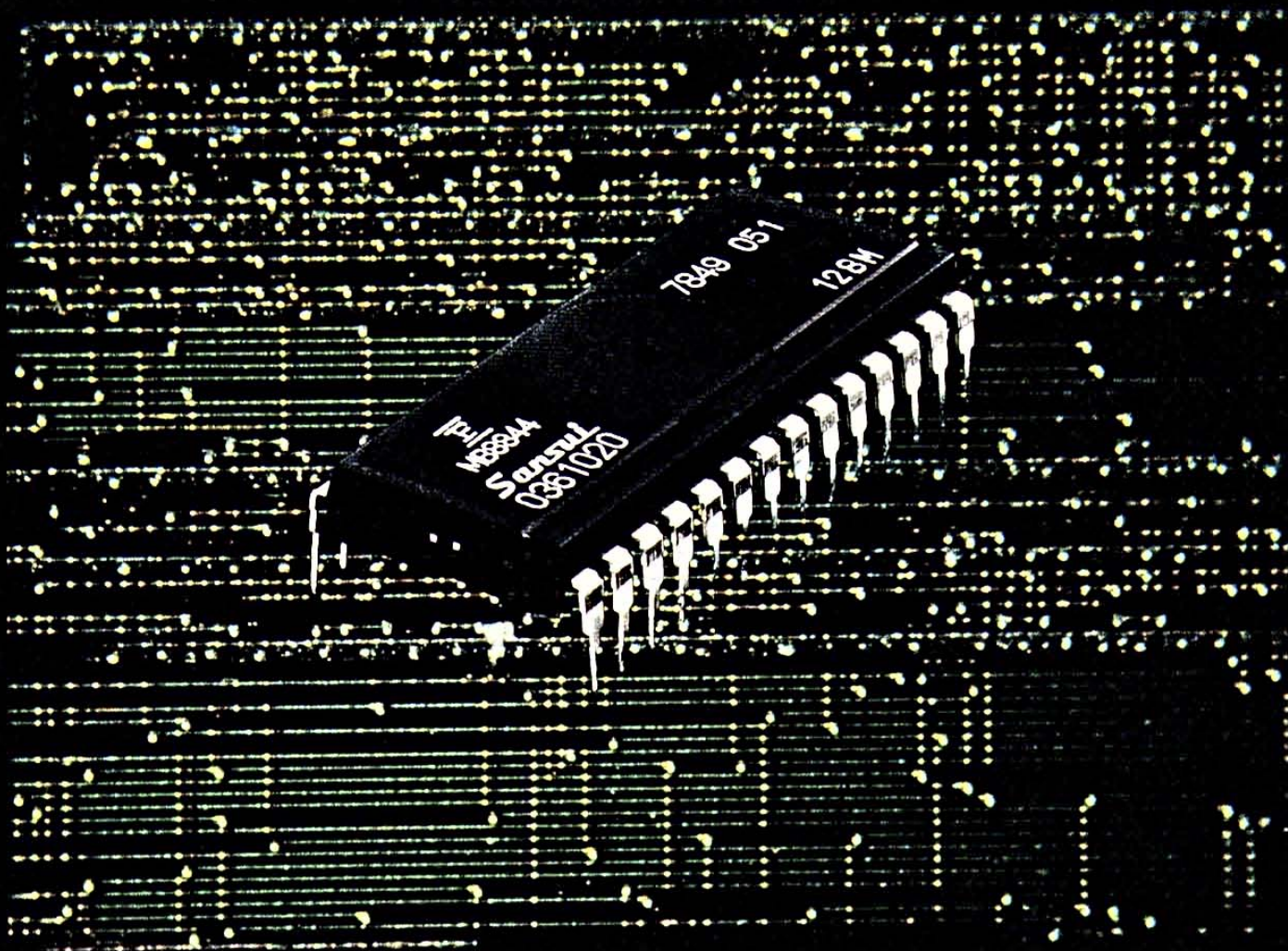


# Music or Magic?

Computers have their place in hi-fi, to be sure. But space-age electronic wizardry should always support the prime objective of high fidelity—rich and satisfying musical reproduction. Beyond that, “computerized” hi-fi components are nothing but expensive toys.

We use a “thinking” electronic control system in the Sansui FR-Q5 turntable to improve tonearm performance. Some people would call it a kind of computer. We also use advanced electronics in the direct-drive motor to keep platter speeds as accurate as a fine quartz timepiece. But these devices are deployed not for the sake of gadgetry but to assure more faithful musical performance.

Our D-O-B Tonearm (for Dyna-Optimum-Balanced) and the second, separate motor which drives it for return and repeat, plus the many other new features of the FR-Q5, do put on quite an astonishing show. But as always, the spotlight is on music, not magic, from Sansui—where it's *all* hi-fi.



# The Sansui FR-Q5: Quartz-Servo and D-O-B Tonearm sensitivity to match its "computerized" convenience.

**Speed accuracy is NOT QUITE perfect in the new-generation Quartz-Servo system, unless you consider 99.998% close enough to pass for absolute.**

## **Silicon Dioxide (Quartz) Oscillator: A ready reference for dynamic response.**

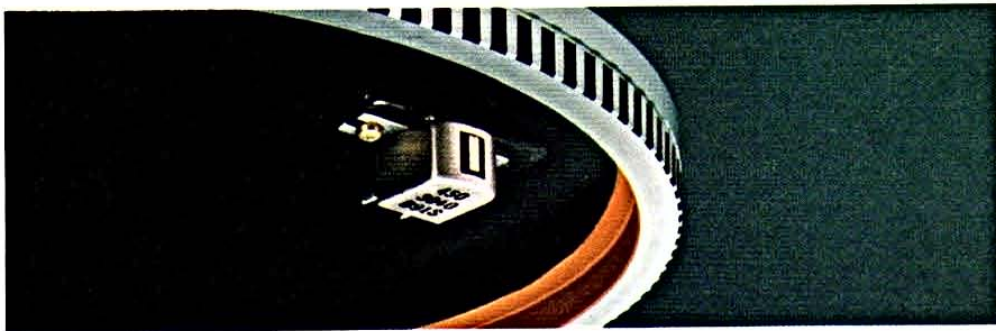
Most audiophiles are familiar with the use of reference oscillators in servosystems which help keep platter speeds accurate in direct-drive turntables. In the case of the FR-Q5 we have employed the most trustworthy of all—an energized sliver of silicon dioxide (quartz crystal) which is entirely impervious to all conceivable variables such as changes in power-line frequency and voltage and in external/internal fluctuations in temperature and humidity.

The speed of the platter is detected (see below) and compared against the quartz reference signal via a PLL (Phase-Locked Loop) circuit contained in reliable ICs; variations in load, such as the drag caused when the stylus tracks a highly-modulated groove, are instantly caught and corrected to result in outstanding dynamic response. Speed accuracy is just about as close to absolute as you can ever expect to come: drift is never more than  $\pm 0.002\%$ .

## **Magnetic-Pattern Detection: The correction is faster than the eye.**

Sansui's all-new magnetic-pattern detection system, generating as many as 960 pulses per each rotation of the platter, makes it possible to correct any speed deviation via the quartz/PLL servo in less than the blink of an eye.

Along the inside rim of the platter is a pattern of 960 magnetic poles; fixed beneath the platter is a stationary magnetic head—somewhat like the playback head on a tape deck—which senses the changing polarity of the revolving pattern and sends a "report" to the servo. If there are more (or fewer) pulses than there should be, the phase-comparison stage of the servo detects them and the controlling stage converts them to correctional information, slowing down (or speeding up) the direct-drive motor.



## **Instantaneous Rise & Electronic Brake: Absolutely no overshoot or undershoot.**

Almost before you can remove your finger from the START/STOP button—as soon as the platter completes a minute 0.375 degrees of rotation it is moving at the selected speed without *any* overshoot or undershoot! Additionally, when you change from 45 rpm to 33 $\frac{1}{3}$  rpm, or when you tell the platter

to stop, the built-in electronic brake comes into play for fast, accurate results.

## **Brushless Direct-Drive Motor: Impeccable performance from high-precision parts.**

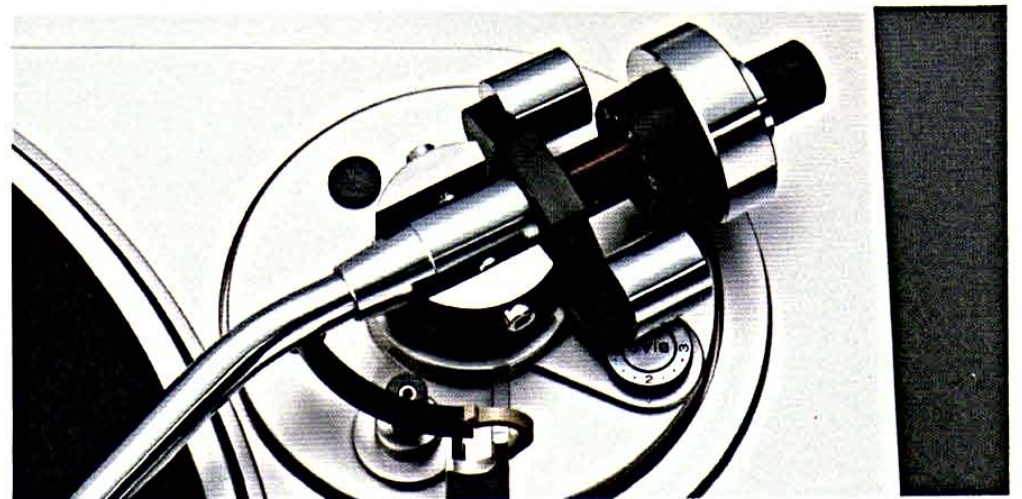
In our special design (pat. pend.) we have employed the DC brushless, saturable-core system with a rotor-position sensor. It responds quickly and accurately to the control information it receives from the quartz/PLL servo. To reduce friction and wear, the motor shaft is made of special hard stainless steel (SUJ-2) and polished to a mirror finish in a "centerless" polishing technique to achieve an overall roundness never more than  $0.2\mu$  from absolute. And for the thrust bearing, itself of a special low-wear nylon compound, we have used a newly-developed aerospace-grade lubricant.

## **Manual Operation: Just touch the tonearm.**

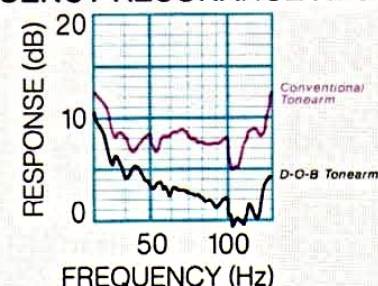
There is no switch on the Sansui FR-Q5 to defeat the full automatic operation. If you wish to use the tonearm manually, simply lift it up with the fingerpiece on the headshell; the built-in "computer" and its optical sensors will detect your touch and put the full automatic system on standby while you select another track on your record or return the arm to its rest.

## **D-O-B Tonearm: A novel theory put to practical use for purer sound.**

After many long years of experimentation and experience, Sansui has developed what just may be the world's most accurate tonearm. In our patent-pending "Dyna-Optimum-Balanced" arm the dynamic fulcrum is placed precisely on the point or node of vibration. Because of this (as explained below), the arm exhibits very high stability and its counterweight, headshell and support components show almost none of the microscopic wobbling vibrations which, in other arms, cause still more mutual resonance and pass it on to the stylus. In short, our D-O-B suffers none of the compound resonance irregularities which prevent accurate tracking and give rise to frequency modulation to "muddy" musical reproduction.



LOW-FREQUENCY RESONANCE RESPONSE





### Dynamically Ideal Design: The stylus is effectively "decoupled" from the arm.

In theory, it should be possible to create a tonearm balancing system which frees the stylus to trace the undulations in the record groove without *any* adverse inhibitions imposed by the arm. How Sansui achieved this theoretical ideal in practical terms is explained as follows:

Suppose the tonearm were a ruler, with its mass distributed uniformly throughout. Place the ruler on a flat surface, grasp it at one end (*a* in Fig. 1) and wiggle it back and forth rapidly; you should find that point *d* is "stationary." That point is called the node of movement and, if the ruler is indeed of uniform mass, the node will be exactly one-third of the way along the length of the ruler from its far end. Note that no point beyond *d* (*e*, etc.) is stationary but instead moves in proportion to its distance from *d*.

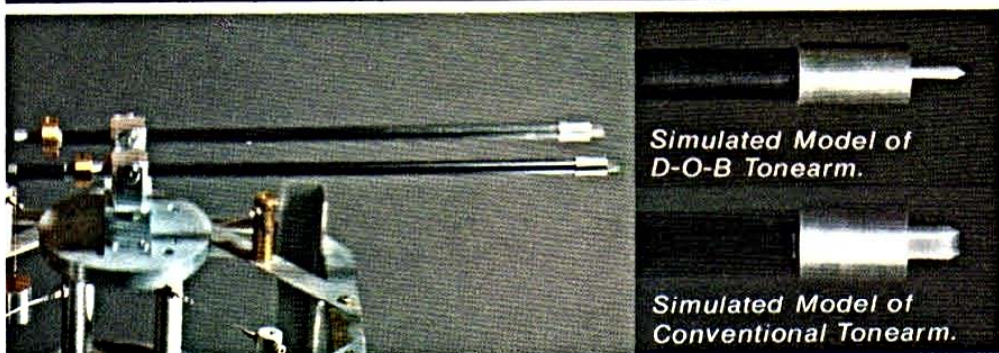
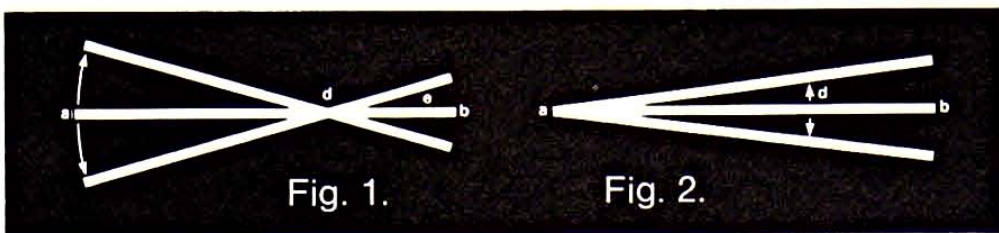
Now move your fingers to point *d* and wiggle the ruler back and forth. As seen in Fig. 2, point *a* is now the "stationary" point. In theory then, point *d* should be the point of

*dynamic balance* for the ideal tonearm, assuming that the stylus is located at point *a*. In practice, however, conventional *statically balanced* tonearms are supported with a fulcrum positioned anywhere between points *b* and *d*, in other words, at or near point *e* in Fig. 1. And as you saw earlier, point *e* moves proportionately to point *a*; if a support's fulcrum is fixed at or near that point, the free movement of the stylus at point *a* is naturally inhibited.

In the Sansui D-O-B arm we have concentrated the static mass at the tail end (around point *b*) and placed the fulcrum itself, as mentioned earlier, smack on point *d*, the node of vibration, to achieve dynamically-optimum balancing—no mean feat of engineering, we can assure you. The stylus, now "decoupled" from the arm's fulcrum, is now entirely free to trace the record groove.

### And we haven't forgotten...

- UP-FRONT CONTROLS—You may operate them with the dust cover closed.
- DAMPED TONEARM PIPE—Special acoustic absorbent (Pat. Pend.) inside the tonearm ends resonance to assure clearer reproduction.
- SOLID DIE-CAST ALUMINUM HEADSHELL—Low-porosity formation ends resonance in this lightweight precision piece.
- GOLD-PLATED CONNECTORS—Avoid corrosion.
- DIRECT-READOUT ANTI-SKATE—Prevents uneven wear and channel imbalance.
- BALANCE WEIGHT—A special rubber decoupler damps spurious vibration, preventing it from reaching your stylus.
- DIRECT-READOUT TRACKING FORCE—Easy to use dial.
- SMOOTH ARM LIFTER—Works with full-automatic system for smooth, silent, safe operation in this first-class Sansui turntable.
- SANSUI HIGH-RESOLUTION CARTRIDGE—In some areas, the Sansui FR-Q5 comes complete with a high-resolution IM (Induced Magnet) cartridge (Sansui SC-50).



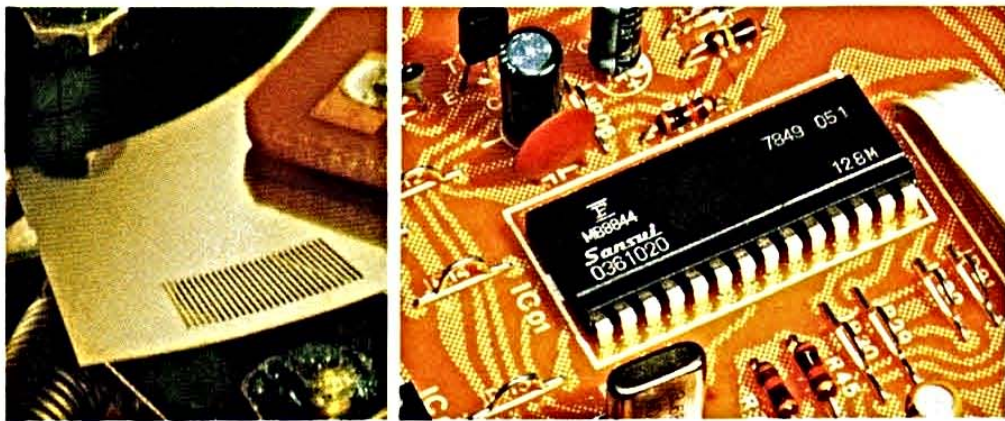
Apply vibrations to a conventional design tonearm, mounted on a base; the arm will then vibrate together with the base. But the D-O-B tonearm, subjected to the same test, does not vibrate at all.

# Fully Automatic with a "Thinking" Tonearm.

## Computerized Tonearm— A Technological First

A kind of electronic "brain," assisted by a team of optical sensors, controls the operation of the fully automatic tonearm on the Sansui FR-Q5 turntable with unprecedented accuracy. It monitors the moment-to-moment position of the arm, oversees the functions of the separate motor which lifts and returns the arm when required, and even memorizes action sequences.

Some people would call this a "computerized" system, and they wouldn't be far wrong. Actually, it makes use of a CPU (Central Processing Unit) which is contained in an LSI (Large-Scale IC). Therefore, its reliability and precision cannot be bettered.



## Quick and accurate response without compromise.

Having developed one of the world's most sensitive tonearms (see other pages) for the FR-Q5, Sansui engineers weren't about to compromise that sensitivity by using an ordinary mechanically-linked full-auto system. Thanks to the CPU "brain," the arm remains entirely free during play; when the record ends, or if you touch the START/STOP button at any time, the CPU sends a command to lift the arm and return it to its rest gently and quickly.

## Fully protected against all conceivable mishaps.

That's quite a promise—that this system is entirely accident proof. But it's true. The CPU permits the incorporation of a "fail-safe" system which gives total protection to the arm and its motor, its cartridge stylus, and your records.

If, for instance, you forget to unlock the tonearm clip before you touch the START/STOP button, the CPU instantly countermands the start order and shuts off the arm motor before damage can occur.

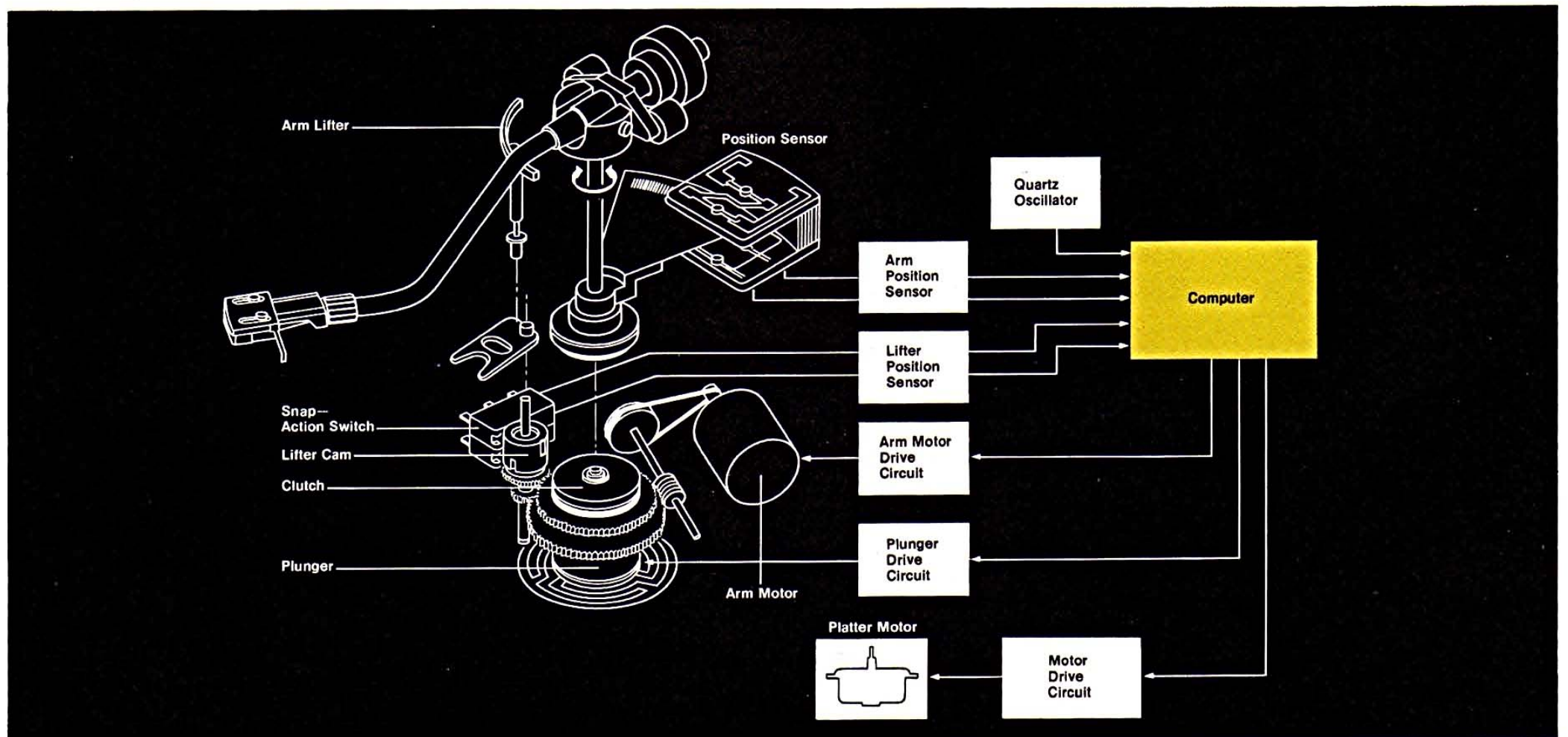
## Light-touch switches make full control easy.

All control switches on the FR-Q5 are short-stroke types requiring only the slightest finger pressure for positive operation.

After powering on the turntable, select speed and record size, place your record on the platter and touch the START/STOP button; the CPU "brain" orders the arm up and over the opening track, then lets it fall slowly to the beginning groove. When the record ends, the optical sensor for lead-out informs the "brain" which immediately orders the arm's return. The turntable is then shut off automatically, *unless* you have also pushed the REPEAT button, in which case the lead-in, play and return process will continue until you order it to stop, again with a light touch on the START/STOP button.

## The independent tonearm motor "remembers" the first note.

As we have mentioned, there is a second motor in the Sansui FR-Q5, independent from the direct-drive platter motor, used exclusively to lift, cue, and return the tonearm. Its computerized operation is controlled electronically, but it employs a mechanical damping system to ensure that the stylus is lowered to the very beginning of the lead-in groove every time when you cue a record.



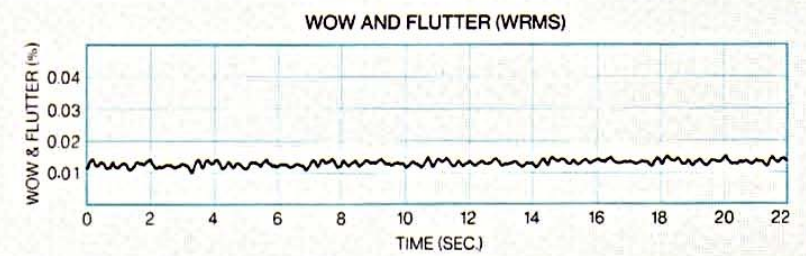
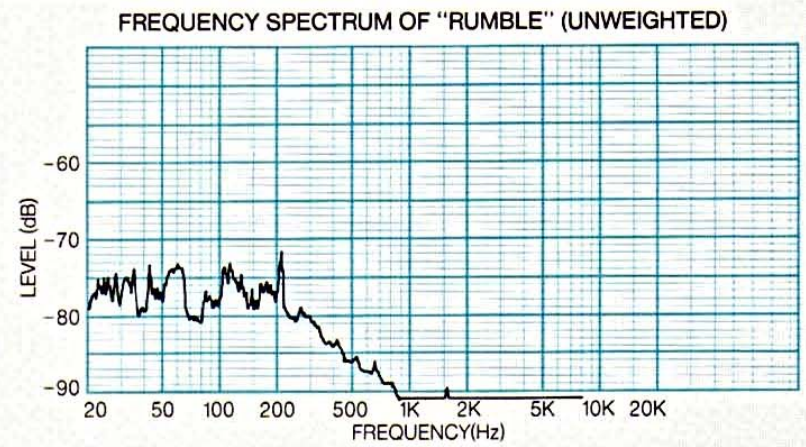
# Specifications

<b>TYPE</b>	Two-speed, computerized fully automatic quartz-servo direct drive turntable
<b>MOTOR DRIVE SYSTEM</b>	20-pole, 30-slot DC brushless Direct spindle drive electronically servo controlled
<b>PLATTER</b>	300mm (11 <sup>13</sup> / <sub>16</sub> " ) aluminum alloy die-cast, weighing 1.3kg (2.86lbs.)
<b>PERFORMANCE</b>	
WOW & FLUTTER	less than 0.018% Read out direct at the FG output.
SIGNAL TO NOISE RATIO	better than 75dB (DIN-B)
BUILD-UP TIME AND ARC ANGLE	within 1.8sec. (150°)
PLATTER SPEED DEVIATION	±0.002% (QUARTZ-SERVO ON)
TEMPERATURE COEFFICIENT	less than 0.00003%/°C (QUARTZ-SERVO ON)
LOAD CHARACTERISTICS	0% (QUARTZ-SERVO ON)
<b>PLATTER SPEEDS</b>	33 <sup>1</sup> / <sub>3</sub> , 45 rpm
<b>TONARM</b>	Statically-balanced S-shaped D-O-B tonearm with two point pivot support
LENGTH	220mm (8 <sup>11</sup> / <sub>16</sub> " ) pivot to stylus
OVERHANG	17.5mm (3/4" )
OFFSET ANGLE	24.5°
MINIMUM TRACKING FORCE SETTING	0.5g (when using cartridge guaranteed to operate at 0.5g stylus pressure)
<b>ACCEPTABLE CARTRIDGE WEIGHT</b>	4 to 10g
<b>CABINETRY</b>	Slim-line cabinet with anti-howling insulators and hinged free-stop dust cover
<b>CARTRIDGE</b>	SC-50
TYPE	IM Type
FREQUENCY RESPONSE	10 to 20,000Hz
OUTPUT VOLTAGE	3mV per channel (1,000Hz, 35.4mm/sec.)
OPTIMUM LOAD	47k ohms
TRACKING FORCE	2.5 ±0.4g
STYLUS	0.6 mil diamond spherical (SN-50)

No Sansui cartridge is provided on FR-Q5 models sold in the U.S.A., Canada  
Cartridge supplied along with the turntable varies depending on sales area.

<b>POWER REQUIREMENTS</b>	100, 120, 220, 240V 50/60Hz U.S.A. and Canada models: 120V 60Hz European and UK models: 220, 240V 50Hz Australian models: 240V 50Hz
<b>POWER CONSUMPTION</b>	less than 10 watts
<b>DIMENSIONS</b>	440mm (17 <sup>5</sup> / <sub>16</sub> " )W 133mm (5 <sup>1</sup> / <sub>4</sub> " )H 385mm (15 <sup>3</sup> / <sub>16</sub> " )D
<b>WEIGHT</b>	6.9kg (15.1lbs.) Net 8.1kg (17.9lbs.) Packed

Design and specifications subject to change without notice for improvements.



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